

CENOZOIC MURICIDAE OF THE WESTERN ATLANTIC REGION  
PART XI – THE SUBFAMILY ERGALATAXINAEEMILY H. VOKES  
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## I. ABSTRACT

The muricid subfamily Ergalataxinae has only recently been recognized to comprise a small number of primarily Indo-Pacific genera and species, which have been placed in a variety of subfamilies over the years. In the western Atlantic the group is poorly represented with but six species in all. One, assigned to the genus *Cytharomorula*, is a relatively deep-water form known only from the Recent fauna. Three species are assigned to the genus *Trachypollia*. Of these, one occurs in the Oak Grove Sand, the Shoal River Formation, and (?) the Gatun Formation; one is from the Cercado, (?) Caloosahatchee, Bowden, Moín, and Bermont formations and the Recent fauna; and one is found only in the Recent fauna. Two species are assigned to the genus *Lindapterys*, one from the Miocene Chipola Formation and one from the Pleistocene Moín Formation and the Recent fauna.

## II. INTRODUCTION

In studying the gastropod family Muricidae, once one leaves the well-defined subfamilial groups of Muricinae, Muricopsinae, and Typhinae, suprageneric

assignments become not a little complicated. There is still no clear consensus as to which genera should be assigned to the Ocenebrinae, the Trophoninae, or the Rapaninae (= Thaidinae of authors). In addition to these long accepted groups, we must add another more recently proposed subfamily, which is the least well-defined of the entire family Muricidae. Although most subfamilial taxa have been recognized since the turn of the Century (primarily Cossmann, 1903), this subfamily was only delineated in 1971 by Kuroda, Habe, and Oyama.

The members of the subfamily Ergalataxinae are, for the most part, non-variccate muricids, and are probably the most misunderstood species in the entire family. As a measure of just how misunderstood this collection of species actually is, they were originally named in at least 48 different genera, including the types of nine new genera. The genera in which the various species were described include not only *Murex*, *Ocenebra*, *Urosalpinx*, and *Trophon*, but also *Drupa* (including the synonyms *Ricinula*, *Pentadactylus*, and *Sistrum*), *Purpura*, *Triton* [= *Cymatium*], *Buccinum*, *Cantharus*, *Nassarina*, *Fusus*, *Peristerina*, and *Latirus* to mention but a few.

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The group is primarily Indo-Pacific in distribution but there are New World species and this paper is an attempt to bring together the few representatives of the subfamily in the western Atlantic. Two of the genera in the Western Hemisphere have a respectable fossil record, stretching back to the Early Miocene but, on the whole, the group is poorly represented in both the fossil and Recent faunas of the western Atlantic.

Characters that unite members of this subfamily include a radula that is muricine in appearance but with a strongly recurved rachidian plate much like that of the Muricopsinae. The operculum is half-way between that of the typical Muricinae, with a basal nucleus, and the purpuroid type, with a lateral nucleus, found in the Ocenebrinae and Rapaninae (= Thaidinae). This operculum with a sub-basal nucleus is the same type found in the Trophoninae, which is why many of the species were originally described as "*Trophon*."

In general, members of this group tend to have a large, open aperture, usually denticulate on the outer lip and frequently on the inner lip. In most, the siphonal canal is short, often the spire is half the shell length. And, most importantly, as noted above, the shells are non-varicate or, if they do have varices, these tend to be irregular in appearance, often just the apertural lip is thickened in the adult stage.

### III. ACKNOWLEDGMENTS

My heartfelt gratitude is expressed to the staff of several institutions for the material utilized in this study. The Natural History Museum [formerly the British Museum (Natural History)], Recent Mollusca Section (Kathie Way, especially), kindly permitted me to search their collections seeking members of this misunderstood group, and to photograph those that were located, as did the Institut Royal des Sciences Naturelles de Belgique. The United States National Museum of Natural History (M.G. Harasewych, Raye N. Germon, Thomas R. Waller, Warren C. Blow) kindly lent specimens for study, as did the Academy of Natural Sciences of Philadelphia (Gary Rosenberg, David G.

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### ABBREVIATIONS FOR REPOSITORY INSTITUTIONS

- BMNH – Museum of Natural History  
[British Museum (Natural History)],  
London, England  
HMNS – Houston Museum of Natural  
Science, Houston, TX  
IRSNB – Institut Royal des Sciences  
Naturelles de Belgique, Bruxelles,  
Belgium  
MCZ – Museum of Comparative Zoology,  
Harvard University, Cambridge, MA  
NMB – Naturhistorisches Museum, Basel,  
Switzerland  
TU – Tulane University, New Orleans, LA  
UF – Florida Museum of Natural History,  
Gainesville, FL  
USNM – United States National Museum  
of Natural History, Washington, DC

### IV. SYSTEMATIC PALEONTOLOGY

Family MURICIDAE Rafinesque, 1815  
Subfamily ERGALATAXINAE  
Kuroda, Habe, and Oyama, 1971

Genus CYTHAROMORULA Kuroda, 1953  
*Cytharomorula* KURODA, 1953, Venus, v. 17, p.  
183.

Type species: *Cytharomorula vexillum*  
Kuroda, 1953, by monotypy.



## CYTHAROMORULA GRAYI (Dall)

Plate 1, figures 1-7

- Nassarina (Nassarina) grayi* DALL, 1889, Harvard Mus. Comp. Zool., Bull., v. 18, p. 183, pl. 32, fig. 12a.
- Cantharus (Tritonidea) laevis* E.A. SMITH, 1890, Zool. Soc. London, Proc., 1890, pt. 2, p. 261, pl. 21, fig. 11.
- Trophon lowei* WATSON, 1897, Jour. Linn. Soc., v. 26, p. 244, pl. 19, fig. 12.
- "*Nassarina*" *grayi* Dall. WOODRING, 1928, Carnegie Inst. Washington, Publ. 385, p. 269.
- Evokesia grayi* (Dall). RADWIN and D'ATTILIO, 1972, Biol. Soc. Washington, Proc., v. 85, no. 28, p. 336; RADWIN and D'ATTILIO, 1976, Murex Shells of the World, p. 143, pl. 23, fig. 4 (USNM 94778a); KAICHER, 1979, Card Cat. World-Wide Shells, pack no. 20 (Muricidae-Part 4), no. 1977.
- Urosalpinx lowei* (Watson). NORDSIECK, 1975, La Conchiglie, An. 7, nos. 75-76, p. 5, fig. 22.
- Nassarina grayi* Dall. NORDSIECK, 1975, La Conchiglie, An. 7, nos. 75-76, p. 5, fig. 25.
- Orania grayi* (Dall). BOUCHET and WARÉN, 1985, Boll. Malac., Suppl. 1, p. 150, figs. 344 (radula), 356.
- Cytharomorula grayi* (Dall). HOUART, 1991, Nautilus, v. 105, no. 1, p. 33; HOUART and ABREU, 1994, Apex, v. 9, no. 4, p. 122, figs. 5 (holotype-*Trophon lowei* Watson), 6; HOUART, 1995, Bull. Mus. Natl. Nat. Hist., Paris, (Ser. 4) v. 16 (1994), Sect. A, nos. 2-4, p. 254, figs. 9, 10 (radula), 67, 68.
- Cytharomorula* sp. cf. *C. grayi* (Dall). TRONDLE and HOUART, 1992, Apex, v. 7, nos. 3-4, p. 89, fig. 48.
- Cytharomorula gravi* [sic] (Dall). RIOS, 1994, Seashells of Brazil, ed. 2, p. 114, pl. 37, fig. 480.
- Cytharomorula* [sic] *grayi* (Dall). COLTRO, 1995, La Conchiglia, An. 27, no. 275, p. 49, color fig. 3.

*Description*: "Shell solid, strong, yellowish white with darker brown spiral lines and about six whorls. Nucleus smooth brown; sculpture of numerous close-set spiral threads, of which about every third or fourth is stronger and darker colored than the others; transverse sculpture of stout ribs becoming obsolete behind the periphery, thus giving the whorl a shouldered aspect, there are nine or ten of these on the last whorl, extending well forward; the rib

behind the aperture is varicoid and swollen; the spiral sculpture passes over the ribs, which are a little angulate at the periphery; the whorl is appressed to the suture, which in the upper whorls is more or less waved by the ends of the ribs behind it; the aperture is long, narrow, and somewhat contracted, the continuous margin less elevated than in the preceding species [*Nassarina columbellata* Dall]; the base of the last whorl is somewhat constricted, the canal is twisted, recurved, and with a strong siphonal fasciole; the outer lip has about seven teeth of which the hinder ones are the stronger; there is a rounded callus on the body and also a few denticulations on the anterior part of the columella." (Dall, 1889, p. 183)

*Lectotype*: MCZ 7256; height 12.0 mm, diameter 5.8 mm (*vide* Dall, 1889, p. 183; not found, 1993) (here designated).

*Type locality*: Blake Station 290, off Barbados in 73 fathoms [133.5 meters] (here designated).

*Occurrence*: Recent only, Canary Islands, Madeira, St. Helena, and Lesser Antilles to southern Brazil. Also Indian Ocean, French Polynesia, and New Caledonia (Trondle and Houart, 1992, p. 88; Houart, 1995, p. 254).

*Figured specimens*: Fig. 1, USNM 869667; height 17.0 mm, diameter 8.8 mm; locality, Las Palmas, Canary Islands, dredged in 120-200 meters. Fig. 2, USNM 94778a (paralectotype); height 15.3 mm, diameter 7.6 mm; locality, Blake Station 290, off Barbados. Fig. 3, USNM 94778b (paralectotype); height 11.8 mm, diameter 6.0 mm; locality, Blake Station 290, off Barbados. Fig. 4, BMNH 89.10.1 [holotype-*Cantharus (Tritonidea) laevis* E.A. Smith]; height 22.3 mm, diameter 10.0 mm; locality, St. Helena. Fig. 5, Dautzenberg Collection (IRSNB); height 20.4 mm, diameter 10.1 mm; locality, St. Helena. Fig. 6, BMNH 1911.7.17.2 [holotype-*Trophon lowei* Watson]; height 19.2 mm, diameter 9.8 mm; locality, Madeira, 50 fathoms [91 meters]. Fig. 7, BMNH; height 18.8 mm, diameter 10.3 mm; locality, Porto Santo, Madeira, 60 fathoms [110 meters].

*Discussion*: It is interesting that this moderately deep-water species should have received three names in the short period from 1889 to 1897. It also is characteristic of the entire subfamily that the three species should have been named in three different genera, as this has been the fate of most of the species now referred to the Ergalataxinae. Like most of the



species in the subfamily, *C. grayi* is extremely variable; in general, becoming more elongate with increasing size (e.g., pl. 1, fig. 4). There are usually reddish-brown spiral lines topping the spiral cords, and often a broad reddish band anterior to the shoulder. Some specimens develop small nodules at the intersection of the axial and spiral ornamentation (e.g., pl. 1, fig. 1).

The type lot consists of six specimens taken by the *Blake*, of which two are at the U.S. National Museum of Natural History (USNM 94778, both from Station 290; figured here pl. 1, figs. 2, 3), and four are at the Harvard Museum of Comparative Zoology. Dall's figured specimen is MCZ 7256; however, the specimen in the box with that label is not *C. grayi* but another species (as noted by Trondle and Houart, 1992, p. 89). This is not the only muricid type specimen that is missing in the MCZ collections, as has been previously discussed (see Vokes, 1992, p. 50). It is apparent that at some time between 1945, when Clench and Pérez Farfante studied the Muricidae of the western Atlantic, and about 1970, when Radwin and D'Attilio (1976, p. 31) attempted to study the holotype of *Murex carnicolor*, someone engaged in nefarious activity, removing the type specimens of at least two species (*Murex carnicolor* Clench and Pérez Farfante and *Nassarina grayi* Dall). These specimens have not been simply mislaid, for in each

case a specimen of a different species with the same approximate dimensions has been substituted in the box. This suggests deliberate larceny. Certainly a dedicated search through the entire muricid collection in 1993 did not locate these missing types.

This poses a dilemma, for Dall did not designate a type specimen for *Nassarina grayi*. He cited the measurements of the figured example, but then added "a larger but imperfect specimen is 15.5 mm long" (Dall, 1889, p. 183). This is the specimen here figured in pl. 1, fig. 2, which is from *Blake* Station 290, as is also indicated on the label for the supposed "type" at MCZ. Nevertheless, in the perhaps misguided hope that the figured specimen will someday be found, I am designating that specimen as the lectotype. The original illustration (Dall, 1889, pl. 32, fig. 12b) is excellent and there is no question as to the identity of the species. In the MCZ collections there are also three other examples (MCZ 7258, from Station 152; MCZ 7259, from Station 272; and MCZ 7257, no station number). Of the six specimens in the type lot, five are from off Barbados, in 73, 76, and 100 fathoms [= 133, 139, 183 meters] and MCZ 7258 is from St. Kitts, in 127 fathoms [232 meters].

*Trophon lowei* and *Cantharus laevis* were described from Madeira and St. Helena, respectively, and the species is

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PLATE 1

Figures	Page
1-7. <i>Cythraromorula grayi</i> (Dall) . . . . .	29
1. (X 3) USNM 869667; height 17.0 mm, diameter 8.8 mm. Locality: Las Palmas, Canary Islands, dredged in 120-200 meters; Recent.	
2. (X 3) USNM 94778a (paralectotype); height 15.3 mm, diameter 7.6 mm. Locality: <i>Blake</i> Station 290, off Barbados; Recent.	
3. (X 4) USNM 94778b (paralectotype); height 11.8 mm, diameter 6.0 mm. Locality: <i>Blake</i> Station 290, off Barbados; Recent.	
4. (X 2.5) BMNH 89.10.1 [holotype – <i>Cantharus (Tritonidea) laevis</i> E.A. Smith]; height 22.3 mm, diameter 10.0 mm. Locality: St. Helena; Recent.	
5. (X 2.5) Dautzenberg Collection (IRSNB); height 20.4 mm, diameter 10.1 mm. Locality: St. Helena; Recent.	
6. (X 3) BMNH 1911.7.17.2 [holotype – <i>Trophon lowei</i> Watson]; height 19.2 mm, diameter 9.8 mm. Locality: Madeira, 50 fathoms [91 meters]; Recent.	
7. (X 3) BMNH; height 18.8 mm, diameter 10.3 mm. Locality: Porto Santo, Madeira, 60 fathoms [110 meters]; Recent.	



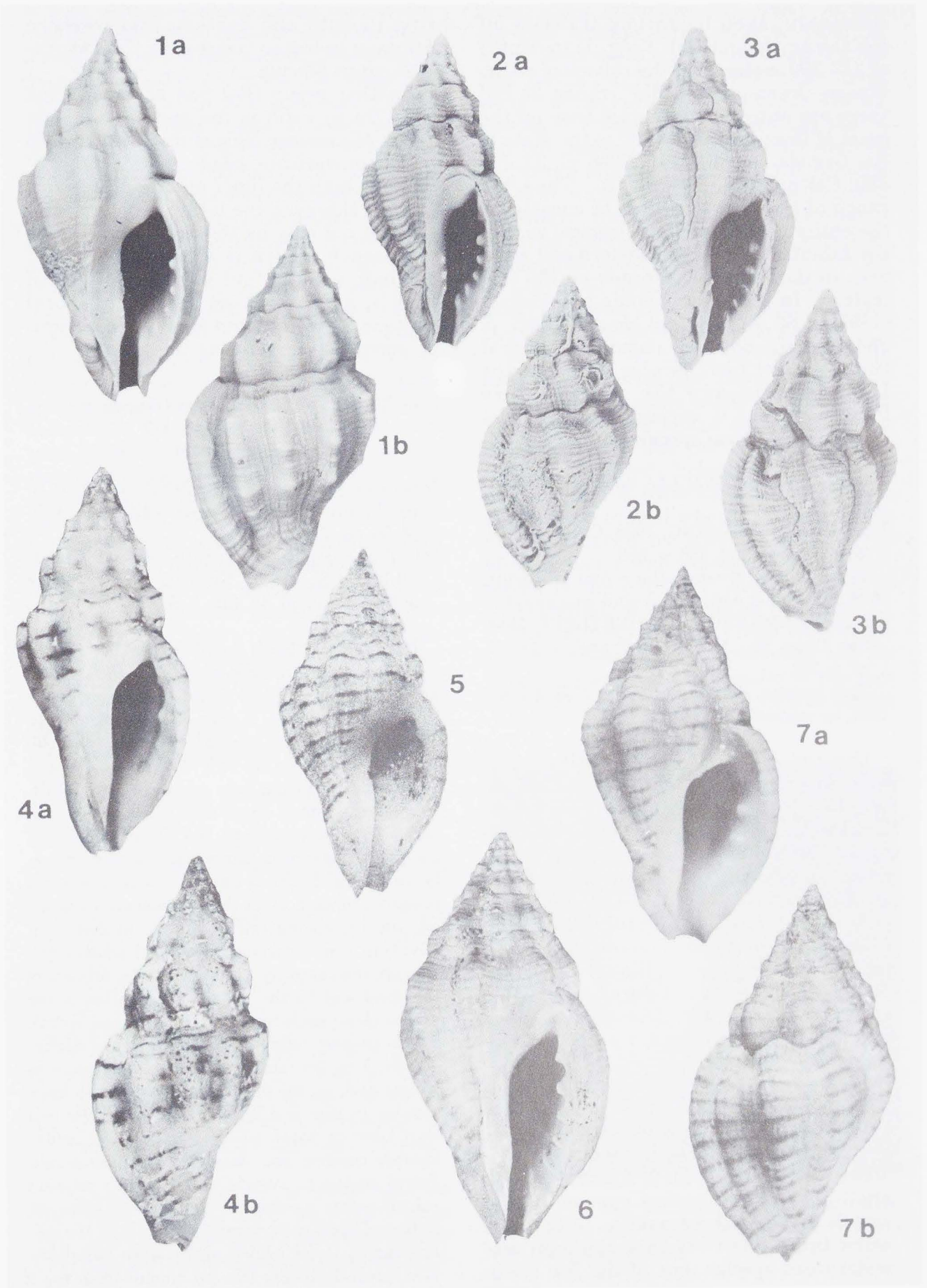


PLATE 1



commonly taken by shrimp trawlers off the Canary Islands (pl. 1, fig. 1) in depths of 120-200 meters. In the collection of the Museu Oceanográfico Rio Grande do Sul there are numerous examples from off the coast of Brazil, as far south as the state of Rio Grande do Sul (Rios, 1994, pl. 37, fig. 480; Coltro, 1995, color fig. 3). Thus, the range of the species seems to encompass the entire tropical and sub-tropical zone of the Atlantic Ocean, both eastern and western, in depths on the order of 100-200 meters. In addition, Trondle and Houart (1992, p. 88, fig. 48) and Houart (1995, p. 254, figs. 67, 68) have demonstrated that the identical form is also living in the Indian Ocean and the southwestern Pacific Ocean. It appears that this is a world-wide tropical species.

Genus TRACHYPOLLIA Woodring, 1928

*Trachypollia* WOODRING, 1928, Carnegie Inst. Washington, Publ. 385, p. 268.

Type species: *Trachypollia sclera* Woodring, 1928, by original designation (and monotypy).

*Morunella* EMERSON and HERTLEIN, 1964, San Diego Soc. Nat. Hist., Trans., v. 13, no. 17, p. 361.

Type species: *Buccinum lugubre* C.B. Adams, 1852, by original designation.

*Discussion:* Radwin and D'Attilio (1972, p. 328) were the first to recognize the muricid affiliation of the genus *Trachypollia*, which Woodring had considered to be "close to *Pollia* Sowerby," a buccinid. In addition to *T. sclera* they included *Buccinum lugubre* C.B. Adams, 1852, *Drupa didyma* Schwengel, 1943, and *Purpura nodulosa* C.B. Adams, 1845. All four species have a papillose multiwhorl protoconch (see text-figures 1-5) and a radula that is similar to both the ergalataxine genus *Orania* and the rapanine genus *Morula*.

Initially, I followed these authors in assigning "*Purpura*" *nodulosa* Adams to *Trachypollia* (Vokes, 1983, p. 50, fig. 5; Vokes and Vokes, 1983, p. 23, pl. 13, fig. 1; Vokes, 1984, p. 214, pl. 2, figs. 26, 27) but shell characters in this species do not match those of *Trachypollia*. Additional work indicates that this common and widespread species (one of the few occur-

ring in both the eastern and western Atlantic) is better referred to the rapanine genus *Morula*.

Another group that has been confused with *Trachypollia* is the muricopsine subgenus *Muricopsis* (*Risomurex*), which also has a non-variccate, beaded shell, and denticles on both the inner and outer apertural lips. However, the latter may be distinguished not only by the radula but by the protoconch, which is always of one and one-half, usually (but not always) keeled whorls, and by having the fourth labral denticle (counting from anterior to posterior) somewhat larger than the others.

TRACHYPOLLIA TRACHEA (Gardner)

Plate 3, figures 1-3

Text-figure 1

*Nassarina trachea* GARDNER, 1944, U.S. Geol. Survey, Prof. Paper 142-G, p. 465, pl. 50, fig. 21.

[?] *Trachypollia aneureta* WOODRING, 1964, U.S. Geol. Survey, Prof. Paper 306-C, p. 258, pl. 42, figs. 8, 9.

*Description:* "Shell small but rather heavy, fusiform. Aperture approximately half the total height. Whorls closely coiled, increasing regularly in diameter, feebly convex; the body smoothly but rather abruptly constricted at the base, conch including only 4 3/4 turns in the type but containing 5 in a less perfect adult. Protoconch rather small and slender, smooth, polished, conic in outline, the initial turn worn away but apparently minute and almost entirely submerged, the 3 extant nuclear whorls broadly rounded, all of them moderately elevated, and increasing rather rapidly in diameter. Dividing line between conch and protoconch sharply indicated by a change in the texture of the shell and by the abrupt assumption of the postnuclear sculpture, both axial and spiral. Axials broadly inflated, usually 8 on the earlier whorls, 7 on the later, persisting from suture to suture and, on the body, well down to the base, regular in size and spacing except on the last half turn in some adults. Interaxial areas sharply concave and narrower than the axials. Spiral sculpture overriding the axial; primary spirals rather narrow but prominently elevated, flattened upon their summits, 3 on both the earlier and the later whorls of the spire, the posterior spiral decidedly less prominent than the 2



in front of it, the anterior a little more prominent than the medial, thus lending to the whorl a somewhat trapezoidal outline. Primaries on the body and pillar 7 or 8, the 2 or 3 that gird the medial portion the most prominent; a single sharp, narrow, finely beaded secondary usually introduced between each pair of primaries, except on the medial portion of the body, where the secondary may be simple or where exceedingly fine tertiaries may be developed on either side of the primary. Incremental sculpture sufficiently strong to roughen the flattened interspiral channels and, on the base of the body and the pillar, roughening even the primaries themselves. Whorls closely appressed; the sutures distinct, undulated by the costae of the preceding whorl, in most individuals following a fourth primary on the later whorls and in some falling in front of it. Aperture lobate, obtusely angulated at the posterior commissure. Outer lip symmetrically arched between the commissure and the canal, finely crenate at the margin in harmony with the external sculpture, the inner surface reinforced with 4 or 5 elongated denticles, the medial the most prominent. Curvature at the base of the body rather strong. Parietal wall and pillar smoothly glazed, the pillar denticulate in the adult. Columella simple. Anterior canal not very long, the margins parallel and slightly recurved. Anterior fasciole sharply differentiated, incrementally striated, obscurely lirate, strongly arched, and obliquely emarginate at its extremity." (Gardner, 1944, p. 465)

*Holotype*: USNM 371810; height 8.3 mm, diameter 4.1 mm.

*Type locality*: USGS 4742, Shoal River Formation; Shell Bluff, Walton County, Florida (= TU 69)

*Occurrence*: Oak Grove Sand, Shoal River Formation, Florida; (?)Gatun Formation, Panama.

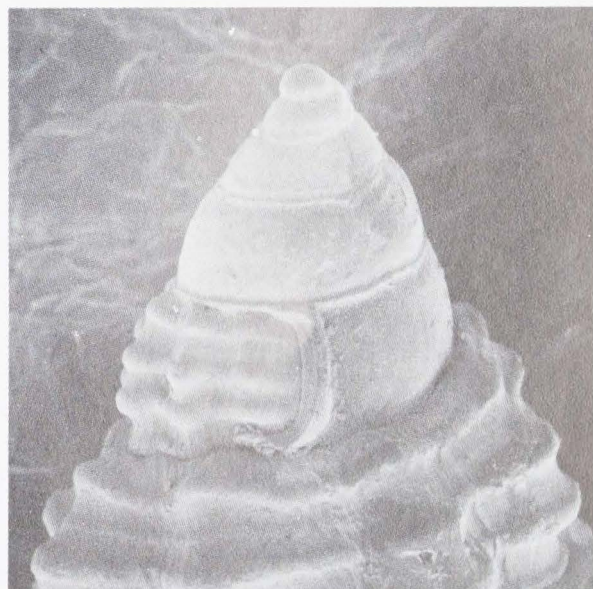
*Figured specimens*: Fig. 1, UF 68774; height 9.0 mm, diameter 4.1 mm; locality UF-WL004, Shoal River (NW 1/4 Sec. 4, T3N, R21W), about 3 1/2 miles north of Mossyhead, Walton Co., Florida (? = TU 69A). Fig. 2, UF 66106; height 8.8 mm, diameter 4.5 mm; locality UF-WL004. Fig. 3, UF 68775; height 8.3 mm, diameter 3.8 mm; locality TU 91. Other occurrence: TU 69A.

*Discussion*: In the Tulane collections we have long had four small specimens from the late Early Miocene Oak Grove Sand (TU 91), and two from the Middle Miocene

Shoal River Formation (TU 69A). It was not until another, larger example from the Shoal River was collected by Roger Portell and Kevin Schindler (1993) that these were recognized as the oldest known species of *Trachypollia*. I assumed that it was an undescribed taxon until Andrew and Greta Murray suggested that it might be that named as *Nassarina trachea* Gardner. Comparison with Gardner's material showed that her holotype has an incomplete aperture, lacking the characteristic anal notch, as well as the labial denticles. But there is no doubt that our specimens are the same as her species.

We have never taken any examples in the Chipola Formation; clearly the species lived in very shallow, sandy environments. This is reflected in the fact that in our material none has the protoconch preserved. Gardner's holotype has the remnants of a *Trachypollia* protoconch with about three conical whorls, and one specimen collected by Andrew and Greta Murray has a well-preserved protoconch, which is the papillose, multiwhorl type characteristic of *Trachypollia* (text-fig. 1).

The immediately obvious difference between these Miocene specimens and the younger species of *Trachypolla* is the lack of the elaborate surface ornamentation.



Text-figure 1. *Trachypollia trachea* (Gardner); UF 68899; locality UF-WL004 (? = TU 69A) (X 40).



These shells have simple spiral cords that are not beaded except on the secondary spiral threads. However, this may be ecologically determined, as specimens from the Oak Grove Sand are more scabrous than those from Shoal River. There is a fair degree of difference in the amount of elongation of the shell between specimens of this species. As may be seen in the three examples figured here, figures 1 and 3 represent slender specimens, with a height:width ratio of 2.2:1, but figure 2 has a ratio of 2.0:1. This same variation is present in other members of *Trachypollia* (see below) and perhaps there is some sexual dimorphism in this genus, we do not know.

From the Gatun Formation of Panama, Woodring (1964, p. 258, pl. 42, figs. 8, 9) has named another small specimen (height 7.2 mm) of *Trachypollia* as *T. aneureta*. On the basis of the single incomplete holotype specimen (USNM 643651) there is no way to differentiate this species from *T. trachea*. The type of *T. aneureta* has only six axial ribs, in contrast to seven in specimens of *T. trachea*, but this does not seem to be of specific importance.

#### TRACHYPOLLIA SCLERA Woodring

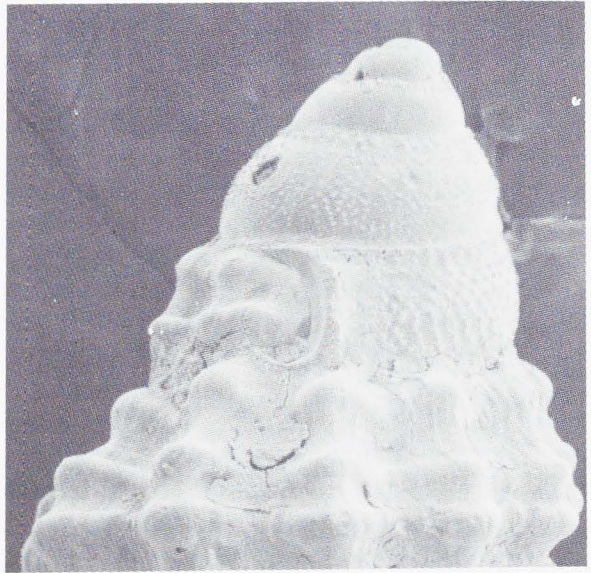
##### Plate 2, figures 1-3

##### Text-figures 2, 3

*Trachypollia sclera* WOODRING, 1928, Carnegie Inst. Washington, Publ. 385, p. 269, pl. 16, figs. 7, 8; RADWIN and D'ATTILIO, 1972, Biol. Soc. Washington, Proc., v. 85, no. 28, p. 328, fig. 1-B; RADWIN and D'ATTILIO, 1976, Murex Shells of the World, p. 134; VOKES, 1983, Texas Conchologist, v. 19, no. 3, p. 50, fig. 1; VOKES, 1984, Shells and Sea Life, v. 16, no. 11, p. 214, pl. 2, fig. 24; PETUCH, 1994, Atlas Florida Fossil Shells, p. 132, pl. 45, fig. L [not in text].

[?] *Trachypollia didyma* (Schwengel). DE JONG and COOMANS, 1988, Stud. Fauna Curaçao, Caribbean Islands, v. 69, no. 214, p. 75, pl. 16, fig. 409 (protoconch) [? not of Schwengel].

*Description*: "Shell small, moderately slender, pillar short. Nucleus stout, consisting of about three smooth whorls rapidly enlarging in diameter. Aperture rather wide, contracted to form a short, wide, oblique, recurved, moderately emarginate canal. Siphonal fasciole broad,



Text-figure 2. *Trachypollia sclera* Woodring; UF 68900; locality TU 1240, Moín Formation (X 40).

moderately inflated. Between it and edge of inner lip lies a narrow umbilical groove. Edge of inner lip standing out from pillar on adult shells. Inner lip bearing near base of columella two or three crude low denticles and also a short low parietal ridge. Interior of outer lip bearing five elongate denticles, the posteriormost one and the parietal ridge forming a posterior channel. Sculpture consisting of swollen axial ribs and of crude beaded spiral threads." (Woodring, 1928, p. 268 – description of *Trachypollia*, new genus)

"Shape, nucleus, and aperture as described above. Sculpture consisting of broad axial ribs overridden by spiral threads. Primary spirals crude, greatly swollen on summits of ribs. In each interspace on later whorls lies a fine secondary spiral." (Woodring, 1928, p. 269)

*Holotype*: USNM 135520; height 8.2 mm, diameter 3.8 mm.

*Type locality*: Bowden Formation, Bowden, Jamaica (= TU 705).

*Occurrence*: Cercado Formation, Dominican Republic; Bowden Formation, Jamaica; Moín Formation, Jamaica; (?) Caloosahatchee (*vide* Petuch, 1994, p. 132) and Bermont formations, Florida; Recent, Texas to Costa Rica and (?) northern South America.

*Figured specimens*: Fig. 1, USNM 869666; height 16.3 mm, diameter 8.0 mm; locality, off Freeport, Texas, 46 meters. Fig. 2, Landau Collection; height 11.2 mm, diameter 5.5 mm,





Text-figure 3. *Trachypollia sclera* Woodring; HMNS 39136; locality Northwest Gulf Survey Station 1375, 54.5 miles [87.8 km] southeast of Freeport, Texas, 27 fms. [49 meters] (X 40).

locality NMB 16982, Río Cana, Dominican Republic. Fig. 3, UF 68773; height 12.2 mm, diameter 6.0 mm; locality, Capeletti Pit, Dade County, Florida. Other occurrence: TU locality 1240.

*Discussion:* The holotype of this species is a small specimen from the Bowden Formation of Jamaica but Radwin and D'Attilio (1972) were able to recognize it as being in the same genus as *Buccinum lugubre* C.B. Adams, from the eastern Pacific, and *Drupa didyma* Schwengel, described from the east coast of Florida. After they figured these shells, along with drawings of the radula and protoconch, I was able to identify specimens collected at Moín, Costa Rica, as being living representatives of *T. sclera*.

In the collections of the Houston Museum of Natural Science there are numerous specimens taken off the Texas coast (see Vokes, 1983), which probably are responsible for both Abbott's (1974, p. 177) and Radwin and D'Attilio's (1976, p. 135) records of "*T. didyma*" from off the Texas coast. In addition, in my collection there is material from off the Dominican Republic and off the Dry Tortugas, Florida.

These Recent occurrences are duplicated in the fossil record with a single specimen taken in the Cercado Formation, Dominican Republic (pl. 2, fig. 2) and another collected by Edward J. Petuch in the Bermont Formation, Florida (pl. 2, fig. 3). In addition, Petuch (1994, pl. 45, fig. L) has figured a second specimen, also from the Capeletti pit, Bermont Formation. In the plate explanation for this specimen he notes that the species also occurs in the Caloosahatchee Formation, but I have not seen any specimens. In the Tulane collections from the Moín Formation, Costa Rica (TU 1240), we have several juvenile examples (text-figure 2).

When Schwengel described *Drupa didyma*, she stated that "the name, from the Greek, means a twin, in allusion to its resemblance to the West Coast *Drupa lugubris* (C.B. Adams)" (Schwengel, 1943, p. 76), but it is *T. sclera*, if anything, that is the "twin" to the Pacific species. The irregular ornamentation of *T. lugubris* (pl. 2, fig. 4) is more like that seen in *T. sclera* than the "beaded" appearance of *T. didyma* and the protoconch also is more like that of *T. sclera* (compare text-figs. 3 and 4).

#### TRACHYPOLLIA DIDYMA (Schwengel)

Plate 2, figures 5-8

Text-figure 5

- Drupa didyma* SCHWENGEL, 1943, Nautilus, v. 56, no. 3, p. 76, pl. 7, fig. 7; NOWELL-USTICKE, 1959, Check List Mar. Shells St. Croix, p. 63, pl. 3, fig. 14.
- Morula (Morunella) didyma* (Schwengel). EMERSON and HERTLEIN, 1964, San Diego Soc. Nat. Hist., Trans., v. 13, no. 17, p. 361.
- Morula didyma* (Schwengel). RIOS, 1970, Coastal Brazilian Seashells, p. 81 [in part, dimensions refer to specimen figured in Rios, 1975, which is *T. turricula* (von Maltzan)].
- Trachypollia didyma* (Schwengel). RADWIN and D'ATTILIO, 1972, Biol. Soc. Washington, Proc., v. 85, no. 28, p. 330, figs. 1-J (shell), 7 (protoconch), 8 (radula), 9 (operculum); RADWIN and D'ATTILIO, 1976, Murex Shells of the World, p. 134, pl. 3, fig. 8; KAICHER, 1980, Card Cat. World-wide Shells, pack no. 25 (Muricidae—Part 5), no. 2526; VOKES, 1983, Texas Conchologist, v. 19, no. 3, p. 50, fig. 2; ESPINOSA and ROLAN, [?] 1995, Soc. Española Malac., Res. Malac. IX, p. 31.



[?] Not *Drupa* cf. *didyma* Schwengel. GIBSON SMITH and GIBSON SMITH, 1972, IV Caribbean Geol. Conf., Mem., p. 474 [? = *Muricopsis* (*Risomurex*) *withrowi* Vokes and Houart].

*Morula* (*Trachypollia*) *didyma* (Schwengel). ABBOTT, 1974, Amer. Seashells, ed. 2, p. 177 [in part, not fig. 1873, = *Muricopsis* (*Risomurex*) *withrowi* Vokes and Houart]; RIOS, 1975, Brazilian Marine Moll. Icon., p. 92 [in part, not pl. 26, fig. 380, = *T. turricula* (von Maltzan)]; RIOS, 1985, Seashells of Brazil, p. 92 [in part, not pl. 32, fig. 400, = *T. turricula*].

[?] Not *Trachypollia didyma* (Schwengel). DE JONG and COOMANS, 1988, Stud. Fauna Curaçao, Caribbean Islands, v. 69, no. 214, p. 75, pl. 16, fig. 409 (protoconch) [? = *T. sclera* Woodring].

*Trachypollia turricula* (von Maltzan). HOUART, 1991, Nautilus, v. 105, no. 1, p. 33 [in part, not of von Maltzan]; RIOS, 1994, Seashells of Brazil, ed. 2, p. 113 [in part, not all localities], pl. 37, fig. 475 [not of von Maltzan].

*Morula turricula* (von Maltzan). SUNDER-

LAND and SUNDERLAND, 1993, Amer. Conchologist, v. 21, no. 4, p. 15 [not of von Maltzan].

*Description*: "This small shell, of 8 1/2 rounded whorls, with well defined sutures, has a comparatively large nucleus of 3 1/2 whorls, the earlier ones glossy with fine granules along the suture, the last one covered by fine rounded papillae and terminated by a narrow, elevated, curved varix, of a light brown color. The fourth whorl begins abruptly with two spiral cords, which form nodules where the axial ribs cross. The fifth, sixth and seventh whorls have three nodular spirals, and the body, or eighth whorl, has seven of these noduled spirals. Over the larger sculpture run evenly spaced spiral granular threads, two and sometimes three between each noduled spiral. The color varies from apricot-buff to cinnamon-rufous, with the nodules a carob-brown. Aperture bluish-white within, about 2/5 the length of the shell, raquet-shaped, slightly flaring outer lip with five or six lirae, the upper three or four heavy and the two lower much fainter. The shallow anal notch is accentuated by the first lira and a tubercle on the

## PLATE 2

Figures	Page
1-3. <i>Trachypollia sclera</i> Woodring . . . . .	34
1. (X 3.5) USNM 869666; height 16.3 mm, diameter 8.0 mm. Locality: off Freeport, Texas, 46 meters; Recent.	
2. (X 4) Landau Collection; height 11.2 mm, diameter 5.5 mm. Locality: NMB 16982, Río Cana, Dominican Republic; Cercado Formation.	
3. (X 4) UF 68773; height 12.2 mm, diameter 6.0 mm. Locality: Capeletti Pit, Dade County, Florida; Bermont Formation.	
4. <i>Trachypollia lugubris</i> (C.B. Adams) . . . . .	35
(X 4) USNM 869662; height 11.5 mm, diameter 5.5 mm. Locality: Panama Bay, Panama; Recent.	
5-8. <i>Trachypollia didyma</i> (Schwengel) . . . . .	35
5. (X 4) ANSP 178763 (lectotype); height 9.5 mm, diameter 4.8 mm. Locality: off Palm Beach, Florida, 200 feet [61 meters]; Recent.	
6. (X 4) USNM 869663; height 12.3 mm, diameter 5.9 mm. Locality: off Palm Beach, Florida, 30-45 meters; Recent.	
7. (X 4) USNM 869664; height 13.3 mm, diameter 7.5 mm. Locality: off Buzios Island, Sao Paulo, Brazil, on rubble at 40 meters depth; Recent.	
8. (X 4) USNM 869665; height 13.5 mm, diameter 7.2 mm. Locality: off Palm Beach, Florida, from reef in 52 meters; Recent.	
9, 10. <i>Trachypollia turricula</i> (von Maltzan) . . . . .	39
9. (X 4) USNM 859068; height 11.0 mm, diameter 4.6 mm. Locality: Corimba, Luana, Angola; Recent.	
10. (X 4) Berlin Museum 37205 (lectotype); height 12.5 mm, diameter 5.4 mm. Locality: Ile de Gorée, Senegal; Recent.	



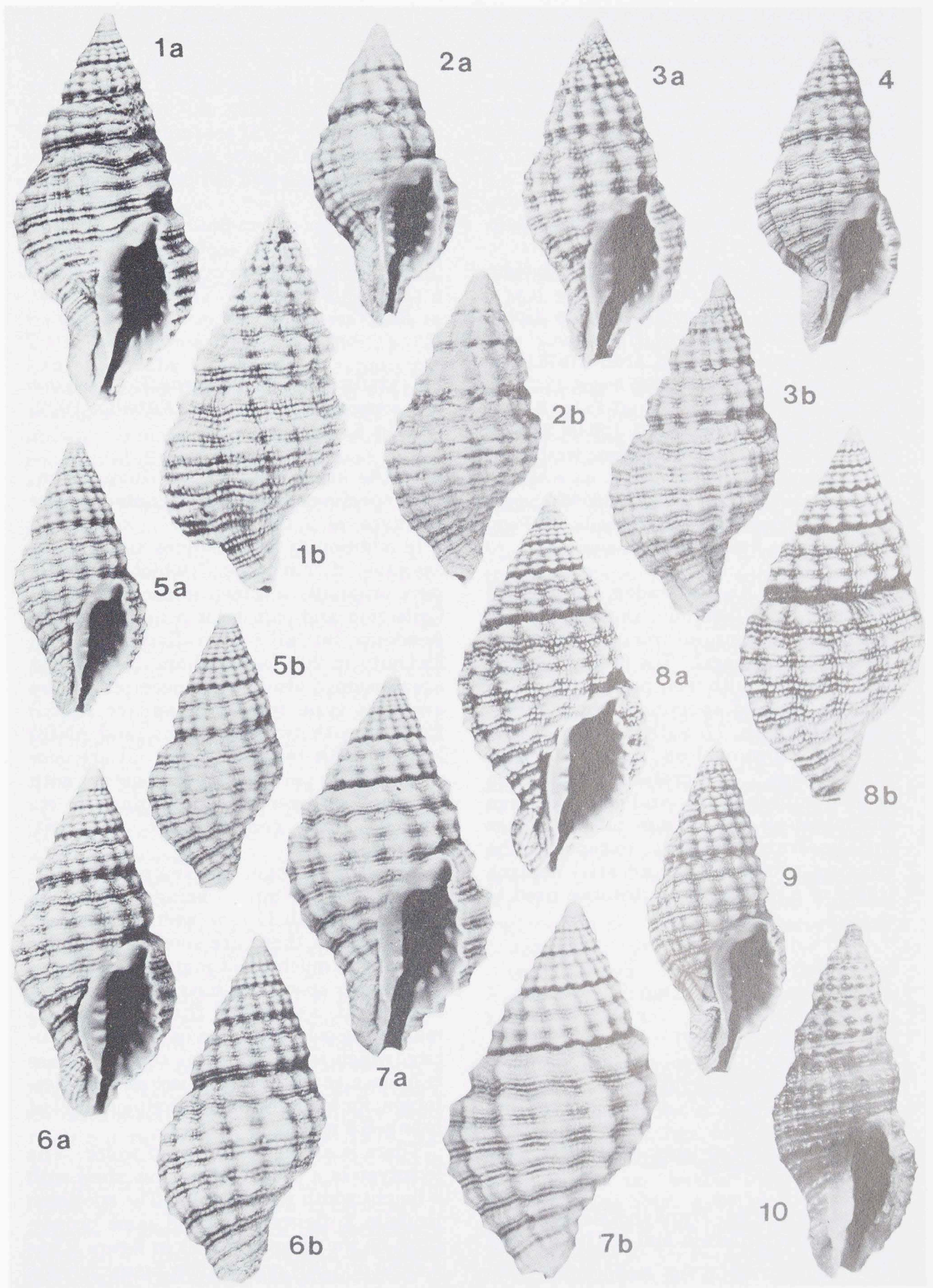


PLATE 2



heavy callus at the upper end of the parietal wall. The sigmoid columella and parietal wall are covered by a heavy reflected callus, which becomes free and erect toward the base, leaving a shallow slit or crevice in the umbilical region, and forming the outer wall of the short, deep, recurved anterior canal." (Schwengel, 1943, p. 76)

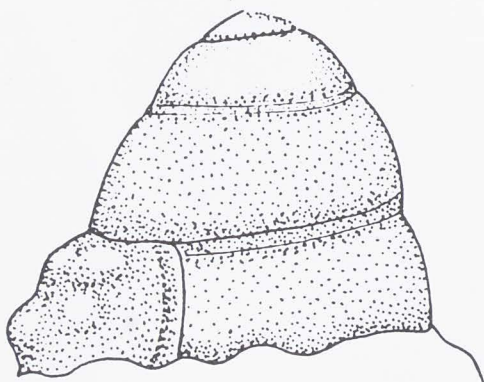
*Lectotype*: ANSP 178763; height 9.5 mm (protoconch broken), diameter 4.8 mm (here designated).

*Type locality*: off Palm Beach, Florida, dredged in 200 feet [61 meters].

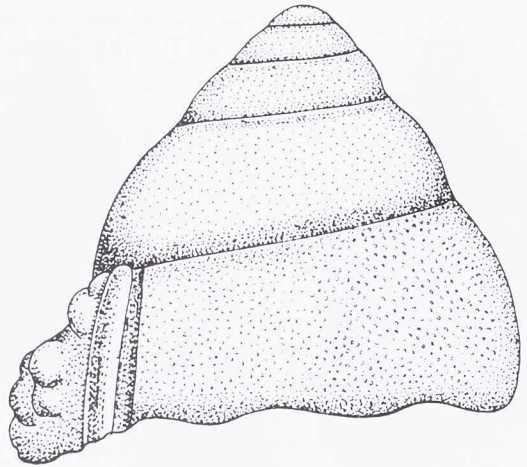
*Occurrence*: Recent only, Florida, Cuba, Lesser Antilles to Brazil and [?] Curaçao.

*Figured specimens*: Fig. 5, ANSP 178763 (lectotype). Fig. 6, USNM 869663; height 12.3 mm, diameter 5.9 mm; locality, off Palm Beach, Florida, 30-45 meters. Fig. 7, USNM 869664; height 13.3 mm, diameter 7.5 mm; locality, off Buzios Island, Sao Paulo, Brazil, on rubble at 40 meters depth. Fig. 8, USNM 869665; height 13.5 mm, diameter 7.2 mm; locality, off Palm Beach, Florida, from reef in 52 meters.

*Discussion*: At the Academy of Natural Sciences of Philadelphia there are three lots of this species, all from the collection of Jeanne Schwengel. The first of these is ANSP 178763, with five specimens, including the figured specimen (Schwengel, 1943, pl. 7, fig. 7), with measurements cited by Schwengel as "Length 10 mm, width 5 mm." The protoconch has been broken subsequently and the specimen now measures only 9.5 mm, but it matches the illustration exactly (except for the missing protoconch) and still retains traces of a sticky blue substance used to



Text-figure 4. *Trachypollia lugubris* (C.B. Adams); Radwin and D'Attilio, 1972, text-fig. 4.



Text-figure 5. *Trachypollia didyma* (Schwengel); Radwin and D'Attilio, 1972, text-fig. 7.

hold the shell in place for illustration. This specimen is here designated as the lectotype (pl. 2, fig. 5).

In addition to this lot there are two others labeled "paratypes," which probably were originally retained in the Schwengel Collection and only later acquired by the Academy, but all were collected by Tom McGinty in 200 feet off Palm Beach, and are presumed also to have been part of the original type lot. These are ANSP 220237, with two specimens, and ANSP 235139, with two specimens; all are considered to be paralectotypes, together with the four specimens in the original lot no. 178763, now renumbered as ANSP 398719.

These Schwengel specimens are relatively small, the largest being that one she cited as "Length 11 mm, width 6 mm." In my collection there are several examples that are as much as 14 mm long. Many of the smaller specimens have complete apertures and, assuming that the animal makes the columellar lip only upon maturity (which is by no means certain), there is quite a range of adult size; one paralectotype, for example, has a complete lip but is only 8.8 mm long.

There is also a fair range of width. The lectotype is a relatively narrow shell with a height:width ratio of 2.1:1. The specimen in plate 2, figure 6 has the same proportions as the lectotype; that in figure 8 has a ratio of 1.9:1, and that in figure 7 has a



ratio of 1.8:1. Based on measurement of 30 specimens with complete apertural lips, the species varies from 1.8:1 to 2.1:1, averaging about 2.0:1, with no evident geographic control. In general, it seems that in mature examples (*i.e.*, with complete apertural lips) the smaller examples are more narrow and the larger specimens are less narrow.

At the narrow end of the range *T. didyma* meets the range of specimens of the West African *T. turricula* (von Maltzan, 1884) (pl. 2, figs. 9, 10), which has a height:width ratio ranging from 2.2:1 to 2.4:1. For this reason Houart (1991, p. 33) has placed the two forms in synonymy; however, to me the two completely disjunct averages (2.3 for *T. turricula* and 2.0 for *T. didyma*) indicates that the two should be considered distinct, although closely related, forms.

The widespread occurrences of this species (North Carolina to Venezuela, Brazil from Amapá to Espírito Santo, and off-shore islands) cited by Rios (1970, 1975, 1985, 1994) are complicated by the fact that the species which occurs on the off-shore islands is *T. turricula*, and it is this form that Rios figured in his early works (1975, 1985). However, after Houart (1991, p. 33) stated that the Brazilian species is *T. turricula* and placed *T. didyma* in synonymy, Rios (1994) changed his citation to *T. turricula*. But his illustrated specimen (1994, pl. 37, fig. 475) is *T. didyma* and not *T. turricula*, which is always a more narrow shell (compare pl. 2, figs. 5-10). Along the coast of Sao Paulo, Brazil, in collections made by the Coltro brothers, the form is *T. didyma* (see pl. 2, fig. 7). Therefore, all that can be said at this time is that *T. didyma* apparently occurs along the coast of Brazil, and *T. turricula* occurs on the offshore islands.

De Jong and Coomans (1988) cite *T. didyma* from Curaçao but illustrate only a beautiful SEM picture of the protoconch. Unfortunately, they did not figure their shell but referred to Abbott's (1974, fig. 1873) figure of *Muricopsis withrowi* and to the illustration given in Nowell-Usticke (1959, pl. 3, fig. 14), which is certainly *T. didyma*. However, I have not seen specimens of *T. didyma* from the southern Caribbean. Although the protoconchs of

all the species of *Trachypollia* are essentially the same, that of *T. sclera* is slightly more narrow than that of *T. didyma* (compare text-figures 3 and 5), and the illustration given by de Jong and Coomans seems to match *T. sclera* better than *T. didyma*. It is probable that the species they had is not *T. didyma* but *T. sclera*.

#### Genus LINDAPTERYS Petuch, 1987

*Lindapterys* PETUCH, 1987, New Caribbean Moll. Faunas, p. 97.

Type species: *Lindapterys vokesae* Petuch, 1987, by original designation.

*Discussion:* When I originally discussed the generic assignment for an enigmatic shell occurring in the late Early Miocene Chipola Formation of Florida, which I felt to be the same as that one named "*Ranella*" *poppelacki* Hörnes, 1853, from the "Lethyakalk" (middle Miocene) of the Vienna Basin (Vokes, 1974, p. 96), I noted the resemblance to other equally enigmatic species, including the Recent Australian *Daphnellopsis murex* Hedley, 1922, and two French fossil species: *Ranella alata* Millet, 1854, and *Argobuccinum boutillieri* Cossmann, 1889. But, beyond that, I could offer no suggestion for generic placement.

Since that time, we have recognized that *Daphnellopsis*, along with *Phyllocoma* and other two-varixed muricids, properly belongs to the Ergalataxinae. But "*Ranella*" *poppelacki* did not fit into any of the previously known genera. This was resolved by the description of *Lindapterys*, for the Florida and Austrian species, together with a living Caribbean relative, *L. sanderi* Petuch, 1987.

In a subsequent study of the genus *Lindapterys*, both fossil and living, Lozouet *et al.* have determined that the Australian *murex* Hedley is a species of *Lindapterys* (Lozouet *et al.*, 1994, p. 44, pl. 2, figs. 4-6; text-figs. 2C, 2D) and the Late Miocene *alata* Millet is also a *Lindapterys* (*ibid.*, p. 42, pl. 1, figs. 11-16; text-figs. 1C, 1D) but the Middle Eocene *boutillieri* Cossmann is better referred to *Daphnellopsis* (*ibid.*, p. 47, pl. 2, figs. 8, 9). They also figure the holotype of *L. poppelacki* (*ibid.*, p. 42, pl. 1, figs. 9, 10) and two specimens of a form from the



Aquitanian (early Early Miocene) of France, which they identify as *L. cf. poppelacki* (*ibid.*, p. 41, pl. 1, figs. 4-8, text-fig. 1A).

Based upon their studies it seems that there are three similar but possibly distinct fossil species (not including *L. alata*, readily distinguished by its cancellate sculpture), which are all in the same lineage as *L. sanderi*. These are:

- 1) Aquitanian (France) – *L. cf. poppelacki*, with multiwhorl (3+ whorls) protoconch, 18-20 axial ribs on body whorl, and a patulous labrum with four denticles;
- 2) Burdigalian (Florida) – *L. vokesae*, with unknown protoconch (presumed by Lozouet *et al.* to be of the multiwhorl planktotrophic type), about 12 axial ribs on body whorl, and a narrow labrum with five denticles;
- 3) Badian (Austria) – *L. poppelacki*, protoconch probably multiwhorl (according to Lozouet *et al.*), about 14 axial ribs on body whorl, patulous labrum with five denticles.

The Recent *L. sanderi*, with about 14 axial ribs on the body whorl and a patulous labrum with five denticles, is scarcely distinguishable from the Austrian *L. poppelacki*; however, it has a paucispiral protoconch. As Lozouet *et al.* note, because of the small number of specimens of all of the forms involved, it is preferable not to

introduce another name for the Aquitanian form. However, the latter also has a patulous aperture similar to that of *L. poppelacki* and *L. sanderi*, indicating that the living Caribbean species may, in fact, be a descendant of the European side of the line and not the Chipola species.

The only other living species is the western Pacific (Coral Sea) *L. murex*, which has a more cancellate shell ornamentation and elongate outline similar to that of the French *L. alata*, and it is probable that these two represent a species lineage separate from the type species.

#### LINDAPTERYS VOKESAE Petuch

##### Plate 3, figure 4

- “*Ranella*” *poppelacki* Hörnes. VOKES, 1974, Tulane Stud. Geol. Paleont., v. 11, no. 2, p. 96, text-figure 1 (not of Hörnes).  
*Lindapterys vokesae* PETUCH, 1987, New Caribbean Moll. Faunas, p. 98, pl. 15, figs. 10, 11 (after Vokes); LOZOUET *et al.*, 1994, Geobios, no. 27, pt. 1, p. 44, pl. 1, figs. 1-3 (holotype); text-fig. 1B (protoconch).

*Description:* Dorso-ventrally flattened shell with five teleoconch whorls; protoconch unknown, broken and plugged in unique specimen. Axial ornamentation on early teleoconch whorls of 12-14 rounded ribs; on later whorls a flange-like varix developed at random intervals; three on the penultimate whorl, two on the body whorl. Number of intervarical ribs also ran-

### PLATE 3

Figures	Page
1-3. <i>Trachypollia trachea</i> (Gardner) . . . . .	32
1. (X 6) UF 68774; height 9.0 mm, diameter 4.1 mm. Locality: UF-WL004, Shoal River, Florida; Shoal River Formation.	
2. (X 6) UF 66106; height 8.8 mm, diameter 4.5 mm. Locality: UF-WL004, Shoal River, Florida; Shoal River Formation.	
3. (X 6) UF 68775; height 8.3 mm, diameter 3.8 mm. Locality: TU 91, Yellow River, Florida; Oak Grove Sand.	
4. <i>Lindapterys vokesae</i> Petuch . . . . .	40
(X 5) USNM 647012 (holotype); height 11.7 mm, diameter 5.8 mm. Locality: TU 951, Tenmile Creek, Florida; Chipola Formation.	
5, 6. <i>Lindapterys sanderi</i> Petuch . . . . .	42
5. (X 5) Landau Collection; height 14.5 mm, diameter 6.2 mm. Locality: TU 1240, Limon, Costa Rica; Moín Formation.	
6. (X 5) USNM 859838 (holotype); height 11.6 mm, diameter 6.0 mm. Locality: Off St. James, Barbados, in 300 meters; Recent.	



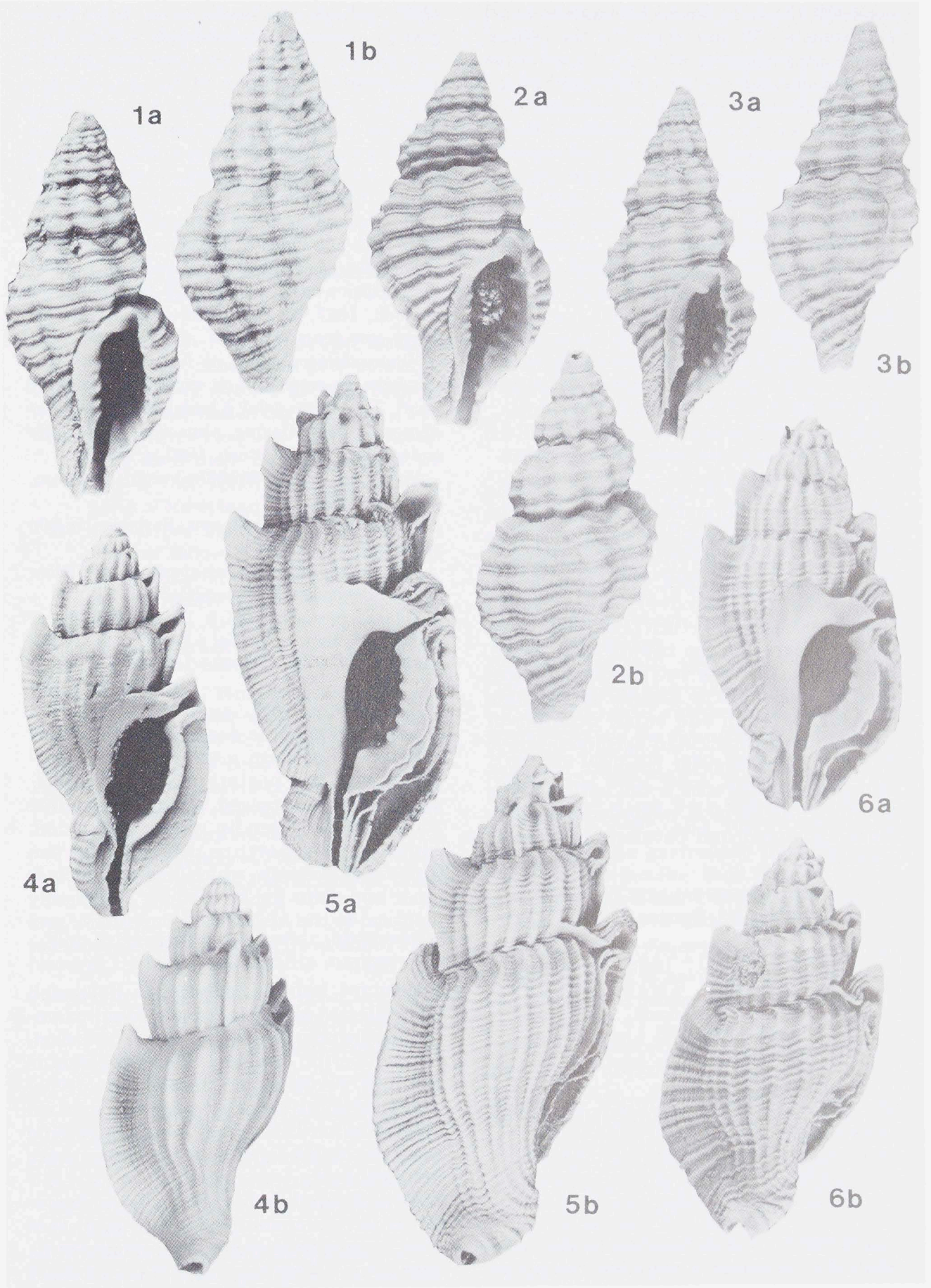


PLATE 3



dom, but the total for each complete whorl approximately 12, interrupted by the varices. Varices wing-like, with an anal channel at the shoulder, opening into the aperture in the manner of *Pterochelus*. Spiral ornamentation of numerous fine threads, with occasional weaker threads intercalated. Suture deeply impressed. Aperture oval, inner lip with a smooth, narrow callus, appressed at posterior end, slightly free-standing at posterior end. Outer lip narrow, with five small denticles on inner side. Siphonal canal short, open, distally recurved.

*Holotype*: USNM 647012; height 11.7 mm, diameter 5.8 mm.

*Type locality*: TU 951, Chipola Formation; Ten Mile Creek; south bank, about one and one-quarter miles west of Chipola River (SE 1/4 Sec. 12, T1N, R10W), Calhoun County, Florida.

*Occurrence*: Chipola Formation, Florida.

*Figured specimen*: USNM 647012 (holotype).

*Discussion*: In 1974 I identified a single specimen (which remains unique until today) from the Chipola Formation as the Vienna Basin species "*Ranella*" *poppelacki* Hörnes, 1853 (see Vokes, 1974, text-figs. 1, 2). With the discovery of a living Caribbean species, Petuch (1987) felt justified in separating the two Miocene forms. Comparison of these two species indicates that *L. poppelacki* is slightly larger than *L. vokesae* with the same number of whorls (both illustrated specimens have five teleoconch whorls); however, the most conspicuous difference is the nature of the aperture, which in *L. poppelacki* is much more expanded and patulous than in *L. vokesae*.

LINDAPTERYS SANDERI Petuch  
Plate 3, figures 5, 6

*Lindapterys sanderi* PETUCH, 1987, New Caribbean Moll. Faunas, p. 98, pl. 15, figs. 5, 6; PETUCH, 1988, Neogene Hist. Trop. Amer. Moll., pl. 38, figs. 13, 14 [not in text]; LOZOUET *et al.*, 1994, Geobios, no. 27, pt. 1, p. 46, pl. 2, figs. 1-3 (holotype); text-figs. 2A, 2B (protoconch).

*Lindapterys rosaliae* NASCIMENTO DE BARROS, 1990, Siratus, Year 1, no. 2, p. 12 (English), 13 (Portuguese), text-figs. 1, 2; LOZOUET *et al.*, 1994, Geobios, no. 27, pt. 1, p. 46, pl. 2, fig. 7 (holotype).

*Description*: "Shells small for family, dorso-ventrally flattened; 2 winglike varices per

whorl, with varices aligned up the spire; varices pointed, distinctly channeled; last varix with channel connected to aperture as anal channel; numerous thin, sharp axial ribs between varices, running from suture to siphonal canal; siphonal canal short, open; columellar region with large, adherent parietal shield; outer edge of lip flaring, extending beyond varix; parietal shield and flaring lip producing peristome; inner edge with several denticles; shell sculptured with numerous raised spiral threads; protoconch tiny, similar to genus *Pterochelus*; first postnuclear whorls with several cord-like ribs." (Petuch, 1987, p. 97 – description of *Lindapterys*, new genus)

"General morphology as for genus; 6 axial ribs between varices [6 on ventral side of body whorl, 7 on dorsal side]; 5 labial denticles; outer edge of lip very flaring, almost obscuring the underlying varix." (Petuch, 1987, p. 98)

*Holotype*: USNM 859838; height 11.5 mm, diameter 6.0 mm.

*Type locality*: Off St. James, Barbados, in 300 meters.

*Occurrence*: Moín Formation, Costa Rica; Recent, Barbados to Pernambuco, Brazil.

*Figured specimen*: Fig. 5, Landau Collection; height 14.5 mm, diameter 6.2 mm; locality TU 1240. Fig. 6, USNM 859838 (holotype).

*Discussion*: In *L. sanderi*, as Petuch notes in the generic description, the inner and outer lips form a trumpet-like peristome, with the posterior end of the columellar lip appressed to the columellar wall, and the outer lip greatly expanded. This type of aperture differs from the Chipola *L. vokesae*, which has a narrower inner and outer lip; however, it is virtually identical to the Austrian *L. poppelacki* and the French *L. cf. poppelacki* (see Lozouet *et al.*, 1994).

Bernard Landau, Albufeira, Portugal, has collected the first known fossil example of *L. sanderi* from the Moín Formation, Costa Rica (pl. 3, fig. 5). This specimen is one-half whorl larger than the holotype, and has eight axial ribs on the ventral side, nine on the dorsal side, suggesting that the number of ribs increases with increasing size.

This is further borne out by a larger Brazilian specimen (height 18 mm) that Nascimento de Barros (1990) named as *L. rosaliae*. This specimen has one more



whorl than the holotype of *L. sanderi* with eight axial ribs between varices on the body whorl, but six on the penultimate, comparable to *L. sanderi*. Although Lozouet *et al.* hesitated to place *L. rosali-mae* in the synonymy of *L. sanderi*, as they had not been able to study the unique holotype, I feel no such reluctance.

#### V. LOCALITY DATA

The following are Tulane University fossil locality numbers:

- 69. Shoal River Formation, type locality, Shell Bluff, Shoal River (NW 1/4 Sec. 4, T3N, R21W), about 3 1/2 miles north of Mossyhead, Walton Co., Florida.
- 69A. Shoal River Fm., first ravine upstream from Shell Bluff, Shoal River (NW 1/4 Sec. 4, T3N, R21W), about 3 1/2 miles north of Mossyhead, Walton Co., Florida.
- 91. Oak Grove Sand, type locality, west bank of Yellow River, about 100 yards below bridge at Oak Grove (NE 1/4 Sec. 20, T5N, R23W), Okaloosa Co., Florida.
- 705. Bowden Fm., type locality, Bowden, east of Port Morant, Parish of St. Thomas, Jamaica.
- 951. Chipola Fm., Tenmile Creek, about one and one-quarter miles west of Chipola River (SE 1/4 Sec. 12, T1N, R10W), Calhoun Co., Florida.
- 1240. Moín Fm., Barrio Los Corales, top of hill at end of road that passes Standard Fruit Company box factory, 1.8 km north of main highway at Pueblo Nuevo, which is 2 km west of Puerto Limon, Costa Rica.

The following is a Florida Museum of Natural History fossil locality number:

- UF-WL004. Shoal River Fm., Shoal River (NW 1/4 Sec. 4, T3N, R21W), about 3 1/2 miles north of Mossyhead, Walton Co., Florida (? = TU 69A).

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