

Turridae (Mollusca: Gastropoda) of southern Africa and Mozambique. Part 3. Subfamily Borsoniinae

by

R. N. Kilburn

(Natal Museum, Pietermaritzburg)

ABSTRACT

Eleven genera of Borsoniinae occur in southern Africa and Mozambique. Of these, one genus (*Tropidoturris*, type-species *Pleurotoma scitecostata* Sowerby, 1903) is new; another (*Mitrellatoma* Powell, 1942) is the first non-fossil record, and *Maorimorpha* Powell, 1939, is recorded outside New Zealand for the first time. *Maoritomella* Powell, 1942, and *Pulsarella* Laseron, 1954, are treated as full genera. *Helenella* Casey, 1904, *Apaturris* Iredale, 1917, and *Cymakra* Gardner, 1937, are synonyms of *Mitrolumna* Bucquoy, Dautzenberg & Dollfus, 1883, which is regarded as a subgenus of *Mitromorpha* Carpenter, 1865.

45 species are reported; of these, 24 species and two subspecies are new, viz. *Bathytoma* (*Parabathytoma*) *prodicia*, *B.* (*Micantapex*) *ar Buckleyi*; *Tropidoturris* *anaglypta*, *T. fossata notialis*, *T. planilirata*, *T. simplicicingula pondo*; *Tomopleura* *oscitans*; *Maoritomella* *tarrhion*, *M. granilirata*, *M. clupeispina*, *M. densecostulata*, *M. megalacme*, *M. leptopleura*; *Microdrillia* *dinos*; *Mitrellatoma* *mitra*; *Mitromorpha* (*Mitrolumna*) *kennellyi*, *M. (M.) chelonion*, *M. (M.) brevispira*, *M. (M.) iridescens*, *M. (M.) rotundicostata*, *M. (M.) tenuilirata*, *M. (M.) nodilirata*, *M. (M.) ustulata*, *M. (M.) maraisi*, *M. (M.) amphibolos*, *M. (M.) platacme*.

New combinations: *Cominella?* *sulcata* Sowerby, 1892, is a *Maorimorpha*; *Pleurotoma fultoni* Sowerby, 1888, and *Oligotoma clevei* Jousseume, 1883, belong to *Pulsarella* Laseron, 1954; *Bela eva* Thiele, 1925, and *Drillia pleonastica* Barnard, 1958, are *Maoritomella*; *Acrobela acus* Barnard, 1958, belongs to genus *Teretia* Norman, 1888 (subfamily Raphitomiinae); *Mitromorpha veneris* Barnard, 1964, belongs to *Charitodoron* Tomlin, 1932 (family Mitridae).

New records: *Tomopleura nivea* (Philippi, 1851), *Microdrillia patricia* (Melvill, 1904), *M. circumvertens* (Melvill & Standen, 1901).

New synonyms: *Surcula opulenta* Thiele, 1925 = *Tropidoturris scitecostata* (Sowerby, 1903); *Columbella* (*Seminella*) *stepheni* Melvill & Standen, 1897, and *C. dibolos* Barnard, 1964 = *Anarithma metula* (Hinds, 1843).

Neotype designated: *Pleurotoma nivea* Philippi, 1851.

Lectotypes designated and figured: *Oligotoma bellardii*, *O. clevei* and *O. makimonos* Jousseume, 1883, *Pleurotoma belaeformis*, *P. scitecostata* and *P. fossata* Sowerby, 1903, *P. vertebrata* E. A. Smith, 1875, *P. violacea* Hinds, 1843, non Adams & Mighels, 1841 [= *P. reevii* C. B. Adams, 1850] and *P. retusispirata* E. A. Smith, 1877. Holotypes figured: *Clavatula metula* Hinds, 1843, *Drillia simplicicingula* and *D. pleonastica* Barnard, 1958, *Bathytoma regnans* Melvill, 1918, *Mitromorpha* [? = *Liratilia*] *veneris* Barnard, 1964. Syntype figured: *Columbella* (*Seminella*) *stepheni* Melvill & Standen, 1897.

Radulae of *Tomopleura nivea*, *Pulsarella fultoni*, *Bathytoma helenae* Kilburn, 1974, *Tropidoturris fossata notialis*, *T. scitecostata* (Sowerby, 1903) and *T. simplicicingula* (Barnard, 1958) are illustrated.

INTRODUCTION

I follow McLean (1971) in extending the definition of the subfamily Borsoniinae to include some genera referred to the Clavinae [= Drilliinae] by Powell (1966), but with toxoglossate teeth. However, I do not differentiate subfamily Diptychomitriinae Bellardi, 1889, as is done by several recent writers (using the later names Mitromorphinae Casey, 1904 [May] or Mitroluminae Sacco, 1904 [August], references in Cernohorsky 1975). Characters offered (McLean 1971) as disting-

ishing this subfamily from the Borsoniinae are the lack of a deep U-shaped anal sinus, generally smaller shell-size, clathrate sculpture and shallower-water habitat. These criteria do not stand up to close scrutiny. Thus the anal sinus varies from vestigial to moderately deep within genera such as *Mitromorpha* (Figs 101–103) and *Mitrellatoma*, and many typical Borsoniinae of genera *Maoritomella* and *Microdrillia* are no larger than the 'diptychomitrids'. Most of the latter do not in fact have truly clathrate sculpture. The borsoniine genus *Tomopleura* is characteristically littoral, while at least 65% of southern African *Mitromorpha* spp. inhabit the continental shelf and slope. No significant differences thus appear to exist between the two groups.

TAXONOMY

Subfamily Borsoniinae Bellardi, 1875

Diagnosis: Shell small to large, biconical, fusiform or claviform in shape, sculpture predominantly spiral in most genera; labrum thin with a very shallow to deep anal sinus on periphery or shoulder slope, stromboid notch feeble or absent, columella callus usually convex and expanded, with or without pleats, parietal pad absent (rarely present but feeble). Operculum present or absent, oblanceolate with terminal nucleus to oblong-ovate with eccentric nucleus. Radula of awl- or harpoon-shaped, hypodermic marginal teeth, basal membrane weak or absent.

Key to genera of Borsoniinae in southern Africa and Mozambique

- | | | |
|---|--|----------------------|
| 1 | Anal sinus at periphery | Bathytoma |
| — | Anal sinus on shoulder slope | 2 |
| 2 | Shell resembling a columbellid, a <i>Conus</i> or a <i>Mitra</i> | 3 |
| — | Shell not so shaped | 7 |
| 3 | Protoconch domed, 1½–2 whorls | 4 |
| — | Protoconch conical, 2½–4½ whorls | 6 |
| 4 | Spire very high, protoconch large, with inrolled apical whorl .. | Maorimorpha |
| — | Shape fusiform or biconical, protoconch relatively small, its apex depressed or tilted | 5 |
| 5 | Shell narrowly fusiform with markedly produced base | Mitrellatoma |
| — | Shell more or less biconical, base not produced | Mitromorpha |
| 6 | Columella with V-shaped notch; shell biconical; labrum with large tubercle near posterior end | Anarithma |
| — | Columella without a notch or denticles; shell conoid; labrum without a tubercle | Lovellona |
| 7 | Sculpture of strong spiral lirae or cords and fine collabral threads; often a peripheral keel but never a conspicuous shoulder angle | 8 |
| — | Sculpture of spiral lirae, with or without strong axial ribs; shoulder angle usually very strong, crenellated by axials (when present) | Tropidoturris |
| 8 | Protoconch with one or more whorls axially ribbed, shoulder slope strongly concave | Microdrillia |
| — | Protoconch with axial riblets absent or restricted to terminal half-whorl .. | 9 |

- 9 Collabral threads crossing spiral lirae; siphonal canal not or feebly indented; small (seldom exceeding 10 mm) **Maoritomella**
 — Collabral threads not crossing spirals; siphonal canal deeply indented; larger 10
- 10 Spiral cords with wide, evenly concave intervals **Pulsarella**
 — Intervals relatively narrow and flattened **Tomopleura**

Doubtful or spurious southern African Borsoniinae

Acrobela acus Barnard (1958:149, fig. 21e) has its later protoconch whorls diagonally cancellate. It is referable not to *Microdrillia* Casey, 1904 (= *Acrobela* Thiele, 1925) but to the raphitomine genus *Teretia* Norman, 1888.

Mitomorpha veneris Barnard (1964:16) was based on a worn fragment (Fig. 21) which was compared with *Maorimorpha sulcata* (Sowerby, 1892). It agrees with juveniles of a *Charitodoron* sp. (family Mitridae).

Mitomorpha neptuni Thiele (1925:221, pl. 19, fig. 16). I have not been able to examine the unique holotype, but from the figure it would appear to be an *Anachis* (family Columbelloidae).

Tomopleura vertebrata (E. A. Smith, 1875), recorded by Smith (1903) and Barnard (1958): see *T. nivea* (Philippi, 1851) and *T. oscitans* sp. n., below.

Biogeography in southern Africa

At present little can be said about this insufficiently studied subfamily. More intensive sampling of the continental shelf and slope (notably the main body of the Agulhas Bank) will no doubt vastly increase the list of known species, particularly in genera such as *Mitomorpha* and *Maoritomella*, if one may judge by the quantity of available material, additional to the present study, but inadequate for description. Of the species recorded here, only about 29% are littoral (or inshore). Compared with the Turridae, true Indo-Pacific elements are poorly represented, and consist of *Lovellona atramentosa* (Reeve, 1849), *Anarithma metula* (Hinds, 1843), *Tomopleura nivea* (Philippi, 1851), *Microdrillia patricia* (Melvill, 1904) and *M. circumvertens* (Melvill & Standen, 1901), although *T. oscitans* and *Mitrellatoma mitra* spp. n. will probably be added to the list. Percentage endemism in southern Africa is thus probably at least 90%.

ABBREVIATIONS

- a/l = ratio of aperture length (measured along main shell axis) to total shell length.
 b/h = ratio of maximum protoconch breadth to its height.
 b/l = ratio of shell breadth to total length.
 BM(NH) = British Museum (Natural History).
 MHNP = Muséum National d'Histoire Naturelle, Paris.
 MN = R/V Meiring Naudé.
 NM = Natal Museum.
 NMNH = National Museum of Natural History, Washington.
 NMW = National Museum of Wales, Cardiff.

- NSMT = National Science Museum, Tokyo.
 OUM = Oxford University Museum.
P.F. = *s.s. Pieter Faure*.
 SAM = South African Museum, Cape Town.
 ZMB = Zoological Museum, Humboldt University, East Berlin.

METHODOLOGY

Colour terminology in main descriptions follows the ISCC–NBS system. Radula preparations for the light microscope are stained with Chlorazol Azurine and Shirlastain A, and mounted in polyvinyl lactophenol.

Bathytoma Harris & Burrows, 1891

Type-species (M.) *Murex cataphractus* Brocchi, 1814.

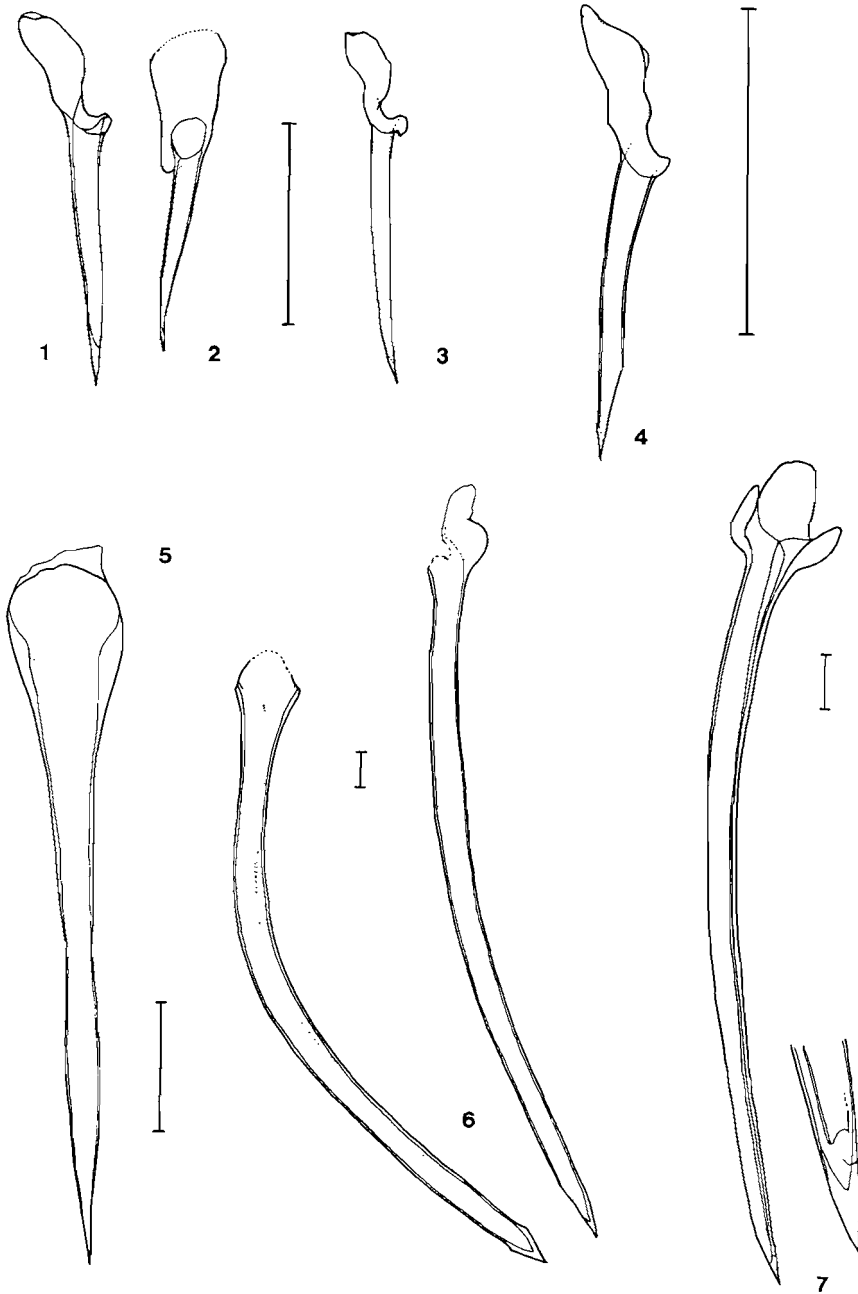
Diagnosis: Shell medium-sized to large, biconical; periphery angulate or keeled, often gemmate; anal sinus deep, peripheral; columella tumid, sometimes with a pleat. Protoconch of $1\frac{1}{2}$ – $3\frac{1}{2}$ whorls, conical or globose, smooth or with faint spiral striae. Operculum broadly ob lanceolate to ovate, nucleus eccentric to terminal. Radula of long awl-shaped marginals, sometimes weakly barbed apically.

Notes: Powell (1966) recognised four subgenera: *Bathytoma* s.s. with a conical, multispiral protoconch (see Bernasconi & Robba 1984:297, pl. 6, figs 1, 2), and *Parabathytoma* Shuto, 1961, *Riuguhdrillia* Oyama, 1951, and *Micantapex* Iredale, 1936, all with a paucispiral, globose protoconch. Of the latter three subgenera, *Parabathytoma* has barbed marginal teeth, while *Micantapex* has non-barbed marginals with distinctly elongate bases. Of the five southern African species (all of which have a paucispiral protoconch), *belaeformis* has the dagger-like teeth of *Micantapex*, while *visagei*, *helenae* and *prodicia* sp. n. have barbed marginals as in *Parabathytoma*; radula characters of the remaining species (*arbucklei*) are unknown.

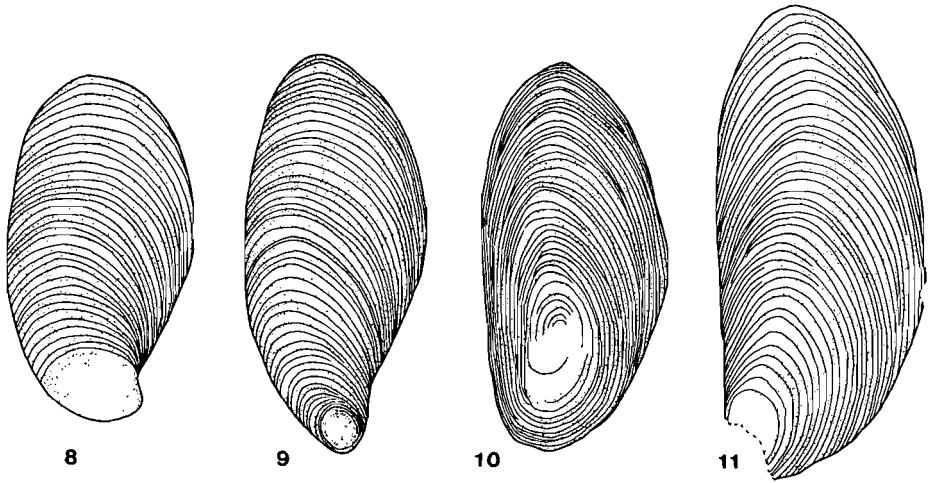
Three of the five southern African species have been described elsewhere in detail by me. Here I have merely summarised their diagnostic characters.

Key to *Bathytoma* in southern Africa and Mozambique

- | | | |
|---|---|--------------------|
| 1 | Periphery nodose; base of spire whorls with strong spiral lirae | 2 |
| — | Periphery smooth or with small crenules; base of whorls without strong spiral lirae | 3 |
| 2 | White; peripheral keel with 20–22 nodules; basal lirae rugose but not granular; b/l 0,40–0,45 | prodicia |
| — | Light yellowish-brown; peripheral keel with 28–34 nodules; basal lirae granular; b/l 0,39 | helenae |
| 3 | Yellowish-brown; fusiform-biconic (b/l 0,32–0,35), smooth except for peripheral keel and fine basal lirae | visagei |
| — | White; biconic (b/l 0,41–0,47), with fine spiral and collabral threads overall | 4 |
| 4 | Whorls without shoulder; 1st whorl of protoconch somewhat inflated | belaeformis |
| — | Whorls with strong, rounded shoulder; 1st protoconch whorl less inflated | arbucklei |



Figs 1-7. Radulae of: 1-2, *Tropidoturris fossata notialis*; 3, *T. scitecostata*; 4, *T. simplicicingula simplicicingula*; 5, *Pulsarella fultoni*; 6, *Tomopleura nivea*, two views. 7, *Bathytoma helenae*, with apex magnified. Scale-lines = 0,05 mm.



Figs 8–11. Opercula of: 8, *Tropidoturris scitecostata*; 9, *Tropidoturris fossata notialis*; 10, *Tomopleura oscitans*; 11, *Tomopleura nivea*. Not to scale.

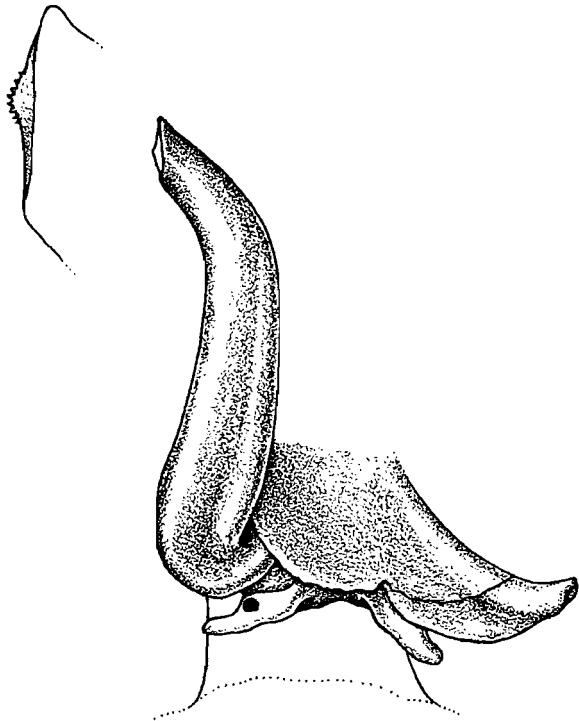


Fig. 12. Penis of *Tropidoturris fossata notialis*, with tip magnified.

Subgenus *Micantapex* Iredale, 1936

Type-species (o.d.) *Bathytoma agnata* Hedley & Petterd, 1906.

Diagnosis: Protoconch globose, of about $1\frac{1}{2}$ whorls, 1st whorl tilted, last ending in a series of arcuate riblets. Marginal teeth of radula with base produced like the hilt of a dagger, shaft straight, tip not barbed.

Bathytoma (Micantapex) belaeformis (Sowerby, 1903)

Figs 24–27

Pleurotoma (Genotia) belaeformis Sowerby, 1903:216, pl. 4, fig. 8. Type locality: 18½ mi. off Vasco da Gama Peak, 230 fath.

'*Genotia belaeformis*'; Barnard, 1958:112, figs 8b (radula), 9b (protoconch).

Bathytoma (Micantapex) belaeformis; Kilburn, 1971:132.

Diagnosis: Shell biconical (b/l 0,41–0,46, a/l 0,47–0,51), suture deep (not fissure-like), whorls strongly convex with median periphery, subsutural cord relatively feeble; columella without a pleat; sculptured by irregular, sigmoid collabral threads, forming short lunulate crenules on periphery and oblique plicules below suture, and fine spiral lirae bearing granules where crossed by collabral threads; chalky white; protoconch breadth 1,6–1,8 mm (b/h 1,07–1,24), 1st whorl inflated and strongly tilted, smooth except for a series of dense, arcuate axial threads near termination. Maximum length 24 mm.

Radula: See Barnard (1958).

Range: Continental slope of Namibia to Tsitsikamma area, in 350–420 m.

Locality data: NAMIBIA: off Chamaïs Bay (NM 4402: J. Dichmont). AGULHAS SLOPE: off Cape Point, 190 fath. (SAM A8661); south of Still Bay (36°40'S, 21°26'E), 200 fath. (SAM A1688); Cape St Blaize area, *ex pisce* (NM B4216: R. Le Maitre).

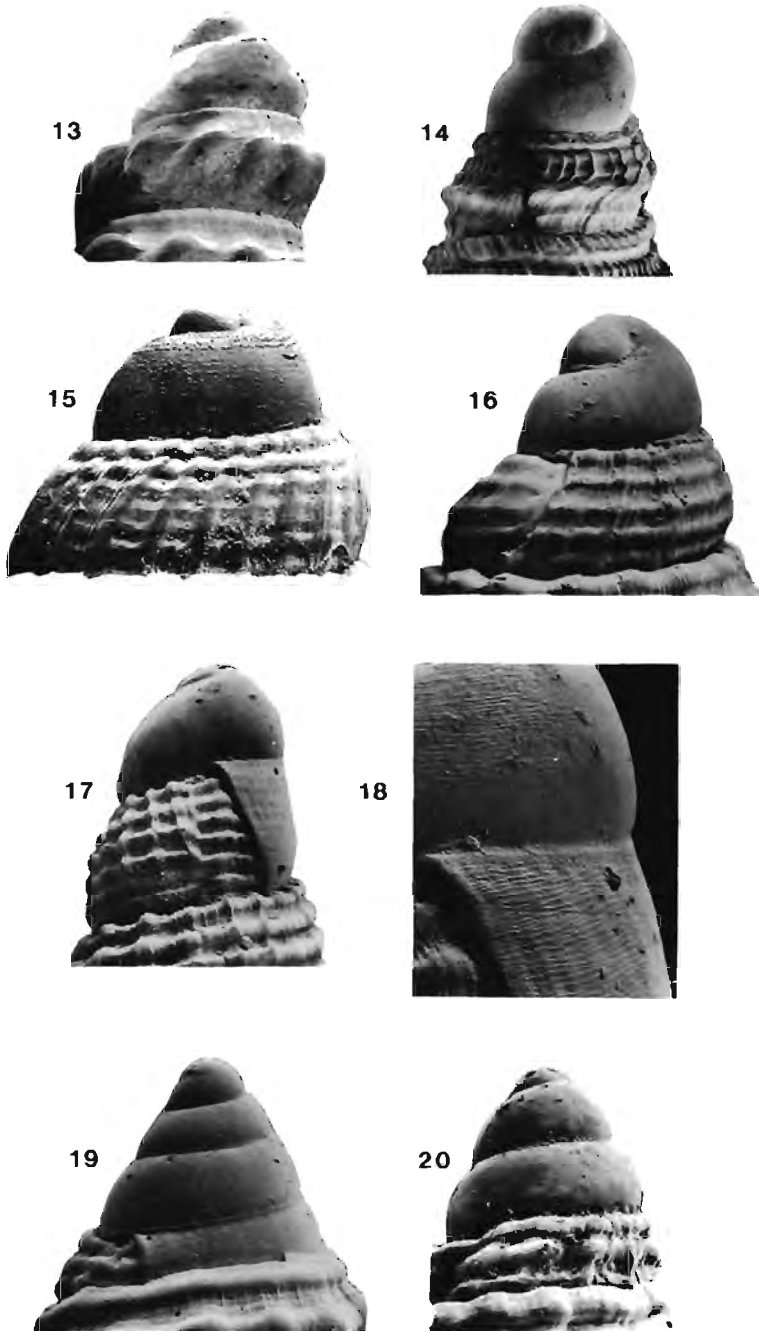
Type material: Syntypes, two, SAM A1687; one (22,9 × 9,3 mm, Figs 24, 25) here designated as lectotype.

Bathytoma (Micantapex) arbucklei sp. n.

Figs 28–29, 33–34

Diagnosis: Shell biconical (b/l 0,45–0,47, a/l 0,45–0,50), suture deep but not fissure-like, whorls with strong, but rounded shoulder and a weak subsutural cord; columella without a pleat; sculptured by fine spiral threads crossed by irregular, sigmoid collabral threads with fine granules at intersections; white; protoconch as in *B. belaeformis*, but 1st whorl slightly less inflated; maximum length 17,2 mm.

Description: Shell biconical (b/l 0,45–0,47, a/l 0,45–0,50), suture deep but not fissure-like; teleoconch whorls about 4, with strong but rounded peripheral angle, which is somewhat cord-like, situated above median; shoulder slope declivous, moderately concave, with a weak, narrow subsutural cord; base of body whorl with strong, rounded fasciole. Aperture with greatest width median, siphonal canal unnotched, opening obliquely to right as result of foreshortened labium; labrum with relatively thick callus, widely expanded medially, without columella pleats, paries gently concave, columella rather straight; labrum thin, smooth inside, strongly convex in side view, with a deep, openly U-shaped anal sinus at periphery.



Figs 13–20. Protoconchs of some southern African Borsoniinae (all SEM): 13, *Tropidoturris scitecostata*, breadth 1,1 mm; 14, *Maoritomella densecostulata* (holotype), breadth 0,65 mm; 15, *Mitromorpha brevispira* (paratype), breadth 0,63 mm; 16, *Mitromorpha tenuilirata* (paratype), breadth 0,78 mm; 17–18, *Maorimorpha sulcata*, with sculpture magnified, breadth 1,00 mm; 19, *Anarithma metula*, breadth 0,50 mm; 20, *Lovellona atramentosa*, breadth 0,45 mm.



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Figs 21-29. 21, *Miromorpha* [= *Charadoron*] *veneris* Barnard, 1964, holotype, SAM A8750, length 10.4 mm. 22-29, *Bathyioma* spp.: 22-23, *B. prodicia* sp. n., holotype, NM 6068/T3134, 30.5 × 13.8 mm; 24-27, *B. belaeformis* (Sowerby, 1903) 24-25, lectotype, SAM A1687, 22.9 × 9.3 mm; 26-27, SAM A1688, S of Still Bay, 200 fath., 24.0 × 10.7 mm; 28-29, *B. arbutketi* sp. n., holotype, NM C9510/T3126, 17.2 × 8.0 mm.

Sculpture of thin spiral threads, crossed by subequal but irregular collabral threads, with weak granules at intersections; spiral lirae 3–4 on shoulder angle, 2–6 on slope, anteriorly 4–5 on 1st whorl, increasing to 6–10 on penultimate whorl; base of body whorl with about 23–33 lirae, becoming weaker and more widely spaced on rostrum. Collabral threads weakest below shoulder, relatively strong and lunulate on shoulder angle, forming oblique plicules on subsutural cord, where they number approximately 50–60 (penultimate whorl). White.

Protoconch (Figs 33–34) bluntly domed, glossy white, of about $1\frac{1}{2}$ whorls; 1st whorl moderately inflated and strongly tilted, smooth except for dense, arcuate axial threads near termination and faint scratch-like spiral striae; breadth 1,6–1,8 mm, height 1,2–1,5 mm (b/h 1,07–1,42).

Dimensions: 17,2 × 8,0 mm (holotype); 14,5 × 6,6 mm (paratype).

Range: Continental slope of western Transkei, 300–500 m, on muddy sand.

Type material: Holotype NM C9510/T3126, off Mbashe River (32°22,8'S, 29°00,8'E), 450–500 m, coarse sand, some mud; a dead shell. Paratypes 1–4, NM C9061/T3128, same data. Paratype 5, NM C9398/T3127, off Whale Rock, 400 m, fine muddy sand. Paratype 6, NM C8551/T3129, off Bulungulu River, 300–370 m, coarse sand. Paratype 7, NM C6624/T3132, off Qora River, 450–460 m, sandy mud. Paratype 8, NM C6807/T3130, off Stony Point, 390–400 m, muddy sand, small stones. Paratype 9, NM C6876/T3131, off Sandy Point, 450 m, muddy sand, stones. Paratype 10, NM C8024/T3133, off Shixini Point, 350 m, coarse sand, broken shell. All dredged MN.

Notes: *Bathytoma arbucklei* is closely allied to the more western *B. belaeformis* (Sowerby, 1903) in general form and sculpture, but is smaller, with markedly angular teleoconch whorls and a slightly less inflated initial protoconch whorl. It is referred to *Micantapex* on account of this resemblance in shell-characters.

Etymology: Named in honour of Mr Maurice Arbuckle of the Natal Museum, whose organisational assistance has contributed greatly to the success of our dredging projects.

Subgenus *Parabathytoma* Shuto, 1961

Type-species (o.d.) *Pleurotoma striatotuberculata* Yokoyama, 1928.

Diagnosis: Protoconch as in *Micantapex* but without brephic axials. Marginal teeth curved and very slender, tip weakly barbed, base not produced.

Bathytoma (Parabathytoma) visagei Kilburn, 1973

Bathytoma (Parabathytoma) visagei Kilburn, 1973:572, figs 13c, d, 14 (radula). Type locality: off Ponta Zavora, Mozambique, 260–280 fathoms.

Diagnosis: Shell fusiform-biconic (b/l 0,32–0,35, a/l 0,38–0,46), spire relatively high and base relatively wide, suture rather shallow; whorls with a blunt, more or less median keel; columella sometimes with a weak pleat; early whorls with about 22 small granules on peripheral keel and another series below suture; adult whorls smooth except for the peripheral keel, very faint spiral and incremental striae, and 27–37 weak spiral lirae on base of body whorl; light yellowish-brown, periphery

slightly darker, apex and aperture white; protoconch breadth 1,40 mm (b/h 1,08). Maximum length 62,4 mm.

Range: Continental slope of southern Mozambique.

Additional locality data: Off Boa Paz, Limpopo River area, 198 fath. (NM G664: A. Krige).

***Bathytoma (Parabathytoma) prodicia* sp. n.**

Figs 22–23

Bathytoma (Parabathytoma) regnans (non Melvill, 1918); Kilburn, 1971:31, figs 2c (radula), 2f (protoconch), 4b.

Diagnosis: Shell biconical (b/l 0,40–0,45), spire relatively high (a/l 0,45–0,51), suture relatively shallow, whorls with a strong peripheral keel at or just anterior to median; columella without a pleat. Peripheral keel with 20–22 strong, rounded nodules, becoming flatter and somewhat irregular on later part of body whorl; strong, sigmoid growth-lines form fine, prosocline plicules below suture (on early whorls forming plicate cord); spiral lirae fine and feeble on and above peripheral keel; base of body whorl with 22–26 low spiral lirae, and 2–3 on penultimate whorl, where they are somewhat weak, lirae stronger and more convex on rostrum. Off-white, with a thin, transparent yellowish periostracum. Protoconch greyish-white, with very faint spiral striae, breadth 1,40–1,55 mm (b/h 1,27–1,55), 1st whorl strongly tilted. Maximum length 41,7 mm.

Description: See Kilburn 1971 (*loc. cit.*).

Dimensions: 30,5 × 13,8 mm (holotype); 41,7 × 16,5 mm, 35,1 × 14,0 mm (paratypes).

Range: Continental slope of southern Mozambique, 420–567 m.

Type material: Holotype NM 6068/T3134, E. of Bazaruto Is., 300–310 fath., don. Mrs K. Eastwood. Paratypes 1–15, NM A24/T3135, off Monte Belo, Limpopo River area, 230 fath., leg. G. Scott; paratype 16, NM 9789/T3136, off Inhaca Is., depth unknown, don. R. Cruickshank; paratypes 17–22, NM F7292/T3137, no locality, don. R. Cruickshank.

Notes: In recording (Kilburn 1971) the present species as *Bathytoma regnans* Melvill, 1918, I noted several discrepancies between local material and the original description. Comparison between the much larger series now available and the unique holotype of *regnans* (a chalky shell with eroded protoconch and broken lip) confirms their distinctness. The holotype (Fig. 168) of *B. regnans* (NMW 1955.158.499) differs from *B. prodicia* in its strong columella pleat, deeply channelled suture, strongly granular basal lirae, less oblique subsutural plicules, and stronger spiral sculpture.

Etymology: *prodicius* = deceptive (L.).

Bathytoma (Parabathytoma) helenae Kilburn, 1974

Fig. 7a

Bathytoma (?*Parabathytoma*) *helenae* Kilburn, 1974:215, fig. 22. Type locality: off Durban, 180 fath.

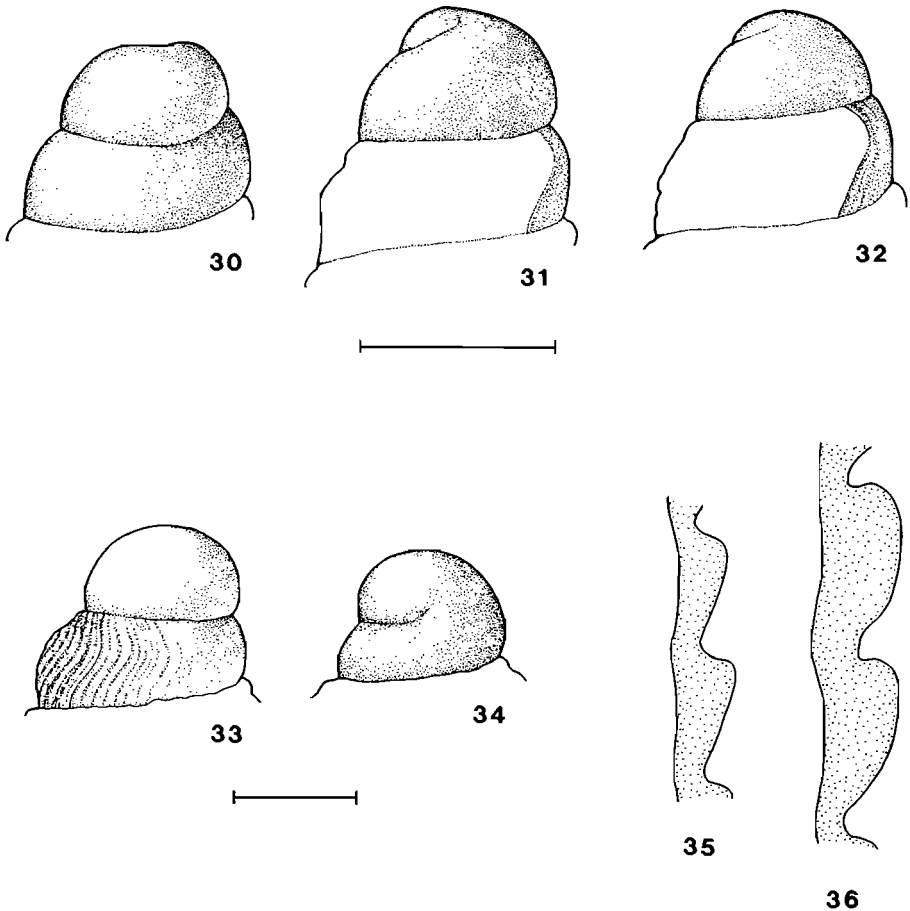
Diagnosis: Shell narrowly biconical (b/l 0,39, a/l 0,48–0,50), base curved slightly to right, suture moderately deep but not fissure-like; a fairly strong, more or less

median peripheral keel, sometimes weakening on body whorl, bearing 28–34 rounded nodules with spiral striae in their intervals; strong, arcuate growth-lines form slightly oblique plicules below suture, tuberculate in young, feeble on adult body whorl; weak, rugose spiral lirae above periphery (7–9 on later whorls); base of body whorl with 26–32 distinctly granular spiral lirae, and 4–5 on penultimate whorl, somewhat flattened except on rostrum where higher and rounder, with fine intermediaries. Colour light yellowish-brown, darker on keel, aperture and columella callus white. Protoconch with faint spiral striae; breadth 1,40–1,60 mm, b/h 1,40–1,46. Maximum length 46,4 mm.

Radula: see Fig. 7a.

Range: Continental slope of Natal.

Notes: The radula of *B. helenae* confirms that the species is a *Parabathytoma*.



Figs 30–36. *Tropidoturris* and *Bathytoma* spp. 30–31, *T. fossata notialis* ssp. n., protoconch; 32, *T. simplicicingula simplicicingula*, protoconch; 33–34, *B. arbucklei* sp. n., protoconch; 35–36, T/S through median spiral lirae on body whorl of 35, *T. fossata notialis*, and 36, *T. fossata fossata*. Scale-line = 1 mm.

Tropidoturris gen. n.

Type-species: *Pleurotoma (Drillia) scitecostata* Sowerby, 1903.

Diagnosis: Shell biconical, shoulder with a strong (rarely weak) spiral keel, shoulder slope concave to almost canaliculate; base tapering, obliquely truncate, not distinctly notched, sometimes with a weak fasciole; columella with a thin callus pad, without pleats, parietal callus usually thin (rarely thick and with a posterior nodule); labrum thin, smooth inside, edge with a feeble stromboid notch; anal sinus deep and wide, usually occupying entire shoulder slope. Sculpture of spiral lirae and/or axial ribs (which may crenellate shoulder keel). Protoconch narrowly domed, of $1\frac{1}{2}$ –2 more or less smooth whorls, sometimes with weak terminal riblets; termination opisthocline and sigmoid.

Operculum rather small, ob lanceolate, slightly curved, with terminal nucleus, translucent.

Foot colourless, relatively small; tentacles short, subcylindrical, with eye on large swelling half-way down length; penis thick, slightly flattened, tapering only towards end, tip with an obliquely flattened face, sometimes with a median row of tiny prickles.

Radula of short, straight hypodermic marginals on a diaphanous basal membrane, tip very sharp, without barb, base relatively large, with a prominent heel at about 0,3 from base, behind which opens the venom canal.

Etymology: *tropis* (a keel) + *turris* (a tower), L., f.

Notes: This genus is characterised by its biconical shape, distinct shoulder keel, deep, wide anal sinus and paucispiral, smooth protoconch. There is some resemblance to *Corinnaeturris* Bouchet & Warén, 1980, but in that the teleoconch whorls are shouldered but not keeled, the surface is granulose, and the protoconch is conical and multispiral with carinate whorls. *Carinotropis* Bernasconi & Robba, 1984, has a similar protoconch to *Corinnaeturris*, and a shorter, more abbreviated base than *Tropidoturris*.

As far as I can determine, *Tropidoturris* is an endemic genus, characteristic of the continental shelf and slope of south-eastern Africa, although at least one species ranges as far west as False Bay. The commonest is *T. fossata* (Sowerby, 1903), which inhabits the continental shelf from Zululand to Transkei (and perhaps the eastern Cape), mostly on bottoms of coarse sand and rubble. From Durban southwards *T. f. fossata* is replaced by subspecies *notialis*. In the western/southern part of its range, on fine to coarse sand, it is in turn largely replaced by *T. simplicingula* (Barnard, 1958), an eastern population of which is here distinguished as subspecies *pondo*. Just south of Durban, in slightly shallower water than *fossata*, occurs *T. planilirata* sp. n. In deeper water, on the fine to coarse sands of the continental slope, these species are replaced by *T. scitecostata* (Sowerby, 1903); this appears to occur in much shallower water in the western part of its range (37 m off False Bay). On the slope and outer shelf off Natal and Zululand *T. scitecostata* is replaced by the small *T. anaglypta* sp. n.

Key to species of *Tropidoturris*

- 1 Axial ribs present (at least on early whorls) 2
 — No axial ribs 4
- 2 Entire teleoconch (other than shoulder concavity) with spiral lirae **fossata**
 — Spiral lirae restricted to base of body whorl 3
- 3 Shell fusiform-biconic (a/l 0,37–0,42), body whorl with 10–11 basal spiral
 lirae; attains 23,5 mm; protoconch breadth 1,1–1,2 mm **scitecostata**
 — Shell short-biconic (a/l 0,49–0,56), body whorl with 13–15 basal lirae; attains
 11,5 mm; protoconch breadth 0,85 mm **anaglypta**
- 4 Spiral lirae broad, close, flattened; shoulder cord very weak **planilirata**
 — Spiral lirae narrower, declivous; shoulder cord stronger to carinate
simplicicingula

Tropidoturris fossata (Sowerby, 1903)

Diagnosis: Shell fusiform-biconic (b/l 0,31–0,36, a/l 0,36–0,48); shoulder keel strong, posteriorly directed, smooth to crenellate; shoulder slope strongly concave, smooth; anal sinus very deep; base of body whorl without fasciole; axial ribs typically short and opisthocline, but sometimes feeble or obsolete by 4th or 5th whorl; more or less declivous spiral lirae cover each whorl anterior to keel, 3–10 on penultimate whorl, 16–21 on base, fine anteriorly; cream to light brown, densely flecked and mottled with brown, usually with a broad brown band at mid-body whorl; protoconch breadth 1,00–1,10 mm, 1st whorl slightly tilted. Maximum length 25,3 mm.

Notes: *Tropidoturris fossata* is here regarded as polytypic, with a northern and a southern subspecies. Although they appear to be allopatric, the intervening area has yet to be adequately sampled. The two are distinguished thus:

Spiral cords broad, rounded, slightly declivous, with very deeply incised intervals (Fig. 36); spiral sculpture absent on first two teleoconch whorls, 3–4 cords above suture on penultimate whorl; axial ribs present on all whorls; aperture longer (a/l 0,48); Zululand **f. fossata**

Spiral cords narrower, flattened, strongly declivous, shallowly incised (Fig. 35); fine spiral threads on base of first two whorls, 7–10 cords (rarely as few as 4) above suture on penultimate whorl; axial ribs evanescent by 3rd to 5th whorl; a/l 0,36–0,43; Durban to Eastern Cape **f. notialis**

The presence of only 4 suprasutural lirae in some individuals of subspecies *notialis* from just south of Durban is perhaps an intermediate character state. Otherwise no sign of intergrading is detectable in the available material.

A third taxon may be represented by a solitary specimen (NM A3989, don. H. W. Bell-Marley, 1921, Fig. 58) whose only data are 'off Natal, south east, 80 fath., *R. V. Pickle*'. In this the axial ribs are even stronger than in *T. f. fossata* and extend as far as the lower suture on the penultimate whorl; spiral cords are even fewer (18 on body whorl, of which one shows on penultimate whorl) and stronger,

and moreover are very strongly declivous. In some respects it resembles a giant *T. anaglypta* (q.v.), but dimensions and protoconch size are comparable with those of *T. fossata*.

Tropidoturris fossata fossata (Sowerby, 1903)

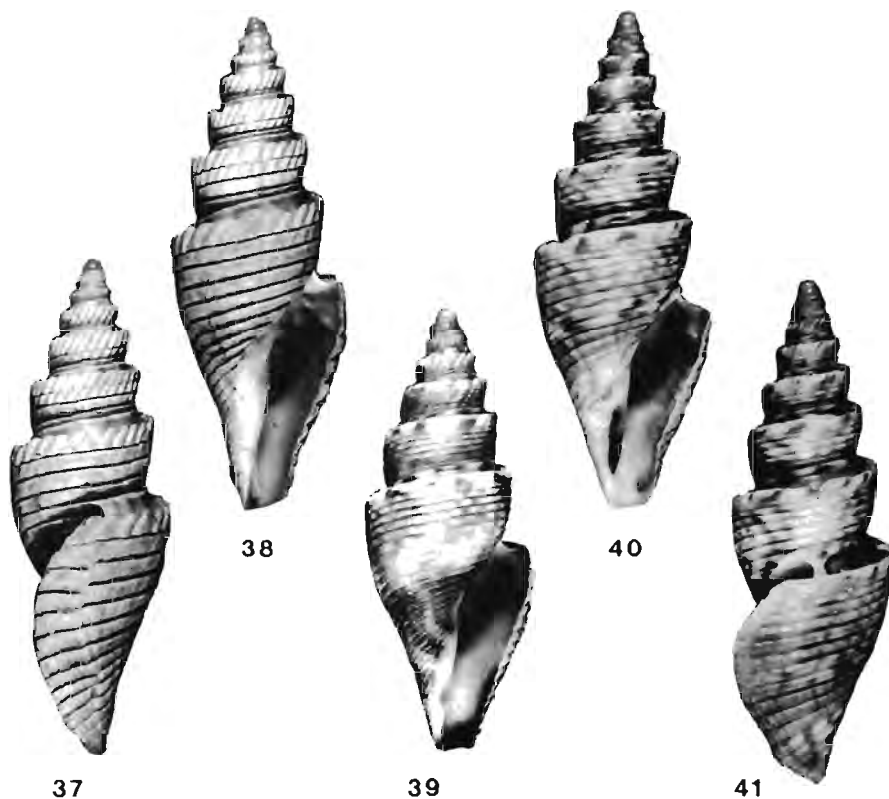
Figs 36–38

Pleurotoma (*Drillia*) *fossata* Sowerby, 1903:214, pl. 3, fig. 5. Type locality: 9½ miles off Cape Vidal, 80–100 fathoms, rocks.

Drillia fossata [partim]; Barnard, 1958:135, fig. 18a (protoconch).

Diagnosis: Shell with a/l 0,48; axial ribs present on all teleoconch whorls; although evanescent below shoulder region on later whorls, ribs are strong enough to crenellate keel; spiral sculpture not developing until 3rd teleoconch whorl, where a single lira is present above suture, increasing to 3 by 4th whorl, penultimate whorl with 3–4 lirae; spiral cords strong, rounded, a little declivous, with deeply incised intervals; length 20,4 mm.

Description: Shell fusiform-biconic (b/l 0,35, a/l 0,48), with a sharp, posteriorly directed shoulder keel developing on 1st teleoconch whorl as a median angle,



Figs 37–41. *Tropidoturris fossata* (Sowerby, 1903): 37–38, *T. fossata fossata*, holotype, SAM A346, 20,4 × 7,1 mm; 39–41, *T. fossata notialis* ssp. n.: 39, paratype, NM C1654/T3108, off Park Rynie, 140 m, 16,6 × 6,2 mm; 40, 41, holotype, NM C6580/T3090, 23,5 × 8,1 mm.

subsequently situated about 0,25 of each whorl below suture; teleoconch whorls 6; suture shallow; face of each whorl gently convex, shoulder slope strongly concave; body whorl moderately convex, base concave-sided. Aperture narrowly lanceolate, tapering slightly towards base, truncate posteriorly at sinus; columella and parietal region gently convex, meeting at a gently rounded angle, columella callus thin, slightly expanded; labrum thin, smooth, slightly incurved, strongly convex in side view; anal sinus very deep, occupying entire shoulder slope, somewhat L-shaped.

Sculpture below shoulder keel of rounded, slightly declivous spiral cords, with narrow, deeply incised intervals, and short, strongly opisthocline axial ribs, which crenellate shoulder keel. Spiral lirae absent on 1st two whorls, one lira developing above suture on 3rd whorl, increasing to 3 on 4th, penultimate whorl with 3–4 cords; base of body whorl with 16–17 cords, becoming finer and flatter on rostrum. Concave shoulder slope smooth except for growth-lines and a feeble subsutural ridge. Axial ribs 13–14 on 1st whorl, where they extend from periphery to lower suture, increasing to about 22 on 3rd whorl, and about 27 on body whorl; ribs rounded, broader than their intervals, becoming progressively shorter, and on later whorls restricted to region of shoulder keel.

Colour faded in lectotype: 'pale fulvous, obscurely spotted with brown, here and there tinged with light purple, and coloured anteriorly with a purplish band' (Sowerby 1903).

Protoconch of just over $1\frac{1}{2}$ strongly convex whorls, smooth except for a few sigmoid growth-lines near termination, 1st whorl low and somewhat tilted; breadth 1,00–1,05 mm, height 0,60–0,75 mm (b/h 1,40–1,67).

Dimensions: 20,4 × 7,1 mm (lectotype).

Operculum and radula unknown.

Range: Known only from type locality.

Type material: Two syntypes SAM A346, dredged *P.F.* Larger syntype (see above) here designated as lectotype; for smaller syntype see *T. anaglypta* sp. n.

Notes: At present *T. f. fossata* is known only from the lectotype and a number of fragments from the type locality (SAM A8663).

***Tropidoturris fossata notialis* ssp. n.**

Figs 1–2, 9, 12, 30–31, 35, 39–41

Drillia fossata [partim]; Barnard, 1958:135.

Diagnosis: Shell with a/l 0,36–0,43; axial ribs obsolete by 3rd to 5th whorl, crenulating keel on early whorls; 3–6 fine spiral threads developing on base of 1st whorl, increasing to 7–10 (rarely as few as 4) on penultimate whorl; spiral cords relatively low, somewhat flattened and strongly declivous, with relatively shallowly incised intervals; length 25,3 mm.

Description: Shell form as in *T. f. fossata* but aperture shorter (a/l 0,36–0,43); b/l 0,31–0,36; sometimes a small parietal nodule near posterior angle of aperture; up to 7 teleoconch whorls.

Sculpture of flattened, declivous spiral lirae, with shallowly incised intervals, and weak axial ribs on early whorls only. Spiral lirae initially weak, 3–6 on first whorl,

mainly on its lower half, increasing to 7–10 (rarely as few as 4) by penultimate whorl, covering whole whorl anterior to keel; lirae wider than intervals, declivous in section, with steep adapical face; 16–21 lirae on base of body whorl, becoming thinner anteriorly and fine towards tip of rostrum. Concave shoulder slope smooth except for growth-lines, and a feeble subsutural ridge. Axial ribs 14–17 on 1st whorl, 18–25 on 3rd, feeble to obsolete by 4th or 5th whorl, strongly opisthoclinal, rounded, broader than intervals, weakly crenulating shoulder keel on early whorls.

Overall finely mottled or speckled with light or moderate orange-yellow to deep brown, usually with a broad band of light brown or brownish-orange to deep brown around body whorl at level of parietal/columella junction, and blotches or flames of that colour on shoulder slope, usually forming spots on shoulder keel, and sometimes extending down whorl face as axial flames, or suffusing columella and base; protoconch uniform light to dark orange-yellow.

Protoconch (Figs 30, 31) of about $1\frac{1}{2}$ –2 strongly convex whorls, 1st whorl low and somewhat tilted, smooth except for a few sigmoid growth-lines near the termination; breadth 1,00–1,10 mm, height 0,70–0,85 mm (b/h 1,29–1,43).

Dimensions: 23,5 × 8,1 mm (holotype); 22,0 × 7,3 mm; up to length 25,3 mm (paratypes).

Operculum (Fig. 9) oblongate, with terminal nucleus (curved slightly outward) and coarse growth-lines, translucent yellowish, 0,34–0,45 of aperture length.

Penis (Fig. 12) obliquely flattened at tip; flattened area has a small central convexity with a row of about 8 microscopic prickles.

Radula (Figs 1–2) as described for genus; about 60 rows.

Range: Continental shelf of Natal (south of Durban) to eastern Cape Province, 70–165 m.

Type material: Holotype, NM C6580/T3090, radula slide M181; male; off Mncwasa Point, Transkei (32°06,5'S, 29°07,6'E), 90 m, coarse sand; dredged *MN*. Paratypes (unless otherwise stated all NM:*MN*): NATAL: off Umlaas Canal, S. of Durban, 150 m, coarse sand, pebbles, numerous spatangoids, eight (D819/T3094, 4 in alcohol); do, 150 m, muddy sand and fine pebbles, two (D1165/T3093); off Amanzimtoti, 180 m, medium sand, one (D1248/T3092); do, 160–170 m, medium sand, two (D1501/T3091, 1 in alcohol); off Park Rynie, 104 m, fine sand, sponge-rubble, two (C1697/T3098); do, 105 m, sponge rubble, two (B8521/T3104); do, 120 m, rubble and solitary corals, three (B3822/T3114); do, 128 m, some sand, sponge-rubble, one (C1618/T3118); do, 130 m, two (D230/T3102); do, 140 m, some sand, sponge-rubble, one (C1654/T3108); off Port Edward, 125 m, live sponges, one (D926/T3124, in alcohol). TRANSKEI: off Mtamvuna River, 110 m, pebbles, one (C498/T3113); do, 120–140 m, sponge-rubble, one (C440/T3106); between Mtamvuna and Mzamba Rivers, 100 m, large sponges, rubble, three (C5403/T3103); off Mzamba, 100 m, sponge-rubble, nine (C5263/T3111, 2 in alcohol); between Mpahlana and Umyameni Rivers, 100 m, sponge-rubble, five (C5366/T3096); off Port Grosvenor, 80 m, calcareous nodules, five (C7326/T3100); do, 95–100 m, coarse sand, one (C579/T3107); do, 82 m, calcareous nodules, two (C676/T3110); do, 100–110 m, coarse sand, some mud, three (C424/T3105); do, 100–110 m, pebbles, some sand, one (C7501/T3099); do, 120–128 m, coarse sand,

some mud, shells, two (C1138/T3125); off Rame Head, 70 m, mud, shell debris, one (C1913/T3122); off Whale Rock, 90 m, sponge-rubble, small pebbles, one (C2844/T3097); do, 90 m, sponge-rubble, coarse sand, two (C9505/T3123, in alcohol); do, 150–165 m, coarse sand, discoid corals, four (C2307/T3115); off Mncwasa Point, 90 m, coarse sand, three (C2228/T3095); off Bulungula River, 90 m, slightly muddy sand, one (C2610/T3120); off Nthlonyane River, 130 m, coarse brown sand, old calcareous debris, one (C2667/T3121); off Mbashe River, 100 m, sponges, marine growths, one (C1952/T3109), one (B3031/T3116); off Nqabara Point, 95 m, sponge, sand, one (C4153/T3117, in alcohol). EASTERN CAPE: St Francis Bay, 24–34 fath., one (SAM A8665:PF). Number of paratypes 75.

Notes: As no examples were dredged by me south/west of Nqabara, I am inclined to query Barnard's record from St Francis Bay, particularly in view of the shallow depth (44–62 m) of the latter record. Mislabelling of *P.F.* molluscs has been noted on several previous occasions. Certainly SAM A8671 from 'off Hood Point' is incorrectly labelled, as it consists mainly of *Tropidoturris anaglypta*, which has not been found south of the Durban–Amanzimtoti area.

Etymology: *notialis* = southern (L).

Tropidoturris simplicicingula (Barnard, 1958)

Diagnosis: Shell fusiform-biconic (b/l 0,35–0,43, a/l 0,38–0,46), shoulder keel strong to relatively weak, slightly outwardly directed, smooth; shoulder slope moderately to strongly concave, smooth with 2–4 spiral lirae; anal sinus moderately deep; base with slightly swollen fasciole; no axial ribs; declivous spiral lirae covering whorl anterior to keel, 6–10 on penultimate whorl, 14–21 on base, relatively coarse on rostrum, lirae weakly nicked by incremental striae; speckled and mottled with brown, shoulder slope spotted, columella with dark brown blotch; protoconch breadth 1,10–1,25 mm, 1st whorl rather depressed. Maximum length 19,8 mm.

Notes: Under the name *simplicicingula* I unite two apparently allopatric populations, whose resemblances are decidedly greater than their differences. *T. simplicicingula* is typically an eastern Agulhas Bank taxon, ranging from off the Great Fish River to just beyond the Umtata River mouth, mostly on coarse to fine sand, but also on sponge-rubble. Further north/east up the Pondoland coast, on rubble bottoms, occurs a population that I recognise as subspecies *pondo*. These two subspecies may be distinguished thus:

Peripheral keel relatively strong, beginning on about 2nd whorl; shoulder slope more concave, more or less smooth	s. simplicicingula
Peripheral keel weak, only beginning on about 3rd whorl; shoulder slope less concave, with 2–4 well-developed spiral lirae	s. pondo

T. s. simplicicingula may superficially resemble *T. fossata notialis* but totally lacks axial sculpture, has a fasciole-like basal swelling, a different protoconch, a dark columella blotch and relatively coarse spiral lirae on the end of the rostrum; the anal sinus is shallower than in *notialis*.

Tropidoturris simplicicingula simplicicingula (Barnard, 1958)

Figs 4, 32, 42–44

Drillia simplicicingula Barnard, 1958:135, fig. 18b (protoconch); *idem*, 1969: fig. 5a. Type locality: off Hood Point (East London), 49 fath.

Diagnosis: See key.

Description: Shell very similar in form to *T. fossata*, but base with slight twist to right, so that its left side bears a fasciole-like convexity, and the rostrum is often shallowly depressed to form an incipient false umbilicus; teleoconch whorls 6, shoulder keel slightly lower and more outwardly directed than in *fossata*, face of spire whorls flatter and columella callus somewhat thicker; b/l 0,36–0,43, a/l 0,38–0,46.

Sculptured by sharply incised, coarse to relatively fine spiral lirae, without trace of axial ribs, but with fine to coarse incremental striae. Spiral lirae 3–5 on 1st teleoconch whorl, close, rounded, subequal, but on 2nd whorl 3rd lira from base begins to strengthen and develop into a shoulder keel; 1st lira remains as a thin subsutural ridge, the following 2 becoming obsolete and replaced by the concave shoulder slope, which is smooth except for fine growth-lines and (rarely) 1–2 feeble lirae; on penultimate whorl 6–10 lirae anterior to shoulder keel, declivous in section as in *fossata*; base of body whorl with 14–21 lirae, anteriormost lirae relatively coarse.

Colour pale orange-yellow, flecked and mottled to a variable extent with moderate or light brown to strong yellowish-brown, most strongly flecked on the pale shoulder keel and subsutural ridge, shoulder slope usually with blotches; columella with a vivid yellowish-brown to light brown blotch; protoconch yellowish-white to light orange.

Protoconch (Fig. 32) bluntly conical, of $1\frac{1}{2}$ moderately convex whorls, 1st rather depressed, smooth except for a terminal series of dense, sigmoid axial ribs; breadth 1,10–1,25 mm, height 0,70–1,00 mm (b/h 1,25–1,57).

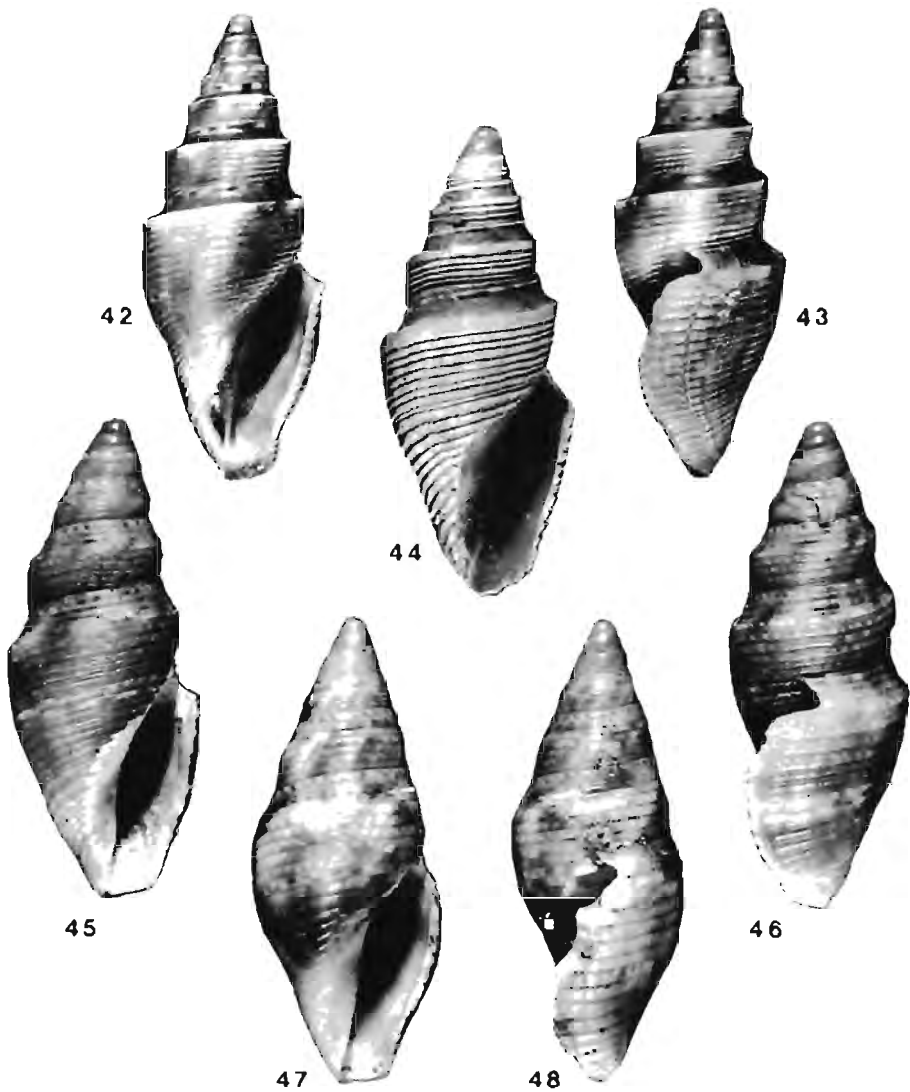
Dimensions: 19,8 × 7,1 mm; 15,5 × 6,1 mm, 11,5 × 4,9 mm.

Operculum evidently detached and lost in only preserved specimen available.

Radula (Fig. 4) as in *T. fossata notialis*, but each tooth dorsally flattened towards tip; about 58 rows.

Range: Eastern Agulhas Bank off western Transkei and eastern Cape, 45–280 m.

Locality data (unless otherwise stated, all NM:MN): TRANSKEI: Off Whale Rock, 150–165 m, coarse sand, discoid corals (C8017); do, 250–280 m, sand, shell rubble (C8654); off Mncwasa Point, 90 m, coarse sand (C6610); off Bulungula River, 80 m, fine sand (C3029); off Nthlonyane River, 80 m, sand, broken shell (C2576); do, 95 m, sponge-rubble (C1939); off Qora River, 100 m, coarse sand, some sponge-rubble (C4829); do, 75 m, moderately fine sand (C3901); do, 45 m, coarse sand (C4015); off Stony Point, 87 m, coarse sand (C4225); do, 95 m, sponge-rubble (C4197); off Mbashe River, 75 m, calcareous nodules (C7638); off Sandy Point, 90 m, calcareous debris, coarse sand (C7649, C4504); do, 90 m, gorgonians, sponges (C7586); off Qolora River, 114 m, sponge-rubble (C7431, C3940); do, 50 m, fine sand and mud (C4669); off Kei River, 85 m, sponge-rubble, coarse sand (C4982). EASTERN CAPE: off Cape Morgan, 47 and 57 fath. (Barnard 1958); off Kidd's Beach, East London, 90 m, coarse sand. sponges,



Figs 42–48. *Tropidoturris simplicicingula* (Barnard, 1958) and *T. planilirata* sp. n. 42–44, *T. simplicicingula simplicicingula*: 42–43, NM C6610, off Mncwasa Point, Transkei, 90 m, 15,6 × 6,0 mm; 44, holotype, SAM A8666, 13,0 × 5,0 mm. 45–46, *T. simplicicingula pondo* ssp. n., holotype, NM C7151/T3229, 11,9 × 4,8 mm. 47–48, *T. planilirata*, holotype, NM B5500/T3180, 14,8 × 16,0 mm.

gorgonians (B7787); off East London, 90 m, coarse sand, sponges, gorgonians (B8245); do, 100 m, coarse sand, sponges (B8506); do, 70 m, fine sand (B8428); off Great Fish Point, 51 fath. (Barnard 1958).

Type material: Holotype (Fig. 44) SAM A8666; paratype ('cotype' of Barnard 1958) SAM A3471, Sandy Point, Transkei, 57 fath.

Tropidoturris simplicicingula pondo ssp. n.

Diagnosis: See under key (above).

Description: Characters as in nominate subspecies but peripheral keel only beginning to develop from about 3rd whorl and remaining weak throughout; shoulder slope less concave, with 3–4 (rarely 2) well-developed spiral lirae; penultimate whorl with 6–8 spiral lirae anterior to shoulder cord, 15–20 on base of body whorl; lirae and intervals weakly nicked by fine incremental striae; b/l 0,35–0,43, a/l 0,40–0,46. Protoconch breadth 1,0–1,2 mm, height 0,6–0,8 mm (b/h 1,38–1,67). Colour as in nominate subspecies; protoconch light orange to light greyish-brown.

Dimensions: 11,9 × 4,8 mm (holotype); 12,6 × 4,6 mm, 14,6 × 5,1 mm (paratypes).

Operculum as in *T. fossata notialis* but larger (0,49–0,59 of aperture length).

Penis as in *T. fossata*, but no terminal prickles.

Range: Continental shelf of eastern Transkei, from Mtamvuna River to Port Grosvenor, in 60–137 m.

Type material: Holotype, NM C7151/T3229, off Port Grosvenor (31°24,6'S, 29°57,2'E), 80 m, worn calcareous nodules. Paratype 1, NM C7314/T3237, same data as holotype; paratypes 2–14, all off Port Grosvenor: paratype 2, NM C7364/T3239, 80 m, calcareous nodules, lithothamnion sheets; paratypes 3–5, NM C7293/T3238, 82 m, worn calcareous nodules, 1 adult, 2 juveniles; paratype 6, NM C7397/T3236, same data; paratypes 7–11, NM C7302/T3230, 80 m, calcareous nodules, lithothamnion sheets; paratype 12, NM C949/T3231, 60 m, sand, broken shell; paratypes 13–14, NM C7332/T3233, 80 m, worn calcareous nodules. Paratypes 15–17, NM C8871/T3234 (two in alcohol), off Mtamvuna River, 137 m, rocks, sponge. Paratype 18, off Kwanyana River, 100 m, sponge-rubble (C5320/T3232). Paratype 19, off Mpahlana River, 100 m, sponge-rubble (C5235/T3235); paratype 20, between Mzamba and Mpahlana Rivers, 100 m, sponge-rubble (C6581/T3052, in alcohol).

Etymology: The trivial name is derived both from the region (Pondoland) and the Amaondo who inhabit it.

Tropidoturris planilirata sp. n.

(Figs 47–48)

Diagnosis: Shell biconic (b/l 0,39, a/l 0,44–0,45); shoulder ridge not forming a keel; shoulder slope slightly concave with 2 spiral lirae; base with a weak fasciolar swelling; no axial ribs; spiral lirae rather flattened, close-set, covering entire whorl anterior to shoulder ridge, 4–5 on penultimate whorl, 15–17 on base, becoming rounded and narrow on rostrum, incremental striae very fine; cream with scattered, diffuse blotches of light brown, sometimes with groups of axial brown hair-lines, columella with a faint brown blotch. Protoconch diameter 1,1–1,2 mm, 1st whorl rather low. Maximum length 16,8 mm.

Description: Shell biconic (b/l 0,39, a/l 0,44–0,45), teleoconch whorls 5½, spire whorls gently convex, shoulder ridge developed but not forming a keel, shoulder

slope slightly concave, suture shallow, body whorl strongly convex, sides of base moderately concave, with weakly swollen fasciole. Aperture narrowly lanceolate, widest medially; columella slightly convex, meeting parietal region at most at a very slight angle, with a fairly thick callus, evanescent in parietal region; labral edge thin, smooth, strongly convex in side view, with slight stromboid notch; anal sinus deep and narrower than in its congeners, with its apex at mid-shoulder slope.

Sculptured by low, close-set spiral lirae, without trace of axial ribs; incremental striae weak. First teleoconch whorls with 5–7 weak spiral lirae, close-set and equal except for subsutural one which is slightly stronger; on 3rd whorl the 3rd or 4th lira below suture becomes slightly more prominent than the others; penultimate whorl bears 7–9 lirae, i.e. a subsutural one, 1–2 in shoulder concavity, a slightly projecting shoulder cord and 4–5 flattened anterior lirae with narrow intervals; base of body whorl with 15–17 low, rather tabulate, close-set spiral lirae, becoming narrow and rounded on rostrum.

Yellowish-white with scattered, diffuse blotches of light or greyish-brown and in places faint axial hair lines of that colour, subsutural lirae flecked with brown, columella yellowish-white with a faint brown blotch, aperture white, protoconch yellowish-white.

Protoconch bluntly conical, $1\frac{1}{2}$ whorls, smooth, except for faint terminal growth-lines, breadth 1,1–1,2 mm, height 0,8–1,00 mm (b/h 1,13–1,34).

Dimensions: 14,8 × 6,0 mm (holotype); 16,8 × 6,5 mm (paratype).

Range: Continental shelf south of Durban.

Type material: Holotype NM B5500/T3180, off Natal between Port Shepstone and Port Durnford, from gut of slinger fish (*Chrysoblephus puniceus* (Gilchrist & Thompson, 1908)), don. P. Garrett, ORI. Paratype 1, NM D3485/T3369, off Umzimbazi River, 70 m, fine sand, MN. Paratypes 2–5, NM D3486/T3370, same data. Paratype 6, NM D3487/T3371, off Amanzimtoti, 80 m, A. Connell. Paratype 7, NM D3489/T3372, N.E. of Umgababa River, 70–80 m, fine sand, MN.

Notes: Although its range is widely disjunct, *T. planilirata* may eventually prove to represent a Natal subspecies of *T. simplicicingula*. From *T.s. pondo* it differs in its broad, low, somewhat tabulate spiral ridges, with narrow intervals (in *pondo* the ridges are declivous to rounded-declivous), and in the weakness of the shoulder cord.

Etymology: *planus* (flat) + *liratus* (ridged), L.

Tropidoturris scitecostata (Sowerby, 1903)

Figs 3, 8, 13, 49–53

Pleurotoma (*Drillia*) *scitecostata* Sowerby, 1903:214, pl. 4, fig. 10. Type locality: 21 mi. off Glendower Beacon (near Port Alfred), 100 fathoms, sand and stones.

'*Drillia*' *scitecostata*; Barnard, 1958:119, figs 8f (radula), 20 (left-hand fig.).

Surcula opulenta Thiele, 1925:226(192), pl. 24 (36), fig. 15. (**syn. n.**) Type locality: 35°16'S, 22°26,7'E, 155 m.

Comitas opulenta [partim]; Powell, 1969:286, pl. 224, fig. 4 (after Thiele).

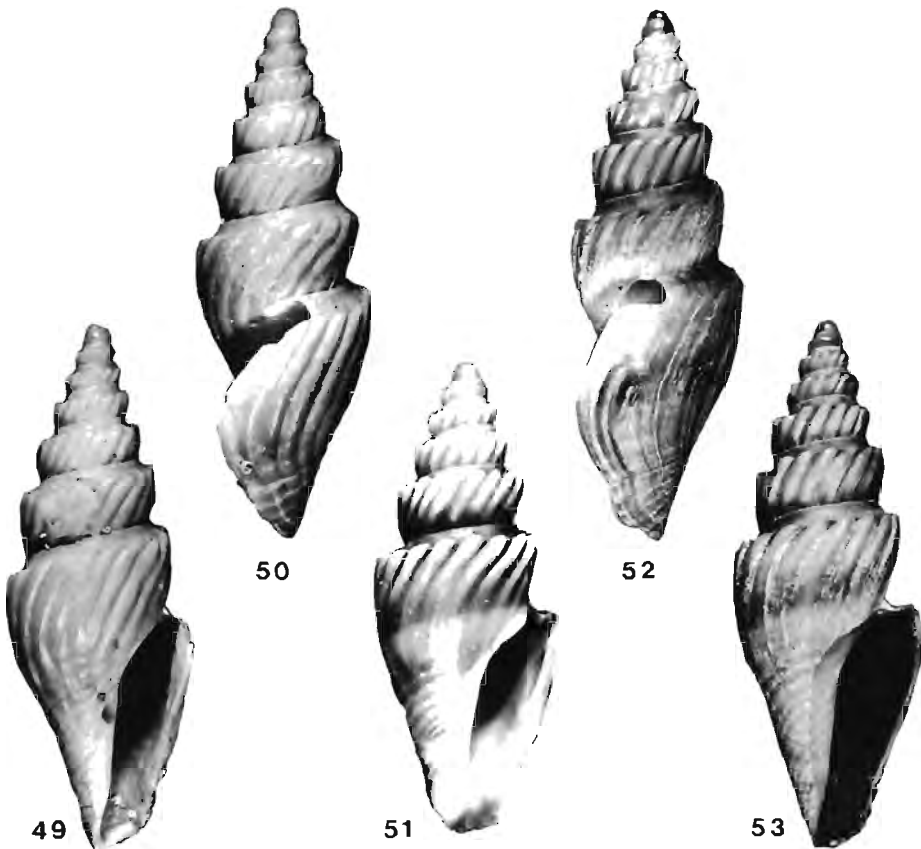
Not: *Clavatula* (*Surcula*) *opulenta*; Barnard, 1958:144 [= *Comitas anteridion* (Watson, 1881)].

Diagnosis: Shell fusiform-biconic (b/l 0,34–0,39, a/l 0,37–0,42); shoulder keel strong, crenellated, formed by terminations of axial ribs, shoulder slope strongly

concave, smooth; base without fasciole; axial ribs present throughout, 20–26 on body whorl, ending at or above parietal level, base with 10–11 spiral cords; dull purplish-pink (fading to light brown), often with a broad brownish zone below shoulder and around base, sometimes flammulate; protoconch breadth 1,1–1,2 mm, 1st whorl low. Maximum length 23,5 mm.

Description: Shell fusiform-biconic (b/l 0,34–0,39, a/l 0,37–0,42), with strong, crenellated shoulder keel, formed by terminations of axial ribs, shoulder slope strongly concave, whorl face gently convex; body whorl with moderately convex sides, and slightly concave to almost flat-sided base, without a fasciolar swelling. Aperture and its margins as in *T. fossata*.

Sculptured by short, oblique axial ribs at whorl periphery and a few spiral lirae on base of body whorl; shoulder concavity smooth except for growth-lines, no subsutural lira. Axial ribs strongly opisthocline, slightly arcuate, rounded, with narrower, V-shaped intervals; at shoulder ribs project slightly in coronate fashion, and in western Cape form reach lower suture on spire and posteriormost basal cord



Figs 49–53. *Tropidoturris scitocostata* (Sowerby, 1903): 49–50, Lectotype SAM A347, 20,1 × 7,2 mm; 51, NM C6348, off Shixini Point, Transkei, 240 m, 14,2 × 5,6 mm; 52–53, NM C2308, off Whale Rock, Transkei, 150–165 m, 16,8 × 6,0 mm.

on body whorl, but in Transkei examples ribs usually become obsolete just above suture and at/above parietal level, and project more at shoulder; 12–14 ribs on 1st whorl, increasing to 20–26 on last whorl, not weakening behind lip. Base of body whorl with 10–11 spiral cords, upper ones broad and declivous, becoming narrower and rounder anteriorly.

Protoconch (Fig. 13) somewhat globose, $1\frac{1}{2}$ whorls, practically smooth (scattered granules and a few spiral threads are just visible), except for a few sigmoid, terminal growth-lines; 1st whorl low; vitreous, moderate orange-yellow; breadth 1,1–1,2 mm, height 0,9–1,0 mm (b/h 1,20–1,33).

Colour (when fresh) moderate pink, with slightly darker intervals between ribs, sometimes with a broad brownish zone below shoulder and another around base of body whorl, often broken into axial flames; fading after death to light brown or moderate yellowish-pink; protoconch dark pink.

Dimensions: 21,9 × 7,9 mm; 22,7 × 8,6 mm, attaining 23,5 mm (lip broken).

Operculum (Fig. 8) oblancoolate, anteriorly curved and tapering only slightly, nucleus terminal, growth-lines coarse; transparent yellowish; about 0,26 length of aperture.

Radula teeth (Fig. 3) as in *fossata* but more slender; about 50 rows.

External anatomy as in *fossata* but no prickles visible on penis (only immature males available).

Range: Continental slope of Transkei to shelf off False Bay.

Locality data (all NM:MN unless otherwise stated): TRANSKEI: off Mgazi River, 190 m, glutinous black mud (C8810); do, 250 m, muddy sand (C8962); off Whale Rock, 150–165 m, coarse sand, discoid corals (C2308, C7488); do, 250–280 m, sand and shell rubble (C8653); off Bulungula River, 250–270 m, muddy sand, old shell debris (C2116); do, 250–300 m, coarse sand (C9348); off Nthlonyane River, 300 m, medium sand (C8741); off Mbashe River, 200–220 m, sponge-rubble (C7474); do, 450–500 m, coarse sand, some mud (C9057); do, 295–350 m, coarse sand (C9134); off Mendu Point, 250 m, coarse sand, rubble, some sponges (C6398); do, 250–260 m, coarse sand (C4920); do, 300 m, coarse sand (C6282); off Nqabara Point, 400–410 m, fine muddy sand, shell-conglomerate (C6417); off Shixini Point, 300 m, coarse sand, broken shell (C6352); same locality and substrate, 350 and 240 m (C6570, C6348 respectively); off Qora River, 270 m, old shells (C8012); do, 300 m, coarse sand, broken shell (C6563); off Stony Point, 395 m, sponge, stones, (C4355); off Qolora, 510 m, sandy mud (C6869); do, 290–300 m, fine muddy sand, broken shell (C6573); do, 340–350 m, coarse sand, broken shell (C6696); off Kei River, 222 m, coarse sand, old shell debris (C4083). EASTERN CAPE: off East London, 80–130 fath. (SAM A352); Algoa Bay, 56 fath. (SAM A1721). WESTERN CAPE: off False Bay, 20 fath. (SAM A1722); False Bay area, *ex pisce* (NM A4014: R. Le Maitre).

Type material: Lectotype of *P. scitecostata* (here designated) SAM A347, 20,1 × 7,2 mm (Figs 49–50). Paralectotype (SAM A37020), length 19,4 mm (lip broken). Holotype of *Surcula opulenta* presumably in ZMB.

Notes: The SAM shells referred to *Surcula opulenta* by Barnard (loc. cit.) are indistinguishable from *Comitas anteridion* (Watson, 1881). Although I have been

unable to examine the holotype of Thiele's *opulenta*, his description and figure apply well to *Tropidoturris scitecostata*, notably in the oblique, shouldered axial ribs and restricted basal lirae. As indicated in my description, a small sculptural difference occurs between the deep-water Transkei form (Figs 49–50) and shallower water western Cape material (Figs 51–53). Adequate samples from the central Agulhas Bank are needed before variation can be interpreted.

Barnard (1958) erroneously stated that an operculum was absent in this species.

***Tropidoturris anaglypta* sp. n.**

Figs 54–57

Diagnosis: Shell relatively short-biconic (b/l 0,42–0,47, a/l 0,49–0,56); shoulder keel and slope as in *scitecostata*, usually with a strong subsutural lira; no fasciole; axial ribs 20–26 on body whorl, base with 12–15 strong, rounded spiral cords, uppermost cord crossing rib bases; uniform pale to violaceous-brown; protoconch breadth 0,85 mm, 1st whorl slightly tilted. Maximum length 11,5 mm.

Description: Shell relatively short biconical (b/l 0,42–0,47, a/l 0,49–0,56), with a strong crenellated shoulder keel or angle formed by termination of axial ribs, shoulder slope strongly concave, whorl face gently convex, teleoconch whorls 5½, body whorl with strongly convex sides and moderately concave-sided base, without fasciole. Aperture and its margins as in *T. fossata*, but labrum more strongly convex in side view, and labial callus is relatively thick with sharply defined outer edge.

Sculptured around shoulder by short, oblique axial ribs and on base by coarse spiral cords; shoulder concavity smooth except for a strong subsutural cord (rarely absent). Axial ribs 14–15 on 1st whorl, increasing to 20–26 on last, strongly opisthocline, obliquely rounded in cross-section with narrow, V-shaped interstices, ribs sometimes becoming weak behind lip. Basal cords totalling 12–15, more or less rounded with narrow, deep intervals; uppermost cord, which terminates the bases of the axial ribs, may show above suture on penultimate whorl as may the two subsequent cords (eg. spire whorls usually with 1–3 anterior cords); cords broad, becoming narrower anteriorly, weak towards end of rostrum.

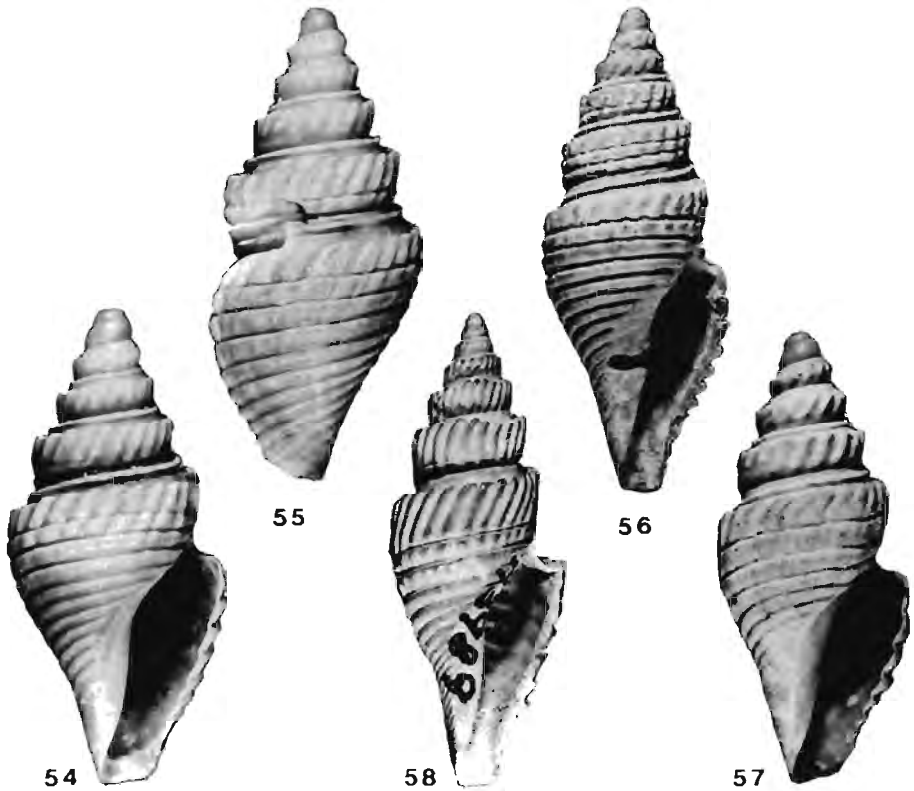
Protoconch somewhat globose, about 1½ whorls, 1st whorl slightly tilted; smooth; breadth 0,85 mm, height 0,60–0,75 mm (b/h 1,13–1,42).

Colour pale orange-yellow to light greyish-red or light yellowish-pink, protoconch greyish-white.

Dimensions: 8,2 × 3,8 mm (holotype); 7,5 × 3,5 mm, 11,5 × 4,3 mm (paratypes).

Range: Continental slope and outer shelf of Natal and Zululand, 150–305 m.

Type material: Holotype NM D1595/T3240, off Amanzimtoti, Natal (30°06,0'S, 31°01,6'E), 245–250 m, medium sand; *MN*. Paratypes 1–3, NM B5934/T3181, D536/T3184, off Durban, 270 m, fine sandy mud, *MN*; paratypes 4–5, NM B1079/T3183, off Durban, *ex pisce*, don. A. Visagé; paratype 6, SAM A37021, off Cape Vidal, Zululand, 80–100 fath., *PF*; paratype 7, NM D769/T3187, same as holotype; paratypes 8–11, NM D806/T3186, off Umlaas Canal, S. of Durban, 150 m, coarse sand, numerous spatangoids, *MN*; paratype 12, NM D1439/T3182, off Umlaas



Figs 54–58. *Tropidoturris anaglypta* sp. n. and *T.* sp. aff. *T. fossata* (Sowerby, 1903). *T. anaglypta*: 54–55, Holotype, NM D1595/T3240, 8,2 × 3,8 mm; 56, paratype 6, SAM A37021, off Cape Vidal, 80–100 fath., 11,5 × 4,3 mm; 57, paratype 3, NM D536/T3184, off Durban, 270 m, 6,7 × 3,1 mm. 58, *Tropidoturris* sp. aff. *fossata*, NM A3989, off Natal, 80 fath., 22,6 × 8,3 mm.

Canal, 250 m, coarse sand, MN; paratype 13, NM D1335/T3185, off Amanzimtoti, 300–305 m, medium sand, MN.

Notes: *T. anaglypta* is the smallest and most strongly sculptured member of the genus, somewhat similar to *T. fossata* and *T. scitecostata* in many respects, but with a much smaller protoconch.

Etymology: *anaglypta* = an embossed object, L.

Tomopleura Casey, 1904

Tomopleura Casey, 1904:138. Type species (o.d.) *Pleurotoma nivea* Philippi, 1851.

Diagnosis: Shell claviform, with high spire and truncate base, fasciole strong, columella usually with 1–2 weak to strong pleats, labrum with moderately deep, U-shaped anal sinus on shoulder slope, interior often with spiral ridges; sculptured by strong spiral lirae, with crisp, dense collabral threads in intervals. Protoconch smooth, except sometimes for a few terminal axial riblets or feeble spirals. Operculum oblong-ovate with terminal nucleus or oblong-ovate with eccentric

nucleus. Radula with long, slender, curved harpoon-like marginals and acutely pointed tip; no basement membrane.

Notes: Powell (1966) recognised two subgenera, viz. *Tomopleura* s.s. with multispiral protoconch, and *Maoritomella* Powell, 1942 (synonym *Narraweena* Laseron, 1954) with a paucispiral one. However, I suggest that direct development has been acquired independently by at least three different offshoots of the *Tomopleura* lineage. Firstly, *Narraweena* may perhaps be retained as a subgenus for a group of species that are otherwise typical *Tomopleura* in sculpture, columella plication and radular characters; examples are *T. subtilinea* (Hedley, 1922), the type species *T. cicatrigula* (Hedley, 1922), and *T. carrota* (Laseron, 1954) from Australia, and *T. retusispirata* (Smith, 1877) from locality unknown. Secondly, *Maoritomella* (q.v.) I recognise as a full genus for small, mainly austral shells in which axial/collabral threads/striae cross the spiral lirae; radular characters also differ. Thirdly, *Pulsarella* Laseron, 1954 (q.v.) appears useful for species resembling *Narraweena*, but with a characteristic sculpture of few spiral cords separated by wide, gently concave intervals; it may also differ in lacking an operculum and in its *Mitromorpha*-like radula teeth.

Key to *Tomopleura* in southern Africa and Mozambique

- Labial callus with ill-defined outer edge; b/l 0,31–0,32, maximum length 36 mm, up to 12 teleoconch whorls; mottled pale yellowish-brown or lilac; shoulder slope with 2–3 spiral threads, main one with small oblong nodules; protoconch breadth 0,43–0,45 mm. **nivea**
 Labial callus with sharp outer edge; b/l 0,32–0,35, maximum length 19,8 mm, with up to 9 teleoconch whorls; almost uniform yellowish-brown; shoulder slope with 1–2 spiral threads, main one finely gemmulate; protoconch breadth 0,53–0,63 mm **oscitans**

***Tomopleura oscitans* sp. n.**

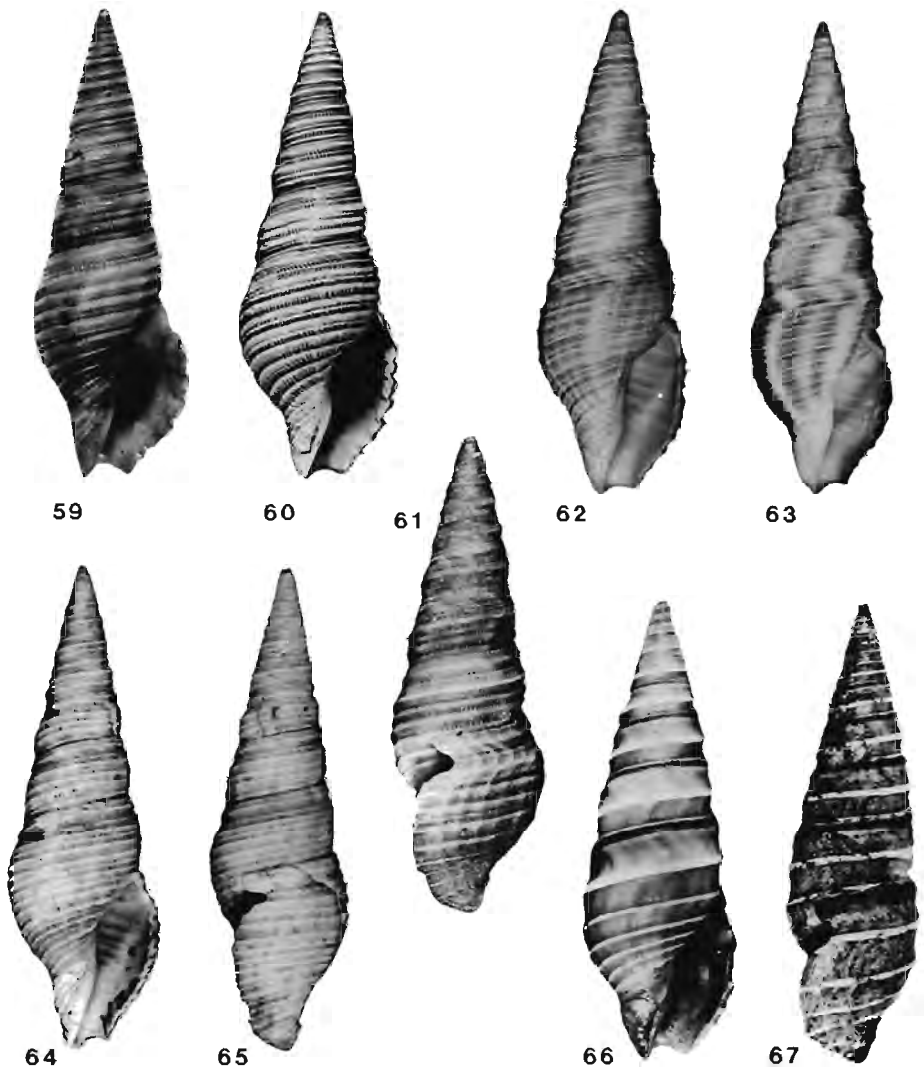
Figs 10, 59–61, 68

Pleurotoma vertebrata (non E. A. Smith, 1875); E. A. Smith, 1903:363.

Asthenotoma vertebrata (partim); Barnard, 1958:113.

Diagnosis: Shell with b/l 0,32–0,35, a/l 0,29–0,36, 9 teleoconch whorls, peripheral keel not strong on later whorls, base not markedly contracted, aperture wide, with flaring labrum, pinched in anteriorly; fasciole distinct, labial callus with sharply defined outer edge, a single weak columella pleat; 1st teleoconch whorl unicarinate, penultimate whorl with $2\frac{1}{2}$ –3 main lirae anterior to shoulder keel, shoulder slope moderately concave with 1–2 fine threads, anterior one distinctly gemmulate, subsutural cord fairly weak, with angular main cord and a fine one at suture crenulated by the fine, regular terminations of the collabral riblets; light brown, aperture greyish-pink; protoconch narrowly conical, $3\frac{1}{2}$ whorls, breadth 0,53–0,63 mm; maximum length 19,8 mm. Operculum oblong-ovate with eccentric, subterminal nucleus; slightly translucent orange-brown.

Description: Shell claviform with high spire, flaring lip and short, slightly bent base (b/l 0,32–0,35, a/l 0,29–0,36), about 9 teleoconch whorls, suture shallow, whorls



Figs 59–67. *Tomopleura* and *Pulsarella* spp. 59–61, *T. oscitans* sp. n.: 59, Holotype, NM D602/T3278, 18,6 × 6,0 mm; 60, paratype 1, NM 4394/T3279, 19,7 × 6,7 mm, whitened with MgCl₂; 61, paratype 10, NM D600/T3282, off Umhlanga Rocks, 15 fath., 18,6 × 6,0 mm. 62–65, *T. nivea* (Philippi, 1851): 62, Neotype (and lectotype of *Oligotoma makimonos* Jousseume, 1883), MHNP, 27,8 × 8,1 mm; 63, paralectotype of *O. makimonos*, MHNP, Japan, 24,1 × 7,0 mm; 64–65, NM H2486, Conducia Bay, Mozambique, 32,0 × 10,0 mm. 66–67, *Pulsarella fultoni* (Sowerby, 1888): 66, NM 4381, Jeffreys Bay littoral, 28,3 × 9,0 mm; 67, NM C4569, off Sandy Point, Transkei, 66 m, 25,2 × 6,8 mm.

gently convex, periphery median or slightly anterior, peripheral keel (which forms lower border to anal sinus) strong on early whorls, but barely stronger than other lirae on penultimate whorl, body whorl moderately convex, sides of base slightly concave, fasciole distinct. Aperture narrowly pyriform, greatest width at about posterior third, acute posteriorly, siphonal canal oblique and relatively wide, tip of rostrum projecting beyond end of labrum, siphonal canal obliquely notched; labial callus slightly sunken with a sharply defined outer edge, inner side of columella with a weak, oblique pleat; labrum thin, crenate, with 5–7 internal spiral ridges in adult, in side-view moderately convex with a slight stromboid notch and a fairly deep, narrowly U-shaped anal sinus.

Sculptured by narrow spiral ridges with collabral threads in intervals. First whorl with a strong peripheral keel and arcuate axial threads; a subsutural ridge develops on 2nd whorl, and a third one shows just above suture so that following 4–5 whorls are tricarinate; from 3rd or 4th whorl onward intermediary lirae develop by interpolation, so that by 9th whorl there are 4–5 main spiral ridges ($2\frac{1}{2}$ –3 below peripheral keel); sides of each ridge moderately sloping, $\frac{1}{2}$ to $\frac{1}{4}$ width of each interval; subsutural cord weak, bearing a double ridge, the lira at suture being weak and finely crenulate; shoulder sulcus moderately concave, with a fine lira (sometimes an even finer one posteriorly) that is rendered gemmulate by axial plicules; base of body whorl with 13–18 lirae, anteriorly strong, declivous, sometimes alternately weaker and stronger, 6–9 on rostrum closer and weaker than others. Axial plicules close, sharply incised, obsolete on rostrum.

Colour light brown or light yellowish-brown, faintly mottled, interior of aperture greyish-pink.

Protoconch (Fig. 68) narrowly conical, $3\frac{1}{2}$ whorls, last half-whorl with axial riblets, a thin ridge above suture on later whorls, otherwise smooth; breadth 0,53–0,63 mm, height 0,85 mm (b/h 0,62).

Dimensions: 18,6 × 6,0 mm (holotype); 19,8 × 6,6 mm, 19,0 × 6,6 mm (paratypes).

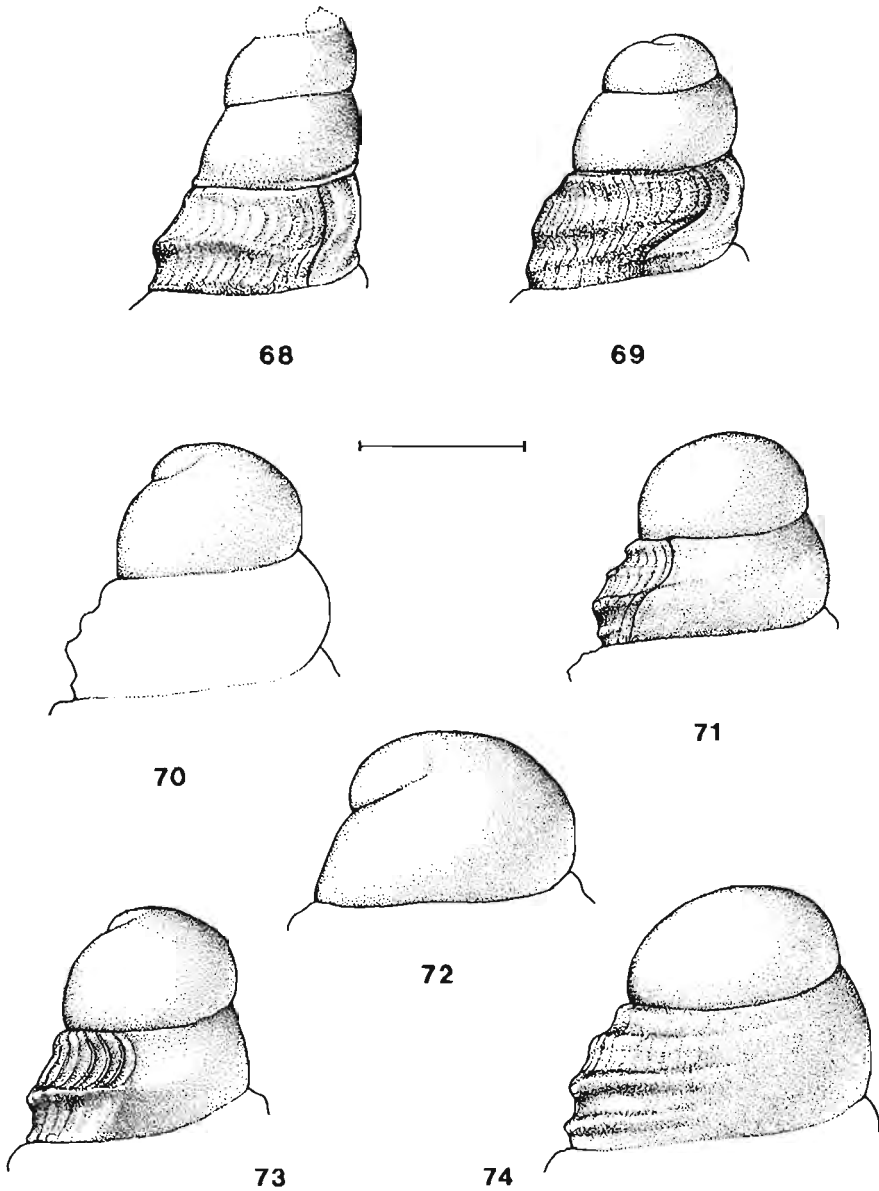
Operculum (Fig. 10) oblong-ovate, 0,38 of aperture length, nucleus eccentric near anterior end, which is rounded, slightly translucent, moderate orange-yellow.

Radula unknown.

Range: Durban to southern Mozambique, littoral to about 27 m on clean sand.

Type material: Holotype NM D602/T3278, Durban Bay, Bluff area, littoral, H. C. Burnup. Paratype 1, NM 4394/T3279, Durban, R. K.; paratypes 2–5, NM D1583/T3088, Durban Bay, Bluff, H. C. Burnup; paratypes 6–9, NM B2116–8/T3280, A1398/T3281, Durban Bay, shallow dredgings, B. J. Young; paratype 10, NM D600/T3282, off Umhlanga Rocks, Natal, 15 fath., clean sand and shell, R. K.; paratype 11, NM A403/T3283, off Umhlanga Rocks, 12–15 fath., R. Cruickshank; paratypes 12–14, NM J488/T3284, between Maputo and Zavora, *ex pisce*, leg. C. Fernandes.

Notes: Like *T. nivea* (q.v.), this species has been recorded as *T. vertebrata* (Smith, 1875), but differs from it in the same respects. *T. oscitans* in fact resembles a miniature *nivea* but is somewhat narrower (b/l 0,32–0,35 instead of 0,31–0,32), has fewer teleoconch whorls, a slightly larger protoconch (in South-East Africa, at all



Figs 68–74. Protoconchs of some *Tomopleura*, *Pulsarella* and *Maoritomella* spp. 68, *Tomopleura oscitans*; 69, *Pulsarella fultoni*; 70–71, *Maoritomella densecostulata*; 72, *M. megalacme*; 73, *M. granilirata*; 74, *M. tarrhion*. Scale-line = 0,5 mm.

events), a more gemmulate thread in the shoulder sulcus, finer and more regular axial plicae at the sutural border, a more flaring labrum, a sharply edged labial callus and a browner coloration. The two do not intergrade and do not appear to be sympatric. Even the operculum, if one may judge from the single available example of that of *oscitans*, is rather different (Figs 10, 11). A single shell from off Richards Bay, Zululand, in 100 m (NM D1532: A Connell) resembles some forms of *T. reevii* (C. B. Adams, 1850) (= *Pleurotoma violacea* Hinds, 1843, non C. B. Adams & Mighels, 1841) in coloration, being yellowish-white with orange-brown spiral cords. However, it has the wider aperture and more contracted base of *T. oscitans*, and is referred to the latter species (although excluded from the type series). Finally, there is some superficial resemblance to *Pulsarella komakimonos* (Otuka, 1935) from Japan; according to NSMT material that has a protoconch of slightly more than two whorls, a wider, barely impressed shoulder slope bearing 2–3 non-gemmulate spiral threads, fewer spiral lirae (only one lira on base of spire whorls, 11–12 on base of body whorl) and finer collabral threads.

Etymology: *oscitans* = yawning, L.

Tomopleura nivea (Philippi, 1851)

Figs 6–7, 11, 62–65

Pleurostoma nivea [sic] Philippi, 1851:92. Type locality: Formosa [here emended to Japan].

Tomopleura nivea; Habe, 1964:120, pl. 38, fig. 12; Kuroda *et al.*, 1971:226, pl. 55, fig. 2.

Oligotoma makimonos Jousseaume, 1883:198, pl. 10, fig. 4. Type locality: Japan.

Drillia makimonos; Tryon, 1884:319, pl. 34, fig. 10 (after Jousseaume).

Turris (*Tomopleura*) *nivea* var. *makemonos* [sic]; Melvill, 1917:147.

Asthenotoma vertebrata (non E. A. Smith, 1875), *partim*; Barnard, 1958:113, fig. 8c (radula).

Diagnosis: Shell with b/l 0,31–0,32, a/l 0,30–0,35, about 12 teleoconch whorls, peripheral keel not strong on later whorls, base not contracted, fasciole distinct; labial callus without sharply defined outer edge, a single weak columella pleat; 1st teleoconch whorl unicarinate, penultimate whorl with 3–4 ridges (sometimes with intermediaries) below shoulder keel, shoulder slope moderately concave, with 2–3 threads, anteriormost one cut into small, oblong nodules; subsutural cord weak, with angular main cord and a fine one, crossed by the relatively coarse and irregular terminations of the collabral riblets, at suture; off-white, mottled with light yellowish-brown, sometimes pale lilac, aperture and sometimes columella lilac or purple; protoconch breadth 0,43–0,45 mm (0,55 mm); maximum length 36 mm. Operculum leaf-shaped with terminal nucleus, opaque, dark brown.

Description: Shell as in *oscitans* but b/l 0,31–0,32, a/l 0,30–0,35, about 12 teleoconch whorls, peripheral keel prominent on first 7–9 whorls, barely stronger than other lirae; labial callus slightly sunken, glaze-like, outer edge not sharply defined; interior of aperture with 7–9 spiral ridges in adult; penultimate whorl with 6–9 main ridges, subsutural cord weak, bearing a strong angular ridge and a weaker, coarsely crenulate one posteriorly; shoulder sulcus with a nodular ridge below and 1–2 fine threads above; 3–4 ridges below shoulder keel, sometimes with weaker intermediaries; base of body whorl with 13–18 lirae (rarely as few as 11), posterior ones strong, declivous, often alternately weaker and stronger, 6–9 closer lirae on rostrum.

Colour yellowish-white, diffusely mottled with light yellowish-brown, apex

light-brown, spire sometimes light grey, interior of aperture greyish-yellowish-pink to dark purple, this colour sometimes extending onto columella. Occasionally purplish-white with early whorls very pale purple.

Protoconch damaged in all specimens seen, but apparently resembling that of *T. oscitans*; breadth 0,43–0,45 mm (0,55 mm in a Japanese syntype).

Dimensions: 36,3 × 11,3 mm; 32,0 × 10,0 mm.

Operculum (Fig. 11) opaque dark brown, oblongate with terminal nucleus, 0,45 length of aperture.

Radula (Figs 6–7) of harpoon-shaped, curved marginal teeth, without basement membrane, tip with cutting edges but no barbs.

Range: Japan to Mozambique and Natal, littoral in sand.

Regional locality records (all NM): NORTHERN MOZAMBIQUE: Nacala Bay, soft sand below *Thalassodendron* and rocks, 4 ft above LST, little surf (H2483: K. Grosch); Nacala (J7164: Mrs H. Boswell); Conducia Bay (H2486: K. Grosch); Lunga Bay, under rock slab in soft sand, 5 ft above LST (H2485: K. Grosch); Mozambique Is., soft sand above coral area, little surf, 4 ft above LST (H2484: K. Grosch); Angoche, open muddy sandbank, little surf, LST (J4279: K. Grosch). SOUTHERN MOZAMBIQUE: Bazaruto Is., S. W. sandbank (J5797, G3469: Mrs E. Roscoe); Magaruque Is., sandbank (G2129: Mrs E. Roscoe); Inhambane Bay, sand, 1 ft below LST (F8733: M. Lohr). NATAL: Durban Bay, shallow dredgings (A1429, B2275: B. J. Young).

Type material: Holotype of *Pleurotoma nivea* missing from the extant remnants of the Largilliert collection (P. Bouchet, in litt. 25/xi/85). Four syntypes of *Oligotoma makimonos* from Jousseume colln. preserved in MHNP. Figured syntype (Jousseume, 1883: pl. 10, fig. 4) here designated as both lectotype of *makimonos* and neotype of *nivea* (Fig. 62); no accession number, dimensions 27,0 × 8,1 mm, a faded shell with chipped lip, no locality data with material, but 'Japon', according to Jousseume, which supersedes 'Formosa' as type locality for *P. nivea* (ICZN Article 75 (f)); Taiwan (Formosa) lies only a few hundred kilometres from the nearest Japanese island.

Notes: *T. nivea* has been confused by various authors with both *T. vertebrata* (Smith, 1875) and *T. reevii* (C. B. Adams, 1850). *T. vertebrata* differs in its markedly contracted base, stronger fasciole, more prominent shoulder keel and fewer spiral lirae. In *T. reevii* the subsutural cord is more prominent and it also differs in colour and size. These two species are discussed further in the appendix.

The holotype of *P. nivea* was never figured, nor were dimensions given, and the brief description could apply to several species of *Tomopleura*. Being the type-species of the genus it cannot merely be disregarded as a *nomen dubium*. I am therefore following modern Japanese usage in equating it with *Oligotoma makimonos* by designating a syntype of the latter as neotype of *nivea*.

Pulsarella Laseron, 1954

Pulsarella Laseron, 1954:20. Type-species (o.d.) *Pleurotoma cognata* E. A. Smith, 1877.

Diagnosis: Shell resembling *Tomopleura* but spiral cords few and separated by wide, evenly concave intervals; protoconch paucispiral or multispiral, smooth

except for a few terminal axials; operculum absent. Marginal teeth of radula relatively short, straight and awl-shaped, slightly constricted medially.

Notes: Powell (1966:85) believed that this group might prove a synonym of *Asthenotoma* Harris & Burrows, 1891, but in the absence of details of protoconch and sinus retained it as a full genus. Shuto (1969:199), on the other hand, treated *Pulsarella* as a subgenus of *Microdrillia* Casey, 1903. I regard it as extremely close to *Tomopleura*, but prefer to maintain it as a full genus. Confirmation of the paucispiral nature of the protoconch in the type species, *P. cognata*, is still required, as this is broken or absent in all specimens examined. The last protoconch whorl, retained in one AMS shell (C147604, Swain Reefs, Queensland, 9 m), is smooth, with only a few arcuate axial ribs terminally; this indicates relationship with *Tomopleura* rather than *Microdrillia*.

Under *Pulsarella* I would also group *Pleurotoma fultoni* (Sowerby, 1888) from South Africa and *Oligotoma clevei* Joussemae, 1883, from Sri Lanka. These show a paucispiral protoconch and a single feeble columella pleat. Provision of a subgenus may be necessary for the West African *Pleurotoma spiralis* E. A. Smith, 1871, whose multispiral protoconch indicates that it has retained pelagic larval development; it possesses two columella pleats. It remains to be shown whether the absence of an operculum (as observed in *P. fultoni*) and the distinctive *Mitromorpha*-like radula of the latter species characterise the group as a whole.

Pulsarella fultoni (Sowerby, 1888) **comb. n.**

Figs 5, 66–67, 69

Pleurotoma fultoni Sowerby, 1888:210, pl. 11, fig. 17. Type locality: Port Elizabeth.
'*Drillia*' *fultoni*; Barnard, 1958:118 (references), fig. 8g (radula).
Tomopleura vertebrata (non E. A. Smith, 1875); Powell, 1966:81.

Diagnosis: Shell with b/l 0,30–0,34, a/l 0,29–0,35, base not contracted, fasciole distinct, suture very shallow, a weak columella pleat, interior of labrum smooth; whorls with 3 strong, rounded, equidistant spiral cords, median (peripheral) one slightly stronger than others, intervals wide and evenly concave, shoulder sulcus with a thin intermediary, base of body whorl with 5 spiral cords plus a series of fine, close threads on rostrum; intervals with dense, fine incremental threads, crossed in places by spiral microstriae; yellowish-brown, with occasional incremental lines of orange-brown, rostrum and sutural border orange-brown, peripheral and basal cords white. Protoconch rather pupoid, 2½ whorls, breadth 0,55–0,65 mm. Maximum length 32 mm. No operculum.

Description: Shape claviform with high spire, and short, slightly bent base (b/l 0,30–0,34, a/l 0,29–0,35); teleoconch whorls 10(11?), suture very shallow, whorls only slightly convex, periphery median, body whorl moderately convex, left side of base concave, fasciole distinct. Aperture curved, somewhat linear, acute posteriorly, siphonal canal oblique and relatively wide; columella with a convex pad bearing a feeble median pleat, parietal region with a thin, transparent glaze, but no nodule; labrum thin, slightly undulating in side-view, anal sinus moderately deep, relatively wide, asymmetrically U-shaped, with its anterior limb projecting beyond subsutural one; interior of aperture smooth.

Sculptured by strong spiral cords with wide, evenly concave intervals, crossed by fine, close incremental threads. First teleoconch whorl with 3 spiral lirae, the lowermost the strongest, the subsutural lira sometimes feeble; by 2nd or 3rd whorl a 4th lira develops above suture, and all except 2nd lira increase in strength; penultimate whorl with 3 rounded, equidistant spiral cords, the median one slightly stronger, plus a thin lira within shoulder sulcus, sides of ribs strongly sloping; base of body whorl with 5 progressively weaker cords, plus a series of fine, close threads on rostrum. Intervals with dense, fine incremental threads crossed in places by microscopic spiral striae. Covered by a very thin, translucent brown periostracum.

Colour light greyish-yellowish-brown to light yellowish-brown, with occasional incremental lines or stripes of brownish-orange or strong brown, rostrum and a narrow subsutural border similarly coloured; peripheral and basal lirae uniform white; columella stained with greyish-purple, interior of aperture white, labrum edged with strong brown, interrupted at terminations of spiral cords. Occasionally white, with brownish-orange markings restricted to last whorl and columella. Apex in beach-rolled shells greyish-violet.

Protoconch (Fig. 69) rather pupoid, of about $2\frac{1}{2}$ whorls, suture deep, vitreous white, smooth except for coarse axial plicules on last quarter whorl, termination opisthocline and sigmoid; breadth 0,55–0,65 mm, height 0,53–0,70 mm (b/h 0,93–1,04).

Dimensions: 29,5 × 8,9 mm; 28,3 (plus protoconch) × 9,2 mm; attains 32,3 mm (worn shell).

No operculum. Body white; tentacles short, subcylindrical, with eyes at tips; penis dorsoventrally flattened, end blunt, simple.

Radula (Fig. 5): Marginals only, without basement membrane, awl-shaped, slightly constricted in middle, with relatively wide base and slender, very sharp end, without barbs or cutting edge.

Range: Agulhas Bank from False Bay to Transkei, 25–84 m on inshore sand and mud, rarely washing up on shore in eastern Cape.

Locality data: TRANSKEI (all NM:MN): off Ubombo, 40–45 m, coarse sand, broken shell, living (C2451); off Mncwasa Point, 32–35 m, fine sand (C1808); off Bulungula River, 25 m, fine sand, small polychaete tubes (C6584); off Shixini Point, 45–48 m, muddy sand (C4387); off Sandy Point, 66 m, grey mud (C4569). EASTERN CAPE: off East London, 60 m, grey mud, worm tubes (NM B7888:MN); Port Alfred, beach (NM B2974: H. Becker) and 40 fath. (Barnard 1958); Port Elizabeth, beach (NM 5955: W. Falcon; B6822: J. Crawford; 610: H. Burnup); Algoa Bay, 32 fath. (Barnard 1958); Jeffreys Bay, beach (NM 4381: R. K.). TSITSIKAMMA COAST: off Cape St Blaize, 39 fath. (Barnard 1958), *ex pisce* (NM B1065: R. Le Maitre); off Cape Infanta, 46 fath. (Barnard 1958). FALSE BAY (Barnard 1958); Simonstown dredgings (NM A2817: Mrs C. M. Connolly).

Type material: The location of the holotype is unknown; it is not in BM(NH) nor in the S. D. Bairstow collection at OUM.

Notes: This striking species washes up only in more or less worn condition. The spire of living individuals is usually coated with a tar-like black deposit.

Barnard (1958) noted the apparent resemblance between *fultoni* and *Pleurotoma spiralis* E. A. Smith, 1871, from West Africa. A specimen from off Takoradi, Ghana, 17 m (NM K489: R. H. Isaacs) has thinner spiral cords and coarser incremental threads than *fultoni*, plus a double columella pleat and an orthoconic protoconch of at least $3\frac{1}{2}$ whorls. There is equal resemblance to *Pleurotoma cognata* E. A. Smith, 1877 (type-species of *Pulsarella*) of Queensland, but that is uniform pale brown with thinner spiral cords and coarser incremental threads. *Oligotoma clevei* Jousseume, 1883, from Ceylon, has a similar protoconch to *fultoni*, but is a smaller species (9 mm), with sharper spiral cords, the peripheral one being prominent (rendering early whorls unicarinate) and the rostrum has a few angular ridges instead of fine, dense threads.

Powell's 1966 record of *Tomopleura vertebrata* from 'False Bay' cannot refer to that tropical Indian Ocean species; his description of its radula, its lack of an operculum and its locality clearly apply to *P. fultoni*.

Maoritomella Powell, 1942

Maoritomella Powell, 1942:113. Type-species (o.d.) *Pleurotoma albula* Hutton, 1873.

Diagnosis: Shell resembling *Tomopleura* but small and usually biconical, collabral threads *crossing* spiral lirae; protoconch bluntly domed, of $1\frac{1}{2}$ – $2\frac{1}{2}$ whorls. Operculum present. Marginal teeth of radula rather short, straight and awl-like.

Notes: The protoconch of the type-species of *Maoritomella* was figured by Powell (1942: text fig. C8) and its radula by Powell (1966: text fig. D97). Although previously treated as a subgenus of *Tomopleura*, there seems greater resemblance to some of the European fossils referred to the genus *Asthenotoma* Harris & Burrows, 1891.

Key to *Maoritomella* in southern Africa

(excluding *M. eva*, q.v.)

- 1 Outer lip foreshortened basally, siphonal canal indented; protoconch diameter about 0,9 mm 2
- Outer lip not foreshortened basally, siphonal canal not indented; protoconch diameter 0,8 mm or less 4
- 2 Peripheral keel strong; body whorl with 9 basal lirae **megalacme**
- Peripheral keel weak; body whorl with 15 basal lirae 3
- 3 Sculpture fenestrate, without granules; suture moderately deep, fasciole strong **tarrhion**
- Spiral lirae cut into granules by finer collabral threads; suture shallow, fasciole absent **pleonastica**
- 4 Low axial ribs forming nodules on spiral lirae, collabral threads conspicuous only on shoulder slope; beginning of 1st teleoconch whorl with 2 spiral lirae only; peripheral keel weak **granilirata**
- No axial ribs, but collabral threads well developed; beginning of 1st teleoconch whorl with 4–5 spiral lirae; peripheral keel moderately strong 5

- 5 Shoulder slope shallowly concave, with 2–3 fine, feeble spiral threads; subsutural cord fairly weak; collabral threads very fine and dense; a/l 0,43; protoconch breadth 0,65–0,68 mm **densecostulata**
- Shoulder slope moderately to strongly concave, with a spiral thread crossed by arcuate plicules; subsutural cord strong; collabral threads strong and well spaced; a/l 0,45–0,47 6
- 6 Peripheral keel moderately strong, median; ‘herringbone’ ridge on shoulder slope with small erect nodules; posterior basal cords subequal to/slightly narrower than intervals; protoconch diameter 0,80 mm **clupeispina**
- Peripheral keel stronger, below median; nodules on ‘herringbone’ ridge weak; posterior basal cords $\frac{1}{2}$ – $\frac{1}{3}$ width intervals; protoconch diameter 0,68–0,73 mm **leptopleura**

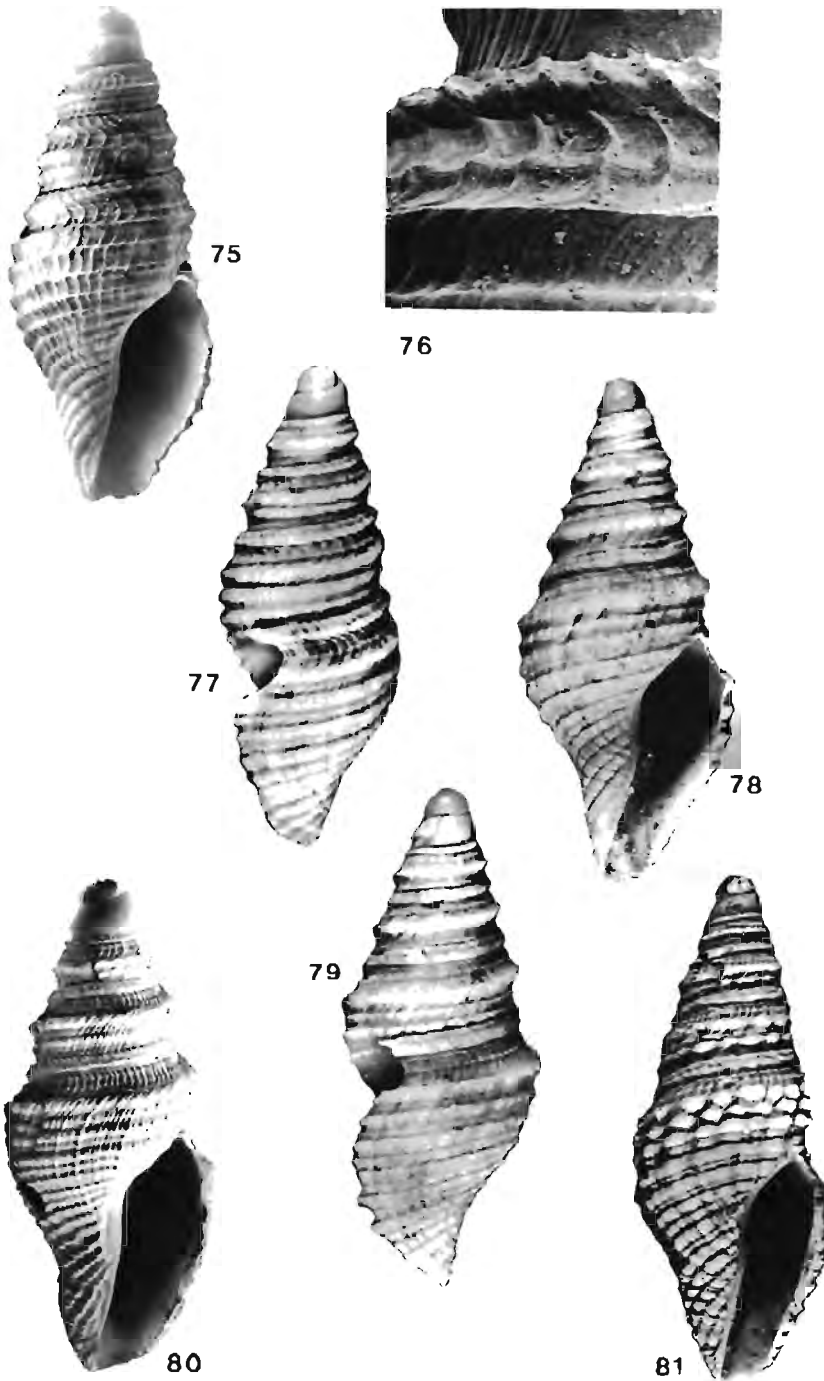
Maoritomella clupeispina n. sp.

Figs 75–77

Diagnosis: Shell fusiform-biconic (b/l ca. 0,41–0,43, a/l 0,45–0,47), fasciole indistinct, labrum not foreshortened basally, siphonal canal not indented; 1st teleoconch whorl with 4 spiral lirae, 3rd one keel-like; subsutural cord strong, shoulder slope deeply concave with a spiral thread with erect granules where crossed by lunulate plicules, plus a weaker thread; peripheral keel moderately strong, median; 1–2 somewhat declivous spiral lirae anteriorly, 9–11 on base, subequal to or slightly narrower than intervals; collabral threads crisp, strong, well spaced; protoconch breadth 0,80 mm; attains 5,7 mm.

Description: Shell fusiform-biconic (b/l about 0,41–0,43, a/l 0,45–0,47) with blunt, more or less orthoconic spire, concave-sided base and indistinct fasciole; suture deep; teleoconch whorls about 4; spire whorls slightly convex with peripheral keel median on later whorls, shoulder slope with a rather deep, moderately wide sulcus, subsutural cord strong. Aperture narrowly pyriform, greatest width at posterior third, siphonal canal wide, slightly tapering; labium sinuous, columella straight anteriorly, slightly convex posteriorly, parietal region weakly convex, callus moderately thick, without a columella pleat; labrum thin, smooth inside, anal sinus moderately deep, an open U; siphonal canal not notched; growth-lines indicate a feeble stromboid notch.

Sculpture of strong spiral lirae, crossed by elevated, well-spaced collabral threads; very dense, microscopic spiral striae on early whorls. First teleoconch whorl with a peripheral cord just below midline, with a weak thread on either side of it and another below suture; by penultimate whorl subsutural cord has become strong, declivous and bifid, peripheral cord moderately strong, median, with 1–2 subequal cords anterior to it, crests of cords somewhat declivous; shoulder sulcus with a median thread, bearing small angular nodules where crossed by strongly arcuate incremental riblets, and a very fine thread next to subsutural cord; intervals between main anterior cords on penultimate and last whorls may each bear a finer intermediary spiral; base of body whorl with 9–11 rounded, steep-sided spiral cords, posterior ones equal to or slightly narrower than their intervals, on rostrum becoming closer but not weaker. Collabral threads form oblique plicules on crests



Figs 75-81. *Maoritomella* spp. 75-77, *M. clupeispina* sp. n., holotype, NM C8025/T3288, 5,7 × 2,3 mm, 76 showing mid-shoulder thread; 78-79, *M. leptopleura* sp. n., holotype, NM C1307/T3244, 5,7 × 2,5 mm; 80, *M. densecosulata* sp. n., holotype, NM C7213/T3290, 4,6 × 2,0 mm; 81, *M. granilirata* sp. n., holotype, NM C7317/T3247, 6,4 × 2,5 mm. 75, 76, 80 are SEM, 81 coated with magnesium oxide.

of main cords, and render basal lirae somewhat nodular. Bleached, but evidently brown with paler protoconch.

Protoconch of $1\frac{1}{2}$ – $1\frac{3}{4}$ smooth, strongly convex whorls, breadth 0,80 mm, height 0,60 mm (b/h 1,33), smooth.

Dimensions: $5,7 \times 2,3$ mm (holotype, lip slightly chipped); $5,3 \times 2,3$ mm (lip broken).

Range: Continental slope of eastern Transkei.

Type material: Holotype NM C8025/T3288, off Rame Head ($31^{\circ}56,1'S$, $29^{\circ}26,5'E$), 410–430 m, stones, some sand; dredged MN. Paratypes 1–2, NM C7374/T3243, C7821/T3242, same data.

Notes: All three types are bleached, but are distinctive enough for description. *M. clupeispina* somewhat resembles *M. regina* (Thiele, 1925) from East Africa, but has a lower spire, and the shoulder slope bears a prickly ridge (Fig. 76) crossed by lunulate plicules (somewhat resembling a fish's backbone).

Etymology: *Clupea* (a herring) + *spina* (a backbone), L, referring to the 'herring bone' appearance of the shoulder thread.

Maoritomella leptopleura sp. n.

Figs 78–79

Diagnosis: Shell resembling *M. clupeispina* but more biconical with a more strongly projecting peripheral keel, situated below midwhorl, anal sinus with more rounded apex, labrum without stromboid notch; "herringbone" ridge on shoulder sulcus without sharp nodules and cross-plicules less arcuate; basal cords posteriorly narrow and wide-set, intervals 2–3 times their width; incremental threads less crisp, closer and more irregular; protoconch diameter 0,68–0,73 mm.

Description: Shell biconical (b/l 0,44, a/l 0,46), with rather blunt, orthoconic spire, concave-sided base and no fasciole; suture moderately shallow, teleoconch whorls 4; spire whorls slightly convex, with angularly projecting peripheral keel below midwhorl; shoulder slope moderately concave, rather wide, subsutural cord strong. Aperture and its margins as in *M. clupeispina*, but apex of anal sinus less rounded and no sign of a stromboid notch.

Sculpture of strong spiral lirae, crossed by moderately elevated, well-spaced collabral threads. First teleoconch whorl as in *clupeispina*, subsequent whorls with a prominent peripheral keel, an anterior lira immediately above suture, a declivous, bifid subsutural cord and a weak thread on shoulder slope, crossed by gently arcuate collabral plicules that form feeble compressed nodules, slope also with traces of additional faint spiral threads; penultimate whorl with a thin intermediary below peripheral keel; base of body whorl with about 10 spiral lirae, close and rounded on rostrum, posteriorly narrow, half to one-third width of their intervals, some of which bear a fine intermediary thread. Collabral threads irregular, rendering spiral lirae somewhat nodular. White.

Protoconch rather papilliform, of $1\frac{2}{3}$ smooth, strongly convex whorls, breadth 0,68–0,73 mm, height 0,50–0,63 mm (b/h 1,16–1,36).

Dimensions: $5,7 \times 2,5$ mm (holotype).

Range: Continental shelf of eastern Transkei.

Type material: Holotype NM C1307/T3244, off Port Grosvenor (29°58,0'S, 31°56,6'E), 100–115 m, sand, some mud, solitary corals, shells, dredged *MN*. Paratype 1, NM C5059/T3245, same data, a juvenile.

Notes: A shallower-water species than *M. clupeispina* which it closely resembles.

Etymology: *leptos* (fine) + *pleuron* (a rib), Gr.

***Maoritomella densecostulata* sp. n.**

Figs 14, 70–71, 80

Diagnosis: Shell fusiform-biconic (b/l 0,40–0,41, a/l 0,43), fasciole feeble to distinct; labrum not foreshortened basally, siphonal canal not indented; 1st teleoconch whorl with 4–5 lirae, 3rd or 4th keel-like, subsutural cord rather weak; shoulder slope shallowly concave with 2–3 fine, feeble spiral threads, dominated by axial sculpture; peripheral keel strong, slightly below midwhorl, 2 somewhat declivous main spiral lirae anteriorly, 11 on base; collabral threads very fine and dense; brown; protoconch breadth 0,65–0,68 mm; attains 6,3 mm.

Description: Shell shape as in *M. clupeispina* (b/l 0,40–0,41, a/l 0,43), but peripheral keel somewhat anterior to midwhorl, shoulder slope only shallowly concave and subsutural cord relatively weak; aperture and its margins as in *clupeispina*, basal fasciole feeble to distinct.

Sculptured by moderately strong spiral lirae, overridden by fine, dense collabral threads. Early whorls with 4–5 equidistant spiral lirae, of which the subsutural one develops into a declivous, bifid cord, the 2nd (and 3rd lira, when present) remains as a weak thread on shoulder slope, while peripheral cord remains stronger than the others and the anteriormost lira is eventually joined by another above suture; an intermediary thread may develop in each interval; unlike *clupeispina*, spiral threads on shoulder slope are feeble and barely stronger than the axial riblets, and number 2–3; base of body whorl with 11 spiral lirae, resembling those in *clupeispina*. Colour light orange-yellow to brownish-orange.

Protoconch (Figs 14, 70–71) of $1\frac{1}{2}$ – $1\frac{3}{4}$ strongly rounded whorls, smooth save for a vestige of a peripheral angle on end of last whorl, light orange-yellow to brownish-orange, breadth 0,65–0,68 mm, height 0,53–0,58 mm (b/h 1,17–1,28).

Dimensions: 4,6 × 2,0 mm (holotype); 6,3 × 2,5 mm, 5,4 × 2,2 mm (paratypes).

Range: Outer continental shelf of Transkei, 74–200 m.

Type material: Holotype NM C7213/T3290, off Whale Rock (32°01,3'S, 29°19,3'E), 150–200 m, sponge-rubble. Paratypes 1–2, NM C7429/T3249, off Qolora River, 114 m, sponge-rubble; paratypes 3–4, NM C7581/T3250, off Sandy Point, 94 m, gorgonians, sponges; paratype 5, C7611/T3251, off Mncwasa Point, 74 m, sand, rubble; paratype 6, NM C7539/T3254, off Nthloniyane River, 95 m, sponge-rubble; paratypes 7, 8, NM C7655/T3255, off Whale Rock, 70–73 m, marine growths; paratype 9, C7794/T3252, off Whale Rock, 150–165 m, coarse sand, discoid corals; paratype 10, NM C7264/T3253, off Mgazi River, 180 m, soft mud. All dredged *MN*.

Notes: None of the adult types are undamaged but the species is clearly distinct from its congeners. *Maoritomella regina* (Thiele, 1925) from East Africa has a slightly different shape, shouldered whorls, and a broad shoulder slope evidently lacking spiral sculpture. The spiral sculpture of the first teleoconch whorl resembles that of *M. clupeispina*.

Etymology: *densus* (dense) + *costulata* (with fine ribs), L.

***Maoritomella granilirata* sp. n.**

Figs. 73, 81

Diagnosis: Shell narrowly fusiform-biconic (a/l 0,43–0,44), fasciole weak, labrum not foreshortened, siphonal canal not indented; 1st teleoconch whorl initially with only a submedian keel and subsutural lira; subsutural cord in adult rather weak, shoulder slope shallowly concave, with 2 thin, weak spiral threads, crossed by lunulate plicules; peripheral keel weak, at or slightly above midwhorl; 2 main lirae anteriorly, 9–10 on base; axial ribs low, rounded, extended well onto base; 14–16 on body whorl, forming spirally oblong nodules on spiral lirae; brown; protoconch breadth 0,65 mm; attains 6,4 mm.

Description: Shell narrowly fusiform-biconic (a/l 0,43–0,44) with a blunt, high orthoconic spire and tapering, concave-sided base, with weak fasciole; suture deep, $4\frac{1}{2}$ teleoconch whorls, slightly convex with a weak peripheral keel, which is median (slightly posterior to middle on penultimate whorl); shoulder slope shallowly concave, subsutural cord fairly strong. Aperture and its margins evidently as in *clupeispina* (but labrum broken in type material).

Sculpture of spiral lirae bearing spirally oblong nodules where they cross weak axial ribs; minute collabral threads overall, but showing mainly on shoulder slope. First teleoconch whorl with 2 spiral lirae, consisting of a strong submedian peripheral lira and a weaker subsutural one, with a feeble intermediary thread developing later on the whorl; on 2nd whorl a 3rd lira develops above suture (another may begin to develop subsequently), so that penultimate whorl bears a shallowly bifid, declivous subsutural cord, a weak peripheral keel and two main subequal anterior lirae; shoulder slope with 2 feeble spiral threads, subequal to the incremental ones; base of body whorl with 9–10 spiral lirae, posterior ones alternately weaker and stronger. Axial ribs ill-defined, only developing from 3rd whorl, opisthocline, terminating at peripheral cord, but extending well onto base of body whorl, where number 14–16. Colour light brown (but faded).

Protoconch (Fig. 73) of $1\frac{3}{4}$ smooth whorls, 1st whorl large but depressed, light orange; breadth 0,65 mm, height 0,53–0,58 mm (b/h 1,12–1,23).

Dimensions: 6,4 × 2,5 mm (holotype, lip damaged).

Range: Continental shelf of eastern Transkei.

Type material: Holotype NM C7317/T3247, off Port Grosvenor (31°24,6'S; 29°57,2'E), 80 m, worn calcareous nodules, dredged *MN*. Paratype 1, NM C7297/T3248, worn, same data.

Notes: *M. granilirata* differs from *M. clupeispina* and *densecostulata* in its higher spire, nodular axial ribs, slightly narrower and more papilliform protoconch, with

larger first whorl, and in its initial teleoconch sculpture of 2 spiral lirae, instead of 4–5.

Etymology: *granum* (a grain) + *liratus* (ridged), L.

Maoritomella megalacme sp. n.

Figs 72, 82–3

Diagnosis: Shell biconical (b/l 0,44, a/l 0,49), fasciole moderately strong, peripheral keel strong, initially below middle, later slightly above, siphonal canal shallowly indented; 3 spiral lirae on 1st teleoconch whorl; penultimate whorl with 2 weakly rounded anterior lirae, a low subsutural cord and a low, wide midshoulder lira which bears transverse nodules, collabral threads strong, rendering spirals somewhat granulose; body whorl with 9 low basal lirae, subequal in strength, posterior ones subequal to their intervals; protoconch breadth 0,9 mm, 1st whorl large; total length 7,2 mm.

Description: Shell biconical (b/l 0,44, a/l 0,49), with blunt, more or less orthoconic spire, concave-sided base and moderate fasciole; suture fairly deep; teleoconch whorls about 4, spire whorls strongly convex with strong peripheral keel, below median on upper whorls, slightly above it on penultimate whorl; shoulder slope moderately concave and wide, subsutural cord present, but not strong. Aperture narrowly pyriform, greatest width at posterior third, siphonal canal wide, parallel-sided; labium sinuous, columella convex, parietal region concave, callus fairly thick, without pleat; labrum damaged, anal sinus moderately deep, a widely open U; siphonal canal shallowly notched, oblique.

Sculpture of strong, somewhat flat-topped spiral lirae, crossed by well-developed but finer collabral threads. First teleoconch whorl with 3 spiral lirae, the anteriormost (which lies at $\frac{1}{3}$ of the whorl above suture) being the strongest, and developing on 2nd whorl into a prominent but blunt keel; on this whorl a 4th lira is interpolated above suture, and upper two develop into a subsutural and a midshoulder lira respectively; penultimate whorl with two lirae anteriorly, midshoulder lira relatively broad and gently rounded; base of body whorl with 9, low, gently rounded spiral lirae, subequal in strength, but close together on rostrum, subequal to their intervals posteriorly. Collabral threads coarse, strong, rather deeply incising the spiral lirae (giving these a granulose appearance) and forming oblique plicules on subsutural cord and a series of transverse nodules on midshoulder lira. Shell bleached.

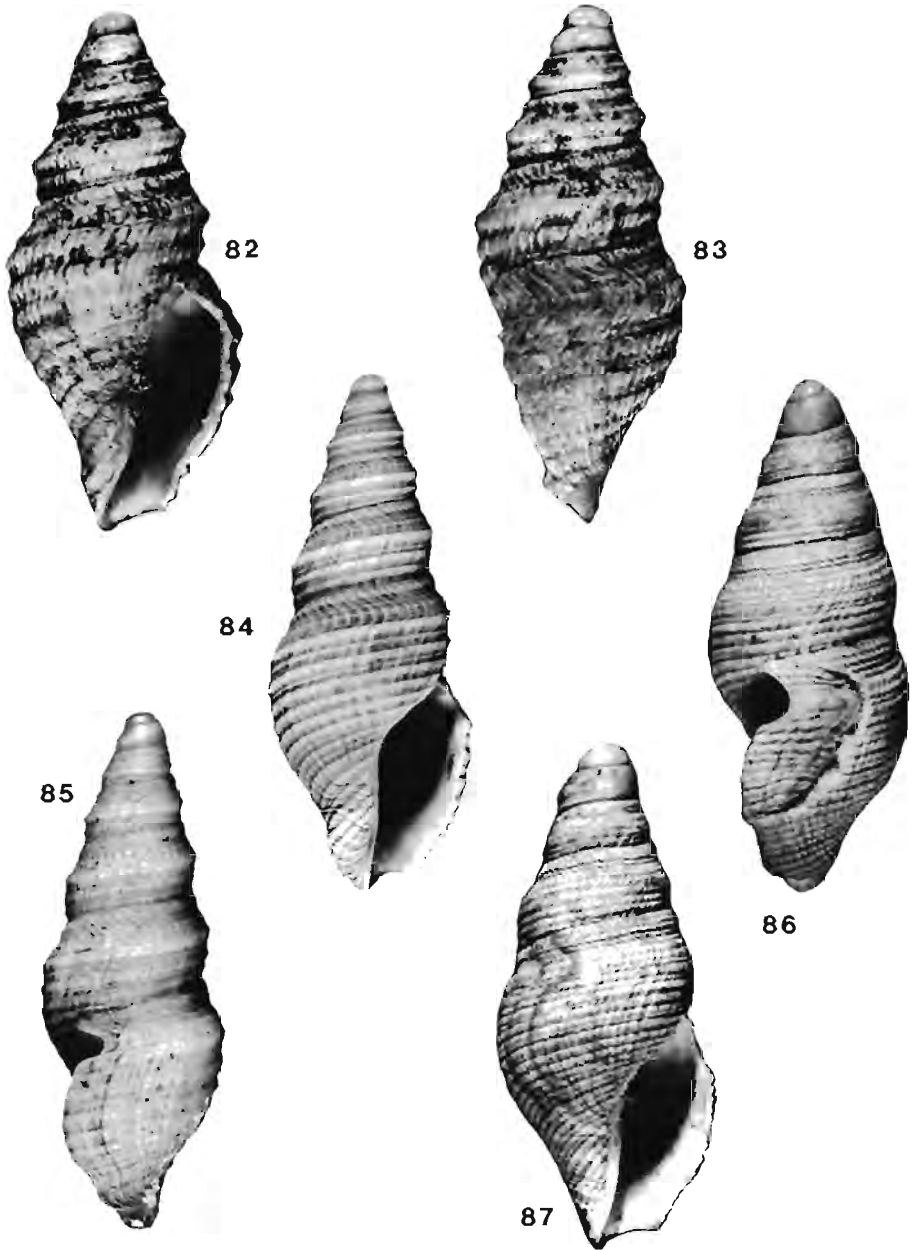
Protoconch (Fig. 72) of about $1\frac{1}{2}$ smooth, strongly convex whorls, 1st whorl relatively large but depressed; breadth 0,90 mm, height 0,65 mm (b/h 1,39).

Dimensions: 7,2 × 3,2 mm (holotype).

Range: Continental slope of western Transkei.

Type material: Holotype, NM C9064/T3241, off Mbashe River (32°22,8'S, 29°00,8'E), 450–500 m, coarse sand, some mud.

Notes: *M. megalacme* somewhat resembles *M. clupeispina* and *M. leptopleura*, but the protoconch (Fig. 72) is much larger and the midshoulder lira is broad and low with pliculate nodules, rather than forming a 'herringbone' ridge. In protoconch



Figs 82–87. *Maoritomella* spp. 82–83, *M. megalacme* sp. n., holotype, NM C9064/T3241, 7,2 × 3,2 mm; 84–85, *M. tarrhion* sp. n., holotype, NM C188/T3246, 9,0 × 3,5 mm; 86–87, *M. pleonastica* (Barnard, 1958), holotype of *Drillia pleonastica*, SAM A8565, 6,8 × 2,8 mm.

size it resembles *M. tarrhion* but shape differs, the peripheral keel is much stronger and collabral threads are closer together.

Etymology: *megale* (large) and *akme* (a tip), Gr.

***Maoritomella tarrhion* sp. n.**

Figs 74, 84–85

Diagnosis: Shell claviform (b/l 0,39, a/l 0,40), suture moderately deep, fasciole strong, labrum foreshortened basally, siphonal canal indented, columella with a faint pleat, labrum smooth inside; 1st teleoconch whorl with 4 spiral lirae, 3rd one slightly stronger than others; subsutural cord weak; shoulder slope barely concave, with 4 fine spiral lirae; peripheral keel weak, median or slightly submedian; sculpture fenestrate, without granules at intersections; 4 tabulate spiral lirae below shoulder, 15 on base of body whorl; axial ribs narrow, low, irregular, subequal to spiral lirae; white; protoconch breadth 0,90 mm; attains 9,0 mm.

Description: Shell claviform (b/l 0,39, a/l 0,40), with blunt, orthoconic spire and concave-sided base with strong fasciole; suture moderately deep; teleoconch whorls nearly 5; spire whorls moderately convex, peripheral keel weak, slightly posterior to median on later whorls, shoulder slope barely concave, subsutural cord rather weak. Aperture narrowly pyriform, greatest width at posterior third, siphonal canal wide, slightly tapering, labrum ending short of tip of columella, so that siphonal canal has an oblique termination, shallowly notched; labium with moderately thick callus, columella relatively straight anteriorly, with a feeble median pleat; labrum smooth inside, in side-view strongly convex with a deep openly U-shaped anal sinus and slight stromboid notch.

Sculpture of relatively uniform, flattened spiral lirae, crossed by subequal axial riblets, producing a fenestrate sculpture. First teleoconch whorl with 4 equidistant spiral lirae, 3rd one slightly stronger than others, crossed by fine arcuate plicules; by second whorl axials have strengthened, while the third spiral has become keel-like; on penultimate whorl a very low, weakly rounded subsutural lira and a slightly projecting peripheral one, followed by 4 low, tabulate, subequal spiral lirae anteriorly; shoulder slope with 4 feeble spiral threads, crossed by arcuate plicules; base of body whorl with about 15 spiral lirae, some weaker than others, those on rostrum close and rounded. Axial riblets relatively close and irregular, rendering spirals fenestrate, even on rostrum, not forming nodules at intersections; fine collabral striae also present. White inside and out.

Protoconch (Fig. 74) narrowly domed, of about $1\frac{1}{2}$ whorls, smooth; breadth 0,90 mm, height 0,75 mm (b/h 1,20).

Dimensions: 9,0 × 3,5 mm (holotype).

Range: Continental slope of eastern Transkei.

Type material: Holotype NM C188/T3246, off Rame Head (31°56,1'S, 29°26,5'E), 410–430 m, stones, some sand; dredged *MN*.

Notes: *M. tarrhion* shares with *M. pleonastica* a weak shoulder keel, barely impressed shoulder slope, a foreshortened outer lip, large adult size and a distinctly indented siphonal canal. It differs from *pleonastica* and other southern African

species in its clathrate sculpture and the presence of a columella pleat. It resembles *M. regina* (Thiele, 1925) from East Africa in many respects but differs in details of shape and sculpture.

Etymology: *tarrhion* (Gr.), a small wicker basket.

Maoritomella pleonastica (Barnard, 1958) **comb. n.**

Figs 86–87

Drillia pleonastica Barnard, 1958:133, fig. 17a. Type locality: 34°26'S, 25°42'E, 124 fath.

Diagnosis: Shell as in *M. tarrhion* (b/l 0,38–0,43, a/l 0,35–0,46), but suture shallow, fasciole absent, columella without a pleat, labrum with weak internal lirae; peripheral keel very weak, spiral lirae fine, cut into granules by even finer collabral threads, not fenestrate; buff; protoconch breadth 0,93–1,05 mm; attains 10,9 mm.

Description: Shell somewhat claviform (b/l 0,38–0,43, a/l 0,35–0,46), with bluntly orthocone spire and concave-sided base, without fasciole, suture shallow; teleoconch whorls about 5, spire whorls moderately convex; peripheral keel very weak, median on penultimate whorl, at basal third on 1st whorl; shoulder slope barely concave, subsutural cord weak and gently rounded. Aperture narrowly pyriform, greatest width at about posterior third, siphonal canal wide, slightly tapering; labrum ending short of tip of columella, so that siphonal canal terminates obliquely, its end shallowly notched; labium with moderately thick callus, columella slightly convex anteriorly, without a pleat; labrum with faint spiral plicae internally, in side-view very strongly convex with a moderately deep, openly U-shaped anal sinus and very slight stromboid notch.

Sculptured by relatively uniform, fine spiral lirae, cut into granules by collabral threads. First teleoconch whorl with 4 equidistant spiral lirae, with weak axial threads, 3rd lira slightly stronger; after first $\frac{1}{4}$ -whorl about 6 fine spiral lirae develop, the basal 3 close (the uppermost forming a feeble peripheral keel), separated from a subsutural pair by a slight shoulder concavity in which lies the 6th lira; by penultimate whorl 5–8 unequal spiral lirae anterior to the (now very feeble) peripheral keel, 3 feeble ones on subsutural convexity and 5–6 fine threads on shoulder slope, of which the median one is the strongest; 16–21 subequal spiral lirae on base of body whorl. Collabral threads weaker than spiral lirae, forming arcuate plicules on shoulder slope. Colour pale orange-yellow.

Protoconch bluntly conical, of $1\frac{1}{2}$ whorls, smooth; breadth 0,93–1,05 mm, height 0,70–0,75 mm (b/h 1,24–1,50).

Dimensions: 6,8 × 2,8 mm (holotype); 8,0 × 3,1 mm, 10,9 × 4,1 mm.

Range: Agulhas Bank.

Type material: Holotype SAM A8565 (Figs 86–87).

Additional material: Off Cape St Blaize, *ex pisce* NM A4069, B1008: R. Le Maitre).

Notes: This rather uniformly sculptured species, like *M. tarrhion*, may prove to be generically separable from *Maoritomella*. The true extent of the protoconch is uncertain; after the initial $1\frac{1}{2}$ smooth whorls follows a quarter-whorl of simple spiral lirae which may prove to be brephic, but is here regarded as teleoconch.

Maoritomella eva (Thiele, 1925)

Bela eva Thiele, 1925:193(227), pl. 37 (25), fig. 12. Type locality: 35°19'S; 20°12'E, 126 m.
 Not: *Asthenotoma eva*; Barnard, 1958:114, fig. 21d [= '*Taranis miranda* Thiele, 1925].

Notes: I have not been able to examine the unique holotype (ZMB collection) and Thiele's description reveals nothing that is diagnostic. His figure somewhat resembles a juvenile *Filodrillia*, but the presence of an operculum suggests that it is not mangeliine. The radula was reported to be toxoglossate but was neither figured nor described in detail. If one can rely on the illustration, *M. eva* differs from its local congeners in the following combination of characters: protoconch relatively large; shoulder slope not concave; subsutural cord feeble; peripheral cord median, strong; 3 anterior cords on penultimate whorl, one (plus peripheral keel) on 1st whorl; shoulder slope apparently with several spiral threads; base of body whorl with numerous spiral lirae (over 15); siphonal canal not indented; a/l 0,49, b/l 0,46; dimensions 4,8 × 2,2 mm.

The shell (SAM A8563) identified by Barnard (1958) as *eva* is the mangeliine described by Thiele (1925) as *Taranis (Nepotilla) miranda*.

Microdrillia Casey, 1903

Microdrillia Casey, 1903:276. Type species (sd. Cossmann, 1906) *Pleurotoma cossmanni* Meyer, 1887, non *Purpura cossmanni* de Raincourt, 1884 [= *Pleurotoma meyeri* Cossmann, 1906, revised ICZN Art. 59(b)].

Diagnosis: Shell small, claviform or biconical, with strong spiral lirae and collabral threads (mainly in intervals) which form conspicuous lunular crenules on the concave shoulder slope; labrum thin, anal sinus deep, on shoulder slope; no columella pleats nor parietal pad; siphonal canal shallowly indented. Protoconch proportionately large, conical, of 4–6 whorls, first 1–3 smooth (or with exceedingly minute spiral striae or pustules), later ones with strong, arcuate axial ribs and sometimes minute spiral striae. Operculum? Radula of short, slender, awl-shaped marginal teeth with greatly expanded bases.

Notes: Bouchet & Warén (1980) synonymised *Microdrillia* with *Drilliola* Cossmann, 1903, on account of general similarity in teleoconch characters. I agree with Bernasconi & Robba (1984) that differences in protoconch form and sculpture are so great that two genera should be maintained. The marginal teeth of the type species of *Drilliola* (Bouchet & Warén 1980: fig. 29) differ considerably from those of *Microdrillia* (cf. Thiele 1929: fig. 446) in form. The other species referred to *Drilliola* by Bouchet & Warén are certainly not congeneric.

Key to species of *Microdrillia* in southern Africa.

- 1 Collabral threads weak; base of body whorl with 12–13 spiral lirae; protoconch with 21–24 axial ribs on last whorl 2
- Collabral threads strong; base of body whorl with 7–9 spiral lirae; protoconch with 15–16 axial ribs **patricia**
- 2 Biconic-claviform with orthoconic apex; 2 anterior spiral lirae on penultimate whorl; protoconch breadth 0,68 mm; large (12 mm) **circumvertens**
- Narrowly claviform with cyrtoconic apex; 4 anterior spiral lirae on penultimate whorl; protoconch breadth 0,98 mm; smaller (7 mm) **dinos**

Microdrillia patricia (Melvill, 1904)

Figs 88–89, 94

Pleurotoma (Oligotoma) patricia Melvill, 1904:164, pl. 10, fig. 15. Type locality: Gulf of Oman, 156 fath.

Turris (Tomopleura) patricia; Melvill, 1917:148.

Diagnosis: Shell narrowly claviform, b/l 0,35, a/l 0,35–0,36, fasciole distinct, peripheral keel strong, at or slightly above midwhorl, whorls with an angular non-bifid subsutural cord and 2–3 lirae anterior to peripheral keel, base of body whorl with 7–9 spiral lirae, those on rostrum very feeble; collabral threads strong, particularly on shoulder sulcus; pale buff with brownish-orange columella; protoconch of 6 whorls, last 2½ with oblique axial riblets, 15–16 on last whorl, and a shallow suprasutural channel crossed by axial striae, protoconch breadth 0,78–0,83 mm. Maximum length 7,3 mm.

Description: Shell narrowly claviform with high spire (b/l 0,35, a/l 0,35–0,36), base subtruncate, its sides moderately concave, with a narrow false umbilicus and distinct fasciole; suture moderately deep; teleoconch whorls about 5½; whorls moderately convex, peripheral keel below median on early whorls, slightly above midwhorl on penultimate one. Aperture rather small, greatest width at about posterior third, labial callus fairly thick; labrum thin, with deep anal sinus (damaged in all types); siphonal canal shallowly indented.

Sculpture of strong spiral cords and sigmoid collabral threads. Early whorls with a subsutural lira, a projecting peripheral keel and a weak anterior lira; from 2nd or 3rd whorl another lira shows just above suture and an intermediary thread may also develop; penultimate whorl with an angular, non-bifid subsutural cord, a gently concave shoulder sulcus (without spiral sculpture), a peripheral keel, and 2–3 lirae anteriorly, the latter thinner and much lower than keel; base of body whorl with 7–9 lirae, becoming weaker anteriorly and very feeble on rostrum. Collabral threads strong, particularly on shoulder sulcus. Glossy, near pale orange-yellow, columella darker.

Protoconch (Fig. 94) cyrtoconic, 6 whorls, first 3½ smooth, rest with arcuate, opisthocline axial riblets; 15–16 on last whorl, ending a little above suture in tapering forward-projecting 'tails', leaving a shallow suprasutural channel that shows very fine, prosocline axial striae; breadth 0,78–0,83 mm, height 1,1 mm (b/h 0,76).

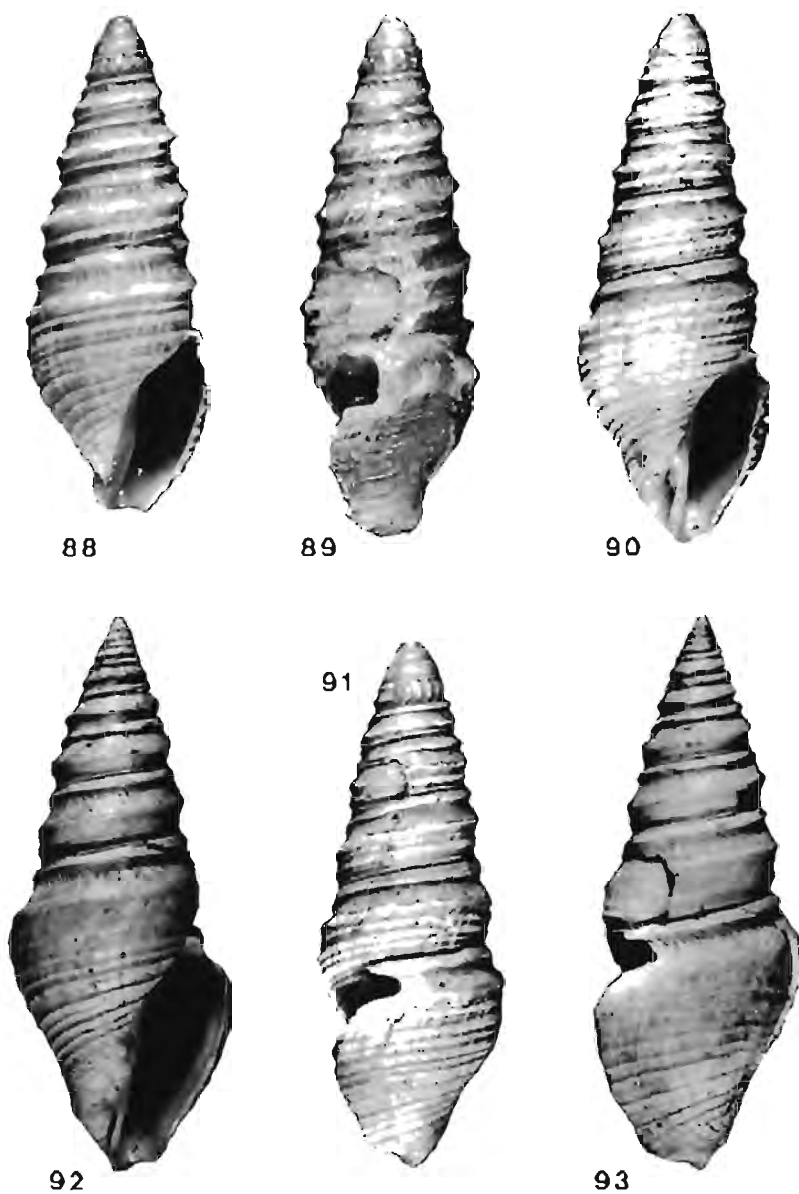
Dimensions: 6,0 × 2,1 mm; length 7,3 mm (lip broken).

Range: Gulf of Oman to continental shelf of western Transkei.

Regional locality data (all NM:MN): TRANSKEI: off Bulungula River, 41–45 m, fine sand, small worm-tubes (C2824); off Nthlonyane River, 51 m, sandy mud (C7523); off Mzimhlava River, 50 m, coarse sand (C7690).

Type material: Three syntypes BM(NH) 1905.7.14.46–8, four syntypes NMW 1955.158.490.

Notes: Local material agrees with the syntype series in the BM(NH), although the latter shells are somewhat bleached and worn. *M. sansibarica* (Thiele, 1925) may be a synonym of *M. patricia*, but appears to have a more produced base and to lack a basal cord on early whorls.



Figs 88-93. *Microdrillia* spp. 88-89, *M. patricia* (Melvill, 1904), NM C2824, off Bulungula River, 41-45 m, 6.0 × 2.1 mm; 90-91, *M. dimos* sp. n., holotype, NM C1310/T3289, 7.0 × 2.8 mm; 92-93, *M. circumvertens* (Melvill & Standen, 1901), NM C8963, off Mgazi River, 250 m, 12.2 × 4.8 mm.

Microdrillia dinos sp. n.

Figs 90–91, 95

Diagnosis: Shell resembling *M. patricia* but apex cyrtoconic, collabral threads weak and 4 spiral lirae below peripheral keel on penultimate whorl, base with 13 spiral lirae, distinct on rostrum. Protoconch with about 35 axial riblets on its penultimate whorl, last whorl with 21, penultimate whorl with a suprasutural thread as well, breadth 0,98 mm. Maximum length 7 mm.



Figs 94–96. Protoconchs (SEM) of *Microdrillia* spp.: 94, *M. patricia*, NM C7523, breadth 0,78 mm; 95, *M. dinos* sp. n., holotype, breadth 0,98 mm; 96, *M. circumvertens*, NM C9540, breadth 0,78 mm.

Description: Shell resembling *M. patricia* in form, but apex cyrtoconic; b/l 0,40, a/l 0,39; teleoconch whorls 5; labrum with 5 irregular threads in interior, lip edge strongly curved in side-view with a feeble stromboid notch and deep U-shaped anal sinus. First whorl with a subsutural lira, a peripheral keel and 2 weak threads anteriorly; latter threads strengthen and develop intermediaries by 4th whorl; by end of penultimate whorl these form a total of 4 anterior lirae, alternately weaker and stronger; base of body whorl with 13 spiral lirae, those on rostrum close but distinct. Collabral threads present but weak, particularly in shoulder sulcus. Types bleached.

Protoconch (Fig. 95) broadly cyrtoconic, of at least 4 whorls (apex missing), last $2\frac{1}{2}$ ribbed, ribs approximately 35 on penultimate whorl, 21 on last; penultimate whorl with a weak spiral thread immediately above suture, becoming obsolete on last whorl; breadth 0,98 mm.

Dimensions: 7,0 × 2,8 mm (holotype).

Range: Continental shelf of eastern Transkei.

Type material: Holotype C1310/T3289, off Port Grosvenor (29°57,6'S; 31°26,2'E), 100–115 m, sand, some mud, solitary coral, shells; dredged MN.

Etymology: *dinos* = a whirlpool, Gr.

Microdrillia circumvertens (Melvill & Standen, 1901)

Figs 92–93, 96

Drillia circumvertens Melvill & Standen, 1901:436, pl. 23, fig. 3. Type locality: Gulf of Oman, 205 fath. *Turris (Tomopleura) circumvertens*; Melvill, 1917:146.
Bela (Acrobela) circumvertens; Thiele, 1925:205 (239), pl. 25 (37), fig. 20.

Diagnosis: Shell large for genus (12 mm), biconic-claviform, b/l and a/l 0,39, aperture relatively large; interior of labrum with weak plicae; spiral lirae narrow but strong, their intervals wide and evenly concave with weak collabral threads, which form fine lunulae on shoulder sulcus; 1st whorl with an anterior and a posterior lira; on later whorls peripheral keel median, stronger than the simple subsutural lira, two lirae anteriorly on penultimate whorl, about 12 on base of body whorl; protoconch of $3\frac{1}{2}$ whorls, last $1\frac{1}{2}$ with curved axial ribs, about 24 per whorl, breadth 0,68 mm.

Description: Shell biconic-claviform (b/l 0,39, a/l 0,39), spire moderately high, base subtruncate, its sides moderately concave, with a strong depression in umbilical area and a distinct fasciole; suture moderately deep; teleoconch whorls $6\frac{1}{2}$, moderately convex, peripheral keel median on later whorls, initially situated just above suture. Aperture relatively large, greatest width at posterior third; siphonal canal moderately wide, slightly tapering; labial callus moderately thick; labrum thin, with deep anal sinus, interior with about 6 weak plicae.

Sculpture of fairly strong but narrow spiral lirae, with rather broad, evenly concave intervals, crossed by weak, sigmoid collabral threads, forming close arcuate plicules on shoulder slope. Spiral lirae two on 1st two whorls, one below suture, one just above it or a third of the whorl up; by 3rd whorl lower lira has moved nearly to midwhorl and a weak 3rd lira (and sometimes a 4th) has developed above suture; penultimate whorl with two weak lirae anterior to peripheral keel, the upper one shallowly bifid; subsutural lira narrow, angular and simple, weaker than peripheral lira; base of body whorl with about 12 low spiral lirae, those on rostrum weak. White.

Protoconch (Fig. 96) orthoconic, of about 4 convex whorls, 1st $2\frac{1}{2}$ smooth, rest with arcuate axial ribs, about 15–24 on last whorl, ending slightly above suture; breadth 0,68–0,78 mm, height 0,65–0,80 mm (b/h 0,98–1,05).

Dimensions: 12,2 × 4,8 mm; 6,2 × 2,9 mm.

Range: Gulf of Oman to upper continental slope of Transkei.

Regional locality data (all NM:MN): TRANSKEI: off Mgazi River, 250 m, muddy sand (C8963); off Qora River, 450–460 m, sandy mud (C9540).

Type material: One syntype BM(NH) 1901.12.0.66, second syntype *ubi*?

Notes: Probably the largest known Recent member of the genus (according to Shuto 1969 the slightly larger *Pleurotoma triporcata* Smith, 1879, of Japan, often referred to *Microdrillia*, is a *Pulsarella*). Transkei shells agree well with the BM(NH) syntype, although attaining twice its size.

Mitrellatoma Powell, 1942.

Mitrellatoma Powell, 1942:109. Type-species (o.d.) *Columbella angustata* Hutton, 1886.

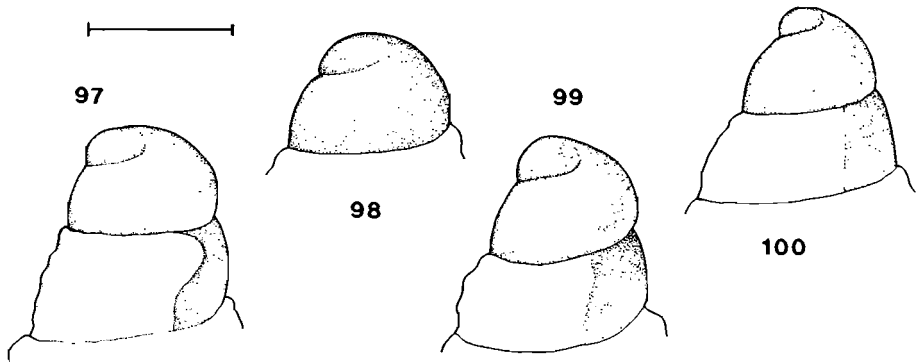
Diagnosis: Shell narrowly fusiform with oblong body whorl, columella without pleats, labrum thin, smooth inside, anal sinus shallow to moderate; sculptured by spiral lirae, axial sculpture faint or absent. Protoconch somewhat papilliform, with $1\frac{3}{4}$ – $2\frac{1}{4}$ smooth whorls, the first small and eccentric. Operculum and radula unknown.

Notes: Powell (1966) accepted only two species as members of *Mitrellatoma*, the type species from the lower Pleistocene of New Zealand, and *Pleurotoma ligata* DeFrance, 1826, from the Miocene of France. The Recent Mozambican species referred here by me agrees closely in general characters but differs in its deeper anal sinus (width equal to depth, not double it as in its fossil congeners).

***Mitrellatoma mitra* sp. n.**

Figs 97, 101

Diagnosis: Shell b/l 0,36, a/l 0,47; whorls weakly convex, with a slightly swollen subsutural region; anal sinus a rounded 'V', as deep as wide; 7 thin, rounded spiral lirae per whorl, intervals 4–5 times their width, with numerous dense spiral microstriae; whorls above shoulder with faint traces of axial folds; pale buff with nebulous blotches of brownish-orange and white; protoconch breadth 0,63 mm; maximum length 6,4 mm.



Figs 97–100. Protoconchs of *Mitrellatoma* and *Mitromorpha* spp.: 97, *Mitrellatoma mitra*; 98, *Mitromorpha kennellyi*; 99, *Mitromorpha nodilirata*; 100 *Mitromorpha striolata*. Scale-line = 0,5 mm.

Description: Shell narrowly fusiform (b/l 0,36, a/l 0,47) with high, orthoconic spire, oblong body whorl and elongate base, which is bent slightly to the left and shallowly concave-sided; teleoconch whorls 4; suture fairly deep, whorls only slightly convex, a little swollen below suture, not keeled, shoulder slope barely concave, body whorl with gently convex periphery at its midline. Aperture elongate, widest at middle, narrowly tapering posteriorly, slightly tapering anteriorly; labium sinuous, very thinly calloused, columella strongly convex, without pleats, parietal region gently convex; labrum thin, smooth inside, edge rather straight in side-view, anal sinus a rounded 'V', on shoulder slope. First teleoconch whorl with about 7 weak, close spiral lirae; on penultimate whorl still 7, but thin and rounded; intervals flattened and wide, 4–5 times width of lirae, and bearing numerous, dense, microscopic spiral striae; subsutural lira somewhat cord-like, it and shoulder slope showing vestiges of axial crenules; growth-lines fine with an occasional very coarse one.



Fig. 101. *Mitrellatoma mitra* sp. n., holotype, NM J4527/T3287, 6,4 × 2,3 mm.

Colour pale orange-yellow, with diffuse blotches of light orange, and white on shoulder slope, apex and base yellowish-white.

Protoconch (Fig. 97) blunt, narrowly domed, of about $1\frac{1}{4}$ whorls, 1st whorl small, termination opisthocline, smooth, breadth 0,63 mm, height 0,50 mm (b/h 1,26).

Dimensions: 6,4 × 2,3 mm (holotype).

Range: Southern Mozambique, littoral.

Type material: Holotype NM J4527/T3287, Two Mile Reef, Benguera Island, Bazaruto Archipelago (approximately 21°53'S, 35°26'E), leg. Mrs E. Roscoe, 28/v/75.

Notes: The unique holotype is moderately fresh, but bears a number of major repaired fractures and has been bored by a muricid. Apart from its deep anal sinus, it bears a superficial resemblance to a small *Mitra*.

Mitromorpha Carpenter, 1865

Mitromorpha Carpenter, 1865:182. Type-species (monotypy) *Daphnella filosa* Carpenter, 1864, non *Columbella filosa* Dujardin, 1837 [= *M. carpenteri* Glibert, 1954].

Diagnosis: Shell small, biconic, aperture narrow, anal sinus obsolete to moderately deep, siphonal canal not terminally notched, columella with or without 1–2 pleats; sculpture various. Protoconch domed, of $1\frac{1}{2}$ –2 smooth whorls, 1st one depressed or tilted. Operculum absent. Radula of acicular marginal teeth, slightly constricted medially, with expanded, spatulate base, no barbs.

Notes: Powell (1966), followed by subsequent authors, recognised two major groups in the *Mitromorpha* genus-complex. In one (*Mitromorpha*, *Lovellona*, *Maorimorpha*) columella pleats are 'obsolete or nearly so', in the other

(*Mitrolumna*, *Helenella*, etc.) they are 'quite distinct'. However, when an adequate range of species is considered it is clear that degree of development of the columella pleats is a very artificial yardstick by which to separate so-called lineages. In other borsoniine genera such as *Bathytoma* and *Tomopleura*, columella pleats are present or absent according to species, and this may even vary individually in *Tomopleura*. Certainly plicae may be either weak or absent in individuals of the same species of *Mitromorpha*. While *Lovellona*, *Maorimorpha* and *Anarithma* (overlooked by most authors) are well characterised by protoconch and other characters, *Mitromorpha* differs little from *Mitroluma* and its ilk, which are here recognised only as a weakly separable subgenus, distinguished as follows:

Columella and parietal region in same plane, no columella pleats **Mitromorpha** s.s.
 Columella meeting parietal region at a slight, rounded angle, columella pleats present or absent **Mitrolumna**

Subgenus *Mitrolumna* Bucquoy, Dautzenberg & Dollfus, 1883

Mitrolumna Bucquoy, Dautzenberg & Dollfus, 1883:115, 120. Type-species (o.d.) *Mitra olivoidea* Cantraine, 1835.
Helenella Casey, 1904:167. Type-species (s.d. Dall 1918) *Pleurotoma multigranosa* E. A. Smith, 1890 (syn. n.).
Apaturris Iredale, 1917:329. Type-species (o.d.) *Mitromorpha expeditionis* Oliver, 1915 (syn. n.).
Cymakra Gardner, 1937:421. Type-species (o.d.) *Cymakra poncei* Gardner, 1937 (syn. n.).
 Additional synonyms: *Clinomitra* Bellardi, 1889, and *Diptychomitra* Bellardi, 1889 (fidé Powell 1966); *Mitrihara* Hedley, 1922 (see Cernohorsky 1975).

Diagnosis: Shell resembling *Mitromorpha* but columella and parietal region meeting at a slight angle; columella sometimes with two weak to strong pleats. Radula as in *Mitromorpha*.

Notes: Southern Africa is particularly rich in *Mitrolumna* species, no fewer than 17 being here recognised. Among these may be found transformation sequences of a number of characters, whose extremes are very different, but which clearly cannot be used as bases for higher taxonomic groupings. Thus in allied species sculpture ranges from spiral through cancellate to predominantly axial, the anal sinus may be very slight, shallow or relatively deep, and columella pleats are absent, feeble or distinct (even within the same species). Consequently I cannot accept the validity of taxa such as *Apaturris* (with relatively deep anal sinus), *Helenella* (with nodose-cancellate sculpture) and *Cymakra* (smaller with wider aperture).

The protoconch in all South African species agrees well with that of the type species of both *Mitromorpha* and *Mitrolumna*. Interspecific variation occurs in degree of tilting of the first whorl (Figs 15–16). In a few species microscopic spiral striae have been observed; these may prove to be widespread in the complex when fresh protoconchs of all are available.

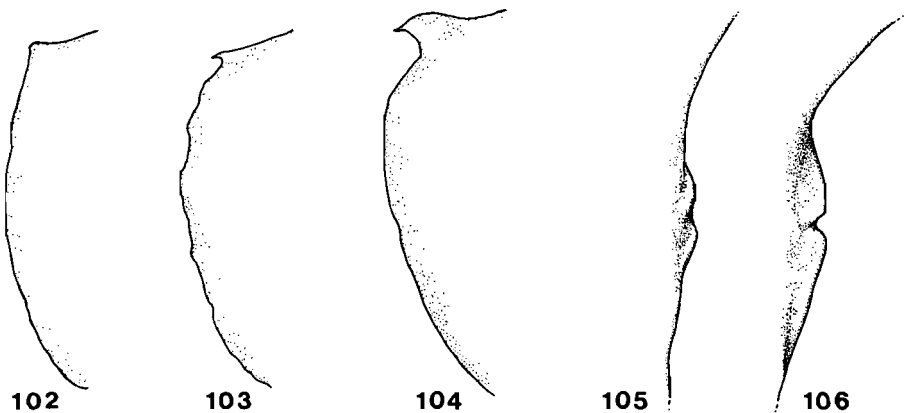
The only previous discussion of South African *Mitromorpha* is that of Barnard, who (1969:613) incorrectly rejected *Mitromorpha hewitti* (Tomlin, 1921) and *M. striolata* (Turton, 1932) as synonyms of *M. volva* Sowerby, 1892, and (1958:121) treated *M. herilda* (Bartsch, 1915) as a synonym of the unrelated *Clionella subcontracta* (E. A. Smith, 1904).

The following key excludes *Mitromorpha jovis* and the probable columbellid *M. neptuni* Thiele, 1925, for which inadequate data are available.

Key to subgenus *Mitrolumna* in southern Africa

- 1 No axial ribs 2
 — Axial ribs present 6
- 2 Spiral lirae close and flattened, 17–19 on base of body whorl; orange-brown with white blotches in shoulder area **striolata** (part)
 — Spiral lirae elevated and more or less widely spaced, 16 or fewer on base; colour not as above 3
- 3 Peripheral lirae with conspicuous brown and white spots; 4–5 spiral lirae on penultimate whorl; protoconch breadth 0,60–0,65 mm 4
 — Peripheral lirae faintly mottled or unpatterned; 5–7 lirae on penultimate whorl; protoconch breadth 0,63–0,73 mm 5
- 4 Median third of body whorl light brown; shell cylindric-biconic with rather flattened whorls and somewhat truncate base; 1st whorl of protoconch not tilted **kennellyi**
 — Entire base of body whorl white; ovate-biconical with moderately convex whorls and tapering base; 1st whorl of protoconch strongly tilted **hewitti**
- 5 Anal sinus slight; spiral lirae subequal to intervals; periphery of spire whorls basal; white or orange-brown, sometimes with faint peripheral white marks **volva**
 — Anal sinus shallow but distinct; spiral lirae narrower than intervals; periphery of spire whorls at basal third; mottled light yellowish- or orange-brown **chelonion**
- 6 Axial ribs fine and numerous, 25–39 on penultimate whorl 7
 — Axial ribs coarser, 10–25 on penultimate whorl (if 24–25 then protoconch large (breadth 0,70 mm) and either very blunt or with its 1st whorl strongly tilted and raised) 9
- 7 Lip preceded by a broad, low varix; slightly iridescent; off-white, usually with brown markings; spiral sculpture fine, sometimes weak 8
 — Lip not preceded by a varix; not iridescent; uniform brown or white; spiral lirae coarse, somewhat flattened or bifid **apollinis**
- 8 Spire low (a/l 0,53–0,55), whorls with basal periphery; 6–8 weak spiral lirae on penultimate whorl, 15–17 on base **brevispira**
 — Spire higher (a/l 0,43–0,48), whorls with periphery at basal third; 12–14 spiral lirae on penultimate whorl, 17–20 on base **iridescens**
- 9 Axial ribs short and projecting prominently at periphery of body whorl; shape markedly biconic **rotundicostata**
 — Axial ribs not prominent, usually extending onto base; shape ovate- or narrowly biconic 10
- 10 Protoconch large (breadth 0,70 mm or more); subsutural lira prominent; pearly white 11
 — Protoconch smaller (0,53–0,65 mm); subsutural lira relatively weak; not pearly white 12

- 11 First whorl of protoconch conspicuously raised and tilted; spiral lirae much narrower than their intervals **tenuilirata**
- First whorl of protoconch depressed; spiral lirae subequal to or slightly narrower than their intervals **platacme**
- 12 9–12 spiral lirae on base of body whorl, not becoming finer anteriorly; columella pleats usually strong **nodilirata**
- 14–20 spiral lirae on base, becoming finer on rostrum; columella pleats weak or absent 13
- 13 Narrowly biconical (b/l 0,37–0,44), spire whorls more or less strongly convex; axial ribs strong and almost straight 14
- Ovate-biconic (b/l 0,42–0,50), spire whorls only moderately convex, axial ribs relatively weak and oblique 15
- 14 Axial ribs 16–18 and spiral lirae 7–11 on penultimate whorl; lip preceded by a distinct varix; whorls less convex; usually patterned with axial brown flames, sometimes uniform white **ustulata**
- Axial ribs 10–15 and spiral lirae 6–8 on penultimate whorl; lip not preceded by a varix; whorls strongly convex; uniform brown or white **herilda**
- 15 Spiral lirae mostly close-set and flattened, with narrow intervals, 6–9 lirae on penultimate whorl; blotched with white above periphery of body whorl **striolata**
- Spiral lirae mostly narrower than their intervals, 4–6 on penultimate whorl; not so patterned 16
- 16 Base of body whorl with 14–16 spiral lirae; buff or yellowish-brown with a broad, pale zone posteriorly (sometimes uniform white); smaller (up to 5,0 mm) with smaller protoconch (breadth 0,55–0,60 mm) **maraisi**
- Base with 16–18 lirae; uniform orange-brown; larger (up to 6,4 mm) with larger protoconch (breadth 0,63 mm) **amphibolos**



Figs 102–106. Anal sinus and columella denticles in some *Mitromorpha* and *Anarithma* spp. 102–104, Anal sinus in 102, *M. hewitti*, 103, *M. chelonion* and 104, *M. iridescens*. 105–106, Columella denticles in 105, *M. nodilirata* and 106, *Anarithma meula*. Not drawn to scale.

Mitromorpha (Mitrolumna) volva Sowerby, 1892

Figs 107, 109

Mitromorpha volva Sowerby, 1892:7, pl. 1, fig. 16. Type locality: Port Elizabeth.
Antimitra volva; Turton, 1932:48.

Diagnosis: Shell cylindric-biconic, apex somewhat papilliform, spire whorls moderately convex with basal periphery; columella pleats feeble, labrum smooth inside, anal sinus very slight, no subterminal varix; no axial ribs, 5–7 rounded spiral lirae on penultimate whorl, 14–16 on base; protoconch breadth 0,63–0,73 mm (b/h 1,07–1,70), 1st whorl depressed; orange-brown or white; length 6,0 mm.

Description: Shell cylindric-biconic (b/l 0,38–0,42, a/l 0,45–0,50), greatest width slightly anterior to middle, spire slightly cyrtconic, apex somewhat papilliform; teleoconch whorls 4, early whorls flat, later ones moderately convex with basal periphery, periphery of body whorl also moderately convex, left side of base concave. Aperture somewhat sinuous, curved and parallel-sided anteriorly, posteriorly acute; labial callus thin, particularly in parietal region, columella plicae very feeble; labrum smooth inside, anal sinus very slight, edge not preceded by a varix.

Sculpture of strong, rounded spiral lirae with numerous very fine interstitial axial threads. First teleoconch whorl with 4 spiral lirae, increasing to 5–7 on penultimate whorl, subequal to their intervals, subsutural lira separated by slight gap; base of body whorl with 14–16 lirae, equal to/narrower than their intervals, becoming weaker anteriorly.

Colour uniform moderate orange, paler behind labrum, peripheral cord on body whorl sometimes with paler flecks; frequently white with opaque peripheral spots.

Protoconch of 1½ whorls, 1st whorl depressed, suture deep, breadth 0,63–0,73 mm, height 0,38–0,50 mm (b/h 1,07–1,70).

Dimensions: 6,0 × 2,3 mm; 6,0 × 2,2 mm, 5,3 × 2,2 mm.

Range: Eastern Cape littoral.

Locality data (all NM): EASTERN CAPE: Sardinia Bay, W. of Port Elizabeth (5954: R. K.); Port Elizabeth (A2627: F. Graeve); Port Alfred (5953: R. K.); East London (A6540: Mrs C. M. Connolly).

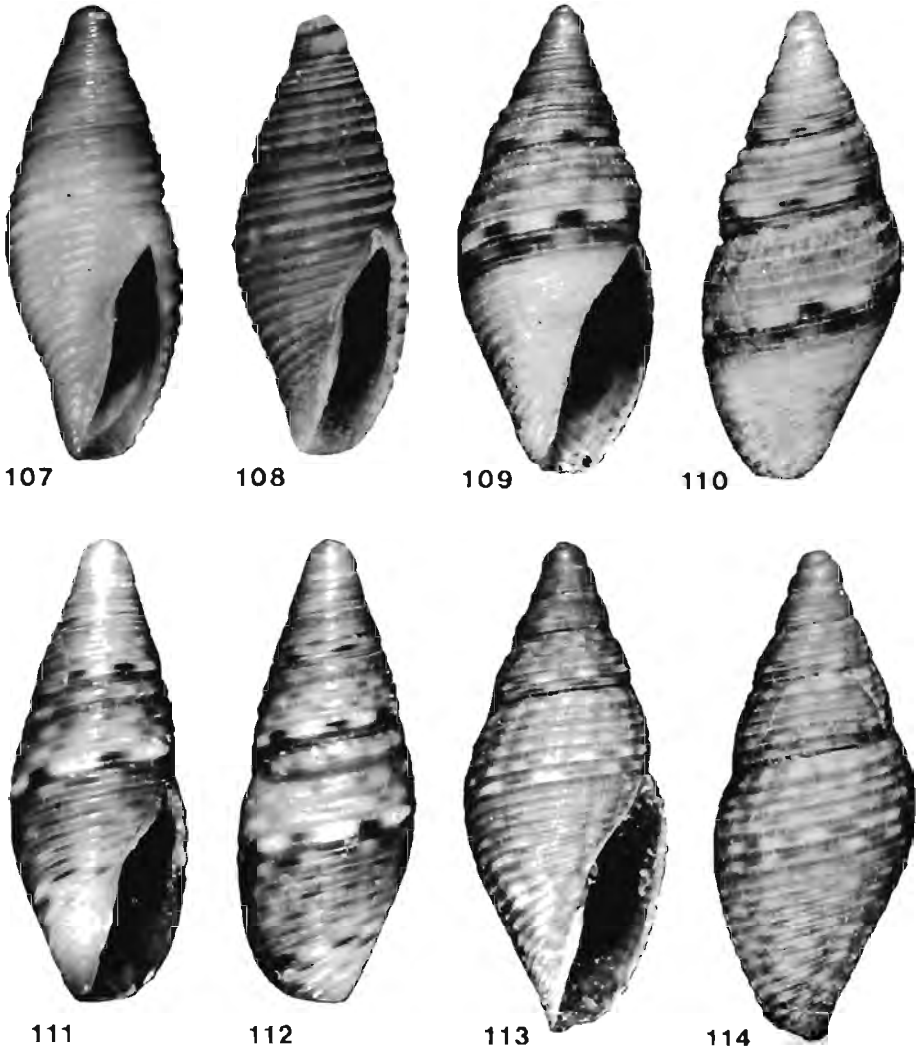
Type material: BM(NH) 19.4.14.3487–3492, five syntypes ex J. H. Ponsoyby; all are worn but represent the brown morph.

Notes: Evidently a dimorphic species, usually pure white, but occasionally orange-brown; there appears to be some variation in size of the first protoconch whorl, but I can detect no strict correlation with teleoconch variation.

Mitromorpha (Mitrolumna) kennelyi sp. n.

Figs 98, 111–112

Diagnosis: Shell as in *M. volva*, but apex not papilliform, spire whorls weakly convex, columella pleats obsolete, left side of base of body whorl usually almost flat, spiral lirae 4–5 on penultimate whorl; protoconch breadth 0,60–0,65 mm, 1st whorl depressed but evenly rounded; off-white, median third of body whorl with



Figs 107–114. *Mitromorpha* (*Mitrolumna*) spp. 107–108, *M. (M.) volva* Sowerby, 1892, NM A2627, Port Elizabeth, white form (5,9 × 2,3 mm) and brown form (5,3 × 2,1 mm) respectively. 109–110, *M. (M.) hewittii* (Tomlin, 1921), NM B6745, Port Alfred, 6,4 × 2,7 mm. 111–112, *M. (M.) kennellyi* sp. n., holotype, NM D262/T3192, 5,2 × 2,0 mm. 113–114, *M. (M.) chelonion* sp. n., holotype, NM C7257/T3208, 5,9 × 2,5 mm.

broad zone of light brown, also brown-tinged below suture, 1–2 peripheral cords with orange-brown spots; maximum length 5,2 mm.

Description: Shell cylindric-biconic (b/l 0,39–0,46, a/l 0,42–0,54), greatest width at/slightly anterior to middle, spire orthoconic, apex not papilliform; teleoconch whorls 4, almost flat to slightly convex, with basal periphery; periphery of body whorl gently convex, left side of base weakly concave to flat. Aperture relatively straight and parallel-sided anteriorly; labial callus thin, its outer edge barely free on

columella, columella without pleats; labrum thin, smooth inside, gently and evenly curved, in side-view rather straight, with a shallow anal sinus immediately below suture, not preceded by a varix. Sculpture of strong spiral lirae and numerous fine, interstitial axial threads. First teleoconch whorl with 4 equal spiral lirae, a 5th sometimes visible in lower suture, all subequal to their intervals; these lirae do not increase in number with growth, but merely become broader, flatter and more widely spaced, the subsutural one being separated by a still wider interval; 3rd or 4th lira is peripheral; base of body whorl with 14–16 rather tabulate spiral lirae, narrower than their intervals, becoming fine and weak near distal end of rostrum.

Spire, protoconch and base of body whorl yellowish-white, peripheral cord with moderate orange spots; median third of body whorl (ie. anterior to periphery) and (more faintly) the sutural region tinged with moderate orange, occasionally with faint darker spots.

Protoconch (Fig. 98) domed, of $1\frac{1}{2}$ whorls, 1st depressed, but evenly convex, suture very shallow; smooth; breadth 0,60–0,65 mm, height 0,38–0,45 mm (b/h 1,33–1,66).

Dimensions: 5,2 × 2,0 mm (holotype); 5,0 × 2,2 mm, 4,4 × 2,0 mm (paratypes).

Range: Eastern Cape littoral, from Port Alfred to East London.

Type material: Holotype NM D262/T3192, Port Alfred, beach-drift, leg. R. K.; paratypes 1–8, NM D261/T3042, same data; paratypes 9–19, NM B6746/T3191, Port Alfred, beach-drift, leg. D. H. Kennelly, J. Hewitt; paratypes 20–21, NM 632/T3041, Port Alfred, beach-drift, H. Burnup colln.; paratypes 22–24, NM D260/T3189, East London, leg. Mrs C. M. Connolly; paratype 25, same locality, NM B6747/T3190, ex Albany Mus. colln.

Notes: *Mitromorpha kennellyi* closely resembles *M. hewitti* (Tomlin, 1921) in sculpture and coloration. It is distinguished by a concordance of small but constant characters: shape is more cylindrical in *kennellyi*, with a flatter-sided spire and base, a less convex body whorl, more truncate anterior end and shallower suture; maximum size is smaller; protoconch is lower and more domed, b/h 1,33–1,66 against 1,13–1,19 in *hewitti*, with shallower suture; median third of body whorl light orange-brown, instead of white. The last character distinguishes them at a glance. In shape and protoconch characters there is closer resemblance to *M. volva* (see diagnosis).

Etymology: Named in honour of the late Dennis Harper Kennelly (1890–1971), an eminent shell-collector and writer of popular articles on South African shells.

Mitromorpha (Mitrolumna) hewitti (Tomlin, 1921)

Figs 102, 109–110

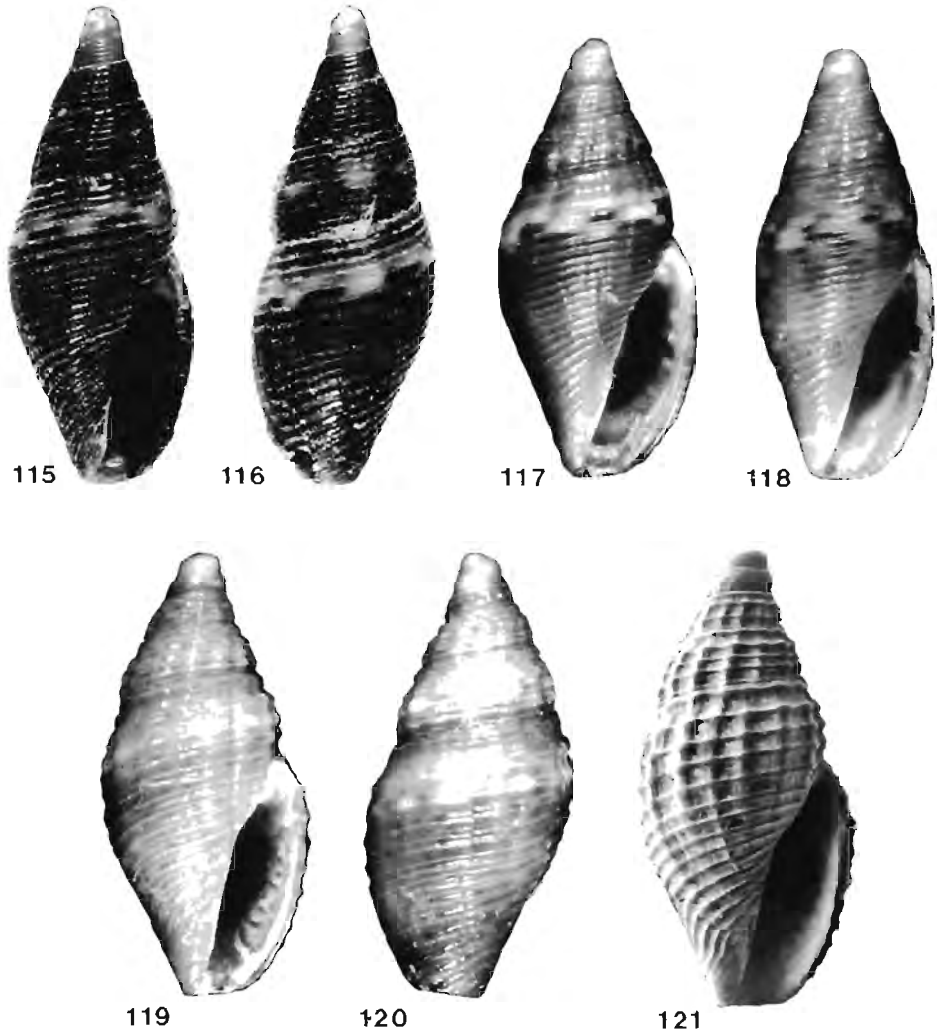
Mitromorpha volva var; E. A. Smith, 1904:31, pl. 2, fig. 13.

Antimira(?) hewitti Tomlin, 1921:156 (cites Smith 1904); Tomlin, 1932:48. Type locality: Port Alfred (restricted Turton, 1932).

Diagnosis: Shell ovate-biconic, apex rather acute; spire whorls moderately convex with basal periphery, body whorl strongly convex; columella pleats feeble; labrum as in *M. volva*; no axial ribs; spiral lirae 4–5 on penultimate whorl, 14–16 on base; lirae somewhat tabulate, 4th one slightly wider; protoconch breadth

0,60–0,63 mm, 1st whorl strongly tilted; base white, spire and subsutural region buff, 2–3 peripheral lirae spotted with orange-brown and white; maximum length 7 mm.

Description: Shell ovate-biconic (b/l 0,38–0,43, a/l 0,45–0,51), early part of spire shallowly coeloconic, apex fairly acute, greatest width at/slightly anterior to middle; teleoconch whorls $4\frac{1}{2}$, moderately convex, with basal periphery, suture fairly deep, periphery of body whorl strongly rounded, base and aperture as in *kennellyi* (q.v.), save that columella may show two very slight pleats. Sculpture as



Figs 115–121. *Mitromorpha* (*Mirolumna*) spp. 115–118, *M. (M.) striolata* (Turton, 1932): 115–116, NM C6080, Dwesa, Transkei, 6,8 × 2,6 mm; 117, NM B6729, Coffee Bay, Transkei, 4,2 × 2,2 mm; 118, NM B4691, Mzamba, Transkei, 4,2 × 1,7 mm. 119–121, *M. (M.) maraisi* sp. n., holotype, NM D474/T3293, 4,4 × 2,1 mm (121 is SEM).

in *kennellyi*, but spiral lirae somewhat flatter and wider, and 4th one on later whorls is usually slightly broader than the others.

Colour: Base of body whorl (below periphery) yellowish-white, 2–3 peripheral lirae spotted with moderate orange and white (the posteriormost one particularly strongly so); spire, protoconch and upper part of body whorl tinged with light orange-yellow, occasionally yellowish-white.

Protoconch of nearly 2 whorls, 1st one strongly tilted, 2nd whorl swollen, suture deep; breadth 0,60–0,63 mm, height 0,53 mm (b/h 1,13–1,19).

Dimensions: 6,5 × 2,6 mm, 6,3 × 2,4 mm; 7,0 × 2,75 mm (holotype *fidé* Tomlin).

Range: Eastern Cape Province littoral, from Jeffreys Bay to Kei River.

Locality data (all NM): Jeffreys Bay (5952: R. K.; A8611: F. Graeve); Sardinia Bay, W. of Port Elizabeth (5954: R. K.); Algoa Bay (A2627: R. K.); Port Alfred (B697, B4800: E. K. Jordan; B1084: J. Hutt; B2971: H. Becker; B6745: ex Albany Mus.); Fish River mouth (B706: E. K. Jordan); East London (A6542: Mrs C. M. Connolly); off Kei River, 222 m (NM C4085: MN).

Type material: Holotype in Tomlin collection (NMW).

Notes: An uncommon species, known only from beach-drift, other than a single worn shell from 222 m, whose occurrence at that depth is doubtlessly due to alluvial flow.

Mitromorpha (Mitrolumna) chelonion sp. n.

Figs 103, 113–114

Diagnosis: Shell ovate-biconic, apex not papilliform, spire whorls moderately convex, with periphery at basal third; columella pleats weak or absent, labrum as in *volva*, but sinus moderately deep; no axial ribs, interstitial plicules weak, spiral lirae mostly thinner than intervals, tabulate, rather weak, 6–7 on penultimate whorl, 11–16 on base; protoconch with spiral striae, breadth 0,63–0,73 mm, 1st whorl small and depressed; mottled with yellowish- or light orange-brown, particularly around periphery and on base; maximum length 5,9 mm.

Description: Shell ovate-biconic, b/l 0,39–0,42, a/l 0,48–0,53, greatest width median, spire orthoconic to slightly cyrtconic, apex not papilliform; teleoconch whorls about 4, moderately convex, with periphery at basal third, suture fairly shallow, periphery of body whorl moderately to strongly convex, left side of base flattened to slightly concave. Aperture somewhat linear; columella/parietal angle sometimes very slight; labial callus very thin (sometimes a mere glaze) on paries, columella callus thicker and (in squatter shells) slightly tumid, with a barely free outer edge; columella pleats sometimes absent, sometimes 1–2 (but feeble); labrum thin, smooth inside, anal sinus fairly deep, forming an asymmetrical U at suture; lip not preceded by a varix.

Sculpture of thin, rather weak spiral lirae, with inconspicuous to obsolete microscopic axial striae in intervals. Spiral lirae flat-topped, faintly granular near apex and on base of body whorl, narrower than intervals (often only half their width) except sometimes on base where they may be equal; subsutural lira set apart by a slightly wider and deeper interspace, but usually no stronger (and sometimes slightly weaker) than subsequent lirae; 1st teleoconch whorl with 5–6 rather weak

lirae, 6–7 on penultimate whorl; base of body whorl with 11–16 lirae, subequal in strength except on rostrum where finer and closer.

Colour yellowish-white, faintly to heavily mottled with diffuse spots and blotches of moderate orange-yellow, mostly restricted to peripheral lirae but sometimes forming faint axial stripes on base.

Protoconch of $1\frac{1}{2}$ whorls with dense spiral striae; first whorl smaller and rather depressed, suture fairly shallow; breadth 0,63–0,73 mm, height 0,48–0,53 mm (b/h 1,33–1,38).

Dimensions: 5,9 × 2,5 mm (holotype), 5,2 × 2,2 mm (paratype).

Range: Transkei continental shelf.

Type material: Holotype NM C7257/T3208, off Whale Rock (31°59,5'S, 29°16,9'E), 90 m, sponge-rubble, small pebbles. Paratype 1, NM C7434/T3212, off Qolora River, 114 m, sponge-rubble; paratype 2, NM C7856/T3210, off Mncwasa Point, 68 m; paratype 3, NM C7338/T3209, off Ubombo, 60–62 m, coarse sand; paratype 4, NM C7860/T3213, off Ubombo, 135–165 m, sponge-rubble; paratype 5, NM C7388/T3211, off Port Grosvenor, 82 m, worn calcareous nodules. All dredged MN.

Etymology: *chelonion* = tortoiseshell (Gr.).

Mitromorpha (Mitrolumna) striolata (Turton, 1932)

Figs 100, 115–118

Antimitra striolata Turton, 1932:48, pl. 11. no. 359. Type locality: Port Alfred.

Diagnosis: Shell ovate-biconic, b/l 0,38–0,44, apex slightly papilliform, spire whorls moderately convex, with basal periphery, columella pleats feeble, aperture as in *volva* but often widest anteriorly; axial ribs absent or feeble to moderately strong and 12–19 per whorl; spiral lirae close and flattened, 6–9 on penultimate whorl, 17–19 on base of body whorl; protoconch breadth 0,60–0,68 mm, 1st whorl tilted; dark to light orange-brown with white blotches in shoulder area; maximum length 6,8 mm.

Description: Shell ovate-biconic (b/l 0,38–0,44, a/l 0,46–0,54), apex slightly papilliform, early part of spire shallowly coeloconic, teleoconch whorls $4\frac{1}{2}$, later whorls moderately convex, periphery near base of each whorl; suture moderately shallow, periphery of body whorl strongly convex, left side of base flat or slightly concave. Aperture lanceolate, often widest anteriorly; labial callus thin but distinct, columella plicae feeble; labrum smooth or with feeble plicae inside, in side-view moderately convex, anal sinus slight, asymmetrical and gently curved, lip not preceded by a varix.

Sculpture of close, flattened spiral lirae, microscopic interstitial axial striae and sometimes weak to moderately strong axial ribs. Spiral lirae 4–5, close and equal on 1st whorl, increasing by interpolation to 7–9 (rarely 6) on penultimate whorl, sometimes with an occasional fine intermediary thread; lirae flat-topped, usually wider than/equal to their intervals, but most widely spaced below suture; subsutural lira sometimes slightly stronger than the others, but seldom separated by a wider or deeper interval; base of body whorl with 17–19 flat spiral lirae, their width varying

individually, subequal in strength except on rostrum where finer and closer. Axial ribs may develop as early as 1st teleoconch whorl, but are usually so weak as merely to give spirals an undulating or granular appearance, opisthocline, straight, suture-to-suture on spire, 12–19 per whorl but by body whorl always feeble and visible only above periphery.

Protoconch of nearly 2 smooth whorls, 2nd whorl swollen, 1st tilted, suture deep; breadth 0,60–0,68 mm, height 0,43–0,60 mm (b/h 1,08–1,47).

Ground colour strong brown to strong orange, with a series of peripheral yellowish-white blotches developing towards end of penultimate whorl; these blotches are usually marked with spots or flames of brown, but form a continuous pale band on dorsal side of body whorl; apex somewhat paler than general ground colour.

Dimensions: 6,8 × 2,6 mm; 6,5 × 2,5 mm; 4,8 × 2,0 mm.

Range: Eastern Cape Province to eastern Transkei, littoral to inner shelf.

Locality records (all NM): EASTERN CAPE: Port Alfred (B5735: H. Becker); Bulugha (A2174: R. K.); Kwelera (A6538: R. K.). TRANSKEI: Sandy Point (C3751: R. K.); Dwesa (C6080: R. K.); Hluleka (C1516: R. K.); Nthlonyane (A1565: R. K.; A6543: Mrs C. Connolly); off Mzimhlava River, 50 m, gorgonians (C1141; C7803:MN); Mgazi (A2665: J. P. Marais); Mzamba (B4691: R. K.).

Type material: Holotype in OUM is worn (the type figure is heavily retouched).

Notes: This species appears to replace *M. hewitti* and *M. volva* in the Transkei littoral. Three examples from 50 m depth represent a small (up to 4,8 mm) squat form (b/l 0,41–0,44 instead of 0,38–0,40). Two Bulugha shells resemble *M. maraisi* in their more rounded, well-spaced spiral lirae and stronger axials, but appear to represent aberrant *striolata*.

Mitromorpha (Mitrolumna) maraisi sp. n.

Figs 119–121

Diagnosis: Shell as in *striolata* but usually more squat (b/l 0,42–0,48), aperture usually widest near middle, labrum with 6–8 weak internal ridges, axial ribs well developed, 13–14 per whorl, spiral lirae rounded, equal to/narrower than intervals, 4–6 on penultimate whorl, 14–16 on base of body whorl, small nodules at spiral/axial intersections; protoconch breadth 0,55–0,60 mm, 1st whorl moderately tilted; buff or yellowish-brown with a broad pale band posteriorly, sometimes uniform white; maximum length 5,0 mm.

Description: Shell ovate-biconic (b/l 0,42–0,48, a/l 0,48–0,52), spire orthoconic to slightly cyrtconic, apex slightly papilliform, teleoconch whorls $3\frac{1}{2}$, moderately convex, periphery near base of each whorl, suture moderately shallow, periphery of body whorl strongly rounded, base slightly concave on left side. Aperture lanceolate, tapering slightly anteriorly, greatest width more or less median; labial callus very thin or absent except for a slight columella deposit; columella with 2 feeble pleats; labrum internally with 6–8 short, weak ridges, in side-view quite strongly convex, with shallow, gently concave, asymmetrical anal sinus below suture; lip not preceded by a varix.

Sculpture of strong, rounded spiral lirae, rendered nodular to granular by underlying axial ribs (rarely absent); interstices with microscopic axial threads. Spiral lirae 3–4 on 1st whorl, increasing to 4–6 on penultimate one, an additional lira sometimes just showing above suture; lirae equal to/narrower than intervals (except where newly interpolated); subsutural lira slightly stronger than others, but not separated by a wider or deeper interval; basal lirae on body whorl 14–16, sometimes wider than intervals, sometimes narrower, but width fairly uniform except on rostrum, where finer and closer. Axial ribs 13–14 per whorl, occasionally fairly strong, although rounded and visible mainly in intervals and by the weak nodules that form where spirals cross axials; as a rule ribs are barely traceable across intervals and render spiral lirae gently undulating; where strong, ribs are opisthoclinal, slightly narrower than their interstices (which are rectangular in shape), straight on spire whorls, slightly arcuate on body whorl, ribs terminating at base of paries and on last half-whorl.

Protoconch of $1\frac{1}{2}$ whorls, 1st moderately tilted, suture deep, sculptured by very faint, dense, spiral striae; breadth 0,55–0,60 mm, height 0,33–0,45 mm (b/l 1,33–1,76).

Colour light to moderate orange-yellow, with a broad, paler subsutural band (sometimes covering spire); occasionally uniform white.

Dimensions: $4,4 \times 2,1$ mm (holotype); $4,4 \times 1,9$ mm, $5,0 \times 2,1$ mm (paratypes).

Range: Littoral of eastern Transkei and southern Natal.

Type material: Holotype NM D474/T3293, Mzamba, Transkei ($30^{\circ}51'S$, $29^{\circ}46'E$), beach-drift, leg. J. P. Marais, Oct. 1975. Paratypes 1–4, NM A2170/T3225, Mzamba, leg. R. K.; paratypes 5–7, same data, J. P. Marais colln.; paratype 8, NM A3770/T3226, Shelley Beach, S. of Port Shepstone, Natal, leg. Mrs R. Cock.

Notes: *M. maraisi* not uncommonly washes up just south of the Mtamvuna River, but is usually beach-worn. It is rather similar to *M. striolata*, which replaces it further west; from that species it differs in possessing fewer spiral lirae (4–6 on penultimate whorl, 14–16 on base, instead of 7–9 and 17–19 respectively in *striolata*), which are stronger, rounder and more widely spaced, with the subsutural lira more prominent. Generally the outer lip is more strongly convex in side-view in *maraisi*, the labial callus is thinner and the aperture is widest medially, not basally as is usually the case in *striolata*.

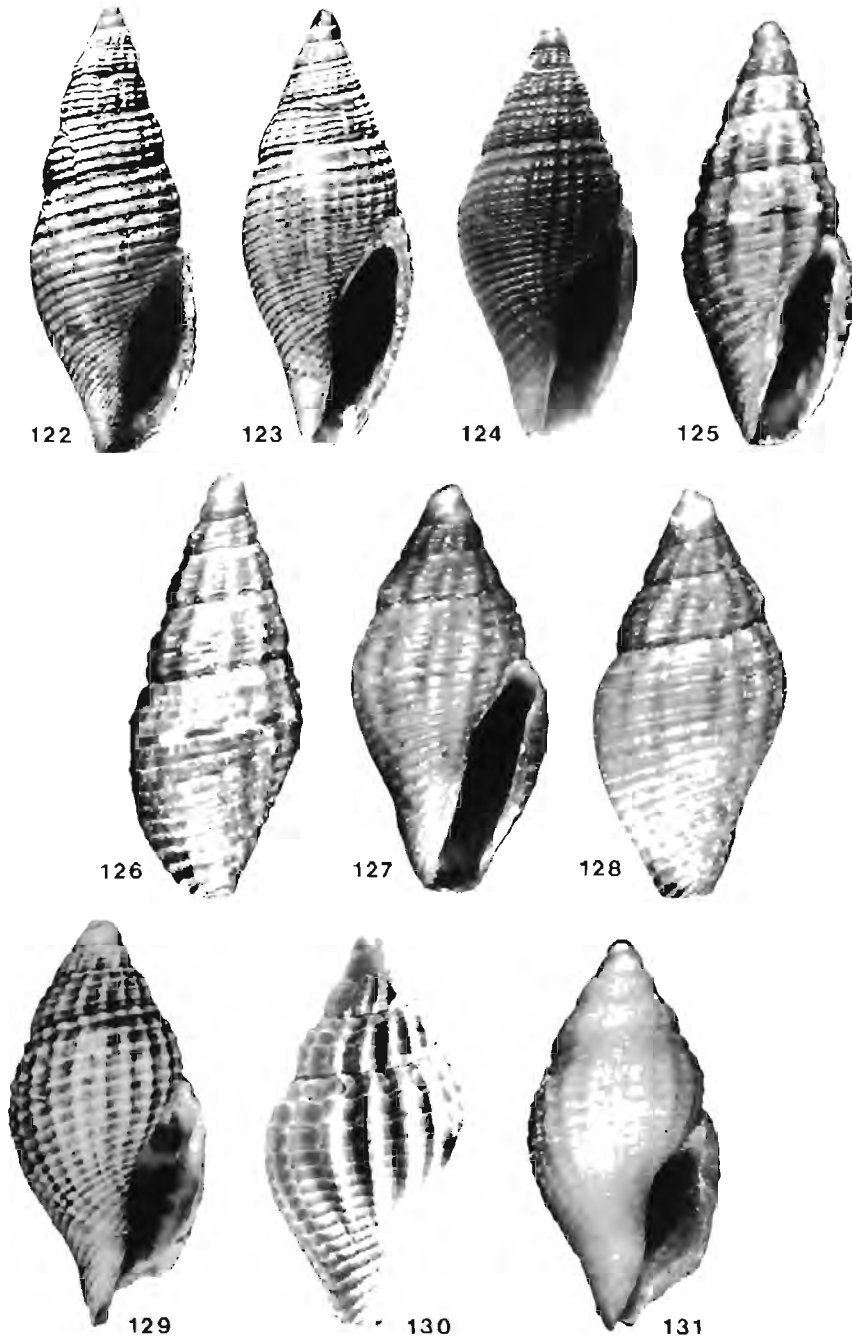
Etymology: Named in honour of Johan Marais of Pietermaritzburg.

Mitromorpha (Mitrolumna) apollinis Thiele, 1925

Figs 122–124

Mitromorpha apollinis Thiele, 1925:221 (155), pl. 19 (31), fig. 14; Barnard, 1958:163. Type-locality: $34^{\circ}51'S$, $19^{\circ}37'E$, 80 m.

Diagnosis: Shell ovate- to narrowly biconic, a/l 0,45–0,52, apex fairly sharp, not papilliform, body whorl strongly convex, labrum smooth, columella pleats feeble; axial ribs thin and weak, strongest on early whorls, not reaching upper suture and sometimes obsolete by penultimate whorl, 25–26 on later whorls; spiral lirae somewhat tabulate or shallowly bifid, subequal to intervals and to axials, small nodules at intersections, 6–7 lirae on penultimate whorl, 19–20 on base, becoming



Figs 122–131. *Miromorpha* (*Mitrolumna*) spp. 122–124, *M. (M.) apollinis* Thiele, 1925: 122, SAM A8741, off Cape St Blaize, 125 fath., $10,1 \times 3,7$ mm; 123, NM B1011, off Cape St Blaize area, *ex pisce*, $9,4 \times 3,6$ mm; 124, NM D154, off Cape Agulhas, *ca.* 80 fath., $8,1 \times 3,4$ mm. 125–126, *M. (M.) nodilirata* sp. n., holotype, NM C7389/T3218, $5,5 \times 2,2$ mm. 127–128, *M. (M.) amphibolos*, holotype, NM C7574/T3218, $5,0 \times 2,5$ mm. 129–131, *M. (M.) tenuilirata* sp. n.: 129, holotype, NM C9542/T3297, $4,8 \times 2,4$ mm; 130, paratype, NM C7055/T3299, $4,0 \times 2,1$ mm. SEM; 131, paratype, same number $5,5 \times 2,8$ mm.

fine on rostrum; subsutural lira well differentiated, dull orange-brown with paler protoconch; protoconch breadth 0,68–0,75 mm, 1st whorl slightly tilted; maximum length 10,1 mm.

Description: Shell ovate- to narrowly biconic (b/l 0,37–0,43, a/l 0,45–0,52), spire orthoconic, apex fairly sharp, not papilliform, teleoconch whorls $4\frac{1}{2}$, moderately convex, with periphery at basal third, periphery of body whorl moderately to strongly convex; aperture relatively long and narrow, labial callus thin, columella pleats very weak, labrum not preceded by a distinct varix, smooth inside, anal sinus moderately shallow. Sculptured by weak axial ribs, strongest on early whorls, crossed by spiral lirae of equal width, with small nodules at intersections; interstices with dense, microscopic axial striae. Spiral lirae 4–5 on 1st teleoconch whorl, increasing on penultimate whorl to 6–7; lirae tend to be flat-topped or even shallowly bifid, and are subequal in width to intervals; subsutural lira set slightly apart from the others by a wider and deeper interval; base of body whorl with 19–20 lirae, which are flat-topped and subequal to each other and to their intervals, except on rostrum, where finer, closer and rounded. Axial ribs 16 on 1st whorl, increasing to 25–26 on penultimate one, evanescent on back of body whorl or sometimes as early as penultimate whorl; ribs rather straight, opisthocline, equal in width to spirals but visible only in intervals, forming small bifid or paired nodules on spirals.

Colour moderate orange with paler protoconch, or (*fidé* Thiele) white.

Protoconch somewhat conical, 1st whorl only slightly tilted; breadth 0,68–0,75 mm, height 0,50–0,55 mm (b/h 1,36–1,42).

Dimensions: 5,8 × 2,2 mm (Thiele); 9,4 × 3,6 mm; 10,1 × 3,7 mm.

Range: Agulhas Bank, in Cape Agulhas–Cape St Blaize area, 80–230 m.

Locality records: AGULHAS BANK: off Cape Agulhas, ca. 80 fathoms, from crayfish trap (NM D154: W. R. Liltved); off Cape St Blaize area, *ex pisce* (NM B1011: R. Le Maitre); 73 mi. off Cape St Blaize, 125 fath. (SAM A8741).

Type material: Four syntypes in ZMB (*fide* Thiele).

Notes: Thiele's description and figure lack detail, but apply well enough to the present material, which is from the general vicinity of the type-locality. It appears to be a variable species.

Mitromorpha (Mitrolumna) amphibolos sp. n.

Figs 127–128

Diagnosis: Shell ovate-biconic, a/l 0,48–0,52, apex slightly papilliform, body whorl strongly convex, labrum usually with internal ridges, anal sinus relatively deep, columella pleats feeble; axial ribs low, rounded, not reaching upper suture, 13–14 per whorl; spiral lirae rounded, equal to/slightly narrower than their intervals, 5–6 on penultimate whorl, 16–18 on base of body whorl, becoming fine on rostrum; small rounded nodules at intersections; subsutural lira fairly well differentiated; dull orange-brown with paler protoconch, whose 1st whorl is strongly tilted, protoconch breadth 0,63 mm; maximum length 6,4 mm.

Description: Shell ovate-biconic (b/l 0,42–0,50, a/l 0,48–0,52), spire orthoconic,

apex slightly papilliform, teleoconch whorls 4, moderately convex, with periphery at basal third, suture fairly deep, periphery of body whorl strongly convex, aperture relatively narrow, anterior two-thirds rather straight and parallel-sided, narrow and tapering posteriorly; labial callus thin, columella with two feeble pleats; labrum usually with about 6 weak internal lirae, anal sinus relatively deep, asymmetrically U-shaped; lip preceded by a very slight swelling, indicative of a vestigial varix.

Sculptured by low, rounded axial ribs, crossed by somewhat stronger spiral lirae, with feeble nodules at intersections; interstices with microscopic axial striae. First whorl with 4 weak spiral lirae, increasing to 5–6 on penultimate whorl, equal to/slightly narrower than intervals, rounded, subsutural lira differentiated by a slightly wider, deeper interval; 16–18 lirae on base, flattened and equal to/wider than their intervals except on rostrum where they are finer and closer. Axial ribs opisthocline, straight, equal to/narrower than their intervals, becoming obsolete shortly below suture and on base of body whorl at mid-parietal level; ribs feeble on 1st half teleoconch whorl, 2nd and later whorls each with 13–14, evanescent on back of body whorl.

Colour uniform moderate orange, protoconch paler; beach shells may be uniform pale orange-yellow or with a median band of moderate orange on body whorl.

Protoconch of $1\frac{1}{2}$ smooth whorls, apical whorl strongly tilted, breadth 0,63 mm, height 0,48–0,53 mm (b/h 1,19–1,31).

Dimensions: 5,0 × 2,5 mm (holotype); 5,7 × 2,4 mm, 6,4 × 2,7 mm (paratypes).

Range: Continental shelf of Transkei, worn shells sometimes washing ashore.

Type material: Holotype NM C7574/T3204, off Sandy Point (32°40,3'S, 28°40,4'E), 94 m, gorgonians, sponges. Paratype 1, NM C8016/T3205, off Port Grosvenor, 82 m, worn calcareous nodules; paratypes 2–4, NM C7299/T3206, off Port Grosvenor, 80 m, calcareous nodules; paratypes 5–8, NM A5025/T3207, Mzamba beach-drift, leg. J. P. Marais.

Notes: *M. amphibolos* is somewhat intermediate between *M. apollinis* (Thiele, 1925) and *M. nodilirata* sp. n., but nevertheless appears to be distinct. From *apollinis* it differs in its fewer axial ribs (13–14 per whorl instead of 25–26) and fewer basal lirae (16–18 instead of 19–20). From *nodilirata* it differs in its more numerous basal lirae (9–12 in that species) which become fine anteriorly; it further differs in its slightly more numerous axial ribs (which do not reach the suture as in *nodilirata*), and its slightly lower spire and paler apex.

Etymology: *amphibolos*: 'caught between two fires' (Gr.), ie. intermediate between *M. apollinis* and *M. nodilirata*.

Mitromorpha (Mitrolumna) nodilirata sp. n.

Figs 99, 105, 125–126

Diagnosis: Shell narrowly biconic, a/l 0,46–0,48 mm, apex papilliform, body whorl strongly convex, labrum with internal ridges, anal sinus relatively deep; columella pleats weak to fairly strong; axial ribs strong, rounded, reaching suture, 10–12 on penultimate whorl; spiral lirae strong, rounded, usually narrower than intervals,

4–5 on penultimate whorl, 9–12 on base of body whorl, not becoming finer anteriorly; fairly strong nodules at intersections; light orange-brown, with darker and lighter nodules posteriorly; protoconch breadth 0,55–0,63 mm, 1st whorl tilted; maximum length 6,1 mm.

Description: Shell narrowly biconic (b/l 0,40–0,44, a/l 0,46–0,48) with an orthoconic spire, apex papilliform, teleoconch whorls 4½, moderately convex with periphery at basal third, periphery of body whorl strongly convex. Aperture rather narrow, widest anterior to middle; labial callus thin, with 2 weak to strong columella pleats; interior of labrum with 6 short, ridge-like denticles, posterior one strongest; anal sinus U-shaped, relatively deep; lip preceded by a slight swelling, scarcely a varix.

Sculpture of strong, rounded axial ribs crossed by coarse, undulating spiral lirae, with elongate nodules at intersections; interstices with microscopic axial plicules. Axial ribs straight, slightly opisthoclinal, suture-to-suture, becoming obsolete on base at level of parietal/columella junction; very weak on first half-whorl, 10–12 on 2nd and later whorls but becoming obsolete on last half of body whorl. Spiral lirae slightly narrower than axials, rounded, rarely shallowly bifid, equal to/narrower than intervals; subsutural lirae differentiated by a slightly wider, shallower groove; 3 lirae on 1st whorl, 4 on others, occasionally a 5th just showing above suture; base of body whorl with 9–12 coarse, subequal lirae, which do not become finer on rostrum.

Colour (including protoconch) uniform moderate orange, 3rd spiral lira below suture (and sometimes 1–2 above it) with alternating darker orange and white spots (corresponding to nodules); basal lirae sometimes faintly mottled.

Protoconch (Fig. 99) of 1½ whorls, suture deep, apical whorl tilted; smooth except for traces of exceedingly fine spiral striae; breadth 0,55–0,63 mm, height 0,45–0,55 mm (b/h 1,09–1,25).

Dimensions: 5,5 × 2,2 mm (holotype); 6,1 × 2,5 mm, 5,2 × 2,3 mm (paratypes).

Range: Outer continental shelf of eastern Transkei.

Type material: Holotype NM C7389/T3218, off Port Grosvenor (31°25,0'S, 29°56,6'E), 82 m, worn calcareous nodules. Paratypes 1–4, NM C7421/T3219, Mtamvuna River, 111 m, sponges; paratype 5, NM C7849/T3220; do, 106 m, stones; paratypes 6–7, NM C7560/T3221; do, 137 m, rocks, sponges; paratypes 8–10, NM C7223/T3222; do, 111 m, sponges; paratype 11, NM C7443/T3223; do, 115 m, sponges; paratype 12, NM C7627/T3224, 110 m, pebbles, sand. All dredged MN.

Notes: With the exception of the holotype all material comes from a small area off the Mtamvuna River. *M. nodilirata* appears somewhat similar to *M. jovis* (Thiele, 1925), if one may judge by the meagre description and figure. However, the figure shows a large, rather domed protoconch (unlike that of *nodilirata*), and the axial ribs become obsolete earlier and do not appear to form nodules on the subsutural lira. Furthermore, the aperture of *jovis*, although shown with an adult labial callus, lacks the rather strong columella teeth (Fig. 105), labral ridges and anal sinus of adult *nodilirata*. Finally, the spiral cords in *jovis* are illustrated as close together, not widely spaced.

Etymology: *nodus* (a nodule) + *liratus* (ridged), L.

Mitromorpha (Mitrolumna) jovis Thiele, 1925

Mitromorpha jovis Thiele, 1925:221 (255), pl. 31 (19), fig. 221. Type locality: off Cape Agulhas, 80 m.

See comments under *M. nodilirata* sp. n.

Mitromorpha (Mitrolumna) tenuilirata sp. n.

Figs 16, 129–131

Diagnosis: Shell ovate-biconic, rather squat, a/l 0,53–0,58, apex rather acute, not papilliform, suture bordered by a narrow shoulder, body whorl strongly convex; columella convex, without pleats, labrum preceded by a definite varicoid thickening; axial ribs rounded, extending from suture on to base of body whorl, 16–24 per whorl; spiral lirae sharp, thin (much narrower than intervals), 5–6 on penultimate whorl, 16–19 on base, subsutural lira separated by a distinct concavity; off-white, with slightly pearly sheen; protoconch breadth 0,70–0,78 mm, 1st whorl strongly tilted; maximum length 5,5 mm.

Description: Shell ovate-biconic (b/l approximately 0,50–0,51, a/l 0,53–0,58), apex relatively acute, not papilliform, greatest width of shell slightly anterior to median; teleoconch whorls $3\frac{1}{2}$, moderately convex, periphery at basal third, with a narrow but distinct shoulder below deep suture, body whorl strongly convex, left side of base strongly concave. Aperture sinuous, acute posteriorly, curved anteriorly, labial callus thin but distinct, without trace of pleats, columella gently convex; labrum badly damaged, but evidently smooth inside and without anal sinus, preceded externally by a broad, low, rounded varicoid thickening.

Sculpture of thin, sharp, widely spaced spiral lirae, crossing gently-rounded axial ribs, without nodules at intersections; intervals with very fine axial microplicules. Spiral lirae: Four equidistant, weak threads at beginning of 1st whorl, increasing to 5–6 by penultimate whorl, subsutural one separated by a slightly wider, more concave interval which impresses axial ribs; all lirae much narrower than their intervals; base of body whorl with 16–19 widely spaced lirae, becoming progressively weaker anteriorly. Axial ribs 16–21 on 1st whorl, on 1st half teleoconch whorl sometimes partly masked by a series of strong axial plicules, increasing to 20–24 on penultimate whorl; ribs about half width of intervals, with sloping sides, suture-to-suture (weaker subsuturally) on spire whorls, arcuate on body whorl, evanescent on base at level of upper part of columella and on last half body whorl.

Protoconch (Fig. 16) rounded-conical, with strongly tilted 1st whorl, suture deep, smooth except for a very few, fine, dense axial threads near termination; breadth 0,70–0,78 mm, height 0,50–0,60 mm (b/h 1,22–1,46).

Uniform yellowish-white, with a slight nacreous sheen (particularly on protoconch).

Dimensions: 4,8 × 2,4 mm (holotype), 5,5 × 2,8 mm (paratype 5).

Range: Continental slope of Transkei.

Type material: Holotype NM C9452/T3297, off Mgazi River (31°44,8'S, 29°33,0'E), 370 m, soft black mud, few rocks, large crinoids. Paratypes 1–3, NM

C8833/T3298, same data. Paratypes 4–5, NM C7055/T3299, off Shixini Point, 500 m, muddy sand, old *Dendrophyllia* rubble (paratype 5 (Fig. 131) was accidentally badly damaged during photography). All dredged MN.

Notes: *M. tenuilirata* is the deepest-water member of the genus yet known from southern Africa. The thin, sharp spiral sculpture and strongly tilted first protoconch whorl are diagnostic.

Etymology: *tenuis* (thin) + *liratus* (ridged), L.

Mitromorpha (Mitrolumna) platacme sp. n.

Figs 132–133

Diagnosis: Shell oblong-biconic (b/l 0,45–0,51, a/l 0,51–0,53), spire whorls gently convex, with basal periphery, columella without pleats, labrum preceded by a low varix, anal sinus shallow but wide; axial ribs moderately fine, 21–25 on penultimate whorl, equal to/slightly narrower than intervals, almost straight, with feeble nodules where crossed by the finer spiral threads; spirals equal to/slightly narrower than their intervals, 6–7 on penultimate whorl, 16–17 on base of body whorl, subsutural lira strong and well demarcated; pearly white; protoconch apically flattened, with low 1st whorl, breadth 0,70 mm; adult length 5,2 mm.

Description: Shell oblong-biconic (b/l 0,45–0,51); spire high, blunt, slightly cyrtoconic, apex somewhat papilliform, a/l 0,51–0,53; teleoconch whorls $3\frac{1}{2}$, gently convex, with periphery at or slightly above suture, whorls very narrowly shouldered at suture, which is moderately deep, body whorl strongly convex, left side of base shallowly concave. Aperture long, narrowly lanceolate, acute posteriorly, greatest width slightly posterior to median; labial callus fairly thin, without pleats; edge of labrum thin, slightly incurved, smooth inside, externally preceded by a low varix; labrum moderately convex in side-view, anal sinus shallow, gently concave.

Sculpture of moderately fine axial ribs, crossed by much finer spiral threads, with slight nodules at intersections; interstices with microscopic axial plicules. Axial ribs thin, equal to/narrower than intervals, opisthocline, almost straight, suture-to-suture on spire and extending well on to base of body whorl, but becoming weak and pliculate on varix; 21 ribs on 1st whorl, 21–25 on penultimate one. Spiral lirae subequal to their intervals (in places slightly narrower than them); 1st whorl with 5 weak threads, 6–7 on penultimate whorl, subsutural lira strong, demarcated by a deeper, wider groove that indents but does not incise axial ribs; 16–17 flattened spiral lirae on base of body whorl, finer and more rounded on rostrum.

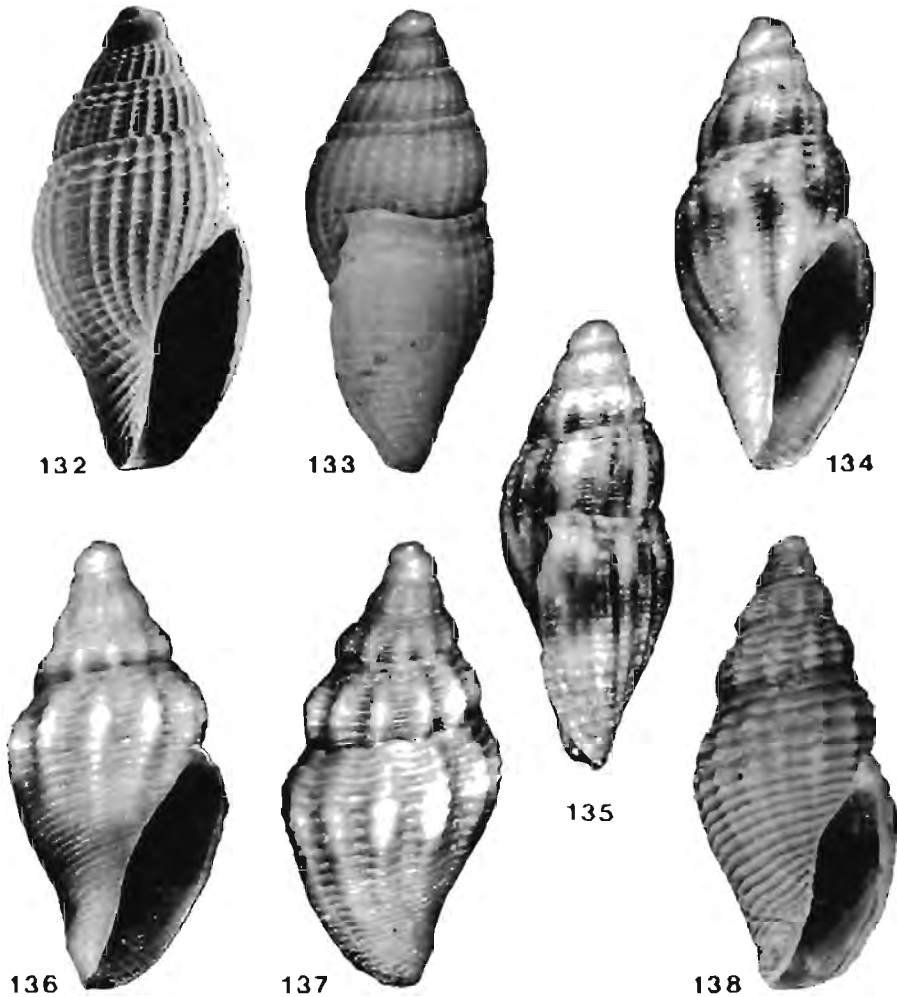
Greyish-white with a silky or pearly sheen.

Protoconch truncately domed, with a small, depressed 1st whorl and deep suture, $1\frac{1}{2}$ whorls, sculptured by very faint, punctate spiral striae; breadth 0,70 mm, height 0,45 mm (b/h 1,56).

Dimensions: 5,1 × 2,3 mm (holotype); 4,7 × 2,4 mm and length 5,2 mm, lip broken (paratypes).

Range: Upper continental slope of western Transkei.

Type material: Holotype NM C8763/T3139, off Nthlonyane (32°16,7'S, 29°06,0'E),



Figs 132–138. *Mitromorpha* (*Mitrolumna*) spp. 132–133, *M. (M.) platyce* sp. n., holotype, NM C8763/T3139, 5,1 × 2,3 mm. 134–135, *M. (M.) ustulata* sp. n., holotype, NM C807/T3214, 4,3 × 1,9 mm. 136–137, *M. (M.) roundicostata* sp. n., holotype, NM C7516/T3049, 5,4 × 2,6 mm. 138, *M. (M.) herilda* (Bartsch, 1915), NM B513, Jeffreys Bay, 5,0 × 2,4 mm.

300 m, medium sand. Paratype 1, NM C9117/T3141, off Mbashe River, 295–350 m, coarse sand; paratype 2, NM C9346/T3140, off Bulungula River, 250–300 m, coarse sand.

Notes: Somewhat similar to *M. tenuilirata* but more elongate with denser spiral sculpture, closer, straighter axial ribs and a different type of protoconch. A similar but smaller protoconch occurs in *M. brevispira*, which has a proportionately lower spire, a deeper anal sinus and a definite colour pattern.

Etymology: *platys* (broad, flat) + *akme* (tip), Gr.

Mitromorpha (Mitrolumna) herilda (Bartsch, 1915)

Fig. 138

Mangilia herilda Bartsch, 1915:28, pl. 7, fig. 7; Turton, 1932:28. Type locality: Port Alfred.

Diagnosis: Shell narrowly biconic, *Anachis*-like, a/l about 0,43–0,47, whorls strongly convex with periphery on basal third; columella pleats obsolete; labrum smooth inside, anal sinus slight; axial ribs strong, rounded, arcuate on body whorl, weak below suture, 10–18 per whorl, spiral lirae rounded, subequal to/narrower than intervals, 6–8 per whorl, 15–20 on base of body whorl; subsutural lira weakly differentiated, feeble nodules at intersections; uniform brownish-orange or white; protoconch breadth 0,53–0,55 mm; maximum length 7,5 mm.

Description: Shell narrowly biconic (b/l approximately 0,42–0,44, a/l 0,43–0,47) resembling an *Anachis*, spire slightly cyrtconic, teleoconch whorls $4\frac{1}{2}$, strongly convex (particularly on penultimate and body whorls), periphery on basal third; suture deep; aperture curved basally, greatest width posterior to middle, labial callus very thin, columella flat or gently convex, columella pleats very faint; labrum smooth inside, anal sinus very shallow; lip not preceded by a varix. Sculptured by strong rounded axial ribs, crossed by spiral ridges, which form weak nodules at intersections; interstices with very fine axial striae. Axial ribs weakly arcuate, slightly opisthoclinal, narrower than intervals, suture-to-suture on spire (although relatively weak on shoulder slope), on body whorl becoming obsolete below level of paries, and usually weaker on last half-whorl; 9–15 ribs on 1st whorl, 10–15 on penultimate and 11–18 on body whorl. Spiral lirae rounded, well raised, 4–5 on 1st teleoconch whorl, increasing to 6–8 on later whorls, subequal to/narrower than intervals, most widely spaced below suture; 15–20 on base of body whorl, here flatter and subequal to intervals.

Colour uniform white or light orange.

Protoconch worn in all specimens, breadth 0,53–0,55 mm.

Dimensions: 7,0 × 3,0 mm; 6,4 × 2,7 mm; 5,4 × 2,4 mm. Length exceeds 7,5 mm (a worn shell).

Range: Eastern Cape Province.

Locality records (all NM): EASTERN CAPE (all beach-drift); Jeffreys Bay (B513: F. Graeve; 7035: R. K.); Port Alfred (B4378, B6730: W. H. Turton; B6731: Albany Museum; B704: E. K. Jordan); Kwelera, near East London (A6539: Mrs C. M. Connolly).

Type material: Holotype (No. 249734) and one paratype in NMNH (*fidé* Bartsch 1915).

Notes: A rare species, and all known examples have the labral edge and first protoconch whorl broken.

Mitromorpha (Mitrolumna) rotundicostata sp. n.

Figs 136–137

Diagnosis: Shell biconic, a/l 0,54, apex somewhat papilliform, spire whorls strongly convex with median periphery; columella straight, pleats obsolete, [labrum

immature]; axial ribs high, rounded, straight, weak below suture, projecting strongly at periphery, 11–12 per whorl, crossed by thin, somewhat flat-topped spiral lirae, 7 on penultimate whorl, subequal to intervals, 22 on base of body whorl where progressively flatter and closer; subsutural lira weakly differentiated; no nodules at intersections; colour pale orange-brown with paler ribs, or with two orange-brown zones, or uniform off-white; protoconch breadth 0,65–0,70 mm, 1st whorl depressed; maximum length 5,4 mm.

Description: Shell biconic (b/l 0,48, a/l 0,54), with slightly asymmetrical spire, apex somewhat papilliform, whorls strongly convex, periphery at mid-whorl; teleoconch whorls nearly 4; base of body whorl strongly tapering, left side somewhat concave. Aperture somewhat linear (but lip immature), labium with a thin callus, parietal region and columella meeting at a very slight angle, columella straight, pleats very faint.

Sculptured by high, rounded axial ribs and thin spiral lirae; interstices with microscopic axial threads. Axial ribs straight, opisthoclinal, suture-to-suture on spire, weak below suture, on body whorl ending rather abruptly at mid-parietal level, but continuing further on to base behind labrum, subequal to intervals; 12 ribs on 1st whorl, 11 on last. Spiral lirae: 4–5 fine, rather weak threads on 1st whorl, increasing to 7 by penultimate whorl, where narrower than intervals (particularly on posterior half of whorl); base with 22 lirae, which become progressively closer and flatter anteriorly, except on end of rostrum, where they are raised and rounded.

Colour light orange-yellow, with paler axial ribs on body whorl; sometimes with two zones of moderate orange above and below periphery of body whorl, or uniform yellowish-white.

Protoconch of about $1\frac{1}{2}$ smooth whorls, initial whorl small and depressed, suture deep; breadth 0,65–0,70 mm, height 0,48–0,50 mm (b/h 1,30–1,46).

Dimensions: 5,4 × 2,6 mm (holotype).

Range: Outer continental shelf of southern Natal and Transkei.

Type material: Holotype NM C7516/T3049, off Mtamvuna River, Natal/Transkei border (31°09,7'S, 30°15,3'E), 120–140 m, sponge-rubble. Paratype 1, NM D224/T3228, off Park Rynie, Natal, 130 m, sponge-rubble, juvenile; paratypes 2–3, NM C7341/T3227, off Ubombo, Transkei, 60–62 m, coarse sand, oyster-shell conglomerate, juveniles. All MN.

Notes: *M. rotundicostata* resembles *M. herilda* in general form, but is broader and more biconical, with a lower spire, much stronger axial ribs and finer spirals.

Etymology: *rotundus* (rounded) + *costatus* (ribbed), L.

Mitromorpha (Mitrolumna) ustulata sp. n.

Figs 134–135

Diagnosis: Shell narrowly biconic, a/l 0,44–0,51, apex not papilliform, spire whorls moderately strongly convex with periphery at basal third, a very narrow shoulder at suture formed by a somewhat nodular bordering lira; no columella pleats or labral

ridges; labrum preceded by a low, rounded varix, anal sinus moderately deep; axial ribs strong, slightly oblique, arcuate on body whorl, extending on to rostrum, 16–18 per whorl; spiral lirae thin, 7–11 on penultimate whorl, 16–19 on base; yellowish-white, usually with axial marks of orange-brown, merging on back of body whorl; protoconch breadth 0,53–0,65 mm, 1st whorl depressed; maximum length 5,4 mm.

Description: Shell narrowly biconic (b/l 0,37–0,44, a/l 0,44–0,51); spire orthoconic to cyrtoconic, apex not papilliform, teleoconch whorls about $3\frac{1}{2}$, moderately strongly convex, with periphery at basal third, and a fairly deep suture, body whorl strongly convex, left side of base gently concave. Aperture relatively large, lanceolate, greatest width median, labial callus a thin glaze, columella without trace of plicae; labrum smooth inside, its edge thin, slightly incurved, preceded externally by a varicoid thickening; in side-view quite strongly convex, anal sinus fairly shallow, an asymmetrical U.

Sculpture of moderately strong axial ribs crossed by much finer spiral lirae; interstices with a microsculpture of relatively coarse axial threads. Axial ribs opisthocline, straight and suture-to-suture on spire, on body whorl arcuate and extending well on to base (evanescent at mid-columella level), equal to/slightly narrower than intervals, 16–18 ribs per whorl. Spiral sculpture of 5–6 weak threads on 1st whorl, 7–11 lirae on penultimate whorl, narrower than their intervals, subsutural lira set apart by a deeper interval (which indents but does not incise ribs) and forms a very narrow shoulder rendered nodular by the rib terminations; base of body whorl with 16–19 lirae, becoming progressively finer on rostrum.

Yellowish-white with axial streaks of moderate orange, initially on alternate ribs, but on back of body whorl diffusing over intervals and forming two obscure spiral zones; sometimes uniform yellowish-white.

Protoconch rather bluntly domed, of $1\frac{1}{2}$ whorls, 1st whorl depressed, second with a very slight shoulder, smooth with a few strong axial plicules at termination; breadth 0,53–0,65 mm, height 0,45–0,48 mm (b/h 1,18–1,44).

Dimensions: 4,3 × 1,9 mm (holotype); 4,9 × 2,0 mm, 5,4 × 2,2 mm (paratypes).

Range: Outer continental shelf of eastern Transkei.

Type material: Holotype NM C807/T3214, off Mtamvuna River (31°09,9'S, 30°15,1'E), 140 m, sponge-rubble. Paratype 1, NM C8018/T3217, same data; paratype 2, NM C7828/T3216, off Port Grosvenor, 80–85 m, calcareous nodules and sand, a juv.; paratype 3, NM C5264/T3215, off Mzamba, 100 m, sponge-rubble. All MN.

Notes: *M. ustulata* shows some resemblance to *M. iridescens*, but the interstitial microsculpture is markedly coarser, the anal sinus shallower, axial ribs fewer (16–18 per whorl against 28–39 in *iridescens*), straighter and much stronger, spiral lirae fewer, the subsutural cord better developed and the colour pattern is different. White examples may resemble *M. herilda*, but differ in their straighter columella, larger protoconch, less convex whorls, distinct prelabral varix and axial ribs that extend further on to the base.

Etymology: *ustulatus* = scorched or browned (L.).

Mitromorpha (Mitrolumna) iridescens sp. n.

Figs 104, 139–141

Diagnosis: Shell as in *M. ustulata* but cylindrical-biconic, left side of base more concave, axial ribs fine, subequal to spiral lirae, more oblique and arcuate than in *ustulata*, 28–39 per whorl, spiral lirae 12–14 on penultimate whorl, 17–20 on base; off-white, either with two spiral lines (one on spire) of orange-brown dots, or two broad zones of orange-brown flames; protoconch breadth 0,63–0,70 mm, 1st whorl depressed; maximum length 5,2 mm.

Description: Shell cylindrical-biconic (b/l 0,40–0,45), spire high, blunt, somewhat cyrtconic, apex not papilliform; a/l 0,43–0,48; teleoconch whorls about $3\frac{1}{2}$, moderately convex, with periphery at basal third and a very narrow shoulder bordering the relatively deep suture, body whorl strongly convex, left side of base shallowly concave. Aperture long, narrowly lanceolate, acute posteriorly, greatest width median; labial callus fairly thin, without even vestigial pleats, edge of labrum distinctly incurved, smooth inside, thin, preceded externally by a varicoid thickening; labrum moderately strongly convex in side-view, anal sinus fairly deep, somewhat L-shaped.

Sculpture of fine axial ribs crossed by slightly finer spiral threads, with small nodules at points of intersection; interstices with microscopic axial plicules; surface with a silky iridescence. Axial ribs thin, narrower than intervals, fairly sharp, opisthocline, arcuate, suture-to-suture on spire whorls, extending well on to base on body whorl, breaking up into a series of dense plicules behind lip; 28–30 ribs on 1st whorl, 28–39 on penultimate one. Spiral lirae narrower than their intervals, sometimes weak to absent around middle of body whorl, 7–8 on 1st whorl, 12–14 on penultimate one; subsutural lira demarcated by a deeper and wider groove which indents, but does not cut through, axial ribs to form an inconspicuous cingulum; base of body whorl with 17–20 lirae, subequal in strength and narrower than their intervals, becoming denser and somewhat stronger at end of rostrum.

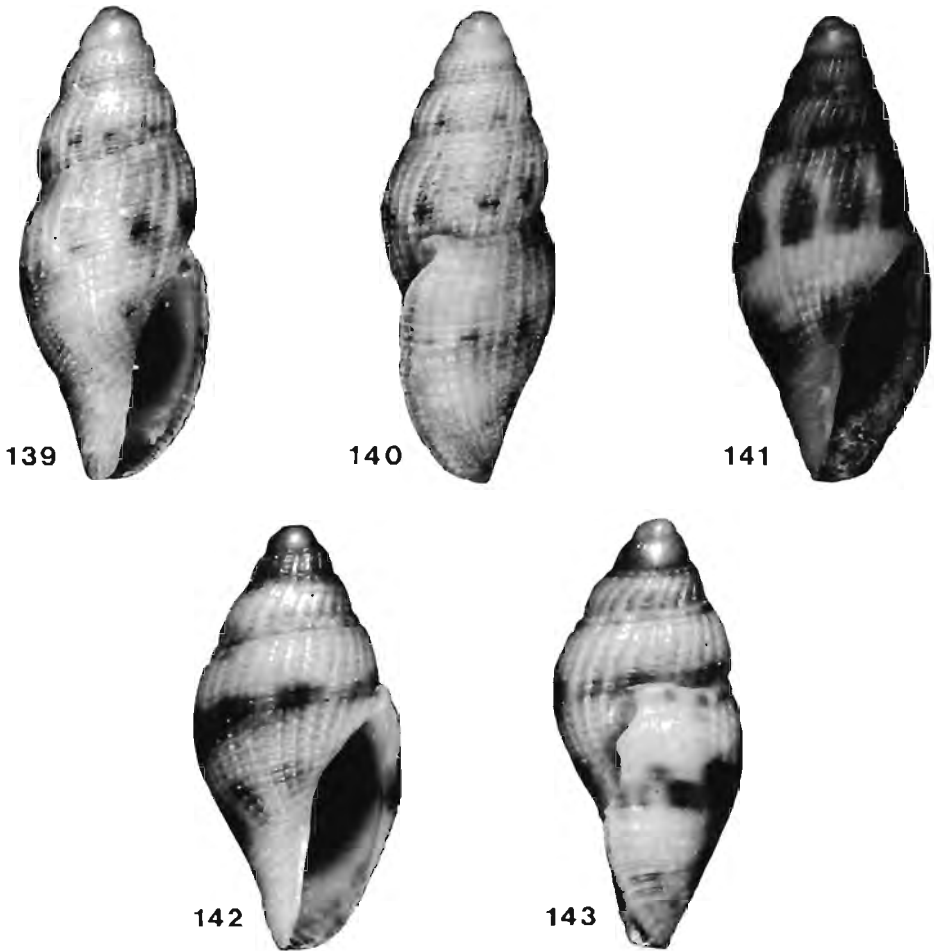
Two colour forms: (a) yellowish-white, with two rows of small, diffuse, widely spaced spots of moderate orange on body whorl, the posterior one visible on penultimate whorl; (b) white with a series of large axial flames of brownish-orange on spire whorls and postperipheral part of body whorl, base of latter with more diffuse blotches; protoconch white.

Protoconch as in *brevispira*; breadth 0,63–0,70 mm, height 0,38–0,53 mm (b/h 1,32–1,79).

Dimensions: 4,6 × 2,0 mm (holotype); 4,2 × 1,9 mm, 5,2 × 2,1 mm (paratypes).

Range: Transkei, outer continental shelf.

Type material: Holotype NM C7784/T3198, off Mtamvuna River (31°09,0'S, 30°15,5'E), 110 m, pebbles. Paratype 1, NM C7360/T3201, off Mtamvuna River, 80 m, rocks; paratype 2, NM C7517/T3199, off Mtamvuna River, 120–140 m, sponge-rubble; paratype 3, NM C7774/T3203, off Mtamvuna River, 100 m, sand and rubble, juvenile; paratype 4, NM C7783/T3202, off Nthlonyane River, 95 m, sponge-rubble; paratypes 5–6, NM C7572/T3294, off Sandy Point, 94 m, gorgonians, sponges; paratype 7, NM C7720/T3200, off Kei River, 390 m, coarse sand, a worn shell.



Figs 139–143. *Mitromorpha (Mitrolumna)* spp. 139–141, *M. (M.) iridescens* sp. n.: 139–140, holotype, NM C7784/T3198, 4,6 × 2,0 mm; 141, paratype 5, NM 7572/T3294, blotched form, off Sandy Point, 94 m, 4,5 × 1,9 mm. 142–143, *M. (M.) brevispira* sp. n., holotype, NM C7408/T3193, 3,9 × 1,9 mm.

Notes: Similar to *M. brevispira* in general form and sculpture, but with a much higher spire, more numerous axials and spirals, and a different colour pattern; protoconch white, not yellow. Blotched individuals (Fig. 141) may have flatter whorls than normal but do not appear to be specifically separable.

Etymology: *iridescens* = iridescent, L.

***Mitromorpha (Mitrolumna) brevispira* sp. n.**

Figs 15, 141, 143

Diagnosis: Shell as in *M. ustulata* but biconic-ovate, with low spire (a/l 0,53–0,55), left side of base more concave, spire whorls with basal periphery; axial ribs fine,

subequal to spiral lirae and to their intervals, more oblique and arcuate, 23–31 per whorl, spiral lirae 6–8 on penultimate whorl, rather weak, 15–17 on base of body whorl; off-white, with diffuse brown blotches around periphery of body whorl (showing on spire), and a weaker zone around base; apex yellow; protoconch breadth 0,63–0,65 mm, 1st whorl depressed; maximum length 4,7 mm.

Description: Shell biconic-ovate (b/l 0,47–0,49), with relatively low, blunt spire (a/l 0,53–0,55), orthoconic to slightly cyrtoconic, apex not papilliform, teleoconch whorls slightly exceeding 3, moderately convex with basal periphery and a very narrow shoulder bordering the relatively deep suture, periphery of body whorl strongly convex, left side of base shallowly concave. Aperture long, narrowly lanceolate, acute posteriorly, greatest width at or just posterior to middle; labial callus fairly thin, without trace of pleats; labrum smooth inside, not distinctly incurved nor incrassate, but preceded externally by a varicoid thickening, in side-view with strongly convex edge, anal sinus moderately deep, somewhat L-shaped.

Sculpture finely and obliquely cancellate, with granules at sites of intersection of the subequal spirals and axials; interstices with exceedingly fine axial striae. Axial ribs fine, subequal to intervals, opisthocline, straight and suture-to-suture on spire, arcuate on body whorl, where evanesce at base of paries and become irregular behind lip; sometimes axial sculpture disappears at beginning of 2nd whorl; 1st whorl with about 20–30 ribs, 2nd with 23–31. Spiral lirae rather feeble on 1st teleoconch whorl, relatively weak throughout, 6–8 on penultimate whorl, narrower than their intervals, a subsutural lira separated by a well-developed groove which incises axials to form a somewhat gemmate collar; base of body whorl with 15–17 lirae, subequal in strength and narrower than intervals, except on end of rostrum where fine and dense.

Colour yellowish-white, periphery of body whorl with a series of diffuse blotches of dark orange-yellow to strong yellowish-brown, sometimes small, sometimes extensive, usually showing on spire whorls, with a second paler and more diffuse zone around base of body whorl (level with top of columella); aperture white with external pattern showing through; protoconch and first teleoconch whorl light orange-yellow.

Protoconch (Fig. 15) rather domed, of $1\frac{1}{2}$ smooth whorls, apical whorl small and depressed; breadth 0,63–0,65 mm, height 0,35–0,43 mm (b/h 1,51–1,80).

Dimensions: $3,9 \times 1,9$ mm (holotype); $4,3 \times 2,1$ mm, $4,7 \times 2,2$ mm (paratypes).

Range: Transkei continental shelf and slope.

Type material: Holotype NM C7408/T3193, off Whale Rock ($31^{\circ}56,9'S$, $29^{\circ}13,5'E$), 20–26 m, sand and gorgonians. Paratype 1, NM C7818/T3195, Rame Head, 410–430 m, stones, some sand; paratypes 2–3, NM C7339/T3292, off Ubombo, 60–62 m, coarse sand, oyster shell conglomerate; paratype 4, NM C7532/T3196, off Nthlonyane River, 95 m, sponge-rubble; paratype 5, NM C7472/T3194, off Mbashe River, 200–220 m, sponge-rubble; paratype 6, NM C7739/T3197, off Kei River, 390 m, coarse sand. All dredged *MN*.

Notes: A distinctive species. The apparent bathymetric range of 20–430 metres is unlikely, and the two deeper-water examples may have been washed down the

slope; however, both examples are larger than the others and may represent a bathymorph.

Etymology: *brevis* (short) + *spira* (a spire), L.

Maorimorpha Powell, 1939

Maorimorpha Powell, 1939:235. Type species (o.d.) *Mitromorpha suteri* Murdoch, 1905.

Diagnosis: Shell narrowly subcylindrical with high spire, short aperture and shallowly notched siphonal canal; anal sinus slight or absent; no columella pleats; labrum with or without small denticles; sculpture of spiral lirae, with or without weak axials. Protoconch large and papilliform, of $1\frac{1}{2}$ smooth or (in all?) spirally striate whorls, 1st one inrolled. Operculum and radula unknown.

Notes: A single South African species, *Cominella?* *sulcata* Sowerby, 1892, is referred here. Although treated by Turton (1932) and Barnard (1958) as a *Daphnella*, it lacks the L-shaped, sutural sinus and distinctive protoconch of that genus. It agrees well in general characters with *Maorimorpha*, previously restricted to two species from southern New Zealand.

Maorimorpha sulcata (Sowerby, 1892)

Figs 17–18, 144–148

Cominella? *sulcata* Sowerby, 1892:11, pl. 1, fig. 10. Type locality: Port Elizabeth.

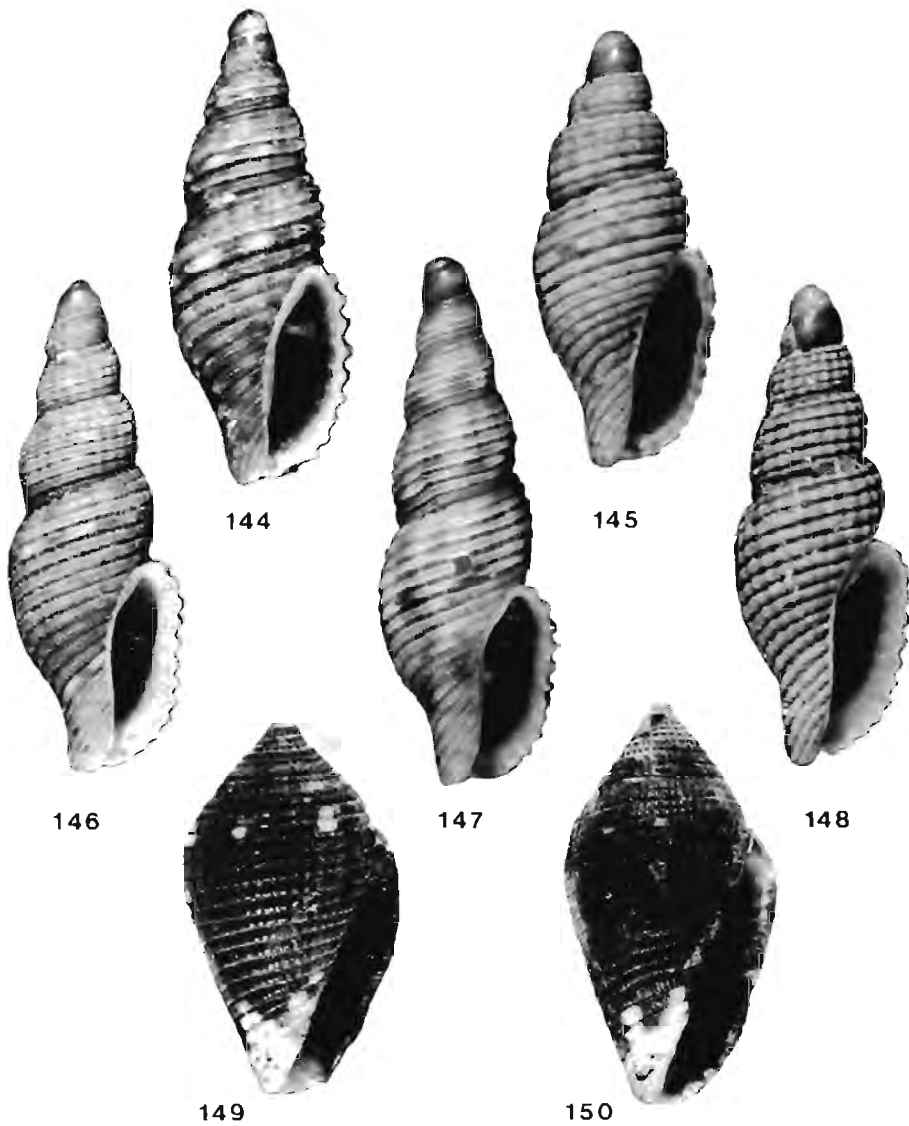
Daphnella (?) *sulcata*; Smith, 1904:28; Bartsch, 1915:32.

Daphnella sulcata; Turton, 1932:30; Barnard, 1958:160 (partim), fig. 30b (protoconch).

Diagnosis: Spire high and turreted (b/l 0,34–0,41, a/l 0,35–0,45), narrowly shouldered at suture; 3–5 tiny labral denticles in adult; 7–8 strong, high spiral lirae with steep sides and fairly rounded, crenulated summits, granular on early whorls (where weak axial riblets may occur) and sometimes on later ones; in Natal sometimes thin, orthocline axial ribs throughout, forming small tubercles on spirals; 9–14 spiral lirae on base (close and rounded on rostrum); intervals with axial plicules; uniform yellowish-buff, or cream with orange-brown flecks or a row of spots below periphery; protoconch breadth 0,78–1,00 mm; maximum length 9,6 mm.

Description: Shell narrow (b/l 0,34–0,41) with high, turreted spire, a/l 0,35–0,45; teleoconch whorls a little more than 4, initially weakly convex, but becoming progressively more tumid with growth, periphery median, whorls narrowly shouldered below the deep suture; body whorl strongly convex, left side of base concave. Aperture relatively narrow, tapering and curved anteriorly, obtusely rounded posteriorly, medially subparallel; siphonal canal shallowly notched; labium with a short parietal region, meeting the long, gently convex columella at a slight, rounded angle, labial callus relatively thick, with a free outer edge in adults; labrum with crenulate edge in young, adult with 3–7 tiny denticles; no anal sinus; adult with a slight, gently convex varicoid swelling behind lip, labrum rising slightly up penultimate whorl to cover suprasutural lira.

Sculpture of strong spiral lirae, somewhat granular on early whorls, with fine but



Figs 144–150. *Maorimorpha* and *Lovellona* spp. 144–148, *M. sulcata* (Sowerby, 1892): 144, NM A6533, Gonubie, 7,6 × 2,9 mm; 145, NM 3064, Port Shepstone, 6,0 × 2,4 mm; 146, NM C7742, off Sandy Point, 90 m, 7,8 × 2,8 mm; 147, NM B731, Port Alfred, 8,9 × 2,8 mm; 148, SAM A8700, off Umkomaas, 40 fath. 149, 150, *L. atramentosa* (Reeve, 1849): 149, NM J5796, 5 mi. NW of Bazaruto Is., 9 fath., 9,1 × 4,9 mm; 150, NM H5639, Conducia Bay, 7,9 × 4,4 mm.

conspicuous axial plicules in intervals; in Natal form sometimes orthocone axial riblets in adult, forming small nodules on spirals. First whorl with 6 spiral lirae, initially close-set, without interstitial plicules, sometimes with about 16 feeble, undulating axial riblets, these usually only visible as rows of weak granules; spirals increase to 7–8 on penultimate whorl, subequal except for the subsutural lira which is weaker, lirae steep-sided with moderately rounded summits, somewhat crenulated by growth-lines, intervals equal to lirae. Base of body whorl with 9–14 spiral lirae, those on rostrum differentiated from rest by being closely set and more rounded.

Protoconch (Figs 17, 18) rather pupoid, of about $1\frac{1}{2}$ whorls, last whorl large, 1st one small and inrolled, with inconspicuous suture; sculptured by dense, divaricating spiral microstriae, absent above suture; termination very abrupt; breadth 0,78–1,00 mm, height 0,73–1,00 mm (b/h 1,00–1,11).

Colour uniform light orange-yellow with paler rostrum, or else yellowish-white with moderate orange flecks or a series of brownish-orange spots below periphery.

Dimensions: 9,6 × 3,5 mm; 9,1 × 3,1 mm, 8,5 × 3,1 mm (eastern Cape); 6,6 × 2,6 mm, 6,4 × 2,6 mm (Natal).

Range: Cape Agulhas to southern Natal, littoral (beach-drift) to at least 96 m.

Locality data: AGULHAS AREA: Cape Agulhas, beach-worn (NM A2727: Mrs C. M. Connolly). EASTERN CAPE: Jeffreys Bay (NM 5943: R. K.); off Cape Recife, 67 fath. (SAM A30428, worn apex only); Port Alfred (NM B4833: H. Becker; 2078: H. C. Burnup; B731: E. K. Jordan); East London (NM A621: R. K.; B6733: ex Albany Mus.); off Cove Rock, 22 fath. (SAM A8699); Gonubie (NM A6533: Mrs C. M. Connolly). TRANSKEI: Nqabara, beach (NM C6172: R. K.); off Nthlonyane River, 51 m, sandy mud, corals (NM C7524: MN); off Stony Point, 87 m, coarse sand (NM C4229: MN); Coffee Bay, beach (NM B6734: ex Albany Mus.; 5942, B1002: R. K.); off Whale Rock, 20–26 m, sand and gorgonians (NM C7412, C7237: MN); off Ubombo, 96 m, sand, gravel (NM C7190: MN); Mbotyi (NM C8397: R. K., D. Herbert; A6535: Mrs C. M. Connolly); Mzamba (NM B4693, A1551: R. K.). NATAL: Shelley Beach (NM A3741: Mrs R. Cock); Port Shepstone, beach (NM 631, 3064: H. C. Burnup); off Umkomaas River, 40 fath. (SAM A8700).

Notes: A variable species, both individually and geographically. In the Eastern Cape (Figs 144, 147) it varies in breadth (b/l 0,34–0,37, a/l 0,35–0,39), and in strength of shoulder and in coloration; it here reaches its largest size (length 9,6 mm). Littoral Natal examples (Fig. 145) are smaller (up to 6,6 mm), broader (b/l 0,39–0,41), often with a higher spire (a/l 0,37–0,45), and more granular spirals, sometimes with stronger interstitial plicules; an offshore form (Fig. 148) has thin, straight axial riblets, narrower than their intervals and forming small nodules on spirals. Protoconch often smaller in Natal form (breadth 0,78–0,80 mm against 0,88–1,00 mm). Intermediates occur in Transkei. The few Cape Agulhas shells seen are very worn, but seem to resemble Natal examples in form, although larger.

Maorimorpha suteri (Murdoch, 1905) and *M. secunda* Powell, 1922, of New Zealand are much smaller (only 4,6 mm) with lower spiral lirae and no lip denticles.

Lovellona Iredale, 1917

Lovellona Iredale, 1917:329. Type-species (o.d.) *Conus atramentosus* Reeve, 1849.

Diagnosis: Shell coniform, labium straight, without callus or pleats, labrum thin, smooth, no anal sinus, periostracum present. Protoconch conical, acute, of about $2\frac{1}{2}$ smooth whorls. Operculum absent. Radula as in *Mitromorpha*.

Notes: The protoconch of the type-species was described by Powell (1966) as 'broad and almost flat'. This was presumably based on a worn example, as the protoconch in a fresh juvenile (NM G6033) is as described here. In form the protoconch is closer to that of *Anarithma* than to *Mitromorpha*, and similarly reflects pelagic, rather than full capsule development.

Iredale (1917) and Powell (1966) listed two other species in *Lovellona*, namely *L. peaseana* Finlay, 1927, and *Conus micarius* Hedley, 1912. Data on the latter species are lacking, but *peaseana* has a low, paucispiral protoconch and presumably belongs to *Mitromorpha* s.s. An unidentified species from the Philippines (NM J2066), possibly *Conus papalis* Weinkauff, 1875, may be another *Lovellona*.

Lovellona atramentosa (Reeve, 1849)

Figs 20, 149–150

Conus atramentosus Reeve, 1849:pl. 7, sp. 265. Type locality: Island of Mindoro, Philippines.

Mitromorpha (Lovellona) atramentosa; Orr, 1959:75 (references), fig. 1 (radula); Orr Maes, 1967:147, pl. 16, fig. 1; Cernohorsky, 1978:163, pl. 54, fig. 4.

Lovellona atramentosa; Tomlin, 1923:46; Powell, 1966:69, pl. 10, fig. 13, text fig. E122 (radula); Kay, 1979:348, fig. 115A.

Range: Hawaii and Polynesia to Natal.

Regional locality data: NORTHERN MOZAMBIQUE: Conducia Bay (NM H230, H5639: K. Grosch). SOUTHERN MOZAMBIQUE: 5 mi. N.W. of Bazaruto Is., 9 fath., on coral (NM G6033, J5796: Mrs E. Roscoe). NATAL: off Durban Bluff, 20–22 m, sand (NM B5460: R. K., R. Fregona); Scottburgh, beach-drift (NM 3287: C. W. Alexander, recorded Tomlin 1923); Shelley Beach, near Port Shepstone, beach-drift (NM 5964: R. K.).

Notes: *M. atramentosa* has recently been figured and described by Cernohorsky (1978) and Kay (1979). Its systematic position in the Turridae was confirmed by Orr (1959).

Protoconch (Fig. 20) orthoconic, of $2\frac{1}{2}$ smooth, gently convex whorls, its apex acute; rather vitreous, apex tinted with dark brown, end of last whorl with two faint brown spiral bands; breadth 0,45 mm, height 0,43 mm (b/h 1,05).

Anarithma Iredale, 1916

Anarithma Iredale, 1916:28. Type species (o.d.) *Clavatula metula* Hinds, 1843.

Diagnosis: Shell resembling *Mitrolumna*, but the swollen columella bears a small V- or U-shaped notch (instead of plicae), and the siphonal canal tip is notched; protoconch conical, with $3\frac{1}{2}$ – $4\frac{1}{2}$ smooth whorls. Operculum absent. Radula as in *Mitromorpha*.

Notes: Although *Anarithma* was referred to the Columbelloidea by Iredale (1916) and Powell (1966), the radula of the type species resembles that of *Mitromorpha* (Orr Maes 1967, as *Mitromorpha stepheni*).

Other apparent members of *Anarithma* are: *Columbella alphonsiana* Hervier, 1899 (synonym *Mitrolumna salisburyi* Cernohorsky, 1978, *fidé* Kay 1979), *C. pinguis*, *C. sublachryma*, *C. iozona* and *C. fischeri* Hervier, 1899, *C. laeta* Brazier, 1877 (synonym *C. dautzenbergi* Hervier, 1899, *fidé* Pace, 1903) and *Mitrolumna iki* Kay, 1979, all from the tropical Indo-Pacific. *Anarithma dorcas* Kuroda & Oyama, 1971 (synonym *Mitrella celinae* Kosuge, 1980), from the Japan–Philippines area, has a similar columella notch, but the general shape is very atypical for the genus.

Anarithma metula (Hinds, 1843)

Figs 19, 106, 151–160

Clavatula metula Hinds, 1843:44; *idem*, 1844:23, pl. 7, fig. 12. Type locality unknown.

Anarithma metula; Iredale, 1916:28 (synonymy).

Columbella (Seminella) paei Melvill & Standen, 1896 (*non* E. A. Smith, 1895):275, pl. 9, fig. 5. Type locality: Lifu.

Columbella (Seminella) stepheni Melvill & Standen, 1897:407 (*nom. subst.*).

Mitromorpha (Lovellona) stepheni; Orr Maes, 1967:143, pl. 15D, text fig. 4F (radula).

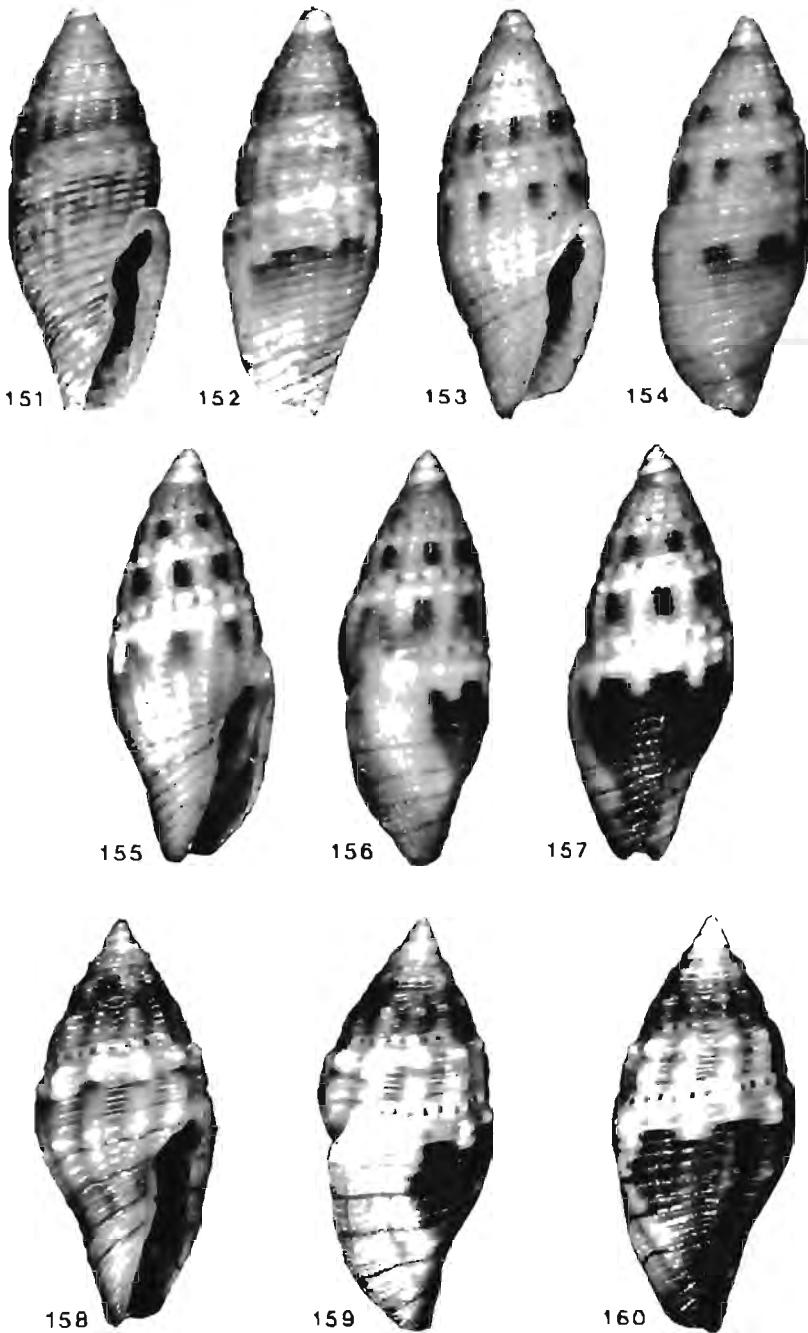
Mitrolumna stepheni; Kilburn, 1977:204.

Columbella dibolos Barnard, 1964:17, fig. 1f (*syn. n.*). Type locality: off Umdloti, Natal, 40 fathoms.

Description: Shell ovate-biconic (b/l 0,40–0,45, a/l 0,43–0,50), spire cyrtconic with acute, non-papilliform apex, teleoconch whorls 4, gently convex with shallow suture, body whorl with moderately to strongly convex periphery, left side of base moderately concave. Aperture narrow, sinuous, rather parallel-sided, acute posteriorly; labial callus fairly thick, paries concave, posterior angle with a small nodule constricting anal sinus; columella tumid posteriorly, with a narrowly U-shaped median notch; labrum smooth inside or with 5–7 weak ridge-like denticles, and a large tubercle at level of columella/parietal junction; in side-view labrum is evenly and gently convex with a fairly deep, openly U-shaped anal sinus; labral edge fairly thin, but preceded by a broad varicoid thickening.

Sculpture of short axial ribs, crossed by thinner spiral lirae; interstices with microscopic axial striae. Axial ribs slightly opisthocline, rounded, slightly wider than intervals, obsolete on body whorl below parietal level; ribs commencing on later half of 1st whorl, 14–18 per whorl (sometimes 10), becoming feeble on back of body whorl; lip preceded by a series of dense growth plicules. Spiral lirae 3 on 1st whorl, granular; subsutural lira cut off by a progressively stronger furrow, to form a prominent, somewhat nodular cord on later whorls; the 2nd lira is cut off by a weaker furrow (which may not even incise axials), and 3rd lira divides once on 2nd whorl, and once or twice subsequently, so that ribs on penultimate whorl are crossed by a total of 3–5 lirae, plus the two subsutural ridges and sometimes a lira just showing above suture; base of body whorl with 13–18 spiral lirae, relatively flat-topped and subequal to their intervals, and becoming somewhat finer and closer towards anterior end.

Protoconch (Fig. 19) acutely orthoconic, of 4 smooth, somewhat convex whorls; breadth 0,50–0,53 mm, height 0,48–0,55 mm (b/h 0,91–1,10).



Figs 151–160. *Anarithma melula* (Hinds, 1843): 151–152, Holotype of *Clavatulula melula* Hinds, 1843, BM(NH) 1879.2.26.81, 4,4 × 1,8 mm; 153, syntype of *Columbella (Seminella) stepheni* Melville & Standen, 1897, NMW 1955. 158. 375, Lifu, 4,8 × 2,0 mm; 154, NM B5470, off Durban Bluff, 20–22 m, 4,5 × 1,8 mm; 155–157, NM A5623, off Sodwana Bay, *ex pisce*, 4,4 × 1,8 mm; 158–160, NM B3549, off Ledsmen Shoal, 100 m, 4,9 × 2,2 mm.

Colour somewhat variable; typically white with a large characteristically shaped moderate to brownish-orange blotch on dorsal surface of body whorl, usually with a series of oblong spots of that colour on alternate ribs from 2nd whorl onwards, and faint brown lines on alternate basal lirae; occasionally uniform pale orange-yellow with a white subsutural region; protoconch yellowish-white.

Dimensions: 6,7 × 2,7 mm; 5,0 × 2,2 mm; 4,5 × 1,8 mm.

Range: New Caledonia to Mozambique and eastern Transkei.

Regional locality data (all NM): NORTHERN MOZAMBIQUE: Conducia Bay (H5982: K. Grosch). ZULULAND: off Kosi Bay, 50 m (A9477: CSIR Water Res.); off Ledsmans Shoal, 100 m (B3549: A. Connell); off Sodwana Bay, 50 and 100 m (A5879, A5789; CSIR Water Res.), do, from gut of *Chrysolephus puniceus* (Gilchrist & Thompson, 1908) (A5623: J. P. Marais). NATAL: off Durban Bluff, 20–22 m (B5470: R. K., R. Fregona); off Port Shepstone, 70 m (B3671:MN). TRANSKEI: off Mtamvuna River, 111 m, sponge (C7422:MN); Mzamba, beach-drift (B4692: R. K., B154: J. P. Marais); off Port Grosvenor, 80 m, worn calcareous nodules (C7320:MN); do, 105 m, rocks, pebbles, mud (C7719:MN); do, 100–115 m, sand, mud, coral, shell (C1303:MN); off N'tafufu River, 50 m, mud, sand (C7839:MN).

Type material: The holotype of *Clavatula metula* (Figs 151–152) is BM(NH) 1879.2.26.81, from the J. Lombe-Taylor collection. It measures 4,4 × 1,8 mm. The figured syntype of *Columbella pacei* [= *stepheni*] is Manchester Museum no. EE3778 (pers. comm. Ms K. Way); ten further syntypes (Fig. 153) are NMW 1955.158.374–375. Two syntypes of *Columbella dibolos* are SAM A29636, a third (incorrectly called a paratype by Barnard 1964) is NM 4087/T1073; all three are very worn.

Notes: Iredale (1916), who traced the complex synonymy of *Anarithma metula* (better known in the literature as *Mitra* [or *Columbella*] *lachryma* Reeve, 1845), did not include *Columbella stepheni*. Hervier (1899) claimed that *stepheni* was smaller than *lachryma* (5 mm against 6–9 mm), more ovate, with stronger, granulose spiral sculpture and axial ribs that evanesce on the back of the body whorl. Orr Maes (1967) said that *stepheni* differed from *lachryma* in its lower spire and dark peripheral spots. However, the holotype of *C. metula* agrees extremely well with syntypes of *stepheni* save in lacking spots. Both extremes occur in south-east Africa, and a specimen from Sodwana Bay (Figs 155–157) is intermediate in that its spots, conspicuous on the spire, become diffuse and merge with the ground colour on the body whorl. I cannot separate two species on these grounds. A series from Reunion Island, presented by J. Drivas, confirms the extreme variability of *A. metula*.

Several large (5–6,7 mm) examples from Zululand (Figs 158–160) are atypical in possessing only 10 strong axial ribs per whorl, and sometimes a slightly longer aperture than normal. Nevertheless in other respects they agree well with *A. metula*.

I have not attempted a diagnosis, as only a study of its poorly known congeners will enable its key-characters to be determined.

TYPE MATERIAL OF SOME EXTRALIMITAL BORSONIINAE

In the course of comparative work, a number of inadequately described species of extralimital origin were examined. Notes and photographs of some type and other specimens are presented.

Tomopleura vertebrata (E. A. Smith, 1875)

Pleurotoma vertebrata E. A. Smith, 1875:416. Persian Gulf; six syntypes (3 juveniles, 2 immature, 1 slightly worn adult with strong growth-fracture, fig. Melvill 1917:pl. 8, fig. 4), BM(NH) 1874.I.19.18, ex R. McAndrew colln., dredged Col. Pelley. Largest specimen (16,0 × 5,7 mm) here designated as lectotype (Figs 161–162).

Notes: First teleoconch whorl with median keel and subsutural ridge, lirae increasing by interpolation to 6 on penultimate whorl, consisting of a subsutural cord (bearing a weak ridge above and a stronger angular one below), a concave shoulder slope with 2 thin lirae, the lower feebly gemmulate, a prominent shoulder keel and 2 main (plus 1 minor) ridges below; base with 11 spiral lirae; axial threads as in *nivea*; columella with a single basal pleat; 6 lirae inside labrum. Faded, but traces of brown blotches. Protoconch of slightly over 3 whorls, smooth except for arcuate axial riblets near termination, white; breadth 0,48–0,53 mm, height 0,50–0,60 mm (b/h 0,80).

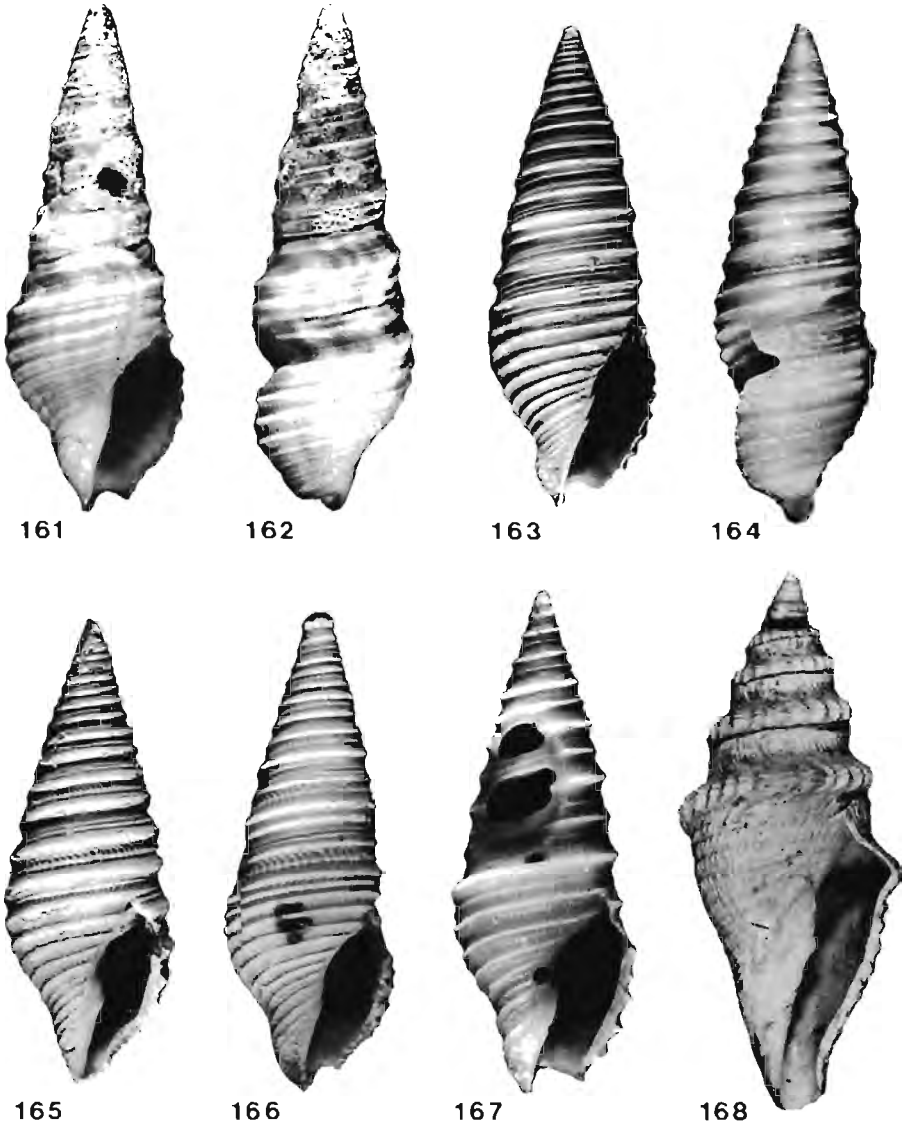
Two Karachi examples (NM H9541, F5118) agree with the syntypes; the larger (21,6 × 7,5 mm) is light yellowish-brown with paler lirae, the other, which has 10 basal lirae, is yellowish-white.

Tomopleura reevii (C. B. Adams, 1850)

Pleurotoma violacea Hinds, 1843 (*non* C. B. Adams & Mighels, 1841):38. Renamed *Pleurotoma reevii* C. B. Adams, 1850 (*non* *Pleurotoma reevei* Bellardi, 1847):54. Philippines; 3 syntypes, BM(NH) 1966459, H. Cuming colln; one of these with shell-dimensions 15,2 × 5,1 mm (Figs 163–164), is here designated as lectotype. Location of other syntypes from New Guinea and Straits of Macassar unknown.

Notes: First teleoconch whorl bicarinate, with a basal and a median keel; adult whorls with a weak subsutural cord bearing a strong keel and a weaker one above; shoulder slope moderately concave with 2 thin spiral lirae, the upper one crenulate, the lower weakly gemmulate; shoulder keel little more prominent than subsutural one, with 1–2 weaker lirae (sometimes with an intermediary thread below keel) anteriorly; base of body whorl with 13–15 spiral lirae, the posterior 6–7 strong, without intermediaries, those on rostrum weak and close, sometimes obsolete at tip. Columella with 2 strong pleats, the posterior one sometimes compounded of 2–3 smaller pleats; interior of aperture with about 6 spiral lirae. Apex stiliform, protoconch of about 2½ whorls, last half-whorl with arcuate axial ribs; breadth 0,45 mm, height 0,55 mm. Syntypes probably faded, now light purplish-grey to pale purple, columella moderate pink.

A fresh example of *Tomopleura reevii* (NM G8591: P. Pechar) from Rabaul, New Britain, 30–50 ft on black sand, is very similar to the syntypes but the spiral lirae are coloured orange-brown in contrast with the greyish-purplish-pink ground; dimensions 19,8 × 6,8 mm.



Figs 161–168. Primary types of some extralimital *Tomopleura*, *Pulsarella* and *Bathytoma* spp. 161–162, *Pleurotoma* [= *Tomopleura*] *vertebrata* Smith, 1875, lectotype, BM(NH) 1874.1.19.18, 16,0 × 5,7 mm. 163–164, *Pleurotoma violacea* Hinds, 1843, non C. B. Adams & Mighels, 1841 [= *Tomopleura reevii* (C. B. Adams, 1850)], lectotype, BM(NH) 1966459, 15,2 × 5,1 mm. 165, *Oligotoma* [= *Tomopleura*] *bellardii* Jousseau, 1883, lectotype, MHNP, 11,2 × 4,0 mm. 166, *Pleurotoma* [= *Tomopleura*] *retusispirata* Smith, 1877, lectotype, BM(NH) 1854.6.30.97–100, 7,9 × 2,7 mm. 167, *Oligotoma* [= *Pulsarella*] *clevei* Jousseau, 1883, lectotype, MHNP, 9,3 × 3,3 mm. 168, *Bathytoma regnans* Melvill, 1918, holotype, NMW 1955.158.499, 29,5 × 12,2 mm.

Tomopleura bellardii (Jousseume, 1883) **comb. n.**

Oligotoma bellardii Jousseume, 1883:202, pl. 10, fig. 10. Type locality unknown. Figured syntype in MHNP, 11,2 × 4,0 mm (lip broken), here designated as lectotype (Fig. 165).

Notes: First teleoconch whorl bicarinate, with a ridge above and another below suture, with arcuate axial riblets between; from 2nd whorl a gemmulate mid-whorl thread develops; later whorls tricarinate, with a subsutural cord bearing a prominent keel and a thin lira at suture, shoulder slope strongly concave with a single gemmulate lira and a feeble thread above; shoulder keel equal in strength to subsutural keel, with a second, slightly weaker keel just showing at suture, with a fine intermediary thread; base of body whorl with 11 spiral lirae, becoming progressively weaker anteriorly, those on rostrum low and close; axial plicules coarse, absent in subsutural region. Columella with a single weak pleat. White. Protoconch worn and broken; breadth about 0,45 mm.

Characterised by its very strong spiral cords, totalling 2–3 per whorl (including the subequal shoulder and subsutural keels), plus 2–3 fine intermediaries.

Tomopleura retusispirata (E. A. Smith, 1877) **comb. n.**

Pleurotoma retusispirata E. A. Smith, 1877:490. Type locality unknown. Four syntypes BM(NH) 1854.6.30.97–100, 'purch. Stevens' sale'. Lectotype (here designated, Fig. 166, marked with red dot by Smith) 7,9 × 2,7 mm.

Notes: First teleoconch whorl with submedian keel and arcuate axial plicules; on 2nd whorl a subsutural lira develops, plus an intermediary thread which becomes gemmulate and on later whorls occupies the concave shoulder slope; subsutural cord develops with a sharp lira and a finer thread posteriorly, shoulder keel subequal to main subsutural one; penultimate whorl with 1–3 lirae anterior to shoulder; basal lirae 10–13, posterior ones widely spaced, without intermediaries, weaker and close on rostrum. Columella with two strong pleats; interior of aperture with 6–7 spiral lirae. Protoconch swollen, papillose, 1½ whorls, 1st whorl large but depressed, smooth except for a faint median keel on last half-whorl; breadth 0,53–0,60, height 0,43–0,48 (b/h 1,21–1,25). Colour pale pink, darkening to moderate pink on apex.

This is a *Narraweena*, allied to *Tomopleura cicatrigula* and *T. subtilinea* (Hedley, 1922) of Queensland. Apart from the very different apex, there is a superficial resemblance to *T. reevii* (C. B. Adams, 1850).

Pulsarella clevei (Jousseume, 1883) **comb. n.**

Oligotoma clevei Jousseume, 1883:200, pl. 10, fig. 11. Ceylon. Lectotype, a bleached shell with a large hole in spire (naticid boring) and a damaged labrum, in MHNP (Fig. 167); dimensions 9,3 × 3,3 mm.

Notes: First teleoconch whorl with a median keel and very fine, arcuate axial plicules; a subsutural ridge develops on 2nd whorl, forming a strongly declivous, angularly keeled subsutural cord on later whorls; shoulder slope on later whorls strongly concave with 1–2 weak, slightly granular spiral threads, shoulder keel stronger than subsutural one; each whorl strongly concave below shoulder, with a fine intermediary thread and a spiral cord just showing at suture; base of body

whorl with 8 sharp spiral lirae, posterior ones strong and widely spaced, those on rostrum rather weak, becoming obsolete terminally. Axial plicules in intervals thin but strong. Protoconch rather pupoid, of $2\frac{1}{2}$ vitreous whorls, smooth except for fine axial riblets behind termination, suture rather deep; breadth 0,45 mm, height 0,48 mm (b/h 0,94). Yellowish-white, tinged below suture with pale yellowish-brown. Columella with a vestigial pleat basally.

Resembles *Oligotoma bellardii* in some respects but with fewer, sharper spiral cords, finer axial threads and simpler, more concave intervals.

Bathytoma regnans Melvill, 1918

Bathytoma regnans Melvill, 1918:68. Bay of Bengal, ex *Investigator* Expedition, via F. W. Townsend, Melvill-Tomlin colln. Holotype (Fig. 168), a chalky shell with broken lip and eroded apex (which has been broken and glued back in place), NMW 1955.158.499, dimensions 29,5 × 12,2 (+) mm.

Notes: Close to *B. fissa* (von Martens, 1901), but with a strong columella pleat, a strongly projecting peripheral cord and finer, more orthocline subsutural plicae. Suture fissure-like, subsutural region adpressed and rising high up preceding whorl (almost reaching periphery); about 7 fine spiral threads above periphery, 5 stronger spiral lirae on the peripheral cord itself and 22 (with some finer intermediaries) on base of body whorl, none of which show on spire whorls; these basal lirae are low, rounded and obliquely granular, except on rostrum, where they are thin, smooth and crisper; collabral threads strong, peripheral cord with about 24 rounded, lunulate nodules on last whorl. Early whorls eroded.

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