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Turridae (Mollusca: Gastropoda) of southern Africa and Mozambique. Part 2. Subfamily Clavatulinae

by

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SYNOPSIS

Four genera and 20 species of Clavatulinae are recorded from southern Africa: *Clionella* (11 species), *Clavatula* (4 species), *Toxiclionella* (4 species) and *Benthoclionella* (1 species). All are described and the radulae of 13 species and egg-capsules of 3 are figured. The radula of *Toxiclionella elstoni* (Barnard, 1962) consists of vestigial rachidians and double-barbed hypodermic marginal teeth.

New species: *Clionella liltvedi*.

New subspecies: *Clionella subventricosa kaffraria*.

New subgenus: *Caliendrula* (of *Toxiclionella*), type species *Latiaxis? elstoni* Barnard, 1962.

Species removed from Clavatulinae: *Pleurotoma turriplana* Sowerby, 1903, is a *Turricula*, and *P. gravis* Hinds, 1843, a *Makiyamaia* (both *Cochlespirinae*); *Clavatula erecta* Turton, 1932, is an indeterminate clavinid.

New synonyms: *Pleurotoma nux* Reeve, 1845 = *Clionella semicostata* (Kiener, 1840); *Clionella nereia* Bartsch, 1915, *C. proxima*, *C. kowiensis* and *C. kowiensis viridis* Turton, 1932 = *C. rosaria* (Reeve, 1846); *C. assimilans* Turton, 1932 = *Clavatula tripartita* (Weinkauff, 1876).

New combinations: *Drillia subcontracta* Smith, 1904, and *Pleurotoma vilma* Thiele, 1925, are transferred to *Clionella*; *P. impages* Adams & Reeve, 1850, *Clavatula haliplex* Bartsch, 1915, and *Latiaxis ? elstoni* are referred to *Toxiclionella*.

New status: *Clionella bornii* (Smith, 1877), *C. striolata* Turton, 1932, *C. vilma* (Thiele, 1925), *Clavatula helena* Bartsch, 1915, and *Toxiclionella haliplex* (Bartsch, 1915) are valid species. *Toxiclionella* Powell, 1966, is given full generic status. *Mangilia herilda* Bartsch, 1915, is a valid *Mitromorpha*.

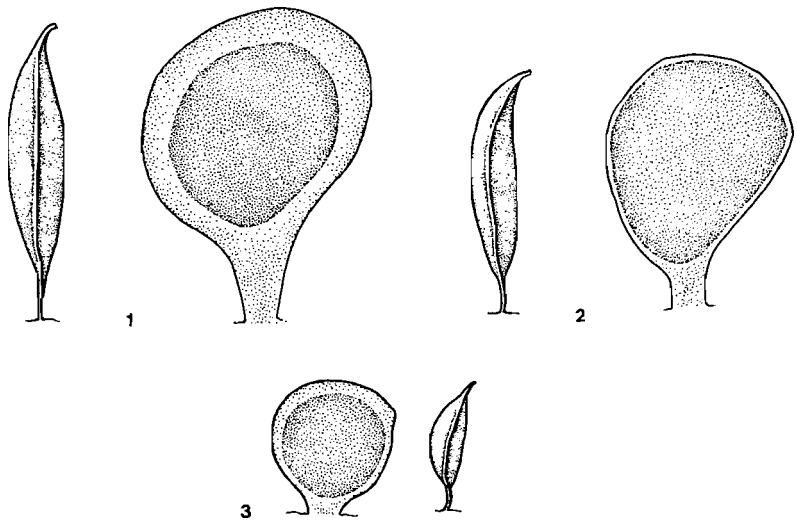
Lectotype designated: *Clionella confusa* E.A. Smith, 1906.

Holotypes figured: *Pleurotoma subventricosa* E. A. Smith, 1877; *P. impages* Adams & Reeve, 1850; *P. nux* Reeve, 1845; *Clavatula haliplex* Bartsch, 1915; *C. gracilior* Sowerby, 1870; *Clionella nereia* Bartsch, 1915.

INTRODUCTION

As defined by Powell (1966), the subfamily Clavatulinae is a rather poorly characterised group, without any significant autapomorphies. Indeed, its only potentially useful synapomorphy—an operculum with a mediolateral nucleus — occurs in several genera referred to the Cochlespirinae (= Turriculinae), a subfamily with very similar radula and shell-characters; however, even within the Clavatulinae there is a shift in position of the opercular nucleus from medial to anterior. Powell is probably correct in postulating a cochlespirine origin for the Clavatulinae, perhaps during the Oligocene. A case might also be made for transferring genera such as *Turricula* and *Makiyamaia* from the Cochlespirinae to the Clavatulinae, or, conversely, for uniting the two subfamilies.

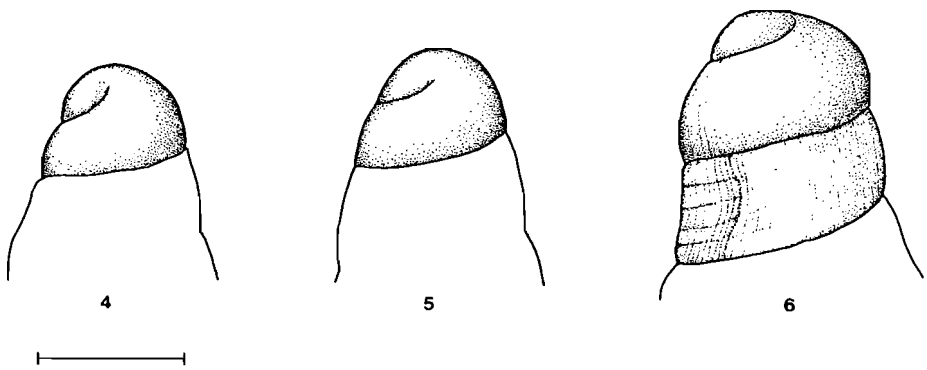
One feature that may prove of systematic value is the stalked, purse-shaped egg-capsule reported solely in members of the Clavatulinae (Figs 1–3, and Knudsen 1950). As far as is known, all other Turridae produce simple dome-shaped



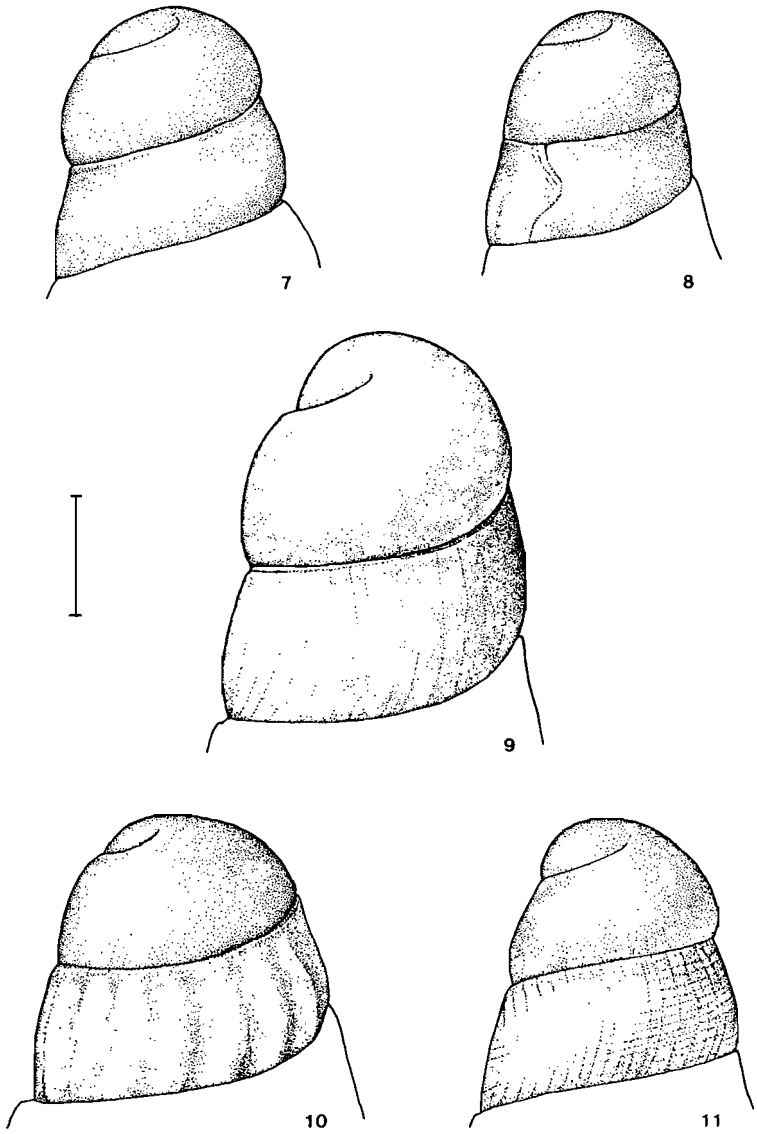
Figs 1–3. Egg-capsules of some South African Clavatulinae: 1, *Clavatula tripartita*, height of capsule 8,8 mm; 2, *Clionella sinuata*, height 8,2 mm; 3, *Clionella rosaria*, height 4,5 mm

capsules, somewhat similar to those found in the Marginellidae. Stalked capsules have evolved independently in many neogastropod families, doubtless as a protective measure against silting and predation. Development is direct, the fully-developed young emerging either through a hole (? gnawed) in the side of the capsule or from between two dorsal flaps.

The protoconch, as in other turrid subfamilies, provides useful taxonomic information (Figs 4–11), but, in intertidal populations at all events, it is almost invariably worn, even in juveniles. Even when the protoconch is intact its limits may not be clear, although in some specimens it is defined by a varix or change in sculpture. As is not infrequent in gastropods, extent of protoconch and veliconcha



Figs 4–6. Protoconch of: 4, *Clionella rosaria*; 5, *C. sinuata*; 6, *Clavatula tripartita*. Scale-line = 1 mm.



Figs 7–11. Protoconchs of: 7, *Clavatula helena*; 8, *C. halistrepta*; 9, *Toxiclionella tumida*; 10, *T. (Caliendrula) elstoni*; 11, *T. haliplex*. Scale-line = 1 mm.

do not necessarily coincide. In *Clavatula tripartita*, for example, the defining varix precedes the veliconch lip by about one-sixth of a whorl (Fig. 12).

The clavatuline radula, with the exception of the highly autapomorphic toxoglossate radula of *Toxiclionella* (see below), is rather similar to that of the Cochlespirinae and Turrinae. Marginal teeth are powerful, with a sharp slicing edge, and a deep socket into which is inserted an accessory limb; distal to this

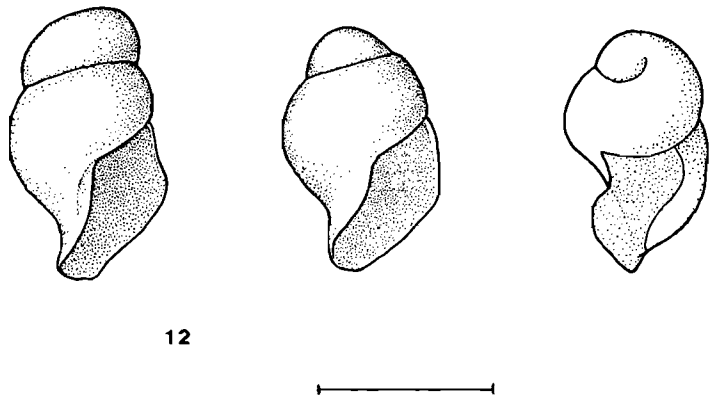
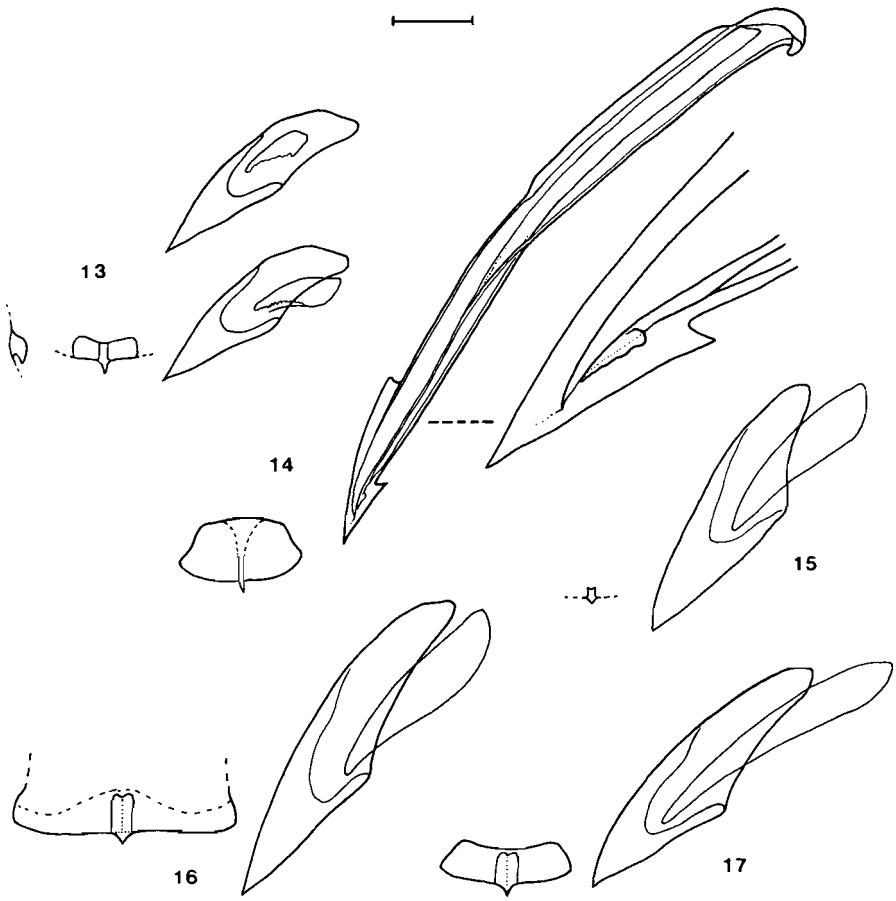


Fig. 12. Veliconchas of *Clavatula tripartita*. Scale-line = 1 mm.

socket is a heel-like angulation (absent in *Clionella liltvedi*). Rachidians consist of a delicate, sometimes diaphanous basal plate, bearing a median thickened area here termed the *shield*. The shield supports a sharp mesocone. The posterior margin of the basal plate is always ill-defined, indeed often indistinguishable from the basement membrane. The anterior margin (leading or cutting edge) generally absorbs sufficient stain to show up as a chevron or pair of lateral wings. The existence of the basal plate was first revealed by Powell (1966), and previously published radula figures are of little comparative value. Its presence should also be sought in the Cochlespirinae. Unfortunately, the full extent of this plate may be indeterminate even with staining, and its low profile has meant that SEM studies have yielded no further details. A basal plate was detected in all species studied, save for *Clavatula taxea* (more material of this species is, however, needed). Interspecific differences in rachidian structure may be considerable, but no patterns that might be used to deduce phylogeny are apparent.

Barnard (1958) and Powell (1966) demonstrated the existence of toxoglossate dentition in *'Clavatula' tumida*, for which the latter author proposed the subgeneric name *Toxiclionella* (here regarded as a full genus). Similar double-barbed, hypodermic marginal teeth prove to occur in *'Latiaxis' elstoni*, together with vestigial rachidian plates, an association not previously reported for the Turridae. The diaphanous nature of these rachidians would render them invisible in unstained or unsuitably stained preparations, and their presence should be sought in *T. tumida*.

Toxoglossate dentition in the Clavatulinae confirms the viewpoint of Powell (1966) that it has evolved independently in different lineages. As indicated for other groups by Shimek & Kohn (1981), the hypodermic structure of *Toxoclionella* marginals appears to have resulted from inrolling of the ancestral plate, although no intermediate stage is retained in any known clavatulid. One might speculate that further development of the deep socket found in some clavatuline marginals (Figs 13 & 15) might ultimately represent another pathway towards the acquisition of the toxoglossate condition.



Figs 13–17. Radulae of some Clavatulinae: 13, *Clionella confusa*; 14, *Toxiclionella (Caliendrula) elstoni*; 15, *Clavatula taxea*; 16, *Clionella sinuata*; 17, *C. semicostata*. Scale-line = 0,1 mm.

All radula preparations used in this series of turrid studies have been counterstained with Chlorazol Azurine and Shirlastain A, and mounted in polyvinyl lactophenol (see Aiken 1981).

Previous work on South African Clavatulinae

In his revision, Barnard (1958) referred 15 species to the genera *Clionella* and *Clavatula*. Of these, two (*opulenta* Thiele, 1925, and *anteridion* Watson, 1881) were transferred to *Comitas* in the Cochlespirinae by Powell (1969), and Barnard's *'Clavatula hottentota'* (actually *layardi* Sowerby, 1897) was shown to be a *Crassispira* (subfamily Crassispirinae) by Kilburn (1970). In the present account two further species are removed from the Clavatulinae, and ten added to Barnard's total.

Littoral Clavatulinae are probably the most variable of the Turridae. Geographi-

cal and ecological variation is reinforced by direct development, so that adjacent populations of the same species may differ morphologically and perhaps genetically. Clinal variation also occurs. In only one species *(Clionella subventricosa)* are phenotypic differences considered sufficient to justify its recognition at the subspecies level. A less conservative approach than that here adopted might utilise a greater number of infraspecific names. As many variants as possible are illustrated in each case to clarify my viewpoint on species limits.

ABBREVIATIONS

BM(NH) = British Museum (Natural History), London.
MHNG = Muséum d'Histoire Naturelle, Geneva.
MN = *R/V Meiring Naudé.*
NM = Natal Museum, Pietermaritzburg.
NMNH = National Museum of Natural History, Washington.
NMV = Naturhistorisches Museum, Vienna.
OUM = Oxford University Museum, Oxford.
SAM = South African Museum, Cape Town.

SUBFAMILY CLAVATULINAE H. & A. ADAMS, 1853

Diagnosis: Shell medium-sized, variable in form but usually with whorls adpressed below suture; anal sinus shallow to deep, almost always situated on shoulder slope. Operculum with more or less mediolateral nucleus. Radula usually with duplex marginals and a small rachidian, rarely with double-barbed, harpoon-shaped marginals, with or without a rachidian. Egg-capsules stalked, purse-shaped, development direct.

Genera: Four genera are here recognised for the southern African region, two of which *(Benthoclionella* and *Toxiclionella)* are endemic. The remaining two, *Clionella* and *Clavatula*, were treated by Powell (1966) as endemic to southern and West Africa respectively, but several South African species clearly belong to *Clavatula*, and an unidentified species from Senegal (NM collection) is very likely a *Clionella*.

Key to the genera of southern African Clavatulinae

1. Radula toxoglossate; protoconch very large and conspicuously papilliform; nucleus of operculum anterior to middle ..... **Toxiclionella**
— Radula with duplex marginals and a small rachidian plate; nucleus of operculum more or less median 2
2. Anal sinus a very wide and shallow concavity ..... **Benthoclionella**
— Anal sinus a shallow to deep notch 3
3. Anal sinus a slight notch; siphonal canal short, no distinct parietal tubercle; protoconch somewhat conical, of about 2 whorls, first one rounded and tilted **Clionella**
— Anal sinus deep; siphonal canal relatively long, parietal tubercle distinct; protoconch bluntly domed, of about 2½ whorls ..... **Clavatula**

Biogeography in southern Africa

All local Clavatulinae are probably endemic to southern Africa (a possible exception is *Clavatula tripartita*), and none reaches the tropical waters of Mozambique. The centre of distribution is the eastern Cape, where 11 of the 15 littoral and inshore species occur, although 4 species (at most) are endemic to the Algoa Province. Only two littoral species inhabit Natal waters, neither being there endemic. Five inhabit the cold temperate Namaqua province, although only one *(Clionella liltvedi)* is endemic there, and the ranges of two *(semicostata, subventricosa)* barely overlap this region. Only one littoral species *(Clionella rosaria)* can be termed widely distributed in that it ranges from False Bay to Natal.

For infratidal species distribution data are very incomplete. *Toxiclionella tumida*, *Clavatula taxea* and *Clionella vilma* are characteristic Agulhas Bank species. *Clavatula tripartita*, *T. elstoni* and *T. haliplex* appear to replace them on the Transkei/Natal shelf. *Benthoclionella jenneri* is the deepest-dwelling species and the only one found on the lower Natal slope.

South African species removed from the Clavatulinae

Pleurotoma (Clavatula) turriplana Sowerby, 1903: Barnard (1958) doubtfully referred this species to *Clavatula*; in 1969 he accepted this placement on radular and opercular evidence, but this radula preparation cannot now be found (pers. comm. W. R. Liltved). However, shell-characters indicate *turriplana* to belong to the genus *Turricula* Schumacher, 1817, in the subfamily Cochlespirinae (= Turriculinae). As indicated above, there is parallelism in radular and opercular characters between *Clavatula* and *Turricula*.

Clavatula lobatopsis Barnard, 1963, was transferred to *Gemmula (Ptychosyrinx)* in the Turrinae by Kilburn (1983).

Pleurotoma gravis Hinds, 1843, was referred to *Clavatula* by Weinkauff (1877) and Barnard (1958), but belongs to genus *Makiyamaia* MacNeil, 1960 (subfamily Cochlespirinae).

Pleurotoma (Clionella) platystoma E. A. Smith, 1877, somewhat doubtfully accepted as a *Clionella* by Bartsch (1915 : 18) and Powell (1969 : 226), is a *Paracuneus* in subfamily Clavinae (*see* Kilburn 1977 : 198).

Clavatula erecta Turton, 1932: The unique holotype in the OUM is a juvenile clavinid of uncertain identity.

The fossil record

The only extinct species described from southern Africa appears to be *Clionella inornata* King, 1953, from the Miocene of Uloa, Zululand. The evenly convex whorls and absence of sculpture other than faint spiral striae suggest that it may be cochlespirine. Details of protoconch and peristome are required. King's (1953) record of *Clionella bipartita* [= *Clavatula tripartita* (Weinkauff, 1876)] from the same beds also requires confirmation, as his identification was apparently based solely on an illustration in Turton (1932).

Two species of *Clionella* are reported from Pleistocene raised beaches. *C. rosaria* (Reeve, 1846) is known from deposits at Jeffreys Bay (Davies 1972) and Algoa Bay (Newton 1913), but a west-coast record (Haughton 1913) is unlikely. *C. sinuata* is recorded from a number of west-coast Pleistocene localities (Krige 1927, Davies 1973), and Kensley (1972 : 180, fig. 5) has reported shells from Pliocene deposits at Langebaanweg which may be squat examples of the same species.

Clavatula Lamarck, 1801

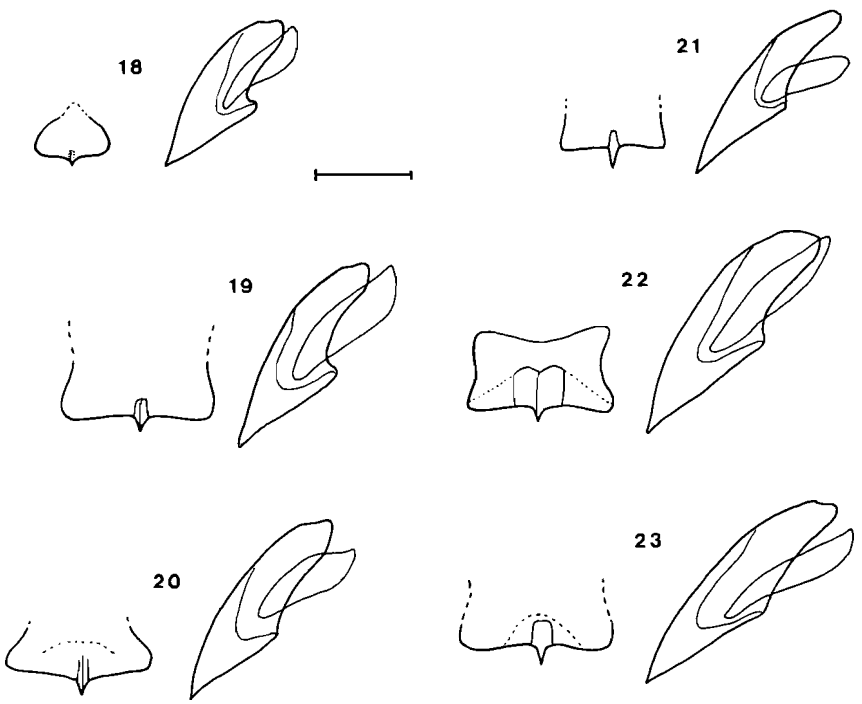
Clavatula Lamarck, 1801 : 84. Type species (monotypy) *Clavatula coronata* Lamarck, 1801.

Diagnosis: Siphonal canal moderately long, anal sinus deep, parietal region usually with a callus nodule: subsutural cord usually tumid, sometimes weak, but as a rule clasping base of previous whorl; protoconch blunt and subcylindrical, sometimes papilliform, about 2½ whorls, first one depressed.

Notes: The only available example of the West African type-species lacks a protoconch, but specimens of the closely allied taxa ('varieties' according to Grant & Gale 1931) *C. bimarginata* Lamarck, 1822 and *muricata* Lamarck, 1822, have been examined. Although the spinose subsutural cord and thinly calloused labium of these taxa are characters not found in any South African member of the genus, the protoconch agrees in form, even if smaller in size. Other West African *Clavatula* such as *C. imperialis* Lamarck, 1822, and *C. caerulea* (Weinkauff, 1875) agree better with local representatives in general characteristics. It is possible that the genus *Clavatula*, as here understood, may have to be reinterpreted when the West African species are better studied.

Key to species of southern African *Clavatula*

1. Axial ribs shouldered, extending to base; shape narrowly fusiform; deep brown with pale ribs ..... **halistrepta**
— Axial ribs (if present) mainly peripheral, not distinctly shouldered nor reaching base; not narrowly fusiform 2
2. Shell widest at its middle; shoulder sulcus not sharply delimited; colour orange-buff with brown intervals between ribs; aperture relatively narrow; subsutural cord weak ..... **helena**
— Shell widest anterior to middle; shoulder sharply delimited by two fine furrows; colour not as above; aperture relatively wide; subsutural cord weak to strong 3
3. Aperture not flaring, siphonal canal shallowly notched; subsutural cord swollen; uniform biscuit-colour (juveniles with brown median band and pale subsutural zone), periostracum translucent to very dark brown; shell relatively large (up to 90 mm) and heavy ..... **taxea**
— Aperture flaring; siphonal canal deeply notched; subsutural cord weak to moderately strong; fine axial hairlines of yellowish-brown, or else mottled/flecked with that colour, periostracum transparent; shell smaller (up to 50 mm) and lighter ..... **tripartita**



Figs 18–23. Radulae of: 18, *Clionella subventricosa kaffraria*; 19, *C. striolata*; 20, *C. rosaria*; 21, *Benthoclionella jenneri*; 22, *Clavatula tripartita*; 23, *Clionella bornii*. Scale-line = 0,1 mm.

Clavatula tripartita (Weinkauff, 1876)

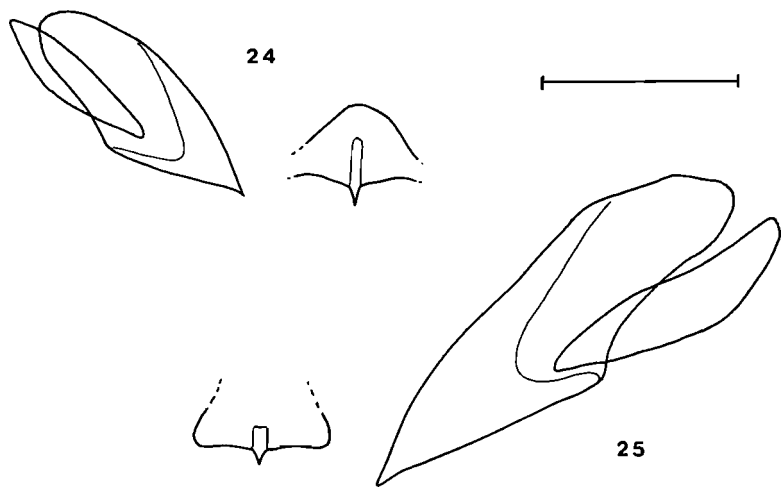
Figs 1, 6, 12, 22, 26, 35–42.

Pleurotoma (Clavatula) tripartita (E. A. Smith M/S) Weinkauff, 1876: 120, pl. 26, figs 12, 13. Type locality: 'Südafrica', here restricted to Algoa Bay.
Pleurotoma (Clionella) tripartita; Sowerby, 1892: 6, pl. 4, fig. 83.
Clionella tripartita; E. A. Smith, 1912: 53 (references and synonymy), text fig. (holotype *bipartita* ?); Kilburn & Rippey, 1982: 116, pl. 28, fig. 5.
Clavatula (Perrona) tripartita; Dautzenberg, 1912: 10.
Clavatula (Clionella) tripartita; Barnard, 1958: 143 (references), fig, 4d; *idem*, 1969: 602.
Pleurotoma (Clionella) bipartita E. A. Smith, 1877: 500. Type locality: Port Elizabeth.
Clionella bipartita; Turton, 1932: 15, pl. 3, no. 128.
Clavatula parilis E. A. Smith, 1902: 115, pl. 1, fig. 7. Type locality: 'from the stomach of a fish caught in forty fathoms ten miles from Durban.'
Clionella assimilans Turton, 1932: 16, pl. 3, no. 129 (**syn.n.**). Type locality: Port Alfred.

Diagnosis: Shell varying in shape, attaining 50 mm; whorls feebly to strongly convex, subsutural cord weak to prominent, shoulder sulcus flattened, delimited by two shallow grooves; aperture relatively wide, parietal tubercle distinct, siphonal canal deeply notched, anal sinus deep; weak peripheral nodules, sometimes obsolete in adults, may form low axial ribs; fine spiral striae present or absent, and base of body whorl may have two rows of granules; typically with dense collabral hairlines of yellowish-brown, blotched or flecked below suture with that colour,

sometimes mottled or flecked overall with yellowish-brown; periostracum translucent. Protoconch subcylindrical, diameter 1,2 mm.

Description: Shell claviform to pupoid-fusiform (breadth/length 0,37–0,47), spire acuminate, apex somewhat papilliform, whorls almost flattened to strongly convex, aperture relatively wide (aperture/total length 0,34–0,41), base of body whorl somewhat produced. Aperture somewhat pyriform, wide to flaring medially, tapering anteriorly, siphonal canal relatively short, wide and deep, strongly



Figs 24–25. Radulae of 24, *Clionella liltvedi*, and 25, *C. kraussii*. Scale-line 0,1 mm.

notched; labium with a thin to moderately thick callus and strong parietal nodule near its posterior end; labrum strongly convex in both side and face-on views; anal sinus deeply U-shaped, asymmetrical with short subsutural limb. Subsutural cord weak and barely elevated, to strongly tumid, shoulder sulcus flattened, well delimited on either side by a shallow groove. Sculpture typically consisting of weak peripheral nodules (about 9 per whorl) on early whorls, usually becoming obsolete on the adult whorls which show only growth-lines and weak basal librae; however, entire shell may show fine spiral striae and the nodules may strengthen to form low, strongly prosocline axial ribs, lower part of body whorl sometimes with a few spiral rows of granules.

Coloration: Littoral form with dense collabral hairlines of light yellowish-brown or light greyish-yellowish-brown*, sometimes vermiculated or interrupted, on a pale ground; subsutural cord and shoulder sulcus with widely spaced blotches or flecks of moderate to strong yellowish-brown; sublittoral forms deep or strong yellowish-brown (sometimes paler), speckled with yellowish-white, or with pale ribs. Aperture sometimes tinged with light greyish-red.

* The ISCC–NBS system is here used in all formal descriptions.

Periostracum thin, transparent brownish.

Protoconch (Fig. 6) papilliform, bluntly domed, white, about $2\frac{1}{4}$ whorls, tip flat-topped, slightly sunken, last whorl flat-sided (giving it a collar-like appearance), with weak brephic axials, termination well defined, basal diameter about 1,2 mm.

Dimensions: 49,6 × 18,6 mm; 46,4 × 18,8 mm; 31,5 × 12,3 mm.

Operculum typical of genus.

Radula (Fig. 22): Rachidian well developed, with rectangular basal plate and strong 'shield'; marginals typical.

Range: Jeffreys Bay to Durban, from low tide to 87 metres; West Africa ?

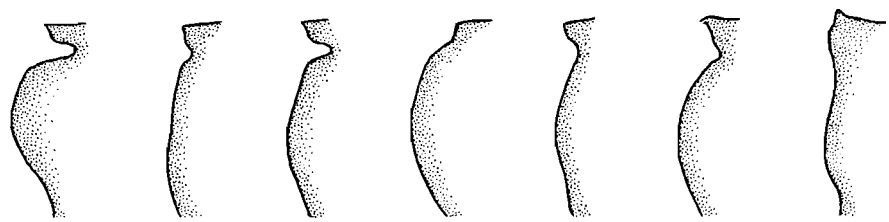
Locality data: EASTERN CAPE PROVINCE: Jeffreys Bay (NM B3139: R. K.); Algoa Bay (NM 600: H. C. Burnup); Port Alfred (NM 5138: R. K.; B5784: ex Albany Mus.; B642: E. K. Jordan); East London area (NM A2856, A4661, A2875, A2857: Mrs C. M. Connolly; B2630: B. J. Young); off East London, 90 m, coarse sand, sponges. (NM B7997: *MN*); off Gonubie Point, 30 m, sponges, soft 'corals' (NM B8508: *MN*); Kei River mouth (NM 5915: R. K.). TRANSKEI: (a) littoral: Qolora River mouth (NM C3378: R. K.); Sandy Point (NM C3686: R. K., R. Fregona); Cebe (NM A2861: Mrs C. M. Watters); Shixini (NM C 6244: R. K.); Dwesa (NM C5928: R. K.); Banyana River mouth (NM B1255: R. K.); Xora (NM 6909: R. K.); Coffee Bay (NM A785: R. K.; B5776: W. Tyson); Lwandile/Mdumbi (NM C84: R. K.); Mbotyi (NM A5214: R. K., J. McKay); Mzamba (NM 5139, B4426, 5916: R. K.); (b) continental shelf (all *MN*): off Mbotyi, 48–50 m, sand, gorgonians (NM C560); off Port Grosvenor, 80 m, worn calcareous nodules (NM C655); off Mzimhlava River, 50 m, gorgonians (NM C1133); off N'tafufu River, 50 m, mud, sand (NM C1034), and 30 m, sand, worm-tubes (NM C1000); off Port St Johns, 40–50 m, mud, worm-tubes (NM C1093), do, 30–50 m, mud, worm-tubes (NM C1065), do, 25 m, organic debris (NM C1103); off Mgazi, 48 m, mud (NM C3265); off Whale Rock, 70–83 m, marine growths and debris (NM C3153); off Mncwasa Point, 32–35 m, fine sand (NM C2702); off Nqabara Point, 70–75 m, mud, sandstone (NM C4713); off Stony Point, 87 m, coarse sand (NM C4227). NATAL: Shelly Beach, Izotscha district (NM 5903: W. G. Rump); Port Shepstone (NM 6682, 5904: W. Falcon; 601, B2981: H. C. Burnup); Kelso (NM A2284: R. K.); off Park Rynie, 96 m, sponges (NM B8565: *MN*); Scottburgh (NM 5905: H. C. Burnup); Umkomaas (NM 5906: W. Falcon); Durban Beach (NM 5907: R. K.; B2631: B. J. Young); off Durban Bluff, 20–22 m, sand (NM B5410: Mrs V. van der Walt; B5455: R. K., R. Fregona); forma *parilis*: off Natal, *ex pisce* (NM 3292, 5896: H. C. Burnup; 9640: R. K.; 5137: H. Bell-Marley; A1470: A. Visage); off Durban, *ex pisce* (NM 4405: H. C. Burnup; 5136: W. Falcon). UNCONFIRMED: Senegal and Baie des Tigres, Angola (Dautzenberg 1912).

Type material: The present location of the holotype of *Pleurotoma tripartita*, originally in the Weinkauff collection, is unknown. The types of *P. bipartita* and *Clavatula parilis* are in the BM(NH). The holotype of *Clionella assimilans* Turton, 1932, is in the OUM.

Notes: The type-figures of *Pleurotoma tripartita* are badly drawn, and subsequent

authors have relied on E. A. Smith's recognition of his species. Early writers disagreed as to whether the name *bipartita* or *tripartita* should be used. The source of the confusion was Weinkauff's description of the species, as *tripartita* 'Edg. Schmith' [sic], from material distributed by the dealer G. B. Sowerby under Smith's (then) manuscript name. Smith's description was published in the following year, but through a *laps. cal.* was spelt *'bipartita'*.

Barnard (1958), who believed *tripartita* to be a deep-water Natal species, doubted Turton's 1932 record of living specimens in the Kowie estuary. It is not



Figs 26–32. Anal sinus profiles: 26, *Clavatula tripartita*; 27, *Clionella sinuata*; 28, *C. semicostata*; 29, *Clionella rosaria*; 30, *Benthoclionella jenneri*; 31, *Toxiclionella (Toxiclionella) tumida*; 32, *T. (Caliendrula) elstoni*.

commonly found intertidally, but to this day abounds on the east bank of that estuary. Turton's *Clionella assimilans* is based on a very worn specimen of *tripartita*.

Like most of the southern African Clavatulinae, *Clavatula tripartita* varies geographically, bathymetrically and individually. In essence, adults of the Eastern Cape littoral form are almost smooth, with a weak subsutural cord, except in individuals from East London eastwards in which distinct spiral striae and peripheral nodules or ribs often develop. At the eastern end of its range, in Natal, the inshore population has a rather pupoid, spirally striate shell with peripheral nodules and a strong subsutural cord. The two extremes are connected geographically by a range of intermediates. These littoral inshore shells show fine collabral brown lines, whereas deeper water forms are speckled or mottled. In Natal waters a large offshore form occurs, only known *ex piscibus* and probably inhabiting sandy reefs, which exhibits a flaring aperture, conspicuous subsutural cord, and obsolete sculpture. On sandy mud and mud in 25–50 m off eastern Transkei lives yet another form, with strong axial ribs and a fairly weak subsutural cord. Interestingly, in the Transkei littoral sometimes occur peculiar squat individuals (Fig. 37) with axial ribs, often rather nodular; breadth/length ratios may be as high as 0,47, as against 0,37–0,43 in other forms. Such shells may show a superficial resemblance to *Clionella subventricosa*, which, however, has only a very slight anal sinus. Curiously, some material dredged on sand and rubble in 32–83 m off Transkei resembles the typical Eastern Cape form more than the ribbed form already mentioned, but has spiral striae on the early whorls.

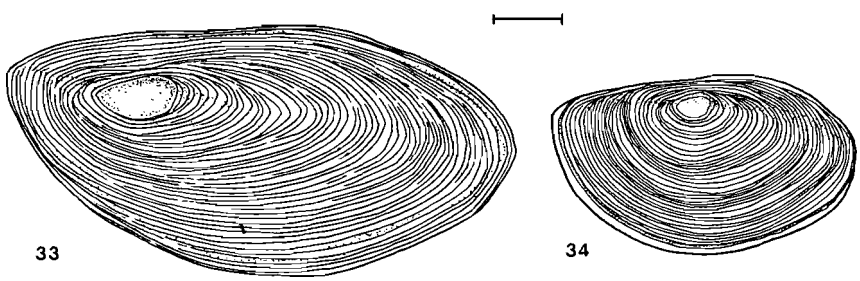
Extreme forms may be categorised as follows, although it should be stressed that all intergrade, except possibly form 4 (*parilis*).

Form 1 (typical, Figs 35, 36): Eastern Cape littoral (Jeffreys Bay to East London, under rocks on fine mud or sand, low-tide level). Relatively narrow (breadth/length 0,38–0,39), spire varying in height (aperture/total length 0,34–0,41); maximum length exceeding 51 mm. Adult without axial ribs (sometimes feeble traces of shoulder nodules), subsutural cord not raised, spiral sculpture on base of body whorl only. Dense axial lines of colour give an overall light yellowish-brown appearance, with deeper brown marks below the suture. As indicated above, intermediates between this form and both (2) and (3) occur on the Transkei/lower Natal coasts.

Form 2 (Figs 38, 39): Natal inshore form (Durban–Scottburgh, evidently on sand down to about 20 m). Shape rather pupoid, breadth/length 0,39–0,43, spire cyrtoconic, with tumid, conspicuous subsutural cord, aperture relatively small (0,36–0,37 of total length); maximum length 31,5 mm. Fine spiral striae overall, later whorls with weak axial ribs, visible mainly as shoulder nodules, which may be pale with brown intervals, base of body whorl with 2–3 spiral rows of small granules. Intervals between collabral brown hairlines often broken into rows of pale dots.

Form 3 (Fig. 40): Transkei ribbed bathymorph: dredged in 25–50 m on fine soft mud or muddy sand with worm-tubes, possibly restricted to the vast bed deposited by the Mzimvubu River. Resembling form 1 in appearance, but subsutural cord moderately raised to tumid, spiral striae overall, adult with strong prosocline axial ribs, 12–15 per whorl, rather irregular, usually continuing onto base of body whorl. Moderate brown, ribs pale or with pale speckles. Exceeds 42,5 mm in length.

Form 4 (*parilis*; Figs 41, 42): offshore Natal bathymorph (*ex pisce* off Durban). Relatively large (exceeds 58 mm) and broad (width/length 0,37–0,41) with flaring outer lip and large aperture (aperture/total length 0,37–0,40), spire orthocline save for the prominently swollen subsutural cord. Peripheral nodules feeble or absent on early whorls, always absent in adult; spiral striae generally visible only on subsutural cord and shoulder sulcus, at least on later whorls, save for faint vestiges of basal lirae. Strong yellowish-brown, heavily flecked with yellowish-white, subsutural cord and base pale, as may be the entire shell.



Figs 33–34 Opercula of 33, *Toxiclionella (Caliendrula) elstoni* and 34, *Clionella rosaria*. Scale-line = 1 mm.

Spawning: Egg-capsules were found attached to hydroids and polychaete tubes dredged with *Clionella tripartita* at several Transkei stations. These capsules are of typical clavatuline form (Fig. 1) and some contained veliconchas agreeing with the protoconch of *tripartita* in shape. Each capsule measures approximately 8,8 mm in height (of which the stalk measures 1 mm) and is pale yellow. Some contain 7–15 veliconchas which evidently gnaw their way out through a hole in the side at the crawling stage. Veliconchas vary in shape (Fig 12), but have approximately $2\frac{1}{2}$ whorls, the last with axial striae; dimensions range from $2,0 \times 1,2$ mm to $1,7 \times 1,2$ mm.

Clavatula taxea (Röding, 1798)

Figs 15, 43–46.

Turris taxea Röding, 1798: 124 (cites Chemnitz, 1780: 259, pl. 162, figs 1550 and 1551). Type locality unknown [here designated as Simonstown, False Bay].
Clionella taxea; Kilburn & Rippey, 1982: 116.
Murex clavatulus var ?; Dillwyn, 1817: 713.
Pleurotoma taxus Kiener, 1840: 37, pl. 10, fig. 1; Deshayes, 1843: 360; Reeve, 1843: pl. 4, sp. 25; Krauss, 1848: 108; Weinkauff, 1876: 127, pl. 28, figs 6, 7. Type locality: 'l'Ocean Indien.'
Clavatula (Perrona) taxus; Odhner, 1923: 7.
Clavatula taxus; Turton, 1932: 18; Barnard, 1958: 94, figs 3b (radula), 4b.
Clavatula taxus affinis Turton, 1932: 18, pl. 3, no. 142. Type locality: Port Alfred.
Clavatula rufanensis Turton, 1932: 18, pl. 4, no. 144. Type locality: Port Alfred.
Clavatula impages (*non* Adams & Reeve, 1850); Turton, 1932: 18.
Clavatula bimarginata (*non* Lamarck, 1822); Odhner, 1923: 7.

Diagnosis: Shell large (80–90 mm) and heavy, biconical to fusiform; spire whorls concave, with strong subsutural cord, siphonal canal fairly long, shallowly notched; axial ribs may be restricted to early whorls or strong throughout, coarse, arcuate, opisthocline, largely peripheral, covered by fine spiral striae; uniform biscuit-colour; periostracum translucent to very dark brown.

Description: Shell large and heavy, biconical to fusiform, breadth/length 0,33–0,44, base obconical, often with a slight false umbilicus; spire more or less orthoconic, with concave whorls and somewhat papilliform apex; aperture narrowly pyriform, length/total length 0,39–0,46. Siphonal canal relatively long, wide, shallowly notched; labium with a relatively thick, rather wide callus, forming a small parietal nodule; labrum strongly curved in both aspects, with a slight indication of a stromboid notch anteriorly; anal sinus deep, asymmetrically U-shaped. Subsutural cord thick and tumid, on early whorls generally undulated by underlying ribs; shoulder sulcus shallowly impressed, flattened, narrower than subsutural cord. Early whorls with weak opisthocline axial ribs covering lower third of each whorl; these are generally obsolete in adult, save in Eastern Cape shells in which adult whorls may bear coarse, arcuate, opisthocline ribs, numbering 9–12 on last whorl, where they are largely peripheral. Covered by fine spiral striae, becoming coarse on base of body whorl. Colour uniform medium orange-yellow to [very] light yellowish-brown. Periostracum varying from translucent light yellowish-brown to dark greyish-brown.

Protoconch of '2 whorls, diam. 1,3 mm, smooth' (Barnard, 1958).

Dimensions (all excluding protoconch): 87×29 mm (Barnard, 1958); $82,5 \times 27,5$ mm, $49,8 \times 22$ mm. Turton's statement that it attains 100 mm requires confirmation.

Operculum typical of the genus.

Radula (Fig. 15): marginals powerful, rachidian tiny, evidently without basal plate.

Range: False Bay to East London in about 35–95 m.

Locality data (see also Barnard 1958): FALSE BAY: off Simonstown (NM B2346: B. J. Young; A4898, 6766: Mrs C. M. Connolly). TSITSIKAMMA COAST: off Cape Infanta, trawled (NM B5813: W. R. Liltved). EASTERN CAPE PROVINCE: Algoa Bay, trawled (NM 5141: R. K.); Port Alfred, beach (B3241: E. K. Jordan); East London area, beach (NM A558: Mrs. V. Armstrong; A2871: Mrs C. M. Connolly).

Types: The present location of the two syntypes of *Turris taxea* Röding, 1798, from the J. F. Bolten collection is unknown, but they may be in the Museum der Natur, Gotha; the remaining syntype (figured specimen) from the Chemnitz collection is apparently lost. The types of Turton's two taxa are in the OUM.

Notes: Although *C. taxea* was one of the first Clavatulinae to be described from South Africa, it rarely washes up on the shore and then only in more or less worn condition. The source of 18th century specimens is a mystery.

Geographical variation: False Bay shells are relatively narrow with traces of axial ribs on early whorls only. In the eastern Cape, adult beach shells always show strong axial ribs; should the eastern population prove worthy of recognition at subspecies level, the name *rufanensis* Turton, 1932, is available.

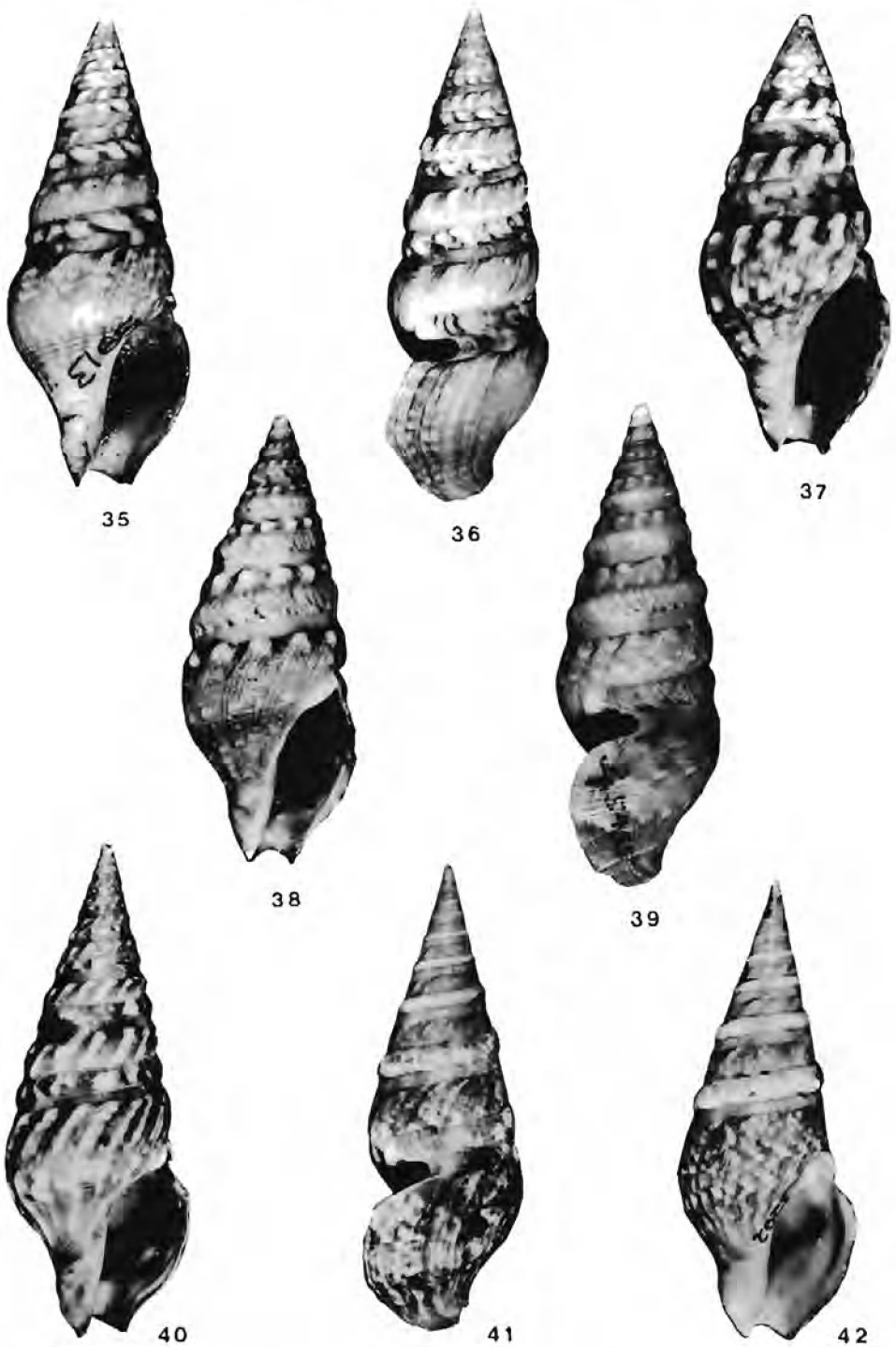
Clavatula helena Bartsch, 1915, **stat. rev.**

Figs 7, 49–51.

Clavatula helena Bartsch, 1915 : 20, pl. 8, fig. 3 (not '2'); Turton, 1932 : 20. Type locality: Port Alfred.

Diagnosis: Shell broadly fusiform, attaining about 33 mm, spire orthoconic with flattened whorls; aperture relatively long and narrow, siphonal canal wide, not notched; a strong parietal pad; anal sinus deep; subsutural cord weak but rounded, shoulder sulcus shallow and narrow, both cord and sulcus only developing on 3rd/4th whorl; axial ribs strongly opisthocline, mainly peripheral; fine spiral threads on base only; pale orange-buff, intervals between ribs brown; protoconch diameter 2,3 mm.

Description: Shell broadly fusiform (breadth/length about 0,38), greatest width median, spire orthoconic, with flattened whorls, moderately deep sutures and a papilliform apex; aperture relatively long and narrowly lanceolate (aperture/total length about 0,43), gradually widening anteriorly, base of body whorl obconical, without, a false-umbilicus. Siphonal canal wide, not notched; labium with a thick callus deposit forming a strong nodule-like parietal fold; anal sinus relatively deep, U-shaped. Subsutural cord relatively weak but rounded, bordered by a narrow, only slightly impressed shoulder sulcus; both cord and sulcus only develop on 3rd or 4th whorl. Sculpture of gently rounded, strongly opisthocline axial ribs, 10–12 per whorl, mainly developed as peripheral swellings, subequal in width to intervals; spiral sculpture only visible on base of body whorl as low rounded lirae. Growth-lines rather coarse.



Figs 35–42. *Clavatula tripartita* (Weinkauff, 1876). 35, Typical form, Jeffreys Bay, 28,3 × 11,1 mm; 36, East London, 49,4 × 18,0 mm; 37, nodular littoral form, East London, 18,5 × 8,0 mm; 38, 39, inshore Natal form, off Durban Bluff, 20–22 m, 26,4 × 10,5 mm and 31,4 × 12,0 mm; 40, ribbed Transkei bathymorph, off Mbotyi, 48–50 m, 34,6 × 13,2 mm; 41, 42, form *parilis*, off Natal, *ex pisce*, 46,4 × 18,8 mm.

Colour (beach-worn shells): base, axial ribs and subsutural region pale orange-yellow, intervals between ribs light to medium yellowish-brown; subsutural cord with diffuse marks of yellowish-brown.

Protoconch (Fig. 7) similar in form to that of *C. tripartita*, 2½ smooth whorls, basal diameter 2,3 mm.

Dimensions (only complete shell seen): 33,5 × 12,8 mm.

Periostracum, operculum and radula unknown.

Range: Port Alfred westward to Tsitsikamma region.

Locality data: TSITSIKAMMA COAST: off Cape St Blaize area, *ex pisce* (NM B4038: R. le Maitre, don. A. Jenner). EASTERN CAPE PROVINCE: Port Alfred, beach (NM B5782: D. H. Kennelly: B5783: W. H. Turton; B5790: ex Albany Mus., det. Tomlin as '*Pleurotoma anteridion* Watson'; B834: R. K.; B550: W. Falcon).

Type material: Holotype is NMNH 227761 (Bartsch 1915).

Notes: *C. helena* is known only from beach-worn shells, apart from one rather chalky *ex pisce* example. Nevertheless, observed variation is minimal and there is no doubt as to the validity of the species. Barnard (1958) was in error in synonymising *helena* with *C. tripartita*; the two differ in shape and colour (see key).

Clavatula halistrepta Bartsch, 1915

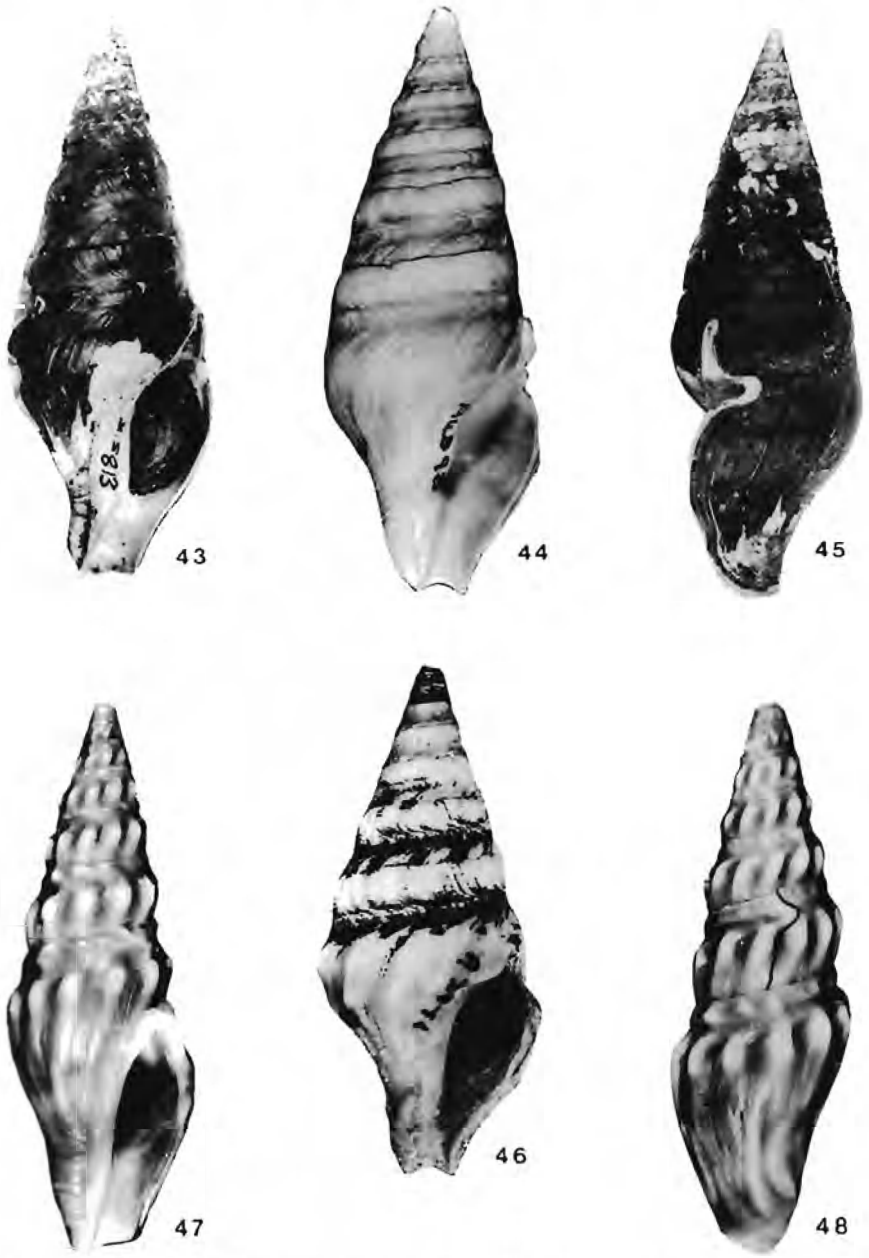
Figs 8, 47, 48.

Clavatula halistrepta Bartsch, 1915 : 19, pl. 2, fig. 5; Turton, 1932 : 19; Barnard, 1958 : 140. Type locality: Port Alfred.
Clavatula halistrepta albocincta Turton, 1932: pl. 4, no. 149. Type locality: Port Alfred.
Clavatula hera Turton, 1932 : 19, pl. 4, no. 140. Type locality: Port Alfred.

Diagnosis: Fusiform with long, rather narrow aperture, base narrow, obliquely truncate, not indented, axial ribs strong, opisthocline, reaching base, 10–12 per whorl, forming strong angle at midwhorl; subsutural cord weak and narrow with small nodules; anal sinus fairly deeply U-shaped; a distinct parietal pad; spiral striae present between ribs and on base; deep yellowish-brown with paler ribs; length about 30 mm.

Description (beach shells): Fusiform, with shouldered whorls and long, relatively narrow aperture, base narrow and obliquely truncate. Labium rather straight with relatively thick callus which forms a strong parietal pad; siphonal canal relatively wide, not notched; labrum with a fairly deep U-shaped anal sinus. Subsutural cord feeble, narrower than shoulder sulcus, which is gently and shallowly concave. Axial ribs strong, slightly wider than their intervals, opisthocline, rather straight, but curving where they extend onto base of body whorl; at periphery (which is median) each rib is slightly expanded to form a weak nodule; ribs increase from about 8 on first teleoconch whorl to 10–12 on last (7th) whorl. Subsutural cord with weak nodules approximating in position to ribs. Microscopic spiral striae are present in rib intervals and on base.

Colour strong to deep yellowish-brown, ribs paler (light orange-yellow to white).



Figs 43–48. *Clavatula taxea* (Röding, 1798) and *C. halistrepta* Bartsch, 1915. 43–46, *C. taxea*: 43, 45, off Cape Infanta, 66,2 × 25,0 mm; 44, off Simonstown, 69,5 × 26,2 mm; 46, East London beach, 49,8 × 22,1 mm. 47, 48, *C. halistrepta*, Jeffreys Bay, 29,9 × 10,6 mm, and 31,7 mm (lip damaged, anal sinus indicated).

Protoconch (Fig. 8) rather cylindrical, narrowly domed, about 2½ smooth whorls, the first one depressed; basal diameter 1,75 mm.

Dimensions (apex and edge of lip missing): 31,7 × 10,3 mm; 30 × 10,5 mm.

Range: Eastern Cape, from Jeffreys Bay to East London.

Locality records: EASTERN CAPE PROVINCE: Jeffreys Bay (NM B3111: Mrs R. Hoogenhout); Port Alfred (NM 4393: R. K.; B3226: E. K. Jordan); East London (NM A282: Mrs C. M. Connolly).

Type material: Holotype of *C. halistrepta* is NMNH 186993 (fidé Bartsch). Types of *C.h. albocincta* and *C. hera* in OUM.

Notes: *C. halistrepta* is known only from more or less beach-worn shells. In shell form it is rather atypical for the genus, and may ultimately prove to be a clavinid. In some respects it is comparable to *C. helena* and juveniles of the two are difficult to distinguish.

Benthoclionella Kilburn, 1974

Benthoclionella Kilburn, 1974: 214. Type species (o.d.) *B. jenneri*.

Diagnosis: Shell resembling *Clavatula*, but anal sinus forming only a slight sinuosity; subsutural cord obsolete on later whorls; aperture relatively large. Radula typical of subfamily.

Notes: In general shell-characters *Benthoclionella* also resembles *Toxiclionella* but has a very different radula and lacks the conspicuously papilliform apex of the latter taxon. The type species is the deepest-dwelling clavatuline known from southern Africa.

Benthoclionella jenneri Kilburn, 1974

Fig. 30.

Benthoclionella jenneri Kilburn, 1974: 214, figs 21 a, b. Type locality: off Durban.

Range: Continental slope in Durban–Tongaat area, in about 230–275 metres.

Additional material: NATAL: off Durban, 125 fathoms (NM A2072: B. Keyter); off Durban, depth unknown (NM B2038: B. J. Young; B5831: A. Visage). Doubtful: off Mozambique (NM H7986–7: B. J. Young).

Notes: This species appears very constant in its characters, apart from slight variation in depth of anal sinus. The largest shell examined measures 65,7 × 25,4 mm; breadth/length ratios vary from 0,36–0,39, aperture/total length from 0,38–0,43. Ground colour (ISCC–NBS system) is yellowish-white to light brown, with subsutural and median body-whorl bands of moderate brown to moderate yellowish-brown, base paler. The protoconch is more or less eroded in all specimens examined.

Toxiclionella Powell, 1966

Toxiclionella Powell, 1966: 57 (as subgenus of *Clionella*). Type species (o.d.) *Clavatula tumida* Sowerby, 1870.

Diagnosis: Shell similar to *Clavatula*, but with a shallow anal sinus and large

papilliform apex, false-umbilicus usually distinct; radula toxoglossate; nucleus of operculum anterior to middle.

Notes: The distinctive radula, with double-barbed, hollow marginals, with or

Figs 49–51. *Clavatula helena* Bartsch, 1915: 49, 51, off Cape St Blaize, *ex pisce*, 33,5 × 12,8 mm; 50, Port Alfred, beach-worn, length 30 mm.

without vestigial rachidians, clearly separates this taxon from other members of the subfamily in which the radula consists of rachidians and slipper-shaped, duplex marginals. Under the classification of McLean (1971) *Toxiclionella* would have to be referred to the subfamily Zonulispirinae (as was done by Kilburn & Rippey 1982) or Borsoniinae. I agree with Powell (1966) that the clavatuline operculum and shell demonstrate its close relationship with the Clavatulinae.

Key to the subgenera of *Toxiclionella*

1. Anal sinus present, subsutural cord simple; operculum with nucleus just anterior to median; rachidian plates absent ..... **Toxiclionella**
— Anal sinus absent, subsutural cord bearing a high, crested lamella, which hides the suture; nucleus of operculum near anterior end; rachidian plates present **Caliendrula**

Subgenus *Toxiclionella* s.s.

Key to the species within the nominate subgenus *Toxiclionella*

1. Shoulder sulcus median, subsutural cord rising high up previous whorl. **haliplex**
— Shoulder sulcus about one-third height of whorl below suture, subsutural cord not as above 2

2. Subsutural cord feeble or absent, axial ribs extending from suture to suture; anal sinus very shallow; spiral sculpture feeble on later whorls ..... **impages**
— Subsutural cord strong, axial ribs interrupted by shoulder sulcus, usually weak on subsutural cord; anal sinus not very shallow; spiral sculpture distinct on later whorls ..... **tumida**

Toxiclionella (Toxiclionella) tumida (Sowerby, 1870)

Figs 9, 31, 52, 53.

Clavatula tumida Sowerby, 1870: 253; Barnard, 1958: 111, figs 4e, 8a (radula), 9a (protoconch). Type locality: Agulhas Bank.
Pleurotoma tumida; Sowerby, 1892: 5, pl. 5, fig. 101 (holotype).
Clionella (Toxiclionella) tumida; Powell, 1966: 57, pl. 8, figs 5, 6, text fig. C68 (radula).

Diagnosis: Shell large (up to 60 mm), heavy, broadly fusiform, spire orthoconic with large (2,2–2,4 mm diameter), papilliform protoconch, labium with a thick callus and parietal tubercle, base rimate, anal sinus very wide and shallow; subsutural cord strong, crenulate or nodulose, shoulder sulcus narrow; axial ribs on lower part of each whorl, arcuate, strongly opisthocline, fine and close on body whorl: fine, wavy, spiral grooves, strong on base of body whorl; off-white with olive-brown periostracum.

Description: Shell large, heavy, broadly fusiform, breadth/length 0,31–0,36, with an acuminate, orthoconic spire and large, papilliform apex, spire whorls slightly concave, aperture relatively large, narrowly pyriform (aperture/total length 0,32–0,38), siphonal canal moderately produced, broad and unnotched; labium with a thick callus, slightly rimate at base, and forming a distinct parietal tubercle; labrum strongly arched in both views, contracted towards base, anal sinus wide, shallow and gently incurved. Subsutural cord strong and tumid, shoulder sulcus narrow but well defined. Sculptured by arcuate axial ribs, strongly opisthocline, 12–15 on lower part of each whorl, forming irregular crenules or nodules on the subsutural cord; sculpture becomes relatively weak on body whorl, except for coarse, sometimes pliculate growth-lines; fine, wavy spiral sulci are present, sometimes absent on later whorls save on lower part of body whorl where they form conspicuous grooves, developing into lirae on rostrum. Yellowish-white inside and out; periostracum thick, close, opaque, moderate olive-brown.

Protoconch of 1½ or 2 whorls (termination unclear), resembling that of *Clavatula taxea* in shape, but much larger (diameter 2,2–2,4 mm).

Dimensions: 60 × 20 mm (Barnard (1968), protoconch lacking); 58,6 × 21,2 mm.

Radula: see references.

Range: Agulhas Bank, from False Bay to off Cape Morgan, 50–100 m.

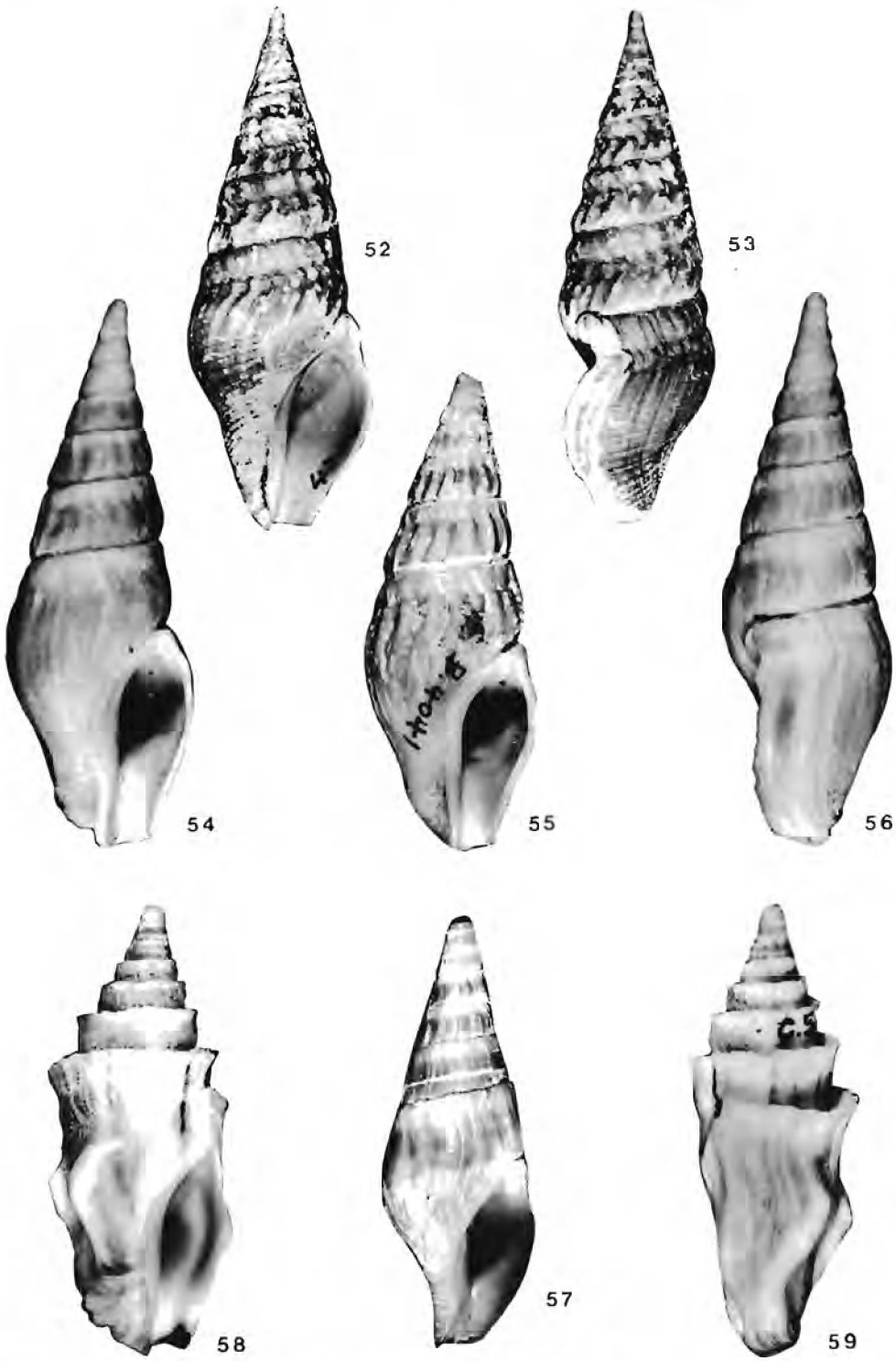
Locality data: see Barnard (1958); NM material lacks precise data.

Type material: Holotype from Denecke colln. in BM(NH) 1874.12.11.290.

Toxiclionella (Toxiclionella) impages (Adams & Reeve, 1850) **comb. n.**

Figs 54–57, 60.

Pleurotoma impages A. Adams & Reeve, 1850: 39, pl. 9, figs 1a, b. Type locality: 'China Sea' [probably = off Cape of Good Hope, 120 fathoms].
Clionella impages; von Martens, 1904: 23.



Figs 52–59. *Toxiclionella (Toxiclionella) tumida* (Sowerby, 1870), *T. (T.) impages* (Adams & Reeve, 1850) and *T. (Caliendrula) elstoni* (Barnard, 1962). 52, 53, *T. tumida*, False Bay, 58,6 × 21,2 mm. 54–57, *T. impages*: 54, 56, holotype, 37,0 × 12,8 mm; 55; off Cape St Blaize, *ex pisce*, length 42,3 mm; 57, off Mendu Point, 250–260 m, 23,0 × 8,5 mm. 58, 59, *T. elstoni*, off Stony Point, 95 m, 33,8 × 14,7 mm.

Diagnosis: Shell claviform with obliquely truncate base and narrow false-umbilicus, spire high with papilliform apex, suture deep, whorls flattened with a slight concavity above midline, anal sinus very shallow and broad; axial ribs arcuate, suture-to-suture, close-set and irregular (to strong ?), spiral striae apparently present but faint in adult; yellowish-white tinged with yellowish-brown, mainly between ribs; attains at least 37 mm.

Description (holotype): Shell claviform, breadth/length 0,35, with obliquely truncate base and high, slightly coeloconic spire, aperture/total length 0,37; suture deep, spire whorls convex basally, concave just posterior to middle, but no distinct subsutural cord or shoulder sulcus; base of body whorl with a strong fasciole and narrow false-umbilicus. Aperture oblong-ovate, greatest width just posterior to median, siphonal canal wide, rather parallel-sided, not notched, labial callus thick, its margin free terminally; labrum gently convex in side view, with wide, gently concave, very shallow anal sinus. Axial ribs arcuate, suture-to-suture, close, rather irregular in width, obsolete on base of body whorl; growth-threads coarse and well developed. Spiral striae evidently faint and irregular (but details are lacking).

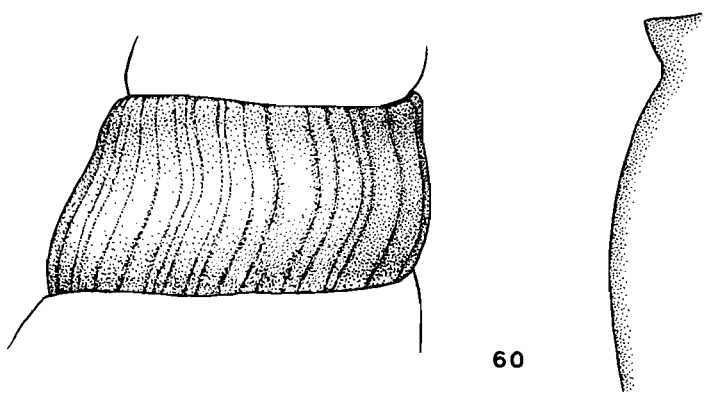


Fig. 60. *Toxiclionella impages*: reconstruction of axial ribbing and lip profile of holotype.

Pale yellowish-white with yellowish-brown intervals between ribs; fresh coloration unknown.

Protoconch very corroded, diameter at least 1,9 mm.

Dimensions: 37,0 × 12,8 mm.

Range: Agulhas Bank or its slopes.

Type material: Holotype BM(NH) 1879.2.26.40, ex Mrs J. Lombe-Taylor colln.

Other material (see below): off Cape St Blaize area, *ex pisce* (NM B4041: A. Jenner); off Mendu Point, Transkei, 250–260 m, coarse sand (NM C4912: *MN*).

Notes: Speculation has long surrounded the possible occurrence of *T. impages* in South African waters. Barnard (1958) believed early records to be based on

Clavatula taxea, but the holotype of *impages* bears scant resemblance to *taxea*, although regrettably it has at some stage been 'beautified' with HCl so that little (if any) of the original surface remains. Recognition of the species is thus fraught with uncertainty. Nevertheless, I identify the two specimens listed above as the 'lost' *impages*.[1] Although the *ex pisce* adult (Fig. 55) has much stronger and more widely set axial ribs, and the dredged juvenile (Fig. 57) has a slightly larger protoconch, these differences may be ascribed to individual variation or the effects of acid. The following notes may be added from these specimens: (1) Juvenile shell: Protoconch diameter 2,0 mm, resembling that of *Toxiclionella haliplex* (Fig. 11) in form; first teleoconch whorl with fine, rather weak and irregular, arcuate, axial riblets, crossed by low, closely set spiral threads, 14 in number; axial ribs become even more irregular with growth, while spiral striae become weak and less conspicuous then the growth-lines, except on base of body whorl where there are a few flattened ridges. (2) Adult shell: probably about 8 teleoconch whorls (apical $1\frac{1}{2}$ lost) with strong axial ribs, about 17 on penultimate whorl, with sloping sides and rounded crests, growth-lines coarse and conspicuous, spiral striae weak and irregular.

The shell of *Pleurotoma impages* resembles both *Benthoclionella jenneri* and *Toxiclionella tumida*, and in the absence of radular data its true generic position remains unknown. The distinct false-umbilicus and basal fasciole indicate that it is probably a *Toxiclionella*.

Toxiclionella (Toxiclionella) haliplex (Bartsch, 1915) **comb. n.**

Figs 11, 61–65.

Clavatula haliplex Bartsch, 1915: 19, pl 2, fig. 3; Turton, 1932: 19. Type locality: Port Alfred.
Clavatula gravis (*non* Hinds, 1843); Turton, 1932: 19, pl. 4, no. 146.

Diagnosis: Shell claviform with obliquely truncate base and narrow false-umbilicus, spire high with papilliform apex; suture shallow, subsutural cord tumid and prominent, clasping high up preceding whorl; shoulder sulcus median, rendering whorls concave; aperture narrow, strongly channelled or even spout-like posteriorly, anal sinus shallow; axial ribs short (shoulder to base) but strong, 11–16, spiral striae fine to feeble; uniform pale orange-yellow, or brown with white subsutural cord and base; attains at least 36 mm.

Description: Shell claviform (breadth/length 0,37–0,40) with a broad, obliquely truncate base and a high spire (aperture/total length 0,36–0,42), apex papilliform; suture rising very high up the preceding whorl, early whorls flat-sided, later ones strongly concave; aperture long and relatively narrow, greatest width posterior to middle, posterior end pinched in, forming a distinct channel, sometimes spout-like in adults; siphonal canal not distinctly indented; rostrum with a shallow, rather rimate false-umbilicus; labium with a fairly thick callus, but no parietal tubercle; labrum strongly arched in side view with a slight stromboid notch and shallow, gently curved anal sinus. Subsutural cord very strongly tumid and subequal in width to rest of whorl, so that the shoulder sulcus is median; floor of sulcus flattened or

[1] While this paper was in press an undoubted example of *T. impages*, agreeing closely with the holotype, came to hand from off Cape Agulhas (NM D155: W. R. Liltved). This, and several allied but undescribed species, will be discussed elsewhere.

Figs 61–65. *Toxiclionella (Toxiclionella) haliplex* (Bartsch, 1915): 61, Holotype, NMNH 186992, length 30 mm; 62, Port Alfred, beach, 29,3 × 11,7 mm; 63, off Mncwasa Point, 40–45 m, 29,5 × 11,7 mm; 64, 65, off Stony Point, 87 m, 35,0 × 12,8 mm.

even slightly convex. Periphery of body whorls slightly angular, with a series of narrow, weak to strong, opisthocline ribs which terminate abruptly at border of shoulder sulcus (showing above suture on spire as a series of low nodules, somewhat crenulating the overlying subsutural cord), and end almost as abruptly on base of rostrum; 11–16 ribs on penultimate whorl; axial sculpture may only develop from about 4th teleoconch whorl, or may be initiated from first whorl as irregular, arcuate, suture-to-suture riblets. Coarse growth-lines (sometimes rather pliculate) occur overall, as well as fine spiral striae, which may be faint to absent in places; rostrum with fine spiral lirae.

Colour: Subsutural cord and upper half of shoulder sulcus, as well as rostrum,

yellowish-white, contrasting with a median zone of light yellowish-brown to moderate brown, crests of ribs paler, shoulder sulcus sometimes darker than periphery; external colour tinting aperture; labium white. Beach shells uniform light orange-yellow with white rostrum. Periostracum inconspicuous.

Protoconch (Fig. 11) similar to *T. tumida*, maximum diameter 2,0–2,2 mm.

Dimensions: 35 × 12,8 mm; 29,5 × 11,7 mm; attains at least 36,6 mm. Operculum and radula unknown.

Range: Continental shelf of Transkei and eastern Cape, in about 32–165 m; worn shells very occasionally washed up on shore.

Locality data: EASTERN CAPE PROVINCE: Port Alfred, beach (NM B5774: H. Becker). TRANSKEI (all NM: *MN*): off Sandy Point, 90 m, coarse sand, shell-debris (C4501); off Stony Point, 95 m, sponge-rubble (C4823), do, 87 m, coarse sand (C4228); off Qora River, 100 m, coarse sand, some sponge-rubble (C4823); off Nthlonyane, 90–95 m, lithothamnial pebbles (C2560), do, 95 m, sponge-rubble (C1936), do, 130 m, coarse brown calcareous sand (C2668); off Mncwasa Point, 90 m, coarse sand (C2768), do, 40–45 m, coarse pink sand (C2418), do, 32–35 m, fine sand (C2703); off Whale Rock, 150–165 m, coarse sand (C2302); off Ubombo, 60–62 m, coarse sand, conglomerate (C2466).

Type material: Holotype is NMNH 18692.

Notes: This species is provisionally referred to *Toxiclionella* on account of its evident resemblance to *T. tumida*: radular confirmation is desirable. The badly worn and broken holotype of *haliplex* (Fig. 61) can be matched with a much fresher beach topotype in the NM collection (Fig. 62), which in turn agrees with fresh dredged shells. Although worn shells are pale yellow, fresh examples (Figs 63–65) are banded with brown and white, as noted by Bartsch for some of his juvenile paratypes.

T. haliplex was incorrectly synonymised with *T. tumida* by Barnard (1958 : 111); it differs from the latter species in the subsutural cord being much more tumid and clasping the previous whorl higher up, so that the shoulder sulcus is situated at midwhorl rather than at the posterior third; aperture shape also differs (see figs) and spiral sculpture is much weaker in *haliplex* than in *tumida*.

Subgenus **Caliendrula** subgen. n.

Type species: *Latiaxis ? elstoni* Barnard, 1962.

Etymology: From *caliendrum* (n) Latin, a highly ornate headpiece.

Diagnosis: Shell differing from *Toxiclionella* s.s. in lacking a distinct anal sinus and in the subsutural cord bearing a high, lamelliform flange. Operculum with nucleus admedian, near anterior end. Radula with double-barbed, slender, hollow marginals and vestigial rachidians.

Notes: The type species of this monotypic subgenus shows several highly autapomorphic shell-characters. Indeed, so aberrant is its overall facies that its describer was doubtful whether it was buccinid or coralliophilid. However, its turrid affinities are demonstrated by the presence of a poison gland and associated pressure bulb, together with toxoglossate dentition. Despite the retention of

vestigial rachidians, radula structure is otherwise so similar to that of *Toxiclionella* that I refrain from giving *Caliendrula* full generic status; in the Turrinae it has been shown (Kilburn 1983) that the presence or absence of a rachidian is of little value as a group character.

Toxiclionella (Caliendrula) elstoni (Barnard, 1962)

Figs 10, 14, 32, 33, 58, 59.

Latiaxis ? elstoni Barnard, 1962: 248, fig. 1; Kensley, 1973: 144, fig. 499. Type locality: 'from a fish stomach off the Natal coast.'

Diagnosis: Shell broadly claviform with wide, obliquely truncate rostrum and distinct false-umbilicus, surrounded by a fasciole bearing vaulted scales; spire high, apex papilliform, suture concealed by a high, crested lamella arising from subsutural cord; shoulder sulcus wide; base of body whorl with 6–7 prominent, arcuate axial ribs; fine spiral striae overall; yellowish-white, tinged in places with orange; attains 38 mm.

Description: Shell broadly claviform (breadth/length 0,41–0,44), with broad, obliquely truncate rostrum, spire coeloconic, with a papilliform apex; aperture/total length 0,48–0,53. From third teleoconch whorl the posterior angle of aperture is produced into a spout-like extension, forming a high lamellate flange, posteriorly directed with a slight outward curve, completely hiding suture; crest of lamella slightly undulating, its base convex in position of subsutural cord, which occupies posterior half of each whorl. Aperture long and relatively narrow, its greatest width median, tapering posteriorly, obliquely parallel-sided anteriorly, siphonal canal deeply indented. Labium with a thick callus, adnate parietally, edge free on columella; end of rostrum with a narrow false-umbilicus, encircled by a strong fasciole bearing vaulted scales. Labrum gently sinuous in side-view with a slight stromboid notch and only a vestigial, widely concave, anal sinus posterior to midwhorl. Spire whorls, and body whorl from shoulder sulcus posteriorly, covered in fine, dense spiral striae; base of body whorl with 6–7 prominent, strongly arcuate axial ribs, terminating abruptly at level of paries but reaching fasciole basally; fine but well-developed growth-lines overall, beginning on first teleoconch whorl as fine, close, axial riblets, but becoming progressively more inconspicuous as shell enlarges.

Colour: Yellowish-white, anterior end of rostrum ringed with moderate orange, also a few diffuse axial streaks of that colour; whorls occasionally stained medially with moderate brown; aperture and columella white, siphonal canal tipped with orange. Periostracum indistinct.

Protoconch (Fig. 10) bluntly domed, probably consisting of about 1½ whorls, but limits ill-defined; smooth, terminating in a series of close, brephic axials, suture deep; maximum diameter about 2,4 mm.

Dimensions: 38 × 15 mm (holotype); 33,8 × 14,7 mm.

Operculum (Fig. 33) thick, broadly lanceolate, with its nucleus situated about one-third length from anterior end just inside midline, with coarse, eccentric growth-lines; colour moderate yellowish-brown; occupying approximately 0,34 of total aperture length (including posterior canal).

Radula (Fig. 14): Marginals harpoon-like, tubular, slightly curved, both cutting plates with a barb, and with the indication of a tiny internal barb near terminal opening; base narrow, without a spur. Rachidian consisting of a diaphanous basal plate and flimsy mesocone.

Range: Continental shelf of Transkei (and presumably Natal) in 80–95 m.

Type material: Holotype is SAM A9346 (Giles & Gosliner 1983 : 20).

Locality records (all NM:*MN*): TRANSKEI: off Port Grosvenor, 80 m, calcareous nodules (C652; C5826, radula slide M174); off Stony Point, 95 m, sponge-rubble (C5827, C4215).

Notes: The radula of this rare species needs SEM study to elucidate the nature of the internal barb that appears to be present in the only preparation available.

Clionella Gray, 1847

Clionella Gray, 1847 : 153. Type species (o.d.) *Buccinum sinuatum* Born, 1778.
Melatoma auctt. (*non* Swainson, 1840).

Diagnosis: Shell bucciniform with short siphonal canal, anal sinus very shallow, parietal region with at most a slight callus pad; subsutural cord relatively weak to obsolete; protoconch somewhat conical, with tilted first whorl, about 2 whorls in total.

Notes: I agree with Iredale (1918) that the type species of *Melatoma*, *M. costata* Swainson, 1840, is unidentifiable and the genus is thus indeterminate. Moreover, the type figure of *M. costata* (Swainson, 1840: text. fig. 104) shows a shell with a tapering, produced base, unlike that of any species of *Clionella*.

Powell (1966 : 56) gave a detailed definition of *Clionella*, but included in his list of characteristic species *Clavatula bipartita* [= *tripartita*] and *Turricula turriplana* (see above).

Key to species of *Clionella*

(Note: This key applies to typical individuals, and extreme variants may be difficult to place.)

1. Anal sinus more or less reversed L-shaped and sutural; no labial callus **rosaria**
— Anal sinus V- or U-shaped, on shoulder slope; labial callus thin to thick . . 2
2. No subsutural cord or shoulder sulcus, axial ribs suture-to-suture; siphonal canal not notched basally 3
— Subsutural cord and shoulder sulcus present (sometimes feeble), axial ribs rarely reaching suture; siphonal canal usually notched 4
3. Axial ribs crossed by fine, close spiral threads; ground colour orange . . . **vilma**
— Axial ribs rendered feebly nodular by groups of low, widely spaced spiral ridges; ground colour dark brown . . . . . **liltvedi**
4. Shell small (attaining 12 mm), glossy, whorls strongly constricted below suture, siphonal canal not notched . . . . . **subcontracta**
— Shell exceeding 12 mm as an adult, not glossy, not markedly constricted below suture, siphonal canal deeply to shallowly notched 5

5. Axial ribs forming a weak to strong shoulder angle 6
— Ribs not shouldered 8
6. Spiral sculpture of shallow, well-spaced grooves; periphery flattened so that body whorl is weakly biangulate; whorls either medially dark brown (western Cape) or with a pinkish-white zone (eastern Cape) ..... **subventricosa**
— Spiral sculpture of fine, close striae; body whorl not biangulate; colour not as above 7
7. Shoulder angle below midwhorl; patterned with fine brown specks; western Cape to Transkei ..... **kraussii**
— Shoulder angle at or above midwhorl; not speckled with brown (except sometimes below suture), usually uniform pinkish-orange; western Cape only ..... **semicostata**
8. Spiral sculpture of 4–5 well-spaced grooves per whorl; subsutural cord feeble; mottled yellowish-brown ..... **striolata**
— Spiral sculpture obsolete or of fine striae; subsutural cord distinct; colour uniform cream, brown or orange 9
9. Spiral sculpture absent; orange or deep brown ..... **confusa**
— Spiral striae present (sometimes faint) 10
10. Cream with yellowish-brown periostracum; whorls usually concave, shoulder cord strong ..... **bornii**
— Pale brown to brownish-orange, periostracum yellowish-brown to black; whorls not distinctly concave, subsutural cord somewhat impressed .. **sinuata**

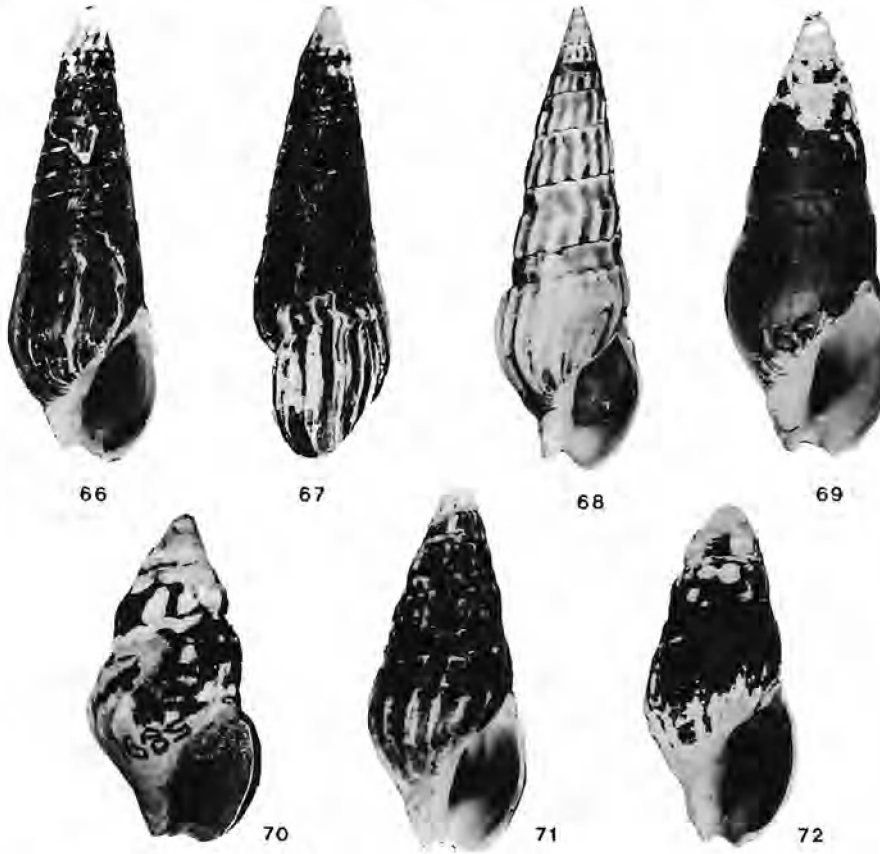
Clionella sinuata (Born, 1778)

Figs 2, 5, 16, 27, 66–72.

Buccinum sinuatum Born, 1778 : 264 (cites Chemnitz, 1780 : pl. 155, figs 1464, 1465, seen in MS); *idem*, 1780 : 268. Type locality unknown, here designated as Simonstown, False Bay.
Clavatula (Melatoma) sinuata [partim]; Barnard, 1958 : 98, figs 3d, 5a.
Clionella sinuata sinuata; Kilburn & Rippey, 1982 : 116, pl. 28, fig. 4, text fig. 68.
Buccinum phallus Gmelin, 1791 : 3503 (cites Chemnitz. *loc. cit.*, and Schröter 1779 : 401, no. 194). Type locality: 'In Indiae, an fluviis?'
Strombus boletus Röding, 1798 : 100 (cites Chemnitz. *loc. cit.*). Type locality unknown [= Coromandel, India, fide Chemnitz].
Pleurotoma buccinoides Lamarck, 1822 : 94 (cites Chemnitz. *loc. cit.*); Kiener, 1840 : 38, pl. 13, fig. 1 (holotype). Type locality: 'l'Océan des grandes Indies.'

Diagnosis: Shell very variable in shape (breadth/length 0,29–0,53, aperture length/total length 0,31–0,43), whorls flat-sided to gently convex with a low to sunken subsutural cord; axial ribs strong, dense and 18–25 per whorl, to almost obsolete, terminating abruptly posteriorly in a row of small nodules generated by anal sinus; spiral striae faint to moderately distinct; colour light brown to brownish-orange, periostracum dark yellowish-brown to black.

Description: Shell very variable in shape (breadth/length 0,29–0,53) spire varying from high and orthoconic to relatively low and cyrtoconic (aperture length/total length 0,31–0,43); apex normally badly eroded, whorls flat-sided to gently convex. Aperture elliptic, siphonal canal wide, deeply notched, labium with thin to thick callus; anal sinus a shallow, narrow, U-shaped notch. Sculptured by opisthocline axial ribs that terminate below the shallow, ill-defined shoulder sulcus in a series of small to feeble, elongated nodules which are generated by the anal sinus and



Figs 66–72. *Clionella sinuata* (Born, 1778): 66, 67, St James, False Bay, 57,2 × 19,2 mm; 68, Simonstown dredgings, 54,2 × 16,9 mm; 69, Kommetjie, 29,7 × 11,3 mm; 70, Saldanha Bay, 20,9 × 11,2 mm; 71, Table Bay, 35,4 × 15,0 mm; 72, Melkbos, 35,8 × 15,9 mm

usually give the axial ribs a shoulder-like termination. Typically the axial ribs are strong, dense, wider than their intervals or subequal to them, 18–25 in number per whorl, reaching base of body whorl and sometimes forming a series of feeble nodules or plicules on the low subsutural cord. However, axial ribs may be almost obsolete or visible only as gentle peripheral folds. Faint spiral striae are usually visible only on early whorls and on unworn periostracum.

Protoconch (Fig. 5) narrowly domed, of 2 whorls, diameter 1,1 mm.

Colour light brown to brownish-orange, ribs paler to white; periostracum a thick lacquer-like film, black to moderate yellowish-brown.

Dimensions: 67,6 × 19,9 mm; 20,9 × 11,1 mm.

Operculum typical of genus.

Radula (Fig. 16): Rachidian with a short, triangular mesocone on a small,

rectangular, longitudinal shield, leading edge of basal plate strongly staining, posterior edge ill-defined.

Range: Namaqualand coast to Cape Hangklip.

Locality data: ATLANTIC CAPE COAST: Hondeklip Bay (in colln. Mrs M. Quickelberge); Saldanha Bay (NM 5891: R.K.); Melkbos (NM 439, 5888: Mr & Mrs M. C. Giles) and Three Anchor Bay, both Table Bay (NM 6662: R. K.); Kommetjie (NM A4642, A3097, 4392: Mrs C. M. Connolly, Mr & Mrs M. C. Giles); Buffels Bay (NM 9643: Mr & Mrs M. C. Giles). FALSE BAY: St James (NM 4390) and Miller's Point (NM 4389), both Mr & Mrs M. C. Giles; Simonstown dredgings (NM A3159, A4897: Mrs & Mrs M. C. Giles); Kalk Bay (NM A1770: Mrs C. M. Connolly); Cape Hangklip (NM 4388: Mr & Mrs M. C. Giles; NM B491: J. P. Marais).

Doubtful: Knysna (B2028: B. J. Young).

Types: Two syntypes of *Buccinum sinuatum* are preserved in the NMV collection; they are typical False Bay examples. The larger, which measures 58,1 × 19,6 mm, is here designated as lectotype. The types of *Buccinum phallus* and *Strombus boletus* are presumed lost; that of *Pleurotoma buccinoides* may be in the MNHG.

Notes: This common, cold-water species varies somewhat in form, infratidal examples being larger and higher-spired than intertidal ones, particularly in False Bay. Squat, weak-sculptured individuals have been misidentified as *sigillata* Reeve, 1846 (see under *Clionella semicostata*).

Egg-capsule (Fig. 1): Dried egg-capsules (*leg. et det.* Mrs C. M. Connolly) measure 8,2 mm in height, of which the stalk measures 1 mm. They contain 5–6 veliconchas.

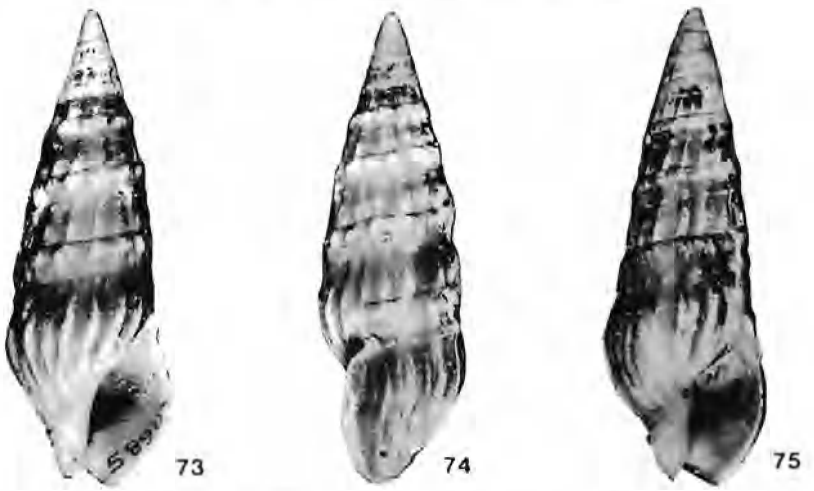
Clionella bornii (E. A. Smith, 1877) **stat. rev.**

Figs 23, 73–75.

Pleurotoma (Clionella) bornii Smith, 1877: 499; Sowerby, 1892: 6, pl. 5, fig. 77. Type locality: Cape of Good Hope [= Algoa Bay, here restricted].
Clionella sinuata bornii; Turton, 1932: 17, pl. 3, no. 137 (not '138').
Clionella sinuata borni [sic]; Kilburn & Rippey, 1982: 116, pl. 28, fig. 1.
Clionella turtoni Bartsch, 1915: 17, pl. 2, fig. 2. Type locality: Port Alfred.
Clionella sinuata (*non* Born, 1778); Turton, 1932: 17, pl. 3, no. 138 (not '137').
Clavatula (Melatoma) sinuata [partim]; Barnard, 1958: 98.

Diagnosis: Shell narrow (breadth/length 0,33–0,41), spire slightly cyrtoconic, whorls not shouldered, usually concave at or just above median; subsutural cord wide and tumid; shoulder sulcus narrow, with a series of tiny elongate nodules; axial ribs thin, rather weak, 16–22 per whorl, becoming obsolete on base and shoulder slope, spiral striae fine and sinuous; anal sinus very shallow, V-shaped; shell cream, with dirty yellowish-brown periostracum; up to 46 mm.

Description: Shell narrow, breadth/length 0,33–0,41, spire slightly cyrtoconic, aperture/total length 0,32–0,37, whorls flat or concave at or just posterior to median, body whorl often strongly concave above periphery; aperture elliptical, siphonal canal wide, deeply notched, labium with thin callus deposit, labrum strongly arched, anal sinus a very shallow V-shaped notch. Subsutural cord wide,



Figs 73–75. *Clionella bornii* (E. A. Smith, 1877): 73, 74, Algoa Bay, 39,6 × 13,7 mm; 75, Port Elizabeth, 40,0 × 13,5 mm.

tumid; shoulder sulcus ill-defined, incorporating a series of small (often feeble) elongated nodules generated by anal sinus. Axial ribs 16–22 per whorl, thin, rather weak, opisthocline, subequal to or narrower than intervals, gradually evanescing on base and in shoulder sulcus; spiral striae distinct, fine and sinuous.

Uniform yellowish-white, periostracum moderate yellowish-brown.

Protoconch as in *C. sinuata*; diameter about 0,9 mm.

Dimensions: 45,4 × 15,5 mm (apex broken); 40,0 × 13,7 mm, 39,7 × 13,7 mm.

Operculum typical of the genus.

Radula (Fig. 23): Rachidian with short, acicular mesocone on small, rectangular longitudinal shield, basal plate transversely rectangular, weakly staining along leading edge, ill-defined posteriorly.

Range: Jeffreys Bay to western Transkei, littoral.

Locality data: EASTERN CAPE PROVINCE: Jeffreys Bay (NM 9553: Mr & Mrs M. C. Giles; B578: F. C. Graham; A4894, A5043: Mrs C. M. Connolly); Algoa Bay (NM 5126: R. K.; 5890: W. Falcon; 620: J. Crawford; A3904: F. Graeve); Port Alfred (NM B461: E. K. Jordan; B5796: O. Armstrong; B5795: G. Sole; B2967: H. Becker; B5791: D. H. Kennelly); East London (NM 621: H. C. Burnup). TRANSKEI: Qolora River mouth (NM C3384: R. K.).

Type material: Holotype of *Pleurotoma bornii* in BM(NH) 1860.4.10.31, that of *Clionella turtoni* is NMNH 186670 (*fide* Bartsch 1915).

Notes: *Clionella bornii* was synonymised with *C. sinuata* (Born, 1778) by Barnard (1958), but (mainly on grounds of allopatry) was treated as a subspecies of that by Kilburn & Rippey (1982). The present study indicates that sufficient differences exist to justify their separation as full species, although future collecting in the area

between their ostensibly widely separated ranges may necessitate reconsideration of their relationships. *C. bornii* differs from *sinuata* in its white shell and pale periostracum, in its more distinctly concave whorls, swollen subsutural cord, and smaller protoconch. An interesting synapomorphy which appears to demonstrate sister-species status is the series of small nodules generated by the apex of the anal sinus; in *sinuata* these nodules form the (abrupt) posterior terminations of the axial ribs, while in *bornii* they lie within the shoulder sulcus, usually separated from the (gradual) terminations of the ribs by a gap. The mesocone of the rachidian radula plate is evidently acicular in *bornii*, conical (triangular) in *sinuata*. Although Turton (1932) recorded both *sinuata* and *bornii* from Port Alfred, no sign of the former has been seen in the eastern Cape, and his material is evidently discoloured *bornii* (the periostracum in individuals from the Kowie estuary is often stained from oxides in the substratum). *C. bornii* is one of the least variable of the genus. It lives half-buried in sand in low-tide rock pools.

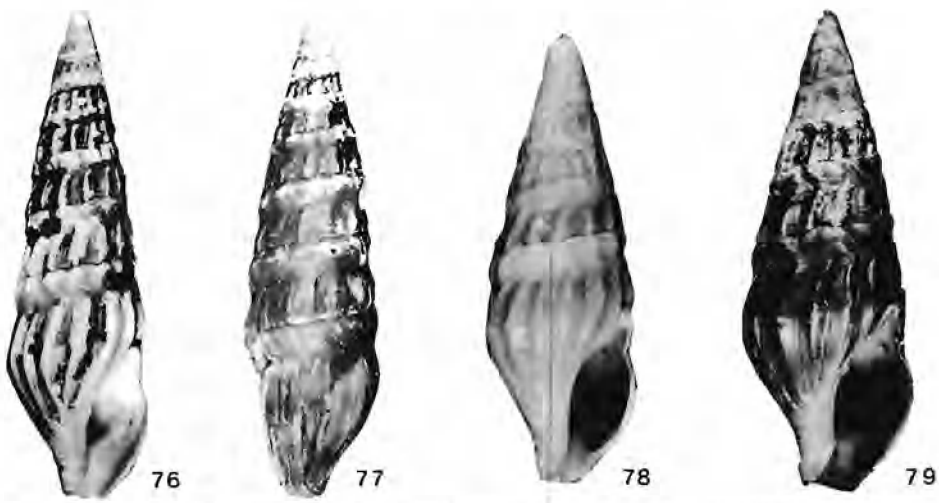
Clionella confusa E. A. Smith, 1906

Figs 13, 76–79.

Clionella confusa E. A. Smith, 1906: 23, pl. 7, fig. 2; Turton, 1932: 16; (partim) Barnard, 1958: 141, fig. 5c. Type locality: Port Elizabeth.

Diagnosis: Shell narrow (breadth/length 0,28–0,41), with flattened whorls, subsutural cord distinct, shoulder sulcus shallow; siphonal canal feebly notched; anal sinus shallow, U-shaped with prosocline subsutural limb; axial ribs strong, 13–17 per whorl, no distinct spiral sculpture; colour uniform orange or brown, periostracum lacquer-like, dark brown; up to 48 mm length.

Description: Shell resembling *C. bornii* in form but usually narrower (breadth/



Figs 76–79. *Clionella confusa* E. A. Smith, 1906: 76–77, Jeffreys Bay, 37,6 × 10,9 mm, 31,8 × 10,1 mm 78, lectotype, NM 623/T495, 29,3 × 10,3 mm; 79, Jeffreys Bay, 25,2 × 9,2 mm.

length 0,28–0,41) and even less variable in proportions; aperture length/total length 0,26–0,35; whorls flattened with fairly tumid subsutural cord; sulcus shallow but well-defined. Aperture as in *C. bornii* but siphonal canal slightly narrower and more feebly notched; labium with a moderately thin callus deposit; anal sinus as in *bornii* but subsutural limb strongly prosocline.

Sculpture of well-developed, strongly rounded to angular axial ribs with gently sloping sides; about 13–17 per whorl (not increasing in number with growth), often splitting longitudinally into groups of weaker ribs; no distinct spiral sculpture, but microscopic collabral threads are present.

Colour uniform, moderate or deep orange to deep brown; periostracum opaque, lacquer-like, moderate to strong brown.

Protoconch unknown.

Dimensions: 35,8 × 9,9 mm; 35,3 × 12,3 mm; 31,9 × 9,7 mm. Attains at least 48,6 mm in length (apex and lip broken).

Operculum typical of genus.

Radula (Fig. 13): Rachidian with fairly large, acicular mesocone on a longitudinally rectangular shield, basal plate transversely rectangular; accessory plate of marginals small, enclosed within socket.

Range: Cape Agulhas to eastern Transkei.

Locality data: AGULHAS AREA: Cape Agulhas, badly worn (in colln. Mrs M. D. Quickelberge). TSITSIKAMMA COAST: Mossel Bay (Barnard 1958); Nature's Valley, east of Plettenberg Bay, and Storms River (both in colln. Mrs M. D. Quickelberge). EASTERN CAPE PROVINCE: Jeffreys Bay (NM 5909: R. K.; 9552: Mr & Mrs M. C. Giles; 5912: W. Falcon; 5908: H. C. Burnup); Algoa Bay (NM 5772: J. Crawford; 2716: H. C. Burnup; 5911: W. Falcon); Port Alfred (NM B5775: D. H. Kennelly; 5127: R. K.; B2567: B. J. Young; B644: E. K. Jordan); East London area (NM 6939: M. Lavertine; A2258, B5850–1: R. K.; 5910: W. Falcon; A2882: Mrs C. M. Connolly). TRANSKEI: Kei River mouth (NM C3564: R. & J. K., R. Fregona); Port St Johns (Barnard 1958); Qolora (NM C3385: R. K.); Sandy Point (NM C3682: R. K., R. Fregona).

Type material: The figured syntype (with broken spire and labrum) is presumably in the BM(NH). Two syntypes are preserved in the NM, leg. J. Crawford, H. C. Burnup colln.; one of these, with relatively intact lip, is here designated lectotype (NM 623/T495); it measures 29,3 × 10,2 mm; the paralectotype is NM B5838/T2677.

Notes: *Clionella confusa* is common in beach-drift, but rarely lives intertidally.

Clionella striolata Turton, 1932

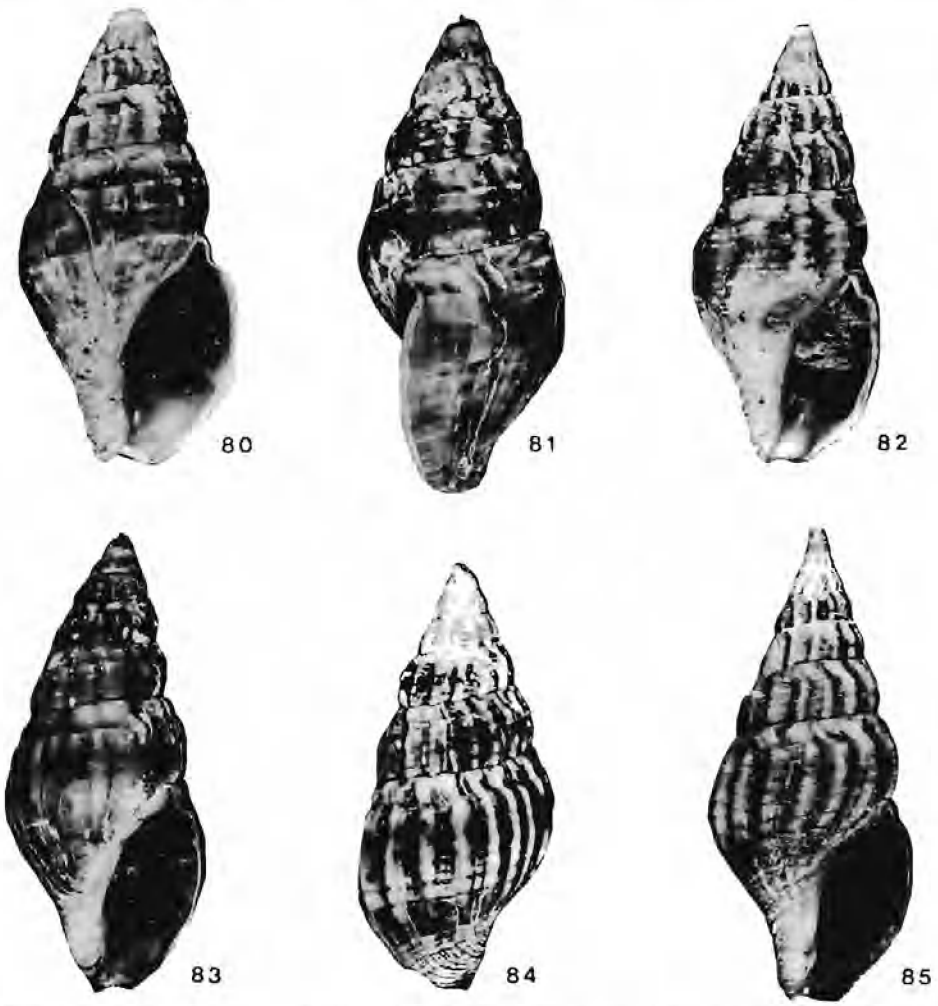
Figs 19, 80–85.

Clionella striolata Turton, 1932:18, pl. 3, no. 139. Type locality: 'Port Alfred' [doubtful, probably = Table Bay].

Diagnosis: Shell squat, whorls markedly convex, aperture fairly large, siphonal canal barely notched, anal sinus very shallow but wide, gently curved; subsutural cord feeble, shoulder sinus wide and shallow; axial ribs strongly arcuate, 14–19 per

whorl, often reaching suture but sometimes obsolete on later whorls, incised by well-spaced spiral grooves, base ridged; mottled in various shades of yellowish-brown; periostracum thin, transparent; up to 21 mm.

Description: Shell bucciniform, breadth/length 0,45–0,52, whorls markedly convex, not shouldered, aperture relatively large (aperture/total length 0,40–0,42), lanceolate with relatively narrow, barely notched siphonal canal, fasciole weak; labium with fairly thick callus, sometimes with a vestige of a parietal tubercle; anal sinus very shallow, rather wide and asymmetrical, with gently rounded apex. Subsutural cord barely developed, shoulder sulcus wide and shallow. Sculpture often weak and irregular on later whorls, but sometimes strong; axial ribs often



Figs 80–85. *Clionella striolata* Turton, 1932: 80–84, Kommetjie, 21,2 × 10,0 mm, 21,4 × 10,6 mm, 19,1 × 8,4 mm, 20,5 × 9,5 mm and 14,3 × 6,8 mm respectively; 85, False Bay, 19,7 × 8,7 mm.

reaching suture, strongly arcuate, angular with sloping sides, 14–19 per whorl, obsolete on base of body whorl; ribs cut by 4–5 distinct spiral grooves, rarely weakly developed, usually rendered punctate by microscopic axial threads; base of body whorl with raised spiral lirae.

Ground colour greyish-yellow to dark greyish-yellow, mottled or blotched with moderate brown to dark yellowish-brown, sometimes forming a few wavy axial streaks; aperture with two zones of moderate brown. Periostracum thin and transparent.

Protoconch worn in all available specimens.

Dimensions: 21,3 × 10,7 mm, 20,6 × 9,8 mm; 20,5 × 9,2 mm.

Operculum typical of the genus.

Radula (Fig. 19): Rachidian with relatively large mesocone on small, narrow shield, basal plate diaphanous, ill-defined posteriorly, cutting edge only slightly thickened; marginal plates relatively small.

Range: Namaqualand coast to Cape Hangklip.

Locality data: ATLANTIC CAPE COAST: Paternoster Bay and Stompneus, Saldanha area (NM A1392, A1368: Mr & Mrs J. W. Watt); Sea Point, Table Bay (NM A1334: D. Klerck); Kommetjie (NM A4634: Mrs C. M. Connolly). FALSE BAY: Muizenberg (NM A2867: Mrs C. M. Connolly); Strandfontein (NM A3966, 588, A2860: Mrs C. M. Connolly); Cape Hangklip (NM 4387: Mr & Mrs M. C. Giles).

Type material: Holotype in OUM.

Notes: Although common in the Cape Town area, *C. striolata* has not previously been identified as such. It has evidently been confused with the squat form (*sigillata auctt, non* Reeve) of *C. sinuata*, from which it differs in its spiral sculpture of well-spaced furrows, its feeble subsutural cord, arcuate axial ribs which often reach the suture, and mottled brown colour. There may also be some resemblance to the typical subspecies of *C. subventricosa*, which differs in colour pattern, and in its shouldered whorls, and distinct subsutural cord and shoulder sulcus.

C. striolata lives in coarse sand and shingle in lower midtidal rock pools, emerging in the company of *Burnupena catarrhacta* (Gmelin, 1791) to scavenge as the tide turns (both species are readily attracted to crushed *Oxystele*).

Western Cape material has been compared by me with the holotype in the Turton collection and found to agree. The species has not been seen at the type locality or indeed anywhere east of the False Bay region. I believe, therefore, that the holotype of *striolata* was either added accidentally to Turton's Port Alfred collection while he was in transit in Cape Town, or that it came from one of his 'friends', who donated shells supposedly from Port Alfred.[1]

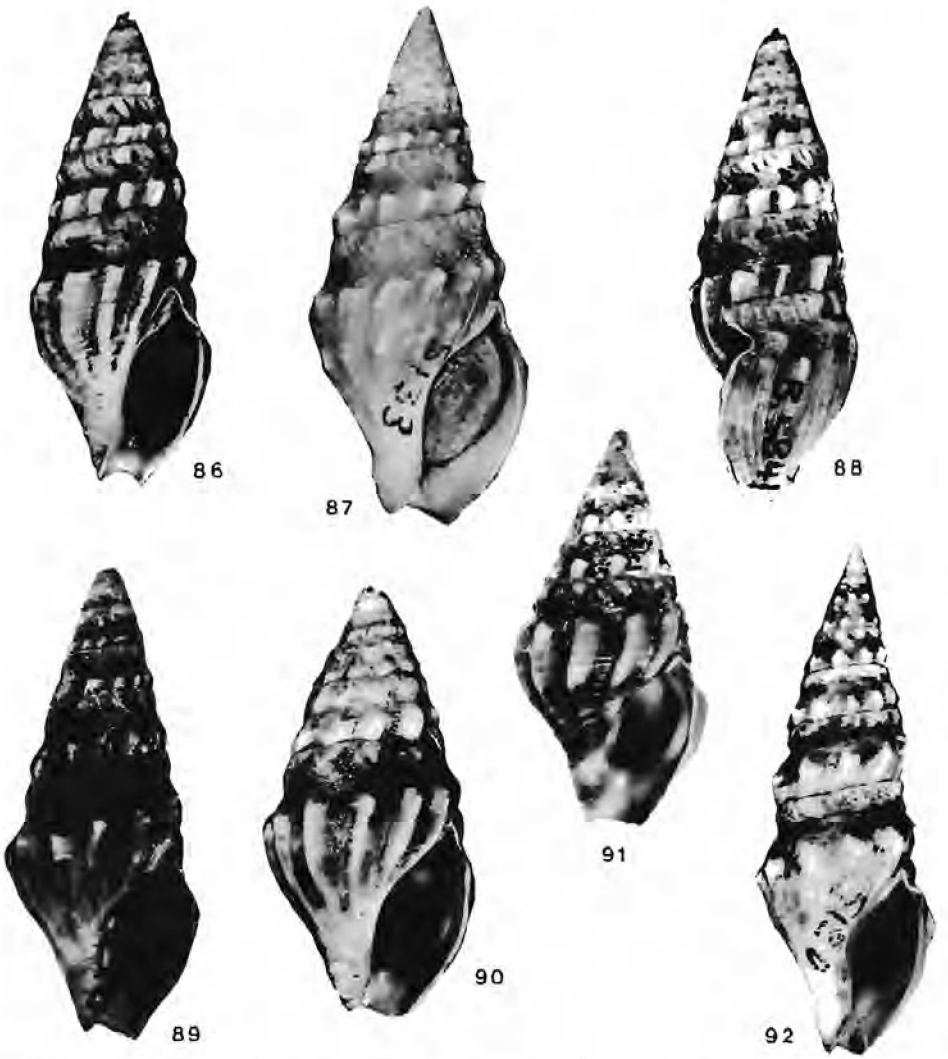
[1] A letter from Turton dated 6/10/1930 and now in the Natal Museum, reveals that one of these anonymous benefactors was John Hewitt (1880–1961), then director of the Albany Museum. The reason for secrecy can only be guessed at. It is, however, clear from this correspondence that Turton's list of 'shells from friends' (1932 : 288) included only a minute fraction of the material actually given to him by Hewitt. Whether this included the mislabelled *Clionella striolata* will never be known.

Clionella kraussii (E. A. Smith, 1877)

Figs 25, 86–92.

Pleurotoma (Clionella) kraussii E. A. Smith, 1877: 500; Sowerby, 1892: 6, pl. 4, fig. 78. Type locality: 'Cape of Good Hope' [here restricted to Algoa Bay].
Clionella kraussi [sic]; Turton, 1932: 15; Kilburn & Rippey, 1982: 116, pl. 28, fig. 2.
Clavatula kraussi [sic]; Barnard, 1958: 100, fig. 5d.
Clionella semicostata (*non* Kiener, 1840); Turton, 1932: 15.

Diagnosis: Shell with obconical body whorl, whorls strongly shouldered at just below middle, siphonal canal shallowly notched, anal sinus a moderately deep



Figs 86–92. *Clionella kraussii* (E. A. Smith, 1877): 86, 88, Cintsa, 23,7 × 9,0 mm; 87, Algoa Bay, 24,8 × 10,4 mm; 89, Qolora, 23,3 × 9,6 mm; 90, East London, 19,7 × 9,3 mm; 91, Jeffreys Bay, 14,2 × 7,0 mm; 92, Port Alfred, 31,6 × 10,8 mm.

notch; subsutural cord and sulcus fairly weak: axial ribs 11–16 per whorl, usually forming a tubercle at shoulder; spiral striae present; densely speckled with various shades of brown; periostracum usually translucent. Exceeds 50 mm.

Description: Shell rather fusiform with a conical body whorl, proportions variable (breadth/length 0,34–0,49, aperture/total length 0,31–0,42); whorls with a conspicuous shoulder, situated just below middle of each whorl, subsutural cord varying in tumidity, sulcus narrow and well defined, to broad and shallow. Aperture lanceolate with an evenly curved labrum and relatively narrow and produced siphonal canal, which is shallowly notched; labial callus thin to moderately thick. Anal sinus narrow but relatively deep, symmetrically V-shaped, subsutural limb prosocline. Sculptured by opisthocline axial ribs, ending abruptly above in prominent (rarely weak) tubercles, 11–14 (rarely 16 per whorl); ribs evanescing on base, occasionally splitting so that two ribs share one tubercle, base of ribs rarely with 1–2 feeble nodules at level of paries. Entire shell covered by weak to strong spiral striae, forming distinctly raised lirae on base of body whorl.

Ground colour yellowish-white to pale yellowish-pink, characteristically flecked with various shades of brown, sometimes mottled and streaked (particularly above shoulder and between ribs) with dark brown or dark greyish-yellowish-brown, and the flecks may form spiral lines (particularly in Cape Agulhas area).

Periostracum thin, translucent dark greyish-yellow to dark yellowish-brown.

Protoconch unknown.

Dimensions: 33,6 × 12,5 mm, 31,6 × 10,6 mm; exceeds 51,8 mm (spire broken).

Operculum typical of genus.

Radula (Fig. 25): Rachidian with small acicular mesocone, situated on a narrow slightly trigonal shield, posterior limits of basal plate unclear, cutting edge staining heavily; marginal plates typical.

Range: False Bay to western Transkei, littoral.

Locality data: FALSE BAY: Smits (NM 5131: Mrs C. M. Connolly); Miller's Point and Simonstown (Mrs M. Quickelberge colln.). AGULHAS AREA: Cape Agulhas (NM A2858: C. M. Connolly). TSITSIKAMMA COAST: Nature's Valley, east of Plettenberg Bay (Mrs M. Quickelberge colln.). EASTERN CAPE PROVINCE: Jeffreys Bay (NM 5132: R. K.; 5135: W. Falcon; 5893: H. C. Burnup; A4638: C. M. Connolly); Port Elizabeth (NM 5892: R. K.; 5133: W. Falcon; 619: H. C. Burnup; Port Alfred (NM B5778: ex Albany Mus. colln.; B5777: D. H. Kennelly; B6415: E. K. Jordan; 5130: R. K.). East London area (NM B2285: B. J. Young; 2725: H. C. Burnup; A2859: C. M. Connolly; A680: Mrs Stuart-Smith); TRANSKEI: Kei River mouth (NM C3574: R. K.); Qolora River mouth (NM C3684: R. K.); Shixini (NM C6242: R. K.); Nqabara (NM C6152: R. K.).

Type material: The holotype (BM(NH) 60.4.10.30) is a worn shell, but typical of material from the Eastern Cape coast.

Notes: This common littoral species may be found living in sand under rocks in

low-tide pools; I have also found live examples under rocks lying on muddy silt in the Kowie estuary.

C. kraussii may be confused with *C. semicostata* but can be separated by its lower shoulder (below midwhorl rather than above) and its finely speckled colour pattern. Other useful but variable differences are discussed under *C. semicostata*. *C. kraussii* shows some variation; in the False Bay–Agulhas area (and rarely Jeffreys Bay) it tends to be strongly patterned with dark purplish-brown under a yellow periostracum, and often shows a violaceous columella; material from muddy parts of the Kowie estuary tends to have conspicuous tubercles and a very dark periostracum.

Clionella semicostata (Kiener, 1840)

Figs 17, 28, 93–103.

Pleurotoma semicostata Kiener, 1840: 39, pl. 19, fig. 1; Reeve, 1843: pl. 8, sp. 67; Krauss, 1848: 141. Type locality unknown [here designated as Miller's Point, False Bay]
Pleurotoma (Clionella) semicostata: Weinkauff, 1876: 135, pl. 30, figs 6, 7.
Clavatula semicostata; Barnard, 1958: 141, fig. 3f.
Clionella semicostata; ['var'] von Martens, 1903: 24, and Thiele, 1925: 212, pl. 35, fig. 10; Kilburn & Rippey, 1982: 116, 214.
Pleurotoma nux Reeve, 1845: pl. 21, sp. 185. **syn. n.** Type locality: Cape of Good Hope.
Pleurotoma sigillata Reeve, 1846: pl. 40, sp. 363; Kilburn & Rippey, 1982: 214, text figs (holotype). Type locality unknown, holotype labelled 'S. Africa'.
Pleurotoma (Clionella) sigillata; Weinkauff, 1876: 133, pl. 30, figs 2, 3.
Drillia halidoma Bartsch, 1915: 23, pl. 2, fig. 9. Type locality: Cape of Good Hope.

Diagnosis: Shell with obconical body whorl, with a strong shoulder at or above midwhorl; siphonal canal and anal sinus as in *kraussii*; subsutural cord and shoulder sulcus usually weak, sometimes strong and nodular; axial ribs 12–14, sometimes restricted to periphery, forming angular tubercles on shoulder, spiral striae faint to distinct; colour orange to off-white, periostracum yellowish-brown to dark brown; exceeds 55 mm.

Description (typical form): Shell very similar to *C. kraussii*, but shoulder at or above midwhorl; subsutural cord weak to strong, often forming nodules where it clasps base of ribs on preceding whorl. Axial ribs 12–14, sometimes restricted to periphery (giving a nodose appearance), but usually strong and angular, extending well onto base of body whorl; spiral striae usually faint and irregular. Colour light orange, light yellowish-pink or pinkish-white, aperture and sometimes columella similarly tinged. Periostracum thicker, shinier and more even than in *kraussii*, varying from moderate yellowish-brown to deep or dark brown.

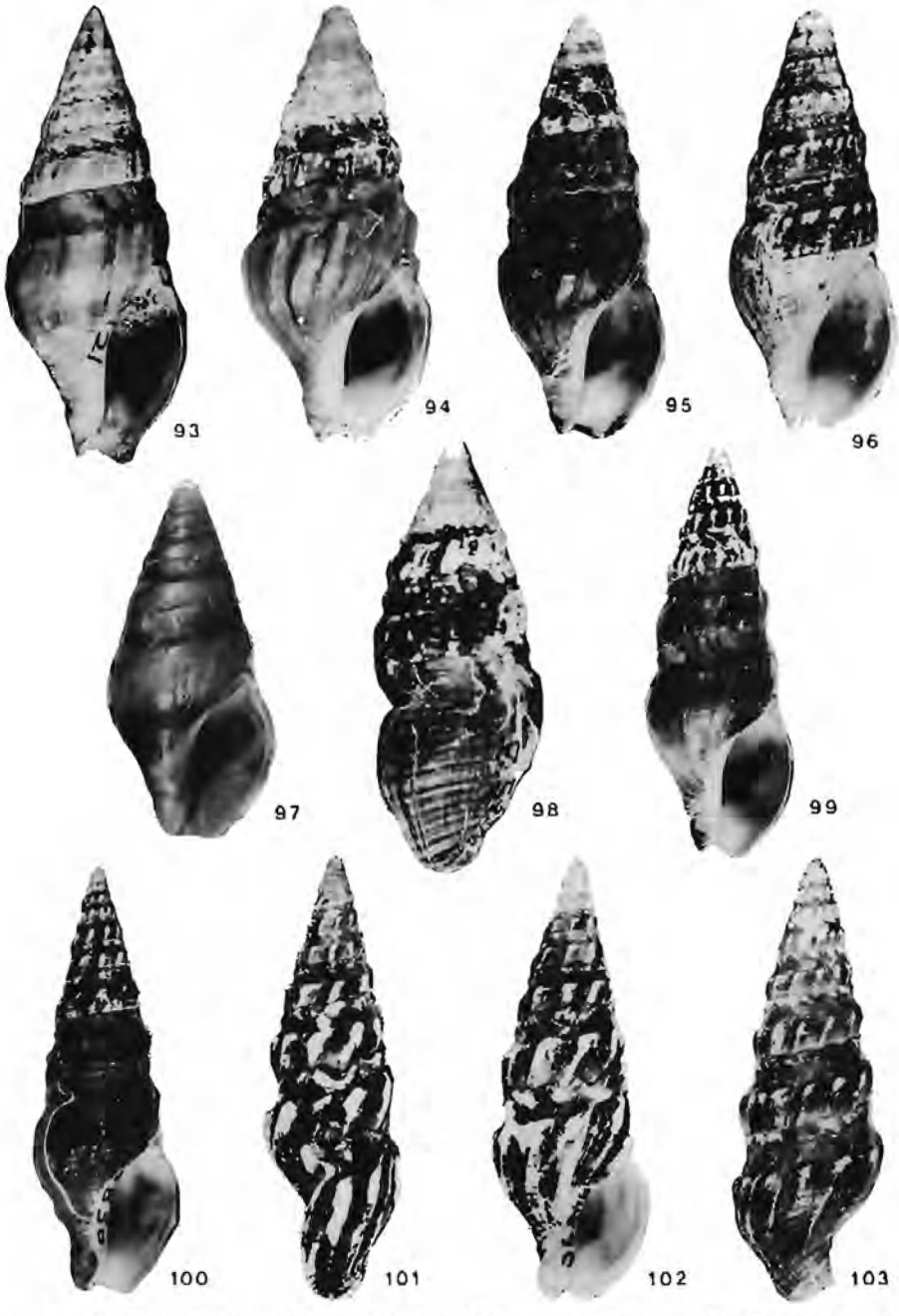
Dimensions: 51,6 × 18,4 mm; 41,1 × 16,7 mm, 38,0 × 14,3 mm (typical form); 49,5 × 16,7 mm, 45,8 × 16,4 mm (deep-water form).

Operculum typical of the genus.

Radula (Fig. 17): Rachidian with fairly small mesocone on a rectangular shield: basal plate transversely arcuate, leading edge not strongly thickened.

Range: West coast of the Cape Peninsula to Cape Agulhas.

Locality records: ATLANTIC CAPE COAST: Kommetjie (NM B5811: Mrs C. M. Connolly). FALSE BAY: Buffels Bay (NM 5895, 9617, 5122: Mr & Mrs M. C. Giles); St James (NM B5817: Mrs C. M. Connolly); Strandfontein (NM A2862,



Figs 93–103. *Clionella semicostata* (Kiener, 1840): 93, Strandfontein, 30,3 × 12,1 mm; 94, Miller's Point, False Bay, 33,2 × 14,3 mm; 95, Cape Agulhas, 32,2 × 12,7 mm; 96, St James, False Bay, 31,9 × 13,1 mm; 97, holotype of *Pleurotoma nux* Reeve, 1845, BM(NH) 1963468, 18,8 × 8,7 mm; 98, Kommetjie, 21,2 × 9,7 mm; 99, 100, Windmill Beach, False Bay, 30 ft, 51,7 × 18,3 mm and 40,8 × 13,5 mm; 101, 102, deep-water form, off Simonstown, 45,8 × 16,1 mm; 103, same data, 46,0 × 16,5 mm.

A3962; 5121: Mrs C. M. Connolly); Miller's Point (NM A2847, A2872: Mrs C. M. Connolly); off Simonstown (NM 6755, A4644); Kalk Bay (Barnard 1958); Windmill Beach, about 30 ft (NM B5830: W. R. Liltved). AGULHAS AREA: Hermanus (Barnard 1958); Cape Agulhas (NM B5804: Mrs E. Roscoe; A 2635: Mrs R. Hoogenhout; A2866, A2861: Mrs C. M. Connolly); off Cape Agulhas, 80 m (von Martens 1903).

Erroneous records: This is a cold-water western Cape species, and records from both subtropical ('Durban', 'Port St Johns', *fide* Barnard 1958), and tropical areas ('Quirimba', *fide* Weinkauff 1876, as *sigillata*) are erroneous. Even Turton's Port Alfred records (1932:15) are based on *Clionella kraussii*, and Barnard's (1969:602) Port Elizabeth specimen (collected by me) was *C. subventricosa*.

Type material: Holotype probably lost; originally in colln. Prince Massena, but not recognisable among remnants in MHNG (pers, comm. Dr C. Vaucher). Kiener also cited Chemnitz 1780: pl. 159, figs 1503, 1504, as representing his species but these figures show a clavinid of doubtful identity (for which Gmelin, 1791, provided the name *Murex alatus*). The holotypes of *Pleurotoma nux* and *P. sigillata* are BM(NH) 1963.468 and 74.12.11.294 respectively, that of *Drillia halidoma* in NMNH 90678 (fide Bartsch 1915).

Notes: *Clionella semicostata* is very similar to *C. kraussii*, but is generally larger and broader, with a thicker, shinier periostracum, a shoulder angle situated at or above midwhorl (instead of below), weaker spiral sculpture and no fine brown dotting (except rarely below suture); it is commonly pinkish-orange, a colour never seen in *kraussii*.

The few examples examined from the Atlantic coast are abnormally small (largest 22,2 × 9,8 mm) and squat, with strong spiral grooves and the axial ribs restricted to small shoulder nodules, colour dark yellowish-brown (ISCC–NBS system).

A strikingly different form was figured by Thiele (1925) from 80 m off Cape Agulhas (this illustration was erroneously referred to *Drillia lignaria* Sowerby, 1903, by Barnard 1958). Similar specimens are available (NM colln.) from Simonstown harbour dredgings (Figs 101–103), and also intermediate examples (Figs 99, 100) from 9 m in False Bay. This bathymorph is somewhat larger than the typical intertidal form (attaining at least 55 mm in length), narrower (breadth/length 0,33–0,39 instead of 0,38–0,44), with more distinct spiral sculpture forming shallow grooves on base of body whorl; periostracum moderate brown to dull brownish-black, shell whitish with brown-flecked subsutural cord.

Clionella subventricosa (E. A. Smith, 1877).

Diagnosis: Shell relatively squat with rather large aperture, body whorl weakly biangulate, with slightly flattened periphery, spire whorls narrowly shouldered at or above middle; siphonal canal narrow, slightly notched; anal sinus very shallow; subsutural cord and shoulder sulcus narrow, distinct; axial ribs rounded, 11–14 per whorl (sometimes restricted to shoulder), incised by shallow, usually well-defined spiral grooves; dark brown, flecked with white, with base and subsutural region

white (western Cape), or speckled with yellowish-brown, leaving a pale peripheral band (eastern Cape); length up to 25 mm.

Notes: *Clionella subventricosa* resembles *C. kraussii* and *C. semicostata* in its shouldered whorls and distinct spiral sculpture, but differs in its squarish periphery, very slight anal sinus, shallower siphonal notch and different coloration. Geographic variation in *C. subventricosa* is sufficiently well-defined for the recognition of two subspecies. Although differences are mainly in colour and pattern, sculptural and shape parameters also differ slightly. The nominate subspecies is restricted to the south-western Cape, while subspecies *kaffraria*, here described, replaces it to the east. Intergrading between the two subspecies occurs at Cape Agulhas where their ranges meet.

Clionella subventricosa subventricosa (E. A. Smith, 1877)

Figs 104–106.

Pleurotoma (Clionella) subventricosa E. A. Smith, 1877 : 500; Sowerby, 1892 : 6, pl. 4, fig. 76 (holotype). Type locality: 'in all probability inhabits the Cape of Good Hope' [here designated as Miller's Point, False Bay].

Diagnosis: Aperture relatively large, shoulder angle posterior to midwhorl, shoulder sulcus with a shallow spiral groove on either side; dark or reddish-brown, flecked with white, base and subsutural region white.

Description: Shell relatively squat (breadth/length 0,40–0,44) with a fairly large aperture (aperture/total length 0,39–0,43); spire whorls with a weak shoulder angle posterior to midline, body whorl weakly biangulate, with slightly flattened periphery; labium with a thin callus, sometimes forming the vestige of a parietal tubercle; siphonal canal rather narrow, oblique, very shallowly notched; anal sinus very slight, openly U-shaped. Subsutural cord narrow, rounded, shoulder sulcus shallow and narrow (subequal in width to cord) but well defined. Sculptured by opisthocline, rounded axial ribs, ending below shoulder sulcus in a narrow but distinct angle, usually with a second, weak angle above base of body whorl, at about level of last suture; ribs rarely crenulate subsutural cord, evanesce on base of body whorl and number 11–14 per whorl; they may be almost obsolete, except for a series of axially elongate nodules around shoulder. Ribs and their intervals incised by shallow spiral grooves, 4–5 per whorl plus one on either side of shoulder sulcus; base of body whorl with 7–12 spiral grooves, whose intervals become progressively more lirate, rostrum smooth; pliculate growth-lines often render spiral grooves punctate.

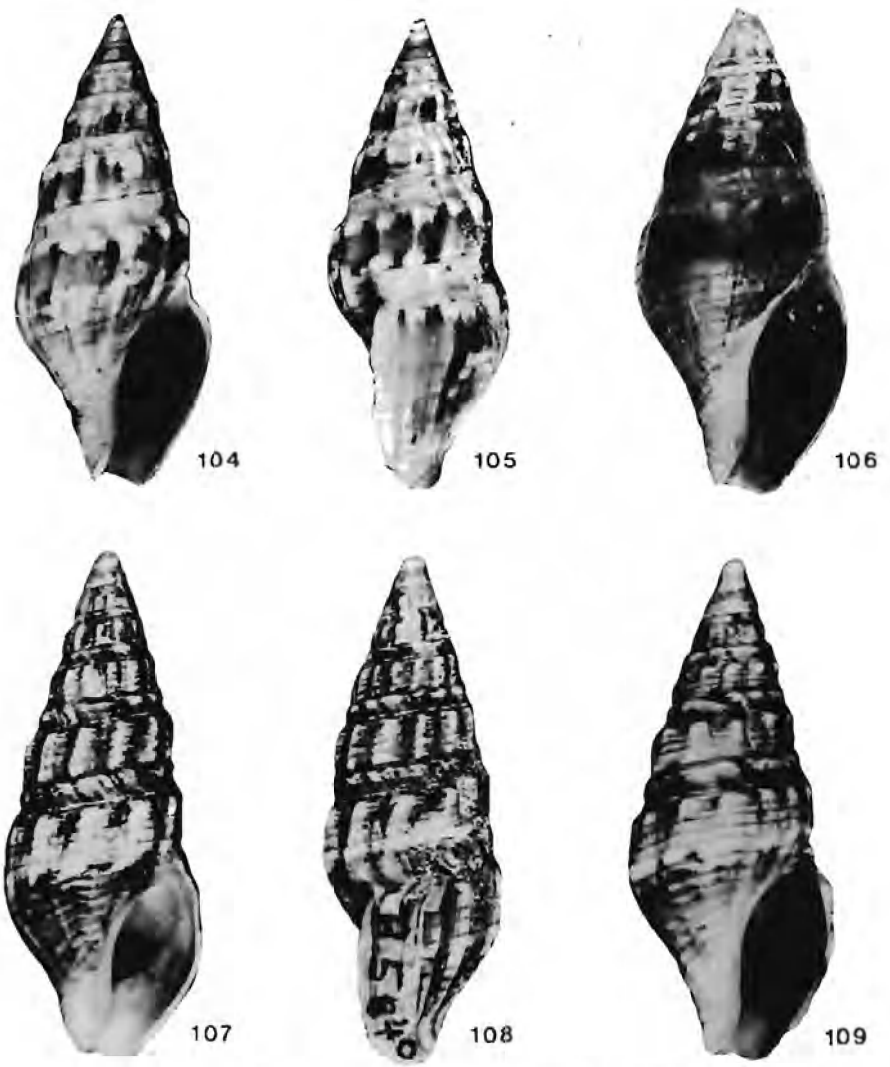
Colour strong brown to dark brown (sometimes forming a well-defined peripheral zone), base and subsutural region white, usually flecked with brown, ribs usually with white specks or spots, particularly around shoulder; aperture tinged with various shades of pale brown. Periostracum translucent.

Dimensions: 25,1 × 10,6 mm (holotype); 19,1 × 8,4 mm.

Operculum and radula unknown.

Range: West coast of Cape Peninsula to Cape Agulhas.

Locality records (all NM: Mrs C. M. Connolly): ATLANTIC CAPE COAST:



Figs 104–109. *Clionella subventricosa* (E. A. Smith, 1877). 104–106, *C. subventricosa subventricosa*: 104, 105, holotype, BM(NH) colln., 25,1 × 10,6 mm; 106, Kommetjie, 18,5 × 8,2 mm. 107–109, *C. subventricosa kaffraria* sub.sp.n.; 107, 108, holotype, NM B5840/T2678, 25,1 × 10,6 mm; 109, paratype, East London, 19,0 × 7,6 mm.

Kommetjie, Cape Peninsula (B5812). FALSE BAY: Miller's Point (A2865). AGULHAS AREA: Cape Agulhas (A2845).

Type material: Holotype in BM(NH), H. Cuming colln. (Figs 104, 105).

Notes: This species is rare, and few unworn shells are available. Barnard (1958) was evidently unfamiliar with it, applying the name *subventricosa* to the distinct Eastern Cape subspecies here described as *kaffraria*. In Kommetjie specimens the axial ribs are reduced to shoulder nodules.

Clionella subventricosa kaffraria subsp. n.

Figs 18, 107–109.

Clionella subventricosa; Turton, 1932: 15.
Clavatula subventricosa; Barnard, 1958: 100, fig. 5e.

Diagnosis: Differing from *C. s. subventricosa* in its slightly smaller aperture, shoulder angle often lower, subsutural cord and shoulder sulcus with 3–5 spiral grooves; colour pattern 'reversed': ie. speckled and mottled with brown, with a pinkish-white peripheral band, visible inside aperture.

Description: Shell as in *C. s. subventricosa* but aperture smaller (aperture/total length 0,35–0,41, breadth/length 0,41–0,48); shoulder angle at or above midwhorl; subsutural cord and sulcus with 3–5 spiral grooves. Colour: periphery of body whorl with a wide band of pinkish-white (spiral grooves slightly darker), occupying lower two-thirds of each spire whorl, subsutural region and base of body whorl heavily flecked or spotted with moderate yellowish-brown, forming a dark basal zone and usually outlining the peripheral band; external pattern showing through to interior as two brown bands. Periostracum translucent greyish-yellow.

Dimensions: 24,7 × 10,3 mm (holotype); 19,0 × 7,7 mm, 17,7 × 7,4 mm (paratypes).

Operculum typical of the genus.

Radula (Fig. 18): Rachidian plates obcordate, with acute mesocone, heavily staining, without distinct basal plate; marginal plates rather short with large accessory limb and prominent 'heel.'

Range: Cape Agulhas to western Transkei.

Type material: Holotype NM B5840/T2678, East London, leg. Mrs C. M. Connolly. Paratypes: TSITSIKAMMA COAST: Still Bay (NM A3069/T2679: Mrs C. M. Connolly, one). EASTERN CAPE PROVINCE: Jeffreys Bay (NM A2133/T2684: Mr & Mrs M. C. Giles, 2); Port Elizabeth (NM 5894/T2683: R. K., 4; A9899/T2682: F. Graeve, 5); Port Alfred (NM B667/T2687: E. K. Jordan, 16); Hamburg (NM B5836/2675: R. K., two); East London (NM A2843/T2681: Mrs C. M. Connolly, 3; A2874/T2688, do, 60); Gonubie (NM B5837/T2676: R. K., one, radula slide M168; A2137/T2680: Mr & Mrs M. C. Giles, 3). TRANSKEI: Qolora River mouth (NM C3387/T2686: R. K., R. Fregona, 5); Sandy Point (NM C3683/T2685: R. K., R. Fregona, 4).

Notes: A common intertidal species in the Eastern Cape Province, living under rocks lying on sand in low-tide pools.

Clionella subcontracta (E. A. Smith, 1904) **comb n.**

Figs 110, 111.

Drillia subcontracta E. A. Smith, 1904 : 26, pl. 2, fig, 2; Turton, 1932 : 22; [partim] Barnard, 1958 : 121. Type locality: Port Alfred.

Diagnosis: Shell small (up to 12 mm) with high spire and narrow base, siphonal canal not notched, subsutural cord and shoulder sulcus feeble, anal sinus shallowly and widely U-shaped, on shoulder slope; axial ribs mainly peripheral, almost straight, 13–16 per whorl, intervals and sides of ribs incised by spiral grooves, 7–9 per whorl; colour uniform dark yellowish-brown.

Description: Shell small and narrow (breadth/length 0,38–0,40), varying little in character, base narrow, spire high (aperture/total length 0,31–0,34), spire whorls strongly convex but contracted below suture. Aperture elliptical, tapering markedly anteriorly, siphonal canal narrow, not notched; labial callus thin; anal sinus on shoulder slope shallowly and widely U-shaped. Subsutural cord and shoulder sulcus feeble and ill-defined; axial ribs strong, rather straight, opisthocline, mainly peripheral, evanescing on base of body whorl and weak above (although often reaching suture), 13–16 per whorl, mainly subequal to intervals, but becoming dense and irregular behind lip; intervals and sides of ribs incised by shallow spiral grooves (about 4 per whorl plus 3–5 in shoulder sulcus area); these grooves become deeper on base, delimiting ridges.

Colour uniform dark orange-yellow to strong yellowish-brown. Periostracum unknown.

Protoconch rather mammilliform, 1½ smooth whorls, evidently terminating in 1–2 brephic axials, diameter 0,75 mm.

Dimensions: 12,0 × 4,5 mm (Smith 1904); 11,8 × 4,5 mm, 11,4 × 4,6 mm.

Operculum and radula unknown.

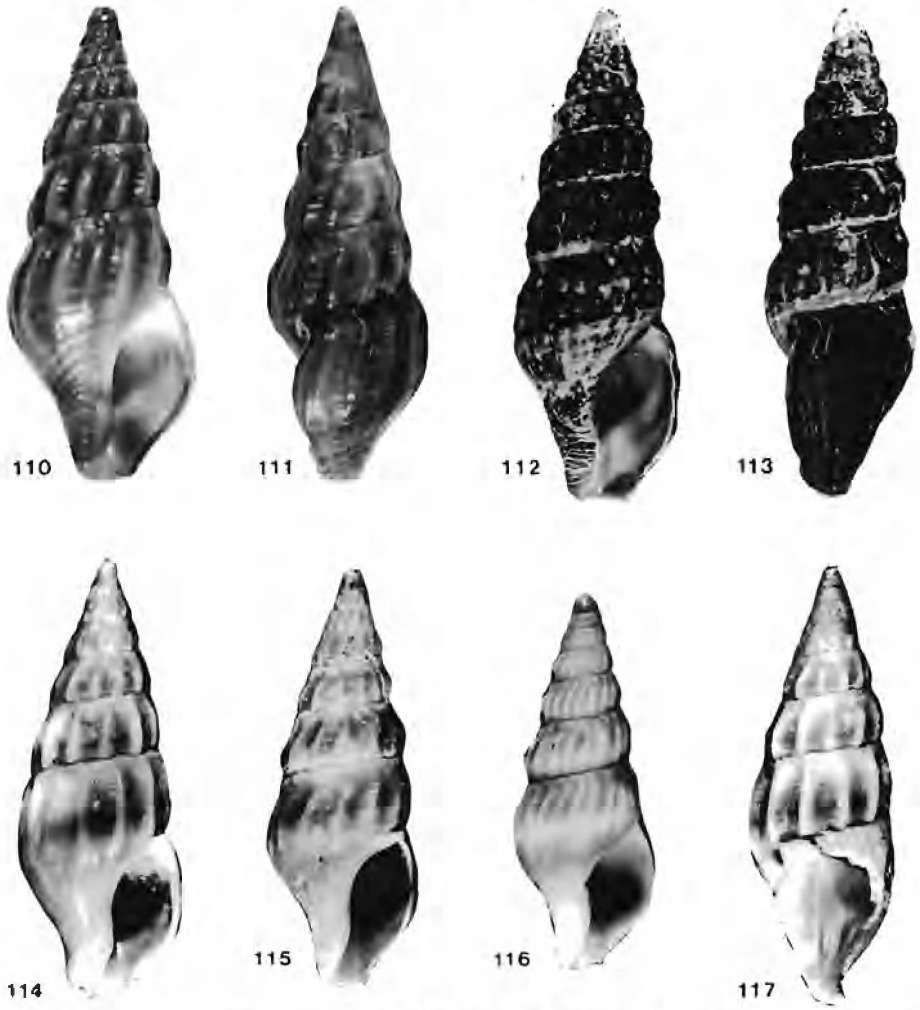
Range: Mossel Bay to Peddie coast.

Locality data: TSITSIKAMMA COAST: Mossel Bay (NM B5792: ex Albany Mus, colln.). EASTERN CAPE PROVINCE: Jeffreys Bay (NM 4397: R. K.); Port Alfred (NM B5788: ex Albany Mus. colln.; 5951: R. K.; B5737: ex Transvaal Mus. colln.; B3220: E. K. Jordan); Peddie coast (NM B5793: ex Albany Mus.).

Type material: 6 Syntypes BM(NH) 1903.12.19.764–769.

Notes: This species is known only from more or less beach-rolled specimens, and confirmation of its affinities is required. Although previous authors have referred it to *Drillia*, its general form, lack of parietal tubercle and shallow anal sinus are more indicative of *Clionella*. If it is indeed a *Clionella*, its small size, glossy brown shell and constancy of form render it a most atypical member of the genus.

Barnard (1958) was certainly in error in synonymising *Mangilia herilda* Bartsch, 1915, and *Drillia nereia* Turton, 1932, with *C. subcontracta*. *M. herilda* is a valid species of *Mitromorpha*, with scant resemblance to *subcontracta*; *D. nereia* appears to be based on the weathered remains of an *Anachis* (family Columbellidae).



Figs 110–117. *Clionella subcontracta* (E. A. Smith, 1904), *C. liltvedi* sp.n. and *C. vilma* (Thiele, 1925). 110, 111, *C. subcontracta*, Port Alfred, 10,8 × 4,1 mm and 11,9 × 4,6 mm respectively. 112, 113, *C. liltvedi*, holotype, NM B5832/T2672, 28,5 × 9,5 mm. 114–117, *C. vilma*, off Cape St Blaize, *ex pisce*. 114, 117, 18,4 × 6,9 mm; 115, 15,7 × 5,7 mm; 116, 12,4 × 4,8 mm.

Clionella liltvedi sp. n.

Figs 24, 112, 113.

Diagnosis: Shell narrowly bucciniform (length about 29 mm) with a high spire and convex whorls, without a subsutural cord or shoulder sulcus, anal sinus a slight, gentle indentation; a weak but distinct stromboid notch is present; axial ribs strong, reaching suture, initially orthoconic and about 10 per whorl, later opisthocline and 17–20, rendered weakly nodular by low spiral cords, formed mainly by pairs of fine

lirae; fine collabral threads present. Dark brown, intervals between cords on base paler brown.

Description: Shell narrowly bucciniform (breadth/length 0,33–0,36) with high spire (aperture/total length 0,32–0,37) and oblong body whorl, spire whorls convex, suture deep, crenulated; aperture narrowly pyriform with relatively broad, parallel-sided, unnotched siphonal canal; labrum flattened in face-view, gently and flatly sinuous in side view, with weak but distinct stromboid notch and very slight, gently indented anal sinus; labium thinly calloused, with no parietal pad. No subsutural cord or shoulder sulcus. Sculptured by well-developed, rather straight axial ribs; on early whorls these are orthocline, about 10 in number and very strong from suture to suture; on later whorls they increase in number to about 17–20 on penultimate whorl (numerous and dense behind lip), and become markedly opisthocline and relatively weak below suture. Surface covered with dense collabral threads. Spiral sculpture consists of widely-spaced, gently raised threads, 6–7 on penultimate whorl, but grouped to form 2–4 low cords, rendering axial ribs feebly nodular at points of intersection; base of body whorl with about 9 very low spiral cords.

Colour dark brown; intervals between basal spirals medium brown; aperture tinged with purple. Periostracum transparent.

Protoconch corroded in types, evidently small (less than 1 mm in diameter).

Dimensions: 28,5 × 9,5 mm (holotype); 22,8 × 8,2 mm (paratype).

Operculum typical of genus, rather thin and translucent, deep orange-yellow with silky sheen.

Radula (Fig. 24): Rachidian plate with acicular, ridge-like mesocone, basal plate trigonal, delicate, leading edge staining lightly, marginal plates broad, with a proportionately small accessory limb and no 'heel'.

Range: Table Bay and west coast of Cape Peninsula.

Type material: Holotype NM B5832/T2672, Hottentots Huisie (approximately 33° 59′S, 18° 20′E), west coast of Cape Peninsula, 60 m, in sand patches among sponges. Paratopotype 1, NM 5833/T2637, slide M170; paratopotypes 2 and 3, NM B5834/T2674. Paratypes 4–6, off Llandudno, 30–45 m; two in SAM colln, one NM B6008/T2740. All dived by W. R. Liltved.

Other material: Two badly beach-worn shells (NM B365) from Sea Point, Cape Town, leg. Mrs C. M. Connolly, represent this species but are excluded from the type series.

Notes: *C. liltvedi* is unique in its strong, somewhat nodular ribs. It is named in honour of its discoverer.

Clionella vilma (Thiele, 1935)

Figs 114–117.

Pleurotoma vilma Thiele, 1925: 195 (229), pl. 25, fig. 1. Type locality: 35° 16′S, 22° 26,7′E, 155 m.
? Crassispira agulhasensis Thiele, 1925: 179, pl. 23, fig. 10. Type locality: 34° 51′S, 19° 37,8′E, 80 m.

Diagnosis: Shell narrow with high spire and rather small aperture, strongly tapering anteriorly; whorls evenly convex, without subsutural cord or shoulder sulcus;

siphonal canal shallow, not notched; anal sinus very shallowly U-shaped; axial ribs 12–22, reaching suture, crossed by fine, flat-topped spiral threads; various shades of orange, sometimes with pale bands or a brown median band; up to 28 mm in length.

Provisional description (based on immature examples and damaged adults): Shell narrow (breadth/length 0,36–0,39), with high spire and relatively small aperture (aperture/total length 0,32–0,37), whorls evenly convex, with relatively deep suture. Aperture narrowly lanceolate, curved and strongly tapering anteriorly, siphonal canal narrow, very shallow, not notched; labium with moderately thick callus, labrum flattened posteriorly, arched below, anal sinus wide, shallow, gently curved and situated on shoulder slope. No trace of a subsutural cord or shoulder sulcus, the axial ribs continuing to the suture; 12–22 ribs per whorl, barely increasing in number with growth, save that those behind the labrum become more numerous and close-set; ribs crossed by fine, close, tabulate spiral lirae, about 7 at end of first teleoconch whorl, increasing to 15–20 on 7th; growth-lines fine, dense and regular. Coloration variable, moderate orange to dark orange-yellow with subsutural region, a median zone and/or the base paler (light orange-yellow to white), intervals between ribs sometimes light brown.

Protoconch narrowly domed, of about 1½ whorls; diameter evidently 0,9 mm, but termination not clear.

Dimensions: 24,3 × 8,7 mm, 21,9 × 7,8 mm. Attains at least 28,1 mm in length (lip broken). Holotype 13,0 × 4,5 mm (Thiele).

Operculum, periostracum and radula unknown.

Range: Agulhas Bank in Tsitsikamma area.

Additional locality data: TSITSIKAMMA COAST: Off Cape St Blaize area, *ex pisce* (NM B4039, B1012, R. Le Maitre).

Notes: Few specimens of this poorly known species are available, and all adults are damaged. Nevertheless, it is clearly a very distinct taxon, easily recognised by the evenly convex whorls and suture-to-suture ribs.

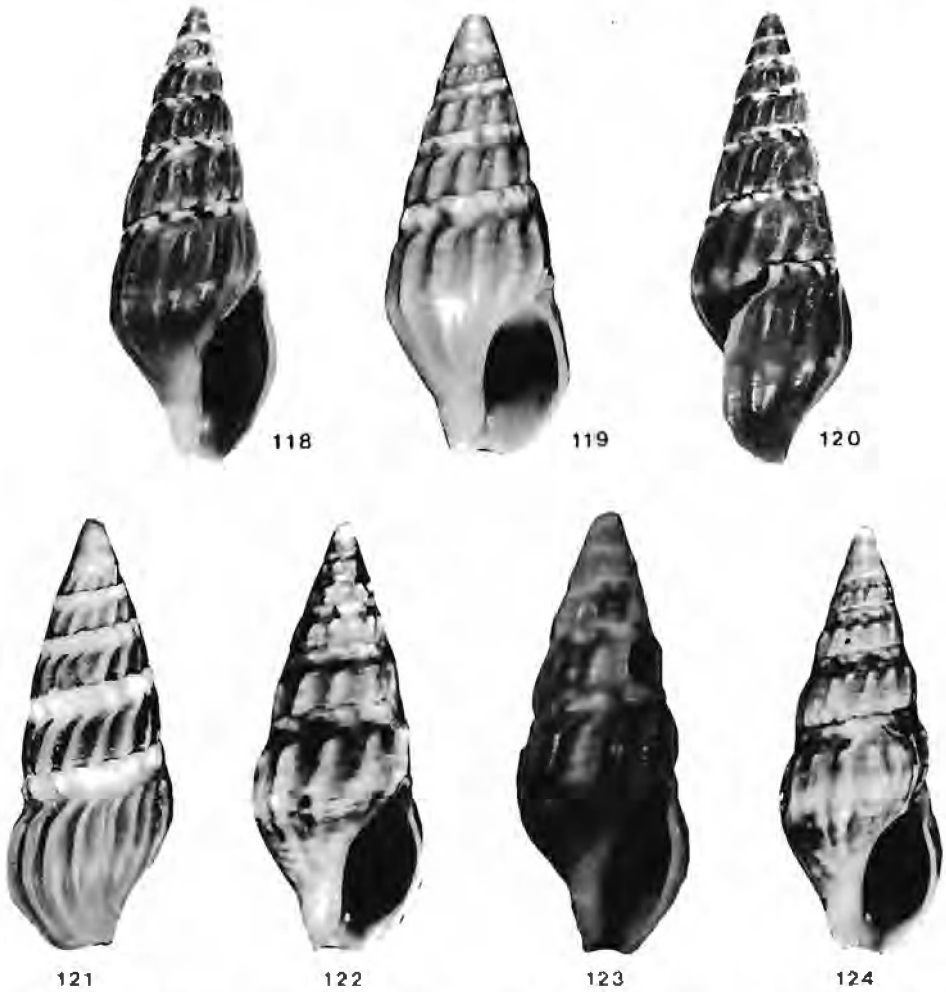
Crassispira agulhasensis may prove to be based on adults of *vilma*. Unfortunately it was introduced with the barest minimum of descriptive data and no indication of size. Sculpture certainly seems to agree, only aperture shape differing. Examination of unbroken adults of *vilma* may solve the problem.

Clionella rosaria (Reeve, 1846)

Figs 3, 4, 29, 34, 118–124.

Pleurotoma rosaria Reeve, 1846: pl. 46, sp. 314; Krauss, 1848: 109. Type locality unknown, here designated as Algoa Bay.
Pleurotoma (Clionella) rosaria; Weinkauff, 1876: 133, pl. 30, figs 1, 4.
Clionella rosaria; Turton, 1932: 16, pl. 3, no. 131 (sinistral); Barnard, 1958: 142.
Clionella sybaritica Bartsch, 1915: 15, pl. 7, fig. 8; Turton, 1932: 17. Type locality: Port Alfred.
Clionella nereia Bartsch, 1915: 16, pl. 2, fig. 8; Turton, 1932: 17. **syn. n.** Type locality: Port Alfred.
Clionella kowiensis Turton, 1932: 16, pl. 3, no. 132. **syn. n.** Type locality: Port Alfred
Clionella kowiensis viridis Turton, 1932: 16. **syn. n.** Type locality: Port Alfred.
Clionella proxima Turton, 1932: 17; pl. 3, no. 136. **syn. n.** Type locality: Port Alfred.
? Pleurotoma (Clavatula) rubinicolor (*non* Reeve, 1845); Sowerby, 1892: 5.

Diagnosis: Shell narrow, spire whorls only slightly convex, labrum strongly curved,



Figs 118–124. *Clionella rosaria* (Reeve, 1846). 118, 120, East London, 21,8 × 8,3 mm; 119, 121, form *kowiensis*, Port Alfred, 15,4 × 5,7 mm and 13,4 × 5,4 mm; 122–124, form *nereia*: 122, 12,8 × 5,1 mm; 123, holotype of *C. nereia* Bartsch, 1915, NMNH 205942 (polaroid courtesy of Dr J. Rosewater); 124, East London, 14,1 × 5,3 mm.

anal sinus more or less L-shaped, sutural; no labial callus; siphonal canal constricted, barely notched; subsutural cord white, either thin and brown-flecked or thick and unpatterned, shoulder sulcus narrow; bright reddish-orange or mottled greyish-brown, periostracum inconspicuous; up to 25 mm.

Description: Shell narrow (breadth/length 0,36–0,41), with acuminate, orthoconic spire and short, constricted, barely notched siphonal canal; spire whorls only slightly convex; aperture relatively wide, elliptical, 0,29–0,37 of total length, labrum strongly and evenly curved, no labial callus. Anal sinus typically a reversed L-shaped notch at suture, but sometimes forming an asymmetrical 'U'. Subsutural

cord generally narrow and rather weak, shoulder sulcus narrow and shallow; however, subsutural cord may be wide and tumid, almost occluding sulcus. Axial ribs opisthocline, sinuous, 12–16 (rarely as few as 10) on body whorl (number barely increasing with growth), with rounded crests and sloping sides, subequal to intervals or slightly wider than them; ribs reaching subsutural cord and base of body whorl, but becoming weak at their extremities; ribs and intervals crossed by spiral striae, usually fine and dense, but sometimes fusing to leave a few shallow, widely spaced sulci; fine, dense growth-striae may also occur.

Colour typically moderate reddish-orange to moderate orange, sometimes flecked with white, subsutural cord uniform white or speckled with various shades of brown; base of body whorl occasionally with a band of moderate brown. Other colour forms are shades of greyish-reddish-brown, heavily to lightly flecked and mottled with white. Periostracum very thin, dull brownish and lacquer-like, usually only visible between the ribs.

Protoconch (Fig. 4) smooth, narrowly domed, about $1\frac{3}{4}$ whorls, basal diameter about 1,1 mm.

Dimensions: 25,4 × 9,8 mm, 16,0 × 5,8 mm.

Operculum typical of the genus (Fig. 34).

Radula (Fig. 20): Rachidian with somewhat angular anteriolateral corners and a small acicular mesocone, situated on a small, narrow shield; posterior limit of basal plate uncertain. Marginal plates typical.

Range: False Bay to Natal south coast.

Locality data (selected records from NM colln.): FALSE BAY: Strandfontein, living (5128, A3978: C. M. Connolly). AGULHAS AREA: Cape Agulhas (A2881: C. M. Connolly); Still Bay (A3068: C. M. Connolly). EASTERN CAPE PROVINCE: Jeffreys Bay, Algoa Bay, Port Alfred and East London–Kwelera area (numerous samples). TRANSKEI: Kei River mouth (C3562: R. K., R. Fregona); Nxaxo River mouth (C3783: R. K., R. Fregona); Qolora River mouth (C3386: R. K., R. Fregona); Sandy Point (C3685: R. K., R. Fregona); Banyana River area (B1297: R. K.); off Mncwasa Point, 32–35 m and 40–45 m, dead (NM C2417, C3077: *MN*); Lwandile/Mdumbi coast (C104: R. K.); Hluleka (C1423: R. K.); Coffee Bay (7302, A775: R. K.); Mbotyi beach (A4769: R. K., J. McKay); off Mbotyi, 50 m, dead (NM C310: *MN*); Mzamba (NM B4677: R. K.). NATAL: Palm Beach (B3528: R. Bieler); Port Shepstone (622: H. C. Burnup).

Type material: The holotype of *Pleurotoma rosaria* could not be located in the BM(NH) and may be lost; although described as being from an unknown locality, it may have been amongst the material collected by Krauss and sold by him in London in 1840. Holotypes of *Clionella sybaritica* and *C. nereia* are in the NMNH (no. 250460 and 205942 respectively). The holotype of *C. proxima*, and syntypes of *C. kowiensis* and *C.k. viridis* are in the OUM.

Notes: This conspicuous and abundant species is as variable as most members of the genus. Barnard (1958) correctly noted that *C. sybaritica* Bartsch, 1915, was a synonym of *C. rosaria*, the microcancellate striae that supposedly characterise it depending on the strength of the growth-striae. Barnard, however, erred in

synonymising *C. nereia* Bartsch, 1915, with *C. subventricosa* (Smith, 1877) and *C. kowiensis* Turton, 1932, with *C. confusa* Smith, 1906. *C. nereia* differs from *C. subventricosa* in its more or less L-shaped sinus (narrowly V-shaped in the latter species) and in its rounded whorl profile. *C. confusa* is uniformly coloured, grows much larger and lacks spiral striae. Typical examples of *C. nereia* and *C. rosaria* appear very different; the former was said to have only 4 spiral grooves per whorl instead of about 20. A polaroid print of the holotype of *nereia* (Fig. 123) shows a particularly coarsely-sculptured individual; brown-and-white examples *(nereia)* often show only 3–6 furrows anterior to the shoulder sulcus, whereas yellow or orange ones *(rosaria)* always have 14–21 fine spiral threads. But brown-and-white individuals with 8–10 furrows also occur, connecting the two extremes. *C. proxima* is merely a narrow *'nereia'*; contrary to Turton's statement, faint spiral sculpture is just visible in the holotype.

Typical examples of *C. kowiensis* are very distinctive on account of their strong white subsutural cord (twice width of that of 'normal' *rosaria*), which may render the anal sinus slightly more U-shaped than usual. However, intermediate states blur the distinction. This conveniently obviates the need for reassessment of names, as the type figure of *Pleurotoma rosaria* actually appears to show an example of the *kowiensis* form.

It is probable that specimens of *C. rosaria* were the basis of Sowerby's 1892 record of the unlocalised *Pleurotoma rubinicolor* Reeve, 1845, from 'Cape of Good Hope'. Specimens of the *'sybaritica'* form of *rosaria* from the first Becker collection in the Albany Museum were so identified.

Egg-capsules: 4 pale yellow egg-capsules were found next to an adult at East London, and are presumably referable to this species. Each capsule has a height of about 4,5 mm, and a maximum length of about 4,1 mm, the rather wide stalk measuring about 0,7 mm in length. In this material the narrow flange which borders each capsule consists of two adpressed flaps, between which the young evidently escape. The number of veligers per capsule varies from 6 to 8.

Doubtful South African species

The following species is included solely on account of its resemblance to *Clavatula taxea* (Röding, 1798). The provenance of the unique holotype is unknown. It is illustrated here for the first time.

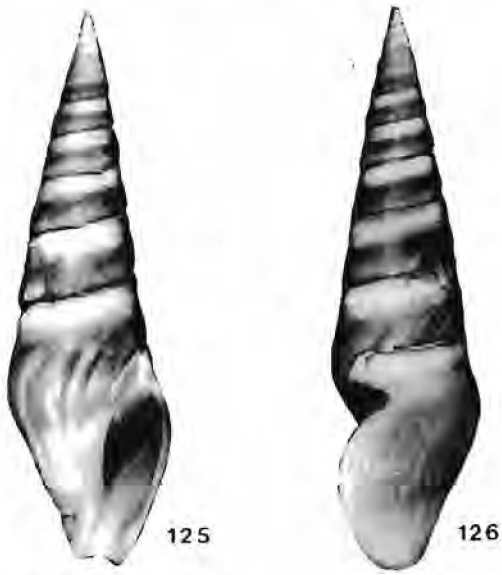
Clavatula gracilior Sowerby, 1870

Figs 125, 126.

Clavatula gracilior Sowerby, 1870: 254. Type locality unknown.

Type material: Holotype BM(NH) 79.2.26.99, ex Lombe-Taylor colln. Dimensions: 80,5 × 24,5 mm.

Notes: Several molluscs of Agulhas Bank origin were described in the same paper as this species, and it should presumably be sought in that region. It may prove to be an extreme form of *Clavatula taxea*.



Figs 125–126. *Clavatula gracilior* Sowerby, 1870, holotype, BM(NH) 79.2.26.99, 80,5 × 24,5 mm.

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