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PART 1

CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART III. GASTROPODA: PROSOBRANCHIATA: TAENIOGLOSSA

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CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART III. GASTROPODA: PROSOBRANCHIATA: TAENIOGLOSSA*

By

K. H. Barnard

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(With 37 figures in the text)

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TAENIOGLOSSA

Fam. **Ficidae** (Pyrulidae, Pirulidae)

Ficus ficus (Linn.)

Pyrula ficus, Sowerby, 1897, p. 11.
Pirula ficus, Vredenburg, 1919, p. 189.
Ficus ficus, Gravely, 1942, p. 46, fig. 7 *f*.

Natal (Sowerby). Mouth of Limpopo River (S. Afr. Mus. Ross-Frames coll.).

Off Tugela River (Natal), 14 fathoms, one dead; off Umhloti River, 27 fathoms, 1 juv., broken; off Tongaat River, 36 fathoms, 1 juv., broken; off Hood Point (East London), 49 fathoms, 3 fragments of adults (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E., 71 metres (U.C.T.).

Distribution. Indo-Pacific.

Fam. **Tonnidae** (Doliidae)

Gen. Tonna Brünnich

Dolium, Vredenburg, 1919, pp. 145 *sqq*. Bayer, 1937, pp. 29 *sqq*. (Recent species).
Tonna, Winckworth & Tomlin, 1933, pp. 206 sqq. (list of Recent species).

* Part I. Toxoglossa: *Ann. S. Afr. Mus.* **44** (4), 1958.
Part II. Rhachiglossa: *Ann. S. Afr. Mus.* **45** (1), 1959.

Ann. S. Afr. Mus. **47** (1), 1963: 1–199, 37 figs.

With umbilicus. Protoconch 3–3½ whorls, corneous, smooth, yellowish or brownish, sharply demarcated from 1st postnatal whorl; last whorl or two whorls lined with shell substance, which persists after the outer corneous layer has been worn away (Vredenburg, 1919, p. 151; figured by Turton, 1932, pl. 25, no. 811).

Remarks. The synonymy of the 'species' is extraordinarily confused, and scarcely any two modern authors seem to be entirely in agreement. Winckworth & Tomlin refrained from giving a 'systematic review' (1933, p. 208).

Consequently the number of species in South African waters and their designation are somewhat uncertain.

T. variegata, *procellarum*, and *luteostoma* have been recorded from Port Elizabeth and Algoa Bay; *dunkeri* from Natal (and Port Alfred); *fimbriata* and var. also from Natal; *costata* from Natal and Delagoa Bay; *perdix* from Pondoland; finally *galea* from Algoa Bay.

The first three names almost certainly refer to one and the same species. Modern figures of *fimbriata* (= *tessellata*) and *costata* disclose no specific differences. The provenance of the single specimen of *perdix* is open to doubt. The specimen identified as '*galea*' is far more likely, with due respect to the high authority of Tomlin, to be one of the Indian species than the true Mediterranean *galea*.

Vredenburg (1919) synonymized *luteostoma* with *variegata*. Tomlin (1927) and Bayer (1937) have assimilated *procellarum* with *luteostoma*, but Winkworth & Tomlin (1933) listed it as a synonym of *dunkeri*. Hanley (1859) described *dunkeri* as nearest to *variegata*, but Vredenburg considered it as unidentifiable from the short description.

Both Smith (1903a) and Braga (1952) have recorded *costata* Menke, which Vredenburg synonymized with *tessellata*, Winckworth & Tomlin with *allium* Dillwyn, and Bayer retained as a distinct species!

Vredenburg quoted for *tessellatum* Lamarck's pl. 403, fig. 3 *a*, *b*; none of his own figures of *tessellatum* are very like Lamarck's figure, but his figures 1 *a* and 1 *c are* extremely like Lamarck's, and this specimen he referred to *maculatum*!

Tonna variegata (Lam.)

Fig. 1 *a*

Dolium procellarum, Euthyme, 1885, p. 247.

Protoconch 3 whorls, diam. 4–4·25 mm., more or less oblique to axis. Postnatal whorls 3½–4. Spiral lirae 5 on each whorl, (11) 12–14 on base, i.e. (16) 17–19 on back of outer lip. Lirae broader than grooves. No intermediaries (*v. infra*). Early whorls finely cancellate with growth-lines. Spire varying in height: juv. 18–20%, adult 20–23% of length. Sutures varying in depth (cf. Vredenburg, 1919, pp. 174, 175). Columella nearly straight, sometimes feebly ridged in upper part. Periostracum smooth, slightly fibrous-fimbriate in the grooves on base. 122 × 100 mm.

Creamy-white, with orange-brown or dull crimson marks or spots on the lirae, widely and irregularly spaced, not forming axial series (contrast *tessellata*), columella white, free edge of glaze orange-brown, interior of aperture fulvous; protoconch brown. Periostracum yellowish or pale brown. Animal (not long preserved: Delagoa Bay specimen) cream, with tentacles, siphon, and hind part of foot irrorated with pinkish-brown.

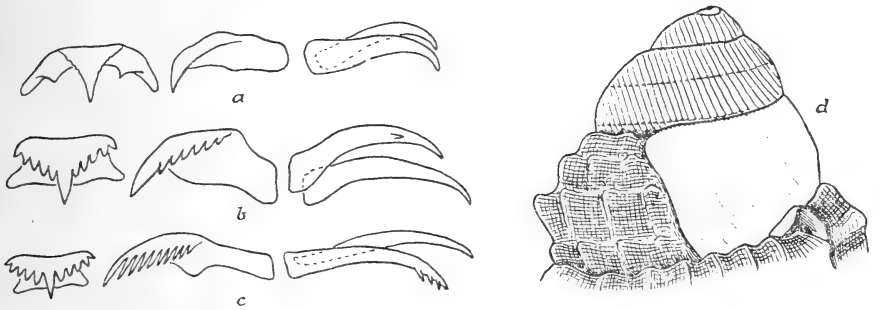


FIG. 1. Radula teeth of: *a*, *Tonna variegata* (Lam.). *b*, *Oöcorys watsoni* Locard. *c*, *Phalium* (*Xenogalea*) *zeylanica* (Lam.). *d*, protoconch of *Bursa cruentata* (Sow.); the triangular hollow on right is the remains of the posterior canal of 1st postnatal whorl.

Radula with 40 rows, as in Thiele's figure of *perdix* (1929, fig. 306, after Troschel, pl. 19, fig. 3), but neither the median cusp of central plate nor the cutting-edge of the lateral plate serrate (or only very obscurely so in the former); each jaw with a strong hook-like process.

Fossil: Pleistocene, Port Elizabeth (Johnson, 1904).

Port Elizabeth, Algoa Bay (von Martens, Euthyme, Sowerby). Natal, 3 juv., dead (S. Afr. Mus. coll. E. L. Layard). False Bay (S. Afr. Mus.).

Off Cove Rock (East London), 34 fathoms, 1 dead but with periostracum, P.F. coll. (Tomlin).

Algoa Bay, 21–50 fathoms, 1 living, 5 dead; off Cape St. Blaize, 42 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Delagoa Bay, living (U.W.).

Distribution. Arabian Sea, W. Australia, Japan. Also Pliocene of Java and Mekran (Vredenburg).

Remarks. Fourteen specimens, 24–122 mm. long, examined.

Growth sequence: $2\frac{1}{4}$ postnatal whorls length 24–27 mm., $2\frac{1}{2}$ whorls 35 mm., $3\frac{1}{4}$ whorls 76 mm., $3\frac{1}{2}$ whorls 76–78 mm., $3\frac{4}{5}$–4 whorls 87–94 mm.

The width varies from 80% to 85% of the length; in the 4 largest examples, 87, 90, 94 and 122 mm., the width is respectively 92%, 88%, 87% and 82%.

In one specimen 26 mm. long the 5th lira is obscured by the suture of succeeding whorl; sometimes the suture runs on the 5th lira but usually this lira is clearly visible in the channelled suture.

In one 87 mm. specimen there is a feeble intermediary lira between the 1st–2nd and 2nd–3rd main lirae on 3rd and 4th whorls. In the 94 mm. shell one feeble intermediary in each groove between 1st and 7th lirae on last part of 4th whorl.

In some specimens on the 3rd and 4th whorls the 1st lira is divided by a fine sulcus; this runs on the sutural slope of the lira, but when well developed is liable to cause confusion in counting the number of lirae. Cf. Euthyme's (1885) remarks on the irregularity of the costae near the suture.

The shell varies in thickness: one 79 mm. shell weighs $1\frac{1}{4}$ oz., another 76 mm. weighs $1\frac{1}{2}$ oz.

Vredenburg (1919, p. 175) said the number of lirae never exceeds 19, and is 'frequently' only 15; also (p. 177) that *variegata* may reach a length of 230 mm.

The largest specimen (122 mm.) I have seen came from off Simon's Town in False Bay (South African Naval Diving School). It is a dead but fairly fresh shell showing the characteristic markings.

Tonna sp. incert.

Tonna galea, non Linn, Tomlin, 1927. p. 81.

Shell thin. Protoconch 3 whorls, diam. 4·5 mm., scarcely oblique to axis. Postnatal whorls $3\frac{1}{2}$ (99 mm. long)–$3\frac{3}{4}$ (94 and 96 mm.). Spiral lirae 4 on each whorl, 13–14 on base, i.e. 17–18 on back of outer lip. On upper part of body whorl lirae subequal in width to grooves, but on lower part a little wider than grooves. A fine intermediary between each pair of main lirae on early whorls, continued on body whorl where they occur as far as the groove between 6th and 7th lirae. In the 94 mm. shell the 1st intermediary is rather strongly developed (about half width of 2nd lira) on body whorl; in the 96 and 99 mm. shells there are on the body whorl 2 intermediaries between 1st and 2nd lirae, unequal, the lower one the stronger. On the 94 mm. and 96 mm. shells there is on body whorl a well-marked sulcus on the 1st (adsutural) lira; on the 99 mm. shell there are 2 finer sulci; in all three shells these sulci are traceable on the early whorls. Spire 20% (99 mm.) to 25% (94 mm.) of total length. Sutures canaliculate. Columella with 2 bulges. Periostracum thin but strongly fibrous-fimbriate, especially in the grooves. 94×80 mm., 96×75 mm. (estimated, lip broken), 99×81 mm.

White, unicolorous, protoconch brown, periostracum brown.

Radula with 35 rows; as in *variegata* neither the median cusp of the central plate nor the cutting-edge of the lateral are serrate.

Algoa Bay, 29 fathoms, 1 dead but fresh, P.F. coll. (Tomlin).

Off East London, 28 fathoms, 1 living, 1 dead but partly retaining the periostracum (S. Afr. Mus. P.F. coll.).

Remarks. Tomlin said that the specimen he saw was 'much broken'; but only the last part of the outer lip (about $\frac{1}{8}$ of the body whorl) is missing.

Hedley (1919, p. 333) said that *variegata* has on the upper half of the body whorl an interstitial riblet in each groove, but this is not well shown in the oblique photographic view on pl. 44, fig. 6.

In this respect the present 3 specimens agree. One of them was regarded by Tomlin as *galea* (Tomlin's label on the specimen reads '*galea* Linn. var.'); but as *galea* has at least 20 lirae (Vredenburg, 1919, p. 175) these specimens cannot be identified with this Mediterranean, west African and west Atlantic species.

They are distinct from the specimens here recorded as *variegata* in having 4 lirae instead of 5 on upper part of the whorls, but having on the other hand intermediate lirae on the early whorls, continued on body whorl as far as 7th lira; in the absence of spots or other coloration; and most strikingly in the strong fibrous-fimbriate periostracum.

I do not think they should be considered a variety of *variegata*, but in the absence of further material for comparison I make no suggestion as to a specific name.

Cf. von Martens (1879, p. 732; and 1880, p. 264). The Indian Ocean examples do not agree exactly with the Mediterranean *galea*. He recorded a specimen from Querimba Island, Mozambique, which he suggested might be *amphora* Phil.

Odhner (1923, p. 12) recorded *galea* from Port Alexander; and Nicklès (1950, p. 88, fig. 137) from Senegal, Gabon, St. Thomé.

Tonna dunkeri (Hanley)

Dolium dunkeri, Hanley, 1859, p. 431.

Nine specimens, 16–44 mm. in length, with $1\frac{1}{2}$–3 whorls, have the width 70%–75% of the length.

One of them, 41×31 mm., has nearly the same measurements as given by Hanley: $1\frac{7}{12} \times 1\frac{1}{8}$ ($= 40 \times 28$ mm.). It has 18 lirae, simple sutures, and coloration as described by Hanley, and came from Natal as did Hanley's example (S. Afr. Mus. A6029).

Another shell 36×27 mm. came from Port St. Johns (S. Afr. Mus. 6625); and there are 6 other specimens, locality unknown; 44×32, 21×15, 19×14, and 16×11 mm.

All have 18–19 lirae as in *variegata*, but they differ in the narrower shape and the slightly larger protoconch: 4·3–4·5 mm. The two largest have a stronger coloration around the upper part of the whorl.

Grooves much narrower than the lirae, no intermediaries. Columella nearly straight, in the 41 mm. shell obscurely plicate; in this shell also the outer lip is slightly thickened within, and plicate.

In appearance this 41 mm. shell is not unlike Iredale's figure of *T. perselecta* (1931, p. 23, fig. 7; size of photo 39×27 mm.), which Winckworth & Tomlin (1933) regard as a synonym of *cumingii*.

T. schepmani Bayer (1937, pl. 2, fig. 3) though larger (56 mm.) seems similar and comparable.

Fossil: Pleistocene: Port Elizabeth (Schwarz, 1910).

Natal (Hanley, and S. Afr. Mus.); Port Alfred (Turton); Port St. Johns (S. Afr. Mus.).

Tonna tessellata

Cf. *Tonna tessellata*, Vredenburg, 1919, pl. 6, figs. 7 *a*, *b*, *c*.

Protoconch 3 whorls, diam. 3·5 mm., oblique to axis. Postnatal whorls 4–4½. Spiral lirae 4 on each whorl, 10 (11) on base, i.e. 14 (15) on back of outer lip. On the body whorl the groove between 1st and 2nd lirae wider than the succeeding grooves, which gradually decrease in width until they become less than the width of a lira. A single fine intermediary between each pair of lirae on 1st and 2nd whorls, evanescent on 3rd whorl except the one between 3rd and 4th lirae, which persists on to the 4th whorl. Between 1st and 2nd lirae the intermediary again becomes visible on last one-third of 4th whorl; and between 2nd and 3rd lirae the intermediary again becomes visible at the start of the 4th whorl, and shortly afterwards another intermediary develops, the two continuing to end of whorl. On body whorl between 4th and 5th lirae and between each succeeding pair one intermediary. In the larger specimen the intermediaries are much less conspicuous, except on the 1st whorl. First and partly the 2nd whorl finely cancellate with growth-lines. Sutures channelled. Columella with 2 bulges, smooth. 85 × 75 mm., height (vertical) of spire 22 mm.; 129 × 115 (estimated, lip broken) mm.

White, with pale orange-brown more or less quadrangular spots or marks on the main lirae at fairly regular intervals so as to form slightly retractive axial series; protoconch brown; periostracum pale buff.

Algoa Bay, 21 fathoms, 1 dead but fresh (S. Afr. Mus. A8898, P.F. coll.). False Bay, 1 dead (S. Afr. Mus.).

Remarks. The 85 mm. *Pieter Faure* specimen, taken together with one example of *variegata*, closely resembles Vredenburg's fig. 7, but not his other figures of *tessellata*.

The larger specimen is a dead shell, with attached barnacles, young oysters and Serpulid tubes, but retains the characteristic markings. It came from off Simon's Town in False Bay (South African Naval Diving School).

Tonna fimbriata (Sow.)

Tonna fimbriata var. *natalensis*, Smith, 1906*a*, p. 41, pl. 7, fig. 10.
Tonna tessellata, Brug, Vredenburg, 1919, pl. 8, figs. 10 *a*, *b*.
Tonna allium, Dillwyn, Iredale, 1931, p. 215, pl. 23, fig. 23.
Tonna fimbriata, (Sow.), Winckworth & Tomlin, 1933, pp. 209, 210.
Tonna costata Menke, Braga, 1952, p. 79, pl. 3, fig. 8.
Tonna galea (*non* Linn.), Macnae & Kalk, 1958, p. 128, fig. 20 *r*.

Protoconch 3 whorls, diam. 3·75–4 mm., very slightly oblique to axis. Postnatal whorls 3–4. Spiral lirae 4, on base 9, i.e. 13 on back of outer lip,

narrow, intervening grooves wide, flat, without intermediaries. Sutures not canaliculate. Columella with 2 bulges (broken anteriorly); outer lip broken. Periostracum thin, fibrous-fimbriate. 38×29 mm., height (vertical) of spire 10 mm.; 73×58 mm., height of spire 19 mm.

Shell pale biscuit-colour without any markings, the lirae orange-brown, protoconch brown, periostracum brown.

Durban (Smith); Delagoa Bay (Braga; also 1 dead, S. Afr. Mus. coll. K.H.B.). Living, but rare: Delagoa Bay (U.W.).

Remarks. My 38 mm. Delagoa Bay shell corresponds with Smith's figure, with Vredenburg's figs. 10 *a*, *b*, and with Braga's figure. I have seen also 2 larger (73 mm.) examples from the same locality, collected by the S.A. Naval Diving School; one of these retains the periostracum.

Smith's example was a little longer (41 mm.), with plicate outer lip and columellar glaze. Braga's 2 examples were 48 mm. long; he figured only the dorsal view.

Iredale figured a broader example (27×23 mm. in photo).

Von Martens (1879, p. 732) recorded *costatum* Menke (*latesulcatum* Hanley) from Querimba Island.

Tonna canaliculata (Linn.)

Tonna canaliculata, Iredale, 1931, pl. 23, fig. 25.
Tonna cepa, Röding, Bayer, 1937, p. 32.
Tonna olearium Brug., Satyamurti, 1952, p. 148, pl. 13, figs. 4 *a*, *b*.

Shell thin. Protoconch 2 whorls, diam. 3·5 mm., not oblique to axis. Postnatal whorls 4. Spiral lirae 6 on 1st to 3rd whorls, but on 3rd whorl the 6th lira only just visible in the sutural canal, already on the 3rd whorl the lirae beginning to become flat, and on 4th whorl they are very flat, separated by narrow grooves, which on upper half of whorl are very faint; on base 13 lirae (i.e. 19 on back of outer lip). Sutures canaliculate. Columella straight, thin-edged, trenchant. Umbilicus much reduced. 102×80 mm., height (vertical, from bottom of sutural canal) of spire 23 mm.

Fawn or brown, with irregularly dispersed spots of chocolate and white, chiefly around upper part of whorls, protoconch brown.

Mozambique (S. Afr. Mus. Ross-Frames coll.).

Distribution. Querimba Is., Mauritius, Indian Ocean, Philippines.

Remarks. This specimen is merely recorded as having been obtained by the late Ross-Frames at Mozambique, but whether as a genuine inhabitant of that area or as a tourist curio cannot be stated.

Tonna perdix (Linn.)

Dolium perdix, Chenu, 1859, fig. 1145.
Tonna perdix, Bayer, 1937, p. 43, pl. 2, fig. 1 (East Indies form), fig. 2 (West Indies form).

An ovoid species with high spire, with 19 flat lirae, slightly curved, trenchant columella, and well-developed umbilicus.

The colour of the East Indies form is brown with numerous straight or crescentic white marks on the lirae, producing a characteristic chequered pattern.

Pondoland (Sowerby). Common at Mauritius. Recorded from Querimba Is. (von Martens, 1879). Probably not a genuine inhabitant of South African waters.

Gen. Eudolium Dall

Vredenburg, 1919, pp. 147–149 (*partim*). Bayer, 1937. p. 24.

No umbilicus. Outer lip thickened and dentate. Protoconch similar to that of *Tonna* (see Dall, 1889, p. 232).

Eudolium crosseanum Mont.

Eudolium crosseanum var. *solidior*, Dautzenberg & Fischer, 1906, p. 38, pl. 3, fig. 1.
Eudolium crosseanum, Tomlin, 1927, p. 82, fig. 4 *b* (2 views).

Protoconch missing, but the calcareous lining present in the two fragments, diam. 4 mm. Postnatal whorls $2\frac{3}{4}$. Spiral lirae on 1st whorl at first 4, then 5, then 6, with one intermediary between each pair, on 2nd whorl 6, then 7, with intermediaries; on base 10 lirae, i.e. on back of outer lip 17, with intermediaries, 5–6 on rostrum without intermediaries. On body whorl the 3rd or 4th and succeeding 4 or 5 main lirae are slightly nodulose. All whorls cancellate with growth-lines. Columella nearly straight, with 5–6 plicae; outer lip reflexed, varicoid, bluntly dentate within. Periostracum (partly present on one of the East London shells) thin, fibrous-fimbriate. $32 \times 23{\cdot}5$ mm. and 33×24 mm. Diam. 1st whorl 8–9 mm., 2nd whorl 15–16 mm. Up to 92 mm. (Dautzenberg & Fischer).

Off Buffalo River (East London), 310 fathoms, 2, P.F. coll. (Tomlin).

Off Umhloti River (Natal), 40 fathoms, 1 fragment (2 apical whorls with the calcareous lining of protoconch); Cape Vidal (Zululand), 80–100 fathoms, 1 fragment (calcareous lining of protoconch, 1st and parts of 2nd and 3rd whorls) (S. Afr. Mus. P.F. coll.).

Distribution. Mediterranean, Moroccan coast, Azores and West Indies. Ancestral forms in the Tertiary of southern Europe (Vredenburg).

Remarks. Tomlin saw only 1 specimen, but actually 2 were taken at the locality recorded by him.

The Cape Vidal fragment is fresher than the other material, it has a few more spiral lirae, 7 at end of 1st whorl and 8 or 9 on later part of 2nd whorl, and the main lirae and intermediaries are not quite so distinctively separable.

The distribution is curious and noteworthy. Recently (1960), however, I have seen a specimen, 63×46 mm., obtained by a commercial trawler 'some-

where off Cape Point or on the stockfish grounds' (north-west of Table Bay), thus bridging the gap in the distribution.

Eudolium aulacodes Tomlin

Eudolium aulacodes, Tomlin, 1927, p. 83, fig. 4 *a* (2 views).

Off Cape Point, 560–700 fathoms, 1 dead, P.F. coll. (Tomlin).

Type in the South African Museum. No other specimens were procured.

Fam. **Oöcorythidae**

Tomlin, 1927, p. 80.

Oöcorys watsoni Locard

Fig. 1 *b*

Oöcorys sulcata (*non* Fischer), Watson, 1886, p. 412, pl. 17, fig. 11.
Oöcorys watsoni, Locard, 1897, p. 288. Tomlin, 1927, p. 80.

Protoconch and apical whorls more or less corroded in all specimens. Protoconch 2 whorls. Postnatal whorls 4. Spiral lirae 11–13 on 2nd whorl, 12–13 on 3rd and 4th whorls, 22–24 on base (incl. rostrum). The 2 largest P.F. shells both measure 40 × 27 mm.; one obtained by Talbot 44 × 30 mm.; *Challenger* specimen 26·5 mm. long. Chalky white.

Radula with 50–55 rows, central plate with 5 (6) cusps on either side of median cusp, lateral plate with 6 cusps on outer side of main cusp, inner marginal plate with one denticle on inner side, outer marginal without denticle.

Off Cape Point, 720–1,000 fathoms, 7 dead (S. Afr. Mus. P.F. coll.).

Off Cape Point: 33° 26′ S., 16° 33′ E., 1,240–1,300 fathoms, 2 dead; 33° 45½′ S., 16° 23½′ E., 1,480 fathoms, 2 living, 1 dead; 33° 49′ S., 16° 30′ E., 1,500 fathoms, 1 adult and 2 juv. living; 34° 42′ S., 16° 54′ E., 1,725–1,780 fathoms, 1 dead (the largest); 33° 50′ S., 16° 30′ E., 1,480–1,660 fathoms, 2 dead; 33° 52′ S., 16° 51′ E., 1,380–1,520 fathoms, 1 living, 2 dead; 34° 05′ S., 16° 58′ E., 1,470–1,490 fathoms, 1 living, 18 dead (S. Afr. Mus. F. H. Talbot coll. 1959).

Distribution. 1° 47′ N., 24° 26′ W., 1,850 fathoms (Watson).

Remarks. Tomlin saw two of the *Pieter Faure* specimens. Dr. F. H. Talbot's recent dredging shows that the species is moderately abundant at depths greater than those worked by the *Pieter Faure*. Several of the specimens recorded above as dead were quite fresh and unworn.

Oöcorys sp.?

Two fragments (S. Afr. Mus. A8901, P.F. coll.) from off O'Neil Peak (Zululand), 90 fathoms, have ordinary shell texture (not corroded or chalky like the specimens of *watsoni*).

The larger fragment is approximately 28 × 18 mm.; it has 29 spiral lirae: possibly one or two more were present at the upper (sutural), and probably

half a dozen at the lower end. The top 4 intervals are as wide as the lirae, the bottom 3 wider than the lirae; the other intervals are narrower than the lirae. Growth-lines, more or less closely aggregated, cross the lirae, forming a cancellate sculpture, but the lirae are predominant.

The other fragment consists of the halves of 2 whorls, the diameter of which if complete would be approximately 9 mm. and 13 mm.; height of the whorls 3 mm. and 5 mm. The upper whorl has 9 spiral lirae, the lower whorl 10; on both whorls the 2 lirae at the bottom are considerably wider than the other lirae; numerous close growth-lines cross the lirae forming especially near the top of the whorls a cancellate sculpture, but the lirae are predominant.

The curvature of the fragments, from top to bottom, fits *Oöcorys*, but not *Ficus* nor any of the *Cassididae*.

These tantalizing fragments have some resemblance to *O. elongata* Schepman (1909, p. 121, pl. 10, fig. 3) from the East Indies.

Fam. **Cassididae**

Iredale, 1927, pp. 321 sqq. (Australian species).
Thiele, 1929, p. 277.
Bayer, 1935, pp. 93–120.

Thiele regarded Iredale's genera *Antephalium*, *Xenophalium*, and *Xenogalea* as merely sections of the subgenus *Semicassis* of the genus *Phalium*.

Sowerby's record (1892) of the West Indian and West African *Cassis testiculus* in the 'Bairstow collection from South Africa' is not acceptable: the *collection* came from South Africa, but did the *shell* originally come from South Africa?

Braga (1952) records *Cassis cornuta* (Linn.) from Mozambique Island (Bayer (1935): from Madagascar).

Gen. Phalium

Iredale, 1927 p. 330 (with key to 4 Australian species).

Phalium glaucum (Linn.)

Phalium glaucum, Iredale, 1927, p. 331. Macnae & Kalk, 1958, p. 127 (listed).

Early whorls cancellate. From later part of 3rd whorl sharp tubercles develop on the shoulder lira, becoming nodules on the later whorls, 15–20 on 4th and 5th whorls, evanescent on body whorl; axial pliculae evanescent after 4th whorl. Columella plicate; columella glaze reflexed, with free edge. Outer lip denticulate within, 3 sharp spinous processes at anterior end. 85 (88 if spines on outer lip included) × 57 mm.

Operculum narrow, semilunate, inner margin nearly straight, 32 × 11 mm. in 85 mm. shell with aperture 60 mm. long.

Pale plumbeous, uniform, but with 5 brownish marks on back of each

varix; outer lip and anterior half of columella orange, aperture fulvous within. Operculum deep amber.

Radula with at least 75 rows, central plate with 11 cusps, lateral plate with 12 cusps, both marginals with 3–4 spiniform cusps apically.

Natal (Sowerby). Living: Delagoa Bay (U.W.).

Distribution. Querimba Is., Madagascar, Indo-Pacific.

Phalium areola (Linn.)

Phalium aerola Iredale, 1927, p. 332. Macnae & Kalk, 1958, p. 127 (listed), fig. 20 *j*.

Later whorls with spiral striae above shoulder and anteriorly on body whorl (scarcely traceable on rest of whorl); axial pliculae evanescent. No processes anteriorly on outer lip. 62 × 38 mm. White with 5 series of large squarish red-brown spots.

Durban (Sowerby). Durban and Tongaat (S. Afr. Mus.). Umhlanga, N. of Durban (S. Afr. Mus. coll. Burnup). Mouth of Limpopo River, Portuguese East Africa (S. Afr. Mus. Ross-Frames coll.). Delagoa Bay, living (U.W.).

Distribution. Indo-Pacific.

Phalium (*Semicassis*) *pila* (Rve.)

Cassis craticulata Euthyme, 1885, p. 250.
Cassis africana Fulton, 1930, p. 686, pl. 18, fig. 3.
Cassis pila Yen, 1942, p. 214, pl. 17, fig. 105.

Protoconch 2½ whorls, diam. 1·5 mm., smooth. Postnatal whorls 5. Early whorls cancellate. Spiral lirae on 1st whorl 4, on 2nd 4–5, on 3rd 6–7, on 4th 7–10, on 5th 8–11, on base 20–24; lirae flat, intervals narrow (intermediaries may confuse the counting of the numbers). Columella pleated, columellar glaze with free edge, umbilicus not closed. Outer lip varicoid, denticulate, plicate within. 47 (44 to end of rostrum) × 36 mm. Up to 55 × 38 mm.

Cream with 4 or 5 series of squarish orange-brown spots.

Port Elizabeth (Euthyme); Durban (Sowerby; also S. Afr. Mus.).

Off Umvoti River (Natal), 27 fathoms, 1 dead; off Durnford Point (Zululand), 90 fathoms, 1 protoconch plus 3 whorls (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E., 71 metres (U.C.T.).

Distribution. Mauritius, India, East Indies, China.

Remarks. Fulton's *africana* would seem to be merely an abnormal specimen.

P. bisulcata (Sch. & Wag.), also recorded by Sowerby (1897) from Natal, is distinguished by the body whorl being lirate only above and below, not in the middle (Schepman, 1909).

Phalium (*Xenogalea*) *zeylanica* (Lam.)

Fig. 1 *c*

Cassis ceylanica var. *intercedens*, von Martens, 1903, pp. 54, 56 note 12, 57.
Cassis pyrum, *non* Lamarck, Bartsch, 1915, p. 95. Odhner, 1923, p. 6.

Protoconch 3 whorls, diam. 2·5–3 mm., smooth. Postnatal whorls 4. Spire subtending an angle of 90°–110°, very rarely less than 90° (85°) and then only the protoconch and 1st whorl (or 1st and 2nd whorls) conforming to this angle. Spiral striae on 1st and 2nd whorls, sometimes also on 3rd, evanescent on later whorls, occasionally traceable at lower end of body whorl. A series of shoulder nodules developing on later part of 2nd whorl, continued to outer lip, variable in number, when present 7–8 on 2nd whorl, on 3rd whorl 9–12 (in one case 16), on 4th whorl 9–12 (15–16 in two cases); a second series of nodules below the shoulder develops on body whorl, varying in prominence and in number from 4 to 7, usually only on last half of whorl, but sometimes as many as 7–9 over three-quarters of the whorl. Columella with only 1 low rounded ridge (in addition to the costa at its anterior end), but occasionally 3–5 feeble pleats present. Columella glaze when fully formed thick, curving over without free edge and nearly (sometimes completely) closing the umbilicus. Outer lip varicoid, sometimes very thick; in some large shells with indications of 3–4 very feeble plicae at anterior end. 46 × 37 mm., 68 × 60 mm., 73 (to end of rostrum, 77 to anterior end of outer lip) × 57 mm. Width 75–85% of length.

Operculum narrow, semilunate, inner margin nearly straight, 12 × 4·5 mm. in aperture 27 mm. long.

Pale fawn or biscuit-colour, uniform, the outer lip varix with 5, usually 5 pairs, chestnut or orange-brown spots; sometimes faint indications of 5 bands with white spots (cf. *labiata* var. *iredalei*) are traceable on the back of the body whorl, sometimes only 5 series of faint white spots on a fawn ground-colour. Operculum amber. Animal pale cream, sides of foot deepening to orange, edge of foot bright yellow, sole pale pinky-orange, tentacles yellow with 2 longitudinal black stripes (K.H.B.).

Radula with 100–105 rows, central plate with 11 cusps, lateral plate with 10 cusps, inner marginal with 3 spiniform (4 incl. the apex) cusps apically, outer marginal entire.

Fossil: Pleistocene: Port Elizabeth (Schwarz, 1910).

Natal and Algoa Bay (Krauss); Port Elizabeth (Sowerby, Bartsch); Port Alfred (Bartsch, Turton); Algoa Bay and Pondoland (von Martens); Simon's Bay (False Bay) (Bartsch); Muizenberg (False Bay) and Port Elizabeth (Bayer); False Bay and Port Elizabeth (S. Afr. Mus.); off Cape Infanta, 34 fathoms (Odhner).

Off Cape Natal (Durban), 55 fathoms, 1 juv., dead but fresh (S. Afr. Mus. P.F. coll.).

Living: False Bay, 19 fathoms; Sebastian Bay, 25 fathoms; off Cape Infanta, 42 fathoms; off Cape St. Blaize, 17–55 fathoms; Mossel Bay, 5–19 fathoms; off Knysna, 46 fathoms; Algoa Bay (S. Afr. Mus. P.F. coll.). False Bay; Knysna estuary shore; and Algoa Bay, 26 fathoms (U.C.T.).

34° 3′ S., 19° 18′ E., 31 metres (*Africana*, per U.C.T.).

Distribution. Mauritius (von Martens, 1880); Ceylon (Bayer, 1935).

Remarks. Smallest shell in the South African Museum with varix: 37 mm. long. Usually only the outer lip varix is developed, but occasionally the shell is continued for a further quarter, half, or three-quarter whorl and then forms another lip varix.

Sometimes the lip varix is very thick: 10 mm. (measured equatorially) on a 46 mm. shell, 16 mm. on a 49 mm. shell.

The thickness of the shell wall varies, e.g. a 72 mm. long shell weighs 2 oz., one 67 mm. weighs $2\frac{1}{2}$ oz., one 62 mm. weighs $1\frac{3}{4}$ oz., two 50 mm. weigh $\frac{1}{2}$ oz. and $1\frac{1}{4}$ oz.

Hybrid? Two shells, locality unknown, have the shape and proportions of *labiata* var. *iredalei*, and also the colour pattern (although rather faint), but have nodules on the back of the body whorl: the 60×42 mm. shell has 9 nodules on the shoulder, the 54×39 mm. shell has 12 on the shoulder and 5 (the first and last very feeble) in a lower series.

I have seen also several other 'intermediates' (locality or localities unknown) which indicate that a long series would show a complete gradation from the *zeylanica* to the *labiata* var. *iredalei* form.

Similar shells were probably responsible for the records of the Australasian *pyrum* by Bartsch, and Odhner.

Phalium (*Xenogalea*) *labiata* (Perry) var. *iredalei* Bayer

Cassis achatina, *non* Lamarck, Krauss, 1848, p. 115. Von Martens, 1880, p. 264. Sowerby, 1892, p. 23. Von Martens, 1903, pp. 54, 56 note 12. Bartsch, 1915, p. 95.
Cassis labiata var. *iredalei* Bayer, 1935, p. 109.

Protoconch 3 whorls, diam. 2·3–2.5 mm., smooth. Postnatal whorls 4. Spire subtending an angle of 80°. Spiral striae on 1st and 2nd whorls, evanescent on later whorls. Shoulder obsolescent. No nodules. Columella usually without pleats (except the costa at anterior end), but sometimes with 1–5 feeble pleats. Columellar glaze curving over without free edge and nearly or completely closing the umbilicus. Outer lip varicoid, not denticulate within (Bayer: indistinctly denticulate below). 60×40 mm. Smallest examined 9×6 mm. Smallest with varicoid outer lip 20×14 mm. (also Krauss).

No specimen with operculum or animal in the South African Museum.

Fulvous or fawn, with irregular chocolate or orange-brown subsutural patches, and 5 darker bands with oval or semilunar white spots backed with brown, more or less crescentic or wedge-shaped marks; the 5 bands appear on the outer lip as dark marks, the uppermost one solid, the other 4 usually as pairs, columellar glaze pale fawn or buff, aperture fawn within. Often when a growth-line is unusually strong, the bands are marked by pairs of short, dark axial streaks.

Fossil: Pleistocene-Recent raised beach, Little Brak River (Mossel Bay) (Smith, 1906b); Port Elizabeth (Schwarz, 1910).

Cape Agulhas and Algoa Bay (Krauss); Port Elizabeth (von Martens, Bayer); Algoa Bay, East London, and Pondoland (von Martens); False Bay,

Mossel Bay, Port St. Johns, and Durban (S. Afr. Mus.); off Tongaat (Natal), 2 juv. dead (S. Afr. Mus. P.F. coll.).

Remarks. Iredale said (1927, p. 349) the Australian *achatina* Lam., now known by the earlier name *labiata* Perry, differed from the South African shells, but did not specify the differences. These differences appear to be the absence in the latter of the labial denticulations and columellar pleats, both of which are well developed in Australian shells (see Iredale, pl. 31, fig. 1). The coloration is very similar. Bayer (1935) said the South African shells were smaller, more ventricose, with more or less distinct shoulder, outer lip smooth, with indistinct teeth towards base. He therefore gave the South African shell a varietal name.

Two varices may occur, separated by a half or quarter whorl (in one case one-eighth whorl). Sometimes a true projecting varix is not formed, but a series of dark spots indicate where the animal seems to have started a varix and then decided to continue its growth before completing it.

A very broad (equatorially) varix sometimes occurs as in *zeylanica*: 5·5 mm. on a 27 mm. long shell.

The shell wall varies in thickness, but heavy shells do not appear so frequently as in *zeylanica*. The thickest shells in the South African Museum are 3 from Durban and 1 from Port St. Johns. In all these the columellar pleats are distinct, though feeble.

The *Pieter Faure* obtained only 2 juveniles of this species.

Phalium (*Casmaria*) *ponderosum* (Gmelin)

Cassis nodulosa var. *torquata* Rve., Smith, 1903*a*, p. 379.
Cassis torquatum Adam & Leloup, 1938, p. 142, pl. 6, figs. 8 *a*, *b*.
Cassis ponderosum Satyamurti, 1952, p. 137, pl. xi, fig. 5.

Protoconch 3 whorls, diam 2 mm., smooth. Postnatal whorls 4. Spire high. All whorls smooth except for growth-lines. Last whorl with or without shoulder nodules; when present 10–12 in number, either confined to the shoulder or continued anteriorly as more or less definite axial plicae. Columella with 2–7 (8) pleats, more or less obscured by callus in fully grown shells; columellar glaze without free edge, completely closing the umbilicus. Outer lip smooth at beginning of formation of varix, later developing 4–8 (or more) rather sharp tubercles, which in fully grown shells form the ends of plicae crossing the outer surface of varix; inner margin sometimes plicate. 32 × 21 mm. (with nodules), 32 × 19 mm. (without nodules, lip varix beginning). Up to 55 × 33 mm. (Ceylon examples).

White with chestnut or orange-brown subsutural marks, and 3 or 4 spiral series of spots, the latter often obscure, back of lip varix with chestnut spots, forming horizontal stripes when the varix is broad.

Durban (Smith); Port St. Johns (S. Afr. Mus., nodulose).

Off Umvoti River (Natal), 27 fathoms, 1 dead, without nodules (S. Afr. Mus. P.F. coll.).

Distribution. India, East Indies, north east Australia.

Remarks. The nodulose shell from Port St. Johns is shiny and unworn.

A series of 6 from Ceylon in the South African Museum (coll. E. L. Layard).

Cassis (*Cypraecassis*) *rufa* (Linn.)

Cassis rufa Bayer, 1935, p. 96. Macnae & Kalk, 1958, p. 127 (listed), fig. 20 *p.*

Mozambique (Bayer); Delagoa Bay (U.W.).

Distribution. East coast of Africa, Madagascar, East Indies, north Queensland.

Gen. Lambidium Link

According to Thiele (1929) the operculum and animal were at that date unknown.

Lambidium macandrewi (Sow.)

Oniscia macandrewi Sowerby, 1888, p. 567, pl. 28, figs. 1, 2. Sowerby, 1903, p. 229.

Protoconch $2\frac{1}{2}$ whorls, diam. 1·75 mm., smooth. Postnatal whorls $5\frac{1}{2}$. Spiral lirae 2, the lower one near suture with following whorl and sometimes more or less obscured; on base 8–9 (10) (i.e. on back of outer lip 10–11 (12)). Crossed by axial ribs, on 1st whorl 12, on 2nd 15, on 3rd 18–20, on 4th 18, on 5th 15, 5–6 on last half-whorl (if the ribs are counted from and including the outer lip there are 12–14 on the body whorl). The number of ribs is variable, and may exceed the numbers given above. Where they cross the lirae they are sharply squamiformly, sometimes almost spiniformly, raised, more or less hollowed in front, especially well developed on body whorl; growth-lines between the ribs forming raised pliculae and also crossing the lirae. Columella plicate, the plicae breaking up into corrugations and granules on outer part of the columellar glaze, which is extensive, with free edge. Outer lip varicoid, denticulate on inner margin. 35×24 mm., 36×29 mm. Sowerby's type 45×23 mm. (text-figure 40×23–24 mm.).

Operculum elongate oval, inner margin nearly straight, outer margin thickened internally, nucleus near middle of outer margin $7{\cdot}5 \times 3$ mm. in aperture (excl. canal) 25×3 mm.

Pale fawn, more or less pinkish, with very faint traces of 3 or 4 darker spiral bands, outer lip varix with groups of orange-brown speckles, columellar glaze white.

O'Neil Peak (Zululand), 90 fathoms; Port Shepstone (Natal), 250 fathoms (Sowerby). [Cape St. Blaize, 27 fathoms (Sowerby), *v. infra.*].

Off Cape Natal (Durban), 47–54 fathoms, 3 dead; off Umkomaas, 40 fathoms, 1 dead but fresh; off Umvoti, 56 fathoms, 1 dead; off Umtwalumi, 50 fathoms, 1 dead; off Amatikulu (Zululand) 50 fathoms, 1 living; off O'Neil Peak (Zululand), 55 fathoms, 1 living (S. Afr. Mus. P.F. coll.).

Distribution. Japan.

Remarks. How many shells were sent to Sowerby is not recorded. He kept the shell(s) from Port Shepstone. There are now 9 shells (and 1 fragment) in the South African Museum.

The Umkomaas shell, though dead, is quite fresh and retains a pink tinge. The Amatikulu and O'Neil Peak shells contained the animals in a very decomposed condition; the operculum was obtained fron one, but no radula or jaws were found in either of them.

The locality off Cape St. Blaize is most improbable. It seems to be due to an accident: the original *Pieter Faure* label in the South African Museum reads 1225 (for which Cape St. Blaize is correct), but is cut off close to the 1, unlike other *Pieter Faure* labels where there is a margin fore and aft the number; if the number had been originally 11225, the locality would be off Umvoti River, 27 fathoms, which is entirely in keeping with the other localities.

The habitat of this species seems to be off the coast of Zululand, and probably northwards, petering out southwards along the coast of Natal.

Sowerby (1888) contrasted his species with the Chinese *cancellata* Kiener (*non* Lamarck), but the slight differences seem to be bridged by the South African specimens. Sowerby's identification of the latter may stand for the time being.

Fam. **Bursidae**

Bayer, 1932, pp. 224 sqq.

Separated from the Cymatiidae by the presence of the posterior canal.

Bursa crumena (Lam.)

Bursa crumena Bayer, 1932, p. 225. Macnae & Kalk, 1958, p. 128 (listed).

Protoconch 3 whorls, alt. and diam. 1·5–1·75 mm., smooth, junction with 1st postnatal whorl abrupt.

Sculpture granulate, with conical tubercles on the shoulder and 2 series below the shoulder on body whorl.

Radula with 55–60 rows, central plate with large median cusp flanked on either side by 2 small ones, a small cusp near outer angle of base, lateral plate with 6 cusps on the cutting-edge, the penultimate cusp the longest, posterior marginal plate with 3–4 apical denticles, anterior marginal more slender, apex entire.

Durban (Sowerby, Bayer, also S. Afr. Mus.); Delagoa Bay (U.W.). 28° 25′ S., 32° 25′ E., 27 metres (*Africana*, per U.C.T.).

Off Amatikulu River (Zululand), 24 fathoms; off Tugela River (Natal), 12–42 fathoms, living and dead; off Umvoti River, 27 fathoms, off Umhlanga River, 22–26 fathoms; off Umloti River, 27 fathoms; off Umkomaas; 13 fathoms (S. Afr. Mus. P.F. coll.).

Mouth of Limpopo River, Portuguese East Africa (S. Afr. Mus. Ross-Frames coll.).

Distribution. Mauritius, Indian Ocean, East Indies, China.

The remains of the posterior canal are sometimes more or less visible on the preceding whorls, but not to such an extent as in *bufonia.*

Bursa bufonia (Gmelin)

Ranella siphonata Krauss, 1848, p. 113. Bayer, 1932, p. 227.
Bursa asperrima Dnkr., Yen, 1942, p. 217, pl. 19, fig. 114.

Protoconch as in *crumena,* alt. and diam. 1·75 mm. The posterior canal is very deep, and its remains are clearly visible on the preceding whorls. The sculpture is very coarsely knobbly.

Natal (Krauss). Durban and Tongaat (S. Afr. Mus.).

Distribution. Mauritius, Indian Ocean, East Indies, China.

Bursa granularis (Bolten)

Ranella granifera Lam., *livida* Rve., *semigranosa* Lam., Krauss, 1848, p. 113. Sowerby, 1892, p. 9.
Ranella granifera Lam., Braga, 1952, p. 79, pl. 3, fig. 7.
Bursa granifera Lam., Day & Morgans, 1956, p. 306. Macnae & Kalk, 1958, p. 128, fig. 21 *p.*
Bursa granularis Bayer, 1932, p. 229.
Bursa alfredensis Turton, 1932, p. 107, pl. 24, no. 781.

Protoconch as in *crumena,* alt. and diam. 2 mm. Fine spiral lirae between the 7 or 8 stronger lirae which carry numerous rounded tubercles. Only slight indications of the closed posterior canal on the preceding whorls.

Port Elizabeth (Sowerby: 'a living specimen').

Natal (Krauss); Durban (Sowerby). Inhambane, Portuguese East Africa (Braga). Durban and Mozambique Island, littoral, living (S. Afr. Mus. coll. K.H.B.); Durban, living (U.C.T.); Delagoa Bay, living (U.W.).

Distribution. Red Sea, Querimba Is., Mauritius, Réunion, Madagascar, East Indies, Philippines.

Bursa cruentata (Sow.)

Fig. 1 *d*

Bursa cruentata, with var. *ranelloides* Bayer, 1932, p. 228.

Protoconch 3 whorls, alt. and diam. 2·5 mm., 1st and 2nd whorls with fine close-set axial retractive pliculae, petering out on 3rd whorl, 1st and 2nd whorls with a fine spiral lira in middle of whorl, 2nd whorl with a second lira almost concealed by suture of 3rd whorl, both lirae obsolete on 3rd whorl. Sculpture clear in a 17 mm. shell, but mostly worn off in older shells.

Whole surface of postnatal whorls very distinctly, though minutely, cancellate. Conical tubercles around shoulder and 2 series below shoulder on body whorl. Only faint traces of the posterior canal visible on the preceding whorls.

Off Scottburgh (Natal), 92 fathoms (Sowerby; also S. Afr. Mus.).

Off O'Neil Peak (Zululand), 90 fathoms, one fragment; off Cape Morgan, 87 fathoms, 3; Algoa Bay, 37 fathoms, one juv.; all fresh but none living (S. Afr. Mus. P.F. coll.).

Distribution. East Indies, Philippines, Japan.

Remarks. Tomlin (1931, p. 431) recorded a living *rhodostoma* from Durban. Bayer (1932, p. 228) listed this species as a variety of *cruentata.*

Bursa rubeta (Bolten)

Bursa rubeta (Bolten), Smith, 1914, p. 228, pl. 4.
Ranella lampas Lamarck, Braga, 1952, p. 78.

Typical form up to 110 mm. long, but var. *gigantea* Smith (= *bubo* (Linn.)) may reach 360 mm. or more (Smith).

Durban (Smith). Mozambique Island (Braga).

Distribution. Red Sea, Arabian coast, Mauritius, Madagascar, Indian Ocean, Philippines.

Fam. **Cymatiidae**

Kesteven, 1902, p. 458, figs. (apices). Bayer, 1933, pp. 33 sqq.

Thiele (1929) accepted four genera, with numerous subgenera and sections, but made no mention of the protoconch in his generic diagnoses. Among the South African representatives, so far as material is available, there are three forms of protoconch:

(i) Smooth, broad and squat, altitude and diameter approximately equal: *argus, murrayi, gemmifera, pustulata.*

(ii) Similar, but with cancellate sculpture: *nassariforme.*

(iii) Smooth or setulose, papilliform, often oblique to axis, altitude greater than diameter: *olearium, dolarium, vespaceum, klenei, durbanense.*

The first and second differ only in the absence or presence of a definite sculpture; but the third is very distinctive. Further consideration of the value of the protoconch as a generic character in this family is not possible without extensive material.

Thiele included as a '? Section' of *Charonia* the genus *Colubraria,* which other authors place in a separate family (*infra,* p. 35).

A notable addition to the representatives of this family in South Africa is *Gyrina gigantea* (Lam.), recently recorded by Mr. S. P. Dance (1959, p. 351, pl. 9) living in 160–180 fathoms off the Natal-Zululand coast. It is known, living, from the Mediterranean, north-east Atlantic, and Angola; and as a fossil from the European Miocene-Pliocene.

Argobuccinum argus (Gmelin)

Figs. 2 *a*, 3 *a*

Murex argus Gmelin, 1791, p. 3547.
Ranella polyzonalis Lamarck, 1816, pl. 414. figs. 3 *a, b,* Liste p. 4.

Ranella argus Krauss, 1848, p. 113. Von Martens, 1874, p. 134. Von Martens, 1903, pp. 41, 56.
Argobuccinum argus (and var. *vexillum*) Turton, 1932, p. 109.
Argobuccinum argus Haughton, 1932, p. 46. Bayer, 1933, p. 34.

Protoconch 3 whorls, diam. 2 mm. alt. 1·75–1·9 mm. (total length before formation of 1st postnatal whorl 3·5 mm.), smooth, with faint growth-lines, junction with 1st postnatal whorl clearly defined, but often indications of 3 spiral lirae on last third of last whorl. Postnatal whorls 6–7. Axial ribs *c.* 20 on 1st whorl, increasing to 25–28 on 3rd, but thereafter decreasing to 15–16 on 6th whorl; on the later whorls the ribs are represented only by nodules on the lirae, obsolete in the interliral grooves. Crossed by spiral lirae 3 on 1st whorl at start, 4 on later part and on succeeding whorls, but 1st lira soon breaks up into several smaller lirae, intermediary lirae also between the main lirae, intersections with ribs bluntly nodulose; on base (7) 8 main lirae, with intermediaries, the upper 3 or 4 main lirae often broken up into finer lirae. Lip varices at approximately every half whorl. Columella with 1–2 plicae pos-

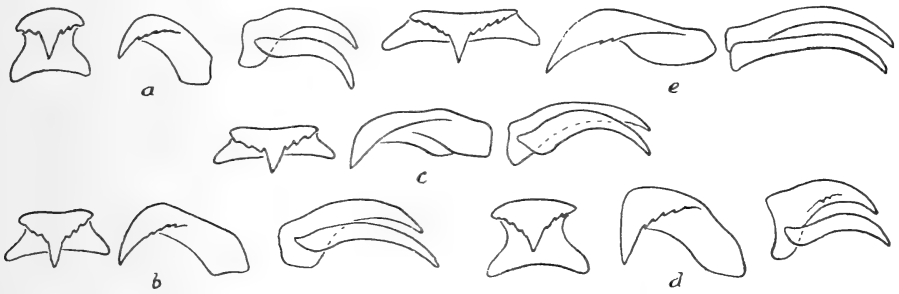


FIG. 2. Radula teeth of: *a*, *Argobuccinum argus* (Gmelin). *b*, *A. murrayi* (Smith). *c*, *A. gemmifera* (Euthyme). *d*, *Cymatium africanum* (A. Adams). *e*, *Charonia pustulata* (Euthyme).

teriorly, and 4–7 blunt tubercles anteriorly. Outer lip thickened, internally denticulate, margin undulate or dentate anteriorly, with one tooth stronger than the others, separated from the canal by one or two denticles. Periostracum moderately thick, with short velvety pile. 76×54 mm., 90×55 mm., 115×74 mm. (protoconch missing in all three).

Operculum oval, growth-lines eccentric, incremental growth greater postero-internally than antero-externally, nucleus apical. 25×16 mm. in aperture 30 mm. long.

Worn shells brown, the main lirae darker red-brown; in fresh specimens these spiral bands are obscured by the yellowish-brown periostracum; operculum dark amber.

Radula with *c.* 70 rows, central plate with large median cusp flanked on either side by 2 (3) small ones, base hour-glass-shaped, lateral plate with 3 small denticles on cutting-edge, anterior marginal plate more slender than the posterior marginal, both apically entire.

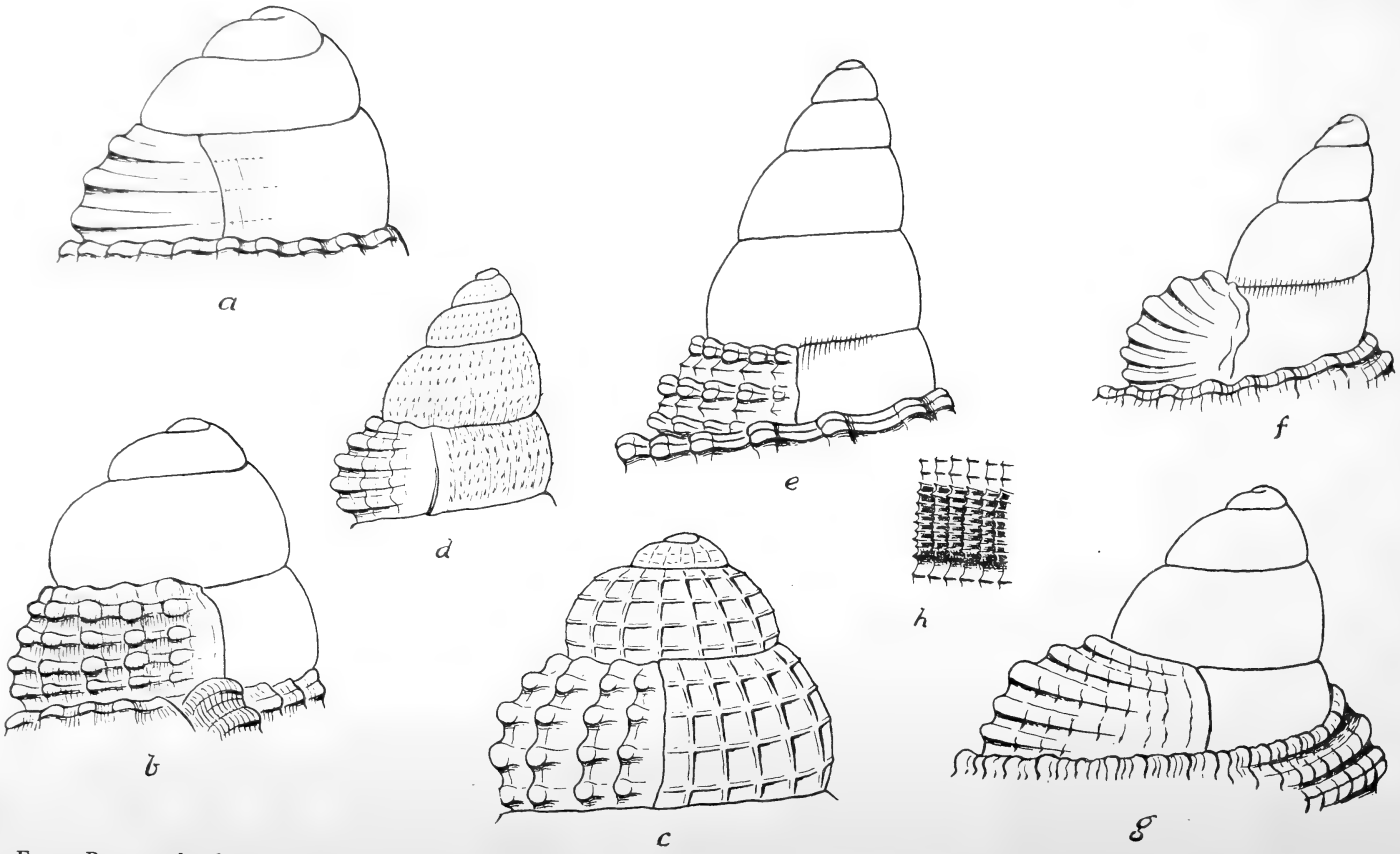


FIG. 3. Protoconchs of: *a*, *Argobuccinum argus* (Gmelin). *b*, *A. gemmifera* (Euthyme). *c*, *A. nassariforme* (Sow.). *d*, *Cymatium klenei* (Sow.). *e*, *C. durbanense* (Smith). *f*, *C. olearium* (Linn.). *g*, *C. dolarium* (Linn.). *h*, *C. dolarium*, portion of periostracum covering one main (multiplicate) lira, with intermediaries above and below.

Egg-capsules. Dr. F. H. Talbot, Marine Biologist of the South African Museum, found the animals spawning at the beginning of October at Simon's Town.

Fossil: Late Tertiary-Quaternary raised beaches: Bogenfels (South West Africa), Olifants River mouth, and Saldanha Bay (Haughton, 1932).

Angra Pequena (Luderitzbucht), Olifants River mouth, Saldanha Bay, Table Bay, False Bay, Cape Agulhas (von Martens); 35° 16′ S., 22° 26′ E., 155 metres, dead, worn (von Martens, 1903); Jeffreys Bay (Bayer, 1933); Port Alfred (Bartsch, 1915; Turton, 1932).

St. Helena Bay, Dassen Island, Table Bay, False Bay (S. Afr. Mus.). Natal (Krauss, also S. Afr. Mus.).

Living: Table Bay, False Bay 8–23 fathoms (S. Afr. Mus. P.F. coll.); Lamberts Bay, 15–29 metres, Langebaan (Saldanha), and False Bay (U.C.T.); 34° 35′ S., 19° 18′ E., 37 metres (*Africana*, per U.C.T.).

Remarks. The only confirmation of Krauss's (1848) record from Natal is afforded by 6 worn juveniles (7–11 mm. long) collected by Dr. L. Kent on the Natal south coast (i.e. from Durban to Port Shepstone). Von Martens (1880, p. 268) referred to a record from the Seychelles, but considered the identification erroneous, doubting whether this Cape species extended so far into the tropics.

It is essentially a cold-water austral species occurring also at St. Paul and Amsterdam Islands (*A. proditor*), Australia, Tasmania, New Zealand, and the Magellanic region (*A. vexillum*).

Argobuccinum vexillum (Lam.) or *argus* var.

Argobuccinum vexillum Watson, 1886, p. 400.

Tristan da Cunha and Nightingale Island, littoral and 100–150 fathoms (Watson). Tristan da Cunha, littoral (S. Afr. Mus.).

Neither von Martens (1874) nor Watson were inclined to separate *vexillum* specifically from *argus*.

The South African Museum specimens, however, are much narrower: the largest are 55×29 mm., 58×32 mm., in both cases protoconch worn away, width at most 52–55% of length, which is appreciably less than 61% in the largest *argus*.

Postnatal whorls 5; the number of axial ribs (nodules) cannot be counted on the more or less corroded early whorls, but the nodules instead of decreasing on the later whorls, as in the South African *argus*, increase in number to 35–40 on the 5th whorl. There are 4 main lirae spiral on each whorl, 5 if the group of finer lirae near suture is counted (i.e. 1+4, contrasted with 1+3 in *argus*). Consequently there is one main lira less on the base (6–7 instead of 7–8). None of the present 19 specimens shows any sign of an enlarged tooth anteriorly on the edge of the outer lip.

Some of the specimens were taken alive, but no animal was preserved.

Argobuccinum (*Fusitriton*) *murrayi* (Smith)

Fig. 2 *b*

Lampusia (*Priene*) *murrayi* Smith, 1891, p. 436, pl. 34, fig. 1.
Trophon magellanicus non Chemn., von Martens, 1900, pp. 157, 159.
Tritonium (*Cryotritonium*) *murrayi*, von Martens, 1903, p. 38 with footnote, pl. 3, fig. 16. Thiele, 1903, p. 165, pl. 8 (3), figs. 48, 48 *a*, *b* (radula).
Fusitriton algoensis Tomlin, 1947, p. 245, fig. White, 1948, p. 3, figs. 1–5 (anatomy, radula (incorrect)).
Argobuccinum murrayi, Barnard, 1949, p. 90, fig. (radula, correction).

Protoconch 3–3½ whorls, alt. and diam. 2 mm., smooth. Postnatal whorls 7–8. Axial ribs 13–14 on 1st whorl, increasing to 18–19 on 5th whorl, but on later whorls not always clearly distinct from the growth-lines; crossed by spiral lirae 3 on 1st whorl, 4 on 2nd and 3rd, 5 on 4th and succeeding whorls, but owing to duplication and intermediaries the main lirae more or less lose their distinctiveness; on base (incl. rostrum) 12–15 (17) main lirae with intermediaries; intersections of lirae and ribs slightly nodulose, usually more distinct on early whorls. Varices at approximately every half or third of a whorl. Columella curved, smooth, with one parietal plica posteriorly. Outer lip reflexed but not strongly thickened, internally smooth. Periostracum moderately thick, fibrous, with short, stiff pile, and on each of the main spiral lirae a fringe of long (2–3 mm.) outstanding setae. 126×63 mm.

Operculum broadly oval, margin slightly upturned, incremental growth greater postero-internally than antero-externally, nucleus apical, 33×23 mm. in aperture (excl. canal) 51 mm. long.

White or pale buff, periostracum yellowish-brown, operculum dark amber.

Radula with 80–90 rows, central plate with 4–5 small cusps on either side of the larger median cusp, base widening posteriorly, lateral plate with 4–7 serrations on cutting-edge, both marginal plates apically entire.

35° 4′ S., 18° 37′ E., 150 fathoms (Smith); 35° 3′ S., 23° 2′ E., 500 metres, numerous; and 33° 41′ S., 18° E., 178 metres (von Martens); 20 miles south of Cape Recife (Algoa Bay), 140 fathoms (Tomlin).

South of False Bay, off Cape Point, west coast of Cape Peninsula, Table Bay and Saldanha Bay, 85–300 fathoms, numerous, living and dead; 36° 40′ S., 21° 26′ E., 200 fathoms. 1 juv. worn (S. Afr. Mus. P.F. coll.).

32° 28′ S., 16° 52′ E., 347 metres (*Africana*, per U.C.T.).

Remarks. The records show that this species is abundant along the south-eastern, south-western, and western slope of the continental shelf: from 23° E. long. around Cape Point to approximately 33° S. lat.; until Tomlin's record from approximately 25° 40′ E. the most easterly locality was 23° E. (*Valdivia*).

Von Marten's preliminary identification (1900) of the *Valdivia* specimens as *Trophon magellanicus* was later (1903) corrected.

Watson (1886, p. 395) records *T. magellanicus* and *Triton* sp. from off Marion and Prince Edward Islands, 46° 48′ S., 37° 49′ E., and 46° 43′ S., 38° 4′ E., 69 and 140 fathoms.

Egg-capsule. Von Martens described and figured (1903, p. 40, pl. 5, figs. 22, 22*a*) a stalked egg-capsule from 100 metres in Plettenberg Bay; and considered the possibility of its belonging to *A. murrayi*. Similar egg-capsules were taken by the *Pieter Faure* in False Bay 23 fathoms, off Walker Point (Knysna) 47 fathoms, and off Cape Recife 51 fathoms.

As *A. murrayi* is now known to occur in the deep water away from the coast, these egg-capsules from shallow water inshore are more likely to belong to another mollusc.

The capsules occur singly; they are oval, flattened, 12×8 mm., each with a slender, thread-like 11 mm. stalk. None of the *Pieter Faure* examples contained embryonic shells.

Argobuccinum (*Eugyrina*) *gemmifera* (Euthyme)

Figs. 2 *c*, 3 *b*

Tritonium gemmifera Euthyme, 1889, p. 277, pl. 7, fig. 1.
Ranella leucostoma Lam. var. *poecilostoma* Lam., von Martens, 1903, pp. 53, 56.
Charonia poecilostoma Smith, 1915, p. 285.
Eugyrina gemnifera [*sic*], and var. *lepta* Bartsch, 1915, p. 93, pl. 9, figs. 1, 4.
Charonia gemmifera and var. *lepta* Bayer, 1933, p. 55.

Protoconch $3\frac{1}{2}$ whorls, alt. and diam. 3·5–4 mm., smooth. Postnatal whorls 7. Axial ribs feeble, represented by granules and nodules on the spiral lirae, more or less regular axial series of granules on 1st whorl (or 1st and 2nd whorls), but thereafter often 2 ribs or indications of ribs to each major nodule; 22 (occasionally 24) granules on 1st and 2nd whorls, 18–20 peripheral nodules on 3rd whorl, 15–18 on 4th, 14–16 on 5th and 6th, and 12–14 on 7th whorl; in var. *lepta* the greater number (20–22) of nodules on the early whorls is continued on to the later whorls. Spiral lirae 4 on 1st whorl, but by division and intermediaries usually only the 3rd (peripheral) lira carrying the nodules remains distinctly larger than the others, though the 4th lira may also bear smaller tubercles on the 6th and 7th whorls in the typical form. On base 8–10 main lirae, with intermediaries. Varices at approximately every half-whorl. Columella with posterior parietal plica, and 4–6 corrugations anteriorly. Outer lip with 9–10 tubercles or plicae internally. Periostracum moderately thick, with short, close pile. 108×63 mm., 100×63 mm., 103×60 mm. (S. Afr. Mus.); 115×50(59) mm. (Euthyme); 91×54 mm. and 84×46 mm. var. *lepta* (Bartsch).

Operculum as in *argus*.

Fulvous or castaneous brown, varices with darker marks, outer lip with 8–10 dark brown marks (some of them sometimes divided) corresponding with the plicae; aperture white internally; columellar glaze white, usually with a dark brown blotch on the parietal plica and often one or two other blotches.

Radula with *c*. 60 rows (in shell 35 mm. long), central plate broad and short, with 3 cusps on either side of median cusp, lateral plate without cusps or denticles on cutting-edge, both marginal plates apically entire.

Port Elizabeth (Euthyme, Sowerby); Algoa Bay, East London, Port Grosvenor (Pondoland) (von Martens); Port Alfred (Bartsch, Turton). Still Bay, coll. Muir; Port St. Johns; Port Shepstone, coll. Burnup (S. Afr. Mus.).

Algoa Bay; off Cove Rock (East London), 22 fathoms, 4 juv.; off Umhloti River (Natal), 40 fathoms (S. Afr. Mus. P.F. coll.).

Living: False Bay (U.C.T.); off Durban, 60–70 fathoms (U.C.T.); Delagoa Bay (U.W.).

Remarks. The two Port Shepstone shells are fresh, with periostracum, and may have been taken alive, though the opercula are missing. The only animal I have seen is the University of Cape Town juvenile example.

According to the late Dr. Muir most of the shells which are washed up at Still Bay and neighbouring coast are much worn and broken.

Argobuccinum (*Gyrineum*) *pusilla* (Brod.)

Argobuccinum pusilla Bayer, 1933, p. 39.

Natal (Krauss); Durban (Sowerby); Tongaat (Natal) (S. Afr. Mus.); Isezela (Natal) (S. Afr. Mus. coll. Burnup).

Off Umkomaas (Natal), 40 fathoms, 1 juv. dead (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea; east coast of Africa (5° 55′ S., 39° E.), 50 metres; East Indies.

Remarks. The Burnup specimens are fresh, but the protoconch is worn away in all of them. Animal of Durban specimens yellow with reddish tinge (R. N. Kilburn *in litt.* 1960).

Argobuccinum (*Cymatiella*) *nassariforme* (Sow.)

Fig. 3 *c*

Lotorium nassariforme Sowerby, 1902, p. 95, pl. 2, fig. 7.

Protoconch 3 whorls, alt. 2·25, diam. 2·5 mm., cancellate with fine axial pliculae and spiral lirae, respectively 18 and 4 on 3rd whorl. Postnatal whorls 6. Axial ribs 13 on 1st whorl, 14 on 2nd, 15–16 on 3rd, 18–20 on 4th, 21–22 on 5th and 18–20 on 6th whorl; crossed by spiral lirae 4 on each whorl, a 5th more or less visible low down near suture on later whorls, with fine intermediaries, intersections with ribs nodulose; 12–15 lirae on base (incl. rostrum), with intermediaries. Varices at approximately every three-quarters of a whorl or slightly less (120°–135°). Columella with parietal plica posteriorly, then plicate to beginning of canal; columellar glaze extensive. Outer lip with 7 denticles or plicae internally. Canal reflexed. Periostracum moderately thick, setose along the lines of growth. 40 (protoconch and 1st postnatal whorl missing, *c.* 43 if complete) × 19·5 mm.

White with indications of brown spiral bands.

Off Scottburgh (Natal), 92 fathoms, P.F. coll. (Sowerby).

Off Cape Natal (Durban), 85 fathoms, 1 dead; off Umhloti River (Natal), 100 fathoms, 1 fresh, with periostracum (S. Afr. Mus. P.F. coll.).

Distribution. Bayer (1933) records a specimen from Japan obtained from Fulton. The locality needs confirmation.

Remarks. The Type was either not returned by Sowerby or has been lost; it is not in the South African Museum.

Charonia pustulata (Euthyme)

Fig. 2 *e*

Triton sauliae non Rve., Krauss, 1848, p. 114.
Tritonium pustulatum with vars. *minor* and *varicosa* Euthyme, 1889, p. 273, pl. 6, figs. 3, 4, and p. 276.
Triton nodifer non Lam., Sowerby, 1892, p. 8.
Triton australis non Lam., Smith, 1906*b*, p. 293.
Nyctilochus alfredensis Bartsch, 1915, p. 94, pl. 4, fig. 4. Turton, 1932, p. 11, pl. 24, no. 804 (juv.).
Charonia pustulata and *alfredensis* Bayer, 1933, pp. 56, 57.
Bursa kowiensis Turton, 1932, p. 108, pl. 24, no. 782.

Protoconch 4 whorls, alt. and diam. 2·5 mm., smooth. Postnatal whorls 8. On 1st whorl the 20–22 granules on the 4 spiral lirae form axial series, but the axial alignment disappears on 2nd whorl and there are only 4 spiral series of granules; on later whorls only 2 spiral series of granules or nodules; the nodules vary from 9 to 14 in number, and are either feebly or strongly developed. Spiral lirae 4 on 1st whorl, thereafter intermediaries develop, but the 4 main lirae can be traced on later whorls, the 3rd bearing the peripheral nodules, the 4th also often with smaller nodules. On base 8–10 main lirae with intermediaries. Growth-lines on early whorls producing a fine cancellate sculpture. Sutures on early whorls often crimped. Varices at approximately every three-quarters of a whorl. Columella with strong posterior parietal plica, followed by numerous plicae as far as beginning of canal, anteriorly strongly developed and extending outwards across the columella glaze. Outer lip with 8–10 plicae on inner margin, some of them duplicate or triplicate. Periostracum thin, smooth. 183 × 97 mm., 206 × 115 mm. Reported up to 225 × 125 mm.

Operculum broadly oval, incremental growth greater postero-internally than antero-externally, nucleus apical, 63 × 32 mm. in aperture (excl. canal) 70 mm. long in 206 mm. shell.

Yellowish or olivaceous brown, with irregular darker brown patches and marks, the main lirae usually with alternate brown and bluish-white marks, columellar glaze brown between the white plicae, outer lip plicae brown, periostracum pale yellowish, operculum dark brown.

The largest shells, even though living, tend to lose most of their coloration, except the marks on the outer lip. Beach specimens, especially juveniles, tend to become orange, salmon-pink, or violaceous.

The four very juvenile *Pieter Faure* specimens have the protoconch brown and the 1st postnatal whorl pink.

Radula with at least 70 rows (in shell *c.* 80 mm. long), central plate broad and short, with 4–6 small cusps on either side of median cusp, lateral plate with 2 small cusps on cutting-edge, both marginal plates apically entire.

Fossil: Pleistocene-Recent raised beach Little Brak River (Mossel Bay) (Smith, 1906*b*).

Port Elizabeth (Euthyme); Port Alfred (Bartsch, Turton); Still Bay, and Natal (S. Afr. Mus.).

Living: Natal (Krauss); Mossel Bay, 20–36 fathoms, off East London, 42 fathoms, 4 juv. (S. Afr. Mus. P.F. coll.); False Bay (S. Afr. Mus. F. Talbot coll.).

Remarks. The largest gastropod in South African waters.

No records from the west coast of South Africa, but its place is taken from Angola northwards by the very similar *nodifera* Lam., under which name the South African species was formerly recorded.

Charonia tritonis (Linn.)

Lotorium tritonis Linn., Smith, 1903*a*, p. 378.
Triton variegatum Lam., Braga, 1952, p. 78.

Coloration very similar to that of *pustulata*, but the shell is smooth, without nodules.

Durban (Smith); Mozambique Island (Braga).

Distribution. Madagascar, India, East Indies, Philippines, Caroline Islands.

Cymatium olearium (Linn.)

Fig. 3 *f*

Triton costatus Born, Watson, 1886, p. 390 (references). Odhner, 1923, p. 12. Nicklès, 1950, p. 86, fig. 131.
Tritonium olearium Kesteven, 1902*a*, p. 712, pl. 35, figs. 4, 5 (protoconch).
Cymatium parthenopus von Salis, Bayer, 1933, p. 41.
Lolorium [*sic*] *olearium* Krige, 1933, p. 51.

Protoconch 4–4½ whorls, narrow conical, more or less sunk in 1st postnatal whorl and oblique to axis, diam. 2 mm. alt. 3 mm., smooth. Postnatal whorls 6–7, profile not shouldered. Spiral lirae 6 on 1st whorl, 6–7 on 2nd, 7 on 3rd and following whorls, more or less subequal in strength on 1st and 2nd, but from 3rd whorl onwards the 2 peripheral lirae become much stronger than the others, and continue thus to the last whorl, each bisected by a stria; 15–16 on base (incl. rostrum), the upper major ones usually bisected by a stria. Indications of axial plicae (enlarged growth-lines) often on 1st and 2nd whorls, but more distinct on 3rd, 14–15 in number, on later whorls forming blunt nodules on the peripheral lirae, decreasing to 12 on last whorl. First postnatal whorl starts with a feeble varix or plica, no other definite varices until the 6th whorl, after which the varicoid outer lip follows at about three-quarters of a whorl. Columella plicate. Outer lip 7-dentate-plicate, corresponding with the

external grooves, the upper 5 biplicate. No umbilicus. Periostracum thick, strongly fibrous-fimbriate at the major growthlines (more or less corresponding with the peripheral nodules), with long bristles extending beyond the fringes. 131 (protoconch missing) × 75 mm.

Operculum oval, incremental growth asymmetrical but not strongly so, nucleus apical.

Ochraceous or fulvous, back of the varix and outer lip with darker patches in the grooves, inner margin of outer lip salmon or orange with dark red-brown patches around the white plicae; columella dark red-brown, the plicae white; periostracum light or dark brown; operculum dark brown.

Fossil: Pleistocene-Recent raised beaches: Durban (Krige).

Port Alfred (Bartsch, Turton). Off Amatikulu Hill (Zululand), 26 fathoms, 2 juv. (S. Afr. Mus. P.F. coll.).

Living: Natal, on surf-beaten rocks (Krauss); Durban (S. Afr. Mus. coll. K.H.B., also U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. Sowerby (1892): almost world-wide: Japan, Australia, Red Sea, Mediterranean, West Indies, Brazil. Port Alexander, Angola (Odhner).

Bayer included Adanson (1756) (Senegal) in his references; and according to Nicklès (1950, p. 86, fig. 131) it occurs on the whole west coast of Africa from Morocco to 'Cape of Good Hope'. There are, however, no records from the west coast of South Africa south of Port Alexander, nor from the south coast farther west of Port Alfred (? Port Elizabeth, Sowerby).

Remarks. There are plump and slender forms, e.g.: 100 × 63 mm. and 103 × 58 mm.

Cymatium durbanense (Smith)

Fig. 3 *e*

Lotorium durbanense Smith, 1899, p. 248, pl. 5, fig. 4.
Cymatium labiosum non Wood, Turton, 1932, p. 110, pl. 24, no. 796.
Cymatium durbanense Bayer, 1933, p. 47.

Protoconch 5 whorls, diam 3 mm. alt. 4 mm., smooth. Postnatal whorls 3. Axial ribs 15–16 on 1st whorl, 12–14 on 2nd, 10–11 on 3rd; crossed by 3 spiral lirae on each whorl, with 1–2 fine intermediaries between each pair, the uppermost (sutural) lira varying in strength, but the other two (peripheral) always strong, all 3 bisected by a stria; intersections with axial ribs nodulose, between the ribs the lirae are beaded. On base 4 beaded and usually bisected lirae, followed by 8–10 simple feebly beaded or smooth lirae. Sutures on 1st and 2nd whorls rather deep. Two varices approximately half to three-quarters of a whorl apart. Columella with parietal plica posteriorly and 2 plicae anteriorly. Outer lip varicoid, internally with 7 (8) denticles. Periostracum fibrous. 26 (protoconch missing) × 16 mm.

Bluish-grey or plumbeous, ribs and lirae plicate, the latter usually with reddish-brown dots, a pale spiral band from top of aperture, varices with 3 or more reddish-brown marks; periostracum yellowish-brown.

Durban (Smith). Scottburgh (Natal) (S. Afr. Mus. coll. Burnup). Port Alfred (worn specimen) (Turton; also S. Afr. Mus.).

Remarks. I doubt whether this is more than a dwarf form of *olearium*, producing its first varix at about the middle of the 3rd whorl, and the varicose lip at the end of this whorl. Smith (1899) said it was characterized by the 'double . . . granose . . . lirae, . . . separated by a . . . thread-like line'; but these are features of *olearium*, though the bisected lirae are not always very distinct, especially in older shells.

Cymatium vespaceum (Lam.)

Triton vespaceum, Krauss, 1848, p. 115.
Lotorium — Kesteven, 1902b, p. 460, pl. 17, fig. 11 (protoconch).
Cymatium vespaceum, Bayer, 1933, p. 53.
— *respaceum* (typ. err.), Turton, 1932, p. 111.

Protoconch 4 whorls, diam 3 mm., alt. 3·5 mm., smooth, but possibly setose when quite fresh. Postnatal whorls 3. Axial ribs 10 on each whorl. First postnatal whorl with 2 peripheral spiral lirae, with 1 intermediary between them, 3 fine lirae between suture and upper peripheral lira, and between lower peripheral lira and the suture below. Suture between protoconch and 1st postnatal whorl undulate, less so between 1st and 2nd postnatal whorls, and straight between 2nd and 3rd. Growth-lines forming a beaded sculpture on the lirae, but obscure in the intervals. Periostracum strongly fimbriate. 26 × 13 mm.

Natal (Krauss); Port Alfred (Turton).

Off Tongaat (Natal), 27 fathoms, 1 fresh, with periostracum; off Cape Natal (Durban), 54 fathoms, 1 dead; off Umkomaas River (Natal), 40 fathoms, 1 fresh, with periostracum; off Nieca River (East London area); 43 fathoms, 1 juv. broken. (S. Afr. Mus. P.F. coll.)

Distribution. Querimba Is., Mauritius, East Indies.

Remarks. The Tongaat specimen was identified by Sowerby as *vespaceum*, the Cape Natal one as *exaratum* Rve. The latter species from Australia (and Japan: Bayer, 1933) was recorded by Sowerby (1897) from Port Elizabeth, but he was somewhat hesitant about the identification.

Cymatium gemmatum (Rve.)

Four shells in the South African Museum were identified by Tomlin as *obscurum* A. Adams. Apart from *Triton obscurum* A. Adams 1854 being pre-occupied by *Triton obscurum* Reeve (1844*a*, p. 117), the present specimens do not appear to differ from examples of *gemmatum* identified (or distributed under this name) by Burnup.

Radula with *c.* 70 rows, central plate with small cusps flanking the larger median cusp, base hour-glass-shaped, lateral plate with serrate cutting-edge,

posterior marginal plate with oblong base, anterior marginal more slender, both with apices entire.

Durban (S. Afr. Mus. coll. Burnup). Living: Durban; Inhambane, Portuguese East Africa (U.C.T.); Delagoa Bay (U.W.).

Cymatium gallinago (Rve.)

Triton gallinago Reeve, 1844*b*, Triton, no. 5.

Radula with *c.* 60 rows, as in *gemmatum*, but posterior marginal plate with one or two feeble denticles midway.

Durban (Sowerby; also S. Afr. Mus. coll. Burnup). Living: Inhambane, Portuguese East Africa (U.C.T.); Delagoa Bay (U.W.).

Cymatium pileare (Linn.)

Cymatium pileare and var. *aquatilis* Rve., Krauss, 1848, p. 114. Bayer, 1933, p. 46.
Lotorium aquatile Kesteven 1902*b*, p. 460, pl. 17, fig. 13 (protoconch).

Fossil: Post Pliocene, Inhambane (Cox, 1939).

Isipingo (Natal) (S. Afr. Mus. coll. Burnup). Living: Delagoa Bay (U.W.).

Distribution. Red Sea, east coast of Africa, Indo-Pacific.

Remarks. Lamarck's figure of *rubecula* (1816, pl. 413, figs. 2 *a*, *b*, and Liste p. 4 (*nubecula* [*sic*]) is very similar. *C. rubecula* (Linn.) was recorded by Tomlin (1931, p. 431) as living at Durban.

Cymatium dolarium (Linn.)

Fig. 3 *g*, *h*

Triton dolarium Krauss, 1848, p. 114. Von Martens, 1874, p. 134. Turton, 1932, p. 110, and vars. *adjacens*, *forticostatum*, pl. 24, no. 795.
Triton doliarium, von Martens, 1880, p. 266. Bayer, 1933. p. 43.
Cymatium cretaceum [*sic*] and var. *doliarium* Smith, 1906*b*, p. 293.
Triton cutaceum var. *doliarius* Schwarz, 1910, p. 114.
Lolorium [*sic*] *cretaceum* [*sic*] Krige, 1933, p. 51.

Protoconch $3\frac{1}{2}$ whorls, alt. 2–2·5 mm., diam. 2–2·25 mm., smooth, more or less sunken in 1st postnatal whorl. Postnatal whorls $4\frac{1}{2}$, profile of 1st and 2nd whorls evenly convex, but thereafter becoming more or less strongly and tabulately shouldered. Spiral lirae 5 on 1st whorl, continued on following whorls, but the 3rd, 4th, and 5th lirae become much stronger and outstanding, and bisected by a stria; the 2nd lira being close to the 3rd, the latter, forming shoulder, appears triplicate, whereas the 4th and 5th lirae remain biplicate (var. *adjacens* shows respectively 4 and 3 threads or striae); usually a fine intermediary lira between 3rd and 4th, and 4th and 5th lirae, the 5th often more or less obscured by suture of following whorl; on base 3 (4) main lirae, with intermediaries, and some obscure lirae on rostrum. On back of outer lip there are thus 6 (occasionally 7) strong main lirae. Growth-lines numerous and close-set, forming a well-marked sculpture, viz.: beaded on the lirae, striated

in the grooves. In addition 10–15 blunt nodules on the main lirae from 2nd whorl onwards, conspicuously (var. *forticostatum*) or feebly connected across the grooves by axial ribs, but never (or only very obscurely) crossing the flat tabulate shoulder (the 1st lira on this flat is more or less evanescent in the later whorls). No varices. Columella smooth but with parietal plica or knob posteriorly; umbilicate. Outer lip more or less varicoid and reflexed, with 7 broad blunt plicae within. Periostracum thick, spongy, imbricate, cancellate; the axial lines corresponding with the growth-lines, but the spiral lines far more numerous than the lirae. 74 (protoconch and 1st whorl missing) × 54 mm.; smallest with thickened outer lip ($3\frac{1}{2}$ whorls) 37 × 29 mm.

Operculum oval, incremental growth greater postero-internally than antero-externally, nucleus apical, 15 × 7·5 mm. in aperture (excl. canal) 25 mm.

Shell buff, fawn, or fulvous, sometimes with darker patches on the flat shoulder and in the grooves on back of outer lip; aperture, outer lip, and columella white; periostracum yellowish-brown; opereulum amber. Animal orange-pink with dense black spots.

Fossil: Pleistocene-Recent raised beaches: Little Brak River (Mossel Bay) (Smith, 1906b); Sedgefield near Knysna (coll. Martin); Port Elizabeth (Schwarz, 1910); Durban (Krige, 1933).

False Bay and Algoa Bay (von Martens, 1874); Port Elizabeth (Sowerby, Bayer); Simon's Bay (False Bay) (Bartsch); Port Alfred (Bartsch, Turton). False Bay, Mossel Bay, Port Elizabeth, Tongaat (Natal) (S. Afr. Mus.).

Algoa Bay, 10 fathoms, 1 juv.; off Umhloti River (Natal), 27 fathoms, 6 juv. (S. Afr. Mus. P.F. coll.).

Living: False Bay (S. Afr. Mus. P.F. coll., and U.C.T.); Delagoa Bay (U.W.).

Distribution. Mauritius (see von Martens, 1880, p. 266).

Remarks. There are plump and slender forms, e.g. 38 × 33 mm. and 44 × 30 mm.; 34 × 27 mm. (strongly tabulate and cingulate) and 32 × 18 mm. (shoulder sloping, not strongly cingulate).

Turton's varietal names are really unnecessary. There is a complete transition from shells without axial ribs or very feeble ribs to shells with strong ribs. The extra thread (stria) on the lirae is without significance, because the number may vary from one whorl to the next, e.g. the normal triplicate lira (composed of the 2nd plus the biplicate 3rd lira) on 3rd whorl may become 4-, 5-, or even 6-plicate on the 4th whorl, with concomitant increase in the number of threads on the 4th and 5th lirae from the normal 2 to 3, 4, or 5. Every lira begins as a single thread and variation in the number of component threads on the later whorls is not surprising.

On the 3rd whorl the tabulate shoulder (ledge, or as Turton called it: berm) is nearly horizontal (perpendicular to axis), but in large shells slopes more or less steeply away from the suture. The 3rd lira forming the edge of the

shoulder is more or less undulate, especially when the nodules and axial ribs are well developed.

The Algoa Bay juvenile (protoconch plus 2 whorls) has the lirae much less well developed (cingulate) than the 6 juveniles from Natal, which are normal.

Krauss held the opinion that *dolarium* was not a variety of the Mediterranean *cutaceum*. Von Martens (1874) said that most South African shells were easily distinguished from *cutaceum*, though in some the differences were not so sharp. Sowerby (1889) regarded both *dolarium* and *africanum* as varieties of *cutaceum*, but said he had seen an undoubted example of the latter from Port Elizabeth. None of these authors specified the actual differences.

Neither *cutaceum* nor *dolarium* seems to occur on any part of the west coast of Africa.

Cymatium africanum (A. Adams)

Fig. 2 *d*

Triton africanum A. Adams, 1855c, p. 312. Sowerby, 1886, p. 7.
Triton cutaceus var. *africanum* Sowerby, 1889*b*, p. 150.
Cymatium africanum Turton, 1932, p. 109, pl. 24, no. 790.

No unworn protoconch available but it appears to be slightly smaller, not exceeding diam. 2 mm. Early and middle whorls, up to 3–3½ whorls, similar to *dolarium*. At this stage, sometimes at 2½ whorls, the outer lip becomes more or less reflexed and varicoid, and the succeeding growth is closely and regularly spirally striate; the '*dolarium*-lirae' are only faintly indicated until the outer lip again becomes varicoid, where they form 6 prominent nodules. The nodules on the 3rd main lira (and less prominently on the 4th and 5th) occur also on the *africanum* whorls of the shell; if feeble on the *dolarium* whorl, they are feeble on the *africanum* whorls (S. Afr. Mus. no. A3537). An outer lip varix occurs at the end of 3rd or 4th whorl, and another opposite at 3½ or 4½ whorls.

Outer lip internally 7-dentate-plicate. Columella with parietal plica or knob posteriorly, elsewhere smooth, umbilicate.

Periostracum on the *dolarium* whorls thick and spongy, on the *africanum* whorls thin, smooth, but with the characteristic 'crinkly-paper' appearance.

Animal pale mauve-pink, with scattered lighter maroon spots, head and tentacles darker maroon, reticulated with white.

Up to 112 (protoconch missing) × 63 mm. Operculum as in *dolarium*.

Radula with 85–90 rows, central plate with small cusps flanking the larger median cusp, base hour-glass-shaped, lateral plate with serrate cutting-edge, posterior marginal plate with oblong base, some small denticles midway, anterior marginal slender, both with apices entire.

Fossil: Pleistocene: Port Elizabeth (Schwarz, 1910).

Ichaboe Island (north of Luderitzbucht, South West Africa) (Adams); Port Elizabeth (Sowerby); Port Alfred (Bartsch, 1915, Turton). Tongaat (30 miles north of Durban) and Natal south coast between Durban and Port

Shepstone (S. Afr. Mus.); Still Bay (S. Afr. Mus. coll. Muir); False Bay (S. Afr. Mus. coll. K.H.B.).

34° 27′ S., 25° 42′ E. (off Cape Recife), 256 fathoms, 1 worn juv. (S. Afr. Mus. P.F. coll.).

Living: False Bay, 9–20 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. As there are no other records from the west coast, Adams' locality (*ex* coll. Cuming) appears doubtful, especially as several of Cuming's localities are known to be erroneous.

An extensive series, even of beach material, of this curious and variable 'species' would provide an interesting study. The shape varies between plump and slender forms, e.g. 40 × 30 mm. (width 75% of length), 58 × 43 mm. (74%), 63 × 38 mm. (60%), 40 × 23 mm. (57·5%), 51 × 28 mm. (55%); the last-mentioned shell with its high spire strongly resembles *C. pustulata* in shape.

The twofold character of the shell raises questions which cannot as yet be answered. What cause induces the animal in *dolarium* shell suddenly to produce a striate, non-cingulate shell? In some animals (e.g. some Crustacea) there is very little difference between the adult female and the immature form, but the adult male assumes a very different aspect. It would be quite fanciful, however, to suggest that *dolarium* may be the immature and female form, and *africanum* the male. Nevertheless, if the opportunity arises, living examples of both 'species' should be examined and sexed.

The abrupt change in sculpture is very striking in one *Pieter Faure* shell (locality ?, S. Afr. Mus. no. A8914) where the thin new striate shell emerges from the inner surface of the varicoid lip of the strongly cingulate *dolarium* shell.

In some cases the change appears to be due to an injury to the outer lip before the normal varicoid thickening has taken place.

The change is not invariably sudden, e.g. one *Pieter Faure* shell from False Bay (S. Afr. Mus. no. A4993) is a typical though not strongly cingulate or nodulose *dolarium* for 3½ whorls, and then *gradually* changes to a smooth *africanum* with obscure lirae but prominent rounded axial ribs; there is no varicoid lip between the two sculptures, only a slightly irregular growth-line nearly at end of the 4th whorl, but at this stage the lirae were already becoming flattened and indistinct.

Turton's figure n. 790 on pl. 24, although a very worn shell, illustrates a smooth, feebly-cingulate form. The 5 lirae on the 1st whorl in normal *dolarium* (and *africanum*) are of more or less equal strength at the start, but the 3rd, 4th and 5th rapidly become stronger and more outstanding. But they may not become *very much* stronger, in fact only slightly stronger than the intermediaries. The profile of the whorls is thus convex with only an indication of the normal two girdles (the third girdle formed by the 5th lira is usually concealed in the suture of following whorl).

The worn juvenile (3 whorls) from deep water on the southern slope of the Agulhas Bank is one of these feebly cingulate forms; and there are others in

the South African Museum collected on the Natal coast together with cingulate examples.

Provisionally *africanum* is recorded here as a species. It is not a case of morphological variation in which a series of shells, young and adult, shows a transition from one kind of sculpture to another involving the whole shell; it may, however, be a physiological variation or aberration induced by injury or some ecological factor.

Cymatium klenei (Sow.)

Fig. 3 *d*

Triton klenei [*sic*] Sowerby, 1889*b*, p. 150. Sowerby, 1892, p. 8, pl. 4, fig. 87 (explanation of plate: *kleinei*). Turton, 1932, p. 110, pl. 24, no. 798 (protoconch).

Protoconch 4–4½ whorls, diam 2 mm., alt. 2·5 mm., with spiral lines of setules, 2 lines on 1st whorl, 3 on 2nd, 5 on 3rd and 4th whorls, also very fine axial striae visible chiefly above and below the sutures. Postnatal whorls 5, profile angular, sutures deep. Axial ribs 10–11 on 1st whorl, but the first 4 or 5 feeble and indistinct, 10–9 (8) on 2nd and 3rd whorls, 9–8 (7) on 4th, 8–7 on 5th whorl. Crossed by spiral lirae 5 on 1st whorl, 5–6 on 2nd, 6–7 on 3rd, the 3rd lira forming the shoulder, on 3rd and following whorls several intermediaries develop; on base 6–8 main lirae, with intermediaries. Growth-lines forming a cancellate sculpture on all whorls. Columella smooth, with a very slight parietal nodule posteriorly. Outer lip more or less plicate within, according to stage of growth. Periostracum thin, fibrous-fimbriate. 44 (protoconch and 1st whorl missing) × 29 mm.

Fawn or buff, often with a plumbeous tinge, outer lip with dark marks, aperture usually fuscous or castaneous internally with a white or pale band; periostracum pale yellowish.

Operculum and animal unknown.

Fossil: Pleistocene: Sedgefield near Knysna (coll. Martin, 1956).

Port Elizabeth (Sowerby); Port Alfred (Turton); Port St. Johns, East London, Jeffreys Bay, Mossel Bay (S. Afr. Mus.).

Off East London, 32 fathoms, 2 juv. and 1 protoconch plus 1st whorl (S. Afr. Mus. P.F. coll.).

Delagoa Bay (U.W.).

Remarks. Turton's photograph of the protoconch gives the impression of protractively oblique series of setules. In the present specimens the setules are in definite spiral lines, but not so obviously in oblique series.

Two juvenile shells, with 3 postnatal whorls, have the axial ribs very obscure on the first half of 1st postnatal whorl, and only 6–7 ribs on each of the succeeding whorls.

Cymatium (*Linatella*) *cingulatum* (Lam.)

Fusus cutaceus Lamarck, 1816, pl. 427, figs. 4 *a*, *b*. Liste p. 6.
Cassidaria cingulata Lamarck, 1822, p. 216.

Lotorium (*Lagena*) *cingulata*, Sowerby, 1897, p. 4.
Cymatium (*Linatella*) *cingulata*, Thiele, 1929, p. 282. Bayer, 1933, p. 40. Satyamurti, 1952, p. 141, pl. 12, figs. 2 *a*, *b*.

Shell thin. Protoconch $3\frac{1}{2}$ whorls, diam. 1·5 mm., alt. 2 mm., smooth. Postnatal whorls 4–5; profile evenly convex. No axial ribs. Spiral lirae 7–8 on 1st and 2nd whorls, 7 on 3rd and 4th, 15–16 on base; lirae regular, flattened on the early whorls, rounded on later whorls, subequal to the grooves, on 4th and 5th whorls the 4th lira with *c.* 20 feeble nodules. Columella sigmoid. Outer lip thin, reflexed, plicate within. Aperture wide. Periostracum thin, smooth, adherent. 42 × 29 mm.

Brown with a pale band from top of aperture, outer lip externally with pale lirae and brown grooves.

Durban (Sowerby; also S. Afr. Mus. coll. Ross-Frames).

Off Tugela River (Natal), 24 fathoms, 1 juv. (S. Afr. Mus. P.F. coll.).

Distribution. Indian Ocean, East Indies.

Remarks. Tomlin used *Paralagena* as a full genus, Thiele as a synonym of *Gelagna*, a subgen. of *Cymatium*. Thiele put this species into *Linatella*, another subgen. of *Cymatium*. Smith (1910) recorded the allied species *clandestina* in the genus *Argobuccinum* (*Paralagena*). According to the protoconch *cingulatum* would seem to be better placed in *Cymatium* than in *Argobuccinum*.

Distortrix reticulata (Bolten-Röding)

Distorsio reticulata Bolten, 1798, p. 133.
Murex cancellinus De Roissy, 1805, p. 56.
Triton clathratum Lamarck, 1816, pl. 413, figs. 4 *a*, *b*; Liste p. 4.
Persona clathrata, Chenu, 1859, fig. 707.
Triton (*Distorsio*) *cancellinus* Watson, 1886, p. 395.
Lotorium cancellinum, var. *decipiens* Smith, 1903*a*, p. 378.
Distorsio cancellina, Thiele, 1925, p. 107.
Distortrix cancellina, Bayer, 1933, p. 54. Adam & Leloup, 1938, p. 150.

Protoconch ?3 whorls, diam. 1·25–1·3 mm. (? alt., apex missing). Postnatal whorls 7. Excentric bulge beginning on 5th whorl. Axial ribs *c.* 20 on each whorl. Spiral lirae 3 on each whorl, with one or two intermediaries between each pair on later whorls; 9–10 on base, with intermediaries. Sculpture cancellate, very regular on early whorls. Columella with strong parietal plica posteriorly, lower (anterior) half with a plicate ridge projecting into aperture. Outer lip with 7–8 denticles, the 3rd from the top larger than the others. Periostracum rather thick, fibrous, with long bristles on early whorls, setose on later whorls. 36 (apex of protoconch missing) × 22 mm. A 5-whorled specimen, with excentric bulge beginning to form: 12 (protoconch missing) × 7 mm.

White, periostracum yellowish-brown.

Durban (Smith). Between Durban and St. Lucia Bay, 10–60 fathoms (U.C.T.).

Off O'Neil Peak and Durnford Point (Zululand), 55 and 90 fathoms, 5 dead, but fresh; off Morewood Cove (Natal), 27 fathoms, 1 fresh, with periostracum (S. Afr. Mus. P.F. coll.).

Distribution. East Africa, 50 metres; Mauritius, Indian Ocean, East Indies, Philippines.

Cymatium sp.

Fig. 4

Protoconch $3\frac{1}{2}$ whorls, diam. 3 mm., alt. 2·25 mm., with spiral lines of setules. Postnatal whorls $2\frac{1}{4}$, profile of 1st whorl convex, of 2nd angularly shouldered. Axial ribs *c.* 24 on 1st whorl, 18 on 2nd, not prominent, indicated on 1st whorl by the series of setules on the periostracum, becoming stronger and decreasing in number on 2nd whorl, on the second half of which they produce an undulate periphery; crossed by spiral lirae 9 on 1st whorl, subequal in strength, though the 5th is slightly the strongest and soon becomes conspicuous as the peripheral lira, on 2nd whorl the 7th and 9th lirae also become stronger, the 5th bisected by one stria, the 7th and 9th each by 2 striae; on base 2 main triplicate lirae, with intermediaries. Growth-lines forming a beaded sculpture on the lirae. Columella smooth, umbilicate. Periostracum moderately thick, the edges of each successive addition with setules on 1st whorl, but setules obsolete on 2nd whorl. Juvenile: 15 × 11 mm.

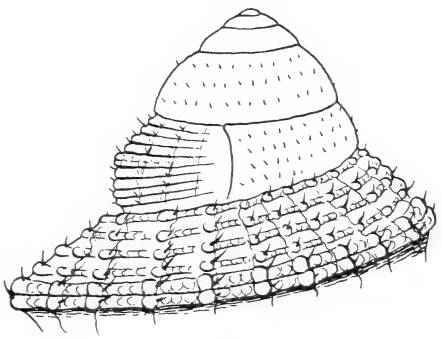


Fig. 4. Protoconch of *Cymatium* sp. (S. Afr. Mus. A4989).

Radula with 70 rows, central plate hour-glass-shaped, and other features as in *Cymatium africanum*.

Off Umhloti River (Natal), 40 fathoms, 1 juv., living (S. Afr. Mus. A4989, P.F. coll.).

Remarks. Not identifiable with any of the material available in the South African Museum, but one young specimen does not justify a new species. The figure may enable it to be identified with one of the Indo-Pacific species.

Fam. **Colubrariidae**

Colubraria fictilis (Hinds)

Triton fictilis Hinds, 1844a, p. 21. 1844c, pl. 12, pl. 4, figs. 11, 12.
Tritonium (*Colubraria*) *fictilis* von Martens, 1903, p. 41.

Protoconch 2 whorls, alt. and diam. 1·3–1·5 mm., smooth. Postnatal whorls 6. Axial ribs 13–14 on 1st whorl, increasing to 30 on 6th whorl; crossed

by spiral lirae 9–10 on 1st whorl, increasing to 24–26 on 6th whorl, on base 30–32; 3 or 4 of the lirae on 4th–6th whorls slightly larger than most of the others, some of the latter thinner, appearing like intermediaries. Varices at approximately every half whorl. Columella with 1 feeble pleat, columellar glaze concealing umbilicus, with free edge. Outer lip varicoid, feebly denticulate on inner margin. 17 × 8 mm. (Hinds's figures, ? nat. size); 28 × 10 mm.; to correspond with Hinds's figures the present 28 mm. shell should be 13 mm. wide.

Uniform pale buff.

Agulhas Bank, 50–60 fathoms (Hinds); 35° 16′ S., 22° 26′ E., 155 metres, 1 dead, and fragments (von Martens).

Off Cove Rock (East London), 80–130 fathoms, 1 living, 3 dead (S. Afr. Mus. P.F. coll.).

Remarks. The slight inequality of the spiral lirae give the axial ribs a somewhat beaded appearance, more so than in *crebrilirata*.

The front part of the animal had been extracted on some previous occasion.

One would have little hesitation in synonymizing *crebrilirata* with *fictilis*, but for the presence of multiplicate and pauciplicate examples. The latter are *crebrilirata*, but are the former *fictilis*? Hinds's description, which amounts to no more than '6 whorls, with axial ribs and spiral lirae', is not helpful; nor are his two figures, which do not seem to agree in the number of axial ribs. The figures given by Hinds also indicate a slightly broader shell; but, again, are they reliable?

Sowerby (1892) listed *fictilis*, consequently he presumably had this species in mind when he described *crebrilirata*, possibly he compared it with Hinds's type in the British Museum (Natural History). I therefore assign the above 4 multiplicate specimens to *fictilis*, keeping *crebrilirata* separate, until perhaps intergrading examples are obtained.

Mr. S. P. Dance of the British Museum (Natural History) has kindly compared an East London specimen with the Type, and confirmed the identification.

Colubraria crebrilirata (Sow.)

Epidromus crebrilirata Sowerby, 1903, p. 220, pl. 4, fig. 4.

Protoconch 2 whorls, diam. 1·3–1·5 mm., alt. 1·5–1·6 mm., smooth, shiny. Postnatal whorls 4. Axial ribs 7–8 on 1st whorl, 9–10 on 2nd, 10–11 on 3rd, 13 on 4th whorl, petering out on base, but the varices extend across base; crossed by fine spiral lirae 10–11 on 1st whorl, increasing to *c.* 20 on 4th whorl, *c.* 30 on base, all lirae equal in size and very regular. Varices at approximately every half whorl. Columella with 1 feeble pleat, columellar glaze concealing umbilicus, with free edge. Outer lip varicoid, in the Type very feebly denticulate on inner margin. 13 × 5 mm. (Type); 14 × 5 mm.; width of last whorl of a larger but broken specimen 6·5 mm.

Brown or fawn, with faint brown markings.

Off Port Alfred, 100 fathoms, 1 living, P.F. coll. (Sowerby).

Off Cape St. Blaize, 125 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Type in the South African Museum. Only the dried liver remained in the shell when I examined it.

Colubraria alfredensis Bartsch

Colubraria alfredensis Bartsch, 1915, p. 50, pl. 4, fig. 5. Turton, 1932, p. 54 (among the *Euthria* species).

One worn juvenile, protoconch plus 3 whorls, 10·5 mm. long. Protoconch appears to consist of 2 whorls, alt. 1·25 mm., diam. 2 mm., but the junction with 1st postnatal whorl is not traceable (S. Afr. Mus. coll. Turton).

One specimen, 36·5 × 10 mm., consisting of protoconch (worn) and 7 postnatal whorls, has been broken longitudinally on one side exposing the whole of the columella. The spiral lirae increase from 6 on 1st whorl and 7 on 2nd to 17 on 6th whorl.

Locality ? (possibly Port Alfred) (S. Afr. Mus. Jardine coll.).

Colubraria nitidula (Sow.)

Triton nitidula Sowerby, 1833, p. 71.
Tritonium (*Colubraria*) *nitidula*, von Martens, 1880, p. 266.
Triton (*Epidromus*) *nitidula* var. Sowerby, 1889a, p. 7. 1892, p. 9.

There is one specimen, 44 × 14·5 mm., in the South African Museum registered as no. 6616. The original entry against this number was '*Purpura cataracta*' [= *Thais dubia*] from False Bay, which would be quite in order; but the name has been changed (in the same handwriting: Lightfoot's) to *Epidromus nitidulus*, and the locality left unaltered. Evidently some error in registration has occurred; it is incredible that this shell came from False Bay; far more likley it is one of a large collection of Mauritius shells which the Museum obtained many years ago from Robillard.

Sowerby's record from 'Port Elizabeth' is also suspect. Until this species is definitely found in the waters of Natal or Portuguese East Africa, it is better omitted from the South African fauna-list.

Originally described from the Caroline Islands; and recorded from Mauritius.

Colubraria obscura (Rve.)

Triton obscura Reeve, 1844b, pl. 16, fig. 63.
Colubraria obscura, Smith, 1910, p. 195.

This Indian and East Indies species was recorded from Durban by Smith. A fine specimen, 56 × 20 mm., dead but fresh, was recently found at Umzikaba, 35 miles north of Port St. Johns.

Fam. **Cypraeidae**

Thiele, 1929, pp. 267 sqq. (*partim*: 2 subfam., 8 genera). Iredale, 1935, pp. 96–135, pls. 8, 9 coloured (superfam. *Cypraeoidea*).

Thiele (1929) included in the one family Cypraeidae not only the true cowries, but also the allied forms which are now separated. Some of the latter appear to be allied to the Lamellariidae.

The splitting-up of the original genus and the institution of new genera has left only one, or two (Schilder & Schilder) species in *Cypraea sensu stricto*.

As the present paper does not include all the recorded South African species, all the true cowries are included in *Cypraea*. The modern genera or subgenera are not used because in many cases there seems to be a difference of opinion as to their definition.

According to the Schilders in their thorough, though somewhat complex 'Prodrome' (1938–9), the Cape region (ignoring the west coast) *in tres partes divisa est*; and the species recorded from each division were listed. But the great majority of these records were based on beach material, and in some cases there are doubts whether the shells on which they were based were actually South African shells.* Such records are, so to speak, 'hearsay evidence', and of little use for zoogeographical purposes.

If any division of the Cape region were possible, it might be a twofold division: west and east of Algoa Bay. But with our present knowledge, or ignorance, of the *living* Cypraeid fauna any division would be arbitrary and premature. Has any *living* cowry been found west of Algoa Bay, or even in Algoa Bay (except *similis*)?

The *Valdivia* obtained (Cypraeidae s.s.) 1 specimen of *C. similis*; the *Pieter Faure* obtained 19 specimens of 6 species, viz. *citrina* 4, *similis* 4, *edentula* 1, *capensis* 7, *barclayi* 2, *fultoni* 1; the *Africana* has obtained 1 *similis*. Of all these, only 2 *similis* were taken alive; and these were taken off Cape Point and the west coast.

Apart from the endemic species, the following Indo-Pacific species can be admitted as living inhabitants of South African waters:

Living as far south as Delagoa Bay: Macnae & Kalk (1958, p. 127) list 20 species, viz. *caurica*, *cribraria*, *helvola*, *isabella*, *moneta*, *mauritiana*, *ocellata*, *onyx*, *talpa*, *ziczac*, as well as those mentioned below as extending farther south (but not *staphylea*).

As far south as Sinkwazi Beach (between Stanger and Tugela River): *cribraria* (S. Afr. Mus.).

As far south as Durban Bay: *lamarckii*, *chinensis*, *vitellus* (S. Afr. Mus. coll. Burnup, coll. Bell-Marley).

As far south as Inyoni Rocks (Amanzimtoti): *arabica* (U.C.T.).

* See: Von Martens, 1903, p. 51 (Crawford collection); Turton, 1932, p. 113 (Bairstow collection).

Like other 'collectors' pieces' (e.g. cones) cowries are bought and exchanged by collectors throughout the world.

As far south as Scottburgh: *tigris* (Tomlin, 1923).

As far south as Port Shepstone: *staphylea* (S. Afr. Mus. coll. Burnup); *citrina*, *carneola* (U.C.T.)

As far south as Port Edward (border of Natal and Pondoland): *annulus* (U.C.T.).

As far south as Umgazana (near Port St. Johns): *caput-serpentis*, *erosa*, *felina* (U.C.T.).

The other Indo-Pacific species require confirmation before they can be admitted to the South African fauna-list.

Iredale (1935) has given coloured figures of the animals of several species, and has remarked (p. 96) that, at least sometimes, the species cannot be discriminated without the animals.

Reeve (1845) illustrated some juveniles, and recently Ray (1951, p. 663, 2 pls.) has given several figures illustrating the transformation from juvenile to adult of *mauritiana*.

Smith (1914, p. 226) gave the size-range of *arabica*: 33–90 mm., and of *moneta*: 13–38 mm.; Griffiths (1956, p. 85), of *arabica*: 31–67, and of *lamarckii*: 19–38 mm., and of two other species, which were not so remarkable.

Gen. CYPRAEA Linn.

Melvill, 1888. Shaw, 1909. Thiele, 1929. Schilder & Schilder, 1938. Steadman & Cotton, 1946. Schilder & Schilder, 1952.* Verdcourt, 1954. Allan, 1956. Kay, 1957.

Miss Kay's researches have led her to divide the genus into only two groups, which are distinguished by the ♀ genitalia and the radula.

The radula (Cooke, 1895, fig. 127; Shaw, 1909, fig. 1; Thiele, 1929, figs. 291, 292) appears to be nearly uniform throughout the genus. Central plate square, lateral plate square or oblong, not much if at all larger than central, marginals unciform; all plates usually tricuspid, a small cusp on either side of the main cusp. I have been able to examine only seven of the South African species. Of these *fuscorubra* (*similis*, globose form) is distinct in having the lateral plate noticeably longer than the central plate.

The genus seems to be absent from the west coast south of Angola (see: Odhner, 1923, p. 11; Nicklès, 1950, p. 83; Schilder & Schilder 1938, p. 199 and maps 1, 2), with the exception of the globose form of *fuscorubra* (*similis*) (p. 43).

Cypraea nucleus Linn.

Cypraea nucleus Schilder & Schilder, 1938, p. 130. Verdcourt, 1954, p. 135, pls. 1, 2.

Living: Delagoa Bay (Schilder).

Distribution. Dar-es-Salaam, Red Sea, Mauritius, Madagascar, Indo-Pacific.

* In this work on p. 34 etc. for 'St. Thomas Bay' read: St. Francis Bay.

Cypraea citrina Gray

Cypraea citrina Schilder & Schilder, 1938, p. 132.

Radula with *c.* 55 rows (? complete), central plate square, tricuspid, lateral plate only slightly longer than central plate, and slightly longer than broad, lateral and marginal plates tricuspid, with one small cusp on inner, one on outer side of main cusp.

Off Tongaat (N. of Durban), off Cape Natal (Durban), and off Umtwalumi River (Natal), 25–47 fathoms, 4 dead (S. Afr. Mus. P.F. coll.).

Living: 30° 47′ S., 30° 29′ E. (off Port Shepstone), 24 fathoms (U.C.T.).

Distribution. Madagascar.

Remarks. An immature shell from Port St. Johns (S. Afr. Mus.), 21 mm. long, uniform brown, with projecting spire, is quite fresh and glossy; it does not look as if it had been carried very far by currents.

Cypraea helvola Linn.

Cypraea helvola Iredale, 1935, p. 116 (colour of animal). Schilder & Schilder, 1938, p. 134, and race *meridionalis* p. 135. Schilder & Schilder, 1952 (*meridionalis*). Braga, 1952, p. 84, pl. 4, fig. 4. Verdcourt, 1954, p. 135, pls. 5, 6 (race *argella*).

Living: Mozambique Island, Inhambane, and Delagoa Bay (U.W.).

Distribution. East Africa, Mauritius, Madagascar, Indo-Pacific. According to Schilder & Schilder two 'races': *argella* Melvill 1888 and *meridionalis* S. & S. 1938, occur in Natal.

Cypraea caput-serpentis Linn.

Cypraea caput-serpentis Iredale, 1935, p. 115 (colour of animal). Schilder & Schilder, 1938, p. 135. Schilder & Schilder, 1952, p. 82. Verdcourt, 1954. p. 135, pls. 7, 8. Day & Morgans, 1956, p. 306.

Cypraea lurida non Linn., Day & Morgans, 1956, p. 306.

Living: Durban Bay, and Umgazana (near Port St. Johns) (U.C.T.); Delagoa Bay (U.W.).

Distribution. East Africa, Indo-Pacific.

Remarks. I have seen the specimen on which Day & Morgans based their record of *lurida*; it is a young *caput-serpentis* with a dark median zonal band and without the expanded margins (cf. Allan, 1956, pl. 12, figs. 27, 28).

It seems strange that Turton did not find this species at Port Alfred, because dead and very worn shells are found as far west as Still Bay (S. Afr. Mus. coll. Muir).

Cypraea erosa Linn.

Cypraea erosa Iredale, 1935, p. 115, pl. 8, figs. 7, 7 *a*, 7 *b* (animal & shell). Schilder & Schilder, 1938, p. 137. Schilder & Schilder, 1952, p. 88. Verdcourt, 1954, p. 135, pls. 7, 8. Day & Morgans, 1956, p. 306.

Radula with *c.* 55 rows, as in *citrina*.

Living: Durban (S. Afr. Mus., and U.C.T.); 30° 47′ S., 30° 29′ E., 24 fathoms (U.C.T.); Umgazana (near Port St. Johns) (U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. East Africa, Mauritius, Indo-Pacific.

Remarks. C. (*Erosaria*) *nebrites* Melvill 1888, with var. *mozambicana* S. & S. 1938, cannot be sharply distinguished from *erosa*, and Verdcourt, very reasonably, was disposed to sink *nebrites* as a synonym.

Cypraea lamarckii Gray

Cypraea miliaris non Linn., Krauss, 1848, p. 128.
Cypraea lamarckii Schilder & Schilder, 1938, p. 139. Schilder & Schilder, 1952, p. 95. Verdcourt, 1954, p. 136, pls. 7, 8.

Radula with *c.* 130 rows, central plate slightly broader than long, tricuspid, lateral plate not longer than central plate, slightly broader than long, lateral and marginal plates tricuspid, with one small cusp inside and one outside the main cusp.

Living: Durban Bay (S. Afr. Mus. coll. Burnup, and coll. Bell-Marley); Delagoa Bay (U.W.).

Distribution. East Africa, Mauritius, Madagascar, India.

Cypraea moneta Linn.

Cypraea moneta Turton, 1932, p. 114. Iredale, 1935, p. 117 (colour of animal). Schilder & Schilder, 1936, p. 1113, 2 pls. (statistics). Schilder & Schilder, 1938, p. 142. Steadman & Cotton, 1946, p. 522, pl. 13, figs. 4–6 (animal & shell). Ray, 1951, p. 667, pl. 2, figs. 1, 2. Schilder & Schilder, 1952, p. 104. Verdcourt, 1954, p. 137, pls. 3, 4.

Living: Delagoa Bay (U.W.).

Distribution. East Africa, Indo-Pacific.

Remarks. Turton seemed to think that its occurrence at Port Alfred and East London indicated that it was living in that area. Beach specimens from any South African locality are far more likely to have been washed ashore from wrecks. The South African Museum has specimens washed ashore at Milnerton in Table Bay, where the money cowry certainly does not live.

C. icterina Lam. is regarded as distinct by Schilder & Schilder (1938, p. 142) and Braga (1952, p. 81, pl. 4, fig. 2), but by Allan (1956) as the East African race of *moneta*. Verdcourt said the two were not satisfactorily distinguishable. Braga's figure looks very different from normal *moneta*.

Cypraea annulus Linn.

Cypraea annulus Schilder & Schilder, 1934, p. 92 (statistics of markings). Iredale, 1935, p. 118, pl. 9, figs. 10, 10 *a*, 10 *b*. Schilder & Schilder, 1936, p. 1113 (racial statistics). Schilder, 1938, p. 141. Ray, 1951, p. 667, pl. 2, figs. 3, 4. Braga, 1952, p. 81, pl. 4, fig. 1. Verdcourt, 1954, p. 137, pls. 3, 4. Day & Morgans, 1956, p. 306.

Radula with at least 100 rows, central plate square, tricuspid, lateral plate slightly broader than long, lateral and marginal plates tricuspid, with one small cusp on inside and one on outside of main cusp.

Living: Durban Bay, and Port Edward (Natal-Pondoland border) (U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.).

Cypraea fuscorubra Shaw

Cypraea similis non Gmelin, Gray, 1831, p. 36.
Cypraea similis Gray, Krauss, 1848, p. 127. Von Martens, 1903, p. 41. Turton, 1932, p. 113.
Cypraea castanea non Bolten, Higgins, 1868, p. 178, pl. 14, figs. 1, 1 *a*.
Cypraea fuscorubra Shaw, 1909, p. 302. Turton, 1932, p. 113. Schilder & Schilder, 1952, p. 117. (for 'St. Thomas Bay' read: St. Francis Bay). Allan, 1956, p. 31, pl. 3, figs. 29, 30 (not good).

Five worn and bleached examples from St. Francis Bay (probably the locality now known as Jeffreys Bay) (S. Afr. Mus. coll. Dr. H. Becker).

From 26 (outer lip and apex of shell coextensive) × 18 mm. to 40 (outer lip, 37 to apex) × 26 mm.; width approx. 70% of shell length. Higgins gave 46 × 25 mm. (? overall).

Labial teeth on submature shell 15 (3 or 4 at each end double), on largest shell 21; columellar teeth 15–21, the posterior ones feeble; fossula with 3–5 ridges.

The larger shells are thick-walled, spire covered by callus (incomplete in the submature shell), but leaving a distinct depression.*

Uniform white, cream or pale fawn.

Remarks. These shells are certainly conspecific with *castanea* Higgins. I cannot say how they compare with *similis*, as I have not seen the early figures of Sowerby, Kiener, and Reeve, which Krauss said differed from one another. Allan's statement of the size of the British Museum (Natural History) shell, 37 × 22 mm. (width 60%), conflicts with her figures 29 and 30 on pl. 3 (width approx. 70%). Turton noted the difference between *fuscorubra* and *similis* but did not specify the respective shapes. Von Martens did not give measurements of the *Valdivia* specimen. Schilder & Schilder (1952) gave width 62% of length.

The above synonymy, therefore, may have to be revised, and the *Valdivia* record may be incorrectly quoted here.

35° 10′ S., 23° 2′ E., 500 metres, one broken shell (von Martens).

A University of Cape Town specimen from False Bay (34° 15′ S., 18° 36′ E.), 51 metres, seems to connect the above form with the globose form. It is 35 (32) × 23·5 mm.; labial teeth 19 (20), columella with 21 (22) denticles. Outer lip thickened, spire covered with callus, but depression remaining. Fossula smooth (*very slightly* undulate). Warm brown, marbled; 4 black spots on outer lip.

* The term 'umbilicus' seems to be generally used, but it is undesirable because it has long been customarily employed to denote the cavity at the *anterior* end of the gastropod shell.

Globose form

Fig. 5 *a–c*

Cypraea similis, Gray, var. Sowerby, 1903, p. 230.

This *Nanquas Peak* specimen was not returned by Sowerby to the South African Museum; but there are three other *Pieter Faure* specimens, one of which was seen by Sowerby and identified as '? *similis*, a globose form'.

25 (overall, 23 to apex of shell) × 19 mm., 35 mm. (32) × 26 mm., and 34 mm. (32) × 26 mm.; width approx. 80% of length.

Labial teeth (18)19–20; columellar teeth 19 in the smallest shell, 18 in one large one, and 10 in the other large shell with only a plain ridge posteriorly; fossula steeply inclined, without ridges, but in the smallest shell with 2 denticles.

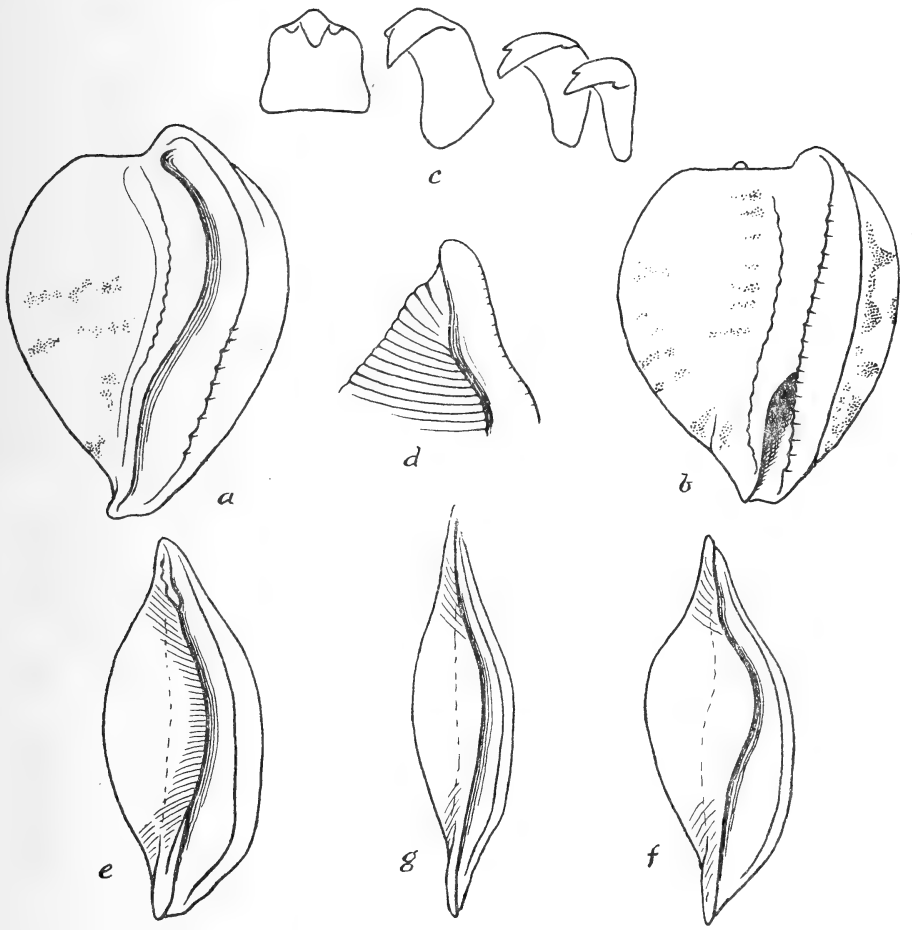


FIG. 5. *Cypraea fuscorubra* Shaw, globose form. *a*, *Africana* shell. *b*, *Pieter Faure* shell. *c*, radula teeth. *d*, *Primovula beckeri* (Sow.), apex of juvenile shell. *Volva*: *e*, *sowerbyana* Weink. *f*, *aurantia* (Sow.). *g*, *birostris* (Linn.).

The smallest shell is thick-walled, and the spire is covered with callus, though a depression remains; the two larger shells are thin-walled and submature, with 5 whorls (protoconch plus postnatal) showing the spire and shallow sutural grooves.

The *Africana* specimen is 37 (35) × 27 mm.; labial denticles 9 on anterior half, columella with 12 obscure granules.

White with orange-brown spots, mainly near the outer lip and columella, evanescent or obsolete dorsally.

Radula with 70–85 rows, central plate square, tricuspid, lateral plate oblong, longer than broad and longer than central plate, lateral and marginal plates tricuspid, a small cusp on inside and one on outside of the main cusp.

Off Nanquas Peak (eastern end of Algoa Bay), 63 fathoms, 1 (Sowerby).

Cape Point N. 50° E., distant 18 miles, 180 fathoms, 1 living, 2 submature, dead but fresh (S. Afr. Mus. P.F. coll.).

Off Olifants River mouth (west coast), approx. 31° 40′ S., 16° 55′ E., 157 fathoms, one living (Fisheries Survey vessel *Africana*, per U.C.T.).

Remarks. It is a little difficult to consider these shells as conspecific with the above described shells from St. Francis Bay. But as Sowerby, with his better facilities of literature and material, did not propose a new specific name, I follow him, at least provisionally. Moreover, the U.C.T. specimen is intermediate.

Berry (1954, p. 83) gave the length of a dead *fuscorubra* shell from Cape Agulhas as 41 mm. The width was not given, but from the statement: '. . . the shell is gibbous or swollen and inflated' one might infer that the shell resembles the globose form here described.

Cypraea fuscodentata Gray

Cypraea fuscodentata Gray, 1825, p. 499. Krauss, 1848, p. 127. Schilder & Schilder, 1938, p. 146. Schilder & Schilder, 1952, p. 117.
Cypraea angustata Gmelin, Steadman & Cotton, 1946, p. 513.

23–36 mm. I have seen a very broad living example: 30 × 20 mm.; the normal width of a beach-worn shell of this length is 16–17 mm. Fawn or fulvous, uniform or spotted or freckled with brown, or (beach-worn) with a median zonal band, labial and columellar teeth orange-brown on a pale buff ground-colour.

Remarks. The idea of two local races (Schilder & Schilder, 1938) in such a small area is quite unscientific, especially as one of them is recorded only from the vague locality 'Cape of Good Hope'.

Krauss mentioned the difficulty in some cases of separating *fuscodentata* from *similis*; and Schilder & Schilder suggested that one of the 'local races' (*coronata* Schilder 1930, with shorter teeth in the middle of the columella) seemed to connect the two species. With the material at hand, however, there seems little likelihood of confusing *fuscorubra* (*similis*), which has only mere

knob-like columellar teeth, with *fuscodentata* which has long ridge-like teeth, even with immature shells of the latter when the ridges are shorter than in the adult. Worn specimens also show shorter ridges.

Steadman & Cotton made *fuscodentata* and *coronata* synonyms of *angustata* Gmelin, which the Schilders (1938 and 1952) consider an Australian species in a different genus. It would be a pity to have to give up the name *fuscodentata* for a species with such distinctive brown teeth.

Cypraea algoensis Gray

Cypraea algoensis Gray, 1825, p. 498. Krauss, 1848, p. 127. Melvill, 1888, p. 221, 222, pl. 2, fig. 21. Turton, 1932, p. 114. Schilder & Schilder, 1938, p. 147. Schilder & Schilder, 1952, p. 117. Allan, 1956, p. 31, pl. 2. figs. 27, 28.

The relationship between this form and *edentula* needs investigation; they may eventually be combined. Turton referred to a 'var denticulata' but was unable to trace an author. The South African Museum has examples so labelled by Dr. H. Becker, who may have invented this MS. name.

Cypraea edentula Sow.

Cypraea edentula Sowerby, 1832, fig. 26. Schilder & Schilder, 1929, p. 230, and p. 231 (subsp. *alfredensis*). Turton, 1932, pp. 113, 114. Schilder & Schilder, 1938, p. 147.

Length 15–31 mm. Dorsally there seems to be no difference between this and *algoensis*; in both there are plain, speckled, spotted, and blotched examples, and some with indications of a median zonal band. They can be distinguished by the columellar area which is perfectly smooth in *edentula*, but has a row of granules or little knobs in *algoensis*; and the labial teeth are well developed in the latter, but evanescent or obsolete in the former (sometimes there are a few denticles anteriorly).

Dead shells found as far west as Still Bay (S. Afr. Mus. coll. Muir).

Off Cape Morgan, 47 fathoms, 1 dead but fresh (S. Afr. Mus. P.F. coll.).

Cypraea capensis Gray

Cypraea capensis Gray, 1828, p. 573. Chenu, 1859, figs. 1728, 1729. Melvill, 1888, p. 221 footnote, pl. 2, fig. 20. Schilder & Schilder, 1929, p. 230 (statistics). Turton, 1932, p. 113, pl. 25, no. 819, and var. *albolineata* pl. 25, no. 820. Schilder & Schilder, 1938, p. 147. Schilder & Schilder, 1952, p. 118. Berry, 1954, p. 83. Allan, 1956, p. 30, pl. 2, figs. 23, 24 (not good, wrong shape).

Cypraea amphithales Melvill, 1888, p. 221, pl. 2, fig. 19. Sowerby, 1892, p. 31, pl. 5, figs. 94–96. Turton, 1932, p. 113. Schilder & Schilder, 1938, p. 147. Schilder & Schilder, 1952, p. 118. Berry, 1954, p. 83. Allan, 1956, p. 30, pl. 3, fig. 31.

Buff or fawn, sometimes speckled, often with an irregular brown or castaneous patch on back (cf. Melvill's original description; also Allan's description of *amphithales*: '. . . a tan central blotching and a few elongated coloured streaks'!); immature specimens often show a darker median zonal band; teeth orange-brown (but not so conspicuous as in *fuscodentata*).

36 (overall, 32 to apex of shell) × 20 mm.; 35 (31·5) × 21 mm. The proportions in Allan's figure of *capensis* are quite incorrect; Chenu's figures are excellent. Shell length ranges from 18 to 32 mm. (incl. outer lip 19·5–36 mm.).

Algoa Bay, 25 fathoms, 1 dead; off Hood Point, Nieca River, and East London, 42–85 fathoms, 3 dead, and fragments; off Cape Morgan, 36 fathoms, 2 dead; off Sandy Point (north of Cape Morgan), 51 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Remarks. Melvill's photograph fig. 19 of *amphithales* just fails to show the columellar lirae clearly; but his text (p. 222) says: 'The columellar teeth, *as in that species* [i.e. *capensis*] are represented by the *fine projecting lirae alone* . . .' (italics mine). Sowerby's drawing clearly shows a shell of *capensis*. Consequently I regard *amphithales* as merely a casual aberration with spots on the sides. The distinctions given by Allan are trivial. The smooth back is due either to immaturity (*v. infra*) or wear. The Schilders (1952, p. 118) state that only 5 examples of this 'rare species' are known; Melvill & Sykes (1897, p. 168), however, said that 'several specimens, some in live condition, have come to hand in recent years . . .'.

The smallest mature shell: 18 (incl. outer lip 19·5) × 12·5 mm., is one of two taken by the *Pieter Faure* off Cape Morgan; the other is 20 (22) × 13 mm.

The juvenile from off Hood Point (East London area), 42 fathoms is 17·5 (19·5) × 13 mm. Uniform cream, smooth and glossy; 4 whorls, spire in apical depression, outer lip with faint indications of developing teeth, columella with *c.* 42 fine ridges.

This specimen also helps to show that *amphithales* is not a valid species.

Cypraea onyx Linn.

Cypraea onyx Schilder & Schilder, 1938, p. 149. Braga, 1952, p. 82, pl. 4, fig. 7. Verdcourt, 1954, p. 137, pls. 13, 14.

Radula with 40 rows (incomplete), as in *citrina*.

Inhambane (von Martens, 1879; Schilder & Schilder).

Living: Delagoa Bay (U.W.).

Cypraea barclayi Rve.

Cypraea barclayi Reeve, 1857, p. 208, pl. 38, fig. 4. Melvill, 1888, pp. 201, 243. Sowerby, 1903, p. 230. Schilder & Schilder, 1952, p. 124. Allan, 1956, p. 60, pl. 8, figs. 17, 18.

White with faint brown speckling. 22 × 14 mm.

Off Cape St. Blaize, 55 fathoms, 1 dead (Sowerby) (this specimen was not returned to the South African Museum).

Off Umtwalumi River (Natal), 50 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Distribution. Diego Garcia (Chagos Archipelago) (Allan incorrectly gave Mauritius as the type locality, apparently following Melvill's error on p. 243).

Remarks. The Schilders (1952) stated that only one specimen was known, viz. the one mentioned by Sowerby as being in the Saul collection at Cambridge University Zoological Museum; they overlooked Sowerby's 1903 record. Where is this *Pieter Faure* specimen which Sowerby recorded?

Cypraea felina Gmelin

Cypraea felina, Schilder & Schilder, 1938, p. 160. Verdcourt, 1954, p. 138, pls. 3, 4.
Cypraea listeri Gray, 1825, p. 507.

Living: Umgazana (Port St. Johns) (U.C.T.); Delagoa Bay (U.W.).

Cypraea chinensis Gmelin

Cypraea chinensis Gmelin, 1791, p. 3421. Iredale, 1935, p. 131 (colour of animal). Schilder & Schilder, 1938, p. 170.
Cypraea cruenta Gmelin, Turton, 1932, p. 114.
Cypraea variolaria Lamarck, 1810, p. 91. Shaw, 1909, p. 294. Schilder & Schilder, 1952, p. 169, pl. 2, figs. 3, 6.
Cypraea violacea Rous, 1905. Verdcourt, 1954, p. 140, pls. 3, 4.
Cypraea tortirostris Sowerby, 1906, p. 39, text-fig. Turton, 1932, p. 114.

Living: Durban (S. Afr. Mus. coll. Burnup); Delagoa Bay, (U.W.).

Remarks. Sowerby described *tortirostris* as a variety of *cruenta*, saying that although it looked like a monstrosity, it seemed to represent a local race. He had 3 specimens from the Kowie (= Port Alfred), and Turton found 2 at the same place. The Schilders (1938) adopted the 'local race' idea. But the occurrence there also of *chinensis* (*cruenta*) seems to negative this. It may represent a dwarf race (Sowerby: 12 × 7 mm. as compared with e.g. 40 × 24 mm.), but it seems more correctly termed a monstrosity, as the Schilders (1952) called the example in the Dautzenberg collection.

Shaw (1909, p. 294) suggested using *variolaria* instead of *cruenta*.

Cypraea isabella Linn.

Cypraea isabella, Iredale, 1935, p. 113 (colour of animal). Schilder & Schilder, 1938, p. 176. Verdcourt, 1954, p. 140, pls. 5, 6.

Living: Delagoa Bay (U.W.).

Cypraea tigris Linn.

Cypraea tigris, Iredale, 1935, p. 112 (colour of animal). Schilder & Schilder, 1939, p. 185. Verdcourt, 1954, p. 142, pls. 5, 6.

Living: Scottburgh (Natal) (Tomlin, 1923); Delagoa Bay (U.W.).

Cypraea vitellus Linn.

Cypraea vitellus, Iredale, 1935, p. 111, pl. 8, figs. 5, 5 *a* (animal & shell). Schilder & Schilder, 1939, p. 186. Verdcourt, 1954, p. 143, pls. 13, 14.

Living: Durban Bay (S. Afr. Mus. coll. Burnup); Delagoa Bay (U.W.).

Cypraea arabica Linn.

Cypraea arabica, Shaw, 1909, p. 306, and var. *eglantina* Duclos. Iredale, 1935, p. 108, pl. 8, figs. 1, 1 *a* (animal & shell). Schilder & Schilder, 1939, p. 183. Verdcourt, 1954, p. 141, pls. 11, 12, with subsp. *immanis* Schilder & Schilder 1939. Griffiths, 1956, p. 85, pl. 3. (statistics). Day & Morgans, 1956, p. 306.

Radula with at least 60 rows, all plates tricuspid as in the other species here described.

Living: Inyoni Rocks (Amanzimtoti, Natal) and Durban Bay (U.C.T.); Delagoa Bay (U.W.).

Cypraea fultoni Sow.

Cypraea fultoni Sowerby, 1903, p. 218, pl. 4, fig. 7 (3 views). Schilder, 1932a, p. 171 (list of known specimens). Tomlin & Salisbury, 1934, p. 148, pl. 18 (3 views). Schilder & Schilder, 1938, p. 173. Schilder & Schilder, 1952, p. 176. Berry, 1954, p. 82, pl. (3 views). Allan, 1956, p. 26, pl. 3, figs. 17, 18.

Holotype in the South African Museum. Reg. no. A5053.

Tomlin & Salisbury gave photographic illustrations of a better specimen than the Type, which was a dead shell. It was slightly larger: 62 × 43, alt. 32 mm., Type 60 × 39, alt. 30 mm.

These authors probably did not know where the Type was deposited. They stated that 'the base is spotted exactly as represented in the figure of the Type'. This is not *exactly* correct, as a comparison of the figures will show: compare, for example the 4 spots forming a square on the anterior part of the columella with the *single* spot in the Type; this '4 to 1' arrangement is reversed on the posterior half of the shell: 4 in the *Pieter Faure* Type, one in the T. & S. shell. Moreover, the T. & S. shell has a somewhat angular profile on the left (columellar) side; the greatest width is thus in the posterior half, not midway as in the Type.

In 1952 the Schilders stated that this specimen had been returned to South Africa, presumably to Mr. Falcon, who had submitted it to Tomlin & Salisbury; and also that the Type had been sold to America. They did not state their authority for the latter statement, which is quite incorrect.

Berry's photographs show a shell with a nearly symmetrical oval outline, thus approximating to the Type.

Allan described and figured an example in the British Museum (Natural History) marked 'type'. Her figure shows a more triangularly shaped shell with greatest width in the posterior half.

I am informed by Mr. Salisbury that the 'type' label has been removed from the British Museum (Natural History) specimen, after I had told him that the real Type was in the South African Museum.

There can be no doubt that the South African Museum specimen is the Holotype. It agrees with Sowerby's figures in shape, and with his measurements, though I make the altitude 30 mm. instead of 29 mm.; the figure makes it 31 mm. The markings on the dorsum agree, including the E mark on the right side; and the spots *exactly* agree in number and position, though the

artist might have drawn them a trifle larger so as to bring them closer together.

Finally, it bears Sowerby's autographic label: '*Cypraea Fultoni*, Sow. Type unique. Plate iv. fig. 7. 3 views.'

The number of specimens known, and where the Type is deposited, however, are of secondary importance. *Has any animal been examined*? In an American sale catalogue (1958), a 67 mm. specimen was offered for sale (bidding to start at '$120.00'). When taken from the fish's stomach the mollusc was alive. What has happened to this *animal*?

Cypraea broderipi Gray in Sow.

Cypraea broderipi Sow., Dance, 1960, p. 446.

Mr. S. P. Dance has recently recorded a specimen of this species *ex pisce* from Natal (H. W. Bell-Marley) in the British Museum (Natural History). The specimen measures 75·5 × 52 mm.; it is in very poor condition, which suggests it may have been in the fish for a considerable time.

The Type was said to have come from Madagascar.

Closely related to *vitellus* Lam.

Fam. **Triviidae**

Shaw, 1909, pp. 288–292, 308–311, 312, text-fig. 2, pl. 12, fig. 2, pl. 13. Schilder, 1927, pp. 1–171. Lebour, 1931, p. 819 (larva, metamorphosis). Schilder, 1932*c*, pp. 90–109. Lebour, 1933, p. 477 (larva, metamorphosis). Fretter, 1951, pp. 14–20 (habits, egg-laying).

Radula, central plate more or less square, small cusps on either side of median cusp, lateral plate longer than central plate, uncinate, with small cusps on either side of main cusp (usually one on inside, several on outside), marginal plates uncinate, simple or serrate. (Shaw, fig. 2; Thiele, fig. 282; Tomlin & Schilder, 1934, fig. 3.)

These molluscs feed and lay their eggs on compound ascidians (Lebour, Fretter).

Nothing is known about the habits of the South African species. In fact, most of the species recorded from South Africa seem to be known only from beach material; in spite of which subspecies and varieties have been instituted.

The *Pieter Faure* obtained 13 specimens, 2 of which were living.

Thiele in his subfam. Triviinae admitted the genera *Erato* and *Trivia*, the latter with 3 subgenera and 6 sections. As in *Cypraea*, these have risen to the status of genera, and further subdivision has taken place. The definitions of these genera (subgenera), however, are not very clear-cut. For example, Tomlin & Schilder considered *splendidissima* (*infra*, p. 51) intermediate between *Trivia* and *Triviella*.

Perhaps when more life histories and growth changes have been studied, a more natural classification will be possible.

Gen. Trivia[1] Gray

Subgen. Triviella Jouss

The subgenus is South African, with 4 species (Schilder, 1932c), to which *splendidissima* T. & S. was added in 1934.

Trivia (*Triviella*) *ovulata* (Lam.)

Fig. 6 *a*

Trivia ovulata, Chenu, 1859, figs. 1739, 1740. Shaw, 1909, p. 312 (var. *rubra*). Schilder, 1927, p. 164 (var. *amaryllis*). Schilder & Schilder, 1929, p. 234 (var. *rubra*, statistics). Schilder, 1930, pp. 71, 73 (var. *rubra*).

Radula with 37 rows, central plate convex in front, side margins indented, lateral plate with 6–7 denticles on outer side of main cusp, inner denticle evanescent, marginal plates non-serrate.

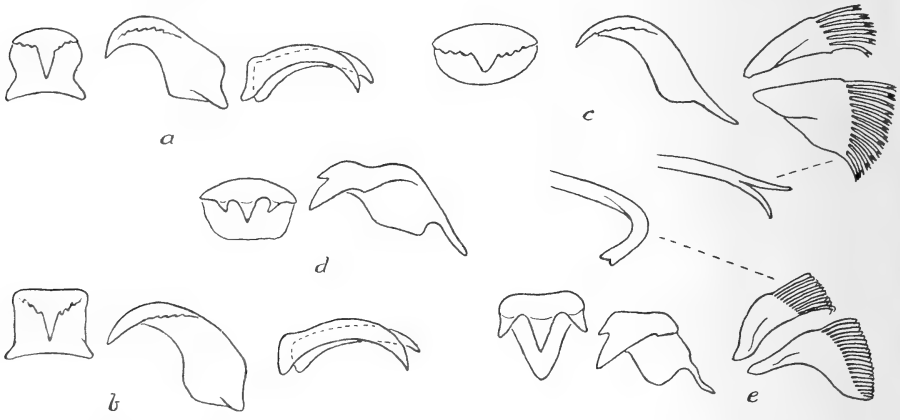


Fig. 6. Radula teeth of: *a*, *Trivia* (*Triviella*) *ovulata* (Lam.). *b*, *T.* (*Pusula*) *suavis* Schilder. *c*, *Primovula beckeri* (Sow.). *d*, *Volva volva* (Linn.) (marginal plates omitted). *e*, *V. aurantia* (Sow.).

Living: False Bay, 5 fathoms, 1 (S. Afr. Mus. P.F. coll.).

In addition the *Pieter Faure* collected 3 dead globose specimens, one of which was identified by Sowerby as '? *ovulata* var.' (S. Afr. Mus. nos. A5067–9). One (A5068) was subsequently sent to Tomlin, but neither identified nor returned.

The remaining two measure: 14·5 × 13·5, alt. 11 mm., and 12 × 10, alt. 8·5 mm. The larger has 15 labial teeth, 15 columellar teeth, the latter feeble (mere granules) on posterior half; the smaller has respectively 12 and 14 teeth. The labial teeth are continued as ribs over the inflated outer lip, but the base is quite smooth. Whole of dorsal surface and spire smooth.

Off Great Fish Point, 51 fathoms, 1; off East London, 52 fathoms, 1; off Cape Morgan, 47 fathoms, 1 (S. Afr. Mus. P.F. coll.).

Beyond recording these specimens under Sowerby's identification no comment is advisable until further material is available.

Trivia (*Triviella*) *aperta* (Swainson)

Trivia aperta, Shaw, 1909, p. 31. Schilder & Schilder, 1929, p. 232 (statistics). Schilder, 1930, pp. 72, 73 (subsp. *neglecta*).

In not fully mature shells, before the ribs are completely formed, the dorsum to a greater or lesser extent is smooth; but from an early stage (before outer lip is inflected) the ribs cross the base and start to cross the spire. One growth-stage when the ribs are only beginning to be formed across the base, or only on the anterior part of the base, might almost be called the '*ovulata*-stage'.

Even when mature the ribs are interrupted in the middle of the dorsum by a smooth longitudinal groove or impression.

Although not taken by the *Pieter Faure*, the species is included here to record the revised specific name.

Trivia (*Triviella*) *vesicularis* (Gaskoin)

Trivia vesicularis, Schilder & Schilder, 1929, p. 233, & subsp. *pseudovulata* (statistics). Schilder, 1930, pp. 71–73 (subsp. *phalacra*).

According to Turton (1932) the dorsum is smooth; according to Allan (1956, pl. 14. fig. 57) it is ribbed. According to Schilder the dorsum is ribbed in *vesicularis sensu stricto*, and the columellar teeth are continued across the base; in subsp. *pseudovulata* the dorsum is quite smooth, sometimes as if 'hammered' (Schilder), and the columellar teeth are confined to the margin of the aperture, except at each extremity. The subspecific name should be deleted from the fauna list as it is obviously based on beach-worn material, the 'hammered' appearance being analogous to the 'chatter marks' on rolled pebbles. I have not seen the description of *phalacra*, but from its name that subspecies is probably also based on worn shells.

Trivia (*Triviella*) *splendidissima* T. & S.

Tomlin & Schilder, 1934, p. 477, figs. 1–3.

Holotype *ubi*? It was not returned to the South African Museum.

No further examples of this species were found during the recent sorting of the *Pieter Faure* bottom-samples.

Subgen. Pusula Jouss

Trivia (*Pusula*) *globosa* (Sow.)

Trivia globosa, Schilder, 1932c, pp. 96, 97. Tomlin, 1931, p. 429.

Dorsal groove well marked from apex to base (when adult). Intervals between ribs with fine axial pliculae, especially on lower surface. The 2 Natal shells have labial teeth 21, columellar teeth 18–19; the St. Francis Bay shell has 20 and 16 respectively.

4 × 3·3 mm., alt. 3 mm. (Scottburgh); 4·3 × 3·75 alt. 3·5 mm. (St. Francis Bay).

Isezela, Tongaat, Port Shepstone (Tomlin); Scottburgh (Natal), 1 fresh (S. Afr. Mus. coll. Burnup); off Umkomaas (Natal), 40 fathoms, 1 immature; St. Francis Bay (34° 3′ S., 25° 10′ E.), 24–34 fathoms, 1 worn (S. Afr. Mus. P.F. coll.).

Known from the Red Sea, India, and Pacific.

Trivia (*Pusula*) *suavis* Schilder

Trivia suavis Schilder, 1931, p. 65. Schilder, 1932c, p. 94.

Radula with 33 rows, central plate square, 3–4 denticles on either side of median cusp, lateral plate feebly denticulate on outer side of main cusp, marginal plates non-serrate.

Off Glendower Beacon (Port Alfred), 66 fathoms, 1; off Nieca River and East London, 50–52 fathoms, 3; off Umkomaas (Natal) 40 fathoms, 1; off Umhloti River, 40 fathoms, 1; all dead but mostly fresh (S. Afr. Mus. P.F. coll.).

Living: False Bay (34° 19′ S., 18° 30′ E.), 52 metres, 1 (U.C.T.).

Subgen. Trivirostra Jouss

Trivia (*Trivirostra*) *oryza* (Lam.)

Trivia oryza Lamarck, 1810, p. 104. Schilder, 1932c, p. 101. Ray, 1951, pl. 2, figs. 5, 6 (not fig. 7 = *C. erosa*).
Trivia scabriuscula Gray, 1827, p. 364.
Trivia sulcata Shaw, 1909, p. 311.

Kowie (Port Alfred) (S. Afr. Mus. coll. Becker); Isezela (Natal) (S. Afr. Mus. coll. Burnup).

Trivia (*Trivirostra*) *hordacea* (Kien.)

Trivia hordacea, Schilder, 1932c, p. 101.

Tongaat (30 miles north of Durban) (S. Afr. Mus.); Port Shepstone (Natal) (S. Afr. Mus. coll. Burnup); Pondoland (Port Alfred) (S. Afr. Mus. coll. Becker).

The two Tongaat specimens are both immature, with smooth, glossy dorsum.

Trivia (*Trivirostra*) *pellucidula* (Gaskoin)

Trivia pellucidula, & n. subsp. *natalensis* Schilder, 1932c, p. 102.

Tongaat (Natal) (S. Afr. Mus.); Port Shepstone (Natal) (S. Afr. Mus. coll. Burnup); East London (S. Afr. Mus.); Pondoland (S. Afr. Mus. coll. Becker).

Off Tugela River (Natal), 65–80 fathoms, 1 worn (S. Afr. Mus. P.F. coll.).

Fam. **Eratoidae**

Smith, 1910b, p. 13. Schilder, 1932c, p. 46. Lebour, 1933b, p. 485 (larva, metamorphosis). Schilder, 1933, pp. 244–283, 85 figs. (keys to genera and species).

The animals feed on compound ascidians (Lebour, 1933b: *Erato voluta*).

Gen. Proterato Schilder

Schilder, 1927, p. 57. Schilder, 1933, pp. 246 (in key), 247, 248, 257.

Proterato sulcifera (Sow.)

Erato guttula Sow., Smith, 1903, p. 379.
Erato sulcifera Smith, 1910b, p. 19. Schilder, 1932c, p. 86. Schilder, 1933, pp. 248, 253, 255, 257, 271, 273, figs. 20, 21; also p. 261, fig. 22 (*capensis*), and p. 271, fig. 24 (*smithi*).

A dorsal longitudinal groove, often very indistinct, and sometimes restricted to the anterior end (*capensis*), or absent (*smithi*), smooth or granulate, the granules over whole shell or restricted to the posterior end, sometimes forming short axial riblets. Labial and columellar teeth 19–21.

Cream, buff, pinkish, pale greenish, sometimes faintly banded. 3·5–5·2 mm. long.

Durban (Smith); Port Shepstone (Natal) (Smith; also S. Afr. Mus. coll. Burnup).

Off Cape Vidal (Zululand), 80–100 fathoms, 1 dead, worn; off Cape Natal (Durban), 54–85 fathoms, 4 dead but fresh; off Illovo River (Natal), 27–30 fathoms, 2 dead, worn (one of them immature); off Umkomaas (Natal), 40 fathoms, 4 dead; off Cove Rock (East London), 22 fathoms, 1 dead, worn (small, distinctly granulate) (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E., 71 metres, 1 living (U.C.T.).

Distribution. Zanzibar, Mauritius, Madagascar, Indo-Pacific.

Fam. **Pediculariidae**

Schilder, 1931b, pp. 165–169, pl. 6.

Radula, central plate broader than long, with small cusps on either side of median cusp, lateral plate short but strongly uncinate, with small cusps on either side of main cusp, marginal plates elongate, apically acute (or claw-like) with 2 subapical long slender bristle-like projections. (Thiele, 1929, fig. 284.)

Living on corals. Young shell *Cypraea*-like in shape, with both lips reflected and denticulate; mature shell limpet-like, with sharp apertural margins. The animals do not change their place on the coral. The colour in life probably matches that of the coral.

Pedicularia elegantissima Desh.

Pedicularia elegantissima Deshayes, 1863, p. 50, pl. 6, figs. 23–26. Von Martens, 1880, p. 257, Schilder, 1931b, pp. 166, footnotes 1 and 6 (p. 67), 168, pl. 6, figs. 4 *a*, *b*, with *subtilis* n.sp.
Pedicularia sicula, *non* Swainson, Sowerby, 1903, p. 230. Smith, 1906a, p. 42.

Aperture narrow oval, columellar margin nearly straight, dorsum variously humped, often irregular; spire not visible; radial dorsal striae fine, about 10 in a space of 1 mm. on middle of back, distinct. In some of the specimens there is a distinct groove between the columella and the sharp 'false' inner lip.

The Cape St. Blaize specimen, seen by Sowerby, measures 12 × 6 mm. (in widest part); the others range from 3 to 7 mm. in length.

Off Cape St. Blaize, 116 fathoms (Sowerby).

Off Umkomaas (Natal), 40 fathoms, 5 dead; off Cape Morgan, 47 and 95 fathoms, 4 dead; off Hood Point (East London), 49 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Distribution. Réunion, Mauritius, Seychelles.

Remarks. Schilder described *subtilis*, also from Réunion, based on characters which are negligible in a shell which may vary according to its immediate environment.

The differentiation of the so-called 'species' appears to be more geographical than morphological. The South African specimens are therefore, on that basis, more properly assigned to *elegantissima* (incl. *subtilis*) than to the Mediterranean *sicula*. There is, however, one character mentioned by Schilder (footnote 1 on p. 167) which may prove constant: the number of radial riblets or striae in a space of 1 mm. on the middle of the back is *c.* 5 in *sicula*, 10 in *elegantissima*. The present specimens conform with the latter.

The kind of coral on which the specimen sent to Sowerby was found, is not recorded. The hydrocoralline from which one of the Cape Morgan examples was taken, is a stylasterid (*Stylaster* or *Allopora*). The other specimens have been picked out of bottom-samples, but 'branching corals' are mentioned in the *Pieter Faure* log-book as occurring at all the above localities.

Hedley (1903, p. 343) gave a list of recorded host-corals, including *Stylaster* and *Distichopora*.

Fam. **Amphiperatidae**

Schilder, 1931a, p. 364.
Schilder, 1932b, pp. 46–64, pls. 3–5 (with key to genera).

Radula, central plate usually broad, with several small cusps on either side of the larger median cusp, lateral plate longer than central plate, uncinate, unicuspid or with small accessory cusp(s), external hind corner of base with a narrow prolongation, marginal plates flat, triangular, widening distally, with a comb-like row of slender projections. (Thiele, 1929, figs. 287, 290.)

Schilder (1932b) gave basal views of all the South African species except *V. aurantia*, viz.: *Amphiperas ovum*, *C. verrucosus*, *P. beckeri*, *N. gracillima*, *V. volva*, *sowerbyana*, and *birostris*.

Bergh (1905, pl. 5, fig. 21) gave a coloured figure of the animal of *A. ovum*.

Calpurnus verrucosus (Linn.)

Calpurnus verrucosus, Chenu, 1859, figs. 1786–1788. Schepman, 1909, p. 146, pl. 15, fig. 10 (radula). Schilder, 1932b, pp. 53, 60, pl. 4, fig. 38. Iredale, 1935, p. 102, pl. 8, figs. 4, 4 *a*, 4 *b* (coloured, animal and shell).

Back high, with a more or less sharp transverse ridge, and a round tubercle at each extremity. Pinkish white. Up to 35 mm. long.

Animal white, foot with numerous black spots, mantle with smaller spots (Iredale).

Radula (Schepman), central plate with very large median cusp and a small denticle on each side, hind corners of base alately expanded, lateral plate with a denticle on outside of main cusp, marginal plates comb-like.

Mozambique Island (S. Afr. Mus. coll. K. Grosch).

Distribution. Madagascar, Indo-Pacific.

Primovula beckeri (Sow.)

Figs. 5 *d*, 6 *c*

Amphiperas beckeri Sowerby, 1900, p. 5, pl. 1, fig. 13. Tomlin, 1926, p. 293. Turton, 1932, p. 113.
Primovula beckeri Thiele, 1929, p. 271, fig. 288. Schilder, 1932b, pp. 52, 58, pl. 3, fig. 13.

Columellar pleat or callus (funiculum) at posterior end prominent in mature shells, with 3–4 crenulations; not developed in immature shell (5·5 mm. long). Labial teeth 30–36. Striae over whole shell.

Pink with pale median zonal band (often faint), extremities yellowish. Mature 5–8 mm. long.

Radula with *c*. 30 rows, central plate oval, broader than long, with 3–4 denticles on either side of median cusp, lateral plate with 4–5 denticles on outer side of main cusp, marginal plates with respectively 13 and 6 distal projections, apically distinctly bifid.

Port Alfred (Kowie, Pondoland) (Sowerby, Bartsch, 1915, Turton; also S. Afr. Mus.); Port Shepstone (Natal) (Tomlin).

Off Cove Rock (East London), 22 fathoms, 1 dead; off Cape Morgan, 47 fathoms, 4 dead; off Umhloti River (Natal), 40 fathoms, 1 dead; off Umkomaas (Natal), 40 fathoms, 1 immature, living (S. Afr. Mus. P.F. coll.).

Remarks. Schilder described (1931a, p. 364, text-fig. 5) *tropica* from the Seychelles as a subspecies of *beckeri*, but in 1932 (p. 51, footnote), after having seen examples from Bombay, raised it to full specific rank. It differs from *beckeri* in having only 20–24 (figure shows 27) labial teeth, though in 1931 the Holotype was stated to have 32 (figure corresponds); and it is 4–5 mm. long. The differences do not seem very convincing.

Neosimnia gracillima (Smith)

Radius gracillima Smith, 1901, p. 107, pl. 1, figs. 20, 21.
Neosimnia gracillima, Schilder, 1932b, pp. 54, 60, pl. 4, fig. 46.
Neosimnia lanceolata Sow. var. or subsp. *gracillima* Schilder, 1932c, p. 233.

No columellar pleat (funiculum), no labial or columellar teeth. Very finely transversely striate, the striae non-punctate; decussate with growth-lines.

Pink dorsally, base yellow. 31 × 4·5 mm.

Known from a single specimen taken from a fish stomach off Durban in 40 fathoms. Not taken by the *Pieter Faure*.

Volva volva (Linn.)

Fig. 6 *d*

Birostra volva, Chenu, 1859, fig. 1794.
Volva volva, Schilder, 1932b, pp. 56, 62, pl. 5, fig. 76.

Shell oval in middle with both extremities strongly rostrate. No columellar pleat. Striae over whole shell.

Pink shading into orange on the extremities, outer lip pale yellow. Animal pale, foot fringed with black papillae, tentacles tipped with black (U.C.T. specimen). 74 × 27 mm. (U.C.T.); 69–99 mm. long, width 24–31% of length (Schilder).

Radula (only a portion removed from animal), central plate broader than long, wider in front than behind, tricuspid, lateral plate with one cusp on inner side of main cusp, marginal plates with respectively *c.* 18–20 and 36–40 distal projections, apically hooked and minutely bifid.

30° 47′ S., 30° 29′ E., 24 fathoms, 1 living; 32° 43′ S., 28° 28′ E., 58 metres, 1 living (U.C.T.).

Distribution. East Indies to Japan.

Remarks. The occurrence of examples of this species in Natal waters and as far south as the Cape Morgan area is noteworthy.

The adult shell has been repeatedly figured, but does the juvenile resemble the adult in shape, especially in the relative length of the rostrate extremities?

Volva sowerbyana Weink.

Fig. 5 *e*

Ovula spelta (*non* Linn.), Sowerby, 1892, p. 34.
Amphiperas smithi Bartsch, 1915, p. 96, pl. 10, figs. 1 and 3. Turton, 1932, p. 113.
Volva sowerbyana Schilder, 1932b, pp. 56, 62, pl. 5, fig. 73.

Shell fusiform, but extremities not very sharp. Columellar pleat distinct, continued as 2–3 crenulations. Columella anteriorly ridged. Striae visible at both extremities, and in some cases on the columella, where, however, they are usually covered by the columellar glaze; possibly in unworn shells the striae extend over whole shell.

Pink or purplish-pink, with paler median zonal band, extremities and outer lip faintly yellowish. 16·6 × 7 mm. to 21 × 9·5 mm.; 19·5 × 8·1 mm. (Bartsch: *smithi*).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); South African Museum has 5 specimens alleged to have been found on the Natal coast.

Volva aurantia (Sow.)

Figs. 5 *f*, 6 *e*

Ovula (*Birostra*) *aurantia* Sowerby, 1889a, p. 11, pl. 1, fig. 15.
Ovula aurantia Sowerby, 1892, p. 34, pl. 1, fig. 26.
Volva aurantia, Schilder, 1932b, pp. 56, 62.
Amphiperas aurantia, Turton, 1932, p. 112.

Shell more regularly fusiform and outer lip more evenly curved than in *sowerbyana*. Columellar pleat very feebly indicated. Columella anteriorly completely rounded, without ridge. Striae visible only at extremities.

Deep orange (Sowerby). Both the *Pieter Faure* shells are white. 23 × 7 mm. (Sowerby); 25 × 9 mm. (living) and 17 × 7·5 mm.

Radula with *c.* 125 rows, central plate triangular, longer than broad, strongly tricuspid, lateral plate with one small cusp on inside of main cusp, marginal plates with respectively *c.* 12 and 18 distal projections, apically hooked and minutely bifid.

Port Elizabeth (Sowerby); Port Alfred (Turton).

Off Tugela River (Natal), 40 fathoms, 1 living; off Umtwalumi River (Natal), 25 fathoms, 1 dead (S. Afr. Mus. nos. A5041, A5042, P.F. coll.).

Remarks. Schilder (1932b, p. 56, footnote) considered this as possibly an 'extreme variety' of *sowerbyana*. These two specimens, however, are quite distinct from *sowerbyana*; they were identified by Sowerby (3rd of that name) as *birostris* Linn. But there are other *Pieter Faure* specimens which resemble more closely the figures of this latter species. Provisionally therefore *aurantia* is maintained.

Volva birostris (Linn.)

Fig. 5 *g*

Birostra birostris, Chenu, 1859, fig. 1796.
Ovula birostris, Sowerby, 1892, p. 34.
Volva birostris, Schilder, 1932b, pp. 56, 62, pl. 5, fig. 78.

Shell regularly fusiform, both extremities rostrate. No columellar pleat. Columella anteriorly rounded, without ridge. Striae visible only at extremities (in present specimens).

Length 53–63 mm., width 16–17% of length (but 24% in figure) (Schilder). 41 × 9·5, 19 × 5, and 7 × 2 mm. (S. Afr. Mus.).

Off Cape Natal (Durban), 54 fathoms, one 19 × 5 mm. dead, and 2 larger but fragmentary; off Umkomaas (Natal), 40 fathoms, one 41 × 9·5 mm. and 1 juv. 7 × 2 mm., both dead; off O'Neil Peak (Zululand), 90 fathoms, 1 fragment, width 10 mm. (S. Afr. Mus. nos. A8923–A8925, P.F. coll.).

Distribution. East Indies, Indo-Pacific, Japan.

Fam. **Lamellariidae**

Lebour, 1931, pp. 819, 822.

Some points of resemblance between the Triviidae and Eratoidae (which were formerly included in the superfamily Cypraeacea) and the present family have suggested their transferrence to the Lamellariacea. On the other hand there are important differences in the metamorphosing larva (Lebour).

Gen. Lamellaria Montagu

Bergh, 1907, pp. 104 sqq. (*Marsenia*, Leach).

Further details are here given of the depths at which the specimens described by Bergh were obtained.

Smith's record (1901, p. 108) of *mauritiana* (Bergh) from Port Elizabeth is scarcely acceptable. It is most unlikely that an example—shell without animal—of this Mauritian species came to Port Elizabeth except by human agency. There is now no means of checking the original provenance of the shell; and the record should be deleted from the fauna list.

There are 2 specimens of the larva *Echinospira* from Qolora (Kwalegha) (north of East London) in the South African Museum.

Lamellaria perspicua (Linn.)

Marsenia perspicua Bergh, 1905, pl. 3, fig. 18 (animal, coloured); 1907, p. 104, pl. 14, figs. 5–9 (radula figs. 7, 8); 1908, p. 105.

Off Umhlanga River (Natal), 22–26 fathoms; and off Cape Point, 180 fathoms (Bergh).

Delagoa Bay, 1 living (S. Afr. Mus. coll. K.H.B. 1912).

The radula of the Delagoa Bay specimen agrees with Bergh's figure.

Lamellaria capensis (Bergh)

Marsenia capensis Bergh, 1907, p. 105, pl. 9, figs. 13–16 (radula figs. 14, 15).
Lamellaria tenera Thiele, 1925, p. 100, pl. 20(8), fig. 4, and pl. 46 (34), fig. 15.

Off Cape Point, 650–800 fathoms; and off Lion's Head (Cape Town), 131–204 fathoms (Bergh).

Off Cape Town (33° 4′ S., 18° E.), 178 metres (Thiele).

Mossel Bay (S. Afr. Mus.).

Brown's Bank (approx. 36° 30′ S., 21° E.), 80–100 fathoms (S. Afr. Mus. P.F. coll.).

Off Cape Point: 34° 42′ S., 16° 54′ E., 1,725–1,780 fathoms, 1 ♂, 1 ♀ living (S. Afr. Mus. F. H. Talbot coll. 1959).

From the shape of the central plate of the radula there seems little doubt that Thiele's species is synonymous.

The radula of the 10 mm. animal obtained by Talbot corresponds with Bergh's figures.

Lamellaria leptoconcha (Bergh)

Marsenia leptoconcha, Bergh, 1907, p. 107, pl. 9, figs. 17–20; pl. 10, figs. 1, 2 (radula pl. 9, fig. 18, pl. 10; fig. 2).

Off Cape Point, 660–800 fathoms (Bergh).

Bergh's figure of the central plate of the radula shows a concave line within the straight hind margin of the plate. In order to check Bergh's observation, I have examined the single duplicate specimen in the bottle (P.F. 17661)

from which the ♂ specimen was taken and sent to Bergh. The concave line in Bergh's drawing does in fact represent the actual hind margin of the plate, and the straight hind margin should not have been drawn. Unless the strong lateral plates are pulled apart from the central plate, a clear view of the latter is not always obtained.

The hind margin is not nearly so deeply indented as in *perspicua*, though in general shape there is no great difference. Therefore *leptoconcha* seems to be a valid species.

Fam. **Naticidae**

In many cases the operculum is essential for a true definition of the species. In the South African Museum there are examples of three closely similar species: *forata* (Cape Province), *queketti* (Natal), and *decipiens*, but none of them with opercula. *N. saldontiana* and *P. psila* are not easily separable without their opercula; *similis* Thiele is obviously synonymous with one or the other, but as the type had no operculum, it will always be a *species incerta*.

The radula is no help, as it is nearly uniform throughout the family (South African genera). The indented inner margin of the lateral plate is characteristic. The inner marginal plate is sometimes apically bifid but the accessory cusp is often very feeble.

Natica genuana Rve.

Fig. 7 *c*

Natica genuana Reeve, 1855, sp. 121.
Natica imperforata (*non* Jay, 1836), Gray, 1839, p. 135, pl. 37, fig. 1. Sowerby, 1886, p. 10 (operculum). Schwarz, 1900, p. 61. Von Martens, 1903, p. 42. Smith in Rogers, 1906b, p. 293. Haughton, 1932, p. 45.
Natica stimpsoni Bartsch, 1915, p. 137, pl. 13, figs. 5, 8, 11.
Natica alfredensis Bartsch, 1915, p. 138, pl. 13, figs. 4, 7, 10.
Natica aureozona Tomlin, 1921, p. 217, pl. 8, figs. 3, 4.

Von Martens mentioned some examples not exceeding 9 mm. in which the umbilicus was half open; but usually juveniles as small as 4·5 mm. have a completely closed umbilicus. The columellar callus extends over the umbilicus to the anterior curve of the aperture, forming a rather broad smooth band, usually with a slight hollow at the site of the umbilicus. Sometimes a narrow chink remains, even in adult shells (e.g. one 24 × 21 mm. from Still Bay).

Operculum calcareous, quite smooth except for faint growth-lines.

Brown mottling, reticulations, or spots of variable size on a paler ground-colour, at top of whorl short brown retractive flames or streaks, usually a peripheral 'necklace' of disconnected brown spots on a faint whitish band (contrast *saldontiana*).

Radula with 60–70 rows, both marginal plates simple.

Fossil: Pleistocene: raised beach, Little Brak River, Mossel Bay (Rogers); Keurbooms River (Schwarz); Sedgefield near Knysna (coll. Martin, 1956); Saldanha Bay (Haughton).

34° 51′ S., 19° 17′ E., 80 metres; St. Francis Bay, 80–100 metres, and 35° 16′ S., 22° 26′ E., 155 metres (von Martens). Still Bay (S. Afr. Mus. Muir coll.).

Living: False Bay (S. Afr. Mus. coll. K.H.B.); Langebaan (Saldanha Bay) (U.C.T.).

Remarks. Bartsch's *stimpsoni* is an extra large example of *genuana*: 38·5 × 36 mm. Stimpson collected it in Simon's Bay (False Bay), and I have myself collected large specimens in False Bay up to 30 × 23 mm. One specimen 32 × 27 mm. was obtained by U.C.T. at Saldanha Bay.

Macnae & Kalk (1958, p. 127) list 'imperforata' from Inhaca Island (Delagoa Bay); I have not seen the material.

A subscalariform aberration, 12 × 8·5 mm., was found by Dr. Muir at Still Bay (fig. 7 *c*.).

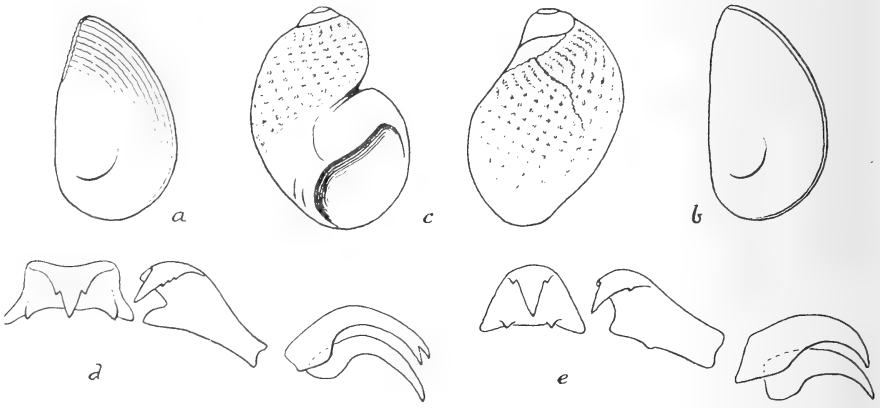


Fig. 7. Operculum of: *a*, *Natica saldontiana* Bartsch. *b*, *N. marochiensis* (Gmelin). *c*, subscalariform freak of *N. genuana* Rve., 12 × 8·5 mm. *d*, radula teeth of *Polynices cleistopsila* n. sp. *e*, *Falsilunatia pseudopsila* n. sp.

N. aureozona may be one of the numerous colour variations of *genuana*. A specimen agreeing with Tomlin's description and figure but larger: 15 × 15 mm., from Algoa Bay, 32 fathoms, has a short umbilical chink (cf. Tomlin's fig. 4) as in *saldontiana*, and was identified by Sowerby as *sagraiana*.

Natica saldontiana Bartsch

Fig. 7 *a*

Natica sagraiana D'Orb. var. Sowerby, 1903, p. 229.
Natica saldontiana [*sic*] Bartsch, 1915, p. 140, pl. 13, figs. 1–3.

The umbilicus is not completely closed even in adult shells, a small semicircular chink remaining, and the columellar callus narrows anteriorly, petering out before reaching the most anterior part of the aperture.

Operculum (not mentioned by Bartsch, though his fig. 2 seems to show one in edge-view) calcareous, fine spiral lirae on outer half, best seen in juveniles, often obscure or obsolete in adults, though the distal half of the inner margin is always crimped or crinkly, outer margin not costate.

The apices of most shells, like those of several other gastropods from the west coast area, are more or less corroded.

Attains a size of 15 × 15 mm.

Pale biscuit-colour or fawn, with slightly darker, but always faint, undulate axial streaks, sometimes these streaks rather sharply kinked and anastomosing, whereby the pattern appears white-spotted, top of whorl slightly darker brown but without streaks, no peripheral 'necklace' (contrast *genuana*).

Radula with 75–80 rows, inner marginal plate apically bifid.

Saldanha Bay, 28 fathoms (Sowerby); Saldontia (*sic*, = Saldanha) Bay 27 fathoms (Bartsch).

Cape Point SW.×W.$\frac{3}{4}$W. $3\frac{1}{2}$ miles, 32 fathoms, 1 operculum (S. Afr. Mus. P.F. coll.).

Living: Saldanha Bay, 27 and 28 fathoms (S. Afr. Mus. P.F. coll.), 34° 19′ S., 18° 30′ E. (False Bay), 52 metres (U.C.T.); Langebaan (Saldanha Bay) (U.C.T.).

Remarks. Bartsch's description was based on 2 examples in the United States National Museum 'dredged in 27 fathoms'. No further data were given, but obviously this was *Pieter Faure* material which the U.S. National Museum had obtained from Sowerby (or Sowerby & Fulton).

From its locality: 33° 41′ S., 18° E., 178 metres, one would suspect *similis* Thiele (1925, p. 102, pl. 20(8), fig. 10) might be synonymous with *saldontiana*, but it was only a dead shell without operculum, and its identity therefore remains uncertain.

One living example from off Umhlanga River (Natal), 22–26 fathoms (S. Afr. Mus. P.F. Coll.), agrees with the characters of shell and operculum, though the lirae on the latter are rather stronger. In the absence of examples from any intermediate locality, it is not advisable to assign this specimen definitely to *saldontiana*.

Seven dead shells without opercula from 34° 27′ S., 25° 42′ E., 256 fathoms (S. Afr. Mus. P.F. coll.), may be this species; but living examples are wanted from the middle and eastern parts of the Agulhas Bank.

N. saldontiana might be regarded as a colour variety of *genuana*: the latter, with brighter and more variegated colouring, occurring in the warmer waters east of Cape Point; the former with 'washed-out' colouring, in the colder west coast waters. The differences in the opercula and radulae are very slight. But the persistence of an umbilical chink in *saldontiana*, and *per contra* the rather broad band of columellar callus in *genuana*, seem to be well-marked and valid distinctions.

Odhner (1923, p. 10) recorded *sagraiana* from Port Alexander, Angola.

Natica marochiensis (Gmelin)

Fig. 7 *b*

Natica lurida Phil., Krauss, 1848, p. 91
Natica moroccana var. *lurida* von Martens, 1879, p. 730.
Natica unifasciata Lam., von Martens, 1880, p. 276.
Natica maroccana von Martens, 1903, p. 12. Turton, 1932, p. 158, with vars. *marochiensis* and *livida*.
Natica maroccana var. *tessellata* Schepman, 1909, p. 208.
Natica nemo, Bartsch, 1915, p. 139, pl. 13, figs. 6, 9, 12. Turton, 1932, p. 157.
Natica marochiensis, Nicklès, 1950, p. 81, fig. 120. Satyamurti, 1952, p. 107, pl. 8, figs. 1 *a*, *b* Day & Morgans, 1956, p. 306.

Operculum calcareous, smooth, highly polished, outer margin with a single costa.

Yellowish-brown, buff, grey, usually more or less plumbeous, often with faint spiral bands, and a narrow pale subsutural band; the bands sometimes broken up into squarish spots: dark spots if the ground-colour is pale, or pale spots when the ground-colour is dark.

Radula with 75–78 rows, inner marginal plate without, or with a very feeble accessory cusp.

Fossil: Pleistocene: Bluff Beds, Durban (Geol. Surv.).

Living: Mozambique Island and Santa Carolina (Bazarute Is.) (U.W.); Chinde (mouth of Zambesi River) and Delagoa Bay (S. Afr. Mus. coll. K.H.B. 1912); Inhambane (U.C.T.); Delagoa Bay (U.W.); Durban Bay, and 29° 58′ S., 31° 02′ E., 49 metres (U.C.T.); Richards Bay (Zululand) (U.C.T.); Hamburg (between East London and Port Alfred) (U.C.T.).

Distribution. Querimba Is. (von Martens, 1879); Mauritius, Réunion (von Martens, 1880); Mauritius (S. Afr. Mus. coll. R. F. Lawrence 1935); Madagascar (Odhner); Indo-Pacific.

Great Fish River (Angola) (von Martens, 1903); Morocco to Angola (Nickèls).

Remarks. The specimens from Chinde were identified by Tomlin.

According to Watson (1886, p. 434) the operculum of *maroccana* Chemn. has a double costa on the outer margin. (*Cf. euzona* Récluz, pl. 35, fig. 22, in Smith, 1903*b*, p. 615.) Satyamurti stated that the operculum of the Indian *marochiensis* was externally granular. Melvill & Standen (1901, p. 359) stated that the operculum of *marochiensis* had no marginal *costa*, whereas that of *tranquilla* M. & S. (p. 359, pl. 22, fig. 5) had a marginal costa but the shell had no sutural plications.

Natica taeniata Menke

Natica taeniata, Sowerby, 1897, p. 12.

Operculum calcareous, with strong spiral lirae.

Like *marochiensis* the shell has obliquely axial subsutural grooves on the upper whorls, but it has a more widely open umbilicus and a sculptured operculum.

Scottburgh (Natal), 1 living, 4 dead (S. Afr. Mus. coll. Burnup). Delagoa Bay, living (U.W.).

Polynices sebae (Soul.)

Natica sebae Souleyet, 1852, p. 579, pl. 5, figs. 6, 7.

Periostracum thin, colourless. Operculum horny, chestnut-brown. Animal pale lemon-yellow.

Locality? (Souleyet). Natal (Sowerby).

Living: Delagoa Bay (U.W.).

Polynices didyma (Bolten)

Natica ampla Braga, 1952, p. 89, pl. 5, fig. 10.

Operculum horny, chestnut-brown.

Off Umhloti River (Natal), 27 fathoms, dead; off Umkomaas River (Natal), 13 fathoms, dead (S. Afr. Mus. P.F. coll).

Fossil: Pleistocene: Bluff Beds, Durban (Geol. Surv.).

Living: Inhambane (U.C.T.); Delagoa Bay (U.W.); Durban Bay (S. Afr. Mus. coll. K.H.B., and U.C.T.); Knysna (U.C.T.).

Remarks. Prof. Day (U.C.T.) took living specimens up to 48 mm. diam. in Knysna lagoon (1960).

Dead but quite fresh specimens are washed ashore as far west as Still Bay (S. Afr. Mus. coll. Muir).

Possibly Krauss's record of *lamarckii* refers to this species (if *lamarckii* is really distinct?).

Polynices mammilla (Linn.)

Natica mamilla, Krauss, 1848, p. 92. Von Martens, 1879, p. 730 (with vars.).

Operculum horny, chestnut-brown.

Fossil: Pleistocene: Bluff Beds, Durban (Geol. Surv.); raised beach, Little Brak River, Mossel Bay.

Living: Bazarute Island (S. Afr. Mus.); Inhambane (U.C.T.); Delagoa Bay (U.W.); Durban Bay (Krauss, and U.C.T.).

In a large specimen from Delagoa Bay a portion of the radula of *Hydatina* was found.

Polynices psila (Watson)

Natica psila Watson, 1886, p. 443, pl. 28, fig. 1.
Not *Natica psila* Watson, von Martens, 1903, p. 66, pl. 3, fig. 22 (= *kerguelensis* Thiele, 1925).

Operculum horny, in the largest example with faint spiral striae crossing the growth-lines.

Up to 15 × 14 mm. Apical whorls more or less corroded. Uniform white beneath the pale brown periostracum. The smallest specimen has numerous fine spiral brown lines on the back of the outer lip.

Radula (of shell 8 mm. long) with 60–65 rows, inner marginal plate apically bifid.

35° 4′ S., 18° 37′ E., 150 fathoms (Watson).

Off Cape Hangklip (mouth of False Bay), 95 fathoms, 1 living; off Vasco da Gama (Cape Point), 120 fathoms, 1 living; Cape Point SW.×W$\frac{3}{4}$.W., 32 fathoms, 1 living (S. Afr. Mus. P.F. coll.).

False Bay, and 34° 09′ S., 18° 14′ E., 110 metres, living (U.C.T.).

Remarks. The largest example (off Cape Hangklip) was identified by Tomlin, presumably after comparison with the Type in the British Museum (Natural History). Unfortunately the *Challenger* shell was dead and without operculum. The species cannot therefore be precisely defined. Perhaps the present shells might be regarded as 'plesiotypes'.

Although *psila* seems to inhabit deeper water than *N. saldontiana*, the shells of the two cannot be distinguished with certainty in the absence of the opercula.

The medium-sized specimen (off Vasco da Gama) was identified by Sowerby as *simplex* Sow. This is another 'species' based on a dead shell without operculum.

Polynices cleistopsila n.sp.

Fig. 7 *d*

Agreeing with *psila* in shape of shell and horny operculum, but the umbilicus completely closed with callus, only a slight hollow indicating its position. 18 × 16·5 mm.

Radula (of two 18 mm. shells) with 70–75 rows; inner marginal plate apically bifid.

Off Cape Point: 33° 50′ S., 17° 21′ E., 600 fathoms, 1 living; 33° 36′ S., 16° 15′ E., 1,520–1,570 fathoms, 3 living, 33° 50′ S., 16° 30′ E., 1,480–1,660 fathoms, 1 living, 2 dead (S. Afr. Mus. A9702, A9735, A9812, F. H. Talbot coll. 1959).

Dead shells up to 25 × 21·5 mm., presumably conspecific, were taken at: 33° 26′ S., 16° 33′ E., 1,300 fathoms, 1; 33° 45$\frac{1}{2}$′ S., 16° 23$\frac{1}{2}$′ E., 1,480 fathoms, 2; 34° 05′ S., 16° 58′ E., 1,470–1,490 fathoms, 6; 34° 36′ S., 19° 00′ E., 1,500 fathoms, 3 corroded (S. Afr. Mus. A9717, A9745, A9844, A9868, F. H. Talbot coll. 1959).

Remarks. The closure of the umbilicus occurs in all the specimens, from 8 to 25 mm. long, and may thus be regarded as a constant character, justifying a separate species.

Falsilunatia pseudopsila n.sp.

Fig. 7 *e*

A single living shell, 9·5 × 8·5 mm., which appeared to agree in all respects with *P. cleistopsila*, was found to have a different radula.

Radula with *c.* 65 rows, central plate a little broader than long, subtriangular, rounded in front, median cusp strong, side cusps small, lateral plate with

concave inner margin (not sharply indented), marginal plates stout, both apically entire.

Off Cape Point: 34° 37′ S., 17° 03′ E., 1,580–1,620 fathoms, 1 living (S. Afr. Mus. A9780, F. H. Talbot coll. 1959).

Remarks. The genus *Falsilunatia* was created by Powell (1951, p. 119) for some species from the Falkland Islands and Patagonia, characterized by the subtriangular shape of the central plate of the radula.

Natica fartilis Watson 1881 and 1886 from the Kerguelen region, which according to Powell has a similar central plate in the radula, has a calcareous operculum as in *Natica*.

Eunaticina papilla (Gmelin)

Living: Durban (S. Afr. Mus. coll. Burnup); Delagoa Bay (S. Afr. Mus. coll. K.H.B.).

Sigaretus delessertii Récluz

Shell with well-marked spiral lirae usually interrupted by the growth-lines.

Durban (in S. Afr. Mus.).

Sigaretus planulatus Récluz

Sigaretus planus von Martens, 1879, p. 730.

Shell smooth, with growth-lines, and very indistinct spiral striae. Periostracum thin, very pale yellowish. Animal creamy-white.

Off Umkomaas (Natal), 13 fathoms (S. Afr. Mus. P.F. coll.).

Living: Delagoa Bay (U.W.). Inhambane (von Martens).

Remarks. Von Martens stated that the mollusc lives in sand and is eaten by the natives; and commented on the water vascular system and the protrusible proboscis.

Fam. **Strombidae**

Thiele, 1929, p. 252. Macnae & Kalk, 1958, p. 127. Verdcourt, 1959b, p. 146. Abbott, 1960, pp. 33–146 (in some of the distribution maps Mozambique City (i.e. on Mozambique Island) and Port Amelia have been misplaced).

The names of 9 species of *Strombus* have been reported from South Africa: *columba* Lam.; *decorus* (Röding) (*cylindricus* Swains., *mauritianus* Lam.); *dentatus* Linn.; *fusiformis* Sow.; *gibberulus* Linn.; *lamarckii* Gray; *lentiginosus* Linn.; *mutabilis* Swains. (*floridus* Lam.); *urceus* Linn.

Until recently the occurrence of living specimens of *Strombus* south of Delagoa Bay has not been recorded. Krauss (1848) did not state definitely that he found *floridus* and *gibberulus* alive. The *Pieter Faure* obtained no specimens, dead or alive, in the course of her dredging along the Natal and Zululand coast. Day & Morgans (1956) listed no species from Durban Bay.

Mr. Elston, however, has recently obtained from skin-divers in Durban Bay living *decorus* and *gibberulus*, and dead but fresh *mutabilis*. Living examples of *decorus* have also been obtained as far south as Gonubie River mouth, East London. Dead specimens of *mutabilis* have been reliably reported from Jeffrey's Bay (St. Francis Bay), thus confirming Sowerby's 1892 record from Port Elizabeth.

Von Martens (1903, p. 42, pl. 4, figs. 8, 8*a*) described a dead juvenile 25 × 12 mm., from 35° 29′ S., 21° 2′ E., 102 metres, commenting on its resemblance to a *Conus*, in particular *C. papillaris*. He pointed out that there were several features precluding its being referred to *Conus*; but he did not attempt a specific determination. It may perhaps have been a young *decorus*.

The occurrence of *lentiginosus* in Simon's Bay (Watson, 1886, p. 415) is most unlikely, and cannot be accepted. The specimen was probably obtained at some other locality, or perhaps given to the *Challenger* scientists by a local shell enthusiast.

S. decorus, *gibberulus*, and *mutabilis* can be definitely accepted as South African inhabitants; the other species require confirmation. The occurrence of *urceus* at Delagoa Bay is unlikely, having regard to its hitherto known distribution; possibly a misidentified *mutabilis*.

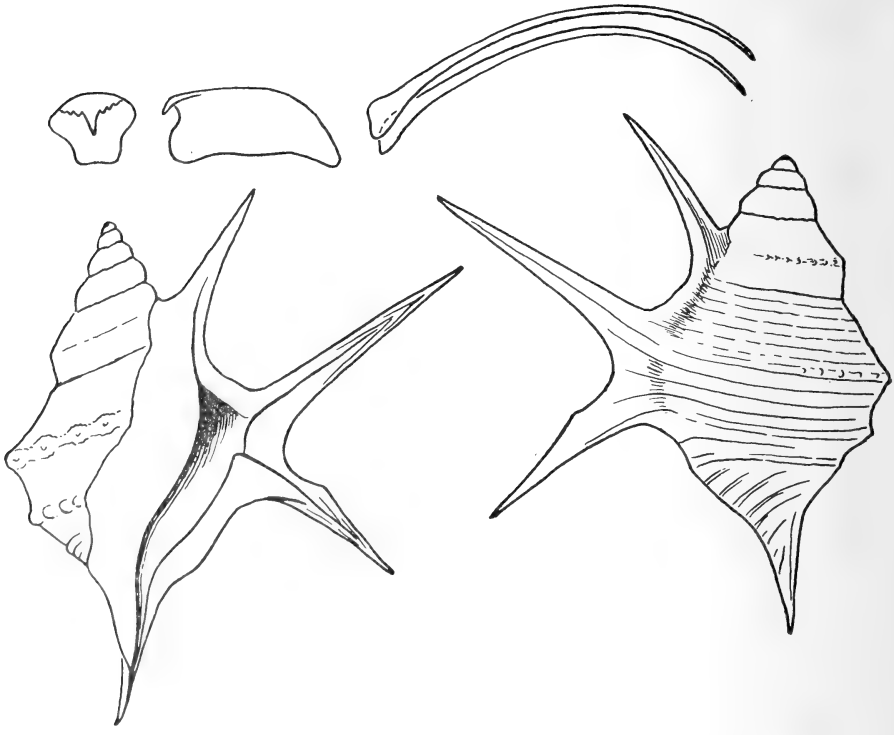


FIG. 8. *Aporrhais pes-gallinae* n. sp.

Fam. **Aporrhaidae**

Aporrhais pes-gallinae n.sp.
Fig. 8

Posterior spiniform process quite free from the spire. Outer lip with two slender processes, the margin between the anterior one and the beginning of the canal slightly convex, but with scarcely any suggestion of an incipient lobe or denticle. Anterior canal tapering evenly, without flange-like expansion of the edge of the columellar callus. The 'webbing' between the claws much less extensive than in *pes-pelicani* or *pes-carbonis*. On peripheral whorl traces of a peripheral row of tubercles. On body whorl a peripheral row of tubercles which owing to corrosion appear as a moniliform lira. On base another lira which is also moniliform where it emerges from under the columellar callus, but is smooth on back of the shell; below this lira (on back of shell) about 9–10 lirae. 40 mm. long.

26° 23′ S., 14° 17′ E., 311 metres, green mud, 1 living (*Africana* Afr. 1263, per U.C.T.).

Remarks. Like other shells from the west coast this specimen is somewhat corroded. If it is a normal example as regards the posterior process being free from the spire, I think it must be regarded as representing a new species different from *pes-pelicani* (Linn.) and *senegalensis* Gray.

I have not seen the original description of the latter (1838, p. 27), nor Dautzenberg (1891, p. 43, pl. 3, figs. 5*a*, *b*), but Nicklès (1950 p. 76, fig. 105) figured a specimen apparently very little different from *pes-pelicani*. *A. senegalensis* is recorded from Senegal and Angola.

See also: Coen, 1931, p. 142, pls. 2, 3.

The discovery of a species of *Aporrhais*, and of *Cancellaria lyrata* (see Part II, p. 16), indicates that the area off the coast of South West Africa is worthy of more intensive investigation.

HETEROPODA

Tesch, 1949, pp. 5–53, 5 pls., 44 text-figs.

Tesch recorded:

Oxygyrus keraudreni (Lesueur) from the Indo-Pacific: 'from Panama to Durban' (p. 12).

Protatlanta souleyeti (Smith) from off the north point of Madagascar (p. 14) and one station off Lourenço Marques *c.* 25° S. (chart fig. 8).

Atlanta fusca Soul. from off Lourenço Marques, and *A. turriculata* d'Orb. from off Durban (p. 22, and charts figs. 18 and 19).

Carinaria lamarcki Peron & Lesueur (? = *fragilis* Bory) from the Agulhas Bank (chart fig. 23), *C. galea* Benson from off Durban (p. 31 and chart fig. 24), and *C. cithara* Benson from off Lourenço Marques (chart fig. 26).

Pterosoma planum Lesson and *Cardiapoda placenta* (Lesson) from the east coast of Africa as far south as 35° 49′ S. (p. 35, chart fig. 28; and p. 38, chart fig. 31).

Pterotrachea scutata Gegenb. from the east coast of Africa as far south as Agulhas Bank and the Cape 35° 42′ S., 18° 37′ E. (p. 46, chart fig. 39).

Probably the *Dana* obtained also *Firoloida desmaresti* Lesueur in the South African region, but Tesch did not specify the localities.

Bory de St. Vincent (1804, p. 142, pl. 6, fig. 4) recorded *Carinaria fragilis* from off South Africa. A mutilated specimen of *Carinaria* sp. was caught in False Bay, 27th April 1954.

A specimen from Durban, March 1935, was identified by Marie Lebour as *Cardiapoda placenta* (Lesson) (Tesch, 1949, p. 36, pl. 4, fig. 6, text-fig. 29 (shell), chart fig. 31) (S. Afr. Mus.).

Specimens of *Atlanta* have been found in the *Pieter Faure* bottom-samples from: off Cape Natal (Durban), 54 fathoms; off Umkomaas (Natal), 40 fathoms; off Cape Vidal (Zululand), 80–100 fathoms; and Cape Point N. 89° E. 36 miles, 700 fathoms (S. Afr. Mus. P.F. coll.).

Tomlin (1931, p. 433) recorded *A. peronii* Lesueur from Port Alfred and Port Shepstone; and *A. lesueurii* Souleyet from 'off Cape Province'.

Turton (1932, p. 107) recorded *A. peronii*, and also *Oxygyrus keraudreni* (Lesueur) from Port Alfred.

A specimen of *Cardiapoda richardi* Vayssière (Tesch, 1949, p. 37, pl. 4, fig. 7, text-fig. 30, chart fig. 32) has recently (August 1959) been taken by Dr. F. H. Talbot (S. Afr. Museum) while trawling down to 1,240 fathoms at 33° 26′ S., 16° 33′ E.

Okutani & Habe (1960, p. 513, 2 figs.) record *Pterotrachea coronata* (Forskal) from the Natal coast.

Fam. **Xenophoridae**

Gen. Xenophora F. von Waldheim

On the west coast of Africa *X. senegalensis* Fischer extends as far south as Great Fish Bay, Angola (von Martens, 1903).

Xenophora corrugata (Rve.)

Xenophora corrugata, Watson, 1886, p. 463. Sowerby, 1897, p. 17. Schepman, 1909, p. 203. Satyamurti, 1952, p. 97, pl. 6, figs. 16 *a*, *b*.

Protoconch (i.e. smooth whorls before any foreign substances are attached) $2\frac{1}{2}$–3 whorls. Postnatal whorls 7–8. Umbilicus open, but in examples with basal diameter over *c.* 30–35 mm. closed with columellar callus. Basal diameter 42 mm.

Upper whorls usually covered with small pebbles, fragments of lamellibranch and barnacle shells; from about 4th or 5th whorl whole lamellibranch valves begin to be incorporated; the commonest are the valves of *Venus arakana*,

others being *Cardium*, *Mactra*, *Nucula* and *Nuculana*. Gastropod shells (unless fragmentary) were not found on the 62 examples of *corrugata* in the South African Museum, except one small worn mitrid.

Durban (Sowerby). From off Umtwalumi (south of Durban) to Umvoti (north of Durban), and off Amatikulu River (Zululand), 22–46 fathoms; most of the examples dredged off Morewood Cove, but all dead (S. Afr. Mus. P.F. coll.).

Living: 29° 58′ S., 31° 02′ E., 49 metres (U.C.T.).

Distribution. Fernando Noronha, Brazil (Watson). Zanzibar, Indian Seas, East Indies, to China and Japan.

Xenophora pallidula (Rve.)

Xenophora pallidula Watson, 1886, p. 464, pl. 28, fig. 6. Sowerby, 1894, p. 38. Schepman, 1909 p. 203. Thiele, p. 250, fig. 259.

The Director of the Natal Museum has shown me some magnificent specimens obtained off the Tugela River in 80 fathoms, which, he tells me, Mr. Dance of the British Museum (Natural History) is proposing to describe.

This species seems to prefer to cover its shell with gastropod shells; see Watson's and Thiele's figures.

One of 2 specimens presented to the South African Museum by Mrs. H. Boswell of Pretoria carries 3 lamellibranchs, 4 gastropods, and several small pieces of rock; the other specimen carries 3 turbinolid corals and pieces of rock, only 2 fragments of mollusc shells; the last piece of rock attached at the outer lip measures 45 × 25 × 15 mm. (diam. of shell 75 mm.).

One of the gastropods on the first shell is a 42 mm. long *Turris flavidula* (Lam.) (see Part I, p. 128).

Distribution. Andaman Is. (Sowerby); Philippine Is. (Watson); Japan.

Xenophora (*Haliphoebus*) *solaris* (Linn.)

Onustus solaris, Chenu, 1859, figs. 2311–2313.
Xenophora solaris, Schepman, 1909, p. 205. Satyamurti, 1952, p. 98 (mentioned). Braga, 1952, p. 89, pl. 5, fig. 7.

Without agglutinated foreign substances. Margin with digitiform processes. Inhambane (Braga).

Distribution. India; East Indies.

Fam. **Calyptraeidae**

Protandrous hermaphrodites, the younger individuals being males, the older ones females. Often forming 'chains' of 3–6 individuals, one on top of another, decreasing in size upwards.

Crepidula porcellana Lam.

Figs. 9 *a–c*, 11 *a*

Crepidula hepatica Krauss, 1848, p. 69, pl. 4, figs. 12 *a*, 12 *b* (with var. *complanata*). Von Martens, 1903, p. 45. Schwarz, 1910, p. 115. Haughton, 1932, pp. 20, 29, 34. Turton, 1932, pp. 155, 156, pl. 35, nos. 1106, 1111 (with *lentiginosa*, *adspersa* and vars.).
Crepidula porcellana, Adam & Leloup, 1936, pp. 350–358, pl. 1, figs. 1–11, pl. 2, figs. 1–5 [not fig. 7 = *aculeata*] (incl. *adansonia*, *goreensis*, *hepatica*, *adspersa*). Nicklès, 1950, p. 74, figs. 100–102 [not fig. 103 = *aculeata*].

Protoconch 1½ whorls, coiled nearly vertically, the nucleus almost concealed by the more or less symmetrical growth of the Patelliform shell, smooth. Margin of septum more or less concave, no notch or concavity on left side.

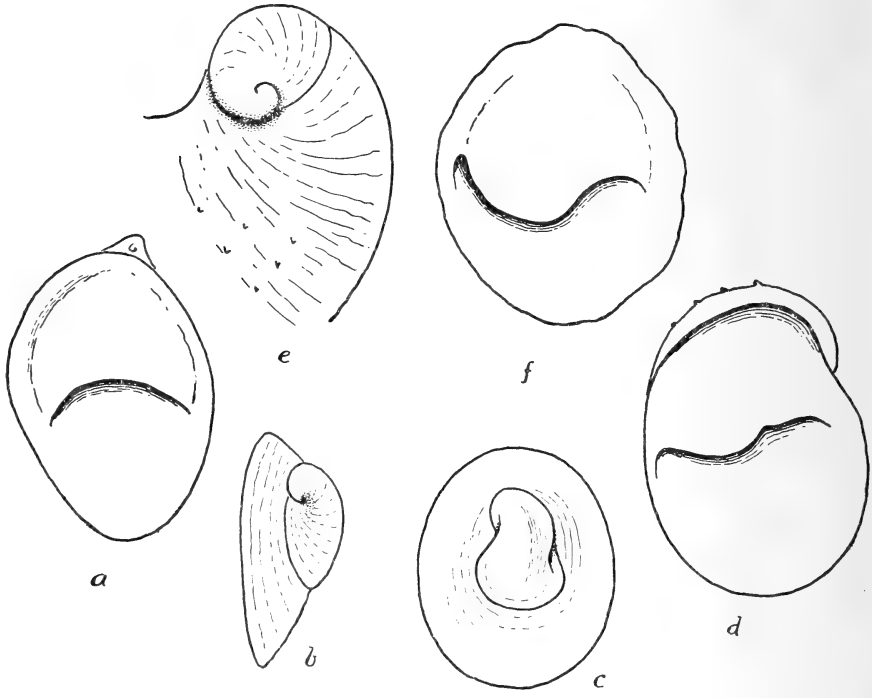


FIG. 9. *Crepidula porcellana* Lam. *a*, basal view. *b*, *c*, lateral and dorsal views of protoconch. *C. aculeata* (Gmelin). *d*, basal view. *e*, dorsal view of protoconch. *C. rugulosa* Dnkr. *f*, basal view.

Surface with growth-lines only. Periostracum somewhat fibrous-fimbriate around circumference. 31 × 22 mm. (40 mm. long, Nicklès).

Two specimens of equal length show the difference between the high form and Krauss's flat form (*complanata*): 25 × 12, alt. 13 mm., and 25 × 17, alt. 4 mm. Var. with *onyx*-coloration: 36 × 23, alt. 16 mm. (50 mm. long, Turton).

Chestnut or greyish brown, uniform or variously mottled, spotted or streaked, internally brown, septum white; or pale with thin reddish-brown

radiating lines, periostracum yellowish, interior whitish, with a fawn or orange horseshoe-shaped band at junction of septum with shell (cf. *onyx* Sow.).

Radula with 35–40 rows, central plate squarish, rounded in front, 2–3 denticles on either side of median cusp, lateral plate with 2 denticles on inside and 5–7 on outer side of main cusp, inner marginal plate rather stout, falcate, both margins, especially outer margin, denticulate, outer marginal plate more slender, less strongly falcate, outer margin with 3–4 feeble denticles.

Fossil: raised beaches at Bogenfels (South West Africa); Port Nolloth; Saldanha Bay (Haughton); Port Elizabeth (Schwarz).

34° 51′ S., 19° 37′ E., 80 metres; and 35° 29′ S., 21° 02′ E., 102 metres (von Martens).

The *Pieter Faure* bottom-samples contained several worn specimens from various localities between False Bay and Cape Morgan.

Hondeklip Bay (west coast), 2 dead but fresh, striped variety (S. Afr. Mus.).

Natal (Krauss, presumably living).

Living: Lambert's Bay (west coast), around the Cape to East London and Morgan's Bay (U.C.T.).

Distribution. Great Fish Bay (Tiger Bay), Angola (von Martens); Port Alexander (Odhner); Cape Verde Is. and west coast of Africa from Morocco to 'Cape of Good Hope' (Nicklès).

Remarks. Extremely variable both in shape and coloration. The shape of the shell, however, although often oblique, is more or less symmetrically patelliform (as contrasted with *aculeata*), the apex projecting nearly in the middle line, with the nucleus of the protoconch nearly concealed.

Turton did not realize that the ribs in his var. *corrugata* were due merely to the animal having grown upon a ribbed shell (e.g. *Mytilus crenatus*). An example in the South African Museum (locality?) attached to a *Turbo natalensis* shows slight ribbing, not completely corresponding with the costae on the *Turbo*; this specimen is also interesting because on the ridge of the back, especially near the apex, it has radiating lines (cf. *onyx*), but on the rest of the shell a spotted and mottled coloration closely harmonizing with that of the *Turbo*.

Crepidula aculeata (Gmelin)

Figs. 9 *d*, *e*, 11 *b*

Crepidula aculeata, Krauss, 1848, p. 69. Turton, 1932, p. 155 (with vars.). Adam & Leloup, 1936, p. 358, pl. 2, figs. 6, 7. Nicklès, 1950, p. 75, fig. 103 (as form of *porcellana*).

Protoconch lying exposed on surface of the *Haliotis*-like shell. Margin of septum arcuate, usually convex on either side of a small median indent, no deep notch on left side, only a widely open indent. Numerous spiral rows of hollow, squamiform projections. 26 × 19, alt. 7 mm. Turton gave 35 mm., and for var. *echina* 38 mm.

Radula as in *porcellana*, but lateral plate proportionately wider, and both marginal plates more slender, the outer very obscurely, if at all, denticulate.

Fossil: Pleistocene: Sedgefield near Knysna (Martin).

Table Bay to Natal (auct.). Several dead examples in *Pieter Faure* bottom-samples from Algoa Bay to off East London.

Living: Port Nolloth (west coast), around Cape Peninsula to Cape Agulhas (U.C.T.).

Remarks. Adam & Leloup were inclined, in the absence of abundant material, to regard *aculeata* not as a distinct species, but as a form which might develop in several species when growing on a spiny substratum. Consequently (p. 360) they assigned a specimen (pl. 2, fig. 6), of typical *aculeata* shape but quite smooth, to *porcellana*. I regard both the smooth and spiny examples (pl. 2, figs. 6, 7), particularly the latter, as *aculeata* on account of the position of the protoconch.

Crepidula rugulosa Dnkr.

Fig. 9 *f*

Crepidula rugulosa Krauss, 1848, p. 69.

Only one specimen sufficiently unworn to show the protoconch, which resembles that of *porcellana* but lies well within the circumference of the shell. Margin of septum sigmoid, with deep notch on left side. Surface more or less rugulose. 36 × 32, alt. 10 mm., 37 × 30, alt. 15 mm.

White, some specimens brownish internally.

Radula as in *porcellana*, but inner marginal plate broader, less falcate, strongly serrate on outer margin.

Fossil: Pleistocene, Angras Juntas (south of Bogenfels), South West Africa (Haughton, 1932, p. 22).

Table Bay (coll. Dunker, Krauss, 1848; also S. Afr. Mus.); Lambert's Bay (west coast) (U.C.T.); Still Bay (S. Afr. Mus. coll. Muir).

Living: False Bay (U.C.T.).

Remarks. Quite possibly this species should be known as *capensis* (Quoy and Gaimard, 1835, p. 424, pl. 72, figs. 13, 14), but I have not seen the original description, only Krauss's comments. Adam & Leloup (1936, p. 349) had no material.

Calyptraea helicoidea (Sow.)

Fig. 10 *h*, *i*

Trochita helicoidea, von Martens, 1903, p. 45.

Protoconch 1½ whorls, very finely and indistinctly spirally striate. Postnatal whorls 3–4. Oblique ribs starting at end of 1st postnatal whorl or beginning of 2nd; the number varies, e.g. (on shells with basal diameter 32–35 mm.) 36 to 50. Junction of columella with septum moderately prominent, umbilicus open in juvenile, but nearly closed in older shells, leaving a narrow slit about in middle of columella.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Jeffreys Bay (S. Afr. Mus. coll. Muir); Umtata River mouth (S. Afr. Mus.).

St. Francis Bay, 80–100 metres, 1 living; and 35° 29′ S., 21° 02′ E., 102 metres, 1 dead (von Martens).

Off East London, 32 fathoms, 1 and 2 juvenile (diam. 5 and 9 mm.), dead (S. Afr. Mus. P.F. coll.).

Algoa Bay, 26 fathoms, 1 juv. dead (U.C.T.).

Remarks. Nicklès (1950, p. 73, fig. 99) figures the very similar *C. trochiformis* Gmelin (*radians* Lam.) which occurs on the coast of Angola northwards.

I suspect that *Nerita dubia* Turton (1932, p. 202, pl. 53, no. 1402), renamed *tomlini* Turton (1933, p. 371), may be the protoconch of this species, or of *chinensis*, but my material is not quite sufficient to prove it.

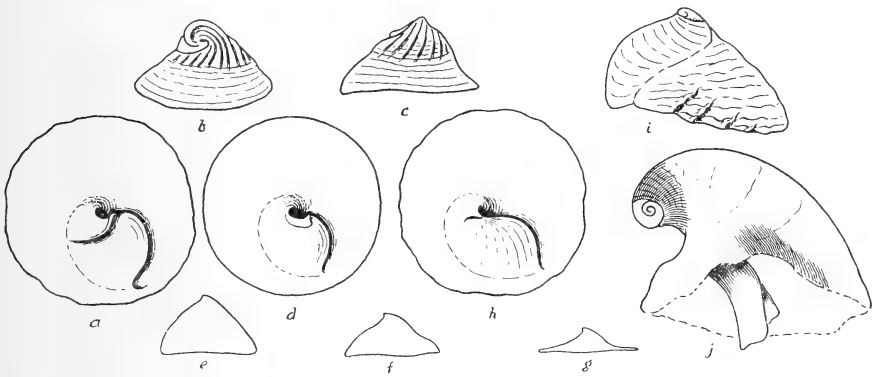


FIG. 10. *Calyptraea aurita* Rve. *a*, basal view. *b*, *c*, two views of protoconch. *C. chinensis* (Linn.). *d*, basal view. *e*, *f*, *g*, side views of extreme high, normal, and extreme low forms. *C. helicoidea* (Sow.). *h*, basal view. *i*, juvenile with protoconch. *Cheilea microstriata* n. sp. *j*, broken shell with protoconch, fine radiating striae indicated only at beginning of 1st postnatal whorl, and on part of broken basal margin.

Calyptraea chinensis (Linn.)

Figs. 10 *d–g*, 11 *c*

Calyptraea solida (*non* Rve.), von Martens, 1874, p. 127.
Calyptraea chinensis, Sowerby, 1892, p. 39. Schwarz, 1910, p. 115. Nicklès, 1950, p. 73, fig. 98.
Calyptraea sinensis, Bartsch, 1915, p. 136. Thiele, 1925, p. 99.
Calyptraea capensis Tomlin, 1931, p. 428, pl. 33, fig. 6.

Protoconch 1½ whorls, nucleus not sunken, smooth. Postnatal whorls 3, usually smooth, but often with small, hollow, squamiform prickles, variable in number. Junction of columella and septum somewhat angularly prominent, columella reflexed but leaving only a mere chink at the junction of columella and septum. Max. diam. 25, alt. 7 mm. Extreme high examples: diam. 12, alt. 10 mm. and diam 15, alt. 9 mm.; extreme low example: diam. 20, alt. 4·5 mm.

Radula with *c.* 30 rows, central plate squarish, 2–3 denticles on either side of median cusp, lateral plate about twice width of central plate, 1 denticle on

inside and *c.* 10 on outside of main cusp, marginal plates falcate, inner plate denticulate (not strongly) on both margins, outer plate feebly denticulate on outer margin.

Fossil: Pleistocene: Port Elizabeth (coll. Johnson, Schwarz).

False Bay (von Martens). 35° 16′ S., 22° 26′ E., 155 metres (Thiele).

Table Bay, False Bay, Still Bay, Algoa Bay (S. Afr. Mus.).

34° S., 25° 44′ E. (no depth recorded), 2 juv.; 33° 03′ S., 27° 57′ E., 32 fathoms, 2 juv.; Buffels Bay (False Bay), 22–35 fathoms, 3; off Cape Infanta, 47 fathoms, 4; off Cape St. Blaize, 37 fathoms, one; off Nieca River (East London area), 43 fathoms, 3; all dead (S. Afr. Mus. P.F. coll.).

Living: Langebaan (Saldanha Bay), False Bay, Mossel Bay and Port Elizabeth (U.C.T.). 34° 15′ S., 25° 05′ E., 6 fathoms; 34° 07′ S., 25° 46′ E., 41 fathoms; 33° 03′ S., 28° 11′ E., 31 fathoms; 33° 47′ S., 26° 04′ E., 26 fathoms (U.C.T.).

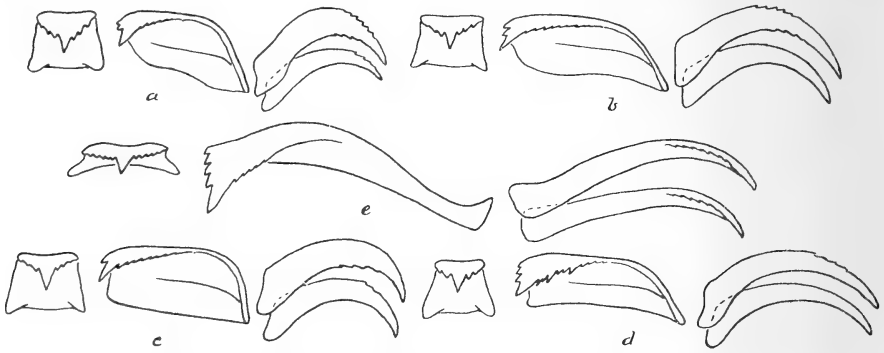


FIG. 11. Radula teeth of: *a*, *Crepidula porcellana* Lam. *b*, *C. aculeata* (Gmelin). *c*, *Calyptraea chinensis* (Linn.). *d*, *C. aurita* Rve. *e*, *Capulus intortus* Lam.

Distribution. Europe, Mediterranean, west coast of Africa to Angola.

Remarks. Smooth and prickly examples may occur in the same locality, e.g. those from Buffels Bay, and from Cape Infanta.

There seems no reason to bring *solida* into the fauna list; von Martens's specimen was certainly only an unusually thick-shelled *chinensis*.

Tomlin described *capensis* from beach-worn examples, and consequently all the characters which he adduced to separate the Cape shells from *chinensis* are useless. The colour, as Turton pointed out, is not always purplish; in fact a purple tint is due to some chemical action, and affects other beach-rolled shells (e.g. *Charonia pustulata*, *Conus* 'lavendulus'). The altitude is by no means higher than in *chinensis*: Tomlin gave diam. 18, alt. 6 mm.; I have seen British examples with same altitude, but only 11 mm. in diameter. The internal process (septum) was said to reach the edge of the shell in *capensis*, but that is clearly because the original margin of the shell had been worn away.

Powell's figure (1951, p. 126, fig. E(1)) shows only the septum, not the reflexed columella margin.

Calyptraea aurita Rve.

Figs. 10 *a–c*, 11 *d*

Calyptraea striata (*non* Say) (*fide* Reeve), Broderip, 1834, p. 38.
Crucibulum aurita Reeve, 1859, sp. xi, pl. xi.

Protoconch 1½ whorls, nucleus sunken, with radiating spiral lirae. Postnatal whorls ?3. With several rows of hollow squamiform prickles. Junction of columella and septum prominent but rounded, columella widely reflexed but leaving a narrow umbilicus. Max. diam. 21, alt. 6·5 mm.; diam 21, alt. 9·5 mm.; diam. 21, alt. 8 mm.; diam. 19, alt. 9·5 mm.; diam. 17, alt. 7 mm.

Radula as in *chinensis*, with *c.* 36 rows, lateral plate relatively wider, about 3 times width of central plate, both marginal plates more slender.

Off Cape Recife, 56 fathoms, 1, and 1 protoconch, dead; off Cape St. Blaize, 125 fathoms, 1, and 1 juv., dead; off Martha Point (Struis Bay), 42 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Living: 33° 47′ S., 26° 4′ E., 26 fathoms (Algoa Bay), and 34° 15′ S., 25° 5′ E., 6 fathoms (St. Francis Bay), (U.C.T.).

Remarks. The Cape Recife shell was identified by Sowerby (3) as *Crucibulum* (*Poculina*) *auritum* Rve., a species originally described from Valparaiso. The identification would seem to be doubtful, but I am not able to check it; I give a figure of the protoconch, which together with the reflected columella and the umbilicus distinguish the species from the other two South African species.

Fam. **Capulidae**

The animal attaches itself to the substratum by secreting a calcareous plate, which shows a horseshoe-shaped muscle-scar similar to that in the shell. For this reason they were at one time regarded as 'bivalves'.

Macnae & Kalk (1958, pp. 36, 88, 127, fig. 30 *g*) have recorded *Thyca ectoconcha* Sarasin from Inhaca Island, Delagoa Bay, on the Echinoderm *Linckia multifora*.

Adam (1934) considered that *ectoconcha* Sarasin 1887 and *pellucida* Kukenthal 1897 were both synonymous with *crystallina* Gould 1846.

Capulus intortus (Lam.)

Fig. 11 *e*

Pileopsis intortus, Lamarck, 1822, p. 18.

Protoconch 1¾–2 whorls, smooth. Postnatal whorls smooth or more or less rugulose, with growth-lines only. White, periostracum pale horny or drab. Overall length 17 mm., maj. basal diam. 10, alt. 8 mm.

Radula with 65 rows, central plate broad, 5–6 denticles on either side of median cusp, lateral plate very wide, 4 denticles on inside and several on outside of the strong main cusp, both marginal plates long, distally finely denticulate.

Off Tugela River, 36–46 fathoms, and off Cape Natal, 54 and 85 fathoms, 37 specimens, incl. juv., living and dead (S. Afr. Mus. P.F. coll.). 29° 53′ S., 31° 06′ E., 71 metres, living (U.C.T.).

Distribution. Madagascar, Mauritius.

Remarks. The largest of the Tugela specimens, with a smaller one on its back, was affixed to the back of the outer lip of a living *Turris gilchristi.*

Two *Pieter Faure* specimens, one from an uncertain locality, but probably Algoa Bay, the other from off Hood Point (East London area), 49 fathoms, are very finely striate as in *Cheilea* (*infra*), but have no trace of an internal process. Even the juveniles of *intortus* are not striate. Until further material is available, these two specimens are merely recorded (S. Afr. Mus. Nos. A9017 and A9018).

Fam. **Amaltheidae**

Thiele, 1929, p. 241.

As *Cheilea* Modeer 1793 is the oldest genus, the family name should be Cheileidae, and the Stirps (Thiele, 1929, p. 238) Cheileacea.

Cheilea equestris (Linn.)

Calyptra equestris H. & A. Adams, 1854, p. 364, pl. 40, figs. 3, 3*a*.
Calyptraea equestris Chenu, 1859, figs. 2322, 2323.
Mitrularia equestria Schepman, 1909, p. 200. Smith, 1910a, p. 201.
Cheilea equestris Satyamurti, 1952, p. 94, pl. 6, fig. 12.

Durban and Scottburgh (Smith); Umzikaba (north of Port St. Johns) (seen by me, 1961).

Distribution. Mauritius, Madagascar, Indian Seas, East Indies.

Remarks. The Umzikaba example and those from Nossi Bé (U.W.) corresponding with the figures in H. & A. Adams, and Chenu, i.e. the margin is evenly subcircular, and regularly crenulate.

Cheilea microstriata n.sp.

Fig. 10*j*

The following specimens differ from *equestris* in having much finer radial striae which maintain their fineness to the margin, but being so fine they make no impression on the edge of the margin and are not visible from below. The margin is irregularly undulate, due apparently to the substratum to which the animal was attached, not to definite ribs such as those which characterize *costifera* Schepman 1909.

Protoconch $2\frac{1}{2}$ ($-2\frac{3}{4}$) whorls, smooth. Postnatal whorls with extremely fine radial striae from apex to margin. Growth-lines distinct in the 12 mm. shell, becoming undulate and lamellose near the margin; surface of the 21 mm. shell more rugged, growth-lines not lamellose, but margin irregularly undulate; the 15 mm. shell has 4–5 lamellose growth-lines projecting from the surface

like flounces on a lady's dress. Maj. diam. 21, alt. 10 mm.; diam. 15, alt. 7 mm.; diam. 12, alt. 5·5 mm.; diam. 7, alt. 5 mm. (broken).

Off Cape Natal (Durban) 85 fathoms; off Umhloti River, 40 fathoms (the largest shell); off Durnford Point (Zululand) 90 fathoms (broken); off Cape Vidal (Zululand) 80–100 fathoms; all dead (S. Afr. Mus. A9004—A9006, and A9342; P.F. coll.).

Remarks. There are no strongly marked ribs as in *costifera*: they are not even as strongly marked as in Chenu's figs. 2329 and 2331 of *martiniana* Rve. If I may repeat Schepman's words: 'I am not proud of this species'; but it can scarcely be regarded as a variety of *equestris*. It is much thinner-shelled than the littoral Madagascan examples of the latter, though this character may possibly be due to habitat in deeper water.

Amalthea barbata (Sow.)

Hipponyx barbata Sowerby, 1846, p. 369, pl. 73, figs. 26, 27. Smith, 1903a, p. 384.
Pileopsis pilosus Krauss, 1848, p. 68.

Tongaat, Umkomaas (coll. Burnup), Scottburgh (coll. K.H.B.); and a very worn specimen from Pondoland (S. Afr. Mus.).

Amalthea acuta (Q. & G.)

Hipponyx acuta Quoy & Gaimard, 1835, p. 437, pl. 72, figs. 35, 36. Krauss, 1848, p. 68. Turton, 1932, p. 154, pl. 35, no. 1100.
Hipponyx australis Sowerby, 1897, p. 32. Adam & Leloup, 1938, p. 108, pl. 6, fig. 4.

Radula with 70 rows, similar to that of *Capulus intortus* (see fig. 11 *e*).

Durban (Sowerby); Port Alfred (Turton); Natal (S. Afr. Mus. coll. Burnup). Delagoa Bay, on *Strombus* and other gastropods, also on a spine of *Prionocidaris baculosa* (U.W.).

Odhner (1919, pp. 34, 42) recorded it from Tamatave, Madagascar, on *Turbo* and *Conus*.

Remarks. I have seen also a specimen from the Pleistocene deposits at De Hoop, Bredasdorp District, western Cape, collected by J. H. Power, formerly Director of the Kimberley Museum. Overall length 8·5, maj. basal diam. 6·5, alt. 4 mm.

Fam. **Trichotropidae**

Trichotropis capensis Thiele

Trichotropis capensis, Thiele, 1925, p. 100, pl. 20(8), figs. 2, 2*a*.

Protoconch $1\frac{1}{2}$ whorls, with 5 spiral lirae. Postnatal whorls $3\frac{1}{2}$; 2 feeble spiral lirae below suture, followed by 5 strong ones, the 3 lower ones being the strongest; numerous oblique plicae, usually every 4th one larger, forming nodules on the lirae. 4·7 × 3·5 mm.

34° 51′ S., 19° 37′ E., 80 metres; and 35° 16′ S., 22° 26′ E., 155 metres (Thiele).

Similar to *townsendi* Melvill and Standen 1901, from Gulf of Oman, in having 5 main spiral lirae.

Trichotropis zuluensis n.sp.

Figs. 12 *d*, 13 *c*

Protoconch 2 whorls, diam. 0·75, alt. 0·5 mm., smooth. Postnatal whorls 4, profile angular at the periphery. Retractive axial ribs 12 on 1st whorl, 14 on 2nd, 16 on 3rd, 20 on 4th, forming small nodules where they cross the spiral lirae; 1 strong spiral lira at periphery, above which 1 on 1st whorl, 2 on 2nd and 3rd, 4 on 4th whorl; below periphery 1 lira, with a second just visible in the suture, which is continued from top of apertue as a strong lira; 5 lirae on concave base. Between the axial ribs numerous fine growth-lines, which

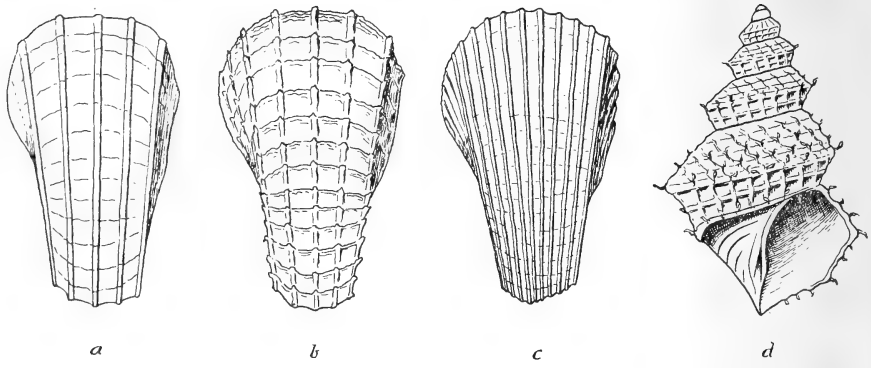


FIG. 12. *Lippistes cornu* (Gmelin). *a*, 5-lirate form. *b*, 8-lirate form, with periostracum. *c*, 20-lirate form (*multilineata* Turton). *d*, *Trichotropis zuluensis* n. sp.

however do not produce a milled edge on the lirae as they do in, for example, *borealis*. Columella slightly bent. 10·5 × 6 mm.

White, periostracum pale brown, fibrous, with filamentous processes at the nodules on the peripheral and basal lirae.

Radula with 35 rows, central plate trapezoidal, wider behind than in front, 4 denticles on either side of median cusp, lateral plate with sinuous front margin, 3–4 denticles on inside and several on outside of main cusp, both marginal plates rather stout, entire; the bulge on front margin of the lateral plate appears to clip under the flange on the preceding plate.

Off Durnford Point, 90 fathoms, 1 living; off Cape Vidal, 80–100 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Remarks. Distinguished from *capensis* by the angular whorls, smooth protoconch, and fewer spiral lirae.

T. pulcherrima Melv. & Stand. (1903b, p. 296, pl. 20, fig. 15), from the Gulf of Oman, has the upper whorls 2–, the body-whorl 4-carinate, no specially strong peripheral lira.

Lippistes cornu (Gmelin)

Fig. 12 *a–c*

Separatista grayi Adams, A., 1850, p. 45.
Lippestes cornu, Turton, 1932, p. 196, pl. 50, no. 1361 (3 figs.).

The number of lirae increases with growth: diam. 1·5 mm.—3 lirae; diam. 2 mm.—4 lirae; diam. 4 mm. upwards—5 lirae. Overall length 14–15 mm., maj. diam. aperture 9 mm.

Table Bay (S. Afr. Mus.); off East London, 32 fathoms (S. Afr. Mus. P.F. coll.).

Although the normal number of well-marked peripheral lirae is 5 (not 6 as Turton stated), many specimens show indications, more or less distinct, of 1–4 additional lirae both on the lower and on the upper surfaces. Turton gave a photo of a juv. 0·4 mm. showing distinctly 5 lirae, and apparently 4 additional smaller ones on the upper surface. These additional lirae are also shown in the photo of the 8 mm. shell.

A living specimen had a brown periostracum, with ridges corresponding with the 5 peripheral lirae and 3 additional ones on lower surface, but none corresponding with 2 additional feeble lirae on upper surface; at each major growth-line short bristles occur on the 8 ridges.

This specimen has 8–10 lirae; and there are other specimens with the number of lirae varying from 14 up to 20. The lirae, especially those on the upper and lower surfaces, are frequently minutely beaded (see Turton's fig. no. 1361). These multilirate shells may be referred to:

var. *multilineata* W. H. Turton

Lippistes cornu var. *multilineata* Turton, 1932, p. 196, pl. 50, no. 1362 (protoconch, 0·7 mm.).

Port Alfred (Turton). St. James, False Bay, littoral, 1 living (S. Afr. Mus. coll. K.H.B. 1912); Still Bay, 5 dead (S. Afr. Mus. coll. Muir).

Off Umkomaas River (Natal), 40 fathoms, 2 and 1 juv., dead; off Cape Morgan, 77 fathoms, 1 (S. Afr. Mus. P.F. coll.).

The Cape Morgan specimen is fossilized, but shows more than the 5 peripheral lirae.

Distribution. Mekran coast, India (Melvill & Standen).

Remarks. The trilirate stage seems to resemble *Neritopsis tricostata* D'Orb. (Chenu, 1859, fig. 2309).

Fam. **Fossaridae**

Thiele, 1925, p. 93.

Fossarus ambiguus (Linn.)

Fossarus ambiguus Chenu, 1859, fig. 2133. Smith, 1910a, p. 199. Thiele, 1925, p. 93, pl. 16(4), fig. 16 (radula). Thiele, 1929, p. 240, fig. 248. Nicklès, 1950, p. 72, fig. 95.

Tongaat (Natal) (Smith); Port Shepstone (Natal) (S. Afr. Mus. coll. Burnup).

Distribution. Mediterranean, west coast of Africa to Angola; St. Helena.

Fossarus capensis Pilsbry

Fossarus capensis, Pilsbry, 1901, p. 190, pl. 5, fig. 13. Smith, 1910a, p. 199.

One or 2 strong peripheral spiral keels, also 1 from the top of aperture, and 1 on base; thus the outer lip shows, respectively, 3 or 4 notches. Between each pair of keels fine spiral lirae. The strength of the keels varies.

Two of the South African Museum specimens from Scottburgh show 1 keel, and two show 2 peripheral keels; all three Delagoa Bay shells have only 1 peripheral keel.

Scottburgh (Natal) (Smith; also S. Afr. Mus. coll. Burnup); Delagoa Bay (U.W.).

Originally obtained from ballast from South Africa (Pilsbry).

Recorded by Burnup as living in the byssus of *Melina dentifera* (Krauss) (see: Tomlin, 1931, p. 448).

Megalomphalus mosselensis Brnrd.

Megalomphalus mosselensis Barnard, 1957, p. 180, text-figs. *b*, *c*, *d* (shell, embryo, radula).

Mossel Bay, 1 specimen (U.C.T.).

Fam. **Vanikoroidae**

Gen. Vanikoro Q. & G.

Quoy & Gaimard, 1833, p. 239.
Smith, 1908, pp. 104–117, one text-fig. (list of Recent species, synonymy, no full descriptions).

Turton's (1932) 2 species *fenestrata* and *aenigmatica* require re-examination; the former seems to be a *Vanikoro*, but the genus of the latter, as Turton said, is doubtful.

Vanikoro cancellata (Lam.)

Narica cancellata, Chenu, 1859, fig. 2402.
Vanikoro cancellata Sowerby, 1903, p. 229. Smith, 1908, p. 105. Thiele, 1929, p. 241, fig. 249.

Oblique ribs on 1st whorl 12 (13), on 2nd 14 (15), on next half-whorl 10, after which they become flattened and obsolete. Spiral lirae between suture of 2nd whorl and top of outer lip *c.* 17–18.

Off Rame Head, south of Port St. Johns [not Natal as stated by Sowerby, 1903], 1 dead (Sowerby).

This *Pieter Faure* specimen (identified by Sowerby) is in the South African Museum; it seems to differ very little from *ligata* (specimens identified as *deshayesiana* by Tomlin).

Distribution. Mauritius, Persian Gulf, East Indies, Pacific.

Vanikoro ligata (Récluz)

Narica ligata & *deshayesiana* Récluz, 1844, p. 138.
Vanikoro ligata, Sowerby, 1900, p. 5. Smith, 1908, p. 106.

Oblique ribs 10 (11) on 1st whorl, 12 (13) on 2nd, 10 on next half-whorl, after which they become evanescent. Spiral lirae *c.* 25 between suture of 2nd whorl and top of aperture.

Pondoland (Sowerby; also S. Afr. Mus.); Durban (Sowerby); Tongaat (north of Durban) (S. Afr. Mus.).

Living: 29° 46′ S., 31° 17′ E., 110–130 metres (U.C.T.). Delagoa Bay (U.W.).

Distribution. East Indies, Philippine Is.

Remarks. Sowerby (1900) had 1 specimen and the South African Museum has 6 specimens from 'Pondoland' (= the Kowie = Port Alfred), collected by Dr. H. Becker. Turton, at the same locality, obtained neither this species nor *gueriniana.*

Vanikoro africana Bartsch

Fig. 13 *a*, *b*

Vanikoro africana, Bartsch, 1915, p. 140, pl. 36, fig. 11.

Protoconch 1½–2 whorls, smooth, the nucleus up-standing. Postnatal whorls 2. Oblique ribs on 1st whorl 22, of first half of 2nd whorl 18–19, thereafter evanescent. Diam. 3, alt. 3 mm.

Port Alfred (Bartsch, Turton, 1932).

Off Cape Morgan, 77 fathoms, 1 dead but unworn (S. Afr. Mus. P.F. coll.).

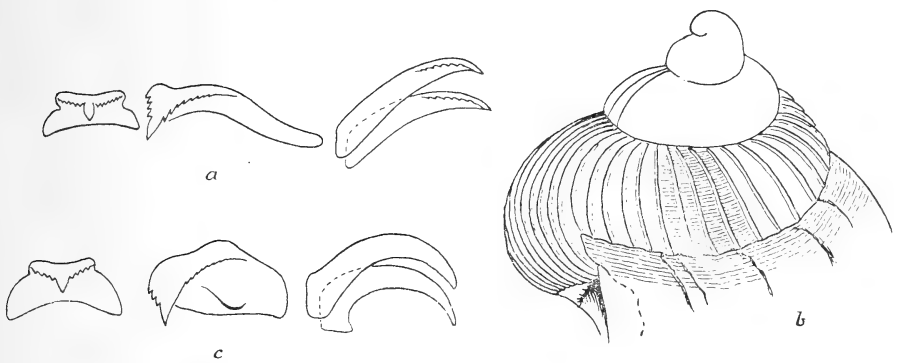


FIG. 13. *Vanikoro africana* Bartsch. *a*, radula teeth. *b*, shell, spiral striae not completely drawn in. *c*, *Trichotropis zuluensis* n. sp. radula teeth.

Remarks. A high-spired species. Bartsch's description does not mention the number of oblique ribs, and the figure is not very clear; apparently there are about 20 on the visible part of body whorl, corresponding approximately with the present specimen. Apparently Bartsch's two specimens were ribbed up to the outer lip, as he does not mention the ribs becoming evanescent on the last whorl; the diameter of the ribbed portion, 1½ whorls, of the present specimen is only 2 mm.

Vanikoro natalensis Smith

Vanikoro natalensis, Smith, 1908, p. 113, text-fig.

The height of the last whorl appears in the figure to be nearly half the vertical diameter of the aperture; it is thus a much higher shell, and less *Sigaretus*-like than *ligata*. Récluz regarded it as a variety of *acuta*; Smith said 'very similar to *striata*'. A more detailed description and better figure are required.

Scottburgh and Durban (Smith).

Vanikoro sp.

Protoconch consisting of nucleus and one whorl, but junction with 1st postnatal whorl not distinct except that the protoconch is smooth (? worn smooth), diam. 0·75 mm. Postnatal whorls, 2, diam. (visible) of 1st 2 mm., of 2nd 8·5 mm.; both whorls with fine spiral lirae, on back of outer lip mostly larger and smaller lirae alternating; no axial sculpture. Sutures not indented. 7 × 8·5 mm.

Off Cape Natal (Durban), 54 fathoms, 1 dead (S. Afr. Mus. no. A9243, P.F. coll.).

A very low (when lying with the aperture downwards), *Sigaretus*-like specimen, to which no specific name is given until material of other species is available for comparison.

Fam. **Pyramidellidae**

Fretter & Graham, 1949.

The *Pieter Faure* obtained only a few specimens of this family. On the other hand, the late Dr. Muir found Still Bay to be an extremely good locality (for sieving shelly sand), perhaps not as rich as Port Alfred, but he was collecting for only a comparatively short period before his death.

A thorough revision of the South African representatives of this family is required, based on good fresh material. Some of the *Pieter Faure* and Muir material is reserved for future study.

Fretter & Graham regard these mollusca as parasitic opisthobranchs. Each species lives on a particular host, usually (as far as known) a tubicolous polychaet or lamellibranch mollusc.

Pyramidella dolobratus (Linn.)

Obeliscus dolobratus Macnae & Kalk, 1958, pp. 44, 86, 88.

Off Umhloti River (Natal), 27 fathoms, 4 dead; St. Francis Bay, 34 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Delagoa Bay (U.W.), Inhambane (U.C.T.).

Pyramidella sulcatus (A. Adams)

Pyramidella mitralis Macnae & Kalk, 1958, pp. 44, 86, 88, fig. 21 *h*.

Kosi Bay (U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also U.W.); Inhambane (U.C.T.).

Commensal (? parasitic) with the enteropneust *Ptychodera flava* and the echinoderm *Echinodiscus* (U.W.).

Pyramidella tarpeia Bartsch

Pyramidella tarpeia, Bartsch, 1915, p. 74, pl. 14, fig. 6 (? pl. 15, fig. 6). Turton, 1932, p. 92 (says figures for this species and *hera* are misplaced in Bartsch).

Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

Pyramidella minor (Smith)

Eulimella minor, Smith, 1904, p. 36, pl. 3, fig. 3.
Pyramidella minor, Bartsch, 1915, p. 74

Port Alfred (Smith, Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

Pyramidella aganea Bartsch

Eulimella nivea, Smith, 1904, p. 36, pl. 3, fig. 2 (*Eulimella nivea, nom. preocc.*). Thiele, 1925, p. 149 pl. 25(13) figs. 22, 22 *a*.
Pyramidella aganea, Bartsch, 1915, p. 73, pl. 14, fig. 9.

Fossil Quaternary: Sedgefield near Knysna (A. R. H. Martin); raised beach, Little Brak River, Mossel Bay (S. Afr. Mus.).

Port Alfred (Smith, Bartsch, Turton).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. Perhaps only a white form of *capensis*; I am assuming that specimens presented to the South African Museum by Turton are correctly named *aganea*. *P. alfredensis* is probably another synonym.

Pyramidella (*Syrnola*) *pyrrha* Bartsch

Pyramidella pyrrha, Bartsch, 1915, p. 73, pl. 14, fig. 8.

Protoconch heterostrophic, diam. 0·5 mm. Protoconch plus 9 whorls: 7 × 2 mm.

Port Alfred (Bartsch, Turton, 1932).

Off Cape Natal (Durban), 85 fathoms, 1 dead but fresh, showing the orange band just above the suture (S. Afr. Mus. no. A9143. P.F. coll.).

Remarks. The present specimen is too slender for *ima* Bartsch, unless perhaps these two species are synonymous. Intermediate in shape between Thiele's (1925) two Sumatran species *jovis* and *veneris*. Straightsided like *minerva* Thiele, not slightly convex as in *dianae* Thiele 1925.

Turbonilla trachealis Gould

Turbonilla trachealis Gould, 1861, p. 407. Bartsch, 1915, p. 82, pl. 17, fig. 1.
Cingulina acutilirata Sowerby, 1892, p. 27, pl. 1, fig. 32.
Cingulina circinnata (*non* A. Adams), Sowerby, 1892, p. 27.
Turbonilla trochlearis [*sic*] Gould, Sowerby, 1897, p. 14.

Simon's Bay (False Bay) (Gould, Bartsch, 1915). Langebaan (Saldanha Bay) (U.C.T.).

34° 5′ S., 25° 55′ E., 67 fathoms, 1 broken; off Hood Point (East London), 49 fathoms, 1 apex; off Itongazi (Natal), 25 fathoms, 1 broken; off Tugela River (Natal), 14 fathoms, 1 apex (S. Afr. Mus. P.F. coll.).

West coast of Cape Peninsula (U.C.T.).

Remarks. Sowerby (1897) quoted 'trochlearis' Gould, *Otia conchologica*, p. 151. Bartsch's index does not include 'trochlearis', and his bibliography does not include Gould's *Otia conchologica*. Gould's papers are not available to me. Compare *Rissoina annulata* (p. 184).

Turbonilla pellucida (Sow.)

Cioniscus pellucida Sowerby, 1897, p. 13, pl. 6, fig. 10.
Turbonilla pellucida Turton, 1932, p. 98, pl. 21, no. 718, and var. *affinis*, p. 98, pl. 21, no. 719.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, 1915, Turton). Kalk Bay (False Bay) and Still Bay (S. Afr. Mus. coll. Lightfoot and Muir respectively).

Turbonilla tincta Sow.

Turbonilla tincta, Sowerby, 1900, p. 5, pl. 1, fig. 15.

Intervals striate (punctate in worn specimens) between the axial ribs. Some of the latter, as strong growth-lines, continued across base, as is also the spiral striation.

Port Alfred (Sowerby, Bartsch 1915, Turton, 1932; also cotypes in S. Afr. Mus.). Still Bay (S. Afr. Mus. coll. Muir). Tongaat (Natal) (S. Afr. Mus.).

Turbonilla kraussi Clessin

Chemnitzia lactea (*non* Linn.), Krauss, 1848, p. 88, pl. 5, fig. 23. Schwarz, 1910, p. 115.
Turbonilla kraussi Clessin, 1890, p. 135, pl. 16, fig. 6. Turton, 1932, p. 93.

No spiral striae in the intervals, which end abruptly at bottom of whorl and are not continued over perimeter on to base. No spiral striae on base. Up to 15 mm. long.

Fossil, Quaternary: Sedgefield near Knysna (coll. A. R. H. Martin); Port Elizabeth (Schwarz).

Natal (Krauss; also S. Afr. Mus.). Port Alfred (Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir). Langebaan (Saldanha Bay) (U.C.T.); Table Bay and False Bay (S. Afr. Mus.; also U.C.T.).

Off Knysna, 49 fathoms, and False Bay, 22 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Very common in Table Bay and False Bay. It seems rather strange that Stimpson on his visit to the Cape in 1853 did not collect any specimens of this species, but obtained specimens which were described by Gould as a separate species, renamed and maintained by Bartsch (*obeliscus* Gould 1861 = *secura* Bartsch 1915). Bartsch's figure (pl. 17, fig. 7) is certainly not *kraussi*.

A single specimen (S. Afr. Mus. A9703) dead, but fresh and glossy, was obtained at Sta. 189, 33° 50′ S., 17° 21′ E., 600 fathoms (F. H. Talbot, on R.S. *Africana II*, 1959). It agrees with *kraussi*, though the ribs are less strongly developed. When more material is available it may prove to be distinct.

Turbonilla bathyraphe Sow.

Fig. 14 *d*

Turbonilla bathyraphe Sowerby, 1901, p. 213, pl. 22, fig. 18.

Protoconch 1½–2 whorls (worn), one whorl smooth, next whorl (? 1st postnatal) with *c.* 14 indistinct (worn) axial pliculae, next whorl (? 2nd postnatal) with *c.* 14–16 pliculae, increasing on later whorls to *c.* 24–30; crossed by spiral lirae 2 on 3rd whorl, 3 on the following whorls, the middle one peri-

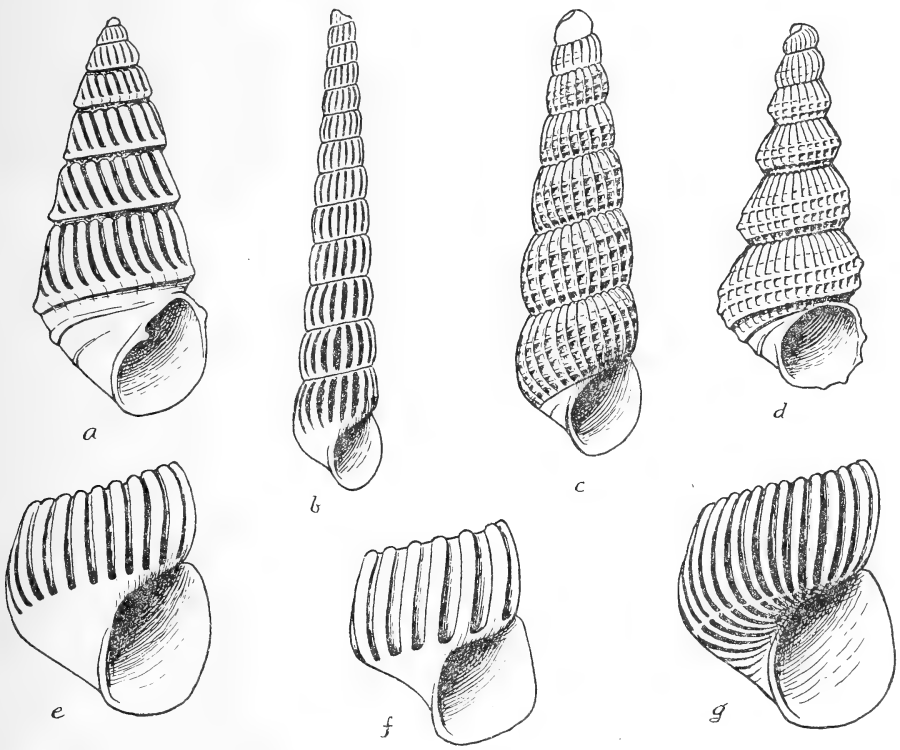


FIG. 14. *a*, *Odostomia ornata* Turton. *b*, *Turbonilla deprofundis* n. sp. *c*, *T. prolongata* Turton. *d*, *T. bathyraphe* Sow. *e*, body whorl of *T. similans* Smith. *f*, *T. tugelae* n. sp. *g*, *T. adaba* Bartsch.

pheral, the upper lira beginning weak but becoming equal to the other two on later whorls, and nearer to the middle one than to the suture above; on 6th whorl a 4th lira, always weak, between upper lira and suture; base with 2 spiral lirae, the upper the stronger. 6·5 × 2 mm. (6 postnatal whorls) (Sowerby: 2 plus 7 whorls, 7 × 2 mm.).

Port Alfred (Sowerby, Bartsch, 1915, Turton, 1932; also S. Afr. Mus. cotype from Dr. Becker). Still Bay (S. Afr. Mus. coll. Muir).

34° 27′ S., 25° 42′ E., 256 fathoms, 1 (protoconch plus 5 whorls); 34° S., 25° 44′ E., 33 fathoms, 9 (one with 6 postnatal whorls, others juv.); off Cape Infanta, 46 fathoms, 1 broken (S. Afr. Mus. P.F. coll.).

Remarks. These specimens correspond with a cotype received from Dr. Becker, but not with Sowerby's description ('. . . liris spiralibus 4 . . .', but the *early* whorls are not 4-lirate), and even less with his figure which shows only 2 lirae on the last whorl, only 3 on the others. His figure also shows the pitch of the whorls as too steep. The identification of the *Pieter Faure* and Still Bay examples would scarcely have been possible unless the South African Museum has possessed a cotype.

Although doubtless carried down to the greater depth of 256 fathoms by currents, this *Pieter Faure* specimen is in better condition than some of those from inside Algoa Bay at 33 fathoms.

Turbonilla tegulata Sow.

Turbonilla tegulata Sowerby, 1892, p. 25, pl. 2, fig. 38. Turton, 1932, p. 100, pl. 22, no. 730.
Turbonilla sophia Thiele, 1925, p. 164, pl. 29 (17), fig. 6.
Turbonilla olga Thiele, 1925, p. 165, pl. 29 (17), fig. 7.

Postnatal whorls 8. Axial riblets on 2nd whorl *c.* 16, increasing to *c.* 28–30 on last whorl. Spiral lirae on 1st whorl 1–2, on 2nd and 3rd 2, on 4th 3, increasing to 5–6 or 7, but often only 3 or 4 distinct on 7th and 8th whorls. 4·5 × 1·25 mm.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, 1915, Turton); Still Bay (S. Afr. Mus. coll. Muir); Simon's Bay (False Bay) (Thiele).

Remarks. Among the large number of specimens collected by Muir, there are a few with a reduced number of axial riblets on the later whorls, *c.* 20–22 on the last whorl, resulting in a wider mesh cancellation. Such variants seem to have misled Turton into the manufacture of 'species' (cf. *intersecta*), but his material needs re-examination.

Tomlin, who saw my provisional identifications of the Muir material, agreed that Thiele's two species were synonymous with *tegulata.*

Turbonilla cf. *prolongata* W. H. Turton

Fig. 14 *c*

Turbonilla prolongata, Turton, 1932, p. 100, pl. 22, no. 727.

Protoconch 2 whorls, worn, heterostrophic. Postnatal whorls 6. Profile of whorls gently convex, not shouldered. Axial riblets on 1st whorl *c.* 16–18,

increasing to *c.* 28–30 on last, slightly sigmoid and slightly retractive, tops entering suture which is crenulate; spiral lirae 2 on 1st whorl, 3 on 2nd, increasing to 6 on last whorl, one marginal lira on base (possibly more, but riblets predominating); cancellation square, intersections nodulose. 6 × 1·5 mm.

34° S., 25° 44′ E. (Algoa Bay), 33 fathoms, 2 (1 with 6, 1 with 3 whorls); off Cove Rock (East London area), 22 fathoms, 1 with 4 whorls (S. Afr. Mus. nos. A9165 and A9166, P.F. coll.).

Remarks. Probably identical with Turton's *prolongata*, which according to the figure has 4 postnatal whorls at a length of 3 mm. (text says 6 whorls); the present two smaller specimens have 4 postnatal whorls at a length of 3·3 mm.

Also very like Turton's *intersecta* 1932, but seems to be larger: 6 postnatal whorls at length of 6 mm., instead of 6 (Turton reckoned 7) at 4·2 mm.

Turbonilla bifasciata A. Adams

Turbonilla bifasciata Adams, A., 1851, p. 297. Turton, 1932, p. 97.
Turbonilla fusca Adams, A., 1855a, p. 181. Turton, 1932, p. 97.

Dr. Muir collected a large number of specimens, some of which are uniformly pale amber-brown, others have 2 distinct narrow bands on a pale ground-colour. Bleaches to pale buff, cream, or white.

Port Elizabeth (Sowerby); Port Alfred (Turton); Still Bay (S. Afr. Mus. coll. Muir).

Turbonilla similans Smith

Fig. 14 *e*

Turbonilla lactea (*non* Linn.), *non* Krauss, Sowerby, 1892, p. 26.
Turbonilla similans, Smith, 1903a, p. 386, pl. 15, fig. 13.

Postnatal whorls 9. Axial riblets 14 on 1st and 2nd whorls, increasing to *c.* 18 on last whorl, strong, slightly sinuous and protractive, their tops crenulating the suture, ceasing abruptly below and not continued across base. 4·5 × 1 mm. (8 whorls); 5·5 × 1 mm. 9 whorls (Smith).

Fossil: Pleistocene, Little Brak River (S. Afr. Mus.).

Port Elizabeth (Sowerby); Still Bay (S. Afr. Mus. coll. Muir).

False Bay, 22 fathoms, (S. Afr. Mus. P.F. coll. identified by Tomlin).

Remarks. A single specimen from St. Francis Bay (34° 3′ S., 25° 10′ E., 24–34 fathoms, S. Afr. Mus. no. A9151, P.F. coll.) with 10 postnatal whorls measures 6 × 1·5 mm. Differs only from the other examples in having the axial riblets not so definitely slanting, and 22 on the 10th whorl. Provisionally I assign it to *similans*.

Turbonilla adaba Bartsch

Fig. 14 *g*

Turbonilla adaba, Bartsch, 1915, p. 75, pl. 15, fig. 5.

Two *Pieter Faure* specimens, 4 × 1·3 and 3·5 × 1·2 mm., with 7 postnatal whorls, are comparable with Bartsch's species and are probably conspecific;

but the whorls are not so strongly shouldered as figured, and there is no definite spiral lira. In Bartsch's figure the (upper) lira is scarcely continuous but formed by slight, not quite contiguous thickenings on the axial ribs. In the present specimens both ribs and intervals become narrower as they pass over the perimeter on to base. No spiral striations visible on base. Suture crenulated by the tops of the axial ribs, of which there are 28 on last whorl. Angle of spire 20°–25°.

Port Alfred (Bartsch). Off Cove Rock (East London), 22 fathoms, 2 (S. Afr. Mus. no. A9156, P.F. coll.).

Turbonilla carifa Bartsch

Turbonilla carifa, Bartsch, 1915, p. 84, pl. 20, fig. 4.

Port Alfred (Bartsch, Turton, 1932). Still Bay (S. Afr. Mus. coll. Muir).

Turbonilla helena Bartsch

Turbonilla helena, Bartsch, 1915, p. 77, pl. 14, fig. 1.

Port Alfred (Bartsch, Turton, 1932). Still Bay (S. Afr. Mus. coll. Muir).

Turbonilla cf. *columna* W. H. Turton

Turbonilla columna, Turton, 1932, p. 93, pl. 20, no. 680.

One worn specimen, 9 × 1·8 mm., with 10 whorls (apical ?3 or 4 whorls missing) invites comparison with Turton's *columna*. Turton said there were 'about 20' axial ribs on penultimate whorl, but his figure shows only 6 (or 7) in face view, i.e. 14 or 16 at most around whole whorl. The present specimen shows 12 ribs on the first remaining whorl, increasing to 16 on the last (the ribs rather worn: 18 at most). Angle of spire *c.* 7° or 8°. Suture not crenulated. No spiral sculpture visible.

Port Alfred (Turton). Off Cape Natal (Durban) 85 fathoms (S. Afr. Mus. no. A9152, P.F. coll.).

Turbonilla tugelae n.sp.

Fig. 14*f*

Protoconch $2\frac{1}{2}$ whorls, prominent, heterostrophic. Postnatal whorls 13. Profile of whorls gently convex. Angle of spire *c.* 12°. Axial ribs 12 on 1st whorl, increasing to 14 on 11th (Type) and 16 on 13th, strong, sharply defined from the equally wide intervals, distinctly protractive, tops reaching suture which is slightly undulate (not crenulate), ceasing abruptly below at the suture, not continued on base, no basal lira, and no spiral sculpture. 7·75 × 1·75 mm. (Type), 9 × 2 mm. (13 whorls).

Off Tugela River (Natal), 14 fathoms, 1 (Type) and 1 apex, broken; off Cape Natal (Durban), 85 fathoms, 3; 34° 3′ S., 25° 10′ E., 24–34 fathoms (St. Francis Bay), 1 and 1 broken (S. Afr. Mus. nos. A9153–5, P.F. coll.).

Remarks. The St. Francis Bay specimens are indistinguishable from the others, and are not more worn than those from off Cape Natal.

Although the largest (and complete) specimen is from Cape Natal, one of those from off the Tugela River (A9153), also with protoconch, is chosen as Type because the ribs are not worn and are very distinct.

The axial sculpture is similar to that of e.g. *T. melitta* Thiele (1925, p. 163, pl. 28 (16), fig. 22) from the East Indies. *T. vallata* Melvill (1912, p. 248, pl. xi, fig. 7), from the Persian Gulf, has vertical, not protractive ribs.

Turbonilla deprofundis n.sp.

Fig. 14 *b*

Protoconch and 1 or 2 whorls missing. Remaining postnatal whorls 13. Profile of whorls gently convex. Angle of spire *c.* 10°. Axial ribs 12 on first remaining whorl, increasing to 18 on last, strong, about as wide as intervals, distinctly protractive, tops not impinging on the straight suture, scarcely reaching suture below, or extending on to base; no basal lira; no spiral sculpture. 8·5 × 1·5 mm., diam. at broken apex 0·4 mm.

Off East London, 400–450 fathoms, 1 (S. Afr. Mus. no. A9157, P.F. coll.).

Remarks. Although the apex is missing, the specimen is in excellent condition.

Not unlike *materna* Melvill (1912, p. 247, pl. 12, fig. 13) from the Persian Gulf, 55 fathoms, but with protractive ribs, and no spiral sculpture.

Turbonilla bathybius n.sp.

Protoconch 2 whorls, heterostrophic. Postnatal whorls 10. Profile gently convex. Angle of spire at apex *c.* 10°, but broadening to *c.* 12°. Axial ribs 14 on 1st whorl, increasing to 19 (20) on last, about as wide as intervals, slightly protractive on lower half of whorl, tops not impinging on the straight suture, both ribs and intervals ceasing abruptly below; no basal lira; no spiral sculpture. 8 × 2 mm., diam. protoconch 0·5, of 1st whorl 0·6 mm.

Off East London, 400–450 fathoms, 1 and 1 apex (protoconch plus 6 whorls) (S. Afr. Mus. A9175, P.F. coll.).

Remarks. In good condition. Coming from the same bottom-sample, these two shells were at first considered to be only broader examples of *deprofundis*; but there are only 10 whorls at almost the same length as that of the latter which has 13 whorls. The abrupt ending of the ribs and intervals has the effect of a slight lira, and produces a very slight angularity at margin of base, whereas in *deprofundis* the contour of the whorl and base is evenly rounded.

Turbonilla sp.

Protoconch 2½ whorls, heterostrophic. Postnatal whorls 10 (Natal specimen), 9 (East London). Profile of whorls gently convex. Axial ribs 16 on 1st

whorl, increasing to 20 (Natal), 22 (East London) on last, about as wide as intervals, straight, very slightly protractive on later whorls, reaching the slightly undulate suture above, but the intervals ceasing abruptly just above the suture below and not continued on to base; crossed by spiral lirae (visible mainly in the intervals) 7–8 on early whorls, increasing to *c.* 12–15 on later whorls, not always regular, some being finer than others; base with fine spiral striae. Perimeter of base slightly angular, making the outer lip somewhat square-angled. 9·5 × 2·5 mm. (Natal); 9·5 × 2·75 mm. (East London).

Fawn (Natal), 1 fawn, 1 cream (East London).

Off Umkomaas (Natal), 40 fathoms, 1; off Cove Rock (East London), 22 fathoms, 1 and 1 broken (S. Afr. Mus. Nos. A9158 and A9159, P.F. coll.).

Remarks. These shells combine the spiral striation of *tincta* with the abruptly ending axial grooves of *kraussi*. *T. rietensis* Turton 1932 is similar, but has only 14 ribs on last (7th) whorl, and a smooth base.

The specimens are very much alike except that both the East London specimens (A9159) are broader, and the unbroken one has 9 whorls with the same length as the Natal one (A9158) with 10 whorls.

It seems inadvisable to name these shells until more material is available.

Turbonilla tefunta Bartsch

Turbonilla tefunta Bartsch, 1915, p. 80, pl. 15, fig. 2.
? *Turbonilla sculpturata* Turton, 1932, p. 95, pl. 21, no. 695.

Port Alfred (Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir).

None of Muir's specimens measures more than 2 mm. long with 4 postnatal whorls.

Both Bartsch's and Turton's species have a columellar fold.

Turbonilla (?) *bifilosa* n.sp.

Fig. 15 *a*

Protoconch and apical whorl(s) missing. Remaining postnatal whorls 5, profile evenly convex. Axial ribs on 1st (remaining) whorl *c.* 17 (somewhat worn), on 2nd 18, on 3rd 20, on 4th 22, and on last whorl 24, from suture to suture, slightly protractive, each rib composed of 2 thread-like riblets, not extending on to base; in the intervals spiral grooves 5 on 2nd (remaining) whorl, 6 on 3rd, 7 on 4th and 5th whorls, grooves not quite so wide as the lirae, the latter not crossing the axial ribs; base with 5 spiral grooves separating broader flat lirae. Aperture oval, columella straight, umbilicus scarcely indicated. 4 × 1·75 mm.

34° 5′ S., 25° 55′ E., 67 fathoms, 1 dead (S. Afr. Mus. A9220, P.F. coll.).

Remarks. Similar to *T. maia* Bartsch (1915, p. 80, pl. 14, fig. 3), which however has the retractive ribs not only solid but crossing the base. On account of the resemblance between the two species I place the present species pro-

visionally in *Turbonilla*; perhaps *Rissoina* might be an alternative; the protoconch is required to decide the question.

Odostomia chitonicola Smith

Odostomia chitonicola Smith, 1899, p. 250, pl. 5, fig. 10. Turton, 1932, p. 107. Robertson & Orr, 1961, p. 87, pl. 6.

Lives commensally, or as an ectoparasite, on the girdle of the large chiton *Dinoplax gigas*. Recorded from Umkomaas (Natal) (Smith) and Port Edward (Natal) (Robertson & Orr). Turton's specimens were probably not collected *in situ* on chitons, but sorted out from beach material.

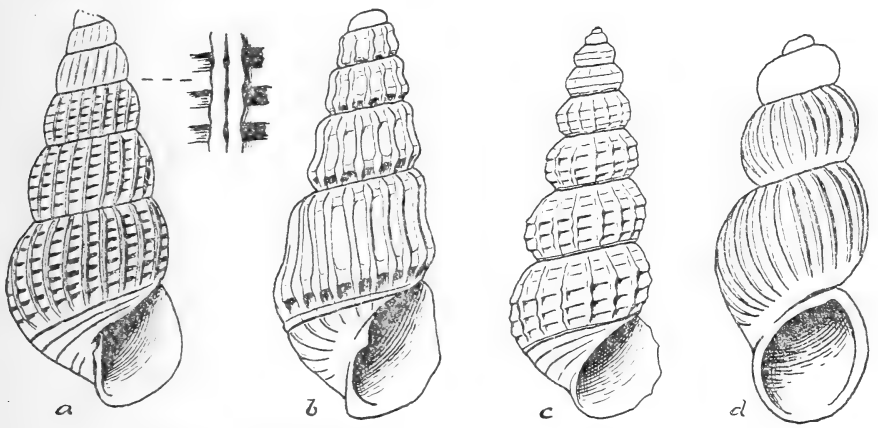


FIG. 15. *a*, *Turbonilla* (?) *bifilosa* n. sp., with portion of axial rib further enlarged. *b*, *Odostomia tugelae* n. sp. *c*, *Cerithidium fragrans* n. sp. *d*, *Amphithalamus muiri* n. sp.

Odostomia lavertinae Smith

Odostomia angasi (*non* Tryon) Sowerby 1892, p. 26.
Odostomia lavertinae Smith, 1901, p. 108, pl. 1, fig. 15. Thiele, 1925, p. 152, pl. 26 (14), figs. 5, 5*a*.

Port Elizabeth (Sowerby). Port Alfred (Bartsch, 1915, Turton, 1932). East London (Smith). Simon's Bay (False Bay) (Thiele). Still Bay (S. Afr. Mus. coll. Muir).

Odostomia aethra Bartsch

Odostomia aethra Bartsch, 1915, p. 89, pl. 18, fig. 7.

Port Alfred (Bartsch, Turton, 1932).

Off Cove Rock (East London), 22 fathoms, several (S. Afr. Mus. no. A9160, P.F. coll.).

Remarks. Said to be distinguished by the protoconch being more deeply embedded in the 1st postnatal whorl, and by the narrow umbilicus. I doubt whether these features will prove sufficiently constant to separate it from *lavertinae*. Possibly Bartsch's *cifara* and *icafra* will also fall into synonymy.

Odostomia crispa (Sow.)

Miralda crispa Sowerby, 1892, p. 37, pl. 2, fig. 55 (misnumbered 57 on plate).
Odostomia crispa Turton, 1932, p. 103, pl. 22, no. 746.

Postnatal whorls 6. First postnatal whorl and first half of 2nd bicingulate, later part of 2nd whorl and the following whorls tricingulate: the 3 lirae equally spaced across the whorl, i.e. the top one is near the suture. A plain marginal lira on base. Thinner-shelled and narrower than *agana*. 4 × 1·5 mm.

Port Elizabeth (Sowerby). Port Alfred (Turton). Still Bay (S. Afr. Mus. coll. Muir).

Odostomia agana Bartsch

Odostomia agana Bartsch, 1915, p. 87, pl. 19, fig. 8.

Sculpture as in *crispa*, but the nodules on the upper (subsutural) lira are less strongly developed, consequently there is a greater space between this lira and the middle peripheral lira than between the latter and the lower lira; also the sutures are not so sunken. Nodules at the intersections weaker than in *crispa*. 3·2 × 1·2 mm.

Possibly only a form of *crispa*, but Still Bay examples can be separated into two 'species'.

O. scitula Turton 1932 is probably synonymous, but seems to have fewer axial riblets.

Port Alfred (Bartsch, Turton, 1932). Still Bay (S. Afr. Mus. coll. Muir).

Odostomia gea Bartsch

Odostomia gea Bartsch, 1915, p. 90, pl. 19, fig. 1.
[?] *Odostomia acrifa* Bartsch, 1915, p. 91, pl. 16, fig. 3.
Odostomia agulhasensis Thiele, 1925, p. 153, pl. 26 (14), fig. 10.

Distinguished by the internal plicae on the outer lip (not always easy to discern). Up to 5 × 2·25 mm., with 7 postnatal whorls.

Port Alfred (Bartsch, Turton).

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres; 33° 50′ S., 25° 48′ E., no depth given (Thiele).

Off Cape Natal (Durban), 54 fathoms, 1; off Umhloti River (Natal), 40 fathoms, 2; 34° 26′ S., 25° 42′ E., 124 fathoms, 3 (S. Afr. Mus. nos. A9161–3, P.F. coll.).

Also Great Fish Bay, Angola (Thiele).

Odostomia turtoni Bartsch

Odostomia turtoni Bartsch, 1915, p. 86, pl. 19, fig. 3.
Pyrgulina algoensis Thiele, 1925, p. 155, pl. 26 (14), fig. 20.

Tomlin agreed with me on the synonymy.

Port Alfred (Bartsch, Turton). Algoa Bay (Thiele). Also Great Fish Bay, Angola (Thiele).

Odostomia ornata W. H. Turton

Fig. 14 *a*

Odostomia ornata Turton, 1932, p. 101, pl. 22, no. 736.
Odostomia formosa Turton, 1932, p. 101, pl. 22, no. 737.

Postnatal whorls 6. Axial riblets *c.* 14 on 1st, increasing to *c.* 26 on last whorl. The lira at bottom of whorl is slightly undulate (viewed from apex) where the riblets impinge upon it; this is repeated on the basal lira though scarcely visible. Fine spiral striae on base in juvenile, but obscure or obsolete in larger specimens.

The Still Bay material includes protoconchs plus 1 whorl up to protoconchs plus 3 whorls. 3·5 × 1·5 mm.

Distinguished from *turtoni* by the *retractive* axial riblets.

Port Alfred (Turton: juv.). Still Bay, several (S. Afr. Mus. coll. Muir).

Off Tugela River (Natal), 14 fathoms, 3 (S. Afr. Mus. no. A9164, P.F. coll.).

Odostomia jucunda W. H. Turton

Odostomia jucunda Turton, 1932, p. 102, pl. 22, no. 738.

Fossil, Quaternary: raised beach, Little Brak River, Mossel Bay (S. Afr. Mus.); Sedgefield near Knysna (coll. Martin).

Port Alfred (Turton). Still Bay (S. Afr. Mus. coll. Muir).

Odostomia tugelae n.sp.

Fig. 15 *b*

Protoconch 1½ whorls, smooth. Postnatal whorls 4 (4½), profile straight, gibbous above and below. Axial riblets 14 on 1st whorl (3–4 crowded together at beginning of whorl), increasing to 20 on last whorl, slightly nodulose at the intersections with a lira at top and another at bottom of whorl, continued across the one basal lira (from top of aperture) on to base. Intervals between riblets below the lower series of nodules deeply pitted. Sutures deep. Columella tooth (pleat) not strong. 2·25 × 1 mm.

Off Tugela River (Natal), 65–80 fathoms, 1 dead (S. Afr. Mus. A9225, P.F. coll.).

Remarks. Rather like *crispa* with deep sutures, but without the midwhorl series of nodules.

Also rather like *Pyrgulina niasensis* Thiele (1925, p. 156, pl. 26 (14), fig. 23), but though the riblets are scarcely retractive they are definitely not protractive as in Thiele's species.

Odostomia ficara Bartsch

Odostomia ficara Bartsch, 1915, p. 88, pl. 16, fig. 1.
Odostomia crassicostata Turton, 1932, p. 103, pl. 23, no. 749.

Port Alfred (Bartsch, Turton).

Off Tugela River (Natal), 14 fathoms, 9 specimens, some broken (S. Afr. Mus. P.F. coll.).

Remarks. Although Turton said both *ficara* and his *crassicostata* were 'quite distinct', there is little doubt that the latter is a worn juvenile of the former.

Apart from the columella pleat, this species is distinguished from *Rissoina annulata* (p. 184) by the 3 spiral lirae being unequally spaced (2 above, 1 below), and by the finer and more numerous lirae on the base.

It was rather surprising to find among the 10 strongly cingulate shells in this bottom-sample 9 *O. ficara* and only 1 *R. annulata*.

Odostomia robusta Sow.

Odostomia robusta Sowerby, 1901, p. 214, pl. 22, fig. 19.
? *Odostomia arfica* Bartsch, 1915, p. 86, pl. 18, fig. 7.
? *Odostomia semiplicata* Turton, 1932, p. 102, pl. 22, no. 742.

Port Alfred (Sowerby, Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir).

Fam. **Stiliferidae**

Macnae & Kalk (1958) record from Delagoa Bay *Mucronalia* sp. parasitic on echinoderms (pp. 88, 127), and *Stilifer linckiae* Sarasin (p. 111, fig. 30 and p. 127).

Sowerby (1897) described *Apicalia biformis* from Durban, and Thiele (1925) *A? chuni* from the Agulhas Bank.

Apicalia leptostoma (Smith)

Eulima leptostoma Smith, 1910a, p. 204, pl. 7, fig. 16.

Protoconch chipped (? styliform). Postnatal whorls 13; first whorl abruptly wider than protoconch, following whorls widening evenly, sutures not indented. No umbilicus. Columella straight, without pleat or denticle. Aperture oval, outer lip not projecting beyond the profile of whole shell. No sculpture. 18 × 5 mm. White, glossy.

Isezela (Natal) (Smith).

Off Umhlanga River (Natal), 22–26 fathoms, 1 (S. Afr. Mus. no. A9168, P.F. coll.).

Remarks. Smith described this fine large species as a *Eulima*; it may be an *Apicalia*. *A. biformis* Sow. had 10 whorls, the first 5 contracted, the following 5 suddenly widened. Length 12–13 mm. (according to Sowerby's recollection).

Apicalia sowerbyi n.sp.

Fig. 16

Protoconch broken in both specimens (? styliform). Postnatal whorls 10; first 3 whorls increasing moderately in width, following whorls more rapidly,

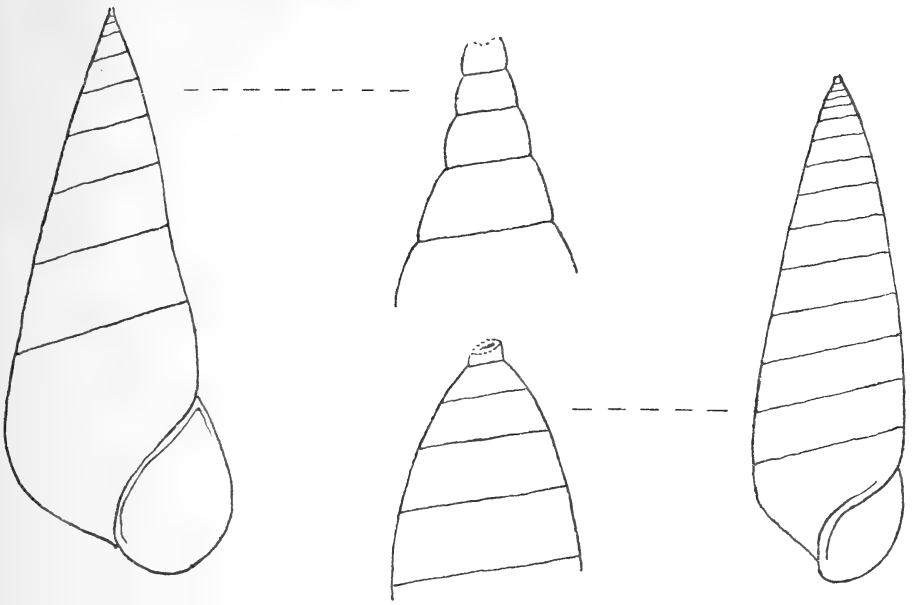


FIG. 16. Left: *Apicalia sowerbyi* n. sp. Right: *A. leptostoma* (Smith), with apices further enlarged.

but no abrupt increase. Profile of later whorls nearly straight, sutures not indented. No umbilicus. Columella curved, without pleat or denticle. Aperture broadly oval, outer lip somewhat expanded and projecting beyond profile of whole shell. No sculpture. 7·5 × 3 mm.; smaller specimen with 6 whorls 4 × 2 mm. White, glossy.

Off Hood Point (East London area), 49 fathoms, 2 (S. Afr. Mus. no. A9169, P.F. coll.).

Remarks. In shape not very different from *chuni* Thiele, but the latter had 9 whorls with a length of only 3·3 mm.

Fam. **Melanellidae** (Eulimidae)

The South African representatives of this family need revising, when sufficient material in good condition has been accumulated.

Melanella dilecta (Smith)

? *Eulima nitida* (*non* Lam.) Krauss, 1848, p. 87.
Eulima dilecta Smith, 1899, p. 250, pl. 5, fig. 9.

Slightly curved. Up to 8 × 2·75 mm.

Natal (Krauss, Smith). Port Alfred (Bartsch, 1915, Turton, 1932). False Bay (S. Afr. Mus.). Still Bay (S. Afr. Mus. coll. Muir, identified Tomlin). 34° S., 25° 44′ E., 33 fathoms, 1 (S. Afr. Mus. P.F. coll.).

Melanella algoensis (Smith)

Eulima algoensis Smith, 1901, p. 109, pl. 1, fig. 10.

Fossil: Quaternary: Sedgefield near Knysna (Martin).

Algoa Bay (Smith). Port Alfred (Bartsch, 1915, Turton, 1932). Still Bay (S. Afr. Mus. coll. Muir, identified Tomlin).

False Bay and 34° 51′ S., 19° 55′ E., 22 metres (U.C.T.).

Both Odhner (1919, p. 35) and Dautzenberg (1929, p. 517) record the species from Madagascar.

Melanella capensis (Thiele)

Eulima capensis Thiele, 1915 (in Clark), p. 165, fig. 1. Thiele, 1925, p. 142, pl. 24 (12), fig. 11.
? *Melanella carifa* Bartsch, 1915, p. 65, pl. 20, fig. 7.
? *Eulima quantilla* Turton, 1932, p. 87, pl. 19, no. 634.

Simon's Bay (False Bay), associated with the crinoid *Cominia occidentalis* Clark (Thiele, 1915). Still Bay (S. Afr. Mus. coll. Muir).

Tomlin was undecided about the identity of *carifa*.

Melanella agulhasensis (Thiele)

Eulima agulhasensis Thiele, 1925, p. 142, pl. 24 (12), fig. 12.

34° 51′ S., 19° 37′ E., 80 metres (Thiele).

Still Bay (S. Afr. Mus. coll. Muir).

Melanella modesta (Thiele)

Eulima modesta Thiele, 1925, p. 142, pl. 24 (12), figs. 13, 13*a*.

35° 29′ S., 21° 2′ E., 102 metres (Thiele).

Still Bay (S. Afr. Mus. coll. Muir).

Melanella elata (Thiele)

Eulima elata Thiele, 1925, p. 143, pl. 24 (12), figs. 14, 14*a*.

35° 29′ S., 20° 12′ E., 126 metres (Thiele).

Off East London, 400 fathoms, 1 (S. Afr. Mus. no. A9171, P.F. coll.).

Agrees with Thiele's species, especially in the long, narrow, oval aperture. 7 whorls. 6 × 1·5 mm. Glistening white. Probably washed down to 400 fathoms by currents.

Melanella cylindrica (Thiele)

Eulima cylindrica Thiele, 1925, p. 143, pl. 24 (12), figs. 15, 15*a*.

34° 51′ S., 19° 37′ E., 80 metres; 35° 26′ S., 20° 56′ E., no depth given (Thiele). Still Bay, very common (S. Afr. Mus. coll. Muir).

Distinguished by the wide patulous aperture. Tomlin agreed with my identification.

Melanella jucunda (Thiele)

Eulima jucunda Thiele, 1925, p. 143, pl. 24 (12), fig. 18.

35° 16′ S., 22° 26′ E., 155 metres (Thiele).

Off Cape St. Blaize, 125 fathoms, 1 (S. Afr. Mus. no. A9172, P.F. coll.). Agrees with Thiele's description and figure, but larger: 11 × 3 mm., with 9 whorls.

Melanella gratiosa (Thiele)

Eulima gratiosa Thiele, 1925, p. 143, pl. 24 (12), figs. 16, 17.

35° 16′ S., 22° 26′ E., 155 metres (Thiele).

Off Cape St. Blaize, 125 fathoms, 1 (S. Afr. Mus. no. A9173, P.F. coll.).

Strombiformis bivittatus (H. & A. Adams)

Eulima bilineata (*non* Alder), Adams & Reeve, 1848, p. 52, pl. xi, fig. 24.
Leiostraca bivattatus Adams, H. & A., 1853, p. 238. Adams in Sowerby, 1854, p. 804, pl. 170, figs. 18, 19.
Eulima (*Liostraca*) *bivittatus* Melvill & Standen, 1901, p. 389.

Sowerby identified the *Pieter Faure* specimen but did not record it in print. It is worn and corroded, but shows (better when wetted) two brown spiral bands, the lower one coinciding with the suture. 13·5 × 3 mm.

Off Umhloti River (Natal), 40 fathoms, 1 (S. Afr. Mus. no. A4962, P.F. coll.).

Distribution. Sooloo Sea (Adams & Reeve); Persian Gulf and Gulf of Oman, including a pure white albino (Melvill & Standen).

A fragmentary specimen consisting of the penultimate and body whorls, 5 mm. long, has a similar elongate narrow aperture; white with one faint brown band immediately above the suture.

33° 52′ S., 25° 50′ E., 25 fathoms (S. Afr. Mus. no. A9174, P.F. coll.).

Fam. **Aclididae**

Aclis africana (Bartsch)

Graphis africana Bartsch, 1915, p. 64, pl. 36, fig. 10.

Port Alfred (Bartsch, Turton, 1932). Still Bay (S. Afr. Mus. coll. Muir).

Fam. **Scalidae**

Melvill & Standen, 1903a, p. 340, pl. 7 (Persian Gulf species).

A family of many species; though it seems that conchologists have not allowed nature very much scope for variation: 'shell more conical', 'whorls more globular', an extra rib or two, are some of the characters which occur

repeatedly for the purpose of distinguishing 'species'. The South African fauna list, based largely on beach material, most probably contains several synonyms, misidentifications, and 'collectors' species'. Perhaps a biological approach will eventually purge some of these.

Thiele (1925, p. 307) suggested that one shell [of *martis*], being distinctly narrower than two others, 'may have belonged to a male'.

As might have been expected, the *Pieter Faure* bottom-samples have yielded several specimens which do not seem to fit known species or at least modern species of which there are good descriptions and figures. I am, however, diffident about introducing these 'new' species.

S. burnupi de Boury, listed by Turton (1932, p. 82), appears to be an unpublished name.

Scala coronata (Lam.)

Fig. 17*a*

Scalaria coronata Lamarck, 1816, pl. 451, figs. 5 *a*, *b*; Liste p. 11. Turton, 1932, p. 80. with var. *africana*.
Epitonium africanum Bartsch, 1915, p. 62, pl. 9, fig. 2.
Scalaria rietensis, *albocostata* Turton, 1932, p. 80, pl. 19, nos. 577, 578.
Epitonium coronatum Day & Morgans, 1956, p. 306 (listed).

Protoconch 1½ whorls, smooth. Postnatal whorls 8. No spiral sculpture except (in good specimens) extremely fine (and irregular) striae. With a basal lira. Ribs continuous across sutures, not shouldered, sharp (when not worn), not reflexed, often with varicoid thickening, varying in number from 8 to 16, usually 13, next frequent numbers 12 and 14. Umbilicus closed. 35 × 16 mm. Turton: up to 45 mm.

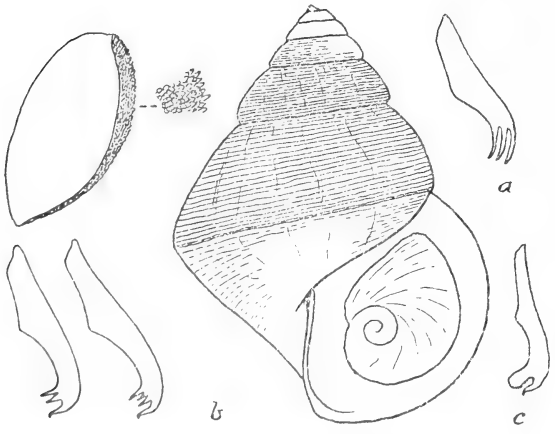


FIG. 17. *a*, *Scala coronata* (Lam.) radula tooth. *b*, *S. bonae-spei* n. sp., with one of the jaws and two radula teeth. *c*, *S. bullata* (Sow.) radula tooth.

White, upper whorls sometimes suffused, with white ribs (*albocostata*), a brown band near upper suture, and another near or at the lower suture, with a series of short oblique streaks, often obscure or obsolete, between the bands. Operculum pale horny.

Radula teeth tricuspid.

Port Elizabeth (Sowerby, 1892); Port Alfred (Bartsch, Turton). Tongaat (Natal), Jeffreys Bay, and Still Bay (S. Afr. Mus.).

Living: Fish Hoek (False Bay) (Mrs. Connolly 1962); Durban Bay, and 29° 58′ S. 31° 02′ E., 49 metres (U.C.T.).

Remarks. A variable species. The number of ribs varies from 8 to 16, according to the available material as follows: 8 ribs—2 specimens, 9 ribs—2, 10 ribs—5, 11 ribs—8, 12 ribs—11, 13 ribs—20, 14 ribs—11, 15 ribs—3, 16 ribs—1. Duplication of ribs may occur, the interpolated rib having no connection with the ribs on the whorls above or below. Varicoid thickening, often corresponding in width with 2 or even 3 ribs, may confuse the rib count. Inter-whorl variation on the same shell may occur, e.g.: 1 specimen had 14 ribs on 2nd whorl, 15 on others; one had 14 on the early whorls, 15 on the 6th, and 16 on the 7th; one had 9 ribs on first five whorls, then only 8 on the 6th whorl; one had 15 ribs on seven whorls but only 9 on the last, the latter number including 3 double ribs, and one rib very wide on back of the outer lip; one with 14 ribs had on the back of the outer lip 2 very wide flat varicoid ribs with a normal thin one between them.

Scala tenebrosa Sow.

Scala tenebrosa Sowerby, 1903, p. 220, pl. 4, fig. 6. Thiele, 1925, p. 139.
Epitonium tenebrosa Bartsch, 1915, p. 63.

Protoconch 1½ whorls, smooth. Postnatal whorls 7. No spiral sculpture. No basal lira. Ribs angularly shouldered near top of whorl, with a small acute point, slightly reflexed, 14 on 1st whorl, increasing to 18 (the Type has 19 on 6th whorl, and 15 on the last, the latter including 3 varicoid and evidently double ribs). Umbilicus nearly closed in the 7-whorled Type, but closed in a 4-whorled and a 6-whorled specimen, and in a larger broken specimen representing the 8th whorl. Type 15 (16) × 6 mm. Diam. of a larger (8th) whorl 8 mm. U.C.T.: 18 × 8 mm.

Fawn-brown, ribs paler.

Cape St. Blaize, 37 fathoms, 1; 34° 7′ S., 25° 43′ E., 55 fathoms, 1 (Sowerby, P.F. coll.).

St. Francis Bay, 80 metres; Algoa Bay, depth not stated (Thiele).

False Bay, 32–35 fathoms, 1 whorl only, 1 apex (4 whorls), 1 fragment; off Cape St. Blaize, 37 fathoms, 1 (6 whorls) topotype; 34° 5′ S., 25° 55′ E., 67 fathoms, 1 apex (S. Afr. Mus. P.F. coll.).

32° 23′ S., 17° 48′ E., 143 metres, 1 dead (*Africana II*, per U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Type in South African Museum (A3599).

Remarks. The 18 mm. *Africana* specimen is normal as far as the penultimate whorl, but on this whorl the number of ribs shows a slight increase to 21; on the back of the last whorl the number increases to 25, plus 10 or 11 which are closely packed in the last 3 mm. on back of outer lip.

The *Africana* specimen is also interesting for showing that this species occurs on the west coast, thus linking up the south coast localities with Thiele's record from Angola.

Bartsch's identification of Port Alfred specimens should be checked.

Scala robillardi (Sow.)

Scalaria robillardi Sowerby, 1894, p. 42, pl. 4, fig. 5.
Scala robillardi Smith 1903a, p. 385. Thiele, 1925, p. 137.

Protoconch $1\frac{1}{2}$ whorls, smooth. Postnatal whorls 4. No spiral sculpture. No basal lira. Ribs (16) 17–18. Umbilicus narrowly open. 5·5–6·0 × 3·75–4·0 mm. (3 whorls, apex missing); protoconch plus first 3 whorls 3 × 2 mm. White.

Durban (Smith); Beira (S. Afr. Mus., identified by Tomlin).

Distribution. Mauritius; Tanga.

Scala trochoides de Boury

Scala trochoides de Boury, 1912, p. 102, pl. 7, fig. 7.

Protoconch missing. Postnatal whorls 6. No spiral sculpture. No basal lira. Ribs 10, continuous across sutures, angularly shouldered near top, with a rather sharp point, slightly reflexed. Whorls disconnected except by the ribs at the sutures, thus leaving between each pair a gap or 'window' leading into the open umbilicus. 11 × 6·5 mm (Zululand), 15 × 10 mm. (Natal). White, operculum horny brown.

Off Durnford Point (Zululand), 90 fathoms, 1 dead; off Umvoti River (Natal), 27 fathoms 1 living (S. Afr. Mus. P.F. coll.).

Remarks. The Umvoti specimen was identified by Tomlin. The animal was not preserved. I agree with Tomlin's identification, though both specimens, especially the smaller, are narrower than the measurements de Boury gave for the Type: 8 × 6 mm. Otherwise both specimens agree with de Boury's description.

The species was recorded from Gorée, West Africa. The distribution is remarkable, but seems to be paralleled by that of *Nassa desmoulioides* Sow. (see Part II, p. 115).

Sowerby records (1892) *replicata* (Sow.) 1844 from Port Elizabeth. This is very similar but, according to New Caledonian examples in the South African Museum, is narrower, 15 × 8 mm., and has only 7 ribs on each whorl (Sowerby said 8).

Scala kraussi (Nyst)

Scalaria lactea Krauss, 1848, p. 94, pl. 5, fig. 27. De Boury, 1913b, p. 90. Turton, 1932, p. 82.
Scalaria kraussi Nyst, 1871, p. 117. Thiele, 1925, p. 138.
Scalaria clathratulum (*non* Mont) Sowerby, 1892, p. 24.
Epitonium shepstonensis Smith, 1910a, p. 204, pl. 7, fig. 15.

Protoconch 3 whorls, smooth. Postnatal whorls 7–8. No spiral sculpture. No basal lira. Ribs 20–25, occasionally 27. Umbilicus closed. 13·5 mm. (Thiele).

Natal (Krauss). False Bay to Port Alfred (auct. and S. Afr. Mus.). 35° 16′ S., 22° 26′ E., 155 metres (Thiele).

34° 5′ S., 25° 43′ E., 52 fathoms, 5 dead; off Keiskamma Point, 33 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. Krauss remarked that the ribs of one whorl alternated with those on the neighbouring whorl, instead of being continuous across the suture. This feature is well shown in some specimens, but not in others, and is by no means a specific character.

Dr. J. Muir collected at Still Bay a series from the protoconch upwards.

Turton claimed to have found the European *clathratula* Mont. (recorded by Sowerby 1892 from Port Elizabeth) which has spiral striae between the ribs; but I have not seen one such specimen among the dozens of *kraussi* examined.

De Boury did not agree with Nyst about the necessity of altering the name *lactea*. I have not seen Menke (1830), but if he used the combination '*Scalaria lactea*', Nyst's name is justified.

Scala aculeata (Sow.)

Scalaria aculeata Sowerby, 1844a, p. 12; 1844b, p. 86 *bis*, pl. 32, figs. 35–37.

Postnatal whorls 6. No spiral sculpture. No basal lira. Ribs (8) 9 (10), shouldered near top, with sharp point. Sutures deep, but no actual perforation to umbilicus. Umbilicus closed. 11 × 4·5 to 12 × 5·5 mm.

Durban (Smith); Isipingo (S. Afr. Mus. coll. Burnup).

Scala eborea Smith

Scala eborea Smith, 1906a, p. 50, pl. 8, fig. 1.

Ribs 10, no shoulder. No spiral sculpture. No basal lira. Umbilicus closed. 9 × 3·75 mm.

Port Shepstone and Durban (Smith); Isipingo (S. Afr. Mus. coll. Burnup).

Is this perhaps *simplex* Sow. 1894 (figured in Sowerby, 1897, p. 12, pl. 6, fig. 5)?

Scala illovoensis n.sp.

Fig. 18 *b*

Protoconch 3 whorls, smooth. Postnatal whorls 3. Ribs 11 on each whorl, not continuous across sutures, but top of one rib contiguous with bottom of corresponding rib on preceding whorl. Fine lirae in the intervals: 8 on 1st whorl, 10 on 2nd, *c.* 12 on 3rd. Sutures not perforate. No basal lira. Umbilicus closed. 2·75 × 1·75 mm. White.

Off Illovo River (Natal), 27–30 fathoms, 1 (S. Afr. Mus. no. A9023, P.F. coll.).

Remarks. Appears to be different from any of the recorded South African species. Resembles somewhat *S. schödei* Thiele (1925, p. 306, pl. 23 (xi), fig. 24) from Sumatra, but has rounded, unshouldered ribs.

Scala blaisei n.sp.

Fig. 18 *a*

Protoconch 3 whorls, smooth. Postnatal whorls 3. Ribs *c.* 48 on last whorl. No spiral sculpture. No basal lira. Sutures moderately deep. Umbilicus closed. 3·5 × 2 mm. White.

Off Cape St. Blaize, 125 fathoms, 1 (S. Afr. Mus. no. A9025, P.F. coll.).

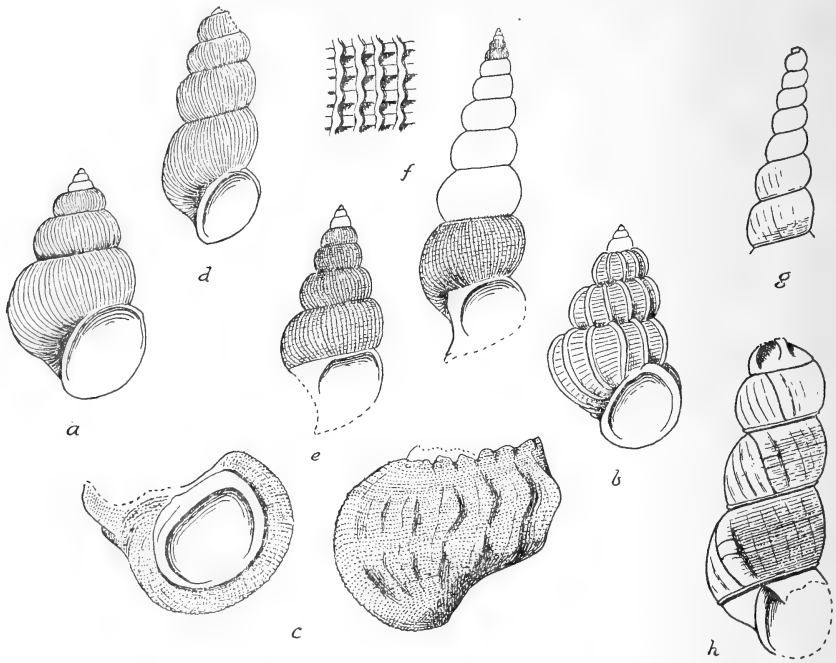


FIG. 18. *a*, *Scala blaisei* n. sp. *b*, *S. illovoensis* n. sp. *c*, *S. crassilabrum* (Sow.), peristome and back view of body-whorl. *d*, *Acrilla cophinodes* (Melvill). *e*, *f*, *A. natalis* n. sp., 4-whorled and 8-whorled shells, with sculpture on last whorl of latter further enlarged. *g*, *h*, *A. analogica* n. sp., apical whorls, and 8th–10th whorls (A9026 and A9228 respectively).

Remarks. Has a greater number of ribs than any other South African species except *macromphalus*, which, however, is entirely different in shape. *S. algoensis* Thiele 1925 has 30–32 ribs.

Scala macromphalus (Smith)

Epitonium macromphalus Smith, 1910a, p. 203, pl. 7, figs. 14, 14 *a*.

Tongaat (Smith); Isipingo (S. Afr. Mus. coll. Burnup).

Scala gemmula (W. H. Turton)

Scalaria gemmula Turton, 1932, p. 84, pl. 19, no. 601.

Port Alfred (Turton). Still Bay (S. Afr. Mus. coll. Muir). Dr. Muir found a dozen specimens.

Scala crassilabrum (Sow.)

Fig. 18 *c*

Scalaria crassilabrum Sowerby, 1844b, p. 105 *bis*, pl. 35, figs. 115, 116.

One broken specimen consisting of half the body-whorl, including the peristome.

Six bi-angular ribs on the half-whorl, outer lip varicoid; crossed by very numerous spiral lirae with the interstices between them deeply punctate; about 12 lirae in a space of 1 mm. on middle of back of outer lip varix. Inner peristome nearly completely surrounded by thick varicoid growth. Suture crenulate. Umbilicus closed. Diameter of body whorl 4·5 mm., aperture 2 × 1·6 mm.

Off Umhloti River (Natal), 40 fathoms (S. Afr. Mus. no. A9029. P.F. coll.).

One very worn specimen consisting of 6 whorls (apex worn away); a varix on 4th whorl, and peristome thickened. Bi-angulate ribs on back of last whorl, but number of ribs on preceding whorls not countable with certainty (? about 18). 9 × 3·25 mm.

Off Cape Vidal (Zululand), 80–100 fathoms. (S. Afr. Mus. no. A9030. P.F. coll.).

Distribution. Philippines.

Remarks. Sowerby's description and figures are quite inadequate, but in general—6 ribs on half-whorl, spirally minutely striate, suture crenulate—this specimen agrees.

Melvill (1899, p. 92, pl. 1, fig. 10) described *hidryma* from Karachi as near *crassilabrum*; but the ribs are not bi-angulate. He made no mention of *punctae* between the striae.

In *sumatrensis* Thiele (1925, p. 307, pl. 23 (xi), fig. 26) the ribs are bi-angulate, and Thiele mentioned the interstitial punctae; but the fine lirae are far less numerous than in the present specimen.

Odhner's figures of the Madagascan *soror* (1919, p. 35, pl. 3, figs. 31–33) at first sight suggest some similarity with the present specimen. But *soror* has a basal lira, and the ribs extend from suture to suture and are not bi-angulate. It is not absolutely clear whether the microcancellate sculpture is on the shell or only on the 'calcareous' epidermis.

S. texta Smith (1903b, p. 616, pl. 35, fig. 23) from the Maldives, is much closer, especially as regards the crenulate, almost castellate, suture (upper margin of whorl). Smith said *texta* was allied to *bicarinata*, but did not mention *crassilabrum*.

Scala bullata (Sow.)

Fig. 17 *c*

Scalaria bullata Sowerby, 1844b, p. 94 *bis*, pl. 34, fig. 37.
Scala bullata, Smith, 1906a, p. 49. De Boury, 1912, p. 102, pl. 7, figs. 8, 9.
Scala papyracea De Boury, 1912, p. 99, pl. 7, figs. 5, 6.
Epitonium papyraceum Tomlin, 1923, p. 50 (listed).

Sowerby's young specimen was broader (as figured 19 × 16 mm.) than de Boury's measurements of *papyracea* (20 × 12 mm.) and *bullata* (as figured 48 × 29 mm., magn. 2). Adults are longer proportionately to breadth than juveniles. The Hibberdene shell is 12 × 9 mm. No really tangible differences for separating *papyracea* were given by de Boury.

The species is distinguished from other South African species by the fine, filiform, and rather widely spaced ribs.

Radula teeth bicuspid, the subapical tooth bluntly lobed and larger than the acute apical tooth.

Durban (Smith: *bullata*); Natal (de Boury: *papyracea*); in both cases collected by Burnup. Living: Hibberdene (north of Port Shepstone), Natal (S. Afr. Mus. coll. Mrs. C. M. Connolly, 1961).

Distribution. Philippines (Sowerby), Red Sea (de Boury).

Scala multicostata (Sow.)

Scalaria multicostata Sowerby, 1844a, p. 28; 1844b, p. 96*bis*, pl. 34, fig. 96. De Boury, 1913b, p. 92.
Scala durbanensis Smith, 1906a, p. 49, pl. 7, fig. 17.
Epitonium durbanensis Bartsch, 1915, p. 63.
Scalaria durbanensis Turton, 1932, p. 81.

Durban (Smith); Port Alfred (Bartsch, Turton).

Distribution. Philippines (Sowerby).

Scala bonae-spei n.sp.

Fig. 17 *b*

Protoconch broken. Postnatal whorls 5, moderately convex, sutures slightly indented, base marked off by a slight angularity. Spiral lirae numerous and fine, somewhat stronger on lower part of whorls, no basal lira; base with fine spiral lirae. No axial sculpture except a few slightly stronger growth-lines at irregular intervals. Umbilicus narrow, concealed (except when viewed obliquely from below) by the slightly reflexed columella. Aperture oval. 21 × 15 mm. and 15 × 12·5 mm. White.

Operculum thin, semi-transparent, 7 × 6 mm. and 6 × 4 mm.

Foot and head of animal cream-coloured. Proboscis strengthened with circular bands of 'conchyolin' (resistant to KOH) (cf. Sars, 1878, pl. VII, fig. 12*a*). Jaws with narrow thickened margin, minutely spinulose (cf. Sars, 1878). A pair of stylets (Sars, 1878, figs. 9 *a*, *b*, *c*, and Thiele, 1929, p. 220) was not observed. Radula teeth with 2 (occasionally 3) tiny cusps behind the apical hook; no difference between the teeth on inner and outer areas of the radula.

Off Cape Point: 33° 49′ S., 16° 30′ E., 1,500 fathoms, 2 living; 34° 42′ S., 16° 54′ E., 1,725–1,780 fathoms, 1 living (S. Afr. Mus. A9761 and A9793, F. H. Talbot coll. 1959).

The specimen from 1,725–1,780 fathoms is intermediate in size: 18·5 × 14·5 mm.

Gen. Acrilla H. Adams

A. acuminata (Sow., 1844a), *gracilis* H. Adams 1860, *minor* (Sow., 1874), *thalia* Bartsch, 1915, and *recreata* de Boury, 1921, have been recorded from Natal and Port Alfred. De Boury (1921) incidentally recorded *minor* from Port Shepstone.

Melvill (1903, p. 350) records the first three (from Karachi) as separate species, though no locality is given for *minor*.

Smith (1906a, p. 50) put *minor* as a synonym of *gracilis*. He recorded (1904, p. 24) Port Alfred shells as *gracilis*, but Turton (1932, p. 84) preferred to assign them to *thalia*.

Tomlin (1923, p. 50) considered *thalia* synonymous with *acuminata*.

De Boury (1921, p. 235) said *recreata* could not be confused with juvenile *acuminata*, and was nearest to *minor*.

Both Bartsch's and de Boury's figures of *thalia* and *recreata* respectively are not consistent with their text.

Perhaps beach-worn material is responsible for these various opinions!

A. thalia seems obviously synonymous with *acuminata*; and *gracilis* may be a slim form of the same species. Melvill (1903) mentioned the same feature distinguishing his Karachi shells from typical *gracilis* as H. Adams (1860) gave for distinguishing *gracilis* from *acuminata*!

There seems to be some discrepancy or variability in size: Bartsch gave the measurements of two shells, both with 9 postnatal whorls, as 33 × 9 and 17 × 4.3 mm. The South African Museum has a shell, also from Port Alfred, with 10 postnatal whorls measuring 23 × 6 mm.

Acrilla cf. *cophinodes* (Melvill)

Fig. 18 *d*

Scala ? *Acrilla cophinodes* Melvill, 1904a, p. 53, pl. 5, fig. 17.

Apex missing. Postnatal whorls 4 present. Ribs *c.* 40 on the uppermost whorl, increasing to *c.* 50 on the last, not shouldered. Spiral striae present but feeble and obscure. No basal lira. Umbilicus closed. 7·5 × 3 mm.

34° 26′ S., 25° 42′ E. (off Cape Recife), 124 fathoms, 1 (S. Afr. Mus. no. A9027, P.F. coll.).

Distribution. Persian Gulf, 156 fathoms.

Remarks. Appears to agree with Melvill's species, but the spiral striation is difficult to see.

Acrilla natalis n.sp.

Fig. 18 *e, f*

Protoconch 3½ whorls, smooth. Postnatal whorls 8 (as preserved). Microcancellate, better shown on the later than on the earlier whorls. Early whorls

slightly turreted. Sutures deep. Ribs *c.* 36 (on 3rd whorl) increasing to *c.* 55 on last; gently curved, slightly retractive above and protractive below, crossing the sutures; spiral lirae 12 (on 3rd whorl), increasing to 15–16 on last whorl; to naked eye or under low magnification the axials and spirals appear to be of equal strength, but actually the axials are predominant, and where they cross the lirae are raised into tiny lobes. No varices. No basal lira. Umbilicus closed. 13·5 (peristome broken) × 4.5 mm. (8 postnatal whorls); 3.25 × 1·5 mm. (4 postnatal whorls). White.

Off Cape Natal (Durban), 54 fathoms, 1 and 1 apex (S. Afr. Mus. no. A9028, P.F. coll.).

Remarks. At first sight the smaller specimen appeared to have some resemblance to *Scala* (*Constantia*) *standeni* Melvill (1899, p. 92, pl. 1, fig. 11) from Karachi, with 42 ribs and 18 spirals. But this somewhat deceptive resemblance was at once counteracted by examination of the larger specimen. Compare also *S. aspicienda* Melvill (1912, p. 242, pl. 12, fig. 3) from the Arabian Sea.

The ribs can scarcely be described as 'fimbriolate' (cf. *intertexta* Melvill & Standen, 1903b, p. 306), but they do appear slightly beaded (Melvill, 1904b, p. 62). The present specimens, however, are quite distinct from *intertexta*. They may also be compared with *S. thielei* de Boury (1913a, p. 180, pl. 8, fig. 8) from Japan and the Philippines.

Acrilla analogica n.sp.

Fig. 18 *g*, *h*

Protoconch 1½ whorls, globose, alt. 0·75, diam. 0·6 mm., smooth. Postnatal whorls (as preserved) 9. Weak axial ribs *c.* 22–24 (somewhat corroded in places, making an exact count difficult), straight, retractive. A varix on each whorl. Fine spiral lirae *c.* 24, separated by punctate striae, 2 of the lirae about in middle of the whorl very slightly larger than the others. A thin basal marginal lira, distinctive above suture on each whorl. Base obscurely spirally striate. Protoconch plus 9 whorls 11·5 × 3·5 mm.; 3 whorls (8th–10th) 9–10 mm. long, width of top whorl 2·5 mm., of lower whorl 3·5 mm.

36° 40′ S., 21° 26′ E., 200 fathoms, 1 (protoconch plus 9 whorls); off Cove Rock (East London), 18–130 fathoms, 1 broken (8th–10th whorls); 34° 27′ S., 25° 42′ E., 256 fathoms, 1 broken (3rd–5th whorls) (S. Afr. Mus. A9026 (Type), A9228, A9229 respectively, P.F. coll.).

There is a curious resemblance to the European Oligocene † *undatella* v. Koenen, figured by de Boury (1913a, p. 185, pl. 8, fig. 10). The slope of the axial ribs (numbering 23) is little different, and de Boury said there was no trace of punctuations.

Fam. **Janthinidae**

Gen. Janthina Bolten

Laursen, 1953, pp. 1–40, pl. 1 and 41 text-figs (anatomy, reproduction, taxonomy).

According to Laursen (1953) some 60 names have been given to shells of this genus. Sowerby (1882) reduced the number of what seemed to him valid species to 11; Tryon (1887) to 7. Laursen recognized only 5.

Laursen's key to the species may be repeated here.

1	Shell trochoid. Viviparous	*janthina*
	Shell globose. Oviparous	2
2	Shell furrowed (ribbed)	*exigua*
	Shell smooth or striated	3
3	Shell with well-developed keel	*umbilicata*
	Shell with poorly developed keel	4
4	Keel visible only on last whorl	*prolongata*
	Keel visible on all whorls	*pallida*

Janthina janthina (Linn.)

Janthina janthina Laursen, 1953, p. 15, pl. 1, fig. 1 and text-figs. 5–8, 10, 11, 14, 15–18, and charts.

The synonyms include *fragilis* Lam., *communis* Lam., *planispirata* Ad. & Rve., *britannica* Forbes & Hanley, *balteata* Rve., *trochoidea* Rve. All these have appeared in the South African fauna list but should be deleted.

The shape of the shell varies from the typical form to a high trochoid shape (*trochoidea*) or to a form with low flattened apex (*planispirata*) (see Laursen, fig. 15). Laursen suggested that the variation in shape of the shell might be due, at least partly, to varying conditions of space in the oviduct while in the *Veliger* stage; whereas in the oviparous species the embryos in the egg-capsules have more or less the same space for development; and in these oviparous species there is little variation in the shape of the shell.

Viviparous; no egg-capsules attached to the float.

Distribution circumtropical, within a belt with surface temperature not less than 10° C., preferably 15° C.

Janthina exigua Lam.

Janthina exigua Lamarck, 1816, pl. 456, figs. 2 *a*, *b* and Liste p. 12. Laursen, 1953, p. 22, figs, 1, 3, 12, 13, 22–24, and chart.

Normally the ribs are well separated by spaces greater than their own thickness, but sometimes they are closely aggregated on the last whorl; they are, however, stronger than the growth-lines in *umbilicata*, and the latter species moreover has smooth early whorls.

Occurs in two belts with surface temperature 15°–25° C. north and south of the equator.

Janthina umbilicata D'Orb

Janthina umbilicata D'Orbigny, 1840, p. 414. Sowerby, 1892, p. 28. Turton, 1932, p. 86. Laursen, 1953, p. 26. figs. 9, 26–28, and chart.

Algoa Bay (Sowerby); Port Alfred (Turton); 33° 03′ S., 27° 54′ E. (off East London) (Laursen).

Still Bay (S. Afr. Mus. coll. Muir).

Dr. Muir found only 4 specimens among very many *exigua*.

Janthina prolongata Blainv.

Janthina prolongata, Laursen, 1953, p. 28, pl. 1, fig. 2, text-figs. 30–35, and chart.
Janthina globosa Swainson, 1822, pl. 85.
Janthina nitens Menke, Smith, 1903a, p. 385.
Janthina iricolor Reeve, 1858, figs. 16 *a*, *b*.

Spire rather depressed, body-whorl globose, columella long, often forming with the lower part of outer lip an open canal.

36° S., 20° 27′ E. (Laursen).

Kalk Bay, False Bay (Smith; also S. Afr. Mus.). Still Bay (S. Afr. Mus. coll. Muir).

Ovigerous specimens: False Bay, December (U.C.T.).

Janthina pallida (Harvey MS.) Thompson

Janthina pallida Laursen, 1953, p. 31, figs. 2, 4, 36–39, and chart. ? Turton, 1932, p. 85.

According to Laursen known only from north of the equator, at surface temperatures above 15° C.

Turton's description of the lower part of aperture being 'rounded and patulate' certainly fits this species; but *umbilicata* is somewhat similar in this respect. Turton's shells should be re-examined.

Distinguished from *umbilicata* (and all other species) by the peripheral keel being visible on all whorls.

The radula teeth are more robust and hamate than in the other species.

Recluzia jehennei Petit

Recluzia montrouzieri Souv., Sowerby, 1892, p. 28.
Recluzia jehennei Smith, 1910a, p. 202.

Port Elizabeth (Sowerby); Tongaat, Natal (Smith).

A fine specimen, 20 × 15 mm., was found on the shore at Gordon's Bay (False Bay) by Dr. H. Ackert, 1960.

Distribution. Red Sea, Mazatlan, New Caledonia, Australia.

Fam. **Triforidae**

Thiele (1925, p. 126) mentioned the ten species (of *Trifora* s.s. and *Viriola*) up to that time recorded from South Africa (omitting Bartsch 1915 and Sowerby

1921), stating that the *Valdivia* had not obtained any of these, but on the contrary, had taken ten other species, all of them new. Thiele (1925), however, unaccountably ignored Bartsch's (1915) 12 new species.* Sowerby (1921) had also added one species; and Tomlin added another in 1926. Turton (1932) in his turn ignored Thiele, and added 12 new species.

Surely among these 46 'species' there must be some synonyms! Although Bartsch did not say so, his *africana* is the species formerly recorded as the European *perversa*. In the sequel I have suggested sinking one of Bartsch's species, 3 of Thiele's, and 4 or 5 of Turton's. But comment on Turton's beach-worn 'species' is impossible without re-examination of his material. With great diffidence, therefore, I propose 6 new species.

None of the species can be fully accepted unless the description is based on good material; and a description of the protoconch is essential. Bartsch has well described the protoconch of *africana*; and the general characteristics of the protoconchs of some half dozen other species are known.

The junction of the protoconch and first postnatal whorl is not always sharply defined, and often it is difficult to decide exactly how many whorls should be reckoned as protoconchal. Sometimes, however, there is a difference in colour.

Trifora africana Bartsch

Fig. 19 *b*

Trifora perversa (*non* Linn.), Sowerby, 1892, p. 36.
Trifora africana Bartsch, 1915, p. 103, pl. 5, fig. 11. Tomlin, 1931, p. 424.
Trifora plebeja Thiele, 1925, p. 129, pl. 22 (10), fig. 21.

Protoconch conical, $4\frac{1}{2}$ (5) whorls, alt. 0.5, diam. 0.3 mm., first or first and a half smooth, the other whorls with 2 fine peripheral lirae, crossed by numerous fine axial pliculae (*c.* 25–30 on each whorl), on last whorl the lirae become one median keel which gradually sinks lower and becomes the lower of the series of nodules on 1st postnatal whorl. Postnatal whorls 10; first 4 or 5 with 2 spiral series of nodules, on 5th or 6th a median lira appears which becomes nodulous and equal in strength (or nearly so) to the other series; axial ribs connecting the nodules, 16 on 1st, increasing to 22–24 on last whorl; base with 3 lirae below the peripheral lira, which is slightly nodulous, and is more or less visible above the suture between each whorl. 6–6·5 × 1·5–1.75 mm.

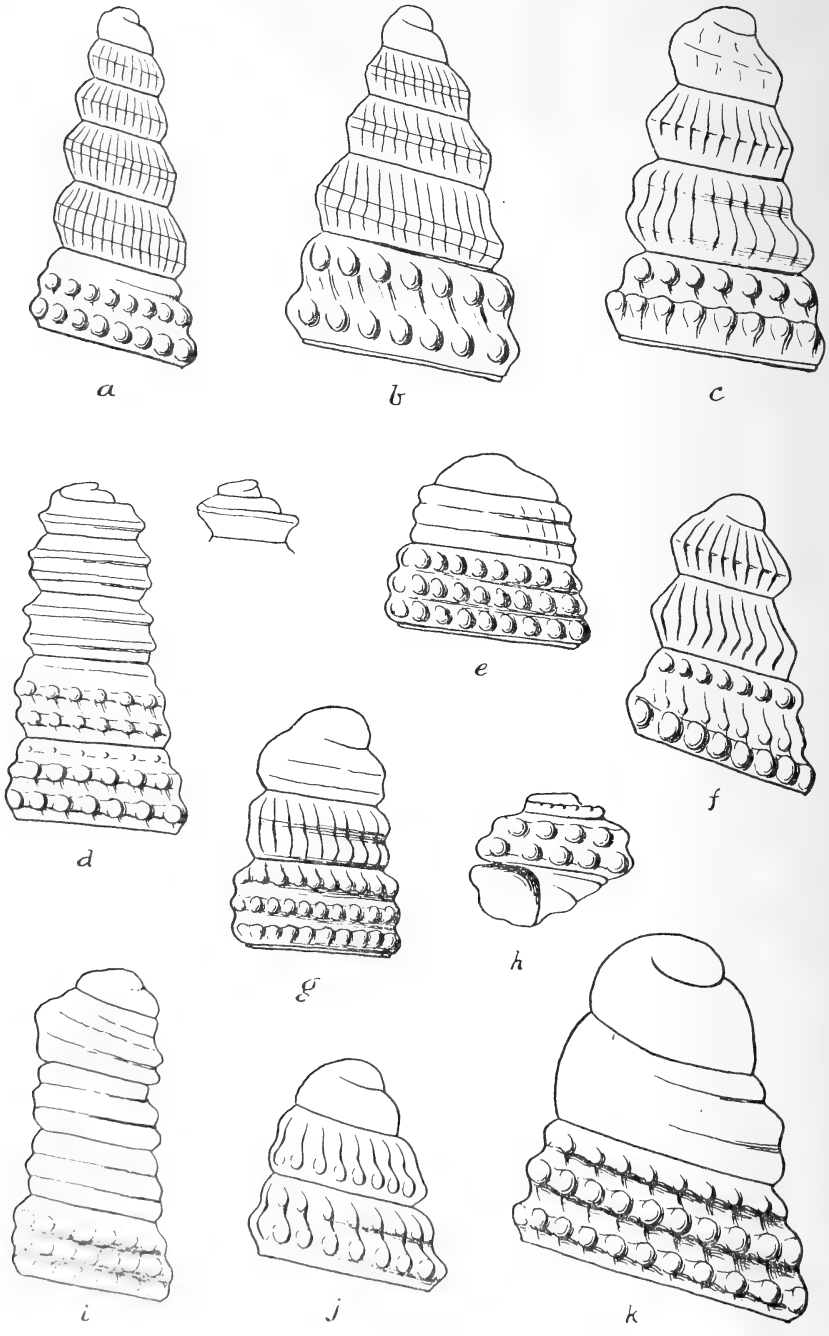
Dark chestnut-brown (when fresh), the upper series of nodules on each whorl paler than the others, and contrasting with the dark sutural groove.

Fossil: Pleistocene: Sedgefield near Knysna (Martin).†

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton, 1932); Jeffreys Bay, Still Bay, False Bay (S. Afr. Mus.).

* Between the completion of his MS. in 1918 and its publication in 1925, Thiele saw Bartsch's paper, as shown by the footnotes he added on pp. 50, 55.

† Schwarz (1910, p. 114) recorded '*Triforis punctata* Sow.' from Pleistocene beds at Port Elizabeth.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34° 8′ S., 24° 59′ E., 80 metres; 33° 50′ S., 25° 48′ E., no depth; 35° 26′ S., 20° 56′ E., no depth given (Thiele).

34° S., 25° 44′ E., 33 fathoms, several; off Cape Recife, 256 fathoms, 1; off Illovo River (Natal), 27–30 fathoms, 2; off Umhloti River, 40 fathoms, 3; off Tongaat, 36 fathoms, 1; off Tugela River, 14 fathoms, several; off Cape Vidal, 80–100 fathoms, 1; all dead (S. Afr. Mus. P.F. coll.).

Living: Still Bay (U.C.T.).

Remarks. The Natal-Zululand examples agree with those from Cape localities as regards the protoconch and the sculpture of the postnatal whorls.

In the Natal-Zululand examples the development of the median lira may be delayed until the 7th or 8th whorl, and only on the 10th whorl do the nodules approximate in strength to those of the other two series. But in one of the Illovo shells the lira appears on the 4th whorl, and on the 7th whorl the median nodules are almost as conspicuous as the others. On the Cape Vidal shell the lira also appears on the 4th whorl, but the nodules are not quite so large as the others, even on the 10th whorl.

The conical protoconch, together with that of the next species, is distinctive among South African species so far as is known.

Trifora morgani n.sp.

Fig. 19 *a*

Protoconch 5 whorls, 1st smooth, 2nd and 3rd with 1 peripheral lira, 4th and 5th with 2 peripheral lirae, crossed by numerous fine axial pliculae. Postnatal whorls 13, tapering evenly, profile straight; 1st whorl with 2 spiral lirae, with a 3rd developing at end of whorl, 3rd and following whorls each with 3 lirae; axial ribs *c.* 18 on 1st whorl, increasing to 28–30 (but difficult to count) on last, forming blunt nodules at the intersections. Peripheral basal lira weak, not showing in the sutures; base concave, broken (? without lirae) 8 × 2 mm.

Sandy Point, north of Cape Morgan, 51 fathoms, 1 dead (S. Afr. Mus. no. A9079, P.F. coll.).

Remarks. Allied to *africana* by the character of the protoconch, differing in the straight-sided cuneiform shape as compared with the slightly fusiform shape and very gently convex profile of *africana.* The 2nd (and end of the 1st) postnatal whorl is trilirate, whereas 3 lirae develop only after the 4th or 5th whorl in *africana.*

Unfortunately the aperture is broken; the axial pliculae on the protoconch are definitely present, but cannot be counted with certainty.

←—

FIG. 19. Protoconchs of: *a, Trifora morgani* n. sp., with 1st postnatal whorl. *b, T. africana* Bartsch, with 1st postnatal whorl. *c, T. natalensis* n. sp., with 1st postnatal whorl. *d, T. scala* n. sp., with 2 postnatal whorls, and apex of another specimen. *e, T. milda* Bartsch, with 1st postnatal whorl. *f, T. dagama* n. sp., with 1st postnatal whorl. *g, T. cerea* Smith, with 1st postnatal whorl. *h, T. algoensis* Thiele. *i, T. madria* Bartsch, with 1st postnatal whorl. *j, T. capensis* Bartsch, with 1st postnatal whorl. *k, T. shepstonensis* Smith, with 1st postnatal whorl.

Trifora natalensis n.sp.

Fig. 19 *c*

Protoconch 3 ($3\frac{1}{2}$) whorls, 1st smooth, but with indications of median keel and axial pliculae towards end of whorl, 2nd and 3rd with median keel and *c.* 20 axial pliculae, keel sinking towards end of 3rd whorl to form the lower series of nodules on the 1st postnatal whorl. Postnatal whorls 9; 1st with 2 series of *c.* 16 nodules, the nodules increasing in number to *c.* 22 on last whorl; a median lira beginning on 2nd whorl, becoming stronger and nodulose, nodules almost as strong as the others on 8th and 9th whorls; base with slightly nodulose peripheral lira and 2 lirae below it, peripheral lira visible above the suture between all whorls. Canal open, outer lip not patulous. 7 × 1·75 mm. Buff, protoconch darker.

Off Umhloti River (Natal), 40 fathoms, 1 (protoconch + 9 whorls); off Umkomaas River (Natal), 40 fathoms, 1 (protoconch + 7 whorls) (S. Afr. Mus. nos. A9071, A9072, P.F. coll.).

Remarks. This does not appear to be the same as any of Thiele's (1925) species. It has some resemblance to *smithi* Bartsch (1915), but the latter, judging from a worn specimen in the South African Museum (coll. Turton) from Port Alfred, seems to have had a different protoconch; also the middle nodules are equal to the others at a much earlier stage.

The larger Umhloti specimen is not fully mature, as shown by the lip and canal. In the smaller (4 mm.) Umkomaas specimen the 2nd whorl of the protoconch is slightly bulbous.

Trifora dagama n.sp.

Fig. 19 *f*

Protoconch 3 whorls, 1st smooth at the start, later with median keel and axial pliculae, 2nd with median keel and *c.* 20 axial pliculae, on 3rd the keel becomes sharper and towards end of whorl sinks lower to form the lower series of nodules, the upper ends of the pliculae become nodulous, and a 3rd (median) series of nodules is interpolated at the (presumed) junction of protoconch and 1st postnatal whorl. Postnatal whorls 8, each with 3 series of equal-sized nodules, connected by axial ribs. Base with slightly nodulose peripheral lira and 2 lirae below it; peripheral lira barely visible in the sutures. Canal closed except at tip, outer lip patulous. 6 × 1·5–1·75 mm. Buff, protoconch slightly paler.

Off Umkomaas River (Natal), 40 fathoms, 2 (S. Afr. Mus. no. A9073, P.F. coll.).

Remarks. Very like the preceding species (*natalensis*) but the 1st postnatal whorl already with 3 series of well-developed nodules.

Trifora cerea Smith

Fig. 19 *g*

Trifora cerea Smith, 1906a, p. 43, pl. 7, figs. 11, 11 *a*. Bartsch, 1915, p. 107. Turton, 1932, p. 117.

Protoconch 2 (2½) whorls, 1st smooth at start, later with 2 spiral lirae, 2nd with 2 stronger lirae crossed by *c.* 20 axial pliculae; passing gradually into the 1st postnatal whorl which has 3 spiral lirae, with *c.* 20 nodules. At the 5th or 6th whorl the nodulose peripheral basal lira becomes almost as strong as the other 3, consequently the later whorls show 4 rows of nodules. 10·5 × 2·25 mm.

Port Shepstone, Natal (Smith); Port Alfred (Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir).

Off Cove Rock (East London), 22 fathoms 1 dead (S. Afr. Mus. P.F. coll.).

Remarks. There is a discrepancy between Smith's description and figure. The former stated in the Latin diagnosis that there are 4 series of tubercles, and the English comment said 4 rows on *each* whorl (italic mine); but the figure shows only 3 rows except on the body whorl where the peripheral basal lira constitutes the 4th row.

Two Port Alfred shells, 5 mm. long with 7 postnatal whorls (coll. Turton), seem to be correctly identified.

Trifora capensis Bartsch

Fig. 19 *j*

Trifora capensis Bartsch, 1915, p. 105, pl. 5, fig. 4. Tomlin, 1931, p. 425.

Protoconch 3 whorls, 1st smooth, 2nd and 3rd with 2 series of *c.* 16 nodules, feeble on 2nd but stronger on 3rd whorl. Postnatal whorls with 3 series of nodules. Sutures deeply incised.

Port Alfred (Bartsch, Turton, 1932); Port Shepstone (Tomlin); Still Bay (S. Afr. Mus. coll. Muir).

Remarks. The Still Bay specimens collected by Dr. Muir show the protoconch which was missing in Bartsch's material; it is also missing in 3 topotypes presented by Turton.

Trifora milda Bartsch

Fig. 19 *e*

Trifora milda Bartsch, 1915, p. 102, pl. 11, fig. 3.
Trifora capensis (*non* Bartsch) Thiele, 1925, p. 128, pl. 22 (10), figs. 18, 18 *a*.
Trifora barnardi (*pro capensis* Thiele) Tomlin, 1945, p. 135.

Protoconch 1½ (2) whorls, 1st smooth at start, then with 3 spiral lirae, with indications of axial pliculae on later part. First postnatal whorl with 3 spiral series of *c.* 20 nodules; *c.* 26 nodules on 6th (last remaining) whorl. Peripheral basal lira showing above the sutures; base (in one specimen) with 3 additional lirae. 4·5 × 1·5 mm. Thiele: 8 × 2·25 mm.

Port Alfred (Bartsch, Turton, 1932).

34° 51′ S., 19° 37′ E., 80 metres; 34° 8′ S., 24° 59′ E., 80 metres; 33° 50′ S., 25° 48′ E., no depth given (Thiele).

34° 5′ S., 25° 55′ E., 67 fathoms, 2 dead; 34° 26′ S., 25° 42′ E., 124 fathoms, 3 dead (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. The present specimens are evidently Thiele's *capensis*, but I think they are also Bartsch's *milda*, although they have more nodules than Bartsch stated: *c.* 20 on 1st whorl instead of only 14, and 26 on 6th whorl instead of 22.

The protoconch seems to be distinctive, but may be slightly worn.

The record from Angola should be accepted with caution until considerably more material from both regions is available.

Trifora shepstonensis Smith

Fig. 19 *k*

Trifora shepstonensis Smith, 1906a, p. 43, pl. 7, figs. 12, 12 *a*.

Protoconch 2 (2½) whorls, smooth. Postnatal whorls 10, each with 3 spiral series of nodules. Base with 2–3 (4) lirae in addition to the peripheral lira which is more or less visible above the suture on some of the later whorls, and may be slightly nodulose on the last whorl. 11·5 (protoconch missing) × 3·5 mm.

Port Shepstone, Natal (Smith); Port Alfred (Bartsch, 1915, Turton, 1932). East London, Jeffreys Bay, Still Bay (S. Afr. Mus.).

Off Cove Rock (East London), 22 fathoms, 5 dead; 34° 5′ S., 25° 43′ E., 52 fathoms, 3 dead (S. Afr. Mus. P.F. coll.).

Remarks. When the peripheral basal lira is visible there is a close resemblance to *elsa* Bartsch (1915).

Trifora madria Bartsch

Fig. 19 *i*

Trifora madria Bartsch, 1915, p. 105, pl. 12, fig. 5. Turton, 1932, p. 118, pl. 25, no. 860 (juv.).
? *Trifora innocens* Sowerby, 1921, p. 126, text-fig.
? *Trifora apicibulbus* Turton, 1932, p. 118, pl. 25, no. 863.

Protoconch 4 whorls, 1st smooth, 2nd-4th each with 3 spiral lirae; 2nd whorl sometimes bulbous, forcing the 1st whorl into an oblique position. Bartsch gave the number of protoconchal whorls as 4; and this is probably correct. In the present material the nodules are so ill-defined that it is impossible to trace any junction between protoconch and postnatal whorls.

Two of the 4 Still Bay shells show the bulbous and oblique protoconch, one more so (figured) than the other. On the base only 2 lirae below the peripheral lira; but 3 topotypes (coll. Turton) also show only 2 lirae with a very feeble 3rd lira.

6·5 × 2 mm. (Bartsch). One of the Still Bay shells with 7 postnatal whorls measures 4·5 × 1·5 mm., and is thus more like *apicibulbus* in shape.

Port Alfred (Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir).

Tomlin considered *apicibulbus* was very close to *madria*; I agree.

Trifora scala n.sp.
Fig. 19 *d*

Protoconch 3 whorls, 1st with median keel, 2nd and 3rd with 2 keels, no axial pliculae. Postnatal whorls 11, 1st with slight thickening at top near suture and 2 series of obscure nodules, 2nd whorl with the lira at top stronger and obscurely nodulose, from about 4th whorl upper series of nodules as strong as the other two, connecting axial ribs obscure. Base with obscurely nodulose peripheral lira, visible above sutures in later whorls, one lira below it. Outer lip patulous, but canal short, not closed. 5·5 × 1·25 mm. (8 whorls), 9 × 2 mm. (11 whorls).

Off Umkomaas River (Natal), 40 fathoms, 1 (11 whorls); off Umhloti River, 40 fathoms, 1 (8 whorls) (S. Afr. Mus. nos. A9074, A9075, P.F. coll.).

Remarks. *T. helena* Bartsch has a somewhat similar protoconch, but the shell is not so slender (12 postnatal whorls: 8·6 × 2·4 mm.).

Trifora bactron n.sp.
Fig. 20 *c*

Apex worn. 18 whorls; 3 spiral lirae on each whorl, the middle lira nearer to the upper than to the lower lira, the upper lira scarcely nodulose, merely undulate, the middle and lower lirae distinctly nodulose, 12–13 nodules on last whorl. Peripheral basal lira thin, scarcely showing in the sutures, base concave with one lira. 11 × 1·5 mm.

Off Umkomaas River (Natal), 40 fathoms, 1 (Type); off Umhloti River, 40 fathoms, 1 (S. Afr. Mus. nos. A9077 (Type), A9076, P.F. coll.).

Remarks. This and the following species (*baculus*) are more slender than any of the other South African species.

Trifora baculus n.sp.
Fig. 20 *b*

One specimen with 14 whorls, apex broken, 6·5 × 1 mm., width where broken 0·5 mm. Upper 8 whorls with 3 series of 14 nodules, the uppermost series weaker than the others. On 9th whorl a 4th series is interpolated between the uppermost and median series; the two upper series remain weaker than the lower two on later whorls. Peripheral basal lira weak, base concave, without lirae.

Off Sandy Point (north of Cape Morgan), 51 fathoms, 1 (S. Afr. Mus. no. A9078, P.F. coll.).

Remarks. This slender specimen is nearest to *patricia* Thiele 1925, but the latter has only 3 series of nodules, and the nodules appear (in the figure) to be more numerous.

T. agulhasensis Thiele 1925 is, as Thiele himself said, very like *patricia* but broader: 5 × 1·6 mm. as compared with 7 × 1·6 mm.

T. whitechurchi Turton 1932 looks to be synonymous with *patricia* Thiele.

Trifora algoensis Thiele
Fig. 19 *h*

Trifora algoensis Thiele, 1925, p. 128, pl. 22 (10), fig. 19.
Trifora retusa Turton, 1932, p. 117, pl. 25, no. 855 (= juv.).

Protoconch 1½ whorls, with 2 series of 12–14 nodules. Postnatal whorls 12, 1st and 2nd with 2 series of nodules, a 3rd series interpolated on 3rd (or 4th) whorl, which on 6th or 7th whorl becomes as strong as the others; nodules increasing to 28–30 on last whorl, connected by axial ribs. Base with feebly nodulose peripheral lira, which is more or less visible in the sutures on later whorls; one strong lira below it. 9·5 × 2·5 mm.

34° 51′ S., 19° 37′ E., 80 metres; 34° 8′ S., 24° 59′ E., 80 metres; 33° 50′ S., 25° 48′ E., no depth stated (Thiele).

Still Bay (S. Afr. Mus. coll. Muir).

Off Tugela River (Natal), 47 fathoms, 1 adult; off Cape Natal, 85 fathoms, 1 apex; off Umkomaas River, 40 fathoms, 2; off Cape Morgan, 47 fathoms, 1 adult, 6 immature; off Cove Rock (East London), 22 fathoms, 4; 34° 5′ S., 25° 55′ E., 67 fathoms, 2; 34° S., 25° 44′ E., 33 fathoms, several apices; 34° 26′ S., 25° 42′ E., 124 fathoms, 2; 34° 5′ S., 25° 43′ E., 52 fathoms, 1; off Cape Infanta, 46 fathoms, 3 apices; all dead (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. This does not seem to be synonymous with any of Bartsch's species. The short, blunt protoconch, nodulous almost from its nucleus, is distinctive.

The protoconchs and juveniles collected by Dr. Muir show that *retusa* is merely the juvenile of *algoensis*. Turton's description of 3 rows of tubercles on *each* whorl belies his figure.

Trifora cf. *superba* Thiele
Fig. 20 *a*

Trifora superba Thiele, 1925, p. 127, pl. 22 (10), fig. 15.

Incomplete and worn specimens, the largest consisting of 10 whorls, measuring 4 × 1·5 mm.

Protoconch worn. Two spiral series of nodules on each postnatal whorl, connected by narrow inconspicuous lirae; nodules arranged obliquely so that

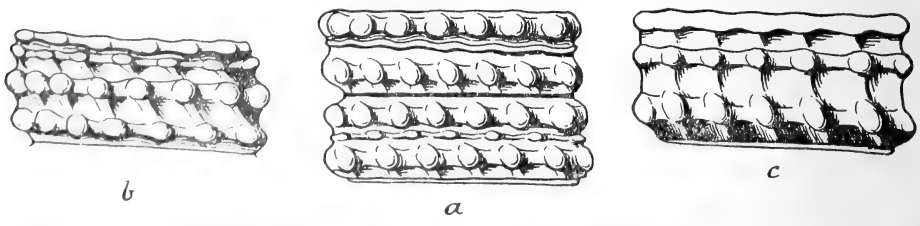

FIG. 20. *a*, two whorls of *Trifora* cf. *superba* Thiele, showing development of 3rd row of tubercles. *b*, one whorl of *T. baculus* n. sp. *c*, one whorl of *T. bactron* n. sp.

those of the lower row on one whorl alternate with those of the upper row on the succeeding whorl, the two series on each whorl also alternating; 14 nodules on earlier whorls (? 3rd and 4th), 16 on last whorl. At about the 8th whorl a thin lira develops close below the upper series of nodules, becoming more median in position as it becomes nodulous. Basal peripheral lira smooth, no lirae visible below it. Aperture (where complete) nearly circular, with a short, almost closed canal.

Off Illovo River (Natal), 27–30 fathoms, 2; off Umkomaas River (Natal), 40 fathoms, 3; off Cove Rock (East London), 22 fathoms, 1; all dead (S. Afr. Mus. P.F. coll.).

Remarks. These shells may be *superba*, from 35° 16′ S., 22° 26′ E., 155 metres, which has 14 nodules in each row (6 visible in face view) but not alternating.

Closely resembling *regia* Thiele 1925 (p. 130, pl. 22 (10), fig. 23) from the Zanzibar Channel, 463 metres, but with more nodules (7 visible in face view instead of only 5) and with the thin lira below the upper row of nodules instead of above, i.e. between the latter and the suture.

T. thetis Turton 1932 (p. 117, pl. 25, no. 853) also has only 2 spiral series of nodules, but has more nodules (*c.* 9 visible, i.e. *c.* 20 around circumference) which are not so definitely alternating; and apparently there is no thin intermediate lira.

Trifora sabita Bartsch

Trifora sabita Bartsch, 1915, p. 106, pl. 11, fig. 7.
Trifora brevis Thiele, 1925, p. 129, pl. 22 (10), fig. 20.

Port Alfred (Bartsch, Turton, 1932).

33° 50′ S., 25° 48′ E., no depth stated (Thiele).

34° 5′ S., 25° 43′ E., 52 fathoms, 1; off Hood Point (East London), 49 fathoms, 1; off Illovo River (Natal), 27–30 fathoms, 2; all dead (S. Afr. Mus. P.F. coll.).

Remarks. The Algoa Bay specimen has the protoconch slightly worn, but its features, as described by Bartsch (his figure is not good), can be traced. The interpolated weak median series of nodules on 2nd and 3rd whorls is very distinct.

The East London and Natal specimens agree in the latter respect, but have lost their protoconchs.

T. carteretensis Hinds, recorded from Natal by Krauss (1848), was described as having the median row of nodules smaller than the others, but has several more whorls than *sabita*. Hinds's (1844c, p. 31, pl. 8, fig. 17) description and figure are inadequate for comparison.

Gen. Viriola Jouss.

The species assigned to this genus with smooth spiral lirae are distinct from those of *Trifora* s.s. with nodulose lirae. *T. helena* Bartsch (1915, pl. xi,

fig. 5) has the lirae very feebly nodulose, but can scarcely be claimed as a transition.

Viriola corrugata (Hinds)

Fig. 21 *b*, *c*

Triforis corrugata Hinds, 1843, p. 18. Hinds, 1844c, p. 29, pl. 8, fig. 7. Sowerby, 1897, p. 17. Schepman, 1909, p. 175. Thiele, 1925, p. 129.
?*Triforis cingulatus* A. Adams, Sowerby, 1892, p. 36.

Protoconch 3 whorls, 3rd with obscure axial pliculae. Postnatal whorls *c.* 21; first 6–7 whorls with 2 spiral lirae, slightly nodulose, connected by axial pliculae in the grooves; from about the 7th whorl a thin intermediary lira develops between the 2 main lirae, succeeding whorls therefore trilirate, but the middle lira always remains weaker than the other two (Hinds: 'carina media

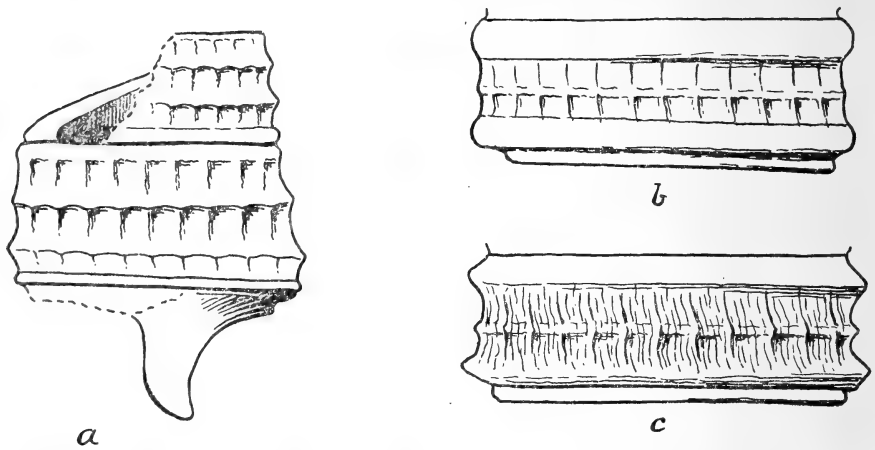

FIG. 21. *a*, *Viriola* cf. *vitrea* (Hinds), broken whorl. *b*, *c*, *V. corrugata* (Hinds), one whorl of worn *Pieter Faure* specimen above, and of fresh Durban specimen below.

secondaria'). Axial plicae present on later whorls, moderately regularly spaced, *c.* 15 on a half whorl, growth-lines distinct; a thin lira at (above) the suture, forming on the last whorl the peripheral basal lira; base with 2 additional weak lirae. On last half whorl of last (21st) whorl a second intermediary develops between the 1st intermediary and the lower main lira, also on back of outer lip an intermediary between the lower main lira and the peripheral basal lira. Canal curved, almost closed in the 19.5 mm. shell, but open in the 11.5 mm. shell. 5.5 × 1.5, 9 × 2, 11.5 × 2.5–2.75, and 19.5 × 4 mm.

Operculum subcircular, paucispiral, nucleus central.

Brown, lirae whitish; inside of aperture brown with 5 white lines corresponding with the external lirae (2 main, 2 intermediaries, 1 basal).

Radula (of 9 mm. specimen, A6140) elongate, with numerous tiny oblong plates in each row, each plate with 3 denticles (cf. Sars, 1878, pl. VII, fig. 8, *Triforis perversa*).

Durban (Sowerby; also S. Afr. Mus. coll. Burnup). Natal (no exact locality) (S. Afr. Mus. no. A6140).

Off Illovo River (Natal), 27–30 fathoms, 1 broken, worn (S. Afr. Mus. P.F. coll.).

Distribution. East Africa, Straits of Macassar, New Guinea, East Indies, Japan.

Remarks. One of the two 11.5 mm. shells retains the protoconch except the actual nucleus; the other 4 shells are decollated. The three larger ones were more or less covered with a thin whitish deposit (algal growth).

In the corroded Illovo specimen the upper and lower lirae are less sharply keeled and therefore relatively broader, the middle lira is a mere thread; the axial plicae show up rather more conspicuously because the growth-lines have been worn away.

The suggestion may be far-fetched, but is it possible that continued wear might produce a form like *dilecta* Thiele (1925, p. 126, pl. 22 (10), fig. 12)? Thiele's specimens from 34° 51′ S., 19° 37′ E., 80 metres, were in bad condition, but showed two spiral grooves.

Viriola alboguttata Tomlin

Viriola alboguttata Tomlin, 1926, p. 294, pl. 16, fig. 7.

Protoconch $4\frac{1}{2}$ whorls, each whorl with a sharp median spiral lira with axial pliculae above and below it. Postnatal whorls 9. Trilirate, the middle lira feeble at first, later 'approximating to the strength of the other two'. Shape (at 5×1.75 mm.) ovate, with last whorl contracted; aperture strongly expanded, with strong sinus at summit. Canal not mentioned, and not clearly figured (in the figure the aperture appears almost holostomatous).

Scottburgh and Port Shepstone, Natal, living (Tomlin).

Remarks. Seems to be a smaller species than *corrugata*, but it is very similar in many structural features as well as coloration. Is it possible, in spite of the expanded lip, that this is the juvenile of *corrugata*?

I am inclined to think that Tomlin may have regarded two whorls as protoconch instead of postnatal.

Viriola cingulata (A. Adams)

Triforis cingulata Adams, A., 1853, p. 279. Sowerby, 1892, p. 36. Smith, 1904, p. 37 (comment on Sowerby's identification).

'. . . ashy-grey, 3 smooth keels, interstices strongly striated, somewhat similar to *corrugatus* Hinds' (A. Adams).

Thiele (1925, p. 127) stated that the middle lira was weaker than the other two.

Smith (1904), in describing his *four*-lirate *fuscescens*, stated that 'some of the shells named *cingulatus* by Mr. Sowerby . . . belong to the present species.

None of them agree with Adams' species. . . .' It is a pity Smith did not give his identification of the other shells which did not belong to his *fuscescens*.

The occurrence of the Red Sea *cingulata* in South Africa is therefore doubtful; and a statement of the actual differences between *corrugata* and *cingulata* would be useful.

Viriola cf. *vitrea* (Hinds)

Triforis vitrea Hinds, 1843, p. 19. Hinds, 1844c, p. 30, pl. 8, fig. 12.

Two thin spiral lirae, 1 in middle of whorl, 1 in lower half, a thinner lira (peripheral basal lira) at bottom of whorl immediately above the suture; in apical view the 2 lirae show a slightly undulate circumference, *c.* 18–20 undulations; obscure axial plicae in the grooves corresponding with the undulations. Diam. 4.5 mm. Creamy-white.

Off Cape Morgan, 47 fathoms, 1 fragment consisting of $1\frac{1}{2}$ whorls (S. Afr. Mus. P.F. coll.).

Distribution. Straits of Malacca.

Remarks. One might suspect this to be the whorl of an adult *dilecta* Thiele (1925, p. 126, pl. 22 (10), fig. 6) from the Agulhas Bank. Thiele's specimens were in bad condition. Nevertheless, and in spite of the fact that in several gastropods the sculpturing on later whorls may be different from that on the early whorl, the present specimen is too definitely bi-lirate to be identified with *dilecta*.

Moreover, another 12 or 13 whorls would have to be added to the shell figured by Thiele to get the requisite width of 4.5 mm.; such a shell would be at least 24 mm. long.

On the other hand there seems considerable similarity with *vitrea*, although Hinds's description and figure are quite inadequate for a definite decision.

Viriola erecta (Thiele)

Fig. 22 *b*, *c*

Trifora erecta Thiele, 1925, p. 127, pl. 22 (10), fig. 14.

Protoconch 3 ($3\frac{1}{2}$) whorls, alt. 1–1.25, diam. 0.75–0.8 mm., smooth. Postnatal whorls 14; first or 1st and 2nd whorls tri-lirate, 2nd or 2nd–4th whorls 4-lirate, succeeding whorls 5-lirate; or 1st whorl beginning 3-lirate becoming 4-lirate, 2nd whorl 4-lirate becoming 5-lirate. Base with peripheral lira and 1 or 2 feeble lirae close below it. 16.5 × 3 mm. Creamy-white.

35° 16′ S., 22° 26′ E., 155 metres, 1 (Thiele).

Off Sandy Point (north of Cape Morgan), 51 fathoms, 1 fresh; off East London, 52 fathoms, 1 fresh (largest specimen); 34° 3′ S., 25° 10′ E., 24–34 fathoms, 1 fresh and 1 worn apex; off Cape St. Blaize, 125 fathoms, 1 broken and corroded (S. Afr. Mus. P.F. coll.).

Remarks. Although Thiele's singleton had lost the protoconch the present specimens agree in being 5-lirate.

Turton's (1932) *sowerbyi* could perhaps be synonymous, but has, according to Turton, only one protoconchal whorl. Re-examination of Turton's material might show whether any protoconchal whorls appear to have been worn away. I think, however, that *sowerbyi* is more likely to be only one of the varietal forms of *fuscescens*.

The worn Cape St. Blaize example has lost the apical whorls, and only 8 remain (probably the 7th–14th whorls); each whorl has only 4 strong lirae, but the peripheral basal lira appears in the sutures, and if this be counted,

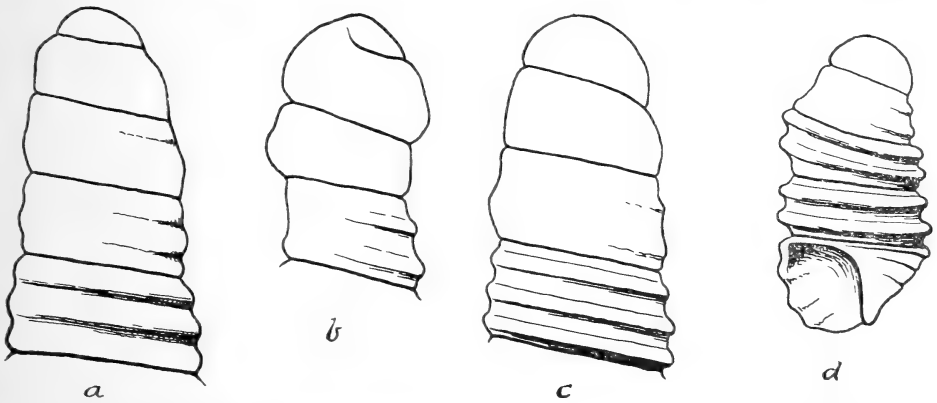

FIG. 22. Protoconchs of: *a*, *Viriola innocens* Thiele, *non* Sow. = *thielei* nom. nov. *b*, *c*, two examples of *V. erecta* (Thiele). *d*, *V. fuscescens* (Smith).

each whorl has 5 lirae. In this respect it differs from the other shells in which the basal lira is concealed by each successive whorl.

Viriola fuscescens (Smith)

Fig. 22 *d*

Triforis cingulata (*non* A. Adams) (*partim*: see Smith), Sowerby, 1892, p. 36.
Trifora fuscescens Smith, 1904, p. 37, pl. 3, fig. 6.
Triforis ima Bartsch, 1915, p. 108, pl. 10, fig. 6.
[?] *Viriola sowerbyi* Turton, 1932, p. 119, pl. 26, no. 872.
[?] *Viriola crebricingulata* Turton, 1932, p. 120, pl. 26, no. 873.
Viriola minuta Turton, 1932, p. 120, pl. 26, no. 874 (=juv.).

Protoconch 1½ (2) whorls, alt. 0·5, diam. 0·3–0·4 mm., slightly oblique, smooth, but later part of last whorl bilirate, junction with 1st postnatal whorl indistinct. Postnatal whorls 13–16; first 2 whorls bilirate, 3rd trilirate, from about the 4th or 5th (sometimes 3rd, but sometimes not until 7th or 8th whorl) 4-lirate; uppermost lira usually a little broader than the others. On later whorls a thin intermediary lira may develop between the 2nd and 3rd lirae, and another (more rarely) between 3rd and 4th (cf. Bartsch, 1915, p. 109); in the latter case there are 6 lirae. The increase in the number of lirae is not always due to interpolation of a newly formed lira, but sometimes to the splitting of a lira. Base with 2 lirae below the peripheral lira. Up to 13 × 2·75 mm.

Port Alfred (Smith, Bartsch, Turton; also S. Afr. Mus.). Still Bay (S. Afr. Mus. coll. Muir).

33° 52′ S., 25° 50′ E., 25 fathoms, 2, apices missing; 34° 5′ S., 25° 43′ E., 52 fathoms, 7; off Cove Rock (East London), 22 fathoms, 4; all dead (S. Afr. Mus. P.F. coll.).

Remarks. Turton said *sowerbyi* had 5 lirae 'on each whorl' but his figure shows 3 on the early whorls, 4 on the middle whorls, and 5 on only the later whorls. *T. sowerbyi* and *crebricingulata* were said to have no basal lirae; this point wants checking on Turton's material.

Viriola thielei nom. nov.

Fig. 22 *a*

Trifora innocens (*non* Sowerby 1921), Thiele, 1925, p. 127, pl. 22 (10), figs. 13, 13 *a*.

Protoconch 3 whorls, alt. 1, diam. 0·6 mm., smooth, a faint spiral sulcus on 2nd whorl presages the growth of the subsutural lira at end of 3rd whorl. Postnatal whorls 9–10, each with 3 lirae, which are subequal in strength, but on later whorls the upper one tends to become sharper, i.e. tabulate above and sloping below, so that the groove between upper and middle lirae appears to be wider than that between middle and lower lirae. Peripheral basal lira weak, visible in sutures from 1st whorl onwards in one specimen (Cape Natal) (and on penultimate whorl in Thiele's figure 13), but not in the other specimen (Umkomaas); one or two (Thiele: 2) weak lirae below the peripheral lira. 8 × 1·8 mm., 9 × 2 mm.

34° 51′ S., 19° 37′ E., 80 metres; 35° 26′ S., 20° 56′ E., no depth given (Thiele).

Off Cape Natal (Durban), 85 fathoms, 1 dead but fresh; off Umkomaas River (Natal), 40 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Fam. **Cerithiopsidae**

Cerithiopsis alfredensis Bartsch

Fig. 23 *e*, *f*

Cerithiopsis tubercularis (*non* Mont.), Sowerby, 1892, p. 27.
Cerithiopsis alfredensis Bartsch, 1915, p. 109, pl. 5, fig. 9. Tomlin, 1931, p. 423. Turton, 1932, p. 120.
Cerithiopsis nisaba Bartsch, 1915, p. 112, pl. 12, fig. 3.
[?] *Cerithiopsis virgo* var. *fuscescens* Thiele, 1925, p. 125, pl. 22 (10), fig. 6 *a*.

Protoconch 5 whorls, alt. 0·6, diam. 0·3 mm. (*solo*); protoconch plus 1st postnatal whorl alt. 0·75, diam. 0·4 mm., smooth. Postnatal whorls 9 (Bartsch: 10). 5 × 1·5–1·6 mm. Brown, protoconch white.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Jeffreys Bay, Coffee Bay (Tomlin); False Bay and Still Bay (S. Afr. Mus. coll. K.H.B. and coll. Muir).

34° 5′ S., 25° 44′ E., 33 fathoms, 6; 34° 5′ S., 25° 55′ E., 67 fathoms, 2; off Cape Infanta, 46 fathoms, 3 (S. Afr. Mus. P.F. coll.).

Living: False Bay and Knysna (U.C.T.).

Remarks. At Still Bay Dr. Muir collected a series from the protoconch upwards.

Port Alfred specimens identified as *nisaba* and presented by Turton do not seem separable from *alfredensis*.

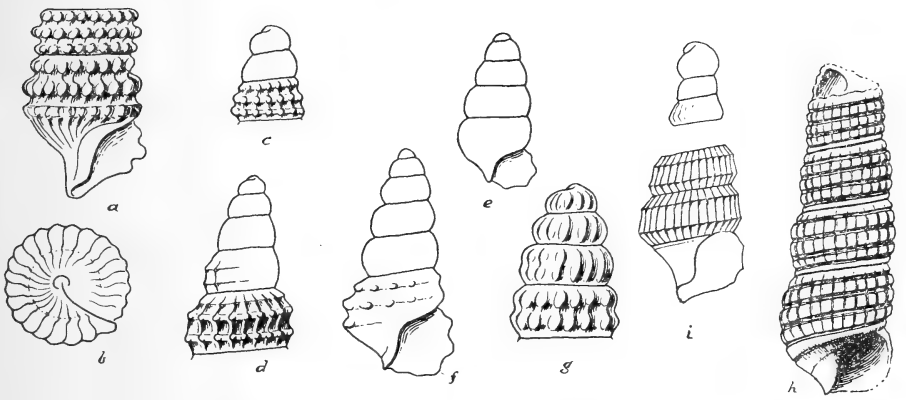

FIG. 23. *Cerithiopsis rota* n. sp. *a*, later whorls. *b*, basal view. *c*, protoconch and 1st postnatal whorl. *C. exquisita* Sow. *d*, protoconch and 1st postnatal whorl. *C. alfredensis* Bartsch. *e*, *f*, protoconch and protoconch with 1st postnatal whorl. *Cerithiella nonnitens* n. sp. *g*, protoconch and 1st postnatal whorl. *h*, *Cerithiopsis* cf. *agulhasensis* Thiele. *i*, *Cerithiella taylori* n. sp. (apex magnified twice as much as base).

Sowerby's examples from Port Elizabeth, recorded as *tubercularis*, are probably referable to *alfredensis*, if there is any difference between the two species. Tomlin accepted Bartsch's species.

Thiele (1925, p. 124) recorded *tubercularis* from Great Fish Bay, Angola.

Cerithiopsis erna Bartsch

Cerithiopsis erna Bartsch, 1915, p. 110, pl. 12, fig. 6.
[?] *Cerithiopsis virgo* Thiele, 1925, p. 125, pl. 22 (10), fig. 6.
[?] *Cerithiopsis scitula* and *kraussi* Turton, 1932, p. 121, pl. 26, nos. 878, 879.

Seems to be distinguished from *alfredensis* by the fine, slightly nodulose lira at bottom of each whorl and above the suture, and by the absence of the strong lira on base. The sutural lira is best seen in the later whorls; in both the present specimens it is clearly *above* the suture. 4 × 1·3 mm. (7 postnatal whorls); 6·75 × 2 mm. (11 postnatal whorls).

Port Alfred (Bartsch, Turton).

34° 27′ S., 25° 42′ E., 256 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Remarks. The protoconch of the larger specimen was possibly plicate, but is too worn for certainty.

Turton's *scitula* and *kraussi* may perhaps be this species.

C. virgo Thiele came from off Cape Agulhas, 80 metres.

Cerithiopsis soror Thiele

Cerithiopsis soror Thiele, 1925, p. 125, pl. 22 (10), fig. 7.

Differs from *erna* and *virgo* in having a thin smooth lira at the *top* of each whorl, *below* the suture with preceding whorl.

The following *Pieter Faure* specimens may belong here, though they have 10 postnatal whorls in a length of 5 mm. whereas Thiele's figure shows 7.

Protoconch 3 whorls, 2nd and 3rd with broad axial riblets, 14 on 3rd whorl. Postnatal whorls 14; early whorls with 2 spiral lirae with nodules at intersections with axial riblets (cf. Thiele's description but not the figured specimen), on 6th whorl an intermediary lira appears and on all later whorls there are 3 nodulose lirae; axial ribs *c.* 18 on 3rd whorl, increasing to *c.* 26–28 on last. The (additional) thin lira at the top of the whorl remains smooth or only very slightly nodulose.

Off Umhloti River (Natal), 40 fathoms, 2 dead (S. Afr. Mus. no. A9042, P.F. coll.).

C. soror came from off Cape Agulhas, 80 metres.

Cerithiopsis exquisita Sow.

Fig. 23 *d*

Cerithiopsis exquisita Sowerby, 1897, p. 14, pl. 6, fig. 13. Turton, 1932, p. 121.
[?] *Cerithiopsis becki, fulgens, admirabilis* Turton, 1932, pp. 121, 122, pl. 26, nos. 881, 886, 887.

Protoconch $3\frac{1}{2}$–4 whorls, alt. 0·5, diam. 0·3 mm., smooth. Postnatal whorls 9; profile convex, biangulate. The upper lira with nodules (near the suture) smaller than the other two lirae. 6 × 1 mm.

Pale or dark brown, glistening, protoconch pale.

Natal (Sowerby); Port Alfred (Bartsch, 1915, Turton); Still Bay (S. Afr. Mus. coll. Muir).

34° S., 25° 44′ E., 33 fathoms, 1 juv. (S. Afr. Mus. P.F. coll.).

Remarks. Cerithiella argentea Thiele with a silver gloss is very near, in fact the words 'anfractus biangulati' in Sowerby's description apply better to *argentea*. Sowerby's figure, however, shows 3 spiral lirae, and all the present material is 3-lirate; there are no fine axial pliculae on the protoconch.

Cerithiopsis rota n.sp.

Fig. 23 *a–c*

Protoconch $2\frac{1}{2}$ whorls, smooth. Postnatal whorls 7; axial ribs 14 on 1st whorl increasing to 23 on last; spiral lirae 3 on each whorl, on 3rd–6th whorls the middle lira is more prominent than the others; intersections nodular. On last whorl the axial ribs are continued over the lowermost lira on to and

across base, with a feeble costa with feeble nodules in middle of base. 3·5 × 1 mm. Buff, protoconch white.

34° S., 25° 44′ E., 33 fathoms, 1 dead (S. Afr. Mus. no. A9043, P.F. coll.).

Remarks. Seems to be distinguished by the basal ornamentation, and the prominent middle lira.

Cerithiopsis cf. *agulhasensis* Thiele

Fig. 23 *h*

Cerithiopsis agulhasensis Thiele, 1925, p. 125, pl. 22 (10), fig. 8.

Apex missing, 4 whorls remaining; increase in width very slight, sides nearly parallel, profile of whorls slightly convex. Axial ribs 22 on top whorl, 23 on last; crossed by 4 spiral sulci, separating 5 lirae; lirae and sulci flat, the latter slightly narrower than the lirae, the 4th sulcus distinctly narrower. The sulci divide the ribs into flat squarish areoles (scarcely nodules); the sulci better marked than the intervals between the ribs. Ribs only feebly indicated on topmost (subsutural) and on lowermost (suprasutural) lirae. Base with one shallow flat sulcus, and a feeble spiral stria. 8 × 3 mm.

34° 51′ S., 19° 37′ E., 80 metres (Thiele).

Off Cape St. Blaize, 125 fathoms, 1 (S. Afr. Mus. A9224, P.F. coll.).

Remarks. Although large for a *Cerithiopsis* and considerably larger than the incomplete *Valdivia* shell, this specimen may be provisionally identified as *agulhasensis*. It closely resembles Thiele's figure, though the sutures are not so deep and the profile of the whorls are less convex. Thiele's figure shows approximately the same number of axial ribs as the *Pieter Faure* specimen, but much broader sulci relatively to the lirae.

Compare also *Eumeta bia* (*infra*, p. 127).

Subgen. Joculator Hedley

Several barrel-shaped cerithiopsids with 3 spiral series of tubercles have been described from South Africa: *insignis* Smith 1906, *nina* Bartsch and *saba* Bartsch 1915, and 7 or 8 by Turton 1932. *C. saba* does not seem very different from *nina*, and with the exception of *whitechurchi* all of Turton's so-called species seem to be merely individuals of one species in various stages of beach wear.

C. insignis has colour bands around the sutures, and the median tubercles are smaller than those in other two rows (description, not the figure); *whitechurchi* has the tubercles in the uppermost row smaller than the others.

All the other 'species' have 3 rows of equal-sized tubercles. The size ranges over 1·6 mm. (5 whorls, excl. protoconch), 2·5–3 mm. (6 whorls), 3–3·2 mm. (7 whorls), and 4 mm. (8 whorls); only *saba*, 3·8 mm. with 6½ whorls, is not quite in sequence.

The protoconch consists of 4 narrow whorls, which are often decollated, even in living examples.

Cerithiopsis nina Bartsch

Cerithiopsis nina Bartsch, 1915, p. 111, pl. 12, fig. 3.
[?] *Cerithiopsis saba* Bartsch, 1915, p. 112, pl. 12, fig. 8.

The following specimens are provisionally identified as *nina*:

Inhambane and Maxixe (Machiche), Portuguese East Africa (U.C.T.).

Off Illovo River, 27–30 fathoms, 1; off Tugela River, 14 fathoms, 3; 34° 26′ S., 25° 42′ E., 124 fathoms, 1 (S. Afr. Mus. P.F. coll.).

Cerithiella taylori n.sp.

Fig. 23 *i*

Protoconch $1\frac{1}{2}$ whorls, bulbous, wider than 1st postnatal whorl, smooth. Postnatal whorls 10. First and second whorls partly corroded; on 3rd whorl *c.* 15–16 axial ribs, increasing to 26 on last whorl, as wide as the U-shaped grooves; crossed by 2 spiral lirae, one near the top, one near the bottom of whorl, producing a biangulate profile. No other spiral sculpture. Base with one lira running from top of aperture, and a feeble one below it. 8·5 × 2·75 mm. Pale corneous.

33° 26′ S., 16° 33′ E., 1,240–1,300 fathoms, 1 dead (S. Afr. Mus. A9711, F. H. Talbot coll.).

Remarks. Deceptively like *argentea* Thiele 1925, from 35° 19′ S., 20° 12′ E., 126 metres, but with more numerous axial ribs, and consequently the rectangular spaces narrower, more elongate axially.

Named after Mr. W. Taylor, Senior Technical Officer of the *Africana II*, and previously of the Fisheries Survey ship *Pickle*, under the direction of the late Dr. J. D. F. Gilchrist.

Cerithiella natalensis n.sp.

Protoconch 3 whorls, 2nd whorl bulbous, *c.* 18 axial pliculae on 2nd and 3rd whorls. Postnatal whorls 8 or 9. Spiral lirae 2 on 1st–6th whorls; on 6th a feeble intermediary lira develops, becoming stronger on 7th–9th whorls, which are thus 3-lirate; base margined above by a lira from top of aperture; base with growth-lines and some of the axial riblets more or less traceable. Axial riblets *c.* 14 on 1st whorl, increasing to *c.* 22 on last. 6 × 1·75 mm. (3 + 9 whorls). Thiele: 5 × 1·5 mm. (3 + 8 whorls).

Pale corneous, protoconch white; no silver gloss.

Off Umkomaas (Natal), 40 fathoms, 1 dead (S. Afr. Mus. A9045, P.F. coll.).

Remarks. Distinguished from *argentea* Thiele 1925, from the Agulhas Bank, by having the last 3 whorls tri-lirate.

The plicate protoconch of this and the following species is distinctive among these small South African cerithiids and cerithiopsids.

Cerithiella vidalensis n.sp.

Protoconch $2\frac{1}{2}$ whorls, 1st blunt, not upstanding, last half whorl with broad axial riblets, passing gradually into 1st postnatal whorl. Postnatal whorls 10, profile slightly turreted; axial ribs 12 on 1st whorl, increasing to 16 on last; each of the 1st–4th whorls with 2 rounded nodules, the upper series near the suture above, the lower series some little distance from the suture below; on 5th whorl an intermediary series of nodules begins, continuing on to last whorl, and becoming as strong as the other series; the profile of the early whorls thus bi-lobate, of the later whorls 3-lobate. Spiral lirae are scarcely developed. Surface of base worn, and end of canal broken, but columella strongly bent. 6 × 2 mm. White, glossy.

Off Cape Vidal (Zululand), 80–100 fathoms, one dead, but only the base is worn (S. Afr. Mus. no. A9046, P.F. coll.).

Remarks. Close to *aethiopica* Thiele (1925, p. 122, pl. 21 (9), fig. 23) from East Africa, 693 metres, but distinguished by the blunt protoconch, 3 series of nodules on the later whorls, and by the lower series of nodules being farther away from the suture below. The first and third features seem to preclude this specimen from being a larger and older individual, with 3 series of nodules on the later whorls (cf. *argentea*).

Cerithiella nonnitens n.sp.

Fig. 23 *g*

Protoconch 3 whorls with well-marked axial riblets, 2nd whorl with 12, 3rd with 14. Postnatal whorls 14; axial ribs 14 on 1st, increasing to 18 on last, somewhat oblique (protractively), especially on early whorls; each with 2 rounded nodules, indicating the intersections with 2 inconspicuous spiral lirae; base bordered above by a feeble lira; columella strongly bent, canal recurved (outer lip broken). 10 × 2 mm.

Off Cove Rock (East London), 80–100 fathoms, 1 dead (S. Afr. Mus. no. A9047, P.F. coll.).

Remarks. This may be a *Bittium*, but as it has a plicate protoconch similar to that of *argentea*, it is provisionally included with Thiele's species in *Cerithiella*. Only the radula can decide the correct position of these species.

Eumeta bia Bartsch

Eumeta bia Bartsch, 1915, p. 116, pl. 12, fig. 4. Turton, 1932, p. 125.
[?] *Cerithiopsis agulhasensis* Thiele, 1925, p. 125, pl. 22 (10), fig. 8.

2·75 × 1 mm. (4 postnatal whorls). Although lacking the protoconchal whorls, the present specimen is as large as Bartsch's specimen which had 3 protoconchal and 4 postnatal whorls. The sculpture, however, agrees.

Port Alfred, 1 specimen (Bartsch).

34° S., 25° 44′ E., 33 fathoms, 1 dead (S. Afr. Mus. no. A9044, P.F. coll.).

Remarks. C. agulhasensis Thiele has 4 spiral lirae according to the description; the figure clearly shows 4 lirae (in addition to the smooth basal peripheral lira) on the lower, but only 3 on the upper of the two whorls. The diameter of the lower whorl is greater than that of Bartsch's specimen or the present specimen, and may therefore be a later (5th) whorl on which 4 lirae are developed. Complete specimens are wanted to settle the synonymy.

Thiele (1925, pp. 121, 125) referred to the alternative generic names *Metaxia* Monterosato and *Eumetula* Thiele.

Seila alfredensis Bartsch

Fig. 24 *c*

Cerithiopsis purpurea (*non* Angas), Sowerby, 1892, p. 27.
Cerithiopsis trilineata (*non* Phil.), Smith, 1904, p. 24. Smith, 1906a, p. 44. Thiele, 1925, p. 126
Seila alfredensis Bartsch, 1915, p. 113, pl. 5, fig. 6. Tomlin, 1931, p. 423. Turton, 1932, p. 124.
Seila gloriosa Turton, 1932, p. 125, pl. 27, no. 907.

Protoconch 3–3½ whorls, alt. 0·75, diam. 0·4–0·5 mm., smooth. Postnatal whorls 10. Spiral lirae 4, but the 4th often appears on the 2nd and 3rd whorls

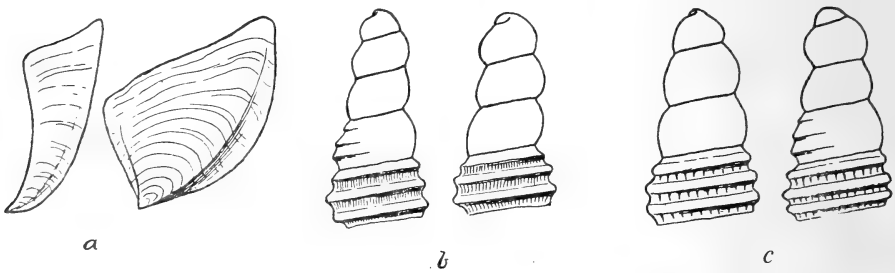

FIG. 24. *a, b, Seila africana* Bartsch, 2 views of operculum and of protoconch with 1st postnatal whorl. *c, S. alfredensis* Bartsch, 2 views of protoconch with 1st postnatal whorl.

only as a thin lira at the bottom of the whorl; grooves (3) between the lirae with close-set axial pliculae. 11·5 (protoconch missing) × 3 mm.

Brown or orange-brown, uniform or with obscure pale patches, protoconch white.

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Coffee Bay (Tomlin); Scottburgh (Tomlin); Tongaat (Natal), Jeffreys Bay, and Still Bay (S. Afr. Mus.).

34° 5′ S., 25° 55′ E., 67 fathoms, 2 dead, broken (S. Afr. Mus. P.F. coll.).

Remarks. Turton's figure of *gloriosa* seems to show 4 lirae though the text gives only three.

Seila lirata (Sow.)

Cerithiopsis lirata Sowerby, 1897, p. 14, pl. 6, fig. 12.
Seila lineata Thiele, 1925, p. 126. Turton, 1932, p. 125.

One *Pieter Faure* specimen with 6 postnatal whorls measures 3·5 × 1·75 mm. (an *africana* of equal length has a width of 1·5 mm.). Spiral lirae 3, with very fine axial growth-lines in the grooves.

Port Elizabeth (Sowerby); Port Alfred (Turton).

34° 5′ S., 25° 55′ E., 67 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Seila smithi Bartsch

Seila smithi Bartsch, 1915, p. 115, pl. 12, fig. 7. Turton, 1932, p. 125, pl. 27, no. 906.
[?] *Seila capitata* Thiele, 1925, p. 126, pl. 22 (10), fig. 9.

Protoconch 3 whorls, with 2 spiral threads and numerous axial riblets at top of whorls (Bartsch). Postnatal whorls 9 (Bartsch).

Port Alfred (Bartsch, Turton).

Remarks. Thiele's *capitata*, from 35° 16′ S., 22° 26′ E., 155 metres, may perhaps be synonymous. Both these species and *shepstonensis* Smith in Tomlin

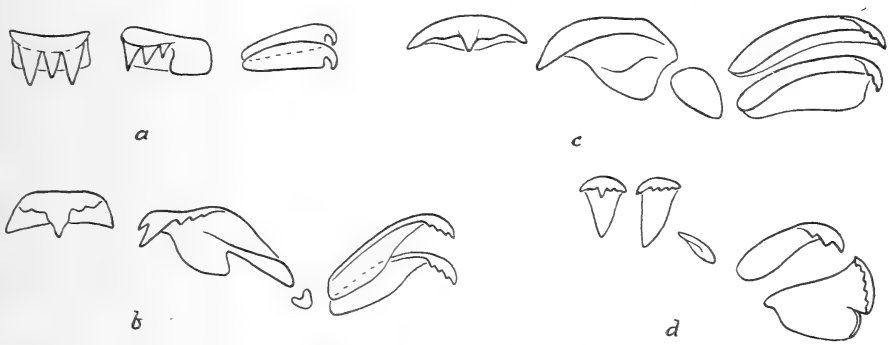

Fig. 25. Radula teeth of: *a*, *Seila africana* Bartsch. *b*, *Cerithium morus* Lam. *c*, *Terebralia palustris* (Brug.). *d*, *Cerithidea decollata* (Linn.).

1923 require comparison with *natalensis* Smith 1914. *S. natalensis* and *shepstonensis* were both obtained at Tongaat.

Seila africana Bartsch

Figs. 24 *a*, *b*, 25 *a*

Seila africana Bartsch, 1915, p. 114, pl. 17, fig. 6. Tomlin, 1931, p. 424.

Protoconch 3–3½ whorls, alt. 0·6, diam. 0.3 mm., smooth. Postnatal whorls 10. Spiral lirae 3; grooves (2) between them with very fine and close-set axial growth-lines. 8·5 (incl. protoconch) × 2.5 mm.

Operculum subtriangular, convex from side to side, but concave longitudinally, the acute apex with nucleus curved upwards, 1 × 0.8 mm. (cf. Thiele, 1925, p. 122).

Uniform chestnut or orange-brown, protoconch white, operculum pale horny.

Radula with at least 80 rows, central plate wider than long, with 3 cusps, the median one smaller than the side cusps, lateral late transversely quadrangular, inner half with 3 graduated cusps on cutting-edge, marginal plates oblong, widening slightly distally, with strong apical hook.

Port Alfred (Bartsch, Turton, 1932); Coffee Bay (Tomlin); Still Bay (S. Afr. Mus. coll. Muir; also U.C.T.). Jeffreys Bay and False Bay (S. Afr. Mus.).

Remarks. The radula is a little different from that of *terebralis* figured by Thiele (1929, fig. 220). The lateral plate has 3 cusps instead of one cusp, and the marginals have only a single strong apical hook instead of 2 hook-like processes and a tuft of bristles (*Borstenbündel*).

Fam. **Cerithiidae**

Subfam. *Cerithiinae*

The *Challenger* is said to have obtained the Mediterranean *Cerithium vulgatum* in Simon's Bay (Watson 1886, p. 532). This record is probably due to mislabelling, because no *Cerithium* has been found anywhere in False Bay (or indeed farther west than Algoa Bay, except as fossils at Little Brak River and Arniston). Johnson (1904, p. 9) recorded *vulgatum* as a fossil at Port Elizabeth. Sowerby (1892, p. 35) recorded both *vulgatum* and *mediterranea* from Port Elizabeth. These records are not acceptable. The two latter records were probably misidentifications for *rufonodulosum* Smith (p. 131).

It is doubtful what was the species which Schwarz (1910, p. 115) identified as '*Cerithium oscitans* Sow.'.

Cerithium pingue A. Adams

Cerithium pingue Adams, A., 1855a, p. 86. Sowerby, 1855, p. 877, pl. 184, fig. 217. Winckworth, 1930, p. 80.
Cerithium contractum Sowerby, 1855, p. 877, pl. 184, fig. 218. Turton, 1932, p. 125, pl. 27, no. 909.
Cerithium taeniatum Sowerby, *non* Q. & G., 1866, pl. 290, fig. 320.

Postnatal whorls 7–8. Axial ribs 11–13, usually 13 on early whorls (but scarcely developed before the 4th whorl), 12–15 on last whorl, not extending to suture above and not crossing base; impressed spiral striae 4 on 3rd whorl, increasing to 10 on last whorl, regularly spaced but the uppermost one often separated from suture by a slightly wider space which may form an inconspicuous cingulum, sometimes with obscure nodules corresponding with the axial ribs. 17–18 × 6 mm.

Fulvous or pale brown, the ribs usually worn pale.

Fossil: south of Bogenfels, South West Africa (S. Afr. Mus. coll. S. H. Haughton).

Port Elizabeth, Natal (auct. and S. Afr. Mus.).

Distribution. Karachi, New Guinea, Philippines.

Remarks. In the available material there is no shell young enough or well enough preserved to check Turton's description and figure of the sculpture of the juvenile.

The 6 specimens from Bogenfels appear indistinguishable from Recent shells.

Haughton (1932, p. 45) did not mention the Bogenfels shells, but recorded a single example of *guinaicum* Phil. from Langebaan (Saldanha), identified by Tomlin. The latter species is quite distinct (see: Sowerby, 1855, pl. 181, figs. 126, 127; and Nicklès, 1950, p. 63, fig. 75).

Cerithium crassilabrum Krss.

Cerithium crassilabrum Krauss, 1848, p. 107, pl. 6, fig. 10.
Cerithium liratula Turton, 1932, p. 126, pl. 27, no. 914.

Two Kowie shells in the South African Museum are 14 and 16 mm. in length, with 7 whorls (apices worn away).

Natal (Krauss). Tongaat (30 miles north of Durban) (S. Afr. Mus.). Kowie = Port Alfred (Turton, and S. Afr. Mus.).

Cerithium kochi Phil.

Cerithium kochi Philippi, 1848, p. 21; 1849, pl. 1, fig. 3. Smith, 1878, p. 817, pl. 50, fig. 18. Schwarz, 1910, p. 115. Turton, 1932, p. 126. Macnae & Kalk, 1958, p. 127 (listed).

Fossil: Pleistocene: Bluff Beds, Durban (Geol. Surv.); Port Elizabeth (Schwarz); Sedgefield near Knysna (coll. A. R. H. Martin*).

Port Elizabeth and Durban (Sowerby); Port Alfred, one specimen (Turton). Algoa Bay, dead but fresh (U.C.T.). Delagoa Bay (Macnae & Kalk.). Inhambane (U.C.T.).

Distribution. East coast of Africa, Red Sea, Madagascar, Mauritius, Indo-Pacific.

Remarks. Very common in the Sedgefield deposits: e.g. at the 20–21 ft. level 34% of all shells obtained, but less numerous in later deposits, at 8½ ft. level only 3–4·5%. Examples up to 33 mm. long.

'The straight *Cerithium* [presumably *kochi*] . . . and others have sometimes been picked up by shell-collectors on the beach, mixed with recent shells; but, possessing none of the fresh appearance of more recent shells, they have always borne evidence of having been disinterred' (Stow, 1871, p. 517).

I have not seen any of the Delagoa Bay examples.

Cerithium rufonodulosum Smith

Cerithium rufonodulosum Smith, 1901, p. 108, pl. 1, fig. 8. Schwarz, 1910, p. 115.

Fossil: Pleistocene: Port Elizabeth (Schwarz) deposits at mouth of Coega River, Algoa Bay (Geol. Surv.); Sedgefield, Knysna (coll. Martin); raised

*For description of locality see: A. R. H. Martin. *S. Afr. J. Sci.* **52**, 1956: 187.

beach Knysna lagoon; raised beach at Little Brak River, Mossel Bay (S. Afr. Mus.); lime pits at Arniston (Bredasdorp District) (S. Afr. Mus.).

Algoa Bay (Smith).

Remarks. Smith referred to the likeness to *nigropunctatum* Sow. 1855 from an unknown locality. Even if these two were to be regarded as synonymous, it would be better to accept Smith's name.

Smith's figure shows a worn shell. Possibly it came from the same source whence the Geological Survey obtained specimens. The question arises whether the species is living at the present day.

At Sedgefield Dr. Martin (1956) found this species comprised 18–19% of all shells obtained at the $8\frac{1}{2}$–$11\frac{1}{2}$ ft. levels, but was less common in the older deposits at lower levels.

In some of the Arniston examples, not only are the nodules crimson, but the whole shell is more or less suffused with pink.

Cerithium rugosum Wood

Cerithium rugosum Macnae & Kalk, 1958, p. 127 (listed).

Durban (Smith, 1903a); Delagoa Bay (Macnae & Kalk); Beira (S. Afr. Mus., identified by Tomlin).

I have not seen the Delagoa Bay specimens. The Beira specimens do not seem very different from juvenile *caeruleum*.

Distribution. Querimba Island (von Martens).

Cerithium columna Sow.

Cerithium columna Sowerby, 1834, pl. 204, fig. 7; 1855, p. 855, pl. 178, figs. 55–58.

Natal (Sowerby). Beira (S. Afr. Mus., identified by Tomlin).

The single specimen is 20 mm. long and closely resembles a half-grown *caeruleum*.

Distribution. Red Sea, Mauritius, Indo-Pacific.

Cerithium morus Lam.

Fig. 25 *b*

Cerithium morus Lamarck, p. 75. Macnae & Kalk, 1958, p. 127 (listed).

Radula with 65–80 rows (3 examples examined): see figure.

Fossil: Congella, Durban Bay, 6 feet below present level (Geol. Surv.).

Kosi Bay (U.C.T.); Delagoa Bay and Mozambique Island (S. Afr. Mus. coll. K.H.B.); Inhambane (U.C.T.).

Distribution. Red Sea, Madagascar, East Indies.

Cerithium caeruleum Sow.

Cerithium caeruleum Sowerby, 1855, p. 866, pl. 179, figs. 61, 62.

Radula with *c.* 70 rows, as in *morus*.

Durban (Smith, 1903a). Mozambique Island (S. Afr. Mus. coll. K.H.B.). Santa Carolina and Nacala (U.W.).

Distribution. Querimba Is. (von Martens); Red Sea.

Cerithium dialeucum Phil.

Cerithium dialeucum Philippi, 1849, p. 14.
(*dialencum* (typ. err.), Macnae & Kalk, 1958, p. 127 (listed)

Radula with *c.* 55 rows (one seen), as in *morus*.
Delagoa Bay (S. Afr. Mus. coll. K.H.B.); Inhambane (U.C.T.).

Cerithium rostratum Sow.

Cerithium rostratum Sowerby, 1855, p. 861, pl. 180, fig. 104. Von Martens, 1879, p. 733. Schepman, 1909, p. 159. Dautzenberg, 1929, p. 482.

I have seen specimens from Nosy-bé (U.W.); also one from mangrove swamps, Durban Bay (coll. R. N. Kilburn). 20 mm. Tip of canal black.

Distribution. Querimba Is., Madagascar, East Indies, Philippines.

Cerithium alexandri Tomlin

Fig. 26 *a*

Cerithium alexandri Tomlin, 1923, p. 48, text-fig. 1.

Protoconch missing. Postnatal whorls 14, possibly 15. Whorls slightly concave a little below the middle, where there is a single impressed spiral stria (sometimes 2). Low rounded inconspicuous axial ribs very obscure on early whorls, 9–10 on 10th or 11th whorl, 10–12 on last whorl, protractive, petering out in middle of whorl, but reappearing less conspicuously on lower half, forming a pseudo-varix on left of last whorl (13th in one shell, 14th in two others). Outer lip externally somewhat thickened above, and with an internal thickening opposite the parietal callosity. 55 × 18 mm.

White with numerous narrow, continuous, red-brown or orange-brown spiral lines.

Scottburgh (Natal) (Tomlin); off Cape Morgan, 34 fathoms (Tomlin: P.F. material).

Off Cape Morgan, 34 fathoms, 4 (one seen by Tomlin); off Cape Morgan, 45 fathoms, one apex; off Rame Head (south of Port St. Johns), 43 fathoms, one; all dead but fresh (S. Afr. Mus. P.F. coll.).

Remarks. The Cape Morgan shell seen by Tomlin, and recorded in conjunction with his description, based on unpublished notes by E. A. Smith, is not a co-type. It was not sent to Tomlin until after Smith's death.

The description and figure of the coloration of the Type specimen from Scottburgh do not apply to the Cape Morgan shell; in fact unless Tomlin had recorded and returned the latter as *alexandri*, I should scarcely have recognized the other *Pieter Faure* shells as Tomlin's species.

In general Tomlin's description of the morphology of the shell is correct, though he did not mention the midwhorl stria (pseudosuture), and the spiral striae in the present specimens are so excessively minute (and only visible in places) as to be of no importance.

The coloration seems to be the only discrepancy.

Was the Type a very worn specimen in which the continuous spiral lines had become disrupted into spots? Against this is Smith's figure (in Tomlin,

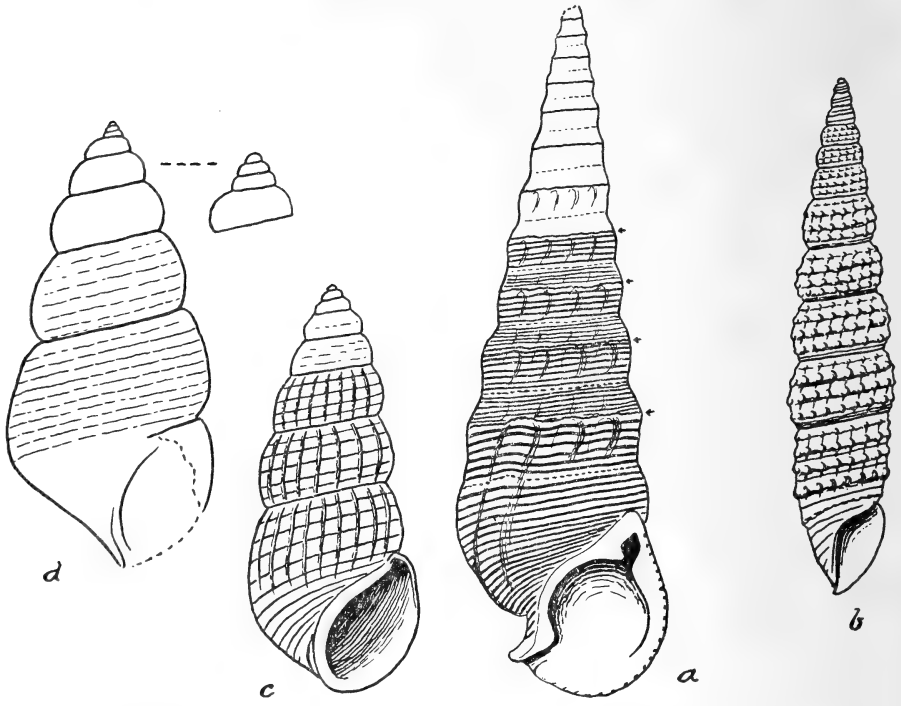

FIG. 26. *a, Cerithium alexandri* Smith (arrows indicate true sutures, dotted lines 'pseudosutures'). *b, Cerithium macrostoma* Hinds. *c, Alabina fulva* (Watson). *d, A. telamon* n. sp., with protoconch further enlarged.

1923) in which the artist (assuming he was accurate) has shown fewer spiral series of spots than there are lines in the *Pieter Faure* shells.

In this respect the difference between the two forms is almost strong enough to justify giving the latter a specific name. But spiral lines of colour may vary in number, e.g. *Marginella musica* (Part II, p. 5); and more or less linear spiral pattern may break up into a series of spots, e.g. *Conus infrenatus-bairstowi* (Part I, p. 87).

Mr. A. E. Salisbury has kindly examined the Type at the British Museum (Natural History) and informs me that it has actually a few continuous lines, and also a few lines carrying spots, though the series of spots only predominate.

Cerithium (*Colina*) *macrostoma* Hinds

Fig. 26 *b*

Cerithium macrostoma Hinds, 1844c, p. 27, pl. 16, figs. 11, 12. Sowerby, 1855, p. 877, pl. 184, fig. 219.

Protoconch one whorl, smooth. Postnatal whorls 11. Spiral lirae 2 on 1st and 2nd whorls, 3 on 3rd, 4 on 4th–10th whorls, 5 on last whorl, nodulose, the nodules arranged in slightly oblique axial series, 16 on last whorl. A 5th, feebly nodulose, lira adjoining the lower suture is visible on 9th and 10th whorls. 8·5 × 1·5.

Delagoa Bay, one juv. (S. Afr. Mus. coll. K.H.B.; identified by Tomlin).

Distribution. Straits of Macassar.

Remarks. The specimen is immature with a very thin papery outer lip, not the expanded patulous lip of the adult. It thus resembles the cigar-shaped *pupaeforme* Sow., or more correctly perhaps the '*pupaeforme*-stage' of some species. Hinds' and Sowerby's descriptions and figures are quite inadequate. Presumably Tomlin compared the present specimen with Hinds' Type, and his identification is here accepted.

Bittium quadricinctum Smith

Bittium quadricinctum Smith, 1903a, p. 381, pl. 15, fig. 12.

Protoconch 3 whorls. Postnatal whorls 9. 6 × 1·75 mm.

Durban (Smith). Off Umhloti River, 40 fathoms, 2 dead and 2 broken; off Cape Natal, 54 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Remarks. Smith's figure shows transversely elongate nodules on the lirae; in the present specimens the nodules are less conspicuous. On the back of the last whorl of one of the broken shells a fine feebly-nodulose intermediary lira is developed between the 2nd and 3rd, and 3rd and 4th nodulose lirae.

Subfam. **Litiopinae**

Bartsch, 1915, p. 121 (*Litiopidae*). Thiele, 1925, p. 118 (*Litiopidae*). Thiele, 1929, p. 210 (subfam. of *Cerithiidae*).

Turton's 'n.spp.', founded on single specimens, need not be considered here.

Thiele's generic diagnoses give protoconch ribbed in *Alaba*, smooth in *Diala*; if this difference be accepted, *pinnae* Krss. should be placed in *Diala*.

Diala capensis Bartsch 1915 was preoccupied by *D. capensis* Sow. 1889 and was renamed *jordani* by Tomlin (1939*b*, p. 159).

Laseron (1956, pp. 454 *sqq.*) included *Diala* and *Australaba* in the Rissoidae.

Diala pinnae (Krss.)

Rissoa pinnae Krauss, 1848, p. 87, pl. 5, fig. 21. Sowerby, 1892, p. 37.
Alaba pinnae Bartsch, 1915, p. 121. Day & Morgans, 1956, p. 306 (listed).

Nuclear whorl smooth (number of whorls composing protoconch?). Postnuclear whorls 7. First 3 whorls smooth, 4th and following whorls with 9–10(11) axial ribs, on body whorl sometimes only 8, from suture to suture, but not extending across base, usually slightly angular in lower half of whorl; crossed by *c.* 10 weak and often obscure striae; 6–7 additional striae on base. 6·5 × 3 mm.

Biscuit-colour, translucent when fresh, usually with wavy red- or orange-brown axial lines. Beach specimens sometimes stained buff, grey, or chestnut-brown; one specimen dark slaty-grey with the more prominent ribs white, showing up like varices.

Fossil: Quaternary: raised beach at Little Brak River, Mossel Bay (S. Afr. Mus.); Sedgefield near Knysna (Martin).

Krauss gave no exact locality. Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton, 1932); Durban Bay (Day & Morgans).

Above jetty in Knysna harbour, brackish water (S. Afr. Mus. P.F. coll.).

Diala capensis Sow.

Diala capensis Sowerby, 1889a, p. 12, pl. 1, fig. 17; 1892, p. 27, pl. 1, fig. 28. Schwarz, 1910, p. 114. Turton, 1932, p. 136, pl. 29, no. 980 (3 figs.).

Nucleus smooth. Postnuclear whorls 8, with one or two more ribs than in *pinnae*, 12–14 on last whorl (Turton gave 16, but duplication and formation of minor riblets, especially on back of outer lip, may occur); spiral striae as in *pinnae*. 9·5 × 3 mm.; 11 × 4 mm. (last 2 whorls almost subscalariform).

Colour as in *pinnae*.

Fossil: Pleistocene: Port Elizabeth (Schwarz).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, 1915, Turton). Still Bay (S. Afr. Mus. coll. Muir).

Remarks. I doubt whether this is more than a slim and elongate form of *pinnae*. Even Turton admitted the great variability of *capensis*, illustrated by three figures; the right-hand figure is a typical *pinnae*.

Diala infrasulcata Sow.

Diala infrasulcata Sowerby, 1892, p. 27, pl. 1, fig. 20. Turton, 1932, p. 136.

Fossil, Quaternary: Sedgefield near Knysna (A. R. H. Martin); raised beach, Little Brak River, Mossel Bay (S. Afr. Mus.).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, 1915, Turton).

Remarks. Some of the specimens from Little Brak River retain a faint mottled brown coloration.

Analogous species: *D. cacumenata* Laseron and *vestigia* Laseron (1956, figs. 188, 189) occur on the coast of Queensland.

Diala almo Bartsch

Diala almo Bartsch, 1915, p. 123, pl. 6, fig. 2.

Some specimens from Still Bay (coll. Muir) resemble a Port Alfred specimen identified by Turton, which however has not the patulous outer lip shown in Bartsch's figure. Most of these specimens are glossy, with fine axial striae (growth-lines) and show the 'double suture' mentioned by Bartsch for *africana* (p. 122) and *almo* (p. 123). Turton was misled by this appearance in a fresh and translucent shell, calling it *cingulifera*.

Probably conspecific with *africana* Bartsch.

Diala sp.

Three specimens from Still Bay (coll. Muir), 3·5 × 1·5 mm. Pale corneous: one has a whitish band below the suture on body whorl; another has a faint narrow spiral brown line on back of the body whorl; the third is unicolorous.

These may be *dubia* Sow. 1892, or '*capensis*' Bartsch 1915 (*non* Sowerby 1889).

Alabina africana Bartsch

Alabina africana Bartsch, 1915, p. 121, pl. 12, fig. 1.

Two specimens found by Dr. Muir measure 1 × 0·5 mm., with 3 postnatal whorls. Bartsch's description says there are 4 lirae on the protoconch, but his figure shows only 3, and the present specimens have only 3, beginning on the actual nucleus. Bartsch's specimen with 7 whorls measured 2 × 0·7 mm.

Port Alfred (Bartsch, Turton, 1932).

Still Bay (S. Afr. Mus. coll. Muir).

Alabina formosa W. H. Turton

Alabina formosa Turton, 1932, p. 136, pl. 29, no. 975. Day & Morgans, 1956, p. 306 (listed) (*Alabena* typ. err.).

Protoconch 2 whorls, seemingly minutely cancellate or pitted (but shells not in pristine condition). Postnatal whorls 5. First whorl with median spiral keel, 2nd and 3rd also angular in profile, 3rd with 2 weak lirae besides the peripheral keel, axial riblets *c.* 22 on 2nd, but only 16 on 3rd; 4th and 5th whorls convex in profile, a slight subsutural lira, and 3 other weak lirae in lower half, 4th with 16, 5th with *c.* 18 axial riblets, not crossing base. Base with 6–7 lirae. No umbilicus. Outer lip seemingly entire, without anterior canal. 3 × 1·25–1·3 mm. (2 specimens); A third shell with 6 postnatal whorls, body whorl incomplete: 3 × 1·75 mm. Turton: 3 × 1·5 mm.

Port Alfred (Turton). Durban Bay (Day & Morgans); Still Bay (S. Afr. Mus. coll. Muir).

A specimen ex coll. Ross Frames, said to have come from Durban, has 7 postnatal whorls, measuring 7 × 2·25 mm., and agrees in the above characters. Axial riblets on last whorl faint, but *c.* 20–22 in number.

Alabina fulva (Watson)

Fig. 26 *c*

Alaba (*Stiliferina*) *fulva* Watson, 1886, p. 571, pl. 42, fig. 5.
Obtortio fulva Laseron, 1956, p. 461, figs. 199–203.

A specimen from Inhambane with 6 postnatal whorls measures 4·3 × 1·75 mm. It is somewhat worn, but has stronger spiral sculpture and thus appears cancellate.

Nucleus of protoconch missing, only one whorl remaining. First and second postnatal whorls seem to have been originally medianly keeled, the 3rd with indications of 3 spiral lirae; 4th and 5th with 4 lirae, 6th and 7th with 5, crossed by axial riblets, *c.* 16 on 3rd–6th, and 18 on last whorl (perhaps 20, if some rather prominent growth-lines are included), not crossing base; 6 additional lirae on base. No umbilicus. Outer lip entire, no anterior canal.

Inhambane, Portuguese East Africa (U.C.T.); Delagoa Bay (U.W.).

Distribution. Torres Straits, Madagascar.

Remarks. So extremely like *fulva* that I do not feel justified in separating it; though possibly fresh material may show tangible differences. It resembles Laseron's fig. 199, but not his figs. 200–202.

Laseron included the species in *Obtortio* (*Rissoidae*), which Thiele regarded as a section of *Finella* in the *Cerithiacea.*

Alabina telamon n.sp.

Fig. 26 *d*

Protoconch 3 whorls, smooth. Postnatal whorls 5, the 1st abruptly wider than protoconch; 1st–3rd whorls smooth, 4th with *c.* 6–7, 5th with *c.* 9–10 very faint lirae. Base smooth. Outer lip broken. No umbilicus. 4·5–5 × 2 mm.

Off Tugela River (Natal), 65–80 fathoms, one fresh, Type; off Umhloti River (Natal), 40 fathoms, 2 broken and worn; off Illovo (Natal), 27–30 fathoms, one fresh, one broken (S. Afr. Mus. P.F. coll.).

Remarks. In general shape this shell bears a resemblance to *A. formosa* and *fulva*, the latter of which Watson placed in the *Stiliferina* section of *Alaba.* Provisionally I include it in the same genus.

Bartsch (1915) and Thiele (1929) are not in agreement as to the validity or taxonomic position of *Alabina.*

All the specimens have been bored by carnivorous gastropods; three of them have two holes side-by-side; in one of these three, one of the holes has not penetrated the shell, and a third hole has been bored near-by.

Fam. **Finellidae**

Thiele, 1929, p. 208.

Finella A. Adams 1860 was the original spelling, but was amended by A. Adams 1864 to *Fenella.* Thiele reverted to the former.

Thiele made the Australian genus *Obtortio* Hedley 1899 a section of *Finella*. Laseron (1956, p. 460) places *Obtortio* in the *Rissoidae*.

Smith (1903a, pp. 383, 384) entered in the South African fauna-list two species: *cerithina* Phil. and *fulgida* Adams, collected by Nevill in Natal and recorded by him (Nevill 1884, pp. 114 and 116). Smith seems to have overlooked a third species: *pupoides* A. Adams (? = *virgata* Phil.) also recorded by Nevill (p. 117) from Natal.

Cerithidium fragrans n.sp.

Fig. 15 *c*

Protoconch $2\frac{1}{2}(3)$ whorls, smooth. Postnatal whorls 6, profile convex, sutures indented. Axial riblets 14–15, not prominent on first two whorls, from suture to suture, but not extending on to base; crossed by spiral lirae 2 on 1st and 2nd whorls, 3 on 3rd, 4 on 4th, 5 on 5th and 6th, the two original lirae continuing as the peripheral and lower lirae, the 3rd develops between the suture above and the peripheral lira and becomes as strong as the original two lirae; the 4th and 5th lirae also develop between the suture above and the supra-peripheral lira, but do not become as strong as the others; also a fine lira at bottom of each whorl, becoming the marginal lira on the base, with 3 lirae below it. Intersection of riblets and lirae nodulose, interstices spirally oblong. Aperture oval. 3·3 × 1·25 mm.

Fossil: Pleistocene, raised beach at Little Brak River, Mossel Bay, one with 6 whorls, 4 with 4 whorls (S. Afr. Mus.).

Remarks. One of the 4-whorled specimens is distinctly more slender than the others: 2·3 × 0·8 and 2·3 × 1 mm.

This species has more convex whorls and deeper sutures than *F. natalensis* Smith 1899. Very like *F. xanthacme* Melvill 1904 from the Persian Gulf, which has 15 axial riblets and 6 spiral lirae; and 4 protoconchal and 8 postnatal whorls at a length of 7 mm.

At first glance has a general resemblance to *Alabina alfredensis* Bartsch (1915, p. 121, pl. 5, fig. 7).

Distinguished from *Bittium quadricinctum* (p. 135) by the fineness of the upper two lirae, and by the shape of the aperture. *B. diplax* Watson (1886, p. 555, pl. 38, fig. 34), transferred to *Obtortio* by Laseron (1956, p. 466, figs. 227, 228), makes a near approach, but has only 2 spiral lirae on the whorls and 2 on the base.

Although described from fossil specimens, one should not presume that the species is extinct. Turton did not obtain it at Port Alfred (unless his *Alabina gracilis* is the juvenile of it, but *gracilis* is more likely to be the juvenile of *A. alfredensis*); nor did Dr. Muir obtain it at Still Bay. No intensive collecting of small shells has been done in the Mossel Bay area.

Named in allusion to the frequent fragrance of brackish waters.

Fam. **Potamididae**

Tympanotonus fuscatus (Linn.) occurs on the west coast of Africa as far south as Mossamedes.

The other representatives of the family are found on the east and south-east coast:

Cerithidea decollata (Linn). occurring along the south-east coast as far west as Zwartkops estuary (Port Elizabeth).

Terebralia palustris (Brug.) not farther south than Durban.

In addition, *C. inaequisculpta* Kobelt 1893 and *natalensis* Kobelt 1893 were recorded from Durban, and were included in Smith's 1903a list. In 1926 Tomlin recorded the Red Sea *Pirenella cailliaudii* (Pot. & Mich.) also from Durban.

Bullen Newton (1913, p. 347, pl. 24, figs. 5, 6) described *Pirenella stowi* from Mio-Pliocene beds at Redhouse near Port Elizabeth.

Mrs. Boswell of Pretoria has shown me a 52 × 19 mm. shell obtained *ex pisce* off Durban, which is in general shape and sculpture extremely like *P. stowi*. It has 15 whorls (nucleus missing) and seems to increase in width slightly more rapidly than *stowi*; there are fine impressed spiral striae over the whole whorl, 11 on the early whorls, 16–18 on later whorls. As the fine sculpture is not preserved in specimens of the fossil (except partially on the base), the living species cannot be identified as *stowi*. I propose to call it *Pirenella boswellae* n.sp.; and hope to give a figure in a later publication. Type in the Helene Boswell collection.

Figures of the radulae of *C. decollata* and *T. palustris* are here given (fig. 25). See also *infra* (*Planaxis sulcatus*).

Fam. **Planaxidae**

Planaxis sulcatus (Born)
Fig. 32 *a*

Planaxis pyramidalis Gray, Krauss, 1848, p. 103. Bartsch, 1915, p. 117.
Planaxis sulcatus Macnae & Kalk, 1958, pp. 34, 118, 127, fig. 21 *q*.

Radula very long, at least 350 rows; central plate with broadly-rounded cutting edge, a strong tooth on either side of base above the pointed postero-lateral corner, lateral plate also with broadly-rounded cutting-edge, with 2 blunt denticles on outer margin, a narrow accessory plate between the lateral and the marginal plates, the latter slender, inner marginal with 4 blunt denticles, outer marginal with 6–8 sharper denticles.

Living: Natal (Krauss); Kosi Bay (U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K.H.B.; and U.W.).

Distribution. Indo-Pacific.

Remarks. Bartsch's record of a specimen from Algoa Bay almost certainly is that of a dead specimen.

Troschel (1856–63, p. 150) described the lateral plate of the radula as having a thickened area on its basal stalk, which might easily be mistaken for a separate little plate ('ein besonderes Plättchen'). In fact it is a separate plate because it lies at a slight angle to the slender stalk of the lateral plate, and moreover both it and the lateral plate can be easily displaced without damage to either of them. Cf. the accessory plates in *Cerithium*, *Cerithidea*, and *Terebralia*. In *Cerithidea* it is obviously an accessory plate having nothing to do with the base of the lateral plate, which slopes inwards towards the central plate.

Planaxis lineatus (Da Costa)

Planaxis lineatus Smith, 1903a, p. 381.

Durban (Smith, coll. Burnup); Umhlali, north of Durban (S. Afr. Mus. coll. C. W. Alexander).

Distribution. West Indies (Smith).

Remarks. Three specimens from Umhlali, 6·5–7 mm. in length, are smooth on the later whorls, but marked with thin orange-brown spiral lines. They are similar in shape to *acuta* Krauss (1848, p. 103, pl. 6, fig. 2) which was 6 lines (15 mm.) in length, very finely striate, and unicolorous.

Fam. **Abyssochrysidae**

Tomlin, 1927, p. 77. Thiele, 1929, p. 202.

Thiele queried Tomlin's inclusion of this family in the *Cerithiacea* because, according to the figure, a penis was present.

In Tomlin's fig. 2 (1927) both I and especially II are ambiguous; the process labelled penis might be either forwardly or backwardly directed. Also in II this alleged penis is situated unusually far behind the base of the right tentacle.

I have examined six specimens, which are well enough preserved to show external features, though not the internal anatomy. Two were ♀♀ with a large oviduct projecting slightly beyond the mantle edge. The other four, being without this process, were presumably ♂♂ and there is no trace of a penis. Although the oviduct is attached to the inside of the mantle, not to the body, I believe that Peile (in Tomlin, 1927) mistook this process for the penis.

Argyropeza melvilli Schepman is here transferred to this family and its genus; and a new species is described. The discovery of another species from deep water on the opposite side of the South African region is notable.

Abyssochrysos melanioides Tomlin

Fig. 27 *a–e*

Abyssochrysos melanioides Tomlin, 1927, p. 78, figs. 1–3 (anatomy and radula by Peile). Tomlin, 1931, p. 423.

The following details are additional to Tomlin's description.

Nucleus of protoconch decollated in all examples even the smallest (19 mm.), apparently naturally because the hole has been filled with a shelly plug. Decollation may occur a little later, and the hole plugged. Number of protoconchal whorls probably $1\frac{1}{2}$.

Postnatal whorls in 45 mm. shell 11 remaining, probably 5 missing; in Type 13, probably 3 missing. Profile of whole shell straight, of each whorl sigmoid. First 5 whorls with 2 spiral lirae in lower half, on 3rd whorl a 3rd

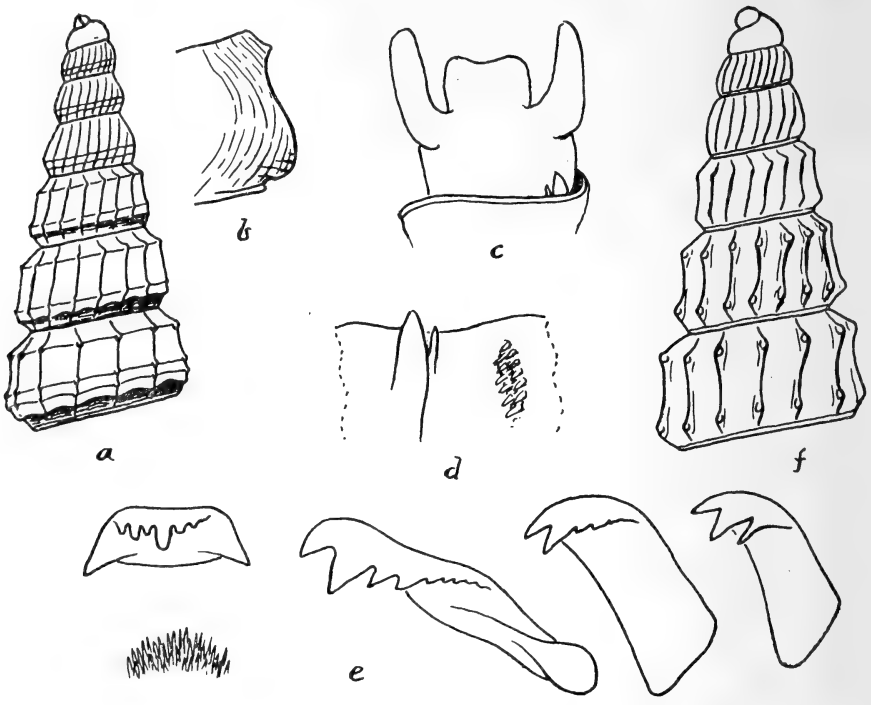

FIG. 27. *Abyssochrysos melanioides* Tomlin. *a*, apical whorls. *b*, profile of later whorl. *c*, head and mantle of animal. *d*, inner view of portion of mantle showing oviduct, anal papilla and gill. *e*, radula teeth, and margin of buccal armature. *A. tomlini* n. sp. *f*, apical whorls.

lira appears in upper half; on 6th whorl, another lira appears in lower half; the uppermost lira continues, but becomes evanescent on later whorls, the lower 3 lirae may increase to 4 or even 5, but all become more or less evanescent on the last 2 or 3 whorls.

Axial riblets *c.* 18–20 on 1st and 2nd whorls, decreasing to 14 on later whorls, on last (16th) or last two (15th and 16th) becoming less regular, and with duplications sometimes numbering 16–18; protractively curved on early whorls, becoming straighter on middle whorls, and again curved on last two or three whorls; small tubercles at intersections with the lirae, especially the uppermost lira, obsolescent on the lower lirae as these become obsolete.

Growth-lines on middle whorls more strongly curved than the nearly straight ribs, but on later whorls conforming with the ribs as these become more curved (not as conspicuous as shown in fig. 27 *b*).

Basal peripheral lira sometimes showing very clearly above suture, but sometimes concealed by the succeeding whorl.

Aperture more subrhombic than 'subcircular' (Tomlin). Junction of outer lip and columella slightly produced.

Periostracum brownish-golden, glossy when fresh, early whorls paler. Up to 50 × 15 mm.; Type 41 × 12 mm.

Radula with 140–150 rows; central plate with 2–4, usually 3, blunt digitiform denticles on either side of the median denticle or cusp, often asymmetrical and variable in different parts of the same radula; lateral plate elongate, with 2 strong but unequal cusps followed on outer side by half a dozen graduated smaller cusps; marginal plates broadly oblong, inner plate with 4, outer plate with 3 cusps.

About 130 specimens, living and dead, were taken at three *Pieter Faure* stations: Cape Point N.E. × E.$\frac{1}{4}$E. distant 40 miles, 800–900 fathoms; same bearing, distant 46 miles, 900+ fathoms; and Cape Point N. 70° E. distant 40 miles, 800 fathoms; bottom at all stations: green mud. (S. Afr. Mus. P.F. coll.).

Off Cape Point: 33° 26′ S., 16° 33′ E. 1,240–1,300 fathoms, one dead; 34° 05′ S., 16° 58′ E. 1,470–1,490 fathoms, 2 living, 5 dead (S. Afr. Mus. F. H. Talbot coll. 1959).

Type in the South African Museum (A5116).

Remarks. Tomlin suggested in his description that the spiral lirae extended over the whole whorl; but in no case are there any lirae between the upper one and the 2–4(5) lower ones.

All the denticles or cusps on the central plate of the radula are blunt and digitiform (as shown in Peile's figure, in Tomlin, 1927), even at the nascent end. The marginal plates, however, are much broader than shown in Peile's figure; but this can only be seen by teasing out a portion of the radula and isolating the plates.

Abyssochrysos tomlini n.sp.

Fig. 27*f*

Protoconch 1$\frac{1}{2}$(2) whorls, smooth. Postnatal whorls 8$\frac{1}{2}$; profile of whole shell straight, of each whorl biangulate, first 2 gently convex. Axial riblets *c.* 18 on 1st whorl, *c.* 16 on 2nd, decreasing to 13–12 on later whorls; protractively oblique and slightly curved on first 2 whorls, straight on other whorls, from 3rd whorl onwards each rib with a blunt nodule at top and at bottom; the two series of nodules not connected by spiral lirae. Peripheral basal lira well marked, visible above sutures between all whorls, including that between 1st and 2nd whorls; in addition one or two spiral lirae below the peripheral lira. No umbili-

cus. Aperture subrhombic, junction of outer lip and columella quadrate, slightly produced.

Growth-lines strongly curved, crossing over the ribs. Periostracum pale brown, glossy. 11 × 3·5 mm., and 11·5 × 3·75 mm.

Cape Natal (Durban) N. × E. distant 24 miles, 440 fathoms, bottom mud, 2 dead (S. Afr. Mus. No. A9101. P.F. coll.).

Remarks. Protoconch intact, showing no sign of sculpture, but perhaps may be slightly corroded.

Agreeing very closely with *Argyropeza melvilli* Schepman (1909, p. 170, pl. 12, fig. 1) from the East Indies, 535 metres.

The small differences, which nevertheless seem to justify specific separation, are: the single specimen of *melvilli* has $1\frac{1}{2} + 10$ (or $2 + 9\frac{1}{2}$) whorls with a length of 10·5 mm., and might therefore be regarded as a smaller species; the two rows of nodules are connected by slight spiral lirae, in most places not clearly represented in Schepman's figure; the axial ribs on the *early* whorls, as shown in the figure (number not stated in text) are fewer than in the present specimens.

Whether specifically distinct or not, the East Indies and Natal specimens seem to be obviously congeneric. Schepman (1909) was in some doubt as to the genus, but at Melvill's suggestion included his species in *Argyropeza*. Although the opercula and animals are unknown, the general facies of the shells, including the periostracum, indicate *Abyssochrysos* as a more appropriate genus.

Fam. **Caecidae**

Carpenter (1858, p. 433) described *Caecum subquadratum* from Port Elizabeth; Sowerby (1892, p. 38) recorded the European *C. glabrum* Mont. from Port Elizabeth, and Bartsch (1915, p. 117) the same species from Port Alfred.

Dr. Muir collected specimens at Still Bay, all with the initial whorls attached, total length 1·3, diam. initial whorls 0·3 mm.

This new locality record will suffice until more material from other parts of the coast is available.

From the *Pieter Faure* bottom samples were obtained: one specimen from 33° 3′ S., 27° 57′ E. 32 fathoms; and 4 specimens from 34° 27′ S., 25° 42′ E. 256 fathoms; all about 2 mm. long, and without the initial whorls.

Fam. **Vermetidae**

For determination of the species of this family living in South African waters no reliance can be placed on dead, incomplete, or beach-worn material. The whole shell, including protoconch, and a well-preserved animal are required. Some species have no operculum, and its absence can only be proved on an unmutilated animal.

The following descriptions are based on the extremely valuable material collected by the University of Cape Town. This is the first collection of living material obtained in South African waters, with the exception of one species taken by the *Pieter Faure*. As a result of the examination of this material, three species of *Vermetus* and one of *Tenagodus* are now known of which all the essential specific characters can be stated. In two other species of *Vermetus* the shell, radula and operculum (or its absence) are known, but not the protoconch; in one other species of *Tenagodus* the animal and operculum are unknown.

Specimens of a nautiloid protoconch have already been described under two specific names, and though the diagnostic features of the adult are unknown, they can be provisionally admitted to the fauna-list. On the other hand, the identification of dead beach-worn South African shells with species from other regions of the world is quite unjustified, and these records are not admissible.

The five South African 'species' described by Thiele (1925), and also two unnamed shells (pp. 108, 109), were all based on dead shells only, though in one species the operculum was also available.

T. chuni was obtained by the *Pieter Faure*, and the species is confirmed; the University of Cape Town obtained specimens which appear to be *corrugatus*; *agulhasensis* is probably a synonym of Bartsch's *Caporbis africana*, and is dealt with below. *V. capensis* and *franciscanus* are most probably, in my opinion, synonyms of *natalensis*.

So far as is known the species of this family are viviparous, and on lucky occasions embryo protoconchs can be found in the animals.

Conspectus of the South African species of Vermetus

Operculum externally saucer-like with central boss, smooth	*corallinaceus*
Operculum externally saucer-like, smooth	*periscopium*
Operculum externally with upstanding spiral lamella	*corrugatus*
Operculum externally with spinate processes	*quincunx*
Operculum externally conical or dome-like	*tholia*
Operculum absent	*natalensis*
Protoconch smooth	*corallinaceus*, *tholia*, *natalensis* and *corrugatus*
Protoconch granulate	*quincunx*
Protoconch nautiloid, with strong transverse ribs	*africanus*, *agulhasensis* and *formosus*
Protoconch unknown	*periscopium*

Vermetus corallinaceus Tomlin

Vermetus corallinaceus Tomlin, 1939a, p. 145, pl. 12, fig. 4, and text-fig. (radula).
Dendropoma corallinaceus Keen & Morton, 1960, pp. 41, 46, 50, figs. 26, 27, 34, 35.

Protoconch $1\frac{1}{2}$ whorls, smooth. Tubes irregularly coiled, in colonies, attached to rocks. No longitudinal lirae. Annular growth-lines strong, closely-set, more or less lamellate. Aperture diam. 2 mm.

Operculum externally flat with a central boss which is variable in size, rim slightly raised.

Tube bluish-grey, grey, or whitish; operculum reddish-brown or maroon.

Radula with 30–35 rows, central plate with 3 small blunt cusps flanking the sharp median cusp, lateral plate with one small cusp on inside and 3–4 on outside of main cusp, marginal plates rather stout and rather strongly uncinate, inner marginal with one small cusp on inside and 2–3 on outside, often obscure, outer marginal with one subapical denticle.

Living: west coast: Oudekraal (west coast of Cape Peninsula) (Tomlin, U.C.T. material), Lüderitzbucht, Paternoster (Saldanha), Hout Bay (Cape Peninsula) (U.C.T.); south and south-east coast: Danger Point, Port Edward (Natal), Umtwalumi (Natal), Isipingo (Natal) (U.C.T.).

Remarks. Usually forming compact rounded or knobbly masses, like small fringing-reefs on the rocks; and often covered with a lilac- or violet-coloured *Lithothamnion*-like alga.

I have not succeeded in observing any actual protoconchs, and quote Tomlin's description; nor have I found any embryos in the animals; see Keen & Morton, figs. 26, 27.

The size of the boss on the outer side of the operculum varies in size; in fact Tomlin's description is not that of a typical specimen. A flat saucer with scarcely any boss is uncommon; usually there is a distinct boss in the centre surrounded by a more or less wide flat border with the rim upturned; but sometimes, especially in Natal examples, the boss covers nearly the whole surface.

The radulae of Cape and Natal specimens do not differ.

Smith's record (1910a, p. 198) of *leucozonias* Mörch on the spire of a *Conus ceylanensis* from Isipingo may have been *corallinaceus*, which occurs abundantly at that locality. Possibly a very young individual became separated from its colony and settled on the Cone.

Vermetus periscopium n.sp.

Fig. 30 *a*

Protoconch and early whorls? Tube consisting of 2 or 3 whorls attached to the substratum, and attaining an external diameter of 2·75–3 mm.; then decreasing in diameter and continuing vertically like a slender chimney, straight or slightly curved. On the adherent part of tube faint indications of 3–4 longitudinal lirae, evanescent at base of upright part of tube. Growth-lines well-marked, on the adherent whorls almost as strong as in *corrugatus*, but on the upright tube less conspicuous and farther apart. Overall diam. of the adherent whorls 7–9 mm., length of upright tube 25–30 mm., internal diam. of aperture 1·5 mm.

Operculum thin, saucer-like, smooth.

Adherent whorls brown or greyish, upright tube pale grey or creamy-white; operculum corneous.

Radula with 28 rows (only one animal available), cusps and denticles on plates as in *corrugatus*, but marginal plates stouter and more uncinate, more as in *corallinaceus*.

29° 46′ S., 31° 17′ E., 110–130 metres (U.C.T.).

Remarks. When the upright tube has been broken, the animal may continue it in the same direction, or at an angle with the jagged broken end (fig. 30*a*).

The peculiar habitus is unique among South African species hitherto discovered, but it resembles that of *V. erectus* Dall 1888, from the Antilles (see Dall, 1889, p. 262, pl. 38, fig. 4). The description of the habitus, the tube, and the operculum would fit the present specimens, but the protoconch of the latter and the radula of *erectus* are unknown.

Type in the University of Cape Town Zoological Department (No. NAD. 11. L).

Vermetus corrugatus Thiele

Figs. 28 *b*, 29 *a*

Vermetus corrugatus Thiele, 1925, p. 110, pl. 20 (8), fig. 16.
[?] *Vermetus subcancellatus* (*non* Bivona), Turton, 1932, p. 127.

Protoconch (embryo) 1½ whorls, alt. and diam. 1 mm., smooth. Tube irregularly coiled, with 2–3 longitudinal lirae, and strong transverse corrugations throughout its length. Internal diam. aperture 1·5–1·75 mm.; Thiele: 2 mm.

Operculum 2½–3 whorls, with upstanding spiral lamella.

Tube creamy-white, protoconch brown, operculum corneous.

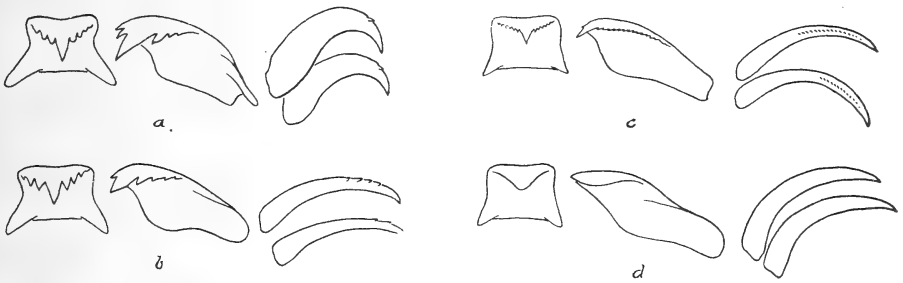

FIG. 28. Radula teeth of: *a*, *Vermetus natalensis* Mörch. *b*, *V. corrugatus* Thiele. *c*, *V. quincunx* n. sp. *d*, *Tenagodus chuni* Thiele.

Radula with 30–35 rows, central plate with 3–4 small sharp cusps flanking the median cusp, lateral plate with one cusp on inside and 5–6 on outside of main cusp, marginal plates slender, not strongly uncinate, inner marginal with 3–4 denticles, outer with 1–2 denticles.

34° 8′ S., 24° 59′ E. 80 metres (Thiele).

32° 15′ S., 28° 57′ E. 26 fathoms; 33° 03′ S., 27° 55′ E. 27 metres (U.C.T. No. SCD. 40 and 88).

Remarks. Although Thiele described only one dead shell, the present specimens agree with his description and figure, but on some tubes there are 3 longitudinal lirae.

Thiele said his shell bore a 'distant similarity' with the Mediterranean *subcancellatus*, and consequently Turton's shells recorded under the latter name should probably be assigned to Thiele's species.

Vermetus (*Dendropoma*) *tholia* (K. & M.)

Dendropoma tholia Keen & Morton, 1960, p. 41, pl. 3, text-figs. 6–13, 20–22, 33.

Protoconch $1\frac{1}{2}$–2 whorls, 1st whorl smooth, 2nd with axial striae. Tubes irregularly coiled, in colonies attached to rocks. No longitudinal lirae; annular growth-lines irregular. Aperture diam. 1·7 mm. (external 2 mm.).

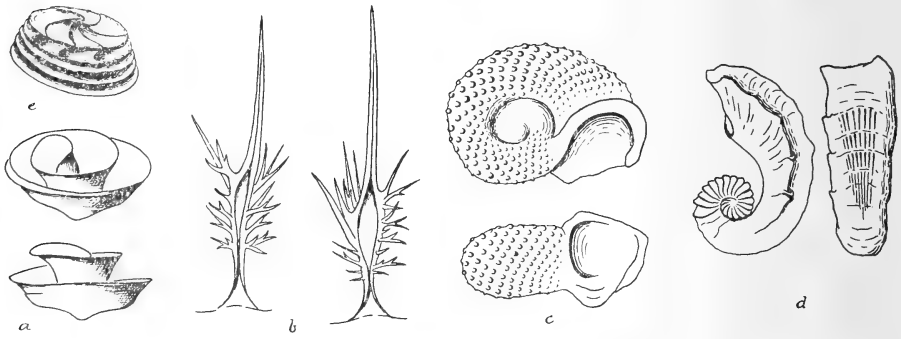

Fig. 29. *a*, *Vermetus corrugatus* Thiele, 2 views of operculum. *b*, two spinate processes from operculum of *V. quincunx* n. sp. *c*, two views of protoconch of *V. quincunx* n. sp. *d*, two views (lower surface and external) of *V. africanus* Bartsch. *e*, *Tenagodus chuni* Thiele, operculum.

Operculum externally conical or dome-shaped, internally concave, with central mamilla.

Tube whitish outside, dark brown internally; operculum mahogany-brown.

Inhaca Island, Delagoa Bay.

Vermetus quincunx n.sp.

Figs. 28 *c*, 29 *b*, *c*

Vermetus tricuspe (*non* Mörch), Sowerby, p. 39.

Protoconch planorboid or slightly trochoid, $1\frac{1}{2}$ whorls, nucleus smooth, whorl with tiny brown granules or tubercles arranged in quincunx. Tube irregularly coiled, appearing at first glance smooth, but with feeble longitudinal lirae showing in places; growth-lines more distinct, but not lamellate or rib-like. Protoconch 1·5 × 1 mm., internal diam. tube up to 2·5 mm.

Operculum externally slightly concave, spirally coiled, each whorl with marginal arborescent spinate processes. Each process like an elongate narrow

leaf with the edges folded inwards, forming in the distal half a long spine, in lower half with small outstanding spines, often bifid or trifid, middle portion with several strong spines and subsidiary spinelets.

Tube snow-white, operculum brown.

Radula with *c.* 30 rows, central plate with 5–8 tiny cusps flanking the median cusp, lateral plate with numerous tiny cusps outside the main cusp, marginal plates slender, with numerous minute denticles.

34° 51′ S., 19° 55′ E. 22 metres (U.C.T.).

34° 27′ S., 25° 42′ E. 256 fathoms, 12 protoconchs and one with short (*c.* 10 mm.) tube (S. Afr. Mus. P.F. coll.).

Remarks. Type: a mass of intertwined tubes, with protoconch and early whorls in the hollows between the bases of the tubes and the rock to which they were attached: in the University of Cape Town Zoology Department (TRA. 152. Y).

The *Pieter Faure* protoconchs were in a bottom-sample which consisted of detrital material and contained worn shells of several molluscs which are very unlikely to be living at that depth.

A granulate protoconch seems characteristic of *Stephopoma* Mörch, but in the present specimens the granules are far more numerous than in the figure of *V.* (*Stephopoma*) *senticosum* Mörch (1861, pl. 25, fig. 14).

Thiele described *V. spinulosus* (1925, p. 109, pl. 20(8), fig. 14) from 38° 40′ S. 77° 38′ E. 672 metres (east of St. Paul Island, southern Indian Ocean), in which similar, but spiny, projections were present not only on the protoconch but also on the 5 following closely-coiled whorls.

The spinate processes on the operculum are more elaborately spiny than in Mörch's figure of his Australian *tricuspe* (1861, p. 150, pl. 25, fig. 1). Until the radula of the latter is known, the South African examples are better regarded as a separate species.

Subgen. Caporbis Bartsch

Bartsch, 1915, p. 170 (as n.g. in fam. *Vitrinellidae*).
Iredale, 1918, pp. 28, 31 (= vermetid protoconch).
Thiele, 1925, p. 110 (*Segmentella* n. subgen. of *Vermetus*).
Thiele, 1929, p. 186 (*Segmentella* subgen. of *Vermetus*).

Segmentella is clearly synonymous with *Caporbis*; and Iredale's suggestion is confirmed. But whether Thiele's species *agulhasensis* is synonymous with Bartsch's *africana* might be debatable. There may be more than one South African species with a nautiloid protoconch with strong transverse ribs. The present material does not provide a definite answer. Nevertheless, I am inclined to regard these nautiloid protoconchs (*africanus*, *agulhasensis*, *formosus*) as belonging to *natalensis*. Turton's lucky find of a juvenile 3–4-whorled tube with protoconch attached (1932, pl. 27, no. 921) is strongly indicative, but *not quite* conclusive. Only a living juvenile can provide the proof.

Bartsch considered his shell to be sinistral, but his fig. 1 surely represents the upper surface (with nucleus) of a dextral shell.

Thiele's examples were sinistral. In all the present Vermetid material, where the actual nucleus of the protoconch is preserved, the shell seems always to be dextral (cf. Keen, 1961, p. 186). Unfortunately in the specimens here assigned to *agulhasensis* it is missing.

If the newly-hatched little animal found itself in too close proximity to other tubes or objects, it might alter the direction of its growth and give a sinistral twist to its tube; as indeed it seems usually to do in *natalensis*.

Keen (1961, p. 184) considered that *Caporbis* (and other generic names) 'should probably be classed as annelids'. If this is *Caporbis* of Bartsch 1915, classification as an annelid is incorrect. Iredale (1918) recognized it as a vermetid nucleus. Neither Bartsch nor Iredale were mentioned by Keen.

Vermetus africanus (Bartsch)

Fig. 29 *d*

Caporbis africanus Bartsch, 1915, p. 170, pl. 35, figs. 1–3. Turton, 1932, p. 128.

Three specimens from Algoa Bay, dextral, more or less umbilicate, with ribs as in Bartsch's figures:

One: diam. 1·75 mm., with 19 ribs on three-quarters of a whorl, tube 1 mm. long, without ribs.

One: diam. 1·75 × 1·5 mm., with 16 ribs on three-quarters of a whorl, aperture broken.

One: diam. 1·75 × 1·5 mm., with 21 ribs on whole whorl, tube incipient (corroded).

Two specimens from East London, dextral, with protoconchs:

One with 19 ribs on three-quarters of a whorl, tube continuing in same spiral plane (but separate from preceding whorl) for another three-quarter whorl, *c.* 6 mm. long, no transverse ribs, one longitudinal lira on lower side, with a few squamae, probably another lira on upper side (corroded), several fine lirae between them on the periphery of whorl (fig. 29 *d*).

One with 18 ribs on three-quarters of a whorl, tube continuing in same plane (but adnate to preceding whorl) for another whole whorl, corroded but with traces of faint longitudinal lirae, no transverse ribs. The ribs on first whorl, being protected by the adnate tube, are sharp.

Port Alfred (Bartsch, Turton).

34° 5′ S., 25° 43′ E., 52 fathoms, 3; off Cove Rock (East London) 22 fathoms, 2; 33° 3′ S., 27° 57′ E., 32 fathoms, 10 (S. Afr. Mus. P.F. coll.).

Remarks. Turton's *formosus* may be synonymous, although it has finer and more numerous ribs (? 25–30; the photo is not wholly clear).

Vermetus agulhasensis Thiele

Vermetus agulhasensis Thiele, 1925, p. 110, pl. 20 (8), fig. 17.

Ten worn specimens from the same Algoa Bay bottom-sample which contained the specimens assigned above to *africanus*. Some of these may be briefly described.

One sinistral whorl with indications on the upper broken surface of an earlier whorl and protoconch. Diam. 2·5 mm., with 18 (possibly 20, as shell worn in one place) broad transverse ribs, followed by 5 or 6 ribs on back of aperture, the margin of which is strongly expanded (cf. Thiele's figure), external diam. 2 × 2·5 mm., internal diam. 0·8 × 0·9 mm.

The ribs are broad and flat with narrow intervening grooves, probably the effect of wear. Thiele's figure shows sharper ribs resembling Bartsch's figure of *africanus*: about 10 or 11 on the half whorl whereas in similar face view the present specimen has only 8 (*c.* 20 instead of *c.* 23–25 around whole whorl).

One specimen diam. 2·3 mm., with *c.* 19–20 broad ribs, aperture broken.

One specimen, protoconch missing, 2 whorls, trochoid, with 19–20 broad, but sharper ribs on 1st whorl, *c.* 25 on 2nd whorl, followed by beginning of the tube with 5 ribs, aperture not expanded.

Three specimens with protoconch and parts of 1st whorl missing 2nd whorl with *c.* 25 broad ribs, tube incipient, aperture not expanded.

One tube 4 mm. long, diam. 1 mm., with 26 ribs (rings), aperture not expanded (? sinistral or dextral).

35° 29′ S., 21° 3′ E. 102 metres (Thiele).

34° 5′ S., 25° 43′ E. 52 fathoms (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. The expanded aperture gives the shell a curiously mature appearance.

Vermetus natalensis (Mörch)

Fig. 28 *a*.

Thylacodes natalensis Mörch, 1862, p. 70.
Vermetus natalensis Day & Morgans, 1956, p. 307 (listed).
[?] *Vermetus* (*Thylacodes*) *capensis* Thiele, 1925, p. 108.
[?] *Vermetus franciscanus* Thiele, 1925, p. 109, pl. 20 (8), fig. 15.
[?] *Vermetus formosus* Turton, 1932, p. 128, pl. 27, no. 921.

Protoconch 1½ whorls, smooth. Tube typically forming flat oval coils, usually sinistral, up to 40 × 30 mm. diameter, adherent to substratum, but may become irregular. Several longitudinal lirae as broad as intervals, sometimes broader and narrower ones alternating, sometimes nodulose or squamose; feeble, evanescent or obsolete on later whorls. Growthlines distinct, sometimes forming nodules or squamae on the lirae, often forming irregularly spaced corrugations on the outer side of the tube; a punctate and (as in Mörch's description) a decussate sculpture may also occur. Aperture when adherent usually oval-triquetral, internally 10 × 7–8 mm., but when free it is circular. External diameter of tube up to 12 mm.

No operculum.

Tube creamy-white, buff, or brownish. Colour of animal in life not recorded; as preserved pedal disc (which in other species carries the operculum), snout, and mantle-edge darker than rest of animal, the dark colour on the mantle-edge often forming spots.

Radula with 30–35 rows, central plate with 3 (2–4) blunt cusps flanking the median cusp, lateral plate with 2 cusps on inside and 3 on outside of main cusp, marginal plates stout and strongly uncinate, both with 2 small subapical denticles. The latter may be lost on the worn anterior end of radula, but the flanking cusps on the central plate are blunt even at the nascent end. Jaws strongly 'chitinised'.

Natal (Mörch). Simon's Bay (False Bay), and St. Francis Bay, 80 metres (Thiele).

Kalk Bay and St. James (False Bay) (S. Afr. Mus.).

Living: Umhlali (north of Durban); Durban; Isipingo (Natal); Port Alfred; Algoa Bay, 46 fathoms; Jeffreys Bay; False Bay, 18 metres; and on the west coast: Langebaan and Saldanha Bay (U.C.T.).

Remarks. The important material collected by the University of Cape Town seems to show that there is only one non-operculate species living around the South African coast: from Natal to Saldanha Bay.

The identification of dead shells can never be satisfactory, but I consider Thiele's *capensis*, and also his two unnamed shells from the Agulhas Bank (1925, pp. 108, 109), are referable to *natalensis*.

As stated above, Turton's *formosus* might almost be accepted as proving that *natalensis* has a nautiloid protoconch; but a juvenile with the animal would be welcome.

There is considerable variation in the number and strength of the longitudinal lirae, and the prominence of the growth-lines. The intersections of these may be more or less nodulose in examples from littoral habitats, whereas in examples from deeper (more placid) water they may be squamose.

The oval-triquetral aperture is also not a constant specific character, but is dependent on the end of the tube remaining adherent.

Fifteen animals of varying sizes were examined and no trace of an operculum was found. None of the animals contained embryos.

The earlier Cape records of shells assigned to *conicus* and *nebulosus* may belong here. They ought to be included in the synonymy if for no other reason than to ensure their exclusion from the South African fauna-list.

Tenagodus chuni Thiele

Figs. 28 *d*, 29 *e*, 30 *c*, *d*

Siliquaria sp. von Martens, 1903, p. 45.
Tenagodus chuni Thiele, 1925, p. 110, pl. 20 (8), figs. 18–20 (shell & operculum).

Protoconch $1\frac{1}{2}$ whorls, diam. 0·5 mm., minutely and closely punctate, umbilicate, aperture patulous. Tube with first 4 whorls closely coiled, but

thereafter loosely and irregularly coiled, dextral, widening rapidly from 2nd (or 3rd) whorl. Aperture circular. Slit on first 3 postnatal whorls closed, thereafter more or less moniliform. Growth-lines strong, sinuous, fissured on the larger whorls appearing as if slashed with a knife (cf. Mörch, 1860, p. 401). Diam. aperture 4–5 mm.

Operculum plug-like, outer surface with 6 or 7 septa radiating from the centre, representing successive growth accretions, the scarious margin descending spirally (4–5 whorls) to the basal (last formed) layer. Thiele described and figured the edges as fringed (setose), but in the present specimens they are

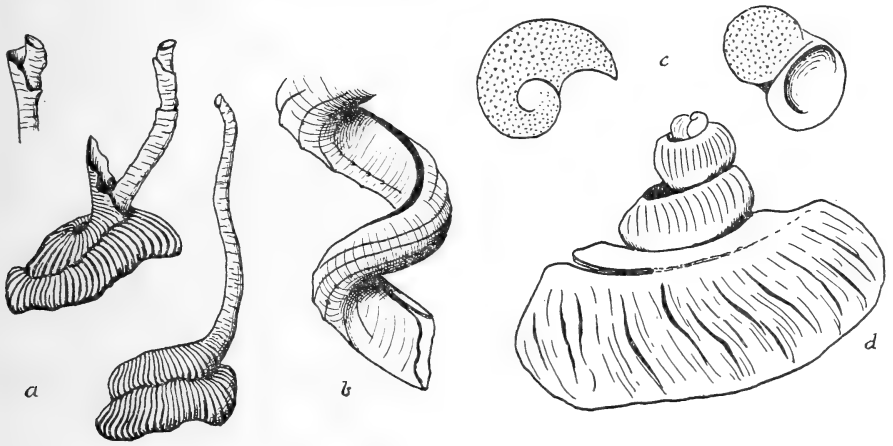

FIG. 30. *a*, tubes of *Vermetus periscopium* n. sp. *b*, portion of tube of *Tenagodus wilmanae* (Tomlin). *c*, two views of protoconch of *T. chuni* Thiele. *d*, early whorls of *T. chuni* Thiele.

merely scarious, and on the earlier whorls somewhat frayed. The nucleus and initial whorls seem to be gradually worn away. Diam. of specimen here figured 4 mm.

Creamy-white, protoconch pale brown, operculum dark brown.

Radual with *c.* 35 rows, weak and feebly 'chitinised', central and lateral plates with entire cutting-edges, both marginal plates simple, without denticles.

34° 51′ S., 19° 37′ E. 80 metres; 34° 8′ S., 24° 59′ E. 80 metres; 35° 16′ S., 22° 26′ E. 155 metres; 35° 29′ S., 21° 3′ E. 102 metres (Thiele).

Off East London and Cape Morgan, 22–85 fathoms; off Umvoti River (Natal) 23 fathoms; off Tugela River (Natal) 47 fathoms; in sponges (S. Afr. Mus. P.F. coll.).

Remarks. The initial whorls do not always stand up so prominently as in the example figured, but may be quite depressed into the succeeding whorl. Sometimes the tube forms a very open spiral.

Only one animal, containing embryos, and two opercula, were obtained from the material (East London). In both opercula the marginal fringes seem to have been worn off.

This species may be allied to *encausticus* Mörch 1860 from Ceylon.

Mörch (1860, p. 410) described *T.* (*Pyxipoma*) *cylindrella*, presumably from the Cape of Good Hope because among its coils were fragments of 'probably' *Mytilus crenatus*. Diam. of aperture 4 mm.; growth-lines fissured. The name of this 'species', inadequately described, and of uncertain provenance, should not be perpetuated.

Tenagodus sp.

Several specimens of various ages, all dead, embedded in a sponge, from off Hout Bay (west coast of Cape Peninsula) (S. Afr. Mus. No. A7210. P.F. coll.) may be juvenile *chuni*, but are left indeterminate.

The early whorls form a closely coiled spiral cone, and the tube widens evenly as in *wilmanae*, but the later whorls are irregularly coiled, not corkscrew-like. The growth-lines are fissured as in *chuni*. Diam. aperture 1·5 mm.

The colour is creamy-white as in *chuni*, without any trace of a violaceous tinge as is found in *wilmanae* extracted from sponges.

Tenagodus wilmanae (Tomlin)

Fig. 30 *b*

Siliquaria wilmanae Tomlin, 1918, p. 16, text-figs. (shell only).

Protoconch 1½ whorls, diam. 0·5 mm., nucleus smooth, whorl minutely and closely punctate, umbilicate, aperture patulous. Tube widening evenly; first 3 or 4 (or 5) whorls more or less closely coiled, thereafter tube forming an open corkscrew-like coil, usually fairly regular. Early whorls smooth except for fine close-set growth-lines, but from about the 5th or 6th whorl with 6, sometimes 7 or 8, feeble longitudinal lirae, which may in places be slightly squamose. Aperture circular. Slit closed on first 3 or 4 whorls, then partially closed (Haliotoid), thereafter moniliform except towards the aperture where it is fully open.

Longest tube (coiled) 45 mm., if uncoiled approx. 120 mm.; diam. aperture 2·5–2·75 mm.

Shells removed from sponges lilac or violaceous.

East London, Port Alfred, Jeffreys Bay (Tomlin, beach worn shells). Jeffreys Bay and Still Bay (S. Afr. Mus., beach worn).

Off Tugela River (Natal) 65–80 fathoms, one fragment from bottom-sample; off Umkomaas River (Natal) 40 fathoms, several in sponges, dead; off East London, 20 fathoms, several fragments from bottom-sample; off Hood Point (East London), 39 fathoms, 2 in sponge, dead; 34° 5′ S., 25° 55′ E. 67 fathoms, several fragments from bottom-sample; off Martha Point, Struis Bay, 42 fathoms, one fragment from bottom-sample (S. Afr. Mus. P.F. coll.).

Remarks. All the specimens in sponges were dead; the animal and operculum remain unknown.

At Oudekraal (west coast of Cape Peninsula) U.C.T. obtained a tightly-coiled 6-whorled specimen, and another of 3 whorls which may have belonged

to the same individual (the two pieces do not quite fit together). The whole interior is filled with sponge, but in the aperture of the larger piece were several embryos corresponding with the above description. Both pieces are creamy-white in colour.

If this is really *wilmanae*, it is the only record from the west coast.

Named after the late Miss M. Wilman, then curator of the McGregor Museum, Kimberley.

Fam. **Solariidae**

Thiele, 1925, p. 113; 1929, p. 183. (Solariidae). Tomlin, 1928, p. 332 (Architectonicidae).

Living examples of three species were obtained by the *Pieter Faure*, but the animals were not preserved. The characters of the radulae have therefore been taken from Thiele.

Solarium cancellatum Krss. was regarded by Hanley (in Sowerby, 1863) as not a solariid. It is more like a vitrinellid (cf. *V. ficara* Bartsch), or a liotiid, but until the animal, or at least the operculum is known, it may be recorded in the *Solariidae*.

Gen. Solarium Lam.

Bayer, 1940, pp. 223–256 (catalogue of species).

Operculum triangularly-oval, with a few rapidly-increasing whorls, the scarious margins usually slightly raised above the succeeding whorl, internal surface with conical knob (Thiele, 1929, fig. 171).

Radula without central plate, lateral plates numerous (14), inner ones apically pointed, outer ones smaller and 2-pronged. (Thiele; and Fischer, 1885, fasc. 8, fig. 482).

Solarium perspectivum (Linn.)

Fig. 31 *b*

Architectonica perspectivum (*partim*) Tomlin, 1928, p. 332.
Solarium perspectivum Bayer, 1940, p. 233, fig. 2 (after Sowerby)*, fig. 3 (diagram of colour pattern). Macnae & Kalk, 1958, p. 127 (listed).

Second sulcus absent (fig. 31 *b*); suprasutural cingulum chestnut-brown with more or less marked darker spots; sutural cingulum not articulated (i.e. none of the growth-lines particularly strong, causing cross-grooves), upper half chestnut-brown, lower half white; upper part of 2nd plus 3rd cingulum chestnut-brown (being the *vitta infrasuturalis*). Diam. up to 55 mm. (figure in Bayer, after Sowerby).

Durban (Bayer; also S. Afr. Mus.); Delagoa Bay (Tomlin; Macnae & Kalk).

Off Amatikulu River (Zululand), 26 fathoms, one living, one dead; off Umvoti River (Natal), 27 fathoms, one dead (S. Afr. Mus. P.F. coll.).

* Except the central figure, which represents the operculum of *Heliacus variegatus*.

Living: 29° 58′ S., 31° 2′ E. 49 metres (U.C.T.).

Distribution. Indo-Pacific.

Remarks. Only the Delagoa Bay and Umvoti specimens identified and recorded by Tomlin belong to this species. I have not seen Macnae & Kalk's material, but I have myself collected this species at Delagoa Bay.

Tomlin's statement that this Indo-Pacific species 'just reaches the Cape' is misleading, becuase 'the Cape' is usually understood to mean the south-west corner of South Africa; he should have said: just reaches Natal. It has not been dredged south of Durban.

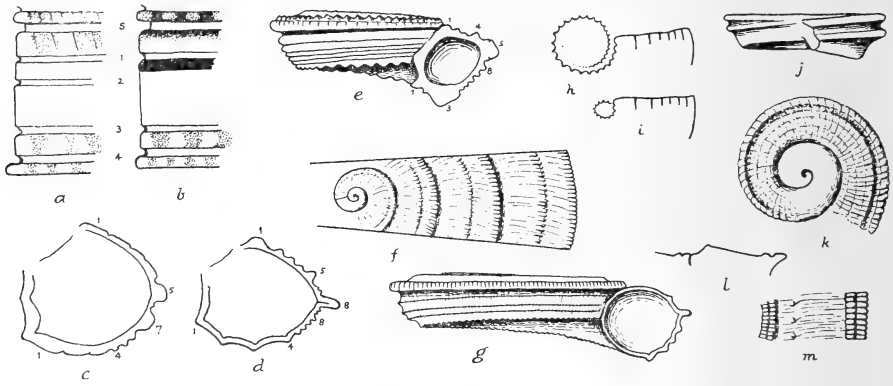

FIG. 31. *a, b*, diagram of colour-pattern of *Solarium maximum* Phil. *perspectivum* (Linn.) respectively (s = suture, 1–4 = sulci). *c, d*, diagram of aperture of *Heliacus africanus* Bartsch and *asper* (Hinds). *e*, *H. numulus* n. sp. *f, g*, *H. obolos* n. sp., section of upper surface, and side view. *h, i*, diagram of umbilicus and last whorl of *H. dorsuosus* (Hinds) and *africanus* Bartsch. *j, k*, side view and upper surface of *H. dorsuosus* juv. diam. 3 mm. *l, m*, profile of last whorl and portion of preceding whorl, and portion of upper surface of *Heliacus* sp. (off Cape Morgan).

Bayer did not give a diagnosis of this species, but mentioned (p. 238) characters which differentiate it from *maximum*; and in fig. 3 illustrated variations in colour-pattern.

The outstanding feature of the species is the absence of the 2nd sulcus, leaving a broad smooth (on last whorl except for growth-lines) surface in the middle of the whorl (fused 2nd plus 3rd cingula).

Solarium maximum Phil.

Fig. 31 *a*

Solarium perspectivum (*non* Linn.), Lamarck, 1816, pl. 446, figs. 1*a*, 1*b*. Liste, p. 10.
Architectonica perspectivum (*partim*) Tomlin, 1928, p. 332.
Solarium maximum Bayer, 1940, pp. 227, 238.

Second sulcus present (fig. 31 *a*); suprasutural cingulum white with brown spots; sutural cingulum articulated, white with brown or orange spots; 2nd and 3rd cingula unspotted. Diam. up to 73 mm. (Lamarck's figure).

Durban (Bayer; also S. Afr. Mus.).

Off Cape Vidal (Zululand), 80–100 fathoms, one juv. dead; off Umhloti River (Natal) 27 fathoms, 2 dead; off Umvoti River (Natal) 27 fathoms, one living, one juv. dead; off Cape Natal (Durban) 47 fathoms, 4 dead (S. Afr. Mus. P.F. coll.).

Distribution. East Indies, Caroline Is., Australia.

Solarium laevigatum Lam.

Solarium laevigatum Sowerby, 1897, p. 15. Bayer, 1940, p. 227.

According to the figures in Sowerby's *Thesaurus conchyliorum* (pl. 251, figs. 21, 22) this species differs from *maximum* in having spots on the broad median area (2nd and 3rd cingula) of the whorls, and on the 'area basalis media'.

Durban (Sowerby; Bayer).

Distribution. Indian Seas, East Indies.

Remarks. One specimen from Durban Bay (coll. R. N. Kilburn) presumably belongs here. The sutural cingulum is not articulated, 2nd sulcus equidistant between 1st and 3rd sulci; umbilicus narrow, 4–5 mm. diam., shell 26 × 16 mm.

Solarium reevei Hanley

Architectonica reevei Tomlin, 1928, p. 333.
Solarium reevei Bayer, 1940, p. 251.

Trochoid, altitude a little over one half the diameter. Three cingula (i.e. 4 sulci) between the infrasutural cingulum and the 4th (= penultimate) cingulum; and 2 suprasutural cingula on all whorls (in other species the lower of these two cingula is only seen on the last whorl, being concealed on the preceding whorls).

Off Great Fish Point, 100 fathoms (Tomlin, P.F. material).

Although no other specimens have been found in the *Pieter Faure* collection, there is no doubt about it having been taken by the *Pieter Faure*. Diam. 11, alt. 6 mm.

Distribution. New South Wales (Hanley; Watson; Bayer).

Gen. Philippia Gray

Thiele, 1929, p. 184. Bayer, 1942, pp. 1–17 (catalogue of species).

Operculum oval, with a few rapidly-expanding whorls, internal surface with conical knob (Thiele, fig. 168).

Radula with 5 plates in each row, central plate long and narrow, median cusp flanked by 1–2 tiny setiform cusps, both lateral plates narrow, apically with 3–5 finger-like processes (Thiele, 1925, pl. 46(34), fig. 18; and 1929, fig. 169).

The character of the radula seems to indicate this genus as transitional between *Solarium* and *Heliacus* (Thiele, 1925, p. 113).

Philippia layardi A. Adams

Philippia layardi Adams, A., 1855c, p. 317. Bayer, 1942, p. 8.
Solarium cingulum Kien., Sowerby, 1892, p. 28.
Solarium hybridum (*non* Linn.), Sowerby, 1897, p. 15. Turton, 1932, p. 134.
Heliacus hybridum (*non* Linn.), Tomlin, 1928, p. 333.
Solarium kowiensis Turton, 1932, p. 134, pl. 29, no. 971.

Port Elizabeth (Sowerby); Tongaat (Natal) (Tomlin, S. Afr. Mus. material); Port Alfred (Turton); Durban, and Kentani (S. Afr. Mus.).

Distribution. Indo-Pacific.

Remarks. Bayer showed that the name *hybridus* Linn. should be restricted to a Mediterranean shell, and gave reasons for adopting *layardi* for the Indo-Pacific shell. He did not include Sowerby's 1892 record of *cingulum* in the synonymy of *layardi*.

Although E. L. Layard collected this shell in Ceylon before he came to the Cape and was appointed (1855) curator of the South African Museum, one hopes that his name will be retained in the South African fauna-list for this shell.

Bayer's statement that this species extends 'over the Cape to the Canary Islands' cannot be accepted literally. Probably the species occurs living on the Natal coast, though only dead shells have been recorded; it may possibly occur living at Port Alfred, but the Port Elizabeth specimen was certainly a washed-up stray (or imported by a collector).

Turton's photo of *kowiensis* illustrates very clearly the words in Adams' diagnosis: '. . . anfractu ultimo ad peripheriam angulato, cingulis *tribus* ornato . . .' [ital. mine], i.e. one cingulum above, and one below the actual peripheral cingulum. None of the present specimens show the cingulum on the base so clearly. Diam. 10 mm.

The coloration is variable, and it seems unlikely that more than one species occurs on the South African coast.

Gen. Heliacus D'Orb.

Smith, 1910a, p. 199 (*Torinia* not acceptable).
Thiele, 1925, p. 114; 1929, p. 183. Bayer, 1948, pp. 3–44 (catalogue of species) (*Torinia*).
Tomlin, 1928, p. 333 (*Heliacus*).

Operculum circular, with numerous spiral whorls with scarious upturned margins, internally with conical knob.

Radula with 5 plates in each row, central plate strong, longer than wide, with strong median hook-like cusps flanked by several tiny cusps (Thiele, 1925, pl. 46(34), fig. 16); lateral plates long, narrow, apically with several long, pliable finger-like processes.

Remarks. Gray defined his genus *Torinia* by the operculum only, which might have sufficed if he had reinforced his definition by quoting a species; as he omitted to do this, his genus, as Smith pointed out, is unacceptable.

Heliacus asper (Hinds)

Fig. 31 *d*

Solarium asper Hinds, 1844a, p. 23; 1844c, p. 50, pl. 14, figs. 9, 10.
Torinia asper Thiele, 1925, p. 302, pl. 21 (9), figs. 6, 7. Bayer, 1948, p. 6.
Heliacus asper Tomlin, 1928, p. 333; 1931, p. 432.

Protoconch $1\frac{1}{4}$ whorls, smooth. Postnatal whorls 4–$4\frac{3}{4}$; 1st whorl flat between the subsutural lira (1) and lira 5 (fig. 31 *d*), then declivous to the peripheral keel; on 2nd whorl lirae 2–4 and 7 appear; on 3rd whorl 6 is interpolated; lirae 1 and 5 are stronger than the others, and though 5 is not actually stronger than 1 it is prominently raised; 6 and 7 are weak; sometimes 4 is weaker than 2 and 3; sometimes an intermediary develops between 4 and 5, and between 5 and 6.

Granules (transverse riblets) on subsutural lira on 2nd whorl *c.* 36, increasing to *c.* 60 on last whorl; on the peripheral keel *c.* 70 in Thiele's figure of 4·5 mm. specimen, *c.* 110 on 7 mm. specimen, *c.* 150 on 9 mm. specimen.

On the base 9 lirae between the umbilicus and the peripheral keel, the three inner (nos. 2–4) stronger than the three (5–7) outer lirae, 8 and 9 very fine. On last whorl *c.* 36 crenulations on umbilical lira (1). On base of the 7 mm. specimen ($3\frac{1}{2}$ postnatal whorls) the 9 lirae are already developed.

Diam. 9, alt. 3·5 mm. (specimen with 4 postnatal whorls, compared with Type by Tomlin); diam. 12, alt. 4 mm. ($4\frac{3}{4}$ whorls). Thiele's example with 3 whorls diam. 4·5 mm.

Off Cape Natal (Durban) 54 fathoms, one fresh; off Umhloti River (Natal) 27 fathoms, one broken (Tomlin, P.F. material).

Off Cape Natal, 54 fathoms, 8 dead (4 fresh, 4 worn); same locality, 47 fathoms, 2 dead (one fresh, one worn) (S. Afr. Mus. P.F. coll.).

Distribution. Straits of Macassar, 11 fathoms (Hinds); off Sumatra (Thiele).

Remarks. The species is not identifiable from Hinds' description and figure, but fortunately Tomlin compared the perfect *Pieter Faure* specimens with Hinds' Type in the British Museum (Natural History); and confirmed an earlier identification by Sowerby (not recorded in print).

A few more specimens have been found in the *Pieter Faure* bottom-samples, including one a little larger than that seen by Tomlin.

Thiele's juvenile seems to be correctly identified.

Thiele remarked that *dilectum* Deshayes 1863 from Réunion (Bourbon), and *admiranda* Melvill & Standen 1903 from the Gulf of Oman, were very similar.

Heliacus caelatus (Hinds)

Solarium caelatum Hinds, 1844c, p. 25; 1844c, p. 51, pl. 14, figs. 11, 12. Sowerby, 1900, p. 5.
Torinia caelatum Bayer, 1948, p. 8.

A subsutural row of tubercles, middle of whorl plicate-striate, 2 tuberculate keels at periphery (*ex* Hinds' diagnosis).

Straits of Macassar, 10 fathoms (Hinds). Sowerby recorded 2 shells from Pondoland (i.e. the Kowie=Port Alfred); as no further specimens have been recorded, one cannot help wondering whether they were not really *dorsuosum-africanum-alfredensis* (*v. infra*). Where are those two shells today?

Heliacus crenellus (Linn.)

Solarium cylindraceum (*non* Chemn.), Sowerby, 1897, p. 15.
Heliacus crenellus Smith, 1910a, p. 199.
Torinia crenellus Bayer, 1948, p. 11 (references & synonyms).

Natal (Sowerby; also S. Afr. Mus. coll. Juritz, 2 very worn specimens); Tongaat (Natal) (Smith).

Distribution. Mauritius, Bourbon (Réunion), Ceylon, Indian seas, China, Japan.

Heliacus dorsuosus (Hinds)

Fig. 31 *h*

Solarium dorsuosum Hinds, 1844a, p. 23; 1844c, p. 439. Sowerby, 1897, p. 15.
Heliacus africanus Bartsch, 1915, p. 123, pl. 24, figs. 1, 3, 5. Tomlin, 1928, p. 333; 1931, p. 432.
Solarium africanus Turton, 1932, p. 134.
Solarium alfredensis Turton, 1932, p. 134, pl. 29, no. 967.
Torinia dorsuosa Bayer, 1948, p. 16; var. *africana*, p. 17; var. *alfredensis*, p. 18.

Tomlin was inclined to agree with Bartsch in differentiating *africanus* from *dorsuosus*. Bayer, however, traversed the reasons given by Tomlin (1928), and listed *africanus* and *alfredensis* as only varieties of *dorsuosus*.

Tomlin (1938, p. 334) stated that the South African Museum had examples of the type form (i.e. *africanus*, with narrow umbilicus) from Tongaat; but the specimen returned by him has the umbilicus almost as wide as the last whorl and therefore does not resemble Bartsch's *africanus*. Two specimens from Port Alfred, however, do agree with *africanus*, and are described below.

Two specimens from Karachi agree with Bartsch's figure of *africanus* (umbilicus about half width of last whorl) thus supporting Bayer's opinion.

Form *africanus* Bartsch

Fig. 31 *c*, *i*

Protoconch 1½ whorls, smooth. Postnatal whorls 3½. Upper surface with 4 sulci and 5 lirae, the 1st lira wider than the three following, 5th peripheral, prominent.

Base with 6 sulci and 7 lirae, 1st lira (bordering umbilicus) widest, 2nd not quite so wide but wider than the following lirae, 7th peripheral but not so prominent as the 5th on the upper surface, the latter forming the true periphery (fig. 31 *c*).

Between the peripheral lira (5) and the outer basal lira (7) one thin lira.

Nodules on peripheral lira *c.* 55 on 2nd whorl, *c.* 60–67 on last whorl.

Umbilicus about one quarter the width of last whorl (at apperture), inner whorls not visible, 12–13 crenulations on the umbilical lira (1) (fig. 31 *i*).

Diam. 10 mm., diam. umbilicus 1 mm., width of last whorl at aperture 4·5 mm.

Port Alfred (Bartsch, Turton).

Remarks. These two specimens, named and presented by Turton, are evidently Bartsch's *africanus*, but have the umbilicus narrower than in Bartsch's figure. Bartsch said there were *two* thin lirae between the two peripheral lirae, though his fig. 5 shows only one (and that not very clearly); in the present specimens there is only one. Two rather broad and not prominent lirae on columella (within the aperture), producing one lira on the umbilical wall.

Form typical *dorsuosus* (Hinds)

Fig. 31 *h*

Cf. *Torinia dorsuosa* Satyamurti, 1952, p. 73, pl. 5, figs. 1*a*, *b*.

Protoconch 1½ whorls, max. diam. 1·25–1·3 mm., smooth. Postnatal whorls 4. Lirae and sulci on upper surface and base as above described for *africanus*.

A thin lira between the 2 peripheral lirae in 10 specimens, varying in strength, feeble in the Umhloti 25 fathoms example, and in the Umvoti juvenile; absent in the Tongaat specimen.

Umbilicus nearly as wide as last whorl (at aperture), inner whorls visible, 20–22 crenulations on the umbilical lira (fig. 31 *h*).

Unworn examples provide also the following additional characters: 1st postnatal whorl flat dorsally; on all whorls the peripheral keel is slightly raised above the narrowly-channelled suture and the subsutural lira on the following whorl. Nodules on peripheral lira *c.* 40–45 on 1st whorl, *c.* 50 on 2nd, *c.* 55–60 on 3rd, *c.* 70–75 on 4th whorl. (The Tongaat specimen has 3½ whorls, and *c.* 100 nodules around periphery of last whorl.) Alt. 5, diam. 11 mm.

Operculum plug-like, diam. 2·5, alt. (incl. knob on internal surface) 2·5 mm., with several whorls of scarious fringes, the earlier formed ones at the top frayed and worn.

Tongaat, one worn (S. Afr. Mus.).

Off Umvoti River (Natal) 56 fathoms, one juv. diam. 5 mm.; same locality, 27 fathoms, one living; off Umhloti River (Natal), 25 fathoms, one dead; and 40 fathoms, 2 dead; off Cape Natal (Durban) 54 fathoms, 7 and one juv. diam. 3 mm., dead (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E. 71 metres (U.C.T.).

The juvenile from Cape Natal, alt. 0·9, diam. 3 mm. (fig. 31 *j*, *k*) with protoconch and 1st postnatal whorl is like a flat biscuit, with a double peripheral keel on the later part of the whorl. Without comparison with the unworn older examples it might be mistaken for a different species. The hollow on the underside is so widely open that it can scarcely be called an umbilicus.

Remarks. These specimens seem to correspond in width of umbilicus with Satyamurti's fig. 1 *b*.

Form *alfredensis* Turton

Umbilicus according to Turton's photo about $1\frac{1}{3}$ times as wide as last whorl at aperture. Crenulations on umbilical lira *c*. 27. Grows to diam. 14 mm. (Turton).

Port Alfred (Turton). No specimens in the South African Museum.

Remarks. Tomlin (1928, p. 334) said the form with wide umbilicus 'seemed to grade into' the typical *africanus*: Turton (p. 134) denied this and regarded the former as a separate species. The present material shows no *grading*: the Natal shells are intermediate between *africanus* and *alfredensis*, though clearly nearer to the latter than to the former.

Heliacus trochoides (Desh.)

Solarium trochoides Smith, 1903a, p. 383.
Torinia trochoides Bayer, 1948, p. 36 (references).

Smith's record from Durban was overlooked by Bayer.

The South African Museum has 2 specimens from Durban collected by Burnup; both have the operculum, and may therefore be presumed to have been taken alive, which qualifies the species for inclusion in the South African fauna-list. Confirmed by live specimens taken at Umhlali (Mrs. Connolly).

Heliacus variegatus (Gmelin)

Solarium variegatum Sowerby, 1892, p. 28.
Heliacus variegatus Tomlin, 1928, p. 333.
Torinia gyrus Meuschen, Bayer, 1948, p. 20, subsp. *variegatus* p. 23.

Depressed examples (var. *planulata*) might at first be confused with 'dorsuosus'. But the number of sulci and lirae distinguishes them: upper surface 3 sulci and 4 lirae, base 4 sulci and 5 lirae.

Operculum externally conical, with several scarious whorls.

Natal (Sowerby; also S. Afr. Mus.); Tongaat (Tomlin); Durban (S. Afr. Mus.); Scottburgh (Natal) one living (S. Afr. Mus. coll. K.H.B.).

Pondoland (Bayer: *gyrus*, forma *typica* and f. *aerola*).

Heliacus petasus Tomlin

Heliacus petasus Tomlin, 1928, p. 334, pl. 26, fig. 4.

Protoconch $1\frac{1}{2}$ whorls, diam. 1 mm., smooth. Postnatal whorls $5\frac{3}{4}$ (Type). Alt. 2, diam. 9 mm. ($3\frac{1}{2}$ whorls); Type: 5 × 16 mm.; Zululand specimen 5 × 17·5 mm.

Off Scottburgh (Natal) 92 fathoms, one dead (Tomlin, P.F. coll.); off Cape Morgan, 77 fathoms, one dead; off O'Neil Peak (Zululand), 90 fathoms, one dead (S. Afr. Mus. A9124 and A9343. P.F. coll.).

Type in the South African Museum (A3579).

Remarks. The Cape Morgan specimen is smaller than the Type, white and semi-transparent; the Type is now (*pace* Tomlin's statement) quite opaque. The Zululand shell is slightly larger than the Type.

Heliacus numulus n.sp.

Fig. 31 *e*

Protoconch 1½ whorls, diam. 0·5 mm., smooth. Postnatal whorls 2¾. Planorboid, 1st whorl flat, but upper profile of whole shell very slightly convex. Upper surface with 4 sulci and 5 lirae, 1st and 4th lirae strong, 3rd weak, 5th strong, prominent, peripheral.

Base with 7 sulci and 8 lirae, umbilical lira strong, 2nd feeble and inconspicuous, 3rd very strong and prominent, 4th–8th weak, but slightly increasing in strength towards periphery.

Peripheral lira with a fine inconspicuous stria above and below.

Radial sculpture producing nodules, distinct on the subsutural, peripheral, midbasal, and umbilical lirae, but indistinct on the other lirae; on the peripheral lira 30 nodules on 1st whorl, 33 on 2nd, and 33 on last three-quarter whorl (say *c*. 40 on the complete whorl); on both the umbilical and the strong midbasal lirae 28 nodules.

Umbilicus widely open, diameter subequal to width of last whorl at aperture. Alt. 1·5, diam. 4·5 mm.

Off Cape Morgan, 77 fathoms, one dead (S. Afr. Mus. No. A9125. P.F. coll.).

Remarks. Resembling *Torinia concava* Thiele (1925, p. 115, pl. 21(9), figs. 4, 5) from East Africa, in having a strong midbasal lira; but this lira in *concava* is slightly nearer to the periphery than to the umbilical margin, and not nearly so prominent. It also has the coin-like shape of *concava*, and is thus, apart from other characters, distinguished from *asper* which is quoit-shaped with a sharp peripheral keel.

The specimen appears to be not fully grown; but it is a smaller species than 'dorsuosus' because the protoconch is distinctly smaller.

Heliacus obolos n.sp.

Fig. 31 *f*, *g*

Protoconch 1½ whorls, diam. 0·75 mm., smooth. Postnatal whorls 3½. Shell planorboid, flat above. Upper surface with a slight ridge nearer to the periphery than to the suture on each whorl. Periphery keeled. Radiating growth-lines fine and close, forming minute beads on the ridge and stronger crenulations on the very slightly upturned peripheral keel.

Base with angular ridge or lira in middle, 3 fine lirae between it and the periphery. Growth-lines forming beads on the ridge and crenulations on the underside of the peripheral keel.

Aperture subcircular. Umbilicus widely open.

Alt. 1·75, diam. 8·5, aperture diam. 2·5 mm.

Off Umhloti River (Natal), 40 fathoms, one partly broken (S. Afr. Mus. No. A9127. P.F. coll.).

Remarks. This, and *numulus*, are distinctive among the species hitherto recorded from South Africa, in the flat planorboid or coin-like shape.

Heliacus sp.

Fig. 31 *l*, *m*

A corroded fragment consisting of protoconch and parts of 3 whorls, base broken away. Off Cape Morgan, 77 fathoms, one (S. Afr. Mus. No. A9126. P.F. coll.).

It has the same flat upper surface and general features of *obolos*, but has on the upper surface 2 small lirae close together at the periphery, and a series of granules a short distance away from, and raised above, the suture with preceding whorl, not nearly so numerous as the granules on the peripheral lirae: *c.* 15 on a quarter whorl.

It has the same-sized protoconch, and the same diameter (measured across the 2nd whorl).

A species different from *obolos*, but the specimen is too incomplete for a full description.

Heliacus sp.

Tomlin, 1928, p. 334.

No other examples of this have yet been found in the *Pieter Faure* bottom-samples. When Tomlin wrote, Turton's book had not been published. The specimen has a strong resemblance to Turton's fig. 947 which he recorded as a juvenile of *Leptothyra africana*. There is also a resemblance to a vermetid protoconch. Discussion on its position is therefore deferred to Part IV.

Solarium *cancellatum* Krss.

Solarium cancellatum Krauss, 1848, p. 95, pl. 5, fig. 29. Turton, 1932, p. 135.

Off Tugela River (Natal), 14 fathoms, 3 dead but fresh (S. Afr. Mus. P.F. coll.).

Described by Krauss from Algoa Bay; Turton collected one specimen at Port Alfred; the *Pieter Faure* locality is considerably farther north. But Krauss' exquisite figures leave no doubt as to the identity. The generic position remains doubtful.

Fam. **Turritellidae**

Gen. Turritella Lam.

Tomlin, 1925, p. 309.

Tomlin's remarks on the occurrence of broader and slenderer forms are confirmed.

The radulae of several species recorded from South Africa have been examined, the exceptions being *annulata*, *bacillum*, and *chrysotoxa*. The occurrence of the first two in South Africa has yet to be confirmed. The radula of *ferruginea* is notably different from that of the typical turritellid radula. The radula of *capensis* needs confirming by examination of full-grown material.

Trophon subglobosus Turton 1932 (no. 545) may possibly be a juvenile *Turritella*, but *Turritella minuta* Turton probably does not belong here; *T. eucosmia* Turton is transferred to *Anabathron* (Rissoidae, p. 188).

Turritella carinifera Lam.

Fig. 33 *d–h*

Turritella carinifera Lamarck, 1822, p. 59. Smith in Rogers, 1906b, p. 293. Schwarz, 1910, p. 115. Wybergh, 1920, p. 66. Thiele, 1925, p. 112. Haughton, 1926, p. 30. 1932, pp. 29, 34, 45. Turton, 1932, p. 129, pl. 27, no. 933.
† *Turritella spina* van Hoepen, 1940, p. 187, fig. 1.

Protoconch 3–3½ whorls, alt. 0·5, diam. 0·3 mm., smooth, junction with 1st postnatal whorl indistinct. Postnatal whorls 18–20. Each whorl with a sharp spiral keel in the middle, very fine at start on 1st whorl, becoming strong and prominent, and continuing thus on middle whorls, but becoming evanescent or obsolete on later whorls in large specimens, the profile of these whorls being almost evenly convex. The angular margin of the base forms a slight ridge or cingulum (never a sharp keel) at the bottom of each whorl; margin of base in large mature examples rounded.

In addition, fine spiral striae beginning on the 4th or 5th whorl with *c.* 4–5 above and below the keel, increasing to *c.* 9 above and 7 below on about the 12th whorl, and by interpolation very numerous on later whorls, especially above the keel, often pitted with oblique punctae, producing a fine irregular undulate or crenulate sculpture. Base with fine spiral striae. 87 (protoconch and 2–3 whorls missing) × 28 mm.

Operculum smooth, each whorl with very oblique growth-lines, margins entire, but more or less scarious.

Dull grey, early whorls more or less plumbeous; beach specimens white, often violaceous, uniform or with orange spots at top of whorls and on keel, sometimes more or less over the whole whorl. Operculum chestnut-brown.

Head, snout and foot pink, head and side of foot around operculum speckled with black, eyes black; mantle edge frilled spotted with brown.

Radula similar to that of *sanguinea*, but with only two marginal plates; 50–60 rows.

Fossil: Tertiary: Port Beaufort (Wybergh); Port Nolloth, Saldanha Bay, Algoa Bay (Haughton).

Quaternary: raised beach, Little Brak River, Mossel Bay (Rogers; van Hoepen); Port Elizabeth (Schwarz).

Table Bay (Krauss, 1848); Simon's Bay (Bartsch, 1915); Port Alfred (Bartsch, 1915, Turton).

Simon's Bay; 34° 8′ S., 24° 59′ E. 80 metres; and 35° 29′ S., 21° 3′ E. 102 metres (Thiele).

Table Bay, Hout Bay (west coast of Cape Peninsula), False Bay, Hermanus, Still Bay, Mossel Bay, Knysna, Natal (south of Durban) (S. Afr. Mus.).

Off Cape Point, 130 fathoms, 3 dead; off Durnford Point (Zululand) 13 fathoms, 2 dead (Tomlin, 1925; P.F. material). Several protoconchs and juveniles from bottom-samples on Agulhas Bank to off Umkomaas (Natal) (S. Afr. Mus. P.F. coll.).

Living: Simon's Bay, False Bay (S. Afr. Mus. coll. F. Talbot, 1958, 1959). Port Nolloth; False Bay, 51 metres; and 30° 47′ S., 30° 27′ E. 36 metres (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. Occurs in shallow water around the South African coast from Zululand to Port Nolloth, extending, if Thiele's record is correct, to Angola.

Tomlin was probably correct in regarding the two shells (consisting of 10 and 14 whorls) from 130 fathoms off Cape Point as having been washed down from shallower water; but they are not unduly broken (only the protoconchs lost), the keels are sharp, and the striation distinct. Two protoconchs from 256 fathoms on the southern slope of the Agulhas Bank are quite fresh.

The shells seem much liable to damage, and various freak shapes occur due to subsequent mending. The axis of the new whorls often does not coincide with that of the earlier whorls, so that a more or less sharp kink in the shell occurs.

Variations or aberrations. In some examples the marginal ridge of the base remains rather prominently exposed (but rounded) as each successive whorl is added. In one specimen a second spiral keel has developed between the median keel and the basal ridge (this specimen has the fine spiral striation of *carinifera*, and is not a *capensis*).

A specimen from Port Nolloth, consisting of the 2nd–13th whorls, shows a fine lira *above* the median keel.

Thanks to the courtesy of the Director of the National Museum, Bloemfontein, I have examined 5 examples of van Hoepen's *spina*. These are merely *carinifera* in which differential weathering has accentuated some of the lirae in relation to the grooves.

form *kowiensis* Sow.

Turritella kowiensis Sowerby, 1900, p. 6, pl. 1, fig. 12. Tomlin, 1925, p. 312. Turton, 1932, p. 129.
Turritella carinifera var. *angustata* Turton, 1932, p. 129, pl. 27, no. 934.
† *Turritella spinella* van Hoepen, 1940, p. 190, fig. 2.

Tomlin regarded this as merely a slender form of *carinifera*, but recorded two separate species. I agree, but reduce *kowiensis* to the status of a form of *carinifera*.

Turton did not state how he distinguished his var. *angusta* from *kowiensis*; his photo of the former shows a typical example of the latter. According to

Turton *kowiensis* reaches 26 mm. in length, while his var. *angusta* grows up to 35 mm.

The University of Cape Town has collected examples up to 42 × 10 mm., with 16 whorls (protoconch and 1st whorl missing).

I have seen no specimen with protoconch. Median keel on first and following half-dozen whorls strong and sharp as in *carinifera*, but thereafter becoming blunt and less prominent, but always traceable (contrast *declivis*).

Operculum, colour, and radula as in *carinifera*.

Fossil: Quaternary: Little Brak River, Mossel Bay (van Hoepen: *spinella*); Sedgefield, near Knysna (A. R. H. Martin).

Kowie (Port Alfred) (Sowerby, Bartsch, Turton; also S. Afr. Mus.). False Bay, Still Bay, and Mossel Bay (S. Afr. Mus.).

False Bay, 32 fathoms, and off Itongazi River (north of Port Edward, Natal) 25 fathoms, 1 juv., 11 whorls, dead (S. Afr. Mus. P.F. coll.).

Living: False Bay, littoral and 51 metres (U.C.T.).

Remarks. None of the present specimens retains the protoconch.

A typical example was found by Dr. Muir at Still Bay, together with several transitional forms connecting with typical *carinifera*; measurements of some of these are as follows: 24 × 6, 23 × 7, 20 × 7, 20 × 5·5, 18 × 7, 18 × 6, 18 × 5·5, 18 × 5, and 18 × 4·5 mm.

The Director of the National Museum, Bloemfontein, also forwarded examples of *spinella*, which proves to be inseparable from *kowiensis*.

Turritella declivis Ad. & Rve.

Fig. 33 *c*

Turritella declivis Adams & Reeve, 1850, p. 48, pl. 12, fig. 10. Von Martens, 1903, p. 44, pl. 4, fig. 10. Tomlin, 1925, p. 313, text-fig. 2. Thiele, 1925, p. 112. Yen, 1942, p. 203, pl. 15, fig. 62.

Turritella excavata Sowerby, 1870, p. 252, pl. 21, fig. 3 (coloured). Von Martens, 1903, p. 44.

Protoconch 3–3½ whorls, alt. 0·5, diam. 0·3 mm., smooth, junction with 1st postnatal whorl indistinct. Postnatal whorls 20 (*declivis*)–22 (*excavata*). First 5 or 6 whorls each with a sharp median keel, thereafter the keel becomes blunt, forming only a slight angularity on the profile, and from about the 9th or 10th whorl becomes obsolete; on later whorls the profile is either straight (*declivis*) or slightly concave (*excavata*); the lower quarter of the whorl is slightly (*declivis*) or distinctly (*excavata*) tumid, forming a cingulum above the suture.

Margin of base rather sharply angular in juveniles, less sharp in older *declivis*, and rounded in large *excavata*.

In addition, fine spiral striae beginning on about the 4th or 5th whorl, *c.* 20 on the 6th whorl, increasing to *c.* 25 on the 10th, and very numerous (at least 35–40) on last whorl. Base with fine spiral striae. 89 × 16 mm. (Tomlin: *declivis*); 85 × 21 mm. (von Martens: *excavata*); 84 (protoconch and 3–4 whorls missing) × 19 mm. (S. Afr. Mus.: *excavata*); 70 (protoconch and 4 whorls

missing) × 17 mm. (Tomlin: *declivis* from Hout Bay); 66 × 18 mm. (von Martens: *declivis*).

Operculum, whorls with very oblique growth-lines, margins entire, more or less scarious.

Cream or buff, middle of each whorl with a broad maroon or pinkish-brown (orange-brown in dead shells) band; early whorls sometimes (usually in *declivis*) with flame-like orange spots at top of whorl, sometimes also at bottom of whorl; juveniles with 12–15 whorls sometimes plumbeous or maroon, apical 3–4 whorls white. Operculum chestnut-brown.

Radula as in *carinifera*, with 2 marginal plates; 40 rows.

Agulhas Bank (Sowerby: *excavata*).

Simon's Bay, 70 metres; and 35° 16′ S., 23° 26′ E. 154 metres (von Martens: *declivis* and *excavata*). 33° 41′ S., 18° E. 178 metres; 34° 8′ S., 24° 59′ E. 80 metres; 33° 50′ S., 25° 48′ E. no depth given; and 35° 26′ S., 20° 56′ E. no depth given (Thiele: *declivis*).

Off Glendower Beacon (Port Alfred area), 66 fathoms (von Martens: *declivis*).*

Hout Bay (west coast of Cape Peninsula) one dead but moderately fresh (S. Afr. Mus.: *declivis*).

Numerous protoconchs and juveniles, and adults from various localities extending from the East London area, across the Agulhas Bank, including Brown's Bank, to False Bay, in 30–124 fathoms (S. Afr. Mus. P.F. coll.).

Living: False Bay, 51 metres; 34° 30′ S., 24° 40′ E. 56 fathoms; and 34° 15′ S., 25° 5′ E. 6 fathoms (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele: *declivis*).

Remarks. The straight even profile of the half-grown examples persists in the *declivis* form, though in some a slight cingulum develops above the suture, producing a step-like profile; in *excavata* the profile, due to the stronger cingulum (and consequently deeper suture) and the concave middle of each whorl, becomes undulating.

From *kowiensis* it is distinguished by being more slender (e.g. 24 × 6 mm. and 30 × 6 mm.), the median keel not so strong on the first 4 or 5 whorls and not persisting beyond about the 10th whorl, and the more numerous striae. Nevertheless some young specimens may cause doubts as to identity.

Tomlin (p. 314) reported that in some of the specimens submitted to him 'the protoconch is nearly perfect, but much eroded', and that the whorls of the protoconch have 'a strong central carina throughout'. The present material shows that he was mistaken. Even on young specimens with only about 10 whorls the protoconch is very seldom retained. Several perfect protoconchs attached to very young shells were obtained from the *Pieter Faure* bottom-samples.

The protoconch cannot be distinguished from that of *carinifera*, but its profile is continued in the same straight line by the 1st and following postnatal

*This was a *Pieter Faure* specimen (P.F. no. 13804) which the Berlin Museum obtained from Sowerby!

whorls, whereas in *carinifera* the first postnatal whorl shows an abrupt increase in width, due mainly to the stronger median keel. The continuous straight-sided profile in *declivis* gives the illusory effect of a taller protoconch.

The record from Hout Bay is noteworthy. The shell was presented to the South African Museum in the eighteen-nineties by a private collector, and its provenance cannot now be checked. The same collector presented examples of *Cancellaria semidisjuncta* and *Ancilla obesa*, allegedly from the same locality, which increases the doubt as to the correctness of the locality.

The occurrence of *declivis* off the west coast of the Cape Peninsula is supported, however, by a single worn juvenile taken by the *Pieter Faure* off Table Bay (Lion's Head S.E. $\frac{1}{4}$ E. 126 fathoms). Future investigations may confirm this occurrence, and may also connect the present known distribution with Thiele's record from Angola.

The original locality 'China Sea' was rejected by Tomlin. Yen included the species in his list of Chinese gastropods and figured the Type, on the authority of the locality originally given.

T. concava von Martens (1880, p. 283, pl. 20, fig. 19) from Mauritius, and East Indies (Schepman, 1909) seems to be closely allied.

Turritella sanguinea Rve.

Turritella sanguinea Reeve, 1849, pl. 6, fig. 27. Sowerby, 1902, p. 100. Tomlin, 1925, p. 311, text-fig. 1.
Turritella puncticulata Sowerby, 1870, p. 253. Turton, 1932, p. 129.
Turritella punctulata (err.) Sowerby, 1892, p. 39, pl. 5, fig. 102. Von Martens, 1903, p. 43, pl. 4, figs. 9, 9*a*, 9*b*. Thiele, 1925, p. 112.
Turritella natalensis Smith, 1910a, p. 198, pl. 7, fig. 11. Tomlin, 1925, p. 313.
Turritella salisburyi Tomlin, 1925, p. 314, text-fig. 3*b*. Turton, 1932, p. 129.

Protoconch $1\frac{1}{2}$ whorls, slightly bulbous, alt. and diam. 0·4 mm., smooth. Postnatal whorls 23–24. Profile of whorls usually nearly straight above, convex below, i.e. the greatest width of a whorl is below the middle, sometimes very noticeable (Tomlin, text-fig. 1 *a*).

Growth-lines fine and crossing, but not crimping, the lirae and not forming a cancellate sculpture.

First whorl at start with 2 peripheral lirae, but later a 3rd develops above the others; on following whorls the 3 lirae continue more or less predominantly, but intermediaries develop, up to at least 15–20. Base with 10–12 main lirae, with numerous fine intermediaries, margin rounded without a definite lira. 99 (protoconch and 11 whorls missing) × 22 mm. (if complete length probably *c.* 114 mm.); 18 whorls (3–4 missing) 106 × 21·5 mm.

Operculum, each whorl with radiating, slightly oblique riblets, margins fringed, whole outer surface rough with scarious fringes.

Cream or buff, with orange or fulvous axial streaks or flames, more or less curved and usually following the course of the growth-lines; the tops of the streaks below the suture usually somewhat darker, producing an irregular subsutural series of ill-defined spots; the streaks are darker red or maroon where

they cross the lirae, i.e. the lirae are marked by disconnected spots and lines. Operculum chestnut-brown.

Snout and head pale, sides of foot around operculum speckled with black; the frilled mantle edge spotted with brown; eyes black.

Radula with 50 rows, 3 marginal plates, the 3rd smaller than the other two.

Agulhas Bank (Sowerby: *puncticulata*); St. Francis Bay, 30–34 fathoms (Sowerby: P.F. material).

St. Francis Bay, 80–100 metres; 34° 51′ S., 19° 17′ E. 80 metres; 33° 50′ S., 25° 48′ E. no depth given (von Martens). 35° 29′ S., 21° 3′ E. 102 metres (Thiele).

False Bay to Cape St. Blaze, 18–45 fathoms (Tomlin: P.F. material). Off East London, 52 (not 30–50) fathoms (Tomlin: *salisburyi*).

Port Alfred (Turton). Durban and Isezela (Smith: *natalensis*).

False Bay to Algoa Bay, East London area, and Natal, 22–67 fathoms, including apices with protoconchs, and juveniles (S. Afr. Mus. P.F. coll.). The Natal localities are: off Tongaat, Morewood Cove, Umhlanga, Umhloti, Umvoti, and Umkomaas.

Lion's Head (Cape Town) S.E. $\frac{1}{4}$ E. 126 fathoms, one juv. (S. Afr. Mus. P.F. coll.).

Living: off Cape Infanta and Struis Point (Tomlin: P.F. material). St. Sebastian Bay, 40 fathoms (S. Afr. Mus. coll. K.H.B.).

False Bay, 30–36 metres (U.T.C., and Fisheries Survey vessel *Africana*).

Distribution. Great Fish Bay, Angola (Thiele).

Types of *sanguinea* and *natalensis* in British Museum (Natural History); of *salisburyi* in South African Museum (A5113).

Remarks. In addition to the characters mentioned above by which this species can be separated from *ferruginea* may be added: in *sanguinea* the lirae become flat on the middle and later whorls, whereas in *ferruginea* they remain more or less sharp.

Inequality of the main and intermediary lirae is always well marked on the first 6–8 whorls; on later whorls, however, there is a tendency in some examples for all the lirae to be nearly equal in strength. This is particularly well seen in the two specimens described as *salisburyi* (the larger is 26 mm. long, with 13 whorls). Such smooth, evenly-lirate examples occur sparingly amongst the material from False Bay to Natal. Possibly they are more frequent in the East London area, whence *salisburyi* was obtained, because the *Pieter Faure* took 7 other examples there (Nieca River, south of East London, 43 fathoms) of which 3 are the smooth *salisburyi* form.

If Tomlin had seen a longer series of *sanguinea*, especially juvenile and half-grown examples, he would have realized that the 'radical difference in sculpture' was merely an extreme instance of a very variable feature. He overlooked the fact that the early whorls of *salisburyi* are typical *sanguinea*.

The Type of *salisburyi* has a very pretty pink colour; but is the colour natural? The cotype is a typical buff-coloured, though faded or washed-out, *sanguinea*. Both have the 'interspaces' (lirae) spotted.

Turton gave as a specific character of his *salisburyi* shells (identified by Tomlin) 'a strong cord at the suture, which rather overlaps the succeeding whorl'; meaning presumably the bulging at the lower part of the whorl (see Tomlin, 1925, text-fig. 1 *a*) which is found sometimes in *sanguinea*, but not in the Type and cotype of *salisburyi*.

There is even less reason for separating *natalensis* from *sanguinea* than there is for separating *salisburyi*. The specimens returned by Tomlin labelled *natalensis*, and compared by him with the Type in the British Museum (Natural History), are typical young *sanguinea*. The fact that no examples larger than 40 mm. have yet been found in the Natal area is no argument for maintaining a separate species.

That Tomlin considered the protoconch of *natalensis* to consist of 4 whorls was due, I think, to the apical 3 or 4 whorls being paler than the rest of the shell. There is no sharp division between the protoconchal and postnatal whorls, and I prefer to regard only the initial 1½ smooth whorls as strictly protoconchal. An embryo in the egg-capsule would settle the question.

One University of Cape Town specimen from False Bay, 72 × 24 mm., with (as preserved) only the last 6 whorls, is unusually heavy. The thickness of the shell wall at the aperture is 2 mm. above, 3 mm. below (normal thickness less than 1 mm.); and the deposition of this abnormal amount of shelly substance has reduced the size of the aperture from a normal diameter of 12 mm. to 9 mm.

The juvenile, 20 mm. long, 9 whorls, apex corroded, from off Cape Town, is the only record of this species occurring on the west coast of South Africa, though Thiele has recorded it from Angola.

Turritella capensis Krss.

Fig. 33 *k*

Turritella capensis Krauss, 1848, p. 106, pl. 6, fig. 8. Schwarz, 1900, p. 61. Haughton, 1932, pp. 34, 35. Turton, 1932, p. 129.
Turritella knysnaensis Krauss, 1848, p. 106, pl. 6, fig. 9. Smith in Rogers, 1906b, p. 293. Turton, 1932, p. 129.
Turritella stimpsoni Bartsch, 1915, p. 118, pl. 5, fig. 8.

Protoconch 1½ whorls, slightly bulbous, alt. and diam. 0·3 mm., smooth. Postnatal whorls 16. Profile of early whorls bicingulate, of later whorls often more evenly convex. First and following whorls with 2 spiral lirae, the upper one in middle of whorl. From the 3rd or 4th whorl a fine intermediary between upper lira and suture, which may develop into a lira almost as strong as the other two; on later whorls usually an intermediary between the 2 initial lirae and one below the lower one; in addition often several fine intermediaries. Base with fine spiral striae, and usually one lira in addition to the marginal

lira, the latter however not prominent. Growth-lines distinct, but not crimping the lirae or forming a cancellate sculpture. 33 × 9 mm.

Operculum smooth, whorls very numerous, margins more or less scarious.

Grey, more or less plumbeous, with pale or whitish apex, irregular darker grey or brown curved axial streaks and flames. Operculum chestnut-brown.

Radula, number of rows ?, central plate present ?, lateral plate longer than broad, marginal plates 3, probably 4.

Mantle edge frilled, spotted, eyes black.

Fossil: Quaternary: Saldanha Bay (Haughton); Sedgefield, near Knysna (A. R. H. Martin); Keurbooms River (Schwarz).

Table Bay and Saldanha Bay (Krauss: *capensis*). Knysna (Krauss: *knysnaensis*). Simon's Bay, False Bay (Bartsch: *stimpsoni* and *knysnaensis*); Port Alfred (Turton: *knysnaensis*).

Table Bay, False Bay, Still Bay, Plettenberg Bay, and Kowie (= Port Alfred) (S. Afr. Mus.).

Living: Langebaan (Saldanha Bay), 15 feet; and Knysna (U.C.T.).

Remarks. The descriptions given for *knysnaensis* by Krauss and for *stimpsoni* by Bartsch are essentially alike; Bartsch mentioned in addition the fine spiral intermediaries.

The bicingulate profile, prominent on the early whorls, may persist on the later whorls; or may be less conspicuous owing to the stronger development of the intermediaries, some specimens showing 3, 4, or 5 lirae of almost equal strength. Other specimens show 6 or 7 lirae, 2 of which are somewhat stronger than the others.

Krauss founded *capensis* on examples with the last mentioned sculpture, and *knysnaensis* on strongly bicingulate examples. The latter is the more typical form. All the present examples are *knysnaensis* on the early whorls, some becoming *capensis* on the later whorls.

Closely resembling *T. praetermissa* Dautzenberg (1912, p. 43, pl. 2, figs. 1, 2; also Nicklès, 1950, p. 55, fig. 56) from Angola.

Some specimens in which the two initial lirae persist on the later whorls, and are rather strong and broad, bear a superficial resemblance to *bicingulata* Lam. from the west coast of Africa as far south as Angola (Nicklès, 1950, p. 55, fig. 55). The latter has 2 very strong lirae equally spaced across the whorl, whereas in *capensis* both lirae are lower, the upper one being in the middle of the whorl.

Investigation along the coast of South West Africa might show how far southwards *bicingulata* and *praetermissa*, and how far northwards *capensis* extend.

Only half-grown specimens (about 15 mm. long) have been available for examination of the radula. Owing to its small size and the numerous marginal plates, my preparations of a mounted radula with all the plates spread out have not been successful. I cannot therefore be certain of the absence of the central plate, though the presence of 4 marginal plates seems correct; the lateral plate appears more uncinate in shape than the normal transversely oblong shape.

Turritella chrysotoxa Tomlin

Fig. 33 *i*

Turritella chrysotoxa Tomlin, 1925, p. 315, text-fig. 3*a*.

Protoconch 2½ whorls, slightly bulbous, alt. 0·3, diam. 0·25 mm., smooth. Postnatal whorls (as preserved) 12. Profile nearly straight. 1st to 3rd whorls with a spiral lira in lower third; on 3rd or 4th whorl a median lira appears, and on 4th or 5th a third lira above, the three lirae equidistant from one another and from the sutures; in addition 2 or 3 (sometimes more) weak intermediaries, sometimes on the later whorls almost as strong as the main lirae (one specimen shows 5 lirae: 2 upper, 2 median, 1 lower). Growth-lines distinct. Base with growth-lines, but only 2–3 very indistinct spiral lirae, the marginal lira not very prominent. 16 × 4 mm.

Operculum and radula unknown.

Off Illovo River (Natal), 27 fathoms, 2 (Tomlin: P.F. material).

Off O'Neil Peak (Zululand), 90 fathoms, one; off Tugela River, 65–80 fathoms, one juv.; off Umhloti River, 40 fathoms, 3 (2 fresh); off Cape Natal, 54 fathoms, one worn; off Umkomaas, 40 fathoms, one fresh and 7 juv.; off Hood Point (East London), one worn (S. Afr. Mus. P.F. coll.).

Type in the South African Museum (A3561); cotype in coll. Tomlin (in National Museum of Wales).

Remarks. The present material extends the known area of distribution, but contains no specimens larger than the type, and no specimens with the animal.

No authentically named *bacillum* Kien. are available in the South African Museum, and I do not know whether Chenu's figure (1859, fig. 2283) is reliable, but there seems a possibility that *chrysotoxa* might be a juvenile *bacillum*, which Krauss recorded from Natal.

Turritella sp.

Fig. 33 *j*

Protoconch 1½ whorls, slightly bulbous, alt. and diam. 0·4 mm., smooth. Postnatal whorls (as preserved) 9. Profile strongly angular. 1st and following whorls with a strong spiral median keel, very prominent on early whorls but becoming less so on 7th and 8th whorls, and on the remaining portion of the 9th whorl scarcely larger or more prominent than the other lirae. Fine spiral lirae beginning on 1st whorl above and below keel, and increasing in number to *c.* 6 above and 8 below on the 5th whorl, and to *c.* 8 above and 10 below on 9th whorl; one of the lirae above and one below the keel usually slightly stronger than the others. Sutures deep. 11·5 (protoconch missing) × 4·5 mm.

34° 5′ S., 25° 43′ E. (off Cape Recife, Algoa Bay), 52 fathoms, one broken 9-whorled specimen without protoconch, and 10 apices consisting of protoconch and 4–6 whorls (S. Afr. Mus. No. A9135 P.F. coll.).

Remarks. These specimens, with strong median keel and deeply indented sutures do not belong to any of the other species represented in the *Pieter Faure* collection. Turton's *eucosmia* (1932, p. 130, pl. 27, no. 944) is much smaller, with a peculiar aperture, and is probably not a turritellid (see *Anabathron*, p. 188).

Turritella ferruginea Rve.

Figs. 32 *c*, 33 *a*

Turritella ferruginea Reeve, 1849, pl. 7, fig. 32. Tomlin, 1925, p. 309.

Protoconch 1½ whorls, slightly bulbous, alt. 0·5, diam. 0·6 mm., smooth. Postnatal whorls 19–20. Profile of whorls evenly convex. Growth-lines distinct, crossing the spiral lirae, which are thereby crimped or beaded, and forming with the lirae a fine cancellate sculpture.

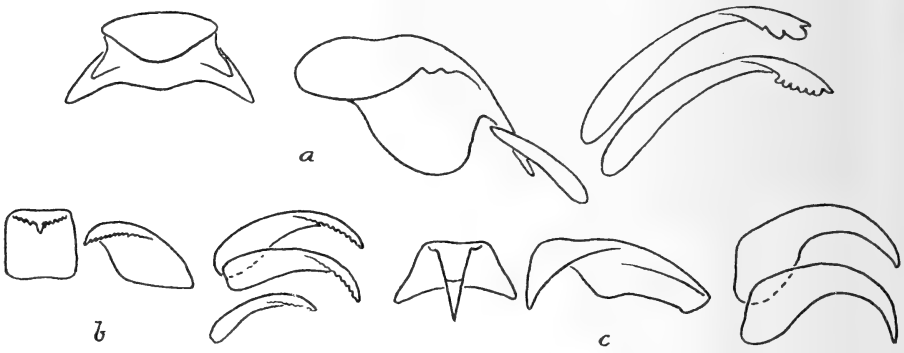

FIG. 32. Radula teeth of: *a*, *Planaxis sulcatus* (Born). *b*, *Turritella sanguinea* Rve. *c*, *T. ferruginea* Rve.

First and following whorls with 2 peripheral lirae; at about the 5th whorl an intermediary develops between these two, and at 6th whorl one between suture and upper lira; at 10th whorl there are 2–3 intermediaries above the upper peripheral lira, and one below the lower lira; additional intermediaries develop above and below, and between the peripheral lirae, on later whorls there may be up to *c.* 15 lirae of various strengths; from about 12th whorl the 2 peripheral lirae, though distinguishable, lose their initial predominence. Base with 7–10 thin (but variable) lirae, and a stronger one forming the margin. 111 (protoconch and 4 whorls missing) × 27 mm.

Operculum smooth, each whorl with very oblique growth-lines, margins entire, not scarious.

Cream or buff, with orange-brown axial streaks following the curve of the growth-lines; on later whorls streaks closer together, the stronger lirae may interrupt the streaks producing a somewhat maculate pattern. Operculum chestnut-brown.

Snout and left side of foot around operculum speckled or lined with black.

Radula with 55–60 rows, central plate with strong slender median cusp, without side cusps, lateral plate with a single strong unserrated cusp, 2 marginal plates, strongly uncinate, unserrated.

Mantle edge frilled. Eyes not traceable in the preserved material.

Fossil: Quaternary: raised beach, Little Brak River, Mossel Bay (S. Afr. Mus.).

False Bay to Algoa Bay, 22–54 fathoms, and off Cape Point, 250 fathoms (Tomlin: P.F. material).

Living: False Bay, 51–73 metres (U.C.T., and Fisheries Survey vessel *Africana*); 29° 30′ S., 31° 28′ E. 68 metres (*Africana*, per U.C.T.).

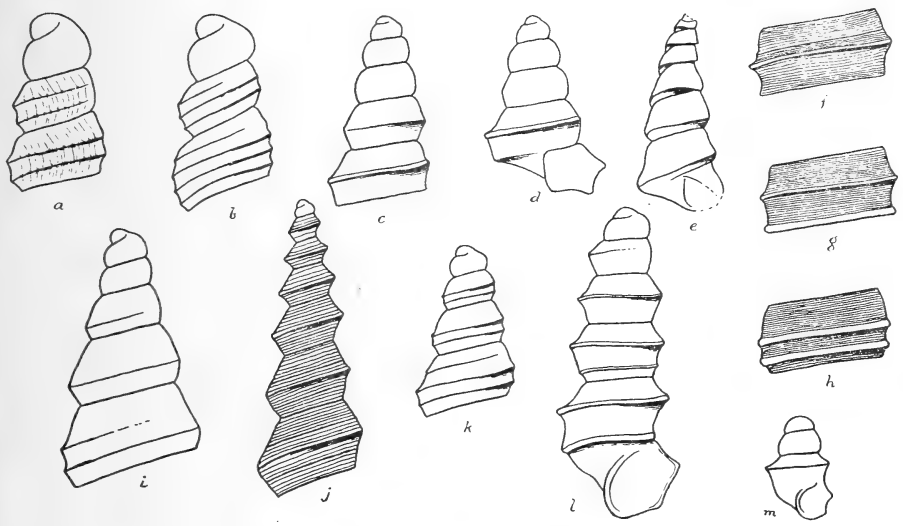

FIG. 33. *a*, *Turritella ferruginea* Rve. protoconch. *b*, *T. sanguinea* Rve. protoconch. *c*, *T. declivis* Ad. & Rve. protoconch. *d*, *T. carinifera* Lam. protoconch. *e*, *T. carinifera*, aberration of 3rd–8th whorls. *f*, sculpture on 9th–13th whorls of *T. carinifera* from Port Nolloth. *g*, sculpture on 7th–13th whorls of *T. carinifera* specimen from Still Bay. *h*, sculpture on 11th–14th whorls of *T. carinifera* specimen from Still Bay. *i*, *T. chrysotoxa* Tomlin protoconch. *j*, *Turritella* sp., protoconch and 1st–6th whorls. *k*, *T. capensis* Krss. protoconch. *l*, *T. minuta* Turton, protoconch and 1st–3rd whorls. *m*, *T. minuta*, protoconch and 1st whorl.

Remarks. The juveniles from the *Pieter Faure* bottom-samples add nothing to the distribution as given above.

The large 111 mm. specimen was taken in False Bay by the University of Cape Town. None of the *Pieter Faure* examples are quite so large.

The protoconch is larger and the shell broader than *sanguinea*; and the pitch of the whorls less steep.

Worn examples without the bicingulate early whorls, the beaded lirae, and cancellate sculpture, may not be easy to distinguish from *sanguinea*; but the greatest width of a whorl is not *below* the middle of the whorl, and usually the margin of the base is more angular.

These shells frequently carry the circular, disc-like egg-capsules of a *Marginella*.

Von Martens (1903, p. 44) recorded *bacillum* Kien. from 34° 20′ S., 18° 36′ E. 70 metres; i.e. from the mouth of False Bay. This locality seems very far west for this Indo-Pacific species (recorded from Natal by Krauss). I think the *Valdivia* specimens are more likely to have been *ferruginea*. Thiele (1925 made no comment on von Martens' identification, but the two specimens should be re-examined. At that time *ferruginea* had not been recognized as a South African species (see Tomlin, 1925, p. 310).

Not recorded in Rogers' report (see Smith, 1906b) on the Little Brak River deposit; but I have seen a specimen in a later collection from the same deposit.

Turritella minuta W. H. Turton

Fig. 33 *l*, *m*

Turritella minuta Turton, 1932, p. 130, pl. 27, no. 943.

Protoconch 1½ whorls, alt. 0·3, diam. 0·25–0·3 mm., smooth. 1st and following whorls with a strong spiral keel in upper third of whorl, on 3rd whorl a second lira develops in lower third. Length: 4 whorls 1·75 mm., 6 whorls 2·75 mm.

Port Alfred (Turton); Still Bay, several (S. Afr. Mus. coll. Muir). 34° 27′ S., 25° 42′ E. 256 fathoms, one with 6 whorls (S. Afr. Mus. P.F. coll.).

Remarks. As Turton's photo of a worn specimen does not show the sutures clearly, a drawing of two Still Bay examples is given here.

These apices appear to be turritellid, but they do not belong to any of the larger species recorded from South Africa.

The *Pieter Faure* specimen was probably carried down to 256 fathoms by currents; the protoconch has been worn away, but the keels are prominent.

In appearance very like a *Pyrgula*.

I do not think this is a *Turritella*, but I make no suggestion as to where it might be placed, beyond referring to *Cyclonidea*, a genus which Laseron (1956, p. 453) tentatively included in the Rissoidae. *C. carina* Laseron (1956, fig. 181) has 2 keels on each whorl (as Turton mistakenly said of his species), and one on the base.

Fam. **Mathildidae**

Gen. Mathilda Semper

Thiele, 1929, p. 183.

Mathilda salve n.sp.

Fig. 34

Protoconch sinistral, oblique to axis of shell, 1¼ whorls, diam. 0·5 mm., smooth. Postnatal whorls 9. Axial ribs *c*. 20 on 1st whorl, increasing to *c*. 30

on 8th whorl, thereafter irregular, not so definite, and confused with the growth-lines. Spiral lirae 2 on 1st whorl, the upper one continued on following whorls as a median keel, on 2nd and following whorls one lira immediately below suture, one between it and the keel, one between keel and lower suture, on later whorls a 5th lira immediately above lower suture, and a very fine intermediary between each pair of main lirae except the 4th and 5th. Intersections with axial ribs, including those on the subsutural lira, granular, becoming stronger on later whorls, especially on median keel and the lira below it. Base with 8 spiral lirae and a marginal one (= the 5th lira mentioned above). Sutures impressed. Columella straight. Umbilicus almost closed, but the

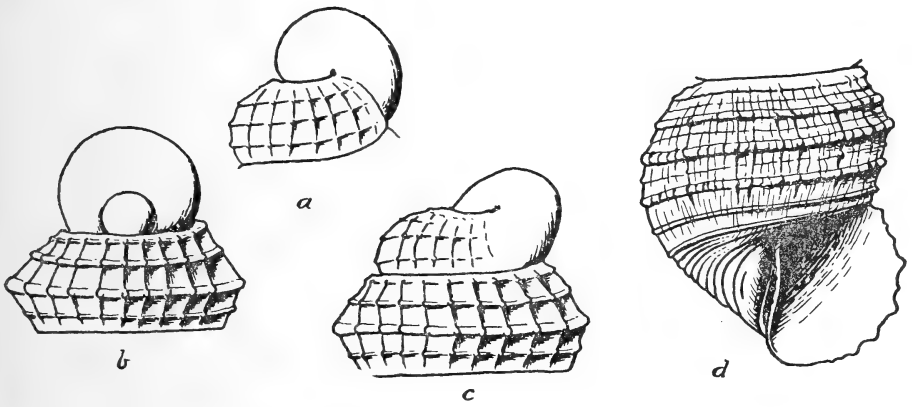

FIG. 34. *Mathilda salve* n. sp. *a*, beginning of 1st postnatal whorl with basal (ventral) view of protoconch. *b*, second half of 1st postnatal whorl with apical (dorsal) view of protoconch. *c*, protoconch and first halves of 1st and 2nd postnatal whorls. *d*, body whorl.

reflexed lip seems to be partially broken, and may have extended farther over the umbilicus. Outer lip rounded. 15 × 5·25 mm.

Cape St. Blaize N. × E. 73 miles. 125 fathoms, one: Type; Cape Morgan N. ½ W. 77 fathoms, apex of 4 whorls, no protoconch; off Glendower Beacon (Port Alfred), 100 fathoms, apex of 7 whorls, no protoconch (S. Afr. Mus. Nos. A9139 Type, A9140, A9141. P.F. coll.).

Remarks. Differing in detail from *sansibarica* Thiele 1925 and *amanda* Thiele 1925, both from the east coast of Africa, but very close to the latter. It has more numerous axial ribs than *zmitampis* Melvill & Standen 1901, from Gulf of Oman, and the spiral sculpture is different (judging by the figure). Appears to have some resemblance to *Mathildona euglypta* Iredale (1929, p. 186) from New South Wales.

The Cape St. Blaize Type specimen is dead but not worn; both the apices are worn, but show enough of the sculpture to confirm their identity with the Type.

Fam. **Homalogyridae**

Homalogyra gemmulata W. H. Turton

Homalogyra gemmulata Turton, 1932, p. 197, pl. 51, no. 1373 (3 views).

Port Alfred (Turton); Still Bay (S. Afr. Mus. Muir coll.).

Turton obtained three specimens; Muir at least two dozen. Identification confirmed by Tomlin.

Fam. **Adeorbidae**

Thiele, 1925, p. 57; 1929, p. 174 (*Vitrinellidae*).

Thiele (1925), on the basis of the radula as far as it was known, grouped the Vitrinellidae with the Taenioglossids, and the Cyclostrematidae with the Rhipidoglossids. In 1929 he took the name of the oldest genus for that of the family.

Vitrinella arifca Bartsch

Vitrinella arifca Bartsch, 1915, p. 168, pl. 36, figs. 7–9. Turton, 1932, p. 197.

Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. Muir coll.). Turton obtained three specimens, Muir two dozen. Identification confirmed by Tomlin.

Vitrinella rifaca Bartsch

Vitrinella rifaca Bartsch, 1915, p. 167, pl. 37, figs. 1–3.

Port Alfred (Bartsch, Turton, 1932); Still Bay (S. Afr. Mus. Muir coll.); west coast of Cape Peninsula (Mrs. Connolly). Tomlin agreed with my identification.

Vitrinella agulhasensis Thiele

Vitrinella agulhasensis Thiele, 1925, p. 71, pl. 15 (3), fig. 17.

Trochiform, 4 spiral lirae, with fine axial pliculae between them, on base 4 spiral lirae. 1·7 × 1·8 mm.

34° 51′ S., 19° 37′ E. 80 metres; 35° 26′ S., 20° 56′ E. no depth given (Thiele).

Not taken by the *Pieter Faure*.

Vitrinella cingulifera (A. Adams)

Cyclostrema cingulifera Sowerby, 1864, p. 250, pl. 255, figs. 13, 14.
Vitrinella cingulifera Thiele, 1925, p. 71, pl. 16 (6), fig. 7 (radula).

Durban (Smith, 1903).

Distribution. Dar-es-Salaam, East Indies, Philippines, Japan.

Vitrinella inclinans n.sp.

Fig. 35 *c*

Depressed. Whorls 3. No visible spiral striations, although the specimens seem to be fairly fresh. Umbilicus rather narrow, without internal granulate lira. Base with 12 or 13 obliquely spiral lirae, the earlier ones curving towards the umbilicus, the later ones running to the inner lip. Aperture circular, with callus adjoining the whorl above. 1 × 0·75 mm.

34° 27′ S., 25° 42′ E. 256 fathoms (southern slope of the continental shelf) 6. (S. Afr. Mus. P.F. coll.).

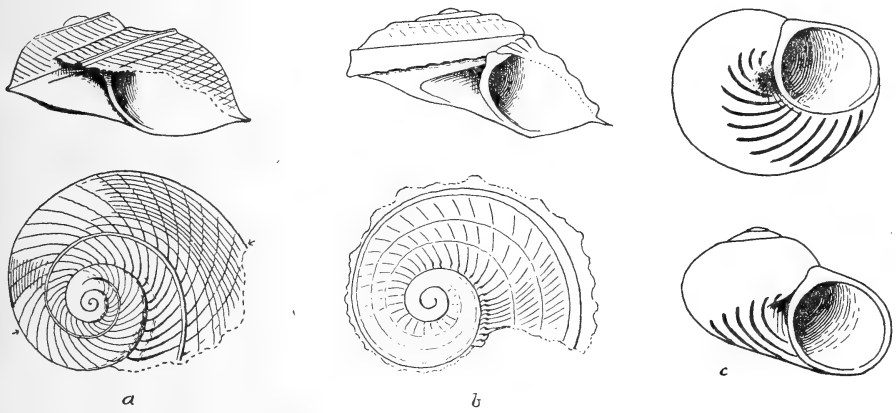

Fig. 35. *a*, *Cochliolepis catherinae* n. sp. *b*, *C. tugelae* n. sp. *c*, *Vitrinella inclinans* n. sp.

Remarks. The basal sculpture is somewhat similar to that of *arifca* Bartsch, but the umbilicus is not bounded by a ridge with which the oblique lirae anastomose. Here the lirae are subparallel and run direct to the inner lip.

Cochliolepis planulata (Sow.)

Cyclostrema planulata Sowerby, 1892, p. 46, pl. 2, fig. 49.
Discopsis planulata Bartsch, 1915, p. 171. Turton, 1932, p. 201, pl. 52, no. 1393.
Discopsis africana Bartsch, 1915, p. 172, pl. 33, figs. 5–7.
Naricava planulata Thiele, 1925, p. 75, pl. 17 (5), figs. 30, 31.

Main lirae 3–4 at start of 1st postnatal whorl, 5–6 on shell 2 mm. diam., increasing to 7–8 on larger shells; number of intermediaries very variable, One of the lirae near the suture (Bartsch said 4th lira; I prefer to call it 1st main lira) forming a shoulder, which in spite of Bartsch calling it 'strong' does not show on the profile of the outer lip in his fig. 5. Retractive growth-lines better marked between suture and this lira than on rest of whorl, often almost forming pliculae. Lirae often somewhat beaded. The undulations on the peripheral keel (*africana*) are of course merely due to beach wear, as is shown by the Muir series.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. Muir coll.); Gordon's Bay (False Bay (Dr. Ackert)). 34° 51′ S., 19° 37′ E. 80 metres (Thiele).

Cochliolepis turtoni (Bartsch)

Discopsis turtoni Bartsch, 1915, p. 173, pl. 33, figs. 1–3.

Port Alfred (Bartsch, Turton, 1932); Still Bay (S. Afr. Mus. Muir coll.).

Cochliolepis catherinae n.sp.

Fig. 35 *a*

Protoconch 1½ whorls, smooth. Postnatal whorls 2. One conspicuous spiral lira at a little below the upper quarter of whorl, forming a shoulder above which the profile is nearly flat, below steeply inclined, periphery keeled; no striae between suture and this lira, but below latter 12 weak lirae, the lower 10 closer together than the upper 2; strongly retractive axial pliculae, interrupted by the shoulder lira, but continued below it, intersections with the weak lirae slightly beaded. Base with a groove near the peripheral keel, and a weak lira about midway between keel and umbilicus; axial pliculae not so strong as on upper surface, and mixed with fine growth-lines. Diam. (at arrows in fig.) 2·75, alt. 1·5 mm.

34° 27′ S., 25° 42′ E. 256 fathoms, one dead; 33° 50′ S., 25° 54′ E. 33 fathoms, one dead (S. Afr. Mus. A9221, and A9341. P.F. coll.).

Remarks. Differs from *planulata* by the distinct tabulate shoulder with one strong lira, and the much stronger axial sculpture.

Cochliolepis tugelae n.sp.

Fig. 35 *b*

Protoconch one whorl, smooth. Postnatal whorls 2. Profile concave below the suture, then convex. Three spiral lirae, the middle one weak, the lower one strongest, periphery thin, carinate (broken); the upper part of 2nd whorl overlies the peripheral keel of the 1st whorl, and is banked up against the strong lower lira; retractive axial pliculae *c.* 30 on last whorl, forming slight nodules at the suture and on the upper lira. Base with one lira forming an angularity at entrance to umbilicus, and joining lower margin of aperture at about midway; pliculae faint, slightly stronger in the umbilicus. Diam. 2·5, alt. 1 mm.

Off Tugela River (Natal), 14 fathoms, one dead (S. Afr. Mus. A9282. P.F. coll.).

Remarks. May eventually be included in *planulata*, but appears to have fewer and stronger axial pliculae, and no trace of intermediary spiral lirae.

Pondorbis alfredensis Bartsch

Pondorbis alfredensis Bartsch, 1915, p. 171, pl. 36, figs. 1–3. Turton, 1932, p. 200.
Pondorbis admirabilis Turton, 1932, p. 200, pl. 52, no. 1389.

Pondorbis iotoides Turton, 1932, p. 200, pl. 52, no. 1390.
Pondorbis inconspicua Turton, 1932, p. 200, pl. 52, no. 1391.
Pondorbis sp. Turton, 1932, p. 201, pl. 52, no. 1392.

The riblets are often, but not always, closer together near the aperture. A spiral line frequently visible on base, or on part of base.

Port Alfred (Bartsch, Turton); Still Bay, numerous specimens (S. Afr. Mus. Muir coll.). 34° S., 25° 44′ E. 33 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. Bartsch placed his new genus in the Vitrinellidae. The shell is very like some East African shells placed by Thiele (1925, p. 116) in a new genus *Lyocyclus* and family Lyocyclidae near the Solariidae. In 1929 (p. 245) Thiele included his genus in the subfam. Lyocyclinae of the family Trichotropidae. He did not mention *Pondorbis.*

Thiele (1925) also referred to the very similar Brazilian shell placed with hesitation by Watson (1886, p. 137, pl. 8, fig. 13) in *Bifrontia.*

Shells of similar facies are also found in *Liotella* and *Brookula* in the family Cyclostrematidae (Thiele) or Liotiidae (see Laseron, 1954, pp. 1 *sqq.*).

Without even an operculum as a clue, one is merely guessing as to the correct taxonomic position of the South African shell.

Fam. **Rissoidae**

Thiele, 1929, p. 159.
Laseron, 1956, pp. 384–484, figs. 1–228 (N. Australian species).

Living material is badly needed in this family for examination of the opercula and radulae. I have obtained the opercula of *Rissoa crawfordi* and *nigra,* and the radula of the latter. The latter must be transferred to *Eatoniella.*

Rissoa capensis Sow.

Rissoa capensis Sowerby, 1892, p. 38, pl. 2, fig. 41. Turton, 1932, p. 147.
Ampullarina africana Smith, 1904, p. 38, pl. 3, fig. 14. Bartsch, 1915, p. 11.
Jeffreysia capensis Bartsch, 1915, p. 135.

Bartsch recorded numerous specimens of Sowerby's species and one of Smith's species from Port Alfred. Turton said that he and Tomlin (1927) compared the Types at the British Museum (Natural History) and found them exactly alike. Tomlin later named the South African Museum specimens from Still Bay (Muir. coll) as *Ampullarina africana.*

Rissoa crawfordi Smith

Rissoa crawfordi Smith, 1901, p. 107, pl. 1, fig. 13. Thiele, 1925, p. 77, pl. 17 (5), fig. 44. Turton, 1932, p. 145.

Operculum oval, no internal process.

Algoa Bay, 20 fathoms (Smith); Port Alfred, 3 specimens (Turton). 34° 51′ S., 19° 37′ E. 80 metres; 35° 16′ S., 22° 26′ E. 155 metres; 35° 26′ S., 20° 52′ E. no depth given (Thiele).

Off Cove Rock (East London), 22 fathoms, one; Algoa Bay, 25 and 33 fathoms, 4; 34° 5′ S., 25° 55′ E. 67 fathoms, several; 34° 26′ S., 25° 42′ E. 124 fathoms, several; 34° 27′ S., 25° 42′ E. 256 fathoms, several (S. Afr. Mus. P.F. coll. all dead).

Living: Sea Point, Cape Town (U.C.T.); west coast of Cape Peninsula (Mrs. Connolly).

Rissoa algoensis Thiele

Rissoa algoensis Thiele, 1925, p. 78, pl. 17 (5), fig. 46 (err.: pl. 17, fig. 45 for 'algoensis' read *valdiviae*, and fig. 46, for 'ignota' read *algoensis*).

34° 51′ S., 19° 37′ E. 80 metres; 33° 50′ S., 25° 48′ E. no depth given (Thiele). Also Great Fish Bay, Angola (Thiele).

33° 3′ S., 25° 57′ E. 32 fathoms, several; off Keiskamma Point, 33 fathoms, several; 34° S., 25° 44′ E. 33 fathoms, several (S. Afr. Mus. P.F. coll. all dead).

Perhaps this may become a synonym of *Microsetia helga* Bartsch 1915.

Rissoa candidata W. H. Turton

Rissoa candidata Turton, 1932, p. 146, pl. 32, no. 1041.

Some specimens collected by Muir at Still Bay were identified by Tomlin as this species.

Turton's locality 'Clifton' is, *presumably*, the rocky beach between Sea Point and Camps Bay (suburbs of Cape Town) on the west coast of the Cape Peninsula.

Rissoina crassa Angas

Rissoina crassa Angas, 1871, p. 17, pl. 1, fig. 16. Smith, 1903a, p. 383.

Tomlin saw a South African Museum specimen (in good condition) from Natal, and agreed with Smith as to the identity of the South African specimens with the Australian species. The South African Museum also has 4 specimens from Durban, collected by Burnup.

One worn but easily identifiable specimen was found attached to an example of *Xenophora corrugata* from off Morewood Cove (north of Durban), 27 fathoms (P.F. coll.).

One worn specimen from off Cove Rock (East London), 80–130 fathoms (S. Afr. Mus. P.F. coll.).

Rissoina cf. *durbanensis* Smith

Rissoina durbanensis Smith, 1906a, p. 47, pl. 7, fig. 15.

Smith described this as a 'granuled-cancellate' species, with ' . . . liris transversis . . . tuberculatis'; his figure shows a strongly granular or nodular shell. The present specimen has axial ribs and spiral lirae forming a cancellate sculpture, with small tubercles at the intersections.

Apex missing, 5 whorls remaining, the top one worn. Axial ribs on 2nd and 3rd (remaining) whorls 14, on 4th and 5th whorls 16, extending across base;

crossed by spiral lirae 2–3 on 2nd (remaining) whorl, 3 on 3rd, 4 on 4th and 5th whorls; base with one lira above, followed by a deep sulcus and then a strong costa; the axial ribs traceable across the sulcus and the costa, causing the latter to appear granulate (pitted in Smith's figure); sutures crenulate; outer lip varicoid. 4·75 (5 whorls) × 2 mm.

Natal (no exact locality) (S. Afr. Mus. A9182. P.F. coll.).

Remarks. In spite of some discrepancies from Smith's description and figure, I provisionally assign this specimen to his species.

It is not *R. pura* (Gould) 1861, as redescribed by Bartsch (1915, p. 131, pl. 5, fig. 10), which has a few more ribs and lirae (on apparently corresponding whorls), and no sulcus or strong anterior costa on base.

Incidentally *R. pura* collected by Stimpson in Simon's Bay in 1853, has not been rediscovered.

Rissoina shepstonensis Smith

Rissoina shepstonensis Smith, 1906a, p. 48, pl. 7, fig. 16.
[?] *Rissoina shepstonensis* Thiele, 1925, p. 90.

Three somewhat worn topotypes in the South African Museum (coll. Burnup). The axial ribs extend on to the upper part of the base but scarcely reach the columella; base with 8–9 spiral lirae, closer together anteriorly, posteriorly forming an inconspicuous lattice sculpture with the axial ribs. Intervals between axial ribs with very fine spiral striae, running up the sides of the ribs, and possibly in fresh specimens crossing them.

Thiele recorded from 34° 51′ S., 19° 37′ E. 80 metres, a small 5-whorled specimen, 2·3 mm. long, as doubtfully *shepstonensis*. It is more likely to be one of Turton's species.

Rissoina alfredi Smith

Rissoina alfredi Smith, 1904, p. 35, pl. 2, fig. 24.

Distinguished by the strong obliquity of the axial ribs.

Off Cove Rock (East London), 80–130 fathoms, one dead (S. Afr. Mus. A9183. P.F. coll.).

Turton (1932, p. 144) said he did not obtain *shepstonensis* at Port Alfred, but one of five specimens of *alfredi* sent by him to the South African Museum is suspiciously like *shepstonensis*.

Rissoina exilis W. H. Turton

Rissoina exilis Turton, 1932, p. 144, pl. 32, no. 1032.

A broken specimen, 4 × 1·5 mm., consisting of 5 whorls (? 2nd-6th), from St. Francis Bay, 24–34 fathoms (S. Afr. Mus. A9223. P.F. coll.) may belong here. Turton did not mention any spiral striae being present in his species, though he described them for *albanyana*.

The axial ribs in the present specimen cross the base to the columella, as they appear to do in Turton's figure of *exilis* (and *albanyana* and *rietensis*). There are no spiral striae (present in *shepstonensis*).

Rissoina calia Bartsch

Rissoina elegantula (*non* Angas), Sowerby, 1892, p. 37.
Rissoina calia Bartsch, 1915, p. 130, pl. 5, fig. 1. Tomlin, 1931, p. 422. Turton, 1932, p. 144, pl. 32, no. 1028.
Rissoina calia, var. *elongata* Turton, 1932, p. 144, pl. 32, no. 1029.
Rissoina denseplicata Thiele, 1925, p. 90, pl. 19 (7), fig. 8.

Protoconch 2($2\frac{1}{2}$) whorls, nucleus sunken, diam. 0·4, alt. 0·3 mm., very finely spirally striate. Postnatal whorls 6; axial ribs on 1st whorl 20–22 (Bartsch: 26), increasing on later whorls, predominant over the fine spiral striae. Outer lip patulous. 8 × 3 mm.

Port Alfred (Bartsch, Turton); Kalk Bay (False Bay), and Still Bay (S. Afr. Mus. coll. Lightfoot and Muir resp.); west coast of Cape Peninsula (Mrs. Connolly).

34° 51′ S., 19° 37′ E. 80 metres; 35° 16′ S., 22° 26′ E. 155 metres; 35° 29′ S., 21° 3′ E. 102 metres (Thiele).

Off Cape Natal (Durban), 85 fathoms, one dead; 34° 5′ S., 25° 55′ E. 67 fathoms, 5 dead; 34° 26′ S., 25° 42′ E. 124 fathoms, 18 dead (some apices only); off Cape St. Blaize, 125 fathoms, 5 dead (S. Afr. Mus. P.F. coll.).

Remarks. Tomlin agreed with my suggestion that *denseplicata* was synonymous with *calia*.

The Natal example is quite typical. Dr. Muir collected numerous examples, including juveniles with protoconchs, at Still Bay.

Cf. the Australian *Zymalata inermis* (Brazier) (Laseron, 1956, fig. 78).

Rissoina (*Iravadia*) *annulata* Dnkr.

Rissoina annulata Dunker, 1860, p. 12, pl. 2, fig. 12. Smith, 1903a, p. 383 (quotes reference: Gould *Otia Conch.* p. 144, *trochlearis*.)

Protoconch 3 whorls, diam. and alt. 0·3 mm., smooth, indications towards end of 3rd whorl of 2 spiral lirae. Postnatal whorls 4; 1st and 2nd whorls bicingulate, with a 3rd lira beginning low down on 2nd whorl; 3rd and 4th whorls tricingulate, the lirae equally spaced; base with 3 strong spiral lirae. 3·8 × 1·75 mm.

Durban (Smith; also S. Afr. Mus. coll. Burnup).

Off Tugela River (Natal), 14 fathoms, one worn (S. Afr. Mus. P.F. coll.).

Distribution. Aden, India, East Indies, China, Japan.

Remarks. Distinguished from *Odostomia ficara* Bartsch (1915, p. 88, pl. 16, fig. 1) by the equally-spaced spiral lirae, only 3 lirae on base and absence of the columellar pleat.

Analogous species in India have been separated under the genus *Iravadia* Blanford 1867, and in Australia under the genus *Pellamora* Iredale 1943 (Lase-

ron, 1956, p. 422). Thiele (1929, p. 156) transferred *Iravadia* to the freshwater and brackish water family Hydrobiidae.

Gen. Pyramidelloides Nevill

Laseron, 1956, p. 418.

Laseron regards this as a genus of well-defined shells ranging from Japan, China, East Indies, N. Australia, Indian Ocean, Persian Gulf to Mauritius. The spire is often bent (Bartsch: falcate) as in *Melanella*, and the sculpturing consists of 2 strong spiral lirae on each whorl, the upper lira broken up into a series of nodules.

The South African species is distinct from the four species described by Laseron, but I have no material available for comparing it with *miranda* A. Adams, or *insolita* Desh. (Mauritius).

Pyramidelloides eucosmia (Bartsch)

Rissoina eucosmia Bartsch, 1915, p. 131, pl. 20, fig. 2.
Rissoina gemmulata Turton, 1932, p. 145, pl. 32, no. 1035.

Port Alfred (Bartsch, Turton).

One worn but unmistakeable specimen, with 4 postnatal whorls, 2·25 mm. long, from off Cape Natal (Durban), 54 fathoms (S. Afr. Mus. A9184. P.F. coll.).

Cingula agulhasensis (Thiele)

Rissoa agulhasensis Thiele, 1925, p. 79, pl. 18 (6), fig. 2.

34° 51′ S., 19° 37′ E. 80 metres; 33° 50′ S., 25° 48′ E. no depth; 35° 16′ S., 22° 26′ E. 155 metres (Thiele); and also Great Fish Bay, Angola.

Off Umhloti River (Natal), 40 fathoms, one dead; 34° 26′ S., 25° 42′ E. 124 fathoms, 5 dead; 34° 27′ S., 25° 42′ E. 256 fathoms, 6 dead (S. Afr. Mus. P.F. coll.).

Alvania fenestrata (Krss.)

Rissoa fenestrata Krauss, 1848, p. 86, pl. 5, fig. 20. Thiele, 1925, p. 80, pl. 18 (6), fig. 8.
Rissoina fenestrata Schwarz, 1910, p. 114.
Alvania fenestrata Turton, 1932, p. 143, pl. 32, no. 1025.

Protoconch 3 whorls, forming a conical apex, smooth. Postnatal whorls 3; axial riblets 16–18, continued across base; spiral lirae 2 on 1st and 2nd whorls, 3 on 3rd, intersections nodulose, on base 3 spiral lirae. 4 × 2 mm.

Fossil: Pleistocene, Little Brak River (S. Afr. Mus.).

On byssus of *Pinna squamifera* (Krauss; his locality for this bivalve was Knysna); Port Elizabeth (Sowerby, 1892); Port Alfred (Bartsch, 1915, Turton); Still Bay (S. Afr. Mus. Muir coll.); Buffels Bay (False Bay) (S. Afr. Mus. coll. K.H.B.).

34° 51′ S., 19° 37′ E. 80 metres; 34° 8′ S., 24° 59′ E. 80 metres; 33° 50′ S., 25° 48′ E. no depth given (Thiele).

Off Tugela River (Natal) 14 fathoms, 5; off Umhloti River (Natal) 40 fathoms, 3; off Illovo River (Natal) 27–30 fathoms, 12; off Umkomaas (Natal) 40 fathoms, 3; off Cape Morgan, 77 fathoms, one; 33° 3′ S., 27° 57′ E. 32 fathoms, 5; off Keiskamma Point, 33 fathoms, 5; 33° 45′ S., 26° 44′ E. 40–43 fathoms, one; Buffels Bay (False Bay) 35 fathoms, one (S. Afr. Mus. P.F. coll. all dead).

Alvania argentea (Sow.)

Rissoa argentea Sowerby, 1892, p. 38, pl. 2, fig. 40. Thiele, 1925, p. 80, pl. 18 (6), fig. 7.
Alvania argentea Turton, 1932, p. 143, pl. 31, no. 1024.

Protoconch 3 whorls, forming a conical apex, smooth. Postnatal whorls 3; axial riblets 24–27, on upper half of whorls, evanescent below; spiral lirae 2 on 1st whorl, 3 on 2nd and 3rd whorls, intersections slightly nodulose; on base 3 spiral lirae (a 4th behind inner lip). 3 × 1·5 mm.

Fossil: Pleistocene: Sedgefield near Knysna (Martin).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, 1915, Turton).

34° 51′ S., 19° 37′ E. 80 metres; 33° 50′ S., 25° 48′ E. no depth given; also Great Fish Bay, Angola (Thiele).

Off Cape Morgan, 47 fathoms, one; 33° 3′ S., 27° 57′ E. 32 fathoms, 6; off Keiskamma Point, 33 fathoms, 11; 34° 26′ S., 25° 42′ E. 124 fathoms, 6; 34° 27′ S., 25° 42′ E. 256 fathoms, 45; off Cape Infanta, 46 fathoms, one; False Bay, 22 fathoms, 2 (S. Afr. Mus. P.F. coll. all dead).

Not found by Dr. Muir at Still Bay.

Alvania farquhari (Smith)

Rissoa farquhari Smith, 1910a, p. 200, pl. 7, fig. 12.
Alvania farquhari Bartsch, 1915, p. 128, pl. 5, fig. 5.

Protoconch 1½ whorls (nucleus plus one whorl), finely spirally striate. Postnatal whorls 3; spiral lirae 2 on 1st whorl, 3 on 2nd 4 on 3rd whorl, 2 on base.

Port Elizabeth (Smith); Port Alfred (Bartsch, Turton, 1932); Still Bay (S. Afr. Mus. Muir coll.); False Bay (U.C.T.).

Alvania winslowae Bartsch

Alvania almo (*non* Bartsch 1911), Bartsch, 1915, p. 128, pl. 21, fig. 7.
Alvania winslowae Bartsch, 1928, p. 141. Tomlin, 1931, p. 421.

Protoconch 1½ whorls (nucleus plus one whorl), finely spirally striate. Postnatal whorls 3; 2 strong spiral lirae on each whorl and 2 on base.

Port Alfred (Bartsch, Turton, 1932); Jeffreys Bay (Tomlin); Still Bay (S. Afr. Mus. Muir coll.); west coast of Cape Peninsula (Mrs. Connolly).

34° S., 25° 44′ E., 33 fathoms, one; 34° 27′ S., 25° 42′ E. 256 fathoms, 6 (S. Afr. Mus. P.F. coll.).

Alvania alfredensis Bartsch

Alvania alfredensis Bartsch, 1915, p. 128, pl. 21, fig. 8.

Protoconch 1½ whorls (nucleus plus one whorl), finely spirally striate. Postnatal whorls 3, profile slightly angular in middle; whorls and base closely and regularly spirally lirate.

Port Alfred (Bartsch); Still Bay (S. Afr. Mus. Muir coll.).

34° 27′ S., 25° 42′ E. 256 fathoms, 2 (S. Afr. Mus. P.F. coll.).

Very abundant at Still Bay. Turton found only one (the Type) at Port Alfred.

Remarks. Might be compared with *Rissoa* (*Amphithalamus*) *densilabrum* Melvill (1912, p. 245, pl. 12, figs. 8, 8 *a*) from Karachi.

Alvania outis Tomlin

Alvania nemo (*non* Bartsch 1911), Bartsch, 1915, p. 127, pl. 5, fig. 3.
Alvania outis Tomlin, 1931, p. 421.

Protoconch 1½ whorls (nucleus plus one whorl), finely spirally striate. Postnatal whorls 3; spiral lirae 3 on 1st whorl, 4 on 2nd, 5 on 3rd whorl, on base one lira, sometimes a 2nd, indistinct.

Port Alfred (Bartsch, Turton, 1932); Jeffreys Bay (Tomlin); Still Bay (S. Afr. Mus. Muir coll.); west coast of Cape Peninsula (Mrs. Connolly).

Alvania kowiensis Tomlin

Alvania ima (*non* Bartsch, 1911) Bartsch, p. 129, pl. 5, fig. 2.
Alvania kowiensis Tomlin, 1931, p. 421.

If *Rissoa hertzogi* Thiele (1925, p. 82, pl. 18(6), figs. 15, 16) should prove synonymous, that name would replace Tomlin's name. Bartsch's figure shows more numerous axial ribs (*c.* 15 in face view, 32 in text, on 3rd whorl) than shown by Thiele (10–11 in face view), but the resemblance is strong, and variability in the number of ribs occurs in the closely allied *deweti* Thiele.

Port Alfred (Bartsch, Turton, 1932); Coffee Bay (Peddie coast) (Tomlin).

Alvania deweti (Thiele)

Rissoa (*Alvania*) *deweti* Thiele, 1925, p. 81, pl. 18 (6), fig. 13.

Protoconch 1½ whorls (nucleus plus one whorl), smooth. Postnatal whorls 4. Axial riblets on 1st whorl 7–10 visible in face view, 15–20 on 4th whorl; spiral lirae on 4th whorl (6)7, not well developed on preceding whorls; intersections in fresh specimens slightly nodulous, in worn specimens the intervening pits more conspicuous; on base 7 spiral lirae. Sutures channeled. Outer lip varicoid in adult. 3·75 × 2·25 mm.

35° 16′ S., 22° 26′ E. 155 metres (Thiele).

Off Hood Point (East London), 49 fathoms, one fresh; 34° 26′ S., 25° 42′ E. 124 fathoms, 11, some broken and worn; 34° 27′ S., 25° 42′ E. 256 fathoms, 5; off Cape St. Balize, 125 fathoms, 5, one of them fresh (S. Afr. Mus. P.F. coll.).

Remarks. The number of axial riblets seems to be variable, but the *Pieter Faure* material contains no specimen with so few riblets as shown in Thiele's figure of *beyersi* Thiele 1925 (pl. 18(6), fig. 14). With more material it may perhaps be possible to combine *beyersi* with *deweti.*

Amphithalamus turtoni Bartsch

Amphithalamus turtoni Bartsch, 1915, p. 126, pl. 6, fig. 5.

Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. Muir coll.).

Amphithalamus denseplicatus Turton

Amphithalamus denseplicata Turton, 1932, p. 141, pl. 31, no. 1012.

Port Alfred (Turton); Still Bay (S. Afr. Mus. Muir coll.).

The Still Bay examples agree with Turton's figure. The specific name, however, may have to be changed to *multistriatus*, which has line and figure precedence. Turton's figure of the latter is not clear; it is also not very dissimilar from that of *Nodulus dilectus* (pl. 30, no. 1001).

Amphithalamus muiri n.sp.

Fig. 15 *d*

Protoconch $1\frac{1}{2}$ whorls (nucleus plus one whorl), smooth. Postnatal whorls 2, profile of whorls strongly convex, sutures indented. Retractive axial riblets 9–10 visible in face view on last whorl, variable in strength, which makes an exact count uncertain. 0·9–1 × 0·3–0·4 mm.

Still Bay (S. Afr. Mus. Muir coll.). 12 specimens.

Resembles *africanus* Bartsch (1915, p. 127, pl. 21, fig. 6) as regards the ribbing, but has much more globular whorls.

Anabathron eucosmia (Turton)

Turritella (?) *eucosmia* Turton, 1932, p. 130, pl. 27, no. 944.

Turton was doubtful about the genus, but it seems to be an *Anabathron.* Very similar to the Australian *A. ascensum* Hedley (1907, p. 496, pl. 17, fig. 20; also Laseron, 1956, p. 444, fig. 157).

Anabathron (*Nodulus*) *africanum* (Bartsch)

Nodulus africanus Bartsch, 1915, p. 125, pl. 31, fig. 5.

Port Alfred (Bartsch, Turton, 1932); Still Bay (S. Afr. Mus. Muir coll.). 34° 27′ S., 25° 42′ E. 256 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. Turton (1932) said this species was 'very rare' at Port Alfred, but Dr. Muir found it abundant at Still Bay. Length up to 1·5–1·6 mm., slightly variable in width.

The *Pieter Faure* specimen is quite fresh and unworn, the spiral striations easily discernible under a × 18 lens.

A single specimen among the Muir material of *africanum* is definitely narrower: 1 × 0·3 mm., with protoconch 1½ whorls plus 3 postnatal whorls, spirally striate. It is perhaps nearest to *curiosus* Turton 1932, but I do not actually identify it with this species. I doubt whether all seven of Turton's 'new species' are valid.

Gen. Coriandria Tomlin

Tomlin, 1917, p. 221 (pro *Microsetia* Monterosato, preocc.).

By using the words 'I propose the new generic name *Coriandria* for the shell I described as *Microsetia durbanensis*', Tomlin merely substituted a new generic name for a preoccupied name; he did not thereby change the genotype of 'Microsetia', which was designated by Monterosato (1884) as *cossurae* (Calcara). If the animal of the genotype is known, the position of the genus is satisfactory.

But as regards *C. durbanensis* Tomlin (1916, p. 119, fig.), the original type series contained only dead shells, and the species can therefore never be confirmed. There are numerous littoral and estuarine small brown shells of similar facies, which are so alike that their identification is uncertain. They may even deceive experts. Some South African Museum examples from Durban (not collected by Burnup, who collected the original *durbanensis* lot) were identified by Tomlin as his *durbanensis*. On examination of the radula I found them to be *Assiminea*!

It seems therefore that *durbanensis* should be deleted from the fauna-list.

Coriandria gisna (Bartsch)

Microsetia gisna Bartsch, 1915, p. 132, pl. 6, fig. 4.

Port Alfred (Bartsch, Turton, 1932); Still Bay (S. Afr. Mus. Muir coll.).

Identified by Tomlin, and agreeing with topotypes presented to the South African Museum by Turton.

Coriandria halia (Bartsch)

Microsetia halia Bartsch, 1915, p. 132, pl. 6, fig. 8.

Port Alfred (Bartsch, Turton, 1932); Gordon's Bay (False Bay) (S. Afr. Mus. coll. Lightfoot; identified Tomlin).

Eatoniella nigra (Krss.)

Fig. 36

Rissoa nigra Krauss, 1948, p. 86, pl. 5, fig. 19.
Turton, 1932, p. 147.

Dull black, body whorl often grey, apex often corroded, grey or whitish; bleached specimens may be greyish, brownish or whitish. 2 × 1·3 mm.

Operculum oval, paucispiral, internal surface slightly nodular at the nucleus, and with a strong outstanding process.

Radula with *c.* 36 rows, central plate square, postero-lateral corners projecting, with 2 cusps on either side of the larger median cusp, lateral plate with inner margin of base excavate, 2 small cusps on inside and 3 on outside of main cusp, marginal plates uncinate, inner with 3–4 apical denticles, outer with 1 or 2.

FIG. 36. *Eatoniella nigra* (Krss.). Inner view of operculum, and radula teeth.

Table Bay and Algoa Bay (Krauss); Port Alfred (Turton); Table Bay and False Bay (S. Afr. Mus.).

Port Nolloth, St. Helena Bay, Saldanha Bay, west coast of Cape Peninsula, and False Bay (U.C.T.).

Remarks. When Tomlin identified some South African Museum specimens from Table Bay, he assigned the species to *Coriandria* presumably without examination of the operculum. Both operculum and radula indicate that *nigra* is a true *Eatoniella*, as defined by Thiele (cf. his figure of the radula: 1912, pl. 16, fig. 1).

Thiele (1912, p. 278, figs. 14, 15) described *Eatoniella capensis* from Simon's Bay; it is a slightly larger (2·3 × 1·35 mm.) brownish-yellow species.

Thiele (1912, p. 278/9, figs. 16–18) also described a smaller species from Simon's Bay as *Eatonina pusilla*, which has a slightly different operculum and radula.

Also *Jeffreysiopsis simoniana* Thiele (1912, p. 278, fig. 13) from Simon's Bay. Thiele (1929, p. 178) makes the genus a synonym of *Rissoella*, in a separate (with a ?) family Rissoellidae.

Fam. **Littorinidae**

Gen. LITTORINA Fer.

Before the number of species occurring around the coast of South Africa can be stated, with their correct names, long series must be collected at as many localities as possible, and a thorough study made of the variation. The forms recorded as *glabrata*, *intermedia*, *laevis*, *newcombi*, *pintado*, *scabra*, *ziczac* may possibly be found to be only one species. Tomlin (1931, p. 420) united *glabrata* and *laevis* under the name *coccinea* (Martyn) (or *obesa* Sow.).

The west African *punctata* Phil. occurs at Langebaan (Saldanha Bay) (U.C.T.); Dassen Island and Table Bay, False Bay, Hermanus, Breede River mouth (St. Sebastian Bay), Still Bay, Mossel Bay, Knysna (S. Afr. Mus.). So far as I am aware, however, South African and west African specimens have not been thoroughly compared.

Lectotypes of *africana*, *decollata*, and *knysnaensis* (all Krauss MS. Philippi 1847) have recently been figured (Janus, 1961).

Gen. Tectarius Val.

Tectarius natalensis (Phil.)

Fig. 37 *b*, *c*

Littorina natalensis Philippi, 1847, p. 160, pl. 3, fig. 4. Krauss, 1848, p. 102.
Tectarius natalensis Day & Morgans, 1956, p. 307 (listed). Macnae & Kalk, 1958, pp. 32 etc., fig. 21 *m*. Kalk, 1958, pp. 195, 211, 221 (habitat). Janus, 1961, p. 7, pl. 3, figs. 7, 8.

Living: Scottburgh (S. Afr. Mus. coll. K.H.B.). Durban (U.C.T.). Delagoa Bay (U.W.). Mozambique Island (U.W.).

Krauss recorded it from rocks at Algoa Bay as well as from Natal; but there does not seem to be any other record from a locality south of Natal.

Radula longer than shell.

Lectotype in Stuttgart Museum.

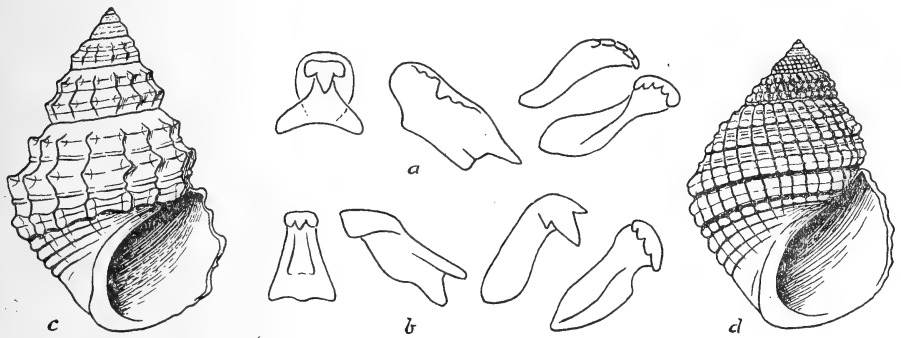

Fig. 37. Radula teeth of: *a*, *Littorina scabra* Linn. *b*, *Tectarius natalensis* (Phil.). *c*, *Tectarius natalensis* (Phil.). *d*, *Tectarius granosus* (Phil.).

Tectarius granosus (Phil.)

Fig. 37 *d*

Littorina granosus Philippi, 1848, p. 65.
Littorina glans Reeve, 1857, sp. 62, pl. 2.

A second species occurs at Delagoa Bay (S. Afr. Mus. coll. K.H.B. 1912) but appears to be much rarer: I obtained only three specimens. Witwatersrand University did not obtain it at Inhaca Island, nor did Mrs. Kalk (U.W.) at Mozambique Island.

9 × 6·5 mm.; but grows to 16 × 11·75 mm. (Salisbury in litt.).

Distribution. Tamatave (Madagascar); Cape Palmas; Fernando Po; and West Africa (Brit. Museum N.H.).

I am indebted to Mr. A. E. Salisbury for the identification of this species.

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ADDENDUM.

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SYNONYMY. Arrangement according to Schenk, E. T. & McMaster, J. H.: *Procedure in taxonomy.* 2nd ed. Stanford, Stanford university press, 1948. Bibliographic references modified.

'I. *Synonymy arranged according to chronology of names.*—All published scientific names by which a species has been previously designated (subsequent to 1758) are listed in chronological order, with bibliographical references to all descriptions or descriptive citations following in chronological order after each name. . . .

B. *Form of bibliographic references to synonymic names.*—The first reference following any name in the synonymy should be to the earliest citation of that name. This should be followed by references to all subsequent citations of the same name, arranged in chronological order. . . .'

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Example:—

Eulalia (*Steggoa*) *capensis* Schmarda

Eulalia capensis Schmarda 1861, p. 86, pl. 29, fig. 231. Willey 1904, p. 259.
Eulalia viridis var. *capensis* McIntosh 1903, p. 34. Day 1953, p. 30.
Eulalia viridis (*non* Muller) Ehlers 1913, p. 455. Day 1934, p. 30.

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ANNALS

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SOUTH AFRICAN MUSEUM

VOLUME XLVII

PART II

CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART IV. GASTROPODA: PROSOBRANCHIATA: RHIPIDOGLOSSA, DOCOGLOSSA. TECTIBRANCHIATA. POLYPLACOPHORA. SOLENOGASTRES. SCAPHOPODA

By

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CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART IV. GASTROPODA: PROSOBRANCHIATA: RHIPIDOGLOSSA, DOCOGLOSSA. TECTIBRANCHIATA. POLYPLACOPHORA. SOLENOGASTRES. SCAPHOPODA*

By

K. H. Barnard

South African Museum, Cape Town

(With 30 figures in the text)

Acknowledgements

Parts I, II, III and IV of this work have been carried out with the aid of a research grant from the South African Council for Scientific and Industrial Research. The Council has also made a grant-in-aid towards the cost of publication of Parts II, III and IV. This help is herewith gratefully acknowledged by the Trustees of the South African Museum.

Fam. **Cocculinidae**

Thiele, 1929, p. 92.

Three dead shells, maj. diam. 2·25–2·3 mm., are most probably a species of *Cocculina*. The surface shows no distinctive sculpture, and in any case the absence of the animal would render the identification uncertain.

34° 27′ S., 25° 42′ E., 256 fathoms, 3 dead (S. Afr. Mus. A9344, P.F. coll.).

Fam. **Neritidae**

Baker, 1923, pp. 117–178, pls. 9–16 (radulae); Thiele, 1929, p. 71; Connolly, 1939, pp. 596–603 and 635 (S. Afr. terrestrial, fluviatile and estuarine genera: *Hydrocena*, *Neritina*, *Septaria*).

Gen. Nerita Linn.

Because the protoconch is not sunken (in the Neritid material available in S. Afr. Museum), I have suggested that *Nerita dubia* Turton 1932 (renamed *tomlini* Turton 1933) is the protoconch of a Calyptraeid: see Part 3, p. 73.

Living examples of the following species, not dealt with below, have been collected by U.C.T.:

plicata Linn. Durban.

polita Linn. Port Edward.

plexa Chemn. (*textilis* Gmelin; *exuvia* Lam., *non* Linn.). Port St. Johns.

* Part I. Toxoglossa: *Ann. S. Afr. Mus.* **44** (4), 1958.
Part II. Rhachiglossa: *Ann. S. Afr. Mus.* **45** (1), 1959.
Part III. Taenioglossa: *Ann. S. Afr. Mus.* **47** (1), 1963.

Ann. S. Afr. Mus. **47** (2), 1963: 201–360, 30 figs.

N. plexa and *plicata* extend as far as Port Elizabeth, according to information supplied by R. N. Kilburn.

N. undata Linn. comes as far south as Delagoa Bay (U.W.).

Braga (1952) gave photographic figures of *plexa*, *polita*, and *plicata*, in addition to *albicilla*.

Nerita albicilla Linn.

Fig. 1 *a*

Nerita albicilla Krauss, 1848, p. 89, and var. *fasciata*, p. 90; Cooke, 1895, fig. 130 (radula); Turton, 1932, p. 201, and vars. pl. 52, no. 1401; Nardini, 1934, p. 239, pl. 18 (5), figs. 5, 6; Adam & Leloup, 1938, p. 48, pl. 4, fig. 1, text-fig. 14 (radula); Braga, 1952, p. 91, pl. 6, figs. 1, 2.

Radula with *c.* 100 plus nascent rows, cutting-edge of capitelliform plate obscurely serrulate (on unworn plates), marginal plates very numerous (Baker, loc. cit., stated 78), inner plates hamate, outer ones ligulate, with minutely denticulate truncate apices.

Fossil: Pleistocene; Red Sea, Kenya (Newton, Cox, Nardini).

Living: Mozambique Island and Delagoa Bay (S. Afr. Mus. coll. K. H. B.; also U.W.); Inhambane (U.C.T.); Natal (Krauss); Durban (U.C.T.); Knysna, 1.viii.1898 (S. Afr. Mus. P.F. coll.); Natal to Algoa Bay and Cape Recife (Kennelly).

Dead: Still Bay (S. Afr. Mus. coll. Muir); Jeffreys Bay (Kennelly).

Distribution. Mauritius, Madagascar, Seychelles, and widely distributed in Indo-Pacific.

Remarks. The *Pieter Faure* found a large specimen: alt. 24, diam. 33 mm., at low tide $\frac{1}{4}$–$\frac{1}{2}$ mile above the jetty at Knysna on 1 August, 1898.

The Muir material consists of juveniles of diam. 1 to 6·5 mm. The smallest has a protoconch of about $1\frac{1}{4}$ whorls and one postnatal whorl, but the junction is not clear. No spiral striae are visible on the protoconch, or on the 1st postnatal whorl, but growth-lines are distinct on the latter. Though most specimens are water-worn, the condition of this 1-mm. juvenile and some of the other shells is fresh enough to suggest that the species may be living in this locality.

Nerita umlaasiana Krss.

Nerita umlaasiana Krauss, 1848, p. 89, pl. 5, fig. 25; von Martens, 1879, p. 734; Baker, 1923, p. 165 ('specific distinction doubtful'); Janus, 1961, p. 4, pl. 2, figs. 4–6.

This seems to be a valid species, distinguished (as Krauss stated) from *polita* by its shape, the spirally lirate early whorls, and the granulate operculum. The operculum is not unlike that of *albicilla*, but the columellar glaze of the latter is nodulose. The operculum of *polita* is smooth, with a transversely ribbed band on outer margin.

The colour varies from black to olivaceous grey, variously marbled and speckled, often with axial zigzags, and with 3 more or less conspicuous darker spiral bands.

Radula as in *albicilla*.

Durban and Scottburgh (S. Afr. Mus. coll. Burnup); Umhlali (Natal) (U.C.T.).

Lectotype in Stuttgart Museum (Janus, 1961).

The locality 'Knysna' is surely a *laps. cal.* on the part of Krauss. It occurs after the Latin diagnosis, but after the German description and contrast with *polita*, the locality Umlaas is given, in conformity with the specific name. (See also: von Martens, 1888, p. 83.)

Von Martens recorded it from Quelimane, and regarded it as a subspecies of *polita* with stronger spiral grooves over the *whole shell*; but apparently he saw no specimen with an operculum.

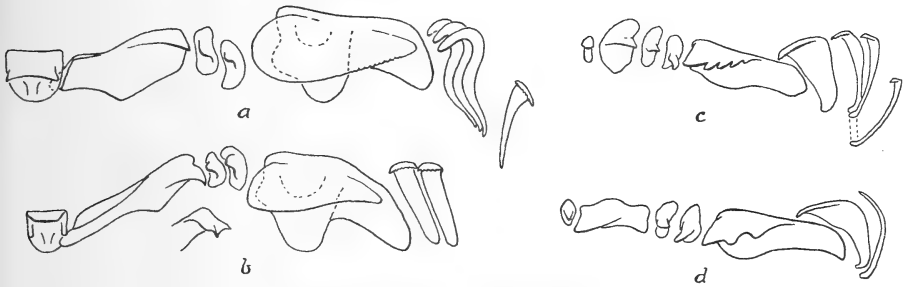

FIG. 1. Radula plates of: *a*, *Nerita albicilla* Linn. *b*, *Neritina natalensis* Rve. *c*, *Smaragdia souverbiana* (Montr.). *d*, *S. rangiana* Récluz.

Neritina natalensis Rve.

Fig. 1 *b*

Neritina natalensis Rve., Connolly, 1939, p. 599.

Radula with *c.* 125 plus nascent rows, 1st lateral plate transversely elongate, oblique to axis, 4th lateral (capitelliform) with obscurely serrulate cutting-edge, marginal plates very numerous (Baker, loc. cit., stated 73–75 for *gagates*), narrow, linguliform, with reverted denticulate apices.

In addition to the localities mentioned by Connolly: Port St. Johns, Port Shepstone, and Limpopo at Vila Joao Belo (U.C.T.).

The egg-capsules of *Neritina* are calcareous, and possibly capable of surviving immersion in sea-water, thereby furthering dispersal (by floating logs) across the sea.

Septaria porcellana (Linn.)

Navicella porcellana Sowerby, 1850, p. 547, pl. 117, figs. 1, 2; pl. 118 *bis*, figs. 43, 44.
Navicella elliptica Lam., von Martens, 1879, p. 735.

Widenham (Natal), 1 shell, animal extracted, operculum not preserved, 32 × 27 mm. (S. Afr. Mus. coll. J. A. Swan).

Distribution. Bourbon; Mauritius; Madagascar; Anjoan, Comoro Islands (von Martens).

Remarks. Connolly (1939, p. 601) recorded *tessellaria* (Lam.), and remarked

that more than one species might occur in Natal. Specimens of *porcellana* were not received at the South African Museum until 1941.

For purposes of record the following may be quoted from Mr. Swan's letter of 28 July 1941 (to McGregor Museum, Kimberley): '. . . Seventy years ago a hot spring supplied the streamlet with warm water. . . . An eruption which was far out at sea [*sic*] and strewed Widenham beach with pumice stone, stopped the hot spring. I do not think there are many more big limpets [*sic*] left. . . . The stream is difficult to get at and the interesting bit is particularly difficult. It is Bilharzia infected. . . . It would appear—after many days of search—that only one pool of limited size contains the big limpet.'

Gen. Smaragdia Issel

Baker, 1923, pp. 135, 172 (with subgen. *Smaragdella*); Thiele, 1929, p. 76.

Smaragdia rangiana Récluz

Fig. 1 *d*

Neritina rangiana von Martens, 1880, p. 292; Odhner, 1919, p. 33; Dautzenberg, 1929, p. 527.
Smaragdia rangiana Thiele, 1929, p. 77, fig. 52 (radula).

Radula with *c.* 125 rows, 1st lateral plate transversely oblong, 4th lateral (capitelliform) with 2 blunt cusps outside the main cusp, 1st marginal plate triangular, apical truncate margin wider than in *souverbiana*, smooth, following marginals 12 in number, slender, tapering.

Living: Delagoa Bay (U.W.).

Distribution. Mauritius, Madagascar (von Martens, Odhner, Dautzenberg); Providence Reef, Mascarenes (Smith, 1884).

Smaragdia souverbiana (Montrouzier)

Fig. 1 *c*

Neritina souverbiana Smith, 1910, p. 204; Turton, 1932, p. 202, pl. 53, no. 1403.
Smaragdia souverbiana Connolly, 1939, p. 599.

Radula with *c.* 65 rows, 1st lateral plate ovoid, 4th lateral (capitelliform) with 4 cusps outside the main cusp, 1st marginal plate broadly triangular, truncate apex reverted, smooth, following marginals successively narrower, reverted apical margin minutely denticulate, the bases of the 12 marginals form a longitudinal row on outer edge of the radula (as noted by Baker, loc. cit., p. 173, who stated there were 22 marginals).

Living: Congella (Durban Bay) (Smith, Connolly; also S. Afr. Mus. coll. Burnup); Richards Bay (U.C.T.); Delagoa Bay (U.W.).

Dead: Port Alfred (Turton).

Distribution. Madagascar (Dautzenberg).

Fam. **Phenacolepadidae**

Pilsbry, 1900, p. 61 (list of species); Thiele, 1929, p. 78.

Phenacolepas asperulata (H. & A. Adams)

Fig. 2 *a*, *b*

Scutellina asperulata H. & A. Adams, 1854, p. 461.
Phenacolepas asperulata Thiele, 1909*a*, p. 32, pl. 5, fig. 9; Dautzenberg, 1929, p. 548; Satyamurti, 1952, p. 64, pl. 4, figs. 2 *a–d*.

Vertical from apex falling 1·5 mm. within hind margin (length of shell 12 mm.), apex 3 mm. above base line. Radiating lirae *c.* 90, including intermediaries, of which one occurs between most of the pairs of main lirae, but not reaching apex; all lirae studded with acute, upstanding squamae, *c.* 40–44 on the anterior main lirae. Pink. 12 × 10, alt. 4 mm.

Radula with 65–75 rows, central plate squarish, rounded in front, margin slightly overturned but not serrate, 1st lateral plate about twice as wide as long, oblique, distal margin with serrate cutting-edge, 2nd lateral small, subcircular, with narrow front edge, 3rd lateral ovate, with oblique thickening forming a cutting-edge, 4th lateral large, subtriangular, front margin overturned forming a cutting-edge but not serrate, marginal plates numerous, finely and sharply serrate.

Inhaca Island, Delagoa Bay, under stones (U.W.).

Distribution. India; Madagascar.

Remarks. I assign these shells tentatively to *asperulata* because they agree well with Satyamurti's description and figure. According to Schepman (1908, p. 15), Smith considered this species a synonym of *galathea* (Lam.) (cf. fig. 2815 in Chenu, 1859).

Phenacolepas cf. *fulva* (Müller)

Fig. 2 *c*

Scutellina (*Iothia*) *fulva* Müll., H. & A. Adams, 1854, p. 461, pl. 52, fig. 6*c*.
Iotia fulva Müll., Chenu, 1859, fig. 2816.

Apex vertically above hind margin, apex 1·75 mm. above base line. Radiating lirae *c.* 112, including intermediaries, which do not reach apex; lirae studded with squamose granules, at least 80 on the anterior main lirae. Horny brown. 10 × 7·3, alt. 4 mm.

Radula with at least 100 rows, central plate squarish, front margin slightly overturned, not serrulate, 1st lateral plate about $2\frac{1}{2}$ times as wide as long, oblique, whole front margin serrate (*c.* 12 cusps), 2nd lateral small, 3rd lateral with oblique cutting-edge, 4th lateral large, subtriangular, front margin overturned, not serrate, marginal plates very numerous, serrate.

Inhambane, on stony beach at Mongue (U.C.T.).

Remarks. In general shape narrower than *asperulata*; agreeing with both Adams's and Chenu's figures except that the apex is vertically above the hind margin.

Fam. **Phasianellidae**

Watson (1886, p. 124) considered that 'the characteristic features relied on for specific distinction are often quite untrustworthy in this most variable genus [*Phasianella*] and I know no marks by which many of the species can be determined'.

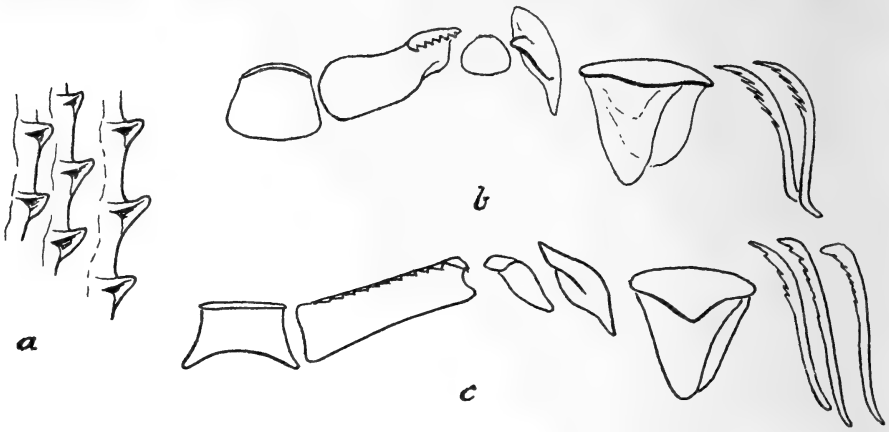

FIG. 2. *a*, *b*, *Phenacolepas asperulata* (H. & A. Adams), squamose lirae and radula plates. *c*, *P.* cf. *fulva* (Müller) radula plates.

Although extremely common on many beaches around the South African coast, no species of 'Phasianella' seems to have been recorded from any of the late Tertiary or Quaternary deposits. Dr. A. R. H. Martin in his very careful and exhaustive collecting at Sedgefield near Knysna did not obtain a single specimen.

Phasianella jaspidea Rve.

Fig. 3 *a*

Phasianella jaspidea Reeve, 1862, pl. 4. sp. xi; von Martens, 1879, p. 735.

Radula with 30 rows, central plate reduced to a mere strip, not always visible, 5 lateral plates each with a strong cusp, those of the 4th and 5th plates smaller, marginal plates very numerous, the inner ones strongly hamate, apparently without subsidiary cusps, decreasing in size outwards, the outer ones very slender.

Inhambane (U.C.T.); Mozambique Island (S. Afr. Mus. coll. K. H. B.). Quelimane (von Martens). Not obtained at Delagoa Bay by U. W.

Gen. TRICOLIA Risso

Distinguished from *Phasianella* by the broad central plate of the radula.

When a species is abundant, with numerous variations in size, shape, and colour, sooner or later several nominal 'species' will be described, and especially

when the material is beach-worn. *T. kraussi* (Smith), *africana* (Bartsch), and Turton's 'species' were all described from beach material.

Krauss was cautious and remarked (1848, p. 105) that it could not be denied that all these four species [*capensis*, *kochii*, *elongata*, *tenuis*] were very closely allied, and that the differences as stated were not very great. When, however, the respective shells were laid side by side, he believed that specific separation was not unnecessary.

Turton's list of 18 species and 4 varieties, including 10 new species and the 4 varieties (some of which were based on single specimens) is quite unacceptable.

Vague characters such as the greater or lesser convexity of the whorls, more oval or less circular aperture, are valueless.

There are both broad and slender individuals, e.g. in a large quantity from one locality (Still Bay, coll. Muir) there are the following pairs: 3·5 × 3 and 3·5 × 2 mm. (breadth : length ratio 85–86% and 57%); 6 × 5·5 and 6 × 4 mm. (91% and 66%); 14 × 10 and 14 × 8·5 mm. (70% and 53½%); 15 × 10 and 15 × 9 mm. (66% and 60%). Cf. Turton's figures 1226 (*carinata*), 1228 (*fuscomaculata*) and 1233 (*rufanensis* var. *adjacens*), all with a length of 6·5 mm.

The width ranges from 91% to 53½% of the length. Krauss's measurements for 4 species show a range from 88% to 48%: *kochii* 88%, *capensis* 63%, *elongata* 56%, *tenuis* 48%. In *africana* the width is 77%, and in *kraussi* 70% of the length.

Among the Still Bay series there are juveniles up to 2·2 × 2 mm. (90%) (2 whorls), but no slender shells of this length. The smallest juveniles (with one or 1½ postnatal whorls) measure 0·75 × 0·75 mm. See also Turton's figures 1218 and 1229.

A greater increase in length relatively to the width seems to take place after the 2nd whorl. A strong increase in length produces forms like *elongata* or *tenuis*, but a smaller increase results in the squat form *kochii*. Krauss noted that in *elongata* it is the last whorl which shows the greatest proportional lengthening, and consequently a more oval aperture.

Size seems to have attracted undue attention. Even Krauss stated that *kochii* was twice as large as *capensis*; *kraussi* (Smith), 5–6 mm. with 3½ whorls (but worn), was stated to be smaller than *capensis*; *africana* (Bartsch), 3·5 mm. with 3½ whorls, was distinguished from *capensis* by its 'minute size'. There must be juveniles, but no comparison of equal-sized examples of the so-called 'species' seems to have been made.

Colour and pattern are no criteria for discriminating species. Krauss noted the contrast of the dull matt colour, with indistinct markings, of fresh shells, and the brightly coloured and variously patterned beach-worn shells. Bright pink or red is to some extent due to the chemical action of weathering. On the other hand in some fresh shells the colour and pattern show clearly when wet, but fade away when dried.

Bartsch mentioned the presence of a series of light blue spots in *africana*, and Turton regarded this as a distinguishing mark, though occurring also in

Turton's 'bicarinata'. These blue or emerald-green spots are frequently found not only in the narrower forms (*capensis* and *africana*), but also in the broad form *kochii*.

One colour variety which Turton named *kochii* var. *viridis* (1932, renamed *rietensis* 1933) is notable. Turton gave its colour as bright green, often with a white line near base, but no markings. Similarly coloured shells occur also at Still Bay, but are more yellowish olive-green or gamboge. Some have only the white basal line, others show the same mottling, axial streaks, and emerald-green spots which are found on shells with a reddish ground colour. Frequently the yellow colour is tinged with red, or the early whorls are red, the later ones yellowish. One shell has the early whorls and the body whorl red, the penultimate whorl yellowish.

FIG. 3. Radula plates of: *a*, *Phasianella jaspidea* Rve. *b*, *Tricolia neritina* (Dnkr.).

Black shells from Port Alfred have been named *kochii* var. *nigra* and *farquhari* (the latter based on a single specimen) by Turton. U.C.T. has collected black shells at Port Nolloth, Lambert's Bay, Saldanha Bay, and at Kommetjie on the west coast of the Cape Peninsula. All the shells in the samples from these west coast localities, as submitted to me, were black; but perhaps they were specially picked out on account of their colour. Confirmatory evidence would be welcome as to whether animals with black shells live in a localized habitat or whether they occur promiscuously among the colourful shells.

I have seen one very dark blackish-maroon shell from Still Bay among many others of various colours and patterns; but both Turton and Dr. Muir collected only dead shells.

In view of the great variability in size, shape, and colour pattern, it is not unreasonable to suspect that there is only one species occurring along the South African coast. If so, what name should it bear? Philippi's *tenuis* (1844) seems to have priority over *capensis* Dunker 1846, which has precedence over *kochii* (Philippi in litt., Krss.) and *elongata* Krss. 1848.

Or are they all forms of the Mediterranean *pulla* (Linn.), which occurs on the west coast of Africa as far south as Senegal? Thiele (1925, p. 57) records *elongata* from Great Fish Bay, Angola.

In examing the present material one feature has been noted which was not mentioned by Krauss, Smith, or Bartsch, but which was used by Turton to characterize his *striolata*, *piperata*, and *insignis* (figs. 1237, 1238, 1239). Both of Krauss's figures 4 show faint spiral lines on the upper part of the body whorl,

but probably these were intended to represent *colour* lines, not sculpture. Turton said that *kochii* when young had 'spiral lines', also presumably meaning colour lines, because he separated those forms with 'spiral cords' as distinct species.

If the shell is not too much worn the whorls are finely spirally lirate (*insignis*), though as a rule the lirae are closer together and more numerous than appears in Turton's fig. 1239. On the other hand, in Turton's other two species there are only 5 or 6 rather widely spaced lirae. Examples of the latter are not common, and are usually broad; but shells with numerous lirae may be either the broad form or the slender form.

Shells in which the lirae are well developed and one of them is enlarged to form a shoulder (a cingulum or carina) have been named *tropidophora* Tomlin 1931*a*. Cf. also Thiele's 5 mm. long *Turbo* sp. (1925, p. 56, pl. 14 (2), figs. 5, 6).

The spiral lirae may frequently remain visible on the base after they have been abraded from the whorls.

Unworn shells may also show very distinct growth-lines, in some cases so conspicuous as to be almost pliculae (cf. Turton's *farquhari*, fig. 1234).

Until a thorough study has been made of living material, a diagnosis is not possible; but the following characters may be given.

Protoconch consisting of nucleus and little more than one whorl, smooth. Postnatal whorls 4–4½. Juveniles with protoconch and one or 1½ whorls measure 0·75 × 0·75 mm. Spiral sculpture (when present) not showing on 1st whorl, but distinct on 2nd and later whorls (variation: see above). Growth-lines often conspicuous. Aperture more or less oval according to the length of the last whorl.

Largest specimen seen: 16 × 10 mm. Width ranging from 91 per cent to 53½ per cent of length.

Radula with *c.* 50 rows (45–55), as in *neritina* (*infra*).

From Umpangazi (Zululand) around the coast to Port Nolloth.

Remarks. T. elongata (Krss.) is recorded from Madagascar by Dautzenberg (1929, p. 528), and also *T. zigzag* (Odhner) (1919, p. 31, pl. 2, fig. 25); the latter has a colour pattern frequently found in South African examples, but no specific diagnostic chracters were given.

Turton's *Leptothyra subconica* (1932, p. 178, pl. 42, no. 1257) may be a *Tricolia*.

Tricolia tropidophora (Tomlin)

? Phasianella bicarinata (*non* Dunker) Bartsch, 1915, p. 145; Turton, 1932, p. 174.
Phasianella tropidophora Tomlin, 1931*a*, p. 420, pl. 33, fig. 1.
Phasianella insignis Turton, 1932, p. 175, no. 1239.

Protoconch 1½ whorls. First postnatal whorl with 4 spiral lirae, 2nd with 7, the 4th forming a slight angular shoulder approximately in middle of whorl, 3rd whorl with 8–11 lirae, the 5th forming a more distinct shoulder. Sometimes 5 lirae on the upper half of the whorl, the 6th then forming the shoulder.

The shoulder lira may be scarcely stronger than the other lirae, or may form a distinct cingulum or carina, below which the profile of the whorl is slightly flattened. Base with 9–12 spiral lirae, the uppermost one (emerging from top of aperture) slightly stronger than the others, and though scarcely cariniform, is strong enough to affect the profile (see Tomlin's figure). 5 × 3·75 mm.

Colour (when fresh and wet) pinkish, with numerous green spots on body whorl, which may coalesce into axial, or more often protractively oblique, stripes; penultimate whorl usually with pale spots or streaks, but green spots may also occur; base paler pink with pale or faintly greenish streaks. When dry, ground-colour and spots dull. Beach-worn specimens dull pinkish, with faint indications of spots.

Radula as in *neritina*.

East London, and Cape Peninsula (Tomlin). Several specimens from an unknown locality, identified by Tomlin (S. Afr. Mus.). Living: Knysna, Port Nolloth, Groen Rivier, Lamberts Bay, East London (U.C.T.).

Remarks. Although the shoulder lira and the basal lira and the flattenning of the profile vary, these specimens can all be referred to *tropidophora*. Future study will decide whether *tropidophora* can remain a distinct species.

Turton's mention of the green spots and the 'not at all prominent' keels indicates that his 'bicarinata' was really this form and not the true *bicarinata*.

Tricolia bicarinata (Dnkr.)

Phasianella bicarinata, Dunker, 1846, p. 110; Krauss, 1848, p. 105.

Description of Kosi Bay specimen. Protoconch 1½ whorls, forming a pointed apex, smooth. Postnatal whorls 4, the uppermost one noticeably wider than the protoconch; 2nd whorl with inconspicuous spiral keel a little below middle of whorl, 6 fine spiral lirae above, 2 below; 3rd whorl with a better-developed keel, *c.* 10 lirae above, 4 below; 4th whorl with well-marked keel, *c.* 12 lirae above, 4 below, followed by a second keel which becomes visible shortly prior to the aperture and is continued around the body-whorl (obscured by the suture on preceding whorls). Base below 2nd keel with *c.* 14 lirae, of which the 4th, 9th and 13th are stronger than the others, those below the 9th and 13th very fine. 4·5 × 3 mm.

Cape (Dunker, Krauss). Kosi Bay (Zululand) (U.C.T.).

Remarks. Distinguished by the rather prominent pointed apex, and the two strong keels.

I have seen a copy of Tryon's figure which shows, in comparison with the present specimen, only 3 whorls after the papilliform apex, all the whorls drawn too high, and the two keels too far apart.

Tricolia (*Chromotis*) *neritina* (Dnkr.)

Fig. 3 *b*

Phasianella neritina Dunker, 1846, p. 110; Krauss, 1848, p. 105, pl. 6, fig. 6.

Protoconch consisting of nucleus and very little more than 1 whorl, diam. 0·2 mm., smooth, white, thereby sharply demarcated from the pinkish 1st postnatal whorl. Up to diam. maj. 5 mm.

Numerous purplish obliquely spiral lines on a dull pinkish-brown ground-colour, often a few white spots around top of last whorl, sometimes also 2–3 on periphery. Bleached shells pink. One from Hondeklip Bay (U.C.T.) pure white with blackish apex.

Radula with *c.* 50–55 rows, central plate broad, oblong-oval, with 2 longitudinal ribs ending posteriorly in short points, 5 lateral plates, the 3 inner ones with triangular bases and sharply cuspidate cutting-edge, the 2 outer ones smaller with longitudinally oblong bases and reduced cusps, marginal plates very numerous, the first 2 with bicuspid apex, the following ones with simple, obliquely truncate apices.

Cape (Krauss); Cape Town (Bartsch). Table Bay, False Bay, Still Bay (S. Afr. Mus.). East London (von Martens). Not found at Port Alfred (Turton).

Living: Lüderitzbucht and Hondeklip Bay to Table Bay, and False Bay to Port Elizabeth (U.C.T.).

Distribution. Mauritius (von Martens, 1880). A remarkable discontinuous distribution, if the provenance and identification of von Martens's shells were correct.

Fam. **Turbinidae**

Thiele, 1929, p. 64 (incl. *Phasianellinae* and *Liotiinae*).

Gen. Turbo Linn.

The following well-known species occur on the south and east coasts of South Africa:

argyrostomus Linn.	Delagoa Bay (U.W.).
chrysostomus Linn.	Durban (Smith, 1903).
cidaris Gmelin	*Vide infra.*
coronatus Gmelin	Off Cape Morgan, 36 fathoms (S. Afr. Mus. P.F. coll.); Durban (U.C.T.); Port St. Johns (S. Afr. Mus. F. H. Talbot coll.); Delagoa Bay (U.W.); Inhambane (U.C.T.); Bazarute Island (U.W.); Mozambique Island (S. Afr. Mus. coll. K. H. B.; also U.W.).
natalensis Krss.	*Vide infra.*
petholatus Linn.	Delagoa Bay (U.W.). Also *vide infra.*
sarmaticus Linn.	*Vide infra.*
splendidulus Sow.	Umzinto and Durban (Smith, 1903).

Smith's records of *chrysostomus* and *splendidulus*, collected by Burnup, may be acceptable, but confirmation would be welcome.

Sowerby (1897) recorded *intercostalis* Menke from Durban, but I am not aware that the record has been confirmed, or that the species is actually living on the South African coast. Schepman (1908, p. 24) said the identification of this species was difficult. For the present it had better not be admitted to the fauna list.

Thiele's 5 mm. long *Turbo* sp. (1925, p. 56, pl. 14 (2), figs. 5, 6) from 34° 51′ S., 19° 37′ E., 80 metres, seems more like a *Tricolia* than a *Turbo*. Cf. Turton's figures nos. 1237, 1238, 1239 on pl. 41 (1932).

Braga (1952, p. 92) recorded *marmoratus* Linn. from Mozambique Island.

No species has been found living west of Cape Point, or in Table Bay, or at any locality on the west coast of South Africa. Nicklès (1950, p. 45) stated that *cidaris* occurs from Mossamedes to South Africa, but the most southerly locality is Port Alexander (Odhner).

The radulae of the three species: *cidaris*, *natalensis*, and *sarmaticus*, agree in having a narrow central plate, whereas *coronatus* (subgen. *Lunella*) has a broad central plate (fig. 5 *a*).

The foot of *sarmaticus* and of *cidaris* is divided longitudinally by a groove, which gives the animal a swaying motion when it crawls (cf. Gilchrist, 1916, p. 43).

Turbo cidaris Gmelin

Figs. 4 *a*, *b*, *c*, *d*, 5 *b*

Liotia fulgens Gould, 1859, p. 142.
Ilaira fulgens Bartsch, 1915, p. 166, pl. 29, figs. 4–6; Turton, 1932, p. 195; Barnard, 1951, p. 113 (= juv.).
Turbo tricarinulatus and var. *bicarinulatus* Euthyme, 1885, pp. 252, 254.
Turbo cidaris Gmelin Schwarz, 1910, p. 115; Odner, 1923, p. 9; Thiele, 1925, p. 57; Haughton, 1932, p. 43.

Junction of protoconch and 1st postnatal whorl not distinct. Smallest example seen: alt. 0·2, diam. 0·5 mm., consisting of nucleus and one whorl. Flat, discoidal, periphery with 3 keels, the middle one a little more prominent than the others, visible in apical view. At alt. 0·9, diam. 2 mm., 2 whorls, the middle lira scarcely more prominent than the upper lira, and the lower lira has shifted towards the axis to form the basal lira surrounding the umbilicus. The apical surface is almost flat, with a shallow but distinct submarginal groove. At alt. 1·3, diam. 3 mm., $2\frac{3}{4}$–3 whorls, the apical surface is gently convex, and the submarginal groove becomes merely a shallow concavity seen in the profile. On later whorls as the marginal keel disappears the concavity also disappears, and the profile becomes evenly convex.

At diam. 6·5, the alt. has increased to 5 mm. The periphery has 2 lirae (originally the upper and middle lirae) but the 3rd (originally the lower) has become weaker and closer to the umbilicus. At diam. 8 mm. the umbilicus is still open though the columellar callus is encroaching on it; and at diam. 10 mm. it is completely closed (contrast *sarmaticus*). A little hollow or dent, however, remains in the callus ('false umbilicus') and is characteristic.

Up to alt. 52, diam. 58 mm. Although *cidaris* does not increase so rapidly in altitude compared with diameter as does *sarmaticus*, eventually it becomes proportionately a slightly higher shell.

Operculum with a subcentral open umbilicus surrounded by a spiral ridge, both these features being retained in large examples, though I have seen one 21 mm. diam. in which the ridge is not sharp and well defined. The surface is covered, but not closely, with small *conical* granules or tubercles (contrast *sarmaticus*).

Many variations occur in ground-colour and pattern; some shells are uniform umber-brown. Except in the latter, two bands differing in colour from the ground-colour, and often spotted, indicate the position of the obsolete peripheral lirae.

The iridescence of the very early whorls, which seems to have been partly responsible for the institution of *fulgens*, is often retained in shells up to 10 mm. diam.

Fossil: Pleistocene; Port Elizabeth (Schwarz); Alexander Bay and Grauwe Duinen (Little Namaqualand) (Haughton).

False Bay eastwards to Port Alfred.

Distribution. Port Alexander, Angola.

Variation. The 2 peripheral lirae remain distinct up to about 15 mm. diam., or sometimes even up to 25 mm., but usually at the latter size they have disappeared as surface ridges. The normal smooth surface, however, sometimes shows more or less distinctly low rounded ridges: 3–4 between the suture and the upper peripheral lira, one between the 2 lirae, and 2–3 feebler ones on the base below the lower lira. When faint there is no hesitation in identifying the shell with *cidaris*, but when well developed there is a strong resemblance to *natalensis*. Such specimens seem to have induced Sowerby to regard *tricarinulatus* Euthyme as a 'small form of *cidaris* with the keels of *natalensis*', and the latter definitely as a variety of *cidaris*. Evidently he saw only shells without opercula, because the operculum of *natalensis* resembles that of *sarmaticus* (as Krauss stated) and is quite distinct from that of *cidaris*.

Euthyme made no mention of the subsidiary lirae which develop in *natalensis*, but laid stress on the 'false umbilicus' which is found in both *cidaris* and *natalensis* (but not in *sarmaticus*).

Turbo natalensis Krss.*

Turbo natalensis Krauss, 1848, p. 101, pl. 6, fig. 1.
Turbo ponsonbyi Sowerby, 1897, p. 17, pl. 6, fig. 20.

* Mr. S. P. Dance (British Museum) has informed me that the part of Reeve's *Conch. Icon.* containing the description of *natalensis* was published in January 1848. The *Preface* to Krauss is dated January 1848. Krauss (1852, p. 34) stated that Reeve published the name in *Ann. Mag.* March 1849, p. 227, the description having been communicated to a meeting of the Zoological Society on 28 March 1848. Krauss claimed priority '*weil ich sie schon im Januar 1848 in meiner Schrift bekannt gemacht habe*'.

In this uncertainty as to the priority, I credit the authorship to Krauss on account of the excellence of his figure.

Smallest shell seen diam. 6 mm., *c.* $3\frac{1}{2}$ whorls; apex worn but first 2 whorls and first part of 3rd as in *cidaris*. On later part of 3rd whorl 2 lirae develop, 1 moderately close to the suture, the other a little below midway between suture and upper peripheral keel; on base 2 lirae between lower peripheral keel and the nodulose lira bounding the umbilicus. At diam. 9 mm., 4 whorls, intermediaries have developed. 4 lirae between suture and upper peripheral keel, 1 between the 2 peripheral keels, and 3 on base. At diam. 12 mm., *c.* $4\frac{1}{2}$ whorls, there are 4 lirae on upper surface, 4 on base, and the lira between the 2 peripheral keels is almost as strong as the latter, thus reducing their prominence and making the general profile more evenly convex. Later, an additional lira develops on base, making the total number of lirae on the body whorl 12; all the lirae subequal in strength, including the 2 original peripheral lirae, which however are usually indicated by a series of pale spots.

Umbilicus nearly closed at about diam. 10 mm.; thereafter completely closed, but a rather deep groove remains in the columellar glaze as a 'false umbilicus'.

Alt. 4 at diam. 6 mm., 16 at 20 mm., thereafter altitude increasing proportionately more rapidly: alt. 28 at 32 mm. (cf. Chenu, 1859, fig. 2543); largest seen alt. 37, diam. 39 mm. Krauss gave 14 × 16·5 lines (of a Paris inch) = approx. 30 × 35 mm., but his two figures show a diameter of 39 mm.

Operculum as in *sarmaticus*, as mentioned by Krauss; at 8 mm. diam. a subcentral pit is present, which at 10 mm. is almost obliterated by the strong columnar and capitate tubercles.

Iridescence on juveniles maintained up to about 7 mm. diameter.

Tongaat (30 miles north of Durban) (S. Afr. Mus.); Natal (Krauss); as far west as Port Alfred (Turton) and Port Elizabeth (Sowerby). Dead but fresh shells collected at Jeffreys Bay (S. Afr. Mus. coll. Miss Shaw and Miss Lewis).

Durban (Sowerby: *ponsonbyi*).

Fossil: Post-Pliocene, Inhambane (Cox, 1939); Pleistocene, Algoa Bay (Johnson, 1904); Knysna raised beach.

Living: East London (S. Afr. Mus. P.F. coll., and U.C.T.); Port St. Johns (S. Afr. Mus. F. H. Talbot coll.).

Sowerby gave the dimensions of *ponsonbyi* as alt. and diam. 8 mm. His figure as drawn measures alt. 9·5, diam. 12 mm. As the description and figure seem to fit *natalensis*, one or the other of his measurements may be regarded as erroneous. Turton's specimen, however, which he and Tomlin thought might be *ponsonbyi*, had the altitude and diameter approximately equal (1932, p. 176, pl. 41, no. 1245). It does not appear to be subscalariform, but the proportions are certainly different from those of normal *natalensis* at that size.

Turbo sarmaticus Linn.

Figs. 4 *a*, *b*, *e*, *f*, 5 *c*

Turbo sarmaticus Linn., Krauss, 1848, p. 101; von Martens, 1874, p. 130; Turton, 1932, p. 175, pl. 41, no. 1240 (juv.).

The protoconch and very early stages are not separable from those of *cidaris*; but from about the 3rd whorl, diam. *c.* 3 mm., squamiform lobules, hollow in front, are developed on the upper (peripheral) and lower keels, slightly larger and more prominent on the former. The submarginal groove on the flat upper surface is distinct on the 2nd whorl, and is traceable on the 3rd, but is so shallow and open as to be scarcely a groove. (Cf. Kesteven, 1902, p. 715, pl. 35, figs. 1–3. *Turbo stamineus*.)

From the end of 3rd whorl a spiral lira develops between the suture and the peripheral keel; thus 3 well-marked keels. The spire becomes more prominent than in *cidaris*, and the profile between suture and the supraperipheral lira is straight or slightly concave. Subsidiary lirae develop, first 1, then 2 above and below the supraperipheral lira, between the peripheral and lower lirae, and also on base between the lower lira and the strong lira surrounding the umbilicus. The basal lirae may increase to 7 or 8, the uppermost (running from top of aperture) being the strongest.

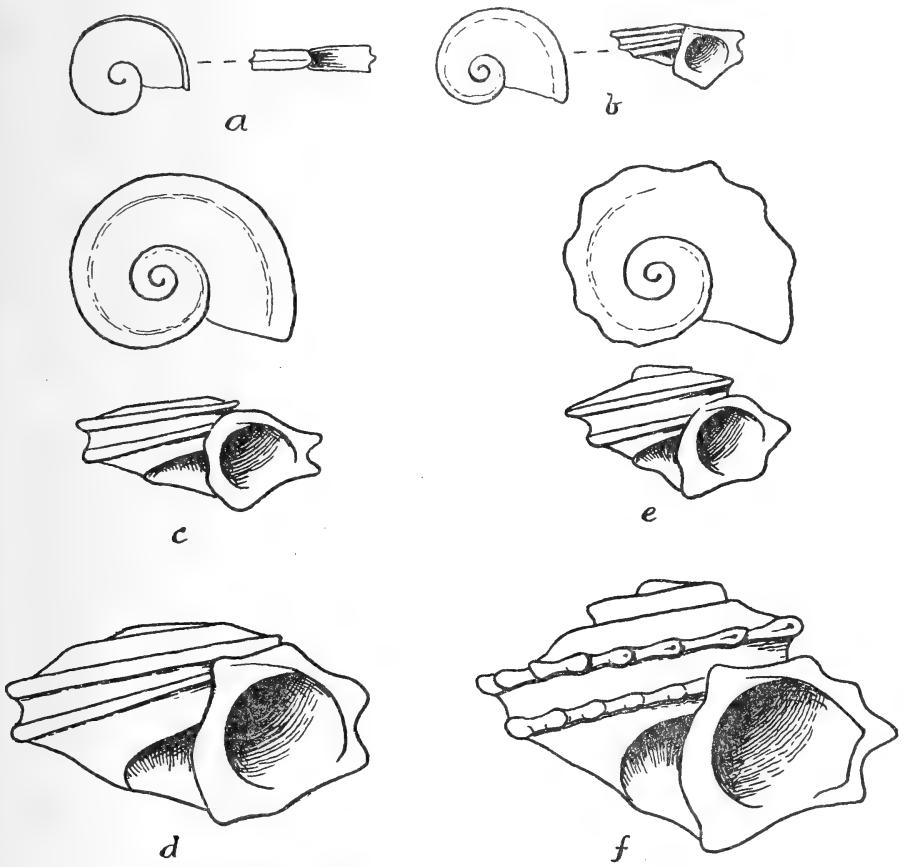

FIG. 4. Juveniles of *Turbo cidaris* Gmelin and *sarmaticus* Linn.: *a*, diam. 0·5 mm. *b*, diam. 2 mm. *T. cidaris*: *c*, diam. 3 mm. *d*, diam. 5·5 mm. *T. sarmaticus*: *e*, diam. 3 mm. *f*, diam. 6·5 mm.

From the 5th whorl the marginal lobules cease to be squamiform, becoming solid nodules. The supraperipheral lira may also develop nodules, and also the uppermost basal lira. Not counting the latter, there may be 2, or sometimes 3, series of nodules; but they vary in prominence, and in the largest shells are evanescent or obsolete.

Size up to alt. 102, diam. 132 mm., $7\frac{1}{2}$–8 whorls; but in large shells the apex is more or less corroded.

The umbilicus usually remains incompletely closed up to the 5th or 6th whorl (*c.* 20–25 mm. diam.), but in larger shells is completely covered by the columellar glaze which forms a broad smooth surface without any 'false umbilicus'.

No opercula of shells under 5–6 mm. diam. seen. In a shell 6 mm. diam., the operculum is 1·75 mm. diam. and has a subcentral pit diam. 0·6 mm. in the granulate surface, but no spiral ridge. In opercula of 7–8 mm. diam. the surface is granulate-tuberculate, but the pit, diam. *c.* 1 mm., remains open. Eventually at *c.* 12 mm. diam. the pit is completely overgrown by the tubercles, which are closely aggregated, more or less confluent, columnar, the larger ones bi- or tricapitate; in very large opercula they become mushroom-like with multinodulose tops.

Juveniles up to about 3 mm. diam. show a golden iridescence, but this sheen is lost sooner than in *cidaris*, owing it seems to the more rapid thickening of the shell wall. Young shells show much variation in colour and pattern, but old shells become uniform blue-black. From False Bay to Scottburgh (Natal) (*auct. et* S. Afr. Mus.). Off O'Neil Peak (Zululand), 55 fathoms, 1 juv., $2\frac{1}{2}$ whorls (S. Afr. Mus. P.F. coll.).

Remarks. Krauss described the young shell, but not the youngest shells with projecting squamiform nodules.

One Scottburgh shell (coll. K. H. B.), alt. 53, diam. 64 mm., received an injury to the outer lip on the 5th (possibly the 4th) whorl, resulting in a notch, and this is traceable up to the lip on the body whorl (7th) as a Scissurella-like groove.

Turbo petholatus Linn.

Turbo petholatus Linn., Chenu, 1859, i, fig. 2535; Macnae & Kalk, 1958, p. 127 (listed).

Although the apices are worn, specimens in S. Afr. Mus., alt. 30 mm., indicate that the juvenile of 3 whorls, diam. 2·5–3 mm., has projecting peripheral lobules as in *sarmaticus*, thus providing a specific difference, in addition to shape, from *cidaris*.

Delagoa Bay (Macnae & Kalk).

Turbo foveolatus n.sp.

Fig. 6

Shell wall rather thick. Protoconch nucleus plus 3 whorls. Profile convex. Retractive axial pliculae and spiral lirae forming a fine clathrate or foveolate

sculpture over whole whorl including base. Spiral lirae 3 on 1st whorl, increasing to 5–6 on 2nd and 8–9 on 3rd; on base *c.* 10–12, the innermost lira stronger than the others, bordering the narrow umbilical chink. Aperture subcircular, columella concave, somewhat expanded at anterior corner. 2·9 × 2·9 mm. Pale buff.

34° 5′ S., 25° 42′ E., 52 fathoms, 6 dead (S. Afr. Mus. A9284, P.F. coll.).

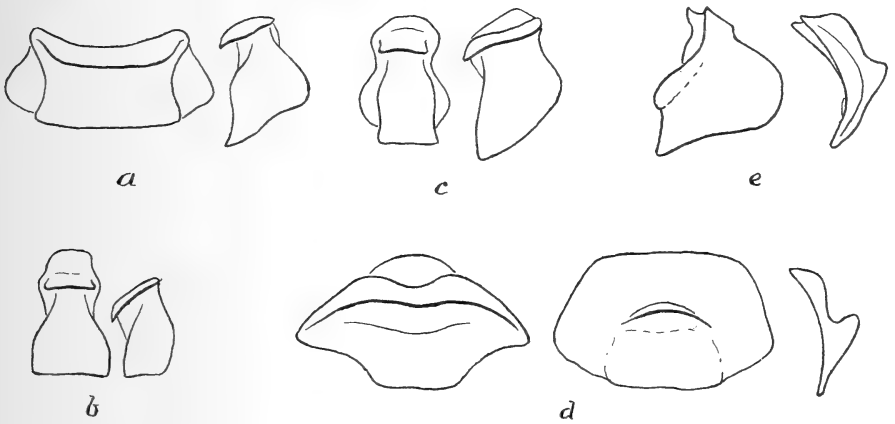

FIG. 5. Central and 1st lateral plates of radula of: *a*, *Turbo coronatus* Gmelin. *b*, *T. cidaris* Gmelin. *c*, *T. sarmaticus* Linn. *d*, *Astraea tayloriana* (Smith), dorsal, ventral, and lateral views of central plate. *e*, dorsal and lateral views of 1st lateral plate.

Remarks. Apparently allied to, and similar in shape to, Thiele's *Turbo* sp. (1925, p. 56, pl. 14 (2), figs. 5, 6) from 34° 51′ S., 19° 37′ E., 80 metres; but differing completely in sculpture.

Gen. ASTRAEA Bolten-Roding

Thiele, 1929, p. 68.

Thiele divides the genus into several sections, including *Astralium*, *Bolma*,* *Cyclocantha*, *Pachypoma*, *Pomaulax*, under one or other of which the South African representatives have been classed.

Astraea tayloriana (Smith)

Figs. 5 *d*, *e*, 7 *a*, *b*

Turbo (*Pomaulax*) *tayloriana* Smith, 1880, p. 483, pl. 48, fig. 9.
Pachypoma tayloriana Sowerby, 1897, p. 18.
Astrea tayloriana Bartsch, 1915, p. 146.
Astralium tayloriana Odhner, 1923, p. 6; Turton, 1932, p. 176.

Protoconch and 1st postnatal whorl not demarcated. Protoconch nucleus and 2 whorls forming a flat apex; 2nd whorl with a supraperipheral lobulate

* Smith, Sowerby, Thiele spell the name of Risso's 1826 genus *Bolma*. Watson (1886, p. 131, footnote) said Risso spelt it *Bolina*. The Prussian Academy Nomenclator and also Neave both give *Bolma* as Risso's spelling. In any case *Bolina* seems to have been already preoccupied by Lamarck (1804) and Rafinesque (1815).

keel, continued on 3rd and 4th whorls with the lobes becoming more prominent, squamiform, hollowed in front; *c.* 12 on 2nd whorl, *c.* 14 on 3rd, *c.* 22 on 4th; towards end of 4th whorl decreasing in size and prominence and becoming

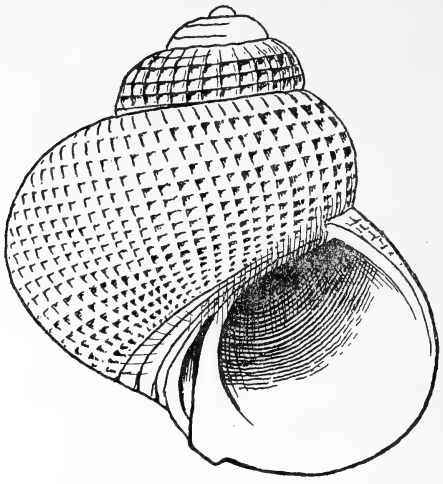

FIG. 6. *Turbo foveolatus* n. sp.

merely solid granules. A second series of squamiform tubercles forms the true periphery and is visible on the 3rd and 4th whorls, the succeeding whorl butting closely up against and sometimes absorbing them. Towards end of 4th whorl these peripheral tubercles diminish and become solid granules.

The groove between these two series of tubercles is prominent on 2nd and 3rd whorls, *appearing* to be the suture, but really forming a 'false suture'. On 4th whorl, however, the groove is clearly distinct from the true suture, but much shallower; on 5th whorl it is still traceable, but on later whorls quite obsolete.

On 3rd whorl 3 spiral series of granules, on 4th 6–7, on 5th 11–12, on 6th whorl *c.* 16, on 7th *c.* 22, 2 or 3 series on the actual periphery slightly larger than the others. On base of 4th whorl 7 series of granules, on 5th whorl 10–11, the 2nd (from the periphery) stronger than the others; on 7th whorl *c.* 16.

In large shells the periphery becomes less strongly angulate.

Four whorls alt. 9, diam. 12 mm.; 5 whorls alt. 14–15, diam. 19–20 mm.; 6 and 7 whorls 40–42 × 47–48 mm., 57 × 67 mm., 65 × 86 mm.

Operculum smooth, slightly concave in middle, 3·5 × 4·5 mm. in 9 × 12 mm. shell; 15 × 21 mm., thickness at inner end 5 mm., in 40 × 48 mm. shell; 25 × 38 mm. in 65 × 86 mm. shell. In young examples there is a trace of a spiral groove at the thin end.

Pinkish or purplish-rose, colour often extending over the periphery on to margin of base; base white, usually with a yellow or orange band near the columellar margin; operculum white. Young shells with darker red flame-like

markings extending retractively from suture above to midway across whorl, or nearly to periphery.

Young shells are clean, but older shells are usually covered with what appears to be a thick brown periostracum, but is really a Hydractinian, probably *Podocoryne carnea* M. Sars (*fide* Dr. Millard, U.C.T.).

Radula with *c.* 70 rows, central plate transversely oblong, resembling a scoop, fixed to the basal membrane by a central lug, 1st lateral plate subtriangular, fixed to basal membrane by an oblique ridge, and ending in a cutting-edge with 2 tiny points, 3rd–5th lateral plates with slightly more prominent cutting-edge.

Locality unknown (Smith). Port Elizabeth (Sowerby). Port Alfred (Bartsch, Turton). Walker Bay, 24 fathoms (Odhner).

Living: False Bay, 14–40 fathoms (S. Afr. Mus. P.F. coll.); False Bay, 37 and 52 metres (s.s. *Africana II*, per U.C.T.).

33° 52′ S., 25° 43′ E., 52 fathoms 1 fragment; off Cape St. Blaize, 37 fathoms, 2 fragments (S. Afr. Mus. P.F. coll.).

Remarks. Krauss remarked on the contrast between young and old shells of *Turbo sarmaticus*, and here the contrast is equally remarkable. Fortunately the adult was described before the juvenile was known.

The 'false suture' on the early whorls is an important feature for distinguishing young *tayloriana* and *gilchristi*.

It is strange that the *Pieter Faure* took living examples only in False Bay. Elsewhere only 1 fragment was obtained in Algoa Bay, and 2 fragments off Cape St. Blaize. The *Africana II* also obtained it in False Bay.

Thanks to the kindness of Dr. A. J. Cain and Mr. J. Hull, of the University Museum, Oxford, I have been able to examine three specimens from the Turton collection. They are broken and beach-worn, the largest 22 mm. diameter, but Turton's identification is confirmed.

Von Martens (1903, p. 46) recorded two living examples of *Calcar henicum* Watson from 35° 29′ S., 21° 2′ E., 102 metres, 'agreeing well with Watson's figure'. Were these really *henicum*? At that time von Martens had probably not seen the description of *gilchristi*. The two species are closely similar (*vide infra*), but the locality accords better with the known localities of *tayloriana* than with those of *gilchristi*, the latter not having been found south of Natal.

The *Valdivia* obtained other examples of *henicum* off the west coast of Sumatra, and von Martens remarked that these bridged the gap in the distribution between Fiji (*Challenger*) and the Agulhas Bank. Thiele (1925, p. 57) made no comment on von Martens's identification. Nevertheless I feel that the *Valdivia* examples from the Agulhas Bank should be re-examined before *henicum* is admitted to the fauna-list.

Astraea andersoni (Smith)

Astralium (*Bolma*) *andersoni* Smith, 1902, p. 248, pl. 4, fig. 7.
Astralium (*? Bolma*) *andersoni* Sowerby, 1903, p. 230, pl. 5, fig. 5.

Junction of protoconch and 1st postnatal whorl not distinguishable. At diam. 31 mm. (Smith's Type) there are, if the protoconch is regarded as consisting of nucleus and one whorl, protoconch plus 6 postnatal whorls. By analogy with *Turbo* and *A. tayloriana*, however, I reckon nucleus plus 7 whorls. At diam. 65 mm. (the larger specimen seen by Sowerby) there are nucleus plus $8\frac{1}{2}$ whorls; at diam. 80 mm. nucleus plus $9\frac{1}{3}$ whorls. Nucleus plus 1st and 2nd whorls forming a flat apex.

Sowerby's figure is good, but on the back of the body-whorl not shown in his figure the axial ribs are not only a little stronger but give an impression of being divided into 3 low rounded nodules. On the largest specimen the ribs on the 8th and 9th whorls are strong but less markedly nodulose.

The number of midwhorl (actually slightly below middle of whorl) and peripheral nodules on the 65 mm. diam. specimen are: on 4th whorl 6 and 13, on 5th 12–13 and 15, on 6th and 7th whorls 16 and 15, on 8th 16 and 14; on the 80 mm. diam. specimen they are: on 8th whorl 18 and 15, on 9th *c.* 24 and 17. On the 8th whorl both series of nodules, especially the peripheral series, diminish in size, and on the 9th whorl the midwhorl series is evanescent, the peripheral series much reduced. Sowerby's statement of 10 flattened scales around the peripheral keel on the 65 mm. diam. shell is correct for the three-quarter whorl, from top of the very oblique aperture onwards.

On base about 15 lirae strongly crenulated by the growth-lines.

Operculum drawn in perspective in Sowerby's figure (23 × 13 mm.); only half of it now remains, but the length was probably about 25 or 26 mm. long, the width is 19 mm., and greatest thickness at inner end 7 mm. The respective measurements of the operculum of the 80 mm. diam. shell are: 35 × 24 × 8 mm.

Size: alt. 57, diam. (incl. projections) 65 mm.; alt. 85, diam. 80 mm. The larger shell is thus proportionately higher, but at diam. 65 mm. was (as far as can be judged) only a little higher (alt. *c.* 60 mm.) than the smaller shell.

Smaller shell dull purplish-pink, becoming on 8th and 9th whorls more fawn or brown; aperture pale, iridescent, columellar glaze orange; operculum white.

The animal in the 80 mm. diam. shell was badly decomposed, but some of the radula plates were secured. The central and lateral plates resemble those of *tayloriana*.

Off Durban (from fish stomach) (Smith). 32° 45′ S., 28° 26′ E. (near Cape Morgan), 36 fathoms, 2 living (Sowerby, P.F. coll.).

Off Port Shepstone, 24 fathoms, 1 living (80 mm. diam.); off Tugela River, 14 fathoms, 1 worn operculum; off Itongazi River, 25 fathoms, 1 worn and corroded juv. (S. Afr. Mus. P.F. coll.).

The type in 1902 was in the collection of 'Mr. Anderson jnr. of Durban' (Smith).

The Cape Morgan specimen figured by Sowerby is in the South African Museum.

Astrea gilchristi (Sow.)

Fig. 7 *c*

Astralium (*Cyclocantha*) *gilchristi* Sowerby, 1903, p. 221, pl. 5, fig. 6.

Type consisting of the protoconchal nucleus and 6 whorls, alt. 27·5, diam. incl. processes 29 mm. Squamiform nodules on 2nd whorl 10–11, on 3rd and 4th whorls 11–12, on 5th 12–14, on 6th 15–16.

Subsutural granules on 2nd whorl *c.* 22, increasing to *c.* 50 on 6th whorl. On 2nd whorl only 1 (the subsutural) series of granules; on 3rd early part 2, later part 3 series, on 4th later part 4, on 5th 5, later part 6, on 6th whorl 6 series, with an additional somewhat irregular series immediately above the peripheral squamiform nodules. Below the latter 1 series of granules beginning on 5th whorl, on later part 2, but the lower series obscured by suture of following whorl, the 2 series visible on body-whorl from aperture around to outer lip, on back of which they become less distinct.

Basal marginal lira with *c.* 32 squamae on 5th whorl, *c.* 40 on 6th whorl (in neither case a complete whorl, some being obscured by the columellar callus); 6 additional series of granules on base. In the 4-whorled and 5-whorled juveniles there are weak axial ribs between the basal marginal lira and the columella, ending at the latter in a series of feeble granules.

Operculum of Type 10·5 × 9, thickness 5·5 mm., another specimen 12·5 × 11 × 5 mm.; with faint concentric striae (cf. fig. 4 *c* of *bathyraphe*, loc. cit., *infra*), sometimes anastomosing, and in the centre a few faint punctae (Type) or vermiculations.

Off O'Neil Peak (Zululand), 90 fathoms, and off Scottburgh (Natal), 92 fathoms (Sowerby; P.F. coll.).

Off Port Shepstone, 250 fathoms, 1 4-whorled juv.; off Cape Natal, 54 fathoms, 1 5-whorled juv.; off Cape Vidal, 80–100 fathoms, 1 fragment; off O'Neil Peak, 90 fathoms, 3 fragments; off Durnford Point, 90 fathoms, 1 broken, 1 fragment (S. Afr. Mus. P.F. coll.).

Natal (locality number lost), 1 operculum (S. Afr. Mus. P.F. coll.).

Type of *gilchristi*, i.e. the figured Scottburgh example, with Sowerby's autograph label, in the South African Museum (P.F. 12233, S. Afr. Mus. no. A5219).

The O'Neil Peak specimen presumably retained by Sowerby (? now in British Museum).

The Type was returned by Sowerby without the animal, which possibly was passed on to Gwatkin, and the radula may now be in the Gwatkin collection in the British Museum.

Remarks. Smith when describing *bathyraphe* (1899, p. 247, and 1901, pl. 12, figs. 4, 4 *a–c*) did not refer to *henicus* Watson, but Sowerby compared *gilchristi* with *henicus*, without reference to *bathyraphe*.

Sowerby gave two main features distinguishing *gilchristi* from *henicus*: the sutural channel and the more numerous peripheral processes. The first feature,

however, seems to be one in which both species agree. The sculpture separates them: about 12 (13 figured) peripheral processes in *henicus*, 16 in *gilchristi*; the 5th whorl in *henicus* has only the subsutural and supracarinal rows of granules, *gilchristi* has the space between these also granulate. The basal marginal lira in *henicus* has 30–35 sharp vaulted scales becoming stronger towards the lip, in *gilchristi* it has *c.* 40 low vaulted scales becoming less conspicuous; additional lirae on base 10 in *henicus*, 6 in *gilchristi*.

On the other hand, *gilchristi* resembles *bathyraphe* from Maldive Atoll, 210 fathoms, in the sutural channel, basal marginal lira without sharp processes, 6 rows of granules on base, and 2 (see Smith's and Sowerby's figures) rows of granules between the peripheral keel and the suture below. But the peripheral keel has only low vaulted scales in *bathyraphe* in contrast with the sharp processes in *gilchristi*.

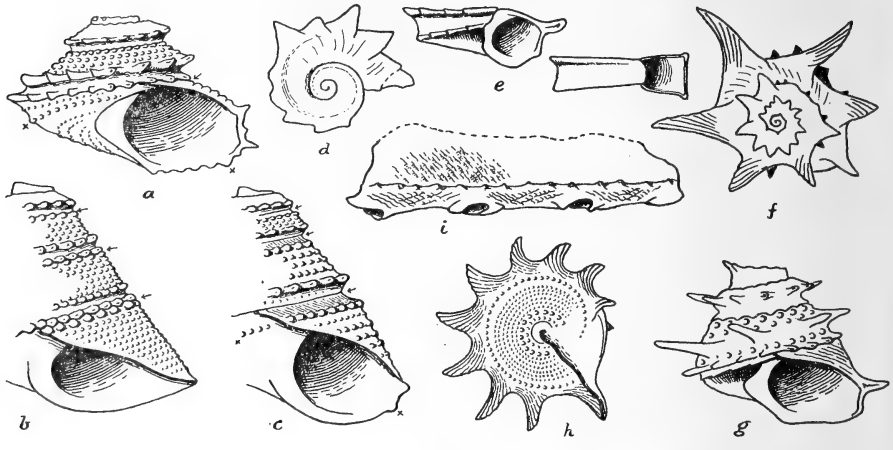

FIG. 7. *a*, *Astraea tayloriana* (Smith) juv. 9 × 12 mm. *b*, *c*, semidiagrammatic profile of *A. tayloriana* and *A. gilchristi* (Sow.) respectively to show true sutures (arrows) and 'false suture' in the former. *d*, apical view of *Astraea* sp. (S. Afr. Mus. no. A9237) (last process injured near aperture). *e*, lateral view of *Astraea* sp. juv., left: diam. 3 mm. (S. Afr. Mus. no. A9237), right: diam. 1 mm. (no. A9238). *f*, *g*, apical and lateral views of *Astraea* sp. (no. A9236). *h*, basal view of *Astraea* sp. (no. A5217). *i*, fragment of *Astraea* sp. (no. A9233), surface sculpture only partially indicated.

More abundant material may very likely show that *gilchristi* should be relegated to synonymy.

Smith said there were 9 whorls in *bathyraphe*, which seems excessive; probably a misprint for 6 (see Smith's figures).

Astralium johnsoni Odhner (1923, p. 9, pl. 1, figs. 15–17) from Port Alexander, Angola, 60 fathoms, resembles *gilchristi* in having a peripheral series of squamate processes above the chanelled suture, but has fewer processes (12 in figure), 5 series of squamose tubercles above the peripheral processes, and only 5 lirae on base.

Astraea sp.

Fig. 7 *h*

Protoconchal nucleus and 6 whorls. Alt. 19, diam. excl. processes 20 mm. Resembling *tayloriana*, but with steeper spire (alt. 19 instead of 16 at 20 mm. diam.); likewise a supraperipheral series of processes and a peripheral series, with a groove ('false suture') between them; each whorl butting up against the peripheral processes of the preceding whorl. Peripheral keel on 2nd whorl worn; upper series of processes on 3rd and 4th whorls *c.* 12, on 5th whorl *c.* 22, on 6th *c.* 45, at first squamate and prominent, but gradually changing into solid and less prominent nodules; lower (peripheral) series of processes on the other hand becoming more prominent, 12 on 3rd and 4th whorls, 11 on 5th and 6th whorls; the groove between the two series deep on 3rd and 4th whorls, gradually becoming shallower and narrower, and evanescent on last part of 6th whorl.

On 3rd whorl a subsutural series of granules, on 4th whorl 4 series, on 5th 7–8 series, on 6th 10–11 series, on each whorl the subsutural granules larger than the others.

On base a distinct but not very prominent marginal series of *c.* 70 granules; commencing at a short distance within this marginal series 8 series of granules, the 2 next the columella slightly larger than the others.

Sandy Point (north of Kei River mouth), 51 fathoms, 1 dead (S. Afr. Mus. no. A5217, P.F. coll.).

Astraea sp. juv.

Fig. 7 *f*, *g*

Protoconchal nucleus and $4\frac{1}{2}$ whorls. Alt. 7·5, diam. excl. processes 7 mm. Apex flat. Second whorl with tiny nodules on upper peripheral keel, becoming gradually stronger, sharp, squamate processes, *c.* 10 on each whorl; lower peripheral keel with more numerous squamate processes, adnate to the succeeding whorl which butts up against them; suture thus undulate, a groove ('false suture') between the 2 peripheral series of processes. Some of the processes on the upper peripheral keel elongated. Base with a marginal slightly squamose lira, and 3 or 4 incipient series of granules.

Off Umkomaas (Natal), 40 fathoms, 1 dead (S. Afr. Mus. no. A9236, P.F. coll.).

Astraea sp.

Fig. 7 *i*

A fragment of a large *Astraea* from off O'Neil Peak, 55 fathoms (S. Afr. Mus. no. A9233, P.F. coll.) consists of about 50 mm. of the peripheral keel, with about 15 mm. of the surface of the whorl above, and about 10 mm. of the base, including a portion of the columellar glaze.

There are 4 hollow flattened projections (broken) on the keel; if their

distance apart were constant around a shell with diameter of say 70–80 mm., there would have been about 14 processes. Close above these projections there are about 14 small feebly developed squamiform projections. The surface above is crossed by closely-set oblique crenulate growth-lines. Base with finer, straighter growth-lines, no spiral lirae (on the portion preserved).

This is probably a fragment of an Indo-Pacific species, but I have no material for comparison. It may be the adult of the Kei River species (A5217) described above.

Astraea sp. juv.

Fig. 7 *d*, *e*

A protoconch nucleus plus $1\frac{1}{4}$ whorls, alt. 0·3 (at aperture), diam. 1 mm., with incipient processes on upper keel. 34° S., 25° 44′ E., 33 fathoms (S. Afr. Mus. A9238, P.F. coll.).

A protoconch nucleus plus 2 whorls, alt. 1·3 (at aperture), diam. excl. processes 2·5 mm. Off Cape Morgan, 77 fathoms (S. Afr. Mus. A9241, P.F. coll.).

A protoconch nucleus plus 2 whorls, alt. 1·5 diam. excl. processes 3 mm. 34° 5′ S., 25° 43′ E., 52 fathoms (S. Afr. Mus. No. A9237, P.F. coll.).

There is no doubt that these are the juveniles of one of the species of *Astraea*. They are not so high as juveniles of *Turbo sarmaticus*, the top is quite flat, and the aperture differs in shape. In this last respect the smaller specimen somewhat resembles in shape *Bifrontia zanclaea* Phil. (cf. fig. 102 in Sowerby, 1863, p. 246, pl. 254).

Fam. **Liotiidae**

Thiele, 1929, p. 64 (as subfam. of *Turbinidae*); Laseron, 1954, pp. 1–25, 49 text-figs. (New South Wales species).

There seems to be no sharply defined character separating *Liotia* (as a section of which Thiele regarded *Cynisca*) from *Leptothyra*. Many specimens, e.g. of *C. granulosa*, with an open umbilicus appear to be adult, but are not really so. Consequently this character is not an infallible guide to the genus.

Several species have been instituted in both genera,* mostly on more or less worn material of single or a few specimens; and further study will surely reduce some of them to synonyms. What has hitherto been regarded as speciation may well prove to be only variation. For example, what morphological or sculptural characters (ignoring coloration) are there separating *C. forticostata*, *Cynisca alfredensis* and *Leptothyra africana*? Only variation in the development of the main and intermediary lirae. In fact, examination of fairly extensive material points to *granulosa* being a very variable species. It may even prove to include *forticostata*; but in the meantime the latter is kept separate.

Possibly some of the species described as adults and assigned to this family

* Bartsch most inadvisedly used *africana* and *alfredensis* as specific names in *both* genera *Cynisca* and *Leptothyra*.

may be only juveniles. Compare for example *Cyclostrema euchilopteron* Melvill & Standen (1903, p. 292, pl. 20, fig. 7) (*Lydiphnis e.* Melvill, 1906, p. 25, pl. 3, figs. 7, 7*a*) with '*Liotia fulgens*', which is the juvenile of *Turbo cidaris* (see p. 212).

Turton's *Leptothyra subconica* (1932, p. 178, pl. 42, no. 1257) is perhaps a *Tricolia.*

Cynisca granulosa (Krauss)

Fig. 8 *a*, *b*, *e*

Delphinula granulosa Dunker, MS.; Krauss, 1848, p. 94, pl. 5, fig. 28.
Monilea spuria Gould, 1861, p. 17.
Gibbula armillata (*non* A. Adams) Sowerby, 1892, p. 42.
Leptothyra armillata (*non* A. Adams) Smith, 1906, p. 53.
Liotia granulosa Krss., von Martens, 1903, p. 46.
Cynisca granulosa Krss., Smith, 1903, p. 388; 1904, p. 38; Thiele, 1924, p. 62, fig. 19 (radula); 1925, p. 54, pl. 13 (1), figs. 35, 36; Turton, 1932, p. 194.
Leptothyra spuria Gld., Bartsch, 1915, p. 146, pl. 22, figs. 4–6.
Leptothyra africana Bartsch, 1915, p. 147, pl. 22, figs. 1–3; Turton, 1932, p. 176, pl. 42, no. 1247 (juv.).
Leptothyra eucosmia Turton, 1932, p. 177, pl. 42, no. 1254 (juv.).
Cynisca gloriosa Bartsch, 1915, p. 163, pl. 31, figs. 6–8; Turton, 1932, p. 194.
Cynisca semiclausa Thiele, 1925, p. 55 and footnote, pl. 14 (2), figs. 1, 2.
Cynisca formosa Turton, 1932, p. 194, pl. 50, no. 1350.

Protoconch nucleus plus $3\frac{1}{2}$–4 whorls. Spiral lirae on 2nd whorl at first 3, later 4, uppermost lira starting as a series of granules, 2nd lira starting a little later, also granulate; 4–5 lirae on 3rd and 4th whorls, often with an intermediary between 3rd and 4th lirae; all the lirae more or less granulate, sometimes strongly, almost nodulose, the 1st–3rd always granulate (unless worn); sometimes the lirae are strong, separated by narrow sulci, and the granules instead of being subcircular become axially oblong and close together. Base with 4–5 lirae on 2nd whorl, increasing to 6–7 on 4th whorl, the inner 2 or 3 often subgranulate. Growth-lines over upper surface and base distinct in fresh specimens, but only seen in the sulci in worn shells. Umbilicus more widely open in juvenile (2 whorls) than in older shells, the innermost lira being well away from the centre; when adult closed by parietal callus. Adult shells with a few granules within the aperture, near the columella. Alt. 5·5, diam. 7·5 mm.; von Martens 6 × 9 mm.

Cream, pinkish, carmine, russet-brown, purplish-brown, speckled, spotted, mottled, or with radial streaks.

Operculum with close-set, finely beaded calcareous spiral lirae.

Radula with *c.* 50–60 rows, central plate broad, front margin turned over, ventral surface with cross-bar, 5 lateral plates with small triangular cusps, expanded basally, marginal plates uncinate.

Table Bay to Port Alfred (*auct. et* S. Afr. Mus.). Port Natal (Durban) (Thiele). One specimen from Tongaat (Natal) (S. Afr. Mus.).

Off Cape Morgan, 25 fathoms, 1 dead; off Cove Rock (East London) 22 fathoms, 20 dead; off Keiskamma Point, 33 fathoms, 4 dead; Algoa Bay, 33 fathoms, 5 juv. dead (S. Afr. Mus. P.F. coll.).

Living: Lüderitzbucht, Buffels River (south of Port Nolloth) to Saldanha Bay; and Cape Hangklip to Cape Agulhas (U.C.T.).

Remarks. A fine intermediary lira may be present between the 1st and 2nd, the 2nd and 3rd, and the 4th and 5th lirae, and between the lowest lira and the outermost basal lira, as well as between the 3rd and 4th; but not all concomitantly are present in one shell.

Bartsch's *gloriosa* appears to be merely a strongly granulate variation; there are two similar specimens among the Cove Rock set. Turton's *formosa* has intermediaries. Turton's photo of *eucosmia* has been badly retouched.

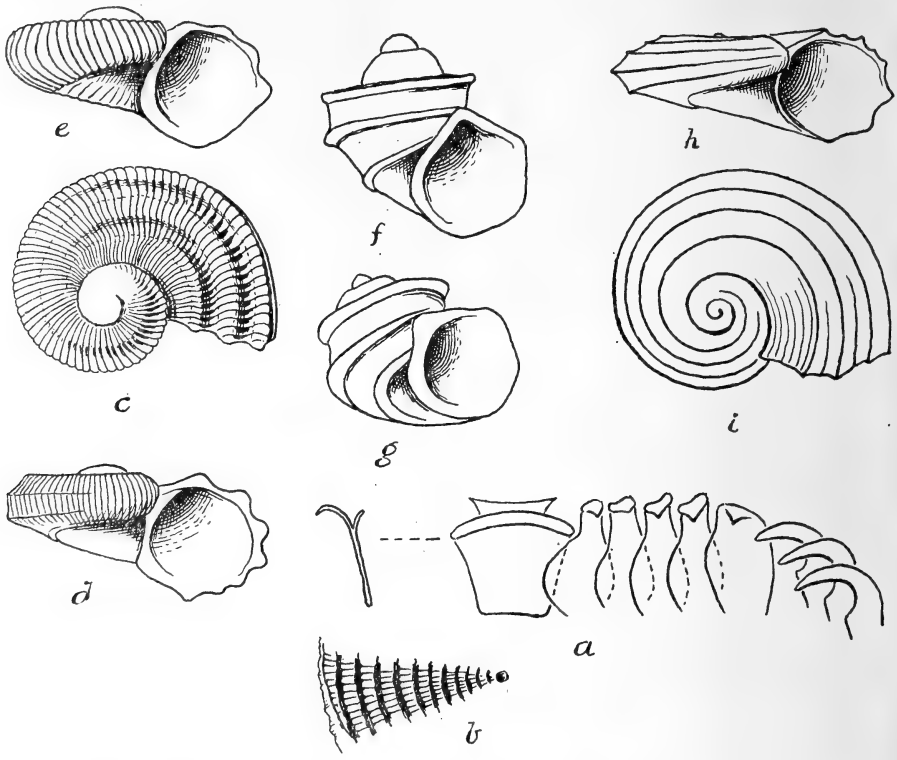

FIG. 8. *Cynisca granulosa* (Krss.) *a*, radula plates, with section of central plate; *b*, portion of operculum. *Cynisca* sp. juv. *c*, *d*, apical and lateral views (no. A6566). *Cynisca granulosa* (Krss.) *e*, lateral view of juvenile. *Leptothyra atomus* Turton *f*, *g*, lateral and oblique basal views. *Liotia* sp. *h*, *i*, lateral and apical views (no. A9280).

It is clear that Krauss figured the immature shell with open umbilicus, whereas Bartsch's figure of Gould's cotype shows the fully adult non-perforate shell. *C. semiclausa* is the half-way stage. Sowerby (1889*b*, p. 152) remarked on the umbilicus being open or closed. Worn adult shells often appear to be perforate because the parietal callus is thin and easily broken away.

Thiele suggested that his *semiclausa* might be the same as *L. africana*, and considered it to be a *Cynisca*.

Cynisca forticostata Smith

Cynisca forticostata Smith, 1904, p. 38, pl. 3, figs. 12, 13; Bartsch, 1915, p. 163; Turton, 1932, p. 194, pl. 49, no. 1348.
Cynisca alfredensis Bartsch, 1915, p. 164, pl. 29, figs. 10–12; Turton, 1932, p. 194.
Cynisca africana Bartsch, 1915, p. 165, pl. 28, figs. 4–6; Turton, 1932, p. 195. (= juv.).

Protoconch smooth. Postnatal whorls $3\frac{1}{2}$–4. Spiral lirae 2 on 1st whorl, the upper one granulate, on 2nd whorl this upper lira becomes the 2nd lira, and a subsutural lira begins, feebly granulate at start but granules becoming stronger, on 3rd and 4th whorls all three lirae are strong with well-marked granules; an intermediary may develop between 1st and 2nd and between 2nd and 3rd lirae; on base 3 granulate lirae on a 2-whorled specimen, 4 on an adult, increasing to 6 if intermediaries are developed. The outermost lira on upper surface forms the periphery, but the outermost basal lira is sometimes equally strong and prominent. Growth-lines (in unworn shells) well marked from the 1st whorl onwards, pliculose, crossing the lirae but leaving the granules smooth and polished; base similarly sculptured. Sutures deep. Umbilicus deep, remaining open in large shells. No granules within the aperture. Alt. 6, diam. 8 mm.

The U.C.T. specimen from a depth of 84 metres fawn with darker spots on the lirae between the paler granules. Beach-worn specimens white, with or without a few scattered pink or brown spots.

Operculum with close-set, finely beaded calcareous spiral lirae.

Radula with *c.* 50–60 rows, as in *granulosa*.

Port Alfred (Smith, Bartsch, Turton; also S. Afr. Mus.).

Off Nieca River (East London area) 43 fathoms, 2 dead; off Tugela River (Natal) 65–80 fathoms, 1 juv. dead (S. Afr. Mus. P.F. coll.).

Off East London (33° 9′ S., 28° 2′ E.), 84 metres, 1 living (U.C.T.).

Remarks. The pliculose growth-lines and the granules on living shells from the littoral zone form a pleasing scuplture, but are particularly beautiful on the U.C.T. specimen.

Cynisca sp.

Fig. 8 *c*, *d*

Heliacus sp. juv. Tomlin, 1928, p. 334.

Diam. 1·5 mm. This may perhaps be the juvenile of *Cynisca forticostata*. It has a lira in the middle of the whorl showing at the start of the 1st whorl, immediately following the protoconchal nucleus; on the 2nd whorl a second lira appears between it and the suture. In *granulosa* no lira appears until the 2nd whorl (S. Afr. Mus. A6566, P.F. coll.).

This distinction, however, needs confirmation, because no unworn juvenile of *forticostata* is available.

Leptothyra alfredensis Bartsch

Leptothyra alfredensis Bartsch, 1915, p. 149, pl. 32, figs. 1, 2, 3.
Cynisca rufanensis Turton, 1932, p. 194, pl. 50, no. 1353.

Protoconch nucleus plus 4 whorls. Spiral lirae 2 on 2nd, 3 on 3rd whorl, but the 3rd (peripheral) lira concealed in the suture and only becoming visible towards the middle of 4th whorl when the aperture drops down; very fine spiral striae between the narrow lirae; on base 3 lirae. Growth-lines pliculate, distinct between all the lirae, including base. Umbilicus open. Alt. 5, diam. 5 mm.

Cream-coloured.

Port Alfred (Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir).

Remarks. Dr. Muir obtained numerous examples but unfortunately none smaller than 1·5 mm. diam.

Leptothyra atomus W. H. Turton

Fig. 8 *f*, *g*

Leptothyra atomus Turton, 1932, p. 177, pl. 42, no. 1253.

This may be the juvenile of *alfredensis*, but specimens of the latter less than 1·5 mm. diam. are required to prove it. Dr. Muir obtained at Still Bay some minute shells, 0·6 × 0·6 mm., similar to Turton's shells. Turton's description does not mention the number of basal lirae; his photo has been retouched with ink, and in any case is not very clear; I think each of the two lower pairs of lines represents one lira, as in the present figure, drawn approximately in the same perspective as Turton's photo.

Liotia (*Cynisca*) *bicarinata* (von Martens)

Collonia bicarinata von Martens, 1902, p. 241.
Liotia bicarinata von Martens, 1903, p. 46, pl. 5, fig. 4.
Cynisca bicarinata Thiele, 1925, p. 55.

Apex broken, 1st and 2nd (or 2nd and 3rd) whorls with 1 spiral lira, last whorl with 2 lirae, 1 in middle of whorl and 1 peripheral; base with 2 lirae. Growth-lines distinct but fine. Umbilicus open. Alt. 6, diam. 9 mm.

35° 10′ S., 23° 2′ E., 500 metres (von Martens).

Not taken by the *Pieter Faure*. Distinguished from *Leptothyra alfredensis* by having only 2 lirae on the body-whorl, and the much finer growth-lines.

Leptothyra quantilla (Gould)

Collonia quantilla Gould, 1861, p. 22.
Turbo sanguineus (*non* Linn.) Sowerby, 1892, p. 42.
Leptothyra sanguinea (*non* Linn.) Smith, 1904, p. 24.
Leptothyra quantilla (Gould) Bartsch, 1915, p. 148, pl. 23, figs. 4–6.
? Leptothyra agulhasensis Thiele, 1925, p. 56, pl. 14 (2) , fig. 4.
? Leptothyra quantilla (Gould) Turton, 1932, p. 177.

Leptothyra carminea Bartsch

Leptothyra carminea Bartsch, 1915, p. 148, pl. 23, figs. 7–9.
? Leptothyra quantilla (Gould) Thiele, 1925, p. 55, pl. 14 (2), fig. 3.

The normal number of lirae on upper part of last whorl seems to be 6; in *carminea* 5 is also frequent, and there may be only 4; on the other hand in *quantilla* there may be 7 or 8.

The basal lirae normally number 6 in *carminea*, but there may be occasionally 5 or 7; in *quantilla* 10–12 seems to be normal. Bartsch gave 15 for Gould's Type, but his figure does not show more than 12 or 13; I have not seen any shell with more than 12 basal lirae; in fact 10 seems to be more common. Thiele (p. 55) gave a *total* of 15 lirae on the last whorl of a 2·5 mm. diam. shell, the lowermost 5 of which were weak and close together.

The uppermost one or two lirae may show weak granulation, as also the lira surrounding the umbilicus. These features were mentioned by Thiele for *agulhasensis*.

In 1-whorled and 2-whorled juveniles there is a faint ridge (not keel) on base, within which the surface slopes down into the umbilicus; it forms a slight angularity on the lower margin of the aperture.

The umbilicus always remains open, though it may be slightly narrowed by encroachment of the parietal callus.

The pink colour begins on the lirae at the end of 2nd whorl, but later extends to the grooves; in beach-worn adults the colour is retained longer in the grooves than on the lirae. U.C.T. specimens kept in alcohol since 1932 are bleached nearly white. Turton's white examples seem to belong to another species, judging by examples sent by him to the South African Museum (see *rotundata*).

Up to alt. 3, maj. diam. 3·5 mm.

Operculum calcified, spiral growth visible internally, external surface slightly concave, with central pit, overlap of last whorl onto previous whorl not strongly marked, a slight calcareous thickening along inner margin (see fig. 9 *c*, as shown by dotted line).

Radula with *c.* 50 rows, similar to that of *Cynisca granulosa*.

quantilla: False Bay (Gould; also S. Afr. Mus.); Still Bay, juveniles from 0·75 mm. upwards (S. Afr. Mus. coll. Muir); Algoa Bay (Sowerby); Port Alfred (Smith, Bartsch).

Still Bay and Knysna (U.C.T.).

carminea: Port Alfred (Bartsch; also S. Afr. Mus.).

Algoa Bay, 33 fathoms, 3; off Sandy Point (north of Kei River mouth) 95 fathoms, several; off Cove Rock (East London), 22 fathoms, 9; off Cape Morgan, 47 fathoms, 1; all dead (S. Afr. Mus. P.F. coll.).

31° 51′ S., 19° 37′ E., 80 metres, 1 bleached (Thiele: *agulhasensis*).

Distribution. Great Fish Bay (Angola) (Thiele: *quantilla*).

Remarks. For the present, two names may be retained for the extreme forms of what may prove to be a single species. The material at hand shows that *quantilla* is found in the western area, from False Bay to Algoa Bay, and extending to Port Alfred; and *carminea* in the eastern area from Algoa Bay eastwards. The two forms seem to commingle in the Algoa Bay–Port Alfred area. More material, and investigation of the northward range beyond Cape Morgan, are desirable.

Thiele said the shell described by Bartsch might belong (*dürfte behören*) to *quantilla* Gould. In fact Bartsch redescribed Gould's Type! Thiele's fig. 3 of an Angolan shell appears to resemble the *carminea* form (with few basal lirae), whereas his fig. 4 of *agulhasensis* is more like the *quantilla* form (with numerous basal lirae).

I am doubtful about including *agulhasensis* in the synonymy because it is based on a shell 4 × 4·5 mm., which is appreciably larger than the largest shell (3 × 3·5 mm.) in the present material.

Turton's *Cyclostrema problematica* (1932, p. 198, pl. 51, no. 1378) looks very like a juvenile *quantilla*.

Leptothyra rotundata (Sow.)

Fig. 9 *a–d*

Turbo minutus (*non* Michaud) Sowerby, 1889 *b*, p. 152, pl. 3, fig. 9; 1892, p. 42, pl. 2, fig. 54.
Cyclostrema minuta Sow., Turton, 1932, p. 199, pl. 52, no. 1383.
Cyclostrema rotundata Sowerby, 1892, p. 45, pl. 2, fig. 47.
Cyclostrema rotundata Sow., Tomlin, 1923, p. 50.
? Cyclostrema rotundata Sow., Turton, 1932, p. 199, pl. 51, no. 1381.
? Cyclostrema inconspicua Turton, 1932, p. 199, pl. 51, no. 1382.

Distinguished from *quantilla* by its uniform white or yellowish colour (not pink or pink striped), and by the umbilicus being closed in the adult.

Lirae on upper part of last whorl 6–7, on base 12–15.

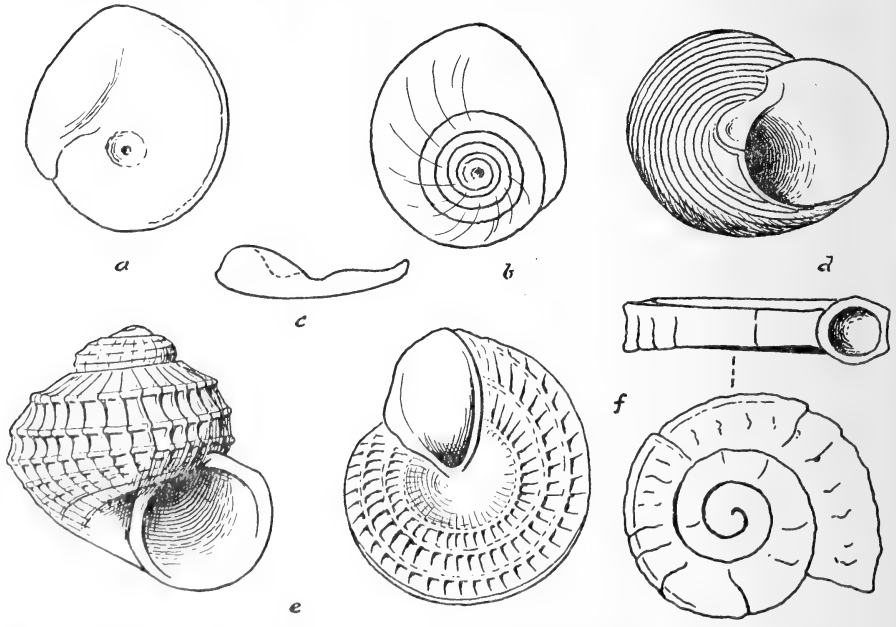

FIG. 9. *Leptothyra rotundata* (Sow.) *a*, *b*, *c*, external and internal views of operculum, with section. The dotted line in *c* refers to *quantilla*. *d*, basal view. *Leptothyra sola* n. sp. *e*, lateral and basal views. *Rufanula sextula* n.g., n. sp. *f*, lateral and apical views.

Umbilicus open on 2-whorled and often on 2½-whorled shells, but closed on 3-whorled shells; the filling is at first a button-like plug, but usually this is covered with a smooth callus, sometimes with a slight concavity forming a false umbilicus.

Operculum as in *quantilla*, but with a larger, more boss-like thickening on inner margin. It has a close resemblance to the operculum of *Bothropoma* (Thiele, 1929, fig. 46).

Radula with *c.* 45–50 rows, similar to that of *Cynisca granulosa*.

Diam. 3 mm. White, cream, yellowish, the apical part sometimes rusty brown.

Port Elizabeth (Sowerby). False Bay (S. Afr. Mus.); Port Alfred (S. Afr. Mus., 3 sent by Turton as white *quantilla*); west coast of Cape Peninsula (S. Afr. Mus.).

Algoa Bay, 33 fathoms, 4; off Cape Morgan, 47 fathoms, 2 (S. Afr. Mus. P.F. coll.).

East London (U.C.T.).

Leptothyra sola n.sp.

Fig. 9 *e*

One specimen, probably juvenile, from the *Pieter Faure* collection, without locality, but probably from Algoa Bay. Similar to *alfredensis* but with fewer axial pliculae (*c.* 33 on 3rd whorl), and with 4 spiral lirae on base. Alt. 1·5, diam. 1·75 mm. (S. Afr. Mus. A9288, P.F. coll.).

Less strongly lirate, and with more numerous axial pliculae, than *Euchelus natalensis* (p. 266).

Liotia sp.

Fig. 8 *h*, *i*

Protoconch nucleus plus 2 whorls. Discoidal, protoconch scarcely projecting above level of 2nd whorl. First whorl with 1 weak lira, at end of whorl 2 lirae, 2nd whorl with 4, the upper one raised above level of suture, the 4th peripheral and carinal, 1 intermediary between 1st and 2nd, and 1 between 2nd and 3rd lirae, in addition 5–6 fine spiral striae between suture and 1st lira; on base fine spiral striae and 1 well-marked lira, a feeble lira marks the entrance to the wide open umbilicus. No axial sculpture. Aperture circular. Alt. 1·25, diam. 3 mm.

Off Nieca River (East London area), 47 fathoms, 1 dead (S. Afr. Mus. A9280, P.F. coll.).

Teinostoma africanum (Smith)

Teinostoma lucidum (*non* Adams) Sowerby, 1892, p. 13.
Ethalia africana Smith, 1904, p. 38, pl. 3, figs. 10, 11.
Teinostoma africana Bartsch, 1915, p. 165.
Teinostoma alfredensis Bartsch, 1915, p. 165, pl. 28, figs. 7–9; Turton, 1932, p. 195, pl. 50, no. 1358.

Both *africanum* and *alfredense* came from the same locality, and appear to have been based on worn and unworn examples, respectively, of the same species.

Cyclostremella africana Bartsch

Cyclostremella africana Bartsch, 1915, p. 170, pl. 29, figs. 1, 2, 3.

The Type specimen was 2·1 mm. diameter with 3 (though Bartsch gave $2\frac{1}{2} + 1\frac{1}{2}$) whorls. The present specimen is 3·3 mm. with 4 whorls. Yellowish with a subsutural series of faint white spots on the last whorl.

Port Alfred (Bartsch, Turton). Still Bay, 1 (S. Afr. Mus. Muir coll.).

Remarks. The true systematic position of this species is uncertain until the animal has been examined.

Rufanula n.g.

Planorboid, spire and base concave, the latter more so than former, last whorl not disunited, Peristome complete.

Genotype: *R. sextula* n.sp.

Without the animal, the family position is uncertain, though the species might perhaps be included in the New Zealand *Zerotula*. Nevertheless it may be given a definite generic status. The name is derived from Sir Rufane Donkin, whose monument in Port Elizabeth overlooks Algoa Bay.

Rufanula sextula n.sp.

Fig. 9 *f*

Whorls 3. Upper and lower surface of last whorl slightly convex, but not costate, bounded by a slight blunt keel, the periphery between the keels flat or slightly concave. Peristome subcircular, flattened at the outerlip; aperture circular. Some of the growth-lines, at irregular intervals, subvaricoid, causing slight irregularities in the outline. 1·5 × 0·3 mm. Corneous.

34° S., 25° 44′ E. (Algoa Bay) (depth not recorded, but probably about 30 fathoms), 3 (S. Afr. Mus. A29634, P.F. coll.).

Remarks. The shell can be stood up firmly on its edge like a tiny coin.

It has a strong resemblance to *Bifrontia zanclaea* Phil., as figured by Sowerby (1863, p. 246, pl. 254, figs. 101–103). *Bifrontia*, seemingly a fossil genus, is not included in Thiele's *Handbuch* (1929).

Somewhat similar shells are: the Philippine *Daronia spirula* A.Ad. (Sowerby, 1864, pl. 255, figs. 32, 33), and the Australian *Liotella parvirota* Laseron (1954, p. 9, figs. 19, 19*a*) and *Orbitestella aura* Laseron (1954, p. 18, figs. 44, 44 *a*, *b*). The two former are loosely coiled, but not the latter. None of them, however, has a flattened periphery.

Easily distinguished from juvenile *Turbo cidaris* (fig. 4 *c*), and the juvenile Astraeid (S. Afr. Mus. A9238) described on p. 224 (fig. 7 *e*).

Fam. **Trochidae**

Minolia splendens (Sow.)

Fig. 10 *a*

Solariella splendens Sowerby, 1897, p. 18, pl. 6, fig. 21.
Minolia splendens Thiele, 1925, p. 53.

Protoconch nucleus plus 5 whorls. Profile with tabulate shoulder. Spiral lirae 2 on 2nd and 3rd whorls, 4 on 4th, 7 (8) on 5th, the uppermost lira forming the shoulder, feebly granulate on 2nd and 3rd whorls, sometimes also on 4th but not on 5th whorl, 1 or 2 finer lirae on the tabulate zone; base smooth. Umbilicus wide, with 3–4 inconspicuous lirae, crossed by axial growth-lines. Up to alt. 8, diam. 10·5 mm.

Radula with *c.* 30 rows, central and lateral plates thin, quadrangular, anterior margins very slightly turned over, marginal plates very numerous, inner ones at first very similar to the laterals, but gradually becoming falcate with broader shaft and biserrulate cusp, then gradually passing into the very fine and slender outer series.

Natal (Sowerby); Durban (S. Afr. Mus.).

Off Umhloti River (Natal), 27 fathoms, 1 living, 5 dead; off Umhlanga River (Natal), 22–26 fathoms, 3 dead; off Cape Vidal (Zululand), 22 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Remarks. The *Pieter Faure* obtained only 1 living example, the others dead but fresh. The radula confirms Thiele's statement that the species is a *Minolia.*

Minolia articulata (Gould)

Margarita articulata Gould, 1861, p. 15.
Trochus (*Solariella*) *dilectus* (*? non* Adams) Sowerby, 1889 *b*, p. 154.
Solariella dilecta (*? non* Adams) Sowerby, 1892, p. 44, pl. 4, fig. 90.
Gibbula articulata Bartsch, 1915, p. 155, pl. 25, figs. 4–6.
Solariella algoensis Thiele, 1925, p. 50, pl. 13 (1), fig. 21.
Minolia bleeki Thiele, 1925, p. 53, pl. 13 (1), fig. 32.

Protoconch nucleus plus 4 whorls. Spiral lirae on 1st whorl 1 (= the uppermost lira on following whorls), weak, on 2nd whorl at start 2, later 3; on 3rd 3 (4); on 4th 4 (5); the uppermost lira separated from suture by a tabulate shoulder; a 5th (6th) lira close below periphery not visible in apical view, and thus reckoned to be on base; intermediaries may be developed. Base with 8–10 spiral lirae, strongest near the umbilicus. Growth-lines forming regular close-set pliculae; varying in strength, especially well marked on the tabulate shoulder; continued across base and well marked in umbilicus. Alt. 8, diam. 9 mm.

White, buff, pink, sometimes nearly unicolorous, usually with radiating axial flames, comma-shaped marks on the tabulate shoulder, spotted or speckled, lirae often articulate, base with more or less well-marked axial streaks. Sometimes dark brown with pale spots around periphery.

Radula with *c.* 35–40 rows, similar to that of *splendens*.

Fossil: Quaternary; Sedgefield near Knysna (A. R. H. Martin).

Simon's Bay (False Bay) (Gould, Thiele); Port Elizabeth (Sowerby); Algoa Bay (Thiele); Port Alfred (Bartsch, Turton); False Bay (S. Afr. Mus.).

False Bay, 22–25 fathoms, numerous; off Cape St. Blaize, 37 fathoms, 1 dead; 34° 5′ S., 25° 55′ E., 67 fathoms, 4 dead; off Keiskamma Point, 33 fathoms, 1 dead; off Cove Rock (East London), 22 fathoms, 4 dead (S. Afr. Mus. P.F. coll.).

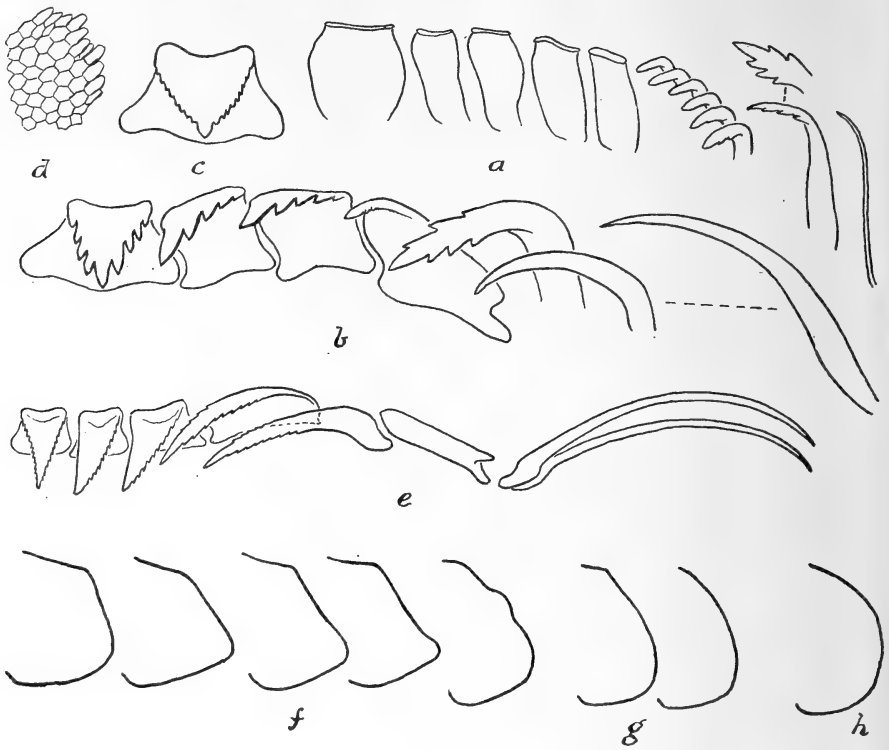

FIG. 10. *Minolia splendens* (Sow.) *a*, radula plates. *Solariella undata* Sow. *b*, radula plates. *d*, portion of jaw. *S. laevissima* (v. Mrtns.). *c*, central plate of radula of no. A5266. *S. franciscana* n. sp. *e*, radula plates. Profiles of: *f*, *S. undata*, five variations; *g*, *S. agulhasensis* Thiele, two variations; *h*, *S. multistriata* Thiele.

False Bay, living (U.C.T.). 34° 16′ S., 22° 17′ E., 73 metres, 1 living (U.C.T.).

Remarks. Thiele rightly by-passed '*dilecta*'; he was undecided whether his *algoensis* was identical with *articulata*. Sowerby's figure of '*dilecta*' is poor, and although S. Afr. Museum specimens were identified by J. H. Ponsonby as *dilecta*, no recent comparison, so far as I am aware, has been made of South African specimens with Adams's Type. The Cumingian locality 'Magellan Straits' may be incorrect.

Gould's species, as illustrated by Bartsch, is unmistakable, and *algoensis* is undoubtedly synonymous. Very common in False Bay, and extends eastwards to the East London area.

The growth-lines vary in strength, being sometimes very fine and close-set, but usually pliculate and well marked. Beach specimens usually show them only on the tabulate shoulder (if at all). When well developed they may impart a slight beading to the shoulder lira.

One of the P.F. specimens from Algoa Bay has intermediary lirae: 1 on the tabulate shoulder on 3rd and 4th whorls, and 1 between each pair of lirae on 4th whorl. The 3-whorled U.C.T. specimen (34° S., 22′ E.) has an intermediary on the tabulate shoulder on 2nd and 3rd whorls, but no intermediaries between the other lirae.

The West African shell described and figured by von Martens (1903, p. 15, pl. 5, fig. 7), and doubtfully identified as *Minolia dilecta* A. Adams, is not the same as the South African shell formerly known as '*dilecta*'. See Thiele (1925, p. 53, pl. 13(1), fig. 31): = *bojadorensis* Thiele.

Minolia adarticulata n.sp.

Fig. 11 *f*

Protoconch plus $5\frac{1}{2}$ whorls. Turreted, profile convex, with tabulate shoulder. Sutures indented. Spiral lirae obscure on 1st whorl (a faint indication of the shoulder lira on later part of whorl), on 2nd whorl 3, 4 at end of whorl, 4 lirae on 3rd, 4th, and 5th whorls, the uppermost lira forming the rather sharp shoulder; fine spiral striae and intermediary lirae may occur on the tabulate shoulder and between the main lirae; on base 7 spiral lirae in one specimen, 10 in the other owing to intermediaries, 4 or 5 within the widely open umbilicus. Growth-lines forming retractive pliculae on the tabulate shoulder only, but producing a feeble beading on the shoulder lira, and sometimes on the early whorls, continued faintly in the sulcus below shoulder. Aperture circular. Alt. 8·5, diam. 8 mm., also 8 × 8 mm.

One shell buff, the other fawn with pink dots on the lirae, on upper part of whorls and on base.

Off Hood Point (East London), 49 fathoms, 2 dead (S. Afr. Mus. A9277, P.F. coll.). Also off Cape Natal (Durban), 85 fathoms, 2 fragments (S. Afr. Mus. P. F. coll.).

Remarks. Definitely a higher shell than *articulata*, but otherwise not dissimilar. The axial pliculae, however, which in the latter are very distinct across all the sulci, are here developed only on the tabulate shoulder.

The two fragments from Natal appear to be conspecific, having fine striae between the lirae, and pliculae only on the tabulate zone.

In the absence of the radula, provisionally assigned to *Minolia* on account of its resemblance to *articulata*.

Minolia sp.

Protoconch nucleus plus $3\frac{1}{4}$ whorls. No spiral lirae above the periphery; below the periphery on base *c.* 10 feebly impressed spiral striae (seen only on part of base, elsewhere worn or corroded). Growth-lines fine, non-plicose, but at irregular intervals accentuated by corrosion. Umbilicus narrow. Alt. 2·5, diam. 3·2 mm. White.

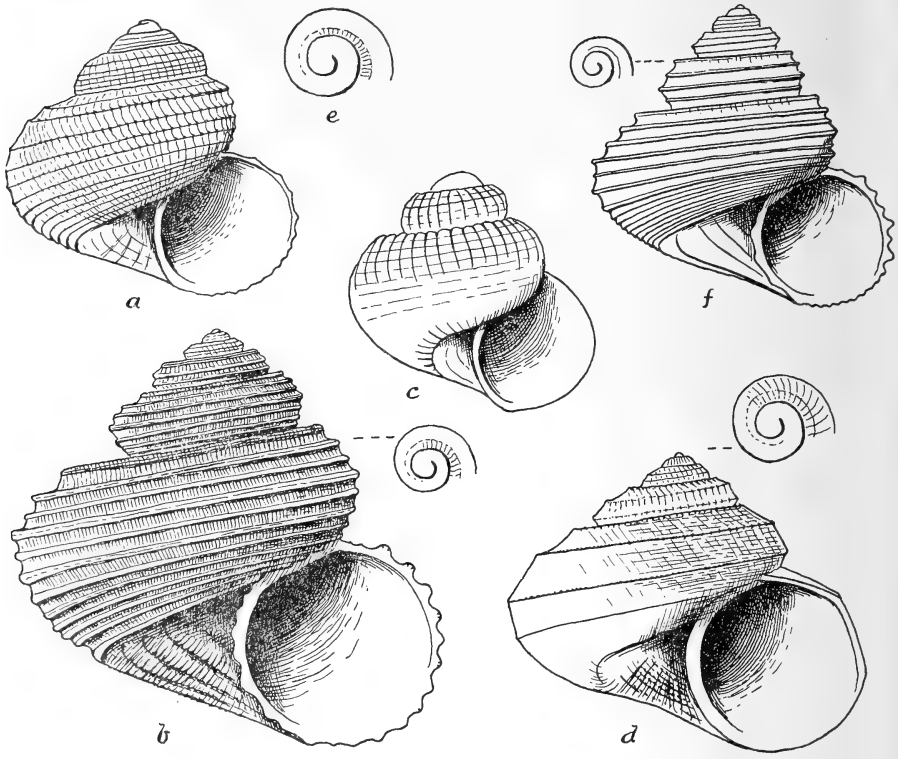

FIG. 11. *a*, *Solariella turbynei* n. sp. *b*, *S. franciscana* n. sp. *c*, *S. macleari* n. sp. *d*, *S. gilchristi* n. sp. *e*, *Solariella* sp., protoconch. *f*, *Minolia adarticulata* n. sp. (*e* is drawn to the same scale as the other protoconchs, but the shells are drawn to different scales).

Radula similar to that of *splendens*, about 25 rows (not easily countable). 32° 5′ S., 18° 16′ E., 20 fathoms, 1 living, 1 dead (U.C.T.).

Differing from *articulata* in having no sculpture above the periphery, and a narrower umbilicus. Moreover *articulata* has not been recorded from the west coast.

Solariella undata Sow.

Fig. 10 *b*, *d*, *f*

Solariella undata Sowerby, 1870, p. 251.
Minolia undata von Martens, 1903, p. 47, pl. 5, fig. 5.
Solariella valdiviae Thiele, 1925, p. 47, pl. 13 (1), fig. 15.

Protoconch nucleus plus 5 whorls. Whorls with a slight but distinct shoulder a little above midway between periphery and suture, periphery feebly angular, less so in adult than in juvenile. Fine close striae over whole whorl including base, with stronger lirae around and within umbilicus. Growth-lines fine, distinct (at least below suture), usually distinct on base and forming radiating pliculae entering the umbilicus. Alt. 9, diam. 15 mm.

Buff or fawn, with large fulvous patches or comma-like flames between suture and shoulder, fine undulate or zigzag streaks below shoulder, periphery with oblique irregular flames; sometimes almost unicolorous.

Jaws reticulate. Radula with *c.* 28 rows, central plate laterally expanded, wider than long, with strong cusp bearing 4 (5) serrations on both margins, 1st and 2nd lateral plates slightly broader than long, strongly serrate on outer margin, 3rd lateral much broader than long, with small cusp bearing minute denticles, marginal plates not numerous, 1st strong, serrate on both margins, following plates sickle-shaped, non-serrate.

Agulhas Bank (Sowerby). 35° 16′ S., 22° 26′ E., 155 metres, several, 1 fresh; 34° 33′ S., 18° 21′ E., 318 metres (von Martens).

Off Umhloti River (Natal), 40 fathoms, 5 dead; off East London, 300 fathoms, 1 dead but unworn; off Cove Rock (East London), 80–130 fathoms, 5 dead; 36° 40′ S., 21° 26′ E., 200 fathoms, 3 dead; Brown's Bank (approx. 36½° S., 20½° E.), 80–100 fathoms, 5 dead; off Cape St. Blaize, 125 fathoms, 4 dead, and 90–100 fathoms, 1 living; off Cape Point and west coast of Cape Peninsula, 120–145 fathoms, 3 dead (one of them fresh) (S. Afr. Mus. P.F. coll.).

30° 42′ S., 15° 59′ E., 201 metres, 2 living (s.s. *Africana*, per U.C.T.).

Remarks. The prominence of the shoulder and the peripheral angulation show variation even among only two dozen examples (fig. 10*f*). Both may be so faint, especially on the last whorl in adults, that the shell almost resembles *laevissima* except for the spiral striae. The profile may be distinctly concave above the peripheral angulation, making the periphery almost carinate (*valdiviae*); there may be a slight convexity immediately below the suture, with a slight concavity above and below the shoulder, which is thus rather conspicuous, almost lirate.

Of the two taken by the s.s. *Africana*, one (diam. 7·5 mm.) is typical, with shoulder and peripheral angulation; the other (diam. 11 mm.) shows a slight shoulder on 3rd whorl, but only a feeble rounded shoulder on 4th and 5th whorls, and the spiral striation is so weak as to be easily overlooked (unless the shell is dried).

The strength and regularity of the growth-lines is another variable feature. In one of the 3 shells from 36° 40′ S., 21° 26′ E., the growth-lines are very conspicuous, almost pliculate, on the tabulate zone below the suture, and also on the base where they form a cancellate sculpture with the spiral lirae at entrance to umbilicus. The East London shell from 300 fathoms is even more strongly sculptured. In the other shells from 36° 40′ S., 21° 26′ E., and other

localities the growth-lines are not conspicuous. The spiral striae/lirae on the base may also be evanescent.

The tabulate zone usually has a gentle slope downwards from the suture, but may be nearly horizontal. In the live example from off Cape St. Blaize, 90–100 fathoms, the zone is horizontal on the 3rd and 5th whorls, but on the 4th whorl it slopes slightly upwards from the suture to the angular shoulder.

Between the shoulder and the periphery the steepness of the slope also varies. Consequently there are 'high' and 'low' forms; the extremes in the present series are: 9 × 12 mm. (one from 36° 40′ S., 21° 26′ E.) and 8 × 14 mm. (the live example mentioned above).

The suggestion by von Martens that the Australian *angulata* Angus = *prodicta* Fischer might be the same as the South African shell was not accepted by Thiele.

Solariella multistriata Thiele

Fig. 10 *h*

Solariella multistriata Thiele, 1925, p. 49, pl. 13 (1), fig. 18.

Protoconch nucleus plus 4 (5) whorls. Profile of whorls convex without any peripheral angulation. Fine spiral striae over whole whorl, and on base, becoming stronger at entrance to umbilicus. Growth-lines fine, not pliculate at umbilicus, which is wide and without any angulation. Being without any peripheral or umbilical angulation, the aperture is circular. Alt. 6, diam. 8·5 mm.

Jaws and radula as in *undata*.

35° 16′ S., 22° 26′ E., 155 metres (Thiele).

33° 52′ S., 25° 50′ E., 25 fathoms, 4 dead; 34° 5′ S., 25° 55′ E., 67 fathoms, 4 dead; off Cove Rock (East London), 22 fathoms, 5 dead (S. Afr. Mus. P.F. coll.).

Living: False Bay (U.C.T.).

Solariella agulhasensis Thiele

Fig. 10 *g*

Solariella agulhasensis Thiele, 1925, p. 51, pl. 13 (1), fig. 26.

The profile may have a slight shoulder high up near the suture or none at all; a slightly accentuated convexity at the periphery and a slight angularity at entrance to umbilicus; consequently the aperture is not quite circular, but slightly triangular. Growth-lines form pliculae at entrance to umbilicus. Alt. 5, diam. 7 mm.; diameter of Natal fragment 9·5 mm. 5·5 × 8 mm. (Thiele).

Fawn with faint darker undulate or zigzag flames.

35° 26′ S., 20° 56′ E., no depth given (Thiele).

34° S., 25° 44′ E., 33 fathoms, 3 dead; off Nanquas Peak (eastern end of Algoa Bay), 63 fathoms, 1 dead; off Hood Point (East London), 49 fathoms, 4 dead; off Cape Natal (Durban), 85 fathoms, fragments (S. Afr. Mus. P.F. coll.).

Remarks. Having in view the variability found in other species I doubt whether this is distinct from *multistriata.*

Turton's *pulchella* 1932, with nucleus plus $3\frac{1}{2}$ whorls but diameter only 3·5 mm., may perhaps be synonymous.

Solariella laevissima (von Martens)

Fig. 10 *c*

Trochus laevissima von Martens, 1889, p. 54 (*sine* descr.).
Machaeroplax laevissima von Martens, 1891, p. 257 (Latin diagnosis of shell), and pl. 25, fig. 15 (radula).
Solariella fuscomaculata Sowerby, 1892, p. 44, pl. 2, fig. 46; Bartsch, 1915, p. 161; Turton, 1932, p. 189, pl. 47, no. 1323.
Solariella beckeri Sowerby, 1901, p. 214, pl. 22, fig. 1.
Minolia (*Nachaeroplax* [*sic*]) *congener* Sowerby, 1903, p. 223, pl. 5, fig. 2; 1904, p. 19 (corrigendum); Peile, 1922, p. 17 (radula).
Minolia laevissima von Martens, Sowerby, 1903, p. 231, pl. 5, fig. 2 [*sic*, typ. err. = 1].
Solariella laevissima von Martens, 1903, p. 49, pl. 5, fig. 2.
Solariella nitens Thiele, 1925, p. 47, p. 13 (1), fig. 16.
Solariella rufanensis Turton, 1932, p. 189, pl. 47, no. 1324.

Protoconch nucleus plus 5–6 whorls. Profile of whorl convex, without any shoulder. Surface smooth and polished. No spiral sculpture (excessively minute, irregular and discontinuous striae may sometimes be seen). Growth-lines fine, not conspicuous except where they enter the umbilicus forming more or less well-marked radiating pliculae. Entrance to umbilicus rounded or more or less angular. Up to alt. 15, diam. 22 mm. (S. Afr. Mus.).

Buff, fawn, or slightly plumbeous, with darker wavy or zigzag or comma-like flames, interspersed with pale marks, often forming a 'necklace' at top and in middle of whorl; early whorls spotted with pink or brown; base with or without zigzag markings.

Jaws and radula as in *undata*, the latter with *c.* 30–35 rows.

33° 59′ S., 17° 52′ E., 91 metres (von Martens: *laevissima*).

34° 33′ S., 18° 21′ E., 318 metres (Thiele: *nitens*).

Off Cape Infanta, 40 fathoms, and off Cape St. Blaize, 37 fathoms (Sowerby: *congener*).

Off Cape Natal (Durban), 55 fathoms (Sowerby: *congener*).

Port Elizabeth and Port Alfred (Sowerby, Bartsch, Turton: *fuscomaculata, beckeri, rufanensis*).

Cape Town (1 dead, *fuscomaculata*) (S. Afr. Mus.).

Off O'Neil Peak (Zululand), 2 dead; off Cape Natal, 54–55 fathoms, 2 dead (one of them fresh); off Rame Head (south of Port St. Johns), 43 fathoms, 1 dead; off Nanquas Peak (eastern end of Algoa Bay), 63 fathoms, 1 dead; off Cape St. Francis, 70 fathoms, 2 living; off Cape St. Blaize, 37 fathoms, 2 living, 39–44 fathoms, 5 dead, 105 fathoms, 2 dead, 125 fathoms, 2 dead; off Cape Infanta, 43 fathoms, 2 (one of them living); off Cape Point, 41 fathoms, 2 (one of them living), 50 fathoms, 1 dead, 166 fathoms, 1 dead,

210 fathoms, 3 dead; off Table Bay, 125 fathoms, 1 dead, 190 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

False Bay, living (U.C.T.). 30° 42′ S., 15° 59′ E., 201 metres, 1 living (s.s. *Africana*, per U.C.T.). 34° 40′ S., 22° 0′ E., 50 fathoms, 1 living (U.C.T.).

Type and cotype of *congener*, cotype of *beckeri* in S. Afr. Museum (A5257 and A3323 respectively).

Remarks. Although only comparatively few specimens (30) are available, there is no question that *congener* is synonymous. Sowerby himself was not consistent in labelling some of the P.F. specimens submitted to him, e.g. the largest specimen in the collection has very distinct umbilical pliculae but was labelled *laevissima*; and in his cotype of *congener* the pliculae become obsolete on the last part of the body-whorl. Specimens may have pliculae but not the angular entrance to the umbilicus, and vice versa.

High and low forms are not so marked as in *undata*, e.g. 10·5 × 15 mm. and 10 × 16 mm.

A juvenile from Cape Town, identified by Tomlin as *fuscomaculata*, shows the *Segmentina*-like lines mentioned by Sowerby in his description of *beckeri*, and which are due to corrosion.

The Zululand and Natal shells are certainly conspecific with the *Africana* shell from the west coast.

Probably Turton's *kraussi*, *whitechurchi*, *rubromaculata*, *rubrolineata* and *rubrostrigata* are merely juveniles in various stages of beach-wear.

Peile (1922, p. 17) stated that a slide in the Gwatkin collection (British Museum) labelled *Minolia* (?) *congener* Sow., South Africa, showed a radula similar to that of *M*(?) *philippensis*, i.e. with an intermediate plate between the laterals and marginals (*vide infra: S. franciscana*). As this conflicts with the radulae here examined, it would seem that the animal from which Gwatkin extracted the radula was misidentified.

I have not seen Thiele's figure of the radula in Troschel's *Gebiss der Schnecken*.

The radulae of two large shells, diam. 20 mm., from off Cape St. Blaize, have a different central plate (fig. 10 *c*): the cusp is more broadly heart-shaped, with numerous small serrations; and the serrations on the 1st and 2nd lateral plates are also slightly more numerous. The shells have umbilical pliculae, but there are no features to separate them from other shells of *congener* and *laevissima*, whose radulae have been examined.

S. kempi Powell 1951 has an oval heart-shaped central plate also with small serrations.

Solariella intermissa Thiele

Solariella intermissa Thiele, 1925, p. 49, pl. 13 (1), fig. 19.

Protoconch nucleus plus 5 (6) whorls. Profile strongly convex. First and 2nd whorls with 2 or 3 feeble spiral lirae, one of which is just traceable on 3rd whorl, but the outer layer of these whorls may have been abraded (showing

the nacreous layer) and probably the spiral lirae were originally more numerous and stronger (cf. the Fisheries Survey specimen); 4th and 5th whorls with numerous close-set fine spiral lirae; base with similar fine lirae and stronger ones within the widely open umbilicus. Growth-lines distinct on 2nd and 3rd whorls, almost pliculose, producing with the spiral lirae a clathrate sculpture, becoming finer and less distinct on later whorls. Aperture circular. Alt. 10, diam. 11 mm. (Thiele). Alt. 11, diam. ? 12 (S. Afr. Mus.).

White or pale cream, upper whorls iridescent.

35° 10′ S., 23° 2′ E., 500 metres, 1 broken (Thiele).

Off East London, 250–300 fathoms, 2 dead (S. Afr. Mus. A3604, P.F. coll.).

36° 48′ S., 52° 08′ E., 400 metres, 1 dead (Fisheries Survey R.S. *Africana II*).

Remarks. The *Pieter Faure* took 2 specimens, one of which was sent to Tomlin but remained unidentified and in his possession at the time of his death. The second specimen is broken but shows all the characters; the diameter cannot be accurately determined.

Thiele's specimen was in poor condition; he made no mention of axial pliculae on the apical whorls. No other elevated species with fine spiral lirae has been found in South Africa; the present specimen is therefore assigned to Thiele's species with fair confidence.

Solariella macleari n.sp.

Fig. 11 *c*

Protoconch nucleus plus 3 whorls. Profile convex. Axial retractive pliculae *c.* 25 on 2nd whorl, *c.* 32 on 3rd whorl, distinct on upper part of whorl, scarcely traceable at periphery and on upper part of base, but reappearing as short pleats on the lira surrounding the umbilicus. Faint spiral lirae one on 1st whorl forming a slight shoulder, with another very faint below it, 3 or 4 on 2nd whorl, 1 immediately below suture, the 2nd (continuation of the shoulder lira on 1st whorl) fairly distinct, the others feeble, on 3rd whorl 5 or 6 but very thin and faint; on base 2 or 3 also very faint. Umbilicus open, with 2 feeble spiral lirae within. Aperture subcircular, a slight angle at junction with columella. Alt. 2·5, diam. 2·75 mm. White, slightly iridescent.

Jaws and radula as in *undata*, the latter with *c.* 20 rows.

Cape Point N. 89° E., distant 36 miles, 700 fathoms, 10 living (S. Afr. Mus. A7417, P.F. coll.).

Remarks. Five of the specimens were sent to Tomlin and presumably are still in his collection (Cardiff Museum).

The retractive axial pliculae give a resemblance to *Cyclostrema semisculptum* von Martens 1903, but the shell is much higher proportionately to its breadth.

At first sight deceptively like the apical whorls of *gilchristi*, but careful comparison shows they are not the same. In *macleari* the protoconch is slightly smaller, and the diameter at $2\frac{1}{2}$–3 whorls is less (*gilchristi*: $2\frac{1}{2}$–3 whorls

diam. 3·5 mm.): the slight shoulder formed on the 1st and 2nd whorls by the 2nd lira disappears on the 3rd whorl in *macleari*, whereas in *gilchristi* it becomes stronger and is continued on later whorls.

It is possible that these shells are juveniles of *intermissa*, though the axial pliculae are much stronger than in the latter.

Until shells of intermediate size are forthcoming a separate name is introduced. The diameter of the East London *intermissa* at $2\frac{1}{2}$–3 whorls is the same as in *macleari*.

Cape Maclear, one of the headlands at Cape Point; named after Sir Thomas Maclear, a former H.M. Astronomer at the Cape, and a Trustee of the South African Museum.

Solariella sp.

A specimen taken by U.C.T. (1960) in nearly the same locality, viz. 34° 25′ S., 17° 36′ E., 1,240 metres, is very similar to *macleari*.

4 × 4 mm. protoconch plus $3\frac{3}{4}$ whorls; axial pliculae 25 on both 2nd and 3rd whorls, and *c.* 21 on the last three-quarter whorl; on the latter the pliculae are not so sharply marked and one or two intermediaries (rather strong growth-lines) appear between each pair. First whorl corroded, a spiral lira forming a slight shoulder on the first quarter of 2nd whorl, but petering out on later part of whorl; on second half of 3rd whorl a slight granular thickening appears on each plicula at the shoulder, but the granules scarcely form a connected lira, and become evanescent on the last three-quarter whorl. Pliculae and growth-lines traceable over the periphery, the former continued on base, forming a series of granules on the lira surrounding the umbilicus, and continued within the umbilicus, where they are crossed by 4 or 5 fine spiral lirae. Bluish-white, iridescent.

The animal dark, but poorly preserved; only portions of the radula were obtained. The plates appear to resemble those in the radula of *undata*.

The shoulder granules are the most obvious distinction of the present specimen in contrast with *macleari* and the other South African species; nevertheless further specimens are desirable before proposing a specific name.

Solariella gilchristi n.sp.

Fig. 11 *d*

Protoconch nucleus, 0·4–0·5 mm., plus $4\frac{1}{2}$ whorls. Profile convex, slightly angular at shoulder and at periphery. Axial retractive pliculae *c.* 33 on 2nd whorl, *c.* 38–40 on 3rd, *c.* 45 on 4th whorl, distinct from suture to suture on 2nd and part of 3rd whorl, on 4th whorl represented by nodules at suture and at shoulder, and thereafter merging into the ordinary growth-lines. Axial pliculae reappearing in umbilicus. Spiral lirae 3 fine on 1st–4th whorls, the 1st near the suture, 2nd forming the shoulder, both nodulose where crossed by the axial pliculae, 3rd lira peripheral; fine intermediaries between 1st and 2nd lirae 1 on

2nd whorl, 2 on 3rd, 3 on 4th, and 6–7 on last half-whorl; also between 2nd and 3rd lirae 4 on 2nd and 3rd whorls, 5 or 6 on 4th, and 8–9 on last half-whorl. Upper part of base with 6–7 fine lirae, then smooth (with extremely faint striae in one of the specimens), but 7–8 lirae in the umbilicus, which is open and not sharply angular at entrance. Aperture circular, slightly angular at shoulder. Alt. 9, diam. 11 mm. Chalky white, iridescent internally.

Off Buffalo River (East London), 310 fathoms, 2 dead (S. Afr. Mus. A3605, P.F. coll.).

Remarks. A third specimen was sent to Tomlin, and is presumably still in his collection (National Museum, Cardiff). The strength of the intermediary lirae varies in the two specimens.

Named after Dr. J. D. F. Gilchrist, formerly Government Biologist in charge of the s.s. *Pieter Faure.*

Solariella turbynei n.sp.

Fig. 11 *a*

Protoconch nucleus plus $3\frac{3}{4}$ whorls. Profile convex, with a very slight shoulder. Axial pliculae obscure on 1st whorl, *c.* 30 on 2nd, *c.* 50 on 3rd, *c.* 55 on last three-quarter whorl; pliculae crossing the lirae and forming low feeble granules; continued across base and entering umbilicus. Spiral lirae obscure on 1st whorl, 4–5 on 2nd, 7 on 3rd with one or two fine intermediaries developing towards end of body-whorl; *c.* 11 on base and 3–4 within the widely open umbilicus. Aperture circular. Alt. 4, diam. 4·25 mm. Pale buff.

Cape Point, NE. $\frac{1}{2}$ N., distant 19 miles, 145 fathoms, 1 dead (S. Afr. Mus. A9276, P.F. coll.).

Remarks. Named after Capt. Turbyne, skipper of the *Pieter Faure.*

S. Kempi Powell 1951 from the Falkland Islands has many more spiral lirae.

Solariella franciscana n.sp.

Figs. 10 *e*, 11 *b*

Protoconch nucleus plus $5\frac{1}{2}$ whorls. Turreted, profile strongly convex, with tabulate shoulder. Sutures indented, somewhat canaliculate. Spiral lirae obscure on 1st whorl (a faint one at shoulder on last part of whorl), 3 on 2nd and 3rd whorls, the uppermost one forming the shoulder, a fine intermediary starting on 3rd whorl between suture and shoulder lira, increasing in strength and becoming the shoulder lira on 4th whorl, therefore 4 lirae on 4th whorl plus 1 intermediary between 2nd and 3rd, and 1 between 3rd and 4th lirae; on 5th whorl 6 lirae plus 2 fine intermediaries on the tabulate shoulder, and 1 between 6th lira and suture below, the 4th lira peripheral; 1st, 2nd, 4th and 6th lirae double or triple (divided by one or two fine striae); on base 5 spiral lirae, the uppermost one strongest and double, an intermediary between 3rd and 4th, and between 4th and 5th, 6 (7) lirae within the widely open umbilicus.

Growth-lines forming axial retractive pliculae in all the sulci, closer together and finer on the last whorl, but stronger in the umbilicus. Aperture circular. Alt. 12·5, diam. 13 mm.

Operculum with *c.* 11 spirals (inner ones not distinct), smooth. Uniform pale brown, operculum horny-amber. Radula with 40 rows, central and inner two lateral plates with very large cusps, finely serrulate on both margins on central plate, but only on outer margin on laterals, 3rd lateral plate broader than long, curved, with strong, serrulate cusp, 4th lateral plate arcuate, with serrulate margins, a transversely oblong intermediate plate with 4 (5) slender marginal plates attached to its outer end. In the normal position the marginal plates, which are about equal in length to the 3rd and 4th laterals and the intermediate plate together, overlie the 3rd and 4th laterals, leaving the central and two inner laterals exposed.

Off Cape St. Francis, 75 fathoms, 1 living (S. Afr. Mus. A3615, P.F. coll.).

Remarks. The radula is noticeably different from that of other South African species in the presence of the intermediate plate, and the very large cusps on the central and two inner lateral plates; viewed as a whole the middle portion of the radula bears a curious resemblance to the quinquelinear arrangement in *Sepia*.

A similar radula was figured by Peile (1922, p. 17, fig. 5*a*) for *Minolia* (?) *philippensis* (Watson).

The shell is comparable with the Californian *peramabilis* Carp. (see Oldroyd, 1927, p. 195, pl. 91, fig. 8, pl. 101, fig. 7), but has more lirae.

Solariella sp.

Fig. 11 *e*

Apices of a species of *Solariella* or *Minolia* have a larger protoconchal nucleus (0·5–0·6 mm.) than any other South African species, except possibly *gilchristi*; but they seem to belong to a less elevated species than the latter. Apart from the protoconch, they might perhaps be assigned to *franciscana* or to *M. adarticulata*, having a tabulate shoulder with axial pliculae, and fine striae between the spiral lirae (as far as preserved).

34° 5′ S., 25° 55′ E., 67 fathoms, 1; 34° 5′ S., 25° 43′ E., 52 fathoms, 2; off Cape St. Blaize, 125 fathoms 2; all fragmentary (S. Afr. Mus. P.F. coll.).

Solariella sp. Thiele

Solariella sp. Thiele, 1925, p. 51, pl. 13 (1), fig. 23.

34° 51′ S. 19° 37′ E. 80 metres.
Seems more like a *Gibbula*.

Stomatella articulata A. Adams

Fig. 12 *b*

Stomatella sulcifera (*? non* Lam.) Krauss, 1848, p. 93.
Stomatella articulata A. Adams, 1850, p. 30; 1854, p. 834, pl. 174, fig. 2.

Radula with *c.* 40 rows, central plate with cusp serrate on both margins, lateral plates with cusp serrated on outer margin, laterals passing gradually into the slender hamate marginals, which are also serrated on outer margin.

Port Elizabeth (Sowerby); Durban and Tongaat (S. Afr. Mus.). Natal, presumably living (Krauss). Living: Umgazana (Port St. Johns) (U.C.T.); Delagoa Bay (U.W.).

Remarks. The Tongaat specimens were identified many years ago by J. H. Ponsonby. As no material of other species is available, this identification is here accepted. The figures in the Thesaurus of *sulcifera*, *articulata*, *orbiculata*, etc. are useless for specific determination. The Durban and Delagoa Bay shells agree with those from Tongaat.

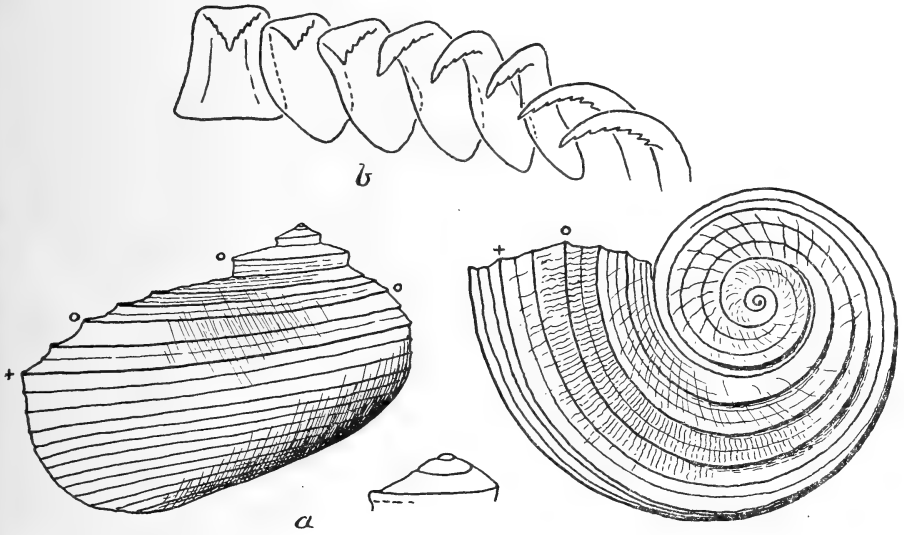

FIG. 12. *a*, *Stomatella* sp. (Sedgefield), two views, with apex further enlarged. + and o indicate corresponding lirae on the two figures. *b*, *S. articulata* A. Adams, radula plates.

It is unlikely that any species of *Stomatella* lives on the shores of Algoa Bay, and the reported occurrences of shells from that area (Sowerby, 1892, and Tomlin, 1923, p. 50) were probably due to human agency. Turton did not obtain any at Port Alfred.

Schwarz (1910, p. 115) recorded both *articulata* and *sulcifera* from Pleistocene deposits at Port Elizabeth.

† *Stomatella* sp.

Fig. 12 *a*

Specimens 6 × 8 mm., protoconch nucleus plus $3\frac{3}{4}$ whorls; 7 × 10 mm. with $4\frac{1}{4}$ whorls; 18 × 23 mm. with $5\frac{1}{4}$ whorls. Profile of 2nd and 3rd whorls tabulately angular, of 4th and 5th whorls convex, sloping. Sutures not indented;

in apical view suture between 2nd and 3rd whorls concealed by the prominent shoulder, but thereafter becoming fully visible. Two spiral lirae beginning on tabulate surface of 3rd whorl, with intermediaries developing on 4th whorl; on 4th and 5th whorls 5 main lirae, with intermediaries; on base 10–12 lirae, with an intermediary between some of the pairs.

Growth-lines forming pliculae, faintly visible on 2nd whorl, stronger on 3rd but never as strong as the spiral lirae, rather widely spaced; very faint and evanescent on 4th whorl, but replaced by close-set growth-lines visible between the lirae on upper surface and also on base.

Largest specimen seen: 18 × 23 mm., aperture 13 × 15 mm. (Sedgefield); smallest: 6 × 8 mm., aperture 4 × 5 mm. (Klein Brak River).

Dull biscuit-colour or pinkish-brown, with slightly darker patches below suture alternating with paler axial streaks (best seen in the Klein Brak River specimen), interior iridescent.

Fossil: Quaternary, Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.); Klein Brak River, Mossel Bay (S. Afr. Mus. coll. S. H. Haughton).

Remarks. Differs from the specimens referred to *articulata* by the tabulate 2nd and 3rd whorls, in consequence of which the suture in apical view is not visible throughout; and by the much feebler axial pliculae which nowhere form with the spiral lirae a cancellate sculpture. At first sight the shell appears to be only spirally lirate.

S. sulcifera Lam. and *mariei* Crosse are the only species available for comparison, and therefore no specific name is attached to these specimens. Probably, however, they are the same species as the fossils from Port Elizabeth which Schwarz identified as *sulcifera*.

S. mariei Cross (2 specimens in S. Afr. Mus. *ex* coll. Ross-Frames), from New Caledonia, is similar in having a lirate, not a cancellate, sculpture; but the apical whorls are much more conical, with a concave profile, and no tabulate shoulder on 2nd and 3rd whorls.

Clanculus puniceus (Phil.)

Fig. 14 *a*

Monodonta puniceus Philippi, 1846, p. 100.
Trochus puniceus Krauss, 1848, p. 100 (part: the larger specimens).
Clanculus puniceus Sowerby, 1892, p. 45 (probably var. of *pharaonis*).

Protoconch nucleus plus 5–6 whorls. In fully grown shells the last whorl near the aperture dips down below the periphery of preceding whorl. The granules in the series next below the suture very little larger than those in the other rows, ovoid, and continuing as granules up to the outer lip.

High and low forms (fully grown): 18 × 19 mm., 17 × 22 mm., and 16 × 21 mm.

No jaws. Radula with *c.* 55–60 rows, central plate with cusp serrate on both margins, lateral plates with cusp serrate on outer margin, laterals passing

gradually into the slender, apically hooked marginals which are also serrate on outer margin; serrations not numerous on any of the cusps.

Uniform reddish, paler on base; a midwhorl and a peripheral series of black spots, each spot covering 1 or 2 (3) granules; 2 or sometimes 3 series on base; the midwhorl series on the *fourth* row of granules below the suture; outer lip in fully grown examples with black spots.

Dead: Isipingo, Durban, Tongaat (S. Afr. Mus.).

Living: Natal (Krauss); Durban (S. Afr. Mus. coll. K. H. B.; also U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K. H. B.; also U.W.); Bazarute Island (S. Afr. Mus.); Quelimane (von Martens).

Clanculus atricatena Tomlin

Trochus puniceus Krauss, 1848, p. 100 (part: the 2 half-grown specimens, *cum* descr.).
Clanculus kraussi (*non* Phil.) Sowerby, 1897, p. 19.
Clanculus atricatena Tomlin, 1921 *a*, p. 216; 1931 *a*, p. 418.

Protoconch nucleus plus 5 whorls. Last whorl at aperture in fully grown shells dipping down below periphery of preceding whorl. The series of granules next below the suture distinctly larger than the other granules, axially oblong, on last half whorl of 5th whorl gradually evanescent and replaced by oblique pliculae (growth-lines). All the granules over the whole whorl smaller than in *puniceus*, the interstices thus more conspicuously obliquely striate or pliculate with growth-lines. The granules on the inner lirae on base often more oblong and tessellated than in *puniceus*.

Fully grown: 14 × 17 mm. and 12 × 15 mm.; Tomlin: 12·5 × 17 mm.

Brownish or greyish, below the suture a more or less distinct series of darker squarish patches alternating with paler marks, and extending downwards to the periphery, sometimes over the periphery as narrow oblique streaks on to the pale base; a midwhorl and a peripheral series of black spots, each spot covering 1–3 granules, 2 series on base; the midwhorl series on the *third* row of granules below the suture; outer lip in fully-grown shells with black spots.

Natal (Krauss). Isipingo and Tongaat (S. Afr. Mus.). Off Itongazi River (between Port Shepstone and Port Edward), 25 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Remarks. The distinct but rather subtle differences between this species and *puniceus* were first noticed by Krauss, and later utilized by Tomlin to characterize shells which had been recorded from South Africa as the West African *kraussi* Phil. Tomlin, however, did not contrast his species with *puniceus*; in particular he did not mention the petering-out of the subsutural oblong granules on the last half-whorl and their replacement by oblique pliculae.

One of the Itongazi and 2 of the Isipingo specimens have the midwhorl series of black spots on the fourth row of granules (as in *puniceus*) owing to the interpolation on the 3rd–4th whorls of an intermediary series of granules.

Future investigation must decide whether the differential characters are really specific (or possibly sexual ?). Both forms seem to occur together.

Clanculus miniatus (Anton)

Fig. 15 *a*, *b*

Trochus miniatus Anton, 1839, p. 58; Krauss, 1848, p. 99.
Clanculus carinatus A. Adams, 1851, p. 162.
Clanculus depressus (*non* Phil.) von Martens, 1874, p. 129.
Clanculus alfredensis Bartsch, 1915, p. 150, pl. 23, figs. 10–12; Turton, 1932, pp. 178, 179 (not pl. 42, no. 1258 juv. = *waltonae*).
Clanculus elevatus Turton, 1932, p. 179, pl. 42, no. 1260.
Clanculus trochiformis Turton, 1932, p. 179, pl. 43, no. 1261.
Clanculus becki Turton, 1932, p. 179, pl. 43, no. 1262.
Clanculus eucosmia Turton, 1932, p. 179, pl. 43, no. 1263.
Clanculus kowiensis Turton, 1932, p. 180, pl. 43, no. 1267.

Protoconch nucleus plus 5–6 whorls. Smallest example seen: diam. 3·5 mm., no umbilicus, only a shallow groove in the columella. At diam. 5 mm. the groove is more prominent, but still no umbilicus is formed (cf. Turton's fig. 1267 of a 5 mm. shell). At diam. 8 mm. the groove is deeper and leads to a definite umbilical pit (cf. Bartsch's figs. 10 and 12 of 8·7 mm. *alfredensis*).

At diam. 10 mm. the tooth at anterior end of columella is beginning to develop; at 11–12 mm. there is a definite tooth, and 3–4 small denticles on the adjacent margin of outer lip; at 13 mm. there are about 6 denticles on outer lip, continued as plicae on inner surface; at 15–16 mm. the denticles are continuous around the whole of the inner margin of lip. When the denticles begin to form, the body whorl begins to drop away from the periphery of the preceding whorl (as in adult *puniceus* and *atricatena*). In one example the aperture underrides the preceding whorl to such an extent that the top of the outer lip is attached to the base midway between the margin of umbilicus and the peripheral keel.

Although the early whorls are more or less angular at the periphery, the peripheral keel does not become prominent until the 4th whorl. The prominence of the midwhorl series of granules is subject to considerable variation, but is less conspicuous on the later whorls, and the granules may sometimes be no larger than the granules above and below it.

Up to: alt. 16, diam. 17 mm.

No jaws. Radula with *c.* 50 rows, as in *puniceus*.

Table Bay and '*an der ganzen Südspitze*' [presumably meaning Cape Agulhas, or ? around to Natal] (Krauss); False Bay (von Martens).

False Bay, Hermanus, Still Bay, Mossel Bay, Port Elizabeth, Kowie (S. Afr. Mus.). Living: False Bay; Knysna; Mossel Bay (U.C.T.).

Mossel Bay, 20 fathoms, 1; Algoa Bay, 20 fathoms, 1; False Bay, 9–11 fathoms, 2 living (S. Afr. Mus. P.F. coll.).

Delagoa Bay (U.W., not seen by me).

Remarks. In spite of Krauss's record, the South African Museum has no examples from Table Bay, and the species probably does not occur there.

Unless Krauss's words include Natal, there is a big gap between Port Alfred and Delagoa Bay without any records.

In my opinion neither Bartsch's *alfredensis*, nor any of Turton's 'species' (except *exquisita*) can be accepted as species. It is not surprising that Turton, believing the shell he figured on pl. 42, no. 1258, was the juvenile of *miniatus*, should regard *kowiensis* (pl. 43, no. 1267) as a distinct species; fig. 1258 shows a canaliculate suture, which, in conjunction with the pliculate growth-lines, clearly indicates a juvenile *waltonae*.

Sowerby did not mention the number of lirae on the base of *laceyi* (1889*a*, p. 11), but Turton (1932, p. 179 under *elevatus*) said the British Museum specimen (? Type) had 6 lirae; nevertheless I suspect that *laceyi* is another synonym of *miniatus*.

Clanculus waltonae Sow.

Clanculus waltonae Sowerby, 1892, p. 45, pl. 2, fig. 45; Bartsch, 1915, p. 151; Turton, 1932, p. 180.
Clanculus miniatus (*non* Anton) juv. Turton, 1932, p. 178, pl. 42, no. 1258.

On 1st postnuclear whorl 2 low spiral lirae, on 2nd 3 lirae, feebly granulose, especially the subsutural lira, on 3rd whorl 4 granulose lirae, the 2nd lira weakest, the 3rd and 4th stronger than 1st, on 4th whorl 5 lirae, the 4th and 5th peripheral, the 5th present on preceding whorl but obscured by suture, and showing only on exposed part of body whorl. On base 7 lirae, the innermost one bordering the umbilicus, but not undulate or denticulate, the outer 2 lirae feebly granulose. Well-marked retractively oblique pliculate growth-lines over whole whorl, including sutural border and base, and making the lirae sharply crispate, but less so on base. Suture canaliculate, the groove formed partly by the whorl above and partly by the whorl below. Protoconch nucleus plus 4 whorls: 6 × 7 mm. (S. Afr. Mus.); $5\frac{1}{2}$ whorls 8·5 × 11 mm. (Sowerby).

No jaws. Radula with *c.* 50 rows, as in *puniceus*, but central plate much broader than in *puniceus* or *miniatus*.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton). Off Cove Rock (East London), 22 fathoms, 1 dead but fresh; 33° 3′ S., 27° 57′ E. (East London), 32 fathoms, 1 dead but fresh (S. Afr. Mus. P.F. coll.).

Living: False Bay (34° 19′ S., 18° 30′ E.) 52 metres (U.C.T.).

Remarks. Turton's figure corresponds with the present P.F. specimen (identified by Tomlin), but shows an intermediary lira between the 2nd and 3rd lirae. Sometimes an intermediary between 3rd and 4th lirae on 4th whorl (or last part of it).

Sowerby's description gave 9 basal lirae on a larger shell than the present one. In unworn specimens the pliculate growth-lines are very sharp.

In having a very broad central plate in the radula this species resembles *Monodonta australis* more than *Clanculus puniceus*.

Clanculus mixtus Smith

Clanculus mixtus Smith, 1903, p. 389, pl. 15, fig. 7; Turton, 1932, p. 180.

Protoconch nucleus plus 4 whorls (Smith: total 5–6 whorls). Profile convex, last whorl not angular (even more convex than in half-grown non-

carinate *miniatus*). On 1st whorl 3 spiral lirae, on 2nd 3 lirae with 2 intermediaries developing on later part, on 3rd whorl 3 main lirae and 2–3 intermediaries, on 4th whorl 6 or 7 with 2–3 intermediaries; owing to the convexity of the profile the peripheral lira is not always clearly distinguishable from the first basal lira; on base 6–8 lirae. All the lirae granulose, but not crispate, those on base usually less strongly granulose. Interstices with fine oblique striations (growth-lines; finer than in *waltonae*). Suture canaliculate. In adult the last part of the last whorl drops down below the periphery of preceding whorl, exposing a series of granules previously concealed in the suture. Umbilicus deep, sometimes with marginal undulations or denticles. In adult coumella with a denticle above and a denticle below; outer lip denticulate. anld plicate within. 11 × 12·5 mm. (Smith); 8 × 10 mm. (S. Afr. Mus.)

Dull pinkish-brown, with a subsutural series of darker patches alternating with paler patches; base pale with pinkish spots on the granules.

Port Elizabeth (Smith); Port Alfred (Turton; also S. Afr. Mus.); Xora (Elliotdale Division).

Remarks. A similarly coloured but smaller species than *miniatus* and differing from half-grown non-carinate examples of the latter by the canaliculate suture and rounded peripheral profile. Differs from *waltonae* in the more convex profile, non-crispate granules, and finer non-plicate growth-lines.

The features mentioned by Smith for differentiating this species from *waltonae*, viz. last whorl descending in front, thickened and lirate outer lip, and umbilical denticles, are merely adult characters.

The granules may vary in size. In one of 4 Pondoland (= Port Alfred, coll. Dr. Becker) specimens in the South African Museum the granules on the 1st lira below the suture on 3rd and 4th whorls are noticeably enlarged (cf. *atricatena*) and continue thus to the outer lip. In another shell this series of granules is obsolete on the last quarter-whorl after an injury, the other series being continued but with smaller granules.

Another of these 4 shells has the suture canaliculate on 2nd and 3rd whorls, but on the 4th (especially later half) the uppermost series of granules has moved close to the suture line, obliterating the usual striated space between them; this part of the shell thus looks very like *miniatus*; also there are 10 series of granules, all (excepting one intermediary) subequal in size; and on the base 9 series.

Priotrochus obscurus (Wood)

Figs. 13 (left), 14 *d*

Trochus obscurus Wood, Krauss, 1848, p. 98.

In very young shells the diameter slightly exceeds the altitude, e.g. alt. 3·5, diam. 4 mm.; at about diam. 10 mm. the altitude and diameter are subequal, thereafter the altitude exceeds the diameter, e.g. 17 × 15, 19 × 17, and 28 × 18 mm.

Grey or buff, with darker greenish-grey axial flames extending from suture to periphery, and often on to base.

Jaws present, but thin and weak. Radula with *c.* 45–50 rows, lateral plates increasing slightly in size outwards, marginal plates hamate, cusps on all plates non-serrate.

Natal (Krauss, Sowerby). Living: Durban (S. Afr. Mus. juv.); Delagoa Bay (S. Afr. Mus. coll. K. H. B., also U.W.); Inhambane (U.C.T.); Mozambique Island (U.W.).

Remarks. It is probable that the specimens recorded as *obscurus* from a raised beach at Klein Brak River really belong to the following species.

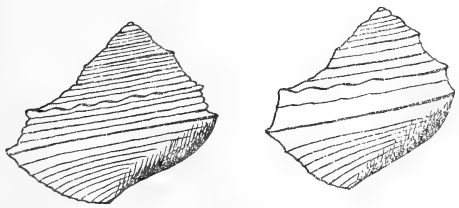

Fig. 13. Juveniles of *Priotrochus obscurus* (Wood) left, and *P. alexandri* Tomlin right; 3·5 × 4 mm. and 3·5 × 3·5 mm. respectively.

Priotrochus alexandri Tomlin

Fig. 13 (right)

Priotrochus obscurus (*non* Wood) Smith in Rogers, 1906 *b*, p. 293.
Priotrochus alexandri Tomlin, 1926 *a*, p. 295, pl. 16, fig. 8.

Not quite so elevated in adult as *obscurus*, but altitude slightly greater than diameter, although in the Type the reverse is the case.

Protoconch nucleus plus 5 whorls. Second and following whorls angularly shouldered; 2nd whorl with 2 spiral lirae, 3rd with 3, the middle lira forming a midwhorl shoulder, a thin intermediary lira between the middle and lower lirae which may or may not persist on to later whorls, middle lira with faint indications of nodules; on 4th and 5th whorls middle lira with 11–12 conspicuous nodules, complanate, but extending upwards towards the suture making the now inconspicuous 1st lira feebly nodulose; in apical view the 3rd lira is undulate, corresponding with the shoulder nodules. A 4th lira forms the periphery but is more or less absorbed in the suture, and does not become wholly visible until the last whorl; in apical view it also is slightly undulate. On base 7 (8) lirae well separated by concave sulci. Retractive growth-lines very distinct, on 4th and 5th whorls often almost pliculose, especially on base. Alt. 3·5, diam. 3·5 mm., 4·5 × 5, 13 × 12, 18·5 × 17 mm. Tomlin: 16·5 × 18 mm.

The largest Sedgefield shell shows faint traces of darker axial flames, passing over the periphery on to base, where they are best seen.

Fossil: Quaternary: Sedgefield near Knysna (A. R. H. Martin); raised beach deposit, Knysna lagoon. Klein Brak River, Mossel Bay (Smith in Rogers; also S. Afr. Mus.).

Algoa Bay (Tomlin).

Remarks. The finding of this species in Quaternary deposits raises the question whether the specimens found at Algoa Bay had been washed out of similar deposits. Compare the case of *Cerithium rufonodulosum* Smith (Barnard, Part III, p. 131).

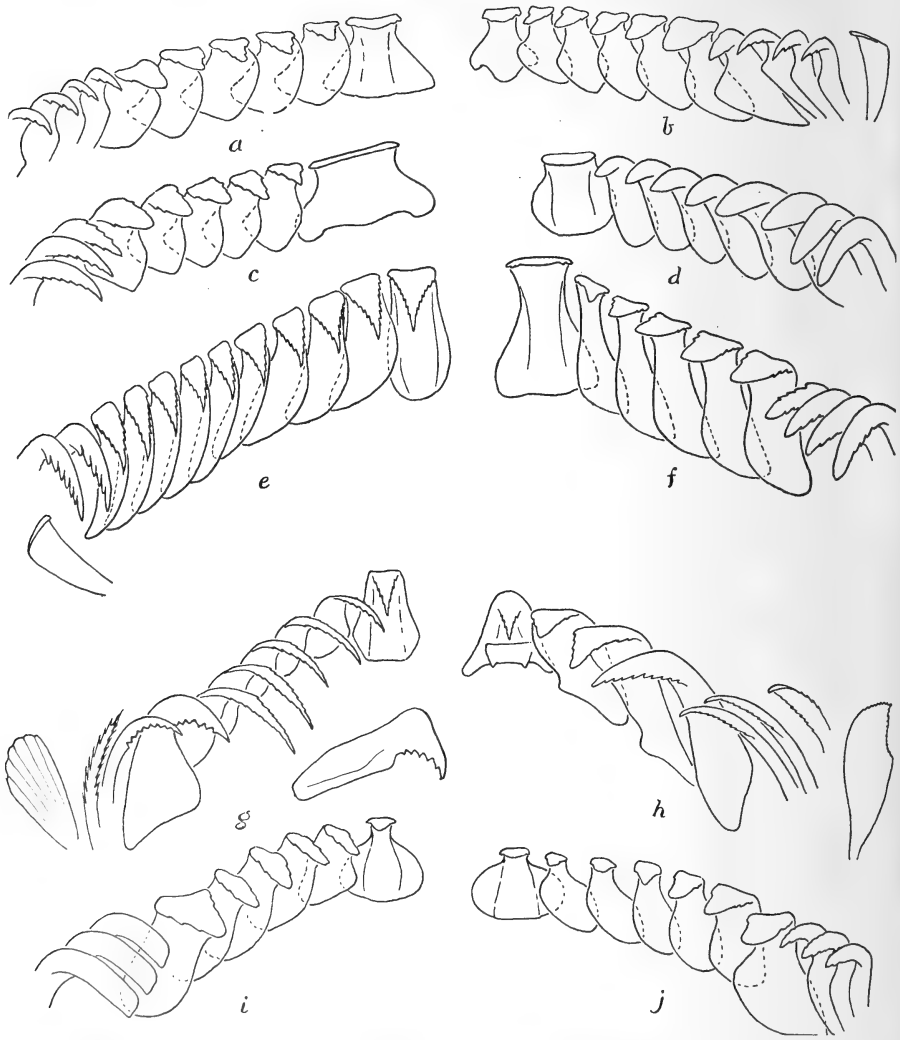

FIG. 14. Radula plates of: *a*, *Clanculus puniceus* (Phil.); *b*, *Trochus nigropunctatus* Rve.; *c*, *Monodonta australis* Lam.; *d*, *Priotrochus obscurus* (Wood); *e*, *Calliostoma eucosmia* Bartsch; *f*, *Oxystele sinensis* (Gmelin); *g*, *Calliostoma perfragile* Sow., with 1st marginal plate in a different position; *h*, *Calliotropis granolirata* (Sow.); *i*, *Cantharidus fultoni* (Sow.); *j*, *Gibbula rosea* (Gmelin).

Monodonta australis Lam.

Fig. 14 *c*

Monodonta australis Lamarck, 1822, p. 35; Krauss, 1848, p. 100; Day & Morgans, 1956, p. 306 (listed).

Up to alt. 32, diam. 29 mm. Dark greenish spots alternating with pale intervals on the lirae. The dark spots on successive lirae may correspond in an axial direction, but the general effect is spiral necklaces around the whorls, not axial flames which characterize *Priotrochus obscurus*.

Radula with 55–60 rows, central plate oblique, broader than long, lateral plates serrate on both margins at base of the cusps, marginal plates uncinate, serrate on both margins.

Living: Point, Durban (Krauss); Durban (S. Afr. Mus. P.F. coll., also K. H. B., and U.C.T.); Umhlali (Natal) (U.C.T.); Scottburgh (Natal) (S. Afr. Mus. coll. K. H. B.).

Remarks. Krauss (1848, p. 100) also recorded *M. labio* (Linn.) (as *Trochus* (*Labio*) *labio*) from Natal, but there does not appear to be any later record.

The central plate of the radula is slightly oblique, so that the lateral plates on the two sides are not quite at the same level (cf. some Fissurellids).

Trochus nigropunctatus Rve.

Fig. 14 *b*

Trochus nigropunctatus Rve., Macnae & Kalk, 1958, pp. 45, 117 and 127 (listed).

Jaws present but rather thin and weak. Radula with *c*. 60–65 rows, central plate hourglass-shaped, rounded-lobate posteriorly, 5 lateral plates, increasing in size outwards, 1st marginal plate broadly expanded inwards, following marginals uncinate, serrate on outer margins, outermost plate elongate-triangular, distal edge truncate, scarcely turned over.

Living: Port St. Johns (S. Afr. Mus. coll. F. Talbot); Inyoni Rocks, Umtwalumi, and Port Edward (Natal) (U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K. H. B., also U.W.).

Sowerby's record (1892) from Port Elizabeth is not acceptable, certainly not for living shells.

Remarks. The presence of jaws and the shape of the central plate of the radula suggest that this species would be better placed in some other genus.

Trochus (*Cardinalia*) *virgatus* Gmelin

Trochus (*Cardinalia*) *virgatus* Gmelin, Smith, 1903, p. 388. Durban (coll. Burnup).

Even though credited to Burnup's collecting, I doubt whether this is a true inhabitant of South African waters. It was not found at Durban by U.C.T., nor at Delagoa Bay by myself or U.W.

Calliostoma eucosmia Bartsch

Figs. 14 *e*, 15 *f*

Trochus ornatus (*non* Lam.) Krauss, 1848, p. 98.
Trochus bicingulatus (*non* Lam.) Krauss, 1852, p. 33.
Calliostoma ornatum (*non* Lam.) Sowerby, 1892, p. 42; von Martens, 1903, p. 47; Thiele, 1925, p. 54; Turton, 1932, p. 193, pl. 49, no. 1340.
Calliostoma bicingulatum (*non* Lam.) Sowerby, 1892, p. 42; Turton, 1932, p. 192 (? the juv. pl. 49, no. 1339.)
Calliostoma euglyptum (*non* A. Adams) Sowerby, 1892, p. 42.
Calliostoma euglyptum = *ornatum* Smith, 1903, p. 401.
Calliostoma eucosmia Bartsch, 1915, p. 161, pl. 25, figs. 1–3; Turton, 1932, p. 193.
Calliostoma ornata var. *similis* Turton, 1932, p. 193, pl. 49, no. 1341.
Calliostoma albolineata Turton, 1932, p. 193, pl. 49, no. 1342.
Calliostoma convexa Turton, 1932, p. 193, pl. 49, no. 1345.

Protoconch nucleus plus 8 whorls; profile (of whole shell) nearly straight, sometimes slightly concave, more or less slightly indented at sutures, periphery more or less angulate. Spiral granulate lirae 3 on 1st whorl, 3–4 on 2nd, 4–5 on 3rd, 5–6 on 4th, increasing to 15–18 on last whorl (Bartsch's Type has a worn apex: his '1st' whorl probably equals the 3rd; in any case 23 lirae on last whorl seems too many: see his fig. 2); lirae subequal in strength, but a broader lira at the periphery, often duplicated. On 2nd and 3rd whorls the granules connected by axial pliculae. On base *c.* 20 lirae, more or less granulate. Umbilicus closed from about shell diam. 3 mm.

The above described sculpture may be regarded as typical, but there is considerable variation in the number of lirae and the development of the granules, from about the 3rd whorl onwards.

One lira in midwhorl and another between it and suture below may be slightly or conspicuously enlarged, hence the records of '*bicingulatum*' (see also Pilsbry's description of *ornatum*). Coalescence may reduce the number of lirae to 6. The granules, which are typically circular or slightly transversely oval, may become axially oval or oblong; they may be greatly increased in number, and then form closely-set narrow pliculae. A few selected variations and transitions are illustrated.

Shells with more or less typical sculpture up to alt. 23, diam. 22 mm.; also 21 × 22 mm. Shells with lirae reduced and close-set pliculae (fig. 15*f*, fourth from left) alt. 24, diam. 26 mm.

Fulvous or orange-brown, with diffused or more or less sharply defined darker patches, some of the lirae articulated, especially the peripheral one (or two); base speckled with articulate lirae; sutures between early whorls (2nd to 4th or 5th) often lilac or violaceous. Beach specimens may become completely pink or violaceous.

Jaws present, with intercalated platelets. Radula with *c.* 110 rows, central plate longer than broad, slightly expanded at sides, 9 lateral plates, cusps lengthening on outer plates as they approach the marginal plates, 1st marginal stout, strongly serrate, outermost marginal oblong, the truncate distal margin slightly turned over.

False Bay to East London (S. Afr. Mus.).

Living: False Bay, 9 fathoms; off East London, 25 and 85 fathoms (S. Afr. Mus. P.F. coll.); False Bay, Mossel Bay, Port Elizabeth (U.C.T.).

Remarks. Bartsch said it was 'remarkable that this large species should have been overlooked so long'. It has not been 'overlooked', but, as Bartsch said, recorded from South Africa as *ornatum* and *bicingulatum*. Apparently Krauss, Sowerby (3rd), Smith, von Martens, and Thiele were satisfied as to the identity of the South African shells. But Bartsch considered there were differences, though unfortunately he did not state them. Tomlin accepted *eucosmia*, and I follow him, especially as the modern description is accompanied by a clear figure. Turton seems to have included as many 'names' as possible, and added 2 n.spp. and one n.var. Another case of a common and variable species being described several times.

Sowerby (1892) recorded several varieties from Port Elizabeth, fortunately recognizing them as varieties. With only a comparatively limited amount of material in the South African Museum, including a good series from Still Bay (coll. Muir), the variation in the lirae and the granulate ornamentation is very striking.

There are 'high' and 'low' forms, though the contrast is not strongly marked. The profile may be straight or slightly concave, and the periphery may be sharply angulate or almost rounded; but I have not seen any shell which could be regarded as transitional to *multiliratum* in which the periphery of the body-whorl is completely rounded.

I doubt whether *layardi*, with its suprasutural pliculae, and peculiar intermittent nodules on the suprasutural lira, can be brought into the synonymy.

Calliostoma africanum Bartsch

Calliostoma africanum Bartsch, 1915, p. 162, pl. 24, figs. 2, 4, 6.

An elevated form. Protoconch nucleus plus 7 whorls; profile straight, more (young shells) or less (older shells) sharply angulate at periphery. Spiral granulate lirae 2 on 1st whorl, 3 at end, 3 on 2nd and 3rd, 4–5 on 4th, 7 on 5th, 8–9 on 6th, and 10–12 on 7th whorl; on 2nd and 3rd whorls granules on the lirae connected by axial pliculae. On base 12–15 smooth or feebly granulate lirae. Alt. 17·5, diam. 15 mm.

Isolated brown or orange-brown or fulvous squarish blotches on a pale ground on lower half of whorl, sometimes extending a little above midway. Living examples show only faint traces of the isolated patches, indicating that these become accentuated in beach shells; the latter often become pink.

Jaws with intercalated platelets. Radula with *c.* 80 rows, central plate as in *eucosmia*, only 5 lateral plates, with very long slender hamate cusps, 1st marginal plate stout, outermost marginal obovate, with incompletely separated plates (cf. *perfragile*).

Port Alfred (Bartsch, Turton; also S. Afr. Mus.). Port St. Johns, littoral, 1 living (S. Afr. Mus. coll. F. Talbot); Umhlali (Natal), littoral, living (Mrs. Connolly, 1962).

Off Nanquas Peak (eastern end of Algoa Bay), 63 fathoms, 2 dead; off Great Fish Point, 22 fathoms, 2 living; off East London, 85 fathoms, 1 dead; off Itongazi River (Natal), 25 fathoms, 1 living; off Umkomaas (Natal), 40 fathoms, 2 juv. dead; off Cape Vidal (Zululand), 80–100 fathoms, 1 juv. dead (S. Afr. Mus. P.F. coll.).

Remarks. Turton was inclined to regard this as only another variety of *eucosmia*; and at first I was also inclined to regard it as a colour variety. Apart from colour pattern, the altitude exceeds the diameter more distinctly than in 'high' shells of *eucosmia*.

Examination of the radula, however, disclosed a clear anatomical difference between the two species: the present species having only 5 lateral plates.

The distribution, according to the records, extends much farther north-east and less far west than *eucosmia*.

Calliostoma burnupi Smith

Calliostoma burnupi Smith, 1899*b*, p. 250, pl. 5, fig. 11 (= xi) (not fig. 2 as given by Smith, 1903, p. 389).

Five worn specimens from the original locality, Durban (Ross-Frames coll.), do not add much to Smith's description.

Smith's text says 8 whorls; the figure shows only 6 or possibly 7 including the protoconch. None of the present specimens has (or would have had when unworn) more than 7. Spiral lirae (? on 1st whorl) 4 on 2nd and 3rd whorls, the 3rd lira peripheral and strong, the 4th weaker, on 4th whorl 5 lirae, on 5th and 6th whorls 6; the lowest (suprasutural) less prominent than the peripheral one above it. On base 8–10 feebly granulose lirae. Umbilicus closed. Shell thickwalled.

Calliostoma multiliratum (Sow.)

Fig. 15 *g*

Ziziphinus multiliratus Sowerby, 1875, p. 127, pl. 24, figs. 10, 11.
Calliostoma liratum (*laps. cal.*) Sowerby, 1900, p. 6.

Two specimens, the larger 11 × 10 mm., from Pondoland, presented by Dr. H. Becker, labelled 'liratum'; presumably therefore part of the material reported on by Sowerby in 1900.

Whorls convex, body-whorl rounded, without peripheral angulation. Spiral lirae 3 on 2nd and 3rd whorls, 4 on 4th, 5 main lirae on 5th whorl with intermediaries; the uppermost lira on last whorl strongly granulate, concealing in side view the suture, which is thus canaliculate. In the larger specimen many of the granules on the uppermost lira and the upper peripheral

lira on body-whorl are distinctly transversely oval and some of them enlarged and nodulose; but not so prominently as in typical *layardi*.

Further material is obviously desirable.

Judging by the respective figures, it might be useful to compare *multiliratum* and *crossleyae* Smith 1910.

Calliostoma layardi Sow.

Fig. 15 *c*

Calliostoma layardi Sowerby, 1897, p. 18, pl. 8, figs. 10, 11.

Protoconch nucleus plus 7 whorls. Profile (of whole shell) straight, indented at sutures. Spiral lirae 2 on 1st whorl, 3 on 2nd–4th whorls, granulate at intersections with retractive axial pliculae of which there are (1st whorl

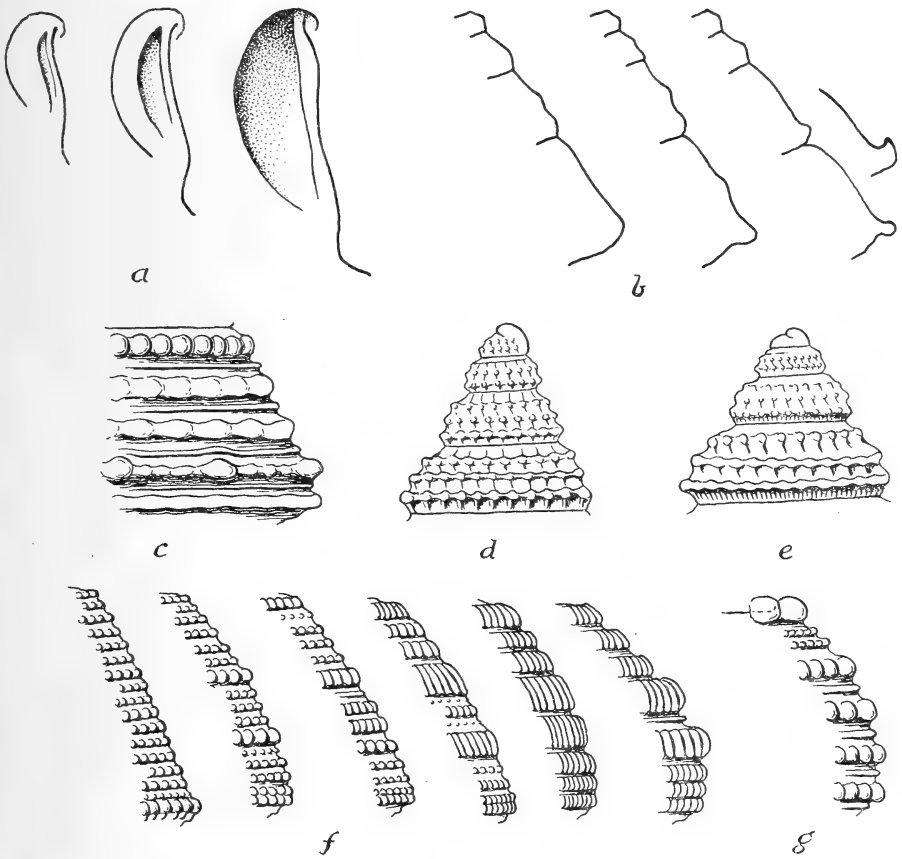

Fig. 15. *a*, *Clanculus miniatus* (Anton), stages in growth of the umbilicus: diam. of shell 3·5 mm., 5 mm. (cf. Turton's figure of *kowiensis*), and 8 mm. (cf. Bartsch's figure of *alfredensis*). *b*, Profiles to show variation of *C. miniatus—carinatus*. *c*, *Calliostoma layardi* Sow., portion of whorl. *d*, *C. iridescens* Sow., apex. *e*, *C. perfragile* Sow., apex. *f*, *C. eucosmia* Bartsch, profiles to show variation, typical form on left. *g*, *C. multiliratum* (Sow.) profile.

worn) *c.* 20 on 2nd whorl, *c.* 22 on 3rd; on 4th whorl lirae granulate but pliculae obsolete; on 5th whorl 4 granulate lirae, on 6th whorl 5, on 7th whorl 7 (8); the uppermost lira and lowermost lira stronger and more strongly granulate than the others, on the latter about every 4th or 5th granule is enlarged and nodulose, so that in apical view the periphery is slightly undulate; the lowest lira, which with the nodulose lira produces the bicingulate periphery, is only seen on the body-whorl; there is often a fine intermediary between the two lirae. Base with 10–12 lirae, the inner 3 or 4 broader and slightly nodulose. Sutures channelled. The axial pliculae, which on 2nd and 3rd whorls extend from suture to suture, on later whorls may be traceable between the lirae but are usually well marked between the lower lira and the suture, at least as far as the 5th whorl, though inconspicuous on 6th and 7th whorls. Up to 15 × 16 mm.

Uniform buff (P.F. specimen). Beach specimens fulvous with slightly darker marks, chiefly on the peripheral lirae.

Jaws with intercalated platelets. Radula (only one available) with *c.* 70 rows, central plate laterally expanded but longer than broad, 5 lateral plates, with long slender hamate cusps, 1st marginal plate strong, outermost marginal rather broadly obovate, composed of 4 or 5 incompletely separated plates.

Pondoland (Sowerby: also S. Afr. Mus.: 4 coll. Dr. H. Becker).

Off Itongazi River (Natal) 25 fathoms, 1 living (S. Afr. Mus. P.F. coll.).

Remarks. Distinguished by the channelled sutures, the bicingulate body-whorl, and the intermittently nodulose suprasutural lira.

The exact locality on the Pondoland coast is uncertain. Layard (Curator, S. Afr. Museum, 1855–72) did not visit the eastern districts of the Colony (Layard, *Birds of South Africa*, 1867, p. vii), but one of his correspondents was Mrs. F. W. Barber (loc. cit., p. vi) of 'Tharfield' near Port Alfred, well known as a keen naturalist (I. & R. Mitford-Barberton, *The Bowkers of Tharfield*, Oxford, 1952, p. 33). In all probability, therefore, the original locality was 'The Kowie' = Port Alfred, where later Dr. Becker collected. Turton, however, did not obtain any specimens. The living example indicates that its true habitat is farther towards Natal.

Calliostoma perfragile Sow.

Figs. 14 *g*, 15 *e*

Calliostoma perfragile Sowerby, 1903, p. 222, pl. 5, fig. 3.
Calliostoma ornatum (*non* Lam.) part, von Martens, 1903, p. 47.
Calliostoma capense Thiele, 1925, p. 54, pl. 13 (1), fig. 33.

Shell thin-walled. Protoconch nucleus plus 8 whorls; profile (of whole shell) straight or slightly concave, indented at sutures. Spiral lirae 2 on 1st whorl, 3 on 2nd, the uppermost one feeble at start, 3 on 3rd whorl with an intermediate between 1st and 2nd lirae towards end of whorl, 4 on 4th whorl, with an intermediary between 2nd and 3rd lirae at end of whorl, 5–6 on 5th whorl and 7–8 on 6th and 7th whorls, with intermediaries developing so that

on 8th whorl there are *c.* 13 lirae of more or less equal strength; on early whorls all lirae granulate, but on 5th whorl the granules are evanescent on the lower 3 (4) lirae, and on succeeding whorls the lower 3 or 4 (5) lirae are quite smooth. Lowermost lira (peripheral) moderately sharp. Base smooth, usually with 3 spiral striae near outer margin, and 5 in centre; but faint lirae may be present in the intervening space, and in the largest specimen the base is covered from margin to umbilicus with *c.* 25 lirae. Umbilicus closed in the smallest specimen (8 mm.). Sutures channelled on early whorls, less so on later whorls. 18 × 18·5 mm. (figured Type); up to 24·5 × 22·5 mm.

Cream or pale biscuit-colour, slightly iridescent externally; carinal lira articulated with faint brown marks in some shells (e.g. the Type).

Jaws with intercalated platelets. Radula with *c.* 120 rows, central plate laterally expanded but longer than broad, 5 lateral plates with long serrulate cusps, 1st marginal plate very large, 2nd and 3rd or 4th not so strong, serrate on concave margin, following marginals slender, serrate on both margins, outermost marginal oval-oblong, appearing to consist of 5–6 incompletely separated plates.

Off Cape Point and west coast of Cape Peninsula, 154–166 fathoms (Sowerby); also several living and dead specimens from same area, 91–190 fathoms; 34° 26′ S., 25° 42′ E., 124 fathoms, 1 dead but fresh (S. Afr. Mus. P.F. coll.).

34° 33′ S., 18° 21′ E., 318 metres (von Martens, Thiele).

30° 42′ S., 15° 59′ E., 201 metres (s.s. *Africana* per U.C.T.).

Figured Type in the South African Museum (A5275).

Remarks. Thiele said his *capense* seemed to be somewhat similar to *perfragile*; it is undoubtedly synonymous. Perhaps Sowerby's figure does not express very clearly the most noticeable feature of the species: the granulate lirae on upper half of whorl contrasted with the smooth lirae on lower half. Thiele's figure is correct, but both kinds of lirae on the last whorl seem to be unduly accentuated. Usually there is not such a sharp distinction, the granules disappearing more gradually. The *Pieter Faure* specimen from south of Cape Recife, and the *Valdivia* specimen, show that the species is found along the southern slope of the Agulhas Bank, extending round Cape Point to the west coast.

Calliostoma iridescens Sow.

Fig. 15 *d*

Calliostoma iridescens Sowerby, 1903, p. 223, pl. 5, fig. 4.

Shell rather thin. Protoconch nucleus plus 7–8 whorls; profile (of whole shell) straight but slightly concave, scarcely indented at sutures, angulate at periphery. Spiral lirae 2 on 1st whorl, 3 on 2nd–4th, granulate at intersections with retractive axial pliculae, of which there are 14–15 on 1st whorl, *c.* 18 on 2nd; *c.* 22 on 3rd, *c.* 24 on 4th whorl, producing a clathrate appearance; intermediaries start developing on later part of 4th whorl, on 5th whorl 3

granulate lirae and 2 intermediaries, on 6th whorl 6 lirae, on 7th 9 lirae, only the upper 2 granulate, the others smooth; on 8th whorl 11–13 lirae, the upper 1 or 2 feebly granulate (moniliform), the peripheral lira sharp. Base with 15–17 lirae, the inner 2 or 3 feebly nodulose, the innermost one entering the open umbilicus. Sutures slightly channelled on early whorls, scarcely so on later whorls. 16 × 17 mm.

Buff or fawn, with fulvous marks around the periphery, iridescent externally.

Off Cape Natal (Durban), 55 fathoms (Sowerby).

Off Umhloti River (Natal), 100 fathoms, 2 dead; off Cape Natal, 54 fathoms, 1 living, 1 dead (S. Afr. Mus. P.F. coll.).

Figured Type in the South African Museum (A5294).

Remarks. Sowerby in his description placed this species in the subgenus *Astele* Swainson 1855, but on his label for the Umhloti River specimens he used the synonym *Eutrochus* A. Adams 1863.

In this species, as in *perfragile*, there is a contrast between the granulate upper lirae and the smooth lower lirae on the later whorls; but here the granules are suppressed earlier and to a greater degree, remaining only on the two upper lirae and even on these more or less evanescent on the last whorl.

The Type is fresh, but was not taken alive. In the only specimen (half-grown) taken alive, the animal was completely decomposed and had been washed out, only the operculum remaining wedged obliquely in the aperture.

Calliotropis granolirata (Sow.)

Fig. 14 *h*

Calliostoma (*Lischkeia*) *granoliratum* Sowerby, 1903, p. 222, pl. 5, fig. 7.
Solariella infundibulum (*non* Watson) von Martens, 1903, p. 48, pl. 4, fig. 22.
Calliotropis granolirata Thiele, 1925, p. 48.

Shell not thin-walled. Protoconch nucleus plus 6 whorls. First whorl with *c.* 20 axial slightly retractive pliculae, 2nd whorl with *c.* 22–24, and 2 spiral lirae forming nodules at intersections; on 3rd whorl lirae become evanescent as continuous lirae, only the 2 series of nodules, *c.* 16 in number, remaining, with a 3rd series more or less occluded in the suture; on 4th and 5th whorls *c.* 16 nodules, on 6th *c.* 20; the 3rd (peripheral) series with *c.* 36–40 nodules on last whorl. On base 4 nodulose spiral lirae. Growth-lines on later whorls distinct. Umbilicus axially striate, but closed except for a short narrow chink. 12 × 13 mm. (figured Type); 13 × 12 mm. (cotype).

Cream or pale biscuit-colour, not iridescent externally.

Jaws thin, without intercalated platelets. Radula with *c.* 40–45 rows, central plate triangular, extending in front of the finely serrulate cusp, 3 stout lateral plates with finely serrulate cusps, *c.* 16 marginal plates, the inner ones slender, the outermost one broader, outer distal margin slightly concave, both margins distally finely serrulate.

Animal with large frontal veil, fimbriate at margin, continued into the epipodium which has 4 or more cirri on each side. Eyes shortly-stalked, black.

Off Cape Point, and west coast of Cape Peninsula, 250–630 fathoms, numerous examples living and dead (S. Afr. Mus. P.F. coll.).

35° 33′ S., 18° 20′ E., 2,750 metres (von Martens); 35° 19′ S., 20° 12′ E., 126 metres (Thiele).

Figured Type (A5296) and a cotype in the South African Museum.

Remarks. The locality 'Cape Point' given by Sowerby was correct, but not 'False Bay . . . 45 fathoms'. Smith (1906*a*, i, p. 54) quoted the correct locality but the wrong depth.

Thiele recorded a specimen from 126 metres, which led him to regard the species as not necessarily a deep-water species. His locality is also considerably east of any of the other records.

Thiele examined the animal of a *Pieter Faure* specimen obtained from Sowerby, and on the basis of the radula (not figured) transferred the species to *Calliotropis*.

Comparable in appearance with *Solariella valida* Dautzenberg & Fischer (1906, p. 57, pl. 3, figs. 22–27) from off Cape Verde, 1,311 metres.

It may be noted that *infundibulum* Watson (probably to be included also in *Calliotropis*) was taken by the *Challenger* off Marion Island in 1,375 fathoms, and also off Bermuda in 1,075 fathoms.

Calliotropis metallica (W.-M. & A.)

Solariella metallica Wood-Mason & Alcock, 1891, p. 444, fig. 12 *a*, *b*.
Margarita (*Turcicula*) *aethiopica* von Martens, 1901, p. 24.
Basilissa aethiopica von Martens, 1903, p. 125, pl. 4, fig. 20; Thiele, 1903, p. 162, pl. 8 (3), fig. 40 (radula).
Solariellopsis metallica Schepman, 1908, p. 59.
Calliotropis aethiopica Thiele, 1925, p. 43.
Calliotropis metallica (W.-M. & A.), Barnard, 1963*b*, p. 440, fig. 8 *a*.

Shell thin-walled. Protoconch nucleus plus 7 whorls. First to 3rd whorls each with *c.* 20 slightly retractive axial pliculae, 4th with *c.* 25, thereafter pliculae evanescent (as pliculae extending across whorl) but their position marked by the tubercles; 2nd and following whorls with 2 thin spiral lirae, feeble at start, later forming conical tubercles at intersections with the axial pliculae; on each whorl *c.* 20–25 tubercles, the number increasing sometimes to *c.* 30 on back of 7th whorl, the upper and lower series of tubercles not always quite agreeing in number; a 3rd (subperipheral) lira, smooth or only feebly tuberculose, occluded in the suture until the later part of 6th whorl.

Base with 4 spiral lirae, the outer 3 thin and smooth, or feebly granulose-tuberculose, the inner one bordering the umbilicus nodulose. Growth-lines distinct on base, especially where they enter the widely open umbilicus, in which they form axial pliculae. 21 × 19 mm. Von Martens (*aethiopica*): 32·5 × 31 mm.

Cream or pale biscuit-colour, more or less iridescent externally.

Animal with jaws and radula as in *granolirata*. See also Thiele's figure of the radula of *aethiopica*.

Off Cape Point and west coast of Cape Peninsula, 560–930 fathoms, numerous examples living and dead (S. Afr. Mus. P.F. coll.).

33° 26′ S., 16° 33′ E., 1,300 fathoms, 1 living, 1 dead; 34° 36′ S., 19° 00′ E., 1,500 fathoms, 1 living (S. Afr. Mus. F. H. Talbot coll.).

Distribution. Gulf of Manaar, 738 metres (Wood-Mason & Alcock); East Indies, 918–2,029 metres (Schepman); East Africa, between Cape Guardafui and Aden, 1,840 metres (von Martens: *aethiopica*).

Remarks. A thinner-shelled and deeper-water species than *granolirata*.

The discovery of this species by the *Pieter Faure* off Cape Point forms a notable extension of the hitherto known distribution. I have no hesitation about the identity of the Cape specimens with *aethiopica*, which was considered by Schepman as a variety, and by Thiele as a subspecies of *metallica*; and I see no reason to maintain a varietal or subspecific name.

The East African shells are the largest shells. Differences in the number of basal lirae is due to terminology: in the above description the 3rd, i.e. subperipheral, lira is the same as the outermost basal lira of the other authors.

Calliotropis persculpta (Sow.)

Solariella persculpta Sowerby, 1903, p. 223, pl. 5, fig. 8.
Calliotropis persculpta Thiele, 1925, p. 48 (probably allied to *Calliotropis granolirata*).

Protoconch nucleus plus 5 whorls; profile of 1st whorl slightly angulate, of 2nd–5th whorls biangulate, the lower angle carinate. First part of 1st whorl smooth, followed by *c.* 15 axial pliculae, 2nd whorl with *c.* 20 pliculae, each with 2 tiny sharp points, towards end of whorl the pliculae not continuous from suture to suture; on 3rd whorl the points in the upper series number *c.* 18–20, but they tend to increase and become pliculose in the lower series; on 4th whorl the points in the upper series become feeble, but those in the lower (carinal) series form very numerous closely imbricate pliculae; on 5th whorl the upper series of points usually quite obsolete, only a blunt spiral angulation remaining. Growth-lines distinct on 4th and 5th whorls, especially near the carinal pliculae. A third, more or less granulate (sutural) lira at bottom of whorl is partially occluded in the suture; on body-whorl visible below the carina, running from top of aperture and forming the outermost basal lira.

In addition to the lira just mentioned, 4 more or less granulate spiral lirae, the innermost one entering the open umbilicus. 6 × 8 mm. (figured Type); 8 × 9 mm. (Sowerby's measurements in text); up to 6·5 × 8, 6·5 × 9, and 6·5 × 10 mm. (topotypes in S. Afr. Mus.).

Cream or pale biscuit-colour, not externally iridescent.

Radula as in *granolirata*, but the outermost marginal plate is not different from the preceding marginals.

Off Cape Natal (Durban), 440 fathoms, 2 (Sowerby); topotypes from bottom-sample of same haul, 8 (S. Afr. Mus. A9249, P.F. coll.).

Figured Type in the South African Museum (A5251).

Remarks. Sowerby's description is masterly. His four basal lirae included the lira called the sutural lira in the above description, but he added that the entrance to the umbilicus is nodulosely lirate (innermost lira in the above description); there is thus no discrepancy in the two descriptions.

The Type in the South African Museum corresponds in altitude with the line indicating the natural size in Sowerby's figure, and is accompanied by his autograph label; the measurements given in his description seem to have been taken from the second specimen submitted to him (? where is this specimen).

From one of the 8 topotypes I have extracted the radula. Although it has not the peculiar outermost marginal plate found in the radulae of *granolirata* and *metallica*, it is certainly not that of a *Solariella*. Thiele's suggestion that *persculpta* was allied to *granolirata* is thus confirmed.

The East Indies '*Solariellopsis*' *limbifera* Schepman 1908 is closely allied, and probably also belongs to *Calliotropis*.

Calliotropis chenoderma n.sp.

Fig. 16 *c*

Protoconch nucleus plus 3 whorls. Axial pliculae *c.* 18 on 1st whorl, increasing to *c.* 26 on last whorl; distinct on 1st and 2nd whorls, but less so on 3rd. One spiral lira beginning on 1st whorl, 2 on 2nd, becoming by interpolation 6 on 3rd whorl; intersections with the pliculae forming sharp upstanding points. Base with 4 (Cape St. Blaize) or 5 (Cape Morgan) spiral lirae. Umbilicus sharply demarcated, 2 lirae within. Columella partially reflexed over umbilicus, expanded at lower end. Aperture subcircular. In the Cape St. Blaize shell a short intermediary between umbilical margin and 1st internal lira (inserted in the figure, but not actually visible in the position in which the shell is figured). Alt. 3·5, diam. *c.* 3 mm. (outer lip broken); alt. 2·5, diam. 2·75 mm.

Buff, nacreous within (Cape St. Blaize); white, iridescent (Cape Morgan).

Cape St. Blaize N. × E., distant 73 miles, 125 fathoms, 1 dead; off Cape Morgan, 47 fathoms, 1 dead but fresh (S. Afr. Mus. A9296 and A9297 respectively, P.F. coll.).

Remarks. The Cape St. Blaize shell is very fragile, and the outer layer is very liable to flake off, exposing the nacreous internal layer. The smaller Cape Morgan shell is fresh and unworn, but does not show the 'goose-skin' sculpture so conspicuously.

Without the radula the generic position is doubtful; included in *Calliotropis* provisionally.

Seguenzia sykesi Schepman

Fig. 16 *b*

Seguenzia sykesi Schepman, 1909, p. 180, pl. 12, fig. 6.

Protoconch nucleus plus 5 whorls. Each whorl with a blunt lira forming an angular midwhorl shoulder; a 2nd lira, peripheral, only shows on the bodywhorl; below the suture a narrow fillet; in addition extremely fine spiral striae between the lirae. Fine close-set axial pliculae on 1st–3rd whorls between suture and shoulder; becoming inconspicuous on 4th and 5th whorls, but more or less traceable on the subsutural fillet. Base with 7 lirae, the outermost one and the one bordering the umbilicus stronger than the others. Umbilicus open. Columella with strong pleat near lower end forming a knob projecting into aperture. Approximately 3 × 3 mm. White.

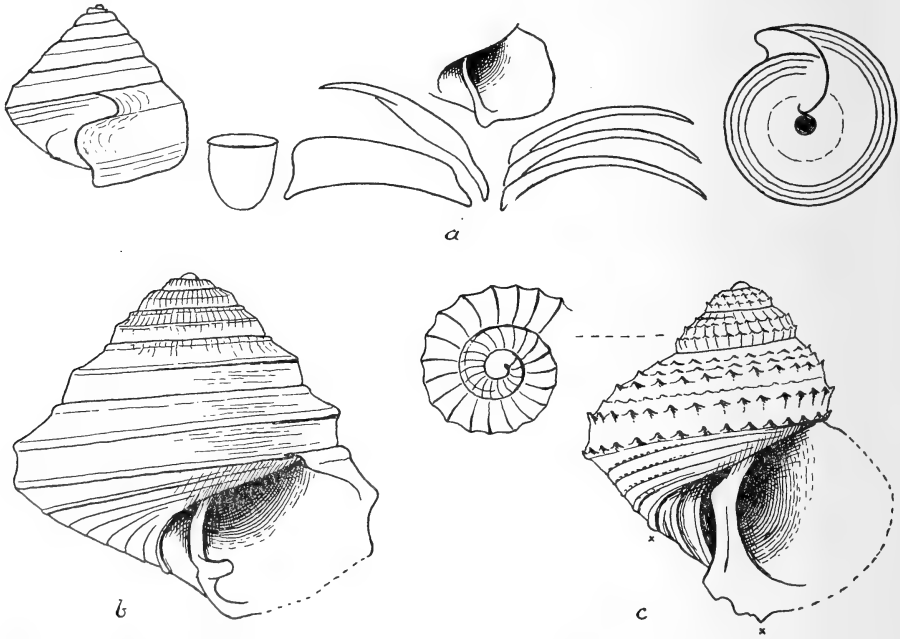

FIG. 16. *a*, *Seguenzia simplex* n. sp., lateral and basal views, aperture, and radula plates. *b*, *S. sykesi* Schepman. *c*, *Calliotropis chenoderma* n. sp., with apical view further enlarged.

Natal (exact locality ?), 1 dead (S. Afr. Mus. A9298, P.F. coll.).

Distribution. East Indies, 1,570 metres.

Remarks. This specimen, though broken, shows all the essential features, and agrees so well with Schepman's description and figure that the identification cannot be avoided.

S. orientalis Thiele (1925, p. 46, pl. 13 (1), fig. 12) from 1° 40′ S., 41° 47′ E., 693 metres, is a very similar species, which may perhaps become a synonym when fresh material is available. The occurrence off the East African coast helps to bridge the gap between the East Indies and Natal.

Seguenzia simplex n.sp.

Fig. 16 *a*

Protoconch nucleus plus 4 whorls. Profile straight, with a very slight angulation forming the lower border of the sinus (where the growth-lines change direction from concave to convex). A peripheral lira shows only on the last whorl. First and 2nd whorls with fine axial pliculae; 3rd and 4th with extremely fine spiral striae. Base with 3–4 spiral lirae on upper part, followed by one which forms a slight angulation marking the slope leading into the narrow and deep umbilicus, 5–6 striae on the slope. Growth-lines extremely fine. Aperture subcircular, slightly produced at anterior end; columella nearly straight, without any pleat or knob. 3 × 3 mm.

White, iridescent.

Radula with *c.* 35 rows, central plate oblong, with overturned cutting-edge but not distinctly serrate, 1 transversely elongate lateral plate, 1st marginal hastate, and 3 slender hamate marginals.

Cape Point N. 89° E., distant 36 miles, 700 fathoms, 8 specimens (S. Afr. Mus. A7421, P.F. coll.).

Remarks. Not a typical *Seguenzia* because it lacks the columellar pleat, but *siberutensis* Thiele (1925, p. 47, pl. 13 (1), figs. 13, 14), from the East Indies, 750 metres, and Zanzibar Channel, 463 metres, agrees in this respect. In other respects also there is close similarity between the two species, except that *siberutensis* is distinctly higher than wide.

Eight specimens were taken. Four of these were sent to Tomlin, but not described; presumably they remain in his collection (National Museum, Cardiff). Of the four in the South African Museum 2 contained animals, and 1 is a juvenile with protoconch plus 2 whorls.

One radula was obtained. It is very delicate but agrees with that figured by Schepman (1909, p. 178, pl. 15, fig. 12); there appear to be 3 outer marginal plates in each row.

Clarke (1961, p. 350) has assigned to *S. elegans* Jeffreys a specimen (not figured) taken by the *Vema* at station 18° 23′ S., 8° 11′ E., in 2,262 fathoms (about 400 miles west of Walvis Bay). Also *S. louiseae* n.sp. from the same locality and from 2,507 fathoms about 1,450 miles south-west of Cape Town; *carinata* Jeffreys from 1,703 fathoms about 400 miles north-west of Cape Town; *eritima* Verrill from station 18, 2,262 fathoms; *antarctica* Thiele from station 18, and from 2,670 fathoms about 300 miles south-west of Cape Town.

Clarke refers to the difficulty of precisely defining the species owing to considerable variability.

Guttula blanda n.sp.

Fig. 17

Protoconch nucleus plus $3\frac{3}{4}$ whorls. Surface quite smooth, without any trace of spiral lirae, and the growth-lines, though distinct on the last whorl,

are not pliculose. Very fine spiral striae at entrance to umbilicus, which is almost closed by the reflexed columella. The latter angular at anterior end, but margin of lip broken. Alt. 3·5, diam. 4 mm. White, iridescent. Operculum very thin.

Jaws reticulate. Radula with *c.* 22 rows, central plate with 2 projecting points on posterior margin, and a small recurved cusp flanked by a minute denticle, only 1 lateral plate, oblong, anterior margin convex, no recurved cusp or denticle, number of marginal plates few (not more than 10), 1st strong, hamate, with 1 minute denticle on outer edge, 2–3 on inner edge, the others falcate, becoming more slender.

FIG. 17. *Guttula blanda* n. sp., with radula plates.

Cape Point N. 89° E., distant 36 miles, 700 fathoms, 1 living (S. Afr. Mus. A7424, P.F. coll.).

Remarks. The radula indicates that this specimen can be included in the genus *Guttula* Schepman 1908 (Thiele, 1929, p. 48). *G. sibogae* Schepman, from the East Indies, 835 metres, has the altitude greater than the diameter, but in other respects the two species are very similar.

The radula corresponds with that of *sibogae* (Schepman, 1908, pl. 9, fig. 11) except that the 1st marginal plate is larger than the following ones; possibly these plates had been displaced in Schepman's mount of the radula.

Euchelus natalensis Smith

Euchelus natalensis Smith, 1906*a*, p. 55, pl. 8, fig. 5; Turton, 1932, p. 193.
Euchelus gemmula Turton, 1932, p. 194, pl. 49, no. 1347.

Immature shells are perforate, adults imperforate. Up to 4·5 × 4·5 mm.

Durban (Smith); Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir.).

Off Illovo River (Natal), 27–30 fathoms, 1 juv.; off Cape Morgan, 77 fathoms, 2 juv.; off Cove Rock (East London), 80–100 fathoms, 1 juv.; all dead (S. Afr. Mus. P.F. coll.).

Remarks. Allowing for its being a worn shell with broken aperture, the shell figured by Turton for his *gemmula* does not seem very different from Smith's figure. Adult shells have up to *c.* 30 axial pliculae, which towards the end of the last whorl are somewhat crowded together.

Oxystele sinensis (Gmelin)

Fig. 14 *f*

Trochus merula Lamarck, 1822, p. 16; Krauss, 1848, p. 95.
Trochus meruloides Krauss, 1848, p. 95.
Oxystele sinensis Gmelin, Tomlin, 1931 *a*, p. 418; Turton, 1932, p. 181, pl. 43, no. 1269 (juv.).
Oxystele inflata Turton, 1932, p. 181, pl. 43, no. 1271.

Protoconch nucleus plus 8–9 whorls. Spiral lirae 4 on 2nd whorl (3 sulci), increasing to 7–8 at end of 3rd whorl, and continuing on 4th, 5th and 6th whorls, at first wider but later narrower than the sulci, later evanescent and eventually obsolete, though traceable on interior of aperture. On base of 3rd and 4th whorls 9–11 lirae, of 5th and 6th whorls 12–15, less prominent than the lirae on upper part of whorl; after the 6th whorl base becomes smooth, lirae and sulci traceable only by coloration.

Apices of large shells always corroded. Growth-lines fine and close-set on early whorls, on later whorls interspersed irregularly with coarser ones. Umbilicus on shells of 3–4 whorls (diam. 3–6 mm.) open or partially closed, thereafter completely closed.

Up to alt. 46 (apex worn), diam. 51 mm. High and low forms, e.g.: alt. 42, diam. 52 mm., 46 × 49, 46 × 51, 24 × 25, 24 × 26, 24 × 28, 16 × 22, and 18 × 24 mm.

In juveniles the pale lirae conspicuous against the dark sulci, usually 3–5 white axial streaks, either of uniform width or more usually wedge-shaped, expanding towards the periphery, but not extending below it, sometimes reduced to small subsutural spots, or absent; later (from 5th or 6th whorl) becoming uniform dull blackish with a violaceous tinge. Base in juveniles paler with dark sulci, later almost as dark as upper part of whorl, but with a roseate tinge, becoming lighter towards centre, a bright crimson or roseate band on the columellar glaze, columella white; aperture internally white, nacreous, outer lip with black margin.

Radula with *c.* 55–65 rows, central plate narrow, lateral plates sloping backwards oblique to axis, cusps serrate on both margins, marginal plates hamate, 1st serrate on both margins, following plates only on outer margin.

Fossil: Pleistocene; Algoa Bay (Johnson, 1904).

False Bay to Algoa Bay and Port Alfred (*auct. et* S. Afr. Mus.). Sebastian Bay, low tide (S. Afr. Mus. P.F. coll.).

Remarks. Turton's *inflata* is merely a casual variation; a slight 'berm' is visible in some of the Still Bay series in the South African Museum, especially in one shell 14 × 19 mm.

The largest specimens I have seen were collected by myself on the beach at Cape Hangklip.

Oxystele tigrina (Chemn.)

Trochus trigrinus Chemn., Krauss, 1848, p. 96.
Monodonta tigrinus Odhner, 1923, p. 5.
Oxystele tigrinus Turton, 1932, p. 181, and var. *vascoi*, p. 182.
Oxystele sagittifera Lam. var. *perdix* (Koch), Turton, 1932, p. 182, pl. 44, no. 1280.

Protoconch nucleus plus 8–9 whorls. Spiral lirae on 2nd whorl (?) (no very young unworn shells seen); on 3rd and following whorls 4 or 5, rounded, broader than in *sinensis*, subequal to the sulci, usually traceable on 8th and 9th whorls if not corroded. On base 8–10 lirae, usually evanescent after 6th or 7th whorl, obsolete on largest shells. Growth-lines fine and close-set. Umbilicus partially closed on shells of diam. 5 mm., and completely closed on those of diam. 9 mm.

Up to alt. 41, diam. 43 mm. Turton mentions one of 47 mm. Altitude and diameter often subequal, but the former may exceed the latter: 35 × 32 and 36 × 35 mm.

Blackish with a more or less violaceous or roseate tinge, the lirae darker than the sulci, and usually with series of white dots; base dark, with or without white dots on the lirae, no red mark or tinge, columella white; aperture internally white, nacreous, outer lip with black margin.

Radula as in *sinensis*.

Fossil: Pleistocene; Algoa Bay.

Saldanha Bay, Table Bay, and False Bay to Natal (*auc. et* S. Afr. Mus.). Saldanha Bay and Still Bay (U.C.T.).

Remarks. A more elevated species than *sinensis*, and more constant in its proportional measurements.

At Still Bay Dr. Muir obtained only one juvenile under diam. 9 mm., although juveniles of *sinensis* were very plentiful.

Krauss said he collected it also at Cape Verde Islands, but possibly his specimens were *punctulifera*, which also has white dots.

Turton's '*sagittifera* var. *perdix*' is too large for a *sagittifera* (= *variegata*), and has blunt lirae on the body-whorl; thus it seems to be obviously a *tigrina*.

Oxystele variegata (Anton)

Trochus variegatus Anton, 1839, p. 57.
Trochus impervius Menke, 1843, p. 18; Krauss, 1848, p. 96, and var. *variegatus*.
Trochus indecorus Philippi, 1844, p. 143, pl. 24, fig. 5.
Oxystele sagittifera Lam., Smith, 1903, p. 389 (note); Bartsch, 1915, p. 152 (descr. juv.); Turton, 1932, p. 182, nos. 1276–1279 (not 1280 = *tigrina*).
Oxystele impervius Menke, Schwarz, 1910, p. 115; Barnard, 1913, p. 80, fig. (feeding track).
Oxystele sagittifera Lam., var. *rufanensis* Turton, 1932, p. 183, pl. 44, no. 1281.
Oxystele tabularis Krss., var. *pulchra* Turton, 1932, p. 183, pl. 44, no. 1282.

Protoconch nucleus plus 6 whorls (Krauss: 8). Spiral lirae on 1st whorl traceable but all present specimens worn; on 2nd whorl 5–6, on 3rd 6–7, thereafter evanescent, only the intervening striae remaining, but these may often be numerous (when traceable) on 4th whorl. Base of 3rd whorl with 7–8 lirae, evanescent on 4th whorl though sometimes faint striae may be traceable. Umbilicus usually closed at shell diam. 5–6 mm.

Up to alt. 34, diam 24 mm. High and low forms, e.g. alt. 11, diam. 12 mm. and 9 × 12; 16 × 18; 13 × 18; 23 × 23 and 19 × 22 mm.

Colour and pattern very variable; but whether the whorls are speckled,

spotted, blotched, or streaked with protractive flames or zigzags, one feature is constant and is seen in the smallest juveniles, viz.: a series of squarish spots below the suture, darker than the ground-colour, and alternating with paler or white spots; these dark spots are often extended as flames or zigzags; sometimes the whole shell is very dark or blackish, in which case the subsutural spots remain more or less visible, or faint traces of streaks are visible on base.

These black shells are distinguishable from *sinensis* by the absence of the crimson flash on the base, or if juveniles by the absence of the white wedge-shaped streaks and the less conspicuous spiral liration.

Radula as in *sinensis*.

Fossil: Pleistocene, Port Elizabeth (Schwarz).

Table Bay and False Bay to Port St. Johns (*auct. et* S. Afr. Mus.). Lüderitzbucht, Port Nolloth and Saldanha Bay (U.C.T.). Mozambique Island (U.W.).

Remarks. Bartsch in describing a 2·5 mm. diam. juvenile said there were 17 spiral threads 'between the periphery and summit' on 3rd whorl; and also 12 on the base. Both these numbers seem too high if 'threads' mean raised lirae, not impressed striae.

The colour pattern described by Bartsch is not characteristic of all juveniles, but is only one of several patterns; in fact it is far less common than some of the other patterns.

In the present material there are only 3 specimens which show this particular pattern of alternating red and green axial stripes of approximately equal width, all of them larger than Bartsch's juvenile: 2 from False Bay (S. Afr. Mus. coll. Lightfoot, also U.C.T.), and one from Mozambique Island (U.W.).

The latter locality is unexpected. Krauss gave Natal as a locality, but there appears to be no later record of this species from north of Port Alfred and the Peddie coast; Lightfoot did not obtain it at East London.

Oxystele tabularis (Krss.)

Trochus tabularis Krauss, 1848, p. 97, pl. 5, fig. 30.
Oxystele tabularis Turton, 1932, p. 183; Day & Morgans, 1956, p. 306 (listed); Macnae & Kalk, 1958, p. 127 (listed).

In the present material no examples with unworn early whorls. Apart from the possibility of a specific difference in the early whorls, there seems to be no *conchological* difference between this species and *variegata*. The larger shells are more consistently of the 'high' form: alt. 12, diam. 13–14 mm., though 'low' forms occur in the younger shells: 8 × 10 and 4 × 5 mm. Removal of the outer layer of the shell-wall discloses no difference in the spiral liration of the nacreous layer.

The peculiar colour pattern seems, therefore, to be the only means of separating the two; and it seems to be sufficiently distinctive to justify specific rank. The only approach to a transitional pattern is that in the 3 specimens mentioned under *variegata*.

The pattern of *tabularis* is very constant, and is already distinct on the 3rd whorl (probably also on the 2nd if unworn): a series of protractive axial dark red streaks, bordered both fore and aft with pale green, on a paler reddish ground-colour, and extending over the periphery on to the paler base; streaks and intervals of approximately equal width; each streak usually continuous across the whorl, but may be disconnected in middle, and the lower part displaced forwards; sometimes 2 or 3 displacements occur; the streaks may be straight or slightly crinkly; an additional narrow wavy streak of green may be present on the intervals between two streaks.

Alt. and diam. 14 mm. (Krauss). No examples with the *tabularis* pattern have been seen equal in size to the largest *variegata*.

Radula as in *sinensis*.

Fossil: Quaternary, Sedgefield near Knysna (A. R. H. Martin).

Table Bay (Krauss); 'Cape of Good Hope', presumably Simon's Bay (False Bay) (Bartsch, N. Pacific Explor. Exp. coll. Stimpson); Kassouga and Port Alfred (Bartsch); Port Alfred (Turton).

Port St. Johns, Durban, and Tongaat (north of Durban) (S. Afr. Mus.); Delagoa Bay (U.W.).

Remarks. It is curious that there are no later records of *variegata* in Natal, and none of *tabularis* in Table Bay, the respective localities given by Krauss. Did Krauss accidentally transpose the two localities in his MS.? (Compare his Latin and German diagnoses of *Neritina umlaasiana*, loc. cit., p. 89). Nor has *O. tabularis* been collected in False Bay by Lightfoot, myself, or U.C.T. Probably therefore Stimpson obtained his specimen from an amateur collector, as seems to have been the case of the 5 *Littorina knysnaensis* stated to have been 'collected by Stimpson . . . at Port Elizabeth' (Bartsch, 1915, p. 120), although the N. Pacific Exploring Expedition did not touch at Port Elizabeth. I am indebted to Dr. H. Rehder, U.S. National Museum, for a photostat of the relevant pages from Stimpson's MS. Journal. Stimpson made no mention of having visited any localities outside the Cape Peninsula during the Expedition's stay in Simon's Bay, Sept. to Nov. 1853.

Gen. Gibbula Risso

Our knowledge of the South African species of this genus is unsatisfactory. Gould described *loculosa*, *fulgens*, *articulata*, *fucata*, *musiva*, *gaudiosa*, *pintado*, all of which were accepted by Bartsch as valid species except *musiva*, a synonym of *cicer* (Menke). All the specimens on which these species were based were collected by Stimpson in Simon's Bay in False Bay. According to the numbers of each species given by Bartsch, about 30 specimens were collected: 21 were referred to *musiva* = *cicer*, and of the other species 1, 2, or at most 3 were obtained. Supposing that 50 specimens were collected, or even 100, does it seem likely that 7 species should be represented, all from one limited locality, and collected in a very brief space of time?

Turton based 9 new species on single specimens; and all from beach material.

No doubt one could continue picking out individuals from a large number of specimens, and bestowing names on them; thereby obscuring Nature's versatility in producing variations. The possibility of variation seems to have been overlooked, or subordinated to the desire to find 'new species'. Species with a spiral sculpture of main and intermediary lirae seem to be especially prone to variation.

Living shells dredged in shallow water, especially immature ones, often show a stronger sculpturing than living shells from the intertidal zone.

A pink coloration is a frequent phenomenon in beach-weathered shells. Investigation might show under what conditions this is most likely to occur. Even living specimens often have the apex, i.e. the part which has been longest exposed, tinged with pink.

The closure of the umbilicus is a variable feature, even in shells of the same size, and is unreliable as a specific character.

The following presentation is admittedly provisional. It has only been possible by the study of the material collected by U.C.T. Even so, far more material is required before one can state the number of species occurring on the South African coast. Beach-worn examples may sometimes be useful for giving a clue to the identity of some 'species' proposed in recent years.

The radulae of the species examined are alike. The radula of '*zonata*' is that of a *Gibbula*, not of an *Oxystele*, in which latter genus it has been included by some authors.

Gibbula rosea (Gmelin)

Figs. 14 *j*, 18 *g*, *j*

Trochus roseus Gmelin, Krauss, 1848, p. 97.
Stomatella margaritana A. Adams, 1850, p. 33; 1854, p. 839, pl. 174, fig. 31.
Gibbula gaudiosa Gould, 1861, p. 21; Bartsch, 1915, p. 156, pl. 28, figs. 1–3.
Gibbula rosea Gmelin, Tomlin, 1921 *b*, p. 237.

Gibbula zonata (Wood)

Trochus cingulatus von Muhlberg, 1818, pl. 2, fig. xi; von Martens, 1903, pp. 55, 57 note 16.
Trochus zonatus Wood, 1828, p. 17, pl. 5, fig. 34 (n. *et* f.); Krauss, 1848, p. 97; von Martens, 1874, p. 129.
Trochus menkeanus Philippi, 1844, p. 91, pl. 3, fig. 6.
Gibbula leaensis Watson, 1880, p. 90 (named after Lea [*sic* = Sea] Point, Cape Town).
Gibbula zonata Wood, Watson, 1886, p. 76, pl. 6, fig. 7.
Oxystele zonata Wood, Sowerby, 1892, p. 42.

Protoconch nucleus plus $3\frac{1}{2}$–4 whorls (Watson, 1880: 6 !). Spiral lirae 1 on 1st whorl, 2 on 2nd, with a 3rd at and more or less absorbed in the suture, on 3rd whorl 3 main lirae; intermediaries present but variable, some of them sometimes almost as strong as the main lirae, which also show considerable variation in strength from ordinary lirae to outstanding costae or carinae.

On base (last whorl) numerous lirae, 9–16, varying in strength. Growth-lines fine, not pliculose. Umbilicus open in juvenile, usually closed in shells with diam. 3–4 mm., but may remain open in larger shells.

Up to alt. 7, diam. 10 mm.; 'high' and 'low' forms, e.g. 8 × 10 and 7 × 10, 6·5 × 7 and 5·5 × 7 mm.

Coloration, living: cream, buff, grey, or purplish-grey, with darker grey or purplish lirae, those on the early whorls often pinkish or livery, the lirae on the later whorls often articulated light and dark. Beach specimens may retain the greyish or pinkish coloration, or may become bright pink with darker pink lirae.

Jaws present. Radula with *c.* 40 rows, central plate with broad lateral expansions, cusps on central and lateral plates with a few serrations, 1st marginal plate with broad base projecting inwards, the following plates feebly serrate on outer margin.

Table Bay (Krauss, Watson, also S. Afr. Mus.). Simon's Bay (False Bay) (Gould: *gaudiosa*). False Bay and Still Bay (S. Afr. Mus.). Port Alfred (Bartsch, Turton).

Off Keiskamma Point, 33 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Living: Lüderitzbucht, Port Nolloth and various localities on west coast southwards to west coast of Cape Peninsula; and False Bay (U.C.T.).

Remarks. Considerable variation occurs in the strength of the main and intermediary lirae. Consequently it seems impossible to separate, conchologically, *rosea* and *zonata*, even as forms or subspecies. The respective references, however, are given separately. It is unfortunate that the earlier *rosea* must be retained, because it is applicable only to beach-weathered shells.

The darkest shells come from the west coast; towards the south on the west coast of the Cape Peninsula and in False Bay the shells tend to be paler, less suffused with grey, and the lirae more often pinkish. On the south coast also the lirae are more often articulated, even to the formation of more or less continuous axial streaks (*gaudiosa*; also shells from Still Bay). Some of the shells with these markings closely simulate *cicer*, as was noted by Krauss, but may be distinguished by the more numerous basal lirae.

Gibbula cicer (Menke)

Fig. 18 *i*

Trochus cicer Menke, 1844, p. 91, pl. 3, fig. 5; Krauss, 1848, p. 98.
Trochus zeyheri Krauss, 1852, p. 33.
Gibbula musiva Gould, 1861.
Gibbula cicer Menke, Bartsch, 1915, p. 156, pl. 30, figs. 8–10 (one of Gould's cotypes of *musiva*); Wybergh, 1920, p. 66; Turton, 1932, p. 185, and pl. 45, no. 1296 (basal view of *musiva*).
Gibbula thalia Bartsch, 1915, p. 157, pl. 30, figs. 1–3.

Distinguished from *rosea* by the stronger liration on upper part of 3rd and 4th whorls, by the fewer and stronger basal lirae and by coloration.

Up to alt. 8·5, diam. 9 mm.; also 8 × 10, 8 × 9·5, 8 × 8, 7·5 × 8, 7 × 7·5 mm.

Radula as in *rosea*.

Coloration, living: pale cream, buff, or yellowish, with grey, purplish-grey, livery, or reddish spots or marks on the lirae, forming more or less continuous axial streaks, continued over periphery on to base, the early whorls yellowish, with continuous grey or red lirae. Shells from the west coast tend to be grey, those from the south coast more often, but not always, reddish. Beach shells retain more or less the same coloration, but may become pinker, especially on the early whorls.

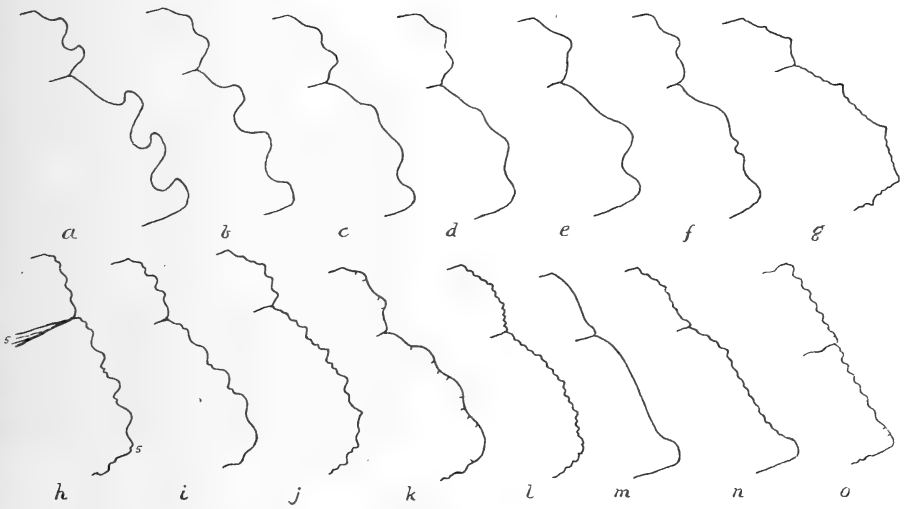

FIG. 18. Profiles of *Gibbula*: *a–d*, *multicolor* (Krss.); *e*, forma *biporcata* A. Adams; *f*, *multicolor* aberration (no. A8267); *g*. *rosea* (Gmelin), low form; *h*, *fulgens* Gould; *i*, *cicer* (Menke); *j*, *rosea*, high form; *k*, *beckeri* Sow.; *l*, *benzi* (Krss.); *m*, *tryoni* Pilsbry; *n*, *capensis* (Gmelin); *o*, *perspectiva* Sow.

Fossil: Pleistocene, Bredasdorp Beds, Port Beaufort (Wybergh).

Table Bay (Krauss). False Bay (Gould; also S. Afr. Mus.). Port Elizabeth (Sowerby). Port Alfred (Bartsch, Turton). Natal (Bartsch).

Hermanus, Still Bay, Mossel Bay (S. Afr. Mus.).

Living: numerous localities from Lüderitzbucht, Saldanha Bay and west coast of Cape Peninsula, and False Bay to East London and Quolora (U.C.T.).

Remarks. Sometimes difficult to distinguish from *rosea*. As a rule the coloration is distinctive, and correlated with broader, blunter lirae and narrower sulci. But transitional specimens do occur.

Both *rosea* and *cicer* occur on the west and south coasts, but the former seems to be commoner on the west coast, and the latter far commoner and extending farther east along the south coast.

Adam & Leloup (1938) identified specimens from Banda, East Indies, as *cicer*.

forma *fulgens* Gould

Fig. 18 *h*

Gibbula fulgens Gould, 1861, p. 21; Bartsch, 1915, p. 154, pl. 26, figs. 4, 5, 6.

An unusually 'high' form of *cicer*, and occurring in association with the typical form.

Alt. 8, diam. 7·5 mm. (Bartsch; also U.C.T.) and 7 × 6·5 mm. (U.C.T.).

In accordance with the coloration of west coast and south coast typical examples, the Langebaan examples have grey marks, the Cape Hangklip example red marks. Radula as in *rosea*.

Simon's Bay (False Bay) (Gould).

Living: Langebaan (Saldanha Bay) and Cape Hangklip (U.C.T.).

Gibbula multicolor (Krss.)

Fig. 18 *a–f*

Trochus multicolor Krauss, 1848, p. 97, pl. 5, fig. 31.
Gibbula fucata Gould, 1861, p. 20; Bartsch, 1915, p. 155, pl. 27, figs. 4–6.
Gibbula lauta Turton, 1932, p. 186, pl. 45, no. 1302.
Gibbula distincta Turton, 1932, p. 186, pl. 45, no. 1306.
Gibbula pulchella Turton, 1932, p. 187, pl. 46, no. 1307.
Gibbula polychroma Turton, 1932, p. 187, pl. 46, no. 1310.
Gibbula ornata Turton, 1932, p. 187, pl. 46, no. 1311.
Gibbula sp. Turton, 1932, p. 187, pl. 46, no. 1309.

Protoconch nucleus plus 3–4 whorls, elevated but diameter exceeding altitude, protoconch (if not worn) prominent. Spiral lirae 2 beginning on last part of 1st whorl, continued as strong costae on 2nd and 3rd whorls; actually a 3rd lira is present but included in the suture and not visible until the 4th whorl (or later part of 3rd); on body-whorl therefore 3 strong lirae or costae, subequally strong and usually equidistant, but 1st and 2nd may be a little farther apart than 2nd and 3rd. Sulci usually smooth except for the growth-lines. Intermediary lirae may develop but not very conspicuously, 3–5 between suture and 1st costa, and 2–5 (6) between the pairs of costae (cf. Turton's figure of *distincta*).

On base *c.* 12 more or less fine lirae, but variable, only 5 or 6 when no intermediaries are present, 2 or 3 of them may be slightly stronger than their neighbours. Umbilicus partially closed at shell diameter 4 mm., but may not be completely closed even in the largest shells.

In some examples growth-lines between 1st and 2nd lirae and between 2nd and 3rd (i.e. on body-whorl; on penultimate whorl between 2nd lira and suture below) form very regular retractive pliculae; when the pliculae are well developed the intermediary lirae are recessive or obsolete.

Alt. 6·5, diam. 7·5 mm.; also 5·5 × 7 and 5·5 × 6 mm.

Brown-red and white radiating stripes, best seen at the suture, upper 2 costae with alternating blue and orange-yellow spots, the lowest costa with

brown-red and white; base spotted with brown-red and white, then blue and orange, and rose and white near umbilicus (Krauss).

Similarly coloured examples from Natal (S. Afr. Mus.), but somewhat faded, especially the blue spots. No two of the 10 specimens are exactly alike. One is distinctive: ground-colour orange-yellow, with reddish radiating marks from suture to 1st lira on last whorl, the 3rd lira with alternating reddish-brown and pale yellow spots; base orange with paler spots and streaks. The Mossel Bay shell is similar but brighter orange, the radial streaks pale yellow, very faint on base.

The East London specimens are similar to those from Natal in coloration; the upper two lirae in one shell with pale green spots, deep peacock-blue spots in another.

The Buffels Bay example (taken alive) is buff with a few faint fulvous radiating marks and the two main lirae articulated with fulvous spots.

Beach examples from Table Bay rose-pink, uniform or with white or faded blue spots on the lirae.

Table Bay (Krauss; also S. Afr. Mus.); Simon's Bay (False Bay) (Gould, Bartsch: *fucata*); Buffels Bay and Gordon's Bay (False Bay), and Still Bay (S. Afr. Mus.); Port Elizabeth (Sowerby); Knysna (U.C.T.); Port Alfred (Bartsch, Turton); East London (S. Afr. Mus. coll. Lightfoot); Natal (S. Afr. Mus.).

Remarks. Bartsch's figures of Gould's cotype indicate clearly that *fucata* is a synonym.

Turton's *distincta* ('a single specimen') is a worn shell, with the intermediaries well developed on upper part of whorl; traces of the finer lirae on base are visible in the photo, though Turton said the spaces between the lirae were quite smooth.

forma *biporcata* A. Adams

Fig. 18 *e*

Stomatella biporcata A. Adams, 1850, p. 33; 1854, p. 893, pl. 175, fig. 43.
Gibbula bifurcata (*laps. cal.*) Sowerby, 1889 *b*, p. 153.
Gibbula fucata Sowerby, 1894, p. 372; Turton, 1932, p. 184, pl. 44, no. 1290, and var. *sowerbyi* no. 1291.
Gibbula biporcata Adams (MS.), Sowerby, 1892, p. 67, pl. 5, fig. 100; Tomlin, 1921 *b*, p. 237.
Gibbula hera Turton, 1932, p. 184, pl. 44, no. 1293 (*non hera* Bartsch).

Not so elevated as *multicolor*; with (typically) 2 spiral lirae, one slightly below middle of whorl and one peripheral, bluntly rounded, not so prominent as in *multicolor*, not costate. Intermediary lirae well developed but variable: usually one between suture and upper lira (corresponding with the 1st costa in *multicolor*) more prominent than the others, and sometimes as strong as the main lirae, thus producing a trilirate form; between the 2 main lirae also one intermediary may be stronger than its neighbours but never as strong as the aforesaid intermediary. Basal lirae as in *multicolor* but likewise variable. Umbilicus as in *multicolor*.

Alt. 5, diam. 6·5 mm.; also 5·5 × 7 and 6 × 7 mm.

Beach specimens from Table Bay as in *multicolor* from same locality: rose-pink, uniform, or with subsutural darker marks, or dark and pale alternating marks, lirae deeper red, with or without pale or faded blue spots.

Table Bay (S. Afr. Mus.); Cape Town (Sowerby: *fucata*); Port Alfred (Turton).

Remarks. This, in my opinion, is the less elevated bilirate form of *multicolor*. Probably it is the basic form, and *multicolor* the extreme cingulate form, but there is no sharp distinction between the two forms. The latter has taxonomic priority. In fact it is possible to find links connecting, conchologically, the less strongly lirate forms of *biporcata* with *rosea-zonata*; and only the mainly axial coloration separates them.

Gibbula benzi (Krss.)

Fig. 18 *l*

Trochus benzi Krauss, 1848, p. 99, pl. 5, fig. 32; von Martens, 1874, p. 129; Watson, 1886, p. 71.
Trochus ludwigi Krauss, 1848, p. 99, pl. 5, fig. 33.
Gibbula loculosa Gould, 1861, p. 21; Bartsch, 1915, p. 153, pl. 23, figs. 1–3 (one of Gould's cotypes); Turton, 1932, p. 188.
Gibbula pintado Gould, 1861, p. 21; Bartsch, 1915, p. 160, pl. 28, figs. 10–12 (Gould's Type); Turton, 1932, p. 186, pl. 45, no. 1298.
Gibbula kowiensis Turton, 1932, p. 187, pl. 46, no. 1308.
Gibbula benzi Krauss, Turton, 1932, p. 188, and var. *affinis*, p. 188, pl. 46, no. 1315.

Protoconch nucleus plus 5 whorls, profile convex though often slightly shouldered near middle of whorl, angulate at periphery on early whorls but becoming less distinctly so on later whorls, and quite rounded in largest shells. Spiral lirae 3 (4) on 2nd whorl, 4 or 5 main lirae on 3rd whorl, numerous on 4th and 5th whorls owing to interpolation of secondary lirae (*c.* 7–10 on 4th, *c.* 12–15 on 5th whorl). Basal lirae *c.* 15–20, with duplication and intermediaries sometimes up to 25. Umbilicus usually, but not always, completely closed in largest shells. Growth-lines distinct, often pliculate.

Alt. 2·5, diam. 3 mm., up to 12 × 14 mm. High and low forms, e.g. 6·5 × 7 and 5·5 × 7, 9·5 × 11 and 8 × 11 mm.

Ground-colour variable, brown, red, orange, uniform or with white or pale yellow radiating streaks, pale marks on the peripheral angle, lirae usually articulated, necklace-like. In a series of 28 shells from Mossel Bay 11 are almost uniformly deep orange. The U.C.T. shell from False Bay (living) is uniform dull drab; and the Langebaan shell (living) bluish-grey with darker and lighter patches around the periphery. The *Pieter Faure* and U.C.T. specimens from Table Bay (living) are pale biscuit-colour, with or without brown spots on the lirae.

Radula similar to that of *rosea*.

Cape (Krauss); Simon's Bay (False Bay) (Gould, Bartsch: *loculosa*, *pintado*); False Bay (von Martens); False Bay, Still Bay, Mossel Bay (S. Afr. Mus.); Port Alfred (Bartsch, Turton; also S. Afr. Mus.).

Off Cove Rock (East London), 22 fathoms, 9 and fragments; 34° 5′ S., 25° 55′ E., 67 fathoms, 7 juv. (S. Afr. Mus. P.F. coll.).

Living: False Bay, 15–20 fathoms (Watson: presumably living); Table Bay, 22 fathoms (S. Afr. Mus. P.F. coll.); Langebaan (Saldanha Bay), Table Bay, and False Bay (U.C.T.).

Remarks. It seems a little strange that Krauss separated *ludwigi* (a 'distinctive' species) from *benzi*; he may have been influenced by the colour and the well-developed growth-lines. But both of these features are found to be variable when a large series is available. In the *loculosa* form the growth-lines are particularly well developed.

The brightly coloured shells are all beach-weathered shells from south coast localities.

Although at first sight the synonymy seems strained and unlikely, the variation in the development of the main and secondary lirae, and of the growth-lines, seen in a long series, amply accounts for the institution of *ludwigi*, *loculosa*, and *pintado*. In Gould's Type of *pintado* (figured by Bartsch) and one of the *Pieter Faure* specimens there are, respectively, 7 and 8 or 9 main lirae, of equal strength, and no intermediaries. Usually, however, the lirae differ distinctly in strength, some being evidently intermediaries.

The Langebaan shell (which is the largest I have seen) has the intermediaries on the 3rd–5th whorls (apex and 2nd whorl worn) so well developed as to be indistinguishable from main lirae, and without reference to a series of *benzi* might be thought to be a different species. In fact it is very like a *capensis*, which occurs in the same locality, with the profile rounded or scarcely angular at the periphery.

It may be useful to retain the name *pintado* as a form of *benzi*, but not *loculosa* which applies merely to strongly sculptured unworn *benzi*.

Gibbula capensis (Gmelin)

Fig. 18 *n*

Trochus capensis Gmelin, Krauss, 1848, p. 100; Wood, 1856, p. 141 (*capensis* Gmelin for *variegatus* Chemn.).
Gibbula capensis Gmelin, Sowerby, 1892, p. 43; Haughton, 1932, p. 34.

Protoconch nucleus plus 5 whorls; profile evenly convex but with a slight shoulder, strongly carinate at periphery. Spiral lirae 3 on 2nd and 3rd whorls, but the 3rd (peripheral) lira is more or less embedded in the suture; 1, later 2 intermediaries between suture and 1st lira and between the two pairs of lirae; on 3rd whorl the 2nd lira decreases in strength, and a little later the 1st also decreases, so that on 4th whorl there are 8–10 subequal lirae, and on 5th whorl 10–13 between suture and carinal lira; the shoulder remains more or less distinct in the position of the original 1st lira.

On base of 3rd whorl 4 main lirae, on 4th 5–6, on 5th 6–7; fine intermediaries may occur, giving a total on 5th whorl of *c.* 15 lirae. Umbilicus open

in largest shells. Growth-lines distinct, in good specimens often pliculose between the lirae.

Alt. 2·5, diam. 4·5 mm.; also 3·5 × 5, 3·5 × 6, 4 × 7, 4·5 × 6, 6·5 × 11, 7 × 12, 9·5 × 11, 10 × 12, and 10 × 13 mm. Krauss: 11·5 × 15 mm.

Apex (2nd whorl) often with pink or violaceous articulated lirae on a pale ground-colour; but these spots soon develop into axial streaks of red or violaceous brown, often with darker borders, on a pale or greenish ground-colour; the streaks often faint or interrupted at midwhorl but reappearing prominently on the peripheral keel; basal lirae pink, uniform or articulated. There are several variations of this colouring and pattern, which is often particularly bright on beach-worn specimens.

Radula as in *rosea*, but central plate more triangular.

Fossil: Quaternary, Hoedjes Bay (Saldanha Bay) (Haughton).

'*An der ganzen Südspitzen*' (Krauss); Port Elizabeth, Natal, etc. (Sowerby); Dassen Island (north of Table Bay), False Bay, Hermanus, Still Bay (S. Afr. Mus.).

Living: Langebaan (Sandanha Bay); west coast of Cape Peninsula; Cape Hangklip (U.C.T.).

Remarks. A distinctive species with 'high' and 'low' forms (see measurements). The largest shells are usually high (cf. Krauss).

The peripheral keel is typically well marked, not only structurally, but by the necklace-like alternating dark and light spots. But occasionally high shells occur with the periphery only angular, not carinate.

One of the Still Bay high shells has a rounded periphery as in *O. tabularis*, and a similar colour-pattern, the axial streaks being continuous from suture to periphery and passing over on to base; but it has spiral lirae and an open umbilicus, and therefore cannot be *tabularis*.

In the low form the peripheral carina is always prominent, which obviates confusion with some juveniles of *rosea*, *multicolor* and *biporcata*, especially when the latter have acquired a pink tinge.

Eight shells from Langebaan provide a more puzzling question. In colour they are livery or violaceous, the lirae darker, a series of white spots at top of whorl below suture and another series around periphery, the two series separate or more or less connected by pale axial streaks; base uniform or the lirae articulated; umbilicus pinkish. When the pale axial streaks are continuous the resemblance to *capensis* is strong, but where there are only the sutural and peripheral white spots the resemblance is more towards some of the south coast colour varieties of *benzi*. The profile of the body-whorl is like that of *benzi* or the high forms of *capensis* which have a rounded periphery.

Gibbula beckeri Sow.

Fig. 18 *k*

Gibbula beckeri Sowerby, 1901, p. 214, pl. 22, fig. 22 (not very good).

Protoconch nucleus plus 4 whorls; profile rather strongly convex in upper half of whorl. Spiral lirae 2 on 2nd and 3rd whorls, 3 on 4th, broad and low, scarcely projecting above the profile, defined by impressed striae, the 3rd being peripheral and feebly carinate; an additional stria (or 2) between 1st and 2nd lirae, and 2–3 between 2nd and 3rd. Sometimes (as in a cotype) only 1 (midwhorl) lira on 2nd and 3rd whorls, but the peripheral one comes into view on 4th whorl.

On base usually a marginal lira and 7–8 weaker lirae, variable. Umbilicus not completely closed in largest shells. Growth-lines distinct.

Alt. 5, diam. 7 mm. (cotype); 7 × 9 mm.

Grey or violaceous-grey with white or pale spots, radiating streaks, and/or zigzag marks, very young shells (up to 2–3 mm. diam.) uniformly violaceous.

One specimen yellowish with darker brown radiating patches forming a band below suture, similar dark patches on the peripheral lira, between these two bands brown zigzags.

Two specimens have red-brown radiating streaks on an emerald-green ground-colour on 3rd and 4th whorls, streaks extending on to peripheral lira (cf. *capensis*). Base with grey lirae, or faintly streaked and spotted.

Radula as in *rosea*.

Kowie = Port Alfred (Sowerby). Sea Point (Cape Town) (S. Afr. Mus. coll. Lightfoot 1893).

Living: Port Nolloth, Buffels River, Hondeklip Bay and Steenberg Cove (west coast); Cape Peninsula; and Knysna (U.C.T.).

Remarks. A puzzling species, if it is a species. Up to the present the large *tryoni* has not been found on the west coast; otherwise one might be tempted to regard the above-described specimens as juvenile *tryoni*. On the other hand there is the likeness to *multicolor—biporcata*. Provisionally, therefore, *beckeri* is retained.

Turton did not obtain it, or at least did not record it under this name, at the type locality.

Sowerby's Latin description might apply to *multicolor*: '*anfractus . . . penultimatus supra bicarinatus, . . . ultimus tricarinatus*.' His English comment mentions: 'deep furrows and strong keels.' His figure, however, shows only 2 lirae (midwhorl and peripheral) on the body-whorl; it might almost have been drawn from a *capensis*!

A cotype from the Kowie presented by Dr. H. Becker agrees with Sowerby's description in colour, and has 3 lirae on the body-whorl. These lirae, however, are very low and rounded, the upper one is represented by barely more than a slightly greater convexity of the profile, the midwhorl lira is delimited above by an incised stria, and the peripheral lira is not so prominent as in Sowerby's figure. Intermediaries very faint, but 3–4 between the midwhorl and peripheral lirae on body whorl.

In some specimens the main lirae or intermediaries are scarcely raised above the profile and are indicated only by incised striae; in some juveniles the surface from suture to periphery is quite smooth, and the periphery is

only very feebly angular. A Knysna specimen is like *aglaia*, having the appearance of being 'wrapped by turns of a bandage' (Bartsch).

When the 1st and 2nd lirae are suppressed and only the peripheral one remains, the shell approximates to the early whorls of *tryoni*, especially as the latter often has 2 'necklaces' of coloured spots which are in the same position on the whorl as the 1st and 2nd lirae in *beckeri*, and, though only coloured, simulate raised lirae. Occasionally a specimen occurs without any spiral sculpture.

In juveniles the growth-lines are often very distinct, in fact almost pliculate. In one of the Knysna shells there are major growth-lines at regular intervals, forming well-marked retractive axial pliculae—an unusual feature among South African species of *Gibbula*.

Gibbula tryoni Pilsbry

Fig. 18 *m*

Gibbula tryoni Pilsbry, 1889, p. 239, pl. 69, figs. 20, 21; Turton, 1932, p. 189.
Gibbula incinta Sowerby, 1894, p. 372; 1897, p. 18, pl. 6, fig. 22 ('= *tryoni*').
Gibbula aglaia Bartsch, 1915, p. 158, pl. 27, figs. 1–3 (= juv.).
Gibbula medusa Bartsch, 1915, p. 159, pl. 29, figs. 7–9 (= juv.).

Protoconch nucleus plus 6 whorls; profile evenly convex, angulate at periphery. Early whorls may have 2 or 3 very feebly developed spiral lirae, and a stronger peripheral keel, more or less visible in the suture; later whorls with peripheral keel usually marked off by a feeble groove from the surface above, which (in good specimens) is covered with exceedingly fine spiral striae. Growth-lines distinct, becoming rather coarse on body-whorl in large shells. Umbilicus widely open.

Alt. 5, diam. 6 mm.; also 8 × 11, 10 × 10, 10 × 12, 11 × 12, up to 16 × 16 mm. and 19 × 20 mm.

Ground-colour brown, yellowish-brown, olive, reddish, usually with dark marks radiating from suture, alternating with pale marks, or pale marks only; one, two or three characteristic necklace-like spiral bands articulated with dark and pale spots; on early whorls sometimes green spots.

Port Elizabeth (Sowerby). Port Alfred (Bartsch, Turton, also S. Afr. Mus.), Port St. Johns, and Tongaat (Natal) (S. Afr. Mus.).

Remarks. A large and distinctive species, umbilicate, and with only 1 well-developed spiral lira—the peripheral keel; but on the last whorl in the largest shells this keel tends to disappear.

The spiral necklaces, being sharply defined, often simulate raised lirae.

Bartsch's two species are regarded as juveniles. But the growth of *tryoni* should be traced back to its juvenile stage by obtaining good (living) material. See also *beckeri*.

Gibbula perspectiva Sow.

Fig. 18 *o*

Gibbula perspectiva Sowerby, 1900, p. 6, pl. 1, fig. 17.

Protoconch nucleus plus 6 whorls; conical, profile straight, angulate at periphery. Apex worn; spiral lirae 4 on 3rd whorl, 5–6 on 4th, 6–7 on 5th and 6th whorls, including one or two fine intermediaries; in addition a peripheral carinal lira slightly broader than those above it, but not projecting beyond profile, divided by 1 (5th whorl) or 2 (6th whorl) faint striae; in apical view the peripheral keel is slightly undulate; on 6th whorl lirae may be feebly granulate; suture slightly undulate. Base with 6 lirae. Growth-lines distinct, more or less pliculose in the sulci. Umbilicus widely open.

Alt. 8·5, diam. 9 mm. (cotype); another: 7·5 × 7·5 mm. Sowerby: 10 × 11 mm.

Mottled red on pale ground-colour, faint darker patches from suture extending more or less across whorl, peripheral carina articulated, basal lirae spotted (cotype). Another specimen uniform fulvous-brown.

Pondoland coast (Sowerby, also S. Afr. Mus.). A second specimen in the South African Museum (Juritz coll.) probably came also from Port Alfred, but possibly from Natal.

Remarks. The present cotype (coll. Becker) is not in very good condition, but exhibits characteristics (number of lirae) not mentioned in Sowerby's description.

Not taken by Turton at Port Alfred.

Related to *townsendi* Sow., described from the Mekran Coast, and recorded by Smith (1903) from Durban.

Cantharidus fultoni (Sow.)

Figs. 14 *i*, 19

Calliostoma fultoni Sowerby, 1889 *b*, p. 153, pl. 3, fig. 7 (labelled *Trochus stenomphalus*); 1892, p. 43, pl. 2, fig. 43; Schwarz, 1910, p. 115; Tomlin, 1931 *a*, p. 419 (note on *stenomphalus*), Haughton, 1937, p. 22.

Calliostoma farquhari Sowerby, 1892, p. 43, pl. 2, fig. 42; Schwarz, 1910, p. 115; Tomlin, 1931 *a*, p. 419.

Calliostoma bisculptum Smith, 1906 *a*, p. 54, pl. 8, fig. 4.

Calliostoma ? n.sp. Smith in Rogers, 1906 *b*, p. 293.

†*Calliostoma mosselense* Tomlin, 1926 *b*, p. 81; Haughton, 1926, p. 81 (note on Tomlin); Barnard, 1962, p. 182.

Conical, altitude greater than diameter, but proportionately greater in large shells than in juveniles. Protoconch nucleus plus 8 whorls; profile straight, angularly carinate at periphery, sharply on the early whorls but less so on later whorls, carina often making a slight bulge above the suture. First whorl obscurely spirally striate, following whorls with spiral lirae, varying in number from 6 broad flat lirae to 18 fine filiform lirae. Base with 8–13 lirae. Growth-lines fine, close, oblique. Umbilicus variable, usually almost or quite closed in shells of about diam. 8–9 mm., but even in largest shells a narrow chink may remain.

Up to alt. 16, diam. 13 mm.

Grey or pale buff, sometimes with a livid or faint greenish tinge, usually with more or less distinct darker grey protractive axial streaks, flames, or

zigzags, sometimes in duplicate or bifid towards the periphery, lirae more or less articulate, peripheral carina distinctly articulated; often 2 thin red spiral lines, 1 below suture and 1 midwhorl, sometimes a third red line above the peripheral carina. Base paler, speckled or with axial streaks, and often 1–3 red spiral lines. Juvenile shells often iridescent externally, especially in alcohol.

Some of the Mossel Bay and Sedgefield fossil shells retain traces of the axial streaks.

Jaws present, without intercalated platelets. Radula with *c.* 50–55 rows, central plate expanded laterally, 5 lateral plates with broad cusps, with one or two serrations, marginal plates not serrated.

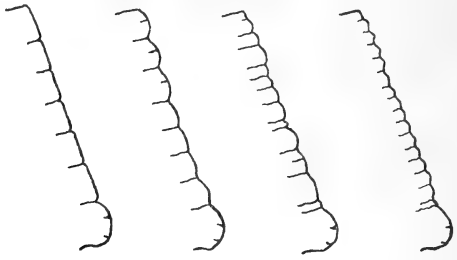

FIG. 19. Profiles of *Cantharidus fultoni* (Sow.) to show variation.

Fossil: Quaternary, Klein Brak River (Mossel Bay) (Tomlin: †*mosselense*); Port Elizabeth (Johnson; Schwarz; Haughton); Sedgefield near Knysna (A.R.H. Martin); Knysna raised beach (S. Afr. Mus.).

Port Elizabeth (Sowerby); Durban (Smith); Isipingo and Durban (S. Afr. Mus.).

Off Cape Morgan, 47 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Living: Delagoa Bay (S. Afr. Mus. coll. K. H. B.; also U.W.); Inhambane and Maxixe (U.C.T.); Mozambique Island (U.W.).

Remarks. Sowerby's description of *fultoni* and Smith's description of *bisculptum* are very similar, sometimes with almost *ipsissima verba*: ('*strigis plerumque duplicatis*' and '*strigis plus minus duplicatis*'); Smith, however, did not mention *fultoni*, and did not compare his species with any other.

Tomlin (1931*a*) showed that *farquhari* was only juvenile *fultoni*; and mentioned some features which appeared to separate the unique specimen of *bisculptum* from *fultoni*, but foresaw the possibility of these differences being bridged by further material.

Tomlin, according to Haughton's note (1926), had only one specimen from Mossel Bay, and therefore was unaware of the variation in the liration and in the umbilicus. His statement that *farquhari* was 'much smaller' than *mosselense* was not quite correct: Sowerby gave 12 × 9 mm. for the former, Tomlin 12 × 10 mm. for the latter.

Both Sowerby and Tomlin regarded *fultoni* as close to the Madagascan

Trochus suarezensis Fischer 1880, later transferred to *Cantharidus* (see Dautzenberg, 1929, p. 538). A comparison of a series from Madagascar and the east coast of Africa might be interesting.

The radula shows that *fultoni* is not a *Calliostoma*.

The variation in the number of lirae is remarkable but not unexpected in the case of a lirate shell. The most common, and therefore to be regarded as normal, form is multilirate. There is one 6-lirate shell from Delagoa Bay; but the longest series from any one locality is that from Mossel Bay, most of which are in good condition. Variation on the whorl does not always coincide with that on the base: shells with multilirate whorls usually have a multilirate base, but not always.

Haughton's statement (1937) that *mosselense* was extinct must be qualified. Like *Cerithium kochi* (Barnard, Part III, p. 131) this species at one time was living much farther westwards along the coast than it is today. It is doubtful if it is living as far south as Port Elizabeth. One may even doubt whether it is living on the Natal coast; Burnup's unique specimen of *bisculptum* (? living) and 2 dead shells in the South African Museum appear to be the only records.

In the Mossel Bay raised beach *fultoni* is one of the most abundant species.

Angaria lacunosa n.sp.

Fig. 20

A worn specimen, the upper surface partially covered with a Polyzoan, seems to belong to this genus. The upper surface is irregularly oval in outline, 9 × 8 mm.; a faint suture is visible in places. Three cavities appear to represent apertural expansions on previous whorls; one such cavity is at the upper corner of the aperture, and one slightly behind it. Base convex, with traces of spiral lirae, best seen near the narrow umbilicus, which is not completely covered by the columellar glaze.

From one of the *Pieter Faure* bottom-samples from Natal, but exact locality not recorded (S. Afr. Mus. A9281, P.F. coll.).

May possibly be *atrata* (Gmelin).

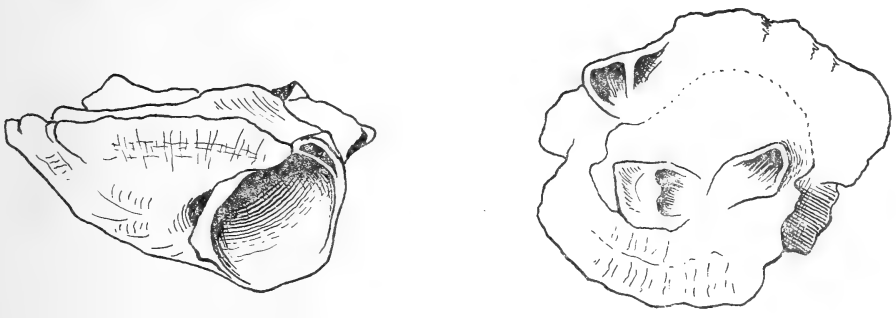

FIG. 20. *Angaria lacunosa* n. sp., frontal and apical views.

Umbonium vestiarium (Linn.)

Rotella vestiara Linn., Chenu, 1859, figs. 2592–2603 (coloured).

Recorded by Sowerby (1897) from Durban. The South African Museum has it from Kentani (coll. Rev. F. C. Kolbe), but the record needs confirmation. Bartsch's (1915) 'Cape of Good Hope' is not a definite locality, and merely means that the specimens were in a collection received from 'South Africa'.

Turton (1932, p. 183) recorded '*Omphalius fasciatus* Born', identified by Tomlin. 'Smooth, with brown marks and spiral dotted lines . . . rather like a Solarium.' Turton seems to have made some mistake, because his words suggest *Umbonium*; *Omphalius* is not at all like a *Solarium*.

Fam. **Fissurellidae**

Thiele, 1929, i, p. 31.
Tomlin, 1932, p. 159 (South African species).

The radula seems to require further investigation. Powell (1951, p. 87, fig. G 3) described and figured the radula of *Parmaphorella melvilli* with an 'incipient or obsolescent' 6th lateral plate, and noted that a similar plate is present in other genera. It seems to be distinct in this genus, and simulates a lateral plate; but as the fan-like series of marginal plates is closely associated with this plate, and in *Amblychilepas scutella* (fig. 21 *b*) appears to be actually attached to it, it would be better interpreted as the 1st marginal plate. It is absent in *Pupillaea aperta* (fig. 21 *e*), but its homologue seems to be the alate 1st marginal plate.

This latter plate may represent an evolutionary stage, because in *Diodora parviforata* it is present but lacks the slender process at the outer corner.

Torr (1914, pp. 363, 364) described a *double* row of marginal plates in *Megatebennus* (*Cosmetalepas*), *Lucapinella*, and *Emarginula*; presumably meaning a double row belonging to each transverse row of plates on the radula. This, at least in all the radulae I have been able to examine, is an illusion due to the series of marginals being directed backwards parallel with the axis of the radula instead of spreading out more or less laterally. Consequently when the marginals are numerous, those belonging to one transverse row overlap those of the row in front (fig. 21 *a*). In *A. scutella* (fig. 21 *b*), however, the marginals are not numerous, and all are accommodated on the well-'chitinized' basal plate.

Fissurella *robusta* Sow.

Fissurella robusta Sowerby, 1892, p. 48, pl. 2, figs. 50, 51; Tomlin, 1932, p. 160; Haughton, 1929, p. 38, pl. 9, figs. 1–3; 1932, pp. 23, 27, 29, 30, 42.

Tomlin declined to admit this large species to the list of Recent shells on account of its fossilized appearance. Probably the original specimen had been washed out of Pleistocene deposits in the neighbourhood of Port Elizabeth, like *Cerithium rufonodulosum* (see: Barnard, Part III, p. 131) and *Priotrochus alexandri* (p. 251, *supra*).

Haughton recorded it from Late Tertiary or Pleistocene deposits north of Orange River Mouth, Alexander Bay, Port Nolloth, and north of Olifants River mouth.

Up to 81 × 62 × 40 mm.

Franca (1960, p. 11, pl. 1, fig. 1) recorded 2 large examples of *Fissurella*, 57 and 62 mm., from Tiger Bay, Angola, and identified them with a query as *F. tanneri* Verrill 1883. It seems unlikely that this American species occurs on the Angolan coast.

Subfam. **Fissurellinae**

Central plate of radula narrow, 5th lateral plate with 4 cusps.

Fissurella mutabilis Sow.

Fig. 21 *a*

Fissurella mutabilis Sowerby, 1834, p. 127; Krauss, 1848, p. 65; Watson, 1886, p. 33; von Martens, 1903, p. 50; Odhner, 1923, p. 32; Tomlin, 1931 *a*, p. 418.
Fissurella mutabilis var. *aurantia* Sowerby, 1921, p. 127; Turton, 1932, p. 205.
Fissurella mutabilis var. *obtusa* Sow., Turton, 1932, p. 205.
Fissurella rota Rve., Turton, 1932, p. 205.
Fissurella sagittata Rve., Turton, 1932, p. 205.
Fissurella alboradiata Turton, 1932, p. 205, pl. 53, no. 1424.
Fissurella indistincta Turton, 1932, p. 206, pl. 53, no. 1427.

Not saddle-shaped, lies flat. Foramen narrow, keyhole-shaped.

Animal, except the head, covered by the shell. Grey or brownish sole pale.

Radula with 45–55 rows, central plate triangular, very narrow in front, 4th lateral plate with an inner flange and tapering apex, 5th lateral with 4 cusps, marginal plates *c.* 22–26 attached to an alate basal plate but continued slightly beyond its hind end and attached to the basal membrane of the radula, thus slightly overlapping the series on the row behind, the hindermost 4–6 obovate, spatulate.

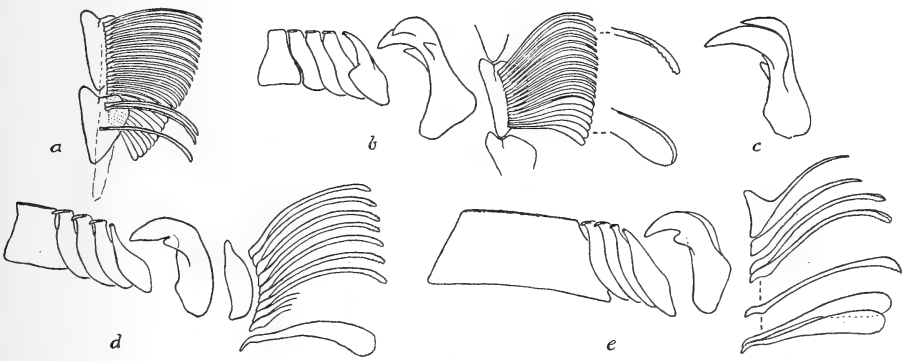

FIG. 21. Radula plates of: *a*, *Fissurella mutabilis* Sow., two series of marginal plates, the lower series not completely drawn; *b*, *Amblychilepas scutella* (Gmelin); *c*, *Megatebennus* (*Cosmetalepas*) *africanus* Tomlin, 5th lateral plate; *d*, *Tugalia barnardi* (Tomlin); *e*, *Pupillaea aperta* (Sow.), adult.

Fossil: Pleistocene; Algoa Bay (Johnson, 1904); Little Brak River (S. Afr. Mus.).

Lüderitzbucht, Table Bay, False Bay to Port Alfred, and Natal (*auct. et* S. Afr. Mus.). 34° 8′ S., 24° 59′ E., 80–100 metres (von Martens).

Living: Lüderitzbucht, Port Nolloth to Langebaan (Saldanha Bay); West coast of Cape Peninsula; False Bay, and various localities to Kleinmond (Bathurst Div.) (U.C.T.).

Distribution. Madagascar (Odhner); St. Paul and New Amsterdam (southern Indian Ocean), *vide* Velain (*Faune St. Paul. Moll.*, p. 120, pl. 4, figs. 11, 12) and von Martens (loc. cit., p. 71).

Fissurella natalensis Krss.

Fissurella natalensis Krauss, 1848, p. 66, pl. 4, fig. 8; Schwarz, 1910, p. 115; Dautzenberg, 1929, p. 545; Braga, 1952, p. 93, pl. 6, fig. 8; Janus, 1961, p. 3, pl. 1, figs. 7–9.
Diodora natalensis Krauss, Day & Morgans, 1956, p. 306 (listed); Macnae & Kalk, 1958, p. 127 (listed).

Not saddle-shaped, nor flat, sides slightly concave so that shell rests on front and hind ends. Foramen keyhole-shaped. Up to 50 × 30 mm.

Animal covered by shell. Dark grey or brown, mottled or speckled, mantle edge with squarish dark marks, head dark, sole pale.

Radula with *c.* 55 rows, as in *mutabilis*.

Fossil: Pleistocene, Port Elizabeth (Schwarz).

Port Elizabeth (Sowerby). Port Alfred (Bartsch, Turton); Natal (Krauss; also S. Afr. Mus.); Delagoa Bay (Braga).

Living: Richmond (Alexandria Division), East London (U.C.T.), Morgan Bay (S. Afr. Mus. coll. Mrs. Kerr), Umzimkaba (F. Talbot), Durban and Umhlali (U.C.T.), Delagoa Bay (U.W.).

Lectotype in Stuttgart Museum.

Distribution. Madagascar (Dautzenberg).

Amblychilepas scutella (Gmelin)

Figs. 21 *b*, 22 *d–f*

Fissurella trapezina Sowerby, 1834, p. 126.
Fissurella scutella Gmelin, and var. *trapezina* Krauss, 1848, p. 63.
Fissurella incarnata Krauss, 1848, p. 65, pl. 4, fig. 7; Sowerby, 1892, p. 47.
Fissurella dubia Sowerby, 1862, p. 193, pl. 244, fig. 208.
Fissurellidea sella Sowerby, 1862, p. 203, pl. 243, fig. 197.
Fissurellidea hiantula non Lam., Sowerby, 1892, p. 48.
Megatebennus (*Amblychilepas*) *scutella* Gmelin, Smith, 1903, p. 391; Haughton, 1932, pp. 34, 43.
Fissurellidaea scutella Gmelin, Turton, 1932, p. 207.
Fissurellidaea incarnata Krauss, Turton, 1932, p. 206, and var. *maculata*, pl. 53, no. 1431.
Fissurellidaea multilineata Turton, 1932, p. 206, pl. 53, no. 1432.
Fissurellidaea albanyana Turton, 1932, p. 207, pl. 54, no. 1433.
Fissurellidaea nigrostriata Turton, 1932, p. 207, pl. 54, no. 1435.
Megatabeunus [*sic*] *scutellum* Gmelin, Krige, 1933, p. 37.
Megatebennus incarnatus Krss., Janus, 1961, p. 3, pl. 1, figs. 4–6.

Saddle-shaped, foramen oval; radiating lirae numerous but variable in

strength: coarser, more or less unequal, some of them especially at both ends distinctly stronger than others (*scutella*), or finer and more regular (*incarnata*); growth-lines subordinate to the lirae but often, especially in *dubia-scutella*, forming squamose nodules, sometimes when well developed (and unworn or uncorroded) forming continuous concentric crinkly lines. Up to 35 × 22 and 37 × 22 mm., alt. 10–11 mm.; high and low forms, e.g. long. 19 × alt. 5·5 and 18 × 3 mm. Sometimes strongly saddle-shaped, the upper surface nearly level instead of sloping down from the foramen (*sella*). Smallest seen: 1·5 × 0·75 mm. (coll. Muir).

Colour on west coast usually grey or drab, with more or less distinct darker radial streaks; white with black radial streaks (Lüderitzbucht); on south coast often brighter, tending to pink or reddish. Beach shells very variable in colour and pattern, but probably the colours accentuated by weathering.

Animal much larger than shell, projecting and elevated posteriorly, propodium projecting triangularly forwards, in preserved specimens usually concealing the snout in ventral view (contrast *mutabilis*); animal (as preserved) 46 mm. long with shell 33 mm. Surface nodulose and granulose, cirri projecting from around margin of shell. Chestnut-brown or reddish, sole dark.

Radula with 30–35 rows, central plate narrow in front, broader behind, 1st–3rd lateral plates narrow-oblong, 4th with projecting inner flange and tapering apex, 5th large, with 4 cusps, marginal plates not numerous, attached to an oval-alate basal plate, slender, distally minutely serrulate, the hindermost 3–4 elongate-obovate, spatulate.

Fossil: Pliocene; Inhambane, Portuguese East Africa (Cox, 1939). Quaternary; Hoedjies Bay and Saldanha Bay (Haughton); Klein Brak River, Mossel Bay (S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin); Durban (Krige; also Geol. Survey).

Table Bay and False Bay to Natal (*auct. et* S. Afr. Mus.).

Off Cape Vidal (Zululand), 22 fathoms, 2 juv. dead, fresh; off O'Neil Peak (Zululand), 90 fathoms, 2 dead, worn (S. Afr. Mus. P.F. coll.).

Living: Table Bay and False Bay (S. Afr. Mus.): Hoedjies Bay (Saldanha Bay), low tide (S. Afr. Mus. P.F. coll.); Elizabeth Bay (south of Lüderitzbucht), Groen Rivier and Zout Rivier; Langebaan (Saldanha Bay), False Bay, and various localities to Durban (U.C.T.).

Lectotype of *incarnatus* in Stuttgart Museum.

Remarks. Although the coarsely lirate *scutella* and the finely lirate *incarnata* appear quite distinct, all transitions can be found in a long series from one locality (e.g. Still Bay, coll. Muir). Some Durban examples, and the O'Neil Peak shells, have very coarse lirae with well-marked squamose nodules (*dubia*); the Cape Vidal unworn juveniles have the concentric crinkly growth-lines more conspicuous than the lirae.

Juveniles below about 7–8 mm. long, before they have become distinctly saddle-shaped, are often difficult to distinguish from *mutabilis* even when the foramen is undamaged.

In the Muir collection there is a very young shell 1·5 × 0·75 mm. retaining the protoconch, which appears referable to this species; at 2 mm. long all trace of the protoconch has been lost.

The fossils from Klein Brak River are very young, the largest only 5 mm. long, and are narrower than juveniles of similar size from, for example, Still Bay; they may possibly be *mutabilis*, though the foramen seems to be oval, not keyhole-shaped.

Macrochisma africana Tomlin

Macrochisma producta (*non* A. Adams) Sowerby, 1892, p. 48.
Macrochisma compressa (*non* A. Adams) Sowerby, 1897, p. 11.
Macrochisma producta A. Adams var., Smith, 1901, p. 105.
Macrochisma africana Tomlin, 1932, p. 161, fig. 3.

Saddle-shaped. The present specimens agree with and add nothing to Tomlin's description. The largest specimen is the same size as Tomlin's Type: 22 × 10, alt. 7 mm. The *Pieter Faure* specimen is slightly narrower: 17·5 × 7 mm.

Port Elizabeth (Sowerby); Port Alfred, Scottburgh (Natal), and Umvoti (Natal) (Tomlin). Durban (S. Afr. Mus. coll. R. M. Lightfoot); Scottburgh (S. Afr. Mus. coll. K. H. B.).

Off O'Neil Peak (Zululand), 90 fathoms, 1 dead, worn (S. Afr. Mus. P.F. coll.).

Type ? in coll. Tomlin.

Subfam. **Emarginulinae**

Central plate of radula broad, 5th lateral plate with 2 (occasionally 3) cusps.

Fissurellidea (*Pupillaea*) *aperta* (Sow.)

Fig. 21 *e*

Fissurella aperta Sowerby, 1825, p. vi.
Pupillaea aperta Sow., Krauss, 1848, p. 62, pl. 4, fig. xi; von Martens, 1874, p. 127; 1903, pp. 55 and 57 note 18.

Slightly saddle-shaped; inner layer of shell projecting beyond the outer coloured layer; foramen very large, about $\frac{1}{3}$ length of shell, oval; radiating lirae more or less subequal, often less strongly developed at sides than at ends; growth-lines distinct, crinkly where they cross the lirae. Up to 40 × 28, foramen 15 × 10 mm., and 50 × 32, foramen 15 × 10 mm.; broad and narrow forms, e.g. 24 × 17 and 28 × 15 mm. Smallest seen: 10 × 6·5, foramen 3·5 × 2 mm.

Grey with darker grey or livery radiating stripes of varying width. Beach shells often buff or fawn with fulvous stripes.

Animal much larger than shell, mantle completely covering shell up to edge of foramen. Flesh-coloured, grey, dark brown, or blackish, more or less mottled, sole paler. Up to approximately 110 × 80 mm. (as preserved).

Radula with 30–35 rows, central plate oblique, very broad, front margin slightly thickened and sometimes extremely finely serrulate, 1st–4th lateral plates narrow, with small overturned apices, 5th lateral very large, with strong uncinate cusp and small external cusp, marginal plates numerous, posteriorly overlapping the series behind, 1st marginal with alate internal expansion basally, with a slender process from outer distal corner, 2nd marginal stouter than the following *c.* 18 slender marginals, 2nd apically terete, the others biserrulate, the hindermost 2–3 elongate-obovate.

Fossil: Pleistocene; Algoa Bay (Johnson, 1904).

Kalk Bay (False Bay) (Krauss; coll. Wahlberg); Lüderitzbucht (Thiele); Table Bay (von Martens); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); East London (von Martens). Table Bay and False Bay to East London (S. Afr. Mus.).

Living: Table Bay (S. Afr. Mus.); False Bay, littoral to 17 fathoms (S. Afr. Mus. P.F. coll.; also U.C.T.).

Remarks. The central plate of the radula is relatively wider in the adult than in juveniles: the front margin about 1½ times the combined width of 1st–4th lateral plates in the juvenile, at least twice as wide in adult.

Megatebennus (*Cosmetalepas*) *africanus* Tomlin

Fig. 21 *c*

Fissuridea concatenata (*non* Crosse & Fischer) Sowerby, 1892, p. 48; Smith, 1904, p. 25.
Lucapina concatenata (*non* Crosse & Fischer) Thiele, 1925, p. 41.
Megatebennus africanus Tomlin, 1926 *a*, p. 296, pl. 16, fig. 10.

Not saddle-shaped. Foramen about ¼ length of shell, in some shells slightly coarctate (see Tomlin's figure). The honeycomb pitting is very close and regular (quincuncial), the pits elongate-oval in the direction of the growth-lines on the sides, but subcircular at each end. White. Up to 20 × 15 mm., foramen 5·5 × 3·5 mm. Juveniles (coll. Muir) 1·3 × 1 mm., and 2 × 1·75 mm.

Animal (as preserved) with undulate mantle-edge, 23 × 20 mm., reflexed over the 15 × 12 mm. shell, leaving an opening 9 × 7 mm. around the foramen. Dull yellowish-brown, tentacles brown, eyes at base of tentacles, black (U.C.T.).

Radula with 55–60 rows, central plate oblique, about as broad as long, 5th lateral plate tricuspid, the external cusp more distal than the internal cusp, 1st marginal plate subtriangular, with *c.* 12 slender plates apparently attached to it, followed by *c.* 20 plates attached to the basal membrane of the radula, and overlapping the series behind, all apically biserrulate, the hindermost ones not obovate.

Port Elizabeth (Sowerby); Port Alfred (Smith, Tomlin, Turton). 35° 26′ S., 20° 56′ E., no depth given (Thiele). Still Bay (S. Afr. Mus. coll. Muir).

Living: 30° 47′ S., 30° 27′ E., 36 metres, 1 (U.C.T.).

Remarks. The very distinctive sculpturing seems to justify at least a subgeneric name (*Cosmetalepas* Iredale 1924, genotype *concatenata* C. & F.).

Of the distinctions between the Australian *concatenata* and the South African *africanus* given by Tomlin, the relative size of the foramen is not borne out by his figure: it is said to be one-fifth the length of the shell in *concatenata*, smaller in *africanus*, but the figure shows it larger ($\frac{1}{4}$). The sculpture is certainly very regular in South African shells, and as Tomlin was able to compare shells from both regions, the South African species can be maintained.

Thiele examined a radula but did not state definitely whether it was from an Australian animal or from the small corroded *Valdivia* shell. The radula of the present specimen—the only one hitherto taken alive in South African waters—agrees with that figured by Torr for the Australian *concatenata*, though I disagree with his interpretation of there being a double series of marginal plates (see *supra*, p. 284).

Diodora calyculata (Sow.)

Fissurella calyculata Sowerby, 1823, no. 21, fig. 4; Krauss, 1848, p. 68; Sowerby, 1862, p. 193, pl. 140 (err. 240), figs. 126, 127; von Martens, 1903, p. 55 (listed).
Fissuridea calyculata Sow., Bartsch, 1915, p. 177; Thiele, 1925, p. 40.
Diodora calyculata Sow., Tomlin, 1932, p. 160.

Up to 28 × 18, alt. 13 mm.

Knysna; St. Francis Bay; Still Bay (S. Afr. Mus.).

Sebastian Bay, low tide, 1; Algoa Bay, 33 fathoms, 4; East London, 20 fathoms, 1 (S. Afr. Mus. P.F. coll.).

The most westerly locality where this species has been found washed up on the beach is Cape Agulhas (Krauss). It does not seem to have been taken alive.

Diodora elizabethae (Smith)

Fissurella sieboldi (*non* Rve.) Sowerby, 1892, p. 47.
Glyphis elizabethae Smith, 1901, p. 104, pl. 1, fig. 12.
Fissuridea elizabethae Smith, Bartsch, 1915, p. 177.
Diodora elizabethae Smith, Tomlin, 1932, p. 160.

Not saddle-shaped, margin crenulate; foramen subcircular, hind margin squarish, internal callus truncate behind. Four strong nodulose ribs in front of and 4 behind the foramen; an additional smaller rib between the front pair and the hind pair, feeble in juv. at 4 mm. long (smallest seen), but distinct and noticeable (usually) at 10 mm. long. Up to 44 × 28 mm. High and low forms: 13 × 5, 13 × 4, 14 × 4, and 20 × 7, 20 × 6 mm.

Still Bay (S. Afr. Mus. coll. Muir); Port Elizabeth (Sowerby, Smith); Port Alfred (Bartsch, Turton); Tongaat (Natal) (S. Afr. Mus.).

Off Nieca River (East London area), 43 fathoms, 1 dead; off Tugela River (Natal), 47 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Diodora spreta (Smith)

Fig. 22 *g*

Fissurella fimbriata (*non* Rve.) Sowerby, 1892, p. 48.
Glyphis spreta Smith, 1901, p. 104, pl. 1, fig. 18.

Fissuridea spreta Smith, Bartsch, 1915, p. 177.
Diodora spreta Smith, Tomlin, 1932, p. 160.

Not saddle-shaped, margin crenulate; larger shells tending to have sides concave and to rest on front and hind ends. Foramen subcircular, internal callus truncate behind. Usually 7 main radiating lirae in front of and 7 behind foramen, with 1 on either side (total 16), but 1 or 2 (3) intermediaries between each pair may become almost as strong as the main lirae, which may make the 16-lirate ribbing less conspicuous. Main growth-lines, 8–10 on large shells, well separated and forming squamose nodules on the lirae. Up to 27 × 18, alt. 9 mm. Smallest seen 1 × 0·75 mm. The protoconch may persist or remain traceable as a tiny knob on shells up to 4 mm. long.

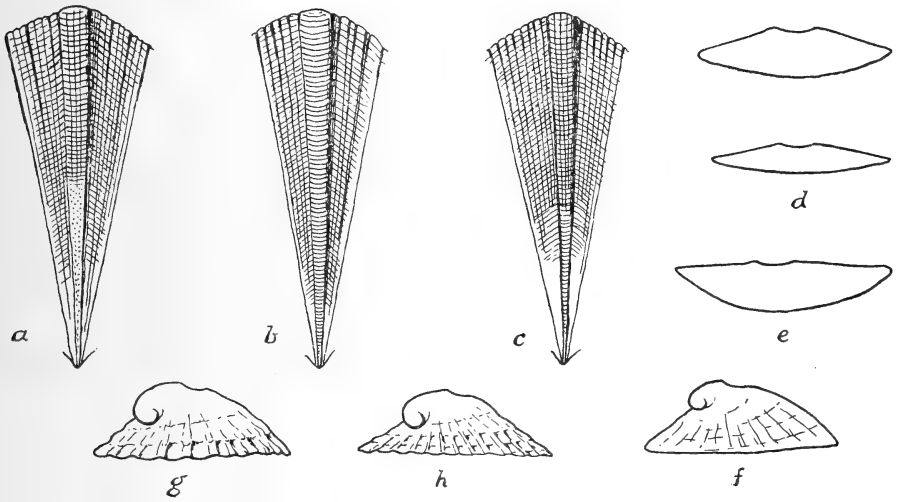

Fig. 22. *a*, *b*, *c*, *Tugalia barnardi* (Tomlin), anterior part of shell of Type (*a*) and two other specimens, to show variation in strength of lirae; *d*, *Amblychilepas scutella* (Gmelin) lateral profiles of high and low forms; *e*, the same, aberr. *sella* (Sow.); *f*, the same, juvenile 1·5 × 0·75 mm.; *g*, *Diodora spreta* (Smith) juvenile 1 × 0·7 mm.; *h*, *D. elevata* (Dnkr.) juvenile 2 × 1·3 mm.

Brown or fawn, more or less mottled, but seemingly never radially streaked.

Mossel Bay (Smith; also S. Afr. Mus., cotypes); Still Bay (S. Afr. Mus. coll. Muir); Port Alfred (Bartsch, Turton).

Off Umhloti River and off Umkomaas River (Natal), 40 fathoms, 2 and 3 juv. dead (S. Afr. Mus. P.F. coll.).

Living: Still Bay, Breede River mouth and Bashee River mouth (U.C.T.).

Diodora elevata (Dnkr.)

Fig. 22 *h*

Fissurella elevata Dunker, 1846, p. 67, pl. 2, fig. 4; Krauss, 1848, p. 67; Sowerby, 1892, p. 47.
Fissurella fumata Watson, 1886, p. 34; Sowerby, 1892, p. 48.
Glyphis elevata Dnkr., Smith, 1901, p. 105; von Martens, 1903, pp. 55 and 57 note 17; Turton, 1932, p. 208.

? Glyphis levicostata Smith, 1914, p. 2, pl. 1, figs. 3–5.
Fissuridea elevata Dnkr., Thiele, 1925, p. 41.
Diodora elevata Dnkr., Tomlin, 1932, p. 160; Haughton, 1932, pp. 22, 43.
Glyphis anima Turton, 1932, p. 208, pl. 54, no. 1441.

Not saddle-shaped, margin crenulate; foramen subcircular, internal callus truncate behind. Radiating lirae moderate in early stages, numerous in later stages: *c.* 20–23 in shell 2 mm. long, 35 at 4 mm., 45 at 7 mm., *c.* 70 at 13 mm., *c.* 90 at 21 mm., and *c.* 100–114 in large shells, more or less subequal in strength, but a few slightly stronger than others; growth-lines distinct, forming a clathrate sculpture with the lirae, which are more or less squamosely nodulose at the intersections. Up to 30 × 21, alt. 11 mm. 35 × 23, alt. 14 mm. (Smith: *levicostata*).

Buff or brownish, often with a greenish tinge, uniform or with radiating darker brown, greenish or grey streaks, sometimes connected by 2 or 3 irregular concentric bands.

Fossil: Pleistocene, Angra Juntas, South West Africa (Haughton).

Port Elizabeth (Sowerby; also S. Afr. Mus.); Algoa Bay (von Martens); Port Alfred (Bartsch, Turton); Natal (Krauss; also S. Afr. Mus.). Still Bay (S. Afr. Mus. coll. Muir). Camps Bay (west coast of Cape Peninsula) (Watson).

Off Umhloti River (Natal), 40 fathoms, 3; off Cape Natal (Durban), 54 fathoms, 1; off Illovo (Natal), 27–30 fathoms, 1; off Cape Morgan, 47 fathoms, 1; off East London, 20 fathoms, 5; off Cove Rock (East London), 22 fathoms, 1; off Nanquas Peak (eastern end of Algoa Bay), 49 fathoms, 4; St. Francis Bay, 34 fathoms, 1; off Martha Point (Struys Bay), 42 fathoms, 3; False Bay, 23 and 32 fathoms, 3; Hoedjies Bay (Saldanha Bay), 2; all dead (S. Afr. Mus. P.F. coll.).

Living: False Bay, Mossel Bay and Algoa Bay (U.C.T.).

Tongaat and Port Shepstone (Natal) (Smith: *levicostata*).

Remarks. The statement by von Martens (1903, note 17) that *parviforata* Sow. 1889 was a synonym of *elevata* was corrected by Thiele (1925).

The juvenile is distinguished from that of *spreta* by the more numerous and more regular radiating lirae.

Smith's figure of *levicostata* surely represents an *elevata*. His description will fit *elevata*, except for the statement (in English comment) that the lirae are 'separated merely by impressed lines or striae', which applies better to *parviforata*. It is, however, contradicted in the next sentence by the words 'in the grooves between the riblets'.

Diodora australis (Krss.)

Fissurella australis Krauss, 1848, p. 67, pl. 4, fig. 10.
Glyphis fuscocrenulata Smith, 1906*a*, p. 56, pl. 8, fig. 6; Turton, 1932, p. 208, pl. 54, no. 1442.
Fissuridea australis Krss., Bartsch, 1915, p. 177.
Diodora australis Krss., Tomlin, 1932, p. 160 (part: Scottburgh example).
Glyphis australis Krss., Turton, 1932, p. 208.

Not saddle-shaped, margin crenulate; foramen tilted forwards, subcircular, internal callus truncate behind, with a small pit. Radiating lirae *c.* 30, but with intermediaries which often may be nearly as strong as the main lirae, total *c.* 50–60, sharp, squamose where they are crossed by the less conspicuous concentric growth-lines. High and low forms: 15 × 11, alt. 9·5 mm., 21 × 16, alt. 14 mm. Krauss gave 8 × 5·5 × 4 Paris lines = 18 × 11·5 × 8 mm., but his figure of the side view measures long. 26, alt. 18 mm., and was thus drawn from a proportionately higher shell.

Port Alfred (Bartsch, Turton); Natal (Krauss); Port Shepstone, Umkomaas, and Tongaat (Smith); Scottburgh (Tomlin); Durban (S. Afr. Mus.).

Off Umhloti River (Natal), 40 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Distribution. St. Paul and New Amsterdam (southern Indian Ocean) (Velain, von Martens (1903, p. 71)).

Remarks. I do not agree with Tomlin's identification of the Delagoa Bay shell (see *ruppellii*).

Smith (1910, p. 208) recorded a freak from Tongaat without an apical foramen.

Diodora crucifera (Pilsbry)

Fissurella cruciata (*non* Gould) Krauss, 1848, p. 67, pl. 4, fig. 9.
Fissurella crucifera Pilsbry, 1890, p. 225, pl. 32, figs. 27–31.
Diodora crucifera Pilsbry, Tomlin, 1932, p. 160; Janus, 1961, p. 2, pl. 1, figs. 1–3.

Not saddle-shaped, not very high, margin crenulate. Foramen not tilted forwards, suboval, internal callus not truncate behind, without pit. Radiating lirae *c.* 40–45, nodulose where crossed by the concentric growth-lines which are conspicuous, forming a cancellate sculpture. 23 × 16, alt. 11 mm. (Krauss; but measurements of his figure long. 18, alt. 6 mm.).

Natal (Krauss); Tongaat (Natal) (Tomlin).

Lectotype in Stuttgart Museum.

Remarks. Seems to be distinct from *australis*, with well-marked cancellate sculpture (see Krauss's figure), and the lirae not squamose, or only slightly so near the margin.

The 3 worn Tongaat shells identified by Tomlin have more numerous lirae (main plus intermediary: 60–70) than Krauss gave for his species. The largest is 19 × 11·5, alt. 6 mm.

Diodora ruppellii (Sow.)

Fissurella ruppellii Sowerby, 1835, p. 128.
Fissurella dysoni (*non* Rve) Braga, 1952, p. 93, pl. 6, fig. 9.
Diodora lima Sow., Macnae & Kalk, 1958, p. 127 (listed).

The following shells are evidently the same as that recorded from Delagoa Bay, by Braga: 2 from Delagoa Bay (S. Afr. Mus. A3620, coll. K. H. B.) identified and recorded by Tomlin (1932) as *australis*; 2 living from the same locality (U.W.); and 6 living from Inhambane (U.C.T.).

These have a keyhole-shaped foramen, not tilted forwards (slightly so in the high S. Afr. Mus. Shells), with internal callus not truncate behind and with no pit. The radiating lirae are very regularly arranged: 20–22 main lirae and 1 intermediary between each pair (total *c.* 45). Growth-lines well marked, forming nodules at intersections with the lirae, and a conspicuous cancellate sculpture (cf. *crucifera*).

The two U.W. shells from Delagoa Bay and the Inhambane shells are brown with 7–8 dark grey-brown radiating streaks.

The radulae of the U.W. and U.C.T. specimens have a squarish central plate, bicuspid 5th lateral plate, alate 1st marginal plate (as in *Pupillaea aperta*), and numerous marginals which overlap the series behind, the hindermost half-dozen obovate.

Remarks. Braga considered the occurrence of the Honduras species *dysoni* at Delagoa Bay as a 'salient' fact; as it undoubtedly would be if the identification were correct. Far more probably these specimens are referable to the Red Sea *ruppellii* (Sow.). They have 40–45 lirae which Smith (1901, p. 105) said distinguished *ruppellii* from *elevata*. The species occurs also at Mauritius and Madagascar.

Another possibility is the Indian *lima* (Sow.). But without material for comparison, I assign the present specimens provisionally to *ruppellii*.

Diodora parviforata (Sow.)

Fissurella parviforata Sowerby, 1839 *a*, p. 12, pl. 1, fig. 7; 1892, p. 48, pl. 2, figs. 52, 53; Haughton, 1932, pp. 30, 42.
Fissuridea parviforata Bartsch, 1915, p. 177; Thiele, 1925, p. 41 (correction to von Martens, 1903); Tomlin, 1932, p. 160.
Fissuridea algoensis Thiele, 1925, p. 40.
Glyphis parviforata Sow., Turton, 1932, p. 208.

Not saddle-shaped, margins crenulate. Foramen small, subcircular, internal callus truncate behind, with a deep pit. Radiating lirae numerous, more or less equal in strength on later part of shell, though some have evidently developed as intermediaries on the earlier part, separated by impressed striae or very narrow grooves, but relatively a little farther apart on early part of shell, lirae sometimes feebly regulose. Growth-lines distinct between the lirae on early part of shell, forming a cancellate sculpture, but indistinct on later part.

23 × 15, alt. 13 mm., 17 × 11, alt. 8 mm. (Sowerby; figure 53 measures long. 15, alt. 9·5 mm.). 11·5 × 7·5 × 4, 14 × 10·5 × 9, 14 × 10·5 × 9, 14 × 9·5 × 9, and 17 × 12 × 10 mm. (S. Afr. Mus.). In the 17 mm. shell the foramen measures 1 mm., and 2 mm. in the 23 mm. shell. White.

Radula with 60–70 rows, central plate squarish, 5th lateral plate bicuspid, 1st marginal plate triangular, alate, outer apical angle not produced in a slender process, marginals numerous, overlapping the series behind, hindermost half-dozen obovate.

Fossil: Pleistocene, Port Nolloth (Haughton).

Kommetjie (west coast of Cape Peninsula) (S. Afr. Mus.); Port Elizabeth (Sowerby; also S. Afr. Mus.); Port Alfred (Bartsch, Turton; also S. Afr. Mus.); Kalk Bay (False Bay) and Mossel Bay (Tomlin); Still Bay (S. Afr. Mus. coll. Muir).

Living: Langebaan (Saldanha Bay); Oudekraal (west coast of Cape Peninsula) (U.C.T.).

Distribution. St. Helena and Ascension Is. (Tomlin).

Remarks. Characterized by being at first sight lirate only, though closer examination shows the growth-lines on the early part of the shell. The lirae are very close together, Smith's words in connection with his *levicostata* being applicable here (see p. 292).

One specimen from Camps Bay (west coast of Cape Peninsula) and 12 others probably from the same locality, are quite white like *parviforata*. They range from 14 × 9, alt. 6 mm. to 30 × 20 × 15 mm. One of them is very narrow and high: 22 × 13 × 14 mm., closely corresponding in form with the 14 × 9·5 × 9 shell mentioned above.

In sculpture they do not seem to be quite typical; some of the lirae at the ends stand out a little more clearly as main lirae; and the cancellate sculpture continues, more or less clearly, to the margin in some of the larger shells. Some of them are not unlike *elevata*, and possibly the uniform white colour is due to bleaching.

The white coloration (farblos) seems to indicate that *algoensis* is a synonym; the sculpture fits that on the early part of *parviforata* shells.

Puncturella noachina (Linn.)

Puncturella noachina Watson, 1886, p. 42; von Martens, 1902, p. 243; Sowerby, 1903, p. 231; Thiele, 1925, p. 39; Powell, 1951, p. 86, fig. G 1 (radula).
Puncturella analoga von Martens, 1903, p. 70, pl. 5, fig. 8.

Off Table Bay, 125 fathoms (Sowerby; S. Afr. Mus. A3574, P.F. coll.).

Remarks. Long. 6·5, alt. 4·5 mm. No other specimens of this species have been found in searching through the *Pieter Faure* bottom samples. There is, however, the possibility or even probability that the specimen from Simon's Bay (False Bay), 70 metres, recorded by von Martens (1903, p. 50) as *fastigiata* A. Adams 1851, was a *noachina* though considerably higher: long. 5·5, alt. 5 mm.

P. noachina has been recorded from Kerguelen, Marion and Prince Edward Islands and the Straits of Magellan; and the southern examples seem indistinguishable from those of the northern Atlantic as regards shell characteristics, but the radulae may be different (see: Powell). Thiele pointed out that if another name is desirable for the southern shell, *analoga* von Martens must give place to the earlier *princeps* Mighels.

Puncturella africana Bartsch 1915 appears to be a juvenile *Emarginula*.

P. (*Fissurisepta*) *agulhasae* Clarke 1961 was recorded from 2,507 fathoms in the so-called 'Agulhas Basin', about 1,000 miles south-west of Cape Town.*

Gen. Emarginula Lam.

Thiele (1925) in claiming his *agulhasensis* to be the first record of the genus in South Africa overlooked Smith's record (1910, p. 209) of *micans* A. Adams. And Tomlin (1932) overlooked Thiele's record when he stated that Smith's record was the first 'and only' record.

Tomlin doubted whether Smith's Natal shell was *micans*, but did not suggest any other species. There are two shells, said to come from Natal, in the Ross-Frames collection which are different from any of the other species here described.

Emarginula agulhasensis Thiele

Fig. 23 *a*

Emarginula agulhasensis Thiele, 1925, p. 38, pl. 13 (1), fig. 1.

Apex not overhanging hind margin. Radiating lirae 25 (13 on left, 12 on right side) with 1 intermediary between each pair, and 4 between the 2 anterior main lirae, coarsely nodular where crossed by the growth-lines, of which 15 can be counted; the ridges forming the margins of the slit very thin, *c.* 10 concave pliculae corresponding with the growth-lines. 6·25 × 4, alt. 2·4 mm. (Thiele). 8 × 5·5, alt. 4 mm.

35° 16′ S., 22° 26′ E., 155 metres (Thiele).

Off Cape Morgan, 77 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Remarks. Although relatively higher, the present shell agrees with the *Valdivia* shell in the coarsely nodular lirae.

Emarginula pulchreclathrata Tomlin

Fig. 23 *b*

Emarginula pulchreclathrata Tomlin, 1932, p. 162, fig. 4.

Apex not overhanging hind margin. Radiating lirae *c.* 90, approximately every alternate one being slightly more prominent, all with small nodules where crossed by the growth-lines, of which *c.* 40 can be counted; the ridges forming the margins of the slit thin; *c.* 20 concave pliculae can be counted, not corresponding with the growth-lines; in the portion figured (about 8 mm.) there are 12 pliculae and 17–18 growth-lines. 19 × 12·5 mm. (Tomlin); alt. 9 mm.

Off Saldanha Bay, 55 fathoms (Tomlin; S. Afr. Mus. A3617, P.F. coll.).

Off Cape St. Blaize, 125 fathoms, 1 dead (S. Afr. Mus. A9324, P.F. coll.).

Type in the South African Museum.

Remarks. The Cape St. Blaize shell is a younger shell, 8·5 mm. long, agreeing with the Type in the number of lirae and growth-lines at the corresponding

* The basin south of the Agulhas Bank would be more correctly designated the Agulhas Basin. The naming of a species from *south-west* of Cape Town as *agulhasae* is misleading.

stage, and in the growth-lines being more numerous than the pliculae in the slit. The nodules on the lirae are slightly squamose towards the margin in the smaller shell, and the Type, though slightly corroded, shows similar traces.

Emarginula natalensis n.sp.

Fig. 23 *c*

Apex vertically over the hind margin, or very nearly (when not corroded). Radiating lirae *c.* 55–65, main and intermediary lirae alternating, feebly nodulose where crossed by the growth-lines, which are as strong as the lirae, forming a well-marked and regular clathrate sculpture; concave pliculae in the slit corresponding with the growth-lines. 7 × 5, alt. 3·5 mm. (Type); one of the Tugela River shells 8 × 5·25 × 4 mm.

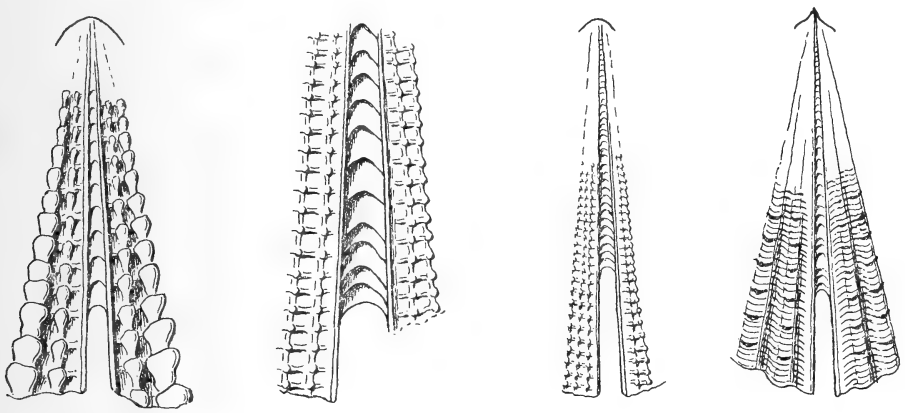

FIG. 23. Anterior part of shell of *Emarginula*: *a*, *agulhasensis* Thiele; *b*, *pulchreclathrata* Tomlin; *c*, *natalensis* n. sp.; *d*, *vadum* n. sp.

Off Cape Morgan, 77 fathoms, 3 (Types); off Tugela River (Natal), 65–80 fathoms, 2; off O'Neil Peak (Zululand), 90 fathoms, 1; off Cape Vidal (Zululand), 80–100 fathoms, 1; all dead (S. Afr. Mus. A9325 and A9326–A9328, P.F. coll.).

Remarks. The three Cape Morgan shells are the best-preserved and are therefore chosen as Types.

Emarginula vadum n.sp.

Figs. 23 *d*, 24 *b*

Apex extending slightly beyond hind margin. Radiating lirae 6 on each side, with 1 intermediary between each pair including the hindermost pair, and 1 between the foremost lira and the thin ridge bordering the slit; growth-lines very numerous and fine, crossing the lirae, on which they form at intervals

slight nodules; *c.* 14 can be counted on the foremost main lira; *c.* 24 concave pliculae can be counted in the slit, not corresponding with the growth-lines (nor with the nodules on the lirae). In lateral view the pliculae project slightly above the profile. 7 × 4·5, alt. 3·5 mm.

Off Cape Vidal (Zululand), 80–100 fathoms, 1 dead, fresh (S. Afr. Mus. A9329, P.F. coll.).

Remarks. The fine growth-line sculpture resembles the ripples in shallow water at a ford. Quite unlike any of the other South African species.

E. undulata Melvill & Standen (1903, p. 290, pl. 20, fig. 1), from the Gulf of Oman, appears to have similar close-set growth-lines, but differs in having more radiating ribs.

Emarginula oppressa n.sp.

Fig. 24 *a*

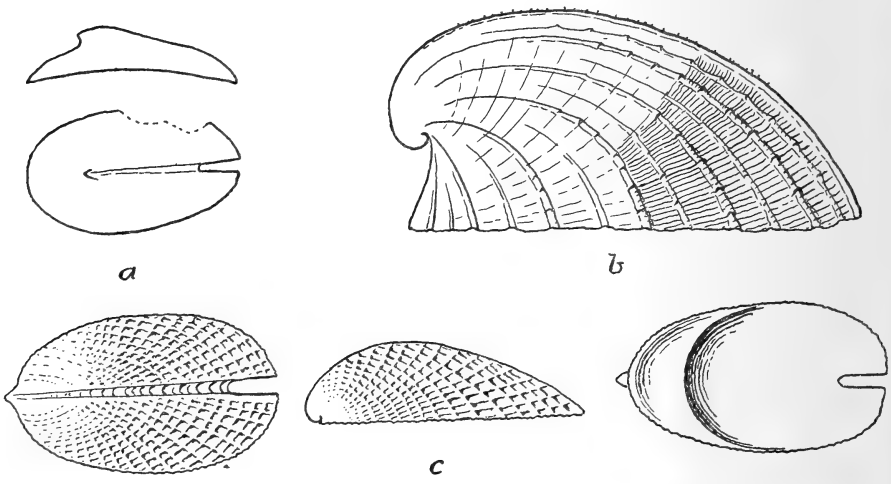

Fig. 24. *a*, Profile and outline of *Emarginula oppressa* n. sp. *b*, *E. vadum* n. sp. (growth-lines not completely drawn); *c*, *Zeidora reticulata* A. Adams, dorsal, lateral, and ventral views.

Depressed, scutiform, apex at about $\frac{2}{7}$ length from hind margin, sides somewhat concave, shell resting on front and hind ends. Radiating lirae *c.* 50, main and intermediary lirae alternating, but all nearly of the same strength, at least near the margin, squamulose-nodulose where crossed by the growth-lines which are not so strong as the lirae but form a well-marked and regular clathrate sculpture; concave pliculae in the slit corresponding with the growth-lines. 14 × 9, alt. 3 mm.

Off Cape Natal (Durban), 54 fathoms, 1 dead (S. Afr. Mus. A9330, P.F. coll.).

Remarks. The specimen is slightly damaged on one side, but otherwise is in good condition.

Zeidora reticulata A. Adams

Fig. 24 *c*

Zeidora reticulata A. Adams, Thiele, 1929, p. 32, fig. 17.

In the two Tugela shells: Radiating lirae *c.* 20, but the posterior ones indistinct, here and there an intermediary; growth-lines *c.* 20, but the posterior ones indistinct, as strong as the lirae, forming with them a clathrate sculpture; concave pliculae in the slit nearly corresponding with the growth-lines, but occasionally an extra one. Septum about $\frac{1}{4}$ length of shell.

In the Sandy Point shell, which is larger than the Tugela shells, radiating lirae *c.* 30, and about the same number of growth-lines, but anteriorly the latter are closer together and not so regularly spaced as on the earlier part of the shell; convex pliculae in the slit more numerous than the growth-lines, especially anteriorly. 4·75 × 2·75, alt. 1·25 mm. (Tugela); 7 × 3·5, alt. 2 mm. (Sandy Point).

Off Tugela River (Natal), 65–80 fathoms, 2 dead, fresh; off Sandy Point (north of Kei River mouth), 51 fathoms, 1 dead, fresh (S. Afr. Mus. A9331, A9345, P.F. coll.).

Distribution. Japan.

Remarks. This may be the Japanese *reticulata*, but the figure in Sowerby (1863, pl. 245, fig. 3) is too small for a comparison. Thiele's figure shows (not very clearly) approximately the same number of lirae and growth-lines as the present specimens. The septum is too well developed for the Red Sea *Z.* (*Nesta*) *candida* H. Adams.

There is no great improbability in the Natal specimens being conspecific with the Japanese species, and I record them as such pending the opportunity of a direct comparison.

Gen. Tugalia Gray

Thiele, 1929, p. 33; Tomlin, 1932, p. 163; Powell, 1951, p. 87.

Thiele did not mention *Parmaphorella* Strebel 1907, even as a synonym, and accepted *Tugalia* Gray 1857 with a dozen species in the Indo-Pacific and Falkland Islands. Powell accepted *Parmaphorella* with 2 subantarctic species and the South African species.

The characters given by Tomlin to differentiate *Parmaphorella* from *Tugalia* do not seem very decisive. In *P. melvilli* (Thiele) he said the 'rib' [i.e. the external ridge corresponding with the internal anal groove] is 'twice the breadth of the others' [= radiating lirae]; but in *Tugalia* there is 'no alteration of sculpture to mark the anal rib'. In all the unworn present specimens (except one) there is a ridge from the apex 'regularly crossed by the concentric striae' in shells up to about 6–7 mm. long; thereafter the ridge is ornamented with 2–4 (5) lirae subequal in strength to the other lirae. In other words, the shell seems to be a *Parmaphorella* when young, and a *Tugalia* in later life. This liration

on the ridge is seen in both the Type and the broken specimen recorded by Tomlin.

The exception (from East London, S. Afr. Mus. A3624) shows a broad ridge unmarked by any lirae and crossed throughout its length (13 mm. long) by the concentric growth-lines.

The acceptance of *Tugalia* avoids the paradoxical situation, as Tomlin expressed it, of the rejection of a name *ipso facto* constituting publication of that name.

Tugalia barnardi (Tomlin)

Figs. 21 *d*, 22 *a–c*

Emarginula (*Tugalia*) *carinata* A. Adams, Thiele, 1925, p. 39.
Parmaphorella barnardi Tomlin, 1932, p. 164, fig. 5.

Internal groove and external ridge distinct on early part of shell, usually traceable on later part but sometimes indistinct. Radiating lirae over whole shell, for the most part subequal in strength, but variable, broader and narrower ones alternating, or 2–3 narrow ones between a pair of broader ones; on posterior part of shell the lirae tend to be stronger. Concentric growth-lines with a slight notch where they cross the external ridge, less well marked towards the margin in older shells, usually stronger than the lirae, and more or less nodulose at the intersections (when not worn). Up to 24 × 16, alt. 10 mm. Type: 19 × 12, alt. 7 mm.

Cream-coloured or greyish-white.

Animal white, mantle edge with black spots (U.C.T.).

Radula with *c.* 55 rows, central plate oblique, slightly longer than broad, front margin scarcely turned-over, 1st–4th lateral plates narrow, with small overturned apices, 5th lateral strong, with long uncinate cusp and small external cusp, 1st marginal plate narrow-oval, closely adjacent to the first 7 or 8 of the numerous slender plates, which posteriorly overlap the series behind, hindermost 4–6 elongate-obovate, spatulate.

35° 16′ S., 22° 26′ E., 155 metres; 34° 51′ S., 19° 37′ E., 80 metres (Thiele: *carinata*).

Cape Point N. 50° E., distant 18 miles, 180 fathoms, 1 living, 1 dead (Tomlin: P.F. coll.). Off Cape Morgan, 77 fathoms, 1 and 3 juv. dead; off Cove Rock (East London), 80–130 fathoms, 1 dead (the largest shell); 33° 5′ S., 25° 54′ E., 33 fathoms, 1 dead; off Martha Point (Struys Bay), 42 fathoms, 2 dead; False Bay, 9 fathoms, 2 living; Lion's Head (Cape Town) N. 67° E., distant 25 miles, 131–136 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

34° 15′ S., 25° 5′ E., 6 fathoms, 1 living (U.C.T.).

Cape Peninsula, on beach, 1 dead (S. Afr. Mus.).

The distribution is thus from Cape Morgan to Cape Point and off the west coast of the Cape Peninsula.

Type and cotype in the South African Museum (A3623).

Remarks. Tomlin's statement that the apical beak 'almost overhangs the

margin' is true only of juveniles; in adults, as the figure shows, the apex lies well within the margin.

Tomlin naturally assumed that as one of the two shells sent to him was broken, the other (Type) was also a dead shell; inadvertently he was not told that the animal of the Type was retained at the South African Museum. Both shells have a somewhat worn aspect, which frequently occurs in shells from deep water in the Cape Point area.

Although this species has been taken alive in 9 fathoms in False Bay, and 6 fathoms in Algoa Bay (U.C.T.), only one specimen has been found washed up on the beach, doubtless owing to its fragility.

Unfortunately Tomlin did not refer to Thiele's record of the Philippine *carinata*, or compare the South African shells with any other Indo-Pacific species.

That the *Valdivia* and *Pieter Faure* shells are conspecific can scarcely be doubted; and Thiele's identification will probably prove to be correct. No certain identification can be obtained from the descriptions and figures in Sowerby (1863); actual material is needed, and when such is available due regard must be paid to small individual variations in the sculpture, which are not specific characters as is shown by the present material.

Scutum unguis (Linn.)

Parmaphorus imbricatus Krauss, 1848, p. 62.
Scutus unguis Linn., Smith, 1879, p. 261; 1903, p. 391; Bergh, 1905, pl. 3, fig. 20; Bergh in Schepman, 1908, p. 99; Macnae & Kalk, 1958, p. 127 (listed).

Natal (Krauss); Durban (Smith); Delagoa Bay (Macnae & Kalk).

Umpangazi (Zululand), Port Edward, and Port St. Johns (U.C.T.).

Off Cape Morgan, 77 fathoms, posterior half of a broken juvenile specimen, 3 mm. wide (S. Afr. Mus. P.F. coll.).

Remarks. This juvenile is not a *Cocculina*; comparison with the apical part of a large specimen shows the beginning of the laminated surface characteristic of *Scutum*.

Fam. **Scissurellidae**

Scissurella smithi Thiele

Scissurella jucunda (*non* Smith 1890) Smith, 1910, p. 207, pl. 8, figs. 2, 2*a*; Bartsch, 1915, p. 175.
Scissurella smithi Thiele, 1912*b*, p. 7; 1925, p. 42; Tomlin, 1926*a*, p. 296 (attributed to Kobelt).

Port Elizabeth (Smith); Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

Scissurella agulhasensis Thiele

Scissurella agulhasensis Thiele, 1925, p. 41, pl. 13 (1), fig. 2.

On last whorl above the slit *c.* 70–75 axial pliculae.

35° 16′ S., 22° 26′ E., 155 metres, 3 (Thiele).

Off Hood Point (East London), 49 fathoms, 1; 34° 26′ S., 25° 42′ E., 124 fathoms, 4; off Cape St. Blaize, 125 fathoms, 1; all dead (S. Afr. Mus. P.F. coll.).

Schismope insignis Smith

Schismope insignis Smith, 1910, p. 208, pl. 8, figs. 4, 4*a*; Bartsch, 1915, p. 176.

Turton (1932, p. 204) gave the size as 2 mm. The largest shell in the Muir collection is alt. 0·8, diam. 1 mm. Smith gave 0·5 × 0·8 mm.

Port Elizabeth (Smith); Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. Muir coll.).

Fam. **Haliotidae**

Thiele, 1929, p. 28; Lissmann, 1945, pp. 58–69, graphs, pl. 1 (locomotion).

According to Lissmann's diagrams the rate of progression of the European H. *tuberculata* seems to be 1–2 cm. per second.

Haliotis midae Linn.

Figs. 25 *a–c*, 26

Haliotis capensis Dunker, 1844, p. 120, pl. 1, figs. 4, 5.
Haliotis midae Linn., Krauss, 1848, p. 93; Turton, 1932, p. 202.
Haliotis elatior Pilsbry, 1890.
Haliotis midae elatior, and *midae capensis*, Turton, 1932, p. 203.

Protoconch nucleus plus about ¾ of a whorl 1·5 × 1 mm., smooth; followed by fine and regular spiral lirae 6–8 above the foramina, 5–6 between these and the periphery, 3–4 between latter and edge of columellar plate; increasing to respectively 25–30, 9–10, and 4 at 12 mm. diam.; 50–60, 10–12, and 6–8 at 40 mm. diam.; thereafter the lirae obscured on upper surface by oblique corrugations, which develop at first in middle of whorl, then extend across whole whorl from suture to the foramina; the corrugations usually begin at 40 mm. diam., but may begin at 35 mm., or occasionally at 30 mm. diam.

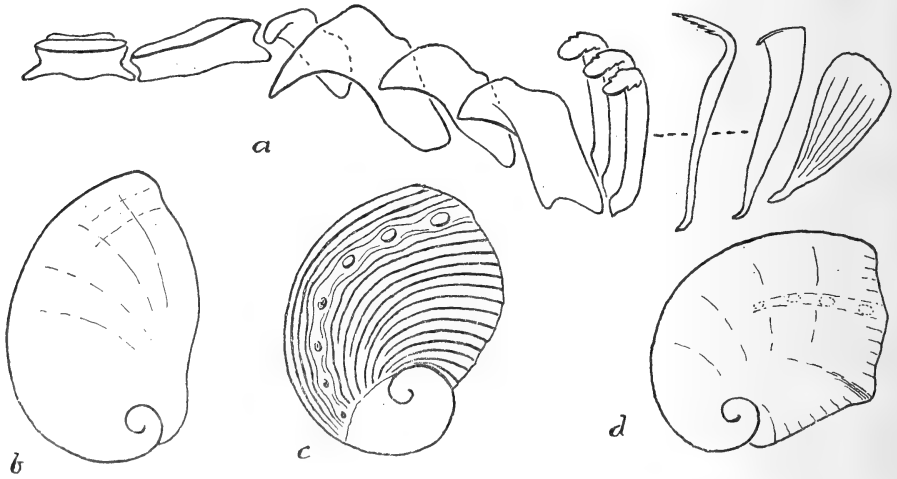

FIG. 25. *Haliotis*: *a*, radula plates of *midae* Linn.; *b*, protoconch nucleus plus 1st whorl of *midae*; *c*, juvenile of *midae*, 4·5 × 3·5 mm.; *d*, protoconch nucleus plus 1st whorl of *parvum* Linn.

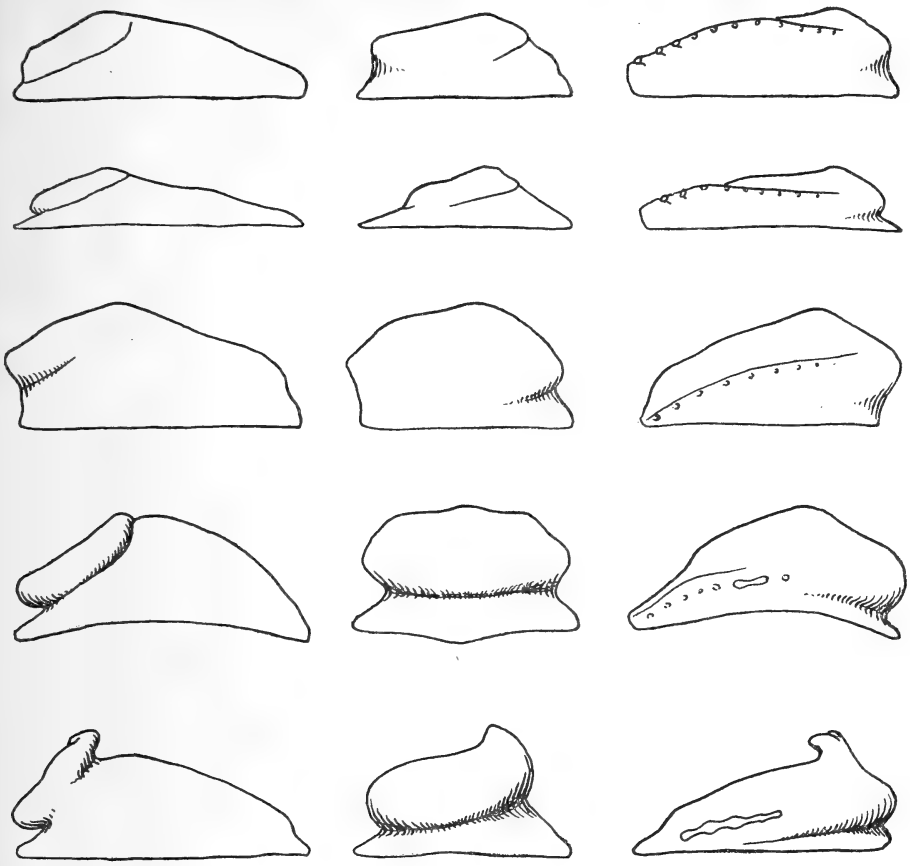

FIG. 26. *Haliotis midae* Linn., views from apertural side, apical end, and columella side: normal, low form, high form (*elatior*), and two freak individuals. All approximately 150 × 130 mm.

Periphery never sharply marked, and after about 40 mm. diam. the profile between the foramina and the columellar plate is evenly rounded; in large shells it may be concave, with the columellar plate projecting like a flange.

Up to 188 maj. × 177 min. diam., alt. at apex 72 mm.; also 181 maj. × 152 × 53 mm.; also 175 × 156 × 58 mm. (f. *elatior*), and 170 × 140 × 45 mm. Krauss gave $7\frac{1}{2} \times 6\frac{1}{2} \times 2\frac{1}{2}$ inches.

Young shells brown, rusty-red, or maroon, the lirae (at least in very young) paler than the interstices. Protoconch and most of 1st whorl pale.

Radula with *c.* 60 rows in a shell 25 mm. long, central plate broader than long, laterally indented, with strong but entire cutting-edge, 1st lateral plate wider than central plate, with entire cutting-edge, 2nd lateral longer than wide, 3rd–5th laterals stout, with strong uncinate cusp, the 3rd plate the largest, marginal plates numerous, with uncinate serrate apices, inner ones not

much longer than 5th lateral plate, longer and more slender in the middle of the series, outermost ones widening distally, with slight overturned truncate apex, the last one usually obovate and incompletely divided.

Fossil: Pleistocene, Algoa Bay.

Saldanha Bay, Table Bay, False Bay to Port Alfred (*auct. et* S. Afr. Mus.).

Remarks. As Krauss showed, *capensis* is merely a growth-stage of *midae*. The name *elatior* was given to unusually high individuals; such forms are reported to be of more frequent occurrence at Saldanha Bay than elsewhere.

Very large shells occur in the kitchen-middens at Cape Hangklip, but no actual measurements are available.

Owing to injuries, intrusion of foreign bodies between the mantle and the shell, and lesions by the boring sponge *Cliona*, various reparations to the internal surface occur such as baroque nacreous pustules and concretions, and more or less extensive duplication of the columellar plate.

The muscle scar is traceable, chiefly by a faint but not conspicuous line on the left side, up to about 90–100 mm. shell maj. diam.; but thereafter the scar becomes more or less roughened, with a clearly defined outline.

Although young shells are common at Still Bay, Dr. Muir obtained only 1 as small as 4·5 × 3·5 mm., and only 1 protoconch plus 1st whorl.

Haliotis sanguineum Hanley

Haliotis sanguineus Hanley, 1841, p. 60, frontispiece, fig. 5; Krauss, 1848, p. 94; Bartsch, 1915, p. 174; Turton, 1932, p. 203; Macpherson, 1953, p. 169, pl. 1.
Haliotis ficiformis Menke, 1844, p. 98.
Haliotis pertusa (*non* Rve.) Bartsch, 1915, p. 175; Turton, 1932, p. 203.
Haliotis nebulata (*non* Rve.) Turton, 1932, p. 203.

Protoconch nucleus plus about ¾ whorl 1·5 × 1 mm., smooth; followed by spiral lirae 2 above the foramina, 2 below, and 1 below the periphery; increasing to respectively 10–12, 3, and 2 at 12 mm. diam., *c.* 18, 4 (5), and 2–3 (4) at 25 mm.; at 35 mm. diam. the lirae on the upper part of whorl evanescent. Between the foramina and edge of columellar plate 6–7, a peripheral lira not distinguishable from the others; on the upper part the original 2–4 lirae more or less bluntly nodulose or pustulose; in large shells the lirae evanescent and surface smooth.

Growth-lines fine and close, at intervals (periodic cessation of growth) rather more prominent. In some shells (not under 30 mm. maj. diam.) undulations may occur protractively oblique to the growth-lines, but never as strong as the corrugations in *midae*.

Up to 76 × 48, alt. 26 mm., 81 × 50 × 23, and 86 × 54 × 30 mm.

Fulvous, brown, or greenish-brown, usually with pale streaks and vermiculations in young shells, old shells uniform red-brown or maroon; the pustules on the lirae usually green or the lirae articulated with green and red; usually an orange-red suffusion internally at apex.

Radula plates as in *midae*.

Table Bay and False Bay to Port Alfred (*auct. et* S. Afr. Mus.). Durban and Tongaat (Natal) (S. Afr. Mus.).

Distribution. Mauritius, and West Australia (Macpherson).

Remarks. Dr. Muir did not obtain at Still Bay any juveniles under 14 mm. maj. diam.

Usually when a shell is laid on a flat surface the apex is the highest point, and the profile between apex and the foramina is slightly concave. Some examples, however, have a convex profile and the highest point is about in the middle of the shell, e.g. the 86 mm. shell recorded above.

Some shells with strong undulations resemble at first sight *midae*, but the few and well-separated lirae between the foramina and the columellar edge are distinctive of *sanguineum*.

The muscle scar does not become roughened, even in the largest shells.

The occurrence of living examples on the coast of West Australia (33° 53′ S.) is interesting. Macpherson compared them with Cape specimens, and also a Mauritius example, and found no differences.*

Haliotis parvum Linn.

Fig. 25 *d*

Haliotis parvum Krauss, 1848, p. 94; Smith, 1910, p. 207; Turton, 1932, p. 203.
Haliotis kraussi Turton, 1932, p. 203, pl. 53, no. 1413.

Protoconch nucleus plus about ¾ whorl 1·5 × 1·25 mm., smooth; followed by spiral lirae *c.* 15 above the foramina, 5 between these and periphery, 2–3 between latter and columellar plate; increasing to respectively 20–25, 6–7, and 3–4 at 10 mm. diam.; at 40 mm. diam. to respectively *c.* 60, *c.* 12, and 8–10. The peripheral lira is slightly larger than the others and more or less carinate; but after about 15 mm. diam. while continuing to be slightly larger ceases to be peripheral, and in large shells there is no distinction between the subforaminal and basal zones.

The midwhorl ridge begins at the same time as the spiral lira and the foramina, but sometimes is not very conspicuous. In large shells it tends to become flatter and may sometimes be almost obsolete. Growth-lines on early part of shell often producing a fine cancellation.

Up to 45 maj. × 34 min. diam. Turton gave 47 mm.

Sometimes nearly uniform pale brown, but usually variously mottled with rusty-red or maroon patches on a pale ground-colour; beach shells often more brightly coloured, sometimes uniform orange.

Radula plates as in *midae*, in a shell 20 mm. long *c.* 50 rows.

Table Bay (Krauss, Sowerby); False Bay (Bartsch; coll. Stimpson; also

* A paper by Shirley, 'Marine Mollusca common to Australia and South Africa' (*Proc. Roy. Soc. Queensland*, xxxi, 1919, pp. 83–89), cannot be taken seriously. Only old authors were consulted, the latest being Bartsch (1915). 'Shell *names* common to . . .' would have been a more accurate title.

S. Afr. Mus.); Still Bay (S. Afr. Mus. coll. Muir); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton).

Living: False Bay, 6–14 fathoms (S. Afr. Mus. P.F. coll.; also U.C.T.).

Remarks. In the Muir series are shells from 6·5 mm. up to 45 mm. maj. diam.; also a protoconch plus the smooth whorl which shows the beginnings of the spiral lirae (only just visible) and the mid-whorl ridge, and 3–4 white dots on a slight ridge but no open foramen.

Haliotis speciosum Rve.

Haliotis speciosum Reeve, 1846, sp. 47; Talmadge, 1958, p. 278.
Haliotis pertusa (*non* Rve.) Sowerby, 1900, p. 6; Smith, 1903, p. 391.
Haliotis alfredensis Bartsch, 1915, p. 175, pl. 24, figs. 7, 8; Tomlin, 1927, p. 81; Turton, 1932, p. 203.

Spiral lirae at start 10 between suture and foramina, 4 between these and periphery, increasing at 17 mm. to *c.* 40–45, 7–8, and 4–5 below periphery; at 45 mm. *c.* 60, 10, and 6–7 respectively, the latter somewhat irregular and the periphery blunt and obsolescent.

A very faint midwhorl ridge with a very shallow groove above it can sometimes be seen in profile, or better by oblique lighting on the internal surface.

Growth-lines on early part of shell forming a more or less distinct fine cancellation, but with the lirae predominating.

55 maj. diam. × 39·5 mm. min. diam. (Bartsch). 'About $2\frac{1}{2}$ inches' (Talmadge).

Mottled or blotched with rusty-red or maroon on a pale cream or brown ground-colour.

Pondoland = Kowie = Port Alfred (Sowerby, Bartsch, Turton, Talmadge; also S. Afr. Mus.). Natal (Talmadge: *ex* Natal Mus.).

Remarks. Tomlin (1926*a*, p. 296) doubted Bartsch's identification of Stimpson's False Bay examples as *pertusa*. They are almost certainly *sanguineum*, and as such are recorded above.

Talmadge, by sending a Pondoland specimen to the British Museum to be compared with the Type series of *speciosa*, and then to the U.S. National Museum for comparison with the Type of *alfredensis*, seems to have satisfactorily established the correct name for this species.

Haliotis queketti Smith

Haliotis queketti Smith, 1910, p. 206, pl. 8, figs. 1, 1*a*; Turton, 1932, p. 203; Macnae & Kalk, 1958, p. 127 (listed) (*quecketti* [*sic*]).

Spiral lirae between suture and foramina 7–8 at about the beginning of 2nd whorl (prior to that indistinct from wear), increasing to *c.* 32–35 at aperture, 2 between foramina and peripheral lira, increasing to 6–7 (8), and 3–4 (5) below the latter (exposed on the last whorl); all lirae squamose; peripheral lira distinct, but flattened near the aperture.

Midwhorl ridge feeble and only slightly raised, even the corresponding groove on internal surface often obscure. Faint oblique undulations sometimes present. Foramina prominently raised.

Up to 46 maj. × 32 mm. min. diam.

Pale brown or reddish, with darker maroon or brown blotches, and more or less distinct radiating streaks near suture, margin below foramina with alternating olivaceous-brown or red-brown and pale bars.

Isezela (Natal) (Smith). Port Alfred (Turton). Natal (S. Afr. Mus. *ex* coll. Ross-Frames). Delagoa Bay (Macnae & Kalk).

Off O'Neil Peak (Zululand), 90 fathoms, 1 (S. Afr. Mus. P.F. coll.).

Remarks. Smith gave the number of spiral striae as about 12; if counted along the minor diameter this number corresponds with his figure; but the latter shows at least 16 at the apertural margin. In the two present specimens there are at least 16 along the minor diameter and double that number at the margin.

One of the specimens is strongly lirate; the other almost smooth, except close up under the suture, up to about 40 mm. maj. diam., ending with a well-marked line indicating temporary cessation of growth; the later addition to the shell is more normally lirate. The area below the foramina is strongly lirate (normal) throughout, but shows the line of cessation.

The *Pieter Faure* specimen is young (*c.* 22 mm. maj. diam.) and almost completely covered with coralline growth; but the prominence of the foramina indicates its specific identity.

Haliotis bistriata Gmelin

Three specimens, identified by J. H. Ponsonby, presented by E. L. Layard, registered as from 'South Africa'. This species has been recorded from Mozambique, and probably these specimens were obtained by Layard when he accompanied H.M.S. *Castor* up the East Coast of Africa. The South African Museum has it also from Mauritius (coll. R. F. Lawrence, 1935).

A specimen recently obtained from Bazarute Island is very similar, but the spiral lirae are much finer than the coarse lirae, in places somewhat nodulose, typical of *bistriata*. The lirae below the foramina, however, agree with those of *bistriata*: 4–5 followed by 3 stronger ones.

Fam. **Pleurotomariidae**

Pleurotomaria africana Tomlin

Pleurotomaria quoyana (*non* F. & B.), Fish. Mar. Biol. Surv., 1933, pp. 20–23, fig. of Durban Museum specimen.
Pleurotomaria africana Tomlin, 1948, p. 2, pl. 1; Barnard, 1963*c*, p. 156, fig. 2.
[*Non*] *Pleurotomaria* [*sic*] (err. *pro Pleurotoma*) Wybergh, 1920, p. 66.

The first specimen was taken by the Fisheries Survey vessel *Africana* on

21st July 1931, at 29° 50′ S., 31° 19′ E., in 369 metres. It measured alt. 118, diam. 115 mm., and was presented to the Durban Museum.*

The second specimen was taken on 27th June 1932, at 29° 48′ S., 31° 23′ E., in 366 metres. It was presented to the South African Museum, and was later described by Tomlin, thereby becoming the Type of the species. Alt. 83, diam. 100 mm.

In 1948 three more specimens were obtained by the *Africana*, one of which went to the Transvaal Museum, Pretoria, and the other two to America.

The South African Museum has an operculum which was also presented by the Fisheries Survey, but which probably belonged to a larger shell than the Type, having max. diam. 29 mm. (*vide infra*).

So far as I am aware none of the animals taken by the *Africana* were preserved.

A specimen obtained by a deep-sea trawler has been presented, I am informed, to the British Museum.

Thanks to the kindness of Mrs. H. Boswell of Pretoria, I have recently (1963*c*) examined two fine specimens, both larger than the Type, and both containing the animal with operculum: alt. 104, diam. 125 mm., and alt. 123, diam. 145 mm.

Tomlin assigned two unsculptured whorls to the protoconch in the Type; this seems to be correct, though the surface is worn and polished. The present 125 mm. shell has 9 whorls, but on the upper two most of the sculpture has been abraded. On the 145 mm. shell the protoconch and (?) 1st whorl are worn away; the diameter of the uppermost remaining whorl corresponds with that of the 2nd postnatal whorl of the Type; on this reckoning there would be 10 postnatal whorls on this large and seemingly fully-grown shell.

The slot in the Type is not more than $1\frac{3}{4}$ inches long; in the 145 mm. shell it is 7–8 mm. wide and $2\frac{1}{2}$ inches long.

A spiral lira in the middle of the cicatrix in the slot begins (as a series of tiny granules, one on each growth-line) on the 4th whorl; a second one below it begins on early part of 6th whorl, and a third one (above the original one) on later part of 6th whorl; on last there are 4 lirae (as Tomlin said) but they are not continuously distinct. In the 145-mm. shell the 4 lirae are obscured towards the aperture by the growth-lines becoming very coarse.

The spiral lirae between the slot and the suture below increase from 1 on 2nd whorl to 11 on last whorl; those between slot and the suture above

* These measurements seem to be anomalous in that the altitude exceeds the diameter, though only slightly. In other specimens the diameter exceeds the altitude. At my request Mr. P. Elston of Durban measured the specimen in the Durban Museum, and found alt. 102, diam. 110 mm. Scarcely any two people will obtain the same results in the measurement of a shell (cf. Connolly, 1939, p. 3), and the discrepancy need not be very seriously considered. Nevertheless there may be a doubt whether the specimen now in the Durban Museum is the same as that referred to in the Fisheries and Marine Biological Survey Report, because (so Mr. Elston informs me) the present specimen bears a label: 'Dept. of Geology.'

increase from 2 on 2nd whorl to about 25, with some fine intermediaries, on last whorl.

The operculum of the 125-mm. shell has max. diam. 28 mm. It corresponds with Dall's figure of that of *adansoniana* (1889, pl. 32, fig. 10). Seven or eight whorls can be counted, but the earliest whorls in the centre are indistinct.

The coarseness of the growth-lines towards the aperture, especially those filling up the slot, together with the broken and worn operculum, in the 145 mm. shell seem to indicate that this is about the maximum size to which the species grows.

Animal in general resembling *adansoniana* (Dall, 1889, p. 401). Sole longitudinally irregularly pleated. Foot dorsally behind the operculigerous lobe with a deep medio-longitudinal groove to end of foot, transversely rugulose and with a row of papillose warts on either side of the deeper part of the groove. Epipodia without cirri or processes; the left extending forwards to the operculigerous lobe, the right to the front of the foot.

Mantle edge papillose. Rachis of each gill anteriorly free and sharply pointed. Vascular area on dorsal part of mantle well developed, reddish in colour (after preservation). Rectum not free from mantle distally; containing an amorphous mass with a few minute Foraminifera, not consolidated into faecal pellets. According to Thiele (1935, p. 1129) the species of *Pleurotomaria* seem to feed chiefly on sponges.

Jaw plates subcircular; very feebly attached (as preserved).

Radula similar to that of *adansoniana* (Dall, 1889, p. 402, pl. 31, figs. 3–6). The description of the radula of *hirasei* is not available.

Ribbon very long: 90 mm., with at least 170 rows. In cross-section ⟆⟆⟆-shaped, the central tooth with its 4 flanking laterals on each side form a median ridge at the bottom of the groove formed by the arching-over of the fan-like groups of marginal teeth on either side (see Barnard, 1963*c*, fig. 2).

The 4 laterals flanking the central tooth are stronger and slightly larger than the following laterals, of which there are about 25, at first decreasing in size, then increasing and gradually passing into the strong, uncinately curved teeth with simple acute apices, of which there are about a dozen. These gradually change into marginals with 1 subapical denticle, and then with 2 denticles; these are succeeded by at least 50 slender marginals with 2 subapical denticles and a tuft of bristles; the outermost half-dozen marginals are narrow lamellae with simple subtruncate apices. There is no sharp distinction between laterals and marginals; most of the latter have the peculiar apical tufts, of which in *adansoniana* there are only five (Dall).

The South African species apparently belongs to the subgen. *Mikadotrochus*, which has no umbilicus and has the columella margin thickened and twisted (Lindholm, 1927, not seen). It has been compared with the Japanese species *teramachii* Kuroda 1955.

Fam. **Acmaeidae**

Acmaea roseoradiata Smith

Fig. 27 *a*

Acmaea roseoradiata Smith, 1901, p. 106, pl. 1, fig. 19; Thiele, 1925, p. 38.

Described from Cape Town. The South African Museum has a large number of dead shells *ex* coll. J. Juritz, a resident of Cape Town, but without locality label. Up to 6 × 5 mm.; Smith: 5·75 × 4·5 mm.

35° 16′ S., 22° 26′ E., 155 metres (Thiele).

U.C.T. obtained living examples in Simon's Bay (False Bay) at 2½–17 metres.

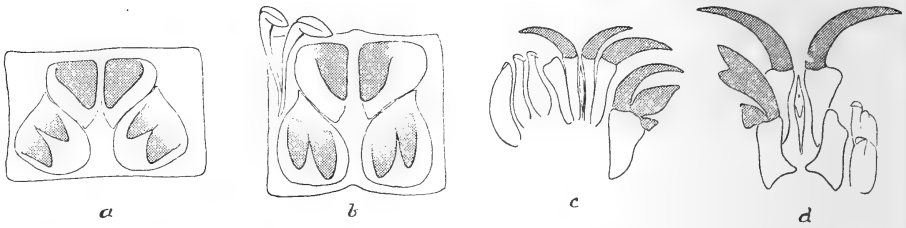

FIG. 27. Radula plates of: *a*, *Acmaea roseoradiata* Smith; *b*, *Patelloida profunda* (Desh.); *c*, *Helcion pectunculus* (Gmelin) 3rd lateral plate and indurated cusp of 2nd lateral removed on left side; *d*, *Cellana capensis* (Gmelin), indurated cusp of 2nd right lateral plate removed.

Radula with *c.* 45 rows, no central plate, 2 lateral plates, one behind the other, with retrorse cusps, that of the hinder plate bifid, the three cusps forming an oblique line on each side, no marginal plates.

Remarks. The New Zealand *roseoradiata* Suter 1907 was renamed *suter* by Iredale, 1915.

Patelloida profunda (Desh.)

Fig. 27 *b*

? Patelloida conoidea Q. & G., Krauss, 1848, p. 57.
Patella profunda Deshayes, 1863, p. 44, pl. 6, figs. 15, 16; von Martens, 1880, p. 299; Tomlin & Stephenson, 1942, p. 6; Stephenson, 1948, pp. 279, 282; Day & Morgans, 1956, p. 306 (listed).
Helcioniscus profundus Desh., Pilsbry, 1891, p. 150, pl. 65, figs. 94–96, and var. *mauritianus*, figs. 97–99; Dautzenberg, 1929, p. 551.
Acmaea albonotata Smith, 1901, p. 107, pl. 1, figs. 14, 16.
? Acmaea coppingeri (*non* Smith) Turton, 1932, p. 160, pl. 36, no. 1141.
Patelloida profunda (Desh.) Hodgkin, 1962, p. 5, fig. 1 (radula).
[*Non*] *Patelloida profunda:* Turton, 1932, p. 165 (see Tomlin & Stephenson).

I have seen examples from Durban, Morgans Bay, and East London (U.C.T.); and the South African Museum has 3 specimens from Kelso Junction (Natal) collected by Burnup, and named *A. albonotata* by him.

Of the latter, only one has the internal margin marked with rufous spots, though all three have the central area suffused fulvous, as in the specimens of

profunda. Some of these also show indications of spots on the inner margin, and corresponding streaks on the external surface.

Up to 19 × 14, alt. 11 mm.; also 19 × 14 × 6 mm.

No circlet of gills around the mantle. So far as I am aware the radula of Smith's *albonotata* has not been examined, though possibly Burnup sent the animals of his specimens to Prof. Gwatkin, in whose collection (in Brit. Mus.) there may be a mounted example.

The radula of a Durban specimen is here figured: *c.* 45 rows, no central plate, 2 lateral plates, one behind the other, with retrorse cusps, that of the hinder one bifid, 2 slender curved marginal plates with retrorse spatulate apices.

Hodgkin's figure of the radula of Mauritian examples does not show the apices of the marginal plates as spatulate.

Natal (Krauss); Umkomaas (Natal) (Smith); Kelso Junction (S. Afr. Mus. coll. Burnup); Umhlali (Natal) to East London (Tomlin & Stephenson, Stephenson).

Distribution. Mauritius, Ile Europa, Madagascar.

Remarks. Von Martens gave as a reason for transferring this species to *Acmaea* the smooth spotted ('*glatte farbig gegliederte*') margin. Pilsbry transferred it to *Helcioniscus*, now regarded as a synonym of *Cellana* (in Thiele, 1929, p. 42, the date of the latter should read 1869).

There seems little doubt that *albonotata* should fall into synonymy.

Fam. **Patellidae**

Gen. Patella Linn.

Stephenson, 1936, p. 74 (habits of S. Afr. species); 1939, pp. 512–528 (distribution of S. Afr. species); Tomlin & Stephenson, 1942, pp. 4–9 (comments and corrections to Turton, 1932, and revised list of S. Afr. species); Stephenson, 1948, pp. 274 sqq. (figs. of radulae); Koch, 1949, pp. 487 sqq., pls. 17–23 and 22 text-figs. (review of S. Afr. species).

Circlet of gills not interrupted in front. Radula with central plate, 3 lateral and 3 marginal plates; 1 South African species (*variabilis*) without central plate.

Recent anatomical and biological researches have drastically reduced the number of acceptable species living along the South African coast: Tomlin and Stephenson admitted 12, Koch 11.

Koch's examination of the radulae seems to have placed the taxonomy on a firm basis. I have not had similar opportunities of field collecting, or of examining the radulae of all the species. Those which I have examined confirm Koch's observations, and only one or two points seem to require comment.

The difference between the two types of radulae is more lucidly expressed in the key (p. 512) than in the text (p. 492). The formula for *barbara* and *compressa* includes 4 lateral plates, the outermost pluricuspid [typ. err. pleuri-] lateral is stated to be divided into 'two separate teeth' (*barbara*, p. 493). This

is not borne out by figs. 4 and 8, and conflicts with the family diagnosis. There may be 3 or 4 *cusps* (teeth) on the 3rd lateral plate, but they all arise from an undivided basal plate.

In the European species (e.g. *vulgata*) the innermost (nearest the axis of the radula) is the smallest of the 3 cusps (Fischer-Piette, 1934, p. 280, figs. 1, 2; also Eslick, 1940, p. 52, fig. 3); but in the South African species the outermost cusp is the smallest (Koch's figures and my observations).

The central plate is always much narrower than the 1st lateral plate (contrast Thiele, 1929, fig. 23).

The distribution of the eleven recognized species around the South African coast is shown graphically by Stephenson (1939, fig. 13).

Nardini (1934, pp. 249, 250) records *Patella dunkeri* [= *Helcion d.*], *granularis*, *umbella* [= *miniata*] and *rustica* [= *tabularis*] from Umkomaas, Natal: 'Trovata fossile per la prima volta.' Probably these were merely dead shells from kitchen-middens, not true fossils; there are no Pleistocene deposits at Umkomaas.

For deciding the question whether the South African Patellas are endemic, or, in some cases, linked with species from other regions (Stephenson, 1939, pp. 527, 528), it is scarcely necessary to utter the warning that dead shells are useless. Von Martens (1880, p. 299, 300) stated that Prof. Möbius had brought a specimen of *cochlear* from Mauritius, but doubted the provenance of this and earlier records of *granatina*, *oculus*, *miniata*, *compressa*, *spinifera* Lam. [= *plicata* = *barbara*], because these shells so easily get into the hands of collectors. The reverse process has undoubtedly taken place, and collectors are responsible for several Mauritian shells having been recorded as South African!

P. cochlear Born. (see: Stephenson and du Toit, 1937, pls. 21, 23; and Stephenson, 1939, p. 515, text-fig. 8 and pl. 14, fig. 1). The U.C.T. Ecological Survey found this species from Lambert's Bay on the west coast southwards around the coast to Cape Morgan, but not in the Durban area. I have seen a dead shell from Umsikaba River mouth (north of Port St. Johns) (S. Afr. Mus. coll. F. Talbot, 1959).

P. granatina Linn. Tomlin (1926 *a*, p. 297) considered that *Acmaea apicina* (Gray) was probably Lamarck's *Patella apicina*, which is *granatina*. The most northerly locality on the west coast given by Koch is Port Nolloth; Lüderitzbucht (U.C.T.); Lamy (1931, *Bull. Mus. Paris*, 2nd ser., III, 3, p. 304) records it from Walvis Bay.

P. granularis Linn. Recorded as *natalensis* Krss. from Angola by Nicklès (1950, p. 39, fig. 13); also Franca, 1957 and 1960). Lüderitzbucht (U.C.T.).

P. tabularis Krss. Recorded, as *rustica* Linn., from Maputo-Zitundo and Inhambane by Braga (1952, p. 94, pl. 6, fig. 10). The identification is probably erroneous and may refer to *barbara* Linn., recorded from Natal by Krauss (*obtecta*) and from Delagoa Bay by Macnae and Kalk (1958, pp. 86, 127, fig. 21 *f*).

P. variabilis Krss. From Bushman's River mouth to Natal (Koch, 1949, p. 510). Inhambane (Braga, 1952, p. 94, pl. 6, fig. 11, as *Helcioniscus v.*).

Lectotype of *P. argenvillei* Krss. in Stuttgart Museum figured (Janus, 1961, p. 3, pl. 2, figs. 1–3).

Gen. Helcion Montfort

Circlet of gills interrupted in front. Central plate of radula more or less degenerate, 3 lateral plates.

Helcion pectunculus (Gmelin)

Fig. 27 *c*

Patella pectinata Krauss, 1848, p. 57.
Helcion pectunculus Gmelin, Tomlin, 1923, p. 50; Stephenson, 1948, pp. 279, 282, fig. 10 (radula).
Helcion pectinata Krss., Thiele, 1929, p. 41.
? Acmaea ordinaria Turton, 1932, p. 160, pl. 36, no. 1142.
? Acmaea punicea Turton, 1932, p. 160, pl. 36, no. 1143.

Shell high, apex vertically over front margin, or nearly so, in adult; with numerous squamose ribs. Up to 31 × 27, alt. 14 mm. (highest point behind the apex). High and low forms: 20 × 17 × 9 and 20 × 17 × 7 mm.

Brown or greenish black, sometimes, especially in brown shells with paler radiating streaks.

Radula very long. Central plate very narrow, squeezed between the 1st laterals, 2nd lateral plate a little wider than 1st, each with a strong falcate indurated cusp, 3rd lateral farther back, stouter, with 3 indurated cusps, the inner one falcate, the middle one ovate, the outermost smaller, triangular; 3 marginal plates, the two inner ones with reflexed cutting-edges, the outer one broader.

Lüderitzbucht, Table Bay, False Bay, Still Bay, Mossel Bay, Algoa Bay, Port Alfred, Natal (*auct. et* S. Afr. Mus.). Port Nolloth to East London (U.C.T.).

Remarks. Thiele said the central plate of the radula has a small cutting-edge, but I have not found this in any of my examples.

Helcion pruinosus (Krss.)

Patella pruinosa Krauss, 1848, p. 56, pl. 3, figs. 9*a*, *b*; Turton, 1932, p. 171, pl. 40, no. 1215.
Patella dunkeri var. *approximata* Turton, 1932, p. 170.
Patella pruinosa Krss., var. *fuscoradiata* Turton, 1932, p. 171, pl. 40, no. 1216.
Helcion pruinosus Krss., Tomlin & Stephenson, 1942, p. 8; Stephenson, 1948, pp. 279, 282, fig. 10 (radula).

Shell low, apex well within the margin, sometimes with feeble radiating ribs, but usually quite smooth. Up to 28 × 21, alt. 8 mm. (apex usually the highest point).

Grey, brown, olive, horn-coloured, unicolorous or with radiating streaks, often with radiating lines of iridescent blue dots.

Radula as in *pectunculus*.

Lüderitzbucht, Table Bay, False Bay, Hermanus, Still Bay, Mossel Bay, Algoa Bay, Port Alfred (*auct. et* S. Afr. Mus.). Yzerfontein, Table Bay to East

London (U.C.T.). Umsikaba River mouth (north of Port St. Johns) (S. Afr. Mus. coll. Talbot).

Remarks. Juveniles 1·5 mm. long (Still Bay, coll. Muir) have the apex well within the margin.

Helcion dunkeri (Krss.)

Patella dunkeri Krauss, 1848, p. 55, pl. 3, fig. 14; Bartsch, 1915, p. 144; Turton, 1932, p. 170; Nardini, 1934, p. 249, pl. 18 (5), fig. 19.
Patella dunkeri Krss., var. *formosa* Turton, 1932, p. 170, pl. 40, no. 1211.
Patella testudinaria non Linn., Turton, 1932, p. 170.
Helcion dunkeri Krss., Stephenson, 1939, p. 524; Tomlin & Stephenson, 1942, p. 8; Stephenson, 1948, pp. 279, 282, fig. 10 (radula).

Radula as in *pectunculus*.

Cape and Natal (Krauss, *ex* coll. Wahlberg and Dunker). Table Bay (S. Afr. Mus. coll. Lightfoot and K. H. B.). Port Alfred (Bartsch, Turton). Lüderitzbucht, Port Nolloth, Lambert's Bay, Saldanha Bay, Table Bay, Port Elizabeth, East London, Umhlali (Natal) (U.C.T.).

Remarks. Krauss apparently did not himself collect this species. Its occurrence in Natal has not been confirmed. Tomlin & Stephenson have confirmed the identity of specimens collected by Turton at Port Alfred.

There is great difficulty in separating *dunkeri* from *pruinosus*. Stephenson (1939) remarked that it was suspected to be a form of the latter. *H. dunkeri*, however, has page precedence; and I would reduce *pruinosus* to a synonym, not even a variety of *dunkeri*.

H. dunkeri is as a rule a little more distinctly ribbed than *pruinosus*, but some specimens are almost smooth. Shells which are strongly marked with black and white rays may be assigned to *dunkeri*. There are not always 11 black rays; some of them may split into 2–4 narrower rays, with a total of 16–18 black rays; on the other hand there may be only 6–7 rays, or the shell may be black with 2–4 white rays, or completely black. There are also, as Krauss remarked, other colour patterns, and there may be a blue-green sheen on some of the stripes.

The only locality in Table Bay known to the late R. M. Lightfoot and myself where this species (or form) could be found living was the groynes alongside the sewerage outlet on Woodstock beach. Stephenson also found it there.

It is also difficult, as Krauss noted, to separate the shell from juvenile *Patella compressa*. The latter are oval, depressed but not compressed, and up to a length of *c.* 20 mm. lie flat.

Gen. Cellana H. Adams, 1869

Winckworth, 1928, p. 133.
Tomlin, 1937, p. 176.

Circlet of gills interrupted in front. Central plate of radula degenerate, only 2 lateral plates. Shell internally with a satiny, metallic sheen.

Cellana capensis (Gmelin)

Fig. 27 *d*

Patella capensis Krauss, 1848, p. 53, pl. 3, figs. 13 *a–c*.
Helcioniscus capensis Gmelin, Dautzenberg, 1929, p. 551; Braga, 1952, p. 94, pl. 6, fig. 12.
Cellana capensis Gmelin, Stephenson, 1939, p. 524; 1948, pp. 279, 282, fig. 11 (radula).
Cellana capensis Gmelin, subsp. *karachiensis* Winckworth, 1930, p. 80.

Radula very long; central plate a narrow strip without indurated cusp, squeezed between the 1st lateral plates, each of which has a strong falcate indurated cusp, 2nd lateral with 2 indurated cusps, the inner one apically bifid, the outer one small, triangular, the composite marginal plate with one reflexed cutting-edge in front and another behind, about in middle of plate.

Yellowish or drab, sometimes with faint darker marks on outer surface, internally with 2, 3 or more dark brown radiating streaks, which are sometimes broken up into spots, central area more or less mottled with orange-brown or dark brown (in juveniles 7–10 mm. long, bright orange).

Living: Port Alfred (S. Afr. Mus. coll. E. K. Jordan 1941); East London (U.C.T.); Umsikaba River mouth (north of Port St. Johns) (S. Afr. Mus. coll. Talbot); Durban (S. Afr. Mus. P.F. coll.); Delagoa Bay (S. Afr. Mus. coll. K. H. B.; also U.W.); Bazarute Island (U.W.); Mozambique Island (S. Afr. Mus. coll. K. H. B.; also U.W.). Recorded by Braga from Inhambane and Mozambique.

Distribution. Madagascar (Dautzenberg); Karachi (Winckworth).

Remarks. Both Krauss (for his fig. 13 *b*) and Dautzenberg remarked on the similarity of *capensis* with *rota* (Gmelin). The latter stated that *capensis* was larger (!), with the internal central impression white, more or less maculated with brown or orange (*rota*: uniform dark brown).

Karachi specimens were described as differing in having more numerous ribs, alternately larger and smaller, with about 20 (out of 180) stronger ones, and in being more strongly granulate; and also in having 11 brown rays on the inside instead of only 9. All these characters seem to be variable, and of no taxonomic value.

Cellana rota (Gmelin)

Helcioniscus rota Gmelin, Dautzenberg, 1929, p. 551; Braga, 1952, p. 95.

Radiating ribs numerous and regular, sometimes slightly squamulose at the growth-lines. Up to 25 × 20 mm.

Grey with faint irregular darker marks; interior pale with dark brown spots or more or less zigzag lines, but not radiate, central area mostly white.

Radula as in *capensis*.

Mozambique Island (Braga; also U.W.).

Distribution. Suez, Gulf of Akaba; Lindi (Tanganyika); Madagascar.

TECTIBRANCHIATA

Fam. **Actaeonidae**

The Angolan species *conicus* Thiele 1925 was placed in *Actaeon* with a query; I consider it more likely to be a *Leucotina* (*Pyramidellidae*).

Actaeon flammeus (Gmelin)

Durban (Sowerby). Off Amatikulu River (Zululand), 13–15 fathoms, 1 dead but fresh (S. Afr. Mus. A6552, P.F. coll.).

Actaeon fortis Thiele

Actaeon fortis Thiele, 1925, p. 259, pl. 42 (30), figs. 10, 11.

A *Pieter Faure* specimen closely resembles Thiele's fig. 11 of a shell from the Zanzibar Channel, except that the punctate-striate sculpture is not so strong on the upper part of the whorl, in this respect being more like *fragilis* Thiele 1925 from Angola; it is also proportionately broader (3 whorls: 4 × 2·25 mm.).

As Thiele considered the narrower East Indies shells as conspecific with those from East Africa, the Natal shell may also be referred to *fortis*, at least provisionally.

Off Umhloti River (Natal), 40 fathoms, 1 dead (S. Afr. Mus. A9407, P.F. coll.).

Distribution. Zanzibar Channel, 463 metres; also East Indies (Thiele).

Solidula suturalis (A. Adams)

Spire twice (at least) in length of aperture, columella pleat double, sculpture punctate-striate, striae narrower than the lirae.

Port Elizabeth and Natal (Sowerby).

Off Glendower Beacon (Port Alfred), 39 fathoms, 2 dead and worn (identified by Sowerby) (S. Afr. Mus. A5640, P.F. coll.).

Solidula sulcata (Gmelin)

Spire $2\frac{1}{4}$–2 in aperture; columella pleat double, with an additional costa posterior to it; sculpture punctate-striate, the striae varying in number from 14 or 15 to 36, 25 being about the average, striae (even when numerous) narrower than the lirae. Up to 17 × 8 mm.

White with grey axial streaks, more or less interrupted at level of top and middle of aperture, thus forming 3 grey zones; in one specimen the streaks are pink, those on the uppermost zone being somewhat undulate or angular.

Fossil: Pleistocene; Durban North Ridge, 60 feet below sea level (Geol.

Survey); Algoa Bay (Johnson, 1904, as *solidula*); Sedgefield near Knysna (A. R. H. Martin); Little Brak River, Mossel Bay (S. Afr. Mus.).

Durban (*sed* ?) (S. Afr. Mus. coll. Ross-Frames).

Off Cape Natal, 54 fathoms, 1 juv.; off Tongaat, 36 fathoms, 1 juv. (S. Afr. Mus. A9422, A9423, P.F. coll.).

Remarks. Corresponds with larger examples in S. Afr. Mus. from New Caledonia.

Solidula niecaensis n.sp.

Spire $1\frac{1}{4}$ in aperture; columella pleat double, with an additional costa posterior to it; sculpture of spiral sulci subequal in width to the lirae, crossed by axial pliculae producing squarish foveolae; 7 sulci on penultimate whorl, 9 on upper part of last whorl, *c.* 15 on base; on back of outer lip the number of lirae and sulci doubled by interpolation. 17 × 7·75 mm. White, periostracum brown.

Off Nieca River (East London area), 43 fathoms, 1 living (S. Afr. Mus. A6553, P.F. coll.).

Remarks. Although the somewhat foveolate sculpture is similar to that of *albus*, and the specimen was actually identified by Tomlin as *albus*, the shell has a much longer spire relatively to the aperture, and the columella is that of a *Solidula*.

The forepart of the animal had been pulled out, and no radula was obtained.

Pseudactaeon albus (Sow.)

Fig. 28 *h*

Tornatella albus Sowerby, 1873, p. 720, pl. 59, fig. 6.
Actaeon albus Sow., von Martens, 1903, p. 50; Schwarz, 1910, p. 115.
Pseudactaeon albus Sow., Thiele, 1925, p. 257, pl. 46 (34), figs. 3, 3*a*, 4 (radula).

Spire 2–$2\frac{1}{2}$ in aperture; columella pleat simple. The sculpture is not 'punctate-striate' in the usual sense; the grooves are at least as wide as the lirae, usually a little wider, and are divided by axial pliculae into squarish foveolae; at the base of last whorl the sculpture is sometimes almost cancellate. Up to 15·5 × 7·5 mm. White, periostracum orange-brown.

Radula large, length 3 mm., width when spread out 4 mm. in shell 15 mm. long; 12 rows, no central plate, 4 widely spaced longitudinal series of small lateral plates, increasing in size outwards, base narrow, with 3–4 cusps, a single large marginal plate consisting of a long curved spine on a short base; when *in situ* the marginals fold inwards over the laterals.

Fossil: Pleistocene, Sedgefield (A. R. H. Martin); Knysna (S. Afr. Mus.); Zwartkops (Schwarz 1910).

Port Elizabeth (Sowerby). 34° 54′ S., 19° 37′ E., 80 metres, 1 living (von Martens). False Bay, 27–28 metres (U.C.T.).

Off Knysna, 30 fathoms, 1 dead; off Cape Recife, 20 fathoms, 1 dead;

34° 5′ S., 25° 38′ E., 51 fathoms, 1 dead; off Great Fish Point, 40 fathoms, 1 living; off O'Neil Peak (Zululand), 90 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Fam. **Ringiculidae**

Ringicula turtoni Bartsch

Ringicula australis (*non* Hinds) Sowerby, 1892, p. 25; Smith, 1910, p. 184; Schwarz, 1910, p. 114.
Ringicula turtoni Bartsch, 1915, p. 7, pl. 1, fig. 4; Tomlin, 1931 *a*, p. 442.
Ringicula africana Bartsch, 1915, p. 7, pl. 33, fig. 4; Tomlin, 1931 *a*, p. 442.
Ringicula agulhasensis Thiele, 1925, p. 261, pl. 42 (30), fig. 16.
Ringicula scalaris Turton, 1932, p. 5, pl. 1, no. 46.
Ringicula solida Turton, 1932, p. 6, pl. 1, no. 47.

The study of nearly 200 specimens, mostly from the *Pieter Faure* bottom-samples, in various stages of growth and of abrasion, convinces me that only one species occurs in South African waters.

Juveniles are multistriate (*agulhasensis*), adults paucistriate (*turtoni*), though more than 6–7 (*turtoni*, Bartsch's figure; also *scalaris*) may persist on to the last whorl; sometimes only 2 or 3 persist on the lower part of the whorls (just above the suture) which is the part less exposed to wear than the periphery (*africana*).

The shape of the adult is usually rather squat (*turtoni*), especially when the outer lip is well thickened; but high-spired individuals (*africana*, *solida*) occur; *scalaris* of course is an immature example.

R. acutispira Turton is not a *Ringicula*, but probably a worn *Actaeocina*, or perhaps an *Actaeon*.

Up to 5·5 × 3·3 mm. A particularly stalwart high-spired adult measures 6·5 × 3·5 mm. (appropriately it came from off Stalwart Point north of Gr. Fish Point, 53 fathoms).

Fossil: Pleistocene, Sedgefield (A. R. H. Martin); Zwartkops (Schwarz 1910).

Dead, but including fresh and glossy, examples were obtained at numerous localities extending from off O'Neil Peak and Tugela River (Zululand) to Algoa Bay and St. Francis Bay, in depths of 22–90 fathoms. (S. Afr. Mus. A9391–A9402, P.F. coll.).

There are no records from any locality farther west; Dr. Muir did not find it at Still Bay. Recently, however, U.C.T. obtained a dead worn specimen at 34° 17′ S., 17° 53′ E., 320 metres.

Remarks. Formerly recorded as *australis* Hinds. Thiele (1925, p. 262, pl. 42 (30), fig. 23) recorded the latter species from the Zanzibar Channel and from the East Indies (p. 348); his figure closely resembles an *africana*. Future investigation of the East African area may possibly show that *australis* extends farther south, linking up with Zululand, and that the South African specimens were correctly named *australis*.

R. aethiopica von Martens 1903 (also Thiele 1925) from the East coast of Africa is another form which might be compared when more material is available.

Incidentally *R. congoensis* Thiele (1925, p. 260, pl. 42 (30), fig. 15) looks remarkably like the West African *conformis* Monterosato as figured by Nicklès (1950, p. 135, fig. 277).

Fam. **Atyidae**

Haminea alfredensis Bartsch

Fig. 28 *g*

Haminea alfredensis Bartsch, 1915, p. 6, pl. 1, fig. 5.

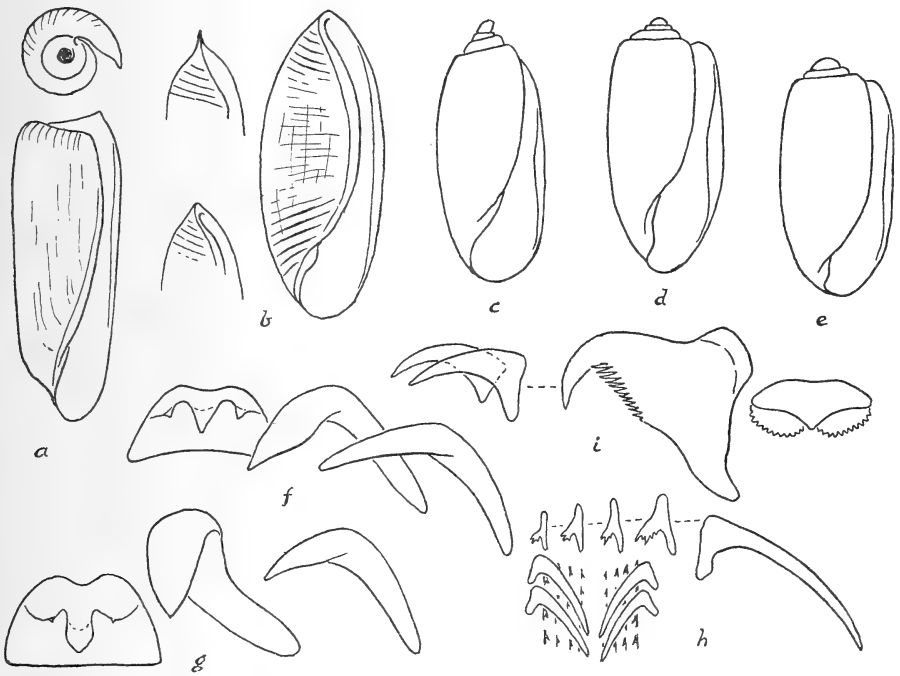

Fig. 28. *a*, *Retusa natalensis* n. sp., with apical view; *b*, *Volvula mutabilis* n. sp., with apex of juv. 2·75 mm., and immature shell 3 mm.; *c*, *Actaeocina natalensis* n. sp.; *d*, *Actaeocina* species A; *e*, *Actaeocina* species B. Radula plates of: *f*, *Haminea gracilis* Sow.; *g*, *H. alfredensis* Bartsch; *h*, *Pseudactaeon albus* (Sow.), with portion of radula showing lateral plates in situ (semidiagrammatic); *i*, *Cylichna tubulosa* Gould.

This may have to become a synonym of *natalensis* (Krss.). Turton seemed to think that the pear-shaped *alfredensis* graded into the oval *natalensis*. The pear shape is more noticeable in the larger shells; juveniles 3·5–4 mm. long are oval.

But neither in these juveniles nor in any specimen I have seen does the posterior margin of the outer lip extend so prominently beyond the apex as in Krauss's figure. I have seen no Natal specimens.

The largest specimen measures 19 × 13 mm., and came from Little Brak River estuary, near Mossel Bay.

Stomach plates semicircular, with transverse pleats (cf. Thiele, 1929, fig. 486, *natalensis*, after Bergh).

Radula with *c.* 25 rows, central plate notched on front margin, sharp median cusp flanked by a rounded lobe bearing when unworn a small cusp, 23–26 hamate lateral plates, decreasing in size outwards, 1st lateral not dentate.

False Bay, Still Bay, Mossel Bay, Plettenberg Bay, Port Alfred (S. Afr. Mus.).

Specimens with egg-ribbons have been found in the estuary of the Silvermine River (Fish Hoek, False Bay) in March.

Haminea gracilis Sow.

Fig. 28*f*

Haminea gracilis Sowerby, 1897, p. 20, pl. 6, fig. 16; von Martens, 1903, p. 50.

More cylindrical than *alfredensis-natalensis*, nearly parallel-sided, with extremely fine spiral striae, some of the growth-lines stronger than others, subpliculose. 11 × 6·5 mm. Pale straw- or amber-coloured.

Radula with *c.* 30 rows, central plate feebly indented on front margin, sharp median cusp flanked by a rounded lobe carrying when unworn a small cusp, 12–15 similar, simple (non-serrate), curved lateral plates.

Durban (Sowerby). 34° 21′ S., 20° 22′ E., 117 metres, 1 living (von Martens). Karridene (south of Durban) (S. Afr. Mus.). St. Lucia Bay, 1 living (U.C.T.).

Remarks. The *Valdivia* shell had the greatest width nearer the middle than in Sowerby's figure, and von Martens was unable to find any spiral striation.

Fam. **Aceridae**

Acera soluta Gmelin

This Indian Ocean species was recorded by Smith (1903, p. 357) from Durban. I have received living specimens from Port Elizabeth and Knysna.

Fossil: Pleistocene, Port Elizabeth. 'From the immense numbers of the Akerae found in it, I have termed it the *Akera-stratum*' (Stow, 1871, p. 517).

Fam. **Retusidae**

Retusa truncatula (Brug.)

Retusa trancatula Smith, 1904, p. 38; Bartsch, 1915, p. 4; Turton, 1932, p. 3, pl. 1, no. 27.
Retusa atlantica Thiele, 1925, p. 269, pl. 43 (31), fig. xi (? fig. 12).

Thiele's fig. 11 of a South African shell seems to portray the same species as that previously identified by Smith and Bartsch as the European *truncatula*. It came probably from Simon's Bay where the *Gauss* obtained other shells described by Thiele (1912). The specimen fig. 12 from Great Fish Bay, Angola, however, seems somewhat different; but if the South African shells are really the European species, the locality links South Africa with West Africa.

I can find no differences between South African and British shells. The apical cavity is wide, and the axial riblets show on the sunken penultimate whorl.

Fossil: Pleistocene, raised beach Knysna (S. Afr. Mus.).

Port Alfred (Smith, Bartsch, Turton). Still Bay, 0·6 up to 2 mm. (S. Afr. Mus. Muir coll.).

Retusa agulhasensis Thiele

Retusa agulhasensis Thiele, 1925, p. 270, pl. 43 (31), figs. 10, 10*a*.

Slightly barrel-shaped, apical cavity narrow, columella with pleat, no axial sculpture, 4 spiral striae on base. 4·5 × 2·3 mm.

35° 16′ S., 22° 26′ E., 155 metres, 2 (Thiele).

No examples of this species were found in the *Pieter Faure* bottom-samples.

Retusa natalensis n.sp.

Fig. 28 *a*

Parallel-sided, slightly narrower anteriorly, apical cavity narrow, columella pleat weak, outer lip carinate on top, not expanded anteriorly, aperture posteriorly rectangular, no sculpture, fine growth-lines which are best seen on the shoulder. 4 × 1·5 mm.

Off Umkomaas River (Natal), 40 fathoms, 2 (S. Afr. Mus. A9409, P.F. coll.).

Retusa cf. *nicobarica* Thiele

Retusa nicobarica Thiele, 1925, p. 270, pl. 43 (31), fig. 13.

Egg-shaped, columella with blunt projection. The present specimens agree with Thiele's description and figure, and are of the same size: 3·3 × 2 mm.

If Thiele had recorded specimens also from the Zanzibar Channel, I would have had no hesitation in identifying the Natal–Zululand shells with his species; but it is better to record them as only comparable with *nicobarica*.

Off Cape Natal, 85 fathoms, 9 dead; off Cape Vidal (Zululand), 85–100 fathoms, 4 dead (S. Afr. Mus. A9420, A9421, P.F. coll.).

Distribution. Nicobars (7° 48′ N., 93° 7′ E.), 804 metres (Thiele).

Retusa (*Pyrunculus*) cf. *semen* Thiele

Retusa semen Thiele, 1925, p. 271, pl. 43 (31), fig. 17.

Two dead but fresh specimens agreeing with Thiele's species.

Off Hood Point (East London area), 49 fathoms, 2 (S. Afr. Mus. A9408, P.F. coll.).

Distribution. Zanzibar Channel, 463 metres; East Indies, 470 metres (Thiele).

Volvula pia Thiele

Volvula pia Thiele, 1925, p. 272, pl. 43 (31), fig. 21.

Apex rounded, with very small apical pit, no sculpture. 2·6 × 1·1 mm. 34° 51′ S., 19° 37′ E., 80 metres, 1 (Thiele).
Not taken by the *Pieter Faure*.

Volvula mutabilis n.sp.

Fig. 28 *b*

Nearly symmetrically oval, apex in immature sharply, in adult bluntly pointed, 5–6 distinct though fine spiral striae at apex and base, middle of whorl with extremely fine spiral striae, growth-lines fine, columella with pleat, aperture not expanded anteriorly. Up to 4 × 1·75 mm.

Off Umhloti River (Natal), 40 fathoms, 3 adult, 1 immature (Types); off Cape Natal (Durban), 54 fathoms, 1 adult, 1 immature; off Tongaat River, 36 fathoms, 1 immature (S. Afr. Mus. A9410 (Types), A9411, A9412, P.F. coll.).

Remarks. Although an acute, thorn-like apex is usually regarded as a specific character, I think the present series, small as it is, shows that the pointed apex of the juvenile gradually becomes blunter in the adult.

The smallest (2·75 mm. long) of the present immature shells closely resembles *fortis* Thiele 1925 from the East Indies, but the latter is larger and is smooth in the middle between the spiral striae at each end. But the adult is nearer in shape to *suavis* Thiele 1925 from Angola.

Fam. **Scaphandridae**

Scaphander punctato-striatus (Mighels)

Scaphander punctato-striatus Sars, 1878, p. 292, pl. 18, fig. 6 (shell), pl. xi, fig. 14 (radula); Watson, 1886, p. 642; Sowerby, 1903, p. 232.

Sowerby saw only 2 specimens; and returned the one from 166 fathoms. This was a dead specimen, but still retains most of the periostracum. A similar specimen was obtained in 180 fathoms; 1 living specimen was obtained in 190 fathoms, and 2 in 755 fathoms.

Additional localities: Cape Point N. 50° E. 18 miles, 180 fathoms, 1 dead but fresh; off Table Bay, 190 fathoms, 1 living; Cape Point NE. × E. ¼ E. 38 miles, 755 fathoms, 2 living; Cape Point NE. × E. ¼ E. 40 miles, 800–900 fathoms, 3 dead; Cape Point N. 58° E. 49 miles, 900+ fathoms, 1 dead; Cape Point NE. × E. ¼ E. 46 miles, 900+ fathoms, 5 dead; Cape Point N. 77° E., 660 fathoms, 2 dead; Cape Point NE. ¾ E. 40 miles, 720–800 fathoms, 2 dead; Cape Point N. 70° E. 40 miles, 800 fathoms, 3 dead (S. Afr. Mus. P.F. coll.).

One living juvenile, 9 mm. long, was recently (1959) obtained by Mr.

Talbot: 33° 45½′ S., 16° 23½′ E., 1,480 fathoms. It has the characteristic sculpture, but the apex is visible, not covered by the advancing outer lip. Radula as in *Scaphander*.

Distribution. North Atlantic, West Indies, Mediterranean, Azores.

Scaphander sp.

Four specimens, the largest 7 × 4 mm., are left undetermined pending further and better material. Surface with impressed spiral striae which are minutely punctate.

Off Cape Natal (Durban), 85 fathoms, 1 broken; off Cape Vidal (Zululand), 80–100 fathoms, 2 dead; off O'Neil Peak (Zululand), 90 fathoms, one dead (S. Afr. Mus. A9403–5, P.F. coll.).

Bullaria ampulla (Linn.)

Bullaria ampulla Linn., Turton, 1932, p. 5, pl. 1, no. 39 (juv. 1·8 mm. long).

Fossil: Pleistocene, Little Brak River (Smith in Rogers, 1906*b*); Sedgefield (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.); Port Elizabeth (Johnson, 1904, Schwarz, 1910).

Fresh specimens, including juveniles 7 mm. long, are washed up on the beach at Still Bay (Dr. Muir); but S. Afr. Mus. has no records from farther west.

Gen. Actaeocina Gray (syn. *Tornatina* A. Adams)

Only a dozen specimens were obtained from the *Pieter Faure* bottom-samples; none of them is with certainty referable to *nitens* (Thiele) 1925 or *agulhasensis* (Thiele) 1925. Thiele's *nitens* from 35° 19′ S., 20° 12′ E., 126 metres, is not unlike the Natal *meridionalis* (Smith) 1902; *agulhasensis* from 35° 16′ S., 22° 26′ E., 155 metres, appears to have the columella pleat nearer the base, and an oblique suture.

Provisional synopsis

Protoconch projecting prominently
- Sides parallel; suture horizontal .. .. .. *smithi*
- Slightly ovate; suture oblique .. .. .. *natalensis*

Protoconch sunken, hemispherical
- Columella pleat at lower one-third
  - Suture horizontal .. .. *meridionalis nitens*
- Columella pleat at lower one-quarter
  - Protoconch moderate
    - Suture oblique .. .. *agulhasensis*
    - Suture horizontal .. .. species A
  - Protoconch large (0·25 mm. diam.) .. .. species B

Actaeocina smithi Bartsch

Tornatina voluta (*non* Q. & G.) Sowerby, 1892, p. 52.
Actaeocina smithi Bartsch, 1915, p. 4, pl. 1, fig. 9; Turton, 1932, p. 3.

See synopsis. Extremely fine spiral striae at base. Up to 5·5 × 2·5 mm.

Port Elizabeth (Sowerby); Port Alfred (Bartsch); East London (S. Afr. Mus. coll. R. M. Lightfoot); off Cove Rock (East London), 22 fathoms; and Algoa Bay, 33 fathoms (S. Afr. Mus. P.F. coll.).

Actaeocina natalensis n.sp.

Fig. 28 *c*

Protoconch prominently projecting, shape of shell slightly ovate, suture oblique. 5 × 2 mm.

Off Illovo River (Natal), 27–30 fathoms, 2 dead (S. Afr. Mus. A9388, P.F. coll.).

Actaeocina sp. A

Fig. 28 *d*

Agrees with *agulhasensis* in having the columella pleat low down, but has suture horizontal, i.e. the top of the outer lip is near the top of preceding whorl. 3·5 × 1·5 mm.

Off Illovo River (Natal), 27–30 fathoms, 1 dead (S. Afr. Mus. A9389, P.F. coll.).

Actaeocina sp. B

Fig. 28 *e*

Protoconch conspicuously large, diam. 0·25 mm., sunken, hemispherical, shape of shell slightly ovate, suture horizontal, columella pleat low down. 2·5 × 1·25 mm.

34° 27′ S., 25° 42′ E., 256 fathoms, 2 dead; 33° 3′ S., 27° 57′ E., 32 fathoms, 1 dead (S. Afr. Mus. A9390 and A9406, P.F. coll.).

Cylichna tubulosa Gould

Fig. 28 *i*

Cylichna tubulosa Gould, 1859, p. 40; Bartsch, 1915, p. 5, pl. 3, fig. 5.
Cylichna cylindracea (*non* Pennant) Sowerby, 1892, p. 52.
Cylichna affinis Thiele, 1925, p. 275, pl. 44 (32), fig. 4.
Cylichna algoensis Thiele, 1925, p. 275, pl. 44 (32), fig. 5.

Shell cylindrical, aperture not expanded anteriorly. Very fine wavy orange-brown spiral lines across whole whorl from apex to base, or reduced to 5–6 at top of whorl; usually a narrow orange-brown band outside the columella. Growth-lines fine, some of them a little stronger, but scarcely pliculose. Up to 12 mm. (Turton); 9·3 × 3·3 mm. (S. Afr. Mus.).

Radula with 20 rows, central plate with finely ctenate cutting-edge,

lateral plate large, uncinate, ctenate on inner margin, 2 simple hamate marginal plates.

Simon's Bay (False Bay) (Gould, Bartsch); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton). St. Francis Bay and Algoa Bay (Thiele).

False Bay, 14 fathoms, 1 living, 1 dead; 34° 5′ S., 25° 55′ E., 67 fathoms, 3 dead; off Keiskamma Point, 33 fathoms, 2 dead; off Cove Rock (East London), 22 fathoms, 3 dead; off Cape Natal (Durban), 47 fathoms, 4 dead; off Umhloti River, 40 fathoms, 3 dead (S. Afr. Mus. A6551, A9416–8, A5583, A9419, P.F. coll.).

Plettenberg Bay, 26–53 fathoms; and 36° 26′ S., 21° 11′ E., 100 fathoms (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. One of the Cape Natal shells is large (9·3 mm.); all the others are juvenile (2·5–5 mm.).

C. bistriata Tomlin 1920, with 2 spiral striae at top of whorl, seems distinct in having the top of the outer lip projecting above the apex.

Cylichna dulcis Thiele

Cylichna dulcis Thiele, 1925, p. 275, pl. 44 (32), fig. 6.

Shell narrowing at base, less conspicuously tubular than *tubulosa*, outer lip anteriorly more strongly curved than the bluntly rounded margin of *tubulosa*; columella larger, and less oblique to the axis. Surface very finely spirally striate (Thiele); surface worn in present specimen. 4 × 1·75 mm. (S. Afr. Mus.); 3·6 × 1·4 mm. (Thiele).

35° 26′ S., 20° 56′ E., 1 (Thiele).

Off Illovo River (Natal), 27–30 fathoms, 1 dead (S. Afr. Mus. A9414, P.F. coll.).

Roxania utriculus (Brocchi)

Atys utriculus Brocchi, Sars, 1878, pl. xi, figs. 2*a*, *b* (radula).
Roxania simillima Thiele, 1925, p. 277, pl. 44 (32), fig. 17, and pl. 46 (34), fig. xi (radula).

Whole whorl closely covered with spiral series of punctae, but with impressed punctate striae only at top and base. Up to 12 × 8 mm.

St. Francis Bay, 80 metres; Algoa Bay; 35° 29′ S., 21° 3′ E., 102 metres; 35° 21′ S., 20° 22′ E., 117 metres (Thiele).

Off Kowie (Port Alfred), 40 fathoms, 1 dead; Algoa Bay, 52 fathoms, 1 dead; False Bay, 24 fathoms, 1 living (S. Afr. Mus. A5646–8, P.F. coll.).

Distribution. Great Fish Bay, Angola (Thiele). Europe.

Remarks. The three *Pieter Faure* specimens were identified by Sowerby as *Atys* (*Roxania*) *utriculus* Brocchi. The *Valdivia* shells are doubtless conspecific; and as Thiele recorded the species also from Angola it will probably be found at other localities on the west coast of Africa linking up with Europe.

Thiele (1925, p. 265) accepted *Roxania* with subgen. *Sabatia* in the

Scaphandridae. In 1929 (p. 391), however, he regarded *Roxania* Gray 1847 as preoccupied by *Roxana* Stephens 1834, and adopted *Sabatia* Bellardi as the generic name.

Fam. **Philinidae**

Gen. Philine Ascanius

The species of this genus cannot be diagnosed from the shell alone; giving names to isolated shells is useless. At present there is only one *fully diagnosed* species in South African waters: *aperta*. *P. berghi* is known only from a single specimen, the shell of which was not specifically described (Bergh: '. . . of usual form').

It was pure assumption on the part of Bartsch (1915) and Turton (1932) to identify Port Alfred shells as *berghi*. Turton's figure (1932, pl. 1, no. 66) shows a prominent, almost scabrous, liration on the shell.

P. minuta Thiele 1925 has a finely striate shell, but is only 2 mm. long, and is surely a juvenile.

Philine aperta (Linn.)

Philine aperta Bergh, 1907, p. 24, pl. 5, figs. 5–10; O'Donoghue, 1929, p. 7, pl. 1, figs. 1–7.

As defined by Bergh this species has stomach plates, radula without marginal plates (formula 1.0.1), and a smooth non-striated shell showing growth-lines only. Shell: up to 40 × 31 mm.

False Bay, 10–18 fathoms; off Cape Natal and Umvoti River (Bergh).

False Bay (S. Afr. Mus.; also U.C.T.). Port Elizabeth (P.E. Museum).

Remarks. Presumably Bergh tested the anatomical features of the Natal examples, and found them corresponding with the Cape examples.

Fossil examples, attributed to *aperta*, have been recorded from: Pleistocene, Bogenfels (Haughton, 1932); Sedgefield (A. R. H. Martin); Port Elizabeth (Johnson, 1904; Schwarz, 1910).

Philine berghi Smith

Philine capensis (*non* Pfr.) Bergh, 1907, p. 27, pl. 5, figs. 11–15.
Philine berghi Smith, 1910, p. 184.
Philine berghii Smith, O'Donoghue, 1929, p. 10.

With stomach plates, radula with 2 marginal plates (formula 2.1.0.1.2). Shell presumably smooth; if it had been striated Bergh would surely have mentioned the fact; he figured only an apical view.

The locality as quoted by Bergh is misleading: the correct locality is Cape Point bearing SW. × W., i.e. *within* False Bay ($4\frac{1}{2}$ miles 'off Cape Point' in a direction SW. × W. would be outside False Bay).

Philine sp.

For purposes of record a single shell from off O'Neil Peak (Zululand), 90 fathoms (S. Afr. Mus. A9385, P.F. coll.), may be mentioned. Spirally striate, but finer than in Turton's figure, pl. 1, no. 66. 10 × 7 mm.

Philine sp.

Philine berghi (*non* Smith) Turton, 1932, p. 8, pl. 1, no. 66.

Dr. Muir obtained at Still Bay 4 very juvenile shells, 0·8–1 mm. long, which correspond with Turton's figure. The dark band covers 7–8 spiral lirae which are catenulate (see Turton's figure and compare Sars, 1878, pls. 18 and 26). In Turton's figure of a 5 mm. shell the band covers about 14 lirae.

Fam. **Gastropteridae**

Gastropteron sp.

Two specimens of a species of this genus were taken by Dr. F. H. Talbot (Marine Biologist, South African Museum) at the following localities: 33° 52′ S., 16° 51′ E., 1,380–1,520 fathoms; 34° 05′ S., 16° 58′ E., 1,470–1,490 fathoms (S. Afr. Mus. A9833, A9847).

Without material for comparison, I attach no specific name to these specimens. Eyes absent. Radula with 15 rows, inner plates not serrulate.

POLYPLACOPHORA

Krauss, 1848, pp. 36–43; Thiele, 1906 *b*, pp. 328–330 and 335, 336; Nierstrasz, 1906, pp. 487–520, pl. 26, figs. 1–29, pl. 27, figs. 30–53 (explanation of figures on pp. 518–520 incorrect); Ashby, 1928, pp. 76–93, pls. 6–8; Thiele, 1929, pp. 1–22; Ashby, 1931, pp. 1–59, pls. 1–7 and 2 text-figs.

The more important papers dealing with South African Chitons are listed above. Ashby made no mention of Nierstrasz's work (except one bibliographic reference to one species); references are therefore given here to all the species recorded by Nierstrasz.

For convenience the arrangement of the families and genera here follows Ashby (1931), which differs slightly from that of Thiele (1929).

Ashby's 1928 and 1931 photographic illustrations are of unequal quality, some are good, others quite useless for showing details.

The radula throughout the group consists of 17 plates in each row, with only minor modifications in some of the plates.

A study of the aesthetes and eyes on the valves of South African Chitons has not yet been undertaken.

The breeding habits of South African Chitons also await investigation. One species, *C. nigrovirescens*, is known to shelter its young under the mantle (perinotum). Plate (1899, p. 100, and 1901, p. 477) recorded two similar cases: *I. imitator* from South America and *C. polii* from the Mediterranean. He also recorded (*SB. Ak. Wiss. Berlin*, 1898, p. 217, and 1899, pp. 159–161, figs. 278, 279) a case of viviparity: *Callistochiton viviparus* Plate. Recently *Ischnochiton hewitti* has been observed to shelter its young.

Fam. **Cryptoplacidae**

Thiele, 1929, p. 12.
Ashby, 1931, pp. 7, 54 (*Acanthochitonidae*).

Ashby (1926, p. 10) argued that because neither *Cryptoconchus* Burrows 1815, Guilding 1829, nor *Cryptoplax* Blainv. 1818 were recognized as 'typical' genera, whereas *Acanthochiton* Grey 1821 (emend. Hermannsen 1846) *Acanthochites* Leach, Risso 1826 was so recognized, the family name must be derived (International Rules) from that of the 'type' genus. Straightforward priority, untrammelled with questions of phylogeny or specialization (on which opinions may differ from time to time) seems preferable.

Iredale (1914, pp. 128, 129) suggested *Cryptoconchidae*, *Cryptoconchus* Burrows 1815 being the earliest name, if its use by Burrows were recognized.

Acanthochiton garnoti (Blainv.)

Acanthochites garnoti Blainv., Nierstrasz, 1906, p. 498, pl. 26, figs. 25–29, pl. 27, fig. 30.
Acanthochiton garnoti Blainv., Ashby, 1931, p. 7, pl. 1, figs. 1–4.
Acanthochiton turtoni Ashby, 1931, p. 8, pl. 1, fig. 5, pl. 2, figs. 6–8.
Acanthochiton turtoni var. *tenuigranosus* Ashby, 1931, p. 10, pl. 2, fig. 13 (useless!).

Valves much subject to corrosion. Low-arched (*garnoti*) and subcarinate (*turtoni*) examples can be found in the same locality.

Sculpture on unworn valves: dorsal area finely longitudinally lirate, pleural-lateral area with close-set flattened circular or oval pustules.

The two slits on the tail valve are widely separated. Ashby said the tail valves of *garnoti* and *turtoni* differed in shape; but his figures (pl. 1, fig 4, and pl. 2, fig. 8, respectively) are taken from different viewpoints, and that of *turtoni* has been printed inverted.

Up to 43 mm. (Nierstrasz). Usually brown or greenish-brown, with dark median stripe flanked by 2 anteriorly diverging white or pale stripes; girdle dull greenish, with bundles of pale green bristles.

One Cape Peninsula specimen (U.C.T.) has the girdle white with orange-chestnut bristles, and the small spicules, especially at head and tail ends, black.

A 10-mm. specimen from Algoa Bay (U.C.T.) has the valves deep orange, the girdle lemon-yellow, the bristles pinkish with white tips.

Radula with *c.* 60 rows, the major (or hooked) lateral plate tricuspid.

Saldanha Bay, Table Bay, and False Bay to Port St. Johns (*auct.*, S. Afr. Mus., and U.C.T.).

Remarks. Von Martens (1880, p. 300) recorded *garnoti* from Mauritius, and suggested that the South African *fascicularis* (Linn.) might be the same species. The latter is recorded from Mauretania and Senegal (Leloup, 1937 *b*).

Acanthochiton variegatus Nierstrasz

Acanthochiton variegatus Nierstrasz, 1906, p. 500, pl. 27, figs. 31–37.

Illovo or Isipingo (Natal) (Nierstrasz). One specimen 6 × 2·5 mm. Sculpture as in *garnoti*. According to the description and fig. 33, the tail valve has 2 slits which are relatively close together, and thus seem to offer a differential character separating the species from *garnoti*. This may, however, be a juvenile character. As in *garnoti* there are 18 bundles of bristles.

In spite of Nierstrasz's express statement that the tail valve had only 2 slits and was therefore an *Acanthochiton* s. str., Ashby made this species a synonym of *Notoplax productus*.

Notoplax productus (Pilsbry)

Notoplax productus Pilsbry, Ashby, 1931, p. 10, pl. 1, figs. 9–12 (part only of synonymy).

Tail valve with 4 slits (Ashby), but 6 seems more usual.

As preserved up to 50–55 mm. (U.C.T.). Valves dull pinkish-orange, or pink and white, or the middle valves orange; girdle rose mottled with white, or bright orange, or crimson; underside of girdle pinkish or greyish (U.C.T.).

Jeffreys Bay (Ashby); False Bay, Danger Point, and Algoa Bay (U.C.T.).

Remarks. The convexity of the tail valve and the plane of the insertion plate may perhaps change with age. In a young specimen with width of tegmentum (sculptured part) of median valve 4 mm. the tail valve is slightly convex, the insertion plate is in a plane at 45° with it, and is fully visible in dorsal view. In specimens with valve width 6, 7 and 8 mm. (and larger ones) the insertion plate is nearly or quite vertical and scarcely visible in dorsal view. The convexity of the tail valve becomes more conspicuous in larger specimens. But many more very juvenile specimens must be examined before a change in the plane of the insertion plate can be regarded as normal.

Another feature which might be determined on living material is whether the width of the girdle relatively to the visible, sculptured width of the median valve increases with age.

Craspedochiton (*Thaumastochiton*) *isipingoensis* (Sykes)

Fig. 29 *a*, *b*

Onithochiton ? isipingoensis Sykes, 1901, p. 259, fig. (median and tail valves inverted).
Thaumastochiton isipingoensis Sykes, Thiele, 1909*b*, p. 116.
Craspedochiton (*Thamastochiton*) *isipingoensis* Sykes, Iredale, 1914, p. 124; Tomlin, 1926, p. 297.
Notoplax productus Pilsbry part, Ashby, 1931, p. 10.
Notoplax umgaziana Koch, 1951, p. 211, pls. 23–25.

A specimen, identified by Tomlin, from off Umkomaas, Natal, 40 fathoms (S. Afr. Mus. A5339, P.F. coll.), has been partly damaged. The girdle shows 4 obscure pits in front of the head valve, and others along the sides. The sculpture consists of close-set flattened pustulate tubercles, increasing in size outwards; on head valve 5 larger tubercles around the front margin. Dorsal area of median valves with 2 ribs forming a V, enclosing a few pustules which form transverse connecting bars.

Head valve with 5 slits (but damaged), middle valves with one slit, tail valve with 6 slits and some irregular crenulations, the insertion plate descending vertically, in fact sloping slightly forwards (fig. 29*b*).

As preserved approximately 18 mm. long.

Isipingo (Natal) (Sykes); Umgazana (south of Port St. Johns (Koch). 30° 47′ S., 30° 27′ E. (off Port Shepstone, Natal), 36 metres (U.C.T.).

Remarks. Ashby includes Sykes's species in the synonymy of *Notoplax productus*. The similarity in the dorsal sculpture certainly supports this view, and I am strongly inclined to agree with Ashby. The greater convexity of the tail valve in *isipingoensis*, becoming conical and upturned in the *umgaziana* form, is scarcely an impressive difference.

Iredale did not mention *N. productus*, but after examining Sykes's Type in the British Museum agreed with Thiele that the South African species was closely related to the Mauritian *möbiusi* Thiele 1909 (see Thiele, 1929, figs. 6, 7).

Although considerably larger: 48 × 35 mm., *Notoplax umgaziana* Koch seems to be synonymous. In dorsal view Koch's and Sykes's figures of the tail valve are much alike, the insertion plate invisible. Sykes said the tail valve

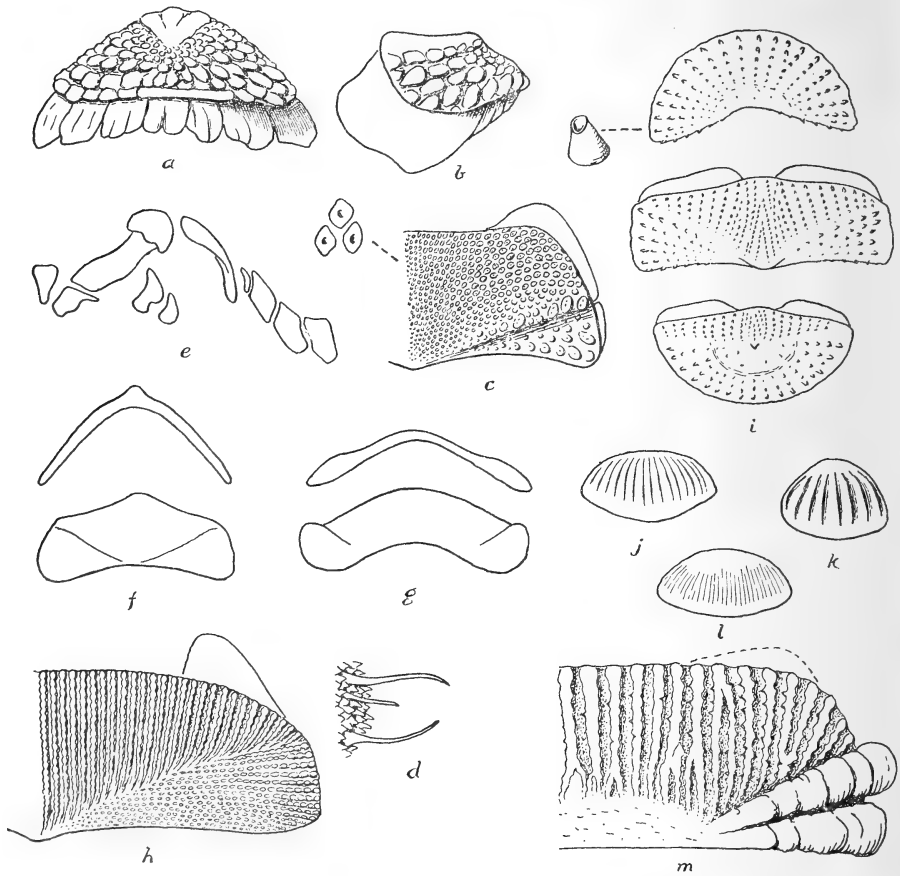

FIG. 29. *a*, *b*, *Thaumastochiton isipingoensis* (Sykes), posterior and lateral views of tail valve; *c*, *d*, *e*, *Plaxiphora parva* Nierstrasz, right half of middle valve, portion of girdle, and radula plates; *f*, *g*, *Dinoplax gigas* (Gmelin), dorsal view, with section, of middle valve of high and low shells, angle of divergence 85° and 135° respectively; *h*, *Lepidopleurus chariessa* n. sp., right half of middle valve; *i*, *Chaetopleura pomarium* n. sp., head, middle, and tail valves; *j*, *k*, *l*, girdle scales of *Ischnochiton textilis* (Gray), *I. hewitti* Ashby, and *I. oniscus* (Krss.) respectively; *m*, *Chiton ashbyi* n. sp., right half of middle valve (sutural lamina abraded).

was 'obtusely beaked behind'; Koch said 'markedly turned up' and showed it thus in pl. 24, fig. 3 and pl. 25, fig. 6 *b*. The original mucro seems to get pushed up by later growth. There were no specimens in the Transvaal Museum in 1959; and Mr. Koch informed me that his mollusc collection was in storage and not available for re-examination.

Recently (1963), however, I have seen a specimen from The Haven (between East London and Port St. Johns) collected by U.C.T., which is obviously *umgaziana*. The girdle has a ridge as in Koch's figure (pl. 23); this is not distinctive, it occurs in *productus* and in *möbiusi*. The width of the girdle almost equals the visible width (sculptured) of median valve. The over-all length (slightly curved) is 50 mm. (perhaps 55 mm. when alive), width 42 mm.; length of shell 40 mm., width of median valve (sculptured part) 15 mm. The tail valve has the mucro upturned, and the insertion plate with 5 or 6 irregular slits is not visible in dorsal view.

I feel sure that *umgaziana* is only the adult of *isipingoensis*, and the latter is very likely a synonym of *möbiusi*. What is the difference between *möbiusi* and *productus*?

I have also seen a specimen 40 × 27 mm. (girdle slightly shrunken) from Xora (Elliotdale Division) (between The Haven and Umgazana) (C. Walker, 1961). The tail valve is obtusely beaked behind, but not upturned. Also one 40 mm. in length (inc. girdle) with upturned tail valve, from Kei River mouth (D. H. Kennelly).

Cryptoplax sykesi Thiele

Cryptoplax cf. *striatus* Lam., Sykes, 1900, p. 164, figs. 2–5.
Cryptoplax sykesi Thiele, 1909*b*, p. 53, pl. 6, figs. 83–86; Ashby, 1931, p. 12, text-fig. 2 *a–d* (copy of Sykes's figs. 2–5).

Umkomaas (Natal) (Sykes).

Remarks. Sykes (1907, p. 33) compared specimens from Zanzibar with the Australian *striatus* Lam.

Fam. **Lepidopleuridae**

Thiele, 1929, p. 6.

Lepidopleurus sykesi (Sow.)

Chiton (*Hanleya*) *sykesi* Sowerby, 1903, p. 225, pl. 5, fig. 13.
Lepidopleurus sykesi Sow., Thiele, 1906*b*, p. 328, pl. 29, figs. 6–8; Ashby, 1931, p. 15, pl. 2, figs. 16–19.

Some examples are more strongly ridged than described by Thiele or Ashby, having an angle of divergence of 80°. Middle valve up to width 8·5, length 4·5 mm.

Off Cape Point, 210 and 166 fathoms (Sowerby; P.F. coll.).

Off Cape Point, west coast of Cape Peninsula, and Table Bay, 125–230 fathoms, living (Ashby, S. Afr. Mus. P.F. coll.).

Type in the South African Museum (A5342).

33° 41′ S., 18° 03′ E., 178 metres; 34° 33′ S., 18° 21′ E., 318 metres; 34° 20′ S., 18° 36′ E., 70 metres (Thiele).

31° 50′ S., 16° 50′ E., 330 metres (U.C.T.).

Remarks. At a station NW. of Table Bay, 190 fathoms, the *Pieter Faure* obtained about 65 living examples.

Lepidopleurus chariessa n.sp.

Fig. 29 *h*

Head valve with *c*. 60 fine radiating moniliform pliculae (or lines of granules). Middle valves ridged, dorsal-pleural area with *c*. 50 fine moniliform pliculae, lateral area not raised (or only very slightly), distinguishable only from the dorsal-pleural area by the alteration in direction of the pliculae, and even this is not very clear at the margin, with close-set round granules in quincunx, becoming more or less radial near margin; growth-lines only near margin, and feeble. Tail valve with umbo slightly in front of centre, area in front with *c*. 45 fine longitudinal moniliform pliculae, area behind umbo with *c*. 60 radiating moniliform pliculae.

No insertion plates. Girdle with fine spicules (but not in good condition).

Animal mostly decomposed; enough flesh remained to hold the valves together, but no radula was obtained.

Width of median valve 5, length 2·3 mm. Angle of divergence *c*. 105°.

Off Cape St. Blaize, 125 fathoms, 2 living (S. Afr. Mus. A9338, P.F. coll.).

Remarks. Not so strongly ridged as *sykesi*; sculpture, though fine and delicate, not so fine as in *sykesi*, the latter having for example on head valve *c*. 80 rows of granules; moreover the sculpture is definitely more radial and longitudinal than quincuncial.

The feminine form for the specific name is used because more euphonious than the neuter 'charien'.

Fam. **Lepidochitonidae**

Thiele, 1929, p. 7 (Lepidochitonidae); Ashby, 1931, p. 16 (*Callochitonidae*).

Callochiton castaneus (Wood)

Callochiton castaneus (Wood) Nierstrasz, 1906, p. 496, pl. 26, figs. 22–24; Ashby, 1931, p. 18, pl. 2, fig. 24, pl. 3, figs. 25–27.

Table Bay, Still Bay, Port Alfred. Port Nolloth to Oudekraal (west coast of Cape Peninsula); False Bay to East London and Qolora (U.C.T.).

Up to median valve width 30, shell length *c*. 55 mm.

Fam. **Mopaliidae**

Thiele, 1929, p. 10.

Plaxiphora parva Nierstrasz

Fig. 29 *c–e*

Plaxiphora parva Nierstrasz, 1906, p. 501, pl. 27, figs. 38–43; Leloup, 1942, p. 31, text-fig. 18 G.
Plaxiphora tricolor Thiele, 1909*a*, p. 21, pl. 2, figs. 77–83; Leloup, 1937*a*, p. 167, figs. 12–16.

Plaxiphora indica Thiele, 1909*b*, p. 23, pl. 3, figs. 15–19.
Plaxiphora platei von Knorre, 1925, p. 617, pl. 32, fig. 56, pl. 35, fig. 59, text-figs. 15–17.

Sculpture over whole surface of all valves consisting of close-set circular or oval, flattened granules, mostly arranged in quincunx, each with a minute pore.

Head valve with 7 obscure radial ribs, insertion plate with 7 slits (Nierstrasz: 8). Middle valves each with a low radial rib on which the granules are rather larger and more oval in shape, with 2–3 pores; sinus wide, insertion plate with one slit. Tail valve with apex near hind margin, insertion plate without slits.

Girdle with minute calcareous platelets and spicules, and longer chitinous hair-like processes.

5 × 3·25 mm. (Nierstrasz); 7·5 × 4·5 mm. (U.C.T.).

White mottled with rose, grey, or blackish, girdle grey with brown hairs (Nierstrasz). Nierstrasz's coloured figure is buff with a blackish V-shaped mark on either side on the head and tail valves, the pleural areas on 2nd and 4th valves grey or blackish.

The U.C.T. example is greenish-blue with faint dark greyish speckling, head and tail valves pale medianly, umbo of 4th, 7th and tail valves white, girdle with cream scales and brown hairs.

Gills 13–14 (Nierstrasz: *c.* 15).

Radula with *c.* 35 rows, major lateral plate bluntly tricuspid, 1st marginal plate spatulate; the 2nd marginal appears to have a small inset piece antero-internally.

Mozambique (Nierstrasz); Inhambane (U.C.T.).

Distribution. Ceylon, Madras.

Fam. **Ischnochitonidae**

Chaetopleura papilio (Spengler)

Chaetopleura watsoni Krauss, 1848, p. 41 (Ashby quoted *papilio* in error).
Chaetopleura papilio Spengler, Ashby, 1931, p. 22, pl. 3, figs. 32, 33.
Chaetopleura destituta (*non* Sykes) Ashby, 1931, p. 26, pl. 4, figs. 37–39.

Dorsal-pleural areas of the middle valves finely and closely longitudinally lirate, the *interstices not punctate*; in juveniles the interstices may be minutely punctate near the beak, and minute punctae may continue to appear at later stages, but never so definite and conspicuous as in *pertusa*; lateral areas (when fresh) feebly radially lirate, with tiny granules. Head and tail valves more or less distinctly, but feebly, radially lirate, with scattered granules.

The specimen S. Afr. Mus. 4880, which Ashby identified as *destituta*, is merely a low-arched and somewhat worn example of *papilio*; the interstices between the lirae are not punctate, and therefore it cannot be *destituta*. It has similar little pale triangular spots near the outer margins of the valves, but not so numerous and conspicuous as in S. Afr. Mus. 4887 (Ashby fig. 32). Ashby

returned only the 2nd valve of S. Afr. Mus. 4874, and as can be seen from fig. 38 the sculpturing is the same as that of *papilio* fig. 32. Ashby himself (p. 27) admitted that the sculpture 'approached' that of *papilio*, but he seems to have placed more value on the 'form of shell'.

The height of the valves (angle of divergence) is a variable character (as also in *Acanthochiton garnoti* and *Dinoplax gigas*) and therefore not a good specific character.

The length given by Ashby for no. 4880 should be 58, not 68 mm.

Valves with a dark brown median stripe flanked more or less distinctly by buff, laterally with blue zigzag streaks or cuneiform spots, girdle light brown spotted with darker brown, bristles black. Width (visible) of median valve up to 34 mm.

Luderitzbucht (Thiele); Saldanha Bay (Melvill & Standen, also U.C.T.); Table Bay (Krauss; also S. Afr. Mus. coll. K. H. B.); Zout Rivier and Lambert's Bay to Table Bay (U.C.T.); False Bay (U.C.T.); off East London, 27 metres (U.C.T.); 34° 33′ S., 18° 20′ E., 290 metres (R.S. *Africana* per U.C.T.).

Chaetopleura pertusa (Rve.)

Chaetopleura pustulatus Krauss, 1848, p. 42, pl. 3, fig. 7; Nierstrasz, 1906, p. 488, pl. 26, figs. 1–7.
Chaetopleura destituta Sykes, 1902, p. 195, text-fig.
Chaetopleura pertusus Rve., Ashby, 1931, p. 23, pl. 3, figs. 34–36.
Ischnochiton pertusus Rve., and *punctulatus* [*sic*] Krauss, Turton, 1932, p. 212.
[*Non*] *Chaetopleura destituta:* Ashby, p. 26, pl. 4, figs. 37–39. = *papilio*.

Dorsal-pleural area with numerous more or less granulate longitudinal lirae, the *interstices strongly punctate*, sometimes producing a more or less cancellate appearance; lateral area more or less distinctly radially lirate, with scattered granules. Head valve radially lirate, with scattered granules. Most of the granules are perforated.

Head valve with 10 slits (Nierstrasz, Ashby, S. Afr. Mus. 6766), 9 (Krauss). The same specimen S. Afr. Mus. 6766 has 14 slits on the tail valve (as Ashby stated), but Krauss gave 8, and Nierstrasz 10. Another South African Museum specimen (4875) has 10 slits.

Radula with major lateral plate bicuspid (Nierstrasz).

Saldanha Bay (U.C.T.); Table Bay (Nierstrasz); False Bay; Mossel Bay, Jeffreys Bay, and Algoa Bay, 15 fathoms (U.C.T.); Port Alfred (Ashby); Natal (Krauss); Durban (Sykes).

The *Pieter Faure* obtained only isolated valves at the following stations: off Cape Point, 145 fathoms; off Cape Infanta, 46 fathoms; off Cove Rock (East London), 22 fathoms; off Illovo River (Natal), 27–30 fathoms.

Remarks. I accept Ashby's recognition of *pustulatus* as a synonym of *pertusa*. But the variable development of the lirae (sometimes 'grooves' is the better term) and the little granules on the lateral areas of the middle valves indicates that *destituta* is merely a smooth variation of *pertusa*. As stated above the two examples referred by Ashby to *destituta* are certainly *papilio*.

The record of a small (rolled up 9·5 × 10 mm. [*sic*]) *destituta* from Rio de Oro (24° 41′ N., 14° 51′ W.) (Leloup, 1937 *b*, p. 135, figs. 4–6) is perhaps a misidentification, especially as Ashby's 1931 paper is quoted as a reference.

C. papilio seems to occur mainly on the west coast, and *pertusa* on the south coast, though they overlap according to the records. Adults are easy to distinguish, but some juveniles may cause difficulty. This may account for the record of *pertusa* from Table Bay and Saldanha Bay, and of *papilio* from False Bay.

Chaetopleura pomarium n.sp.

Fig. 29 *i*

Head valve with *c.* 15 (smaller) to 18 (larger specimen) radiating lines of small pustules; middle valves with *c.* 11–12 lines of pustules on the pleural area, dorsal area with *c.* 6–7 lines of finer pustules set closer together, lateral area with 4–5(6) radiating lines of pustules; tail valve with 6–7 more or less longitudinal lines of pustules on pleural area, 5 on dorsal area, with radiating lines of pustules behind the umbo which is slightly in front of centre.

Nearly all the pustules are perforate; surface between the pustules perfectly smooth; lateral areas of the middle plates scarcely raised but there is a smooth strip separating the radial lines from the longitudinal lines.

Slits 9 on head valve, 1 on each middle valve, 8 on tail valve (the latter rather obscure).

Girdle with minute calcareous scales, and long and short chitinous hairs.

Animal 21 × 14 mm.; width of middle valve 12 mm.

Buff, obscurely mottled with brown, valves paler medianly and laterally, girdle buff with more or less distinct squarish orange spots, one at each valve (i.e. 6 on each side), 2 (or 4) on tail valve, girdle around head valve uniform orange.

Gills 25–27. Radula with major lateral plate bicuspid.

Lüderitzbucht, 35 metres, Buffels River, south of Port Nolloth, Lambert's Bay, Saldanha Bay, and west coast of Cape Peninsula (U.C.T.); Kommetjie (Mrs. Connolly).

Type in the South African Museum (A9339), cotypes in Zoology Department, U.C.T.

Remarks. Nierstrasz's (1906) fig. 2 of *pustulata* might seem to represent the present form as it shows only 10 longitudinal lirae on the pleural area; his text says at least 10, but they are connected by cross-bars as in Krauss's description. This would produce a punctate appearance and it is therefore clear that he had a typical *pertusa* with punctate interstices between the lirae.

There is a distinct resemblance between the present form and *C. fernandensis* Plate (1899, p. 197, pl. 2, fig. 144, pl. xi, fig. 304) which is closely allied to *C. peruviana* (Lam.) (Plate, p. 182); nevertheless I am unwilling to identify the Cape specimens with a species from the Pacific coast of South America, without

a direct comparison and a more detailed study. Plate gave the number of gills for *fernandensis* as 30–33, and for *peruviana* as 31–44.

In one of the Lambert's Bay specimens the pustules are less numerous on all the valves: 6–7 lines on the pleural areas of the median valves, 2–4 pustules on the lateral areas.

The regularly spaced arrangement of the lines of pustules suggests the lines of trees in an orchard.

Gen. Dinoplax Carp.

Ashby (1928, 1931) regarded *gigas*, *fossus*, and *alfredenis* as forms of one variable species; in 1934 he added another variety *validifossus*. In 1931 (p. 28) he claimed to have discussed (in 1928, p. 83) the extent of variation 'very fully', although he had only 7 specimens. In 1934 he had about 50 specimens, all from Durban.

I have examined 24 dry and 16 alcoholic specimens in the collections of the South African Museum and U.C.T.; also a dozen dry shells in a private collection. The U.C.T. material (8 alcoholic, 1 dry) has been particularly useful because it was collected at various localities from False Bay (Cape) to Umpangazi (Natal). I am also indebted to Prof. Day (U.C.T.) for allowing me to make use of his observations.

Krauss recorded *gigas* from Table Bay and Natal. But no *Dinoplax* has since been collected in Table Bay or on the west coast either by the South African Museum or U.C.T., or, as far as I am aware, by private collectors.

There appear to be three forms or species living on the South African coast, defined as follows:

1. Girdle and membrane between the valves with *scattered* tufts of short spicules. Dorsal pleural areas of median valves with fine punctate-foveolate sculpture, sometimes tending to become striate; if present the striae *converge* towards the middle line .. *gigas*
2. Girdle and membrane *densely covered* with spicules. In addition long curved spicules may be present.
   (*a*) Dorsal pleural areas sculptured as in *gigas* with a tendency to form deep 'stab-like' markings or grooves, more or less longitudinal .. .. *fossus*
   (*b*) Dorsal-pleural areas with strong costae radiating from the beak and *diverging* from the middle line. Ribs on lateral areas often few in number, strong, with deep intervening grooves .. .. *validifossus*

The original description is not available, but in all probability it was based on a specimen from the Cape. I have therefore assumed that *gigas* as here defined represents the typical form.

The Pyramidellid *Odostomia chitonicola* Smith 1899 (see Barnard, Part 3,

p. 91) lives commensally or as an ectoparasite among the spinelets on the girdle. It has been recorded on '*gigas*' at Umkomaas and Port Edward (Natal) (Robertson & Orr, 1961).

Dinoplax gigas (Gmelin)

Fig. 29 *f*, *g*

Dinoplax gigas Gmelin, Pilsbry, 1892, p. 254, pl. 57, figs. 21–32 (description quoted in Ashby, 1928, p. 82); Sykes, 1899, p. 277.
[*Non*] *Chiton gigas:* Krauss, 1848; *Dinoplax gigas:* Ashby, 1928, 1931 and 1934; Nardini, 1934.
? Bartsch, 1915, Turton, 1932, van Bruggen, 1952.

The girdle and membrane between valves with scattered bunches of spicules has a very different appearance from that of the densely spiculose girdle of *fossus* and *validifossus*. The bunches of spicules may vary in abundance and proximity, but they are always separated by bare areas. I have seen no specimen which could not at first glance be placed in the one or the other group without the slightest doubt.

The dorsal pleural area in unworn specimens is finely punctate-foveolate (somewhat similar to *textilis*, but much finer), or 'chevronate', the appearance due to the intersection of very fine more or less longitudinal and diagonally oblique riblets. On the anterior margin, protected by the preceding valve, the sculpture frequently becomes striolate. Striations may also develop on the outer part of the pleural area. These striae are perpendicular, or nearly so, to the oblique anterior border of the lateral area, and therefore converge towards the middle line.

The lateral area of the median valves is usually elevated and demarcated from the dorsal pleural areas. Usually it has radiating ribs, but these may be obscure in juveniles. The number of ribs increases with age: 3–4 obscure ribs on valve 7 in a juvenile with valve width 6·5 mm., and on valve 6 only a suggestion of one or two ribs; on a large valve 75 mm. wide there are *c.* 50 ribs.

The angle of divergence is normally about 110°; but the South African Museum material shows a range from 85° to 120°, and in one specimen 135°. This latter specimen is very flat, and the median valves are short in proportion to their width; the abnormal growth seems to have been mainly in the central portion of the valves because the lateral areas are widely separated and do not nearly reach the middle line.

Up to (dry specimens excl. girdle) 110 × 55 mm., angle of divergence 85°, and 105 × 60 mm., angle of divergence 135°. Some very large valves from middens at Cape Hangklip measure 50 mm. from the middle line to the side margin, and 75 mm. from one side margin to the other (direct); probable total length of all the valves would be about 150 mm., to which about 10 mm. might be added fore and aft for the girdle.

A 7-valved specimen, now in the South African Museum, was found at Still Bay by Dr. Muir. Recently (1962) Mrs. Connolly found one at Cape Hangklip.

Gills about 40 (juv.) to 55–60. Radula (of juvenile 23 mm. long) with *c.* 45 rows, major lateral plate tricuspid, major marginal plate spatulate.

False Bay, Cape Hangklip, Still Bay (S. Afr. Mus.). Arniston, Mossel Bay, Knysna (U.C.T.).

Dinoplax fossus Sykes

Chiton gigas (*non* Gmelin) Krauss, 1848, p. 30, pl. 3, fig. 3.
Dinoplax fossus Sykes, 1899, p. 277, fig. 1.
Dinoplax gigas (*non* Gmelin) subsp. *alfredensis* Bartsch, 1915, p. 179, pl. 39, figs. 1, 2.
Dinoplax gigas (*non* Gmelin) Ashby, 1928, p. 82, pl. 8, figs. 22–24; 1931, p. 27, pl. 4, figs. 40–42; 1934, p. 77, pl. 9, figs. 1, 2.

Girdle and membrane between valves densely covered with spicules. In addition long white, curved spicules may be present (possibly always present, but easily rubbed off). Dorsal pleural area sculptured as in *gigas*, but with a tendency to form deep 'stab-like' (Sykes) more or less longitudinal marks or grooves. Lateral area radiately ribbed as in *gigas*.

Natal (Krauss; Table Bay not acceptable). Umkomaas, Natal (Sykes). Port Alfred (Bartsch, Ashby, Turton). Durban (Ashby). Umzimkaba (Port St. Johns) (S. Afr. Mus.). Port Elizabeth, Richmond, Kowie, East London, Morgans Bay, Imbotje (Port St. Johns), and Umpangazi (Natal) (U.C.T.).

Remarks. The subspecies *alfredensis* can be ignored, as it was evidently based on a worn specimen. When a surface with conical pits is abraded, the pits become smaller and finer.

Dinoplax validifossus Ashby.

Dinoplax gigas (*non* Gmelin) Nardini, 1934, p. 250, text-fig. 1.
Dinoplax validifossus Ashby, 1934, p. 79, pl. 9, fig. 3 (as var. of *gigas*).

Girdle and membrane as in *fossus*. Dorsal pleural area with strong costae radiating from the beak and diverging from the middle line. Lateral area with the radiating ribs tending to become fewer, stronger, broader, with deep intervening grooves.

Umkomaas, Natal, from shell middens (Nardini). Durban (Ashby). Natal (exact locality ?) (S. Afr. Mus.). Qolora (north of East London) and Port Edward (south of Port Shepstone) (U.C.T.).

Remarks. The *diverging* costae on the dorsal-pleural area are very distinctive.

Nardini's figure shows that she had this species, not the (assumed) true *gigas*. The example 'found fossil for the first time' was not a true fossil in the usually accepted sense, because there are no Pleistocene deposits at Umkomaas. Shell-middens, however, do occur.

Ischnochiton textilis (Gray)

Fig. 29 *j*

Chiton trigrinus Krauss, 1848, p. 38, pl. 3, fig. 5.
Chiton textilis Gray, Krauss, 1848, p. 38, and var. *punctulata*, p. 39.

? Ischnochiton textilis Gray, Nierstrasz, 1905, p. 142, pl. 9, fig. 1 (girdle scale: *? hewitti*).
Ischnochiton ludwigi Pilsbry, Ashby, 1931, p. 35, pl. 5, fig. 55 (not good).
Ischnochiton textilis Gray, Ashby, 1931, p. 36, pl. 5, figs. 56–58; Stephenson, 1948, p. 268.
Ischnochiton tigrinus Krss., Ashby, 1931, p. 38, pl. 5, figs. 59–62; Turton, 1932, p. 212.
Ischnochiton reticulatus (*non* Rve.) Turton, 1932, p. 211.
? [*Non*] *Ischnochiton textilis:* Nierstrasz, 1905, 1906, = *hewitti.*

Head valve with 18 slits, tail valve with 14 (Ashby).

Girdle scales transversely oval, with numerous (18–20) fine pliculae. Gills 35; I find that 30 is the more normal number.

Radula with *c.* 35 rows, major lateral plate tricuspid, major marginal plate spatulate.

Lüderitzbucht (Thiele); Saldanha Bay (Melvill and Standen, Ashby, S. Afr. Mus. P.F. coll, and U.C.T.); Table Bay; False Bay; St. Sebastian Bay; Mossel Bay (S. Afr. Mus. P.F. coll.); Port Elizabeth; Port Alfred; Umsikaba River mouth (north of Port St. Johns) (S. Afr. Mus. coll. F. H. Talbot).

Remarks. Ashby gave as the features distinguishing *tigrinus* from *textilis*: the carinated valves, the narrower sinus, and the cellular non-linear sculpture of the dorsal-pleural area. The second and third of these features are clearly shown in his figs. 57 and 58 as compared with figs. 60 and 61. Unfortunately these differences are not always so clear-cut, and I doubt whether two species can be maintained.

The smallest specimen I have seen with longitudinal grooves on the anterior margin has a valve width of 10 mm. (it has the tigrine stripes). All specimens smaller than that, e.g. 8, 6, 5, 3, and 2·5 mm. valve width, are without grooves. Thus apparently at about 10 mm. valve width *tigrinus* begins to develop longitudinal grooves and becomes *textilis*. This, however, should be checked on more material.

Both forms occur together, and both may, or may not, show the tigrine colour striping (S. Afr. Mus. series from Table Bay, coll. K.H.B.). Stephenson came to the same conclusion.

Nierstrasz (p. 493) quoted the features of *punctulata* Krss., but omitted the word obsolete ('*radiatim obsolete striatis*'); nevertheless he was probably correct in regarding this character as not being of varietal value in view of the occurrence of transitional forms.

In my opinion, however, the specimens described by Nierstrasz in 1905 and 1906 were not the true *textilis*. His description and figure of the girdle scales do not apply to *textilis*, but they do apply to *hewitti*. In 1905 Nierstrasz stated there were 7–11 strong ribs, and he figured a scale much more like that of *textilis*.

Krauss himself at first thought of using *ludwigi* as a species name, but after seeing Gray's description he identified his specimens as *textilis*, and gave a description of them. There seems no reason why Pilsbry, and after him Ashby, should have resurrected the discarded ms. name *ludwigi*.

Ischnochiton delagoaensis Ashby

Ischnochiton delagoaensis Ashby, 1931, p. 40, pl. 6, figs. 63–66.

A species with larger reticulation on the dorsal-pleural area than in *textilis-tigrinus*, and with the reticulation extending over the lateral area which is not ribbed.

Type (head, tail, and 4 middle valves, and part of girdle) in the South African Museum (A6589).

No further specimens have come to hand in spite of the intensive collecting done at Inhaca Island by the Zoology Department of the Witwatersrand University.

Ischnochiton hewitti Ashby

Fig. 29 *k*

? Ischnochiton viridulus (*non* Couthouy) Gould, Haddon, 1886, p. 16.
? Ischnochiton textilis (*non* Gray) Nierstrasz, 1906, p. 491, pl. 26, figs. 10–16.
Ischnochiton hewitti Ashby, 1931, p. 33, pl. 5, figs. 50–53; Leloup, 1939, p. 81, figs. 1–3.

Head valve with 10–13 slits (Nierstrasz), 13 (Ashby). Tail valve with 11–14 slits (Nierstrasz), 12 (Ashby). Girdle scales subcircular or slightly conical, with a few (3–7) strong plicae. Gills 23–25 (Nierstrasz).

The living Langebaan specimens were blue-green in colour (U.C.T.).

Possession Island (south of Lüderitzbucht) (Leloup); Port Nolloth (Nierstrasz); Lüderitzbucht, Port Nolloth, Langebaan (Saldanha Bay) (U.C.T.); Sea Point, Table Bay (Nierstrasz, Ashby).

Remarks. Ashby considered Haddon's record of *viridulus* from Cape Town as referable to *oniscus*; but Haddon stated that the girdle scales were 'coarsely striated', which seems to apply better to *hewitti*. See also p. 327.

Ischnochiton oniscus (Krauss)

Fig. 29 *l*

Chiton oniscus Krauss, 1848, p. 39, pl. 3, fig. 4.
Chiton pruinosus (*non* Gould) Sowerby, 1892, p. 51.
Ischnochiton oniscus Krss., Nierstrasz, 1906, p. 494, pl. 26, figs. 17–21; Ashby, 1931, p. 30, pl. 4, figs. 43–46 (not good); Turton, 1932, p. 210.
Ischnochiton oniscus Krss., subsp. *alfredensis* Ashby, 1931, p. 31, pl. 5, fig. 54 (not good).
Ischnochiton oniscus Krss., vars. *pyramidalis*, *aurantius*, *albocarinatus* Turton, 1932, p. 210, pl. 54, nos. 1458, 1459, 1460.
Ischnochiton eucosmia Turton, 1932, p. 211, pl. 54, no. 1464.

Head valve with 9–12 slits, tail valve with 9–10 slits (Ashby), 10–12 and 9–13 (Nierstrasz). Girdle scales with numerous very fine striae. The 'chaffy' appearance (Ashby) of the girdle scales seen in some specimens seems to be due, sometimes at least, to contraction of the girdle while drying, or to the method of preservation. Further study of *living* material should be undertaken.

Sykes (1894, p. 133) considered *elizabethensis* to be the same as *oniscus*, but later (1898, p. 41) reversed his opinion.

Ischnochiton elizabethensis Pilsbry

Chiton marginatus (*non* Pennant) Sowerby, 1892, p. 50.
Ischnochiton elizabethensis Pilsbry, 1894, p. 9; Ashby, 1931, p. 32, pl. 4, figs. 47–49 (not good); Turton, 1932, p. 211.
Ischnochiton elizabethensis Pilsbry, var. *piperatus*, and var. *zebra* Krss., Turton, 1932, p. 211, pl. 54, nos. 1467, 1468.

This is stated to differ from *oniscus* by having coarser valve sculpture and larger girdle scales. I doubt whether it is a natural species. The distinctions given by Ashby are subtle, and merely comparative. A single specimen would be unidentifiable in the absence of one of the other kind for comparison. Even in material identified by Ashby I am unable to appreciate the differences.

The name *elizabethensis* may, however, be used as a varietal name for specimens in which the longitudinal grooves on the dorsal pleural area (well marked in typical *oniscus*) are restricted to a small or very small part of the pleural area near the girdle.

Numerous variations in colour and pattern occur (Ashby, 1928, pp. 85 and 87). Often the same pattern is found in both 'species'. Turton (p. 210) complained that it was 'provoking' to find the same marking in *elizabethensis* as in his new var. *pyramidalis*!

The distribution is coterminous: False Bay to Natal. The only record from Table Bay is by Smith (1903, p. 392); if taken from Tryon, the record is certainly unreliable.

Ischnochiton (*Chondropleura*) *simplicissimus* Thiele

Ischnochiton (*Chondropleura*) *simplicissimus* Thiele, 1906*b*, p. 335, pl. 29, figs. 21–25.

Valves ridged, angle of divergence *c.* 90°. Valves perfectly smooth, except for faint growth-lines; lateral area slightly raised. Umbo of tail valve at $\frac{1}{3}$ length. Head valve with 13, tail valve with 10 slits, middle valves each with one slit.

Girdle with very small scales, without distinct striation, apex with minute granules.

Animal 16 × 8 mm., width of valve 7 mm. White.

Radula, major lateral plate with simple apical cusp.

34° 33′ S., 18° 21′ E., 318 metres (Thiele). One specimen found among *Lepidopleurus sykesi*. Not taken by the *Pieter Faure*.

Fam. **Chitonidae**

Chiton tulipa Q. & G.

Chiton tulipa Q. & G., Ashby, 1931, p. 43.
Chiton tulipa Q. & G., var. *alfredensis* Ashby, 1928, p. 87, pl. 8, figs. 19–21; 1931, p. 43, pl. 6, figs. 67–69.
Chiton alfredensis Turton, 1932, p. 212, pl. 54, no. 1474.

There seems no need to bring in the name *alfredensis* as the short longitudinal grooves adjacent to the lateral area are not constant. They may or may

not be visible in examples from the same locality. Krauss considered that they were a juvenile feature which disappeared in later growth; Turton said vice versa! The smallest specimen I have seen would be about 18 mm. long if unrolled, from Simon's Bay (False Bay); it has no indication of the grooves. In a series from Still Bay (Dr. Muir coll.) the grooves begin to appear at a length of about 20 mm., and are quite distinct in larger shells, thus confirming Turton. Sometimes the grooves vary on the two sides of the same animal, distinct on one side, obsolete on the other side.

When very well developed there is a perplexing resemblance to *crawfordi*; in fact I have seen specimens which cannot be assigned definitely to one or the other!

U.C.T. has obtained living examples with the following coloration. From False Bay: rose-red with darker mottling, middle valves maroon, head and tail valves pink, girdle pink. From 34° 09′ S., 18° 17′ E., 24 fathoms: pink with crimson markings and a crimson mid-dorsal stripe, girdle mottled pink and crimson.

The locality Camps Bay mentioned by Ashby is probably correct, and although no further examples have been collected there, it is confirmed by the above U.C.T. locality, Oudekraal, a little farther south off the west coast of the Cape Peninsula. U.C.T. collected it also at Steenberg Cove on the west coast.

False Bay to East London and The Haven (Bashee River) (U.C.T.). Umsikaba River mouth (north of Port St. Johns) (S. Afr. Mus. coll. F. H. Talbot) bridges the gap between Port Alfred (Ashby, Turton) and Natal (Krauss).

Chiton nigrovirescens Blainv.

Chiton capensis Gray, Krauss, 1848, p. 37.
Chiton nigrovirescens Blainv., Krauss, 1848, p. 38; Haddon, 1886, p. 22; Tomlin, 1931*a*, p. 417.
Chiton nigrovirens [*sic*] Blainv., Nierstrasz, 1906, p. 503, pl. 27, figs. 44–49; Thiele, 1910, p. 269; Ashby, 1931, p. 47, pl. 7, figs. 78–81.

Head valve with 11–14 slits, tail valve with 10–16 (Nierstrasz). Girdle scales rather rough (subgranulose). Gills 22–26. Radula with *c.* 40 rows, major lateral plate bicuspid, inner cusp larger than outer cusp, major marginal plate spatulate.

Up to 25 × 15 mm.

Lüderitzbucht (Thiele, and S. Afr. Mus. Coll. J. D. F. Gilchrist); Saldanha Bay (Melvill & Standen); Dassen Island, Table Bay, and False Bay (S. Afr. Mus.); Cape Town (Haddon). Port Nolloth to Oudekraal (west coast of Cape Peninsula), Cape Hangklip, Danger Point (U.C.T.). Ashby mentioned Port Alfred, but Turton did not collect it there. Krauss gave Natal (coll. Wahlberg), but I think this must be an error.

Remarks. Tomlin (1931) pointed out that Blainville's spelling was *nigrovirescens*.

Nierstrasz found minor differences in the radula between his examples and Thiele's, and queried the identity of the latter.

Breeding. A feature of this species which has not been observed in any other South African Chiton is the sheltering of the juveniles under the girdle of the mother (Thiele, 1910; and K. H. B. in Ashby, 1931). But see p. 327.

Chiton crawfordi Sykes

Chiton crawfordi Sykes, 1899, p. 279, fig. 2; Ashby, 1931, p. 44, pl. 6, figs. 70–73.

To the localities given by Ashby can be added: Simon's Bay (False Bay) (S. Afr. Mus.); Still Bay, dead shells (S. Afr. Mus. coll. Muir); and 34° 15′ S., 25° 5′ E. (St. Francis Bay), 6 fathoms, 1 living (U.C.T.).

The old record from False Bay (Nightingale & Layard) has not been confirmed by U.C.T. collecting in recent years.

The U.C.T. specimen (St. Francis Bay) is umber-brown, umbo of 2nd valve white, and white mid-dorsal patches on 3rd–5th valves, also a few white spots on posterior margins of valves, girdle maroon-brown with paler patches.

The half-grown U.C.T. (St. Francis Bay) specimen, width of middle valve 6 mm., is unworn and shows the longitudinal lirae on the dorsal area of middle valves extending to the mid-dorsal line, but narrower and finer than those on the pleural area; the lateral areas have 6–7 radial lirae; the head valve has *c.* 40 radiating lirae.

Remarks. Although *crawfordi* is really only a *tulipa* with well-developed dorsal grooves, it may be retained as a species for the time being (*vide supra*).

Chiton barnardi Ashby

Chiton barnardi Ashby, 1931, p. 46, pl. 6, figs. 74–76, pl. 7, fig. 77.

The whole surface appears minutely shagreened, but this is due to coloration, not to pits or granules; the surface is smooth. The groove between the 2 ribs on the lateral area of the middle valves is pitted (or as Ashby would have said: the lateral nodules of the ribs bridge the sinus). The longitudinal ribs on the pleural area of the middle valves are quite simple and straight-sided, without any lateral nodules or irregularities.

I have seen one specimen, *c.* 10 mm. long, from Nossy-Bé, Madagascar (U.W.). The grooves on the middle valves do not extend to front margin of valve, especially towards the middle line. This is also the case in the one valve of the paratype (the only valve returned by Ashby).

Pale pinkish, tail valve with black patch on either side, 6th valve with a small patch on right side only, girdle pale with slightly darker grey patches.

Chiton ashbyi n.sp.

Fig. 29 *m*

A single middle valve has similarities with *barnardi*, having the pleural area longitudinally ribbed, and the lateral area with 2 strong ribs. Pleural area with 10–11 longitudinal, laterally irregularly nodulose (submoniliform)

ribs (sometimes bifurcating or anastomosing); dorsal area with 4 ribs, slightly broader and less moniliform (perhaps because more worn); lateral area with 2 very strong nodulose ribs, with a narrow deep sulcus. Umbo corroded. Sutural laminae and insertion plates worn away. Length 3·3, width 9 mm.

Off Cape Infanta, 46 fathoms, 1 middle valve (S. Afr. Mus. A9337, P.F. coll.).

Remarks. This valve is so unlike any other South African Chiton, except *barnardi*, that although the head and tail valves are missing, I propose a n.sp., and reciprocate Ashby's compliment by naming it after him.

It may be a *Callistochiton* (subgen. of *Lorica* in Thiele, 1929), several species of which have a similar sculpture (cf. Nierstrasz, 1905, pp. 143, 146, pl. 9).

Acanthopleura brevispinosa (Sow.)

Acanthopleura brevispinosa Ashby, 1931, p. 49, pl. 7, fig. 82.

In 1905 (*Notes Leyden Mus.* xxv, pp. 151, 152) Nierstrasz recorded examples of *spinigera* Sow. and *granulata* Gmelin from 'Cape of Good Hope'. Ashby (pp. 49, 53) put the former in the synonymy of *brevispinosa*, but did not mention the latter. Smith (1910, Ann. Natal Mus. ii, pp. 211, 212) listed both without commenting on the locality. It is most unlikely that the West Indian *granulata* occurs anywhere in the South African region, and this species should be deleted from the fauna-list.

A. brevispinosa has been found at Santa Carolina, Bazarute Is. (U.W.), but so far as I am aware not farther south. Neither myself (1912) nor U.W. found it at Inhaca Island (Delagoa Bay).

Onithochiton literatus (Krss.)

Onithochiton literatus Krss., Nierstrasz, 1906, p. 505, pl. 27, figs. 50–53; Ashby, 1931, p. 50, pl. 7, figs. 83–86 (synonymy); Macnae & Kalk, 1958, p. 127 (listed) (*litteratus*) [*sic*].
Plaxiphora wahlbergi Krss., Eyre & Stephenson, 1938, p. 38 (habitat).

Port St. Johns (S. Afr. Mus. coll. G. Shortridge) seems to be the most south-westerly locality recorded. I have (1962) seen a specimen from Xora (Elliotdale Division), about 7 miles north of Bashee River mouth; and another from Coffee Bay, a little farther north. Umhlali, Durban, Umtwalumi (U.C.T.). Inhaca Is., Delagoa Bay (McNae & Kalk). Krauss described *wahlbergi*, which Ashby regarded as synonymous, from Table Bay. This surely is due to some error in labelling (cf. *Dinoplax gigas*).

The Xora specimen was mottled crimson.

Gills 35–38 (Nierstrasz). Radula, major lateral plate 4-cuspid (Nierstrasz).

The Mauritian species *maillardi* (Desh.) is closely allied.

SOLENOGASTRES

Aplacophora Fischer, 1885, p. 884.
Solenogastres Thiele, 1902, p. 249; Nierstrasz, 1902, p. 1; Thiele, 1913, p. 1; Leloup, 1950, p. 1.

The only Solenogastrid hitherto recorded from South Africa has been *Archaeomenia prisca* (*infra*). In August and December 1959 Dr. F. H. Talbot,

Marine Biologist of the South African Museum on board the Fisheries Survey R.S. *Africana II*, obtained several examples at the following stations:

St. A191. 33° 36′ S., 16° 15′ E., 1,520–1,570 fathoms.
St. A193. 33° 49′ S., 16° 30′ E., 1,500 fathoms.
St. A316. 34° 42′ S., 16° 54′ E., 1,725–1,780 fathoms.

At least two species are represented. One slender species 35–40 mm. long, 1–1·5 mm. diam.; the other 45–50 × 5–8 mm.

The identification of these specimens must wait until sections have been cut.

Archaeomenia prisca Thiele

Archaeomenia prisca Thiele, 1906*a*, p. 315, pl. 28.

35° 9′ S., 18° 32′ E., 564 metres (Thiele).

Two specimens were taken by U.C.T. in False Bay: 34° 23′ S., 18° 40′ E., 88 metres; bottom: green mud.

The radula of one specimen was extracted, but the number of teeth in each transverse row, 12 according to Thiele, could not be checked, nor could any bifid or trifid teeth be discerned along the margin.

SCAPHOPODA

Fam. **Dentaliidae**

Jaeckel (1932, p. 307) gave a key to the South African species, but evidently had not seen Tomlin's paper (1931*b*). His key is now no longer useful.

Dentalium strigatum Gould

Dentalium strigatum Gould, 1859, p. 166; Bartsch, 1915, p. 180, pl. 44, fig. 5; Tomlin, 1931*b*, p. 337; Jaeckel, 1932, p. 303.
Dentalium dentalis (*non* Linn.) Watson, 1886, p. 11.
Dentalium lessoni (*non* Desh.) Sowerby, 1892, p. 48.
Dentalium belcheri Sowerby, 1903, p. 231.
Dentalium novemcostatum (*non* Lam.) Sowerby, 1903, p. 231.
Dentalium agulhasense Plate, 1908, p. 349, pl. 30, figs. 21–23; Jaeckel, 1932, p. 303.

At the apical end the number of ribs is 9–10, the number increasing later to 11–12–14; intermediaries if present feeble; no longitudinal striae in the grooves. Up to 32 mm.

False Bay (Gould); 34° 51′ S., 19° 37′ E., 80 metres (Plate; Jaeckel); East London area to False Bay, 18–46 fathoms (S. Afr. Mus. P.F. coll.).

34° 8′ S., 24° 59′ E., 80 metres; 33° 50′ S., 25° 48′ E.; 35° 19′ S., 20° 12′ E., 126 metres (Jaeckel).

33° 03′ S., 28° 11′ E., 31 fathoms (U.C.T.).

Remarks. The *Challenger* example from False Bay, 15–20 fathoms, should probably have been identified as *strigatum*.

The specimens returned by Sowerby labelled *belcheri* and *novemcostatum*

do not seem to show any differences. There is no doubt that Plate's *agulhasense* is the same species although Jaeckel accepted it as distinct.

Dentalium plurifissuratum (Sow.)

Schizodentalium plurifissuratum Sowerby, 1894, p. 158, pl. 12, fig. 24.
Fissidentalium plurifissuratum Sow., Pilsbry and Sharp, 1897, p. 82, pl. 6, figs. 87–89.
Dentalium plurifissuratum Sow., Sowerby, 1903, p. 231; Plate, 1908, p. 344, pl. 30, figs. 12–16; Bartsch, 1915, p. 181.
Dentalium multistriatum (*non* Desh.) Plate, 1908, p. 347; Jaeckel, 1932, p. 304.

Moderately curved. Ribs numerous, rounded, subequal to the grooves. Both ribs and grooves finely longitudinally striated. Growth-lines distinct. Striations and growth-lines sometimes forming a microcancellate sculpture in the grooves. One to five elongate perforations; sometimes none; sometimes an apical slit, sometimes an apical slit plus 4–5 perforations (depending on the length of the apical portion which has been broken off, or absorbed by the animal).

There is considerable variation in the ribbing. In the smallest specimens there are nearest the apex 12–14 ribs; at 15 mm. the number has increased by interpolation to 17–18, at 20 mm. to *c.* 25–28, at 30 mm. to *c.* 28–30, at 40–60 mm. to *c.* 30–34; in the larger shells the average number of main ribs (i.e. original ribs plus intermediaries which have now become large enough to be called main ribs) is 26–28, with 4–6 intermediaries. In one 70-mm. shell there are at a length of 60 mm. 26 + 8 = 34 ribs, but in the last 10 mm. splitting and interpolation has increased the total number to 58.

Length 5, diam. aperture 0·75, apex 0·25 mm.; 8 × 1·3 × 0·3; 15 × 1·5 × 0·3; 22 × 2·3 × 0·4; 35 × 4 × 0·75; 55 × 6 × 1; 65 × 7·3 × 1; 70 × 8 × 1·75 mm.

Radula with 14–15 rows, central plate wide, lateral plate unicuspid.

From the East London area extending across the Agulhas Bank, including Browne's Bank on the southern point of the Agulhas Bank (approx. 36½° S., 21½° E.) to the mouth of False Bay, 40–130 fathoms (S. Afr. Mus. P.F. coll.).

34° 8′ S., 24° 59′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres; 35° 9′ S., 18° 33′ E., 564 metres (Plate; Jaeckel).

Plettenberg Bay, 60–75 fathoms, Algoa Bay, 99 fathoms (U.C.T.).

Distribution. Angola (16° 26′ S., 11° 41′ E.) (Jaeckel).

Remarks. An abundant and characteristic species. Frequent in the P.F. bottom samples.

Plate apparently had not seen Sowerby's 1903 paper in which the occurrence of this species on the Agulhas Bank was recorded. Sowerby's original locality was '? Hong Kong'; but his recognition of his own species may be accepted as indicating this species as South African, not Chinese.

The worn shells referred by Plate to *multistriatum* should, in my opinion, have been referred to *plurifissuratum* although Jaeckel accepted Plate's identification.

Bartsch's record is obviously based on a P.F. shell acquired by the U.S. National Museum from Sowerby.

Verco's remarks (1904, pp. 136, 137) on the variability of an Australian species (*intercalatum* Gould), based on numerous specimens collected by himself, are here apposite.

Dentalium exasperatum Sow.

Fig. 30 *c*

Dentalium exasperatum Sowerby, 1903, p. 225, pl. 5, fig. 12; Bartsch, 1915, p. 181; Jaeckel, 1932, p. 305.
Dentalium platei Jaeckel, 1932, p. 303, figs. 1, 2.

The microserrulate profile of the ribs, especially noticeable on the earlier part of the shell, easily distinguishes this species from *plurifissuratum*, which also often has microcancellate sculpture in the grooves. The present species has an apical slit, but no perforations.

At apex (when present) 13 ribs, the number increasing by interpolation to 40–44 in specimens 40 mm. long.

Length 16, diam. aperture 2, apex 0·3, slit 2 mm.; 27 × 4 × 0·8, slit 2·5; 30 × 4 × 0·75, slit 5; 32 × 5 × 1, slit 4; 39 × 5 × 1, slit 4·3; 40 × 5 mm. (apex broken).

Radula with 15 rows, lateral plate unicuspid.

Off Umvoti River (Natal), $4\frac{1}{2}$ miles, 27 fathoms (Sowerby).

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres (Jaeckel).

Off Hood Point (East London), 49 fathoms, 6 dead; off Umvoti River, 56 fathoms, 1 dead; off Umhloti River, 100 fathoms, 4 living, 2 dead; off Cape Natal, 47 fathoms, 8 dead; off O'Neil Peak (Zululand), 90 fathoms, 2 dead, rather worn; off Cape Vidal (Zululand), 80–100 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Port Alfred (littoral, dead) (Bartsch, Turton).

Distribution. Angola (16° 25′ S., 11° 41′ E.) (Jaeckel).

Remarks. A 32-mm. specimen in the South African Museum (A5461) with Sowerby's autograph label may be the Type; according to the P.F. number on the label, however, it was taken with the same bearings off Umvoti but 15 miles off shore in 56 fathoms.

D. platei is clearly a synonym. In his count of the ribs Jaeckel did not distinguish main ribs and intermediaries. The specimen referred by Jaeckel to *exasperatum* had only 10 ribs.

Dentalium platypleurum Tomlin

Fig. 30 *b*

Dentalium platypleurum Tomlin, 1931*b*, p. 339.

The fine raised growth-lines produce a slight moniliform appearance on the ribs, and in profile a slight crenulation, not scabrous as in *exasperatum*. The grooves appear punctate.

Radula with 14 rows, lateral plate unicuspid.

Off Itongazi River (Natal), 25 fathoms, 1 living (Tomlin, P.F. material); also from the same haul 2 dead, not seen by Tomlin.

Off Umhlanga River, 22–26 fathoms, 1 dead; off Morewood Cove (Natal), 27 fathoms, 5 dead; off Umhloti River, 27 fathoms, 4 dead (S. Afr. Mus. P.F. coll.).

Type in the South African Museum (No. A3631).

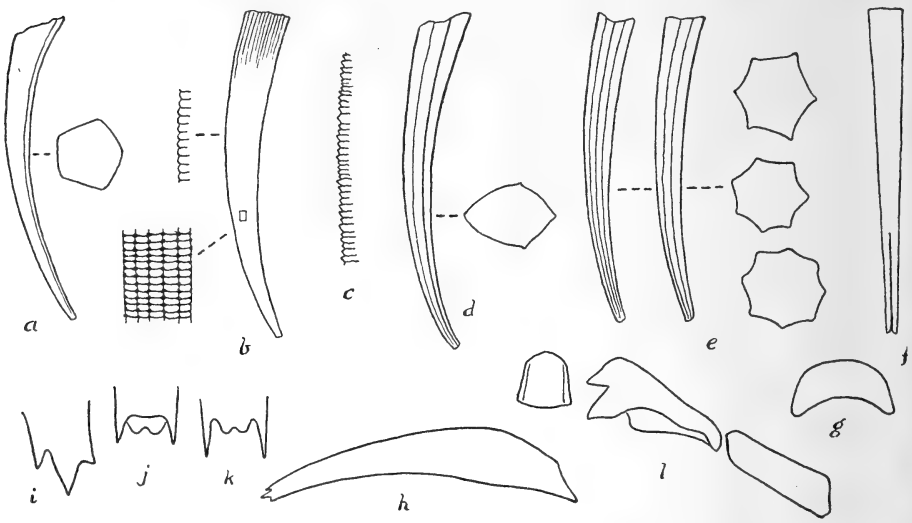

FIG. 30. *a*, *Dentalium subterlineatum* Tomlin, with cross-section; *b*, *D. platypleurum* Tomlin, with profile of rib, and sculpture further enlarged; *c*, *D. exasperatum* Sow., profile of rib; *d*, *D. capense* Tomlin, with cross-section; *e*, *D. natalense* n. sp., two variations, with cross-sections of 6-, 7-, and 8-ribbed shells; *f*, *D. engischistum* n. sp.; *g*, *D. salpinx* Tomlin, central plate of radula; *h*, *Cadulus promontorii* n. sp., *i*, *j*, *k*, lateral, dorsal, and ventral views of apex, *l*, radula plates.

Dentalium subterlineatum Tomlin

Fig. 30 *a*

Dentalium subterlineatum Tomlin, 1931*b*, p. 337.

Cape Point N. 86° E., 43 miles, 900 fathoms (Tomlin, P.F. material).

Cape Natal (Durban) N. × E. 24 miles, 440 fathoms, 6 dead (S. Afr. Mus. P.F. coll.).

The Natal specimens agree perfectly with the Type but are larger: 20, diam. aperture 2·3, apex 0·5 mm.

Type in the South African Museum (A6192).

Dentalium salpinx Tomlin

Fig. 30 *g*

Dentalium salpinx Tomlin, 1931*b*, p. 338, text-fig.

In Tomlin's description the word 'narrow' should be inserted after his words 'rounded . . . grooves'. The grooves are always narrower than the ribs, though the latter often vary in width.

The number of ribs in the Type is actually 32. Another specimen 70 mm. long from the same lot has 37 ribs; other specimens at 15 mm. have 23 ribs, at 40 mm. 25–27 ribs, at 45 mm. 30 ribs.

The ribs extend for 40–50 mm., sometimes to 60 mm. from the apex, but thereafter are evanescent or obsolete; in one specimen the ribbing ceased at 35 mm.

Up to 80, diam. aperture 10, apex 1·5 mm. No slit.

The smooth, polished, ivory-white basal portion usually contrasts with the dull grey colour of the rest of the shell; the apical one-third, or even half, of the shell is usually corroded.

Radula with 17–19 rows, lateral plate unicuspid.

Cape Point NE. $\frac{3}{4}$ E. 40 miles, 700–800 fathoms, 15 living (Tomlin, P.F. coll.).

Cape Point NE. × E. $\frac{1}{4}$ E. 38 miles, 750 fathoms, 4 living; NE. × E. $\frac{1}{2}$ E. 43 miles, 900 fathoms, 11 living; N. 77° E. 660–700 fathoms, 1 living; NE. $\frac{1}{4}$ N. 46 miles, 760 fathoms, 18 living (S. Afr. Mus. P.F. coll.).

Type in the South African Museum (A5459).

Remarks. Some specimens carry a commensal Actinian; cf. *D. cornu-bovis* Smith, 1909, pl. 23, figs. 2, 2*a*.

Dentalium capillosum Jeffreys

Dentalium capillosum Jeffreys, 1877, p. 153; 1882, p. 658, pl. 49, fig. 1; Watson, 1886, p. 1, pl. 1, fig. 1; Tomlin, 1931*b*, p. 339; Nicklès, 1955, p. 106.

According to Jeffreys very large specimens, size not quoted, were taken by the *Travailleur* (this work not available in South Africa).

The specimen identified by Tomlin is 35 (not 38), diam. aperture 3, apex 0·8 mm. There are 20 ribs at apex, 36 at a length of 24 mm., ribs obsolete on the last 10 mm. on convex side, but on the concave side extending more or less distinct up to 2–3 mm. from aperture.

A dead specimen 22 mm. long was found in the bottom-sample from the same haul.

Although *capillosum* has a wide distribution in the North Atlantic as far south as 4° 50′ N., its presence off the Natal coast is perhaps rather surprising. Tomlin's identification, however, based on comparison with *Challenger* material, is here accepted.

Dentalium capense Tomlin

Fig. 30 *d*

Dentalium capense Tomlin, 1931*b*, p. 340; Barnard, 1963*b*, p. 446.

In Tomlin's description of the position of the lateral keel the words 'convex' and 'concave' should be transposed: the keel is nearer to the concave

(dorsal) side. The second lateral keel ('angular line') is nearer the convex side and much feebler; it is not seen in cross-section at the aperture. The keel on the convex side is not quite so sharp as that on the concave side.

Up to 19 × 2·5 (maj. diam.) mm.; Type 16 × 1·9 mm.

Cape Point N. 86° E., 43 miles, 900 fathoms, 1 dead (Tomlin, P.F. material).

Cape Natal (Durban), N. × E. 24 miles, 440 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

33° 50′ S., 17° 21′ E., 600 fathoms, 1 living, 2 dead (S. Afr. Mus. F. H. Talbot coll.).

Type in the South African Museum (A6191).

This species and *subterlineatum* occur in deep water off both Cape Point and Durban.

Dentalium natalense n.sp.

Fig. 30 *e*

Moderately curved. Ribs 6 (4 specimens) or 7 (47 specimens), or 8 (22 specimens); towards basal end indications of 3–4 fine intermediaries (one between a pair of main ribs); at least 15 fine striae between each pair of main ribs; growth-lines fine. No slit or perforations. White. Up to 22 × 2·5 (diam. aperture) mm.

Off Umhloti River (Natal), 100 fathoms, 1 (6 ribs); off Hood Point (East London), 49 fathoms, 17 (1 with 6, 12 with 7, 4 with 8 ribs); off Cape Natal (Durban), 85 fathoms, 49 (2 with 6, 32 with 7, 15 with 8 ribs) (Type series); off Cape Vidal (Zululand), 80–100 fathoms, 4 (1 with 7, 3 with 8 ribs); off O'Neil Peak (Zululand), 90 fathoms, 2 with 7 ribs; all dead (S. Afr. Mus. A5482, A9363, A9364 (Type series), A9365, A9366, P.F. coll.).

Remarks. All the specimens are dead, and perhaps none of them is fully grown.

At two localities specimens with 6, 7 and 8 ribs occur; at one locality specimens with 7 and 8 ribs, at another locality 2 specimens with 7 ribs, and at one other locality 1 specimen with 6 ribs. As all the specimens agree except in the number of main ribs, it is a reasonable assumption that they all belong to one species.

Compare the variability in the number of ribs in the West African *D. coarti* Dautz. 1912, see Nicklès, 1955, p. 105.

A larger example of *octagulatum* Donovan (= *octagonum* Lam.) from Japan, whose broken apex is of the same diameter as that of the aperture of the largest Natal shell, shows much stronger intermediaries between the main ribs.

The 6-ribbed Natal specimens agree with the apical portion of a Chinese *sexcostatum* Sow.

The relative numbers of specimens seem to indicate that the 7-ribbed form is the normal form, and therefore a n.sp. is instituted.

Dentalium africanum Sow.

Dentalium africanum Sowerby, 1903, p. 224, pl. 5, fig. 10.

Up to 60, diam. aperture 6, apex 1·5 mm. A shell 47 × 5 × 1 mm. has a slit 4 mm. long.

Radula with 15 rows, lateral plate unicuspid.

Off Umtwalumi River (Natal), 25 fathoms, living and dead (Sowerby). Off Morewood Cove (Natal), 27 fathoms, 3 living, 1 dead; off Illovo River (Natal), 27–30 fathoms, 3 living, 1 dead; off Durnford Point (Zululand), 34 fathoms, 1 living, 3 dead; off Cape Vidal (Zululand), 22 fathoms, 1 living, 2 dead; off Rame Head (south of Port St. Johns), 43 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Cotypes in the South African Museum (A5489).

Dentalium inflexum Sow.

Dentalium inflexum Sowerby, 1903 (July), p. 224, p. 5, fig. 11.

Radula with 14 rows, lateral plate unicuspid.

Off Tugela River (Natal), 14 fathoms, living (Sowerby).

Off Amatikula River (Natal), 24 fathoms, 1 dead; off Umhloti River, 27 fathoms, 1 living, 1 dead; off Cape Vidal (Zululand), 22 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Cotypes in the South African Museum (A5470).

Remarks. According to Sowerby, differs from *longitrorsum* Rve. by being finely striate; but a Philippine example of the latter in the South African Museum is finely striate at the apical end.

Smith (1903, Oct., p. 393) recorded *longitrorsum* from Durban (coll. Burnup), but had not then seen Sowerby's description of *inflexum*. One or other of the species names should probably be deleted from the South African fauna-list.

Dentalium engischistum n.sp.

Fig. 30*f*

Dentalium politum (*non* Linn.) Sowerby, 1903, p. 231.

Moderately curved when young, straightening later. Surface smooth, polished, fine growth-lines showing through, but not incised. Slit a mere crack, long, often one-third length of shell.

Up to 30, diam. aperture 3 mm., slit 8–10 mm.

Radula with 14–15 rows, lateral plate unicuspid.

Off Cape Natal (Durban), 62 fathoms, 7, living and dead (Type series); off Cape Natal, 54 fathoms, about 100, mostly dead but fresh, a few living; off Umhloti River, 100 fathoms, 8, living and dead; off Cape Natal, 47 fathoms, 9 living and dead (S. Afr. Mus. A5463 (Type series), A5464, A5465, A5493, P.F. coll.).

Remarks. Sowerby (1860, p. 100) stated that *politum* was 'distinguished from all other species by the incised lines which divide its whole length into oblique rings', a feature which is clearly shown on his pl. 225, fig. 46 (see also: Boissevain, 1906, pl. 1, fig. 20, after Deshayes). Sowerby also said that *politum* was very rare in a Recent state but common as a fossil in the Paris basin.

It seems unlikely that the Natal shells, which show no trace of incised lines, should be identical with a European fossil.

The long apical slit is comparable with that of 'translucidum' (*non* Deshayes) figured by Sowerby (1860, pl. 225, fig. 47), which was renamed *stenoschizum* by Pilsbry and Sharp, 1897 (see Boissevain, 1906, p. 59).

Fam. **Cadulidae**

Plate, 1908, p. 358 (*Siphonodentalidae*); Thiele, 1934, p. 780 (*Siphonodentaliidae*).

As *Cadulus* Philippi 1844 antedates *Siphonodentalium* M. Sars 1859, the family name should be taken from the former.

Cadulus booceras Tomlin 1962 and *C. platei* Jaeckel, 1932, are the only species recorded up to the present from South Africa. Among the *Pieter Faure* Scaphopods sent to Tomlin, however, were two species. These Tomlin identified but did not include in his 1931 Report on the Scaphopoda (Ann. S. Afr. Mus. xxix, pp. 337 sqq.).

Cadulus cylindratus Jeffreys

Cadulus cylindratus Jeffreys, 1877, p. 158; 1882, p. 664, pl. 49, fig. 6.

Smooth, glossy. Symmetrically curved, slightly swollen in middle or slightly nearer anterior end; aperture slightly oblique, subcircular; apex transverse, entire, oval, without internal perforated discs. 4–4·5 × 0·8–0·9 mm.

Radula with 14 rows, central plate as long as wide, lateral plate bicuspid, marginal plate 3 times as wide as long.

Cape Point N. 89° E. 36 miles, 700 fathoms, a dozen specimens, some living (S. Afr. Mus. A7461, P.F. coll.).

Distribution. North Atlantic.

Remarks. Tomlin's identification is accepted. The specimens appear to agree with Jeffreys's 1882 figure; his 1877 description I have not seen.

Cadulus cf. *booceras* Tomlin

Cadulus booceras Tomlin, 1926*a*, p. 298, pl. 16, fig. 11.

A single specimen from each of the following localities: off Cape Vidal (Zululand), 80–100 fathoms; off Hood Point (East London), 49 fathoms.

Without further material and direct comparison with examples of Tomlin's Durban Bay species, it is better to leave these small (4·5 and 5·3 mm.) specimens unnamed.

Another single example 8 mm. long, from off Cape Natal (Durban), 85 fathoms, may be a *Cadulus* (*Dischides*) or possibly a *Siphonodentalium*.

Cadulus platei Jaeckel

Cadulus platei Jaeckel, 1932, p. 311, fig. 11.

Diameter largest in the middle; apex slightly oblique, with internal perforated thickening; apex and aperture subcircular. 8 × 1·2 mm. (text), 24 × 9 (fig.).

35° 19′ S., 20° 12′ E., 126 metres, 1 (Jaeckel).

Remarks. The discrepancy in size between text and figure is unfortunate, and renders identification uncertain.

Cadulus promontorii n. sp.

Fig. 30 *h–l*

Smooth, glossy; curved, swollen at or slightly in advance of anterior third; aperture oblique, slightly oval; apex with 2 notches on each side, the ventral notches deeper than the dorsal notches, between them a triangular tooth-like projection, the dorsal margin between the lateral projections very slightly arcuate, the ventral margin bilobate. 17·5 mm., width in front (vertical to axis) 2, at widest part 3, at apex 1 mm.

Animal (as preserved) with the foot slightly bulbous at the apex, with a small central pit. Jaw semicircular. Radula amber-coloured, with 15–16 rows, central plate slightly longer than wide, slightly narrower in front, side margins slightly thickened, lateral plate bicuspid on hinder rows, but blunt on the front rows, marginal plate $3\frac{1}{2}$ times as wide as long.

Cape Point N. 89° E. 36 miles, 700 fathoms, 5 (1 retained by Tomlin) living (S. Afr. Mus. A7460 (Types), P.F. coll.).

33° 50′ S., 17° 21′ E., 600 fathoms, 3 living (S. Afr. Mus. A9705, F. H. Talbot coll.).

Remarks. Tomlin identified the P.F. specimens as *colubridens* Watson, a species known from New Zealand (*Challenger*), East Indies (*Siboga*), and East coast of Africa (*Valdivia*). They cannot possibly be this species because of the indented apex; Tomlin evidently considered the notches to be due to accidental breakage.

The apex of the shell has a somewhat fanciful resemblance to Cape Point, flanked on the south-west by Cape Maclear and on the north-east by another headland.

Some of the Foraminifera found in the pharynx were remarkably large, and apparently could only have been drawn in through the aperture of the shell with difficulty.

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'I. *Synonymy arranged according to chronology of names.*—All published scientific names by which a species has been previously designated (subsequent to 1758) are listed in chronological order, with bibliographical references to all descriptions or descriptive citations following in chronological order after each name. . . .

B. *Form of bibliographic references to synonymic names.*—The first reference following any name in the synonymy should be to the earliest citation of that name. This should be followed by references to all subsequent citations of the same name, arranged in chronological order. . . .'

Bibliographical references modified to consist of author's name, date of citation, pagination and illustrations (plates and figures).

Example:—

Eulalia (*Steggoa*) *capensis* Schmarda

Eulalis capensis Schmarda 1861, p. 86, pl. 29, fig. 231. Willey 1904, p. 259.
Eulalia viridis var. *capensis* McIntosh 1903, p. 34. Day 1953, p. 30.
Eulalia viridis (*non* Muller) Ehlers 1913, p. 455. Day 1934, p. 30.

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PART III

CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART V. LAMELLIBRANCHIATA

By

K. H. BARNARD

South African Museum, Cape Town

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CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART V. LAMELLIBRANCHIATA*

By

K. H. Barnard

South African Museum, Cape Town

(With 39 figures in the text)

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Fam. **Nuculidae**

Nucula nucleus Linn.

Nucula nucleus Linn., Sowerby, 1892, p. 66; Thiele, 1931, p. 194; Turton, 1932, p. 214.
Nucula tumidula (*non* Malm.) Thiele, 1931, p. 195.
Nucula distincta Turton, 1932, p. 214, pl. 55, no. 1489 (= juv.).

Teeth at shell length 0·75 mm. anterior 3, posterior 1–2, at 1·5 mm. 4–5 and 2–3, at 1·75 mm. 6 and 3, at 3·5 mm. 11 and 5, at 5 mm. 13–14 and 8, at 10 mm. 20 and 12, at 13–15 mm. 24–25 and 13–14 respectively.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Table Bay (S. Afr. Mus.); Still Bay (S. Afr. Mus. Muir coll.); Lüderitzbucht, Agulhas Bank, and Algoa Bay (Thiele).

Off Tugela River (Natal), 65–80 fathoms; and from East London area to Algoa Bay, across Agulhas Bank to False Bay, 20–60 fathoms; south-west of Cape Point, 80 fathoms; living and dead (S. Afr. Mus. P.F. coll.).

34° 26′ S., 21° 48′ E., 37 fathoms; 33° 03′ S., 28° 11′ E., 31 fathoms; False Bay, 51 metres; Saldanha Bay; Lüderitzbucht, 35–91 metres (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele). N. Atlantic.

Remarks. Thiele identified two shells and a juvenile from the Agulhas Bank as the North Atlantic *tumidula*. According to Sars's diagnosis (1878, pp. 32, 33) there seems very little to separate this species from *nucleus*, except

* Part I. Toxoglossa: *Ann. S. Afr. Mus.* **44** (4), 1958.
Part II. Rhachiglossa: *Ann. S. Afr. Mus.* **45** (1), 1959.
Part III. Taenioglossa: *Ann. S. Afr. Mus.* **47** (1), 1963.
Part IV. Rhipidoglossa, Docoglossa, Tectibranchiata, Polyplacophora, Solenogastres, Scaphopoda: *Ann. S. Afr. Mus.* **47** (2), 1963.

Ann. S. Afr. Mus. **47** (3), 1964, 361–593, 39 figs.

perhaps the teeth: Sars gave 10–15 'anterior', 23–25 'posterior' teeth* in *nucleus* with shell length 12 mm.; for *tumidula* 8 and 16 at shell length 6 mm. In view of the increase in number with growth, as shown by examples in the Muir and P.F. collections, this character seems of little value. The number given for *tumidula* approximates to those given above for South African *nucleus*.

According to Thiele the *Valdivia* took at one locality one shell of *tumidula* together with a pair of *nucleus*.

Without more cogent evidence I am disinclined to admit the occurrence of *tumidula* in South African waters.

The Muir series of juveniles shows that *distincta* Turton is only the juvenile of *nucleus*.

Turton's *convexa* and the juveniles nos. 1487, 1488, are almost certainly *nucleus*.

Nucula pulchra Hinds

Nucula pulchra Hinds, 1843, p. 97; 1844, p. 62, pl. 18, fig. 3; Krauss, 1852, p. 30; Thiele, 1931, p. 195.
Nucula sculpturata Sowerby, 1904, p. 7, pl. 6, fig. 11.
Nucula rugosa Odhner, 1919, p. 23, pl. 2, figs. 15–18; Dautzenberg, 1929, p. 582.

Teeth at shell length 2·5–3 mm. anterior 10, posterior 4, at 5 mm. 10–12 and 4–5, at 9 mm. 17–19 and 7–8. Hinds gave 27–29 and 9; Krauss 20–22 and 10; Odhner 22–24 and 9.

Length 9, alt. 7 mm. (Sowerby and S. Afr. Mus.); 13·5 × 10·5 mm. (Odhner).

Agulhas Bank (Hinds); 'Cape coast', coll. Zeyher (Krauss); Port Alfred (Bartsch, Turton).

33° 3′ S., 27° 57′ E., 32–34 fathoms (Sowerby, P.F. coll.).

Same locality, 5 living, cotypes; 34° 3′ S., 25° 10′ E. (St. Francis Bay), 24–34 fathoms, several valves; off Cape Natal (Durban) 47–85 fathoms, a lot, living and dead; off Umhloti River (Natal) 27–40 fathoms, 2 living, several valves; off O'Neil Peak and Cape Vidal (Zululand) 80–100 fathoms, several valves (S. Afr. Mus. P.F. coll.).

31° 38′ S., 29° 34′ E., 26 metres (U.C.T.).

Cotypes in South African Museum. Reg. no. 14830.

Distribution. Madagascar (Odhner, Dautzenberg); also in Quaternary deposits (Dautzenberg).

Remarks. Although not based on actual specimens, Thiele's suggestion that *sculpturata* is synonymous with *pulchra*, seems correct. Hinds gave the number of 'posterior' (i.e. anterior) teeth as '27–29': a misprint for 17–19? In any case re-examination of Hinds's type and actual comparison with *sculpturata* is desirable, especially because Odhner stated that the 'corselet' (escutcheon) in *pulchra* was smooth.

* These terms must be reversed. Sars considered the shorter side anterior, but the position of the animal shows that it is actually posterior (cf. Hanley in Sowerby, 1860, *Thes. Conch.* iii, p. 147 footnote).

Odhner gave such excellent figures of his *rugosa* that the synonymy with *sculpturata* (and presumably *pulchra*) is beyond question, though the radial sculpture is not so evident. He mentioned the likeness to *pulchra* and *sculpturata*;* but the number of teeth is no objection (especially if Hinds's numbers are correct) and the difference in altitude (if any) is negligible.

The species is evidently more at home in the eastern waters of South Africa, not extending farther south-westwards than East London. The Port Alfred shells were dead, likewise the P.F. shells from St. Francis Bay. Dr. Muir did not obtain it at Still Bay; the provenance of Zeyher's shells may have been Algoa Bay (see Krauss, 1848, p. 12), but they were certainly dead shells.

Melvill (in Melvill & Standen, 1906, p. 791) compared his Persian Gulf *consentanea* with the South African *sculpturata*, 'the radiating and concentric sculpture being of the same character'. The diagnosis gave 'radiatim obscurissime striata' and the figure, pl. 54, fig. 7, shows no radial sculpture. In *sculpturata*, however, both the concentric and radial sculpture are much stronger (see Sowerby's figure).

Nucula irregularis Sow.

Nucula irregularis Sowerby, 1904, p. 7, pl. 6, fig. 12.

The oblique ridges on juvenile and immature shells are cut off obliquely at the antero-ventral margin. The whole lunule, not only its rim, is crossed by ridges. The sculpturing is quite distinct from that of *pulchra*.

Teeth at shell length 3·5 mm. anterior 10, posterior 4, at 6 mm. 17–19(20) and 7(8).

Off Struys Point, 48–49 fathoms (Sowerby, P.F. coll.).

Same locality, 2 living, cotypes; off Amatikulu River (Zululand) 24 fathoms, one valve; off Tugela River (Natal) 37 fathoms, 19 valves; off Umhloti River (Natal) 40 fathoms, 13 valves (S. Afr. Mus. P.F. coll.).

Cotypes in South African Museum. Reg. no. 14834.

Remarks. The type locality is open to doubt. The original label with the *Pieter Faure* number is not extant. The label returned with the two cotypes bears in Sowerby's writing the *Pieter Faure* number 15319, for which Struys Point (approx. 20° 15′ E.) is the correct locality. Nevertheless, the occurrence of dead valves off the Zululand–Natal coast suggests a possible error in labelling: 12319 would indicate a Natal locality, and 13319 or 13519 a locality in the Cape Morgan–East London area. Living shells in the Zululand–Natal–East London area and dead shells farther west is in conformity with the direction of the coastal current, but not vice versa. Probably the original number was 13519.

* He erroneously gave Reeve as the author of *pulchra*; and *sculpta* 1908 instead of *sculpturata* 1904. 1908 is the date of the title-page of vol. 4 of the *Marine Investigations in S. Africa*, not the date of Sowerby's paper in that volume.

Nucula sultana Thiele

Fig. 1 *b*

Nucula sultana Thiele, 1931, p. 197, pl. 7(2), figs. 41, 41*a*.

Length greater than altitude, posterior margin convex. Middle part smooth, with only growth-lines, but some radial striae show very faintly near the ventral margin. Anterior and posterior parts with strong, concentric, curved ridges, cutting obliquely across the growth-lines, *c.* 30 on anterior, *c.* 20 on posterior part. Lunule not distinct. Teeth anterior 17–18, posterior 8; ligament pit oblique; margin internally crenulate.

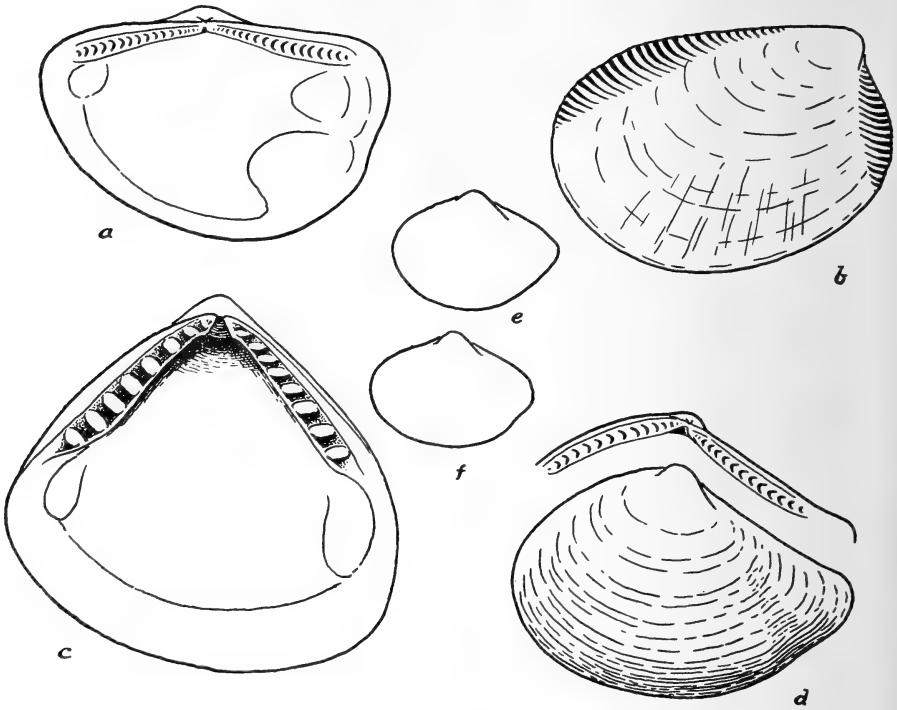


FIG. 1. *a. Leda compta* (Sow.), internal view of right valve of cotype. *b. Nucula sultana* Thiele. *c. N. aequalitas* n.sp. *d. Leda spreta* Thiele, 8 mm. long. *e.* juvenile, 2 mm. long. *f.* copy of Thiele's fig. 52, 3–4 mm. long.

Length 10·5, alt. 8 mm. (S. Afr. Mus.); 17 × 15 mm. (Thiele).

Delagoa Bay, one living, dredged in muddy channel, harbour entrance (S. Afr. Mus., K.H.B. coll., 1912); Durban harbour sediments (Dr. Lester King, 1963).

Distribution. East Africa: 5° 55′ S., 39° 1′ E., 50 metres (Thiele).

Remarks. The *Valdivia* shell is larger and has 25 anterior and 10 posterior teeth.

Nucula aequalitas n.sp.

Fig. 1 *c*

Solid, subtriangular, almost equilateral, upper anterior and posterior margins converging to a right angle, ventral margin gently convex. Fine concentric growth-lines only. Teeth 8 on each side of the ligament pit. Margin internally smooth. Glossy, pale brown. Length 3·75, alt. 3·5, width (valves together) 2·2 mm.

Off East London, 400–450 fathoms, one living (S. Afr. Mus. A9472, P.F. coll.).

Remarks. Comparable with *guineensis* Thiele (1931, p. 193, pl. 7(2), figs. 35, 35*a*), from the Gulf of Guinea to the mouth of the Congo River, 44, 2278 and 2492 metres; and with *verrillii* Dall, 1889 (see references quoted in Thiele), from the east coast of North America.

Differs in being slightly longer than high, and in having fewer teeth, equally disposed on each side of the ligament pit. The specific name refers to this symmetry of the teeth, and the nearly equilateral outline.

Distinguished from the other South African species by its shape, though *Nucula benguelana* Clarke approaches it in this respect (see Barnard, 1963b, p. 446).

Fam. **Ledidae**

Leda belcheri (Hinds)

Nucula belcheri Hinds, 1843, p. 98; 1844, p. 63, pl. 18, fig. 11.
Nuculana belcheri Sowerby, 1904, p. 4, pl. 6, fig. 7.
Leda belcheri (Hinds), Thiele, 1931, p. 202.

The ridges on the middle part develop only at about shell length 10 mm., and are slightly oblique to the concentric growth-lines; they do not extend on to the posterior dorsal side between the lower oblique rib and the hinge-line, which is crossed only by fine close-set growth-lines. Teeth at shell length 3 mm. anterior 9, posterior 7, at 4 mm. 10 and 8, at 6 mm. 12 and 10, at 10 mm. 18 and 15, at 20 mm. 22 and 20, at 37 mm. 28–30 and 25–26, with 1–3 minute ones on each side of the ligament pit. Periostracum thin, pale brown, around both ends and along ventral margin, but usually abraded on middle part of shell. Up to length 38 mm., alt. 18 mm.

Agulhas Bank, 40–54 fathoms (Hinds).

False Bay, 34 and 42 fathoms; off Cape St. Francis, 75 fathoms; Algoa Bay, 256 fathoms (Sowerby, P.F. coll.).

Agulhas Bank, 80–102 metres; Simon's Bay (False Bay), 70 metres, 2 living (Thiele).

Living: from Cove Rock and Nieca River (East London area) to Algoa Bay, across Agulhas Bank to False Bay, 30–100 fathoms; one living shell and several valves were also taken at 34° 27′ S., 25° 42′ E. (south of Cape Recife), 256 fathoms (S. Afr. Mus., P.F. coll.).

Living: False Bay; 34° 33′ S., 21° 28′ E., 67 metres; 34° 33′ S., 21° 52′E., 42 fathoms; and 34° 35′ S., 21° 11′ E., 75 metres (U.C.T.).

Remarks. This is a characteristic and abundant species throughout the above-mentioned area, but does not extend farther north-eastwards than the neighbourhood of East London, not even as far as Cape Morgan. It lives in False Bay, but does not extend around Cape Point on to the west coast. The most westerly localities where the *Pieter Faure* obtained dead shells are: Cape Point, N. ½ E., 4 miles, 50 fathoms, and Cape Point, N.E. ½ N., 19 miles, 145 fathoms.

The locality off Cape Natal given by Sowerby is erroneous, due to a slip on Sowerby's part; the specimen returned with his label is clearly *lamellata.*

The anterior teeth are consistently slightly more numerous than the posterior teeth.

Leda lamellata (Sow.)

Nuculana lamellata Sowerby, 1904, p. 5, pl. 6, fig. 8.

Ridges developing much earlier than in *belcheri,* slightly oblique to the concentric growth-lines; and continued on to the dorsal posterior end, where they become lamellate; they cross the 2 grooves between the 3 ribs. Teeth at shell length 3 mm., anterior 9, posterior 9 at 4–5 mm. 12 and 12, at 7 mm. 14–15 and 15–16, at 10 mm. 15–16 and 17–18, at 14 mm. 17–18 and 21–22 at 17 mm. 20–21 and 22–23, at 20 mm. 24–25 and 28–29, with 1–2 minute ones on each side of the ligament pit. Length 21, alt. 10·5 mm. Periostracum thin, pale brown, on hind end and along ventral margin.

Off Cape Natal (Durban), 54 and 85 fathoms (Sowerby, P.F. coll.).

From the same locality a lot, living and odd valves, cotypes; same locality 47 and 62 fathoms; off O'Neil Peak (Zululand), 55 fathoms, 6 living; off Cape Natal, 250 fathoms, one living, and 440 fathoms, one living; off Hood Point (East London), 49 fathoms, odd valves (S. Afr. Mus. P.F. coll.).

Remarks. Abundant in the Durban area, but no examples were taken farther south except the dead valves off Hood Point. The specimen from 440 fathoms is that previously recorded by Sowerby inadvertently as *belcheri.*

Leda gemmulata (Sow.)

Nuculana gemmulata Sowerby, 1904, p. 6, pl. 6, fig. 9.

Ridges as in *lamellata* developing early; at posterior end they become lamellate, and squamose on the 4 ribs; they do not cross the intervening grooves between the ribs (occasionally some of the growth-lines are lamellate). Teeth at shell length 15 mm. anterior and posterior 20–21, at 21 mm. 23–25. Length 22, alt. 11 mm. Periostracum thin, pale brown, on posterior end and along ventral margin.

Off Tugela River (Natal), 37 fathoms; off Umvoti River (Natal), 27 fathoms (Sowerby, P.F. coll.).

Off Tugela River, 37 fathoms, 2 living, cotypes; off Amatikulu River (Zululand), 24 fathoms, 12 living; off O'Neil Peak (Zululand), 90 fathoms, 3 living and odd valves; off Durnford Point (Zululand), 90 fathoms, 3 valves; off Morewood Cove (Natal), 27 fathoms, 4 living and several valves; off Umvoti River (Natal), 27 fathoms, 3 living; off Umhloti River (Natal), 27 fathoms, 3 living and several valves; off Cape Natal (Durban), 47 fathoms, one living (S. Afr. Mus. P.F. coll.).

29° 46′ S., 31° 17′ E., 60–70 fathoms (U.C.T.).

Remarks. Neither living shells nor dead valves of this species have been found farther south than off Durban.

Leda compta (Sow.)

Fig. 1 *a*

Nuculana compta Sowerby, 1904, p. 6, pl. 6, fig. 10.

The number of teeth (not mentioned in the description, but indicated in the small figure) is, in the cotype, 8·5 mm. shell length, 14 anterior, 17 posterior, with 2–3 minute ones on each side of the very small ligament pit; at 6 mm. shell length 10–11 anterior, 13–14 posterior.

The cotype contained the animal, which however, after over 55 years preservation in a dry state, was not in very good condition. There is a definite pallial sinus, and the siphons appear to be completely united. The animals in the two bottom-sample shells were less well preserved.

Off Cape Natal (Durban), 440 fathoms, 2 specimens (Sowerby, P.F. coll.)

Bottom-sample from same haul, 2 living, 2 valves (S. Afr. Mus. P.F. coll.)

Remarks. The unopened specimen which contained the animal was returned by Sowerby and is regarded as the cotype (S. Afr. Mus. Reg. no. 14818). The specimen figured, showing the hinge teeth (Type) is presumably in the Sowerby collection in the British Museum.

Two juveniles from off Cape Point, 700 fathoms, which at the time without close study I thought might be this species, were went to Tomlin; they were not returned and are presumably in the Tomlin collection in the National Museum, Cardiff.

Leda sinuata Thiele

Leda sinuata Thiele, 1931, p. 203, pl. 7(2), figs. 53, 53*a*.

A single right valve agrees with Thiele's description and figure, except that the teeth number anterior 12, posterior 16, with 4 minute ones on each side of the ligament pit; but the specimen is slightly larger than Thiele's shells. The concentric ridges are weaker anteriorly. Length 8·5, alt. 5·25 mm.

Off East London, 400–450 fathoms, one valve (S. Afr. Mus. Reg. no. A9452 P.F. coll.).

Distribution. Zanzibar Channel, 463 metres (Thiele).

Remarks. Thiele noted the close similarity to the European Tertiary fossil *excisa* (Phil.). Examples of the latter living in the North Atlantic, with a

shallower posterior sinus, have been named *subexcisa* by Dautzenberg & Fischer (1897, 1927).

Although Atlantic species have been obtained from the deep water off East London, e.g. *Eudolium crosseanum* (Mont.) (Barnard, 1963a, p. 8), the present shell is preferably assigned to the East African species.

Leda spreta Thiele

Fig. 1 *d, e, f*

Leda spreta Thiele, 1931, p. 203, pl. 7(2), figs. 52, 52*a*.

Teeth 10–12 both anteriorly and posteriorly, with 3–4 minute ones on each side of the ligament pit. Length 9, alt. 6·5 mm. A larger shell with broken umbo has length 10 mm.

35° 19′ S., 20° 12′ E., 126 metres (Thiele).

St. Francis Bay, 24–34 fathoms, 14 valves; off Hood Point (East London), 49 fathoms, 5 valves, 3 juv. living; off Cape Natal (Durban), 54 fathoms, 2 valves, and 85 fathoms, several valves; off Umhloti River (Natal), 40 fathoms, 7 valves; off Umvoti River (Natal) 56 fathoms, 11 valves; off Tugela River (Natal), 65–80 fathoms, 2 valves; off Durnford Point (Zululand), 90 fathoms, 7 valves; off Cape Vidal (Zululand), 80-100 fathoms, 9 valves (S. Afr. Mus. P.F. coll.).

Remarks. The present specimens are much larger than the *Valdivia* shells, but leave little doubt as to their identity. The most obvious difference is in the posterior end; but when a juvenile 2–3 mm. long is compared with Thiele's figure of a 3·4 mm. shell there is very little difference.

Clarke (1961, p. 375) has recorded *Nuculana ultima* Smith, 1885 from *Vema* stations 51 and 52 (45° 34′ S., 6° 2′ E., 2507 fathoms, and 41° 3′ S., 6° 2′ E., 2711 fathoms) approximately 1,000 and 800 miles respectively south-west of Cape Town. He regarded *modesta* Thiele, 1931, from 2,278 metres in the Gulf of Guinea, and *spreta* Thiele, 1931, from 126 metres on the Agulhas Bank, as synonyms of *ultima*. He may be right in uniting *modesta* with *ultima*, but for the present I prefer to retain *spreta* from the shallower South African waters as a separate species.

Fam. **Solenomyidae**

Solenomya occidentalis Desh.

Ligament posterior, supported internally by a well-developed shelf. No ridge (or only a very slight one) in front of insertion of posterior adductor muscle.

Length 38, alt. 13 mm.

Off west coast of Cape Peninsula (Lion's Head, N. 78° E., distant 12 miles), 60 fathoms, 2 living; False Bay, 22–42 fathoms, 4 and 3 juv., living; off Cape Infanta, 47 fathoms, 2 living (S. Afr. Mus. P.F. coll.). Off Saldanha Bay, 75-85 fathoms (U.C.T.). False Bay (U.C.T.).

Remarks. Sowerby (1897, p. 27) recorded *togata* Poli (= *mediterranea* Lam.) from Durban; but he identified P.F. shells, from the above three localities, as *occidentalis*. Turton (1932) recorded Port Alfred specimens as *mediterranea*.

Macnae & Kalk (1958, p. 129) list *S. occidentalis* ?*togata* from Delagoa Bay.

Fam. **Arcidae**

Arca navicularis Brug.

Arca navicularis Brug., Smith, 1903, p. 395; Braga, 1952, p. 102, pl. 8, fig. 4.

Fossil: Post Pliocene, Inhambane (Cox, 1939).

Durban (Smith); Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also U.W.); Inhambane (Braga). Durban harbour sediments (Dr. Lester King).

Distribution. East Africa, Madagascar, Indo-Pacific.

Arca (*Trisidos*) *tortuosa* Linn.

Arca tortuosa Linn., Chenu, 1862, fig. 871.

Delagoa Bay (S. Afr. Mus. coll. K.H.B.).

Distribution. Madagascar, East Indies. Not mentioned by von Martens (1879, 1880) as occurring in East Africa.

Arca semitorta Lam.

Arca semitorta Lam., Braga, 1952, p. 103, pl. 9, fig. 1.

Delagoa Bay (Braga; also S. Afr. Mus. coll. K.H.B.).

Arca avellana Lam.

Fig. 2 *b*

Arca acuminata Krauss, 1848, p. 14, pl. 1, fig. 11; Turton, 1932, p. 217.
Arca kraussii Krauss, 1848, p. 14, pl. 1, fig. 13; Philippi, 1849, p. 88, pl. 5, figs. 8–10; Cox, 1930b, p. 154, pl. 17 B; Turton, 1932, p. 217; Day & Morgans, 1956, p. 307.
Arca kraussii var. *inflata* Krauss, 1848, p. 15; Turton, 1932, p. 217.
Arca scabra (*non* Poli), Sowerby, 1892, p. 65.
Arca imbricata Brug. and var. *arabica* Nardini, 1937, p. 242, pl. 15(9), figs. 17, 18; Braga, 1952, p. 103; Day & Morgans, 1956, p. 307.
Arca avellana Lam., Prashad, 1932, p. 32 (references & synonymy); Adam & Leloup, 1939, p. 38, pl. 3, fig. 1.
[*Non*] † *Cucullaea kraussii* Tate, 1867.

Prodissoconch 0·3 mm., brown, conical, the rim not raised above the succeeding shell (contrast *plicata*). Area 'white-margined' (Krauss), i.e. the ligament does not cover the whole of the area, longitudinally striate, with dark transverse lines (corresponding to the teeth) showing through the shell substance; ligament thin, smooth, a slightly oblique groove from umbo to hinge-line filled with fibrous ligament, 3–4 additional incomplete (not starting from umbo) grooves (see Krauss's figure).

Length 26, alt. 16, width (valves together) 15 mm. Krauss gave 18 × 9·5 × 10, Paris lines 38 × 20 × 21·5 mm.

Fossil: Mio-Pliocene, Redhouse, Port Elizabeth (Cox 1930); Post Pliocene, Inhambane (Cox, 1939).

Natal Point (Durban) (Krauss); Umlaas River Mouth (Natal) (S. Afr. Mus.); Durban Bay and Isipingo (U.C.T.); Inhambane (Braga); Bazarute Island (S. Afr. Mus.).

I have seen a typical 'acuminata', living, from Xora (Elliotdale Division) (C. Walker coll.).

Off Cape Natal (Durban), 54 fathoms, one worn valve, and 85 fathoms, 5 valves; off Tugela River (Natal), 65–80 fathoms, one juv. valve; off Cape Vidal (Zululand), 80–100 fathoms, one valve; off Cape Morgan, 52 fathoms, 2 valves; of Hood Point (East London), 49 fathoms, one living, 9 valves; 34° 27′ S., 25° 42′ E., 256 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea, east coast of Africa, Mauritius, Madagascar, Indo-Pacific.

Remarks. Krauss said *kraussii* was nearest to *arabica*; von Martens (1880) recorded both species from Mauritius; Dautzenberg (1929) regarded *kraussii* as a synonym of *arabica*, and the latter as a variety of *imbricata*.

The name *imbricata* Brug. is restricted to the West Indies form.

Cox figured a fossil shell from Redhouse, Port Elizabeth, which he thought was probably *kraussii* distorted by growing in a narrow crevice; he did not mention *acuminata* Krss., with the figure of which the fossil closely agrees.

Arca (*Anadara*) *uropigimelana* Bory

Arca uropigimelana Bory St. Vincent, 1824, p. 156, pl. 307, fig. 2; Adam & Leloup, 1939, p. 42.
Arca uropygmelana von Martens, 1880, p. 320; Lamy, 1907, p. 207; Dautzenberg, 1929, p. 580.
Arca holoserica Reeve, 1843, pl. 2, fig. 11.

Area wide, ligament with 2–3 divergent lines. None of the ribs subdivided by sulci or striae. Length 55, alt. 50 mm.

Delagoa Bay, Chinde (mouth of Zambesi River), and Beira (S. Afr. Mus. coll. K.H.B.).

Distribution. East coast of Africa, Madagascar, Mauritius, East Indies.

Remarks. Sherborn (Index Animal.) gave *uropigimelana* as 'n. et f.' i.e. *nom. nud.*, and did not include it in the list of Trivialia.

Anadara morrumbenensis Cox (1939, p. 81, pl. 2, figs. 19 *a*, *b*), seems to be allied, but is proportionately higher: length 39, alt. 38 mm., and has only about 16 ribs.

Arca (*Anadara*) *erythraeensis* Jonas

Arca erythraeensis Jonas, Dunker, 1858, p. 123, pl. 40, figs. 6–8; Smith, 1903, p. 395; Braga, 1952, p. 105, pl. 9, fig. 3.

Area wide, ligament with 3 divergent lines. Ribs on anterior part and on anterior half of middle part subdivided by a sulcus (on shells over 20 mm. long); anterior part regulose. Internally white. Periostracum fimbriate. Length 75, alt. 45 mm.

Delagoa Bay (S. Afr. Mus. coll. Dr. J. D. F. Gilchrist; also K.H.B.; Braga; U.W.). Durban harbour sediments (Dr. Lester King).

Distribution. Red Sea.

Remarks. Tomlin labelled a specimen 'erythraeonensis'. Living examples were obtained by Dr. Gilchrist and U.W.

Arca (*Scapharca*) *natalensis* Krss.

Arca natalensis Krauss, 1848, p. 17, pl. 1, fig. 12; von Martens, 1880, p. 320; Dautzenberg, 1929, p. 580; Lamy, 1931, p. 304; Braga, 1952, p. 103, pl. 9, fig. 2.
[*Non*] *Arca natalensis* Macnae & Kalk, 1958, pp. 117, 129, fig. 23 *g*, *h*.
[*Non*] † *Arca natalensis* Baily, 1855 (nom. nov. *bailyi* Brnrd., 1962b.)

Right valve smaller than left. Ribs not subdivided. Length 61, alt. 50, width (valves together) 42 mm.; also 68 × 63 mm.

Natal Point (Durban) (Krauss), Richards Bay (U.C.T.), Delagoa Bay (Braga). Durban harbour sediments (Dr. Lester King).

Off Tugela River (Natal), 24 fathoms, 4 living; Cape St. Blaize N.E. ½ N., 8 miles, 36 fathoms, one and one juv. (22 mm.) living, one dead (both valves intact) (S. Afr. Mus. P.F. coll.).

31° 38′ S., 29° 34′ E., 26 fathoms (U.C.T.).

Distribution. Mauritius, Madagascar. Also Quaternary deposits in Madagascar.

Remarks. Like *inaequivalvis* Brug. this species is inequivalve, and it is questionable whether Smith's specimen of the former from Durban was not really *natalensis*.

The figure given by Macnae & Kalk is the wrong shape for this species; it is more like *erythraeensis* or *antiquata*.

The occurrence of this species living so far west as Cape St. Blaize is noteworthy; confirmation is desirable. Lamy's (1931) record from Walvis Bay is even less acceptable, without confirmation.

The combination *Arca natalensis* Krauss antedates the same combination for the Cretaceous fossil species given by Baily 1855. For the latter I have proposed *Arca bailyi* (Barnard, 1962 b, p. 183).

Arca (*Scapharca*) *africana* Sow.

Arca africana Sowerby, 1904, p. 4, pl. 6, fig. 4.

Equivalve. Up to length 29, alt. 21, width 19 mm.

Off Tugela River (Natal), 46–55 fathoms (Sowerby, P.F. coll.).

Same locality, one living, 2 valves, cotypes; same locality, 40 fathoms, several living, and odd valves; off Umhloti River (Natal) 40 fathoms, one living, 4 valves (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E., 71 metres (U.C.T.).

Durban harbour sediments (Dr. Lester King).

Cotypes in South African Museum. Reg. no. 14831.

Remarks. Compare *Anadara waylandi* Cox 1927 (p. 34, pl. 8, figs. 5–7), from the Lower Miocene, Pemba Island.

Arca (*Acar*) *plicata* (Chemn.) Dillwyn

Fig. 2 *a*

Arca plicata Dillwyn, 1817, p. 228; Dautzenberg, 1929, p. 577; Prashad, 1932, p. 50 (references & synonymy); Nardini, 1937, p. 243, pl. 16(10), figs. 1, 2; Adam & Leloup, 1939, p. 44, pl. 3, fig. 4; Nicklès, 1955, p. 115.
Arca domingensis Lamarck, 1818, p. 40; Lischke, 1869, p. 142; Melvill & Standen, 1899, p. 186; Smith, 1903, p. 395; Turton, 1932, p. 216.
Arca gradata Broderip & Sowerby, 1829, p. 365; Turton, 1932, p. 216.
Arca squamosa Krauss, 1848, p. 16.
Arca aghulhasensis Thiele, 1931, p. 177, pl. 6(1), figs. 12, 12*a*.

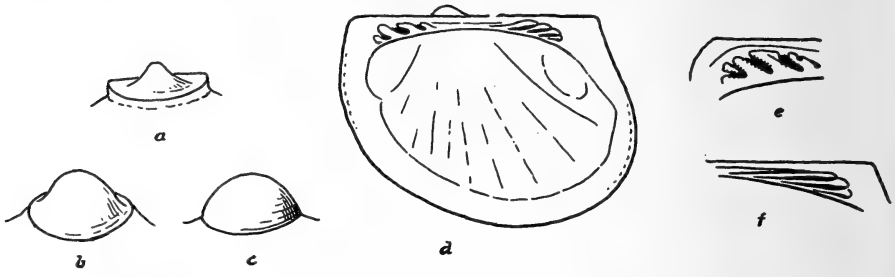


FIG. 2. Prodissoconch of: *a. Arca plicata* (Chemn.), *b. avelana* Lam. *c. obliquata* Gray. *d.* internal view of right valve of *Arca* (*Bathyarca*) *orientalis* Thiele (off Cape St. Blaize). *e.* anterior teeth of specimen from Browne's Bank. *f.* posterior teeth of specimen from Algoa Bay.

Prodissoconch 0·4 mm., with central conical tubercle, rim raised above succeeding shell (cf. Thiele). Ligament posterior to umbones, with very oblique close-set lines. Length 45, alt. 32 mm.

Fossil: Post Pliocene. Inhambane (Cox, 1939).

Natal (Krauss); Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also Braga); Umkomaas (Natal) (S. Afr. Mus. coll. Burnup); Port Alfred (Turton); Still Bay (S. Afr. Mus., coll. Muir), Port Edward (U.C.T.).

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres (Thiele).

Off Durnford Point (Zululand), 13 fathoms, one valve; off Tugela River (Natal), 24 fathoms, 2 valves; and 47 fathoms, one juv. living, one valve; off Cape Natal (Durban), 54 fathoms, 2 valves; off Illovo River (Natal), 27–30 fathoms, 5 valves; off Cape Morgan, 77 fathoms, one juv. living, several valves; of Nieca River (East London), 43 fathoms, 4 valves; 33° 3′ S., 27° 57′ E., 32 fathoms, one valve; 34° 5′ S., 25° 43′ E., 52 fathoms, 2 valves (S. Afr. Mus , P.F. coll.).

Distribution. Red Sea, Arabian Sea, Madagascar, Indo-Pacific, Cape Verde Islands, St. Helena.

Remarks. Only the 2 valves from 24 fathoms off Tugela River are large; all the other P.F. specimens are small (4–21 mm.).

In 1931 (p. 175) Thiele identified some worn shells from 31° 51′ S., 19° 37′ E., 80 metres, as *acerea* Melvill & Standen, 1899 (loc. cit. *supra*), a species from Torres Straits. From the same station other shells were taken which Thiele described as *agulhasensis*, allied to *plicata*. I consider the former a synonym; and I am inclined to regard the worn shells as conspecific. It seems unnecessary to bring into the fauna-list the name of a Torres Straits species when there are other better known species living in South African waters.

A. acerea is a very low species 15 × 7 mm., whereas Thiele's measurement of 18 × 10 mm. exactly fits some of the above-recorded specimens of *plicata*.

The *Pieter Faure* obtained no shells of any *Arca* species from the particular area west of Cape Agulhas whence the *Valdivia* obtained *agulhasensis* and 'acerea'. Dr. Muir found dead shells of *plicata* at Still Bay.

Arca (*Barbatia*) *bistrigata* Dnkr.

Arca bistrigata Dnkr., Braga, 1952, p. 105, pl. 8, fig. 6.

Upper part of posterior margin almost at right angles to dorsal margin of hinge-line. Area moderate, ligament with 2–3 divergent lines. Ribs on middle part subdivided by a sulcus (Braga: 2–3), nodulose; on anterior and posterior parts undivided, rugulose. Internally greenish. Periostracum fimbriate. Length 28, alt. 15 mm.; Braga: 32 × 16 mm.

Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also Braga).

Remarks. The subdivision of the ribs appears to begin at an earlier stage than in *erythraeensis*.

Arca (*Barbatia*) *obliquata* Gray

Fig. 2 *c*

Arca obliquata Gray, 1837, p. 65; Sowerby, 1892, p. 65; Johnson, 1904, p. 9; Krige, 1933, pp. 51, 52; van Bruggen, 1952, p. 12, pl. 1, fig. 1 (worn specimen, bad photo).
Arca alfredensis Bartsch, 1915, p. 182, pl. 46, figs. 9, 10; Turton, 1932, p. 216; Reinhart, 1935, p. 26; Day & Morgans, 1956, p. 307.

Prodissoconch 0·25 mm., strongly convex, button-like, margin not raised above succeding shell. In juveniles up to 3–4 mm. long the shape is oblong-oval, the altitude being nearly the same fore and aft; but thereafter the altitude increases posteriorly more rapidly than anteriorly. Area narrow, ligament mostly posterior, with very oblique lines. Up to length 50, alt. 30 (greatest altitude perpendicular to hinge-line; perpendicular from umbo to ventral margin *c.* 19), width (valves together), 18 mm.

Fossil: Post Pliocene, Inhambane (Cox, 1939); Pleistocene; raised beach, Algoa Bay (Johnson); Durban (Krige; also Geol. Survey specimens seen by me).

Natal Point (Durban) (Krauss); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Knysna, Mossel Bay, Still Bay, St. Sebastian Bay, Umzikaba (North of Port St. Johns) (S. Afr. Mus.); Scottburgh (Natal) and Delagoa Bay (S. Afr. Mus. coll. K.H.B.); Barzarute Island (S. Afr. Mus.).

False Bay; Umhlanga (Natal) and Durban Bay (U.C.T.).

Distribution. Indo-Pacific.

Remarks. This seems to be a littoral species; it was not taken by the *Pieter Faure*, and does not occur in any of the bottom-samples.

The Muir series from Still Bay includes juveniles from 1·5 mm. upwards.

Arca (*Barbatia*) *helblingii* Brug.

Arca helblingi Bruguière, 1789, p. 99.
Arca ovata Gmelin, 1790, p. 3307.
Arca velata Sowerby, 1833, p. 18; von Martens, 1880, p. 320.
Arca nivea Chemn., Krauss, 1848, p. 16; Dautzenberg, 1929, p. 576; Turton, 1932, p. 217; Krige, 1933, p. 51; Nardini, 1937, p. 241, pl. 15(9), fig. 15; Adam & Leloup, 1939, p. 41, pl. 3, fig. 3.
Arca nivea var. *velata* Braga, 1952, p. 104, pl. 8, fig. 7.

Ribs on posterior part subdivided by a sulcus; contrast *natalensis*.

Fossil: Pleistocene, Durban (Krige).

Natal, living (Krauss); Durban and Natal, living (S. Afr. Mus.); Delagoa Bay, living (S. Afr. Mus. coll. K.H.B.); Port Alfred 'very rare' (presumably dead) (Turton); Umpangazi, Zululand, living (U.C.T.). Durban harbour sediments (Dr. Lester King).

Off Umtwalumi River (south of Scottburgh, Natal), 25 fathoms, 3 living; off Umhloti River (Natal), 40 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Remarks. Krauss regarded *helblingii* as the juvenile of *nivea*. Sowerby identified P.F. shells as *nivea*. My larger Delagoa Bay shells were labelled *helblingii* by Tomlin.

Numerous odd valves, none over 14 mm. long, from the following localities: St. Francis Bay 24–34 fathoms; off Hood Point (East London), 49 fathoms; off Cape Morgan, 77 fathoms; off Cape Natal (Durban), 54 fathoms; off Tugela River (Natal), 65–80 fathoms; off Durnford Point (Zululand), 90 fathoms (S. Afr. Mus. P.F. coll.) may be referable to this species, which seems moderately common on the Natal coast.

Arca (*Barbatia*) *decussata* Sow.

Arca decussata Sow., Thiele, 1931, p. 174; Prashad, 1932, p. 42 (reference); Braga, 1952, p. 105, pl. 8, fig. 8; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, p. 37; Broekhuysen & Taylor, 1959, p. 292.

Four living specimens from Table Bay, 136 fathoms, the largest 18 × 10 mm. (S. Afr. Mus. P.F. coll.) were identified by Tomlin as *decussata* Sow. Similar specimens were obtained at Saldanha Bay by U.C.T. The *Pieter Faure* also obtained one living example, 11 mm., off East London, 47 fathoms.

There are no authentic specimens of *decussata* in South African Museum for comparison. Braga's figure of a larger shell is very similar to a shell identified by Tomlin as *helblingii* (q.v.).

Fossil: Post Pliocene, Inhambane (Cox, 1939).

Delagoa Bay (Braga); Kosi Bay and Inhambane (U.C.T.).

Arca (*Barbatia*) *cafria* Bartsch

Arca cafria Bartsch, 1915, p. 183, pl. 38, figs. 1, 5.
Noetia cafria (Bartsch), Reinhart, 1935, p. 48.
Cardita rufanensis Turton, 1932, p. 131, pl. 60, no. 1615 (= juv.).

Prodissoconch 0·2 mm., smooth. Obliquely oval, deeper posteriorly; margin, especially hind margin, scalloped. Radially ribbed, broad and narrow ribs alternating, the broad ribs may be striated, and are sometimes double; crossed by growth-lines and more or less nodulose; narrow ribs much more deeply indented by the growth-lines and consequently beaded or moniliform. In juveniles up to *c.* 1·5 mm. there are *c.* 15 radial ribs, the growth-lines strong, and the sculpture clathrate. Thereafter intermediate ribs develop.

Area with transverse grooves; at 5 mm. shell length 2 anterior, at 8 mm. 3 anterior, 3 posterior, at 17 mm. *c.* 7 anterior and 12 posterior. Teeth at 2·5 mm. shell length 10–11, at 4 mm. 16–17, at 7–8 mm. 22–25, at 10–12 mm. 26–28 those in the middle becoming very narrow, linear.

Margin internally crenulate. Posterior adductor scar bordered anteriorly by a ridge or flange. Periostracum dark brown, fibrous-setose, chiefly in the grooves between the ribs.

Length 14·2, alt. 8·5 mm. (Bartsch). A worn Port Alfred shell in South African Museum 17·5 × 13 mm.

Port Alfred (Bartsch, Turton).

Off Tugela River (Natal), 14 fathoms, 2 living, several valves 2·5–15 mm.; and 47 fathoms, 5 valves; off Tongaat (Natal), 46 fathoms, two valves; off Umhloti River (Natal), 40 fathoms, 10 valves; off Illovo River (Natal), 30 fathoms, 8 valves; off Umkomaas (Natal), 40 fathoms, 2 valves; off Itongazi (Natal), 25 fathoms, 2 valves; off Cove Rock (East London), 22 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Remarks. The shape and the alternating broad and narrow ribs are distinctive.

Large shells are liable to become distorted from being cramped in crevices, e.g. the Port Alfred shell mentioned above.

The *Pieter Faure* took no living shells, but several of the valves are quite fresh and retain portions of the periostracum. The ligament grooves on the area appear to be more numerous than shown in Bartsch's fig. 5.

This species according to Lamy (1931, p. 305) appears to be very similar to *A.* (*Noetia*) *lateralis* Rve., which he records (p. 304) from Walvis Bay.

The West African *gambiensis* Rve. also appears to have a similar shape and alternating broad and narrow ribs.

Turton's *Cardita rufanensis* appears to be undoubtedly a juvenile of this species. There is even a suspicion of taxodont dentition to be seen in the photograph.

Arca (*Arcopsis*) *gibba* Krss.

Arca lactea var. *gibba* Krauss, 1848, p. 16.
Arca lactea Smith, 1891, p. 394; Sowerby, 1892, p. 65.
Arca gibba Krss., Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, pp. 37, 129.

Area wide. Ligament rhomboidal (triangular on each valve) transversely striated, dark brown or blackish, occupying only about one half the length of area. Length 17, alt. 12, width (valves together) 11·5 mm.

Fossil: Post Pliocene, Inhambane (Cox, 1939).

Natal (Krauss); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton).

Living: Port Elizabeth (R. N. Kilburn, 1960, specimen seen by me); Umzikaba (S. Afr. Mus.); Scottburgh, Natal (K.H.B.); Umhlanga, Inyoni and Durban Bay (Natal) (U.C.T.); Delagoa Bay (K.H.B.; also U.W.).

Off Durnford Point (Zululand), 13 fathoms, 3; off Tugela River (Natal), 14 fathoms, several valves; off Morewood Cove (Natal), 27 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Remarks. One specimen has a linear extension of the ligament posteriorly along the dorsal hinge-line, but not extending to the end of the area.

South African Museum (coll. R. M. Lightfoot) has one worn valve from Kalk Bay (False Bay). Unless some error has occurred, this must be a very unusual 'wash-up'; the species was not taken by the P.F. nor by U.C.T. in False Bay; Dr. Muir did not obtain it at Still Bay. The farthest west locality where it is known to be living is Port Elizabeth.

Thiele (1931, p. 174) considered *gibba* to be conspecific with *afra* Gmelin, which occurs at Querimba Island and other localities on the coast of East Africa.

Arca (*Bathyarca*) *orientalis* Thiele

Fig. 2 *d*, *e*, *f*

Arca (*Bathyarca*) *orientalis* Thiele, 1931, p. 179, pl. 6(1), fig. 14.

Almost equivalve, but the left valve very slightly the larger, obliquely inequilateral, hinge-line straight, nearly equal to length of shell. Fine concentric and radiating ribs forming a more or less distinct cancellate sculpture, visible on dead shells; on living shells the radial ribs are accentuated by the setose periostracum, especially towards the margin. Periostracum overlapping margin.

Teeth (3)4 anterior, oblique, (4)5 very oblique, almost horizontal (parallel with hinge-line) posterior. Juveniles have 2 anterior and 3 posterior teeth. Margin internally very obscurely crenulate, visible only near the dorsal margin anteriorly and posteriorly. Length 5·5, alt. 4, hinge-line 4·5 mm. White with brown periostracum.

35° 16′ S., 22° 26′ E., 155 metres; 35° 19′ S., 20° 12′ E., 126 metres (Thiele).

Off Umhloti River (Natal), 40 fathoms, 3 valves; off Cape Natal (Durban), 40 fathoms, 13 living; off Hood Point (East London), 49 fathoms, 2 living; 33° 4′ S., 27° 54′ E., 27 fathoms, one valve; 34° 26′ S., 25° 42′ E., 124 fathoms, 5 valves; off Cape St. Francis, 70 fathoms, 2 living, 2 valves; Browne's Bank (approx. 36½° S., 21½° E.), 80–100 fathoms, 3 living; off Cape St. Blaize, 125 fathoms, 5 living, 17 valves; Cape Point, N. 40° E., 120 fathoms, 3 living; Cape Point N.E. ½ N., 145 fathoms, one living (S. Afr. Mus. P.F. coll.).

34° 25′ S., 17° 36′ E., 1,240 metres, 2 and one juv., living; 34° 17′ S., 17° 53′ E., 320 metres, one living; 34° 51′ S., 23° 41′ E., 100 fathoms, one living (U.C.T.).

Distribution. Dar-es-Salaam and Zanzibar Channel, 404 and 463 metres (Thiele).

Remarks. There is no doubt that the P.F. specimens are conspecific with those obtained by the *Valdivia* and described by Thiele. The *Valdivia* also obtained specimens off the East African coast, which Thiele considered conspecific in spite of certain minor differences. That may be correct, but in any case Thiele, by figuring a specimen from the Agulhas Bank, has fixed this locality (35° 16′ S., 22° 26′ E.) as the type locality for *orientalis*.

Thiele's description lacks details. The South African specimens were stated to have 'as a rule less numerous teeth' than the East African specimens, but the number of teeth in the latter was not mentioned, and no figure of the teeth was given.

Similar in shape to the North Atlantic *pectunculoides* Scacchi (see Sars, 1878, pl. 4, figs. 2 *a–c*), and to the Persian Gulf *anaclima* Melvill & Standen (1906, p. 54, fig. 6; also Thiele, 1931, pl. 6(1), fig. 13).

The posterior teeth in the present specimens are more horizontal than shown in Sars's figure. Thiele gave the number of teeth in East African specimens of *anaclima* as usually 4. Here there are usually 4 anterior and 5 posterior teeth; there may be only 3 anterior teeth or the outermost may be partly or completely bifid, making 4 teeth. When there are only 4 posterior teeth, they are quite horizontal; the outermost may be partly or completely bifid (i.e. 6 teeth, but this occurred in only one shell).

The teeth do not fit the figure of *frielei* (Jeffreys, 1879, pl. 45, fig. 4).

A. profundicola Verrill & Smith (1885, p. 439, pl. 45, figs. 23, 23*a*) has almost horizontal posterior teeth, but the total number of teeth is greater, and the shell is more oblique. Dautzenberg (1927, p. 283) suggested that *profundicola* and *pteroessa* Smith (1885, p. 262, pl. 17, figs. 4, 4 *a*, *b*) were synonymous; but Smith's figure shows the posterior teeth more oblique. Thiele (1931, pp. 172, 178) seemed doubtful about the synonymy.

One of the Hood Point shells is more oblique than the other shells, as here figured, length 3, alt. 2·3 mm.; the other shell is less oblique, length 2·75, alt. 2·5 mm.

The Cape Natal specimens are very fragile, but that may be due to long sojourn in the bottom-sample saturated with formalin.

Gen. Deltaodon Brnrd.

Barnard, 1962a, p. 249.

Shell equivalve, inequilateral, area short and very narrow; umbones approximate; no ventral gape; margin internally smooth. Anterior teeth forming a D-shaped group, posterior teeth oblique, a shallow oblique groove separating the two groups.

Seems to differ from the other Arcid genera and subgenera in the greatly reduced dorsal area, and the strong hinge with two groups of teeth. The anterior group as a whole is D-shaped, and the individual teeth radiate and bifurcate like the river mouths in a delta.

Deltaodon tugelae Brnrd.

Deltaodon tugelae Barnard, 1962a, p. 249, fig. 2.

From a bottom-sample off Natal–Zululand (exact locality not recorded) (S. Afr. Mus. A9477, P.F. coll.). One valve attached to a *Xenophora pallidula*, trawled off the Zululand coast, 160–180 fathoms.

Types in South African Museum; two cotypes in Natal Museum.

Named after the Tugela River, the boundary between Natal and Zululand.

Fam. **Glycimeridae**

Gen. Glycimeris Da Costa

(syn. Pectunculus Lam.)

1. Slightly inequilateral. About 24 narrow ribs with 2–4 intermediaries between each pair. Up to 32 mm. .. .. *connollyi*
2. Equilateral. Numerous ribs subequal in width to the grooves, both ribs and grooves finely striated. Up to 60–70 mm. .. .. *queketti*
3. Nearly equilateral. A few broad ribs, broader than the grooves. (S. African examples) 18 mm. .. .. cf. *pectiniformis*

Glycimeris connollyi Tomlin

Fig. 3 *a*, *b*, *c*

Pectunculus inaequalis (*non* Sow.) Krauss, 1848, p. 18; Sowerby, 1892, p. 66.
Pectunculus arabicus (*non* Adams) Sowerby, 1892, p. 66.
Pectunculus castaneus (*non* Lam.) Sowerby, 1904, p. 4.
Glycimeris connollyi Tomlin, 1923, p. 299, pl. 16, fig. 12; Turton, 1932, p. 215; van Bruggen, 1952, p. 12; Barnard, 1962b, p. 183.
Pectunculus kraussi Thiele, 1931, p. 193.
Glycimeris multistriata Turton, 1932, p. 215, pl. 55, no. 1495.

Length a little more than altitude; slightly inequilateral; posterior margin slightly pointed (i.e. less rounded than anterior margin). About 20–24 radiating, narrow, well-defined ribs in middle part, with 4–5 fine riblets in the intervening grooves; anterior and posterior parts with numerous fine riblets of equal strength. Concentric growth-lines producing a finely beaded appearance on the ribs, and a more or less punctate sculpture between the riblets in the grooves. Teeth at 2 mm. shell length 8, at 3 mm. 10, at 5 mm. 12, at 10 mm. 16, and in adult 20–24, those in the middle feeble and variable. Margin internally crenulate; on an *adult* shell 5 crenulations cover 5 mm.

Periostracum thin, shortly fibrous, usually more or less abraded except on the anterior and posterior parts of shell.

Up to length 31, alt. 28 mm. (Tomlin); 32 × 29 mm. (S. Afr. Mus.).

Yellowish, marbled with reddish-brown zigzag or cuneiform marks,

uniform when full grown, periostracum brown. Interior becoming orange-brown in beach-weathered shells.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Table Bay (Krauss); False Bay, Mossel Bay (Tomlin); Table Bay, Hermanus, Still Bay, Mossel Bay (S. Afr. Mus.); Port Alfred (Turton).

Off west coast of Cape Peninsula, 250 fathoms, odd valves (Sowerby, P.F. coll.).

34° 8′ S., 24° 59′ E., 33° 50′ S., 25° 48′ E.; 35° 29′ S., 21° 2′ E., 102 metres; 36° 26′ S., 20° 56′ E. (Thiele).

Dead shells: from numerous localities from Durban area (Umhloti, Morewood, Illovo, Umkomaas), Cape Morgan and East London area, Algoa Bay and Agulhas Bank, to False Bay; living: False Bay, 28 fathoms (S. Afr. Mus. P.F. coll.).

Algoa Bay, Mossel Bay, False Bay, 34° 33′ S., 21° 28′ E., 67 metres, living (U.C.T.).

Remarks. Tomlin's specimens were evidently beach-worn, and neither his description nor his photographic illustration express the characteristic sculpturing of this species. In worn shells the ribs naturally tend to become broader. In living and fresh shells the main ribs (in middle part of shell) are narrow (Thiele: 'fein'), with finer ones between them.

In shells up to *c.* 6–8 mm. long the ribs are all subequal in strength, with here and there perhaps a finer intermediary; thereafter intermediaries develop between each pair of main ribs, increasing in number from 1 to 4 or sometimes 5. Thiele's description is correct, except that the word 'stärkere' seems to be a *laps. cal.* for 'schwächere'.

Sowerby's record of *arabicus* probably belongs here. If the specimen really was *arabicus*, it was probably not South African (the species occurs in the Red Sea, Madagascar, and possibly along the east coast of Africa).

Sowerby (1904) recorded 'odd valves' from the P.F. collection but he returned 2 complete shells labelled *castaneus*.

This record, Krauss's record from Table Bay, and 2 juvenile beach shells in South African Museum, appear to be the only records from the west coast. As shown by the P.F. bottom-samples the species is more abundant from Natal to Algoa Bay, becoming less abundant westwards to False Bay.

Named after the late Major M. Connolly, author of the Monograph of South African Non-marine Mollusca (*Ann. S. Afr. Mus.* xxxiii, 1939).

Aberr. an var. (fig. 3 *c*). Among numerous typical examples of *connollyi* found by Dr. A. R. H. Martin in Pleistocene deposits at Sedgefield, was a single valve which has distinctive characters (Barnard, 1962b, p. 183).

The external sculpture is typical *connollyi*, but the valve is as high as long (19·5 mm.), with prominent umbo, 8 posterior and 10 anterior teeth, with feeble linear ones between, and 6 crenulations in a length of 5 mm. on the margin. The valve is also heavier than equal-sized valves of typical *connollyi*.

If several examples had been found, a separate specific name might have

been justified. A parallel case occurs in *pilosa-queketti*, the fossil *pilosa* differing from the living *queketti* in having more inflated umbones (*v. infra*). Also in *Tivela compressa—tomlini* (p. 506).

Glycimeris queketti (Sow.)

Fig. 3 *d*

Pectunculus queketti Sowerby, 1897, p. 27, pl. 7, figs. 8, 9; Braga, 1952, p. 106, pl. 9, fig. 6.
Glycimeris queketti (Sow.), Bartsch, 1915, p. 181; Krige, 1927, pp. 69, 77; Turton, 1932, p. 215; Cox, 1939, p. 96; Macnae & Kalk, 1958, p. 129 (*quecketti* [*sic*]); Barnard, 1962b, p. 183.

Length and altitude subequal, nearly equilateral. Numerous radiating ribs, rounded and not sharply defined, subequal in width to the grooves; both ribs and grooves finely striated. Concentric growth-lines, more or less distinctly marked by punctae when the bristly periostracum is abraded; and producing an obliquely striate appearance on the lateral areas.

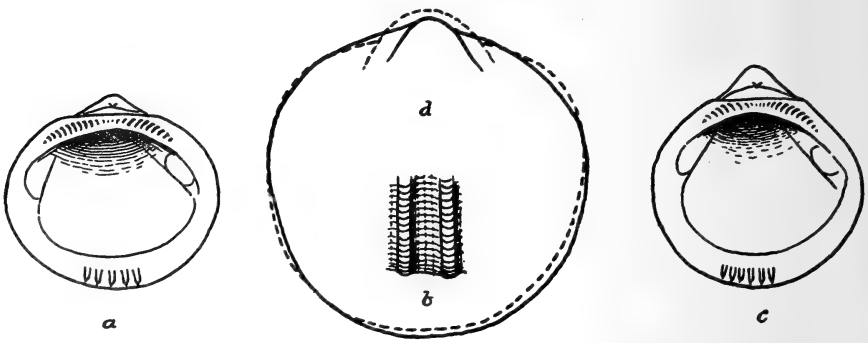


FIG. 3. *a*, *b*. *Glycimeris connollyi* Tomlin, with detail of ribbing further enlarged. *c*. *G. connollyi* var. from Sedgefield. *d*. outline of *G. queketti* Sow. superimposed on outline (dotted) of Newton's figure of †*pilosa*.

Teeth at 4 mm. shell length 9–10, at 7 mm. 14, at 15 mm. 18, increasing to 22–24, with a few feeble and indistinct ones in the middle. Margin internally crenulate.

Periostracum thin, shortly fibrous, usually abraded except on lateral parts of shell.

Up to length 65, alt. 65 mm. (Sowerby); 56 × 53 mm., 63 × 58 mm., and 78 × 76 mm. (S. Afr. Mus.).

Yellowish-brown, juveniles often with zigzag or arrow-like markings, periostracum brown; impressions of adductor muscles with orange-brown radial streaks.

Fossil: Post Pliocene; Inhambane (Cox).

Durban (Sowerby); Port Alfred, dead (Bartsch, Turton).

Natal: from Tugela River to Umtwalumi (between Umkomaas and Port Shepstone), 27–54 fathoms, living and dead (S. Afr. Mus. P.F. coll.).

Delagoa Bay (Braga: also U.W.).

Remarks. I have not seen the U.W. Delagoa Bay examples.

A comparison between the South African *queketti* and *pectunculus* (Linn.), which occurs at Madagascar (Dautzenberg 1929), would be interesting.

In the Pliocene deposits at Redhouse and Koega River (Port Elizabeth) very large shells up to 105 mm. occur, which have been identified with *pilosa* (Linn.), a species from the European Mio-Pliocene deposits, and also living in the Mediterranean. The South African fossil shells differ from *queketti* in having inflated umbones (fig. 3 *d*) (cf. *supra* p. 380) (Bullen Newton, 1913, p. 333, pl. 19, figs. 3, 4).

Cox (1939, pp. 67, 82) considered that these fossil shells are probably conspecific with shells from the Pliocene of Inhambane; and, although very close to *pilosa*, regarded them as a distinct species: *africana* Cox (1939, p. 81, pl. 2, fig. 11).

Two valves in South African Museum, the larger length 78, alt. 76 mm., are said to have been collected south of Skulpfontein Point, i.e. in the Hondeklip Bay area (west coast). They do not differ from *queketti*; the umbones are not inflated. They are worn nearly smooth externally, but internally the teeth are not much worn, and the hinge-line area is shiny; there are orange-brown patches at the adductor muscle scars.

Glycimeris (or *Pectunculus*) was not recorded by Haughton (1932) although it had been recorded by Krige (1927, pp. 69, 77) from Velddrift, Berg River mouth. But the genus occurs in the Bredasdorp Beds at De Hoop (Wybergh, 1920, p. 57).

Skulpfontein as a locality for *queketti* is not fully acceptable in spite of Krige's west coast record (Barnard, 1962b, p. 183).

Glycimeris cf. *pectiniformis* (Lam.)

Pectunculus pectiniformis (Lam.), Bruguière, 1797, pl. 311, fig. 5; Chenu, 1862, fig. 878; von Martens, 1879, p. 741.

Some worn valves are comparable in general with *pectiniformis* Lam. as represented in the figures quoted above.

There are 13–14 (11–12 in juv.) broad rounded ribs, subequal to or slightly wider than the grooves; the surface is worn, but there do not appear to be any subsidiary striae on the ribs (as are shown in Chenu's fig. 877 of *delesserti*).

Teeth at 4 mm. shell length 9–10, at 10 mm. 12, and 16 in a larger valve.

Length 18, alt. 17 mm. A fragment indicates that the species may reach 25 mm.

Cape Natal (Durban), 54 fathoms, 2; off Umhloti River, 40 fathoms, one; off Illovo River, 27–30 fathoms, one juv.; off O'Neil Peak (Zululand), 90 fathoms, 3 (S. Afr. Mus. P.F. coll.).

Distribution. Querimba Island (von Martens).

Remarks. Smith (1891, p. 432) regarded *pectiniformis* as a synonym of the earlier *Cardium amboinense* Gmelin 1790.

Fam. **Limopsidae**

Three of the South African species are now shown to be incubatory: *Philobrya angulata* and *limoides*, and *Hochstetterina velaini*.

Gen. Limopsis Da Costa

Clear-cut diagnoses of species in this genus seem difficult to formulate. The varying obliquity of the shell, and the convexity of the anterior and posterior margins are not helpfully expressed by such words as 'valde obliqua', 'un peu plus oblique', 'wenig schief'. In spite of this difficulty in defining species, *varieties* also have been named, e.g. 5 varieties of *minuta*, 8 varieties of *aurita*!

Study of the P.F. material seems to show that there are 3 distinct species inhabiting the continental shelf down to 200 fathoms, and another species (recently discovered) living at greater depths.

There is no difficulty in distinguishing these South African species according to the diagrams here given (fig. 4). Exact mathematical agreement must not be expected in every individual shell, especially in worn valves. Two lines perpendicular to the (upper) hinge-line divide the shell into 3 areas, the relative proportions of which are easy to measure. Each species may thus be defined by a formula, supported by other characters such as number of teeth, presence or absence of crenulations on internal margin, and external sculpture. An additional perpendicular from the umbo is required in case two species have the same outline, but differently placed umbones.

1. Altitude usually less than length, sometimes subequal.
   - (*a*) Umbo approximately in middle of hinge-line.
     - i. *a* twice in *m*, and $1\frac{1}{8}$ times in *p*. Margin internally crenulate .. .. *chuni*
     - ii. *a* 3 times in *m*, and $2\frac{1}{8}$ in *p*. Margin internally smooth .. .. cf. *straminea**
   - (*b*) Umbo distinctly nearer to anterior end. Shoulders at ends of hinge-line rectangular. Sculpture cancellate .. .. *natalis***
2. Altitude greater than length .. .. *anceps*

The question, however, arises as to the correct names of the South African species. There can scarcely be any doubt that Adams obtained a specimen of one or other of the two species of which numerous examples were later obtained by the *Valdivia* and described by Thiele (and also by the P.F.).

Adams (1862, p. 230) stated: 'This is the species actually dredged from 136 fathoms [*sic*. *Voy*. *Samarang*, p. 76 has: 120], off the Cape, during the voyage of H.M.S. *Samarang*.' His description was quite inadequate, but his species was synonymized with *minuta* by both Jeffreys and Smith. Authentic examples of *minuta* are not available to me. The figures of *minuta* differ; Jeffreys's 1879 figure shows a shell higher than long; Sars's 1878 figure shows the height subequal to the length. Lamy (1912) accepted both figures as applying to *minuta*; and also the figures given by Bush (1893), and Verrill & Bush (1898), which agree with Sars's figure.

* Barnard, 1963b, p. 449.
** Barnard, *Ann. Natal Museum*. [In press.]

In face of this uncertainty only recourse to Adams's Type (if still extant) can settle the question. If *abyssicola* is a high species, Adams's name will displace *anceps* Thiele; if it is subcircular, *chuni* Thiele will become a synonym. In the meantime Thiele's specific names are used here.

All the species have a bristly periostracum which overlaps the margin of the shell, especially ventrally.

Limopsis chuni Thiele

Fig. 4 *a*

Limopsis chuni Thiele, 1931, p. 183, pl. 6 (1), figs. 18 *a–c*.
Limopsis agulhasensis Thiele, 1931, p. 183, pl. 6 (1), fig. 19.

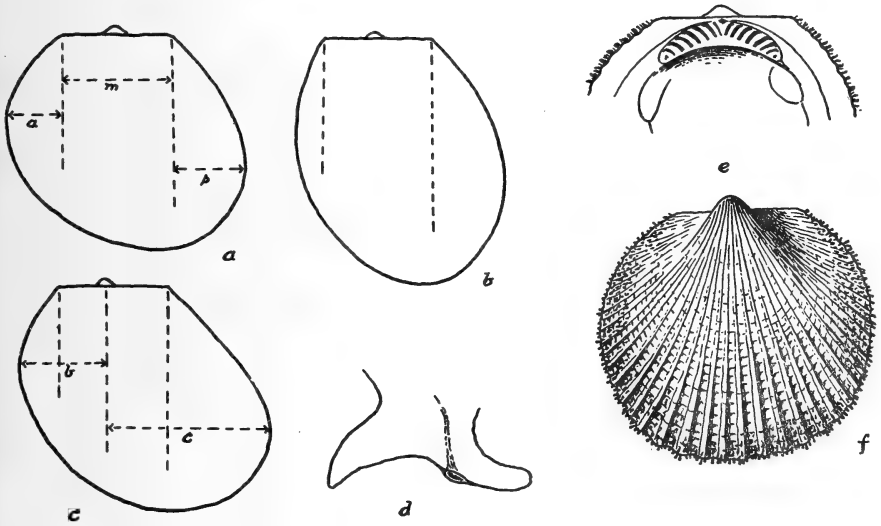


Fig. 4. *a*, *b*, *c*. outlines of *Limopsis chuni* Thiele, *anceps* Thiele, and a species cf. *straminea* Smith. *d*. *L.* cf. *straminea*, foot. *e*, *f*. internal and external views of *L. multistriata* (Forskål).

Subcircular, length slightly greater than altitude. (Formula *a* twice in *m*, $1\frac{1}{3}$ times in *p*; *b* $1\frac{1}{3}$ times in *c*). Concentric lirae, also fine radial striae. Internally no radial ribs; whole margin finely crenulate. Lower margin of hinge slightly arched. Teeth interrupted in middle; at 2 mm. shell length 3 teeth on each side, at 4 mm. 4, at 10 mm. 6–7 anterior, 5–6 posterior, increasing to respectively 8–9 (10) and 7–8 at 33 mm. length.

Up to length 35, alt. 30 mm. (S. Afr. Mus.); 36 × 32–33 mm. (Thiele).

Foot with posterior process, byssus rudimentary.

33° 41′ S., 18° 03′ E., 178 metres; 35° 10′ S., 23° 2′ E., 500 metres (*chuni*) (Thiele). 35° 16′ S., 22° 26′ E., 155 metres (*agulhasensis*) (Thiele).

From: off Cape Vidal (Zululand) 80–100 fathoms, Cape Natal (Durban), 54 and 85 fathoms, and the East London area, 39 fathoms, to Algoa Bay and St. Francis Bay, across the Agulhas Bank to Cape Point, off the west coast of

the Cape Peninsula, off Table Bay (e.g. Lion's Head S.E. ½ E., 42 miles, 156 fathoms) (S. Afr. Mus. P.F. coll.).

32° 43′ S., 17° 39′ E., 222 metres, one living (*Africana I*, per U.C.T.).

Remarks. Although not recorded by Sowerby in his 1904 Report on the P.F. Bivalves, specimens were submitted to him, and identified as *belcheri* Ad. & Rve.

L. belcheri Ad. & Rve. was described (as *Pectunculus belcheri*) in 1850 from the Cape, but A. Adams in 1862 said it was really obtained in the Korean Archipelago. Both Krauss (1852, p. 29) and Sowerby (1892, p. 66) listed *belcheri* from the Cape, the latter in ignorance of, or in spite of, Adams's correction.

It is not clear, however, why Thiele instituted *agulhasensis*. Both species have approximately the same shape, the same number of teeth, and a crenulate inner margin. The P.F. material shows that *agulhasensis* is only the young of *chuni*.

The P.F. took living examples off the Zululand and Natal coast, but they (and the dead shells) are all of small size. The largest specimens came from off Cape Point and the west coast.

Limopsis anceps Thiele

Fig. 4 *b*

Limopsis anceps Thiele, 1931, p. 184, pl. 6 (1), figs. 20, 20 *a*.

Altitude greater than length, more noticeable in the larger shells; anterior margin almost perpendicular to hinge-line. (Formula: *a* 3 times in *m*, 2⅓ in *p*, *b* 1½ times in *c*.) Concentric lirae, also faint striae marking the radial arrangement of bristles. Internally a few rather broad radial pleats anteriorly and posteriorly, with finer ones between the two series; these pleats are in very low relief, but the stronger anterior and posterior ones form about 6 definite undulations on the margin (best seen in oblique view); Thiele's fig. 20 *a* shows these undulations on the posterior margin only. Lower margin of hinge slightly angular, as in Jeffreys's figure of *cristata* (1879, pl. 46, fig. 8) (contrast *minuta* pl. 46, fig. 9).

Teeth interrupted in middle, at 2 mm. shell length 2–3 on each side, at 4 mm. 3–4, increasing to 5–6.

Up to length 10, alt. 12 mm.

Foot with posterior process, byssus rudimentary.

35° 16′ S., 22° 26′ E., 155 metres; 35° 26′ S., 20° 56′ E. (Thiele).

From: off Cape Vidal, Durnford Point, and O'Neil Peak (Zululand), 80–100 fathoms, and Natal coast, 30–85 fathoms, to the East London area, Algoa Bay, and Agulhas Bank, but *not west* of Cape St. Blaize (approximately 22° E.), except the *Valdivia* record from 20° 56′ E.

Remarks. More abundant off the Zululand and Natal coast, where numerous living examples were taken, than farther southwestwards; only one living

example was taken off Cape Morgan, and only dead shells in Algoa Bay and on the Agulhas Bank.

Limopsis multistriata (Forskål)

Fig. 4 *e,f*

Arca multistriata Forskal, 1775, p. 123.
Limopsis multistriata (Forskål) Chenu, 1862, fig. 881; Lamy, 1912, p. 132; Prashad, 1932, p. 58 (references and synonymy); Nardini, 1937, p. 249.
Pectunculus multistriata (Forskål) Dautzenberg, 1929, p. 582.
Limopsis lata (*non* Smith), Braga, 1952, p. 107.

Equilateral, subcircular. About 12 riblets on early part of shell (middle portion), with an intermediary between each pair developing later; at the margin in the larger shell the intermediaries are almost as strong as the primary riblets. Growth-lines well developed in the grooves, producing a cancellate sculpture. Margin internally wide, not crenulate. Largest shell with 27–28, the 9 mm. shell with 16, smallest with 12 teeth, the middle one or two feeble. Periostracum fibrous-fimbriate. Length and alt. 4·5 mm.; length 9·5, alt. 9 mm.; length and alt. 24 mm.

Foot with posterior process, byssus rudimentary.

Delagoa Bay, 2 juv. living (U.W.; also Braga); Inhambane, one living (U.C.T.); Durban, dead valves (coll. Kilburn).

Distribution. Red Sea; Indo-Pacific. Quaternary: Madagascar.

Remarks. This is probably the shell which Braga recorded as the New Zealand *lata* Smith; a most unlikely identification.

Limopsilla pumilio (Smith)

Limopsis pumilio Smith, 1904a, p. 43, pl. 3, figs. 27, 28.
Limopsilla pumilio (Smith), Thiele, 1923, p. 290; 1931, p. 187, pl. 6 (1), figs. 27, 27 *a*; Turton, 1932, p. 215, pl. 55, no. 1490 (juv.).

Length and altitude up to 3 mm.; Smith, altitude 3·25 mm.

Port Alfred (Smith, Turton); Still Bay (S. Afr. Mus. Muir coll.).

33° 41′ S., 18° 03′ E. (Table Bay), 178 metres; 34° 51′ S., 19° 37′ E., 80 metres; 33° 50′ S., 25° 48′ E.; 35° 16′ S., 22° 26′ E., 155 metres; 35° 26′ S., 20° 56′ E. (Thiele).

Umkomaas (Natal), 40 fathoms, one valve; Sandy Point (north of Kei River mouth), 51 fathoms, one valve; 34° 26′ S., 25° 42′ E., 124 fathoms, 9 valves; 34° 5′ S., 25° 55′ E., 67 fathoms, 13 valves; 33° 50′ S., 25° 54′ E., 4 valves (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Thiele).

Pleurodon pretiosus (Gould)

Nuculina pretiosus Gould, 1861, p. 31.
Nuculina ovalis (*non* Wood), Smith, 1885, p. 230, pl. 19, figs. 1, 1 *a*, *b*.
Limopsis pretiosus Thiele, 1931, p. 187; 1934, fig. 794.
Limopsis sp. Turton, 1932, p. 215, pl. 55, no. 1492.

Up to altitude 4 mm. Living examples are chestnut-brown in colour.

Simon's Bay (False Bay), 15–20 fathoms (Gould, Smith); Port Alfred (Turton).

34° 51′ S., 19° 31′ E., 80 metres; 34° 8′ S., 24° 59′ E., 80 metres; 33° 50′ S., 25° 48′ E. (Thiele).

Off Cape Natal (Durban), 54 fathoms, 2 valves; 34° 5′ S., 25° 55′ E., 67 fathoms, many valves; 34° 5′ S., 25° 43′ E., 52 fathoms, 6 valves; off Cape St. Blaize, 60 fathoms, 3 valves, and 125 fathoms, 6 valves; False Bay, 22 fathoms, many valves (S. Afr. Mus. P.F. coll.).

Living: Algoa Bay, 68 fathoms, Plettenberg Bay, 43–61 fathoms, and 34° 51′ S., 23° 41′ E., 100 fathoms (U.C.T.). Off Saldanha Bay, 150 fathoms; off Lamberts Bay, 92 fathoms (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Gen. Philobrya Carpenter

Philobrya meridionalis (Smith) (see Melvill & Standen, 1907, p. 145) needs a new name, if it has not already received one (? = *desolationis* Lamy, 1936, pp. 112, 113). *Mytilus meridionalis* Smith 1885 was preoccupied by Krauss 1848, and transference to another genus will not resuscitate a still-born name. Nevertheless the species was listed by Thiele (1912, p. 268) as *Philobrya meridionalis*.

On the other hand, the transference of *Hochstetteria limoides* Smith 1904 to the genus *Philobrya* necessitates a new name to avoid conflict with *Philobrya limoides* Smith 1907.

Philobrya angulata (Sow.)

Fig. 5 *a*

Neocardia angulata Sowerby, 1892, p. 63, pl. 3, fig. 66.
Hochstetteria alfredensis Bartsch, 1915, p. 184, pl. 39, figs. 6, 7.
Philobrya angulata (Sow.), Thiele, 1931, p. 190; van Bruggen, 1952, p. 6, fig. 1 (shell), fig. 2 (map).

Prodissoconch length 9·5, alt. 0·35 mm., slightly domed in middle of hinge-line, with 5–6 radiating, bifurcate riblets in middle part of shell, anteriorly and posteriorly 5–6 riblets branch off and curve towards the hinge-line; riblets not reaching margin which forms a strong raised rim.

Periostracum brown, scarious, especially on the riblets, which makes them appear broader than they really are, overlapping the margin, sometimes to the extent of 1 mm.

Up to length 6, alt. 6·75 mm. (P.F. coll.).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); East London (S. Afr. Mus.); Still Bay (S. Afr. Mus. coll. Muir).

False Bay and Port Elizabeth, living, attached to Hydroids; Algoa Bay, 15 fathoms (U.C.T.).

St. Francis Bay, Algoa Bay, and Agulhas Bank (Thiele).

Common in bottom-samples from numerous localities extending from off the Tugela River (Natal), East London, Port Alfred area, Algoa Bay, Agulhas Bank, to False Bay (S. Afr. Mus. P.F. coll.).

West coast of Cape Peninsula (34° 11′ S., 18° 20′ E.), 15 fathoms, living; Lüderitzbucht, 71 metres (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. Juveniles are almost subcircular, and not all full-grown shells are slightly obliquely oblong. The angularity of Sowerby's figure seems exaggerated.

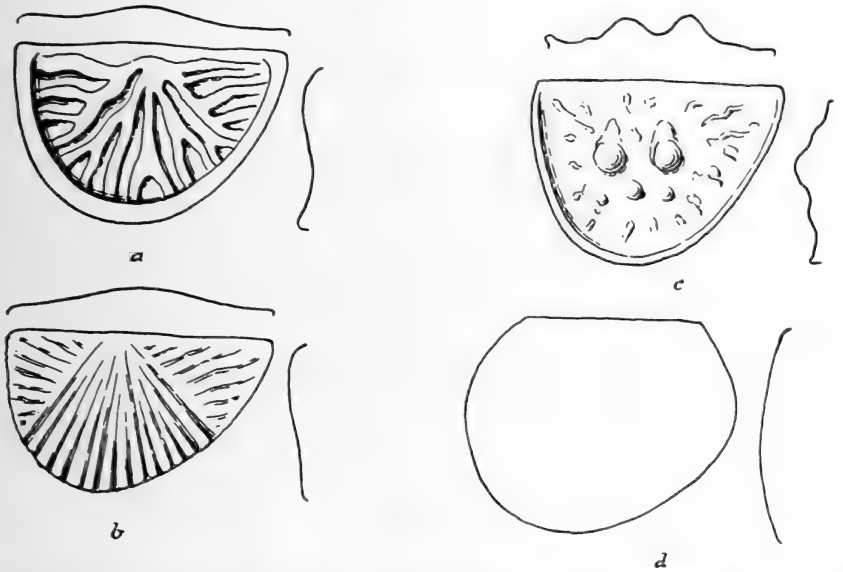


FIG. 5. Prodissoconchs, with longitudinal and transverse profiles, of: *a. Philobrya angulata* (Sow.). *b. smithi* nom. nov., *c. pileata* Thiele. *d. Hochstetterina velaini* (Smith).

Incubating examples were obtained by the P.F. off Cape St. Blaize, 125 fathoms, off Cape St. Francis, 70 fathoms; and by U.C.T. in False Bay and off Port Elizabeth.

Van Bruggen inserted in his map of the recorded localities 'Fish Bay' in its correct position: west of Cape St. Blaize; but the *Valdivia* locality was *Great* Fish Bay in Angola (*Valdivia* St. 81. 16° 25′ S., 11° 41′ E.).

Philobrya paramoea (Bartsch)

Hochstetteria paramoea Bartsch, 1915, p. 184, pl. 39, fig. 4.
Philobrya paramoea (Bartsch), Thiele, 1931, p. 191.

Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

34° 51′ S., 19° 37′ E., 80 metres; 35° 26′ S., 20° 56′ E. (Thiele).

Prodissoconch slightly domed in middle, radiately ribbed, with marginal rim.

Shell with 8–9 radial ribs, rounded, not slender as stated by Bartsch, nor sharp as his figure suggests.

Remarks. I am uncertain whether this is not a form or variation of *angulata.*

The present material from Still Bay, and some Port Alfred valves received from Turton, are worn and do not show the radiating riblets on the prodissoconch very clearly, but they probably run in two directions as in *angulata.*

Philobrya pileata Thiele

Fig. 5 *c*

Philobrya pileata Thiele, 1931, p. 192, pl. 7(2), fig. 32.

Prodissoconch convex in middle, with 2 strong knobs, and smaller granules, and short more or less radial ridges, a narrow marginal rim.

Shell with 12–14 rounded radial ribs, slightly nodulose where crossed by the concentric lirae. 2·1 × 2·5 mm.

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E. (Thiele).

34° 5′ S., 25° 55′ E., 67 fathoms, 14 valves (S. Afr. Mus. P.F. coll.).

34° 48′ S., 23° 39′ E., 80 fathoms (U.C.T.).

Remarks. A species neatly characterized by its prodissoconch. The ribs on the shell are rounded as in *limoides,* not sharp as in *angulata.*

Philobrya smithi nom. nov.

Fig. 5 *b*

Hochstetteria limoides Smith, 1904a, p. 42, pl. 3, fig. 25; Bartsch, 1915, p. 184; Turton, 1932, p. 219.
Philobrya limoides Smith, 1904; Thiele in Thiele & Jaeckel, 1931, p. 191.

Prodissoconch 0·5 × 0·3 mm., with *c.* 12 radiating riblets in middle part, and 6–7 riblets curving upwards in anterior and posterior parts, riblets reaching the margin which has no raised rim.

Shell up to length 3, alt. 3·3 mm. (U.C.T.). Periostracum thin, pale brown.

Port Alfred (Smith, Bartsch, Turton); Still Bay (S. Afr. Mus. Muir coll.).

34° 51′ S., 19° 37′ E., 80 metres; 33° 50′ S., 25° 48′ E.; 35° 16′ S., 22° 26′E., 155 metres; 35° 26′ S., 20° 56′ E. (Thiele).

Many specimens from two stations in Algoa Bay, 67 and 124 fathoms; 2 valves from off Cape Infanta, 46 fathoms; 4 valves from East London area, 43 fathoms (S. Afr. Mus. P.F. coll.).

Living: False Bay, containing juveniles (U.C.T.); 34° 51′ S., 19° 55′ E., 22 metres (U.C.T.); west coast of Cape Peninsula (34° 11′ S., 18° 20′ E.), 15 fathoms (U.C.T.).

Remarks. Philobrya sp. juv. Thiele (1931, p. 193, pl. 7(2), fig. 34) may perhaps be a juvenile of this species; the shell has 7 ribs in the middle part, but the anterior and posterior parts are smooth. 1·5 × 1·6 mm. Off Table Bay, 178 metres, one valve (Thiele).

Philobrya africana Bartsch

Philobrya africana Bartsch, 1915, p. 185, pl. 46, figs. 1, 2; Thiele, 1931, p. 191; Turton, 1932, p. 219, pl. 56, no. 1527.
Philobrya africana var. *attenuata* Turton, 1932, p. 220, pl. 57, no. 1528.

Prodissoconch similar to that of *angulata*. Shell smooth. A thin, pale brown periostracum, slightly scarious along the later growth-lines, and overlapping the margin. Up to length 5, alt. 6·5 mm.

Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. Muir coll.).

34° 51′ S., 19° 37′ E., 80 metres; 35° 29′ S., 21° 2′ E., 102 metres; 35° 26′ S., 20° 56′ E. (Thiele).

Algoa Bay 67 fathoms, several valves; off Gericke Point (Knysna area) 46 fathoms, one valve (S. Afr. Mus. P.F. coll.).

West coast of Cape Peninsula (34° 11′ S., 18° 20′ E.), 15 fathoms (U.C.T.).

Hochstetterina velaini (Smith)

Fig. 5 *d*

Hochstetteria velaini Smith, 1904a, p. 42, pl. 3, fig. 24; Thiele, 1931, p. 189.
Hochstetteria decapitata Thiele, 1931, p. 189, pl. 6(1), fig. 30.
Hochstetteria kowiensis Turton, 1932, p. 219, pl. 56, no. 1524 (juv.).

Prodissoconch length 0·6, alt. 0·5 mm., smooth. Shell with thin brown periostracum. Length 4, alt. 4·75 mm.

Port Alfred (Smith, Bartsch, Turton).

Algoa Bay and Agulhas Bank, 80–155 metres (Thiele); 35° 16′ S., 22° 26′ E., 155 metres, one valve (*decapitata*) (Thiele).

Fairly abundant in the P.F. bottom-samples from off the Tugela River (Natal) to Algoa Bay, across Agulhas Bank, to False Bay, 22–124 fathoms; but only one valve was taken in False Bay (S. Afr. Mus. P.F. coll.).

33° 38′ S., 26° 54′ E., 30 metres, living, containing juveniles; also Algoa Bay, 15–46 fathoms, Plettenberg Bay, 5–60 fathoms, and 34° 51′ S., 23° 41′ E., 100 fathoms (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. The shape varies somewhat. The length may equal the altitude, or occasionally may slightly exceed it (this may perhaps be due to wear). Older examples tend to be more oblique than younger ones. The prominence of the umbones also varies; and a very slight tilting of the shell can alter the appearance. The crenulation of the margin may be complete, or it may be interrupted in one or more places, especially in dead and worn shells.

Thus the present material (over 150 specimens) casts doubt on the validity of *decapitata*, which was based on a single valve.

Complete (bivalve) examples were taken by the P.F. off Cape Natal, 54 fathoms (7 examples); off Tugela River, 65–80 fathoms (2); off Cape St. Blaize, 125 fathoms (2); and East London area 43 fathoms (one).

Fam. **Mytilidae**

Jukes-Browne, 1905; Soot-Ryen, 1955.

Perna perna (Linn.)

Mytilus perna (Linn.), Krauss, 1848, p. 23; Jukes-Browne, 1905, p. 218; Lamy, 1931, p. 305; 1936, p. 130; Stephenson *et al.*, 1938, p. 12, pl. 3; Eyre & Stephenson, 1938, p. 35; Braga, 1952, p. 100, pl. 9, fig. 4.
Mytilus elongatus Lam., Fritsch, 1868, p. 74.

White line below the ligament (resilial ridge) pitted. No anterior adductor; anterior retractor byssi long oval, far forward; posterior retractor byssi divided, forming two separate scars. Hinge with 2 teeth in right, one in left valve (or vice versa).

Length up to 170 mm. (Thiele: Great Fish Bay).

Fossil: Pleistocene, Durban (Geol. Surv. S. Afr.).

Natal (Krauss). False Bay, Still Bay, Mossel Bay, Durban, Delagoa Bay (S. Afr. Mus.). Delagoa Bay (Braga; also U.W.). False Bay, Still Bay, Knysna, Port Elizabeth, East London, Isipingo, Durban, Kosi Bay, Inhambane (U.C.T.).

Walvis Bay (Lamy); Swakopmund (S. Afr. Mus.); Lüderitzbucht (U.C.T.).

Distribution. Red Sea, Aden, Madagascar, Mediterranean, north-west and west coast of Africa as far south as Great Fish Bay. Straits of Magellan, Brazil.

Remarks. The only South African Mytilid with a pitted resilial ridge.

Isolated examples have been found on the west coast of the Cape Peninsula, and at Ysterfontein (between Table Bay and Saldanha Bay) (U.C.T.).

† *Mytilus tomlini* Haughton, 1926, may be synonymous. See: Barnard 1962b, p. 183.

Chloromytilus meridionalis (Krss.)

Mytilus meridionalis Krauss, 1848, p. 21, pl. 2, fig. 7; Johnson, 1904, p. 9; Jukes-Browne, 1905, p. 218; Swart, 1926, p. 275, text-figs. 1–3; Lamy, 1931, p. 305.
Mytilus chorus f. *meridionalis* Lamy, 1936, p. 144.
Mytilus edulis (*non* Linn.), Krige, 1933, pp. 51, 52.
Not *Mytilus meridionalis* Smith, 1885, nom. preocc. See *Philobrya* (*Limopsidae*).

No pits on the white line below ligament (resilial ridge). No anterior adductor. Posterior retractor byssi scars continuous. Hinge with one tooth (right or left valve) fitting between 2 teeth on opposite valve, or sometimes 2 teeth in both valves. Caecum containing crystalline style very long.

Length up to 114 mm. (Krauss: $4\frac{1}{2}$ in.).

Fossil: Post Pliocene; Inhambane (Cox, 1939); Pleistocene; Durban (Krige) (sed?), Sedgefield near Knysna (A. R. H. Martin).

East and west coasts, Elim (Bredasdorp Division) (Krauss); Port Elizabeth (Sowerby); Natal and Port Alfred (Bartsch, Turton); Saldanha Bay, Dassen Island, Table Bay, False Bay, Still Bay (S. Afr. Mus.); Lüderitzbucht, Port Nolloth, Lamberts Bay and Olifants River (west coast), False Bay and Hermanus (U.C.T.); Walvis Bay (Lamy); Beira (Lamy).

Remarks. If the extreme localities (Lamy) are accepted, this species extends all around southern Africa from Walvis Bay to Beira. There is, however, only one record from Natal (Bartsch) and no great reliance can be placed on the provenance of that specimen. Krauss gave east and west coasts, but mentioned only one locality (Elim) on the south coast *east* of Cape Point. U.C.T. has not found it at any locality east of Hermanus; nor has U.W. found it at Delagoa Bay.

The Beira record therefore should be regarded as due to some error in labelling; and Port Alfred taken as the extreme easterly limit of this species. Apparently it has not been taken *living* in any locality east of Hermanus.

Krige's fossil material should be re-examined. Material submitted to me by the Geological Survey South Africa (1958) contained only *perna*. Cox's 1939 material might also be re-examined.

Gen. Semimytilus Soot-Ryen

Soot-Ryen, 1955, p. 25.

White line (resilial ridge) below ligament not pitted. Anterior adductor present. Anterior retractor elongate, divided into two. Posterior retractor (foot and byssus) continuous. Hinge without any teeth. Lunule small, circumscribed by a fine line.

The only species is *algosus* (Gould) from the west coast of South America (Ecuador to Chile) and Juan Fernandez Islands. See Soot-Ryen, 1955, p. 25, pl. 4, fig. 17, text-figs. 8, 9, 14, 15, 16. A specimen 28 mm. long is figured.

Specimens collected by U.C.T. at Cape Cross, South West Africa, July 1957, undoubtedly belong to this genus. Soot-Ryen's description of *algosus* defined the genus but disclosed no characters which might serve as specific differences between the South American and the present specimens. They may be conspecific. *Aulacomya* has an analogous distribution.

Aulacomya magellanica (Chemn.)

Mytilus magellanicus Chemnitz, 1785, p. 164, pl. 83, figs. 742, 743; Lamy, 1936, p. 147.
Mytilus crenatus Lamarck, 1819, p. 38; Krauss, 1848, p. 24.
Mytilus capensis Dunker, 1846, p. 108 (= juv.); Lamy, 1936, pp. 147, 149.
Aulacomya magellanicus Jukes-Browne, 1905, p. 218; Thiele, 1931, p. 169.
Aulacomya ater Soot-Ryen, 1955, p. 33.

No pits on resilial ridge. No anterior adductor, except in juveniles; anterior retractor byssi elongate; posterior retractor byssi scars continuous, but the muscles divided into 3 bands; posterior retractor pedis slender. Hinge with a toothlike projection in left valve fitting into a depression on right valve.

Length up to 82 mm.

Table Bay, Saldanha Bay (Krauss); Port Elizabeth and Natal (Sowerby); Port Alfred (Turton); Swakopmund, Saldanha Bay, Dassen Island, Table Bay, False Bay, Still Bay (S. Afr. Mus.); Lüderitzbucht, Port Nolloth, Lamberts Bay, Saldanha Bay, False Bay, Hermanus, and Mossel Bay (U.C.T.).

Distribution. Straits of Magellan; Falkland Islands; Kerguelen Island.

Gen. Modiolus Linn.

Shell typically smooth, lunule dull. Hinge-line and margins not crenulate. Anterior adductor scar elongate, placed ventrally; posterior retractor and adductor scars continuous.

Modiolus auriculatus Kiss.

Fig. 6 *c*, *d*

Modiola auriculatus Krauss, 1848, p. 20, pl. 2, fig. 4; von Martens, 1880, p. 318; Smith, 1891, p. 340; Odhner, 1919, p. 25; Dautzenberg, 1929, p. 572; Turton, 1932, p. 228; Lamy, 1936, p. 289.
Tapes [*sic*] *auriculata* (Krss.), Schwarz, 1910, p. 116.

The shape varies; individuals cramped for growing space become very short and deep. Periostracum hairs simple, filiform.

Length up to 53 mm.

Fossil: Pleistocene; Port Elizabeth (Schwarz).

Natal (Krauss); Port Alfred (dead) (Bartsch, Turton); Inyoni Rocks, Amanzimtoti, Natal (U.C.T.); Inhambane (U.C.T.); Mozambique Island (S. Afr. Mus. coll. K.H.B.).

Distribution. Red Sea, Suez, Persian Gulf, Seychelles, Diego Garcia, Anjouan Islands, Europa Island, Madagascar, Mauritius.

Remarks. Shells transitional between *auriculatus* and *philippinarum* have been recorded (Lamy, 1936, p. 287).

Modiolus sirahensis Jouss.

Fig. 6 *b*

Modiola rhomboidea Hanley [*ined.*] Clessin, 1889, p. 103, pl. 26, fig. 10; Sowerby, 1904, p. 3; Lynge, 1909, p. 130.
Modiola rhomboidea Reeve (*non* Hanley); Tomlin, 1923, p. 51.
Modiola sirahensis Jousseaume, 1891, p. 222; Lamy, 1937, p. 325.

One specimen, 40 × 16 mm., is quite fresh and was probably taken alive. The hind end is obliquely truncate, the hind margin very slightly concave. The growth-lines indicate that even when the shell was only 10 mm. long, the hind margin was obliquely truncate. The hinge-line is approximately three-quarters of the total length.

Off Tugela River (Natal), 25 fathoms (Sowerby, P.F. coll.) (S. Afr. Mus. No. A5393).

Distribution. Red Sea, Persian Gulf, Gulf of Siam, China, Japan.

Remarks. Sowerby in 1904, and on the label attached to the specimen, attributed the species to Hanley; Tomlin attributed it to Reeve. Lamy (1937, pp. 321 and 325) regarded *rhomboidea* Rve. as a synonym of the West African *stultorum* Jouss., and *rhomboidea* Hanley as a synonym of the Indo-Pacific *sirahensis* Jouss. As the South African specimens are far more likely to be the latter species, I follow Sowerby in identifying them as *rhomboidea* of Hanley, and figured by Clessin, for which Lamy adopted Jousseaume's name.

Modiolus philippinarum Hanley

Fig. 6 *a*

Modiola philippinarum Hanley, 1844, p. 15; 1845, p. 235, pl. 24, fig. 26; Odhner, 1919, pp. 6, 25; Dautzenberg, 1929, p. 572; Prashad, 1932, p. 72, pl. 2, figs. 25, 26; Lamy, 1936, p. 284; Cox, 1939, p. 73, pl. 1, fig. 6; Braga, 1952, p. 101, pl. 8, fig. 3; Macnae & Kalk, 1958, pp. 43, 129, fig. 23*d*.

Modiola lignea (*non* Reeve), Sowerby, 1892, p. 64; Johnson, 1904, p. 11; Bartsch, 1915, p. 189; Turton, 1932, p. 227.

A large specimen identified by Tomlin: greatest length 87 mm., hinge-line c. 44 mm.

More oblique than *sirahensis*, especially when old; hind margin convex, hinge-line approximately one half the total length.

Fossil: Miocene, Inhambane (Cox); Pleistocene, Port Elizabeth (Johnson) (sed?).

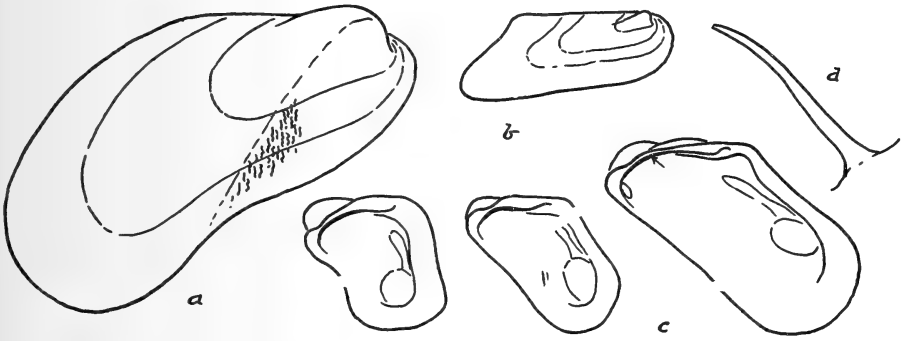


FIG. 6. *a*, *Modiolus philippinarum* Hanley. *b*, *M. sirahensis* Jouss. *c*, *M. auriculatus* Krss., three variations in shape (arrow in largest shell points to position of anterior retractor scar). *d*, periostracum hair.

Natal (sed?) juveniles 14–30 mm. (S. Afr. Mus.); Delagoa Bay (S. Afr. Mus. adult coll. K.H.B.; also Braga; also U.W.).

Distribution. Red Sea, Madagascar, Indo-Pacific.

Remarks. Juvenile shells, 11 mm. long, from 33° 03′ S., 27° 55′ E., 27 metres (U.C.T.), and 4–5 mm. long from False Bay (U.C.T.) correspond in shape with the growth-lines on the larger juveniles (14–30 mm.) and the adult specimen recorded above. They are glossy bright brown in colour.

Sowerby (1892), Johnson, Bartsch, and Turton recorded the Australian *lignea* Rve. from Port Elizabeth and Port Alfred. The 'dark brown, very shiny shells' (Turton) are more likely to be the juveniles of *philippinarum*.

Septifer bilocularis (Linn.)

Fig. 7 *a*, *b*

Tichogonia kraussi (Kien.), Krauss, 1848, p. 26.
Septifer kraussii (Kien.), Turton, 1932, p. 227.
Septifer nicobaricus Sowerby, 1897, p. 27.

Septifer bilocularis (Linn.), Odhner, 1917, p. 18, figs. 1, 2; Prashad, 1932, p. 69, pl. 2, figs. 21–24 (references); Lamy, 1936, p. 240 (references); van Bruggen, 1952, p. 13; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, pp. 34, 36, 129.
Modiola subtriangularis Turton, 1932, p. 228, pl. 59, no. 1592 (= juv.).

Fossil: Post Pliocene, Inhambane (Cox, 1939); Pleistocene, Durban (Geol. Surv. S. Afr.).

Off Umkomaas (Natal), 40 fathoms, several juv. valves 4–7 mm.; off O'Neil Peak (Zululand) 55 fathoms, 1 juv. valve (S. Afr. Mus. P.F. coll.)

Jeffrey's Bay (dead) (van Bruggen); Port Alfred (dead) (Turton).

Living: Port Elizabeth (S. Afr. Mus. R. Kilburn coll.); Durban and Umpangazi (U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.).

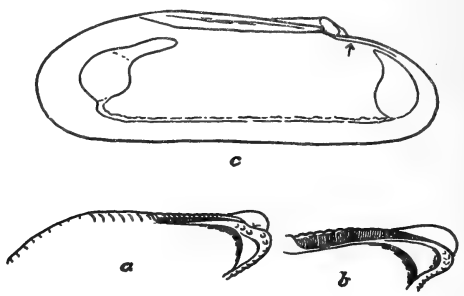


FIG. 7. *a*, *b*, *Septifer bilocularis* (Linn.), hinge of left valve of juvenile (total length 5 mm.) and of adult. *c*, *Adipicola pelagica* (Forbes, Woodward).

Distribution. Red Sea, Madagascar, Indo-Pacific.

Remarks. Turton's photo of the interior of no. 1592 shows distinctly the internal shelf not retouched (as is the hinge-line).

Specimens occur in which the margin of the septum is evenly curved, others in which there is a slight notch (cf. Odhner, fig. 2 *b*, *c*).

Gen. BRACHIDONTES Swainson

(emend. *Brachyodontes* Agassiz, *Brachydontes* Gray).

Stephenson (1947, pp. 267, 268) mentioned a small purplish-black mussel common in Natal and referred to in previous papers as *variabilis* and as *capensis*. He said (p. 268) that '. . . two forms are figured by Krauss . . . , and it is very difficult to make out from the figures which of them applies to the Natal species —*there is little difference between them in any case*' [italics mine]. He identified the Natal specimens with the figure of *variabilis*, whereas Tomlin preferred to identify them with the *capensis* figure.

Surely (*pace* Stephenson and Tomlin) Krauss's two figures clearly show entirely different species. There is no difficulty in separating the typical form of *variabilis* from *capensis*. There is, however, some doubt as to the correct interpretation of Krauss's figure of the var. *semistriata* (*v. infra*).

Brachidontes variabilis (Krss.)

Fig. 8 *a–c*

Mytilus variabilis Krauss, 1848, p. 25, pl. 2, fig. 5; Bartsch, 1915, p. 188; Turton, 1932, p. 226.
Brachidontes variabilis (Krss.), Tomlin, 1927, pp. 302, 320; Prashad, 1932, p. 66; Lamy, 1936, p. 176; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, pp. 118, 129.
Brachidontes capensis (*non* Krauss), Eyre & Stephenson, 1938, p. 35.

Shape mytiloid, umbones terminal; obliquely oblong, ventral margin more or less concave, hind margin rounded or sometimes subtruncate; radiating riblets from dorsal margin to middle of ventral margin, none on anterior part; ligament groove broadening posteriorly and ending abruptly, its dorsal margin crenulate, behind it a few denticulations or strong crenulations, followed by crenulations which continue around margin except antero-ventrally; right valve with a notch below umbo, left valve with a tooth, in both valves a few inconspicuous denticles below on anterior margin.

Anterior adductor placed ventrally, scar partly concealed by the shell margin, posterior retractor byssi strong, forming a single scar joined dorsally to the posterior adductor, and sometimes exceeding the latter in size.

Length 19–20 mm.

Brownish or blackish, more or less purplish, internally violaceous.

Table Bay and Natal (Krauss); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Umkomaas (Natal) (S. Afr. Mus. coll. Burnup); Delagoa Bay and Mozambique Island (S. Afr. Mus. coll. K.H.B.).

East London, The Haven, Umtwalumi, Umkomaas, Isipingo, Durban Umhlali, Richards Bay, Umpangazi, St. Lucia Bay, Kosi Bay (U.C.T.).

Distribution. Red Sea, Suez, Karachi, Seychelles, Madagascar, Rodriguez, East Indies.

Remarks. Krauss seems to have erred in giving Table Bay as a locality. It has not been confirmed by recent collecting, nor in fact has the species been found anywhere on the west coast of South Africa. Farther north, however, it is represented by the very similar *puniceus* (Gmelin) = *senegalensis* (Lam.). Prashad was of opinion that *variabilis* was quite distinct from the latter species, but did not state any differential characters.

Var. *semistriata* Krss.

Mytilus variabilis var. *semistriata* Krauss, 1848, p. 26, pl. 2, fig. 6; ? Turton, 1932, p. 226.
[?] *Mytilus variabilis* var. *striata* [*err.*] Bartsch, 1915, p. 188.

Krauss sald that in Natal there were transitions from typical *variabilis* to a variety which he called *semistriata*, having radiating riblets *only below* the umbonal ridge to the middle of the ventral margin. In old and worn shells, however, the riblets on the dorsal area are often feeble and obscure.

Two other, more serious, comments are required on Krauss's figure 6 of the variety. The ligament groove is shown narrower than in figure 5 of the typical form. This may be due to perspective, the full width of the groove often not being seen unless the ventral margin of the shell is tilted up. Assuming,

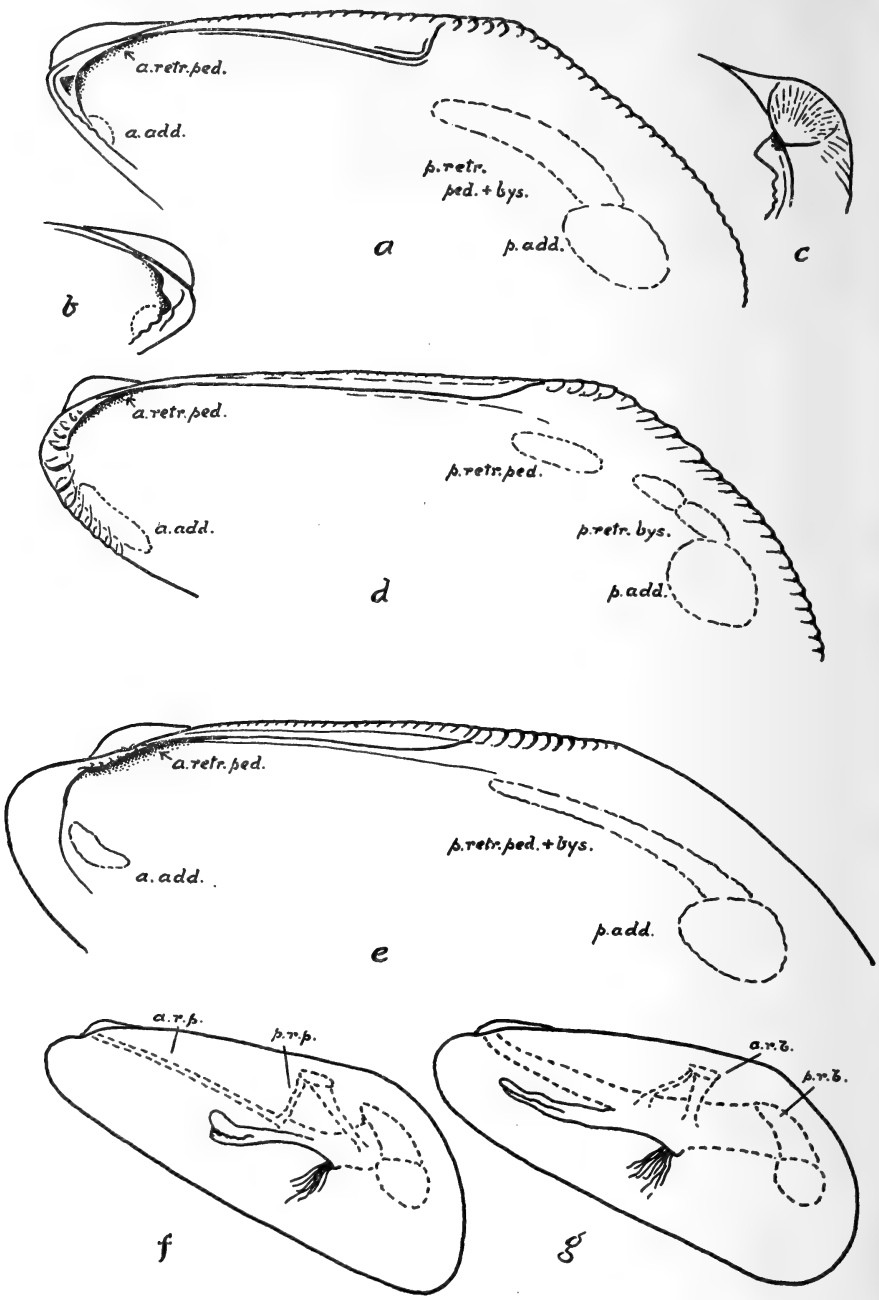


FIG. 8. *Brachidontes variabilis* (Krss.). *a*, right valve. *b*, apex of left valve. *c*, apical view of left valve. *d*, *Musculus virgiliae* n.sp. *e*, *Lamya capensis* (Krss.). *f*, *g*, *Lamya capensis*, pedal and byssal muscles in retracted and extended positions (semidiagrammatic).

however, that the full width of the groove was portrayed in both figure 5 and figure 6 by the artist, the difference is noticeable.

The second comment concerns the hinge under the umbo, and the anterior margin. This detail is not as clear as could be desired either in figure 5 or in figure 6; but figure 5 (right valve) seems to show a hollow and 2 denticles, as is found in the present specimens. Figure 6, however, shows a different hinge: a series of denticles from below, or slightly behind, the umbo, continued around the anterior margin.

Nevertheless the umbo is shown as terminal, as in the typical form, and definitely not subterminal as in figure 3 of *capensis*.

I have seen no specimens with the 'semistriate' sculpture; and suggest that a re-examination of Krauss's material would be useful.

Specimens of *B. karachiensis* Melv. & Standen (1906, p. 800, pl. 54, fig. 8) might perhaps be compared; neither the description nor the figure are adequate.

Gen. Lamya Soot-Ryen

Soot-Ryen, 1958, p. 342; 1963, p. 127.

Modioliform, umbones subterminal; hinge-line denticulate, the denticulations extending behind the ligament; a slight denticulate callus below the umbo, anterior margin without denticles.

Anterior adductor scar placed about midway between umbo and ventral margin, anterior retractor scar round, in the umbonal cavity. The scar of the posterior retractor is contiguous posteriorly with that of the posterior adductor, and narrows anteriorly to below about the hind two-thirds of the hinge. The posterior retractor byssi, however, is divided into a slender anterior branch and the main posterior portion contiguous with the posterior adductor (contrast *Lanistina*); the slender posterior retractor pedis is attached contiguous with the anterior branch of the posterior retractor byssi.

Mantle margin of branchial cavity papillose; gonads entering the mantle.

In 1963 Soot-Ryen thought that *Lamya* might prove to be a synonym of *Arcuatula* Lamy 1919.

Lamya capensis (Krss.)

Fig. 8 *e–g*

Modiola capensis Krauss, 1848, p. 20, pl. 2, fig. 3; Schwartz, 1910, p. 116; Bartsch, 1915, p. 189; Turton, 1932, p. 227; Scott, Harrison & Macnae, 1952, pp. 301, 302, 306, 309 (habitat); Day, Millard & Harrison, 1952, pp. 395–398 (habitat).

Modiola tenerrima Smith, 1904a, p. 42, pl. 3, fig. 26; Bartsch, 1915, p. 188; Turton, 1932, p. 227; Lamy, 1937, p. 346.

Volsella capensis (Krss.), Day & Morgans, 1956, p. 308.

Lamya capensis (Krss.), Soot-Ryen, 1958, p. 342, 2 text-figs; Barnard, 1962b, p. 183.

[*Non*] *Mytilus capensis* Dnkr. (= *magellanicus*).

Brachidontes capensis Eyre & Stephenson 1938 (= *variabilis*).

Brachidontes capensis from St. James and Arniston, Stephenson, 1948 (= *Gregariella simplicifilis*).

Modiola capensis Day, Millard & Broekhuysen, 1954, and Broekhuysen & Taylor, 1959 (= *Musculus virgiliae*).

Obliquely oblong, ventral margin straight or slightly concave, sometimes distinctly concave; surface smooth, occasionally a few weak and obscure riblets anteriorly; a slight, feebly denticulate callus below umbo; hinge-line with crenulations which continue a short distance behind the ligament (feeble and obscure in some large specimens); rest of margin not crenulate (except feebly so anteriorly when riblets are developed).

Corneous-olivaceous, usually with concentric undulating reddish cross-bars, and radiating reddish streaks from umbo to hind margin; internally the reddish cross-bars are more conspicuous.

Up to 76 × 30 × 20 mm. (Still Bay); 67 × 28·2 × 16·4 mm. (Soot-Ryen: Zwartkops estuary); 10·3 × 5·5 × 3·3 Par. lines (Krauss: Knysna).

Fossil: Pleistocene, Port Elizabeth (Schwarz) ? (not seen by me); Sedgefield near Knysna (A. R. H. Martin).

Klein River estuary, Hermanus (U.C.T.); Breede River mouth (U.C.T.); Still Bay lagoon (Miss Wapenaar, U.C.T.); Knysna River (Krauss); Knysna lagoon (S. Afr. Mus. P.F. coll.); Knysna lagoon, dredged in 3–5 metres (U.C.T.); Keurbooms River estuary (Provincial Inland Fisheries Dept.); Zwartkops River estuary, Port Elizabeth (Soot-Ryen; coll. Macnae); Bushman's River, 18 miles from mouth (U.C.T.); Port Alfred (Smith, Bartsch, Turton); Buffalo River, 2 miles above jetty (S. Afr. Mus. P.F. coll.); Port St. Johns, on piles of footbridge, western estuary (U.C.T.); Salisbury Island, Durban Bay, floating jetty (U.C.T.); Inhambane (U.C.T.).

Remarks. Bartsch recorded one specimen taken by Stimpson in 1853 in Simon's Bay (False Bay). This species has not been recorded from the sea, nor from any locality west of Hermanus. There is no river or lagoon at Simonstown; the nearest suitable estuary or lagoon is Muizenberg Vlei; but neither South African Museum nor U.C.T. has found it there. Presumably therefore some error in labelling has occurred; or perhaps Bartsch misidentified the specimen.

I have examined the U.C.T. material collected by Prof. T. A. Stephenson and his assistants; some of the specimens recorded by these authors had been misidentified (*v. supra*).

I have little doubt that Smith's *tenerrima* is synonymous; and Soot-Ryen was inclined to regard it as such pending examination of the animal. Re-examination of the Type shell should suffice to settle the question.

Up to the present very large specimens have been found at only two localities: Zwartkops estuary by Dr. Macnae in 1950, and more recently (1960) in the Still Bay lagoon by Miss Wapenaar (U.C.T.). The latter are the largest known specimens. At Knysna shells up to 25 mm. long occur, and up to 30 mm. in the Bushmans River and Klein River estuary.

Undulating reddish cross-bars occur in this species, and also in *Musculus virgiliae* and in *Lanistina cuneata*; but *capensis* is the only South African species which has *radiating* colour streaks.

The anatomy of Knysna specimens (not in very good condition) appears to

correspond with that of the large Zwartkops (Soot-Ryen) and Still Bay examples.

Musculus (*Musculus*) *virgiliae* n.sp.

Fig. 8 *d*

Modiola capensis (*non* Krauss), Day, Millard & Broekhuysen, 1954, pp. 143, 153; Broekhuysen & Taylor, 1959, pp. 284, 285, 292.

Obliquely oblong, dorsal margin straight, ventral margin concave, umbones subterminal; hinge-line straight, obscurely crenulate along whole length, or anterior part, of ligament, which is narrow and close to dorsal margin; denticulations or strong crenulations beginning behind ligament, and continued as weaker crenulations around margin as far as the non-ribbed area on ventral margin; anterior margin with 6–8 conspicuous denticles, one or two of them larger than the others, followed by crenulations extending to the non-ribbed area.

Radiating riblets 7–9, not very strong, on anterior area, numerous and well developed on posterior area, a smooth intervening area; towards the margins new riblets are interpolated, the old ones not bifurcating. At shell length 2 mm. anterior riblets 4–5, posterior *c.* 25; at 4 mm. anterior 5, posterior *c.* 28–32; at 10 mm. anterior 6–7, posterior *c.* 35–38.

Anterior adductor scar elongate-oval, near antero-ventral margin; anterior retractor under the umbo; posterior retractors usually with 3 branches, not extending forwards under the ligament, continuous with the well-developed posterior adductors.

Margin of upper siphon smooth, of branchial opening papillose.

Length 17–19 mm. Dark olivaceous or coppery brown, sometimes grass-green, juveniles paler, with transverse reddish wavy bars on the posterior part, interior violaceous, the cross-bars sometimes showing faintly.

Great Brak River (Mossel Bay), 4 miles from mouth (U.C.T.); Knysna lagoon, under stones just above low water (U.C.T.); Keurbooms River, on water-logged wood, 5 miles from mouth (S. Afr. Mus. coll. K.H.B.) (Types); Zwartkops River, Redhouse, Port Elizabeth (S. Afr. Mus.); Bushmans River, 18 miles from mouth (U.C.T.); The Haven (Bashee River mouth) ½ mile up Mbanyana River (U.C.T.); Port St. Johns, piles of footbridge, western estuary (U.C.T.); Amanzimtoti lagoon (Natal) (U.C.T.); Umzimbezi River mouth (U.C.T.); Illovo (S. Afr. Mus.); Amahlongwana lagoon (near Scottburgh) (S. Afr. Mus. coll. Burnup); St. Lucia Bay and Kosi Bay (U.C.T.); Lagoa Poelela, Inhambane (U.C.T.).

Type material South African Museum no. A7776.

Remarks. The specimens described above seem to belong to a distinct species. Externally they closely resemble B. *variabilis*, and have been identified as such. They have also been identified as *L. capensis*, with less justification because the latter is a smooth species.

Bearing in mind the comments given above concerning var. *semistriata*, is it possible to identify the present series of specimens with Krauss's variety?

Krauss referred to the absence of riblets on the dorso-posterior part of the shell, but here it is precisely this area which is always clearly ribbed. And in Krauss's figure the umbo is terminal.

For these reasons I consider these specimens should be given a specific name. *Virgilia*: the botanical name of the Keurboom tree.

Musculus difficilis (Desh.)

Fig. 9 *a–c*

Modiola difficilis Deshayes, 1863, p. 23, pl. 3, figs. 22–24 [Odhner quoted: pl. 3; Dautzenberg: pl. 30]; Odhner, 1919, p. 6; Dautzenberg, 1929, p. 573.
Modiolaria difficilis (Desh.), Lamy, 1937, p. 36.
Modiolaria africana Bartsch, 1915, p. 190, pl. 41, fig. 2; Braga, 1952, p. 102.

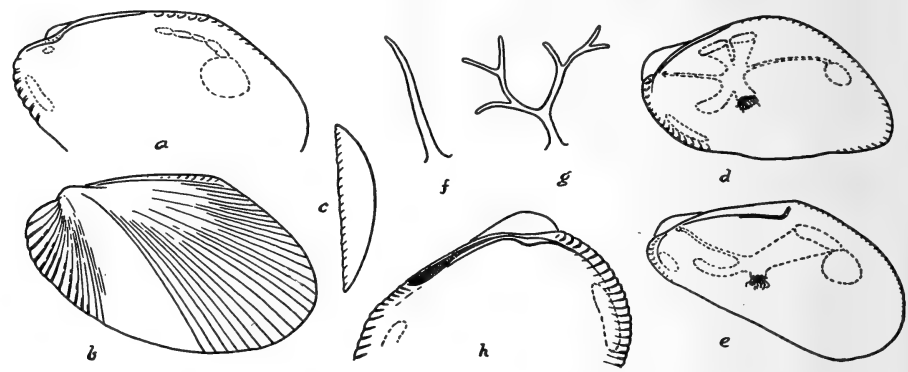


Fig. 9. *a, b, c, Musculus difficilis* (Desh.), internal, external, and end view of one valve. *d, Lanistina cuneata* (Gould). *e, f, Gregariella simplicifilis* n.sp., internal view and periostracum hair. *g, Gregariella* sp., periostracum hair. *h, Crenella striatissima* Sow.

Posterior ribbed area crenulated by the growth-lines. 3·5 × 2 mm. (Bartsch); 5 × 3·5 mm. (Braga); 13 × 6 mm. (Odhner); Port Alfred (dead) (Bartsch); Inhambane (Braga).

Distribution. Réunion (Deshayes); Madagascar (Odhner).

Remarks. Odhner mentioned minor differences in his material; but did not give the number of riblets.

A single flat and ovoid shell may be *difficilis* as it is similar in form to *africana*; but the posterior riblets are fewer (26 instead of 50), and are not crenulate, the growth-lines being very fine. The posterior retractor muscles are as in *Musculus* s. str.

7·5 × 4·5 × (2 valves together) 2·3 mm. Corneous, with irregular, wavy reddish cross-bars.

Delagoa Bay (S. Afr. Mus. coll. K.H.B.).

'Musculus' *ima* (Bartsch)

Modiolaria ima Bartsch, 1915, p. 190, pl. 41, figs. 4, 5; Turton, 1932, p. 228.

Seems to be distinguished by having fewer riblets; but a doubtful species.

Two valves in South African Museum (pres. Turton) have at shell length 2·25 mm. anterior 3, posterior 11 riblets; at 3·25 mm. 4 and 14 resp.; Bartsch gave 4 and 16 at 7 mm. length.

Gen. Lanistina Gray

Anterior adductor stronger than posterior adductor. Posterior retractor divided into a strong elongate anterior portion attached to the shell *beneath the ligament*, and a slender posterior branch contiguous with the posterior adductor.

Soot-Ryen (1955) considered that certain species (e.g. *marmoratus*) should be separated from *Musculus* s. str. on account of the posterior retractor; and suggested adopting *Lanistina* Gray 1847 in preference to *Modiolarca* Gray 1843 (the latter being possibly a misprint for *Modiolaria*).

Lanistina cuneata (Gould)

Fig. 9 *d*

Modiolaria cuneata Gould, 1861, p. 38; Smith, 1885, p. 278, pl. 16, figs. 7, 7*a*; 1891, pp. 393, 394 (synonymy discussed); Bartsch, 1915, p. 189, pl. 42, figs. 5, 6; Turton, 1932, p. 228.
Musculus cuneatus (Gould), Prashad, 1932, p. 75, pl. 2, figs. 34, 35.
Modiolaria discors (*non* Linn.), Sowerby, 1892, p. 64; Schwarz, 1910, p. 116.
Modiolaria marmorata (*non* Forbes), Sowerby, 1892, p. 65; Turton, 1932, p. 228.

At shell length 1·5 mm. anterior riblets 10, posterior 18; at 3–4 mm. 10 and 20; at 7–8 mm. 12–14 and 26–28; at 11 mm. 16 and 30–32 (numbers approximate); Bartsch's number '17' posterior riblets is too low, possibly a misprint for 27.

Valves strongly inflated, thickness (2 valves together 4·5 mm. at shell length 7 mm.; 6–7 mm. at 11 mm.

Yellowish olivaceous, often with pinkish or reddish mottling, irregular or forming more or less concentric wavy cross-bars.

Musculature as in *marmorata* (List, 1902).

Fossil: Pleistocene, Port Elizabeth (Schwarz); Quaternary, Sedgefield near Knysna (A. R. H. Martin).

Simon's Bay (False Bay), 'imbedded in test of large Ascidian' (Gould; also Smith); Port Alfred (Bartsch, Turton); False Bay to Tongaat (Natal) (S. Afr. Mus.).

Off Cove Rock (East London), 22 fathoms (S. Afr. Mus. P.F. coll.).

Saldanha Bay, amongst *Pyura*; Kalk Bay (False Bay) harbour piles; off Cape St. Blaize (34° 46′ S., 22° 05′ E.), 51 fathoms; Algoa Bay, 6–46 fathoms; Durban; Kosi Bay (Zululand); Inhambane (U.C.T.).

Distribution. Sydney, Australia, 6–15 fathoms (Smith, 1885); East Indies (Prashad).

Remarks. Smith (1891) was doubtful about *cuneata* being synonymous with *marmorata* (Forbes) from Europe, Mediterranean, Suez, Persian Gulf, and Canary Islands. In 1885 he said it was 'not quite so elongate' as *marmorata*,

and suggested varietal rank for the former. Slight variations in shape and proportions are found in the present material, and do not seem important. After comparison with List's (1902) description and figures of shell and anatomy, I think *cuneata* should be regarded as a synonym, but *pro tem.* retain Gould's name.

The large Ascidian mentioned by Gould is the 6–8-inch-long *Pyura stolonifera*, locally known to fishermen as 'red bait'; several individuals usually grow close together in clumps, and the mollusca are found in the intervening crevices, and also embedded in the tests. List records *marmorata* as living free or embedded in the test of Ascidians, or even within the mantle cavity (1902, pl. 3, figs. 10, 12, 13, 14).

Gregariella simplicifilis n.sp.

Fig. 9 *e*, *f*

Modiola petagnae (*non* Scacchi), Sowerby, 1892, p. 64; Turton, 1932, p. 227.
Modiola petagnae var. *rietensis* Turton, 1932, p. 227, pl. 59, no. 1590.
Modiola rufanensis Turton, 1932, p. 227, pl. 59, no. 1591.
Modiola albanyana Turton, 1932, p. 229, pl. 59, no. 1600.
Brachidontes capensis (*non* Krauss), Stephenson, 1948, p. 268.

A few feeble and obscure riblets anteriorly; fine radial riblets on the umbonal ridge and slightly below it, usually more or less concealed by the simple, unbranched periostracal hairs. Dorsal margin crenulate, crenulations extending behind ligament, but petering out before reaching the ventral margin, anterior margin crenulate. Ligament widening posteriorly and ending abruptly (cf. *B. variabilis*).

Anterior retractor under the umbo, posterior retractor (pedis et byssi) compact, contiguous with posterior adductor, which is larger than the anterior adductor.

Up to 14 mm. long. Golden brown.

Gordon's Bay (False Bay) (no. 6878, Types), Hermanus, Still Bay, Mossel Bay (S. Afr. Mus.); St. James (False Bay) and Arniston (Stephenson); Plettenberg Bay; Inyoni Rocks, Amanzimtoti, Natal (U.C.T.).

Remarks. Soot-Ryen (1955, pp. 76, 77) suggested that *petagnae* Scacchi should be a synonym of *opifex* (Say), described originally from supposedly Mediterranean shells; and stated that this species has branched periostracal hairs.

Sowerby's identification of the common South African species with simple hairs therefore seems erroneous. A new specific name seems advisable to place the South African species on a definite footing, even though it may later have to be altered.

Gregariella sp.

Fig. 9 *g*

Deeper and more oval in shape than *simplicifilis*. Feeble riblets anteriorly, and fine radial riblets on the umbonal ridge, extending forwards to middle of

ventral margin. Periostracal hairs branching dichotomously, those on the hind end nearly half the length of the shell. Dorsal and posterior margins more conspicuously crenulate than in *simplicifilis*, the crenulations extending to midway on ventral margin. Ligament not so broad as in *simplicifilis*. Muscle scars as in the latter species.

5·5 × 3 mm.

Off Umkomaas (Natal), 40 fathoms, one valve; off Umhloti River (Natal), 40 fathoms, one valve (S. Afr. Mus. nos. A9475, A9476, P.F. coll.).

Until further material is available, these valves are left indeterminate.

Crenella striatissima Sow.

Fig. 9 *h*

Crenella striatissima Sowerby, 1904, p. 3, pl. 6, fig. 1; Bartsch, 1915, p. 189; Thiele, 1931, p. 171; Turton, 1932, p. 228; Lamy, 1937, p. 58.
Crenella alfredensis Bartsch, 1915, p. 189, pl. 41, fig. 1; Turton, 1932, p. 228.
Crenella minuta Thiele, 1931, p. 171, pl. 6(1), fig. 5 (= juv.).

Length (i.e. alt.) 10, width (i.e. length) 8 mm. (Sowerby).

34° 7′ S., 25° 42′ E., 56 fathoms, one living (Type); off Umhloti River (Natal), 100 fathoms, one valve (fresh) cotype (Sowerby; P.F. coll.).

Off Cape Natal (Durban), 85 fathoms, 2 living; 34° 5′ S., 25° 55′ E., 67 fathoms, several valves; 34° 26′ S., 25° 42′ E., 124 fathoms, 8 valves; off Cape Morgan, 45 fathoms, several valves; off Umkomaas (Natal), 40 fathoms, several valves (S. Afr. Mus. P.F. coll.).

Port Alfred, dead (Bartsch, Turton).

33° 50′ S., 25° 48′ E.; 34° 8′ S., 24° 59′ E., 80 metres; 33° 41′ S., 18° 03′ E. (off Table Bay), 178 metres (Thiele).

Algoa Bay, 14 fathoms; and False Bay, 22 fathoms (U.C.T.).

Type and cotype in South African Museum no. 14855 and 14856 respectively.

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. Thiele assigned a small (size not given) valve from 34° 51′ S., 19° 37′ E., 80 metres, to Sowerby's species. Nevertheless he described two valves from another locality (35° 29′ S., 21° 2·5′ E., 102 metres), one of them nearly circular (2·5 × 2·8 mm.), the other more egg-shaped, as a different species; without stating the differences. Shape, however, is not a differential character, because the growth-lines on larger shells show that the younger the shell the more circular its outline; and young shells may vary in this respect. Beach-wear, of course, may alter the appearance of the shell.

A worn and broken valve from off Cape St. Blaize, 125 fathoms (S. Afr. Mus. P.F. coll.), shows that the Type is by no means fully grown. Although the umbo and the part containing the anterior adductor scar are missing, the specimen is similarly striated and appears to be undoubtedly conspecific. Length 16, alt. *c.* 19 mm. (20 if the umbo were present).

Rhomboidella capensis Thiele

Rhomboidella capensis Thiele, 1931, p. 170, pl. 6(1), fig. 4.
Mytilus thalia Turton, 1932, p. 227, pl. 58, no. 1583; Lamy, 1936, p. 179.

Obliquely rhomboidal (approximately as in Thiele's figure, but slightly variable), thin, transparent; fine radial striae; growth-lines (or the main ones) rather widely spaced; margin internally crenulate.

Length 3, alt. 3·5 mm. (Thiele). 5 × 7 mm. (S. Afr. Mus.).

34° 51′ S., 19° 37′ E., 80 metres, one shell (Thiele).

St. Francis Bay, 24–34 fathoms, one living; 34° 26′ S., 25° 42′ E., 124 fathoms, 2 valves; off Cape Morgan, 77 fathoms, one valve; off Umkomaas (Natal), 40 fathoms, 2 valves; off Tugela River, 65–80 fathoms, 7 valves, fresh (semitransparent); off O'Neil Peak (Zululand) 90 fathoms, 2 living, 2 valves (S. Afr. Mus. P.F. coll.).

Remarks. Thanks to the kindness of Dr. Cain of the Oxford University Museum, I have been able to examine the Type of Turton's *Mytilus thalia.* It is rather narrow, compressed antero-posteriorly, and measures length 2·3, alt. 3·75 mm. In the *Pieter Faure* collection there are comparable specimens, e.g. the Cape Morgan valve, 2·5 × 4 mm., and the smaller of the two Umkomaas valves, 3 × 5·3 mm. The anterior margin can be straight (slightly convex in Thiele's figure), but usually shows a slight concavity, which is more clearly noticeable in the compressed valves, including the Type of *thalia.*

Of the three largest valves one comes from off O'Neil Peak, one from off Tugela River, and one from St. Francis Bay.

Thiele assigned a larger valve (umbo to lower corner 6 mm.) from East Africa as doubtfully belonging to *capensis.* As the species is found living off the Zululand coast, it may well be living farther north.

Adipicola pelagica (Forbes MS., Woodward)

Fig. 7 *c*

Modiolarca pelagica Forbes MS., Woodward, 1854, p. 266, pl. 17, fig. 6.
Myrina denhami Adams, H. & A., 1854, p. 76.
Myrina pelagica (Woodward), Adams, H. & A., 1857, p. 514, pl. 121, figs. 2, 2*a*, *b*.
Adula pelagica (Woodward), Tomlin, 1926, p. 299; Lamy, 1937, pp. 186, 190.
Adipicola pelagica (Woodward), Dautzenberg, 1927, p. 274, pl. 8, figs. 15, 16.

Prodissoconch distinct. Concentric growth-lines, but no radial striations. No trace of crenulations on margin of valve. Ligament wholly internal. Anterior adductor as large as posterior adductor; anterior retractor pedis + byssi high up under the margin and immediately in front of umbo; posterior retractor pedis + byssi contiguous with posterior adductor.

Margins of ventral opening of mantle papillose anteriorly and posteriorly; siphon not fringed.

17 × 5·5 (at umbo) 6 mm. (at end of ligament). Corneous brown, paler on umbonal region, prodissoconch chestnut-brown.

On floating whale blubber off the Cape (H.M.S. *Herald*).

Off Dassen Island (Table Bay), 240 fathoms, living in abundance on water-logged whale skull (S. Afr. Mus. coll. Eccles, 1963).

Distribution. 42° 50′ N., 28° 37′ W. on a lump of floating spermaceti; Azores, 1372–1846 metres (Dautzenberg).

Remarks. The specific name *denhami* appears to have been instituted by H. & A. Adams in 1854; and in the same year Woodward (1854, p. 266) used *pelagica*. These two papers are not available to me to settle the priority, but H. & A. Adams in 1857 (p. 514) adopted *pelagica*; and later authors (Dautzenberg 1927, Lamy 1937) have followed suit. It seems a pity if this species, collected during the cruise of H.M.S. *Herald* off the Cape in 1850–1, cannot bear the name of her commander Captain Denham.

Gen. Lithophaga Röding

Lynge, 1909, p. 136; Prashad, 1932, p. 76; Iredale, 1939, p. 416; Soot-Ryen, 1955, p. 91; Turner & Boss, 1962.
Modiola cylindrica Krauss, 1848, p. 21, pl. 2, fig. 2; Turton, 1932, p. 227.
Modiola mucronata Phil., Krauss, 1848, p. 21.
Lithodomus lithophagus Linn., Macnae & Kalk, 1958, pp. 37, 92, 119, 129, fig. 23 *a*.

To the two species recorded by Krauss from Natal, *lithophagus* has recently been added from Inhaca Island, Delagoa Bay.

Turton's specimens from Port Alfred must have been dead shells because Madrepore corals die out at about Port St. Johns, considerably north of Port Alfred (Crossland & Stephenson, 1948, pp. 174, 178).

Tomlin identified specimens collected by U.C.T. from Umpangazi and Umtwalumi as *gracilis* (Phil.).

I have seen 3 specimens from Umtwalumi (U.C.T.) measuring 30 × 10, 46 × 16, and 66 × 17 mm. All vertically striated. The hinge-line is longer than the length of the shell behind it, and the length of the shell (umbo to posterior margin) makes an angle of 10°–12° with the line of the hinge. The shell is thus only slightly oblique, nearly cylindrical.

These shells are clearly referable to *cylindrica* Krss. This may be the same as *gracilis* (Phil.), which is regarded as a synonym of *teres* (Phil.) (see Lynge, p. 136; Prashad, p. 77).

At the same locality U.C.T. took another shell, 65 × 24 mm., without vertical striations and with a thin chalky incrustation, giving the shell a fretted appearance, and not extending beyond the valves. The shape is definitely oblique, the length making an angle of 22° with the line of the hinge. The hinge-line is shorter than the length of the shell behind it. This shell has the shape of *obesa* (Phil.) as figured by Iredale (1939, pl. 6, fig. 30). Iredale said the shape was distinctive.

L. obesa was recorded from Mozambique by Dunker, and from the Red Sea by Lamy. *L. nasuta* (Phil.) has also been recorded from Mozambique.

Some small specimens, the largest 18 × 9 mm., from corals at Inhaca Island, Delagoa Bay (coll. K.H.B. 1912) have a thin chalky incrustation not

extending beyond the valves, and no vertical striations. The shape is very little oblique, and the hinge-line is a little more than half the total length. These specimens may perhaps be juvenile *obesa*.

Species inquirenda

Modiola pseudocapensis Lamy

Modiola pseudocapensis Lamy, 1931, p. 305; 1937, p. 312; Soot-Ryen, 1958, p. 341.

This species, the largest specimen of which measured 52·5 × 25 × 16 mm., was stated to resemble *Lamya capensis* externally. Do the words 'obscure radiatim striatum' mean *colour* streaks (as in *capensis*) or sculpture? In addition to this ambiguity, the words in the diagnosis 'post ligamentum margo cardinalis crenulatus' conflict with the statement that all the *pseudocapensis* shells had no crenulations, and the species was therefore a true *Modiolus*. The hinge and the muscle scars were not mentioned.

Soot-Ryen (1958, p. 341) said he had seen the Type, and that it belonged to a different group [not *Modiolus*]; he did not, however, state to what genus he considered it belonged.

Lamy's specimens were stated to have been collected at Beira and Walvis Bay.

Fam. **Isognomonotidae**

Prashad, 1932, pp. 81 and 88 (*Isognomoniidae* + *Vulsellidae*).
Thiele, 1935, p. 801. (*Vulsellidae*).
Iredale, 1939, p. 319 (*Isognomontidae*).
Kira, 1955, p. 91 (*Isognomonidae*).

The following key combines the generic diagnoses of Thiele and Iredale (omitting one of the latter's new genera):

1. A single ligamental cartilage in a pit. Animal occupying only the upper part of the more or less attenuated shell.
   (*a*) Byssus present. Hinge-line straight, more or less elongated .. .. .. *Malleus*
   (*b*) Byssus absent. Hinge-line short.. .. .. *Vulsella*
2. Several ligamental cartilages in pits.
   (*a*) Elongate, animal extending along the shell. Muscle scars separate.. .. *Isognomon*
   (*b*) Broad, hinge-line very broad. Muscle scars coalescing .. .. .. *Melina*
   (*c*) Oblong-oval, nacreous area covering nearly whole of interior, muscle scars coalescing (S. African species), deeply impressed .. .. *Parviperna*
   (*d*) Oblong-oval, nacreous area not nearly covering whole of interior; hinge-line crenulate; no byssal sinus .. .. *Crenatula*

Iredale (1939) stated for *Melina* in the key p. 319 'umbonal area very shallow', but in generic diagnosis on p. 325 'umbonal area is deep'.

Malleus regula (Forskål)

Fig. 10 *b*

Ostrea regula Forskål, 1775, p. 124.
Malleus decurtata Lamarck, 1819, p. 145; Reeve, 1858, pl. 3, fig. 10; Dautzenberg, 1929, p. 564; Prashad, 1932, p. 105.
Vulsella nuttalli Conrad, 1837, p. 257, pl. 20, fig. 10; Dall, Bartsch, Rehder, 1938, p. 68, pl. 14, figs. 6–9.

Malleus regula (Forskål), Reeve, 1858, pl. 2, fig. 4; Odhner, 1917, p. 17; Dautzenberg, 1929, p. 564; Prashad, 1932, p. 105 (references).
Malleus tigrinus Reeve, 1858, pl. 3, fig. 7; Sowerby, 1897, p. 27.
Pinna saccata (*non* Rve.), and var. *similis* Turton, 1932, p. 218, pl. 56, nos. 1517, 1518.
Pinna aenigmatica Turton, 1932, p. 219, pl. 56, no. 1521.

External concentric growth-lines on the part corresponding with the nacreous area more or less lamellose, those on the extension irregularly lamellate. Faint radiating riblets on early part of shell (up to 3 mm. alt.) in the Zululand shell, and feeble traces towards the end of the extension, mainly on the left valve. No riblets traceable on the Mozambique shells.

The internal rib is faintly traceable on the external surface in the Zululand shell, not as a raised rib but by the greater opacity than the translucent area on either side of it.

The Zululand shell has the nacreous area very sharply defined from the thin extension by a raised rim; in the Mozambique shells this raised rim is not so distinct though the nacreous area is equally sharply defined. In the latter also the internal rib is not so distinct.

Minute obscure denticles on the hinge.

White (Zululand); brown with irregular castaneous or purplish mottling, the nacreous areas are suffused (Mozambique).

Alt. 23, hinge-line 7 mm. (Zululand); alt. 45, hinge-line 9 mm., and 40 × 9 mm. (Mozambique). Nacreous area subcircular, length 7, alt. 6·5 mm. (Zululand); oval, length 11, alt. 17 mm., and 15 × 20 mm. (Mozambique).

Durban (Sowerby); Port Alfred (Turton).

Off Durnford Point (Zululand), 45 fathoms, one living (S. Afr. Mus. A9486 P.F. coll.).

Mozambique Island, littoral, 2 living (S. Afr. Mus. coll. K.H.B.).

Distribution. Red Sea, Suez, Persian Gulf, Madagascar, Indo-Pacific.

Remarks. It seems amazing that Turton could assign his shells with 'straight flat top' to *Pinna*. Both photos show the longitudinal rib, and this is specially mentioned for *aenigmatica*. No. 1518 is more strongly ribbed than the present shells. Winckworth (1936, p. 21) referred to *aenigmatica* as 'This gruesome piece of beach refuse'. But he missed the one essential clue to its generic position.

Odhner remarked that this species is easily recognized by the internal rib on the tongue-like extension. Prashad agreed, but stated that *daemonicus* Rve. also had a similar rib.

Malleus anatinus (Gmelin)

Ostrea anatina Gmelin, 1790, p. 3333; Brugière, 1797, pl. 177, fig. 14.
Malleus anatina (Gmelin) Chenu, 1862, fig. 816.

One specimen, undulate and semicircularly curved, measures 45 mm. from umbo to end of posterior hinge extension, vertical from hinge-line to lowest part of curved margin *c*. 80 mm., from umbo to end of shell *c*. 120 mm.,

interior nacreous area extending *c.* 30 mm. from ligament. Posterior retractor united with posterior adductor.

Corneous with scattered black spots and short streaks, nacre violaceous. 29° 58′ S., 31° 02′ E., 49 metres, 3 specimens (U.C.T.).

Distribution. East Indies.

Gen. Vulsella Bolten

Smith, 1911, pp. 306–312, pl. xi.

Usually living in sponges, in correlation with which habitat apparently the byssus has been suppressed.

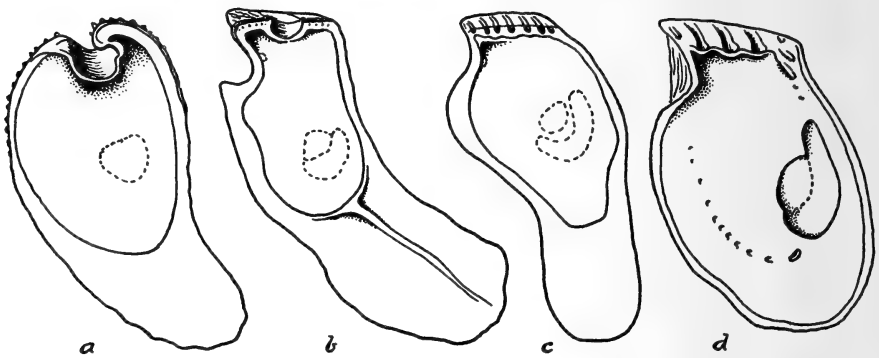


Fig. 10. *a*, *Vulsella minor* Röding. *b*, *Malleus regula* (Forskål), specmen from Mozambique Island. *c*, *Isognomon* sp., from Delagoa Bay. *d*, *Parviperna dentifera* (Krss.).

Vulsella minor Röding

Fig. 10 *a*

Vulsella minor Röding, 1798, p. 156; Prashad, 1932, p. 89, pl. 2, figs. 46–49 (bad photos).
Vulsella attenuata Reeve, 1858, pl. 1, fig. 5; Smith, 1911, p. 309; Tomlin, 1923, p. 51; Dautzenberg, 1929, p. 565.
Vulsella vulsella (*non* Linn.), Smith, 1910, p. 213.

Umbones widely separated. A deep ligamental fossa in each valve. Radiating ribs more or less squamose where they are crossed by the concentric growth-lines, especially on anterior and posterior margins. Brown, radiating lines not very distinct.

Length 10, alt. 19, thickness (two valves) 8, distance between umbones 6 mm.

Tongaat, Port Shepstone, Alexandra Junction, Umkomaas (Smith); Durban (U.C.T., identified by Tomlin), Port St. Johns, and Umhlali (U.C.T.).

Off Durnford Point (Zululand), 13 fathoms, one living (S. Afr. Mus. A5395 P.F. coll.).

Distribution. Red Sea, Suez, East Indies, Madagascar.

Remarks. The P.F. specimen, measurements given above, was identified by Sowerby as a young *lingulata* Lam., but evidently agrees with the Natal

specimens with widely separated umbones which Smith (1911) called *attenuata*.

V. vulsella (Linn.) also occurs at Madagascar; it is distinguished by the umbones being closer together, and the ligament pit not so conspicuous.

Isognomon perna (Linn.)

Perna costellata Conrad, 1837, p. 246.
Melina costellata Tomlin, 1931, p. 446.
Isognomon (*Melina*) *costellata* Dall, Bartsch, Rehder, 1938, p. 65, pl. 14, figs. 1–5.
Perna sulcata Deshayes, 1850, pl. 81, figs. 3, 3*a*.
Melina perna (Linn.), Smith, 1910, p. 213.
Isognomon perna (Linn.), Prashad, 1932, p. 85.
Isognomon roberti Koch, 1953, p. 22, pl. 5.

Rounded quadrangular, with postero-ventral corner more or less expanded, numerous narrow radiating ribs. Uniform corneous.

Length 66, alt. 66·8, hinge-line 33 mm. (Dall, Bartsch & Rehder); 45 × 48 × 23 mm. (Koch).

Scottburgh (Natal) (Smith); Umtamvuma River (= Port Edward) (Tomlin); Umgazana, 10 miles south of Port St. Johns (Koch).

Distribution. Madagascar, Seychelles, Indo-Pacific.

Remarks. Port Edward is about 65 miles south of Scottburgh, and Umgazana about the same distance south of Port Edward. There is little doubt that *roberti* is a synonym of *costellata*.

Smith accepted *sulcata* Lam. as a synonym of *perna* (Linn.); and the figure of *sulcata* in Cuvier corresponds with the figures of *costellata* in Dall, Bartsch & Rehder, especially with figures 1 and 2 in which the shell is expanded anteriorly. In figures 3 and 4 the shell is more expanded posteriorly, as is also the case in the figure of *roberti*. Cuvier's and Koch's figures both show the ligament pits more widely separated than in D, B, & R's figures 2 and 3.

Prashad stated that *perna* was a very variable species.

Koch's figure of the interior of the right valve seems to show an oval muscle scar attached to the anterior end of the curved posterior adductor scar. The other figures here quoted do not show the muscle scars.

Isognomon sp.

Fig. 10 *c*

Buff or horny coloured specimens, with pale nacreous interior, approximately 25 mm. length, 60 mm. alt., are probably referable to *isognomon* Linn.; but I do not wish to add another name to those already recorded (*anomioides*, *perna*, *vulsella*) without comparison with more material.

The posterior retractor scar lies within the curve of the posterior adductor scar but does not seem to be actually contiguous.

Delagoa Bay (S. Afr. Mus. A9487 coll. K.H.B.); Mozambique Island (U.W.).

Gen. Parviperna Iredale

Iredale, 1939, p. 322.

This genus was instituted for some small black species of 'Perna'. The South African small black Perna was not mentioned.

The genus was defined as follows: squarish, ovate-oblong not attenuate, nearly equivalve, byssiferous, umbones terminal, ligamental cartilage pits 4–5; nacreous area covering nearly whole of the interior, the non-nacreous margin narrow; muscle scars large, deeply impressed.

The generic key on p. 319 stated 'small nacreous area, muscle scars not coalescing'. As the first character conflicts with the diagnosis on p. 322, one cannot well trust the accuracy of the second character. No figure of the muscle scars was given. In the descriptions of the two species assigned to this genus, the words 'anterior' and 'posterior' [sides of the shell] seem to have been transposed.

The above diagnosis would include *dentifera* except for the one doubtful character of the muscle scars. The deeply impressed muscle scars, including those of the pallial line muscles, are very noticeable in *dentifera*. The posterior retractor and adductor scars are always confluent, and usually the junction between the two cannot be traced.

I think no great harm will be done if the definition of *Parviperna* is amended by including the words: muscle scars coalescing or (*fide* Iredale) not coalescing.

Parviperna dentifera (Krss.)

Fig. 10 *d*

Perna dentifera Krauss, 1848, p. 28, pl. 2, fig. 9; von Martens, 1880, p. 316; Braga, 1952, p. 100, pl. 8, fig. 9; Macnae & Kalk, 1958, pp. 34, 119, 120, 129.
Isognomon dentifera (Krss.), Day & Morgans, 1956, p. 307.

Shape variable, usually oblong-oval, but sometimes subcircular. The short ridge-like oblique teeth at postero-dorsal corner behind the last ligament pit may be either one in the left, two in the right valve, or vice versa.

Blackish or brownish, violaceous, interior usually dark violaceous, but sometimes pale, the narrow non-nacreous margin black, but likewise sometimes pale.

31 × 19 mm. (Krauss); 23 × 15 mm. (S. Afr. Mus.).

Natal (Krauss); Scottburgh (S. Afr. Mus. coll. Burnup); Karridene and Durban (U.C.T.).

Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also Braga; also U.W.); Maxixe (U.C.T.); Mozambique Island (S. Afr. Mus. coll. K.H.B.; also U.W.).

Distribution. Réunion (von Martens).

Crenatula mytiloides Lam.

Crenatula mytiloides Dautzenberg, 1929, p. 565.

Obliquely ovoid, hind margin straight, oblique to the hinge-line. Length 50, hinge-line 30, alt. 35 mm. Violaceous black.

Bazarute Island (A. E. Dichmont, 1961).

Distribution. Red Sea, Madagascar.

Remarks. The species of this genus live among sponges; the external surface is sometimes completely enveloped in sponge. The animal has no byssus, and there is no byssal sinus in the shell.

Fam. **Pteriidae**

Pteria chinensis (Leach)

Fig. 12 *d*

Avicula chinensis Leach, 1814, p. 86, pl. 38, fig. 1.
Avicula crocea Lamarck, 1819, p. 148; Chenu, 1862, fig. 786.
Pteria chinensis (Leach), Tomlin, 1931, p. 446; Prashad, 1932, p. 92 (references).

Surface smooth; hind wing bluntly pointed, posterior indent shallow. Hinge-line slightly callused below and in front of umbo, scarcely nodular, a long narrow posterior ridge. Scars of the posterior retractor and adductor separate.

Dark brown postero-dorsally, reddish-brown radial streaks, mostly narrow or in pairs or partly united, on a pale ground colour, fading out anteriorly.

Length 78, alt. 28 mm.

Umhlali (Natal) (Tomlin, *fide* Burnup); Delagoa Bay (U.W.).

Distribution. Indo-Pacific.

Remarks. I have seen the Delagoa Bay specimens. They are not like Chenu's figure of *crocea*, which has a long hind wing; they are more like his figure of *heteroptera*. Prashad, however, said that the hind wing was not so well marked in young shells.

Pteria zebra (Rve.)

Avicula zebra Rve. Sowerby, 1897, p. 27.
Pteria zebra (Rve.), Odhner, 1917, p. 16, pl. 1, figs. 6–8; Prashad, 1932, p. 91; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, p. 129.
Electroma zebra (Rve.), Iredale, 1939, p. 333.

A Durban specimen: length 20, alt. 13 mm.; the False Bay specimen: 15 × 11 mm.

Port Elizabeth (Sowerby).

Living: False Bay, one (U.C.T.).

34° 35′ S., 21° 11′ E., 75 metres, one (St. Sebastian Bay) (U.C.T.); Durban (S. Afr. Mus. A3656 coll. K.H.B.); Durban and Inhambane (U.C.T.); Delagoa Bay (U.W.).

Distribution. Ceylon, Maldives, Indo-Pacific.

Remarks. Dr. Rehder (U.S. Nat. Mus.) saw the U.C.T. specimen from False Bay, and suggested (in litt. to Prof. Day, 25 March 1955) that it might bear the name of the oldest species: *physoides* (Lam.). It does not differ from Durban specimens named *zebra* by Tomlin. Odhner and Prashad have recorded *zebra* without reference to *physoides*; Iredale said the Lamarckian names *physoides*

and *virens* for Australian shells 'deserve investigation'. The descriptions (at least in the 2nd edition of *Anim. sans Vert.* vii, p. 101, 1836) are inadequate. Meanwhile, therefore, it seems better to record the South African shells under the well-known name *zebra*.

Sowerby's record was almost certainly a dead shell, but the U.C.T. records from False Bay and St. Sebastian Bay indicate that the species does occur in Algoa Bay, though rarely. No specimens were obtained by the *Pieter Faure*.

Odhner found that the thickness of the stripes varied according to the species of Hydroid to which the shell was attached. He figured young shells in which the stripes were longitudinal (but not radiating from the umbo). In later growth (at about 6 mm. long in the present specimen) the stripes become more or less zigzag, and on the dorsal area (between hinge-line and the dark stripe from umbo) become transverse cross-bars almost perpendicular to the hinge-line.

P. tomlini Prashad (1932, p. 94, pl. 3, figs. 3, 4) appears to differ in having only cross-bars; no longitudinal stripes are visible on the early part of the shell in the figures.

Electroma vexillum (Rve.)

Fig. 12 *a*

Avicula vexillum Reeve. 1858 Avicula. Sp. 70, pl. 17, fig. 70; Herdman, 1906, p. 117, pl. figs. 33, 34.

Semi-transparent, faintly greenish, usually darker or with a dark and a whitish stripe from umbo to hind margin, on either side of the median ridge dark cross-bars, often undulating or zigzag.

Greatest length (left valve) 5·5, alt. 4 mm. Mr. A. E. Salisbury informed me that the species grows to 18–20 mm. with alt. 12–13 mm.

Delagoa Bay, attached to weed (U.W.).

Remarks. In Herdman's Report these small molluscs are referred to as 'false spat', as opposed to the spat of the Pearl Oyster.

E. pygmea Iredale, 1939, is very similar; but in the present specimens the cross-bar markings are rather more definite than in either Herdman's or Iredale's figures. Iredale seemed to think his specimens, 8 × 5 mm., were adult ('apparently adult').

Gen. Pinctada Bolten-Röding

Jameson, 1901, pp. 372–94.

Jameson divided the species into two groups: one without trace of hinge-teeth, the other with one or two denticles in front of the ligament [i.e. the middle deeper part of the ligament] and a short ridge behind, nearly parallel with the hinge-line. This division was weakened by the occasional presence of hinge-teeth in the young of one of the species of the 1st group (p. 379), and by the teeth frequently becoming obsolete in the 2nd group.

Herdman (1906, p. 117, pl. figs. 28, 29) figured the hinge of the spat of *vulgaris* at 1 mm. diameter with 5 anterior and 5 posterior teeth in each valve. These teeth disappear with later growth.

So far as I am aware the spat of the Cape pearl oyster has not been examined. From examination of the limited material at hand, hinge teeth are present in young shells but obsolete in older ones, in accordance with Jameson's 2nd group.

I propose to adopt for the common Cape pearl oyster Sowerby's name *capensis*, leaving future detailed research to determine its identity with, or relationship to *margaritifera* and *vulgaris*.

According to Jameson *margaritifera* (Linn.) var. *zanzibarensis* (Jameson), *capensis* (Sow.), *vulgaris* (Schum.) and *anomioides* (Rve.) all occur at Bazarute Island off the coast of Portuguese East Africa; according to Sowerby 1897, Jameson 1901, and Smith 1903 *vulgaris* (Schum.) and *natalensis* (Jameson) occur in Natal.

The method of reproduction, and life history of *capensis* should be investigated. According to Seurat (1904, p. 359) *margaritifera* is dioecious and oviparous.

Pinctada capensis (Sow.)

Fig. 11 *a–c*

Avicula margaritifera Linn. var., Krauss, 1848, p. 29.
Avicula meleagrina capensis Sowerby, 1889b, p. 158, pl. 3, fig. 10; 1892, p. 65, pl. 3, fig. 75.
Pteria margaritifera (*non* Linn.), Odhner, 1923, p. 4.
Pinctada capensis (Sow.), Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, p. 129.
Pteria capensis (Sow.), Franca, 1960, p. 89, pl. 20, fig. 1.

Shell variable in shape, but Sowerby's figure shows the common shape when not distorted. Grows to about 130 × 130 mm. As Krauss noted, large specimens tend to become thick-walled (10–15 mm.) and heavy.

The anterior tubercle and posterior linear ridge (tooth) are well marked in a specimen (smallest seen) with hinge-line 11 mm.; but they disappear at about 35–40 mm. hinge-line; the linear tooth is more persistent than the tubercle, and may be traceable in shells with hinge-line 50 or 55 mm.

Ground colour buff or corneous; dark brown or reddish-brown radiating stripes, some of them sometimes double; (pale stripes on a dark ground would be equally correct); nacre white, margin dark purplish-brown ('Black lip'). The dark margin occurs in shells with hinge-line *c.* 25 mm., but in younger shells is not so obvious, the external radiating stripes showing through the thin shell and giving a more or less mottled coloration.

The most westerly recorded locality is Dyer's Island (off Danger Point) (Odhner), presumably living. Occurs living in St. Sebastian Bay, low tide, and in Mossel Bay, 12 fathoms (S. Afr. Mus. P.F. coll.). U.C.T. obtained young specimens at 33° 38′ S., 26° 54′ E., 30 fathoms, also at Durban and Inhambane.

Delagoa Bay (U.W.); Bazarute Island (Jameson).

Var. *natalensis* (Jameson)

Margaritifera natalensis Jameson, 1901, p. 383, fig. 93; Smith, 1903, p. 394.

This appears to be no more than a variety, if even that, of *capensis*, with more intense, almost black, radiating stripes.

Described from Umkomaas (Natal), 70 × 70 mm., hinge-line 55 mm.

U.C.T. collected it at Kosi Bay, and I found it at Delagoa Bay and Mozambique Island. Bazarute Island (S. Afr. Mus.).

The Delagoa Bay specimens, hinge-line 20–35 mm., show the anterior tubercle and posterior linear tooth.

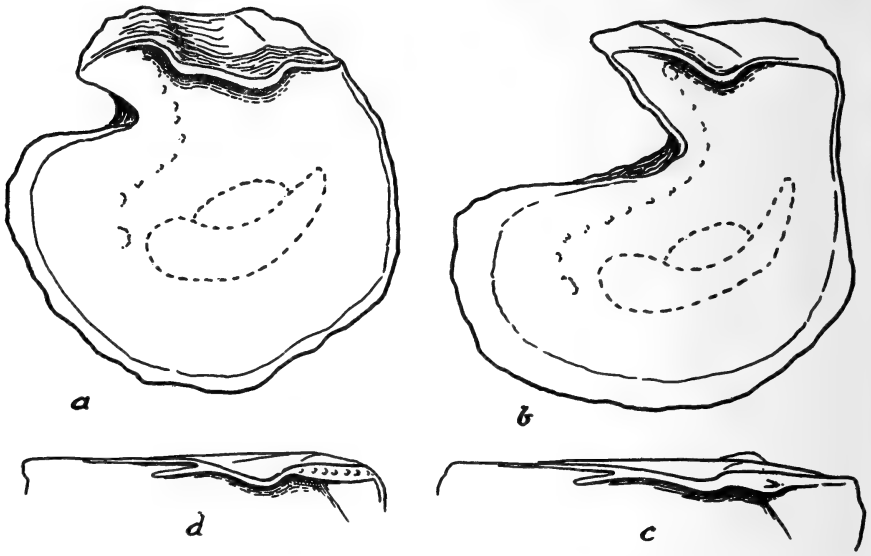


FIG. 11. *Pinctada capensis* (Sow.). *a*, *b*, a thick heavy shell, and a distorted shell, both 130 × 130 mm. *c*, hinge of a juvenile (hinge-line 32 mm.). *d*, *Pinctada* sp., hinge-line 8 mm., from Mozambique Island. (*a*, *b*, right valves; *c*, *d*, left valves.)

A small Mozambique specimen, hinge-line 8 mm. (fig. 11 *d*), has 6(7) anterior denticles and a posterior linear tooth. A juvenile attached to this 8 mm. shell, with hinge-line 2 mm., has no denticles and no posterior tooth. On the other hand a specimen with hinge-line 19 mm. has a posterior tooth but no anterior denticle.

Pinctada margaritifera (Linn.)

Margaritifera margaritifera var. *zanzibarensis* Jameson, 1901, p. 375.
Meleagrina margaritifera (Linn.), Braga, 1952, p. 99, pl. 8, fig. 1.

Bazarute Island (Jameson); Delagoa Bay (Braga).

Braga's figure might well portray a *capensis* shell.

Pinctada anomioides (Rve.)

A single living example from Scottburgh (Natal) (S. Afr. Mus. coll. K.H.B.) was identified by Tomlin. It has a hinge-line 18 mm., with a posterior

linear tooth and a feeble anterior tubercle. Translucent white with 4 or 5 opaque white radial stripes on the left valve.

Pinctada sp.

Three shells from Mozambique Island (S. Afr. Mus. coll. K.H.B.), hinge-line 17–27 mm., and two shells from 'South Africa' (S. Afr. Mus.) hinge-line 27 and 41 mm. with denticle and linear tooth.

Colour gamboge or golden-yellow, with faint indications of radiating stripes, or irregular markings.

Pinctada sp.

Fig. 12 *c*

Hind wing distinct, posterior indent right-angled. Surface smooth in smaller specimen; larger specimen smooth on earlier part, later lamellose-squamulose. Hinge with 2 denticles and 2 posterior ridges. Posterior retractor scar embraced by the crescentic posterior adductor scar. Brown; the smaller shell with a dark radial stripe from umbo to hind margin on left valve only.

Length 27, alt. 16 mm. (Mozambique); 20 × 13 mm. (Inhambane).

Mozambique Island (S. Afr. Mus. coll. K.H.B.); Inhambane (U.C.T.).

Pinctada sp.

Fig. 13 *a*

A small specimen found in a bottom sample taken off Umkomaas (Natal), 40 fathoms (S. Afr. Mus. no. A9488 P.F. coll.), is a case of incubation. The specimen is clearly a *Pinctada*, not an *Ostrea*.

Shell subcircular, scarcely oblique, with straight hinge-line; right valve fitting within the left; a slight indent on anterior margin on left valve, a stronger indent on the right; hind margin slightly indented dorsally. Surface smooth, with concentric growth-lines. A rather broad non-nacreous margin. Hinge-line without anterior denticles but with a series of 10–12 minute granules posteriorly.

When opened the dried shell was found to contain about 12 shelled juveniles (2 or 3 were broken in opening the shell). The foot and byssus were intact. The juveniles varied from 0·7 to 1 mm. in length, very slightly oblique, hinge-line straight, hinge without denticles.

Fam. **Pinnidae**

Rosewater, 1961.

These shells live in an upright position in gravel or sandy mud, the apex deeply buried and anchored by the byssus, the posterior end projecting a short distance above the surface. The anatomy of the animal is correlated with the vertical position of the shell. They are often gregarious, packed closely together in large colonies (Macnae & Kalk, 1958, pp. 43, 45, 92).

The small pea-crab (*Pinnotheres*) lives commensally within the shells; shrimps (*Anchistus*, *Paranchistus*, *Conchodytes*) have also been recorded as commensals.

Field investigation into the growth and variability in colonies of Pinnas would be welcome. Winckworth (1929, p. 284) referred to the different shape of the shell at different growth stages.

Owing to great variability in shape numerous names have been given to supposed 'species'. The recent exposition by Rosewater (1961) reduces the number of Indo-Pacific (including South Africa) species to nine, of which five are known from South Africa.

Sowerby (1897, p. 27) recorded *squamossima* Phil. from South Africa and *serra* Rve. from Durban. The former is considered a synonym of *serrata*, a West Atlantic species; and the name should be deleted from the South African list. Winckworth considered *serra* a synonym of *pectinata* Linn., a species known from India eastwards. This species is not likely to be found in South African waters, and the original provenance of Sowerby's specimen cannot be checked.

Key to South African species (after Rosewater)

1. Nacreous layer divided longitudinally by a groove. Externally a longitudinal ridge anteriorly .. .. *Pinna*
   (*a*) Posterior margin squarely truncate. Posterior adductor scar often extending on to ventral lobe of nacreous layer .. .. *muricata*
   (*b*) Posterior margin arcuate or rounded. Posterior adductor scar not extending on to ventral lobe .. .. *bicolor*
2. Nacreous layer not divided, no external ridge
   (*a*) nacreous layer occupying whole anterior part of shell .. .. .. *Atrina*
      (i) Shell thick, heavy, black .. .. *vexillum*
      (ii) Shell thin, with squamiferous projections .. .. *squamifera*
   (*b*) Nacreous layer confined to dorsal anterior part of shell. Usually contorted *Streptopinna saccata*

Pinna muricata Linn.

Pinna muricata Linn., Winckworth, 1929, p. 285, fig.; Rosewater, 1961, p. 188, pl. 139, figs. 1, 2 (embryonic valves), pls. 141–145.
Pinna semicostata Conrad, Dall, Bartsch & Rehder, 1938, p. 74, pl. 18, figs. 7–10.
Pinna aequilatera von Martens, 1880, p. 317, pl. 22, fig. 4.
Avicula [*sic*] *aequilatera* (von Mrtns.), Day & Morgans, 1956, p. 307 (listed); Macnae & Kalk, 1958, pp. 65, 92, 129.
Pinna squamifera (*non* Sow.), Franca, 1960, p. 90, pl. 20, fig. 2.

Posterior margin of shell more or less squarely truncate. External ridge distinct on earlier half or two-thirds. Radiating ribs 12–26, but fewer in juveniles (e.g. 10 at 25 mm. length). Squamae present or absent. Nacreous layer occupying anterior half to two-thirds, divided into two lobes by a very narrow groove; both lobes posteriorly truncate or broadly rounded, the dorsal lobe extending farther than ventral lobe. Posterior adductor scar on the dorsal lobe, but usually extending onto the ventral lobe. Pigmented glands (organs of Will, or so-called 'eyes') on the mantle lobes inconspicuous and widely spaced (contrast *bicolor*).

Up to 311 × 149 mm. (Rosewater); South African Museum 155 × 59 mm.

Cream or pale horny colour, often obscurely blotched or spotted with brown or greenish-brown, nacreous layer glossy white or silvery.

Port Alfred (Rosewater); Durban (S. Afr. Mus. coll. Col. J. H. Bowker, 1882; also U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.); Mozambique Island (U.W.).

Distribution. East coast of Africa, Indo-Pacific, North Australia, and including oceanic islands.

Remarks. Smith (1906, p. 60) included *aequilatera* von Martens in the South African fauna-list, with the curious remark that he could find no description of the species.

Winckworth (1929) accepted *natalensis* Smith 1906 as a distinct species, with *densecostata* Turton 1932 as synonym. Rosewater regards both as synonyms of *bicolor*. I am more inclined to regard *natalensis* as a synonym of *muricata*; but an examination of the muscle scar might decide the question.

Pinna bicolor Gmelin

Pinna bicolor Gmelin, Odhner, 1917, p. 7; 1919, p. 3, pl. 1, fig. 1 (margin broken); Dautzenberg, 1929, p. 568; Winckworth, 1929, p. 286, fig.; Rosewater, 1961, p. 193, pls. 147–153.
Pinna dolobrata Lam., Hedley, 1924, p. 144, pl. 20, fig. 9, pl. 21.
?*Pinna natalensis* Smith, 1906, p. 60, pl. 8, fig. 9.
Pinna densecostata Turton, 1932, p. 219, pl. 56, no. 1520.
Atrina bicolor (Gmelin) Macnae & Kalk, 1958, pp. 45, 129.

Differs from *muricata*: posterior margin arcuate or rounded; fewer ribs (8–17); ventral lobe of nacreous layer rounded posteriorly; posterior adductor scar not extending onto ventral lobe; pigmented glands on mantle conspicuous and close together; darker colour, cross-bars on early part of shell, changing later to radiate streaks, especially at posterior margin.

Up to 495 mm. (Rosewater).

Port Alfred (Turton: *densecostata*); Durban (Smith: *natalensis*); Umpangazi, Zululand (U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.); St. Carolina, Bazarute Island (Rosewater).

Distribution. East coast of Africa, Indo-West Pacific, Australia, but excluding oceanic islands.

Remarks. The *living* occurrence of this species south of Delagoa Bay has been confirmed by U.C.T. at Umpangazi.

Atrina vexillum (Born)

Pinna vexillum Born, 1778, p. 118; 1780, p. 134, pl. 7, fig. 8; Sowerby, 1897, p. 27; Winckworth, 1929, p. 287.
Pinna nigra Dillwyn, 1817, p. 325; Braga, 1952, p. 100.
Pinna nigrina Lamarck, 1819, p. 135; Chenu, 1962, fig. 821.
Atrina vexillum (Born), Macnae & Kalk, 1958, p. 129; Rosewater, 1961, p. 204, pl. 139, figs. 3, 4 (embryonic valves), pl. 139, pls. 156–158.

Shell thick, heavy, somewhat inflated, more or less hatchet- or flag-shaped (ventral margin lobed). Radiating ribs and squamae present or absent. Posterior adductor scar large, projecting (in adult) beyond margin of nacreous layer.

Up to 480 mm. (Rosewater). Very dark, almost black.

Durban (Sowerby); Delagoa Bay (U.W.); Port Amelia (Braga).

Distribution. East coast of Africa, Indo-Pacific, North Australia.

Remarks. Sowerby's record from Durban was probably based on a dead shell.

Atrina squamifera (Sow.)

Pinna squamifera Sowerby, 1835, p. 85; Krauss, 1848, p. 27, pl. 2, fig. 8; Smith, 1903, p. 394; Sowerby, 1904, p. 3.
Pinna afra Sowerby, 1835, p. 85.
Pinna kraussii Hanley, 1858, p. 226.
Pinna pernula (*non* Chemn.), Sowerby, 1892, p. 65.
Atrina alfredensis Bartsch, 1915, p. 183, pl. 40, fig. 3.
Pinna segmenta Turton, p. 1932, 217, pl. 56, no. 1510.
Pinna whitechurchi Turton, 1932, p. 218, pl. 56, no. 1512.
Pinna rufanensis Turton, 1932, p. 218, pl. 56, no. 1513.
Pinna sp. Turton, 1932, p. 218, pl. 56, no. 1516 (= juv.).
Atrina squamifera (Sow.), Macnae & Kalk, 1958, pp. 45, 92, 129, fig. 23 *e*; Rosewater, 1961, p. 207, pls.
[*Non*] Franca 1960 (= *muricata*).

Shell thin, fragile, elongate-triangular, posterior margin rounded-truncate. Radiating squamiferous ribs 6–12, with several additional on ventral slope, making this area rugose. Posterior adductor scar not projecting beyond margin of nacreous layer, the margin of the nacreous layer with a notch ventral to the scar.

Up to 390 mm. (S. Afr. Mus.). Smallest specimen seen 34 × 14 mm. Other measurements to show variation in the length/breadth ratio: 64 × 30 and 65 × 24; 72 × 32; 75 × 43, 95 × 50, 109 × 52, 128 × 56, 130 × 51, 170 × 85, 250 × 125, 360 × 165 and 390 × 140 mm. The first and last pairs are perhaps the most striking.

Light horn colour when young, becoming brown or dark brown.

Fossil: Quaternary, Sedgefield near Knysna (A. R. H. Martin).

Saldanha Bay, Table Bay, Hout Bay (west coast of Cape Peninsula), False Bay, Hermanus, Still Bay, Mossel Bay, Knysna, Port Elizabeth (S. Afr. Mus.); Port Alfred (Bartsch, Turton); Natal (Hanley).

Off East London, 43 fathoms (S. Afr. Mus. P.F. coll.).

33° 47′ S., 26° 4′ E., 26 fathoms, and 34° 20′ S., 24° 22′ E., 120 metres (U.C.T.). Delagoa Bay (U.W.).

Remarks. The smallest specimen seen (34 mm.) has no squamae: these begin to develop at about 40–50 mm. length, at first on the dorsal area, extending later over the whole width of the shell.

Krauss said he had used the name *P. capensis* in a preliminary identification of his specimens but had later come to the conclusion that they were the same

as *squamifera*, of which he gave a description and figure. Rosewater (p. 210) has misread Krauss; there never was a type of *capensis*.

Winckworth (1929 and 1936) rightly put Bartsch's *alfredensis*, and some of Turton's 'species' into synonymy. He did not, nor did Rosewater (1961, pp. 209, 224) recognize that '*saccata*' and its var. *similis* were specimens of *Malleus*, having a 'straight flat top' (see *Malleus regula*, p. 407).

The most westerly locality given by Rosewater is Jeffreys Bay, though he mentioned in the synonymy Krauss's locality Knysna. Consequently he considered the species was limited to the south-eastern part of South Africa. He refers, however, to the similarity between *squamifera* and the European *fragilis* Penn. and the West African *chautardi* Nicklès 1953, the latter extending as far south as Angola. 'These three forms may be remnants of a former continually [= continuously] distributed species now broken up into isolated populations which merit specific rank' (Rosewater, p. 208). Future research may obtain specimens from localities between Saldanha Bay and Angola, and thus refute the apparent discontinuous distribution.

Streptopinna saccata (Linn.)

Fig. 12 *b*

Pinna nuttallii Conrad, 1837, p. 244.
Atrina nuttallii (Conrad) Dall, Bartsch & Rehder, 1938, p. 76, pl. 18, figs. 1–4.
Pinna saccata Linn., Sowerby, 1897, p. 27.
Pinna (*Streptopinna*) *saccata* Linn., von Martens, 1880, p. 318; Winckworth, 1929, p. 289; Prashad, 1932, p. 138.
Streptopinna saccata (Linn.), Iredale, 1927, p. 333, pl. 46, figs. 9–11; Rosewater, 1961, p. 221, pl. 136, figs. 5, 6, pls. 169–171.
[*Non*] Turton 1932 (= *Malleus regula*).

A particularly variable species as regards the length/breadth ratio, apart from the distortion which many of the shells undergo.

Measurements: 85 × 50, 95 × 65, 110 × 50, 115 × 48, and 115 × 51 mm. Two other specimens cannot be measured owing to the strong curvature of the valves.

In all, except one, of the present 7 shells, the curvature is towards the right, i.e. the left valve is more or less markedly convex, the right correspondingly concave. Two shells after growing straight for about 60–65 mm., curve round at right angles, so that the shell viewed in dorsal aspect is L-shaped.

The dorsal margin may be straight, slightly convex, or concave. The ventral margin is more or less strongly convex, with at about 40 mm. length a wide and shallow indent, or a sharply marked notch, anterior and posterior to which the margin is more or less lobate. In later stages of growth the dorsal margin (beyond the hinge) of the two valves appears to be completely fused. This is very clearly seen in the two L-shaped shells.

There are 5–7 broad, low, rounded radial ribs on the dorsal half of the shell; later (after a length of about 70 mm.) similar but even less conspicuous ribs appear on the ventral area also, totalling about 12. One very broad example,

55 × 38 mm. (fig. 12*b*) has 16 ribs; the length may have been longer, as the posterior margin is broken.

Nacreous area confined to the dorsal anterior third part of shell, its posterior margin concave dorsally to the posterior adductor scar. Anterior adductor scar small, on a shelf at the tip of the shell.

Byssus present (Rosewater, p. 222); confirmed in a 38 mm. specimen (Port St. Johns), and U.C.T. specimens (largest 97 × 55 mm.).

Up to 235 mm. (Rosewater).

Natal (Sowerby); Durban Harbour (S. Afr. Mus.); Umzikaba, Port St. Johns (S. Afr. Mus. coll. F. H. Talbot); Umhlali (Natal) (U.C.T.).

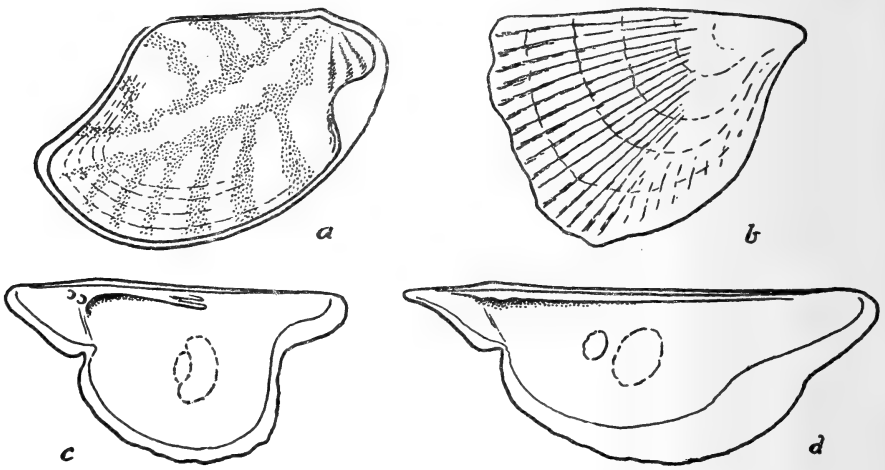


FIG. 12. *a*, *Electroma vexillum* (Rve.). *b*, *Streptopinna saccata* (Linn.) (S. Afr. Mus. no. 5425) half-grown, 55 × 38 mm. *c*, *Pinctada* sp. (Mozambique Island and Inhambane). *d*, *Pteria chinensis* (Leach), Delagoa Bay.

Distribution. Red Sea, east coast of Africa, Seychelles, Réunion, Mauritius, Madagascar, East Indies, Pacific.

Remarks. Von Martens recorded that this species lived vertically in hollows in Madrepore corals; and Rosewater says under and between rocks; such a habitat would account for the remarkable distortion of some of the shells.

Fam. **Pectinidae**

Grau. 1959 (Eastern Pacific species).

Some Indo-Pacific species: *P. squamosus* Gmelin, *Ch. testudineus* (Rve.), *noduliferus* (Sow.), *cuneolus* (Rve.) have been recorded from Natal and Durban. One suspects Sowerby's (1897) record of *squamosus* to refer to the later described *natalensis* Smith. *Ch. noduliferus* was sent to Smith by Quekett, Curator of the Durban Museum; the provenance of a specimen of this Mauritian shell is suspect, at least one cannot place so much reliance on its being a Natal shell

as one can on the other species which were forwarded by Burnup. None of these species has been found in recent years by U.C.T. or U.W.

On the other hand Macnae & Kalk (1958) have listed *P. tranquebaricus* and *Ch. lentiginosus* from Delagoa Bay. The specimens of the former are more probably referable to *senatorius*.

The occurrence of a small incubatory Pectinid, here provisionally assigned to *Cyclopecten*, is noteworthy.

Pecten sulcicostatus Sow.

Pecten sulcicostatus Sowerby, 1842, p. 47, pl. 13, figs. 35, 36; 1892, p. 89, pl. 5, figs. 97, 98; Schwarz, 1910, p. 115; Thiele, 1931, p. 163; Fleming, 1957, pp. 10, 15, 23, 25; van Bruggen, 1961, pl. 1, fig. 4.
Pecten capensis Gray MS. Sowerby, 1892, p. 66 and p. 89 (*erratum*); Johnson, 1904, p. 11.

Both valves convex and smooth up to 6–7 mm. alt., hinge 5–6 mm.; thereafter 12–13 ribs develop and the concentric growth-lines become distinct and lamellose in the grooves; at about 8–10 mm. alt. the 1st sulcus appears in each rib, and at about 13 mm. a 2nd sulcus appears on the left (flat) valve, a 2nd and 3rd on the right; increasing in large shells to 5 on the left and 10–12 on the right valve; on the latter the ribs are low, rounded, and not sharply defined, passing gradually into the shallow narrow grooves, which are also sulcate, so that one may easily count up to 14 or 15 sulci on a rib; at about 10 mm. alt. one or two (sometimes 3) intermediary riblets appear between each pair of main ribs on left valve, but at about 25 mm. alt. they peter out. The lamellose growth-lines cross the ribs on left valve, and continue to the margin in old shells; on right valve they show in the sulci on the ribs and in the grooves, producing a cancellate appearance in early growth, a pitted appearance in later growth. Ears with 4–5 ribs on left valve, 6–7 on right, increasing to resp. 5–6 and 8–9, but less distinct in old shells.

Right valve cream, pale buff, or pinkish; left valve pink or reddish; young shells (up to *c.* 10 mm. alt.) pale, then left valve suddenly becoming darker, the junction sharp but irregular; irregular dark red marks may occur on either valve. A pure white (cream) example has been taken in False Bay (S. Afr. Mus.).

Length 106, alt. (to hinge-line, excluding the projecting umbo) 90, thickness (right valve) 30, hinge-line 52 mm.

Fossil: Pleistocene, Port Elizabeth (Johnson, Schwarz); Sedgefield near Knysna (A. R. H. Martin).

False Bay to Mossel Bay, Algoa Bay, and East London (S. Afr. Mus. P.F. coll.). False Bay 37 metres, and Sebastian Bay, 68 metres (s.s. *Africana*, per U.C.T.).

Remarks. Commoner in False Bay and Mossel Bay than farther east. In Natal its place is taken by *erythraeensis* (*infra*).

Sowerby (1842) said, incorrectly, that the grooves between the ribs on the left valve were sulcate. The 1892 figure 98 shows them correctly.

Juveniles at about 7 mm. alt., before the 1st sulcus has appeared in the ribs (left valve) can scarcely be distinguished from equal sized *fumatus*, except by the stronger lamellose growth-lines.

The development of temporary intermediary riblets on the left valve is noteworthy.

Pecten cf. *erythraeensis* Sow.

Pecten erythraeensis Sowerby, 1842, p. 49, pl. 18, figs. 163, 164; Cox, 1929, pp. 185, 203; Fleming, 1957, pp. 9, 13, 16, 17, 18, 23, 33.
Pecten sulcicostatus Sow. var. *casa* van Bruggen, 1961, p. 31, pl. 1, figs. 1–3.
Pecten fumatus (*non* Reeve), Barnard, 1962b, pp. 184, 192.

Prodissoconch smooth, glossy. Both valves convex up to about 5 mm. alt.; and both smooth up to about 5–6 mm.; thereafter 14–15 ribs develop and concentric growth-lines become distinct, more or less lamellose on left valve, smooth on the right; ribs smooth, but crossed by the lamellose growth-lines on left valve. Ears with 4(5) ribs on left valve, 5–6 on right, in the latter more distinct on the anterior than on the posterior ear; obscure in large shells.

Pale pinkish buff, left valve at about 10 mm., or even earlier at 4·5 mm. alt. suddenly becoming deeper pink or reddish-brown, junction sharp but irregular, and varying; thereafter either uniform or more often similar darker zones appear, more or less zigzag, or with dark Λ-shaped marks (pointing towards the umbo); right valve in young shells more or less mottled or blotched pink or reddish on a pale ground, later more or less uniformly suffused greyish-red.

Length 70, alt. to hinge-line 57, thickness (right valve) 22, hinge-line 35 mm.

Fossil: Quaternary, raised beach at Knysna (S. Afr. Mus.).

Off Tugela River (Natal), 37 fathoms, adult, dead but fresh Morewood Cove, 27 fathoms; Tongaat, 36 fathoms, living; Umhloti, 40 fathoms, adult, dead but fresh; Cape Natal (Durban), 54 fathoms; Illovo, 27–30 fathoms, juv. living Umkomaas, 40 fathoms, juv. living; Umtwalumi, 25 fathoms; Itongazi, 25 fathoms, living; Umhloti and Umkomaas, 40 fathoms, numerous juv. 3–5 mm. alt. (S. Afr. Mus. P.F. coll.).

29° 30′ S., 31° 23′ E., 68 metres (s.s. *Africana*, per U.C.T.).

Remarks. Distinguished from *sulcicostatus* by the non-sulcate ribs, and the absence of temporary intermediary riblets. The growth-lines on the left valve become lamellose only at about 12–15 mm. alt., sometimes not until much later at 30–35 mm. alt.

Pieter Faure specimens were identified by Sowerby as the Australian *fumatus*. In 1962b I accepted this identification, but on further consideration I think that these South African shells are far more likely to be one of the Red Sea species. Cox (1929, p. 203) doubted the occurrence of one and the same species living in the Red Sea and East Australia.

Geological considerations favour a Red Sea species, although the only fossil occurrence in South Africa is of no great age, and there are no East

coast records (Cox, 1927, did not record *erythraeensis* from the Zanzibar deposits).

Cox (1929, p. 186) in discussing *erythraeensis*, mentioned the following features as characteristic: on the left valve there are no grooves on the ribs, and there are (usually) no interstitial ribs. These features are found in the South African shells. Presumably the 'interstitial' ribs of Cox are the same as I have here called 'temporary' intermediary riblets; Cox did not say whether they were present only in young shells (in the closely allied *benedictus*).

Cox (1929, p. 186) said that *fumatus* was very close to *erythraeensis* in its shape and the character of its ribbing, but differed in its dark colour. Mr. G. Grau, a specialist on the family, to whom I sent specimens (1962), also remarked (in litt.) on the similarity of these two species, but preferred not to express a definite opinion on the identity of the South African shells.

In these circumstances I refer the South African shells to the Red Sea species, with the hope that future collecting will bring evidence of its occurrence, fossil and/or living, along the east coast of Africa.

Von Hochstetter (1866, p. 37) in describing Pleistocene deposits at the Cape, said that Mr. Layard [Curator, South African Museum] told him that from the Cape to Port Elizabeth there were 'mussel-banks' [? kitchen-middens] 20–25 ft., in places 100 ft. above sea-level, containing in addition to living species of molluscs a species of *Pecten* which had not hitherto been found alive. Probably Layard was referring to *sulcicostatus*, not to the second species here referred to *erythraeensis*.

† *Pecten* sp.

Haughton (1956, p. 332) quoted Cox's description of some fossil specimens of Pecten from Tertiary deposits off the west coast. The right valve was convex, the left flat, and the latter had 'fine, evenly spaced concentric threads crossing the ribs and intervals'.

Three flat left valves from off Cape Point, 120 fathoms (S. Afr. Mus. A9492. P.F. coll. No. 2784) agree with this description. The growth-lines are of course much closer together on the early part of the valve; but at *c.* 10 mm. alt. the rate of growth increased rather rapidly and the growth-lines become farther apart; towards the margin they are 'evenly spaced'. They are slightly undulate, being convex towards the umbo on the ribs, and convex towards the margin in the intervals.

Equilateral. Ribs 20, without any trace of squamulae. Ears cancellate with fine riblets and growth-lines.

Length 15, alt. 14·5 mm.; 18 × 20; part of the lateral margin of the largest valve is missing, alt. 23 mm.

The two smaller valves are slightly worn; the largest is considerably more worn, the growth-lines showing faintly only towards the margin. Pale greyish-buff.

These three valves are unattached, and show both external and internal surfaces. But it is questionable whether the species is living at the present day.

Of the specimens attached to glauconitic-phosphatic nodules, some are internal casts and are greenish-black like the nodules; others still retain portions of the actual shell, which is whitish.

Chlamys tinctus (Rve.)

Fig. 14 *b*

Pecten pusio (*non* Pennant), Krauss, 1848, p. 29.
Pecten limatula var. Smith, 1885, p. 297, pl. 21, fig. 5.
Chlamys humilis Sowerby, 1904, p. 3, pl. 6, fig. 3; Thiele, 1931, p. 163.
Chlamys tinctus (Rve.), Smith, 1906b, p. 59; Turton, 1932, p. 222 and p. 222, pl. 57 no. 1550 (= juv.); van Bruggen, 1952, p. 13, figs. 3, 3*a* (sculpture).
Pecten (*Chlamys*) sp. Thiele, 1931, p. 163.

Prodissoconch smooth, glossy. Surface up to 1 mm. alt. minutely granular; 10–11 ribs begin at about 1 mm. alt., growth-lines distinct, crossing the ribs; at 3 mm. alt. *c.* 17–18 ribs, at 6 mm. *c.* 25; 1st intermediaries begin at *c.* 1.75 –2 mm. alt.; adult shells with *c.* 70 ribs, main, intermediary, and subsidiary (narrow riblets splitting off from and flanking on one or both sides of a main rib). Granules or nodules on ribs where crossed by growth-lines beginning at about 4 mm. alt., thereafter developing into more or less conspicuous squamae. Concentric lamellose growth-lines usually visible in the grooves up to about 10 mm. alt., but thereafter the grooves become relatively narrower owing to encroachment by the intermediaries and especially the subsidiary riblets, and the growth-lines become less lamellose, closer together, and much less conspicuous. Squamae may be strongly or feebly developed, but the lateral parts are always more strongly or more profusely squamose.

Colour variable, pale pink, deep red, orange, yellow, violaceous, uniform or with more or less concentric or zigzag paler bands, e.g. yellow with cream bands which are edged distally with violet.

Length 32, alt. 37 mm.; two-valved examples: 20 × 24, thickness 9, hinge-line 13 mm., and 18 × 20 × 8 × 11·5 mm. The length/altitude ratio varies, e.g.: 16 × 17 (*humilis*) and 14 × 17 mm. (typical *tinctus*).

Fossil: Post Pliocene, Inhambane (Cox 1939); Quaternary, Sedgefield near Knysna (A. R. H. Martin).

Table Bay, False Bay to Mossel Bay (S. Afr. Mus.); Port Elizabeth (Sowerby); Port Alfred (Smith, Turton); Natal (Krauss).

34° 41′ S., 18° 36′ E., 98 fathoms (Smith: *limatula*).

Off Great Fish Point, 51 fathoms; Cape St. Blaize, 90 fathoms (Sowerby 1904: *humilis*).

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres; 35° 26′ S., 20° 56′ E., 80 metres (Thiele: *humilis*) and St. Francis Bay, 80 metres (Thiele: *Chlamys* sp.).

Off: Tongaat (Natal), 36 fathoms, one living; Cape St. Francis, 75 fathoms, 2 living; Cape Seal, 80 fathoms, one living; Cape St. Blaize, 85–90 fathoms, 2 living; Cape Point, 180 fathoms, one living; and Mossel Bay, low-tide, one

living; also dead valves from numerous localities from Cape Vidal (Zululand), Natal coast, East London, Algoa Bay, Agulhas Bank to False Bay (S. Afr. Mus. P.F. coll.).

Distribution. Tristan d'Acunha (Smith: *limatula*).

Remarks. The figure here given is taken from a series of juveniles from 1 mm. upwards, collected by Dr. Muir at Still Bay.

Smith (1885) stated that the *Challenger* specimen of *limatula* did not correspond precisely with the Type (which had lost the minute sculpture); Smith's figure, however, does seem to represent *tinctus*. Several P.F. shells, identified as *limatula* by Sowerby, are inseparable from *tinctus*. As Reeve's figure 106 (*tinctus*) has figure precedence over (and presumably antedates) figure 124 (*limatula*), *tinctus* is here adopted for this common South African species; and *limatula* is excluded from the fauna list.

Among the specimens identified as *limatula*, Sowerby failed to distinguish one specimen clearly showing the distinctive sculpture of *natalensis*, which had not then been described.

Sowerby also described two shells as *humilis* n.sp. The cotype of this, from off Cape St. Blaize, is in South African Museum (S. Afr. Mus. no. 14858). It is larger than the Type: length 17, alt. 19 mm. Sowerby did not compare his species with either *tinctus* or *limatula*. I am unable to distinguish this cotype from the specimens identified by Sowerby as *limatula*, or from *tinctus*; it is more subcircular (less elevated), and has more ribs than stated in the description (nearer 40 than 30), but the figure of the Type seems to show more than 30 ribs. Thiele's specimens, identified as *humilis*, also had over 30 ribs on a shell of 14 mm. alt.

Thiele's *Chlamys* sp., with very fine striae, is not a different species. These striae can be seen frequently, though not on all shells. Short striae occur between the lamellose growth-lines on the early part of the shell; later when the growth-lines become inconspicuous the striae are longer, parallel with the ribs in the middle part of the shell, but acutely oblique towards the lateral parts. Striae are present on the sides of the ribs, and sometimes may be seen on the top of the ribs when the squamae are feebly developed. Although not traceable on all shells, these striae seem to be a normal feature.

Smith's specimens apparently did not show these striae, and consequently he maintained *tinctus* as a species separate from *pusio* in which he said the striae were characteristic (1906).

Cox, however (1927, p. 42, pl. 7, fig. 6, and p. 96), stated that he could find no difference between *pusio* (Linn.) and *tinctus*; and said that the former existed in Lower Miocene times in the Mediterranean and Indian Ocean before these waters were separated, and occurred in the Zanzibar Pleistocene deposits; but appeared to have died out in the Indian Ocean except in the extreme south (i.e. South Africa: *tinctus*). Cox's description omits mention of any intercostal sculpture. In 1939 Cox recorded *pusio* from the Post Pliocene of Inhambane.

The South African Museum has only 4 valves from Cape Town; and the P.F. took only one worn valve in Table Bay (Lion's Head S.E. ¼ E., 32 miles, 126 fathoms). U.C.T. had no records from Oudekraal (west coast of Cape Peninsula); or from the west coast as far north as Port Nolloth, until recently (1962) when specimens were taken at Langebaan (Saldanha Bay).

Ch. tinctus appears to be a free-living species, not (as e.g. *distortus* da Costa) a fixed species.

Chlamys natalensis Smith

Fig. 14 *d*

?*Pecten squamosus* (*non* Gmelin), Sowerby, 1897, p. 28.
Chlamys natalensis Smith, 1906b, p. 60, pl. 8, figs. 7, 7*a*, 8, 8*a*; 1910, p. 213.
Pecten natalensis (Smith), Bartsch, 1915, p. 186; Turton, 1932, p. 222.

Distinguished from *tinctus* by the more regular ribs, which number 30–36 (S. Afr. Mus.)—40 (Smith); and the criss-cross sculpture in the grooves. This sculpture occurs in both valves, and is produced by 3–4(5) rows of more or less triangular squamulae arranged in quincunx (when the squamulae are blunt the sculpture appears pitted).

Early part of shell radiately finely striate, at 3–4 mm. alt. about 10 ribs, at 4–5 mm. intermediaries appear, at 5–6 mm. about 16–18 ribs, and the radial striation (in the grooves) gives place to the quincuncial squamulae. No concentric growth-lines except towards the margin in adult shell, more or less squamose, but not so strongly squamose as in typical *tinctus*. All the ribs are simple, undivided, and without subsidiaries.

Greyish (Smith); right valve cream, left dull pinkish (S. Afr. Mus.), purplish-brown, faintly mottled (single valve: S. Afr. Mus.); orange (Smith; also S. Afr. Mus.).

Length 20, alt. 23·5 mm. (Smith); 12·5 × 15, 19 × 22, and 22 × 27 mm. (S. Afr. Mus.).

Durban (Smith); Port Alfred (Bartsch, Turton).

Off Durnford Point (Zululand), 13 fathoms, one living and one valve; Cape Natal, 54 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Remarks. As a living species probably confined to Natal and Zululand; and even there it is a much rarer species than *tinctus*.

Presumably all the Port Alfred shells were dead.

Bartsch's locality 'Cape of Good Hope' is inexact, and should not be taken as a record of this species from anywhere in the south-west Cape Province.

Cox (1927, p. 43, pl. 7, figs. 5*a*, *b*) described and figured *tenuisculpta* from the Lower Miocene of Pemba Island. If it is considered desirable to synonymize fossil and recent species, this name may have to be replaced by *natalensis*; and perhaps both may be replaced by *kokeniana* Noetling 1901, which Cox said had the same intercostal ornamentation. When discussing palaeogeographical questions, however, it is sufficient to bear in mind the resemblance between the

Indian and Zanzibar fossils and the living Natal species, without crystallizing a definite synonymy.

The Mauritian species *crouchi* Smith 1892 has the whole surface covered with microscopic reticulations (Eames & Cox, 1956, p. 48).

Chlamys gilchristi Sow.

Chlamys gilchristi Sowerby, 1904, pl. 1, pl. 6, fig. 6.

Left valve slightly convex, 9 main ribs, slightly raised, and numerous granulose secondary riblets or lirae, one or two on each rib; interstices very finely radiately striate, growth-lines obscure except here and there. Right valve slightly more convex, ribs broader and flatter, lirae more strongly granulose on earlier part of shell, less so later, interstices striate, growth-lines more prominent near margin where they make the lirae foliate.

Right valve pinkish, left orange, both valves internally orange.

Length and altitude 35 mm., thickness (valves together) 8 mm. *Africana* specimens 27 and 32 mm. long.

Vasco da Gama (Cape Point) N. 71° E. 18½ miles, 230 fathoms, one, April 1900 (Sowerby, P.F. coll.). 31° 14′ S., 16° 36′ E., 272 metres, two, 1947 (s.s. *Africana* No. AFR. 728, per U.C.T.).

Holotype in South African Museum (No. 14853).

Remarks. I have seen (1960) one specimen in coll. Mrs. H. Boswell, Pretoria, stated to have been taken off Cape Point.

Chlamys eucosmia (W. H. Turton)

Fig. 13 *b*

Pecten eucosmia Turton, 1932, p. 222, pl. 57, no. 1549.

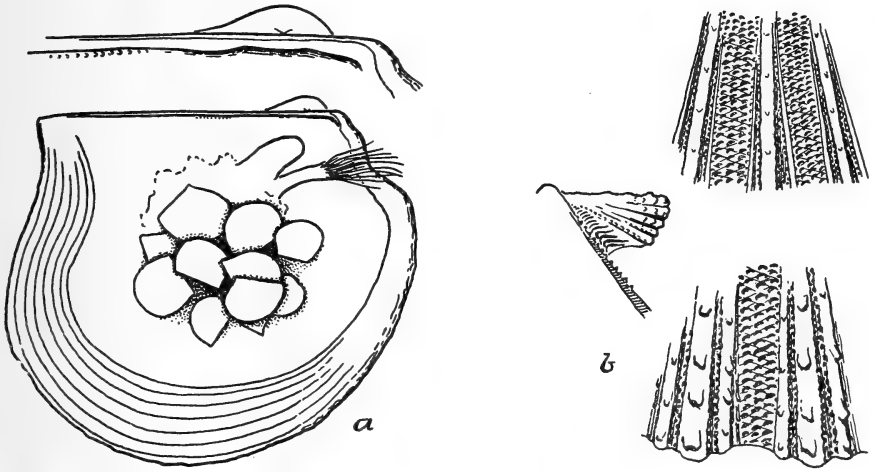


FIG. 13. *a*, *Pinctada* sp. Interior of left valve with juveniles; hinge-line further enlarged (S. Afr. Mus. no. A9488). *b*, *Chlamys eucosmia* (W. H. Turton). Sculpture at beginning of main rib accessories and at margin; right anterior ear.

Right valve slightly more convex than left. At 0·5 mm. alt. 8 ribs, increasing to 15 at 3 mm.; thereafter no more intermediaries, but at about 3–4 mm. alt. an accessory riblet on each side of rib, later two accessories. Main ribs and accessories with small, spaced squamulae. Ears costate, posterior ears less strongly so than anterior ears, anterior right ear also lamellose; criss-cross sculpture in the grooves except on the right anterior ear.

Grooves with criss-cross sculpture, beginning with 2–3 rows of pits at about where the intermediaries develop, later increasing to 6–7 rows, but reduced to 4–5 when the width of the groove decreases owing to the formation of accessories; pits near the rib smaller than those in the middle of the groove. In the grooves between main rib and accessories 1–2 rows of pits.

Length 12, alt. 13, thickness (valves together) 4·5 mm. Lemon yellow.

Umpangazi, Zululand, one living (U.C.T.).

Port Alfred, dead (? one only) (Turton).

Remarks. The present shell seems to be undoubtedly Turton's species described from an 8 × 8 mm. shell. His figure shows criss-cross sculpture on the right anterior ear, but in the present shell such sculpture is absent from this ear.

The species differs in shape and number of ribs from *natalensis*. It resembles *fultoni* in shape, but has 2–3 fewer ribs. It differs from both these species in having composite instead of simple ribs.

Chlamys fultoni Sow.

Fig. 14 *a*

Chlamys fultoni Sowerby, 1904, p. 2, pl. 6, fig. 5; Smith, 1906, p. 59.

Left and right valves almost equally convex, but in juvenile the right very slightly less convex. Ribs (16)17, rounded, subequal in width to the grooves, ribs and grooves crossed by growth-lines which are very close, slightly lamellose on the ribs, chiefly on the lateral ones. Ears costate, anterior right ear also lamellose.

Grooves with extremely fine radiating striae, not always visible; on left valve grooves normally filled with tiny squamulae arranged in quincunx; on the right sometimes present, but usually not; sometimes only in the lateral grooves.

Purplish-brown, with irregular white or cream patches or zigzags or Λ-shaped marks, sometimes the brown sometimes the pale colouring predominating. One juvenile uniform orange.

Length 33, alt. 34, depth (valves together) 11 mm.

Off Amatikulu (Zululand), 26 fathoms (Sowerby, P.F. coll.) (erroneously quoted by Smith as 'off the Cape').

Off: Tugela River (Natal), 24 fathoms, 4 living; and 47 fathoms, valves; Umhloti, 40 fathoms, valves; Tongaat, 36 fathoms, 3 juv. living and valves; Morewood Cove, 27 fathoms, valves; Umkomaas, 13 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

31° 38′ S., 29° 34′ E., 26 fathoms, living (U.C.T.).
Delagoa Bay, one valve (S. Afr. Mus. coll. K.H.B.).
Port St. Johns, one worn valve (S. Afr. Mus.).
Cotype in South African Museum (No. 14970).

Remarks. The number of complete shells and single valves sent to Sowerby is not recorded. It seems strange that he did not notice the squamulae in the grooves. The cotype valve (with Sowerby's label) alt. 18 mm., shows the squamulae on the middle part, though they are absent from the lateral parts.

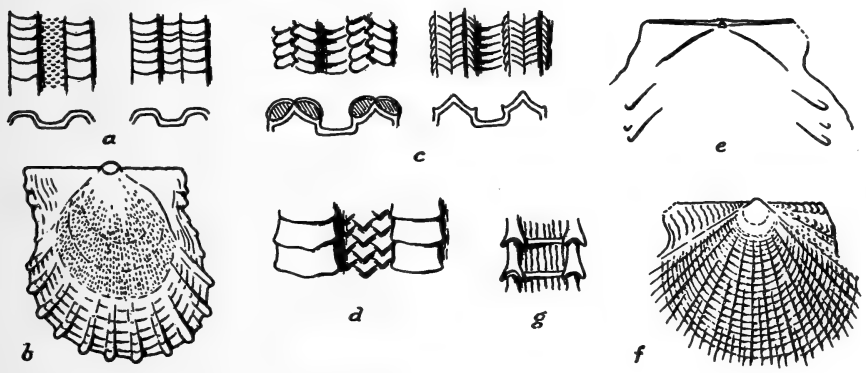


Fig. 14. *a*, *Chlamys fultoni* Sow. sculpture on left and right valves, with sections. *b*, *C. tinctus* (Rve.) juvenile 1·5 mm. alt. *c*, *C. bullatus* D. & B. sculpture of unworn (left) and worn (right) ribs, with sections. *d*, *C. natalensis* Smith sculpture. *e*, *f*, *g*, *Cyclopecten vidalensis* n.sp., portion of interior and exterior, with external sculpture further enlarged. The extremely fine striae on earliest part of shell (exterior) not shown.

The present material comprises: one large complete shell, 28 mm. alt., without squamulae in either valve; this is the only example in which the squamulae are absent from the left valve.

6 complete shells with squamulae on the left, none on the right valve; 28 left valves all with squamulae; 20 right valves without squamulae; 12 right valves with squamulae, sometimes present only in the lateral grooves.

Most of the right valves with squamulae are from off Morewood Cove, where there appears to be a colony with this somewhat unusual character (12 in 20 = 60%).

This species probably does not live far beyond the southern limit of Natal; the Port St. John's specimen is badly worn.

Chlamys bullatus D. & B.

Fig. 14 *c*

Pecten (*Chlamys*) *bullatus* Dautzenberg & Bavay, 1912, p. 17, pl. 27, figs. 1, 2 (poor).

Subcircular but slightly oblique, both valves convex. Ribs 17–18, each with 2 rows of squamae which fuse, forming 2 alternating series of vesicles;

grooves a little narrower than the ribs, with concentric lamellae. Ears with 4(5) ribs, grooves with growth-lines; the rib nearest the hinge on right anterior ear rather strongly lamellose.

Faint traces of rose and paler mottling.

Length 15, alt. 15, hinge-line 8·5 mm. (S. Afr. Mus.).

Off Tugela River (Natal), 47 fathoms, one valve; Umhloti, 40 fathoms, 7 valves and fragments; Cape Natal (Durban), 54 fathoms, 5 valves; Illovo, 27–30 fathoms, one valve; Cape Morgan, 52 fathoms, one very worn valve (S. Afr. Mus. P.F. coll.).

Distribution. East Indies.

Remarks. All the specimens are more or less worn. Only one valve shows clearly the peculiar 'bivesiculous' sculpture on the ribs; other valves in different stages of abrasion show the vesiculous ribs and the worn 'tripartite' ribs. A valve with only the latter sculpture might be mistaken for a different species.

There seems no doubt about the identification. Although the figure is useless, the original description is explicit: '. . . côtes recouvertes par des squamules élevées qui se rejoignent et se soudent entre elles au sommet de manière à former, de chaque côté, une rangée de vésicules disposées en séries alternantes. . . .' These words exactly express the distinctive sculpture on the present specimens.

Chlamys senatorius (Gmelin)

Ostrea senatorius Gmelin, 1790, p. 3327.
Pecten senatorius (Gmel.) and *crassicostatus* Sowerby, 1842, pl. 15, fig. 111, pl. 17, figs. 151, 152, pl. 18, figs. 188–192.
Pecten senatorius (Gmel.), Dautzenberg & Bavay, 1912, p. 4.
Chlamys senatorius (Gmel.), Cox, 1927, p. 45, pl. 7, figs. 1–3, p. 75, pl. 15, fig. 3, pl. 17, fig. 10; Nardini, 1937, p. 233, pl. 14 (8), fig. 4; Cox, 1939, p. 76, pl. 1, fig. 14.
[?] *Pecten tranquebaricus* (Lam.), Macnae & Kalk, 1958, p. 129.

Ribs 22–27, with small squamae at fairly regular intervals, squamae becoming stronger and closer together towards the margin in large shells; at about 20–25 mm. alt. a series of smaller squamae appears on either side of the ribs, which thus become tripartite; grooves smooth. Up to length 60, alt. 62 mm.

Violaceous, often with paler marks; interior violaceous, a broad submarginal bright orange zone, margin violaceous.

Fossil: Miocene, Pemba Island and Inhambane; Pliocene, Zanzibar and Inhambane.

False Bay in St. Lucia Bay (Zululand) (Nardini); Delagoa Bay and Mozambique Island (U.W.). Durban harbour sediments (Dr. Lester King).

Distribution. Red Sea, Madagascar, Mauritius, Indo-Pacific.

Chlamys plica (Linn.)

Pecten plica Linn., Sowerby, 1842, p. 65, pl. 20, figs. 237–239.
Chlamys plica (Linn.), Cox, 1929, p. 201; Nardini, 1937, p. 235, pl. 15 (9), fig. 2; Barnard, 1962b, p. 192 (listed *teste* Nardini).

Pliocene-Pleistocene: Red Sea, Kenya, Dar-es-Salaam.

Quaternary: False Bay in St. Lucia Bay (Zululand) (Nardini); Durban harbour sediments (Dr. Lester King, 1963).

Distribution (living). Red Sea, Ceylon, Nicobars, Maldives, Indo-Pacific.

Remarks. Nardini had three examples. Dr. Lester King obtained a number of single valves, all more or less worn, but some showing traces of irregular brown bands (cf. Sowerby, figs. 237 and 239).

Not recorded by recent collectors. Has the species become extinct along the Natal coast?

Palliolum vitreum (Chemn. Schröter)

Pecten vitreus (Chem. Schr.) Sars, 1878, p. 21, pl. 2, figs. 5 *a*, *b*.
Palliolum vitreum (Chem. Schr.) Verrill, 1897, p. 66, pl. 18, figs. 6–9, 9*a*, 10–12, 12*a*, 13.
Pecten alcocki Smith, 1904b, p. 13; 1907, pl. 18, figs. 4, 4 *a*, *b*.
Chlamys (*Palliolum*) *vitrea* (Chem. Schr.) Dautzenberg & Fischer, 1912, p. 333 (references).
Pecten (*Cyclopecten*) *vitreus* (Chem. Schr.) Dautzenberg & Bavay, 1912, p. 27 (references).
Pecten (*Pseudamussium*) *alcocki* Smith, Thiele, 1931, p. 164.

Equivalve, subcircular, thin, hyaline, posterior ear scarcely differentiated; minutely radiately striate, the striae interrupted by concentric growth-lines, minute squamulae more or less regularly disposed over the marginal area. White.

Length and latitude up to 18 mm. Verrill illustrated a shell of 20 mm.

Constable Hill (Saldanha Bay) E. ¾ S. 19 miles, 145 fathoms, one living, one dead but fresh; Lion's Head N. 67° E. 25 miles (off west coast of Cape Peninsula), 131–136 fathoms, one living; Cape Point E. 26 miles, 210 fathoms, one valve; Vasco da Gama (Cape Point) N. 71° E. 18 miles, 230 fathoms, 2 broken valves; off Cape Vidal (Zululand), 80–100 fathoms, one valve (S. Afr. Mus. P.F. coll.).

31° 39′ S., 16° 55′ E., 287 metres, two (s.s. *Africana* No. AFR. 707, per U.C.T.).

30° 20′ S., 30° 30′ E., 1,300 metres, one valve (Fisheries Survey, *Africana II*).

Distribution. North Atlantic to Morocco, Azores, Teneriffe, Mediterranean; east coast of North America; Patagonia and Magellan Strait; coast of East Africa (6° 18′ N., 49° 32′ E.), off South India, East Indies, Philippines, Japan. 37–4,255 metres.

Remarks. The South African specimens agree with the descriptions and figures of Sars and Verrill. Thiele was inclined to regard Smith's *alcocki* as merely a variety of *vitreum*.

The valve obtained by *Africana II* measures 26 × 26 mm. The concentric growth-lines up to length of 12 mm. are rather widely spaced (as in other specimens) and form low corrugations; thereafter they are closer together, especially near the margin.

Thiele (1931, p. 164) has identified, with some doubt, two shells from 35° 26′ S., 20° 56′ E., 80 metres, and 35° 9′ S., 18° 33′ E., 564 metres with the North Atlantic *Pseudamussium similis* (Laskey). The shell from the latter (South

African) locality measured 6·5 × 6 mm. I would suggest that these shells are more probably juveniles of *vitreum* and I exclude *P. similis* from the fauna list until better evidence is available.

Amussium texturatum D. & B.

Amussium texturatum Dautzenberg & Bavay, 1912, p. 37, pl. 27, figs. 19–22.

Agreeing with the description, but larger. Almost equivalve, but the right valve less convex than the left; in the living example the right valve is turned up at the margin (at 5·5 mm. alt. in a 6·5 mm. shell) to fit within the left valve; in the single valves the margin is not turned up, possibly broken or worn away. Concentric lamellae on left valve beginning at about 0·4 mm. alt., and 6–7 ribs at about 1 mm. alt., intermediaries at about 1·5–2 mm., at 4 mm. 11 ribs, at 8 mm. 21–24 ribs, not counting one or two very faint and short ones at the margin; at the intersections flat squamulae, more or less imbricate, especially near the margin where the growth lamellae are close together. Internal costae at 4 mm. alt. 10–11 (not counting the auricular crurae), at 8 mm. 19–21 (including short intermediaries).

Mostly white or buff, some left valves faintly pinkish, with or without opaque white specks, or with faint reddish blotches.

Length 9, alt. 8–8·5, hinge-line 5 mm.

Off Cape Vidal (Zululand), 50 fathoms, 2 valves; Durnford Point (Zululand), 90 fathoms, 3 valves; off Tugela River, 65–80 fathoms, one living, 4 valves; Tongaat, 36 fathoms, several valves; Cape Natal (Durban), 54–85 fathoms, numerous valves; off Cape Morgan, 77 fathoms, numerous valves (S. Afr. Mus. P.F. coll.).

Distribution. East Indies, 275 metres.

Remarks. I have no hesitation in identifying these shells with *texturatum*. The radial ribs on the left valve curve posteriorly (as in D. & B.'s fig. 19); the intermediaries are variable in development.

Single valves were numerous in the bottom samples from off Cape Natal and Cape Morgan, but the only living specimen was taken off the Tugela River.

Cyclopecten incubans n.sp.

Subcircular, thin, translucent, inequivalve, right valve smaller than left and slightly less convex, not flattened or turned up at margin, ears distinct, byssal sinus well marked; earliest part of right valve with extremely fine radial striae, later replaced by extremely fine and close concentric striae, radial ribs and (major) growth-lines very obscure, anterior ear obscurely ribbed, posterior ear concentrically lamellate, interior smooth. Left valve with concentric lamellae beginning at about 0·4–0·5 mm. alt., very fine radial ribs beginning at about 0·5–0·75 mm., and intermediaries almost immediately thereafter, at margin about 45–50 ribs, not very regularly spaced, often in pairs or 3–4 fine ones between two stronger ones, sculpture cancellate, but the concentric

growth-lines often stronger than the ribs, especially on earlier part of the shell, intersections crenulate, scarcely squamulose except feebly so on posterior part; ears finely cancellate, the concentrics stronger than the radials; interior smooth with very shallow grooves corresponding with the external ribs, no radial costae, margin smooth. White, translucent.

Largest single valve: length 5, alt. 4·5 mm.; a double shell: left valve 4 × 3·5, right valve 3·3 × 3 mm.

The specimen from off Cape Point and one of the Cape St. Blaize examples contained bivalved juveniles, about 20 in the former, 15 in the latter. Minutely radially striate, hinge-line 0·3 mm.

Off Cape St. Blaize, 125 fathoms, 2 living and 8 valves (Types); Cape Point N.E. ½ N. 19 miles, 145 fathoms, one living (S. Afr. Mus. Nos. A9493 (Types), A9494. P.F. coll.).

34° 17′ S., 17° 53′ E., 320 metres, one living (U.C.T.).

Remarks. So far as I am aware incubation has not been recorded in the *Pectinidae*, though some species are known to be monoecious, others dioecious.

The radial ribbing on the left valve is variable, no two specimens being exactly alike.

Cyclopecten vidalensis n.sp.

Fig. 14 *e–g*

Left valve only—subcircular, moderately convex, anterior ear larger than posterior ear; concentric growth-lines showing at 0·5 mm. alt., about 10 ribs appear at 1 mm. alt., and intermediaries begin at 2 mm., about 45 ribs (main and intermediary) at margin of shell; ribs slightly stronger than the concentric lamellae, together forming a cancellate sculpture, intersections slightly nodular or squamulose, the latter chiefly on the lateral parts of the shell; earliest part with extremely fine radial striae which later become stronger and clearly visible in the hollows of the lattice sculpture; ears with concentric lamellae. Internally hinge narrow, a small ligament pit, crurae well marked but without ridge or denticle, no radial costae except 2 short costae and a denticle between them anteriorly and posteriorly, margin smooth. Dull buff (opaque).

Length and alt. 7·5, hinge-line (chipped) 4 or 4·5 mm.

Off Cape Vidal (Zululand), 80–100 fathoms, one valve (S. Afr. Mus. No. A9495. P.F. coll.).

Remarks. Provisionally placed in *Cyclopecten*; but if this valve is juvenile, older shells might show better developed internal costae, which would indicate removal into another genus.

Fam. **Spondylidae**

Watson, 1930a, pp. 25–31, and 1930b, pp. 31–36 (anatomy).

Plicatula plicata (Linn.)

Plicatula ramosa Lam., Sowerby, 1847, p. 435, pl. 90, figs. 1–4; Chenu, 1862, fig. 975.
Plicatula imbricata Menke, Sowerby, 1847, p. 437, pl. 90, fig. 6, pl. 91, figs. 15–18.
Plicatula plicata (Linn.), Nardini, 1937, p. 228, pl. 13(7), figs. 2–5.

Ribs not very numerous, approximately as wide as the grooves, not squamose.

Off O'Neil Peak (Zululand), 90 fathoms, 7 dead valves (S. Afr. Mus. P.F. coll.). Fish Hoek (False Bay), one dead valve; and Still Bay, one valve (Mrs. Connolly).

Distribution. Red Sea, East Africa, Madagascar, Mauritius.

Plicatula squamosissima Smith

? *Plicatula australis* (*non* Lam.), Krauss, 1848, p. 30.
Plicatula squamosissima Smith, 1899, p. 251, pl. 5, figs. 15, 16; Turton, 1932, p. 222.

Ribs numerous, narrow, and close together, imbricately squamose, as are also the very narrow grooves.

Dirty white or grey, with small black spots and radial streaks; interior brownish, with some darker spots.

Umkomaas, Natal (Smith); Natal (S. Afr. Mus.); Umzikaba, north of Port St. Johns, living (S. Afr. Mus.); Port Alfred, dead (Bartsch, Turton).

Remarks. For discussion as to status of *australis* Lam., *australis* Krauss, and *multiplicata* Desh. see: von Martens (1880, p. 313), Lynge (1909, p. 153), Lamy (1918, p. 513), Prashad (1932, p. 115) and Iredale (1939, p. 380).

Smith's name will probably become a synonym, but for the present is retained.

Spondylus hystrix Röding

Spondylus hystrix Röding, 1798, p. 195; Adam & Leloup, 1939, p. 60, pl. 4, fig. 5; Day & Morgans, 1956, p. 308; Macnae & Kalk, 1958, p. 129.
Spondylus nicobaricus Sowerby, 1847, pl. 88, fig. 48.
Chama nicobaricus (Sow.), Turton, 1932, p. 234.
Spondylus ciliatus Sowerby, 1847, pl. 89, fig. 52.
Spondylus sp. Turton, 1932. p. 234, pl. 61, no. 1636 (= juv.).

Fossil: Post Pliocene, Inhambane (Cox, 1939).

Port Alfred, dead (Turton); Umgazana, Port St. Johns, living (U.C.T.); Port St. Johns, one dead but valves united (S. Afr. Mus.); Umzikaba, north of Port St. Johns (S. Afr. Mus. coll. F. H. Talbot); Scottburgh, Natal, 4 valves (S. Afr. Mus. coll. K.H.B.); Durban, living (U.C.T.); Delagoa Bay, living (U.W.).

Off O'Neil Peak (Zululand), 90 fathoms, one very worn valve; Umhloti (Natal), 40 fathoms, 4 valves; Cape Point N.W. × W. ½ N. 8 miles, 45 fathoms (mouth of False Bay) one broken and worn valve (S. Afr. Mus. P.F. coll.).

Distribution. Mauritius, Madagascar, Indo-Pacific.

Remarks. The occurrence of even a worn valve in the mouth of False Bay is unexpected, and the record should be accepted with reserve (but see † *Spondylus* sp., *infra*).

The condition of the Port St. Johns shell (S. Afr. Mus. A6649) indicates that it had lived in the neighbourhood. Both valves are intact but open, and barnacles have settled on the inside of both valves. Port St. Johns should

probably be reckoned as the utmost southerly limit at which *Spondylus* lives on our coast.

Cox (1927, p. 49, pl. 7, figs. 7, 8 *a*, *b*) recorded *ornatissimus* Böhm from the Lower Miocene of Pemba Island, remarking that no other species 'either living or fossil, is so delicately ornamented'. This seems an exaggeration, because some of the present valves assigned by Tomlin to *hystrix* (*nicobaricus* and *ciliatus*)

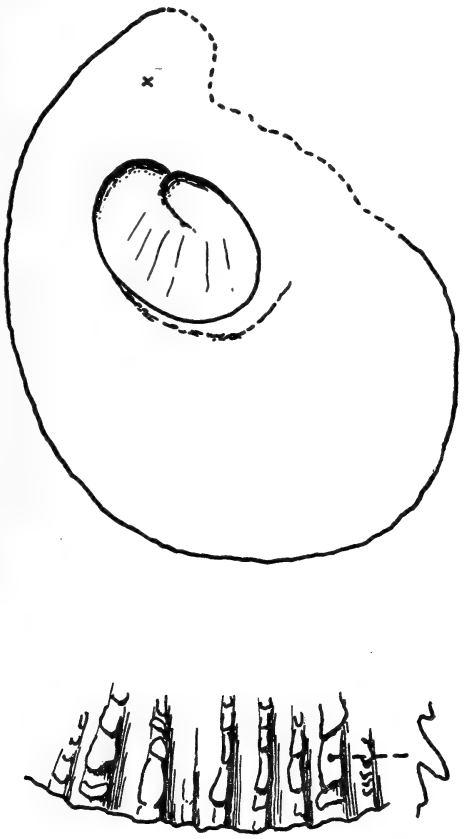


FIG. 15. †*Spondylus* sp. Valve 150 × 120 mm., thickness at × 8 mm. Portion of margin, with profile of one rib.

are ornamented as in Cox's fig. 8*b*. From the Pliocene of Zanzibar *insularis* n.sp. was described (p. 80, pl. 16, fig. 4); this also seems to have a very similar ornamentation. In both cases the figures are good and allow a critical comparison; nevertheless it is always preferable to compare actual specimens.

Sowerby (1897, p. 28) recorded also *S. ducalis* Chemn. from Natal. The shell (if it was really a South African shell) was probably the same as the

specimens recorded as *hystrix*; the latter and its varieties and *ducalis* being difficult to distinguish (Prashad, 1932, p. 111).

The right valve of the Port St. Johns specimen (S. Afr. Mus. A6649) has a very long 'beak' at the hinge, 20 mm. in a total altitude of 63 mm.

† *Spondylus* sp.

Fig. 15

Spondylus sp., Barnard, 1962b, p. 184.

A large flat valve appears to be the left valve of a *Spondylus*. Unfortunately the hinge was broken away in extracting the shell from the deposit, and no attempt was made to obtain it; at least it was not submitted to the South African Museum.

The outer surface has numerous radiating squamose ridges; the squamae are blunt, more or less square-ended; but, even allowing for abrasion, not spiniform. Colour dull orange. 150 × 120, thickness at x in figure 8 mm.

Limestone deposits, Klein River, Stanford. See: Wybergh, 1920, p. 58; and Krige, A.V. 1927, p. 51.

Fam. **Limidae**

Thiele, 1918–1920, pp. 1–66, pls. 1–10.

Synopsis of South African species

I. Inequilateral (oblique)
  A. Anterior and posterior ears more or less equal
    1. Median ligament pit wider than high. A deep pit in posterior ear below hinge-line.
      (*a*) Ventricose .. .. *rotundata*
      (*b*) Flat .. .. *fragilis*
    2. Median ligament pit higher than wide. No pit on posterior ear.
      (*a*) Ribs squamose; grooves more or less punctate .. .. .. *lima*
      (*b*) Ribs nodulose; grooves with concentric growth-lines only .. .. *perfecta*
      (*c*) Ribs very fine, divaricating .. .. *divaricata*
  B. Posterior ear incurved, not visible in surface view. Ribs very fine, divaricating *abscisa*
II. Equilateral (symmetrical)
  A. Altitude slightly greater than length .. .. *symmetrica*
  B. Altitude much greater than length .. .. (*Limatula*) *agulhasensis*

From Gough Island, 180 metres, outside the strictly South African region, Melvill & Standen (1907) described *Lima* (*Mantellum*) *goughensis*.

Lima rotundata Sow.

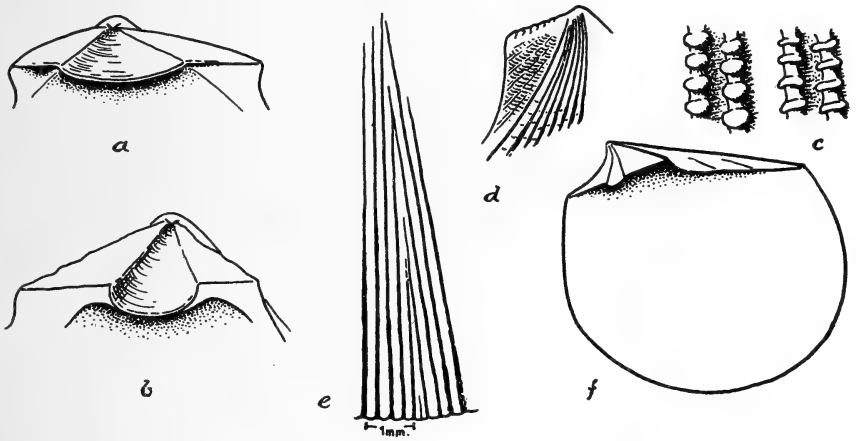
Fig. 16 *a*

Lima rotundata Sowerby, 1843, p. 86, pl. 21, fig. 19; Krauss, 1848, p. 29 (quoted reference to Sowerby as 'pl. 22, figs. 39, 40', which is *angulata*); Sowerby, 1892, p. 66; Johnson, 1904, p. 11; Smith in Rogers, 1906c, p. 294; Schwarz, 1910, p. 116; Thiele, 1920, p. 27, pl. 4, fig. 8; Turton, 1932, p. 223; Day, 1959, p. 538.

Lima hians var. *tenera* Turton (*non tenera* Chemn.) Sowerby, 1897, p. 28.

Lima africana Bartsch, 1915, p. 186, pl. 38, fig. 4; Turton, 1932, p. 223.
Lima angulata (*non* Sow.), Thiele, 1931, p. 166.
Lima subventricosa Turton, 1932, p. 223, pl. 57, no. 1558.
Lima rufanensis Turton, 1932, p. 223, pl. 57, no. 1559.

Oblique, ventricose, slightly gaping posteriorly, more so anteriorly; median ligament pit wider than the lateral portions, twice as wide as high, a deep pit below the hinge-line on the posterior ear. Prodissoconch smooth, glossy. Radial ribs beginning at about 1 mm. altitude, about 10–12 on middle part of shell, at 10 mm. altitude about 17–20, increasing in large shells to *c.* 30–35; anterior and posterior ears with finer riblets, which are not included in the above numbers; ribs mostly smooth on early part, but becoming more or less nodulose later. Grooves with fine concentric growth-lines.



VIG. 16. *a, b,* Hinge (left valves) of *Lima rotundata* Sow. and *L. lima* (Linn.). *c, L. perfecta* Smith Fariations of nodules on ribs. *d, L. lima* (Linn.) posterior ear. *e, L. divaricata* n.sp. divaricating riblets (semidiagrammatic). *f, L. abscisa* n.sp. internal view of right valve.

White or cream. Animal orange-scarlet.

Length (greatest, parallel with hinge-line) 37. alt. 42, thickness (one valve) 15, hinge-line 20 mm.

No eyes. Inner mantle fringe wide, the two sides anteriorly united; lips fused into a transverse tube open at both ends; foot with byssus groove, but no byssus; no retractors.

Fossil: Pleistocene, Port Elizabeth (Johnson, Schwarz); Little Brak River, Mossel Bay (Smith); Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.).

Port Elizabeth and Algoa Bay (Krauss, Sowerby, Thiele); Port Alfred (Bartsch, Turton); False Bay, Still Bay, Mossel Bay, Port Alfred (S. Afr. Mus.).

False Bay, 20 fathoms, juv. valves; off East London, 27 fathoms, 9 valves (S. Afr. Mus. P.F. coll.).

Saldanha Bay; False Bay; Algoa Bay (U.C.T.).

Remarks. Krauss named his specimens *rotundata*, but gave a reference to Sowerby's figures of *angulata*.

Sowerby identified some small P.F. specimens from False Bay as *hians* var. *tenera*, probably having in mind his 1897 record of this species; but they are obviously only juvenile *rotundata*, which is common in that locality; the identity is shown by a long sequence of shells collected by Dr. Muir at Still Bay.

Port Alfred specimens received from Turton as *africana* are also only juvenile *rotundata*. Bartsch included in his rib-count (50) *all* the ribs, which perhaps is logical, though the ribs on the ears near the hinge-line are often inconspicuous. The number of ribs is variable.

The length/altitude ratio varies, as is shown e.g. by the following pairs: length 13 × alt. 13·5 and 13 × 15·5 mm.; 24 × 28 and 28 × 28 mm.; 26 × 30 and 30 × 30 mm.

The degree of obliquity and inflation are also variable. Old shells are relatively more ventricose than juveniles, but young shells vary in this respect, e.g. alt. 15, thickness 4 mm. and 15 × 6 mm.

The height of the median ligament pit also appears to be variable, if only beach-worn valves are examined; the lower margin of the pit, however, is rather prominent and liable to abrasion. Turton's single 8 mm. shell called *rufanensis* is probably an aberration in this respect.

The most easterly locality is East London.

Thiele (1920) stated the nearest relative to be the Mediterranean and Atlantic *inflata* (Chemn.), but that he had South African shells which were scarcely distinguishable from European shells. In 1931 he identified an Algoa Bay valve as the Pacific *angulata*.

Lima fragilis (Chemn.)

Lima fragilis (Chem.), Sowerby, 1843, p. 86, pl. 22, figs. 34–37; Pelseneer, 1911, p. 33, figs. 1, 3, 9 (anatomy); Thiele, 1918–20, p. 34, pl. 1, fig. 2, pl. 6, fig. 4; Prashad, 1932, p. 124 (references).

Lima arcuata (*non* Sow.), Turton, 1932, p. 223; Macnae & Kalk, 1958, p. 37.

Thin, oblique, elongate-oval, ears angulate, especially the posterior ear, gaping anteriorly and posteriorly; median ligament pit wider than high, a deep pit below the hinge-line on posterior ear. Prodissoconch smooth, glossy. Radial ribs beginning at 1·5–2 mm. alt., numerous, increasing by interpolation to 40–50 or more, slender, filiform, non-squamose, ears with growth-lines but no radial ribs (or a few obscure ones on posterior ear). Grooves with growth-lines only. Internally the posterior margin formed by a thickened rib.

Length (greatest) 27, alt. 37, thickness (one valve) 3, hinge-line 11 mm.

Semitranslucent white. Animal scarlet.

Fossil: Pleistocene, limestone deposit, Klein River estuary, Hermanus (S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin).

Port Alfred, one valve (Turton); Still Bay, one valve (S. Afr. Mus. coll. Muir); Natal (S. Afr. Mus.); Delagoa Bay (U.W.).

Off Cape Natal (Durban), 54 fathoms, 3 valves (S. Afr. Mus. P.F. coll.).
29° 30′ S., 31° 23′ E., 68 metres (*Africana*, per U.C.T.).
Distribution. Indo-Pacific.

Lima lima (Linn.)

Fig. 16 *b*, *d*

Lima squamosa Lam., Sowerby, 1843, p. 84, pl. 21, figs. 1, 18; Sowerby, 1897, p. 28.
Lima multicostata Sowerby, 1892, p. 66; Schwarz, 1910, p. 116.
Lima lima (Linn.), Thiele, 1918–20, p. 13, pl. 1, fig. 3; pl. 2, figs. 1, 11–13; Cox, 1927, p. 79, pl. 16, fig. 2; Prashad, 1932, p. 119, pl. 3, figs. 23, 24 (references); Macnae & Kalk, 1958, p. 129; Kalk, 1958, pp. 214, 236.

Oblique, ventricose, slightly gaping anteriorly and posteriorly; median ligament pit higher than wide, one or two obscure granules or a small pit on the anterior and posterior ears. Radial ribs *c.* 18–20 on early part of shell, increasing to 25–30 (ribs on ears not included), more or less strongly squamose; anterior and posterior ears with radial riblets, better marked on the posterior ear, crossed by numerous close-set concentric (vertical to the margin) costulae. Grooves on early part with concentric growth-lines, later becoming more or less oblique, appearing criss-cross punctate, but near the margin of the largest shell becoming again concentric.

Length 20, alt. 25, thickness (one valve), 5, hinge-line 8 mm.

Fossil: Pliocene, Zanzibar; Pleistocene, Port Elizabeth (Schwarz).

Natal (Sowerby); Tongaat, Natal, beach worn (S. Afr. Mus.); Delagoa Bay (U.W.).

Off Port Shepstone, 24 fathoms (U.C.T.).

Off O'Neil Peak (Zululand), 90 fathoms, one valve; off Tugela River, 47 and 65–80 fathoms, 4 valves; off Cape Natal (Durban), 54 fathoms, 4 valves; Off Itongazi, 25 fathoms, one valve; off Umkomaas (Natal), 40 fathoms, 4 valves; off Cape Morgan, 47 fathoms, 4 valves (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea, Madagascar, Indo-Pacific.

Remarks. Iredale (1939) mentioned (not well shown in his figure) the sculpture on the posterior area (ear) of his *persquamifer* (the Australian form of *lima-squamosa*), and also stated that the grooves between the ribs were 'practically smooth'. In the works available here neither of these two features is mentioned. The criss-cross pitting in the grooves is very clear in some of the present valves.

The P.F. obtained only single valves, but none of them is very worn; even the Cape Morgan example retains the squamae on the marginal area. None of them is so strongly squamose as in Sowerby's or Prashad's figures.

The species probably lives as far south as the Natal coast but not very much farther south.

Macnae & Kalk (1958) list *lima*, but in the text (p. 37) they refer to the habitat of *arcuata*; Kalk (1958) also mentions only *lima*.

Sowerby's 1892 record of *multicostata* was based on 'a specimen in the

Bairstow collection', which, however, does not necessarily denote Port Elizabeth as the locality where the shell was found.

Whether the Mediterranean and Indo-Pacific forms are conspecific seems to be still debated; and also whether the range in variation of the number of ribs should include *multicostata*.

Turton's *kowiensis* is obviously a juvenile, but without examining the ligament pit, no clue to its identity can be obtained.

Lima perfecta Smith

Fig. 16 *c*

Lima perfecta Smith, 1904a, p. 43, pl. 3, fig. 29; Thiele, 1918, p. 18, pl. 3, figs. 10, 11.

Very oblique, strongly ventricose; median ligament pit higher than wide, a small pit (or a granule) on the anterior and posterior ears. Radial ribs 20–21, strongly squamose, the squamae thick (but variable), nodulose, scarcely hollowed on the distal side in adult, but definitely hollowed in juveniles, wider than the ribs which are thus moniliform; ears with nodulose riblets. Grooves with close-set concentric growth-lines.

Length 11, alt. 13, thickness (one valve) 5, hinge-line 4 mm.; another shell: 11 × 12 × 4 × 3·5 mm. Smith: 12 × 15 × 10 (valves together) mm.

Port Alfred (Smith, Bartsch, Turton).

Off Sandy Point (north of Cape Morgan), 51 fathoms, 2 juv. valves; off Cape Morgan, 47 fathoms, 6 valves; off Hood Point (East London), 49 fathoms, 3 valves; off Nieca River (East London), 43 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Remarks. The valves from the P.F. bottom-samples exhibit the characteristic nodules on the ribs.

Smith gave the number of ribs as about 18, but his figure seems to indicate more (20), exclusive of those on the ears.

Lima divaricata n.sp.

Fig. 16 *e*

Oblique, ovoid; median ligament pit higher than wide, a feeble granule on each ear on left valve, and a slight ridge on the right valve, the ridge on the anterior ear better developed. Radial riblets numerous, fine, smooth, 4 to 1 mm. in middle of ventral margin, divaricating at a narrow acute angle in middle line; ears with a few obscure, broader radial riblets. Grooves too narrow to show any sculpture. Main concentric growth-lines at intervals, but not at all prominent. Surface near umbones slightly quincuncial in appearance, due to wear.

Length 13, alt. 15, thickness (one valve) 3, hinge-line 5·5 mm.

No trace of colour bands.

Off O'Neil Peak (Zululand), 90 fathoms, 2 valves (Types); off Cape

Natal (Durban), 85 fathoms, one worn valve (S. Afr. Mus. A9501 (Types) and A9502 P.F. coll.).

Remarks. These valves have no expanded ear as in the Australian *alata* Hedley; they are more oblique than in the Indo-Pacific *dunkeri* Smith; they are nearest to the Chinese *concentrica* Sow., but have no raised concentric lirae. The institution of a n.sp. seems advisable.

Lima abscisa n.sp.

Fig. 16*f*

Semitranslucent, inequilateral, upper part of hind margin straight, incurved, anterior margin nearly straight, ventral margin broadly rounded. Ligament pit high and narrow. Numerous very fine radial riblets, divaricating in middle line, about 12 to 1 mm. in middle of ventral margin. Two feeble and obscure radial riblets on posterior ear. Main concentric growth-lines traceable, but not prominent.

Length 5·5, alt. 5·5, thickness (one valve) 1, hinge-line 1·75 mm.

Off Cape Morgan, 47 fathoms, 3 valves (Types); off Tugela River (Natal), 65–80 fathoms, 2 valves (S. Afr. Mus. No. A9504 (Types) and A9505 P.F. coll.).

Remarks. Similar to the Australian *sydneyensis* Hedley 1904 (see: Thiele, 1918, p. 15, pl. 3, figs. 1, 2) but differing in shape, as is indicated by the measurements (*sydneyensis*: 6 × 8 mm.). Both species are axe-head shaped (Hedley); though it is the flat upper posterior margin (the back of the axe) which appears cut-off.

Lima symmetrica n.sp.

Equilateral, ears equal; median ligament pit as wide as high (equilateral), narrower than lateral portions; upper part of anterior margin formed by a thickened rib, ending in a denticle. Exceedingly fine radial riblets, 8–9 in 1 mm., not divaricating (except feebly in the lower third), non-squamose; anterior ear with radial riblets, posterior ear with growth-lines obscuring the radial riblets. Main growth-lines traceable at intervals, but not at all prominent.

Surface near the umbo with slight quincuncial appearance.

Length 13, alt. 15, thickness (one valve) 3, hinge-line 5·5 mm.

Off Cape Vidal (Zululand) 80–100 fathoms, one valve (S. Afr. Mus. No. A9503 P.F. coll.).

Remarks. The valve is almost symmetrical, and owing to the obscurity of the adductor scar, the anterior and posterior margins are not to be determined with certainty; one margin is slightly more curved than the other, and the latter being thickened above, is considered to be the anterior margin.

Lima (*Limatula*) *agulhasensis* Thiele

Lima (*Limatula*) *agulhasensis* Thiele, 1920, p. 48, pl. 9, fig. 12; 1931, p. 167; Barnard, 1963c, p. 15.
Lima (*Limatula*) *exigua* Thiele, 1920, p. 48, pl. 9, fig. 13; 1931, p. 168.
Lima (*Limatula*) *densecostata* Thiele, 1920, p. 49, pl. 9, fig. 14; 1931, p. 167.

Symmetrical, or sometimes very slightly oblique, ears not marked off by a concave margin (or sometimes a very slight concavity). Ligament pit subequal in width (at the hinge-line) to the area on either side of it. Numerous radial riblets, 4–5 or 6 to 1 mm. at an altitude to *c.* 4·5 mm., with or without interpolated riblets, becoming slightly nodulose towards the ventral margin in the larger shells. Fine concentric growth-lines visible in the grooves (except when they are very narrow owing to interpolated riblets).

Up to length 5·5, alt. 9, thickness (one valve) 2·5 mm.

35° 06′ S., 22° 26′ E., 155 metres (*agulhasensis* & *densecostata*); 34° 51′ S., 19° 37′ E., 80 metres, 35° 26′ S., 20° 56′ E., 80 metres (*exigua*) (Thiele).

Off Cape St. Blaize, 125 fathoms, 6 valves; Algoa Bay, 52 fathoms, 10 valves; off Sandy Point (north of Cape Morgan), 51 fathoms, 2 valves; off Umkomaas (Natal), 40 fathoms, 4 valves; off Illovo, 27–30 fathoms, 2 valves; off Cape Natal (Durban), 85 fathoms, one valve; off Tugela River, 47 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Remarks. With the specimens at hand, some of them from a locality not far removed from the *Valdivia* localities, there is difficulty in distinguishing more than one species. As Thiele did not give the thickness (crassitude) of the shells, nor any apical or lateral views, the distinction between 'mässig gewölbt' and 'starck gewölbt' is difficult to assess. The figure of *exigua* scarcely conforms with the description 'deutlich schief'.

The riblets are variable. Interpolated riblets occur, and when they do occur they may be either completely or partially separated from the neighbouring riblets; a main riblet may appear double (two adnate riblets of equal strength). Specimens with more, and specimens with less densely crowded riblets are found together in the same locality (e.g. Cape St. Blaize and Algoa Bay). The Natal specimens have the riblets less dense, and do not appear to be prone to interpolating extra riblets.

The largest specimen is from off the Tugela River.

Fam. **Anomiidae**

Winckworth, 1922, pp. 32–34, pl. 1.

From a preliminary examination of the living material obtained by U.C.T., the three genera mentioned by Winckworth are represented.

Gills W-shaped.
- 3 distinct muscle scars .. .. *Anomia*
- 2 muscle scars, separate or contiguous .. .. *Monia*

Gills Π-shaped; right gill shorter than left. Two contiguous muscle scars .. *Heteranomia*

South African Museum has: upper (left) valves of *A. ephippium* Linn. from 'South Africa' (probably Table Bay or False Bay); also as Quaternary fossils from Sedgefield near Knysna (A. R. H. Martin);

Greenish valves of *Monia squama* (Gmelin) from Table Bay, Still Bay, Mossel Bay.

Turton's (1932) identifications and 'n.spp.' cannot be accepted for inclusion in the fauna-list. His *Saxicava rufanensis* may be an Anomiid.

U.C.T. has taken *Heteranomia* cf. *squamula* Linn. at 33° 48′ S., 25° 47′ E., 27 metres; and *Monia* cf. *squama* Gmelin at Arniston, Still Bay, Mossel Bay, Storms River, and Knysna.

Fam. **Ostreidae**

Orton, 1928; Thomson, 1954; Korringa, 1956.

Korringa's investigations at Knysna seem to have disentangled the taxonomy of the two or three South African oysters which are of commercial importance.

He recognized three species: *Ostrea algoensis*, *O. atherstonei*, and *Crassostrea margaritacea*. The second of these was originally described as a Quaternary fossil, and it is questionable whether a name applied to a fossil shell should be applied also to a living species. In the taxonomy of this family conchology plays a subordinate role as opposed to anatomy and physiology. The shell named *atherstonei* may appear conchologically to be an *Ostrea*, but, to be strictly scientific, we can never know whether it was larviparous or oviparous, and therefore an *Ostrea* or a *Crassostrea*. Its name should be † *Gryphaea atherstonei* (Newton).*

The living large Red Oyster, which Korringa identified as *atherstonei*, is thus bereft of a specific name. Korringa was convinced that it was specifically distinct from the small 'weed oyster' *algoensis* (p. 38). Further research may or may not confirm this. In the meantime I refer to the Red Oyster as *Ostrea* sp. (cf. † *Gryphaea atherstonei*).

Korringa examined the Saldanha Bay shells and considered them to be *atherstonei*. He did not discuss the fossil shells from the diamondiferous areas farther north, but said (p. 39) 'Maybe oysters really occur in that forbidden area [mouth of the Orange River]. If so, in all probability it will be *Ostrea atherstonei*'. The fossil oysters from that area, recorded and figured by Haughton (1932) as *prismatica*, were, however rostrate, sometimes strongly rostrate; and in that respect unlike *atherstonei* (Barnard, 1962b, p. 184).

Discussions, however, about the identity of fossil oysters (e.g. Cox, 1927, and Haughton, 1929, p. 37) are inconclusive. Therefore the shells recorded from the west coast as *Ostrea prismatica* (and typ. err. *imbricata*) (Haughton, 1929, 1932) are not considered here, although they appear to be *margaritacea*.

By a wise decision the generic name *Gryphaea* is henceforth to be used only for fossil oysters (Opinion 338, Intern. Comm. Zool. Nomencl. 1955).

Ranson's ignorance of the South African oyster fauna and his consequent vacillations in identifying specimens (Korringa, p. 37), and his 'fantastic

* Korringa (p. 38) said he saw in the South African Museum 'several fine specimens of *Ostrea atherstonei* classified under a variety of names'. This is not quite correct. At the time of his visit the only *named* specimens in the Oyster Exhibit were specimens of *hyotis* and *cucullata*, neither of which could possibly be mistaken for *atherstonei*. Maybe he meant 'from various localities'.

hypotheses' (Korringa, p. 39) as to the source whence South Africa's oyster population is maintained, impair the value of his work.

Gen. Ostrea Linn.

Hermaphrodite (*Monoeciostrea* Orton). Eggs relatively large. Larviparous, i.e. the eggs are fertilized and incubated within the mantle. No promyal cavity. Suprabranchial chamber large.

Fixed (left) valve without umbonal cavity; with chalky deposits below the gills and suprabranchial chamber (such deposits also in the flat (right) valve in old shells) (Korringa, pl. 13, fig. 2). 'Catch' area of adductor muscle forming more than 50 per cent of the scar. Upper valve with denticles (granules) on either side of hinge, fitting into pits on lower valve.

Prodissoconch with 2 grooves at each end of the hinge (provinculum), internal ligament below hinge or at its anterior end (Ranson, 1951, fig. 7).

Ostrea algoensis Sow.

Ostrea algoensis Sowerby in Reeve, 1871, pl. 26, fig. 65; Korringa, 1956, pp. 35 et sqq., pl. 14, fig. 2, pl. 16, fig. 2 (left).
Ostrea stentina Ranson, 1951, pp. 9, 10, 18, text-fig. 7 (prodissoconch).

Surface of flat valve smooth. Upper valve with a series of marginal denticles near the hinge, fitting into pits on lower valve. Adductor muscle scar oblique and lying wholly on posterior side of middle line drawn from the ligament. Larval shell nearly symmetrical (equivalve).

Yellowish-grey, sometimes with broad dark purple or blackish radial stripes on flat valve; both valves internally faintly greenish-grey.

Algoa Bay (Sowerby); Knysna (Korringa); False Bay (S. Afr. Mus.) 34° 23′ S., 18° 41′ E., 88 metres (s.s. *Africana* per U.C.T.).

Remarks. A small-sized species, scarcely exceeding two inches; and slow growing. Regarded by Korringa as a 'weed' oyster, not worth cultivation. Spawns in December and early January.

'Ranson presumes that *algoensis* may be identical with the widespread *Ostrea stentina* Payraudeau' (Korringa, p. 36).

Ostrea sp. (cf. † *Gryphaea atherstonei* (Newton))

References to the fossil *atherstonei*:

Ostrea atherstonei Newton, 1913, p. 327, text-fig. and pl. 17, figs. 1, 2, pl. 18, fig. 1; Haughton, 1932, pp. 34, 42.
Ostrea redhousiensis Newton, 1913, p. 329, pl. 18, fig. 2.

References to the living Red Oyster:

Ostrea margaritacea (*non* Lam.), Ranson, 1951, p. 4, text-figs. 4, 5, pp. 17, 19.
Ostrea cf. *atherstonei* Newton, Korringa, 1956, pp. 37 et sqq., pl. 16, figs. 1, 2 (right).

Surface of flat valve rough, scaly, imbricate. Marginal denticles and pits often indistinct in large shells. Adductor muscle scar nearly central and nearly parallel with the hinge-line.

Flat valve vinous red, without stripes, lower valve pinkish; internally pinkish.

Fossil: (*atherstonei*): Late Tertiary, Zwaitkops River valley, Port Elizabeth (Newton, Haughton); Klein Brak River, Mossel Bay (S. Afr. Mus. coll. Haughton).

Saldanha Bay (Korringa); Knysna, Keurbooms River lagoon (Korringa; also S. Afr. Mus.); False Bay (S. Afr. Mus.; also U.C.T.).

Remarks. The Red oyster lives below low water of spring tides.

Korringa regarded dark radial stripes on the flat valve as characteristic of the small *algoensis*. There is, however, a pear-shaped flat valve, 105 mm. altitude (S. Afr. Mus. A6167. coll. Haughton, 1920) from Saldanha Bay with a somewhat oblique muscle scar, and externally about 10 violaceous stripes of varying width. Should this be regarded as a large *algoensis*, or a striped '*atherstonei*'?

This raises a doubt whether the position and obliquity of the muscle scar (Korringa, pl. 16, fig. 2) is always a reliable distinction between these two species; variability in the shape of the shell sometimes makes it difficult to decide exactly where the middle line runs.

A very flat and smooth specimen was removed from the supply tank at the St. James Marine Biological Station (now demolished) on 10 November 1911. The tank had been emptied and cleaned 3 months earlier. The oyster had grown to a length (i.e. altitude) of 50 mm. in 3 months or less.

Cox (1939, pp. 67, 82) identified Pliocene specimens from Morrumbene (Inhambane) as cf. *atherstonei*, stating that they did not appear to be referable to any species known to be living off the African coast.

Gen. Crassostrea Sacco

Sexes separate (*Dioeciostrea* Orton). Eggs relatively small. Oviparous, i.e. the eggs are shed direct into the sea and there fertilized. Promyal cavity present. Suprabranchial chamber small.

Fixed valve with umbonal cavity; without chalky deposits below the gills and suprabranchial chamber. The presence of a promyal cavity displaces the adductor muscle towards the distal margin (Korringa, p. 13, fig. 1). 'Catch' area of the muscle forming less than 30 per cent of the scar.

Prodissoconch with 2 grooves at each end of provinculum, internal ligament anterior, a little distance from the provinculum (Ranson, 1951, fig. 1).

Crassostrea margaritacea (Lam.)

Fig. 17 *a*, *b*

Ostrea margaritacea Lamarck, 1819, p. 208.
Ostrea tuberculata (*non* Lam.), Krauss, 1848, p. 30.
Ostrea cochlear (*non* Poli) Odhner, 1923, p. 3 (part: the Cape (G. de Vylder) specimen).
Ostrea procellosa Val., Lamy, 1929.

Ostrea iridescens Gray, Stephenson, Stephenson & du Toit, 1937, p. 378; Stephenson, 1948 p. 267.*

Ostrea prismatica Gray, Haughton, 1929, p. 36, pl. 8, figs. 7–10, pl. 9, figs. 4–7, also pl. 6 (as *imbricata* typ. err.); Stephenson, 1948, p. 267.*

Gryphaea margaritacea (Lam.), Ranson, 1949, p. 251; 1951, p. 3, figs. 1–3, 6 [not figs. 4, 5 = *atherstonei*].

Crassostrea margaritacea (Lam.), Korringa, 1956, pp. 34 et sqq., pl. 14, fig. 1, pl. 18, figs. 1, 2; Macnae & Kalk, 1958, p. 129.

Surface of flat valve with close-set radial riblets. Internally flat valve with or without a series of marginal denticles (granules) near hinge-line fitting into pits in lower valve. Adductor muscle scar distal to the middle of length (altitude) of valve. Shell shape variable, lower valve often with a long umbonal 'beak': e.g. a shell from Still Bay 180 mm. long (alt.) has a beak 95 mm.

Larval shell markedly inequivalve, umbo of the left valve prominent.

Corneous or violaceous, lower valve uniform or with darker pinkish or violaceous radiating stripes.

False Bay to Natal, but rare in Natal. Delagoa Bay (U.W.).

Remarks. Neither Ranson nor Korringa refer to Krauss, who identified the common South African oyster with *tuberculata* Lam. Presumably the Australian *tuberculata*, which name antedates *margaritacea* (1804, p. 358, pl. 67, fig. 2), is to be regarded as a separate species.

The common South African oyster spawns from mid-January to the end of February or early March.

Korringa did not discuss whether the Madagascan shells, referred by Ranson to *margaritacea*, were identical with the South African species.

Ranson saw Odhner's specimens, and identified the specimen from the Cape (G. de Vylder) as *margaritacea*.

Crassostrea cucullata (Born)

Ostrea cucullata Born, 1778, p. 100; 1780, p. 114, pl. 6, figs. 11, 12; Krauss, 1848, p. 30; Roughley, 1926, p. 446; Nardini, 1937, p. 226, pl. 12(6), figs. 4, 5; Stephenson, 1947(48), p. 267; Braga, 1952, p. 96, pl. 7, fig. 5.

Crassostrea cucullata (Born) Macnae & Kalk, 1958, p. 129.

Fossil: Pleistocene, Durban and Umkomaas (Nardini).

East London (rare) northwards to Natal (Stephenson); Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also U.W.); Inhambane (U.C.T.).

Distribution. Madagascar, Indo-Pacific. Also (Nicklès) tropical Atlantic to Angola.

Remarks. Braga's identification of *cucullata* was probably correct, but his records of *vitrefacta* Sow., *pes-tigris* Hanley, *plicata* Chemn., *folium* Linn. require confirmation. The last three (pl. 7, figs. 2, 3 and 4) probably represent merely differently shaped shells of *cucullata*. Franca (1960, pp. 91, 92, pl. 23, figs. 1, 2, pl. 24, fig. 1) recorded *mytiloides* Lam. *plicata* Chemn., and *vitrefacta* Sow., but regarded them as forms of *cucullata*.

* *Ann. Natal Mus.* xi, part 2, issued March 1948, but reprints dated 1947.

Nardini's specimens from Durban were probably, and those from Umkomaas certainly, from shell-middens.

Gen. Pycnodonta (F. de W.) Sow.

Sexes separate. Eggs small. Oviparous. Promyal cavity present.

Large heavy shells. No strongly marked umbonal cavity. A series of vermiculate grooves perpendicular to the margin on either side of hinge-line in both valves. Inner layers vacuolated (fig. 17 *c*).

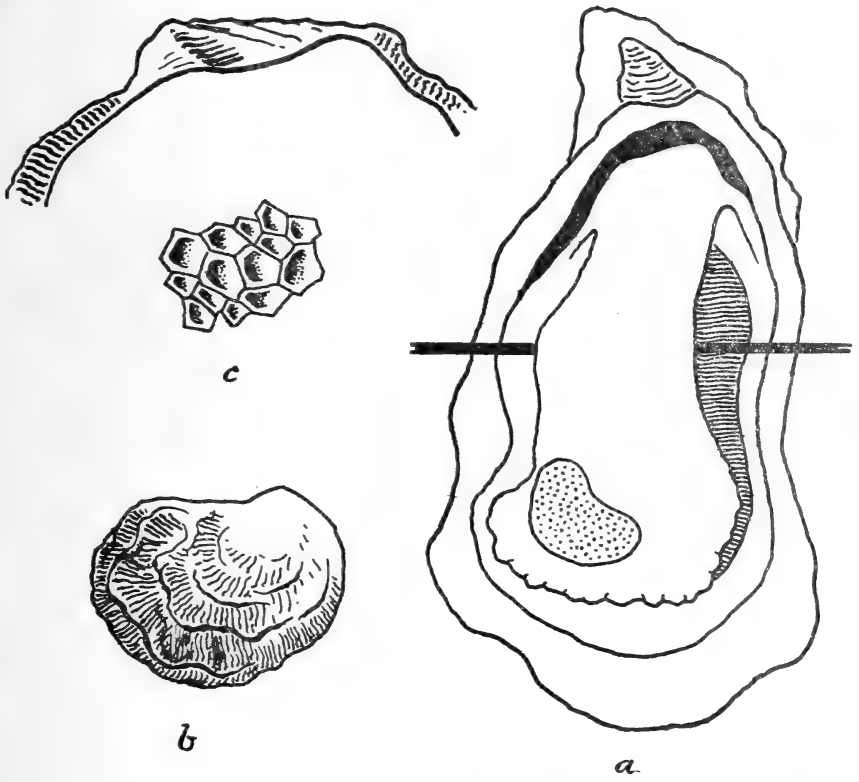


Fig. 17. *Crassostrea margaritacea* (Lam.). *a*, fixed left valve (right valve removed) to show umbonal cavity (black), and animal with black bar passing through the promyal cavity. *b*, right (flat) valve of juvenile, 25 mm., to show close-set radial riblets. *Pycnodonta hyotis* (Linn.). *c*, hinge-line, and portion of vacuolated inner layer of shell.

Prodissoconch with 5 crenulations on the provinculum, and 10 crenulations anterior to the provinculum (Ranson, 1941, p. 61, fig. 1).

Ranson (1949) accepted only 3 species: *hyotis* (Linn.) Atlantic and Indo-Pacific; *cochlear* (Poli) Atlantic only; and *numisma* (Lam.) Indo-Pacific only; but he gave no differential characters.

Associated with coral reefs.

Pycnodonta hyotis (Linn.)

Fig. 17 *c*

Pycnodonta hyotis (Linn.), Ranson, 1941, p. 86, figs. 1–6; 1949, p. 451; Macnae & Kalk, 1958, p. 129.
Ostrea hyotis Linn. Nicklès, 1950, p. 183, fig. 340.

Durban Bay, on floating log (S. Afr. Mus.); Delagoa Bay (U.W.).

Off Cape Vidal (Zululand), 80–100 fathoms, one upper valve, 33 × 27 mm. (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea, Mauritius, Indo-Pacific. Atlantic: St. Helena and Lobito Bay (Ranson).

Remarks. Four specimens from the woodwork of a wreck in Steenberg Cove (St. Helena Bay) (S. Afr. Mus.) may be this species. All were attached by the whole lower surface; two have the upper valve more or less radially plicate. One of the others, antero-posterior length 130, dorso-ventral altitude 110 mm., shows on the attached surface the graining of the wood, and this is exactly repeated over the whole surface of the upper valve, which becomes plicate or sharply crenulate only at the margin.

The Cape Vidal specimen is probably referable to this species.

Pycnodonta cochlear (Poli)

Ostrea cochlear Poli, Odhner, 1923, p. 3 (part: the Cape Infanta specimen); ? Nicklès, 1950, p. 183, fig. 341.
Pycnodonta cochlear (Poli), Ranson, 1949, pp. 448, 450.

Off Cape Infanta, 45 fathoms (Odhner, confirmed by Ranson).

34° 24′ S., 18° 41′ E., 106 metres (U.C.T. *teste* Ranson 1949).

Distribution. Atlantic only (Ranson).

Remarks. Ranson's identification of Odhner's specimen from Cape Infanta conflicts with his statement that this species occurs only in the Atlantic.

The figure given by Nicklès shows denticles near the hinge (not vermiculations, as in the figure of *hyotis*), and therefore does not appear to represent a species of *Pycnodonta*.

I have not seen the U.C.T. specimens, which seem to have been retained by Ranson.

Fam. **Astartidae**

Astarte agulhasensis J. & T.

Fig. 18 *a*

Astarte agulhasensis Jaeckel & Thiele, 1931,* p. 212, pl. 8(3), figs. 78, 78*a*.

Lunule distinct in the early stages, bordered by a slight step, which becomes evanescent in later stages. No radial striation or ribbing. All sulci

* See Introduction, p. 161, and explanations of plates 8–10 (3–5) for division of work and authorship of new species.

evenly curved; beginning at a very early stage of growth. On a juv. 3 mm. alt. (unworn) 10 oblique sulci and one incomplete at margin; at 5 mm. alt. 15, and at 8.5 mm. *c.* 20, becoming closer together as they approach the margin. Margin internally crenulate.

Up to length 9·5–10, alt. 8·5 mm. (P.F.).

Some valves show traces of pinkish-red mottling, or radiating streaks; one valve has 2 Λ-shaped reddish marks, one within the other, the apices pointing towards umbo.

35° 26′ S., 20° 56′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres (Jaeckel & Thiele).

Off Cape Natal (Durban), 54 fathoms, one valve; off Sandy Point (north of Kei River mouth), 51 fathoms, 4 valves; off East London, 22–32 fathoms, many valves; off Great Fish Point, 51 fathoms, 3 valves; off Nanquas Peak (east end of Algoa Bay), 49 fathoms, 10 valves; Algoa Bay, several stations, 25–52 fathoms, many valves; off Cape Infanta 40–46 fathoms, 4 juv. living, several valves; off Cape St. Blaize, 125 fathoms, several worn valves (S. Afr. Mus. P.F. coll.).

34° 13′ S., 26° 04′ E., 68 fathoms (U.C.T.).

Astarte (*Digitaria*) *africana* Bartsch

Digitaria africana Bartsch, 1915, p. 194, pl. 45, fig. 4; Turton, 1932, o. 233.
Astarte (*Digitaria*) *africana* Jaeckel & Thiele, 1931, p. 212.

Port Alfred, 2 valves (Bartsch, Turton).

34° 51′ S., 19° 37′ E., 80 metres; 35° 29′ S., 21° 2′ E., 102 metres; 35° 26′ S., 20° 56′ E., 80 metres; valves only (Jaeckel & Thiele).

Astarte (*Digitaria*) *lunulata* n.sp.

Fig. 18 *b*

Closely resembling *africana*, and more inequilateral than *agulhasensis*. Lunule distinct, with 3 radial grooves interrupting the concentric sulci.

Sulci beginning at a later stage than in *agulhasensis*, the first sulcus not completed until the shell is *c.* 1·5 mm. alt. First 2 or 3 (or 4) sulci angular, thereafter gradually becoming evenly curved. At 2 mm. alt. 2 complete and 5–6 incomplete sulci; at 3 mm. about a dozen complete, and on anterior part about 30 total, the sulci becoming closer together as they approach the margin. Margin internally crenulate.

Length 3·5, alt. 3 mm.; also 4 × 3, and 4 × 3·5 mm.

34° 26′ S., 25° 42′ E., 124 fathoms, 3 valves (Types); off Cape Morgan, 47 fathoms, 5 valves (S. Afr. Mus. A9506 (Types), and A9507 P.F. coll.).

Remarks. From the angular shape of the 1st sulcus one would expect these *Pieter Faure* valves to be *africana*, but they are regarded as a different species for the following reasons. Bartsch mentioned and figured radial riblets around the whole shell, but the present valves show no trace of such; on the other hand

Bartsch did not mention a lunule with 3 distinct grooves anteriorly, which are the chief feature of the present valves.

Bartsch had one beach specimen, but considerable abrasion would be required to obliterate the lunule and its grooves, and any riblets on the main surface would be completely lost. Turton found another valve, and maintained the presence of riblets.

Jaeckel & Thiele recorded their examples of *africana* without any comment. Perhaps a re-examination of the *Valdivia* material would show some of the valves to be the present n.sp.

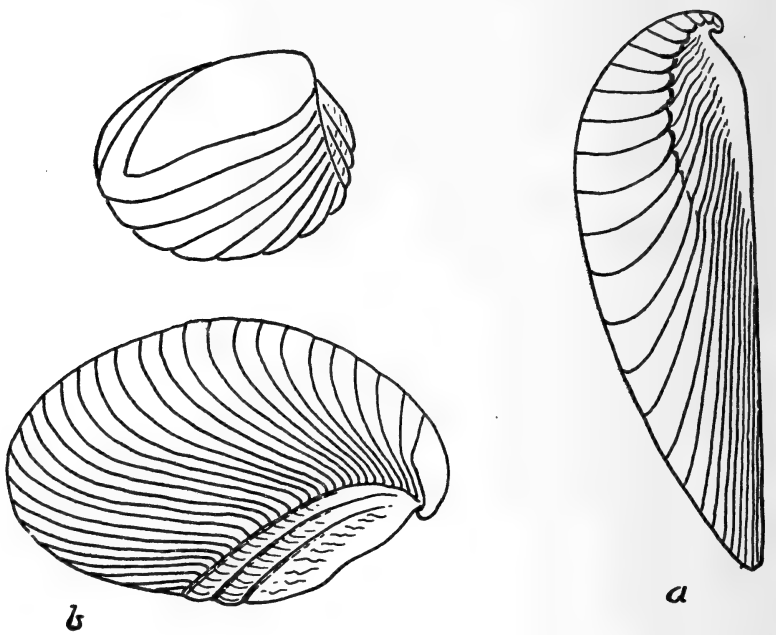


FIG. 18. *a*, *Astarte agulhasensis* J. & T. *b*, *A. lunulata* n.sp., above 2·25 × 2, below 3·5 × 3 mm.

Cuna bartschi nom. nov.

Cuna concentrica (*non* Hedley 1902), Bartsch, 1915, p. 191, pl. 47, fig. 3, pl. 52, figs. 11, 12.
Cuna concentrica Hedley, Jaeckel & Thiele, 1931, p. 215.

Length 2, alt. 2·5 mm. Bartsch gave length *and* altitude 1·2, but the (enlarged) figures measure (external view) 31 × 35 (internal views), 28 × 35 mm.

Port Alfred (Bartsch, Turton).

35° 26′ S., 20° 56′ E., 80 metres (Jaeckel & Thiele).

34° S., 25° 44′ E., 30 fathoms, 6 juv. living, 6 valves (S. Afr. Mus. P.F. coll.).

Remarks. Although Jaeckel said he found no difference between Hedley's

Australian *concentrica* and Bartsch's species of the same name, it seems preferable to have a separate name for the South African shell.

Cuna gemmula W. H. Turton

Cuna gemmula Turton, 1932, p. 231, pl. 60, no. 1613.

This may possibly be a *Cuna*, but is certainly a juvenile, not an adult as Turton thought.

Fam. **Crassatellidae**

The shape of the shell may vary at different stages of growth. Very young shells are subtriangular with a prominent projecting prodissoconch; they then become oval-triangular, and eventually attain the adult shape.

Jaeckel & Thiele (1931, p. 215) record two valves of an unnamed species appearing to differ from any other South African species by having, *inter alia*, the internal margin smooth. This, however, seems to be a juvenile character. E.g. in *tenuis* examples up to about 25 mm. long have a smooth margin, but thereafter crenulations are developed. In *crebrilirata* crenulations are already present at 15 mm. long; and in *natalensis* at 10 mm. long.

Cardita irregularis Turton 1932 is probably a worn *Crassatella*.

Crassatella tenuis Sow.

Crassatella tenuis Sowerby, 1904, p. 10, pl. 6, fig. 17.
Eucrassatella tenuis (Sow.), Jaeckel & Thiele, 1931, p. 214.

Transversely oblong, compressed, thin in juv. but not particularly thin in adult, obtusely angular behind, rounded in front, umbonal ridge very feeble; very fine radial striae, often obscure; concentric lirae thin, sharp, erect, rather distant; at alt. 2·5 mm. 10–11, at 5 mm. 15, at 28 mm. *c.* 28–30, the marginal 4 or 5 close together, subimbricate. Anterior lunule moderately narrow. Margin internally crenulate (except in juv.), adductor scars impressed. Periostracum in larger shells somewhat fibrous at the margin; corneous brown.

Length 40, alt. 27, thickness (valves together) 15 mm.

Cape St. Blaize N. × E. ¼ E., distant 65 miles, 85–90 fathoms, one living (Sowerby. P.F. coll.).

34° 51′ S., 19° 37′ E., 80 metres; 35° 29′ S., 21° 2′ E., 102 metres; 35° 16′ S., 22° 26′ E., 155 metres; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel & Thiele).

Cape St. Blaize N. × E. ¾ E., 73 miles, 105 fathoms, 3 living; Cape St. Blaize N. × E. ¼ E., 67 miles, 90–100 fathoms, 3 living; Cape St. Blaize N. × E., 73 miles, 125 fathoms, 18 juv. and half-grown valves 4–28 mm. long; Brown's Bank (approx. 36½° S., 21° E.) 80–100 fathoms, one valve; 34° 26′ S., 25° 42′ E., 124 fathoms, 2 juv. valves (S. Afr. Mus. P.F. coll.).

36° 25′ S., 21° 08′ E., 177 metres (s.s. *Africana* per U.C.T.).

34° 51′ S., 23° 41′ E., 100 fathoms (U.C.T.).

Type in British Museum.

Remarks. This is quite distinctive among the South African species, and therefore Jaeckel & Thiele's identification may be accepted, whatever the specimens from the same localities, identified as *subquadrata*, may prove to be (see under *gilchristi*).

Distinguished by the shape of the concentric lirae, which in profile form a series of inverted Vs, in contrast with those of other species which are inverted Us.

With the exception of the 2 juv. valves from Algoa Bay, and one from Brown's Bank all the P.F. specimens were taken in one rather circumscribed area off Cape St. Blaize; The *Valdivia* obtained it as far west as 19° 37′ E., but whether alive or dead was not stated.

Crassatella ?tenuis aberr.

A curious specimen from off Cape St. Francis 75 fathoms, living (S. Afr. Mus. no. 14846. P.F. coll.).

Subtriangular, inflated, rounded in front and behind, postero-dorsal margin convex, antero-dorsal margin straight, ventral margin convex, no umbonal ridge; anterior lunule rather wide and deep, posterior lunule wide; very fine radial striae; sharp concentric lirae from anterior to posterior margin, about 35 from umbo to about 5 mm. from ventral margin, where they become evanescent and succeeded by crowded growth-lines. Adductor scars impressed; margin internally crenulate. Pale, brownish towards the umbones and in the lunules. Length 29, alt. 24, thickness (valves together) 19 mm.

Sowerby identified this specimen as a 'somewhat abnormal' *pallida* Ad. & Rve. 1848; Tomlin later saw the specimen and agreed with this identification. I decline, however, to admit a Chinese species to the South African fauna-list on the strength of a single specimen. I see no reason why it should not be a 'somewhat abnormal' *tenuis*. The sculpture is that of *tenuis*; only the shape is remarkable. In addition to the shortness of the shell, the two valves are not quite equally ventricose.

Crassatella capensis Lamy

Crassatella africana (*non* Marrat), Sowerby, 1904, p. 9, pl. 6, fig. 13.
Crassatella capensis Lamy, 1917, p. 237 (nom. nov.); Tomlin, 1931, p. 446.
Crassatella capensis Odhner, 1923, p. 4, pl. 1, figs. 1, 2 (n.sp.); Tomlin, 1926, p. 300.
Crassatella odhneri Tomlin, 1930, p. 35 (nom. nov. for *capensis* Odhner).

Ovate-oblong, obtusely angled behind, rounded in front, a slight umbonal ridge; very fine radial striae, often obscure; numerous rounded concentric lirae, at least as wide as the grooves, often wider (especially in juv.), becoming obsolete posteriorly in shells of about 10–15 mm. alt., continuing on main part of shell and anteriorly up to alt. *c.* 30 mm., but thereafter evanescent and merging in the rather coarse growth-lines; in juv. at 2·5 mm. alt. 12 lirae, at 5 mm. 22–23, and at 30 mm. *c.* 55, becoming closer together and indistinct near the margin; anterior lunule narrow; margin internally crenulate; adductor muscle

scars impressed. Periostracum in larger shells rather rough and fibrous around the margin; yellowish-brown, fulvous, or (large shells) dark brown.

Up to length 45, alt. 30, thickness (valves together) 17 mm. The length/altitude ratio varies slightly, e.g. 43 × 29 and 43 × 32 mm.

Off Cape Infanta, 43 fathoms, one (Sowerby. P.F. coll.).

Off Cape Infanta, 40 fathoms, one valve (Odhner).

Off Mound Point (north of Kei River, Cape Morgan), 34 fathoms, one living, 2 valves; off Cape Morgan, 36 fathoms, one living, and 52 fathoms, one juv. valve; off East London, 27 fathoms, 6 juv. valves; off Nanquas Peak (east end of Algoa Bay), 49 fathoms, 2 juv. valves; Algoa Bay, 67 fathoms, 7 juv. valves; off Gericke Point (Knysna area), 46 fathoms, 2 juv. valves; St. Francis Bay, 24–34 fathoms, 2 juv. valves; off Cape Infanta, 40 fathoms, one living, 2 juv. valves, and 47 fathoms, 2 living; 44 fathoms, one living, one valve, and 46 fathoms, 2 very juv. valves; False Bay 42–47 fathoms, one living and one juv. valve (S. Afr. Mus. P.F. coll.).

Sebastian Bay 30–40 fathoms, one living (S. Afr. Mus. coll. K.H.B.).

False Bay, and 34° 48′ S., 22° 06′ E., 55 fathoms; and 34° 33′ S., 21° 52′ E., 42 fathoms; living (U.C.T.).

Hout Bay (west coast of Cape Peninsula), 9–20 fathoms, 2 living (S. Afr. Mus. P.F. coll.).

Type ? in British Museum.

Remarks. Odhner's *capensis* is obviously the same as Sowerby's *africana*, though the outline of the latter as figured may give a false impression. The present material, however, shows that the shape and the length/altitude ratio may vary.

Juveniles are sometimes difficult to separate from juveniles of *gilchristi*, though the concentric lirae are usually clearly more numerous in *capensis*.

Living examples have been taken in the Cape Morgan area, the Cape Infanta area, and at the mouth of False Bay; the species seems to be more abundant in the Cape Infanta area than elsewhere.

Two living examples were obtained at Hout Bay on the west coast of the Cape Peninsula, according to the *Pieter Faure* number 2276. This locality is rather surprising. An error in transcribing the number may have occurred; the original P.F. label is not extant. No other 4-figure number beginning with 2 offers a better locality; there are no 5-figure numbers beginning with 2; P.F. 1276 would give Cape St. Blaize, 34 fathoms, which would be acceptable. However, the occurrence of *Crassatella* on the west coast is supported by the recent capture of a living *gilchristi* at nearly the same locality by U.C.T.

Crassatella sowerbyi Lamy

Crassatella acuminata (*non* Kobelt), Sowerby, 1889b, p. 156, pl. 3, fig. 6; 1892, p. 62, pl. 2, fig. 69.
Crassatella sowerbyi Lamy, 1917, p. 236; Turton, 1932, p. 230.
Crassatella sowerbyi var. *rubrolineata* Turton, 1932, p. 231, pl. 60, no. 1611 (3 figs.).
Crassatellites sowerbyi (Lamy), Tomlin, 1931, p. 447.

Concentric lirae low, rounded-flattened, about as wide as the grooves, when not worn both lirae and grooves with very fine radial striae. Uniform yellowish-brown, or with faint radial stripes, or with longitudinal (antero-posterior) wavy or zigzag reddish bars, continuous or disrupted.

Length 35, altitude 22 mm. (Sowerby).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton; also S. Afr. Mus.).

Off Cove Rock (East London), 22 fathoms, 5 worn valves; 33° 50′ S., 25° 54′ E., 30 fathoms, one worn valve (S. Afr. Mus. P.F. coll.).

Remarks. Two of the Cove Rock specimens retain some of the periostracum, but only one is fresh enough to show the radial striation.

Turton's lower right-hand figure agrees well with Sowerby's figure; but his other two figures of smaller shells show a slightly angulated postero-dorsal margin.

Of the present material (only 7 valves!), 2 of the Cove Rock valves can be described as acuminate, but the other 3 have a convex (though slightly angular) postero-dorsal margin, almost as in *gilchristi*. The smaller Algoa Bay specimen and a very worn valve from the Kowie (Port Alfred) are also slightly angulated, producing a slightly truncate posterior margin. Is the acuminate shape due to abrasion?

This species has never been taken alive. The concentric liration is very like that on *gilchristi*.

Crassatella gilchristi Sow.

Crassatella gilchristi Sowerby, 1904, p. 8, pl. 6, fig. 14; Lamy, 1917, p. 238.

Transversely oblong, obtusely angled behind, rounded in front, postero-dorsal corner rounded, ventral margin rather straight or slightly convex, sometimes slightly concave; umbonal ridge obscure; very fine radial striae and concentric growth-lines; concentric lirae broad, about equal in width to the grooves, rounded-flattened (not due to abrasion), obsolescent anteriorly and posteriorly, in juv. at 2·5 mm. alt. 9 lirae, at 5 mm. 15–16, at 21–26 mm. *c.* 30. Anterior lunule long, narrow; margin internally crenulate; adductor scars impressed. Brown.

Length 29, alt. 21·5, thickness (valves together) 14 mm. (Sowerby); single valves (S. Afr. Mus.) 27 × 19, 29 × 21·5, 34 × 22·5 mm.; U.C.T. 37 × 26 × 14 mm.

Martha Point, Struys Bay (between Cape Agulhas and Cape Infanta), 42 fathoms, one (Sowerby. P.F. coll.).

Martha Point, 42 fathoms, 10 valves, Topotypes; off Cape St. Blaize, 39 fathoms, 2 half-grown valves; 34° 5′ S., 25° 43′ E., 52 fathoms, 5 juv. and 2 ad. valves (S. Afr. Mus. P.F. coll.).

34° 09′ S., 18° 16′ E. (off Hout Bay, west coast of Cape Peninsula), 41 fathoms, one living (U.C.T.).

Type ? in British Museum.

Remarks. Tomlin informed me that he considered this a synonym of *subquadrata* Sow. 1870; but he also said that *tenuis* was a young *subquadrata*. This cannot be correct, because *tenuis* and *gilchristi* are quite distinct. Sowerby (1904) said *tenuis* resembled *subquadrata*. Lamy also noted the resemblance between *subquadrata* and *tenuis*, and regarded *gilchristi* as a distinct species.

Jaeckel & Thiele (1931) recorded both *subquadrata* and *tenuis*, stating that the latter was very near the former but distinguished by the thin shell, fine radial sculpture, and prominent anterior end. All the *Valdivia* localities are on the Agulhas Bank and fall within the area of distribution as shown by the P.F. material; for distributional purposes therefore they may be disregarded, while the identity of the shells remains *sub judice*.

The shape of the largest shell in South African Museum, 34 × 22·5 mm., is notably more elongate than usual.

The 10 topotype valves are from the bottom-sample of the same haul which obtained the single specimen described by Sowerby.

Only 9 others are referable to *gilchristi*: 2 from Algoa Bay measure 22 and 25 mm. in length, the latter with rather strongly convex ventral margin, but otherwise typical; the 5 juv. measure 3–8 mm. in length. The 2 from Cape St. Blaize are half-grown, length 15 mm. and 17 mm., and like the juveniles flatter than the larger shells; faint brown radiating streaks are visible.

Crassatella crebrilirata Sow.

Crassatella crebrilirata Sowerby, 1870, p. 249; Lamy, 1917, pp. 237, 238.
Crassatella angulata Sowerby, 1904, p. 9, pl. 6, fig. 16.

Transversely oblong, angularly truncate behind, rounded in front, umbonal ridge (Sowerby, 1904: 'angle') well marked but rounded; very fine concentric growth-lines, becoming coarser and subliriform after shell has reached an altitude of *c.* 12 mm.; obscure radial striae seen after removal of periostracum. Anterior lunule rather long; margin internally crenulate; adductor scars raised, the posterior one more so than the anterior one. Corneous, fulvous, or pinkish, sometimes with faint pale radiating streaks.

Length 28, alt. 18, thickness 13 mm. (Sowerby: *angulata*; also S. Afr. Mus.).

Agulhas Bank, 15 fathoms (Sowerby: *crebrilirata*).

Off Umhlangakulu River (Natal), 50 fathoms, one (Sowerby: *angulata*. P.F. coll.).

Off Sandy Point (north of Kei River), 51 fathoms, one ad. and 2 half-grown living, and 5 valves; off Cape Morgan, 45–52 fathoms, 4 worn valves; Nanquas Peak (east end of Algoa Bay), 49 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Type of *angulata* ? in British Museum.

Remarks. Tomlin informed me he agreed with Lamy that *angulata* was synonymous with *crebrilirata*.

The Type of *angulata* was originally entered in the South African Museum register (no. 14847), but is no longer present in the collection.

The non-lirate early part of the shell distinguishes this species from *capensis*, as do also the raised adductor scars, particularly the posterior one.

The Nanquas Peak specimen is covered from anterior to posterior margin with close-set concentric orange-brown zigzags.

Crassatella abrupta Sow.

Crassatella abrupta Sowerby, 1904, p. 10, pl. 6, fig. 15.

Subtriangular, with strong rounded smooth concentric lirae, as broad as, or slightly narrower than the grooves, *c.* 19 at alt. 5–6 mm., 22–23 at 9 mm., obsolescent posteriorly on older shells; extremely fine radial striae seen in the grooves and on the later formed lirae but worn off near the umbones.

Length 16, alt. 14, thickness (valves together) 10 mm. (Sowerby).

Off Umhloti River (Natal), 100 fathoms (Sowerby. P.F. coll.).

O'Neil Peak (Zululand), 90 fathoms, 6 living, 4 valves, and one very juv. valve; off Cape Natal (Durban), 85 fathoms, 3 valves (S. Afr. Mus. P.F. coll.).

29° 46′ S., 31° 17′ E., 60–70 fathoms (U.C.T.).

Type in British Museum.

Remarks. C. indica Smith 1895 (1897, pl. 4, figs. 3, 3*a*, *b*) is comparable, but the abrupt posterior endings of the lirae, not clearly shown in Sowerby's figure distinguishes the South African species. According to Smith (1906a, p. 258) *Crassatellistes* [*sic*] *omanensis* from the Gulf of Oman, 230 fathoms, is even closer to *abrupta*, but grows to a larger size and is more compressed: 35 × 28 × 17 mm.; and has continuous lirae.

Crassatella burnupi Lamy

Fig. 19 *a*

Crassatella burnupi Lamy, 1920b, p. 153, text-fig.

Worn valve—subtriangular (Lamy: subquadrangular), obliquely truncate behind, broadly rounded in front, umbonal ridge distinct; concentric lirae broad, flat; radial striae visible in umbonal region. Length 50, alt. 41, thickness (one valve) 15 mm. (Lamy).

Umkomaas, Natal (Lamy. coll. Burnup *circa* 1900).

Type in Paris Museum.

Remarks. No further specimens of this curious form seem to have been recorded; which is perhaps not surprising because wave action and weathering do not always produce the same shape from shells originally alike. Lamy did not suggest to what extent the posterior margin was due to wear. How thick is the margin? Such a specimen should not have been described as a new species. It is scarcely eligible for inclusion in the fauna-list.

A free-hand copy of Lamy's photographic text-figure is here given for comparison with the next species.

Crassatella natalensis n.sp.

Fig. 19 *b*

Subquadrangular, moderately convex, obliquely truncate behind, rounded in front, umbonal ridge distinct, postero-dorsal margin straight, posterior margin straight, sometimes very slightly concave, ventral margin not very convex; faint traces here and there of very fine radial striae on some valves (sed ?); concentric lirae *c.* 10 at 2 mm. alt., 18–20 at 5 mm., 29–35 at 14 mm., rounded, about as wide as the grooves but sometimes narrower, up to alt. 2 mm. evenly rounded from anterior to posterior margin, thereafter rather sharply bent at right angles at the umbonal ridge. Adductor muscle scars impressed, margin internally crenulate. The freshest valves with faint traces of orange radial, somewhat discontinuous stripes.

Fig. 19. *a*, *Crassatella burnupi* Lamy. copy after Lamy. *b*, *C. natalensis* n.sp., with profile, *c*, *C. pilual* n.sp., with profile, and profiles of lirae at different stages.

Length 20, alt. 14, thickness (one valve) 4–5 mm.

Off O'Neil Peak (Zululand), 90 fathoms, 11 valves; off Umhloti River (Natal), 40 fathoms, one valve; off Cape Natal (Durban), 54 fathoms, 4 valves and one juv. (Types) (S. Afr. Mus. Nos. A9509 (Types), A9510, A9511. P.F. coll.).

Remarks. If these smaller valves should prove to be *burnupi*, the 'cause accidentale' (Lamy) of only one worn valve of *burnupi* having been washed ashore might perhaps be the deep water habitat at which the present valves were dredged.

The feature distinguishing these valves from other South African species is the right-angled bend of the lirae at the umbonal ridge (more marked than in *tenuis*). This appears also in *burnupi*, but in the latter the shape of the area encompassed by the umbonal ridge, the anterior and the ventral margin approximates far more to an equilateral triangle than in the present valves.

The course of the lirae is somewhat similar in *tenuis*, but in *natalensis* the lirae are not Λ-shaped, and the umbonal ridge is more distinct.

Crassatella pilula n.sp.

Fig. 19 *c*

Strongly convex, short quadrangular, rounded-subtruncate behind, rounded in front, postero-dorsal margin straight, antero-dorsal margin straight or very slightly concave, sloping, approximately at right angles to the postero-

dorsal margin, posterior margin nearly straight, ventral margin convex; fine radial striae, best seen posteriorly where the grooves are not so narrow as elsewhere; numerous concentric lirae from anterior to posterior margins, flattened, about as wide as grooves in early stages, but later wider than the grooves, the latter often and especially near the ventral margin becoming mere impressed lines due to the distal margin of the lirae projecting over the grooves like eaves on a house; at 2 mm. alt. *c.* 15 lirae, at 5 mm. 26, at 11 mm. *c.* 53. No umbonal ridge; anterior lunule broad (length 4, width 2·5 mm.). Adductor muscle scars impressed, margin internally crenulate. Yellowish-buff, one valve with faint traces of orange radial streaks.

Length 13, alt. 11·5, thickness (valves together) 9·75 mm.

Off Cape Morgan, 77 fathoms, 3 living, 7 valves (S. Afr. Mus. No. A3665. P.F. coll.).

Remarks. Shorter and more inflated than any of the other South African species. More obese than *indica* Smith 1895, but otherwise very similar. The subimbricate lirae on the later part of the shell are rather distinctive.

Fam. **Carditidae**

Turton's *Cardita rufanensis* is *Arca* (*Barbatia*) *cafria*; and *C. irregularis* is probably a worn *Crassatella*.

Cardita variegata Brug.

Cardita variegata Bruguière, 1792, p. 402; 1797, pl. 223, fig. 6; Krauss, 1848, p. 13; Jaeckel & Thiele, 1931, p. 215; Prashad, 1932, p. 143 (references); Nardini 1937, p. 250, pl. 16(10), fig. 15; Stephenson, 1948, p. 267; Macnae & Kalk, 1958, pp. 37, 129.
Cardita variegata var. *turgida* Krauss, 1848, p. 13.

The smallest present shell 12 mm. in length shows no trace of the formation of a brood chamber. In some of the shells the ventral margin may be slightly concave, but there is no notch or indent as in *T. concamerata*.

Fossil: Post Pliocene; Inhambane (Cox 1939); Pleistocene, Geol. Surv. S. Afr. Durban, Zanzibar (Cox).

Natal (Krauss; also S. Afr. Mus.).

Umpangazi (Zululand) to Port St. Johns (Stephenson, U.C.T.).

Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also U.W.); Bazarute Island (S. Afr. Mus.).

35° 16′ S., 22° 26′ E., 155 metres, one valve (Jaeckel & Thiele).

Off O'Neil Peak (Zululand), 90 fathoms, one worn valve (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea, East Africa, Madagascar, Indo-Pacific.

Cardita pulcherrima Sow.

Cardita pulcherrima Sowerby, 1904, p. 7, pl. 6, fig. 2.

Subcircular, with 19 radial riblets, ornamented with close-set, longitudinally oval bead-like nodules. Buff, obscurely variegated with orange-brown.

Length 10, alt. 10, thickness (valves together) 6·5–7 mm. One of the worn valves from Cape Natal, 85 fathoms 11 × 11 mm.

Off Cape Natal (Durban), 54 fathoms (Sowerby, P.F. coll.).

Same locality, 4 living, 6 valves, cotypes; same locality, 85 fathoms, 2 valves; off Umhloti River, 40 fathoms, 6 valves (one of them juv.); off Umkomaas, 40 fathoms, one living, 16 valves (from 3 mm. upwards); off Tugela River, 65–80 fathoms, 3 valves; off O'Neil Peak (Zululand), 90 fathoms, 4 valves; off Hood Point (East London), 49 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Type ? in British Museum. Cotypes in South African Museum (No. A9512).

Remarks. Has the same beaded (like little sausages) riblets as *Carditella rugosa*, but differs in shape.

The figure of *pelseneeri* Prashad (1932, p. 147, pl. 5, figs. 1, 2), from the East Indies, appears very similar.

Thecalia concamerata (Brug.)

Fig. 20 *a*

Cardita concamerata Brug. Krauss, 1848, p. 13; Jaeckel & Thiele, 1931, p. 216; Turton, 1932, p. 232.
Thecalia concamerata (Brug.), Stephenson, 1948, p. 267.
Cardita rietensis Turton, 1932, p. 232, pl. 60, no. 1616 (= juv.).

Radial riblets on the part anterior to the ventral notch (which indicates the brood chamber) 7–8 (9), posterior to the notch (6)7–12; usually squamose, sometimes strongly so, but variable.

The brood chamber begins to develop at about 8–10 mm. length. Externally it is marked by an indent or notch. In large examples the shell posterior to this notch is much deeper than the anterior part.

The smallest shell containing juveniles in the brood chamber is 11 mm. in length; but at this length the chamber is not always fully developed. A fully developed chamber may occupy about one quarter of the area of the valve, e.g. in a shell length 15, alt. (deepest part) 11 mm. the chamber measures 6·5 × 5 mm.

Juveniles with prodissoconch from 0·25 up to 0·5 mm. are found in the brood chamber; they seem to be liberated at a length of 0·5–0·75 mm., at which stage they are oval in shape and equilateral. At about 1 mm. length the radial riblets *c.* 11–12 begin to appear; the junction between the prodissoconch and later growth persists as a raised collar, which can be seen in (unworn) shells up to about 8 mm. length. At 2 mm. length the shell is definitely inequilateral.

Length up to 21 mm.

Saldanha Bay, Table Bay, False Bay to Mossel Bay (S. Afr. Mus.); Port Alfred (Bartsch, Turton); Natal (Krauss).

Port Nolloth to Table Bay, and False Bay to Kleinmond (Bathurst Division) (U.C.T.).

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres, valves (Jaeckel & Thiele).

Algoa Bay, 67 fathoms; off Cape Morgan, 47 fathoms; and Cove Rock (East London), 43 fathoms, all dead valves (S. Afr. Mus. P.F. coll.).

Off Table Bay, 131–136 fathoms, living (S. Afr. Mus. P.F. coll.).

Remarks. Stephenson (U.C.T.) obtained no material, identifiable with certainty as *concamerata*, east of Kleinmond. The species occurs as far as Port Alfred; but Krauss is the only author to record it from Natal.

Turton refers to the suggestion (cf. Smith 1885, p. 215) that shells without brood chambers are male. Among dozens of this common shell I have not seen one over 10 mm. in length without indication of the formation of a brood chamber; but I have no suitably preserved material to determine whether the species is di- or monoecious.

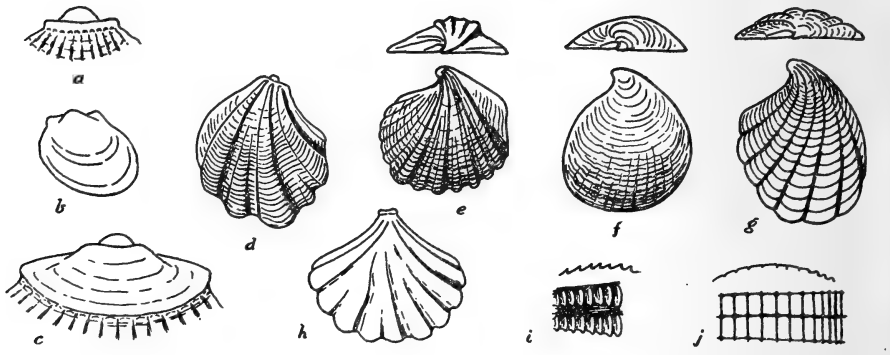


FIG. 20. *a*, *Thecalia concamerata* (Brug.) prodissoconch. *b*, *c*, *Carditella rugosa* Sow., juvenile with prodissoconch, 0·75 mm.; prodissoconch and umbo of shell 1·3 mm. long (antero-posterior). *d*, *e*, *Venericardia elata* (Sow.) right valve of juvenile 1·25 × 1·5 mm., left valve of adult, with profile. *f*, *V. minima* (Smith) left valve. *g*, *V. fortisculpta* n.sp. left valve, with profile. *h*, *C. laticosta* Smith juvenile 1·5 × 1·3 mm. *i*, *C. capensis* Smith two radial ribs with profile. *j*, *C. similis* J. & T. two radial ribs with profile.

Venericardia elata (Sow.)

Fig. 20 *d*, *e*

Cardita elata Sowerby, 1892, p. 63, pl. 3, fig. 67; Turton, 1932, p. 232.
Venericardia elata (Sow.), Bartsch, 1915, p. 192; Jaeckel & Thiele, 1931, p. 216.
Venericardia africana Bartsch, 1915, p. 192, pl. 48, fig. 3, pl. 54, figs. 5, 6.
Cardita africana (Bartsch), Turton, 1932, p. 232.

Prodissoconch separated from succeeding growth by a slight collar, 0·3 mm. wide (antero-posteriorly), 3 riblets beginning at collar but soon, at alt. 0·5 mm., with an additional one, making the 4 main ribs which demarcate the middle area of the shell, and from which the anterior and posterior areas slope away; posteriorly this slope is slightly but usually distinctly concave; additional riblets develop by interpolation between the 4 main ribs, also on the anterior area,

up to a total of 16–17. Close-set concentric growth-lines crossing the ribs and grooves, undulate, often somewhat lamellose and imbricate. Margin internally crenulate.

Up to length 6, alt. 6·5 mm.; but usual size 4·5 × 5 mm.

Port Elizabeth (Sowerby). Port Alfred (Smith, Bartsch, Turton).

34° 8′ S., 24° 59′ E., 80 metres; 35° 29′ S., 21° 3′ E., 102 metres (Jaeckel & Thiele).

Off Cape Natal (Durban), 85 fathoms, 20 valves; off Illovo, 27–30 fathoms, one living, 7 valves; off Cape Morgan, 45–52 fathoms, 3 living, 23 valves; Sandy Point (north of Kei River), 51 fathoms, 2 living, 7 valves; off Cove Rock (East London), 22 fathoms, 16 valves; Algoa Bay, 33 fathoms, one living, 10 valves; St. Francis Bay, 24–34 fathoms, one valve (S. Afr. Mus. P.F. coll.).

False Bay, 22 fathoms (U.C.T.).

Remarks. The present material, living, fresh and in various stages of wear, juvenile and adult, leaves no doubt as to the above synonymy. Neither Bartsch nor Turton seem to have realized that *elata* has more ribs than *africana* merely because the former is a larger and older shell.

The raised median area with its four main ribs is characteristic; though some specimens may not be too easily distinguished from *minima*.

In some valves decomposition of the surface produces a series of pits along one or more of the growth-lines in the grooves between the ribs.

Venericardia minima (Smith)

Fig. 20*f*

Cardita minima Smith, 1904a, p. 41, pl. 3, fig. 22; Turton, 1932, p. 232.
Cardita minima var. *uniradiata* Turton, 1932, p. 232, pl. 60, no. 1621.
Cardita formosa Turton, 1932, p. 232, pl. 60, no. 1622.
Miodontiscus minima (Smith), Bartsch, 1915, p. 193.
Venericardia (*Miodontiscus*) *agulhasensis* Jaeckel & Thiele, 1931, p. 216, pl. 8(3), figs. 82, 82*a*.

Profile from anterior to posterior margins evenly curved. Juveniles (*minima*) with only close-set concentric growth-lines; radial ribs (*agulhasensis*) beginning at about 2–2·5 mm. alt., but sometimes earlier 1·5–2 mm., always subordinate to the growth-lines which in adult become undulate, sublamellose and imbricate.

Length 5·5, alt. 6·5 mm.

Port Alfred (Smith, Bartsch, Turton). Still Bay, juv. only (S. Afr. Mus. coll. Muir).

34° 51′ S., 19° 37′ E., 80 metres; 35° 29′ S., 21° 3′ E., 102 metres; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel & Thiele).

Algoa Bay 33 and 67 fathoms, 4 juv. living, and numerous juv. and ad. valves. Off Cape St. Blaize, 37 fathoms, one juv. (S. Afr. Mus. P.F. coll.).

33° 58′ S., 25° 42′ E., 14 fathoms (U.C.T.).

Remarks. The numerous specimens from Algoa Bay show the change from *minima* to *agulhasensis*.

Venericardia fortisculpta n.sp.

Fig. 20 *g*

Profile from anterior to posterior margins evenly curved. Seven narrow and shallow radial grooves separating 8 low, broad, rounded ribs. Growth-lines well separated. Margin internally undulate, corresponding with the external ribbing.

Length 3·3, alt. 3·5 mm.

Port Alfred, one worn valve (S. Afr. Mus. coll. et don. W. H. Turton, labelled *africana*).

Algoa Bay, 52 fathoms, 4 valves (S. Afr. Mus. A9519 Types. P.F. coll.).

Venericardia nuculoides n.sp.

Subtriangular, a little longer than high, slightly oblique, the gently convex postero-dorsal margin a little longer than the straight (or very slightly concave) antero-dorsal margin, umbones curving forwards but not hook-like as in *elata*. Prodissoconch distinct, smooth and polished, but no definite collar; 20–24 low, flat radiating riblets, never conspicuous, often indistinct. Fine close-set growth-lines, smooth. Margin internally crenulate, corresponding with the external ribbing.

Length 5·5, alt. 5 mm.

Periostracum pale brown or corneous, the umbonal region usually more or less corroded.

Sea Point (Cape Town) (S. Afr. Mus. Nos. 5001, 5002, A7447).

Living: 32° 5′ S., 18° 17′ E., 15 fathoms (Types); 32° 5′ S., 18° 16′ E., 20 fathoms (U.C.T.).

Types in South African Museum (S. Afr. Mus. Reg. no. A29661).

Remarks. The slight obliquity and the colour give this species a Nucula-like appearance. The obliquity distinguishes it from *Carditella subradiata*, the latter moreover having stronger radial sculpture.

Incubatory.

A small living specimen from Still Bay (S. Afr. Mus. A9508 coll. Muir) is probably this species; but as the species has not been found in False Bay, further material is required to confirm its occurrence on the south coast.

Fam. **Condylocardiidae**

Carditella rugosa Sow.

Fig. 20 *b*, *c*

Carditella rugosa Sowerby, 1892, p. 63, pl. 3, fig. 65; Jaeckel & Thiele, 1931, p. 213; Turton, 1932, p. 233, pl. 61, no. 1625 (3 figs.).

Adult inequilateral. Prodissoconch 0·5 mm. long (antero-posteriorly), with collar, succeded by a smooth space and a second collar; at this stage length 1 mm., after which the riblets (14)15 appear; these ribs run to the

margin without any additional ribs being interpolated, except one or two at the anterior or posterior margin, making a total of 16–17. Up to 3·5 mm. length the shell remains equilateral. Growth-lines close. Ribs with oblong-oval beads.

Up to length 10, alt. 8 mm.

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

34° 51′ S., 19° 37′ E., 80 metres; 34° 8′ S., 24° 59′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres; 35° 29′ S., 21° 3′ E., 102 metres; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel & Thiele).

Off Cape Morgan, 52 fathoms, one living, several valves; off East London, 22–49 fathoms, 2 living, numerous valves; Algoa Bay, 25–67 fathoms, numerous valves; off Cape St. Blaize, 39 fathoms, 6 valves (S. Afr. Mus. P.F. coll.).

Remarks. Growth-lines on the smooth area within the 2nd collar seem to be accentuated by wear, usually two as shown in Turton's lower right-hand figure. Very young shells up to 2 mm. might be difficult to distinguish from those of *Thecalia concamerata* except for the double collar. After 2 mm. *T. concamerata* is inequilateral, and becomes far more inequilateral than *rugosa*.

A specimen at the 2nd collar stage, sent to the South African Museum by Turton, was misidentified by him as *Condylocardia io* Bartsch.

Carditella laticosta Smith

Fig. 20 *h*

Carditella laticosta Smith, 1904a, p. 41, pl. 3, fig. 23; Jaeckel & Thiele, 1931, p. 212.
Cardita laticostata [sic] Bartsch, 1915, p. 192; Turton, 1932, p. 231, pl. 60, no. 1614 (adult & juv.).

Oval, inequilateral, compressed; 12–13 radial ribs, not squamose or beaded; very fine close-set concentric growth-lines crossing ribs and grooves. Prodissoconch with inconspicuous collar; at 1·5 × 1·3 mm. equilateral, with 5 riblets, including the thickened antero- and postero-dorsal margins, increasing by bifurcation.

Length 7·5, alt. 4·5 mm.

Port Alfred (Smith, Bartsch, Turton).

34° 51′ S., 19° 37′ E., 80 metres, one valve (Jaeckel & Thiele).

Algoa Bay, 67 fathoms, 7 valves, including one very juv.; off Cape Morgan, 52 fathoms, 8 valves; off Cape Infanta, 46 fathoms, one valve; off Cape St. Blaize, 37 fathoms, one worn valve (S. Afr. Mus. P.F. coll.).

Carditella valdiviae J. & T.

Carditella valdiviae Jaeckel & Thiele, 1931, p. 212, pl. 8(3), fig. 79.

Oval, inequilateral, somewhat similar in shape to *laticosta*, but with *c.* 20 radial riblets, crossed by irregular concentric growth-lines. Length 6·5, alt. 5 mm., and 7·5 × 6 mm.

34° 51′ S., 19° 37′ E., 80 metres; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel & Thiele).

Off Cape Infanta, 46 fathoms, one valve; Hood Point (East London), 49 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Remarks. Jaeckel & Thiele had several valves, some of them damaged; and probably they were all more or less worn. The only P.F. specimen which resembles the figure is worn, but appears to have had nodulose ribs.

Carditella capensis Smith

Fig. 20 *i*

Carditella capensis Smith, 1885, p. 216, pl. 15, figs. 7–7*c*; Jaeckel & Thiele, 1931, p. 213.

Equilateral. Prodissoconch with a collar, succeeded by a smooth area, usually showing one or two accentuated growth-lines, bounded by a 2nd collar as in *rugosa*, length (antero-posteriorly) 0·5 mm. Ribs 17–18(19), no interpolated ribs except one or two at antero- and postero-dorsal margins, with raised *squamulae* (Smith: 'compressed nodules') where crossed by the concentric growth-lines; intervening grooves well marked, only slightly narrower than the ribs. Length 5·3, alt. 4·75.; Smith: 4 × 3·5 mm.

Simon's Bay, False Bay, 15–20 fathoms (Smith).

33° 50′ S., 25° 48′ E.; 35° 29′ S., 21° 3′ E., 102 metres (Jaeckel & Thiele).

False Bay, including the type locality, 14–45 fathoms, living and valves; off Cape St. Blaize, 60 fathoms, 7 valves; off Cape Infanta, 46 fathoms, one living, 3 valves; off Sandy Point (north of Kei River), 51 fathoms, one living, one valve; off Saldanha Bay, 37 fathoms, 2 living (S. Afr. Mus. P.F. coll.).

34° 17′ S., 17° 53′ E., 320 metres, one juv. living (U.C.T.). False Bay, 7 fathoms, Algoa Bay, 42 fathoms (U.C.T.). Lüderitzbucht, 73 metres (U.C.T.).

Distribution. Great Fish Bay, Angola (Jaeckel & Thiele).

Remarks. Incubatory. The profile of the ribs is serrate.

The Saldanha Bay specimens are somewhat corroded, but show the characteristic features (see *similis*).

Carditella similis J. & T.

Fig. 20 *j*

Carditella similis Jaeckel & Thiele, 1931, p. 214, pl. 8(3), fig. 81.

Equilateral. Prodissoconch with collar, and smooth area bounded by a 2nd collar, as in *rugosa* and *capensis*. Ribs 20–21, with *flat* nodules, oval-subcircular in early growth, becoming transversely quadrangular later, and then near the margin in adult shells narrow transverse bars; intervening grooves very narrow, sometimes like mere knife cuts. Length 8·5, alt. 7·25 mm.

33° 50′ S., 25° 48′ E.; 35° 16′ S., 22° 26′ E., 155 metres; 33° 41′ S., 18° O′ E., 178 metres (off Table Bay) (Jaeckel & Thiele).

Algoa Bay, 52 fathoms, several living and valves; off Cape St. Blaize, 125 fathoms, several living and valves; Cape Point N.E. ½ N. (off west coast of Cape Peninsula) 145 fathoms, one living; Lion's Head (Table Mt.) S.E., 95 fathoms, 2 living; off Paternoster Point (Saldanha Bay), 31 and 80 fathoms, several living, corroded (S. Afr. Mus. P.F. coll.).

Off Saldanha Bay, 150 fathoms (U.C.T.). 34° 51′ S., 23° 41′ E., 100 fathoms (U.C.T.).

Remarks. Distinguished from *capensis* by the very narrow grooves, and the flat nodules on the ribs; the profile of the ribs is not serrate, except somewhat bluntly near the margin in adult shells. Incubatory.

A very similar sculpture is seen in *Cuna gambiensis* Nicklès (1955, p. 147, fig. 20 A).

The specimen from off the west coast of the Cape Peninsula is not corroded; the larger of the two from off Table Bay is slightly corroded at the umbones. But the Saldanha Bay specimens are all more or less badly corroded, including living shells, a condition which is found in several other shells from this area.

Carditella subradiata J. & T.

Carditella subradiata Jaeckel & Thiele, 1931, p. 213, pl. 8(3), fig. 80.

Equilateral. A smooth area succeding the prodissoconch with growth-lines only, but not so distinct as in the other species, and without a collar separating it from the ribs. Ribs 22–24, smooth, crossed only by very fine and close-set concentric growth-lines; grooves shallow, narrower than the ribs. Length 3·8, alt. 3·5 mm. Jaeckel & Thiele record some specimens exceeding these measurements by 1 mm.

35° 26′ S., 20° 56′ E., 80 metres; 35° 29′ S., 21° 3′ E., 102 metres (Jaeckel & Thiele).

Off Tugela River (Natal) 65–80 fathoms, one valve; off Umhloti River (Natal), 40 fathoms, 23 living, 12 valves; off Cape Natal (Durban), 54 fathoms, 3 living, 2 valves; off Umkomaas (Natal), 40 fathoms, 5 living, 27 valves; off Hood Point (East London), 49 fathoms, one double-valved but dead; Algoa Bay, 67 fathoms, 18 valves; off Cape St. Blaize, 37 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Algoa Bay, 14 fathoms (U.C.T.).

Remarks. Seems to be a Natal species, as all the P.F. valves from farther south are worn.

Fam. **Corbiculidae**

Corbicula africana (Krauss)

Corbicula africana (Krauss), Connolly, 1939, p. 619, pl. 18, figs. 10–14.

This fluviatile species is mentioned only to record a single valve taken by the *Pieter Faure* off Nanquas Peak (eastern end of Algoa Bay) N.W. ¼ N. distant 15 miles, 49 fathoms.

Fam. **Kellyellidae** (Vesicomyidae)

Vesicomya valdiviae J. & T.

Vesicomya valdiviae Jaeckel & Thiele, 1931, p. 229, pl. 9(4), fig. 101.

Shell large, 60 × 37 mm., oval, thick, chalky, with concentric growth-lines. In each valve 3 stout cardinal teeth, and an anterior lateral tooth.

Specimens of this species are recorded as having been obtained in the North Atlantic (24° 35′ N., 17° 4′ E., 2,500 metres), and also on the Agulhas Bank: 35° 10′ S., 23° 2′ E., 500 metres.

The genus occurs in deep water in the Atlantic and Indian Oceans, and its occurrence on the south-eastern slope of the Agulhas Bank is not very surprising.

This area was not explored by the *Pieter Faure*, whose main objective was the fishing areas on the Agulhas Bank itself. Browne's Bank on the southern tip of the Bank was dredged, but no specimens of, or fragments referable to *Vesicomya* were obtained.

The record requires confirmation.

Fam. **Ungulinidae**

Two gill lamellae on each side (tetrabranch). Foot long, apically swollen. Anterior adductor scar continuing the direction of (united with) the pallial line. (See: Pelseneer, 1911, pl. 13, fig. 6.)

For *Ungulina alfredensis* Bartsch see: *Thracia alfredensis* (p. 573).

For *Cryptodon eutornus* Tomlin see: *Lucina edentula* (p. 470); for *C. subradiatus* Gould see: *Phacoides valida* (p. 472), and *Erycina subradiata* (p. 481).

Gen. Diplodonta Bronn

Jaeckel & Thiele (1931) recorded:

Diplodonta africana Bartsch from 34° 51′ S., 19° 37′ E., 80 metres.

Diplodonta (*Felania*) *rosea* Récluz from 35° 16′ S., 22° 26′ E., 155 metres, and 35° 29′ S., 21° 3′ E., 102 metres.

Diplodonta (*Felania*) *agulhasensis* n.sp. see below.

Felaniella alfredensis Bartsch from 35° 26′ S., 20° 56′ E., 80 metres.

The *Pieter Faure* obtained several valves which can be assigned to one of the species hitherto recorded from South Africa, all of which seem to be flattish (complanate). She also obtained several valves, mostly in the Natal area, which are definitely ventricose, and which are here referred provisionally to an East African species.

The specimens on which Turton (1932) based three 'species' of *Diplodonta* and one of *Felania* require re-examination; some of the figures look as if they might be *Crassatella*.

Diplodonta (*Felania*) *subradiata* (Sow.)

Fig. 21 *a*

Felania subradiata Sowerby, 1892, p. 62, pl. 3, fig. 73; Smith, 1904a, p. 25; Turton, 1932, p. 236; Cox, 1939, p. 100.

Felania whitechurchi Turton, 1932, p. 236, pl. 62, no. 1649 (juv.).
Tellina crassa (*non* Pennant) Turton, 1932, p. 249, pl. 67, no. 1755.

Complanate, suborbicular, but slightly trigonal, antero- and postero-dorsal margins gently convex, declivous, umbo subtending an angle of *c.* 115°, nearly equilateral in adult, but anteriorly slightly bulging in juvenile; no lunule; concentric growth-lines only; two cardinal teeth, the anterior in the left, the posterior in the right valve bifid, no laterals.

Length 19–20, alt. 20 mm., thickness (one valve) 4·5 mm.

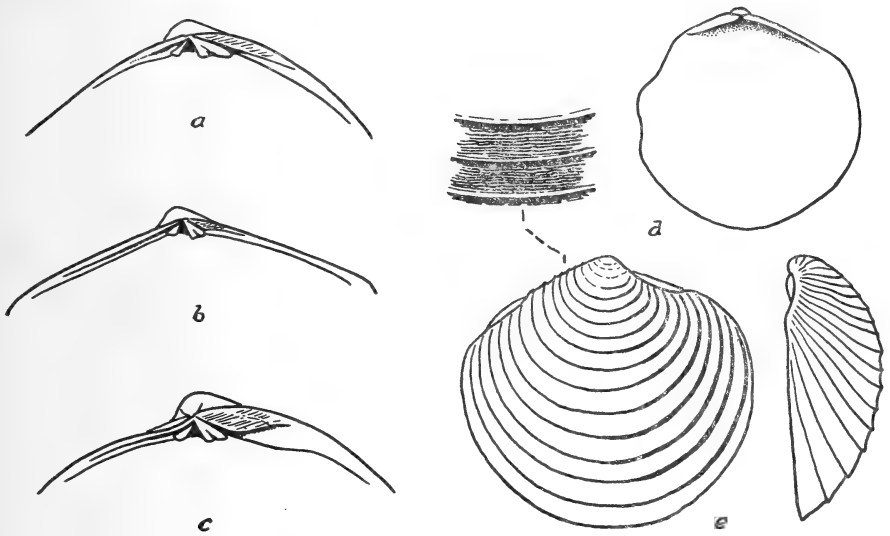


FIG. 21. Hinge (right valve) of: *a*, *Diplodonta subradiata* (Sow.). *b*, *D. agulhasensis* J. & T. *c*, †*D.* cf. *senegalensis* Rve. Internal view of *d*. *Thyasira polygonia* (Gould). *e*, *Phacoides saldanhae* n.sp., with intercostal sculpture further enlarged.

Externally and internally white or pinkish, with or without pink radiating rays; periostracum yellowish-brown; when rays are present they are usually more distinct internally, especially on the ventral margin.

Fossil: Post-Pliocene, Inhambane (Cox).

Port Elizabeth (Sowerby); Port Alfred (Smith, Turton); Still Bay (S. Afr. Mus. Mrs. Connolly coll.).

Off Tugela River (Natal), 37 fathoms, 5 valves; off Morewood Cove (north of Durban), 27 fathoms, one valve; off Umkomaas, 40 fathoms, 5 valves; off Nieca River (East London), 43 fathoms, one valve; off Cape Infanta, 46 fathoms, 5 valves (S. Afr. Mus. P.F. coll.).

False Bay, 26 fathoms, living (U.C.T.; also S. Afr. Mus. coll. Dr. Ackert 1960).

34° 51′ S., 23° 41′ E., 100 fathoms; and Algoa Bay, 14–25 fathoms (U.C.T.).

Remarks. The present series shows that young shells, even up to 15 mm.

long, are distinctly though slightly inequilateral, but the largest shells are almost equilateral.

The specific name refers not to any external surface sculpturing, but to the internal pink rays, often obscure.

Details of the coloration of 4 valves (shells taken alive at Gordon's Bay (False Bay) by Dr. H. Ackert): Length 20, alt. 20 mm. white with two pink rays; 17·5 × 17 mm. white with pink patches on internal margin; 17 × 16 mm. 8 or 9 pink rays on internal margin; 14 × 13 mm. internally pinkish-brown, with rays at margin.

Thanks to Dr. Cain, Oxford University Museum, I have been able to examine Turton's '*Tellina crassa*'; it is obviously a *D. subradiata*; and *whitechurchi* is merely a juvenile.

Diplodonta (*Felania*) *agulhasensis* J. & T.

Fig. 21 *b*

Diplodonta (*Felania*) *agulhasensis* Jaeckel & Thiele, 1931, p. 218, pl. 9(4), fig. 88 (juv.).

Complanate, subcircular but slightly ovoid, being longer than high, nearly equilateral, but posterior half appears slightly larger because the antero-ventral margin is somewhat oblique, antero- and postero-dorsal margins nearly straight, not declivous, umbo subtending an angle of *c.* 130°; no lunule; concentric growth-lines only; 2 cardinals, the anterior in the left, the posterior in the right valve bifid, no laterals.

Length 20, alt. 18·5, thickness (one valve) 3·5 mm.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin); Little Brak River, Mossel Bay (S. Afr. Mus.).

35° 26′ S., 20° 56′ E., 80 metres (Jaeckel & Thiele).

Off Tugela River, 37 fathoms, one valve; off Morewood Cove (north of Durban), 27 fathoms, 5 valves; off Nanquas Peak (eastern end of Algoa Bay), 49 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Remarks. Juveniles of this species and *subradiata* are not distinguishable with certainty; and as there will always be this uncertainty, it is preferable to utilize the name *agulhasensis* rather than to institute a n.sp.

Also, the fossil 15–20 mm. shells may be only immature examples of the cf. *senegalensis* recorded from the same deposits (*v. infra*).

Diplodonta cf. *sansibarica* J. & T.

? *Diplodonta rotundata* Mont., Smith, 1903, p. 398.
Diplodonta sansibarica Jaeckel & Thiele, 1931, p. 218, pl. 9(4), fig. 87.

Ventricose, subcircular or a little longer than high, whole circumference evenly curved; no lunule; fine concentric growth-lines producing on live shells a silky appearance, here and there slightly stronger growth-lines indicating resting periods; two cardinals, the anterior in the left, the posterior in the right valve bifid, no laterals.

Length 16, alt. 14, thickness (one valve) 5–5·5 mm.; 14 × 12 × 5 mm.

Dirty cream or white, some of the valves (Umhloti) with a faint pinkish tinge.

Fossil: Pleistocene, Durban north bridge, 60 feet below sea level (Geol. Survey).

Durban (Smith).

Off Tugela River (Natal), 65–80 fathoms, 3 valves; off Tongaat, 36 fathoms, 7 valves; off Umhloti River (Natal), 40 fathoms, 24 valves; off Cape Morgan, 77 fathoms, one valve; off Cape St. Blaize, 125 fathoms, one valve; False Bay, 42 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Living: Inhambane (U.C.T.).

Distribution. Off Dar-es-Salaam (Jaeckel).

Remarks. The specimens are probably conspecific with the shell recorded with a query as *rotundata* by Smith from Durban.

† *Diplodonta* cf. *senegalensis* Rve.

Fig. 21 *c*

Diplotodon [sic] cf. *senegalensis* Rve., Smith in Rogers, 1906c, p. 294.
Diplodonta cf. *senegalensis* Rve., van Hoepen, 1940, p. 191; Barnard, 1962b, p. 185.
Cf. *Diplodonta diaphana* Gmelin, Nicklès 1950, p. 188, fig. 351.

Subcircular, equilateral, no lunule; growth-lines moderately regular on early part, but later varying in strength; 2 cardinals, the anterior in the left, the posterior in the right valve bifid, no laterals, ligament deep.

Length 40, alt. 42, thickness (one valve) 13 mm.

Fossil: Pleistocene, Little Brak River, Mossel Bay (Smith in Rogers; van Hoepen; also S. Afr. Mus. coll. S. H. Haughton); Zwartkops (Port Elizabeth) and Keurbooms River (van Hoepen); Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.).

Remarks. Nicklès recorded *D.(F) diaphana* from the Quaternary of Benguela, and living from Mauritania to Angola, but did not mention *senegalensis*. One suspects that the two are synonymous, but having no material for comparison I record the present specimens under Reeve's name which has already been used in South African literature by Smith and van Hoepen.

Thyasira investigatoris (Smith)

Cryptodon investigatoris Smith, 1895, p. 13, pl. 2, figs. 6, 6*a*; 1897, pl. 3, figs. 2–2*b*; Sowerby, 1904, p. 12.
Thyasira investigatoris (Smith), Jaeckel & Thiele, 1931, p. 218.

Length 30, alt. 26, thickness (valves together) 22 mm. (S. Afr. Mus.).

Cape Point N.E. ¾ E. distant 40 miles, 720–800 fathoms, one presumably living (Sowerby: P.F. coll.).

33° 50′ S., 17° 21′ E., 600 fathoms, one right valve (S. Afr. Mus. coll. F. H. Talbot, 1959).

Distribution. Off Colombo, Ceylòn, 142–400 fathoms (Smith); 1° 50′ N., 96° 53′ E., 1,143 metres (Jaeckel).

Remarks. The P.F. shell (paired valves) was probably taken alive and preserved in formalin before being sent to Sowerby; it is now badly corroded and flaked.

Compare *T. excavata* Dall (1901, *Proc. U.S. Nat. Mus.* xxiii, p. 818, pl. 39, figs. 12, 15) from California.

Thyasira polygonia (Gould)

Fig. 21 *d*

Cryptodon polygonius Gould, 1861, p. 174.
Thyasira polygonia (Gould), Jaeckel & Thiele, 1931, p. 217.

Subcircular, equilateral, 2 shallow grooves on the posterior part (or as in Gould's description: 2 low 'angles', i.e. ridges), ventral margin evenly curved. Concentric growth-lines.

Length and alt. 8 mm. Gould: 4 × 3·5 mm. Faintly pinkish.

Simon's Bay (False Bay) (Gould, collected by W. Stimpson, 1853); St. Francis Bay, 80 metres, and Algoa Bay (Jaeckel & Thiele).

Simon's Bay, 22 fathoms, one living, 2 valves; False Bay, 32 fathoms, 2 living; False Bay, 45 fathoms, 4 valves; Cape Point N. 20° E., 14 miles, 85 fathoms, one living; 34° 5′ S., 25° 55′ E., 67 fathoms, 8 living, 10 valves (S. Afr. Mus. P.F. coll.).

32° 23′ S., 17° 48′ E., 143 metres, 3 living (s.s. *Africana* II, per U.C.T.).

Off Saldanha Bay, 75–150 fathoms; off Lamberts Bay, 92 fathoms (U.C.T.).

34° 26′ S., 21° 48′ E., 37 fathoms; False Bay, 44 fathoms; Plettenberg Bay, 26–61 fathoms; 34° 51′ S., 23° 41′ E., 100 fathoms; Algoa Bay, 68 fathoms (U.C.T.).

Remarks. As Gould said, this is 'more equal in its diameters' than *flexuosus* (Mont.).

Fam. **Lucinidae**

Only one gill on each side (dibranch). Foot variable, vermiform, not apically expanded. Anterior adductor scar projecting within the pallial line. (See: Pelseneer, 1911, pl. 13, fig. 8, pl. 14, figs. 5, 6.)

Lucina edentula (Linn.)

Lucina fragilis (*non* Phil.), Krauss, 1848, p. 5.
Axinus globosus (*non* Forskål), Sowerby, 1889, p. 157.
Loripes globosus (*non* Forskål), Sowerby, 1892, p. 61, pl. 4, fig. 91; Wybergh, 1920, pp. 58, 67.
Cryptodon globosus (*non* Forskål), Schwarz, 1900, p. 61; Smith, 1904a, p. 25; Smith in Rogers, 1906c, p. 294; Schwarz, 1910, p. 116.
Lucina globosus (*non* Forskål), Bartsch, 1915, p. 194; Braga, 1952, p. 118, pl. xi, fig. 6.
Loripes edentula (Linn.), Chenu, 1862, fig. 581; Stow, 1871, p. 517.

Lucina edentula (Chenu), von Martens, 1897, p. 229, pl. xi, figs. 1, 2; Lynge, 1909, p. 167; Prashad, 1932, p. 154 (references); Thiele, 1935, fig. 826; Barnard, 1962b, p. 185.
Cryptodon eutornus Tomlin, 1921, p. 215, pl. 8, fig. 5; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, p. 129.
Lucina (Cryptodon) eutornus (Tomlin), Turton, 1932, p. 235.

Length 66, alt. 53, thickness 49 mm. (Tomlin); 60 × 53 × 44 mm.; 60 × 56 × 23 (one valve) mm.; 65 × 54 × 24 (one valve) mm. (S. Afr. Mus.).

Fossil: Pleistocene; Klein River estuary, Hermanus (Wybergh); Keurbooms River estuary, Plettenberg Bay (Schwarz; also S. Afr. Mus. coll. K.H.B.); Little Brak River, Mossel Bay (Smith in Rogers; also S. Afr. Mus.); Sedgefield near Knysna (S. Afr. Mus. coll. A. R. H. Martin); Knysna raised beach (S. Afr. Mus.); Zwartkops valley, Port Elizabeth (Krauss, Stow, Schwarz).

Still Bay (S. Afr. Mus. coll. Muir); Port Elizabeth and Zwartkops estuary (Sowerby, Bartsch); Port Alfred lagoon (Smith, Bartsch, Turton); Port St. Johns (S. Afr. Mus.); Durban (Sowerby, Tomlin; also S. Afr. Mus.); Delagoa Bay (Braga; also U.W.).

Living: Knysna (U.C.T.); Durban Bay (U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K.H.B.); Inhambane (U.C.T.).

Distribution. Seychelles, Madagascar, Mauritius, Madras, Indo-Pacific.

Remarks. Examination of examples taken alive showed the dibranch character of the animal.

This estuarine species does not seem to have occurred anywhere on the west coast. The most westerly locality along the south coast at which fossils have been obtained is the Klein River estuary, Stanford. Apparently it is not living there today (1952, Scott, Harrison, & Macnae). It has been found living in the Knysna lagoon by U.C.T., but not recorded (1952, Day, Millard & Harrison).

The correct name for this 'fine and well-known South African bivalve' (Tomlin 1921) was first given by Stow. He perhaps identified it from Chenu's figure 581, as he attributed the authorship to Chenu; or he may have obtained it from W. S. Dallas of the Geological Society of London, to which Society he sent his collection of recent and fossil shells (Stow 1871, Editor's footnote p. 515).

Unfortunately Tomlin was not aware that Lynge (1909) had examined some of Krauss's specimens from Zwartkops, and had thereby confirmed the identity.

Prashad (1932) correctly included Sowerby's 1889 record in his bibliography of *L. edentula*; but incorrectly included Sowerby's 1892 and Smith's 1904a records in his bibliography of *Diplodonta globosa*. Lynge (p. 176) doubted whether Sowerby's 1892 figure 91 was *globosa* Forskål.

Tomlin did not have an animal to examine; but the inset anterior adductor scar shows that the species is a Lucinid, not an Ungulinid.

Cox (1927) did not mention *L. edentula* among the Zanzibar fossils.

Gen. Phacoides Blainv.

This name is said to have been used only as a vernacular name, and therefore *Dentilucina* Fischer has been adopted by Iredale and Prashad. Dall, Lamy, Thiele, and other authors, however, retain *Phacoides*.

Phacoides rosea (Angas)

Lucina rosea Angas, 1878, p. 860, pl. 54, fig. 6; Smith, 1910, p. 217.
Lucina columbella (*non* Lam.), Sowerby, 1892, p. 61.
Lucina despecta Smith, 1904a, p. 40 (nom. preocc. Phil.).
Phacoides despecta (Smith), Bartsch, 1915, p. 195.
Lucina contempta Cossmann, 1921, p. 181 (as quoted by Tomlin, 1931) (nom. nov. for *despecta* Smith preocc.); Tomlin, 1931, p. 447.
Loripes rosea (Angas), van Bruggen, 1952, p. 15.
[*Non*] *contempta* Turton 1932 (= *liratula*).

Subcircular, equilateral, a slight groove on posterior part. Regular, close-set concentric costae. Lunule large. Two cardinal teeth and anterior and posterior lateral denticles in both valves. Ligament external (partly). Margin internally finely crenulate.

Up to 20 × 20, thickness (one valve) 6–7 mm.

Natal (Angas); Tongaat (Natal) (S. Afr. Mus.); Inhambane (U.C.T.).

Port Alfred (Smith, Bartsch); Port Elizabeth (Sowerby, van Bruggen, S. Afr. Mus.); Jeffreys Bay (van Bruggen); Still Bay (S. Afr. Mus. coll. Muir).

Phacoides valida (Smith)

Lucina valida Smith, 1904a, p. 40, pl. 3, fig. 19; Turton, 1932, p. 235.
Phacoides valida (Smith), Bartsch, 1915, p. 194.
Lucina liratula (*non* Sow.), Turton, 1932, p. 235, pl. 62, no. 1640.

Inequilateral, but adult less so than juvenile, in the latter antero-dorsal margin more concave and umbo prominent. Radial riblets begin on posterior part of shell at about 2·5 × 2 mm. and on anterior part at about 3·5 × 3 mm., and thereafter on the intervening part. Lateral teeth well developed. Margin internally smooth.

Up to length 12, alt. 11 mm.; juveniles are relatively longer, e.g. 4·5 × 3·75 mm.

Port Alfred (Smith, Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir); Kalk Bay, False Bay, living (S. Afr. Mus.).

Remarks. Turton has confused *valida* and *liratula*.

Bartsch (1915) had examples of *valida* but did not compare them with the type of *Cryptodon subradiatus* (transferred to *Erycina*, and in error credited to Carpenter instead of Gould). In some respects Gould's description points to a Lucinid, but Dr. Rehder of the U.S. National Museum kindly compared specimens of *valida* sent to him, and found the two species quite distinct.

A worn and broken valve from off Cape Vidal (Zululand), 80–100 fathoms (S. Afr. Mus. A9678. P.F. coll.) is very similar to *valida*, but in the absence of any records from the coast of Natal, is not definitely assigned to this species.

Phacoides capensis J. & T.

Phacoides capensis Jaeckel & Thiele, 1931, p. 221, pl. 9(4), fig. 92.

Subcircular, or slightly longer than high, equilateral, no groove on posterior part; close-set concentric costae, more or less lamellose, especially near postero-dorsal margin in juveniles, but never very prominent, about 15–20 costae in a distance of 10 mm. on middle part of an adult shell; traces of wrinkles (minor growth-lines) in the intervals. Lunule narrow, elongate; escutcheon narrow. Two cardinal teeth and an anterior dentiform lateral in both valves. Ligament external. Inset part of anterior adductor scar narrow, elongate. Margin internally smooth.

Up to length 37, alt. 34, thickness (one valve) 9 mm.

Algoa Bay (Jaeckel).

Algoa Bay, 52–67 fathoms, 17 valves; off Cape St. Blaize, 125 fathoms, one valve; 36° 40′ S., 21° 26′ E., 200 fathoms, many valves, fresh and worn; off Sebastian Bluff, 40 fathoms, one living, one valve; Struys Bay, 42 fathoms, one valve; 34° 34′ S., 18° 32′ E., 100 fathoms (mouth of False Bay) one living; Simon's Bay, False Bay, 22 fathoms, one valve; off Cape Point, mouth of False Bay, 32–42 fathoms, 3 valves; south of Cape Point, 50 fathoms, 2 valves; Cape Point N. 2° E., 85 fathoms, one living, 2 valves; south-west of Cape Point, 120 fathoms, 3 valves; off Table Bay, 104 fathoms, one living (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Jaeckel).

Remarks. The examples from off Sebastian Bluff, from mouth of False Bay, and from off Table Bay were identified by Sowerby as *borealis* (Linn.), but not recorded in print. This species has been recorded from the North Atlantic, Azores and Canary Islands, Persian Gulf, East Indies and Philippines; it may therefore inhabit South African waters.

P. capensis, so far as Jaeckel's incomplete description goes (he did not mention the lunule) is clearly conspecific with the larger shells identified by Sowerby. Jaeckel did not suspect he had only juveniles. One has the choice of accepting or ignoring Sowerby's identification. As there are in the P.F. collection half-grown and adult shells from Algoa Bay, one of the type localities for *capensis*, I adopt the latter course.

The largest valve in the P.F. collection came from Algoa Bay, the next largest, 33 × 32 mm., from off Sebastian Bluff.

The moderately long series of 78 valves, ranging from 12 to 28 mm. in length, from 36° 40′ S., 21° 26′ E., shows that there is a slight variability in shape. The number and closeness of the concentric costae also varies: between 4 and 10 mm. alt. (the very early part of the shell is often corroded) there may be 12–15 costae, sometimes as many as 20; between 10 and 20 mm. alt. 15–20 costae.

Odhner (1923, p. 8, pl. 1, figs. 3–5) described *Lucina* (*Cavilucina*) *semilirata* from Port Alexander, based on a single empty shell 8 × 7 × 3·7 mm. Port

Alexander and Great Fish Bay are not much more than 50 miles apart. Odhner's specimen should be compared with the *Valdivia* shells.

Phacoides aequalis J. & T.

Phacoides aequalis Jaeckel & Thiele, 1931, p. 221, pl. 9(4), fig. 93.

One specimen, 12 × 10·5 × (valves together) 4·5 mm., agrees with the specimens assigned to *capensis* except in having a shorter and broader lunule, 2 × (valves together) 1 mm., and a broader escutcheon.

Jaeckel did not mention the lunule in his descriptions of either *capensis* or *aequalis*; it is therefore uncertain whether the P.F. material has been correctly assigned to the respective species. The *Valdivia* material should be re-examined.

34° 8′ S., 24° 59′ E., 80 metres (Jaeckel).

Off Cape Infanta, 45 fathoms, one living (S. Afr. Mus. No. 14849. P.F. coll.).

Two specimens, the larger the same size as the above, agree in the shape of the lunule and escutcheon, but the surface is almost smooth, without costae and with only very feebly raised growth-lines.

Buffels Bay, False Bay, 35 fathoms, one living, one valve (S. Afr. Mus. A29662. P.F. coll.).

Remarks. Further research will probably show that *aequalis* is only a synonym of *capensis*.

Phacoides saldanhae n.sp.

Fig. 21 *e*

Subcircular, equilateral, not hollowed on posterior part but the upper half of the posterior margin slightly flattened in the 51 mm. shell and the 22 mm. juvenile. No high keel on either side of the ligament or lunule. Widely spaced (more widely spaced than in *capensis*) lamellose concentric costae, and fine wrinkles in the intervals, variable in number: 5–7 on early part, increasing to 8–10(12) on later part. Umbones corroded. Lunule narrow, elongate. Two cardinal teeth and an anterior dentiform lateral in each valve. Ligament strong, external, in a shallow groove. Inset part of anterior adductor scar narrow, elongate. Margin internally smooth.

White, with a thin buff-coloured, or (in the juvenile) pale pinkish-brown, periostracum; ligament brown.

Length 54, alt. 50, thickness (valves together) 30 mm.; and 51 × 45 × 27 mm.; half grown 22 × 20 × 8·5 mm.

Saldanha Bay area: off Baboon Point, 31 fathoms, 2 living, Types; off Paternoster Point, 80 fathoms, one juv. living (S. Afr. Mus. A4473 (Types), and A5379 (juv.), S. Afr. Mus. P.F. coll.).

St. Helena Bay (32° 27′ S., 18° 06′ E. and 32° 23′ S., 17° 48′ E.) 66 and 143 metres, living (s.s. *Africana*, per U.C.T.). Walvis Bay, 99 metres (U.C.T.).

Remarks. The two large P.F. specimens were identified by Sowerby as *Loripes philippinarum* Hanley. They resemble Hanley's figure of a subcircular

shell, and the words in his description: 'distant lamellar ridges, whose intervals are unsculptured' are applicable if by 'unsculptured' he meant without *radial* sculpture (Hanley, 1842–56, p. 348, Suppl., pl. 14, fig. 18 [not 't.12.f.42' as given in text]).

Smith (1895, p. 13) identified an Indian Ocean shell as *Cryptodon philippinarum* (Hanley), but the figure (1897, pl. 4, figs. 6, 6*a*) shows an oblong-oval shell (*c.* 18 × 15 mm.) with closer concentric costae. Jaeckel (1931, p. 221) identified an East Indies shell with this figure, but transferred the species to *Phacoides*, although Smith's figure seems to show a *Cryptodon*-hinge without teeth.

The present specimens agree with the Californian *heroicus* Dall (1901, p. 828, pl. 41, fig. 1); in fact almost every word of Dall's description is applicable to them, except that they lack the flexuosity on the posterior margin. That, however, might be an individual feature; Dall did not state how many specimens he had.

The Eastern American *filosus* Stimpson differs in having a high keel on either side of the ligament and lunule (Dall, 1901, p. 824).

The 54 mm. P.F. specimen is thicker walled than the 51 mm. specimen, and has 6 costae between 10 and 20 mm. alt., whereas the latter has only 5; towards the margin in the former the costae become evanescent.

The juvenile has the posterior margin slightly flattened, and there are 8 costae between 4 and 10 mm. alt., and 8(9) between 10 and 20 mm. alt. Even with this increased number, the costae are quite distinctly more widely separated than in *P. capensis*, and there are several minor wrinkles in each interval as in the larger shells.

The largest *Africana* shell is 47 × 45 × 24 mm.

Although a separate name is here suggested for the Saldanha Bay and St. Helena Bay shells, based on the more widely spaced concentric costae, these shells may be only local variants of *capensis*. Jaeckel & Thiele recorded *capensis* from Great Fish Bay. More material is required to show whether typical *capensis* occurs at other localities on the west coast, or transitional forms rendering the name *saldanhae* unnecessary.

Phacoides semperiana (Issel)

Lucina semperiana Issel, 1869, p. 82; Melvill & Sykes, 1898, p. 46, pl. 13, fig. 1.
Phacoides (*Bellucina*) *semperiana* (Issel), Lamy, 1920a, fig. 211; Pallary, 1926, p. 104, pl. 12, figs. 12^1, 12^2; Dautzenberg, 1929, p. 622.
Phacoides (*Parvilucina*) *semperiana* (Issel), Jaeckel & Thiele, 1931, p. 221.

Shell thick, tumid, antero- and postero-dorsal areas marked off, lunule deep; about 14–15 strong concentric costae, the 13th and 15th sometimes duplicated; finer growth-lines in the intervals; numerous radial riblets in the intervals, but not on the dorsal areas and not actually crossing the summits of the costae. Lateral teeth strong. Margin internally strongly crenulate.

Length and alt. 6, thickness (valves together) 5 mm.

Living: Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. Red Sea, Madagascar, Ceylon, Singapore. Off Dar-es-Salaam, 50 metres (Jaeckel).

Remarks. Mr. A. E. Salisbury kindly compared a specimen with the description in Issel, whose work is not available to me.

Prashad (1932) described *P. macassari* from the East Indies, which seems very much like *semperiana.*

Melvill & Sykes (1898, p. 46, pl. 3, fig. 1) figured a specimen 11 × 10·5 mm. from the Andaman Islands. It appears to be less strongly sculptured, and the radial riblets less closely packed than in the present specimens.

Phacoides peritaphros n.sp.

Fig. 22

Shell thick, tumid, inequilateral, juvenile ovoid, adult with altitude nearly equal to length, antero- and postero-dorsal areas not marked off, anterior margin rounded, posterior margin flattened, lunule distinct; strong concentric lirae, mostly close-set and regular, but at intervals a bare space (sulcus) equal in width to one or two (occasionally 3) lirae, no radial riblets between the lirae or on the bare spaces. Right valve with 2 cardinal teeth, and an anterior and posterior lateral; left valve with one cardinal and an anterior and posterior lateral pit. Margin internally crenulate.

Length 5, alt. 4·8, thickness (valves together) 3·3 mm. Young shells slightly longer than high, but altitude becoming proportionately greater with age, e.g.: 2·5 × 2, 3·2 × 2·75, 3·5 × 3, 4 × 3·5, 4·5 × 4, 5 × 4·8, 6·5 × 6·25 mm.

Off Nieca River (East London area), 43 fathoms, one living, 3 valves (Types); off Nanquas Peak (eastern end of Algoa Bay), 49 fathoms, 2 valves; 34° 5′ S., 25° 55′ E., 67 fathoms, several valves; 34° 5′ S., 25° 43′ E., 52 fathoms, several valves; off Cape St. Blaize, 125 fathoms, several valves (S. Afr. Mus. Nos. A9524 (Types), A9525–A9528 P.F. coll.).

34° 03′ S., 25° 58′ E., 42 fathoms (U.C.T.).

Remarks. Allied to the West African *lamothei* Dautzenberg (1912, p. 100, pl. 3, figs. 50–54) and *congoensis* Jaeckel & Thiele (1931, p. 220, pl. 9(4), fig. 91); differing from the former in having more numerous lirae and no radial riblets, from the latter in shape (*congoensis* is subcircular at alt. 2·5 mm.). The distinctive feature is the deep sulci due to periodic non-formation of the concentric lirae. Up to an altitude of *c.* 2 mm. the lirae are formed regularly, but thereafter irregularity sets in; 3 or 4 bare sulci usually occur, with 4–6 (occasionally as many as 8) lirae between them. The relative height of the lirae and depth of the sulci varies. A shell may reach an altitude of 3·5 mm. before a bare sulcus appears.

Jaeckel made no mention of any irregularity in the lirae in his description of *congoensis*, but his figure shows two sulci.

Lucina tabulata Desh. appears from Chenu's figure (1862, fig. 569) to have a somewhat similar periodic variation in the formation of the lirae.

Loripes philippinarum (Hanley)

Lucina philippinarum Hanley, 1842–56, p. 348. Suppl. pl. 14, fig. 18 (not 't.12.fi.42' as given in text).

Equilateral, rather convex, antero- and postero-dorsal margins nearly straight, slightly sloping, the ventral margin between them evenly curved. Widely spaced, narrow but not lamellose concentric costae, 7 in the first 2 mm. alt., 6 in the next 5 mm., and 7 in the later 11 mm., total 20 (another is just due to be formed at the margin); intervals with fine regular costulae, 5–6 on

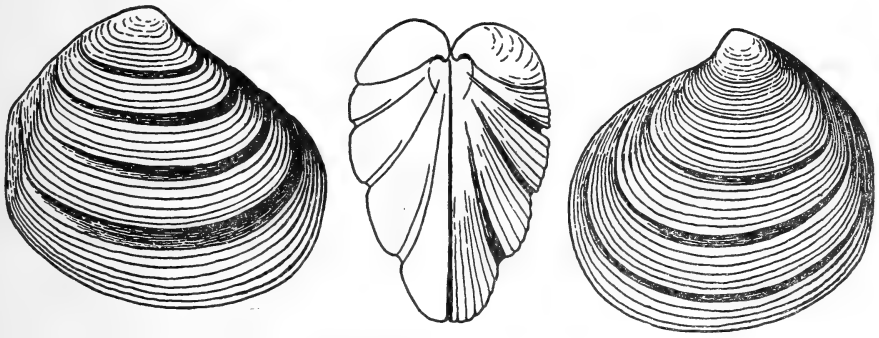


FIG. 22. *Phacoides peritaphros* n.sp. Anterior view, and lateral views of two shells to show variation in the sulci.

the early part, increasing to 7–8 near the margin. Lunule well marked but not sunken, 3·5 long, 1 mm. wide. Escutcheon narrow, elongate. Two cardinal teeth, both bifid, and an anterior dentiform lateral. Ligament internal. Inset part of anterior adductor scar only half as wide as the upper oval part. Margin internally crenulate. Buff.

Length 16·5, alt. 15, thickness (one valve) 5 mm.

Off Umhloti River (Natal) 40 fathoms, one right valve and one broken (S. Afr. Mus. A9534. P.F. coll.).

Remarks. Provisionally identified with Hanley's species.

This is not the *Cryptodon philippinarum* as figured by Smith (1897, Moll., pl. 4, figs. 6, 6*a*).

Loripes clausus (Phil.)

Lucina lactea (*non* Lam.), Krauss, 1848, p. 4.
Loripes lactea (*non* Lam.), Sowerby, 1889b, p. 155.
Loripes lacteus (*non* Linn.), Sowerby, 1892, p. 61.
Loripes flexuosus (*non* Mont.), Johnson, 1904, p. 11.
Loripes leucoma (*non* W. Turton), Krige, 1933, p. 51.
Loripes clausus (Phil.), Sowerby, 1894, p. 378; 1897, p. 26; Schwarz, 1900, p. 26; Smith, 1904a, p. 40; Smith, 1906b, p. 67; Schwarz, 1910, p. 116; Bartsch, 1915, p. 194; Lamy, 1915, p. 157; Tomlin, 1921, p. 257; Cox, 1927, p. 101, pl. 19, fig. 2; Jaeckel & Thiele, 1931, p. 220; Turton, 1932, p. 235; Braga, 1952, p. 118, pl. xi, fig. 5; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, pp. 41, 129, fig. 23*b*; Broekhuysen & Taylor, 1959, p. 292.
[?] *Lucina jacksoniensis* (*non* Smith), Braga, 1952, p. 117.

Subcircular, equilateral, antero-dorsal part well marked, margin prominent, a slight hollow on posterior part. Fine close-set regular growth-lines, interspersed with stronger lines, surface smooth. Lunule short, deep. Cardinal teeth feeble, anterior and posterior lateral better developed in the left than the right valve. Ligament internal. Inset part of anterior adductor scar elongate, tapering. Margin internally smooth.

Up to length 30, alt. 27–28, thickness (valves together) 14 mm.; Single valves: 35 × 32 × 7, 33 × 32 × 7, 33 × 31 × 11 mm. (S. Afr. Mus.).

Fossil: Pleistocene; Zwartkops valley (Krauss, Johnson, Schwarz); Keurbooms River (Schwarz); Durban (Krige, also Geol. Survey); Zanzibar (Cox).

Knysna (Krauss); Port Elizabeth (Krauss, Sowerby); Port Alfred (Smith, Bartsch, Turton); Durban (Krauss); Delagoa Bay (Braga); Mozambique (Br. Mus. *teste* Sowerby).

Off Port Shepstone (Natal), 250 fathoms, one valve; 36° 40′ S., 21° 26′ E., 200 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Living: Still Bay (S. Afr. Mus. coll. Muir); Knysna (P.F. coll.); Durban (U.C.T.); Kosi Bay (U.C.T.); Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. Zanzibar; Madagascar.

Remarks. Braga's identification of 2 valves from Inhambane as the Australian *jacksoniensis* is not acceptable; probably they were *clausus* or perhaps *rosea.*

Loripes rosacea Smith

Loripes rosacea Smith, 1899, p. 251, pl. 5, figs. 12, 13.
Lucina rosacea (Smith), Cox, 1939, p. 99, pl. 2, figs. 16, 17.

Inequivalve, the left valve convex, the right quite flat. Close-set regular concentric growth-lines, interspersed with sulci (periodic cessation of growth). Pale rose.

Length 17, alt. 18, thickness (valves together) 6 mm. (Smith).

Fossil: Post Pleistocene; Inhambane (Cox).

Durban (Smith).

Off Cape Natal (Durban), 54 fathoms, 2 right valves; off Umhloti River, 40 fathoms, 2 right valves; off Tugela River, 37 fathoms, 3 right valves; juv. (S. Afr. Mus. P.F. coll.).

Remarks. Smith's description did not mention the sulci, and his figures are ambiguous: the thick dark lines might be either the shadows of raised costae or sunken sulci. Cox's photographic figures are better.

The *Pieter Faure* took only right valves.

Divaricella dalliana Vanatta

Lucina (*Divaricella*) *quadrisulcata* (*non* D'Orb.), Sowerby, 1892, p. 26; 1894, p. 378.
Lucina (*Divaricella*) *dalliana* Vanatta, 1901, p. 184, pl. 5, figs. 10, 11; Smith, 1903a, p. 399; 1903b, p. 626.

On the early part of the shell the impressed lines are arcuate, angle of divergence obtuse, but gradually they become more angular, the angle of divergence less obtuse, and on later part of large shells almost a right angle. The smooth radial band, caused by the absence of the impressed lines, begins at about 10–12 mm. alt., but may not occur until 15–20 mm. alt. Two cardinal teeth in left, one in right valve, an anterior dentiform lateral in both valves. Margin internally finely crenulate.

Up to length 29, alt. 28, thickness (one valve) 8 mm.

Natal (Sowerby; also in S. Afr. Mus., without exact locality); Tongaat (30 miles north of Durban) (S. Afr. Mus.); Delagoa Bay (S. Afr. Mus.).

Distribution. Maldive Islands (Smith).

Remarks. The smooth band is constant in all the present valves, and is not due to abrasion.

This smooth band is said to distinguish this South African form from *quadrisulcata*; but does it also distinguish it from *angulifera* von Martens (= *ornata* Rve., non Agassiz) which occurs at Mauritius, Madagascar, Seychelles, and Red Sea? Von Martens's figure of *angulifera* (1880, p. 321, pl. 22, figs. 14, 14*a*) shows no break in the angular lines on a shell alt. 24 mm. (See also: Lamy, 1916, p. 187.)

† *D. mozambicensis* Cox (1939, p. 99, pl. 2, fig. 18) from the Post Pliocene of Inhambane is very similar. The single valve measured 12·5 × 12 mm., and therefore would be comparable with juveniles of *dalliana* before the smooth band has appeared.

A similar smooth band occurs in *perparvula* Dall (1901, pl. 39, fig. 8) from the west coast of Mexico. The figured specimen was 7 mm. in length and the smooth band occupies the distal half of the shell.

Divaricella liratula Sow.

Lucina (*Divaricella*) *liratula* Sowerby, 1889b, p. 155, pl. 3, fig. 5; 1892, p. 61, pl. 2, fig. 63.
Lucina liratula (Sow.), Smith in Rogers, 1906c, p. 294; Haughton, 1932, p. 35.
Lucina contempta (*non* Cossm.), Turton, 1932, p. 235, pl. 62, no. 1641.
[*Non*] *liratula* Turton 1932 (= *valida*).

Subcircular, equilateral, a very slight hollow on posterior part. Fine regular concentric costulae, nearly straight in middle part but undulate anteriorly and posteriorly, obliquely truncated by the major growth-lines which occur at intervals (see Turton's figure), but do not form raised costae. Extremely fine radial striae, often obscure. Lunule narrow. Cardinal teeth 2 in left, one in right valve. Ligament internal. Anterior adductor scar nearly the same width throughout its length.

Up to length 14, alt. 13·5 mm. (S. Afr. Mus.).

Fossil: Pleistocene; Geelbek, Saldanha Bay (Haughton); Little Brak River, Mossel Bay (Smith in Rogers; also S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.); Keurbooms River (Haughton).

Port Elizabeth (Sowerby); Port Alfred (Turton); Still Bay (S. Afr. Mus. coll. Muir).

Remarks. Turton gave a good photo of this species, but in addition to misnaming it, he considered that the sculpturing was abnormal and indicated that the animal had had an 'anxious and troubled life'; the distinctive sculpturing, to which the geological term 'false bedding' might well be applied, is of course quite normal.

Dr. Martin found it very abundant in the Sedgefield deposits.* Also very common in the Mossel Bay deposit. I have not seen the Geelbek (Saldanha Bay) shells, and accept Haughton's identification.

Dr. Muir found only three valves at Still Bay.

Codakia punctata (Linn.)

Lucina (*Codakia*) *punctata* (Linn.), Tomlin, 1931, p. 447.
Codakia punctata (Linn.), Prashad, 1932, p. 155 (references); Macnae & Kalk, 1958, p. 129, fig. 23*k* (labelled *exasperata*).

Flat radial ribs, broad but variable, and narrow shallow grooves; fine regular concentric growth-lines.

Length 71, alt. 69 mm. (Lamy, 1915).

Durban (Tomlin); Delagoa Bay (U.W.).

Distribution. Mauritius, Madagascar, Seychelles, Indo-Pacific.

Remarks. Both this species and the next, *tigerina*, occur at Delagoa Bay, but I feel doubtful about their *living* in Durban Bay. U.C.T. did not obtain either species at Durban, nor at Kosi Bay.

Codakia tigerina (Linn.)

Lucina tigerina (Linn.), Krauss, 1848, p. 5.
Lucina exasperata Sowerby, 1897, p. 26.
Codakia exasperata (Sow.), Macnae & Kalk, 1958, p. 129.
Codakia tigerina (Linn.), Prashad, 1932, p. 156 (references).
[*Non*] *Codakia exasperata*, Macnae & Kalk, 1958, fig. 23*k* (= *punctata*).

Cancellate; narrow nodulose radial ribs, not wider than the grooves.

Up to length 83, alt. 73, thickness (valves together) 48 mm. (U.W.). 92 × 73 mm. (Lamy, 1915).

Durban (Krauss, Sowerby); Delagoa Bay (U.W.); Mozambique Island (S. Afr. Mus. coll. K.H.B.).

Distribution. Mauritius, Madagascar, Seychelles, Indo-Pacific.

Codakia pecten (Lam.)

Lucina (*Codakia*) *pecten* (Lam.), Sowerby, 1894, p. 378; 1897, p. 26.
Lucina (*Jagonia*) *pecten* (Lam.), Dautzenberg, 1912, p. 100; Lamy, 1915, p. 158.

This is a West African shell. I suggest the possibility that Sowerby's shells from Port St. Johns and Durban might have been the Indo-Pacific *divergens*

* For description of these deposits see: Martin, *S. Afr. J. Sci.* **52**, p. 187, 1956.

(Phil.). The provenance of those shells cannot be checked, and I exclude the species from the South African fauna list.

Fam. **Erycinidae**

Two gills on each side.

The South African representatives of this, and the following family *Montacutidae* require *anatomical* investigation. At present the number of names in the current fauna-list is certainly excessive; both Bartsch and Turton accepted Nature's beach-worn playthings as examples of 'speciation'.

Further, species have been removed from one genus to another, or even from one to the other family. It may be noted that *Kellia natalensis* Smith 1903 (*Rochefortia* in Bartsch 1915) is not the same as *Montacuta natalensis* Smith 1899. To add to the confusion Thiele (1934) made *Rochefortia* a synonym of *Mysella* in the *Montacutidae*.

Many of the species are known to be incubatory, retaining the larvae in the gill-pouches until the shelled-stage; then follows a lengthy pelagic stage until the velum is lost and the mollusc settles down.

Erycina subradiata (Gould)

Cryptodon subradiatus Gould, 1861, p. 33.
Erycina subradiata Carp. [sic = Gould] Bartsch, 1915, p. 197, pl. 46, figs. 5, 6, pl. 49, fig. 2 (= juv.); Jaeckel & Thiele, 1931, p. 222.
Erycina alfredensis Bartsch, 1915, p. 197, pl. 43, figs. 7, 8, pl. 50, figs. 1, 2 (= juv.); Jaeckel & Thiele, 1931, p. 222.
Erycina rifaca Bartsch, 1915, p. 198, pl. 39, fig. 3, pl. 50, figs. 7, 8 (= juv.).
Erycina rugosa Jaeckel & Thiele, 1931, p. 223, pl. 9(4), fig. 95 (= adult).

Prodissoconch minute, but distinct. At 0·5 mm. alt. a constriction occurs, marking off a false prodissoconch; thereafter up to *c.* 2 mm. alt. 3 or 4, sometimes 5, corrugations or wrinkles; thereafter growth-lines only; surface smooth, but extremely finely shagreened (mentioned for *alfredensis* and *rugosa*); in each valve an oblique cardinal tooth, anteriorly and posteriorly a lateral lamella (zahnartige Leiste, Jaeckel; see Bartsch's figures).

Length 9·5, alt. 8, thickness (one valve) 2 mm.

Simon's Bay (False Bay) (Gould, coll. W. Stimpson; Bartsch); Port Alfred (Bartsch, Turton).

St. Francis Bay, 80 metres, and Algoa Bay (Jaeckel).

Simon's Bay, 22 fathoms, 14 valves; Buffels Bay (False Bay), 35 fathoms, 7 valves; Algoa Bay, 67 fathoms, 5 valves (S. Afr. Mus. P.F. coll.).

False Bay, 17–44 fathoms, and Plettenberg Bay, 43 fathoms (U.C.T.).

One juvenile from Lüderitzbucht, 26 metres (U.C.T.) may be this species.

Remarks. The 14 valves, from 3–6 mm. long, from the type locality, together with larger ones from the neighbouring Buffels Bay, demonstrate that *subradiata* was founded on a juvenile, and that *rugosa* is the adult. It is a pity that the latter more distinctive and appropriate name must fall into synonymy.

The distinctive wrinkles around the umbo resemble ripples around a stone dropped into water. They are variable, and sometimes evanescent or even obsolete; which explains why they were not mentioned in the original description or Bartsch's redescription. Often the one or two last formed wrinkles are slightly indented.

Jaeckel's 9 × 7·5 mm. specimen, which he referred to *alfredensis*, was evidently a nontypical specimen without wrinkles.

Very fine radiating striae are occasionally visible either externally or internally. The umbonal constriction was mentioned in the description of *rifaca*, and is clearly shown in Bartsch, pl. 46, fig. 6. This constriction, marking off a false prodissoconch or umbonal boss, is always traceable even when no wrinkles are formed; but is particularly noticeable in strongly wrinkled shells.

Bartsch's other two species from Port Alfred: *ima* and *carifa*, of which I have seen specimens identified and presented by Turton, also appear to be synonymous; also Turton's *becki*, *rietensis*, and *nympha*, each founded on a single valve, and all from Port Alfred. The supposed differences, magnified by an uncritical desire for 'n.sp.', are merely due to the varying effects of beach wear.

Both Bartsch and Jaeckel attributed *subradiata* to Carpenter instead of to Gould.

Bartsch's figure of *carifa* shows well-spaced radiating lines somewhat resembling *Carditella subradiata* Jaeckel, but his figure of the hinge is not that of a *Carditella*.

Gen. Solecardia Conrad (Scintilla Desh.)

In addition to one Philippine species reported from Natal, 6 species have been described from South Africa: 4 from Durban, 2 from Port Alfred. The number of specimens on which these 6 species were based is not recorded, except in the case of *turtoni* Bartsch: 6 valves, and *ovalis* Turton: several valves.

The differences between the species appear to be: equilateral or nearly so, or slightly inequilateral; valves a little gaping, scarcely gaping, not gaping, or with ventral gape; oval (5 species) or elongate (one species). Obviously further study is required, especially the study of living examples in the field, and the possible variation in shape, before these 'species' can be accepted.

Turton (1932) also regarded *Kellia crassiuscula* Smith 1890 from St. Helena as a *Scintilla*, and burdened his list of Port Alfred shells with it.

Jaeckel (1931) recorded a shell from Algoa Bay which might be referable to *compta* Sow.

The South African Museum material is as follows:

S. queketti Sow. one shell identified by J. H. Ponsonby; presumably from the original material on which Sowerby based his description, and thus presumably a cotype or topotype. The valves do not gape. One cardinal tooth in each valve (but somewhat obscure) 10 × 6 mm.

Two living specimens from Umzikaba (35 miles north of Port St. Johns) 12 × 7·5 mm. and 6·5 × 4 mm. (coll. F. H. Talbot, 1959).

S. durbanensis Sow. Three shells from Delagoa Bay, living (coll. K.H.B., 1912). With ventral gape. One cardinal in one valve, 2 in the other valve. Shape as in Sowerby's figure, but a little longer (not as elongate as in *elongata*), 11·5 × 6 mm. The surface is minutely and irregularly pitted.

Scintilla sp. Four valves from Still Bay (coll. Dr. Muir) largest 10 × 8 × (one valve) 2·5 mm. Not gaping. Hinge-line worn. One shell from False Bay (U.C.T.), 4·5 × 3·2 mm., seemingly conspecific. One cardinal in one valve, 2 in the other valve. Possibly *turtoni* Bartsch, of which *ovalis* W. H. Turton 1932 seems to be a synonym.

Kellya rubra (Mont.)

Bornia seminulum Phil., Krauss, 1848, p. 2.
Lasaea australis Souv., Sowerby, 1892, p. 62.
Lasaea rubra Mont., Smith, 1903a, p. 395.
Lasaea turtoni Bartsch, 1915, p. 201, pl. 42, figs. 9, 10, pl. 50, figs. 3, 4; Tomlin, 1931, p. 448.
Kellya adansoni Nicklès 1950, p. 193, fig. 363.

Tomlin stated that the previous records of *australis* and *rubra* were due to misidentification, and adopted Bartsch's specific name. Neither Bartsch nor Tomlin detailed the differential specific characters of *turtoni*. Smith identified Burnup's Natal specimens as *rubra*; Dautzenberg (1929, p. 584) recorded *rubra* from Madagascar, and regarded the species as cosmopolitan, viz. Europe, West and South Africa, St. Paul and Amsterdam Islands, Japan, Magellan Straits. Dr. R. K. Dell of New Zealand told me (in litt. 19.i.61) that he was of the same opinion.

On the material at hand I fail to distinguish more than a single species living around the coast of South Africa. The Inhambane specimens do not seem to differ from Natal and Cape specimens.

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Umkomaas (Natal) (Smith).

Table Bay, False Bay, Still Bay, Port Elizabeth, Scottburgh (Natal) (S. Afr. Mus.); Inhambane (U.C.T.). Buffels River and Groen River (south of Port Nolloth) (U.C.T.).

From among the tubes, and in empty tubes of *Vermetus corallinaceus* at Oudekraal (west coast of Cape Peninsula) (U.C.T., also K.H.B.).

Incubatory; larvae retained in the gill-pouches until they have reached the shell stage.

Tellimya rotunda (Desh.)

Erycina rotunda Deshayes, 1856, p. 181.
Kellia rotunda (Desh.), Smith, 1885, p. 202, pl. xi, figs. 5, 5 *a*, *b*; Sowerby, 1892, p. 62, pl. 4, fig. 93; Jaeckel & Thiele, 1931, p. 224.
Kellya rotunda (Desh.), Lynge, 1909, p. 178.
Bornia (*Pythina*) *rotundata* [*sic*] Bartsch, 1915, p. 199, pl. 51, figs. 5, 6; Turton, 1932, p. 229.

Length 10 mm. (Lynge); 10–11 mm. (S. Afr. Mus.); 14 mm. (Smith).

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Algoa Bay (Jaeckel); False Bay and Still Bay (S. Afr. Mus.).

Off west coast of Cape Peninsula (Lion's Head N. 78° E.), 60 fathoms, one living; Buffels Bay (False Bay), 32 fathoms, one living (S. Afr. Mus. P.F. coll.).

False Bay and Plettenberg Bay, 17 and 60 fathoms; also Mossel Bay (U.C.T.).

Distribution. New South Wales, and South Australia; Siam.

Remarks. Tomlin saw South African Museum specimens from False Bay and apparently accepted the identity of South African examples with the Australian species, as did Sowerby, Bartsch, Jaeckel.

If Smith and Lynge are correct, *rotunda* becomes a synonym of the British *suborbicularis* (Mont.) 1803.

The animal agrees with Pelseneer's figure of '*Kellya* sp.' (1911, p. 41, pl. 15, fig. 9). Mantle edges anteriorly forming an inhalent siphon; posterior opening (exhalent) small. Free edges of mantle without papillae. Two gills on each side.

Tellimya biradialis n.sp.

Fig. 23 *a*

Shell thin, semipellucid, nearly equilateral, oval, anterior and posterior ends broadly rounded, ventral margin gently convex; anteriorly and posteriorly 3 or 4 faint radial riblets; whole surface, including riblets, very minutely shagreened. Two cardinal teeth below umbo, and a posterior lamellar lateral tooth. White.

Length 5·5, alt. 4·3 mm.

Off Cape Natal (Durban), 85 fathoms, 2 left valves (S. Afr. Mus. No. A9535. P.F. coll.).

Remarks. In general shape resembling *Lepton fortidentatus* Smith, *Bornia africana* Bartsch, *Bornia oblonga* W. H. Turton, *Rochefortia convexa* (Gould) (figured by Bartsch 1915), and *Rochefortia thalia* W. H. Turton.

Tellimya trigona n.sp.

Fig. 23 *b*

Rounded-triangular, equilateral, umbo slightly in advance of middle line; anterior and posterior margins slightly convex, the anterior margin sometimes convex above and straight below, ventral margin gently convex. Fine close-set concentric lirae; no radial striations, no puncticulation. One cardinal, one anterior and one posterior lateral tooth in each valve.

Two gills on each side.

4·3 × 4·3 mm. White or creamy-white.

Langebaan (Saldanha Bay) and Lüderitzbucht, living (U.C.T.); Cape Flats, sandy deposit inland from present shore line on False Bay coast (S. Afr. Mus.).

Remarks. Mr. Dance (British Museum) to whom specimens were submitted, considered this near to *Pythina triangularis* A. Adams, 1856 from the Philippines; but the latter has a nearly straight, or even slightly indented, ventral margin, and is divided in the middle by an impressed radial line.

The convex anterior margin in some of the Cape Flats shells is rather noticeable, but there is no difference in the sculpture or the hinge.

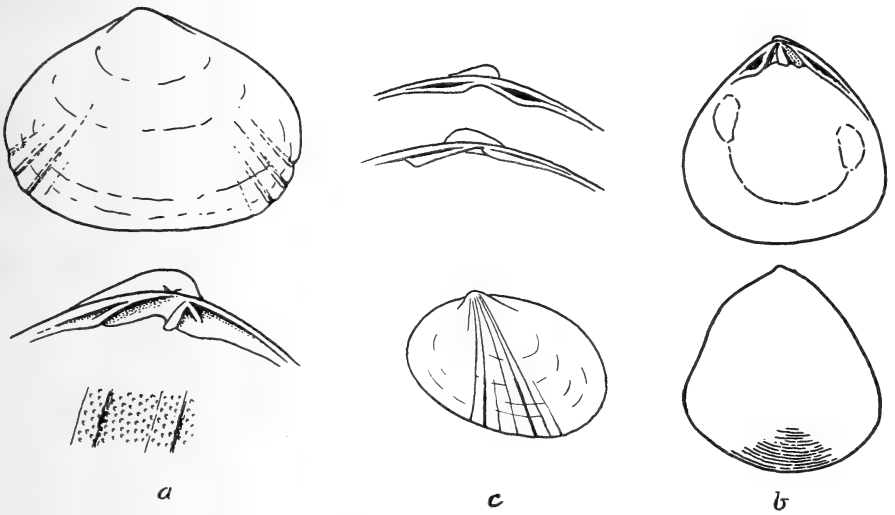


FIG. 23. *a*, *Tellimya biradialis* n.sp., with surface sculpture further enlarged. *b*, *T. trigona* n.sp., right valve (upper), left valve (lower) of variety from Cape Flats (sculpture only partially shown). *c*. Cf. *Montacuta substriata* (Mont.), with hinge.

Tellimya natalensis (Smith)

Kellia natalensis Smith, 1903a, p. 396, pl. 15, fig. 8.

Four valves from P.F. bottom-samples appear to be Smith's species, though they are not nitidulous, and the growth-lines are very distinct, close-set, regular and lirate. 8 × 5·5 mm.; thus slightly larger than Smith's example(s).

Durban (Smith).

Off Cape Natal (Durban), 85 fathoms, 3 valves; off Cape Vidal (Zululand), 80–100 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Lepton sp.

Shell nearly equilateral, compressed, anterior and posterior margins rounded, ventral margin almost straight. Surface with close-set granules in quincunx. Largest specimen length 6·5, alt. 4·5 mm.

Algoa Bay, 67 fathoms, 2 valves; off Cape St. Blaize, 37 fathoms, one valve (the largest) (S. Afr. Mus. A9536, A9537. P.F. coll.).

Apparently related to *squamosum*, but differing in shape.

Lepton fortidentatum Smith

Lepton fortidentatus Smith, 1904a, p. 41, pl. 3, fig. 20.
Lepton fortidentatum Sowerby [err. = Smith] Jaeckel, 1931, p. 223.
Bornia fortidentata (Smith), Bartsch, 1915, p. 198, pl. 50, figs. 9, 10 (hinge); Turton, 1932, p. 238.

Whole valve strongly and closely pitted. Lower margin gently convex. Hinge teeth strong. Pale straw-colour. Up to 6·5 × 5 mm.

Port Alfred (Smith, Bartsch, Turton); Still Bay, and St. James, False Bay (S. Afr. Mus. coll. Muir, and Purcell resp.).

34° 51′ S., 19° 37′ E., 80 metres; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel).

34° 5′ S., 25° 55′ E., 67 fathoms, one valve; off Cape Infanta 46 fathoms, one valve; off Cape Morgan, 77 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Great Fish Bay, Angola (Jaeckel).

Lepton puncticulatum J. & T.

Lepton puncticulatum Jaeckel & Thiele, 1931, p. 223, pl. 9(4), fig. 96.

Very finely shagreened at both ends, but in the middle showing growth-lines only. 9 × 7 mm.

34° 51′ S., 19° 37′ E., 80 metres; 35° 29′ S., 21° 3′ E., 102 metres (Jaeckel).

34° 5′ S., 25° 43′ E., 52 fathoms, 4 valves; 34° 5′ S., 25° 55′ E., 67 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Remarks. I suspect that this is only a large form of *Mysella convexa* (Gould) (see p. 488).

Pythina mactroides Hanley

Pythina mactroides Hanley, 1857, p. 340; Nicklès, 1950, p. 193, fig. 364.
[?] *Kellia mactroides* (Hanley), Sowerby, 1892, p. 62, pl. 4, fig. 92.

Shagreened like *Lepton* (or *Bornia*) *fortidentatus* Smith, but more finely. Also distinguished from the latter by the more triangular shape and nearly straight ventral margin.

Specimens 4·25–4·75 mm. long from 'S. Africa', identified by J. H. Ponsonby at the British Museum, are in South African Museum. Specimens from Still Bay, and Port Elizabeth correspond. The East London P.F. specimen is 5 mm. long, and the Knysna one 6·25 mm. The Algoa Bay P.F. specimens assigned to *puncticulatum* (*supra*) range from 6·5 to 10 mm. Nicklès gave 7–12 mm. for *mactroides*.

Cape of Good Hope (Hanley); Port Elizabeth (Sowerby; also S. Afr. Mus., littoral, living); Port Alfred (Smith, Bartsch, Turton).

Off Illovo River (Natal), 27–30 fathoms, one valve; off Nieca River (East London), 43 fathoms, one valve; Algoa Bay, 25 fathoms, one valve; off Knysna, 46 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Mauritania and Senegal (Nicklès).

Remarks. It should be noted that Sowerby's figure of *Kellia mactroides* scarcely differs from that of *Montacuta capensis*. Both are small figures, and useless for critical comparison.

Sowerby's figure of *mactroides* is very different from that given by Nicklès; the latter is more triangular, with a straight or slightly concave ventral margin, whereas Sowerby's figure (as also that of *M. capensis*) shows a convex margin as in *fortidentata*.

Cf. *Tellimya similis* Smith.

Pythina paula A. Adams

Fig. 24 *a*, *b*

Pythina paula A. Adams, 1856, p. 47; Smith, 1885, p. 203, pl. 12, figs. 1, 1 *a*, *b*.
Pythina peculiaris A. Adams, 1856, p. 47.
Tellimya paula var. *peculiaris* (A. Adams), Smith, 1903a, p. 396.*
Montacuta (*Tellimya*) *paula* (A. Adams) Lynge, 1909, p. 182.
Montacuta (*Mysella*) *paula* (A. Adams) Prashad, 1932, p. 172.

Durban (Smith); Inhambane (U.C.T.).

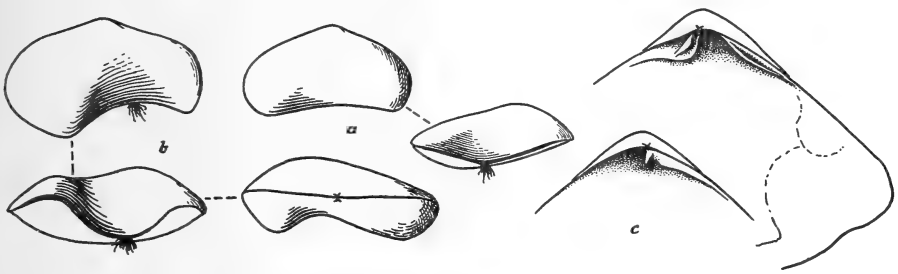


Fig. 24. *a*, *Pythina paula* A. Adams, normal form (5 mm.), *b*, distorted form (6 mm.). *c*, *Rochefortia agulhasensis* J. & T., right valve above, left below.

Distribution. Torres Strait; New Guinea; Siam: East Indies; Ceylon; Aden.

Remarks. The name *peculiaris* was given to unusually distorted examples of *paula*.

Bornia africana Bartsch

[?] *Montacuta macandrewi* (Fischer), Smith, 1904a, p. 26; 1906b, p. 64.
Bornia (*Pythina*) *africana* Bartsch, 1915, p. 199, pl. 42, figs. 1, 2, pl. 51, fig. 3 (hinge). Turton, 1932, p. 239.

Bartsch said the outer surface had 'minute tubercles which lend it a shagreened appearance'. None of the specimens I have seen, including one from Port Alfred (coll. & pres. by Turton) have this appearance. Turton said there were 'fine radiating threads'.

In living specimens the periostracum is more or less abraded on the upper (umbonal) half of the shell; but towards the margin it has tiny fimbriate processes along each growth-line. These processes on successive growth-lines are at

* Smith quoted his earlier paper as: *Ann. Mag. Nat. Hist.* xiii (1891), p. 235. Lynge and Prashad quoted it as: *Ann. Mag. Nat. Hist.* (6) viii, p. 230; Prashad added: pl. 12, figs. 1, 1 *a*, *b*. This reference to the illustration is the same as in the Challenger Report (1885), which seems unlikely. I am not able to check the reference.

regular intervals so that they form radial lines, which are still faintly traceable as radiating 'threads' when the periostracum is abraded.

Mantle margin with tiny papillae. Two gills on each side.

Port Alfred (Smith, Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir); Gordon's Bay (False Bay) (Dr. H. Ackert); Simonstown (False Bay) (living, Mrs. Connolly).

Remarks. Turton considered this the same as the Port Alfred specimens previously identified by Smith as the Iberian *macandrewi.*

Fam. **Montacutidae**

Only a single gill on each side.

Cf. *Montacuta substriata* (Mont.)

Fig. 23 *c*

Montacuta substriata (Mont.), H. & A. Adams, 1857, **2**, p. 476, pl. 114, figs. 10, 10 *a*, *b*; Thiele, 1934, p. 875, fig. 830.

Closely resembling the above quoted figures, but with only 5 or 6 very faint radial riblets in the middle section of the shell. 3 × 2·5 mm.

34° 51′ S., 23° 41′ E., 100 fathoms, one (U.C.T.).

Remarks. Although only partly ribbed this single shell agrees well with the European species; but a definite identification would be injudicious.

Mysella convexa (Gould)

Kellia convexa Gould, 1861, p. 34.

[?] *Montacuta capensis* Sowerby, 1889b, p. 157, pl. 3, fig. 8; 1892, p. 61, pl. 2, fig. 62; Turton, 1932, p. 239.

Rochefortia convexa (Gould), Bartsch, 1915, p. 199, pl. 45, figs. 1, 2, pl. 47, fig. 4 (juv.), pl. 51, figs. 7, 8 (hinge); Turton, 1932, p. 240.

Triangularly oval, lower margin nearly straight. Minutely shagreened over the whole shell in juveniles up to length *c.* 2–2·5 mm., thereafter confined to anterior and posterior areas. An anterior and a posterior lamellar lateral tooth in each valve, and a central cardinal tooth in left valve. Creamy white (Bartsch: wax yellow). Up to length 7, alt. 5·5 mm.

A long antero-ventral pallial opening, and a posterior opening, mantle edges fused for a short distance between the two openings; free mantle edges without papillae. A single gill on each side.

Simon's Bay, 12 fathoms (Gould); Simonstown, littoral (S. Afr. Mus. coll. Mrs. Connolly); Still Bay (S. Afr. Mus. coll. Muir).

Cape Agulhas, littoral, living (U.C.T.).

? Port Elizabeth (Sowerby); ? Port Alfred (Turton).

Remarks. There is no doubt that the present specimens from the type locality are referable to Gould's species. It is a very common species.

Bartsch did not mention any sculpture except growth-lines in his description of Gould's cotypes. His figure 2 on pl. 45 exaggerates the length of the

lateral teeth; figure 7 on pl. 51 omits the cardinal tooth in the left valve, unless the up-turned hook at the proximal end of the anterior lateral tooth is intended to represent it.

Montacuta capensis Sow. is probably a synonym, but the fine surface texture was not mentioned.

Specimens in South African Museum (no. 5609), probably from False Bay, identified by Ponsonby as *mactroides* Hanley 1856, resemble *convexa*; and a direct comparison of Simon's Bay specimens with Hanley's Type (if extant) may show that *convexa* should become a synonym of *mactroides*.

Sowerby's figure (1892, pl. 4, fig. 92) of *mactroides* is very different from that given by Nicklès (1950, fig. 364), and is more like his figure of *Montacuta capensis* (1892, pl. 2, fig. 62); but both figures are small and useless for critical comparison. The finer surface sculpture was mentioned by Nicklès, but not by Sowerby.

Some specimens from Port Elizabeth (coll. R. Kilburn) are more strongly shagreened, almost punctate, but not as strongly as *L. fortidentatum*; the hinge resembles that of *convexa*, not as strong as that of *fortidentatum*.

Lepton puncticulatum J. & T. (see p. 486) has the same sculpturing which is characteristic of *convexa*, and may also become a synonym when more material (living) has been examined.

Rochefortia agulhasensis J. & T.

Fig. 24 *c*

Rochefortia agulhasensis Jaeckel & Thiele, 1931, p. 225, pl. 9(4), fig. 97.

Subtrigonal, anterior end rounded, posterior end somewhat pointed. Surface with growth-lines only, not pitted. In right valve a 'thick plump' anterior tooth and a posterior lamella; in left valve a small median cardinal, in front of which the margin is thickened, no posterior tooth or lamella. Pallial sinus wide but shallow.

Length 4·5, alt. 3·5 mm. (Jaeckel); 8·75 × 6·5 mm. (S. Afr. Mus.).
35° 26′ S., 20° 56′ E., 80 metres, 4 right valves (Jaeckel).

Algoa Bay, 52 fathoms, one left valve; off Cape Infanta, 46 fathoms, one left valve; off Cape Morgan, 45 fathoms, one left valve; off Illovo (Natal), 27–30 fathoms, 2 right valves (S. Afr. Mus. P.F. coll.).

Remarks. Although twice as large, the P.F. specimens are clearly referable to *agulhasensis*. Similar to the North Australian *Montacuta acuminata* Smith 1885, but with stronger hinge teeth.

The 'thick plump' tooth in Jaeckel's description appears to be the ligament shelf, with a small sharp ridge-like tooth.

Fam. **Chamidae**

Odhner, 1919, pp. 1–102, 8 pls.

Chama gryphoides Linn.

Chama gryphoides Krauss, 1848, p. 19; Jaeckel, 1931, p. 226.

This Mediterranean species has twice been recorded from South African waters (Sowerby, 1892, p. 61 merely repeated Krauss's locality): by Krauss from recent deposits (Meeressandstein-Terrassen) on the Natal coast, and by Jaeckel from dredging on the Agulhas Bank.

The lower valve of a Durban specimen (S. Afr. Mus. No. 5582. don. Col. J. H. Bowker, 1888) measures length 36, alt. 39 mm. (aperture 33 × 33 mm.). Both valves are covered with half-cylindrical squamulae arranged concentrically and more or less also radially. The umbonal spiral is clock-wise on the lower, counter clock-wise on the upper valve. Whole margin of both valves finely crenulate. White.

A fresh upper valve from Durban (S. Afr. Mus. A7448. coll. K.H.B., 1912), 23 × 23 mm., is similar, but some of the squamae near the ventral margin are lengthened to 6–7 mm. and flattened. Pale buff.

The *Pieter Faure* obtained valves at three localities: off Tugela River, 14 fathoms, 14 valves; off Cape Natal, 54 fathoms, one juv. 5 mm. valve; off Umkomaas, 40 fathoms, one 3 mm. juv. valve. The Tugela specimens measure up to 15 × 15 mm. None of the upper valves are strongly beaked. Sculpture similar to that of the Durban specimens, and margin internally crenulate (cf. Odhner, 1919, 6, pl. 3, fig. 37, *C. spinosa*).

The *Valdivia* obtained young shells at 35° 16′ S., 22° 26′ E., 155 metres, which Jaeckel referred to *gryphoides*.

The Durban shell No. 5582 was identified by J. H. Ponsonby as *gryphoides* with the comment: '. . . but there is little character in the species of this genus'.

Sowerby (1894, p. 378, and 1897, p. 26) reported *iostoma* Conrad from Natal. A Red Sea and Indo-Pacific species. See: Odhner (1919, p. 76), Prashad (1932, p. 296), and Dall, Bartsch & Rehder (1938, p. 151, pl. 40, figs. 1–4).

Turton's material needs re-examination. His *aenigmatica* (1932, p. 234, pl. 61, no. 1634) however, might be a very worn valve comparable with the *Pieter Faure* specimens.

† *Chama* sp.

Fig. 25

† *Chama* sp. Barnard, 1962b, p. 185.

Somewhat different in character are some fossil (or 'subfossil') shells from deposits in the Keurbooms River estuary (S. Afr. Mus. A7650, coll. K.H.B. 1931). No *Chama* has been recorded from the South African Pleistocene deposits, and it is especially remarkable that none were found by Schwarz when he examined the area (1900, p. 61) because he reported 'Cryptodon globosus' (= *Lucina edentula*) which occurs along with the *Chama* shells.

These shells vary greatly in shape; some are subcircular with a low 'beak', others ovoid with high 'beaks', sometimes very high, like a Gastropod. Measure-

ments: largest 'low-beaked' lower valve length 40, alt. 45 mm.; 'high-beaked' lower valves 45 × 55 and 30 × 60 mm.; the apertures measure respectively 38 × 38, 40 × 40 and 28 × 42 mm. The largest upper valve is 42 × 42 mm.

The umbonal spiral is clock-wise in the lower, counter clock-wise in the upper valve. Lower valves with concentric ridges, more or less lamellose, sometimes strongly so, but irregular; lamellae undulate but not forming separate squamae. In some specimens fine radial striae can be traced on some parts. Upper valve with concentric, more or less lamellose ridges, sometimes near the margin closely imbricate and markedly crinkly. Margin internally in both valves crenulate, but most of the specimens are worn. One upper valve is dull pinkish-orange.

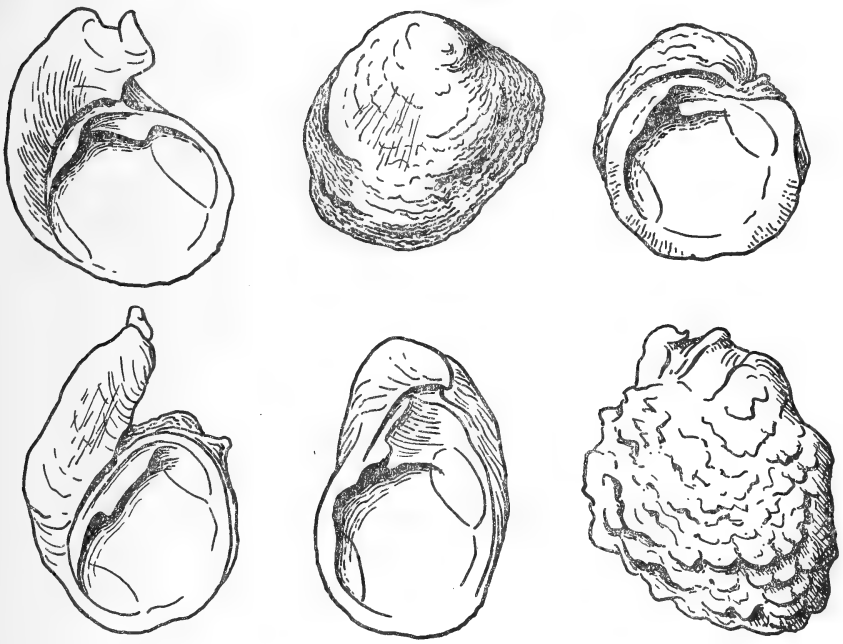


FIG. 25. †*Chama* sp. Keurbooms River estuary.

Among the *circa* 50 specimens collected there are three pairs, i.e. two lower valves firmly grown together, indicating a gregarious habit; and all these have narrow oval apertures and high 'beaks'.

There are also three lower valves and one upper valve from a deposit between Oakhurst and the coast near the Wilderness (George District).

Specimens were submitted to Tomlin, who said 'cannot identify with any Recent species'. This is perhaps too wide a statement in view of Ponsonby's comment (*supra*). In spite of Tomlin's dictum, I think it would be possible, with material for comparison, to assign the name of some Recent 'species' to these Pleistocene fossils; perhaps one of the Red Sea forms, e.g. *cornucopia*

Rve. (*ruppellii* Rve.). Cox (1927, p. 98) recorded *plinthota* Cox (*nom. mut.* for *imbricata* Brod., *non* Lam.) from the Quaternary of Zanzibar.

Krauss's specimens of *gryphoides* were roundish or oval, some with low beaks, others with strongly projecting beaks, with a left to right spiral twist.

Fam. **Cardiidae**

In addition to one specimen of *Papyridea papyracea*, which dwells in lagoons or sheltered bays, the *Pieter Faure* obtained only a very few specimens of *Cardium gilchristi* and *asiaticum*, a moderate quantity of *C. turtoni*, and a single worn valve of *Fragum* sp.

Smith's (1885, p. 162) record of the West Indian *semisulcatum* Gray 1825 (*ringiculum* Sow. 1841 (not 1848 as in Smith)) from Simon's Bay cannot be accepted, as in the case of some West Indian Crustacea (Barnard, 1950, *Ann. S. Afr. Mus.* **38**, p. 3).

Cardium turtoni Sow.

Cardium fasciatum (*non* Mont.), Sowerby, 1892, p. 61; Johnson, 1904, p. 11.
Cardium turtoni Sowerby, 1894, p. 37; 1897, pl. 25, pl. 7, fig. 4; Schwarz, 1910, p. 115; van Bruggen, 1952, p. 16.
Cardium papillosum (*non* Poli), Jaeckel, 1931, p. 227 (part).

Radial ribs (25) 26–27 (28), covered with triangular nodules some of which, chiefly on the anterior and posterior parts and near the margin in large shells, may be subsquamiform; grooves narrower than the ribs, with transverse (i.e. anterior to posterior) punctae.

Length 14, alt. 13 mm.

Fossil: Pleistocene; Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach; Port Elizabeth (Johnson, Schwarz); Durban north bridge, 65 feet below sea level (Geol. Survey).

False Bay to Natal (auct. and S. Afr. Mus.).

False Bay, Struys Bay, off Cape St. Blaize, Algoa Bay, East London area, Umkomaas (Natal) to Tugela River, 22–54 fathoms (S. Afr. Mus. P.F. coll.).

False Bay (U.C.T.).

Remarks. Obviously the *Valdivia* specimens, which Jaeckel identified as the European and West African *papillosum*, belong to the species known in South Africa as *turtoni*. The two species seem to be somewhat similar, and *papillosum* has been recorded as far south as Great Fish Bay, Angola (Jaeckel). Between Angola and the Cape there are no records; U.C.T. has not obtained it on the west coast, and some worn valves in South African Museum labelled as from 'Sea Point, Cape Town' were probably collected at Kalk Bay on the other side of the Peninsula.

Cardium gilchristi Sow.

Cardium gilchristi Sowerby, 1904, p. 11, pl. 7, fig. 1.

Sculpture bipartite: anterior half very finely cancellate, punctate; posterior half with about 18 narrow prickly ribs, with 2–3 (4) closely punctate fine

grooves between them; minute prickles may appear near the margin in the intervals between the main ribs. Margin finely serrulate.

Length 12, alt. 13, thickness (valves together) 11 mm. (Sowerby); the Algoa Bay valve in South African Museum 15 × 16 × 6·5 mm.

Algoa Bay, 15 fathoms (Sowerby; P.F. coll.).

Off Cape St. Blaize, 32 fathoms, 2 living; Algoa Bay, 30 fathoms, one valve; off Cape Vidal (Zululand), 80–100 fathoms, one living, 4 valves (S. Afr. Mus. No. 14854, A9673 and A9674. P.F. coll.).

Type ? in British Museum.

Remarks. Evidently a rare species. Although recorded from 15 fathoms in Algoa Bay, it is probably too fragile to be washed ashore either whole or in recognizable fragments. Only one valve was found in the numerous bottom deposits from this area.

Cardium asiaticum Brug.

Cardium asiaticum Brug., Krauss, 1848, p. 12; Braga, 1952, p. 109, pl. 9, fig. 8.
Cardium lima Gmelin, Sowerby, 1892, p. 61.
Cardium burnupi Sowerby, 1897, p. 25, pl. 8, fig. 25; Macnae & Kalk, 1958, p. 129.

Ribs 29–31, anterior ribs retrorse-subsquamose, median ribs serrate, posterior ribs spinose; grooves narrower than ribs, which slope up from the flat floor of the grooves, the line of junction sharply defined; growth-lines fine; ribbed internally except when young.

Length 44, alt. 43 mm.

Fossil: Lower Miocene, Inhambane district (Cox, 1939, with a ?).

Natal (Krauss); Port Elizabeth (Sowerby); Delagoa Bay (Braga; also U.W.). Durban harbour sediments (Dr. Lester King).

Off Umvoti River (Natal), 27 fathoms, 2 living, 2 valves; off Tugela River, 40 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Indo-Pacific.

Remarks. Sowerby in 1892 recorded *lima*, in 1897 described *burnupi* intermediate between *lima* and *aculeatum* Linn., and later (sometime after 1901) identified *Pieter Faure* shells as *lima*.

Cardium flavum Linn.

Cardium flavum Linn., Bruguière, 1797, p. 297, fig. 2; Cox, 1927, p. 99, pl. 19, fig. 1; Prashad, 1932, p. 266 (references).
Cardium rugosum Lamarck, 1819, p. 10; Sowerby, 1897, p. 25; Nardini, 1937, p. 253, pl. 16(10), fig. 17, pl. 17 (11), fig. 1; Braga, 1952, p. 110, pl. 10, fig. 3; Macnae & Kalk, 1958, pp. 117, 129, fig. 23*j*.
Cardium pectiniforme Dautzenberg, 1929, p. 588.

Durban, Natal (Sowerby; S. Afr. Mus.); Delagoa Bay (U.W.); Mozambique (Braga, Franca).

Distribution. Red Sea, Indo-Pacific. Fossil: Quaternary Zanzibar (Cox).

Laevicardium (*Discors*) *lyratum* (Sow.)

Cardium lyratum Sowerby, 1841, p. 109; Hanley, 1843, p. 141, pl. 17, fig. 1; Nardini, 1937, p. 254, pl. 17(11), fig. 3.
Discors lyratum (Sow.), Kira, 1955, p. 108, pl. 54, fig. 19.

I have seen one shell from Inhaca Island (Delagoa Bay) obtained by U.W.

Distribution. Philippines; Japan. Red Sea (fossil).

Papyridea papyracea (Brug.)

Cardium papyraceum Bruguière, 1789, p. 260; Gmelin, 1790, p. 3254.
Cardium natalense Krauss, 1848, p. 12, pl. 1, fig. 9; Sowerby, 1892, p. 61; Turton, 1932, p. 243.
Cardium natalense var. *adjacens* Turton, 1932, p. 243, pl. 65, no. 1710.
Cardium tenuicostatum (*non* Lam.), Sowerby, 1897, p. 25; Braga, 1952, p. 109, pl. 9, fig. 7.

Living shells externally pale olivaceous, more or less faintly mottled with paler yellowish markings, violaceous near the umbones; internally bright chestnut or maroon. In worn shells the internal coloration fades either completely, or remains as a pinkish radial streak from the umbo, together with a pinkish suffusion posteriorly and on margin.

The largest shell present is from Durban (coll. Burnup): length 45, alt. 43 mm.; one from Port Elizabeth 36 × 33 mm.; a worn valve from Still Bay 31 × 28 mm.; the living shell from Still Bay 22 × 20 mm.

Beach valves tend to be more oblong owing to wear on the ventral margin; hence Turton's varietal name is quite unnecessary.

Fossil: Pleistocene, raised beach at Little Brak River (S. Afr. Mus.).

Still Bay, one living, several valves (S. Afr. Mus. coll. Muir); Plettenberg Bay (Inland Fisheries, Cape Province); Knysna (S. Afr. Mus. P.F. coll.); Port Elizabeth (Sowerby; also living, coll. R. Kilburn); Bushmans River mouth (U.C.T.); Port Alfred (Bartsch, Turton); Natal (Krauss: *natalense*; Sowerby: *papyraceum*); Delagoa Bay (Braga); Inhambane (U.C.T.).

Distribution. Indo-Pacific.

Remarks. All the shells at hand, from Still Bay and Knysna to Inhambane, are clearly conspecific. What name is to be used for them? Sowerby (1892) identified *natalense* from Port Elizabeth, and in 1897 added *tenuicostatum* and *papyraceum* from Natal to the fauna-list; Burnup and Tomlin both used *papyraceum*, ignoring *natalense*.

No material is available for comparison, but *Fulvia bullata* and *australis*, judging by figures 3 and 4 on pl. 5 of Kira (1955), are closely allied.

Nardini (1937, p. 255, pl. 17 (11), figs. 4, 5) recorded *tenuicostatum* as a fossil from the Red Sea, and discussed the synonymy.

Fragum fragum (Linn.)

Cardium fragum Linn., von Martens, 1880, p. 324.
Fragum fragum (Linn.), Prashad, 1932, p. 274 (references).

A single worn valve corresponds in shape with the figure of *unedo* in Chenu, 1862, figure 522. Any differences there may be between the 'White Strawberry'

(*fragum*) and the 'Red Strawberry' (*unedo*) have been lost on the present valve.

Length 12·5, alt. 12 mm.

Off O'Neil Peak (Zululand), 90 fathoms, one valve (S. Afr. Mus. A9540. P.F. coll.).

Distribution. Red Sea, east coast of Africa, Madagascar, Mauritius, Indo-Pacific.

Remarks. Differing in shape from *Fragum* (*Afrocardium*) *shepstonense* Tomlin (1931, p. 449, pl. 33, fig. 8), which has no distinct umbonal ridge.

Lunulicardia retusa (Linn.)

Lunulicardia retusa (Linn.), Chenu, 1862, figs. 524, 525; Prashad, 1932, p. 287 (references); Gravely, 1941, p. 46, fig. 19 *d*.

The occurrence of this species as far south as Delagoa Bay requires confirmation. It was not recorded by Braga (1952), Macnae & Kalk (1958), nor Franca (1960). Two valves in South African Museum are alleged to have been found at Delagoa Bay.

Distribution. Red Sea, east coast of Africa, Madagascar, Indo-Pacific.

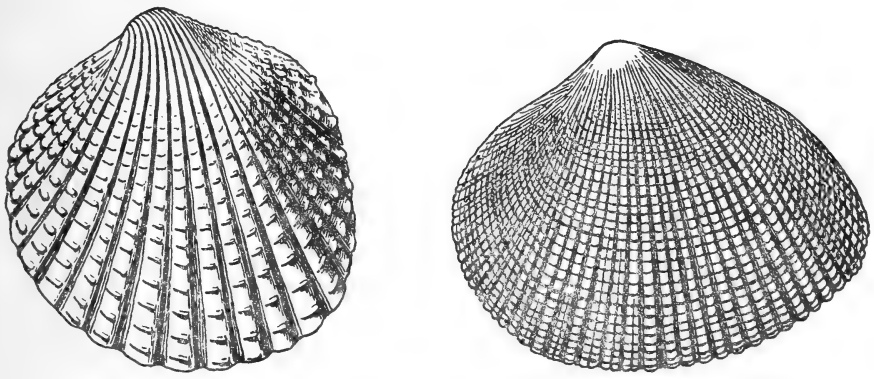
Cardium sp.

Fig. 26 *a*

Subcircular, but with the postero-dorsal margin somewhat rounded-quadrate, equilateral; 25 ribs, the anterior 5 with rounded nodules, the median ribs with transverse bar-like nodules, and the posterior 6 or 7 with obliquely transverse nodules like those on the median ribs but stronger; grooves narrower than ribs. White. Length 7·5, alt. 8 mm.

Inhambane, one living (U.C.T.).

Remarks. Appears to be very similar to the Mediterranean *papillosum*, as figured in Hanley, 1842–56, pl. 17, fig. 6.



a *b*

Fig. 26. *a*, *Cardium* sp., Inhambane. *b*, *Chione* (*Timoclea*) *costellifera* (Ad. & Rve.).

Fam. **Tridacnidae**

The species cannot always be distinctly defined because the shells vary in shape and sculpture according to habitat, and according to age.

Tridacna elongata Lam.

Tridacna elongata Lam., Smith, 1906b, p. 64; Hedley, 1921, p. 167, pl. 30, fig. 8; Prashad, 1932, p. 293; Adam & Leloup, 1939, p. 76, pl. 5, fig. 9, pl. 6, figs. 2 and 4.

Smith identified a young shell from Durban (coll. McBean) as probably *elongata*. So far as I am aware no other specimen had been found on the Natal coast until recently a specimen 61 × 29 mm. was found (by Mr. E. W. Meggersee, 1962) in a brain-coral in a sheltered gully at Chaka's Rock (North coast) Natal. The specimen is now in the South African Museum.

Up to 150 mm. (Hedley).

Distribution. Mozambique, Red Sea, East Indies, Indo-Pacific.

Tridacna squamosa Lam.

Tridacna squamosa Lam., Hedley, 1921, p. 172, pl. 28, fig. 3; Prashad, 1932, p. 290 (references); Macnae & Kalk, 1958, pp. 37, 90, 119, 129, fig. 23 C.

Mantle purple and green spotted (Macnae & Kalk).

Up to 370 mm. (Hedley).

West shore, old coral reefs and coral reef fringe, Saco coral reef, Inhaca Island, Delagoa Bay (Macnae & Kalk).

Distribution. Madagascar, Red Sea, East Indies, Indo-Pacific.

Fam. **Veneridae**

Venus verrucosa Linn.

Venus verrucosa Linn., Krauss, 1848, p. 10; Sowerby, 1892, p. 60; Johnson, 1904, pp. 9, 11; Schwarz, 1910, p. 116; Bartsch, 1915, p. 204; Haughton, 1932, p. 35; Day & Morgans, 1956, p. 308; Macnae & Kalk, 1958, p. 129; Franca, 1960, p. 34.
Venus verrucosa var. *capensis* Sowerby, 1889a, p. 14; Turton, 1932, p. 244; Day 1959, p. 539.
Venus intersculpta Sowerby, 1904, p. 11, pl. 7, fig. 2; Jaeckel, 1931, p. 234.
Ventricola verrucosa Newton, 1913, p. 336, pl. 18, figs. 3, 4.

Up to length 60, alt. 53 mm.

Fossil: Pleistocene; Geelbek (Saldanha Bay); Little Brak River (Mossel Bay); Sedgefield near Knysna; Knysna raised beach (S. Afr. Mus.); Keurbooms River (Plettenberg Bay); Port Elizabeth.

Delagoa Bay (U.W.); Natal (Krauss; U.C.T.); Algoa Bay (Krauss, Sowerby); Port Alfred (Bartsch, Turton); Durban, Mossel Bay, Still Bay, False Bay (S. Afr. Mus.). Saldanha Bay (U.C.T.).

Bird Island Passage, Algoa Bay, 10–16 fathoms (Sowerby: *intersculpta*).

35° 16′ S., 22° 26′ E., 155 metres (Jaeckel: *intersculpta*).

Off Cape Vidal (Zululand), 22 fathoms, one living; off O'Neil Peak (Zululand), 55 fathoms, 2 valves; off Itongazi and Umhloti (Natal), 25–40 fathoms, 4 valves; off Cape Morgan, 52 fathoms, one valve; East London area,

22–32 fathoms, one living, several valves; off Great Fish Point, 51 fathoms, one valve; Algoa Bay, 30 fathoms, 3 juv. valves; St. Francis Bay, 24 fathoms, one valve; Knysna, low tide, one living; False Bay, 32 fathoms, 3 valves (S. Afr. Mus. P.F. coll.).

Type of *intersculpta* ? in British Museum; cotype in South African Museum (No. 14841).

Distribution. Mediterranean, Atlantic, Canaries, Cape Verdes, west coast of Africa south to Mossamedes.

Remarks. The whole description of *intersculpta* is applicable to young *verrucosa*; and the cotype, returned by Sowerby with his label, is in fact only a young *verrucosa*.

Although distributed around the South African coast, this species seems to be nowhere common; only a few valves were found in the *Pieter Faure* bottom-samples.

Smith (1901, p. 116) reported *V. declivis* Sow. 1853 from Durban, and also from the gulf of Guinea; was this a misidentification, or is *declivis* only a young *verrucosa*?

Venus arakana (Nevill)

Cryptogramma arakana Nevill, 1871, p. 10, pl. 1, fig. 16.
Venus arakanensis Nevill, 1871, p. 10, pl. 1, fig. 16 [quoted from Smith 1903a]; Smith 1903a, p. 397.
Venus layardi (*non* Rve.), Sowerby, 1892, p. 60.
Venus arakana Sowerby, 1897, pp. 24, 33; Smith, 1906b, p. 65; Cox, 1939, p. 102.
Venus malonei Vanatta, 1901, p. 185, pl. 5, figs. 4, 5.
Chione curiosa Turton, 1932, p. 244, pl. 65, no. 1720 (= juv.).

Up to length 25, alt. 17 mm.

Fossil: Post Pliocene: Inhambane (Cox, 1939); Pleistocene; Durban (Geol. Survey); Sedgefield near Knysna (A. R. H. Martin).

Durban (Sowerby, Vanatta): Port Alfred (Turton).

Living: from Cape Vidal (Zululand), 80–100 fathoms, southwards as far as Cape Natal (Durban), 22–54 fathoms (S. Afr. Mus. P.F. coll.). Particularly common in the *Pieter Faure* bottom-samples from off Morewood Cove (north of Durban), 27 fathoms.

29° 58′ S., 31° 02′ E., 49 metres (U.C.T.).

Distribution. Arakan, Penang, Singapore (Nevill);* Ceylon (Smith).

Remarks. Sowerby's record from Port Elizabeth was probably based on a specimen brought to Port Elizabeth by human agency; unless it had been washed out of some Pleistocene deposit. Not a single valve, or recognizable fragment, was found in any of the *Pieter Faure* bottom-samples from south of Durban, except two worn valves from off Cape Morgan, 45 fathoms. Turton, however, found 2 juv. valves at Port Alfred; and in Pleistocene times it extended as far as the Knysna area.

* These three localities taken together indicate that Arakan is off the coast of Burma; not the Arakan in the Arabian Gulf, 25° N., 63° E., quoted by Bisacchi (1930, p. 61).

A distinctively sculptured shell, even quite small fragments of valves from bottom-samples being easy to recognize.

Chione (*Timoclea*) *siamensis* Lynge 1909, however, is very similar.

Venus reticulata Linn.

[?] *Venus listeri* Gray, Sowerby, 1897, p. 24.
Venus reticulata Linn., Franca, 1960, p. 96, pl. 27, fig. 4.
Antigona reticulata (Linn.), Tomlin, 1931, p. 449; Prashad, 1932, p. 249 (references).

Hinge-line usually red in fresh examples. Length 52, alt. 45 mm. (S. Afr. Mus.).

Umkomaas (Natal) (Tomlin); Natal (S. Afr. Mus.); Delagoa Bay (Franca; also S. Afr. Mus. coll. K.H.B.). Durban harbour sediments (Dr. Lester King).

Distribution. Indo-Pacific. Fossil: Pleistocene; Red Sea, Zanzibar (Cox).

Remarks. V. listeri Gray is a West Indies species. There appears to be very little difference between the two species, except that *listeri* does not have a red hinge-line.

Venus lamellaris (Schum.)

Antigona lamellaris (Schum.), Prashad, 1932, p. 247 (references).

In South African Museum there are two valves labelled 'mouth of the Limpopo' (i.e. Chai Chai, Portuguese East Africa) ex coll. P. Ross Frames. The provenance of these may be accepted because Ross Frames obtained shells of two undoubted South African species: *Bullia natalensis* and *mozambicensis*, at the same locality (Barnard, 1959, pp. 135, 137).

Venus tiara Dillwyn

Chione tiara (Dillwyn), Prashad, 1932, p. 259 (references).
Anaitis foliacea (Phil.), Braga 1952, p. 113, pl. 10, fig. 11.
Venus foliacea Phil., Macnae & Kalk, 1958, p. 129; Franca, 1960, p. 96, pl. 27, fig. 3.

Delagoa Bay (Braga, Franca; also U.W.; also S. Afr. Mus. coll. Dr. J. D. F. Gilchrist, and K.H.B.). Durban harbour sediments (Dr. Lester King).

Distribution. Red Sea, Madagascar, Indo-Pacific.

Chione (*Timoclea*) *mindanensis* (Smith)

Fig. 27

Venus (*Chione*) *mindanensis* Smith, 1885, p. 130, pl. 3, figs. 4, 4*a*, *b*.
Chione (*Timoclea*) *mindanensis* (Smith), Prashad, 1932, p. 254, pl. 6, figs. 21, 22.

Subcircular, posterior margin slightly flattened. Radial ribs from (or nearly so) umbo, continuous to margin without bifurcation, and a few interpolated ribs, *c.* 45–50 near the margin on a 10 mm. valve, but those near the postero-dorsal margin difficult to count. Concentric lirae beginning at about 1·5–2 mm. alt., 7 at 4 mm. alt., but thereafter subsidiary ones appear irregularly, towards the margin of the larger valves the lirae may be crowded together, *c.* 25–30; lirae crossing the ribs, slightly lamellose posteriorly, and near the margin on larger valves nodulose. Lunule radially striate. Anterior lateral

tooth feeble. Pallial sinus shallow, about $\frac{1}{4}$ distance between adductor scars, rounded. Whole margin finely crenulate internally.

The living shell, and some of the fresher valves, slightly salmon tinted.

Length 10, alt. 9 mm. The living shell (valves together) 6 × 5·5 × 4 mm.

Off O'Neil Peak (Zululand), 90 fathoms, 11 valves; off Cape Natal (Durban), 54 fathoms, 33 valves; off Umkomaas, 40 fathoms, one living, 14 valves; off Hood Point (East London), 49 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Distribution. Philippine Islands, 82 fathoms; East Indies, 55–390 metres.

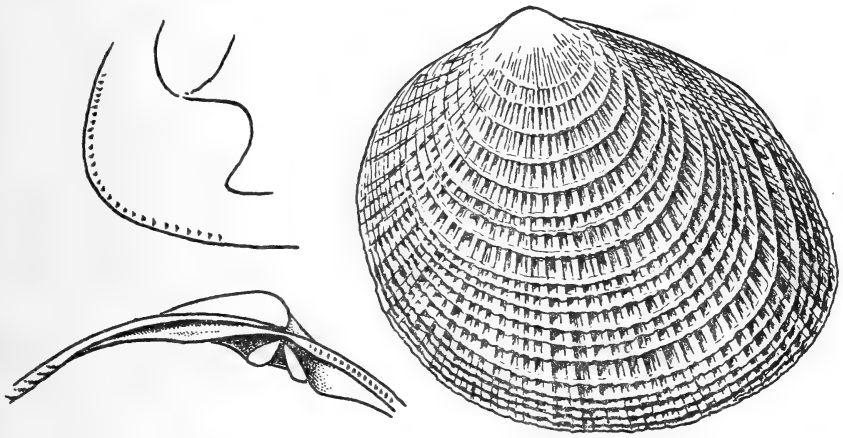


FIG. 27. *Chione* (*Timoclea*) *mindanensis* (Smith).

Chione (*Timoclea*) *costellifera* (Ad. & Rve.)

Fig. 26 *b*

Venus costellifera Adams & Rve., 1848, p. 79, pl. 21, fig. 18; Sowerby, 1853, p. 718, pl. 157, fig. 106.

Chione costellifera (Ad. & Rve.), Prashad, 1932, p. 256 (references); Braga, 1952, p. 113.

Subtriangular, but slightly longer than high, nearly equilateral, but slightly longer posteriorly. Radial ribs *c.* 50, from umbo to margin, a few intermediaries on anterior half, some of the ribs slightly larger than others towards posterior end, wider than the grooves. Crossed by concentric sulcate growth-lines; at the intersections flat squarish nodules, towards the margin and especially posteriorly projecting, almost squamose. Lunule radiately striate. Pallial sinus shallow, rounded. Margin internally finely crenulate.

Length 10, alt. 8 mm.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Inhambane (Braga).

Off Nanquas Peak (eastern end of Algoa Bay), 63 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea, Persian Gulf, Indo-Pacific.

Remarks. Dr. Martin found two valves, the right valve slightly smaller than the above measured left valve. The *Pieter Faure* took only one somewhat worn valve.

The concentric ridges are not really squamose or lamellose posteriorly as in *marica* Linn. or *recognita* Smith (see: Smith 1885, p. 126). There seems to be a close resemblance to the Atlantic *Venus* (*Chione*) *congoensis* Jaeckel (1931, in Thiele & Jaeckel, p. 234, pl. 9 (4), fig. 107).

Comus platyaulax (Tomlin)

Venus latilirata (*non* Conrad), Sowerby, 1897, p. 24, pl. 6, fig. 24.
Venus platyaulax Tomlin, 1924a, p. 114.
Comus platyaulax (Tomlin), Cox, 1930a, p. 20, pl. 4, figs. 2*a–c*, 3*a*, *b*.

All the specimens in South African Museum are worn. The number of concentric ridges therefore uncertain: 8 are visible on the largest valve, but on a smaller valve (alt. 22 mm.) with the umbonal region less worn, there are 9; often a smaller intermediary ridge between the 4th and 5th, or 6th and 7th (visible) ridges. No pallial sinus.

Cream, faintly speckled with pink, 2 carmine radiating streaks. Up to length 31, alt. 28 mm.

Durban (Sowerby); Natal (no exact locality) (Cox; also S. Afr. Mus.); Pondoland coast (seen by me in a private collection).

Off O'Neil Peak (Zululand), 55 fathoms, one juv. valve; off Cape Morgan 45 fathoms, 2 very worn valves (S. Afr. Mus. P.F. coll.).

Type in Durban Museum (1958. *List of Zool. Types in Southern Africa* I, pt. 1, p. 5. Transvaal Mus. Pretoria).

Remarks. Cox's statement that this species had not been taken alive is still true. Cox described also a species from the Pleistocene of Mombasa which appears to belong to this genus.

Sunetta contempta Smith

Sunetta contempta Smith, 1891, p. 422; Sowerby, 1897, p. 24; Wybergh, 1920, p. 66.
Meroë ovalis Sowerby, 1892, p. 59, pl. 3, fig. 69; 1897, p. 33.
Sunetta ovalis (Sow.), Bartsch, 1915, p. 203; Jaeckel, 1931, p. 232; Turton, 1932, p. 244, pl. 65, no. 1718; Franca, 1960, p. 95, pl. 26, fig. 5.
Sunetta ovalis Martin, van Bruggen, 1954, p. 49, fig. 1 *d*, *e*, *f*.
Sunettina sunettina Jouss., Lamy, 1931, p. 306.

Pallial sinus rounded. Length 35, alt. 26 mm. (Sowerby; also S. Afr. Mus.); Franca mentioned specimens up to 39 mm. long.

Fossil: Post Pliocene; Inhambane (Cox, 1939); Pleistocene; Bredasdorp Beds (Wybergh); Sedgefield near Knysna (A. R. H. Martin, 1956); Durban (Geol. Survey).

Port Elizabeth and Durban (Sowerby); Port Alfred (Bartsch, Turton); Tongaat (Natal) living (S. Afr. Mus.); Still Bay, one valve (S. Afr. Mus.coll. Muir); Delagoa Bay (Franca); Beira (Lamy).

33° 50′ S., 25° 48′ E.; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel).

Off Morewood Cove (Natal), 27 fathoms, 4 valves; off Umkomaas, 40 fathoms, 2 valves; off East London, 27 fathoms, 13 valves; Algoa Bay, 25 fathoms, one living, one valve; False Bay, 42 fathoms, one large valve (S. Afr. Mus. P.F. coll.).

Distribution. Aden.

Remarks. The Adenese *contempta* Smith has been recorded from Natal by Sowerby. The present material seems to show that only one species occurs in South African waters, from False Bay to Delagoa Bay; but from the latter locality Braga (1952, p. 112, pl. 10, fig. 6) has recorded *S. truncata* Desh., a synonym of *scripta* Linn.

The single valve from False Bay (P.F.) equals in size the one recorded by Sowerby in 1892.

Van Bruggen, after comparing Tertiary fossils from Java, considered that the name *ovalis* Sow. 1892 was preoccupied by Martin 1880. Comparison of fossil and Recent shells from *widely separated* localities is unsatisfactory, especially in the case of specimens of *Sunetta*; but apart from the possible identity of the two forms, the transference of *ovalis* Sow. from *Meroë* to *Sunetta* makes *ovalis* Sow. *ipso facto* a *nom. preocc.* (presuming Martin put his species into *Sunetta*).

Van Bruggen gave *sunettina* Jouss. 1891 as a synonym of *ovalis* Martin, but Fischer-Piette (1939, p. 144) made *sunettina* a synonym of *contempta* Smith.

In these circumstances one may adopt Smith's name, which has already appeared in the South African fauna-list.

Circe scripta (Linn.)

Circe scripta (Linn.), Prashad, 1932, p. 233 (references); Braga, 1952, p. 111, pl. 10, fig. 5.
Gafrarium scripta (Linn.), Franca, 1960, p. 95, pl. 26, fig. 4.

Delagoa Bay (Braga, Franca; also U.W.). Durban harbour sediments (Dr. Lester King).

Distribution. Red Sea, east coast of Africa, Indo-Pacific.

Circe jucunda Smith

Circe jucunda Smith, 1885, p. 144, pl. 2, figs. 3, 3*a*, *b*.

Subcircular; sculpture of concentric growth-lines and radial ribs, the intersections nodulose; ribs gently arcuate, divaricate, 12 anteriorly, 17 posteriorly.

Length 4, alt. 3·75 mm.

Off Cove Rock (East London), 22 fathoms, one right valve (S. Afr. Mus. No. A9541. P.F. coll.).

Distribution. Cape York, North Australia, 28 fathoms.

Remarks. Corresponds with Smith's description and figure. Smith assigned some Honolulu specimens to *jucunda*; but Hawaiian examples have since been described as a different species in a different genus (Dall, Bartsch, Rehder, 1938)!

Both *nana* Melvill 1898 from the Persian Gulf, Indian Ocean and East

Indies, and *salamensis* Jaeckel & Thiele 1931 from Dar-es-Salaam differ in having far more numerous radiating ribs; *salamensis* may well be a synonym of *nana*.

Gafrarium pectinatum (Linn.)

Circe pectinata Linn., Smith, 1904a, p. 25; Macnae & Kalk, 1958, p. 129.
Circe alfredensis Bartsch. 1915, p. 203, pl. 46, figs. 3, 4.
Circe savignyi Lamy, 1931, p. 306.
Gafrarium pectinatum (Linn.), Prashad, 1932, p. 228 (references); Adam & Leloup, 1939, p. 81, pl. 5, fig. 2.
Gafrarium aduncum Franca, 1960, p. 94, pl. 26, fig. 2.
Not: *Crista pectinata* Braga, 1952 [= *divaricata*].

Retains the oval shape of the juvenile throughout life.

Fossil: Post Pliocene; Inhambane (Cox, 1939).

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Natal (Krauss); Tongaat (Natal) living (S. Afr. Mus.); Delagoa Bay (Franca; also U.W.); Chinde (S. Afr. Mus. coll. K.H.B.); Beira (Lamy).

Off Tugela River (Natal), 37 fathoms, 2 valves; off Umkomaas, 40 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Red Sea, Madagascar, Mauritius, Indo-Pacific.

Gafrarium divaricatum (Gmelin)

Circe (*Crista*) *divaricata* Gmelin, Sowerby, 1897, p. 24.
Gafrarium divaricata (Gmelin), Adam & Leloup, 1939, p. 82, pl. 5, fig. 4; Macnae & Kalk, 1958, p. 129.
Gafrarium dispar Prashad, 1932, p. 230 (references)
Gafrarium discors Franca, 1960, p. 94, pl. 26, fig. 3.
Crista pectinata (*non* Linn.), Braga, 1952, p. 111, pl. 10, fig. 4.

Juveniles oval, but a little deeper than *pectinata* of same length, then becoming rounder, and when adult somewhat pointed or cuneiform posteriorly.

Natal (Sowerby); Delagoa Bay (Braga, Franca; also U.W.; also S. Afr. Mus. coll. K.H.B.); Inhambane (Braga).

Distribution. Red Sea, Madagascar, Indo-Pacific.

Pitaria hebraea (Lam.)

Venus paupercula var. *abbreviata* Krauss, 1848, p. 11, pl. 1, fig. 10.
Chione kraussi Deshayes, 1853, p. 54; Schwarz, 1900, p. 61.
Tapes kraussi (Desh.), Sowerby, 1892, p. 60.
Cytherea hebraea Lam., Smith, 1885, p. 138; Sowerby, 1892, p. 59; Day, Millard, Harrison, 1952, p. 410.
Meretrix (*Pitar*) *hebraea* (Lam.), Dautzenberg, 1929, p. 597; Macnae & Kalk, 1958, p. 129.
Caryatis hebraea hebraea (Lam.), Jaeckel, 1931, p. 233.
Not: *Cytheraea hebraea*, Sowerby, 1851, p. 641, pl. 134, figs. 143, 144, 148 [= *sowerbyi* Desh. 1853].

Length 37, alt. 30, thickness (valves together) 23 mm. (Durban specimen).

Broad concentric zones of russet-brown with narrow white intervening zones, uninterrupted or variously interrupted by white radiating streaks of varying width, anterior and posterior margins white. Sometimes zigzag brown markings.

Fossil: Pleistocene; Knysna (Schwarz).

Natal (Krauss, Sowerby); Durban Bay (S. Afr. Mus. coll. Burnup); Delagoa Bay (U.W.). Durban harbour sediments (Dr. Lester King).

Agulhas Bank from St. Francis Bay to False Bay (Jaeckel).

Living: Knysna, and 34° 15′ S., 25° 5′ E., 6 fathoms; 34° 29′ S., 21° 49′ E., 40 fathoms; 34° 37′ S., 21° 56′ E., 47 fathoms; Algoa Bay, 90 fathoms. (U.C.T.) Off Great Fish Point, Algoa Bay, off Knysna, Struys Bay, False Bay, 32–63 fathoms (S. Afr. Mus. P.F. coll.).

Also valves from the same P.F. localities, and intermediate localities, including Brown's Bank (approx. 36½° S., 21¼° E.), 80–100 fathoms.

Distribution. Madagascar, Indo-Pacific.

Remarks. The figure of *abbreviata* corresponds so closely, including the pallial sinus, with specimens identified by Sowerby and Tomlin that I do not hesitate to bring Krauss's variety, later named *kraussi* by Deshayes, into the synonymy.

Pitaria florida (Lam.)

Cytherea florida Lamarck, 1818, p. 565.
Venus pulchra Wood, 1828, pl. 2, fig. 16.
Cytheraea pulchra (Wood), Sowerby, 1851, p. 624, pl. 130, fig. 73.
Cytheraea semisulcata Sowerby, 1851, p. 624, pl. 131, fig. 82.
Cytheraea erycinella Sowerby, 1851, p. 624, pl. 131, fig. 85.
Macrocallista florida Tomlin, 1923, p. 51.

Anterior half concentrically grooved, posterior half smooth.

Length 39, alt. 27, thickness (valves together) 18 mm.

Durban (Tomlin); Inhambane (S. Afr. Mus. coll. Ross-Frames). Durban harbour sediments (Dr. Lester King).

Distribution. Red Sea, Mozambique, Madagascar, Seychelles.

Pitaria manillae (Sow.)

Cytheraea manillae Sowerby, 1851, p. 634, pl. 136, figs. 180, 181; ? Sowerby, 1897, p. 24.
Dione manillae (Sow.), Deshayes, 1853, p. 75.
Pitar manillae (Sow.), Prashad, 1932, p. 221 (references).
† *Chamelea schwarzi* Newton, Barnard, 1962b, p. 185.

Prashad seems to agree with Römer that young shells are less trigonal (pointed posteriorly) than shown in Sowerby's figures; this is not very noticeable in the present material. One of the larger valves nearly coincides with the outline of Sowerby's figure 181, but the postero-dorsal margin is slightly convex; cf. figure 188 of *belcheri*.

Shells taken alive are cream or fawn, internally white or faintly pinkish.

Length 21·5, alt. 19 mm. (a Durban valve); a living Tugela shell: 20 × 17·5 × 13 mm.

Fossil: Pleistocene, raised beach Jeffreys Bay (A. V. Krige, 1927), also Knysna (S. Afr. Mus.).

Durban (S. Afr. Mus. coll. Burnup); Tongaat (north of Durban) (S. Afr. Mus.); Port St. Johns, one valve (S. Afr. Mus.).

Off Umhloti River, 27 fathoms, 7 living, several valves; also 40 fathoms, 4 living, several valves; off Tongaat, 36 fathoms, many valves; off Tugela River, 11–14 fathoms, 2 living; also 50 fathoms, 7 living (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E., 71 metres, living (U.C.T.).

Distribution. Philippine Islands.

Remarks. Prashad (loc. cit., p. 222), after examination of the specimens recorded from Natal by Sowerby in 1897, regarded them as misidentified; but he did not state to what species he thought they should have been referred. Burnup identified his Durban specimens as *manillae*; and Sowerby identified *Pieter Faure* specimens as *manillae*.

I maintain the name *pro tem.* as it has appeared in the South African fauna-list; but Sonth Africau specimens should be compared with *belcheri*, Sow. 1851.

I consider the fossil *Chamelea schwarzi* Newton 1913 (with *rogersi* Newton 1913 as synonym) from the Zwartkops deposits, Port Elizabeth, to be corroded examples of *manillae*. Specimens of *schwarzi* vary in size from 22 mm. long (S. Afr. Mus.) to 29 mm. (Type: *schwarzi*), 36 mm. (S. Afr. Mus.) to 45 mm. (Type: *rogersi*). The pallial sinus corresponds with that of *manillae*.

C. krigei Hghtn. 1926 from deposits on the west coast and from the Bredasdorp beds, is larger, up to 57 mm. long, but otherwise distinguishable only by a slightly wider pallial sinus.

Pitaria kochii (Phil.)

Venus kochii Philippi, 1843, p. 41, pl. 1, fig. 5; Sowerby, 1853, p. 738, p. 158, figs. 147–151.
Venus paupercula (*non* Chemn.), Philippi, 1844, p. 63, pl. 4, fig. 5.
Chione kochii Deshayes, 1853, p. 150.
Chione ambigua Deshayes, 1853, p. 153; Smith, 1903a, p. 397; Macnae & Kalk, 1958, p. 129.
Gomphina ambigua (Desh.), Day & Morgans, 1956, p. 307.
Tapes kochi Sowerby, 1892, pp. 59, 60.
Meretrix kochi (Sow.), Smith, 1904a, p. 25.
Marcia kochii (Sow.), Jukes-Browne, 1915, p. 284.
Anomalocardia alfredensis Bartsch, 1915, p. 203, pl. 44, figs. 3, 4; Turton, 1932, p. 244; Franca, 1960, p. 96, pl. 27, fig. 5.
Cryptogramma alfredensis (Bartsch), Braga, 1952, p. 112, pl. 10, figs. 8, 9.

Length 40, alt. 30, thickness (valves together) 25 mm. A single Still Bay valve 42·5 × 31 mm. A fossil valve 40 × 32 mm.

Fossil: Pleistocene; between Oakhurst and the coast (George–Wilderness district) (S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin); Durban (Geol. Survey).

Port Alfred, estuary of the Kowie River (Smith, Bartsch, Turton); Keurbooms River estuary, Plettenberg Bay (S. Afr. Mus. coll. K.H.B.); Still Bay (S. Afr. Mus. coll. Muir); Durban Bay (Krauss; also U.C.T.; also S. Afr. Mus.); Umlalazi, near Richards Bay (U.C.T.); Delagoa Bay (Braga, Franca; also U.W.; also S. Afr. Mus. coll. K.H.B.); Beira (S. Afr. Mus. coll. R. M. Lightfoot). Durban harbour sediments (Dr. Lester King).

Distribution. Mozambique, Zanzibar (Sowerby).

Remarks. Turton stated that the bivalve described by Bartsch as a n.sp., had previously been identified by Smith as *kochii*. It would indeed be surprising if this common species had remained undescribed until 1915.

It occurs in lagoons and estuaries, and in enclosed bays as at Durban and Delagoa Bay; and consequently was not taken by the *Pieter Faure*.

There is in South African Museum one shell, 24 × 15 × 10 mm., from Durban, which is relatively more elongate than the shells referred to *kochii*. The umbones are 9 mm. from the anterior margin, the postero-dorsal margin is straight, the postero-ventral margin not indented. Cream, with 2 widely separated brown radiating streaks. It resembles Sowerby's figure 160 on pl. 159 (1853) of the West and East African *floridella* (Gray), except for the straight postero-dorsal margin.

Macrocallista lilacina (Lam.)

Cytheraea lilacina Lamarck, 1818, p. 564; Sowerby, 1851, p. 626, pl. 130, fig. 74.
Macrocallista lilacina (Lam.), Haughton, 1932, p. 36; Barnard, 1962b, p. 185.

The Geelbek specimens, 67 × 47 mm., were thus identified by Tomlin. A Redhouse valve, 73 × 50 mm. (S. Afr. Mus. Palaeontol. Reg. No. 7722), has a similar shape and hinge-teeth, but a more broadly rounded pallial sinus. The Knysna valves, the largest 54 × 37 mm., have the pallial sinus as in the Geelbek specimens.

I have no material for comparison, and record these specimens under the name suggested by Tomlin. The shell of this species is grooved throughout.

Fossil: Pleistocene, Geelbek (Saldanha Bay) (Haughton); Redhouse (Port Elizabeth) (S. Afr. Mus.); Knysna raised beach (S. Afr. Mus.).

Distribution. Indo-Pacific.

Remarks. Cox (1927, p. 58, pl. 9, figs. 7, 8) recorded the Indo-Pacific *M. erycina* (Linn.) from the Lower Miocene of Pemba Island.

Gen. Tivela Link

The three species: *compressa*, *polita*, and *natalensis* are distinct, but the status of *dunkeri*, *hartvigii*, *transversa* and *rejecta* is uncertain.

Pallial sinus subacute, its dorsal margin sloping downwards towards ventral margin.
Fawn, uniform or with radial streaks, escutcheon reddish-brown.
Length-height e.g. 19 × 16 mm., 42 × 34 mm. .. .. *compressa*
Length-height, e.g. 21·5 × 15·5 mm., 42·5 × 31 mm. .. .. .. *transversa*
Pallial sinus subacute, its dorsal margin horizontal and its apex sloping slightly upwards .. .. *dunkeri*
Pallial sinus rounded.
  Postero-dorsal margin convex.
    Length-height e.g. (juv.) 15·5 × 14 mm. .. .. *natalensis*
    Length-height e.g. 15·5 × 11·5 mm. .. .. *rejecta*
  Postero-dorsal margin straight .. .. *polita*

Tivela compressa (Sow.)

Cytheraea compressa Sowerby, 1851, p. 616, pl. 128, figs. 33, 34.
Tivela compressa (Sow.), Smith, 1914, p. 3, pl. 1, figs. 6–8; Wybergh, 1920, p. 66; Jaeckel, 1931, p. 232.
Tivela tomlini Haughton, 1932, p. 36, pl. 4, figs. 1, 2; Barnard, 1962b, p. 186.

Uniform fawn coloured, or more usually cream with fawn radial streaks varying in number and width; the escutcheon deeper fawn or reddish-brown.

Up to length 61, alt. 50, thickness (one valve) 15 mm. Other shells (valves together) 19 × 16 × 9; 47·5 × 41 × 23; 57 × 49 × 29 mm.

Fossil: Pleistocene; Bredasdorp Beds (Wybergh); Little Brak River (S. Afr. Mus.); Langebaan (Saldanha) (Haughton: *tomlini*).

False Bay to Natal (*auct.*); False Bay, 10–14 fathoms (S. Afr. Mus. P.F. coll.); False Bay (U.C.T.).

Remarks. I have examined the Type of *tomlini*; it is a rather heavy example of *compressa*. The pallial sinus, faintly seen in figure 2, agrees with that of *compressa*.

Tivela transversa (Sow.)

Cytherea transversa Sowerby, 1897, p. 23, pl. 7, figs. 2, 3.
Tivela transversa (Sow.), Jaeckel, 1931, p. 232; Barnard, 1962b, p. 186.

Pallial sinus and coloration as in *compressa*. The following measurements of (2-valved) shells seem to indicate that *transversa* is an elongate form of *compressa*: 21·5 × 15·5 × 8·5 (False Bay, together with typical *compressa*); 26 × 20 × 10·5; 27·5 × 21 × 11·5; 32 × 22·5 × 11·5; 33 × 25 × 13·5; 39 × 30·5 × 15·5; 40·5 × 32 × 17; 42·5 × 31 × 16; and 50·5 × 39·5 × 23·5 mm.

Fossil: Pleistocene; Sedgefield near Knysna (A. R. H. Martin); Little Brak River, Mossel Bay (S. Afr. Mus.).

Natal (Sowerby); St. Francis Bay, 80 metres (Jaeckel).

Off Durnford Point (Zululand), 13 fathoms, 2 living; off Umtwalumi River (Natal), 25 fathoms, one living; off Hood Point (East London), 26 fathoms, one living; Algoa Bay, 33 fathoms, one valve; St. Francis Bay, 24–34 fathoms, one valve; Mossel Bay, 14 fathoms, 2 living; False Bay, 9–14 fathoms, 2 living (S. Afr. Mus. P.F. coll.).

Remarks. The Zululand, Natal, and Mossel Bay specimens were identified by Sowerby. They all possess the pointed pallial sinus characteristic of *compressa*. Sowerby's original figure shows a rounded sinus; but perhaps this may be taken as an error, unless examination of the Type shows it to be correct.

A comparable species *T. petiti* Dautzenberg (1929, p. 594, pl. 7, figs. 1–5) has been described from Madagascar.

Tivela dunkeri (Römer)

Venus dunkeri Römer, 1864, p. 5, pl. 5, fig. 1 [quoted from Smith].
Tivela dunkeri (Römer), Smith, 1914, p. 4, pl. 1, figs. 9, 10.

Smith's figure shows a pointed pallial sinus, as in *compressa* and *transversa*, with its apex slightly upturned, as is seen in some of the above-recorded shells of *transversa*, though the upper margin tends to slope downwards.

A similar pointed and apically upturned sinus is seen in a 15 × 10 mm. shell from off Cape Vidal (Zululand) 22 fathoms (S. Afr. Mus. No. 14874. P.F. coll.), which Tomlin identified as an elongate example of *hartvigii* Dnkr.!

As a synonym of this latter species Tomlin regarded *rejecta* Smith (1914, pl. 1, fig. 11) figured with a narrow and apically *rounded* sinus.

I therefore regard *dunkeri*, *hartvigii*, and *rejecta* as requiring further investigation before admitting them to the fauna-list.

T. lamyi Dautzenberg (1929, p. 592, pl. 6, figs. 1–6) from Madagascar, is donaciform, with the anterior end longer than the posterior, but with the pallial sinus apically rounded.

Tivela polita (Sow.)

Cytheraea polita Sowerby, 1851, p. 618, pl. 127, fig. 14.
Cytheraea dolabella Sowerby, 1851, p. 619, pl. 127, fig. 15.
Tivela dolabella (Sow.), Smith, 1877, p. 720; Dautzenberg, 1929, p. 592; Lamy, 1931, p. 306; Cox, 1939, p. 101.

Cream or pale buff, often with a bluish tinge, or livid concentric bands, uniform or with faint radial streaks, internally violaceous.

Length 46, alt. 36, thickness (valves together) 16·5 mm.

Fossil: Post Pliocene; Inhambane (Cox, 1939); Pleistocene; Durban (Geol. Survey).

Natal (Sowerby; also S. Afr. Mus. coll. L. Kent); St. Lucia Bay, Zululand (U.C.T.); Chinde (S. Afr. Mus. coll. K.H.B.); Beira (Lamy). Sowerby's 1892 record (of *dolabella*) from Port Elizabeth can be ignored.

Distribution. Red Sea; Quelimane; Madagascar.

Remarks. A specimen 20·5 × 18 mm. from Chinde has very prominent umbones, especially the right one; the cardinal teeth in the left valve are more or less fused into a conical mass which fits into a hollow on the right valve, anterior lateral tooth present in both valves.

Sowerby's statement (1892, p. 58) that his *polita* is 'merely the young' of *compressa* is obviously incorrect.

Tivela natalensis Dnkr.

Tivela natalensis Dunker, 1864, p. 101; Turton, 1932, p. 243; van Bruggen, 1952, p. 16.
Cytherea alucinans Sowerby, 1897, p. 24, pl. 7, figs. 5, 6.

Juvenile with fawn or orange-brown transverse irregular wavy or zigzag markings, adult uniform cream or fawn.

Up to length 81, alt. 67, thickness (valves together) 37 mm. (S. Afr. Mus.).

Fossil: Post Pliocene: Inhambane (Cox, 1939). Pleistocene; Durban (Geol. Survey).

Natal (Sowerby); Durban Bay (S. Afr. Mus. coll. Col. J. H. Bowker, 1887). Turton reported examples from Port Alfred, and van Bruggen one from Jeffreys Bay; but it is very doubtful if this species lives as far south even as Port Alfred.

Remarks. Juveniles may be distinguished from *polita* not only by the zigzag markings, but by the convex postero-dorsal margin. Not so flat as † *baini* Newton 1913 (see Barnard, 1962b, p. 186).

Tapes corrugata (Gmelin)

Venus obsoleta Chemnitz, 1784, p. 50, pl. 42, fig. 444.
Venus corrugata Gmelin, 1790, p. 3280.
Venus senegalensis Gmelin, 1790, p. 3282.
Tapes pullastra Montagu, 1803, p. 125; Sowerby, 1852, p. 693, pl. 149, figs. 85, 86.
Venus pullastra (Mont.), Krauss, 1848, p. 12.
Tapes dactyloides Sowerby, 1852, p. 691, pl. 150, fig. 129; Schwarz, 1910, p. 116; Lamy, 1931, p. 306.
Paphia dactyloides (Sow.), Turton, 1932, p. 245.
Tapes corrugata (Gmelin), Sowerby, 1852, p. 691, pl. 150, figs. 121, 122; Smith, 1904a, p. 25; 1906b, p. 65; Smith in Rogers, 1906c, p. 294; Schwarz, 1910, p. 116; Wybergh, 1920, p. 66; Day, 1959, p. 539.
Venerupis cordieri (*non* Desh.), Sowerby, 1892, pp. 59, 60.
Venerupis rugosa (*non* Desh.), Sowerby, 1892, pp. 59, 60; Schwarz, 1910, p. 115.
[?] *Venerupis lajonkari* (*non* Payr.), Sowerby, 1897, p. 25.
Venerupis robusta Smith, 1904a, p. 25.*
Venerupis corrugata (Gmelin), Nicklès, 1950, p. 203, fig. 388.
Venerupis corrugata var. *senegalensis* Nicklès, 1950, p. 204, fig. 389.
Tapes disrupta Römer (*non* Sow.), Smith, 1903a, p. 397.
Paphia disrupta Römer (*non* Sow.), Bartsch, 1915, p. 204.
Paphia corrugata (Gmelin), Haughton, 1932, p. 36; Turton, 1932, p. 245.
Venus corrugata Gmelin, Lamy & Fischer-Piette, 1939, pp. 464, 465.

Young shells up to *c.* 15 mm. long finely cancellate with concentric and radial striae; later the radial striae become evanescent and obsolete, while the concentric lirae become stronger, posteriorly more or less lamellose, medianly and anteriorly more or less rugose and corrugated. Shells living in sheltered situations (e.g. Langebaan) may retain the smooth, finely cancellate surface (*senegalensis* (syn.) *pullastra*) until larger (up to 35 mm. long or even larger), than those living in exposed situations. The development of the Λ-shaped rugosities varies; sometimes it may be present only on the middle part of the shell, which is anteriorly lirate and posteriorly lamellosely lirate. The change from the smooth (*senegalensis*) to the rugose (*corrugata*) may be abrupt.

The shape also varies, e.g. 34 × 20 and 32 × 24 mm., and distorted shells are not infrequent.

Up to length 77, alt. 48 mm.

Fossil: Pleistocene; Bredasdorp Beds; Little Brak River (Mossel Bay); Keurbooms River (Plettenberg Bay); Port Elizabeth; Saldanha Bay, Bogenfels (South West Africa). (See: Haughton.)

Walvis Bay and Saldanha Bay to Natal (auct.). Walvis Bay, Lambert's Bay, Table Bay, False Bay, Still Bay (S. Afr. Mus.). False Bay, 0–11 fathoms (S. Afr. Mus. P.F. coll.). Lüderitzbucht, and Langebaan (Saldanha Bay) (U.C.T.).

Distribution. Europe, Mediterranean, west coast of Africa to Angola.

Tapes textile (Gmelin)

Tapex textile (Gmelin), Sowerby, 1852, p. 681, pl. 146, figs. 26–28.
Tapes textrix Sowerby, 1892, p. 59.

One valve, 32 × 17·5 mm., from black clay, East Cylinder, Grain Elevator, Durban (Geol. Survey), may be this species, or perhaps *undulata* (Born.)

* ? a *laps. cal.* for *Venerupis rugosa*, or for *Petricola robusta*.

The differences are given by Prashad (1932, p. 241) but I have no material for comparison.

Recorded from Durban by Sowerby (1892).

Tapes deshayesii Hanley

Tapes deshayesii Hanley in Sowerby, 1852, p. 685, pl. 146, figs. 34–38; 1892, p. 59; Smith in Rogers, 1906c, p. 294.
Paphia deshayesii (Hanley), Haughton, 1932, p. 36.

Fossil: Pleistocene; Little Brak River, Mossel Bay (Smith in Rogers; also S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin); raised beach Knysna lagoon; Saldanha Bay (Haughton).

Port Elizabeth (Sowerby).

Remarks. South African specimens require re-examination.

Tapes malabarica (Chemn.)

Tapes malabarica (Chemn.), Sowerby, 1852, p. 682, pl. 145, figs. 6–8; Braga, 1952, p. 114, pl. 10, fig. 10; Franca, 1960, p. 96, pl. 27, fig. 6.
Pullastra malabarica (Chemn.), Chenu, 1862, fig. 413.
Tapes (*Protapes*) *malabarica* (Chemn.), Lynge, 1909, p. 237.
[?] *Tapes* sp. Etheridge, 1904, p. 82, pl. 1, fig. 9.
Paphia (*Protapes*) cf. *gallus* (Gmelin), Cox, 1939, p. 84, pl. 2, fig. 14.

Pallial sinus obliquely ascending towards umbo.

Fossil: Cretaceous, Zululand (Etheridge); Pliocene, Inhambane (Cox); Pleistocene, Dar-es-Salaam.

Durban harbour sediments (Dr. Lester King).

Distribution. Persian Gulf, Indian Seas, East Indies, China, Philippines.

Remarks. 'Venus gallus Spengler' is only a 'Museum' name and cannot be accepted (Lynge, p. 238).

Gen. Dosinia Scop.

The present material, ranging from Lobito Bay around the coast to Delagoa Bay, is divisible into three lots on morphological characters, and presumably represents three species.

A Lobito Bay example was identified by Tomlin as *africana*, and Jaeckel was inclined to consider shells from the Agulhas Bank as also *africana*. Lamy reported *consobrina* from Walvis Bay, and followed Römer in making it a synonym of *subquadrata* Krss. Sowerby identified *Pieter Faure* shells as *lincta*; in 1892 he regarded *africana* as a variety of *lincta*, and *consobrina* as a variety of *hepatica*.

Smith reported *pubescens* from Natal, and *Pieter Faure* shells from Natal were identified also by Tomlin as *pubescens*.

For two of the lots I accept Tomlin's identifications, and for the third I follow Krauss.

Lunule deeply circumscribed
  Concentric lirae simple .. .. *africana*
  Concentric lirae anteriorly and posteriorly lamellose .. .. *pubescens*
Lunule indistinct. Interior violaceous .. .. *hepatica*

Unlike several other Venerids, *Dosinia* is a comparatively deep burrower, with long siphons. The shell lies in the sand with the ligament uppermost and parallel with the surface (Ansell, 1961, p. 512, fig. 15).

Dosinia africana (Gray)

Arthemis africana Gray, 1838, p. 309.
Dosinia africana (Gray), Dollfus, 1911, p. 52, pl. 3, figs. 19, 20; Dautzenberg, 1912, p. 91.
Dosinia consobrina Deshayes, 1853, p. 10; Lamy, 1931, p. 306.
Dosinia cretacea (*non* Rve.), Sowerby, 1899b, p. 157.
Dosinia lincta (*non* Pult.), Sowerby, 1892, p. 60; Wybergh, 1920, p. 66.
Dosinia pubescens (*non* Phil.), Gevers, 1932, p. 74.
Dosinia lupinus Linn. var. *afra* Gmelin, Nicklès, 1950, p. 201, fig. 381.

Lunules circumscribed by a deep groove which forms a distinct notch in the outline in front of the umbo. Concentric lirae simple; at 10 mm. alt. 3 lirae in a space of 1 mm. in middle of the valve. Buff or cream, no dark rays, not violaceous internally.

Up to length 52, alt. 50, thickness (valves together) 28 mm.

Fossil: Pleistocene; Cape Cross, South West Africa (Gevers); Bredasdorp Beds (Wybergh); Sedgefield near Knysna (A. R. H. Martin); Port Elizabeth (Johnson, 1904, *lincta*, but identification requires confirmation).

Walvis Bay (Lamy; also S. Afr. Mus.); False Bay and Mossel Bay (S. Afr. Mus.).

34° 8′ S., 24° 59′ E., 80 metres; 33° 50′ S., 25° 48′ E. (Jaeckel).

Saldanha Bay, 31 fathoms, several living; off Cape Point, 45 fathoms, several valves; False Bay, 32–45 fathoms, several living, and valves; off Struys Point, 48 fathoms, several living; off Cape St. Blaize, 36 fathoms, 2 living; off Gericke Point (Knysna area), 46 fathoms, 2 valves; Algoa Bay, 31–59 fathoms, several living, and valves (S. Afr. Mus. P.F. coll.).

Off Lamberts Bay (west coast) 30–92 fathoms; Lüderitzbucht, 35–160 metres (U.C.T.).

Distribution. Senegal; Mauritania to Ivory coast; mouth of Congo (Jaeckel); Lobito Bay (S. Afr. Mus. identified by Tomlin); Great Fish Bay, Angola (Jaeckel).

Remarks. The most easterly locality at which the *Pieter Faure* obtained specimens was False Island near the mouth of the Bushman River, 26° 40′ E.

The Saldanha Bay shells are often more or less corroded, like several other molluscs in that area.

I have examined the Cape Cross examples.

A single specimen from Algoa Bay (off Bird Island) 22 fathoms (S. Afr. Mus. No. 14959. P.F. coll.) is noticeably more compressed: 19·5 × 19 × 8 compared with other specimens, e.g. 18·5 × 17·5 × 10 mm.

Jaeckel recorded *orbignyi* Dnkr. from Great Fish Bay, Angola; Nicklès recorded the same species from Cameroon to Angola, and also *isocardia* Dnkr. from Mauritania to Angola, the latter species being 'extrêmement variable de forme'.

Dosinia pubescens (Phil.)

Cytherea pubescens Philippi, 1847, p. 24, pl. 8, fig. 3.
Artemis pubescens (Phil.), Sowerby, 1852, p. 672, pl. 144, fig. 72.
Dosinia pubescens (Phil.), Smith, 1903a, p. 396; Prashad, 1932, p. 245 (references).
Dosinia japonica (*non* Rve.), Franca, 1960, p. 96, pl. 27, fig. 2.

Lunule circumscribed by a deep groove which forms a notch in the outline in front of the umbo. Concentric lirae simple in middle of shell but lamellose anteriorly and posteriorly, the escutcheon thereby clearly demarcated; at 10 mm. alt. 3(4) lirae in a space of 1 mm. in middle of valve.

Buff or pale fawn, or cream, without rays externally, or colouring internally.

Up to length 53 mm. (Franca); 28 × 28 × (one valve) 8 mm.

Delagoa Bay (Franca).

Off Tugela River, 40 fathoms, one valve; off Tongaat, 36 fathoms, 17 valves; off Umhloti River, 25 fathoms, 8 valves; off Cape Natal, 54 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Aden, Madagascar, Indo-Pacific.

Dosinia hepatica (Lam.)

Cytherea hepatica Lam., Krauss, 1848, p. 10.
Cytherea hepatica var. *subquadrata* Krauss, 1848, p. 10.
Dosinia hepatica (Lam.), Schwarz, 1900, p. 61; 1910, p. 116; ? Turton, 1932, p. 242; Braga, 1952, p. 112, pl. 10, fig. 7; Day & Morgans, 1956, p. 307; Macnae & Kalk, 1958, p. 129; Broekhuysen & Taylor, 1959, p. 292; Franca, 1960, p. 95, pl. 27, fig. 1 (bad photo).
[?] *Dosinia becki* Turton, 1932, p. 243, pl. 65, no. 1715.

Lunule shallow, circumscribed by a feebly impressed line which makes scarcely any indent in the outline in front of umbo. Concentric lirae simple; at 10 mm. alt. 5–6 in a space of 1 mm. in middle of valve.

Buff, more or less livid at umbones, often with radiating streaks but often unicolourous, internally violaceous.

Length 24·5, alt. 23·5, thickness (valves together) 12 mm.

Fossil: Post Pliocene; Inhambane (Cox, 1939); Pleistocene; Durban (Geol. Survey); Port Elizabeth (Schwarz); Knysna (Schwarz); Sedgefield near Knysna (A. R. H. Martin); Little Brak River, Mossel Bay (S. Afr. Mus.).

Knysna (Krauss; also U.C.T. *teste* Rehder); Still Bay (S. Afr. Mus. coll. Muir); Port Elizabeth (Sowerby; also S. Afr. Mus.); Port Alfred (Smith, Bartsch, Turton); Durban Bay (U.C.T.); St. Lucia Bay and Kosi Bay (U.C.T.); Delagoa Bay (Braga, Franca; also U.W.; also S. Afr. Mus. coll. K.H.B.); Beira (S. Afr. Mus.). Durban harbour sediments (Dr. Lester King).

Distribution. Red Sea, Mozambique, Madagascar.

Remarks. Krauss mentioned the external colour rays and the violet interior. Turton said bluish inside, and when fresh dark radiating streaks, but he also mentioned a 'notch in front of the umbone', which is in conflict with the present material.

The concentric lirae are finer than in the other two South African species.

Together with one shell externally livid and internally violaceous, I obtained at Delagoa Bay one completely white specimen. The Beira specimen in South African Museum is also white.

Venerupis macrophylla Desh.

Venerupis macrophylla Deshayes, 1855, p. 193, pl. 18, fig. 8; Sowerby, 1854, p. 763, pl. 165, fig. 20; Dautzenberg, 1929, p. 605; Prashad, 1932, p. 263 (references); Gravely, 1941, p. 52, fig. 20 *k*.
[?] *Venerupis rugosa* (*non* Desh.), Sowerby, 1892, pp. 59, 60.
[?] *Venerupis lajonkari* (*non* Payr.), Sowerby, 1897, p. 25.
Venerupis multicostata Turton, 1932, p. 245, pl. 66, no. 1731.
Saxicava sp. Day, Millard, Broekhuysen, 1954, p. 153.

Concentric lirae more or less lamellose, especially posteriorly; fine close-set radial pliculae. Internally brown or purplish-brown at hind end.

Length 29, alt. 21 mm. (Delagoa Bay); 24 × 13 mm. (St. Lucia Bay).

? Durban (Sowerby, as *lajonkari*); Port Alfred, dead valves (Turton); St. Lucia Bay, dead valves (U.C.T.); Delagoa Bay, 2 living (S. Afr. Mus. coll. K.H.B.).

Distribution. Madagascar, Madras, Indo-Pacific.

Remarks. The *Pieter Faure* specimens identified by Sowerby as *V. rugosa* are *Tapes corrugata*. Sowerby's other records of the Mediterranean *lajonkari* and the Californian *cordieri* are also probably misidentifications.

Clementia papyracea (Gray)

Clementia papyracea (Gray), Cox, 1927, p. 54, pl. 4, figs. 3, 4; Prashad, 1932, p. 262 (references).
Clementia mcclellandi Tomlin, 1921, p. 215, pl. 8, fig. 6.

With all respect to Tomlin, I must decline to include *C. mcclellandi* in the South African fauna-list. It is quite incredible that such a large shell should have remained undetected and unreported from Muizenberg or any other part of False Bay.

Shore collecting from early days, e.g. Andrew Smith (1825–1837), Baron von Ludwig (a resident of Cape Town), Wahlberg, Krauss, Fritsch (1863–1866), down to more recent times, e.g. South African Museum (coll. R. M. Lightfoot, W. F. Purcell, K.H.B.) and the University of Cape Town (Prof. Stephenson, Prof. Day and their assistants and students), has not produced a single specimen of this genus.

Dredging by Stimpson (1853, Simon's Bay), the *Challenger*, the *Valdivia*, the intensive work of the *Pieter Faure* and *Africana I* and *II*, has been equally unproductive.

In spite of its large size, 80 × 78 mm., I think that *mcclellandi* is only another synonym of *papyracea*, which is very variable (Cox). And in my opinion the valves seen by Tomlin had come from some other locality, not South African. McClelland (1864–1943) was a private collector who 'amassed a large

world-wide collection'. In such cases, as is well known, the localities (if any) attached to the specimens are apt to be unreliable.

Fossil: Quaternary: Zanzibar; East Indies.

Recent: Arabian and Persian Gulf, Indo-Pacific.

References are here given as the species may possibly be found, fossil or living, on the east coast of Africa south of Zanzibar.

Fam. **Petricolidae**

For *Petricola ventricosa* Krauss see: *Gastrana abildgaardiana*, p. 550.

Petricola bicolor Sow.

Petricola bicolor Sowerby, 1854, p. 776, pl. 166, fig. 22.
Petricola typica (*non* Jonas), Sowerby, 1892, p. 60; 1897, p. 33; Turton, 1932, p. 246.
Petricola robusta (*non* Sow.), Sowerby, 1892, p. 61; Turton, 1932, p. 246.
Petricola ponsonbyi (*non* Sow.), Bartsch, 1915, p. 204.
Petricola albanyana Turton, 1932, p. 246, pl. 66, no. 1737.
Petricola sp. Turton, 1932, p. 246, pl. 66, no. 1734.

Radial ribs extending uninterruptedly from umbo to margin, but intersected by the concentric growth-lines; ribs coarser than in *ponsonbyi*, none of them bifurcate or divaricate, fine intermediaries may develop on the later part of the shells.

Drab, grey, brown, usually the hinder part darker brown both externally and internally, but more strongly so internally.

Up to 25 mm. (Turton). Examples of variation in shape: length 14, alt. 13, thickness (valves together) 9·5 mm., and 17 × 11 × 8 mm.

West coast: Walvis Bay; Lambert's Bay; Table Bay (S. Afr. Mus.); Milnerton, Table Bay (U.C.T.).

South coast: False Bay, Still Bay (S. Afr. Mus.); Port Alfred (Smith, Bartsch, Turton); Durban (Sowerby).

Remarks. Described originally from an unknown locality. Dr. Rehder of the U.S. National Museum suggested to Prof. Day (U.C.T.) that the South African shells formerly recorded under the names *typica* (West Indies) and *robusta* (Panama) should be identified as *bicolor*. It is quite likely that Hanley obtained the specimen, described by Sowerby, from the Cape. I adopt Dr. Rehder's suggestion.

It is possible that an abnormally elongate example of this species is responsible for Sowerby's record (1892) of *cultellus* from Port Elizabeth.

Petricola ponsonbyi Sow.

Petricola ponsonbyi Sowerby, 1892, p. 61, pl. 3, fig. 68; Turton, 1932, p. 246.
[Non] *Petricola ponsonbyi* Sow. Bartsch, 1915, p. 204 [= *bicolor*].

Fine radial riblets, later becoming stronger, those on the hinder part diverging from those on the middle part, the line of divergence running from umbo to postero-inferior corner of the shell.

White or cream, often with a faint lemon-yellow tinge, umbo pinkish.

Length 25, alt. 17 mm.; also 16 × 12, and 16 × 16 mm. (S. Afr. Mus.).

Port Elizabeth (Sowerby); Port Alfred (Turton); Still Bay (S. Afr. Mus. coll. Muir).

Remarks. Judging by the numerous valves collected by Dr. Muir this species is less liable to variation in shape, possibly owing to living in a more open habitat; distortion, however, does occur, as e.g. the circular valve mentioned above.

One Still Bay valve shows an abnormal sculpture: up to 8 × 5 mm. the fine pliculae, including the posterior bifurcate ones, are normal; on the later growth the pliculae are more spaced and their course is interrupted by growth-lines; a zone of about 2–3 mm. width in which they are straight and radial (curving slightly anteriorly) is followed by a zone in which they form a more or less zigzag sculpture.

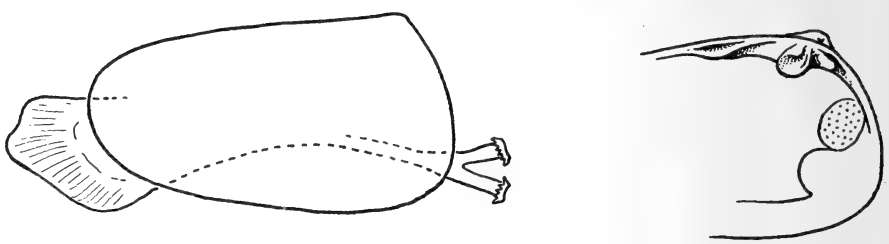


FIG. 28. *a*, *Donacilla africana* W. H. Turton, outline of shell (left valve) with projecting foot and siphons. *b*, *D. delagoae* n.sp., inner view of right valve.

Petricola (*Choristodon*) *divergens* (Gmelin)

Venus divaricata Chemnitz, 1788, p. 357, pl. 172, figs. 1666, 1667.
Venus divergens Gmelin, 1790, p. 3269.
Petricola divaricata (Chemn.), Sowerby, 1854, p. 776, pl. 166, figs. 24, 25.
Choristodon divaricata (Chemn.), H. & A. Adams, 1857, p. 442, pl. 110, figs. 2, 2*a*; Chenu, 1862, fig. 453.
Petricola divergens (Gmelin), Prashad, 1932, p. 264 (references).

Radial pliculae forming longitudinal series of zigzags; posteriorly 8–9 radial lamellose ribs.

Length 22·5, alt. 18, thickness (valves together) 15 mm.; also 21 × 18 × 15 mm.

Delagoa Bay, two living (S. Afr. Mus. A9542. coll. K.H.B.).

Distribution. Red Sea, Persian Gulf, Mauritius, Indo-Pacific.

Remarks. In having radial lamellose ribs on the hinder part these shells resemble Sowerby's figure of *lapicida* Chemn. (1854, pl. 166, fig. 26).

Fam. **Mesodesmatidae**

Donacilla africana W. H. Turton

Fig. 28 *a*

Donacilla africana Turton, 1932, p. 252, pl. 68, no. 1782.

Donaciform, very inequilateral, strongly produced anteriorly, umbones near posterior end (not anterior as in Turton), surface sculpture of growth-lines only. No pallial sinus (cf. Turton's photo).

Foot very large, more or less triangular; siphons distally separate, apices papillose.

White. Length 7·5, alt. 4 mm.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Port Alfred (Turton); Still Bay (S. Afr. Mus. coll. Muir); Breede River mouth, and Great Brak River mouth (U.C.T.).

Inhambane, living (U.C.T.).

Types in S. African Museum (A 29742), cotypes in Witwatersrand University.

Remarks. Very common at Still Bay. I can find no differences in the Inhambane examples.

Donacilla delagoae n.sp.

Fig. 28 *b*

Externally very similar to *africana*, but not so strongly produced anteriorly. A small semicircular pallial sinus, approximately equal in size to the posterior adductor scar. Foot and siphons as in *africana*. White. Length 6, alt. 3·5 mm.

Inhaca Island, Delagoa Bay, living (U.W.).

Remarks. It is curious to find a different species at Delagoa Bay, while the South African *africana* extends farther northwards to Inhambane. The pallial sinus, however, is distinctive.

Gen. Ervilia Turton 1822

Smith (1906b, p. 66) accepted Sowerby's identification (1904, p. 15) of shells from the Buffalo River (East London) as *Ervilia* ? *purpurea* Desh. *ined.* The former's description and figure (pl. 8, figs. 10, 11), however, were based on Red Sea examples in the British Museum. He regarded *purpurea* as the same as *scaliola* Issel.

The Buffalo River specimens returned by Sowerby with his label are not *Ervilia*, but *Psammotellina capensis*.

Smith had previously (1903a, p. 399) recorded from Durban the Japanese and Siamese species *Ervilia bisculpta* Gould (Lynge, 1909, p. 219, pl. 4, figs. 14–16).

Nevertheless until confirmation is forthcoming, it is better to exclude the genus *Ervilia* from the South African fauna list.

Fam. **Mactridae**

Lamy, 1917/18, pp. 173–411, pls. 6, 7.

Gen. Mactra Linn.

In the case of isolated specimens coming into the hands of specialists, minor differences tend to acquire the status of *specific* characters. About a dozen names

of *Mactra* 'species' appear in the South African fauna-list, but only five species seem to be actually inhabitants of South African waters, or six if *Schizodesma* be included. *M. laevis* Dnkr. (1871, p. 171) from Mossel Bay (Lamy, p. 188, footnote 2) seems to have been overlooked by Sowerby, Smith, and Tomlin, compilers of the 'official' list.

Tomlin (1923, p. 52) introduced *rochebrunei* Lamy (*hians* Phil., non Pulteney, Wood) into the list, based on Natal specimens sent to Lamy by Burnup. But Lamy (l.c., p. 215) mentioned no such specimens; and he gave Zanzibar as the nearest locality to South Africa for this species. Burnup did, however, send to Lamy examples of *aequisulcata* (p. 211) and *intuspicta* (p. 229). *M. rochebrunei* is here excluded from the fauna-list.

I. Umbones close together.
   A. Ventral lamella of anterior lateral tooth in right valve entire (*Mactra* s.s.)
      1. Concentric sulci over whole shell. Tumid .. .. *aequisulcata*
      2. Concentric sulci dorsally on each side of umbo, and also on anterior half in shells larger than *c.* 25 mm. long .. .. *lilacea*
      3. Concentric sulci on each side of umbo only.
         (*a*) Oval-triangular, compressed. Cream or fawn .. .. .. *glabrata*
         (*b*) Subtriangular, tumid. Violaceous, especially internally .. .. *cuneata*
   B. Ventral lamella of anterior lateral tooth in right valve bilobed (*Mactrotoma*). A distinct ridge from umbo to postero-ventral corner. No sulci on any part of shell .. .. *ovalina*

II. Umbones far apart. Ligament in a deep curved groove. Lateral teeth granulate (*Schizodesma*) .. .. *spengleri*

Mactra aequisulcata Sow.

Mactra aequisulcata Sowerby, 1894, p. 376; 1897, p. 21, pl. 8, fig. 26; Lamy, 1917, p. 211; Braga 1952, p. 116, pl. xi, fig. 2; Macnae & Kalk, 1958, p. 129.

Tumid. Regular concentric sulci over whole shell. In large shells the median part near the umbo becomes worn more or less smooth.

Fawn or yellowish-brown, uniform.

Length 66, alt. 53 mm.; 54 × 44 × (valves together) 31 mm.

Durban (Sowerby); Tongaat (Lamy; coll. Burnup); Delagoa Bay (Braga; also U.W.); Chinde, low-tide, living (S. Afr. Mus. coll. K.H.B.); Bazarute Island (U.W.).

Off Amatikulu River (Zululand), 26 fathoms, 4 living (S. Afr. Mus. P.F. coll.).

Distribution. Madagascar.

Mactra lilacea Lam.

Mactra lilacea Lamarck, 1818, p. 479; Lamy, 1917, p. 203, pl. 6, fig. 6; Franca, 1960, p. 97, pl. 28, fig. 3.
Mactra decora Reeve, 1854, sp. 80; Deshayes, 1855, p. 63.
Mactra adansoni (*non* Linn.), Sowerby, 1892, p. 55.
Mactra adansoni var. *semistriata* Turton, 1932, p. 255.
Mactra intuspicta (*non* Desh.), Lamy, 1917, p. 229; Tomlin, 1923, p. 51.
[?] *Mactra glabrata* (*non* Linn.), Braga, 1952, p. 115 (= juv.); Macnae & Kalk, 1958, p. 129.
Mactra semisulcata Braga, 1952, p. 116, pl. xi, fig. 4.

Oval. Concentric sulci on each side of umbo, but no sulci elsewhere until the shell reaches a length of 25–35 mm., when they begin to appear on the anterior half.

Length 68, alt. 47 mm.

Delagoa Bay (Braga, Franca; also S. Afr. Mus. coll. K.H.B.); Inhambane (Braga; also S. Afr. Mus. coll. Ross-Frames).

Distribution. Red Sea; Karachi (Melvill & Standen as *glabrata* ? *non* Linn., *apud* Lamy); Nossi Bé (U.W.); Madagascar.

Remarks. Sowerby (1889, p. 156) came to the conclusion that *adamsoni* [*sic*] and *decora* were conspecific. But Lamy (p. 197 and p. 206 footnote) suggested that Port Elizabeth specimens identified by Sowerby as *adansoni* were really *lilacea*; Lamy on both pages erroneously added to the reference to Sowerby a reference to the figure of *Crassatella acuminata* Sow. I think it very unlikely that the Port Elizabeth shells, if they really came from that locality, were *lilacea*; they were probably *adansoni* (*glabrata*); and Sowerby erred in regarding *adansoni* and *decora* as conspecific.

Lamy made *semisulcata* a synonym of *olorina* Phil. 1846, another Red Sea species which also has the concentric sulci confined to the anterior end of the shell.

Mactra glabrata Linn.

Mactra adansonii Philippi, 1849, p. 152; Sowerby, 1889, p. 156 (*adamsoni* [*sic*]); Schwarz, 1910, p. 115; Bartsch, 1915, p. 209; Turton, 1932, p. 255.*; Day, 1959, p. 539.
Mactra adansoni var. *decora* (*non* Desh.), Turton, 1932, p. 255.
Mactra adansoni var. *elongata* Turton, 1932, p. 255, pl. 69, no. 1804.
Mactra laevis Dunker, 1871, p. 171.
Mactra glabrata Linn., Sowerby, 1897, p. 32 (? = *decora* = *lilacea*); Smith in Rogers, 1906c, p. 294; Lamy, 1917, p. 195 (references); Jaeckel, 1931, p. 240; Turton, 1932, p. 256; Nicklès, 1950, p. 208, fig. 395.
[Non] Braga, 1952, p. 115 [= *lilacea* juv.].
Macnae & Kalk, 1958, p. 129 [? = *lilacea*].

Concentric sulci on each side of umbo, but not elsewhere. Cream or fawn, uniform or with faint radial streaks.

Length 100, alt. 73 mm.; 82 × 57 × (valves together) 42 mm., and 52 × 42 × 23 mm. Juveniles tend to be proportionately a little less high: compare 52 × 42 and 23 × 17 mm.

Fossil: Pleistocene; Little Brak River, Mossel Bay (Smith in Rogers); Sedgefield near Knysna (A. R. H. Martin); Port Elizabeth (Johnson, Schwarz); Durban (Geol. Survey).

Mossel Bay (Dunker); Port Elizabeth (Sowerby); Algoa Bay (Jaeckel); Port Alfred (Bartsch, Turton); Durban (Sowerby).

False Bay, Hermanus, Still Bay, Sebastian Bay, Mossel Bay, Algoa Bay (S. Afr. Mus.).

* Turton is slightly in error. Lamy in his monograph 1917 (not 1923) did not 'say doubtfully that it [*adansoni*] is the same as *lilacea*'. Lamy considered that *Sowerby's Port Elizabeth* 'adansoni' was probably *lilacea*. It is now impossible to say what Sowerby's shells were, but at a guess they were probably *adansoni* (*glabrata*).

False Bay, 9 fathoms, one living; off Cape Infanta, 40 fathoms, one valve; off Umkomaas (Natal), 40 fathoms, one valve; off Cape Natal (Durban), 54 fathoms, 6 valves; off Morewood Cove (north of Durban), 27 fathoms, several valves; off Amatikulu River (Zululand), 26 fathoms, 12 living (S. Afr. Mus. P.F. coll.).

Saldanha Bay, and False Bay (U.C.T.).

Distribution. Cape Blanco to Angola (Nicklès).

Remarks. None of the Natal and Zululand specimens exceed 25 mm. in length. They appear indistinguishable from Cape and Agulhas Bank specimens. If they are conspecific, the occurrence off the Zululand coast lends credence to the Delagoa Bay (U.W.) and Inhambane (Braga) records; and also to the Karachi record (Melvill & Standen) which Lamy doubted (p. 197 footnote 3) and assigned probably (p. 206, footnote 1) to *lilacea.*

In separating *glabrata* and *lilacea* size must be taken into account, because the concentric sulci on the anterior end of the latter are not present in juveniles (p. 517 *supra*). Juveniles (under 25 mm. long) of the two species are impossible to separate.

M. largillierti Phil. from Gaboon and Angola (Lamy, 1917, p. 198; Nicklès, 1950, p. 208, fig. 396; Franca, 1957, p. 5) is said to be distinguished by a more transversely oval shape.

Mactra cuneata (Chemn.) Gmelin

Mactra australis (*non* Lam.), Krauss, 1848, p. 1.
Mactra cuneata Lamy, 1917, p. 229 (references).
Mactra intuspicta (*non* Desh.), Lamy, 1917, p. 229; Tomlin, 1923, p. 51.
Mactra lurida Braga, 1952, p. 116, pl. xi, fig. 3; Franca, 1960, p. 98, pl. 28, fig. 4.

Tumid, subtrigonal, postero-dorsal margin straight (seen from inside). Concentric sulci on each side of umbo, but not elsewhere. In right valve the anterior branch of the Λ-shaped cardinal tooth is in the same line with the *dorsal* lamella of the anterior lateral tooth.

Greyish-violaceous, paler towards umbo, sometimes faintly radiately streaked, internally violet.

Length 32, alt. 25 mm.; 28·5 × 22 × (valves together) 18 mm.

Natal (Krauss); Durban (Lamy; Tomlin); Delagoa Bay (Braga, Franca; also S. Afr. Mus. coll. K.H.B. living); Inhambane (U.C.T.).

Distribution. Ceylon; East Indies.

Remarks. Obviously the Durban specimens identified by Tomlin and Lamy as *intuspicta*, and Braga's specimens identified as *lurida*, are one and the same species.

Krauss also had the same species, as shown by the description and colour which he gave. But he was incorrect in giving the Cape (in addition to Natal) as a locality.

Mactra (*Mactrotoma*) *ovalina* Lam.

Mactra capensis Sowerby, 1892, p. 55, pl. 3, fig. 72; Johnson, 1904, p. 11; Jaeckel, 1931, p. 241; Turton, 1932, p. 255; Macnae & Kalk, 1958, p. 129.

Mactrinula ovalina (Lam.), Sowerby, 1897, p. 22; Schwarz, 1900, p. 61.
Mactra ovalina Lam., Smith, 1904a, p. 25; Turton, 1932, p. 255.
Mactra alfredensis Bartsch, 1915, p. 209, pl. 44, figs. 6, 7; Turton, 1932, p. 255.
Mactra depressa Spengler (*non* Lam.), Lamy, 1917, p. 253, pl. 6, fig. 1 (references).
Mactra fragilis (*non* Chemn.), Franca, 1960, p. 97, pl. 28, fig. 2.

Oval, compressed, thin; a distinct ridge from umbo to postero-ventral corner, dorsal to the ridge one or two feeble radial ribs and surface irregularly rugulose; no concentric sulci anywhere, but fine concentric growth-lines over whole shell, with a few stronger ones on anterior side of umbo.

Cream or pale fawn, covered with a thin pale yellowish periostracum, thicker and somewhat fibrous or wrinkly on the postero-dorsal area.

Length 39, alt. 29 mm.; 25·5 × 19 × (valves together) 9·5 mm.

Fossil: Pleistocene; Port Elizabeth (Johnson); Knysna (Schwarz); Sedgefield near Knysna (A. R. H. Martin).

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Durban (Sowerby); Delagoa Bay (Franca).

False Bay, 22–47 fathoms, 4 living, one valve; off Cape St. Blaize, 37–42 fathoms, one living, one valve; off Nanquas Peak (eastern end of Algoa Bay), 49 fathoms, 4 valves; off East London, 32–43 fathoms, 2 living, 6 valves (S. Afr. Mus. P.F. coll.).

False Bay (U.C.T.); Inhambane (U.C.T.).

Distribution. Zanzibar; Indo-Pacific.

Remarks. M. capensis was mentioned by Lamy only in two footnotes (pp. 188, 190), where he suggested that it is very near to *corallina* Linn. var. *stultorum* Linn. Sowerby also said (1892) that his *capensis* 'somewhat resembled' *stultorum*. Both statements are curious, because Sowerby's figure bears no resemblance to *stultorum*. On the contrary, Lamy's pl. 6, fig. 7, of Lamarck's *brasiliana* (= *fragilis* Chemn.) bears a very close resemblance to Sowerby's figure.

Evidently the Indo-Pacific *ovalina* is very similar to the Atlantic *fragilis*. Maybe they cannot be distinguished, and thus form a parallel with *glabrata* which has been recorded from both the west and east coasts of Africa, with South Africa as a connecting link.

In this subgenus the anterior cardinal tooth in both valves has an accessory lamella; in the right valve the cardinal, accessory lamella, and the anterior lateral are in the same straight line (or very nearly so) and together form a trilobed lamella; in the left valve the accessory lamella and the lateral form a bilobed lamella, not quite in line with the anterior cardinal (cf. Lamy. loc. cit., figs. p. 179).

Schizodesma spengleri (Linn.)*

Mactra spengleri Linn.; von Martens, 1874, p. 122.
Schizodesma spengleri (Linn.), Newton, 1913, p. 342, pl. 22, figs. 1–3; Barnard, 1962b, p. 186.
Spisula (*Schizodesma*) *spengleri* (Linn.), Lamy, 1918, p. 328, fig. on p. 295.
Mactra (*Schizodesma*) sp. Turton, 1932, p. 256, pl. 69, no. 1815.

* Sherborn, *Index Anim.*, 1758–1800, p. 916: *sprengleri* [*sic*]; also *Curculio sprengleri*. The 12th edition of Linne is not available here for checking the original spelling; but *sprengleri* seems to be an obvious misprint.

Very young shells are relatively higher than larger shells: length 1·5, alt. 1·25 mm., and 1·75 × 1·5 mm. The ridge from umbo to postero-ventral corner distinct, postero-dorsal margin convex.

The figure of *rufanensis* Turton (1932, pl. 69, no. 1805), 4 × 3·5 mm., shows a similar convex postero-dorsal margin, but not an angular postero-lateral corner, and Turton made no mention of a ridge from the umbo to this corner. Nevertheless *rufanensis* may prove to be merely a juvenile *spengleri*.

Up to length 113, alt. 80 mm.; 94 × 68 × (valves together) 45 mm.

Fossil: Pleistocene, Port Elizabeth. The reported occurrence (Krige, A. V., 1927) in a raised beach at Velddrif, Berg River (west coast) is not acceptable unless confirmed.

Common in False Bay; recorded also from Port Elizabeth (von Martens) and Port Alfred (Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

Remarks. According to von Martens this is the type species of Linnaeus's genus *Mactra*, but apparently nowadays *corallina-stultorum* is regarded as the genotype (Lamy 1917, Stewart 1930, Prashad 1932).

The deep ligament-pit, widely separated umbones, and granulate lateral teeth seem sufficient to characterize a genus separate from either *Mactra* or *Spisula*.

Gen. Lutraria Lam.

Holme, 1959, pp. 557–568, 2 pls. & text-figs.

Specimens of *Lutraria* have been recorded from South Africa under three names: *capensis* Rve. (or *lutraria* var. *capensis*), *intermedia* Sow. 1859 (*non* Deshayes 1854), and *oblonga* (Chemn. Gmelin).

Only a small number of local specimens is available for study, and no European species for comparison. They appear separable into three living species, and one fossil species.

1. Dorsal margin sharply cristate, external surface not visible in internal view. Ante-umbonal length 1½ (juv.)—2 in post-umbonal length.
   (*a*) Altitude slightly less than 2 (juv. 20 mm. long) to 2 (adult) in length. Posterior dorsal margin convex .. .. *lutraria*
   (*b*) Altitude 2¼ in length. Posterior dorsal margin straight .. .. .. ? *oblonga*
2. Dorsal margin not cristate, concave on either side of umbo, external striated surface visible in interior view.
   (*a*) Ante-umbonal length 1⅝ in post-umbonal length. Altitude 1⅝ in length. Posterior dorsal margin convex .. .. *angustior*
   (*b*) Ante-umbonal length 1¾ in post-umbonal length. Altitude 2½ in length. Posterior dorsal margin straight .. .. † sp.

I have seen no specimens of the two following species, and do not know whether they fall into the first or the second major group of the above conspectus.

   (*a*) Ante-umbonal length 2½ in post-umbonal length. Altitude 2¼ in length. Posterior dorsal margin straight (or slightly concave) (H. & A. Adams, pl. 101, fig. 5) .. .. *oblonga*
   (*b*) Ante-umbonal length 1¾ in post-umbonal length. Altitude 2½ in length. Posterior dorsal margin straight (or slightly convex). Hind end acuminate. (Nicklès, 1950, fig. 404) .. .. *elongata*

Lutraria lutraria (Linn.)

Fig. 29 *a*, *b*

Lutraria elliptica Lamark, 1801, p. 120; Turton, 1932, p. 256.
Lutraria elliptica var. *intermedia* (*non* Desh.), Sowerby, 1859, pl. 4, fig. 1; 1892, p. 56.
Lutraria capensis Desh. MS. Reeve, 1854, pl. 3, fig. 9; Sowerby, 1889b, p. 156; 1892, p. 56; Bartsch, 1915, p. 210; Lamy, 1918, p. 306; Turton, 1932, p. 256; ? Haughton, 1932, p. 38.
Lutraria lutraria (Linn.), Lamy, 1918, p. 363, fig. on p. 360 (hinge) (references); Nicklès, 1950, p. 211, fig. 403; Holme, 1959, p. 560, pl. 2, figs. 1–3, text-figs. 1*a*, 2*a*, 3*a*, 4 *a*, *c*; Barnard, 1962b, p. 186.
Lutraria albanyana Turton, 1932, p. 256, pl. 69, no. 1815.
[Non] *Lutraria capensis* Smith in Rogers, 1906 [= fossil species (*v. infra*)].

Anterior and posterior dorsal margins raised into a thin sharp crest, forming when viewed internally the dorsal outline of the shell, slightly concave below the umbo and gently convex on each side. Near the posterior dorsal margin fine radial puckerings, usually best seen when the periostracum is intact. Anterior and posterior lateral teeth in left valve present but weak, in right valve the anterior lateral combined with the anterior branch of the cardinal to form a bilobed lamella; posterior lateral weak. Scar of lower border of pallial sinus running close to the pallial line, but not confluent with it except distally where they form a slightly enlarged oval scar.

White with olivaceous brown periostracum.

Length 143, alt. 75 mm.; also 120 × 63, 118 × 66, 116 × 60, 106 × 59, 100 × 59, 97 × 54·5, 78 × 41, 37 × 18·5, 24·5 × 12·5 mm.; also 116 × 75 mm., but the growth-lines more normal in its younger stages, e.g. 94 × 54 and 60 × 30 mm.

A slightly malformed specimen from Table Bay (S. Afr. Mus. No. 5568 *bis*), ventral margin nearly straight, posterior margin very bluntly rounded, especially in the smaller valve; left valve 68 × 36, right valve 71 × 38 mm.

Fossil: Pleistocene, Bogenfels and Angra Juntas, South West Africa (Haughton); Langebaan, Saldanha Bay (Haughton).

Table Bay, False Bay, Hermanus (Walker Bay), Still Bay (S. Afr. Mus.); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton).

False Bay, 10 fathoms, 4 valves (labelled by Sowerby; *intermedia*); Algoa Bay, 49 fathoms, one juv. valve; off Umhloti River (Natal), 27 fathoms, 5 juv. valves (broken, hinge-line only present) (S. Afr. Mus. P.F. coll.).

False Bay, Saldanha Bay, and Lüderitzbucht (U.C.T.).

Distribution. Mediterranean and Atlantic coast of Europe. ? West Africa and Senegal.

Remarks. The thin crest-like dorsal edge is easily worn away in beach examples; in which case sometimes the growth-lines on the external surface, especially anteriorly, become partly visible in internal view.

L. capensis is said to differ from typical *lutraria* by having the altitude a little more than half the length (Lamy, p. 368; also Reeve's figure).

Lutraria ? *oblonga* (Chemn. Gmelin)

Fig. 29 *a*

Lutraria oblonga (Chemn., Gmelin), Sowerby, 1889b, p. 155; 1892, p. 56; 1897, p. 32; Lamy, 1918, p. 370, fig. on p. 361 (hinge) (references).
Lutraria oblonga var. *australis* Lamy, 1918, p. 370.

Dorsal margin cristate as in *lutraria*, but postero-dorsal margin straight, not convex. Altitude 2–2$\frac{1}{5}$ (2$\frac{1}{4}$) in length. Hinge teeth and pallial sinus as in *lutraria*.

White with grey-brown periostracum.

Length 112, alt. 56 mm.; also 105 × 48, 85 × 39, 84 × 37, 60 × 27 mm.

Off Tugela River (Natal), 37 fathoms, one (bivalve, but periostracum abraded) and 2 valves (S. Afr. Mus. P.F. coll.).

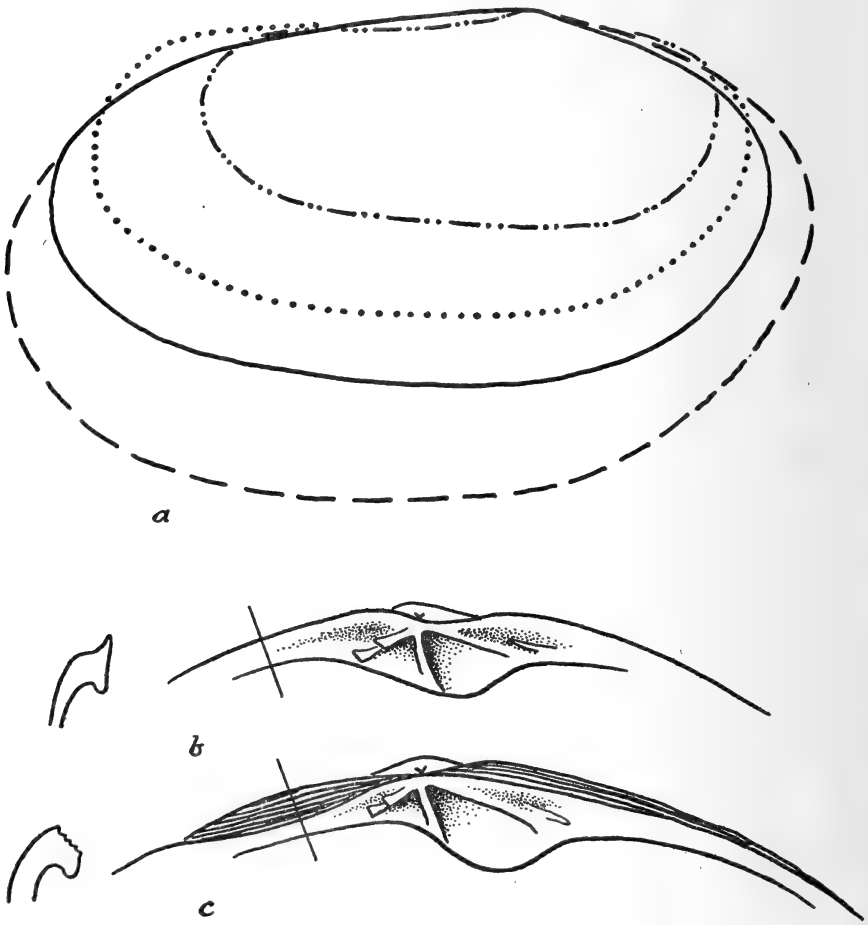


FIG. 29. *a*, Outlines of *Lutraria*: —— *lutraria*, Table Bay, — — — *angustior*, Table Bay, ... ? oblonga, Knysna, —·· — ·· — †Little Brak River, raised beach. *b*, *c*, hinge of right valve of *L. lutraria* (Linn.) and *angustior* Phil., with sections.

Durban harbour sediments (Dr. Lester King).
Knysna, living (Prof. Day, U.C.T. 1960).

Remarks. These specimens are probably the same as those recorded as *oblonga* by Johnson from Port Elizabeth, and by Sowerby from Port Elizabeth and Natal. Lamy recorded var. *australis* from Zanzibar. Cox (1939) identified specimens from the Miocene of Mozambique as cf. *philippinarum* Rve.

In the right valve the anterior branch of the cardinal tooth forms with the anterior lateral a bilobed lamella (as in *lutraria*, *supra*); not a bifid tooth as in Lamy's figure of *oblonga*; nor does the anterior lateral in the left valve approach and simulate a second cardinal tooth.

Therefore the name *oblonga* is here used only *pro tem*, pending further investigation.

Lutraria angustior Phil.

Fig. 29 *a*, *c*

[?] *Lutraria senegalensis* Gray, 1837, p. 374, fig. 32.
Lutraria elliptica var. *angustior* Philippi, 1844, p. 7.
Lutraria lutraria var. *angustior* (Phil.), Lamy, 1918, p. 365 (references).
Lutraria angustior Holme, 1959, p. 557, pl. 1, pl. 2, fig. 4. text-figs. 1*b*, 2*b*, 3*b*, 4*b*.

Shell thicker than equal-sized *lutraria*. Anterior and posterior dorsal margins not raised, nor forming a sharp edge; outline viewed internally concave on both sides of umbo, especially anteriorly, revealing the striated external surface. Hinge teeth as in *lutraria*.

There is one specimen in South African Museum from Table Bay (S. Afr. Mus. No. 5568), 130 × 80 mm., which accords with Holme's description (perhaps not very clearly expressed on p. 559) of the dorsal outline. But the lower border of the pallial sinus runs parallel for its whole length with the pallial line, the two uniting only distally to form an oval scar. Also the fine radial puckerings on the posterior dorsal surface are present (as in *lutraria*).

Lamy regarded *angustior* as a variety of *lutraria*, separated merely by differences in size and shape. Holme, however, gave reasons for regarding *angustior* as a distinct species. Some of the characters he relied upon seem to be somewhat variable, as he himself admitted, and as is shown by the present specimen. But the dorsal outline is a clear-cut character which may prove of specific value.

In the present specimen the striated dorsal surfaces in front of and behind the umbones form, when the valves together are viewed dorsally, a sort of pesudo-lunule and (less marked) a pseudo-escutcheon.

L. angustior has been recorded from the Mediterranean and west coast of Europe. Lamy considered that specimens from Senegal were very close to *angustior*. Further research may show that Philippi's name should give place to Gray's *senegalensis*.

U.C.T. has a specimen from Langebaan (Saldanha Bay).

† *Lutraria* sp.

Fig. 29 *a*

Lutraria capensis (narrow form) Smith in Rogers, 1906c, p. 294.

Smith recorded a narrow form of *capensis* from a raised beach at Little Brak River, Mossel Bay. From this deposit South African Museum has one (bivalve) specimen. It measures 83 × 34 mm.; the ante-umbonal length is 29 mm., which is thus not quite twice in the post-umbonal length. Neither the anterior nor the posterior dorsal margins are raised enough to conceal *entirely* the growth-lines on either side of the umbo, and the posterior outline shows a distinct downward bend just beyond the posterior lateral tooth. The posterior dorsal margin is straight or very slightly concave. The hinge-teeth are as in *lutraria* (*supra*). The lower border of the pallial sinus is confluent with the pallial line for at least three-quarters of the length of the sinus.

This specimen would seem to be a narrow form of *angustior* rather than of *lutraria-capensis*. But more material is desirable.

Another specimen, 115 × 57 mm., has the cristate dorsal margin and slightly convex postero-dorsal margin of *lutraria*, but is slightly narrower and has not the typical oval shape with convex lower margin.

The hinge of a right valve was found by Dr. A. R. H. Martin in the deposit at Sedgefield near Knysna, with cristate dorsal margin, and presumably belonging to a shell similar in shape to the last mentioned Little Brak River shell.

Lutraria elongata Gray

Lutraria elongata Gray, Lamy, 1918, p. 369; Nicklès, 1950, p. 211, fig. 404; Franca, 1957, p. 6.

Lamy considered this species to be well characterized by its shape: anteriorly bluntly rounded, posteriorly elongate and *acuminate* (see Nicklès's figure). Shape alone is inadequate to define a species, and further details are required for a diagnosis.

Lobito Bay (Lamy); French Congo to Angola (Nicklès); Angola (Franca).

Standella nicobarica (Gmelin)

Mactra nicobarica Gmelin, 1790, p. 3261.
Mactra aegyptiaca Chemnitz, 1795, p. 218, pl. 200, figs. 1955, 1956.
Standella aegyptiaca (Chemn.), Smith, 1910, p. 214.
Standella (*Eastonia*) *nicobarica* (Gmel.), Lamy, 1918, p. 389; Dautzenberg, 1929, p. 617.
Eastonia nicobarica (Gmel.), Macnae & Kalk, 1958, p. 129.
Standella rugosa (*non* Helbling), Franca, 1960, p. 98, pl. 28, fig. 5.

Numerous fine radial ribs, nearly equidistant and equal in size, from anterior end to a line from umbo to middle of posterior margin; dorsal to this line finer and closer-set, somewhat undulate pliculae diverge towards the postero-dorsal margin.

Length 54, alt. 37 mm.

Siphons completely united, enclosed in a brown epidermis, 1½–2 times the length of the shell, nonretractile.

Fossil: Pleistocene; Congella (Durban) 6 feet below original floor (Geol. Survey).

Congella (Durban) (Smith); Delagoa Bay (U.W. living; also S. Afr. Mus. coll. K.H.B. living; also Franca); Inhambane (U.C.T.).

Distribution. Aden, Djibouti, Muscat, Zanzibar, Madagascar, Australia.

Remarks. Although Lamy placed this species in the subgen. *Eastonia*, the present specimens have the hinge-teeth as in Lamy's figure (p. 382) of *Standella pellucida*, not as in his figure (p. 383) of *Eastonia rugosa*, i.e. the two branches of the Λ tooth in the left valve diverge at *circa* 90°.

Externally this species somewhat resembles *Tapes bruguieri* (*Veneridae*) as figured by Gravely (1941, fig. 20 *o*) but the latter has no fine divaricating pliculae posteriorly. Also similar is *Asaphis deflorata* (Linn.) (*Psammobiidae*).

Standella (*Eastonia*) *solanderi* (Gray)

Spisula solanderi Gray, 1837, p. 373.
Standella solandri [*sic*] (Gray), Sowerby, 1892, p. 56; Smith, 1904a, p. 25.
Eastonia africana Bartsch, 1915, p. 209, pl. 43, figs. 5, 6; Turton, 1932, p. 256.
Standella (*Eastonia*) *solanderi* (Gray), Lamy, 1918, p. 391; Dautzenberg, 1929, p. 617; Haas, 1936, p. 147, fig. 12; van Bruggen, 1952, p. 17, pl. 1, figs. 2, 3.

Numerous radial ribs, none of them coarse, but varying in size and distance apart, from anterior end to a line from umbo to postero-ventral corner, the hinder ribs more or less cristate, especially the last one; dorsal to the last rib the surface with concentric growth-lines only.

Length 36, alt. 30 mm.

Dead valves: Jeffreys Bay (van Bruggen); Port Alfred (Smith, Bartsch, Turton); Durban (van Bruggen).

Distribution. Red Sea, east coast of Africa, Madagascar.

Remarks. The shape varies, and distorted specimens living in corals may occur, e.g. 'Petricola lyra' Melvill (1898, p. 204, pl. 12, fig. 13) which Melvill later (1899, p. 97) recognized as *S. solanderi*. H. C. & R. Winckworth (1935, p. 162) found *Eastonia rugosa* burrowing in limestone near low-water on the Portuguese coast, together with *Pholas* and *Barnea*. Presumably *nicobarica* and *solanderi* have a similar habitat.

The Λ-shaped cardinal tooth in the left valve is compressed, the branches diverging at *c.* 45°, but the anterior lateral tooth in all the present specimens is oblique, not nearly vertical as in Lamy's figure (p. 383) of *Eastonia rugosa*.

Fam. **Donacidae**

The locality 'Cape of Good Hope' for *scortum* Linn. given on the explanation to pl. 280, figs. 1–3, of Sowerby's *Thesaurus*, cannot be taken seriously.

The occurrence of the West African *elongatus* and *owenii* on the South African coast, as reported by Sowerby 1892, and the latter also by Johnson 1904, seems unlikely; and the record of *lubricus* Hanley (? = *bicolor* Lam., = *cuneata* Linn.) needs confirmation.

Pilsbry (1901) not only described a new species but recorded four other species of *Donax* all from 'ballast from South Africa'. As Smith said (1906b, p. 65), this is a 'rather unsatisfactory locality'. Two of the species recorded, however, are known South African (Natalian) species; thus the other two: *erythraeensis* Bertin and *spiculum* Rve. may also eventually be found living in South African waters.

Lamy (1931) recorded *D. incertus* Bertin 1882 from both Walvis Bay and Beira.

Donax serra (Chemn.) Bolten

Donax serra (Chemn.) Bolt., Krauss, 1848, p. 5; Jaeckel, 1931, p. 239; Lamy, 1931, p. 306; Turton, 1932, p. 253.
Donax serra var. *aurantiaca* Krauss, 1848, p. 6; Turton, 1932, p. 253.
Donax ringens Chenu, 1862, fig. 316 (not good).
Donax ? *helena* Turton, 1932, p. 254, pl. 69, no. 1791 (= juv.).

Fossil: Pleistocene, Angras Juntas, Oranjemund (South West Africa), Alexander Bay (Haughton); Sedgefield (A. R. H. Martin).

Table Bay, and False Bay to Port Alfred (auct. and S. Afr. Mus.), Durban, juv. (S. Afr. Mus. coll. T. D. Butler, Museum taxidermist, 1894).
Saldanha Bay; and Klein River estuary, Hermanus (U.C.T.); Walvis Bay (Lamy).

The var. *aurantiaca* Krss. has been recorded from Mossel Bay and Port Alfred. I have seen specimens from Muizenberg (False Bay).

Donax sordidus Hanley

Donax sordidus Hanley, 1845, p. 15; Krauss, 1848, p. 6, pl. 1, fig. 4; Reeve, 1855, *Donax*, pl. 5, fig. 32; Sowerby, 1892, p. 58; Turton, 1932, p. 253.
Donax semisulcatus (*non* Hanley) Turton, 1932, p. 253.

Trigonal, ventral margin slightly arcuate in the middle; finely and regularly radially striate except near the antero-dorsal margin, a very obtuse ridge from umbo; posterior part cancellate with radial and concentric lirae, the latter on the earlier part more widely spaced than the actual growth-lines, and continued over the ridge as oblique lirae, extending a varying distance, sometimes nearly half-way across the median area. Margin internally crenulate.

White or cream, sometimes with a fawn or pinkish tinge, internally suffused with orange or salmon, and sometimes more or less violaceous anteriorly and posteriorly; periostracum corneous.

Length 29, alt. 20 mm.; also 30 × 20, and 28 × 21 mm.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Natal (Krauss); False Bay, Mossel Bay, Still Bay (S. Afr. Mus.).

Remarks. The enlarged semilamellate lirae on the posterior area only begin at about alt. 1·5 mm.; thereafter they may or may not be continued on to the median area. They may be feebly or well developed, but even when conspicuous they cease when the shell has reached an altitude of 6–7 mm.

Hanley mentioned these 'raised oblique lines' as a striking characteristic

of *sordidus*; his description also mentioned the arcuate lower margin; he gave the Cape of Good Hope as a definite locality. Hanley gave no such distinctive characters for *semisulcatus* from an unknown locality (1843, p. 5). Turton (1932) confused these two species, ascribing the presence of 'slanting lines' to *semisulcatus* instead of to *sordidus*.

D. semisulcatus should be deleted from the fauna-list.

More strongly radiately striate than *aemulus*, and the arcuate lower margin is distinctive; as is also (when present) the patch of oblique lirae below the umbo.

Donax aemulus Smith

Donax aemulus Smith, 1877, p. 721, pl. 75, figs. 23–25; Sowerby, 1897, p. 23; Dautzenberg, 1929, p. 606.
Donax simplex Sowerby, 1897, p. 23, pl. 8, figs. 18, 19; Turton, 1932, p. 254.
Donax elegans Odhner, 1919, p. 10, pl. 1, figs. 5–8; Dautzenberg, 1929, p. 608.
Donax productus Odhner, 1919, p. 28, pl. 2, figs. 22, 23; Dautzenberg, 1929, p. 610.
[?] *Donax lubricus* (*non* Hanley), Krige, 1933, p. 52.

Inequilateral, cuneate, anteriorly smooth, becoming finely radiately striate medianly, and distinctly lirate towards the posterior area which is not bounded by a distinct ridge; posterior area sharply cancellate with radial and concentric lirae. Ventral margin evenly convex. Margin internally crenulate.

Buff, fawn, grey, pinkish or violaceous, juveniles usually with violaceous rays; internally with a more or less distinct salmon or yellowish flush in the middle, and with or without violet rays, or sometimes violet with one or two white rays.

Length 34, alt. 23 mm.

Fossil: Pleistocene, raised beach Durban, half mile south of Umgeni, alt. 375 ft. (Geol. Survey) (? recorded by Krige as *lubricus*).

Durban and Umzinto (Natal) (Sowerby); Isezela and Durban (Natal) (S. Afr. Mus. coll. Burnup); Tongaat (north of Durban) living (S. Afr. Mus.); Delagoa Bay, living (U.W.); Inhambane, living (U.C.T.); Beira (S. Afr. Mus. coll. Ross-Frames); Chinde, living (S. Afr. Mus. coll. K.H.B.).

Distribution. Madagascar.

Remarks. Dautzenberg accepted both *elegans* and *productus*, as well as *aemulus* as valid and distinctive species. A series from Nossi Bé (U.W.). shows that *elegans* is only the adult of *aemulus*.

Distinguished from *sordidus* by the even curve of the lower margin, and the feebler radial striation medianly and its absence anteriorly, and by the absence of any oblique lirae near the umbo in the early stages.

Donax bipartitus Sow.

Donax bipartitus Sowerby, 1892, p. 58, pl. 3, fig. 74; Dautzenberg, 1929, p. 608; Jaeckel, 1931, p. 239; Cox 1939, p. 100.

Elongate trigonal, cuneate, anteriorly smooth, medianly radiately striate, ridge distinct, posteriorly cancellate with radial and concentric lirae, the latter

continued over the ridge and extending a variable distance on the median part, often farther near the ventral margin than near the umbo. Margin internally crenulate.

White or cream, internally with an intense violet streak posteriorly.

Length 21, alt. 12 mm.

Fossil: Post Pliocene, Inhambane (Cox).

Durban (S. Afr. Mus. coll. Burnup; also coll. L. Kent); Tongaat (north of Durban) (S. Afr. Mus.).

35° 26′ S., 20° 56′ E., 80 metres, one (Jaeckel).

Distribution. Madagascar (Dautzenberg).

Remarks. Neither Sowerby nor Bartsch (1915) gave a precise locality. Turton did not find it at Port Alfred. It is evidently a tropical species. It was not taken by the *Pieter Faure*, and the *Valdivia* locality seems exceptionally far west, unless the fossil '*oweni*' recorded by Johnson (1904) from Port Elizabeth was misidentified (Barnard, 1962b, p. 187).

Donax madagascariensis Wood

Donax madagascariensis Wood, 1828, p. 5, pl. 2, fig. 3; Chenu, 1862, fig. 315 (not good); Sowerby, 1866, p. 306, pl. 280, fig. 16; Smith, 1877, p. 721; 1906, p. 65; Dautzenberg, 1929, p. 609; *Donax exaratus* Krauss, 1848, p. 6, pl. 1, fig. 5; Turton, 1932, p. 253, pl. 68, no. 1788; Cox, 1939, p. 101.

Trigonal, cuneate, a well-marked posterior ridge; fine radial striae visible across middle part and especially on posterior part, crossed by oblique costae running from the posterior part, over the ridge and parallel with the antero-dorsal margin; these costae begin when shell has reached an altitude of 1·5–2 mm., at first thin and sharp, later becoming broader, closer together, and bluntened. Margin internally crenulate.

Pale buff or cream, umbones often livid or violaceous, interior more or less violaceous, especially an anterior patch and a posterior streak; periostracum yellowish-brown.

Length 24, alt. 17 mm.

Fossil: Post Pliocene, Inhambane (Cox); Pleistocene, Durban (Geol. Survey).

Natal (Krauss); Durban, living (S. Afr. Mus.); Tongaat (S. Afr. Mus.); St. Lucia Bay, Zululand (U.C.T.); Chinde, living (S. Afr. Mus. coll. K.H.B.).

Distribution. Quelimane (Smith); Madagascar (Dautzenberg).

Remarks. Smith remarked that the growth-lines were visible on the oblique costae but not in the intervals; in young shells they are visible, but in older shells when the costae have become broader they are usually not visible; the costae also obscure to a large extent the radial striae, except on the posterior part.

Donax faba Gmelin

Donax radians Chenu, 1862, fig. 310.

Donax faba Gmelin, Sowerby, 1866, p. 312, pl. 283, figs. 108, 109; Prashad, 1932, p. 204 (references); Macnae & Kalk, 1958, pp. 36, 92, 129, fig. 21 *c*; Franca, 1960, p. 98, pl. 28, fig. 6.

Ovoid, not cuneiform, antero-dorsal margin convex, no ridge posteriorly, posterior part with concentric more or less rugulose lamellae crossed by fine radial striae. Margin internally smooth (subgen. *Latona*).

Colour variable: greyish, violaceous, pinkish, buff or yellowish, uniform or more usually with radiating streaks (see Macnae & Kalk, p. 92).

Length 25, alt. 19 mm.

Delagoa Bay (U.W.; also Franca).

Distribution. Madagascar, Indo-Pacific.

Remarks. Although Dautzenberg (1929) recorded both *abbreviatus* Lam. and *faba*, and Prashad did not include the former in the synonymy of the latter, there seems to be a very close similarity. In the present material the shape varies, some shells resembling Sowerby's (1866) figures of *faba*, others the figures of *abbreviatus*. In any case *faba* has priority.

Braga (1952, p. 114, pl. 10, fig. 12) recorded the very closely allied *cuneata* Linn. also from Delagoa Bay.

Donax incarnatus (Chemn.) Schröter

Donax incarnatus (Chem.) Schröt., Chenu, 1862, fig. 307; Sowerby, 1866, p. 311, pl. 283, figs. 98, 99; Lynge, 1909, p. 215, pl. 4, figs. 12, 13; Dautzenberg, 1929, p. 609; Macnae & Kalk, 1958, pp. 92, 129.

Subtriangular, elevated; height about $1\frac{1}{4}$ in length, ventral margin flattened; posteriorly cancellate with radial striae and concentric undulating rugae.

Length 19–20, alt. 16 mm. (Sowerby's figure); 22 × 17 mm. (Lynge's figure).

Delagoa Bay (Macnae & Kalk).

Distribution. Madagascar; India; Siam.

Donax bertini Pilsbry

Fig. 30 *b*

Donax bertini Pilsbry, 1901, p. 189; Turton, 1932, p. 254.
Donax nereia Turton, 1932, p. 254, pl. 69, no. 1794 (= juv.).
[Non] Dautzenberg 1929, p. 607 (*nom. preocc.*, for *granosus* Römer, *non* Lam.).

Elongate, anteriorly acuminate, posteriorly rounded, umbo at posterior third, ridge feeble; faint radial striae medianly (also anteriorly but very faint), posteriorly with 12–14 ribs, oblique to the dorsal margin, with regular radial striae in the intervals. The ribs are slightly bent dorsally before they cross the umbonal ridge, not very noticeable in lateral view, but clearly seen in posterior view. Margin internally crenulate.

White, fawn, or violaceous.

Length 15·5, alt. 6 mm.

Fossil: Pleistocene, Durban (Geol. Survey).

In ballast from South Africa (Pilsbry). Port Alfred (Bartsch, Turton);

East London (S. Afr. Mus.); Durban, living (S. Afr. Mus. coll. Burnup); Durban Harbour, one living (S. Afr. Mus. P.F. coll.).

Inhambane, living (U.C.T.).

Remarks. Sowerby identified the P.F. specimen as *nitidus* Desh., and Burnup likewise identified his shells as *nitidus*. All the present specimens are quite different from Sowerby's description of the East Australian *nitidus* (1866, p. 314, pl. 282, fig. 75).

Turton claimed to have found a single shell at Port Alfred which agreed with '*nitidus* from S. Africa' in the British Museum, and thus added another name to his list.

Turton's *nereia* is the juvenile: the riblets described as being on the 'anterior' end, and shown in the photo on the posterior end clearly indicate the synonymy.

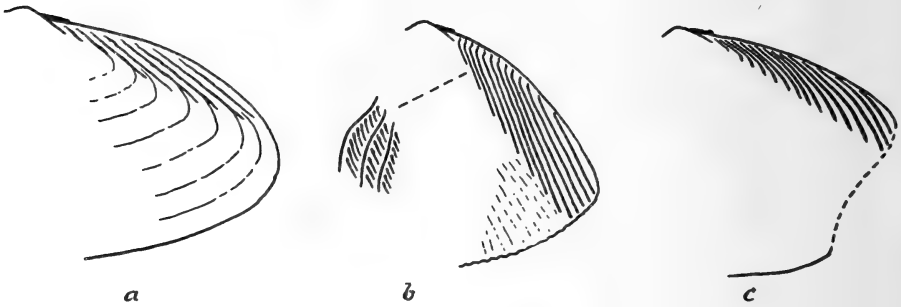


FIG. 30. Posterior end of: *a*, *Donax burnupi* Sow. *b*, *bertini* Pilsbry. *c*, *Donax* sp., off Tugela River.

subgen. CAPSELLA

Thin, without posterior ridge, margin internally smooth.

Donax (*Capsella*) *burnupi* Sow.

Fig. 30 *a*

Donax burnupi Sowerby, 1894, p. 377; 1897, p. 23, pl. 6, fig. 26; Turton, 1932, p. 253, pl. 68, no. 1789.

Elongate oval, smooth, umbo about $\frac{2}{5}$ from posterior end, posteriorly with spaced sulci obliquely crossing the growth-lines, 8–10 on shells *c*. 15–20 mm. long, 12 on a shell 27 mm. long.

Externally buff, fawn, or brown, almost uniform or with brown rays on pale ground, or vice versa; internally brown, fawn, or violaceous, often with an orange flush in middle, both ends being violaceous.

Length 27, alt. 12·5 mm.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Natal (Sowerby); False Bay and Still Bay (S. Afr. Mus.); Port Elizabeth, living (S. Afr. Mus. coll. R. Kilburn); Port Alfred (Bartsch, Turton).

False Bay, 10–13 fathoms, 2 living; also 42 fathoms, one valve (together

with *longissimus*); off Cape Infanta, 40 fathoms, one valve; Algoa Bay, 10–16 fathoms, one living; off Nieca River (East London area), 43 fathoms, one valve; Natal (no exact locality), 3 valves; off Cape Vidal (Zululand), 22 fathoms, one valve (with many *longissimus*) (S. Afr. Mus. P.F. coll.).

False Bay, 27 metres (U.C.T.).

Remarks. In the valve from False Bay, 42 fathoms, 25 mm. long, there are only 2 sulci near the umbo; and in the valve from Cape Vidal, 21 mm. long, there are only 3.

Donax (*Capsella*) *longissimus* J. & T.

Donax (*Capsella*) *longissimus* Jaeckel, 1931, p. 240, pl. 9(4), fig. 116.

Elongate oval, smooth, umbo a little behind middle, no sculpture except growth-lines.

Buff or cream, umbones brownish, with 2 or 3 darker rays, internally fawn.

Length 36, alt. 15·5 mm.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Algoa Bay, and 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel).

Keurbooms River beach (Plettenberg Bay), 6 valves (S. Afr. Mus. coll. K.H.B.).

False Bay, 42 fathoms, 8 valves; off Cape Infanta, 40 fathoms, 4 valves; Algoa Bay, 30 fathoms, 4 juv. valves; off Umkomaas (Natal), 13 fathoms, 16 valves; off Cape Vidal (Zululand), 22 fathoms, 115 valves (S. Afr. Mus. P.F. coll.).

Remarks. It is a little remarkable that this shell should have remained so long undescribed, if indeed it is not merely a perfectly smooth form of *burnupi*. Valves from Cape Vidal were identified by Sowerby as *burnupi*, as were also 2 examples of typical *burnupi* from other localities.

The growth-lines on the posterior part are frequently slightly enlarged, as seems to be indicated in Jaeckel's figure. But the sulci as found in *burnupi* cut across the growth-lines, and when present are immediately noticeable.

In the present material there are many more valves of *longissimus* than of *burnupi*. Among 75 (not counting *circa* 40 worn valves) smooth valves from Cape Vidal only one *burnupi* was found; but among 9 valves from False Bay there was one *burnupi*; and in the Sedgefield collection (as submitted to me) there was one of each species.

A little more evidence would be welcome, but I think there is little doubt that *longissimus* will eventually be merged with *burnupi*.

Jaeckel said his species belonged to the same group (*Capsella*) as the West African *owenii* (Gray) Hanley, although the latter appears (Chenu, 1862, fig. 318; and Sowerby, 1866, pl. 280, fig. 8) to have a different shape and also a distinct posterior ridge; in fact, Sowerby said 'area postica biangulata'. Does *owenii* belong to the subgen. *Capsella*?

It seems scarcely possible that Sowerby misidentified the Port Elizabeth shell (1892, p. 58) as *owenii*; but the provenance of that shell cannot now be checked.

Donax (? *Capsella*) sp.

Fig. 30 *c*

A single worn valve from off Tugela River, 37 fathoms (S. Afr. Mus. No. A9544, P.F. coll.) differs from both *bertini* and *burnupi* in the posterior sculpture.

No posterior ridge. Margin internally not crenulate (but worn). Posteriorly with *c.* 15 or 16 sulci; as in *burnupi* they do not extend below a line from umbo to posterior corner (contrast *bertini*); they are slightly curved, more or less concentric with the dorsal margin, whereas in *burnupi* they are straight.

Length 23 (but posterior corner broken), alt. 11·5 mm.

More material is required.

Fam. **Psammobiidae**

Psammobia costulata Turton

Psammobia costulata Turton, 1822; Reeve, 1857, pl. 6, fig. 38; Smith, 1885, p. 90; Jaeckel, 1931, p. 239.

[?] *Psammobia vespertina* (*non* Gmelin), Sowerby, 1892, p. 56.

Equivalve, equilateral, oval, rounded at both ends; fine concentric growth-lines; between postero-dorsal margin and a line from umbo to postero-ventral corner about a dozen radial costulae, often with very fine intermediaries. Pallial sinus extending to vertical from umbo, its lower margin united for most of its length with the pallial line.

More or less pink, especially in front of umbo, often with disconnected radial splashes.

Length 24, alt. 13, thickness (valves together) 5·5 mm.

Still Bay (S. Afr. Mus. coll. Muir); Port Elizabeth (Sowerby).

35° 29′ S., 21° 3′ E., 102 metres; 35° 26′ S., 20° 56′ E., 80 metres (Jaeckel).

False Bay; Algoa Bay; off Nanquas Peak (east end of Algoa Bay); Kowie area; East London area; Illovo, Tongaat and Umhlanga (Natal); to Tugela River; 22–66 fathoms; living and valves (S. Afr. Mus. P.F. coll.).

Distribution. Europe, Mediterranean, Madeira, Canary Islands.

Remarks. Examples from the *Pieter Faure* collection were identified by Sowerby as *costulata*, but not recorded in his report in the *Marine Investigations*. Hence Jaeckel's statement that this species was an addition to the fauna-list.

Common and widely distributed from False Bay eastwards, but not reported from the west coast of South Africa.

In view of the P.F. locality records, Sowerby's record of *vespertina* probably applies to the present species. Moreover he identified a P.F. specimen from False Bay as *vespertina*, which does not differ from specimens (some of them also from False Bay) he identified as *costulata*.

Psammobia maculosa Lam.

Psammobia maculosa Lamarck, 1818, p. 513; Dautzenberg & Fischer, 1914, p. 215, pl. 6, figs. 1–3.
Psammobia ornata Sowerby, 1897, p. 22.
[?] *Psammobia albanyana* Turton, 1932, p. 250, pl. 67, no. 1770.
Gari maculosa (Lam.), Prashad, 1932, p. 298 (references).

Durban (Sowerby, Smith; also S. Afr. Mus.). ? Port Alfred (Turton). St. Lucia Bay and Kosi Bay (U.C.T.).

Algoa Bay 52 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Madagascar, Indo-Pacific.

Remarks. Smith said *corrugata* was always distinguished by the wrinkles on the posterior area, but there are no wrinkles on the specimen, 45 × 24 mm., identified by Tomlin as *ornata*. Prashad regarded these two species, and also *marmorea* and *rubicunda*, as synonyms of *maculosa*, based on variations in colour and the coarseness of the posterior sculpture.

The single valve from Algoa Bay is 27 × 15 mm., and does not differ except in size from the above specimen identified by Tomlin.

A specimen said to have come from 'Cape Peninsula' has been in the South African Museum for many years. As the donor kept a small private museum for teaching Natural History, I formerly doubted the provenance of this specimen. Recently (1961), however, 3 specimens were obtained in the Simon's Bay area in False Bay. The largest is 65 × 35 × 18 mm. All of them resemble the other specimens here recorded in having no corrugations. Now there are specimens also from Gordon's Bay (False Bay) (Dr. Ackert); and from Still Bay (Mrs. Connolly).

Psammobia pallida Desh.

Psammobia pallida Deshayes, 1855, p. 323; Smith, 1885, p. 93; 1903, p. 398.

Posterior margin obliquely subtruncate; obliquely striated from above downwards and forwards, ceasing at a line separating the anterior-median glossy area from the matt posterior area.

Cream with lilac or violaceous tinge, with darker rays.

Length 40, alt. 20, thickness (valves together) 8·5 mm. Length up to 50 mm. (Smith, 1903).

Fossil: Pleistocene, Durban (Geol. Survey).

Durban (Smith); Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. Red Sea, Indo-Pacific.

Psammotellina capensis Sow.

Psammotellina capensis Sowerby, 1889a, p. 13, pl. 1, fig. 19; 1892, p. 56, pl. 2, fig. 61; Turton, 1932, p. 251.
Psammotellina capensis var. *livida* Turton, 1932, p. 251.
Psammotellina lara Turton, 1932, p. 251, pl. 68, no. 1775.
Psammotellina pyrrha Turton, 1932, p. 251, pl. 68, no. 1778.
Ervilia purpurea (*non* Desh.), Sowerby, 1904, p. 15.

Pallial sinus not very deep, extending to about midway between posterior adductor scar and vertical from umbo (cf. Turton, pl. 68, no. 1775, internal view).

Length 17, alt. 10, thickness (valves together) 6 mm.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton). Cape Flats, False Bay side, recent estuarine deposit (S. Afr. Mus.). Still Bay (S. Afr. Mus. coll. Muir). Keurbooms River estuary (S. Afr. Mus. coll. K.H.B.).

Buffalo River, East London (S. Afr. Mus. P.F. coll.).

Breede River mouth, Great Brak River mouth, Sundays River mouth, Bushmans River mouth, Hamburg (between Port Alfred and East London) (U.C.T.).

Remarks. Common in lagoons and estuaries.

Sowerby (1904) identified the Buffalo River examples as *Ervilia purpurea* with a query; the specimens he returned (one bivalve shell and one valve) are *P. capensis.*

Psammotaea lunulata (Desh.)

Capsa (*Capsella*) *lunulata* Deshayes, 1855, p. 349.
Psammotaea lunulata (Desh.), Smith, 1903a, p. 398; Turton, 1932, p. 251.

Oval, with growth-lines only. Pale, with dark greenish-brown periostracum, internally violaceous.

Length 35, alt. 20, thickness (valves together) 10 mm.

Durban (Smith; also S. Afr. Mus. coll. Ross-Frames); Scottburgh, Natal (S. Afr. Mus. coll. Burnup); Port Alfred (Turton).

St. Lucia Bay, Amatikulu estuary, and Inhambane (U.C.T.).

Distribution. Ceylon, Philippines.

Asaphis dichotoma (Anton)

Sanguinolaria dichotoma Anton, 1838, p. 4.
Asaphis deflorata von Martens, 1880, p. 330; Cox, 1927, p. 81, pl. 16, fig. 3.
Asaphis dichotoma (Anton), Prashad, 1932, p. 306 (references).

Numerous radiating ribs, some of them dichotomous a short distance from the umbo, with occasional intermediaries, the ribs slightly stronger and more spaced on the posterior area.

White, yellowish near umbo; internally suffused with yellow, the whole margin, especially posteriorly, and including the posterior adductor scar, deep blackish-violet, shading through pinkish into the yellow suffusion.

Length 55, alt. 34, thickness (valves together) 26 mm.

Fossil: Pliocene, Zanzibar (Cox).

Mozambique Island (S. Afr. Mus. A7449. coll. K.H.B.).

Distribution. Red Sea, east coast of Africa, Madagascar, Indo-Pacific.

Remarks. Prashad followed Anton, Mörch, and Bertin in separating the Indo-Pacific *dichotoma* from the West Indies *deflorata* Linn. on account of the dichotomous ribs.

Fam. **Semelidae**

Semele radiata (Rüppell, Rve.)

Amphidesma radiata Rüppell MS. Reeve, 1853, pl. 2, fig. 12.
Semele radiata (Rüpp. Rve.), Lamy, 1914, p. 337; Braga, 1952, p. 119, pl. xi, fig. 8; Franca, 1960, p. 99, pl. 28, fig. 8.

Delagoa Bay (Braga, Franca; also U.W.).

Distribution. Madagascar.

Remarks. Braga's and Franca's identification is accepted in the absence of material of other species for comparison.

Sowerby (1897, p. 22) listed *cordiformis* (Chemn.) from Natal.

Iacra seychellarum (A. Adams)

Scrobicularia seychellarum Adams, 1856, p. 53.
Iacra seychellarum (Adams), H. & A. Adams, 1856, p. 409; Sowerby, 1897, p. 22.
Syndesmya (*Iacra*) *lactea* Odhner, 1919, p. 28, pl. 2, figs. 20, 21.
Iacra lactea (Odhner), Dautzenberg, 1929, p. 635.

Sculptured with divaricating lirae separated by impressed striae: on anterior half they are concentric and parallel with the growth-lines and antero-ventral margin; at the half-way line the striae bend downwards at *c.* 140° and run obliquely; at a line from umbo to postero-ventral corner they cease, and an independent series of finer oblique striae slopes upwards to the dorsal margin. At 10 mm. alt. there are 4 concentric lirae in a space of 1 mm.

The postero-dorsal lirae on two left and two right valves from Natal are noticeably finer and closer together than either the oblique or the concentric lirae. On a Nossi Bé shell, however, they are fine on the left valve, but on the right valve are as coarse as the other lirae or even coarser near the margin.

Pallial sinus in left valve reaching to the anterior adductor scar, but not so far in the right valve.

Length 15, alt. 12 mm.

Natal (Sowerby; also S. Afr. Mus. coll. Burnup, and coll. L. Kent); Delagoa Bay (S. Afr. Mus. coll. K.H.B.).

Distribution. Seychelles. Nossi Bé (U.W.).

Remarks. Odhner identified his Madagascan specimens as *lactea* Dnkr., which he thought was probably the same as *seychellarum*.

Iacra trotteriana (Sow.)

Strigillia trotteriana Sowerby, 1894, p. 376; 1897, p. 23, pl. 6, fig. 32.

Sculpture similar to that of *seychellarum*, but striae more widely spaced: thus at 10 mm. alt. only 1½ concentric lirae in a space of 1 mm.; also the concentric sculpture is less conspicuous. Pallial sinus as in *seychellarum*.

White, internally with a salmon or yellowish flush.

Length 14, alt. 13 mm.

Durban (Sowerby; also S. Afr. Mus. coll. Burnup, one living); Tongaat (S. Afr. Mus.).

Remarks. The internal ligament pit shows that this is not a *Strigilla*. Probably only a form of *seychellarum*.

Theora ovalis Smith

Theora ovalis Smith, 1904a, p. 39, pl. 3, fig. 17.
[?] *Aligena ovalis* (Smith), Bartsch, 1915, p. 202; Turton, 1932, p. 243.

Almost equilateral, and regularly oval. Port Alfred specimens sent to South African Museum by Turton have an oblique internal ligament pit, but Smith's words 'fossa ligamenti margine incrassato pone limitata' do not apply. This thickened upper margin, like a flange, is well shown in Bartsch's pl. 49, figure 3, of *alfredensis*. Unfortunately Smith did not figure the hinge.

The right valve has an anterior and posterior lateral groove, but in the left valve the (lamellate) teeth are evanescent. The pallial sinus is not clear.

Length 9·5, alt. 7 mm. (Smith).

Oval specimens similar to those from Port Alfred are in South African Museum from Table Bay and False Bay.

Off Saldanha Bay, 87 fathoms (U.C.T.).

Theora alfredensis Bartsch

Theora alfredensis Bartsch, 1915, p. 206, pl. 45, fig. 8, pl. 49, fig. 3; Jaeckel, 1931, p. 238.

Bartsch illustrated a shell slightly less in altitude, and bluntly pointed at the posterior end (? Bartsch: anterior). The incrassate dorsal margin of the ligament pit in the present specimens as in Bartsch's figure. The lateral 'teeth' as above described for *ovalis*.

Length 9·2, alt. 5·5 mm. (Bartsch); 9·5 × 6, 10 × 6·5, and 10·75 × 7 mm. (S. Afr. Mus.).

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.).

Port Alfred (Bartsch); St. Francis Bay, 80 metres (Jaeckel).

Algoa Bay, 52 fathoms, 4 living, 6 valves; off Hood Point (East London), 49 fathoms, 5 valves; off O'Neil Peak (Zululand), 90 fathoms, 12 valves (S. Afr. Mus. P.F. coll.).

29° 53′ S., 31° 06′ E., 71 metres, 2 living; 31° 41′ S., 29° 33′ E., 90 metres, 2 living (U.C.T.).

Remarks. Two species, differing only slightly in shape, seem to be indicated. The Zululand valves appear to be conspecific.

The single fossil valve is broken at both ends, but has the incrassate dorsal margin of the ligament pit.

Abra longicallus (Scacchi)

Abra longicallus (Scacchi) Barnard, 1963b, p. 450.

I have seen one living specimen in coll. Mrs. H. Boswell, taken off Cape Point together with *Surcula sulcicancellata* Brnrd. (1958), the depth being probably about 200 fathoms.

Leptomya psittacus Hanley

Leptomya psittacus Hanley, 1882, p. 576; 1883, p. 541, pl. 12, fig. 6.

Described by Hanley from an unknown locality. The measurements given: 1·2 × 1 in., do not quite correspond with the figure which was stated to be natural size. In fact the present valves when superimposed on Hanley's figure correspond exactly not only in size but in outline. There can be little doubt, therefore, about the specific identification. There appear to be no other records of this species since its description.

Upper margin of pallial sinus descending in a nearly straight line from the posterior adductor scar to midway between adductor scar and vertical from umbo, where it joins the pallial line with only a slight bend.

Length 32, alt. 23 mm. Pure white.

Bazarute Island, Portuguese East Africa, 2 shells collected alive by Mr. A. E. Dichmont, 1959 (S. Afr. Mus. A9546).

Remarks. From Dar-es-Salaam Jaeckel & Thiele (1931, p. 241) recorded *Raeta bracheon* Sturany, which closely resembles *R. pulchella* Ad. & Rve., as Lynge (1909, p. 224) pointed out. Lamy, however, (1918, p. 358, footnote 2) stated that *bracheon* was a *Leptomya*: *L. cochlearis* Hinds.

The Dar-es-Salaam specimen should be re-examined; it may be a *Leptomya*, not a *Raeta*, and possibly the same as *psittacus*. *L. cochlearis* as figured by Hanley (1883, pl. 12, fig. 8) and Gravely (1941, fig. 22 *e*) differs slightly but distinctly in shape from *psittacus*. It occurs in India and Gulf of Suez (*bracheon*).

Fam. **Tellinidae**

The names of several well-known Indo-Pacific species of *Tellina* have been recorded from Durban or Natal, but there is some doubt as to their being inhabitants of South African waters. *Tellina* being one of the favourites among collectors, the suspicion arises that some of the records in question were based on specimens which emanated originally from Mauritius, the east coast of Africa, or even farther afield.

For *T. crassa* Turton, 1932 (*non* Pennant), see *Diplodonta subradiata*.

Tellina madagascariensis Gmelin

Fig. 31 *a*

Tellina madagascariensis Gmelin, 1790, p. 3237; Jaeckel, 1931, p. 236; Gevers, 1932, p. 74; Nicklès, 1950, p. 224, fig. 435.
Tellina rosea Spengler, 1798; Johnson, 1904, p. 11; Smith in Rogers, 1906c, p. 294; Schwarz, 1910, p. 115; Haughton, 1932, p. 37.
Tellina cf. *perna* Newton, 1913, p. 341, pl. 22, figs. 4, 5; Barnard, 1962b, p. 187.
Tellina albinella var. *alfredensis* Bartsch, 1915, p. 205, pl. 46, figs. 7, 8; Turton, 1932, p. 246.
[*Non*] *Tellina madagascariensis* Gmelin, Smith, 1891, p. 426 [= *manumissa* Melvill, 1898].

Right valve nearly flat, left valve convex; umbonal ridge more distinct on right valve. Pallial sinus not reaching anterior adductor scar, its upper border evenly curved, joining the pallial line at about 60°–80°, *not curving backwards*.

Length 78, alt. 43 mm.; also 67 × 42, 57 × 32, 52 × 30, 42 × 22, 31 × 15, 23 × 12, 20 × 10, 15 × 7·5 mm. Valves together: 72 × 43 × 16, 41 × 22 × 7, and 29 × 15 × 4 mm. Length up to 90 mm. (Nicklès).

Fossil: Pleistocene, Cape Cross north of Swakopmund (South West Africa) (Gevers); Saldanha Bay (Haughton); Port Elizabeth (Johnson, Schwarz, Newton); Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.); Little Brak River (Smith in Rogers).

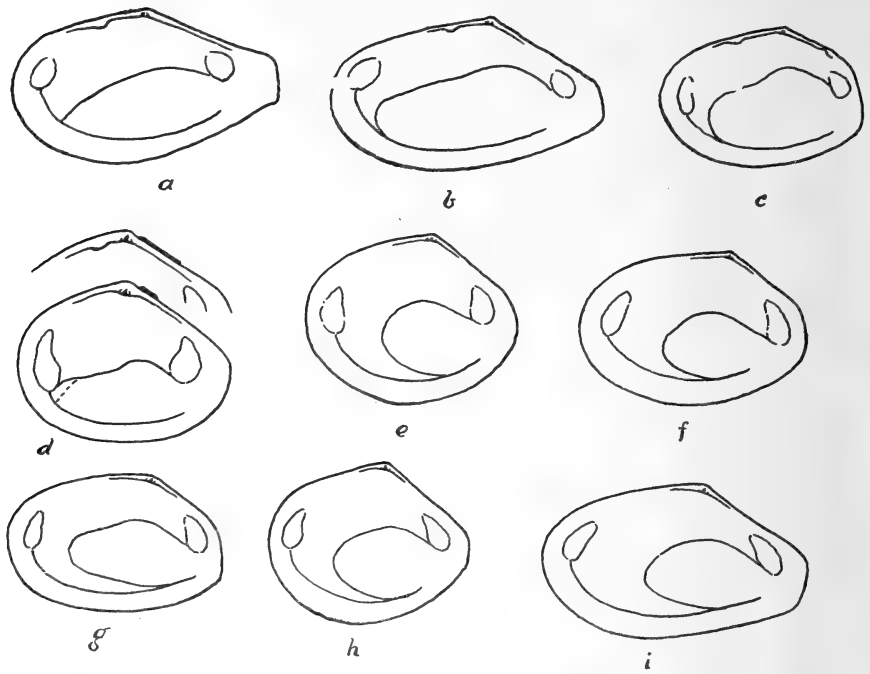


FIG. 31. Inner views of right valve of: *a*, *Tellina madagascariensis* Gmelin. *b*, *gilchristi* Sow. *c*, *analogica* Sow. *d*, *Macoma litoralis* (Krss.) with short ligament; upper figure and the dotted line in lower figure, with long ligament. *e*, *ordinaria* Sow. *f*, *crawfordi* Sow. *g*, *retrorsa* Sow. *h*, *levior* Sow. *i*, *inclinata* Sow.

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Hout Bay (west side of Cape Peninsula), False Bay, Hermanus, Knysna (S. Afr. Mus.).

Algoa Bay, 21 fathoms, 7 living (S. Afr. Mus. P.F. coll.); False Bay (U.C.T.).

Distribution. Madagascar (Gmelin, von Martens, Dautzenberg); Great Fish Bay, Angola (Jaeckel); Loango (von Marten , Jaeckel); French Congo to Angola (Nicklès).

Remarks. The altitude in juveniles is twice in the length, but increases in older shells until it is about $1\frac{2}{3}$ in the length.

I have seen Newton's specimen from Redhouse, Port Elizabeth: it is this species, not *perna*. He contrasted it with *perna*, but did not compare it with

rosea, previously recorded by Johnson and Schwarz from the same district. If he had done so, he would have noticed the difference in the pallial sinus; in *perna* the anterior border *curves backwards* before joining the pallial line at a very acute angle. The narrowness of Newton's shell is due to abrasion of the ventral margin.

Tellina triangularis Chemn.

Tellina triangularis Chemn., Hanley in Sowerby, 1846, p. 294, pl. 60, fig. 150; Turton, 1932, p. 247.

Right valve with oblique striae at posterior end; sometimes a few also on the left valve, but much less distinct. Pallial sinus in left valve extending to the anterior adductor scar; in right valve not quite reaching the scar, a gap of about 2 mm. in a 25 mm. long shell, about 4 mm. in a 45 mm. long shell, bending down to join the pallial line perpendicularly. Two cardinal teeth in right valve, the posterior one bifid, one bifid cardinal in left valve, a dentiform anterior lateral near the anterior cardinal in right valve.

Length 49, alt. 35 mm.; valves together: 45 × 33 × 11 mm., 30 × 21 × 6, 21 × 14 × 5, 16·5 × 11 × 3·5 mm.

Fossil: Pleistocene, Alexander Bay (Haughton 1932); Velddrif, Berg River (west coast) (Krige, A. V. 1927); limestone deposits Klein River estuary, Hermanus (S. Afr. Mus.); Little Brak River, Mossel Bay (S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin); raised beach deposit Knysna lagoon.

Cape (Sowerby); Port Alfred (Smith, Bartsch, Turton).

Table Bay and False Bay (S. Afr. Mus.).

Saldanha Bay and False Bay (U.C.T.).

Remarks. Turton has mistaken the anterior and posterior ends. The oblique striae are shown in Hanley's figure but not mentioned in his description.

Tellina analogica Sow.

Fig. 31 *c*

Tellina analogica Sowerby, 1904, p. 12, pl. 7, fig. 4.

Hinge teeth and pallial sinus as in *gilchristi*.

Saldanha Bay, 55 fathoms (Sowerby, P.F. material).

Off Baboon Point (Saldanha Bay), 31 fathoms, 4 living, one valve (S. Afr. Mus. P.F. coll.).

St. Helena Bay (32° 24′ S., 18° 07′ E.), 69 metres, living (s.s. *Africana* per U.C.T.).

Type *ubi*?

Like several other molluscs living in the Saldanha Bay area the shells are more or less corroded.

One specimen from St. Helena Bay, length 18, alt. 14 mm., is subtrigonal, almost equilateral, the antero- and postero-dorsal margins subtending an angle of 100°, the antero-inferior margin rounded.

Not sharply distinguished from *gilchristi*.

Tellina gilchristi Sow.

Fig. 31 *b*

Tellina natalensis (*non* Phil., Krauss), Smith, 1885, p. 102.
Tellina gilchristi Sowerby, 1904, p. 12, pl. 7, fig. 3; Jaeckel, 1931, p. 237.
Tellina vidalensis (*non* Sow.), Bartsch, 1915, p. 205; Jaeckel, 1931, p. 237.
Tellina becki Turton, 1932, p. 247, pl. 66, no. 1741.
Tellina sp.? Turton, 1932, p. 249, pl. 67, no. 1754 (?).

Nearly equilateral, anterior part $1\frac{1}{4}$–$1\frac{1}{3}$ in posterior part, antero- and postero-dorsal margins subtending an angle of *c.* 130° (120°–140°), postero-dorsal margin straight, posterior margin obliquely subtruncate; concentric growth-lines forming fine close costulae, some of them slightly sublamellate on posterior area. Right valve with 2 cardinal teeth, the posterior bifid, an anterior and a posterior dentiform lateral tooth, the anterior much nearer to the cardinals; left valve with 2 cardinals, the anterior bifid, the posterior weak, no laterals. Pallial sinus extending to near the anterior adductor scar, its anterior border curving slightly backwards to join the pallial line at the vertical from top of anterior adductor scar.

White or pinkish, often with darker zones, and frequently with pink radial streaks.

Length 27, alt. 15·5, thickness (valves together) 6 mm.; 24 × 15 × 6 mm. (Sowerby).

False Bay, 30–50 fathoms (Sowerby, P.F. material).

False Bay, 7–20 fathoms (Smith); St. Francis Bay and Algoa Bay, 80 metres (Jaeckel); Port Alfred (Bartsch, Turton).

False Bay, off Cape Infanta, Sebastian Bay, off Cape St. Blaize, Mossel Bay, St. Francis Bay, Algoa Bay, off False Island and Nanquas Peak (east end of Algoa Bay), off Kowie (Port Alfred); 22–50 fathoms, living shells and numerous valves (S. Afr. Mus. P.F. coll.).

Living: False Bay; 34° 35′ S., 21° 11′ E., 75 metres; and Algoa Bay, 17 fathoms; Langebaan (Saldanha Bay) (U.C.T.). St. Helena Bay (32° 24′ S., 18° 07′ E.), 69 metres (s.s. *Africana* per U.C.T.).

Distribution. Jaeckel recorded it from Great Fish Bay, Angola; the identification requires confirmation; it may possibly be *analogica.*

Remarks. Although he had numerous examples, Sowerby seems to have given measurements of, and figured, a rather short example; normally the length is greater proportionately to the altitude.

There is no doubt that the specimens taken by H.M.S. *Rattlesnake* and H.M.S. *Challenger* in False Bay (Smith 1885) were conspecific with the species later described by Sowerby. It is very common in that area, although seemingly never washed up on shore. At least there is no record, and South African Museum has no valves collected on the beach.

The specimens collected by Stimpson in 1853 and identified by Bartsch as *vidalensis* are also undoubtedly *gilchristi.* Dr. Rehder (*in litt.* to Prof. Day, University of Cape Town, March 1955) suggested that these same specimens

collected by Stimpson might be *tulipa* Hanley 1844 and 1846, from an unknown locality. It is better, however, to ignore early 'collector's species', especially from unknown localities.

Smith (1885) had no choice except to identify his specimens with *natalensis* or institute a new species. In doing the former he seems to have relied on colour, and ignored Krauss's statement that *natalensis* had no lateral teeth.

Tellina natalensis Krss.

Tellina natalensis Krauss in Philippi, 1846, p. 91, pl. 4, fig. 4; Krauss, 1848, p. 3; Smith, 1904a, p. 25; Bartsch, 1915, p. 205; Turton, 1932, p. 247.
Tellina prismatica Sowerby, 1897, p. 22, pl. 6, fig. 29.
Tellina scalpellum (*non* Hanley), Day & Morgans, 1956, p. 308.
Tellina planissima (*non* Anton), Sowerby, 1897, p. 22.
[Non] *Tellina natalensis* Krss., Smith, 1885 [= *gilchristi*].

Inequilateral, anterior part twice in posterior part (Krauss $1\frac{3}{4}$–2 (S. Afr. Mus.), postero-dorsal margin steeply sloping, slightly convex, forming a blunt corner with the ventral margin; fine close growth-lines, not forming costulae, but some of them slightly raised (sublamellate) on posterior area. Right valve with 3 cardinal teeth, the posterior one bifid, the middle one smaller than the others, left valve with 2 feeble teeth (Krauss: a thick bifid tooth), both valves without lateral teeth. Pallial sinus extending to near anterior adductor scar, its anterior border curving backwards to join pallial line.

Rose-red, with 3–4 pale radial streaks (Krauss). Iridescent (Sowerby).

8·7 × 4·8 Par. lines (Krauss) = *c.* 18 × 10 mm.; 16 × 8 mm. (Sowerby).

Fossil: Pleistocene, Durban (Geol. Survey).

Natal coast (Krauss); Durban (Sowerby; also S. Afr. Mus.); Port Alfred (Smith, Bartsch, Turton); 29° 53′ S., 31° 06′ E., 71 metres (U.C.T.). Inhambane (U.C.T.).

Remarks. Distinguished from *gilchristi* by shape, growth-lines not forming costulae, and absence of lateral teeth in both valves; from *vidalensis* by the two latter characters.

Tomlin identified a Durban specimen as the Philippine *scalpellum* Hanley 1844, but without suggesting that *natalensis* was synonymous. The types of Hanley and Krauss might be compared. I was responsible for the Day & Morgans (1956) record of *scalpellum*, having compared U.C.T. specimens with the shell identified by Tomlin as Hanley's species. But further study has convinced me that the shell identified by Tomlin is really Krauss's *natalensis*. The latter name is therefore retained.

Krauss said the pallial sinus was very large, but did not state how far it actually extended anteriorly. I have not seen the figure in Philippi.

Tellina vidalensis Sow.

Tellina vidalensis Sowerby, 1904, p. 13, pl. 7, fig. 5.
Not Bartsch 1915, nor Jaeckel 1931, = *gilchristi*.

Inequilateral, anterior part $1\frac{3}{4}$–2 in posterior part, postero-dorsal margin sloping, convex, posterior margin obliquely subtruncate; close concentric

growth-lines forming fine costulae, some on the posterior area slightly raised. Right valve with 2 cardinal teeth, the posterior bifid, anterior and posterior laterals about equidistant from the cardinals, left valve with a strong bifid anterior and a feeble posterior cardinal, laterals obsolescent. Pallial sinus extending nearly to anterior adductor scar, anterior border curving slightly backwards to join the pallial line.

Salmon pink or rose.

15·5 × 8·5 × 4·25 mm. (Sowerby); 19 × 10 mm. (S. Afr. Mus.).

Off Cape Vidal (Zululand), 13 fathoms, one living (Sowerby, P.F. material).

Off Tugela River, 37 fathoms, 10 valves; off Morewood Cove, 27 fathoms, 28 valves; off Umhloti River, 40 fathoms, two living, 6 valves, all juv.; and 27 fathoms, one valve; off Umhlanga River, 22–26 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Type in South African Museum. Reg. no. 14848.

Remarks. Distinguished from *gilchristi* by being more inequilateral, and having a distinct (though not strong) posterior lateral tooth in the left valve.

Jaeckel picked out one left valve from numerous examples of *gilchristi* taken in St. Francis Bay, and said it might belong (dürfte gehören) to *vidalensis*. Far more likely it was a slightly abnormal or worn *gilchristi*.

Cape Vidal. The headland near St. Lucia Bay was named after Vice-Admiral A. T. E. Vidal, R.N. (1790–1863). As Capt. Vidal he surveyed and charted the Azores, Canary Islands, Cape Verde Islands, and the coast of west Africa. I am indebted to the South African Naval Hydrographic Office, Mowbray, Cape Town, for obtaining this information from the Admiralty Hydrographer, London. See also *Memoirs of Hydrography* by Dawson, 1885.

Specimina inquirenda

Living specimens from Durban Bay and Richards Bay (U.C.T.) are a little difficult to refer to *gilchristi*, *natalensis*, or *vidalensis*, because the pallial sinus meets the lower corner of the anterior adductor scar and joins the pallial line without any recurrent bend.

Shells from both localities resemble *natalensis* in shape. The teeth of the Durban shells resemble those of *vidalensis*. In the single shell from Richards Bay, however, the cardinals resemble those of *natalensis*, the anterior one in the right valve forming a rather conspicuous knob; and the lateral are stronger than in any of the above three species.

Much more material of these pink Natal *Tellinas* should be studied.

Tellina ludwigii Krss.

Tellina ludwigii Krauss, 1848, p. 3, pl. 1, fig. 2; Barnard, 1962b, p. 194.
Tellina queketti Sowerby, 1897, p. 22, pl. 8, figs. 16, 17; Schwarz, 1910, p. 115 (*quecketti* [*sic*]); Broekhuysen & Taylor, 1959, p. 292.
Tellina queketti var. *radiata* Sowerby, 1897, p. 22.

Broadly oval, nearly equilateral; smooth, with fine growth-lines only. Cardinal teeth often indistinct, no lateral teeth. Ligament very short, its supporting ridge prominent. Pallial sinus extending to about midway between anterior adductor scar and vertical from umbo, curving backwards to join pallial line at about vertical from umbo.

Cream or pinkish, with dull violaceous radial streaks, which also show internally; one shell (S. Afr. Mus.) pure white.

About 18 × 14·5 (Krauss); 15·5 × 11·5 mm. (Sowerby); 23 × 17 mm. (S. Afr. Mus.).

Fossil: Pleistocene, Port Elizabeth (Schwarz, 1910).

Coast of Natal (Krauss); Durban (Sowerby; also S. Afr. Mus.); Kosi Bay (U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K.H.B.); Inhambane (U.C.T.).

Remarks. It seems strange that Sowerby described *queketti* without recognizing *ludwigii*, and that Tomlin when identifying South African Museum material should have chosen the former name.

Named after Baron von Ludwig, a Cape Town naturalist and horticulturist in the beginning of the 19th century; and Mr. J. F. Quekett, curator of the Durban Museum (1895–1910).

Tomlin (1926, p. 301) recorded a shell from Durban as doubtfully *yemenensis* Melvill 1898. The doubt was probably due to Melvill's omission to describe the hinge-teeth. The Durban shell agreed with the Aden species in colour, but Tomlin did not state which of the three colours (white, pink, flesh) given by Melvill. The shell was probably a *ludwigii*.

Tellina regularis Smith

Tellina regularis Smith, 1904a, p. 39, pl. 3, fig. 8; Turton, 1932, p. 248, pl. 66, no. 1749.

Oval, inequilateral, postero-dorsal margin steeper and shorter than antero-dorsal margin; very fine close-set subcostulate growth-lines, not decreasing in number posteriorly, microscopic radial striae sometimes visible in the substance of the shell. Right valve with 2 cardinals, posterior bifid, anterior lateral near the cardinals, posterior lateral feeble, left valve with 2 cardinals, anterior bifid, no laterals. Pallial sinus not extending to anterior adductor scar, anterior border curving slightly backwards to join pallial line at vertical from upper corner of anterior adductor scar.

White, semipellucid, sometimes yellowish towards the umbones.

Length 14, alt. 10, thickness (valves together) 4·5 mm. (Smith).

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Port Alfred (Smith, Bartsch, Turton); Port Elizabeth and Jeffreys Bay (coll. Kilburn, seen by me); Still Bay, living and valves (S. Afr. Mus. coll. Muir).

Remarks. Deeper, more broadly oval and less acuminate posteriorly than *gilchristi*, especially juveniles of the latter.

Tellina ponsonbyi Sow.

Tellina ponsonbyi Sowerby, 1889b, p. 155, pl. 3, fig. 1; 1892, p. 56, pl. 2, fig. 58; Turton, 1932, p. 248, pl. 66, no. 1745.
Tellina rietensis Turton, 1932, p. 248, pl. 66, no. 1747.
Tellina kraussi Turton, 1932, p. 248, pl. 66, no. 1748.

Numerous fine radial pliculae crossed by slightly costulate growth-lines, forming a cancellate sculpture. Dentiform lateral teeth well developed, cardinals rather weak. Pallial sinus extending beyond the vertical from umbo, its lower border not fusing with pallial line except at posterior end.

Length 31, alt. 26 mm. (S. Afr. Mus.); also 33·5 × 27·5 mm.

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Durban (Kilburn, 1961).

Off O'Neil Peak (Zululand), 90 fathoms, one worn valve; off Tugela River, 14 fathoms, one living, 9 valves; off Cove Rock (East London), 22 fathoms, one valve; off Keiskamma Point, 33 fathoms, one valve; Algoa Bay, 52 fathoms, 2 valves (S. Afr. Mus. P.F. coll.). Mossel Bay, living (U.C.T.).

Remarks. The concentric costulae are often sublamellate on the anterior and especially the posterior areas. Sometimes there is a distinct resemblance to the sculpturing of *Gastrana abildgaardiana*, but the two species are easily separated by the hinge.

The change in shape from markedly oval to less oval (e.g. from 6 × 4 mm. to 18 × 15·5 mm.) is well shown by the growth-lines in examples from the mangrove swamps in Durban Bay.

The large 31 × 26 mm. valve came from Algoa Bay; the largest I have seen (33·5 × 27·5 mm.) was in a private collection.

Tellina (*Angulus*) *immaculata* Phil.

Tellina immaculata Philippi, 1849, p. 55, pl. 5, fig. 2.

Thin, compressed, equivalve, without flexure, inequilateral, oval, posterior margin slightly obliquely truncate, internally a rib from umbo to postero-ventral corner (in front of posterior adductor scar) with a feebler one in front of it. Fine concentric growth-lines. Two cardinal teeth, the posterior in the right, anterior in the left valve bifid, a dentiform anterior lateral near the cardinals in right valve. Pallial sinus extending nearly to anterior adductor scar, curving slightly backwards to join pallial line at vertical from upper end of anterior adductor scar.

Rose-pink, 2 whitish radial streaks posteriorly, the hinder one corresponding with the internal ribs.

Length 27, alt. 18·5, thickness (valves together) 4 mm.

Chinde, mouth of the Zambezi River; and Delagoa Bay; low tide (S. Afr. Mus. coll. K.H.B.).

Remarks. Identified by Tomlin. Not hitherto recorded from east coast of Africa south of 15° S. latitude; but probably the same as *opalina* Chemn. recorded by Smith (1877, *Proc. Zool. Soc. Lond.*, p. 720) from Quelimane.

Hanley in Sowerby (1846, p. 295, pl. 59, fig. 124, pl. 62, fig. 197) considered that *opalina* Chemn. Schröter was the white variety of *planissima* Anton 1839 from the Moluccas. Dautzenberg (1929) recorded *opalina* (with *planissima* as synonym) from Madagascar. Tomlin's identification is accepted; I am not in a position to decide the status of *immaculata*.

Tellina (*Scissulina*) *dispar* Conrad

Tellina dispar Conrad, 1837, p. 259; Hanley in Sowerby, 1846, p. 306, pl. 59, figs. 108, 113, 114; Sowerby, 1897, p. 22.
Tellina fabula (*non* Gmelin), Krauss, 1848, p. 3; Turton, 1932, p. 248, pl. 67, no. 1751.

Right valve with fine oblique striae except on postero-dorsal area behind the umbonal ridge; left valve smooth, with growth-lines only. Hinge as in *Macoma* (no lateral teeth); upper border of pallial sinus rising rapidly to a right-angled peak, then descending to join pallial line a short distance behind anterior adductor scar.

White, pale orange, or pink.

Length 21, alt. 14 mm.

Natal Bay (Krauss); Natal, without exact locality (Sowerby; also S. Afr. Mus.); Port Alfred (Turton).

Distribution. Querimba Island (von Martens); Madagascar, Mauritius, Indo-Pacific.

Remarks. The identification of Natal shells with an Indo-Pacific species is preferable to identifying them with a European species (*fabula*). No European material is available for comparison.

Macoma litoralis (Krss.)

Fig. 31 *d*

Tellina litoralis Krauss, 1848, p. 4, pl. 1, fig. 3; Sowerby, 1892, p. 57; Johnson, 1904, p. 11.
Tellina calcarea (*non* Chemn.), Sowerby, 1892, p. 57.
Macoma calcarea (*non* Chemn.), Schwarz, 1900, p. 61.
Macoma litoralis Smith, 1904, p. 40; Bartsch, 1915, p. 206; Turton, 1932, p. 249.
Tellina (*Macoma*) *rousi* Sowerby, 1892, p. 57, pl. 3, fig. 70; Turton, 1932, p. 249.
Macoma neptuni Turton, 1932, p. 249, pl. 57, no. 1759.
[?] *Macoma patula* Turton, 1932, p. 249, pl. 57, no. 1761.
Pinguitellina cf. *culter* Day & Morgans, 1956, p. 307.

Hinge and cardinal teeth relatively strong. Upper border of pallial sinus extending to anterior adductor scar, lower border fused with pallial line. Periostracum, thin, pale brown, fawn, or pinkish.

Length 29, alt. 22·5 mm.; said to reach 35 mm. long (Smith). Type of *rousi* 35 × 25 × (valves together) 12·5 mm.

Fossil: Pleistocene, Port Elizabeth (Johnson); Keurbooms River (Schwarz).

'Cape and Natal' (Krauss); Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Keurbooms River estuary, living (S. Afr. Mus. coll. K.H.B.); Still Bay (S. Afr. Mus. coll. Muir); Delagoa Bay (S. Afr. Mus. coll. K.H.B.).

Off Cape St. Blaize, 44 fathoms, 2 valves; Buffalo Rivery estuary (East London) low tide, 3 living (S. Afr. Mus. P.F. coll.).

Bushmans River mouth, Umkomaas (Natal), Durban Bay, Richards Bay, St. Lucia Bay, and Inhambane (U.C.T.).

Estuaries of several rivers between East London and Port St. Johns (Inland Fisheries, Cape Province).

Type of *rousi* Sow. in McGregor Museum, Kimberley.

Remarks. Thanks to the Director of the Museum at Kimberley I have been able to examine the Type of *rousi*; it is not specifically distinct from *litoralis*.

Turton's photo of *neptuni* shows the pallial sinus reaching to the anterior adductor scar, and also the rather strong hinge-teeth; but in the photo of *patula* the extent of the sinus is not clear; nevertheless *patula* is probably only a *litoralis* of slightly different shape.

Variation

While collecting in the Morumbene estuary, Inhambane, Prof. Day and his assistants noticed two forms of this bivalve externally indistinguishable except that one had a short, the other a long ligament.

Further examination of these shells shows that a long ligament seems to be correlated with a narrow gap between the end of the pallial sinus and the adductor scar (see dotted line in fig. 31 *d*). Also the anterior lateral lamella in the right valve tends to develop a denticle.

In the short-ligament form the ligament extends backwards to about midway between the umbo and the vertical from anterior edge of posterior adductor scar. In the long-ligament form it extends to the vertical from the scar or slightly farther. The difference is not great but immediately noticeable when examples are placed side by side.

On beach valves the extent of the ligament is not determinable with certainty. But in a series of 60 valves collected by Dr. Muir at Still Bay about 37 have the pallial sinus extending to the adductor scar, and about 23 have a narrow gap between the sinus and the scar (some valves do not show the difference very clearly). The difference occurs in both right and left valves. The gap may be very narrow, and in some valves the end of the sinus just touches the lower corner of the scar.

From Prof. Day's experience, and Dr. Muir's collecting, the two forms occur together. Much more material, collected alive, should be examined.

Inhambane, living (U.C.T.). Bazarute Island, one living (S. Afr. Mus. coll. E. K. Jordan).

Also 3 valves from Durban North bridge, 60 ft. below sea level (Geol. Survey) appear to belong here, though the altitude is somewhat less proportionately to the length: 32 × 22, 28 × 20, and 24 × 16 mm. The smallest valve is a right valve and has a distinct denticle on the anterior lateral lamella.

It is debatable whether this species should not be returned to *Tellina* where Krauss originally placed it.

Macoma ordinaria Sow.

Fig. 31 *e*

Tellina (*Macoma*) *ordinaria* Sowerby, 1904, p. 14, pl. 7, fig. 7.

Pallial sinus reaching to midway between anterior adductor scar and vertical from umbo, its lower border uniting with pallial line at vertical from umbo. Hinge and cardinal teeth relatively weak. Periostracum thin, pale fawn. Beach valves may be yellowish internally.

Length 24, alt. 18 mm.

Saldanha Bay, 10 fathoms (Sowerby, P.F. material).

Off Baboon Point (Saldanha Bay area), 31 fathoms, one (S. Afr. Mus. P.F. coll.).

Table Bay (S. Afr. Mus. coll. Layard, and coll. Lightfoot).

Langebaan (Saldanha Bay), St. Helena Bay, 6 fathoms, and off Lambert's Bay 10–90 fathoms; Lüderitzbucht, 9–35 metres (U.C.T.).

Cotypes in South African Museum.

Remarks. Table Bay examples, some of which were collected by Layard many years ago, were formerly named *calcarea*, but Tomlin identified them as *ordinaria*. I agree that they are indistinguishable from Saldanha Bay examples.

The description of *Macoma schultzei* Thiele 1910, from Lüderitzbucht, contains no differential characters; the pallial sinus was not described. It is larger (28 × 21 mm.) than either *ordinaria* or *crawfordi*, but would fit *litoralis*. The latter has not been found on the west coast. Probably *schultzei* is the same as the shells from Great Fish Bay identified by Jaeckel as *africana* (*v. infra*). At present it cannot be admitted to the fauna-list.

Macoma crawfordi Sow.

Fig. 31 *f*

[?] *Tellina nobilis* (*non* Hanley), von Martens, 1874, p. 122.
Tellina (*Macoma*) *crawfordi* Sowerby, 1892, p. 57, pl. 3, fig. 71; Jaeckel, 1931, p. 238; Turton, 1932, p. 249.
Tellina (*Macoma*) *cumana* (*non* Hanley), Sowerby, 1892, p. 57; Smith, 1904a, p. 25.
[?] *Tellina tenuis* (*non* da Costa), Sowerby, 1892, p. 56.
Macoma africana Sowerby, 1904, p. 14, pl. 7, fig. 8; Jaeckel, 1931, p. 238 (part: the St. Francis Bay specimens); Turton, 1932, p. 249.

Pallial sinus extending a little beyond midway between anterior adductor scar and vertical from umbo, lower border joining pallial line at vertical from umbo. Hinge line narrow. Periostracum thin, pale buff or fawn. Internally pale orange or yellow.

Length 26, alt. 20 mm.

Port Elizabeth (*cumana* and *crawfordi*) and Algoa Bay 16 fathoms (*africana*) (Sowerby). St. Francis Bay, 80 metres (Jaeckel).

Kalk Bay (False Bay) (S. Afr. Mus. coll. R. M. Lightfoot).

False Bay, 50 fathoms, 4 living, and valves; St. Francis Bay, 24–34 fathoms, one; off Cape Infanta, 45 fathoms, one living; Algoa Bay, 10–31 fathoms, several

living and many valves; off Kowie, 40 fathoms, several living; off East London, 32 fathoms, 2 living, one valve (S. Afr. Mus. P.F. coll.). Off Cape Barracouda, 50 metres, 5 living (S. Afr. Mus.).

False Bay; Algoa Bay, 15–17 fathoms, off East London, 30 fathoms (U.C.T.).

Remarks. Sowerby remarked on the narrow hinge in his descriptions of both *crawfordi* and *africana*. The former was based on beach material, the latter on dredged material.

Jaeckel had shells from St. Francis Bay, and managed to distinguish two species.

I do not accept Jaeckel's record of *africana* from Great Fish Bay, Angola; the shells were more likely either *ordinaria* or *cumana*, if these can be distinguished. In fact it is questionable whether *crawfordi* (*africana*) should be distinguished from *ordinaria*, but in the present material the shells from the south coast are less high proportionately than those from the west coast. The extent of the pallial sinus is the same in both.

Macoma levior Sow.

Fig. 31 *h*

Tellina (*Macoma*) *levior* Sowerby, 1904, p. 13, pl. 7, fig. 6.

Pallial sinus extending to about midway between anterior adductor scar and vertical from umbo, lower border meeting pallial line at vertical from umbo. Hinge-line narrow. Periostracum very thin, cream, more or less discoloured by adherent mud around the margin.

Length 19, alt. 15–16 mm.

Off Amatikulu River (Zululand), 26 fathoms; off Tugela River, 25 fathoms (Sowerby, P.F. material).

Same localities, several living and valves (S. Afr. Mus. P.F. coll.).

Off Umkomaas (Natal); 29° 53′ S., 31° 06′ E., 71 metres; 31° 38′ S., 29° 34′ E., 26 fathoms (U.C.T.). Inhambane (U.C.T.).

Cotypes in South African Museum.

Remarks. Very like *ordinaria*, but there is an obscure umbonal ridge which causes a slight angle at the margin.

Macoma retrorsa Sow.

Fig. 31 *g*

Tellina (*Macoma*) *retrorsa* Sowerby in Reeve, 1867, fig. 234; Smith, 1901, p. 116.
Tellina (*Macoma*) *candidata* Sowerby, 1894, p. 375; 1897, p. 23, pl. 6, fig. 25; Turton, 1932, p. 250.

Length 16, alt. 12 mm. (Sowerby). Turton gave length 20 mm.

Durban (Sowerby, Smith). Port Alfred (Turton).

Off Amatikulu River (Zululand), 24 fathoms, one living (S. Afr. Mus. P.F. coll.).

Delagoa Bay, living (S. Afr. Mus. coll. K.H.B.); Inhambane, living (U.C.T.); Beira (S. Afr. Mus. coll. D. Dods).

Remarks. Jaeckel assigned, with doubt, 2 examples from 35° 9′ S., 18° 33′ E., 564 metres, to *candidata*, agreeing with Sowerby's description but with a *Tellina* hinge. He apparently did not know Smith's 1901 paper.

Macoma inclinata Sow.

Fig. 31 *i*

Tellina (*Macoma*) *inclinata* Sowerby, 1904, p. 14, pl. 7, fig. 9.

Elongate-oval, hind margin slightly flexuose. Pallial sinus extending to midway between anterior adductor scar and vertical from umbo, lower border meeting pallial line at vertical from umbo. Hinge line narrow.

Length 33, alt. 19 mm.

Fossil: Pleistocene, Durban (Geol. Survey).

Off Tugela River, 27 fathoms (Sowerby, P.F. material).

Same locality, 46–55 fathoms, 3 living (S. Afr. Mus. P.F. coll.).

31° 41′ S., 29° 33′ E. (off Port St. Johns), 90 metres, 3 juv., living (U.C.T.).

† *Macoma chakeënsis* Cox

Macoma chakeënsis Cox, 1927, p. 59, pl. 8, figs. 9, 10.

Large, rather solid, oval, outer surface with growth-lines only; lower border of pallial sinus meeting pallial line at vertical from umbo. 68 × 47 mm.

Fossil: Lower Miocene, Pemba Island (Cox).

Durban harbour sediments, numerous examples (Dr. Lester King, 1963).

Remarks. An interesting discovery. It was not found in the Inhambane deposits (Cox, 1939), and has not been found in any other locality, fossil or living. Some of the present specimens appear quite fresh.

The occurrence of this Miocene fossil in the Durban harbour sediments is no indication that all, or any of these deposits date back to the Miocene. The question of their age will be discussed by Dr. Lester King; here only the locality is recorded.

Apolymetis orbicularis (Sow.)

Tellina orbicularis Sowerby, 1889a, p. 13, pl. 1, fig. 20; 1892, p. 57, pl. 3, fig. 64.
Tellina umbonella (*non* Lam.), Sowerby, 1892, p. 57.
Macoma orbicularis (Sow.), Newton, 1913, p. 341, pl. 18, fig. 5.
Metis orbicularis (Sow.), Bartsch, 1915, 206; Turton, 1932, p. 249.

Length 63, alt. 53 mm. (Newton: fossil); 50 × 45 mm. (Sowerby); worn valves 66 × 55, 52 × 46, 41 × 33, and 29 × 22 mm. (S. Afr. Mus.).

The more oval-oblong shape of the 29 and 41 mm. long valves conforms with the growth-lines on the larger valve at corresponding sizes. Cf. also Sowerby's figure.

Fossil: Pleistocene, Redhouse, Port Elizabeth (Newton); Sedgefield near Knysna (A. R. H. Martin); Knysna raised beach (S. Afr. Mus.); Little Brak River (S. Afr. Mus.).

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Mossel Bay (Dr. H. Ackert); Still Bay (S. Afr. Mus. coll. Muir); False Bay (Mrs. Connolly).

Cape Point S.W. W. $\frac{3}{4}$ W. $3\frac{1}{2}$ miles (False Bay), 32 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Remarks. A rare species. The original specimen came from Port Elizabeth; Turton found 2 valves; Dr. Muir found 3 valves; the P.F. took only one half-grown valve.

Sowerby (1889) did not compare this species with any other, nor did Newton (1913). But comparison might be made with the Red Sea fossil *papyracea* Gmelin (*lacunosa* Chemn.); see: Sowerby, 1846, pl. 65, fig. 252; Nardini, 1937, pl. 18(12), fig. 18.

Gastrana abildgaardiana (Spengler)

Tellina abildgaardiana Spengler, 1798, p. 90.
Gastrana abildgaardiana (Speng.), Schwarz, 1900, p. 61; Johnson, 1904, p. 11; Schwarz, 1910, p. 116; Haughton, 1932, p. 38; Macnae & Kalk, 1958, p. 129; Franca, 1960, p. 99, pl. 29, fig. 1.
Petricola ventricosa Krauss, 1848, p. 2, pl. 1, fig. 1.

Shape normally ovate, broadly rounded in front, somewhat acuminate behind, longer than high; but the proportions may vary, and examples with indented margin or otherwise distorted may occur (see below).

Length 43, alt. 33 mm.; also 44 × 31, 31 × 23, 29 × 25, 21 × 17, 21 × 15, 20 × 13, 18 × 14 mm. Valves together: 35 × 26 × 18, 36 × 24 × 15·5, 27 × 20 × 14, and 18 × 12 × 8 mm.

Fossil: Pleistocene, Saldanha Bay (Haughton); Klein River, Stanford (S. Afr. Mus.); raised beach Still Bay (S. Afr. Mus.); Sedgefield near Knysna (A. R. H. Martin); Knysna and Keurbooms River (Schwarz); Port Elizabeth (Schwarz, Johnson).

Dunes near Zoetendal Vlei (Bredasdorp Division) (Krauss); Still Bay (S. Afr. Mus.); Keurbooms River estuary (S. Afr. Mus. coll. K.H.B.); Port Elizabeth (Sowerby; also S. Afr. Mus.); Port Alfred (Smith, Bartsch, Turton); Natal (Krauss); Durban (S. Afr. Mus.; also U.C.T.); Delagoa Bay (S. Afr. Mus. coll. K.H.B.; also U.W.; also Franca).

Off Tongaat (north of Durban), 36 fathoms, one valve; off Tugela River, 65–80 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Distribution. Karachi (Melvill & Standen).

Remarks. A small globose example, 10 × 9 × 7 mm., was found wedged in a crevice in coral at Delagoa Bay, and also a single valve, 12 × 10 mm., with an indent in the ventral margin (K.H.B. 1912).

G. matadoa (Gmelin) (*guinaica* Chemn.) (1846, Hanley in Sowerby, p. 320, pl. 59, fig. 130) occurs on the west coast of Africa (Mauritania, Senegal), and *G. suarezensis* Bertin at Madagascar.

Without material for comparison, I cannot say whether the Saldanha Bay fossil shells should be assigned to the West African *matadoa* or to *abildgaardiana*, presuming there is a specific difference. Melvill & Standen (1906) recorded '*guinaica* Chemn. = *abildgaardiana* Spengler.'

Fam. **Solenidae**

Solen capensis Fischer

Fig. 32 *a*, *b*

Solen marginatus Koch (*non* Pult.), Krauss, 1848, p. 1; Sowerby, 1892, p. 54; Schwarz, 1900, p. 61; Johnson, 1904, p. 11; Schwarz, 1910, p. 116.

Solen capensis Fischer, 1881, p. 155 (*nom. nov.* for *marginatus* Koch, *non* Pulteney); Haughton, 1932, p. 38; Scott, Harrison, Macnae, 1952, p. 310; Day, Millard, Harrison, 1952, pp. 393, 394, 410.

Solen alfredensis Bartsch, 1915, p. 208, pl. 40, figs. 1, 2; Turton, 1932, p. 254.

Anterior margin exsert, causing a definite groove which extends in half-grown and adult shells from dorsal to ventral margin; in large shells the anterior margin is thickened and shows growth-lines. Anterior adductor scar nearly as long as ligament.

Length 158, alt. 22 mm. (Still Bay); also 150 × 21 mm. (Keurbooms River).

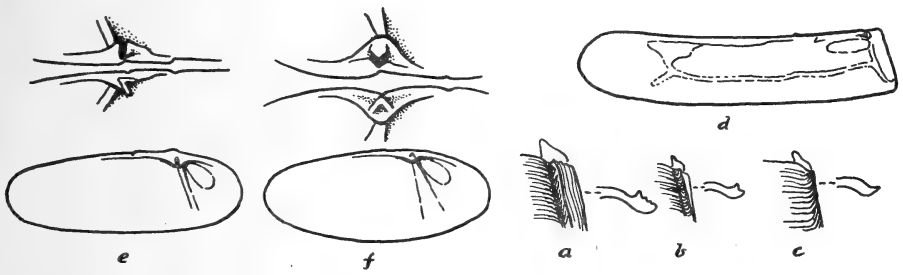


FIG. 32. *a*, *b*, *Solen capensis* Fischer, anterior end of adult and juvenile to show groove. *c*, *S. corneus* Lam., or *gouldi* Conrad, anterior end without groove. *d*, *Solen* sp. St. Lucia Bay, internal view. *e*, *Siliqua polita* (Wood), internal view, with hinge above. *f*, *S. radiata* (Linn.) the same.

Fossil: Pleistocene, Bogenfels, South West Africa, Saldanha Bay (Haughton); Sedgefield near Knysna (A. R. H. Martin); Keurbooms River (Schwarz); Port Elizabeth (Johnson, Schwarz).

Kromme River mouth (Krauss); Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Turton); Jeffreys Bay (S. Afr. Mus.); Keurbooms River estuary (S. Afr. Mus. coll. K.H.B.); Still Bay (S. Afr. Mus. coll. Muir); East London (S. Afr. Mus.). Riet Vlei estuary, Table Bay (S. Afr. Mus. coll. K.H.B.).

Off Nanquas Peak (east end of Algoa Bay) 49 fathoms, one broken valve (S. Afr. Mus. P.F. coll.).

West coast: Olifants River mouth; Milnerton lagoon, Table Bay; south coast: Klein River estuary, Hermanus; Knysna lagoon; Sundays River mouth; Bushmans River mouth; Hamburg; Port St. Johns (U.C.T.).

Estuaries of several rivers between Keiskamma River and Port St. Johns (Inland Fisheries, Cape Province).

Remarks. The smallest valve in a series from one locality (Still Bay) is 49 mm. long. The groove is distinct. The next smaller valve is one 36 mm. long

from Mossel Bay; this has a shallow groove dorsally, none ventrally, and the anterior margin is exsert dorsally (i.e. projecting perpendicularly to the shell surface) but projecting forwards (porrect) ventrally. This Mossel Bay specimen was identified by Tomlin as *corneus*; an identification which I am disinclined to accept. A study of very young shells should be made, and their growth traced up to the half-grown shells.

Krauss gave the locality 'mouth of the Kromme River in Uitenhage District'. In those days the confines of the 'Districts' were larger than those of the present day 'Divisions'; presumably Krauss's locality is the Kromme River flowing into St. Francis Bay in the Humansdorp Division.

Solen gouldi Conrad

Fig. 32 *c*

Solen gouldi Conrad, 1862, p. 26; Sowerby, 1892, p. 54; Day & Morgans, 1956, p. 308; Macnae & Kalk, 1958, p. 129.

Anterior margin not exsert, no definite groove at anterior end. Anterior adductor scar nearly as long as ligament.

Length 70, alt. 11 mm.

Port Elizabeth (Sowerby; also, living, S. Afr. Mus.); Kowie, living (S. Afr. Mus.); East London, living (S. Afr. Mus. P.F. coll.); Durban Bay, living (U.C.T.); Umlalazi, near Richards Bay (U.C.T.); Delagoa Bay (U.W.); Inhambane and Maxixe (Machiche) (U.C.T.); Mozambique Island (U.W.).

Off Umhlanga (Natal), 22–26 fathoms, one broken valve; off Tugela River, 37 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Japan.

Remarks. The P.F. example from East London was identified by Sowerby as *gouldi*. Without material for comparison I am fain to accept this identification; and the above specimens are recorded provisionally as *gouldi*, though perhaps they are more probably *corneus* Lam., which Sowerby (1897) recorded from Durban, and Smith & Bloomer (1906) from Zanzibar.

Solen roseomaculatus Pilsbry

Solen roseomaculatus Pilsbry, 1901b, p. 399, pl. 19, fig. 13; Jaeckel, 1931, p. 240; Kira, 1955, pl. 61, fig. 4; Macnae & Kalk, 1958, p. 129.

Slightly curved, roseomaculate, 31 × 6·3 × 3·8 mm. (ex Pilsbry). The Inhambane specimen measures 25 × 5 mm., is roseomaculate, slightly curved, with truncate posterior margin. The anterior adductor scar is as long as the anterior margin (4 mm.) and as long as (or a trifle longer than) the ligament.

Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. Japan (Pilsbry); off Dar-es-Salaam, 50 metres (Jaeckel).

Remarks. This Japanese species having been found off the coast of East Africa, its occurrence farther south is not unlikely.

Pilsbry described the hinge-teeth, but did not mention the anterior adductor scar. His figure showed the posterior margin truncate.

The following specimen appears to be closely allied.

Solen sp.

Fig. 32 *d*

Slightly curved, anterior margin straight, posterior margin rounded; anterior margin exsert, causing a slight groove, but only on the dorsal half (? juvenile); anterior adductor scar only about $\frac{2}{3}$ length of ligament, oval, $3\frac{1}{2}$ times as long as broad; posterior adductor scar triangular; a single cardinal tooth in both valves; in left valve a slight projection behind the cardinal, which may be a lateral tooth or merely an accidental crack in the shell.

Uniform corneous. Length 23, alt. 5, thickness (valves together) 4 mm.

St. Lucia Bay (U.C.T.).

Remarks. Resembles *roseomaculatus* in being slightly curved. This feature and the shortness of the anterior adductor scar distinguishes this single specimen from the other examples of *Solen* in the present material.

Pharus sp.

Straight, rounded at both ends, altitude greater posteriorly than at umbo, which is 5·5 mm. from anterior end. Hinge with 2 teeth in right valve, 3 in left, the posterior one of the latter bifid. Ligament 6–7 mm. long. No internal ridges. Anterior adductor scar elongate (7 mm.), somewhat dumbbell-shaped, the anterior part subcircular, posterior part oval. Posterior adductor triangular. Lower broder of pallial sinus mostly fused with pallial line. Periostracum yellowish-brown.

Siphons short, united except at very end. Foot apically obliquely truncate. Mantle edge fringed anteriorly, dorsally and ventrally. Gills smooth.

Length 35, alt. (at umbo) 8·5, (greatest) 10·5 mm.

28° 46′ S., 16° 27′ E., 38–42 metres (s.s. *Africana*, per U.C.T.).

Appears to be a species of *Pharus*, but differs from *legumen* by the forward position of umbo, rounded hind end, and absence of internal thickenings. Shape resembling *Solen gaudichaudi* as figured by Chenu (1862, fig. 92).

Phaxas pellucidus (Pennant)

Solen pellucidus Pennant, 1777, p. 71.
Cultellus pellucidus (Penn.), Sowerby, 1892, p. 54; Jaeckel, 1931, p. 240.
Cultellus decipiens Smith, 1904a, p. 39; Turton, 1932, p. 254, pl. 69, no. 1798.

White or cream, with corneous periostracum, darker in large specimens than in juveniles.

Length 57, alt. 15–16 mm.

Port Elizabeth (Sowerby); Port Alfred (Smith, Turton); Lüderitzbucht (Thiele 1910); Table Bay (S. Afr. Mus.); Algoa Bay (Jaeckel); mouth of Kaffirkuils River, Still Bay (S. Afr. Mus. coll. Muir).

False Bay, 22–30 fathoms, 4 living; off Cape St. Blaize, 37 fathoms, one living; Algoa Bay, 22–31 fathoms, 4 living (S. Afr. Mus. P.F. coll.).

Saldanha Bay; off Hout Bay (west side of Cape Peninsula), 41 fathoms; False Bay; off Port St. Johns, 26 fathoms (U.C.T.).

Distribution. Europe.

Remarks. The P.F. examples do not exceed 30 mm. in length; Dr. Muir obtained one 46 mm.; the largest were obtained on Woodstock beach, Table Bay by R. M. Lightfoot.

It seems doubtful whether *decipiens* can be maintained, but I have no European material for comparison.

Phaxas cultellus (Linn.)

Cultellus cultellus (Linn.), Chenu, 1862, fig. 98.
Cultellus (*Ensiculus*) *cultellus* (Linn.), Lynge, 1909, p. 276.
Cultellus (*Cultellus*) *cultellus* (Linn.), Prashad, 1932, p. 312.
Phaxas cultellus (Linn.), Gravely, 1941, p. 63, fig. 23 *a*.
[?] *Cultellus pellucidus* (*non* Penn.), Macnae & Kalk, 1958, p. 129.

Slightly curved, ventral margin more convex than dorsal margin. Anterior adductor scar elongate. One narrow cardinal tooth in right valve fitting between two in left valve, posterior lateral tooth lamellate, with dentiform projection, especially in left valve; anterior lateral more or less dentiform, above the anterior end of adductor scar.

More or less mottled with purplish-brown.

Length 70, alt. 18 mm.

Off Tongaat, Morewood Cove, and Umhloti (Natal), 25–40 fathoms, one juv. living, several valves, more or less broken (S. Afr. Mus. P.F. coll.).

Mozambique Island (S. Afr. Mus. coll. K.H.B.).

? Delagoa Bay (U.W.).

Distribution. Red Sea, Madagascar, India, East Indies, Philippines, China, Japan.

Remarks. The P.F. juvenile and one of the valves were identified by Sowerby.

Siliqua polita (Wood)

Fig. 32 *e*

Solen polita Wood, 1828, p. 3, pl. 1, fig. 6 [*n.* et *f.* only, *teste* Sherborn]; Sowerby, 1902, p. 100; Macnae & Kalk, 1958, p. 129.
Siliqua japonica Sowerby, 1892, p. 54.

Oblong, dorsal and ventral margins nearly straight and subparallel. Anterior arm of the Λ-shaped cardinal tooth in right valve fitting between 2 prominent cardinals in left valve, posterior arm in right valve and the corresponding groove in left valve weak. Internal rib narrow, not widening ventrally.

Pale greyish, periostracum with a more orange zone around the margin.

Length 30, alt. 11 mm.

Port Elizabeth (Sowerby).

Off Amatikulu River (Zululand), 24 fathoms (Sowerby, P.F. material); off Tugela River, 12–14 fathoms, 2 living, one valve (S. Afr. Mus. P.F. coll.).

Delagoa Bay (U.W.).

Distribution. Red Sea, Japan.

Remarks. The locality Port Elizabeth, even for dead shells washed ashore, seems unlikely. Sowerby did not return the Zululand specimens; but returned those described above, with the label 'Siliqua sp.'. Presumably they are conspecific.

Sowerby (1902) regarded *polita* and *japonica* as synonymous. Kira's (1955, pl. 61, fig. 12) figure of *japonica* Dnkr. is coloured as in *radiata*, but is too small to show the shape properly. Gravely (1941, p. 63) refers to a species 'parallel-sided with broadly rounded ends and very pale which may possibly be *S. albida*'.

Siliqua radiata (Linn.)

Fig. 32*f*

Siliqua radiata (Linn.), H. & A. Adams, 1855/56, p. 345, pl. 93, figs. 3, 3*a*; Lynge, 1909, p. 277; Gravely, 1941, p. 62, fig. 23 *c*.
Machaera radiata (Linn.), Chenu, 1862, fig. 102.

Oval, dorsal and ventral margins convex. The Λ-shaped cardinal tooth in right valve fitting into a V-shaped groove between the 3 teeth in left valve. Internal rib widening from umbo to ventral margin.

Pale fawn or fuscous, with 3 or 4 white radiating rays, the anterior one corresponding with the internal rib, the 4th (if distinct) near the postero-dorsal margin.

Length 25, alt. 10 mm.

Durban (S. Afr. Mus. coll. Burnup); Delagoa Bay (U.W.).

Off Umhloti River (Natal), 27 fathoms, 8 valves (S. Afr. Mus. A9553. P.F. coll.).

Distribution. India, East Indies, Siam.

Remarks. Differs from the preceding species in shape, hinge-teeth, internal rib, and coloration.

Without material for comparison, these specimens are provisionally assigned to *radiata*. The outline does not quite conform with that in any of the above quoted figures, the postero-dorsal margin being more sloping and the shape more evenly oval.

Fam. **Saxicavidae**

In 1861 Gould described *S. flaccida* from Hong Kong and Simon's Bay, admitting he was uncertain whether the shells from the two localities were specifically the same. He mentioned the post-umbonal ridges as being sometimes spinulose. It seems highly probable that he had some specimens of *arctica* from Simon's Bay; and so far as concerns the South African fauna-list, *flaccida* should be regarded as a *species delenda*.

S. arctica and *rugosa* have been considered synonymous, the former being more free-living individuals, the latter boring into rocks. The larval development, however, seems to show that they are distinct species (Lebour, 1938, pp. 138, 139, fig. 5 *a–q*).

Saxicava arctica (Linn.)

Saxicava arctica (Linn.), Krauss, 1848, p. 2; Jaeckel, 1931, p. 241.

Two squamiferous ridges radiating from umbo to posterior margin; these are visible on unworn shells at the 1 mm. stage. The squmae vary in size, sometimes long and almost spiniform, e.g. on a 7 mm. shell from Browne's Bank some of the squamae near the margin are 1·5 mm. long.

The largest P.F. shell is 20 × 10 mm. Periostracum rusty-brown.

Knysna (Krauss); Port Elizabeth (Sowerby); Port Alfred (Turton). Algoa Bay and Agulhas Bank, 80–155 metres (Jaeckel).

34° 41′ S., 18° 36′ E., 98 fathoms; 35° 4′ S., 18° 37′ E., 150 fathoms (Smith, 1885).

From East London to Algoa Bay, Agulhas Bank (incl. Browne's Bank approx. 36½ S., 21¼ E.) to False Bay, off Cape Point, west side of Cape Peninsula to Table Bay, 30–150 fathoms, living and valves (S. Afr. Mus. P.F. coll.).

34° 59′ S., 22° 18′ E., 58 fathoms; 34° 48′ S., 22° 06′ E., 55 fathoms; 34° 11′ S., 18° 20′ E., 15 fathoms (U.C.T.).

Distribution. Europe, Canaries, Azores, Mauritania, St. Helena, Marion and Prince Edward Islands, Kerguelen. Also west coast of North America, Japan, Australia.

Remarks. Dead valves are frequent in most of the P.F. bottom samples from the Agulhas Bank.

Krauss found his specimens in the hollow scales on *Pinna squamifera.*

Saxicava rugosa (Linn.)

Saxicava rugosa (Linn.), H. & A. Adams, 1855/56, p. 349, pl. 94, figs. 1 *a, b.*
Saxicava australis (*non* Lam.), Sowerby, 1892, p. 55.

Less rectangular than *arctica*, and both radiating ridges weaker, especially the one near the dorsal margin, and without squamae.

14 × 8 mm. (shell without extension of periostracum) (S. Afr. Mus.).

South Africa (Sowerby); Still Bay (S. Afr. Mus. coll. Muir); False Bay 11 fathoms, one living (S. Afr. Mus. P.F. coll.); False Bay, littoral (U.C.T.).

Distribution. Europe.

Sowerby said 'The specimens shown me from South Africa look very much like the British *S. rugosa*', but he recorded them as *australis*. Any doubt these words might imply as to provenance of the specimens is dispelled by finding examples in False Bay. These look very much like *rugosa.*

The Muir collection contains a series from 1·5 mm. up to 7 mm. long. None of these shows any trace of squamae; the three largest are considerably distorted.

Saxicava sp.

Fig. 33 *a*

A single valve, rather like a plough-share in shape, may possibly be a *rugosa* slightly distorted. It is, however, sufficiently distinct to merit a figure.

Length 6, alt. 3 mm.

Simon's Bay (False Bay), 22 fathoms (S. Afr. Mus. A9554. P.F. coll.).

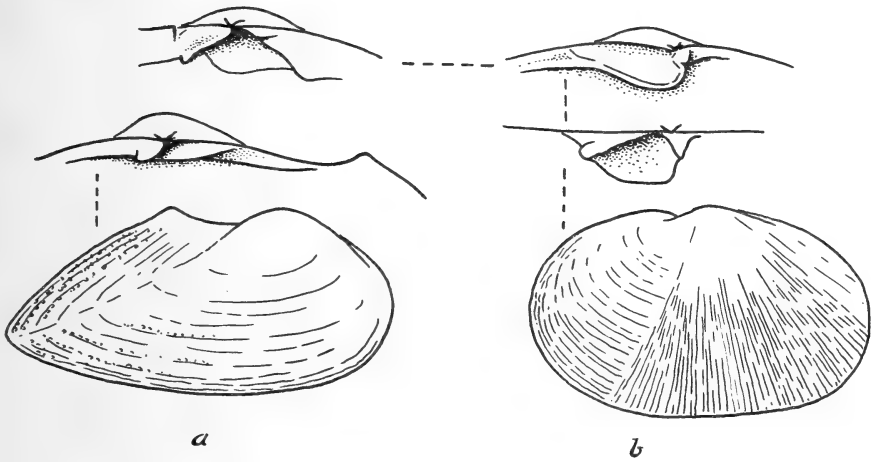


FIG. 33. *a*, *Saxicava* sp. (S. Afr. Mus. No. A9554), with hinge. *b*, *Cryptomya philippinarum* (A. Adams) from Sedgefield deposits, external view, hinges of left and right valves, dorsal view of former with projecting ligament pit.

Gen. PANOPEA Ménard

Ménard, 1807, p. 135.

Panopea aldrovandi Ménard

Panopea aldrovandi Ménard, 1807, p. 136; Nicklès, 1950, p. 228, fig. 444; Franca, 1960, p. 37.
Panopaea australis non Sow., Valenciennes, 1839, p. 1. [Not in Sherborn, Ind. Anim; quoted by H. C. and R. Winckworth, 1935]; Chenu, 1843–53, pl. 8, figs. 1–9 [quoted from Smith, 1903].
Panopaea aldrovandi Lam., Woodward, 1856, p. 218, text-fig. (anatomy).
Panopaea aldrovandi Ménard, Dautzenberg, 1910, p. 148; 1912, p. 99.
Glycimeris rugosa Bosc, H. & A. Adams, 1855, pl. 94, figs. 2–2*b*; 1856, p. 350.
Panopaea natalensis Woodward, 1856, p. 220; Smith in Rogers, 1906, p. 294; Schwarz, 1910, p. 115.
Panopea natalensis Woodward, Smith, 1903a, p. 399; Barnard, 1962b, p. 187.
Panopea attenuata Sow., Reeve, 1873 (1874), pl. 3 [quoted from van Hoepen]; Sowerby, 1889b, p. 156.
Panopea dreyeri van Hoepen, 1940, p. 186, pls. 10, 11.

Pallial line continuous; sinus extending to vertical from hind end of ligamental ridge (or nearly as far). Growth-lines show that the anterior margin becomes increasingly more obliquely subtruncate in the half-grown to adult.

Length 204, alt. 124, thickness (valves together) 98 mm. (Hopefield); 190 × 125 × 96 and 180 × 106 × 72 (Little Brak River); 245 × 145 × (one valve) 50 mm. (Meob Bay).

Fossil: Pleistocene, Little Brak River, Mossel Bay (Smith in Rogers; van Hoepen; also S. Afr. Mus. coll. S. H. Haughton); Port Elizabeth (Schwarz). Berg River near Hopefield (S. Afr. Mus.; ? fossil).

Meob Bay, Lüderitz district (opposite Hollam's Bird Island) washed up by extra high tides (Geological Survey, and Staatsmuseum, Windhoek).

Distribution. 'Sur la côte Natal, baie des Tigres, par 16° 40′ de latitude sud', living (Valenciennes). Baia dos Tigres, and Baia de Mocamedes (Franca).

Mediterranean, Atlantic coast from Portugal to Dakar (Nicklès).

Remarks. Woodward quoted (from Forbes, who quoted from Valenciennes) an account of how Capt. Cecile* of the French frigate *Heroine* obtained these large shells in the sandy bays of 'Port Natal' [*sic*]. H. C. & R. Winckworth (1935, p. 162) gave the locality more correctly as 'Tigers' Bay in Angola', with their comment: 'Curiously said to be in Natal'.

The occurrence of a *Panopea* on the Natal coast is due solely to Woodward (or Forbes) having quoted only the first part of the locality given by Valenciennes, and changed 'côte Natal' into Port Natal (= Durban). Only the second part of Valenciennes's locality is acceptable, because there is not, nor has been so far as I can discover, any Tiger Bay on the coast of Natal; whereas Tiger Bay in Angola *is* situated in 16° 40′ S. latitude.

Woodward based the name of the species on a misquoted locality!

Have any examples of *Panopea* been collected on the Natal coast, more particularly in Durban Bay? Apart from several shell collectors in Natal, Durban Bay has been dredged for harbour and scientific purposes. Neither the *Pieter Faure* nor Prof. Day's party (1956, Day & Morgans, p. 260) obtained this shell. There are no recent records, and so far as I am aware there are no specimens in existence from this locality.

Port Elizabeth is therefore the most easterly locality where *Panopea* has been obtained, and moreover only as a fossil (Stow, 1871, p. 518).

No locality was given for the single valve recorded by Sowerby (1889) under the name *attenuata*, but probably it came from the same source as the specimen(s) recorded by Stow (1871) and Schwarz (1910).

The exact locality in the Great Berg River is not recorded; the donor resided at Hopefield, on the Zout River, a tributary of the Great Berg River; but the specimen is more likely to have come from the estuary of the latter debouching into St. Helena Bay, where there are extensive mud flats and sand banks.

The specimen is bleached, but does not appear to be fossilized as are the shells from the Little Brak River deposit.

* As spelt by Woodward. Probably the same as l'amiral Cécille, referred to by Dautzenberg (1927, p. 346). I have not been able to trace the paper by Forbes from which Woodward quoted.

Woodward said that *natalensis* was very like *aldrovandi*; and in 1962 I provisionally retained the name. But in fact there seems to be considerable resemblance between the so-called species, both fossil and living, of *Panopea*. Are there any clear-cut characters, apart from minor and inconstant differences in shape due to growth changes, which will serve to differentiate these so-called species?

Externally the South African specimens agree with Nicklès's figure of *aldrovandi*; and with Chenu's figures (1862) of *australis* and *faujasi*.

The recent discovery of specimens in South West Africa bridges the gap in the distribution of *Panopea* between southern Angola and Hopefield (Cape); and raises the expectation that specimens will be found in the gap between the former and Dakar.

For the above reasons I adopt Ménard's name for the South African specimens instead of Woodward's inappropriate and misleading name.

Fam. **Aloididae**

Aloidis Megerle 1811 replaces *Corbula* (Brug.) Lamarck 1799, *nom. preocc.* Röding 1798.

Aloidis valdiviae (Jaeckel)

Corbula rugifera A. Adams MS. in Cuming collection; Smith, 1903a, p. 99, pl. 15, figs. 9, 10 (*nom. preocc.* H. Adams).
Corbula valdiviae Jaeckel, 1931, p. 241, pl. 9(4), fig. 117.
Corbula tahitensis (*non* Lam.), Braga, 1952, p. 117.

Inequivalve, oblong, a ridge from umbo to the more or less sharply angulate postero-inferior corner. Strong and rather sharp concentric lirae, which posteriorly to the ridge are obliquely wrinkled (Smith; blätterig, Jaeckel); anteriorly and medianly fine radial striae in the sulci between the lirae, extending up the dorsal slope of the lirae to their crest, but not so far up on the ventral slope. No pallial sinus. The tooth (anterior) in the right valve much stronger than the tooth (posterior) in the left valve.

Length 15·5, alt. 9 mm. (S. Afr. Mus.); 13 × 8 × 5·5 mm. (Smith).

Umkomaas, Natal (Smith); Tongaat and Richard's Bay (S. Afr. Mus.); Inhambane (Braga).

Off Tugela River (Natal), 47 fathoms, 2 valves; off Umkomaas, 40 fathoms, 3 valves; off Hood Point (East London), 49 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Distribution. Off Dar-es-Salaam, 50 metres (Jaeckel).

Remarks. Smith made no mention of the radial striations in the sulci, but they are very distinct in the P.F. specimens, and can be faintly traced on beach-worn valves.

The identity of *valdivia* with Smith's *rugifera* is clear from Jaeckel's description and figure. Jaeckel said the species was similar to the Red Sea fossil *C. acutangula* Issel.

Comparison should also be made with *A. socialis* (Martin) (Cox, 1927,

p. 60, pl. 9, figs. 5 *a*, *b*; Nardini, 1937, p. 264, pl. 18(12), figs. 9, 10). Cox made no mention of radial striae. Nardini distinguished *socialis* from *acutangula*.

Melvill & Standen (1906, p. 843) record a *Corbula rugifera H.* Adams; presumably therefore *rugifera* Smith is preoccupied and must give place to *valdiviae*.

Aloidis tunicata (Hinds)

Corbula tunicata Hinds, 1843, p. 55; 1844, p. 68, pl. 20, figs. 4, 5.
Corbula cuneata Hinds, 1843, p. 56; 1844, p. 68, pl. 20, fig. 6.
Aloidis tunicata (Hinds), Prashad, 1932 p. 310.

Agulhas Bank, 70 fathoms (Hinds). For *tunicata* Hinds gave also Straits of Macassar; and Sowerby (1892, p. 55) said both species were common in the China sea. Neither the *Pieter Faure* nor the *Valdivia* obtained any specimens on the Agulhas Bank.

Both species are posteriorly rostrate; and it seems probable that *cuneata*, figured as being 14 × 11 mm., is only a younger shell of *tunicata*, figured as being 26 × 19 mm., though neither Smith (1885) nor Prashad suggested this.

Aloidis persica (Smith)

Corbula persica Smith, 1906a, p. 262.

Very inequivalve, right valve inflated, umbonate, with *c.* 28 strong rounded concentric lirae, intervals narrow; left valve smaller and flatter, fitting within the right valve, with concentric growth-lines only. No pallial sinus. The tooth (anterior) in right valve stronger than that (posterior) in the left valve.

White, with yellowish-brown periostracum, which is thicker on the left valve and overlaps the margin.

Right valve: length 6·75, alt. (overall) 6·75, internal (excl. umbonal projection) alt. 4·5 mm.; left valve length 5·5, alt. 4 mm.

Off East London, 36–42 fathoms, one living (S. Afr. Mus. A9555, P.F.).

Distribution. Persian Gulf, 47 fathoms (Smith); Gulf of Oman, 156 fathoms (Melvill & Standen).

Remarks. Identified by Tomlin as *persica*. Agrees also with Jaeckel's figure of *andamanica* (Smith). The latter (Smith, 1906a, p. 263) from the Andaman Islands, 100 fathoms, and from off Dar-es-Salaam 50 metres (Jaeckel, 1931, p. 242, pl. 9(4), fig. 120) (right and left valves), is so closely similar to *persica* as to be probably synonymous.

Smith stated that the left valve had a few radiating lirae; in the present specimen they seem to be absent, but except near the umbo the shell is concealed by the thick adherent periostracum.

Fam. **Myidae**

In Bartsch's (1915, p. 251) list of species 'reported from South Africa' are included *Sphenia decurtata* A. Ad., *mindorensis* (Ad. & Rve.), and *philippinarum* A. Ad. I have not discovered who reported these species from South Africa. They are not in the 'Official list' (Sowerby, Smith, Tomlin).

Cryptomya philippinarum (A. Ad.)

Fig. 33 *b*

Sphaenia philippinarum A. Adams, 1851, p. 89, pl. 10, figs. 7–9.
Cryptomya philippinarum (A. Ad.), H. & A. Adams, 1855/56, p. 358, pl. 95, figs. 5, 5*a*, *b*.

Posterior two-thirds (except postero-dorsally) with fine radiating riblets, anterior third with growth-lines only. Ligament pit in left valve sliding under the hinge in right valve.

One left valve 8·25 × 5 mm., and a broken larger right valve probably *c.* 16–17 mm. when unbroken.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

Distribution. Philippine Islands.

Remarks. The external sculpture corresponds with fig. 5*b*, and the original description which said 'posterior side striated'. The shape is more like that of figure 5, but is not so high, and with a less curved ventral margin (figs. 5 and 5*a*, *b* differ in shape). In *decurtata* the whole shell would seem, from the description, to be radiately striated. *Mya mindorensis* (Ad. & Rve. 1848, p. 82, pl. 23, fig. 13) has no sculpture.

Fam. **Gastrochaenidae**

Lamy 1925, pp. 284–319.

Gastrochaena cf. *dubia* (Pennant)

[Cf.] *Rocellaria dubia* (Penn.), H. & A. Adams, 1855/56, p. 336, pl. 91, figs. 2–2*c*.
Gastrochaena sp. Bartsch, 1915, p. 210; Barnard, 1962b, p. 187.
Gastrochaena ? *retzi* Turton, 1932, p. 258.
Gastrochaena cf. *ruppellii* Check-list Mollusca, False Bay, Mem. Conch. Soc. S. Afr., 1960, i, p. 15.

Length up to 16 mm., alt. at umbo 4, greatest alt. (posteriorly) 7 mm. Umbo near anterior end; dorso-anterior corner rectangular. Sculptured with lines of growth only, fine but somewhat irregular in strength. Hinge-line below umbo incrassate, forming a small projecting tooth.

Fossil: Pleistocene, limestone deposit, mouth of Klein River, Stanford (S. Afr. Mus.).

False Bay (S. Afr. Mus.); also False Bay, 9–14 fathoms (S. Afr. Mus. P.F. coll.); Still Bay (S. Afr. Mus. coll. Muir); also Kalk Bay harbour (False Bay) (U.C.T.).

Port Alfred (Bartsch, Turton).

Remarks. This species is not *cuneiformis*, and certainly not *retzi* (= *Spengleria mytiloides*). It might, however, be the European and Mediterranean *dubia* (Pennant). I have no material for comparison.

The tubes of the fossil examples are about 23 mm. long (probably 25 mm. when unbroken), greatest diameter about 9, and at the aperture 5 mm. They appear to be simple tubes without extraneous objects, lining *c.* 0·5 mm. thick, slightly thicker near posterior end where there appears to be a slight constriction of the lumen, as if a septum had once been present. It is impossible to say

whether the tubes lay free in soft sand, or whether the animals had bored into the consolidated sand-(lime-)stone.

Gastrochaena cuneiformis Spengler

Gastrochaena cuneiformis Speng., Chenu, 1862, fig. 73; Lamy, 1925, p. 295 (references); Dautzenberg, 1929, p. 618.
Gastrochaena cuneiformis var. *ruppellii* Lamy, 1925, p. 295.
Gastrochaena lamellosa Smith, 1885, p. 28, pl. 7, figs. 2, 2*a*, *b*.
Gastrochaena dubia (*non* Pennant), Macnae & Kalk, 1958, pp. 37, 92, 129.

Anterior end viewed laterally acuminate, viewed dorsally almost a right angle, posterior end rounded, umbo at about $\frac{1}{5}$ length from anterior end, growth-lines regular, raised, lamellate. Length 25 mm.

Inhaca Island, Delagoa Bay (U.W.).

Distribution. Red Sea, Mauritius, Bourbon, Indo-Pacific.

Fistulana sp.

Fig. 34

Cf. *F. agglutinans* Desh., 1855, p. 330; Lamy, 1925, p. 318.

One specimen collected by U.W. at Inhaca Island, Delagoa Bay.

Tube composed of agglutinated sandgrains and incorporating broken pieces of mollusc and barnacle shells. There is a hint of transverse segmentation. Length 23 mm. Aperture oval, perpendicular to the plane of the tube as here drawn, with a slight keel on each side incompletely dividing the lumen into two canals; an internal septum at *c.* 5–6 mm. from the end of the tube, with an oval perforation.

Shell 14–15 mm. long, bluntly rounded anteriorly, umbo near anterior end, a very feeble ridge from umbo to the rounded-subtruncate posterior margin, sculpture of growth-lines only.

A commensal flat-worm (Trematode ?) was found in the tube.

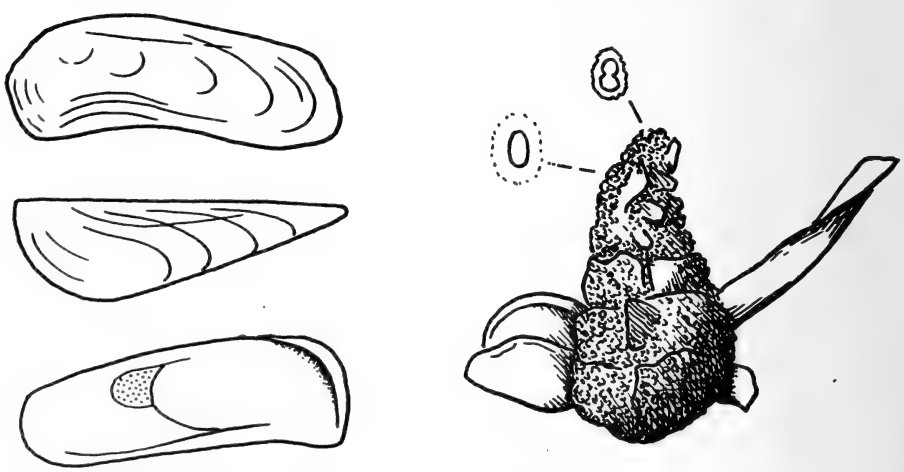


FIG. 34. *Fistulana* sp., Delagoa Bay. Tube, with sections at aperture and internal septum near aperture; lateral, dorsal, and internal views of left valve.

Fam. **Pholadidae**

Heppell, 1963, p. 33 (diagrams of shell and muscle-scars; key to British species).

Pholas dactylus Linn.

Pholas dactylus Linn. Sowerby, 1849, p. 485, pl. 102, figs. 10, 11, and pl. 105, fig. 45 (dwarf and distorted); 1892, p. 54; Turton, 1932, p. 258, pl. 70, no. 1830.
Pholas jordani van Hoepen, 1941, p. 171, pl. 9, figs. 3–7, pl. 10, figs. 1, 2.

Postero-dorsal and ventral margins gently converging posteriorly; hind end rounded. Prickles at intersections of the radial and concentric lirae squamose, diminishing slightly in size towards the anterior groove; dorsal half of groove with growth-lines only. Prickly concentric lirae farther apart in juveniles than in adults (cf. van Hoepen, pl. 9, fig. 7).

Up to length 117, alt. 40 mm. (van Hoepen, specimen from Port Alfred).

Fossil: Pleistocene, Port Elizabeth (van Hoepen).

Port Elizabeth (Sowerby); East London, Port Alfred, Algoa Bay, Jeffreys Bay, Great Brak River (Mossel Bay) (van Hoepen).

Strandfontein and Gordon's Bay (False Bay), Still Bay, Knysna (S. Afr. Mus.).

Distribution. Europe.

Remarks. The long description of *jordani* discloses no features separating it from *dactylus*. Van Hoepen made an *ex cathedra* statement that the South African shells were not the same as those figured by Sowerby (1872) and other authors; but comparison with a figure is not always very conclusive. No differences were specified, except such slight differences as are attributable to individual variation.

In support of his contention that the South African *Pholas* is distinct from *dactylus* van Hoepen quoted a statement by Tomlin. A large 117 mm. long valve from Port Alfred (figured nat. size by van Hoepen, pl. 10, fig. 1) was apparently seen by Tomlin (van Hoepen, p. 174). As quoted by van Hoepen (p. 174) Tomlin is alleged to have said: 'Not at all the same as our British *dactylus*. I have always expected that Bartsch's *alfredensis* would occur very much larger than he described it. *This is evidently the same species* [ital. mine]'. Tomlin would not have regarded a shell with umbonal partitions (*Pholas*) as the adult of a species without such partitions (*Barnea*); of course *alfredensis* is not the same as *dactylus*. But van Hoepen seems to have misconstrued Tomlin, and casuistically seized upon Tomlin's words 'not at all the same as . . . *dactylus*' as justification for his *jordani* n.sp.

I have compared South African shells in South African Museum with a series of British *dactylus*, and can find no specific differences.

The number and proximity of the radial and concentric lirae varies. In one valve (Gordon's Bay) the concentric lirae, including those on the younger part of the shell, are more numerous than usual; and the radial lirae in a space of 25–30 mm. below the umbo are very closely crowded together. The altitude

of the shell is at least 33 mm., but the hinder part is broken away; on the remaining portion the growth-lines are more broadly rounded than in normal shells.

Barnea alfredensis Bartsch

Pholas fragilis (*non* Sow.), Smith, 1904a, p. 25.
Barnea alfredensis Bartsch, 1915, p. 210, pl. 44, figs. 1, 2; Turton, 1932, p. 258; van Hoepen, 1941, p. 168, pl. 8, figs. 1–4.
Pholas alfredensis Bartsch, Jaeckel, 1931, p. 243.

The postero-dorsal and ventral margins converge posteriorly to the narrowly rounded hind end. There is some variation in the amount of convergence, but the hind end can always be described as acuminate. The raised prickles at intersections of the radial and concentric lirae are more or less squamose, i.e. hollowed ventrally; they diminish in size towards the anterior groove; dorsal half of the groove with growth-lines only. Accessory plate (protoplax) linguiform, 12 × (posterior width) 6·5 mm. on a shell 35 mm. long.

Length 46, alt. 17 mm.; also 43 × 17, and 41 × 17 mm. Bartsch: 41 × 12 mm.; van Hoepen 29 × 13, 32 × 13, 34 × 13·5 mm.

Port Alfred and Kowie (Smith, Bartsch, Turton, van Hoepen).

St. Francis Bay and Algoa Bay (Jaeckel).

Table Bay, Gordon's Bay (False Bay), Still Bay (S. Afr. Mus.).

Off Cape Seal, 30 fathoms, 2 living (S. Afr. Mus. P.F. coll.).

Remarks. Dr. Muir obtained one beach-worn valve at Still Bay; one shell was extracted from rock at Gordon's Bay; the Table Bay specimens were extracted from a block of indurated limestone at Woodstock. In the latter block the depth of the burrows was 55–60 mm.

Barnea manilensis (Phil.)

Pholas manilensis Philippi, 1847, p. 72.
Pholas manillensis [*sic*] Smith, 1891, p. 395.
Barnia [*sic*] *erythraea* Gray, 1851, p. 382.
Pholas erythraea (Gray), Sowerby in Reeve, 1872, sp. 48; Cox, 1927, p. 61, pl. 9, figs. 4*a*, 4*b*.
Barnea durbanensis van Hoepen, 1941, p. 169, pl. 8, figs. 5–8, pl. 9, figs. 1, 2.

Postero-dorsal and ventral margins converging posteriorly, hind end narrowly rounded, acuminate. The raised prickles at intersections of radial and concentric lirae are solid, conical granules, except in the anterior groove where they increase in size and form flat imbricate points; dorsal half of groove with growth-lines only.

Length 78, alt. 24 mm. Van Hoepen: 78 × 26 and 89 × 25 mm.

Durban and St. Lucia Bay (van Hoepen). Also Algoa Bay (58 × 25 mm.) (van Hoepen).

St. Lucia Bay (S. Afr. Mus.; also U.C.T.); Chinde, mouth of the Zambezi River (S. Afr. Mus. coll. K.H.B.).

Distribution. Philippines; Red Sea. Zanzibar (fossil).

Remarks. Dr. Rehder *in litt.* to Prof. Day considered the St. Lucia Bay shells to be probably *erythraea.* Smith considered the latter a synonym of *manillensis* [*sic*].

Barnea truncata (Say)

Pholas truncata Say, 1822, p. 321; Sowerby, 1849, p. 488, pl. 104, figs. 29, 30.
Barnea truncata (Say), Nicklès, 1950, p. 232, fig. 454.

Postero-dorsal and ventral margins scarcely converging posteriorly, subparallel; hind end broadly rounded, subtruncate. Prickles on intersections of radial and concentric lirae squamose, diminishing in size towards anterior groove; dorsal half of groove with growth-lines only.

Length 62, alt. 27 mm.

Table Bay (S. Afr. Mus. coll. C. A. Fairbridge).

Distribution. West Africa from Senegal to Angola. East coast of North America.

Martesia striata (Linn.)

Martesia falcata (*non* Gray, *non* Wood), Sowerby, 1892, p. 54.
Martesia striata (Linn.), Lynge, 1909, p. 283 (references); Smith, 1910, p. 216; Turton, 1932, p. 258; van Hoepen, 1941, p. 175, pl. 8, figs. 9, 10, pl. 10, figs. 7–9; Nagabhushanam, 1958, p. 10, figs. 2*a*, *b*, and pl. 1, fig. 1.

Length 31, alt. (protoplax in situ) 15 mm. (U.C.T.: Durban). 42 × 16·4 mm. (Nagabhushanam).

Port Elizabeth (Sowerby); Tongaat (Natal), in seeds of *Barringtonia* (Smith); Durban and Port Alfred (van Hoepen); Durban Bay and Richards Bay (U.C.T.).

Delagoa Bay, in floating wood, living (S. Afr. Mus. coll. K.H.B.).

Bredasdorp coast, in lump of resin washed ashore (S. Afr. Mus.).

Distribution. Zanzibar, Dar-es-Salaam, Mozambique, Indo-Pacific. Also East coast of North and South America, West Indies, Europe, Mediterranean.

Fam. **Teredinidae**

The classic species *T. navalis* Linn. was recorded by Calman (1920) from Simonstown dockyard; but this material was later referred to another species (*robsoni*).

Hammersley-Heenan (1889, p. 313) gave an account of the ravages of 'Teredo navalis' in bridges over the Zwartkops River at Port Elizabeth.

For specific determination the pallets are essential, the shells of the different species being less well differentiated. Realization of the usefulness of the pallets in distinguishing species was a step forward in the taxonomy of the family, but there seems to be a danger of its leading modern investigators into excessive species-mongering.

Some species, e.g. *navalis*, are incubatory, retaining the larvae in the gill-pouches until the shelled stage; when liberated they swim actively around the wood in which the parent bores, and settle down almost immediately (Lebour, 1938).

Teredo robsoni Roch

Fig. 35 *a*, *b*

Teredo navalis (part, *non* Linn.), Calman, 1920, p. 292, fig. 1B.
Teredo robsoni Roch, 1931, p. 209, pl. 23; Moll & Roch, 1937, pp. 169, 178.

Stalk of the pallet passing gradually into blade, which is oblong, slightly constricted near the end, distally covered by brown cuticle enclosing a calcareous knob.

Simonstown (Calman; Moll & Roch).

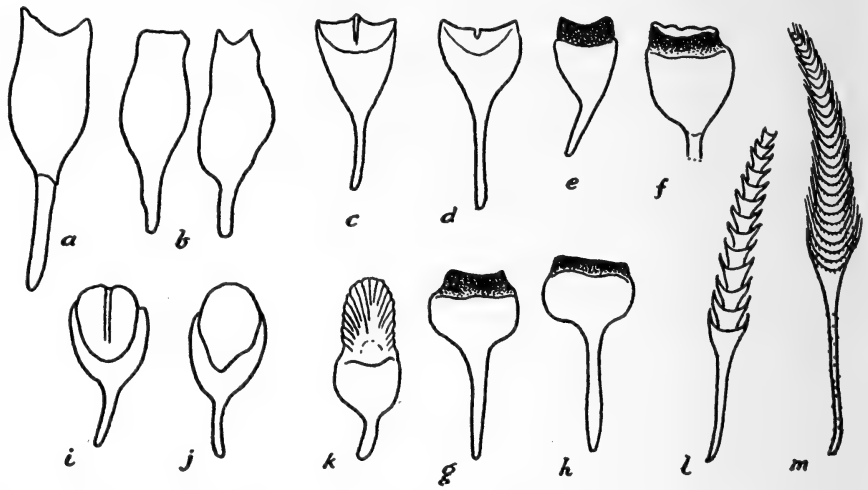


FIG. 35. Pallets of *Teredinidae*: *a*, *Teredo robsoni* Roch, after Calman. *b*, after Roch. *c*, *mannii* (Wright) after Wright, and Roch & Moll. *d*, after Calman.* *e*, *massa* (Jouss.) Lamy, after Roch & Moll. *f*, specimen from East London. *g*, *h*, specimens from Knysna. *i*, *petersi* Moll, after Moll. *j*, *alfredensis* v. Hoepen, after van Hoepen. *k*, *clava* Gmelin, after Roch & Moll. *l*. *Bankia stutchburyi* Leach, Sow. *m*, *capensis* (Calman).

* Does not apply to *mannii*; see text.

Remarks. Calman regarded *pedicellata* Quatrefages as possibly a synonym of *navalis*, and in the absence of a satisfactory definition of the former, recorded the South African examples as *navalis*.

Moll & Roch (1931) figured the pallets of *navalis*, *pedicellata*, and *robsoni*; *navalis* has the outer surface excavate distally, and no calcareous knob; the other two are not excavate but have a knob surrounded by cuticle. There seems no tangible difference between *pedicellata* and *robsoni*; and the former has been recorded from as far south as Lobito Bay, and St. Helena; in view of the northward-flowing Benguella current, might one perhaps say *robsoni* has been recorded as far north as Lobito Bay and St. Helena? (cf. Moll & Roch, 1937, p. 180). In other words, is *robsoni* only a synonym of *pedicellata*?

Nevertheless the occurrence of *navalis* in South Africa seems not unlikely. Some specimens from wharfpiles at Mossel Bay (U.C.T., 1957) have pallets shaped like those of *navalis*. The distal margin is exacavate between the two

lateral horns (fig. 35*a*, after Calman, 1920, fig. 1 B), and there is no calcareous knob (cf. definition in Bartsch, 1922, p. 17, and pl. 32, fig. 2). Other specimens from Port Elizabeth and East London are similar as regards the valves, but the pallets are missing.

Teredo mannii (Wright)

Fig. 35 *c*

Kuphus mannii Wright, 1866, p. 565, pl. 65, figs. 1–8.
Teredo mannii (Wright), Roch & Moll, 1929, p. 15, fig. 14; Moll & Roch, 1931, p. 210, fig. 26; 1937, pp. 164, 176, 185, 187, chart 1.
Teredo (*Kuphus*) *manni* [*sic*] (Wright), Roch, 1955, p. 126, fig. 1.
[*Non*] *Teredo mannii* Calman, 1920, p. 395, figs. 2, 3; Nagabhushanam, 1958, fig. 1 *i* = *Dicyathifer caroli* Iredale, 1936.

Blade of the pallet triangular, distally excavate on outer side, divided by a median rib which projects more or less beyond the distal margin. Calman's (1920, fig. 2) and Nagabhushanam's (1955, fig. 1 *i*) specimens have been referred to a different species.

Mozambique, Beira, Tongaland (northern Zululand) (Moll & Roch, 1937).

Distribution. East Africa, Querimba Islands, Comoro Islands and Madagascar, Réunion, East Indies, Australia.

Teredo massa (Jouss.) Lamy

Fig. 35 *e–h*

Teredo massa Jousseaume, 1923, p. 176, figs.; Roch & Moll, 1929, p. 14, fig. 13; Moll & Roch, 1931, p. 210, fig. 23; 1937, pp. 165, 176, 183, 184, 185, 187, chart 1.

Pallet with a deep cup-shaped excavation, distally with projecting cuticle. Durban (Moll & Roch, 1937).

Distribution. Aden, Erythraea; Madagascar.

Remarks. Some specimens in South African Museum from Knysna (coll. K.H.B. 1938) and East London (fig. 35 *f*) appear to be nearest to this species in the shape of the pallets. In the Knysna examples (fig. 35 *g*, *h*) the blade of the pallet is broader than long, and the stalk long and slender.

The Knysna specimens were incubatory.

Teredo petersi Moll

Fig. 35 *i*

Teredo petersi Moll, 1929, p. 6, pl. 1, fig. 3; Thiele, 1935, fig. 855; Moll & Roch, 1937, pp. 172, 176, 185, chart 1.
[?] *Teredo gregoryi* Dall, Bartsch, Rehder, 1938, p. 212, pl. 55, figs. 1–5.

Pallet 'finger-nail' shaped, the nail portion with a median groove on one side and a ridge on the reverse side.

Querimba Island, Portuguese East Africa (*petersi*). ? Hawaii (*gregoryi*).

Remarks. The description of the shell of *alfredensis* van Hoepen (1941, p. 176, pl. 10, figs. 3–6) discloses no specific characters strong enough to justify a n.sp.

The pallet (fig. 35 *j*), however, belongs to the group of species with 'finger-nail' shaped pallets, viz. *malleolus*, *gazellae*, *diederichseni*, and *petersi* (figures in Roch & Moll, 1929), *thomsonii* Tryon (figure in Bartsch, 1922, pl. 34, fig. 4) and *gregoryi* (loc. cit., *supra*).

Another species with comparable pallets, without median groove on the nail-like portion, is *spärcki* Roch (1922, no. 13, p. 15, pl. 2, fig. 4) from the Philippines.

The Port Alfred pallet shows no median groove on the outside surface of the nail-like portion, thus differing from *petersi*. Nair, however, figured (1954, fig. 7*c*) a Madras example of the Hawaiian *gregoryi* without a median groove.

Teredo clava Gmelin

Fig. 35 *k*

Teredo (*Hyperotus*) *gregata* (*non* Lam.), Sowerby, 1892, p. 54.
Uperotis clava (Gmelin), Smith, 1910, p. 217.
Teredo clava Gmelin, Roch & Moll, 1929, p. 8, fig. 9; Moll & Roch, 1937, pp. 172, 176, 186, 187, charts 1 and 3; Nair, 1956, p. 407, figs. 8 *a–c*.

Shell short (antero-posteriorly), middle part elongate (dorso-ventrally), auricle narrow. Pallet thick, distal portion of blade with radiating riblets.

Port Elizabeth (Sowerby: 'S. Africa'); Port St. Johns, Port Grosvenor (Moll & Roch); Tongaat (Natal) (Smith); Tongaland (northern Zululand) (Moll & Roch).

Distribution. Mauritius, Ceylon, India, East Indies, Australia.

Remarks. Lives in floating seeds of the mangrove *Xylocarpus granatum* (= *Carapa moluccensis*). Smith recorded the Tongaat specimen from the seeds of *Barringtonia*. Moll & Roch's chart 3 shows the coinciding distribution of the *Teredo* and *Xylocarpus*, the South African records being due to drifting in the Mozambique current.

The seeds of *Xylocarpus* and *Barringtonia* have been found washed ashore as far west as Still Bay and the coast of the Riversdale Division (Muir, 1937, pp. 26, 27, 44, 75).

Teredo ancilla n.sp.

Fig. 36

Shell narrow (antero-posteriorly). Anterior part with *c*. 30 rasping ridges. Median part consisting of the anterior area only; ends of the ridges on the posterior margin forming an irregular series of small lobules, which become stronger ventrally. No middle area with groove. A smooth and very narrow flange seems to represent the posterior part, expanding dorsally into the auricle; no line of junction demarcating the auricle. Internally, the anterior edge of anterior part and median part thickened. Anterior and median parts dorsally inflexed to form a smooth ledge, from which the blade depends; in side view the ridged and smooth areas meet in a sharp keel. Dorso-ventrally 13 mm., antero-posteriorly (fig. 36 *b*) 8 mm.

Pallet club-shaped, total length 11 mm., stalk 7 mm.; club broader than long, 7 × 4 mm., externally slightly hollowed, internally slightly biconcave with feeble median rib; distal margin with slight median projection. Brownish.

Animal (as preserved slightly curved) *c.* 40 × (anteriorly) 12, (posteriorly) 10 mm. Dirty white. The mantle collar in front conceals the auricle and narrow flange-like posterior part of the shell. Ventrally an elongate oval grey area

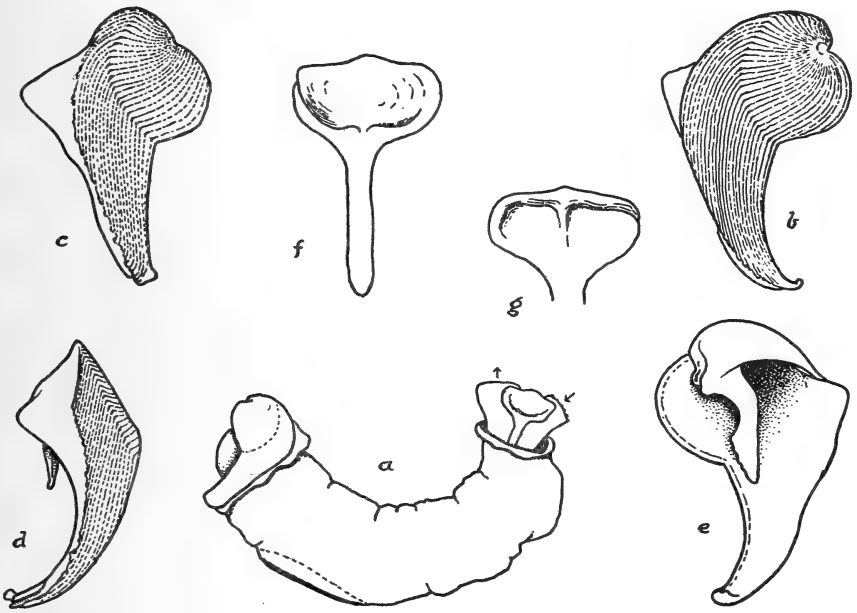


FIG. 36. *Teredo ancilla* n.sp.

FIG. 36. *Teredo ancilla* n.sp. *a*, animal (ridges on the valve not shown). *b*, *c*, *d*, three external views of valve. *e*, internal view. *f*, *g*, external and internal views of pallet.

where the mantle is very thin, with the gonads and the black intestine showing through. Inhalent and exhalent siphons separate throughout their length, the former with a few inconspicuous, but probably extensible, papillae around its opening.

Umlalazi estuary, Zululand, from a log in mangrove swamp, one specimen (U.C.T.).

Remarks. Compared with most species of Teredo this specimen has a short and stout body, at least as preserved. It is soft and pliable, but the gills in the hinder half of the body are crumpled. Thus there seems to have been a certain amount of contraction in preservation, and perhaps a quarter of its present length could be added to give its length when extended.

The pallets somewhat resemble those of *T. mannii* and *Bactronophorus thoracites*, but without the distal protuberance of the latter. The club, however, is broader relatively to its length.

The valves are remarkable for the reduction in width (i.e. in the axis of the animal) of the median part, involving the suppression of the middle area with its usual groove. In the literature available to me, two illustrations appear to represent an intermediate stage in reduction of the median part: Wright's (1866) pl. 64, figs. 11, 12, of 'Calobates' *thoracites*, and Nair's (1956) figs. 8 *a*, *b* of *T. clava*. Further, Moll & Roch (1931*b*, pl. 24, fig. 24 right) have given a figure (seemingly a retouched photograph) of the front end of the animal of *T. arenaria*, which shows the right valve and the mantle collar resembling very closely the present specimen.

T. (*Kuphus*) *arenaria* (Lam.) is a sand-dwelling species with a characteristic tube (Thiele, 1934, p. 935). Pallets attributable to this species are only known from a specimen consisting of the posterior (siphonal) end (50 cm. × 5 cm.) (Moll & Roch, 1931*a*, p. 15; and 1931*b*, p. 210, pl. 24, fig. 24 left).

As regards the *right*-hand figure in this last reference, Moll & Roch made no mention of a specimen of the anterior end with the valves, and gave no explanation of the inclusion of a photograph of such a specimen in figure 24. In 1931*c* (p. 17) they merely repeat that only the siphonal end is known. The latter is in the British Museum, and presumably the anterior end is also there. Thiele (1934, p. 935) said the valves of *arenaria* were not adequately known.

Sivickis (1928) described and figured the valves of *Teredo dubia*, a species related to *arenaria*, and like the latter a sand-dweller. When young the valves were described as broad like those of a 'normal' Teredo; but in the adult they become eroded and narrow, and have the same appearance as the right-hand figure in Moll & Roch (1931*a*). The pallets of *dubia* are similar to those of *arenaria*, and the former may prove to be a synonym of the latter.

Although the valves of the present specimen appear to resemble those of *dubia* and also those presumed to belong to *arenaria*, the pallets are different, and the animal is a wood-borer. The institution of a n.sp. seems advisable (from the resemblance of the pallet to a dust-pan: *ancilla*, a housemaid).

T. radicis Moll (in: Moll & Roch., 1937, p. 182), living in the roots of mangroves at East London and ? East Africa, was very briefly described. Pallets semicircular, distal margin straight or slightly concave, stalk awl-shaped; valves with anterior part large and rhomboidal, anterior middle area narrow, rasping-ridges numerous (*c.* 100). The description of the pallets might possibly apply to the present specimen, but not that of the valves.

Bankia stutchburyi Leach, Sow.

Fig. 35 *l*

Xylotrya stutchburyi (Leach, Sow.), Smith, 1910, p. 216, pl. 8, fig. 8–8*b*.
Bankia stutchburyi Leach, Sow., Roch & Moll, 1929, p. 19; Moll & Roch, 1931, p. 213, pl. 24 (useless photo).
[?] *Teredo stutchburyi* (Leach, Sow.), Turton, 1932, p. 259, pl. 70, no. 1833.

Pallet composed of 12–14 clearly separated triangular segments with cuticular spines at the distal corners. Length and alt. of shell 6 mm., pallet *c.* 10–12 mm.

Port Elizabeth and Durban (Smith).

Off Cape St. Blaize, 30 fathoms, in waterlogged timber (S. Afr. Mus. P.F. coll.).

In planks dredged off Still Bay (34° 40′ S., 21° 35′ E.), 70–77 metres (U.C.T.).

Distribution. East Indies, Christmas Island.

Remarks. Better South African material is required. *B. indica* Nair, 1954 (p. 393, fig. 3) seems closely allied and may possibly be a synonym.

Bankia capensis (Calman)

Fig. 35 *m*

Xylotrya capensis Calman, 1920, p. 402, figs. 9–11.
Bankia capensis (Calman), Roch & Moll, 1929, p. 21, fig. 20; Jaeckel, 1931, p. 243; Moll & Roch, 1931, p. 215, fig. 41; 1937, pp. 176, 180, chart 1.

Pallet feather-like, composed of a large number of short and broad crescentic segments, the lateral apices produced as fine filaments, stalk granulose. Length of valve 15, alt. 14 mm.; pallet 30 mm. (S. Afr. Mus.); Calman: 12·5 × 11·5, pallet 46 mm.

Simonstown (Calman). Lüderitzbucht and Swakopmund (Roch & Moll); Plettenberg Bay (Jaeckel). False Bay (S. Afr. Mus. coll. Mrs. Connolly).

St. Helena Bay, boring into Eucalyptus piles (S. Afr. Mus.).

Remarks. Compare the Pacific Ocean *B. setacea* Tryon (pallet figured in Bartsch, 1922, pls. 4, 5, and 30, fig. 3; and in Roch, 1931, fig. 11).

Fam. **Lyonsiidae**

Bartsch recorded the genus *Lyonsia* from South Africa in 1915, and Turton described the species *densecostata* (1932, p. 229, pl. 59, no. 1602) from Port Alfred.

Lyonsia formosa Jeffreys

Lyonsia formosa Jeffreys, 1881, p. 930, pl. 70, figs. 1, 1*a*.

The posterior half and the hinge of a very thin and delicate right valve appear to agree with the description and figure of this species.

Cape Point N. 86° E. 43 miles, 900–1000 fathoms, one valve (S. Afr. Mus. No. A3671. P.F. coll.).

Distribution. Atlantic, Canaries; Gulf of Mexico. 349–620 fathoms.

Fam. **Pandoridae**

Prashad (1932, p. 322) used *Calopodium* Bolten-Röding 1798 (Fam. *Calopodiidae*) because *Pandora* Hwass in Chemnitz 1798 was not used binominally, and is therefore inadmissible. Thiele (1934), however, retained the more familiar name *Pandora*.

Pandora dissimilis Sow.

Fig. 37 *a–d*

Pandora dissimilis Sowerby, 1894, p. 374; 1897, p. 21, pl. 6, fig. 33.

Nearly equivalve, but left valve slightly convex, right valve almost flat. Antero-dorsal margin may be slightly concave in young shell, but later becomes straight or slightly convex; postero-dorsal margin straight or very slightly convex (when not distorted), In young shells a very shallow groove from umbo to near postero-dorsal corner, less obvious in older shells. Left valve with an anterior and posterior lamellar lateral tooth; right valve with a very strong

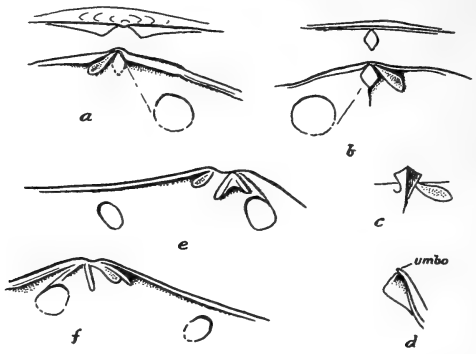


FIG. 37. *Pandora dissimilis* Sow. *a*, left valve hinge with dorsal view, diamond-shaped scar against which right cardinal tooth impinges. *b*, right valve hinge with dorsal view. *c*, *d*, ventral and posterior views of cardinal tooth in right valve. *e*, *f*, *P. similis* Sow. hinges of left and right valves.

cardinal tooth, lamellate where attached to the shell, but expanding into a diamond-shaped apex which leaves a similar-shaped scar where it impinges against the left valve. Adductor muscle scars not sunken, though the antero-dorsal margin of the anterior adductor may be slightly impressed.

Length 45, alt. 25 mm. (Sowerby); 40 × 24 mm. (S. Afr. Mus.); smallest seen: 15 × 8 (at vertical from umbo) or 9 mm. (greatest altitude).

Cape Town (Sowerby); Table Bay (S. Afr. Mus.).

False Bay, 23 fathoms, one living (S. Afr. Mus. P.F. coll.).

False Bay (34° 19′ S., 18° 30′ E.), 52 metres, living (U.C.T.).

Cotype in South African Museum. Reg. No. 5622.

Remarks. Varies somewhat in shape, e.g. 30 × 19 and 30 × 14 mm. (greatest alt.); and sometimes distorted, e.g. 35 × (vertical from umbo) 18, (greatest alt.) 23 mm., and 32 × 9 and 14 mm.

Pandora similis Sow.

Fig. 37 *e*, *f*

Pandora similis Sowerby, 1897, p. 29.

In shape resembling *inaequivalvis* (Linn.). Inequivalve, left valve convex, right smaller (dorso-ventrally), flat or sometimes slightly subconcave. Antero-dorsal margin sloping to rounded anterior end; postero-dorsal margin concave. Two low ridges from umbo to subrostrate hind end following the curve of the dorsal margin; covered distally with crinkly periostracum. Left valve with long ridge-like posterior lateral tooth, and a feeble anterior lateral, a Λ-shaped cardinal tooth; right valve with short posterior lateral ridge, a slender anterior ridge, and 2 diverging cardinals. Adductor muscle scars sunken, the anterior more so than the posterior.

Pinkish when alive. Length 23, alt. 13 mm.

Durban (Sowerby; also S. Afr. Mus.).

Off Morewood Cove (Natal), 27 fathoms, one living; off Umvoti River, 27 fathoms, 2 living; off Umhloti River, 25 fathoms, 15 living, numerous valves (S. Afr. Mus. P.F. coll.).

Cotypes from Bluff Channel, Durban (don. J. H. Ponsonby) in South African Museum (A29743).

Fam. **Thraciidae**

The British *Thracia villosiuscula*, as well as *capensis*, are recorded from Port Elizabeth. Turton thought he found the latter at Port Alfred, and also *distorta*, another British species. He added *kowiensis*, described from juvenile shells.

Thracia capensis Sow.

Fig. 38 *a*

Thracia capensis Sowerby, 1889b, p. 156, pl. 3, fig. 4; 1892, p. 55, pl. 2, fig. 60; ? Turton, 1932, p. 229.

Thin, equivalve, but right valve a little more convex than the left, inequilateral, oblong-oval, posteriorly truncate and slightly gaping, umbonal ridge very faint, growth-lines only. Outer ligament short, inner ligament pit small, obliquely triangular, at anterior end of the thickened dorsal margin. Pallial sinus as deep as broad, extending to vertical from umbo. White.

Length 41, alt. 25 mm. Sowerby's description gave 15 × 12 mm., his 1889 figure is 16 × 11, and his 1892 figure is 16 × 10 mm.

Port Elizabeth (Sowerby). ? Port Alfred (Turton).

Gordon's Bay (False Bay) living (Dr. H. Ackert, 1960, 1962); Smitswinkel Bay (False Bay) (Mrs. Connolly 1962).

Remarks. Corresponds with Sowerby's description, but is a trifle more inequilateral than his figures; cf. Turton's remark (1932, pp. 229, 230).

Thracia alfredensis (Bartsch)

Ungulina alfredensis Bartsch, 1915, p. 196, pl. 43, figs. 1, 2, pl. 54, figs. 1, 10; Turton, 1932, p. 236, pl. 62, no. 1651 (2 figs.); Barnard, 1962b, p. 193.

The shape varies, as might be expected in a species living in rock crevices: length 25, alt. 17, thickness 11 mm., also 21 × 19, 21 × 16 (Langebaan,

U.C.T.); 18 × 12·5 (Bartsch); 14 × 14 (Turton); 12 × 9·5, 10 × 5 × 8, 11 × 9·5, and 9 × 9 mm. (S. Afr. Mus.). The earlier growth-lines on the last mentioned subcircular shell are oval. The cup containing the cartilaginous pad is conspicuously prominent.

The shagreened ('microphlyctous') surface is seen only in unworn examples.

Fossil: Pleistocene, Sedgefield near Knysna (A. R. H. Martin).

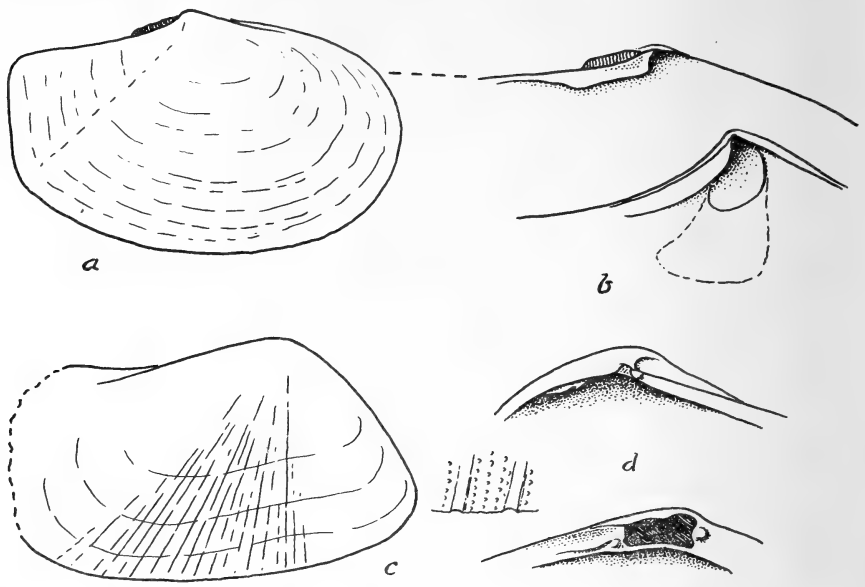


FIG. 38. *a*, *Thracia capensis* Sow., with hinge of left valve. *b*, *Thraciopsis agulhasensis* n.sp., hinge of left valve. *c*, *Lyonsiella agulhasensis* Jaeckel, right valve with sculpture further enlarged, the radial striae very faint. *d*, hinge, with ventral view to show ligament pit.

Port Alfred (Bartsch, Turton); Sea Point, Cape Town (S. Afr. Mus. coll. K.H.B.); Still Bay (S. Afr. Mus. coll. Mrs. Connolly).

False Bay, 11 fathoms (S. Afr. Mus. P.F. coll.).

Langebaan (Saldanha Bay); False Bay; 34° 51′ S., 19° 55′ E., 22 metres (U.C.T.).

Remarks. This species is transferred to the present genus because it does not agree, either in shell or animal characters, with *Ungulina*. Bartsch had only beach-worn material, but even so the hinge as figured (pl. 54, figs. 1, 10) is scarcely that of *Ungulina*. Presumably Bartsch's shells did not show the pallial sinus, although in the interior view (pl. 43, fig. 2) it can be traced—with a little imagination—as also in Turton's figure (pl. 62, no. 1651).

The animal definitely takes *alfredensis* out of *Ungulina*, and places it in *Thracia*. Ligament mainly internal, in a spoon-shaped process in each valve. Pallial sinus wide and shallow, more or less rectangular. Mantle with small anterior pedal opening, and a posterior opening. Siphons separate, apically

fringed. A single gill on each side, thick, pleated, with an oblique furrow separating the dorsal and ventral portions.

Thraciopsis agulhasensis n. sp.

Fig. 38 *b*

Thin, equivalve, inequilateral (umbo 4 mm. fron hind margin), oblong-oval, posteriorly truncate, surface smooth, with growth-lines only. Hinge in left valve without teeth, posterior dorsal margin slightly thickened; ligament internal, in an oval shallow pit, adnate to the shell but anterior edge just free, with ossicle forming a subtriangular scar. Pallial sinus as deep as broad, extending forwards to vertical from umbo. White, interior feebly nacreous, the ossicle scar distinctly nacreous.

Length 10·5, alt. 6 mm.

Mantle edges fused, with branchial and pedal openings. Foot (as preserved) large, triangular. Siphons separate, apically fringed, no eyes.

34° 59′ S., 22° 18′ E., 58 fathoms, one living (U.C.T.).

Remarks. The hinge excludes this species from *Thracia*. It is included, with some hesitation, in the Australian genus *Thraciopsis* Tate & May 1900 (*Alicia* Angas 1867, nom. preocc.). Angas (1867, p. 908, pl. 44, fig. 1) characterized the genus by having a more or less prominent posterior callus on the right valve fitting into a cavity on the left valve; ligament internal, perpendicularly below umbo, covered by a large triangular ossicle. He gave only a small figure of the hinge. Unfortunately the umbonal area of the present right valve is broken.

Fam. **Laternulidae** (**Anatinidae**)

Clistoconcha insignis Smith

Clistoconcha insignis Smith, 1910, p. 218, pl. 8, figs. 9–9*c*; Bartsch, 1915, p. 191; Turton, 1932, p. 230; Kühnelt, 1956, p. 31, fig. 8 (redrawn after Smith).
Clistoconcha costata Turton, 1932, p. 230, pl. 59, no. 1607.

Recorded from Tongaat (Natal) and Port Alfred. U.C.T. has taken it (6 mm. long) in False Bay, and also at 31° 41′ S., 29° 33′ E., 90 metres.

Turton's *costata* is doubtless a synonym, the ribs being due to its being wedged up against a ribbed shell, not to any inherent specific peculiarity.

Fam. **Verticordiidae**

Halicardia flexuosa (Verrill & Smith)

Halicordia [*sic*] *flexuosa* (Verrill & Smith), Tomlin, 1937, p. 23, fig. 1 (references); Barnard, 1963b, p. 450.

Tomlin recorded two specimens (one of them now deposited in British Museum) taken by the *Pieter Faure*. A third specimen, length and altitude 26 mm., has been obtained a little farther to the north-west of the P.F. locality, viz.: 33° 50′ S., 17° 21′ E., 600 fathoms (S. Afr. Mus. A9707 coll. F. H. Talbot, Aug. 1959).

Verticordia lamothei D. & F.

Fig. 39 *a*

Verticordia lamothei Dautzenberg & Fischer, 1897, p. 227, pl. 7, figs. 13–16; Dautzenberg, 1927, p. 347, pl. 9, figs. 15–18; Jaeckel, 1931, p. 245.

Subquadrangular, inflated, anterior margin concave. Radial ribs 21–23, whole surface (except lunule) minutely granulate, growth-lines traceable. Margin not (or not strongly) scalloped.

Length, alt., and thickness 10 mm.

35° 19′ S., 20° 12′ E., 126 metres; 35° 9′ S., 18° 33′ E., 564 metres (Jaeckel).

Off Cape St. Blaize, 125 fathoms, one living (S. Afr. Mus. A9562. P.F. coll.).

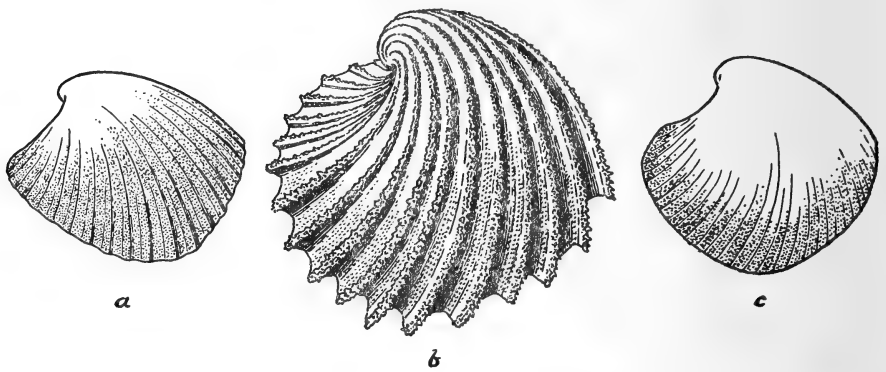


FIG. 39. Left valves of: *a*, *Verticordia lamothei* D. & F. *b*, *ericia* Hedley. *c*, *inornata* Jaeckel.

Distribution. Azores (Dautzenberg & Fischer). East coast of Africa (Jaeckel).

Remarks. Jaeckel seems to have been correct in identifying specimens from the southwest slope of the Agulhas Bank with the Atlantic *lamothei*. The present 5 mm. long specimen came from slightly farther east on the southern slope. Whether the East African specimens are identical is a matter for review.

Verticordia inornata Jaeckel

Fig. 39 *c*

Verticordia inornata Jaeckel, 1931, p. 245, pl. 10(5), figs. 124, 124*a*.

Subcircular ('schief herzförmig'), anterior margin concave. Very feeble radial riblets, *c.* 20 at 3 mm. alt., increasing to at least 30 in larger shells. Whole surface with extremely numerous and minute granules, sometimes somewhat pointed, arranged in radial lines. Margin entire.

Length 6·5, alt. 6 mm. (Jaeckel); 6 × 5·5 mm. (S. Afr. Mus.).

35° 26′ S., 20° 56′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres (Jaeckel).

Off Illovo (Natal), 27–30 fathoms, 2 valves; off Cape Morgan, 52 fathoms, one living, 6 valves; off Hood Point (East London), 49 fathoms, one valve;

Algoa Bay, 52 fathoms, one valve; off Cape St. Blaize, 125 fathoms, 2 valves (S. Afr. Mus. P.F. coll.).

Remarks. Although Jaeckel said that radial riblets were absent, the present specimens are undoubtedly identical with his species.

Verticordia ericia Hedley

Fig. 39 *b*

Verticordia ericia, Hedley, 1911, p. 96, pl. 17, figs. 1–3; Barnard, 1962a, p. 254; 1963c, p. 16.

Subcircular, inflated, umbones strongly curved forwards and downwards, lunule deeply impressed; anterior margin convex, whole margin (except hinge-line) deeply scalloped. Radial ribs 18–19, their crests covered with sharp prickly granules, no intermediary ribs; intervening grooves closely granulate, the granules more or less in radial lines, growth-lines not visible. Right valve with a strong knob-like cardinal tooth below the umbo (partly behind the lunule); left valve with the margin bordering the lunule slightly incrassate. Interior nacreous.

Length 8·5, alt. 8, thickness (one valve) 4 mm.

Off Cape Vidal (Zululand), 80–100 fathoms, 3 valves (one of them juv.) (S. Afr. Mus. No. 9564. P.F. coll.).

30° 40′ S., 50° 15′ E., 400 metres, one juv. valve and one broken (Fisheries Survey. *Africana II.* Station A1248.

Distribution. South Australia, 100 fathoms; New South Wales, 80 fathoms.

Remarks. There appears to be no character in these valves which is not in full agreement with Hedley's description and figures of the Australian species.

If Jaeckel (1931) was correct in identifying examples from off the East African coast as *lamothei*, the present valves cannot be conspecific, as one might perhaps have expected them to be. They differ from *lamothei* in having slightly fewer ribs, a more circular outline (anterior margin convex instead of concave), with conspicuously scalloped margin.

In the same characters *ericia* differs from the East Indies *crebrilirata* Prashad (1932, p. 324, pl. 7, figs. 19, 20), though there are several points of resemblance. Prashad's description of the hinge-teeth applies here also. *V. crebrilirata* has 25–26 ribs; the description does not mention any sculpture in the grooves.

Lyonsiella agulhasensis J. & T.

Fig. 38 *c*

Lyonsiella agulhasensis Jaeckel & Thiele, 1931, p. 250, pl. 10(5), fig. 133.

Shell thin, oblong-ovate, anterior margin declivous, antero-ventral corner somewhat angular; posteriorly somewhat enlarged, postero-dorsal margin straight, horizontal, posterior margin rounded. Concentric growth-lines not prominent, some of them more distinct anteriorly. Radiating lines or riblets scarcely raised above the surface, appearing chalky-white. Whole surface with

minute prickles arranged in radial rows, 3 or 4 between each pair of riblets. No teeth, an internal ligament pit, defined anteriorly by a tiny tubercle continued as a lamella, and posteriorly by another tiny tubercle on the hinge margin. Muscle scars and pallial line indistinct. Interior slightly nacreous.

Length 13, alt. 8·5 mm. Up to 14 × 10·5 mm. (Jaeckel).

34° 51′ S., 19° 37′ E., 80 metres; 35° 16′ S., 22° 26′ E., 155 metres (Jaeckel & Thiele).

Lion's Head (Table Mountain) N. 67° E. 25 miles, 131–136 fathoms, one right valve; off Cape Morgan, 77 fathoms, 3 valves; off Illovo River (Natal), 27–30 fathoms, one valve (S. Afr. Mus. Nos. A9559, A9560, A9561. P.F. coll.).

Remarks. The shape is somewhat variable and irregular. E.g. the three valves from Cape Morgan: rounded oval, 7 × 6 mm.; oblong (somewhat distorted) 8 × 4·5 mm.; oblong-oval, deeper posteriorly. 6·5 × 4·75 mm.

Fam. **Poromyidae**

No further examples of *P. curta* Sow. 1904 have been found in the *Pieter Faure* collection.

Poromya gilchristi Sow.

Poromya gilchristi Sowerby, 1904, p. 15, pl. 7, fig. 10.

Surface minutely 'punctured' (? abraded granules). 'Very slight radiating ridges towards the posterior side.'

Length 25·5, alt. 18·5, thickness (valves together) 13 mm.

Off Umtwalumi River (Natal), 50 fathoms, one (Sowerby, P.F. material).

Off Cape Natal (Durban), 54 fathoms, one broken valve; off Tugela River, 47 fathoms, 2 broken valves (S. Afr. Mus. P.F. coll.).

Type ? in British Museum.

Remarks. The Cape Natal valve (left) has slight traces of radial ribs over the whole shell, but more noticeable posteriorly. The periostracum has been almost completely worn off the larger Tugela valve (left), and radial ribs are not traceable. More material is desirable.

Poromya striata Sow.

Poromya striata Sowerby, 1904, p. 16, pl. 7, fig. 11.

Surface minutely granulate. Periostracum thin, brown, forming raised radial thread-like ribs.

Length 22, alt. 16·5, thickness (valves together) 11·5 mm.

Vasco da Gama (Cape Point) S. 75° E. 13 miles, 166 fathoms (Sowerby, P.F. material).

Cape Point E. 26 miles, 210 fathoms, one valve; Vasco da Gama (Cape Point) N. 10° E. 13 miles, 85 fathoms, one living, one valve; Cape Point N. 50° E. 18 miles, 180 fathoms, one living; Cape Hangklip N.N.E. 31 miles, 95 fathoms, one living; Cape Hangklip N.E. ¾ N. 28 miles, 100 fathoms, 3 living; Browne's Bank (approx. 36½° S., 21¼° E.), 80–100 fathoms, one valve; off

Nieca River (East London), 53 fathoms, one living; one valve (S. Afr. Mus. P.F. coll.).

Type ? in British Museum.

Remarks. The locality given in the original description is impossible. The bearing is correct, and places the locality off the *west coast of the Cape Peninsula.* The words 'False Bay' were inadvertently inserted (? by whom). Moreover there is no such depth as 166 fathoms in False Bay.

I feel certain that *striata* was founded on better specimens than *gilchristi*, and will eventually become a synonym of the latter. The radiating ribs being superficial periostracal ridges are liable to abrasion, as is seen in the broken Cape Natal and Tugela valves mentioned above.

Poromya granosissima Sow.

Poromya granosissima Sowerby, 1904, p. 16, pl. 7, fig. 12.

A slight but distinct umbonal ridge ('angle'). Surface minutely and closely granulate, the granules arranged in radial alternating series (more or less quincuncial), flat-topped and often slightly tabulate, circular on anterior and median parts but becoming transversely oval or oblong on posterior part. No raised periostracal ridges.

Length 9, alt. 8, thickness (valves together) 5·25 mm. (Sowerby); 11 × 10 × 7·5 mm. (S. Afr. Mus.).

Off Cape Natal (Durban), 54 fathoms (Sowerby, P.F. material).

Same locality, 2 living, several valves (topotypes); off Tongaat, 36 fathoms, 4 valves; off Umhloti River, 27 fathoms, 2 living, several valves; off Umkomaas, 40 fathoms, 14 valves; off Tugela River, 37 fathoms, 3 valves; off O'Neil Peak (Zululand), 90 fathoms, 3 valves (S. Afr. Mus. P.F. coll.).

29° 46′ S., 31° 17′ E., 60–70 fathoms, one living (U.C.T.).

Type ? in British Museum. Topotypes in South African Museum.

Remarks. Sowerby stated that this species was more closely and conspicuously granulated than the European *granulata* Nyst; he did not, however, compare it with the North Australian *australis* Smith 1885, which according to Smith is also more coarsely granulated than *granulata.*

The East Indies *pergranosa* Prashad 1932 is also very similar, and has an umbonal ridge which apparently is absent in *australis.*

From the east coast of Africa Jaeckel (1931) has described *sansibarica* and *orientalis*; these, however, do not seem to be so closely allied to the above-mentioned species.

Fam. **Cuspidariidae**

Cuspidaria gigantea Prashad 1932 appears to be *nom. preocc.* by Verrill 1884.

Cuspidaria capensis (Smith)

Neaera capensis Smith, 1885, p. 45, pl. 9, figs. 5, 5*a*, *b*.
Cuspidaria nasuta (*non* Adams), Sowerby, 1904, p. 18, pl. 7, fig. 4; Jaeckel, p. 254.

Pyriform, a concave depression defining the rostrum, which is not as long as the rest of the shell, surface smooth, growth-lines somewhat irregular in strength but not forming concentric lirae. A moderately elongate, thin lamellate posterior lateral tooth in right valve; ligament pit sloping posteriorly.

Length 15, alt. 8, thickness 5 mm. (Smith); 21 × 10 × 7·5 mm. (Sowerby); 27 × 13 × 9 mm. (Cotype, S. Afr. Mus.); 32 × 15 × 12 mm. (Cape St. Blaize, S. Afr. Mus.). The valve from Browne's Bank lacks the rostrum but has alt. 17 mm. Smallest example seen: 12·5 × 6 mm.

34° 4′ S., 18° 37′ E., 150 fathoms (Smith). Cape Point Lighthouse N. 2° E., 14 miles, 85 fathoms, 2 living (Type and cotype of *nasuta*) (Sowerby). P.F. material.

33° 41′ S., 18° 03′ E., 178 metres; 35° 9′ S., 18° 32′ E., 564 metres (Jaeckel).

Lion's Head S.E. ¼ E. 11 miles (outside Table Bay), 69 fathoms, 2 living; 34° 34′ S., 18° 22′ E., 100 fathoms, one valve; Cape Point N.W. ½ W. 4 miles, 50 fathoms, one valve; Vasco da Gama (Cape Point) N. 40° E. 13 miles, 120 fathoms, one valve; Cape Point N.E. × N. 8 miles, 85 fathoms, one living; Cape Point N.E. × E. ¾ E. 8 miles, 91 fathoms, 2 living; off Cape St. Blaize, 105 fathoms, one valve; Browne's Bank (approx. 36½° S., 21¼° E.), 200 fathoms, one valve (S. Afr. Mus. P.F. coll.).

31° 14′ S., 16° 36′ E., 272 metres (s.s. *Africana*, per U.C.T.).

Type and cotype of *nasuta* in South African Museum, Nos. 14819 and A4432.

Remarks. As the name *nasuta* had been used by A. Adams (1864) I had thought of renaming Sowerby's species 'pharos', it having been taken within sight of the Cape Point Lighthouse. On further consideration, however, the characters of the *Challenger* and *Pieter Faure* shells, as well as the localities, clearly indicated that they were conspecific.

A broken right valve was taken by P.F. in Buffels Bay (False Bay) in 35 fathoms, its occurrence there might possibly be due to insetting currents from off Cape Point.

Jaeckel recorded *nasuta* Sow. from outside Table Bay and on the south-western slope of the Agulhas Bank; he identified a specimen from New Amsterdam, 496 metres, with *capensis*, but noted minor differences between his damaged shell and Smith's description.

Cuspidaria optima Sow.

Cuspidaria optima Sowerby, 1904, p. 17, pl. 7, fig. 16.
Cuspidaria rara Jaeckel, 1931, p. 253, pl. 10(5), fig. 139 (= juv.).
Cuspidaria agulhasensis Jaeckel, 1931, p. 253, pl. 10(5), fig. 140 (= juv.).

Pyriform, a concave depression defining the rostrum, which is about ⅓–½ of the rest of the shell, concentrically lirate, the lirae slightly oblique to the growth-lines, but near the margin (in adult) they become feebler and more or less concurrent with the growth-lines. A moderately elongate thin lamellate posterior lateral tooth in right valve; ligament pit sloping slightly posteriorly.

32·25, length alt. 20·5, thickness (valves together) 14 mm. (Sowerby); 30 × 18 × 12 mm. (cotype, S. Afr. Mus.); 30 × 17, 35 × 17·5, and 36 × 18 mm. (S. Afr. Mus.).

Off Umtwalumi River (Natal), 50 fathoms (Sowerby, P.F. material).

Same locality, one living (cotype); off Tongaat, 36 fathoms, one living; off Umvoti River, 27 fathoms, one living, one valve; off Umhloti River, 25–40 fathoms, one living, 3 valves; off Cape Natal (Durban), 47–54 fathoms, 3 living, 8 valves; off Cape Morgan, 77 fathoms, one valve juv.; off Hood Point (East London), 49 fathoms, one valve juv.; off Kei River, 51 fathoms, one valve juv.; 34° 27′ S., 25° 42′ E., 256 fathoms, one valve juv.; St. Francis Bay, 24–34 fathoms, one valve; off Cape St. Blaize 51 fathoms, one living, 2 broken valves (S. Afr. Mus. P.F. coll.).

34° 51′ S., 23° 41′ E., 100 fathoms, one juv. (U.C.T.).

35° 9′ S., 18° 32′ E., 564 metres (*rara*); 35° 19′ S., 20° 12′ E., 126 metres (*agulhasensis*) (Jaeckel).

Type ? in British Museum; cotype in South African Museum, No. 14764.

Remarks. The specimen figured by Sowerby and the cotype both have a relatively short rostrum; that of the cotype appears to be undamaged. Other specimens, including some seen and named by Sowerby, have a relatively longer rostrum. The proportions therefore are variable.

C. rara (7·75 × 4·5 mm.) and *agulhasensis* (3·5 × 2·2 mm.) are clearly juveniles; similar examples, 3·5–5 mm. long, were found in the P.F. bottom-samples.

A fragment from off Cape Vidal (Zululand) 80–100 fathoms appears to be conspecific.

Cuspidaria macrorhynchus Smith

Cuspidaria macrorhynchus Smith, 1895, p. 12, pl. 2, figs. 5, 5*a*; 1897, Moll, pl. 3, figs. 5, 5*a*; Jaeckel, 1931, p. 255; Prashad, 1932, p. 328, pl. 9, fig. 17.

Rostrum approximately as long as rest of shell, surface smooth, with growth-lines only. A moderately long thin lamellate posterior lateral tooth in right valve; ligament pit inclined posteriorly.

Single valve, length 27, alt. 12·5 mm.; bivalve shell, 20 × 9 × 6 mm.

Off Cape Natal (Durban), 440 fathoms, one living, one valve (S. Afr. Mus. A9565. P.F. coll.).

Distribution. Arabian Sea (Smith); East Indies, 535 and 918 metres (Prashad); Zanzibar Channel and Dar-es-Salaam, from 1° 49′ N. to 6° 39′ S., 400–1134 metres (Jaeckel).

Remarks. The specimens correspond with Smith's figures; the shell figured by Prashad appears to have had the rostrum broken.

Cuspidaria approximata Smith

Cuspidaria approximata Smith, 1896, p. 373; 1898, Moll, pl. 8, figs. 2, 2*a*.

Broadly pyriform, rostrum about ½ length of rest of shell, umbones strongly inflated, surface smooth, with growth-lines only, regular but at intervals

(approximately 0·75–1 mm. apart) one slightly more prominent than the others, thread-like, not lirate or lamellate. A rather long lamellate posterior lateral tooth in right valve; ligament pit inclined posteriorly.

Length 17, alt. 12, thickness (valves together) 8·5 mm.

Off Umhloti River (Natal), 25 fathoms, one living, one valve (S. Afr. Mus. No. 14767. P.F. coll.).

Distribution. Andaman Islands, 450 fathoms.

Remarks. Has some resemblance to *salamensis* Jaeckel 1931 from Dar-es-Salaam, but has no lamella in either valve for the support of the posterior adductor muscle. It is more like the East Indies *convexa* Prashad 1932, the hinge of which was not described.

The difference in depth raises a doubt as to the identity of the Natal specimens with Smith's species.

Cuspidaria (Cardiomya) forticostata Sow.

Cuspidaria (Cardiomya) forticostata Sowerby, 1904, p. 18, pl. 7, fig. 15.

Anterior half (Sowerby said one-third, but see his figure) with *c.* 30 weak radial ribs, followed by 3 strong widely spaced ribs, with 1 or 2 fine intermediaries between each pair, posterior part with 7–8 fine ribs. A single linguiform posterior lateral tooth, projecting horizontally inwards, in right valve; ligament pit pointing ventrally or slightly anteriorly.

Topotype pinkish-fawn.

Length 13, alt. 8, thickness 6·25 mm. (Sowerby); 16 × 10·5 × 7·5 mm. (S. Afr. Mus.).

Off Cape Natal (Durban), 440 fathoms (Sowerby, P.F. material).

Same locality, one living (topotype) (S. Afr. Mus. A9566. P.F. coll.).

Type ? in British Museum; topotype in South African Museum.

Remarks. The topotype was found in the bottom-sample from the above locality. It is in perfect condition, and is larger than the one (presumably only one) sent to Sowerby.

Closely similar to *alcocki* Smith 1894 (figured: 1897, pl. 3, fig. 6) which has 4 strong ribs.

Cuspidaria (Cardiomya) gilchristi Sow.

Cuspidaria (Cardiomya) gilchristi Sowerby, 1904, p. 18, pl. 7, fig. 17.

Closely radiately ribbed except on the rostrum and on the antero-dorsal area. A single linguiform posterior lateral tooth projecting inwards, in right valve; ligament pit pointing ventrally or slightly anteriorly.

Length 14, alt. 9, thickness 7 mm.

Off Cape Natal (Durban), 85 fathoms (Sowerby P.F. material).

Same locality, 8 valves (topotypes, A9570); off Umhloti River, 40 fathoms, one valve; off Cape Morgan, 77 fathoms, 2 valves; off Cape St. Blaize, 125 fathoms, one valve (S. Afr. Mus. P.F. coll.).

Type ? in British Museum; topotypes in South African Museum.

Cuspidaria spp.

Until further material is obtained, no names are attached to the following specimens.

South African Museum A7458. 13 living, 3·5–8 mm. long. Shape of *lamellosa* Sars. With concentric thread-like lirae. Right valve with a lamellate triangular tooth anteriorly and posteriorly, the latter larger than the former.

Cape Point N. 89° E. 36 miles, 700 fathoms (P.F. coll.).

South African Museum A7793. 3 living. 11 × 6 mm. Shape of *platensis* Smith. Surface smooth, fine growth-lines only. A lamellate posterior lateral tooth in right valve; ligament pit small.

Cape Point N. 89° E. 36 miles, 700 fathoms (P.F. coll.).

See also Barnard, 1963b, p. 450.

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SYNONYMY. Arrangement according to Schenk, E. T. & McMaster, J. H.: *Procedure in taxonomy.* 2nd ed. Stanford, Stanford university press, 1948. Bibliographic references modified.

'I. *Synonymy arranged according to chronology of names.*—All published scientific names by which a species has been previously designated (subsequent to 1758) are listed in chronological order, with bibliographical references to all descriptions or descriptive citations following in chronological order after each name. . . .

B. *Form of bibliographic references to synonymic names.*—The first reference following any name in the synonymy should be to the earliest citation of that name. This should be followed by references to all subsequent citations of the same name, arranged in chronological order. . . .'

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Eulalis capensis Schmarda 1861, p. 86, pl. 29, fig. 231. Willey 1904, p. 259.
Eulalia viridis var. *capensis* McIntosh 1903, p. 34. Day 1953, p. 30.
Eulalia viridis (*non* Muller) Ehlers 1913, p. 455. Day 1934, p. 30.

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CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART VI. SUPPLEMENT

By

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South African Museum, Cape Town

(With 2 plates and 30 figures)

Contents

Foreword

This work was published with the aid of a C.S.I.R. grant, after the death of Dr. K. H. Barnard, which occurred on 22nd September, 1964.

The work was prepared for publication by Mr. B. F. Kensley.

Figures 1a, b; 5a, b, c, d, e, f, h; 7b; 10a, b, c, d; 12a, b, c; 13a, b, c, d; 14a, b, c; 15b; 16c, d, e; 17b; 18a, b, c; 19f; 20a, b; 21; 22; 24a, c; 28c; 29a, b, c, d, e; 30a, b, c; are the work of Mr. Kensley. All the remaining descriptions and figures are the work of Dr. Barnard. Only minor editorial changes have been made.

We are grateful to Professor R. Tucker Abbott, Professor J. H. Day, Mr. R. N. Kilburn, Dr. W. Macnae, Dr. A. C. van Bruggen for reading the manuscript and for useful comments and suggestions.

Figures of the following species previously described or mentioned by Dr. Barnard in the earlier parts of the Mollusca are now included:

Cerithiella vidalensis Barnard
Columbarium angulare Barnard
'*Columbella*' *confertilirata* Barnard
'*Columbella*' *polyarosus* Barnard
Cyclopecten incubans Barnard
Drillia armilla Barnard

† Died September 1964.

Ann. S. Afr. Mus. **47** (4), 1969: 595–661, 2 pls, 30 figs.

Drillia pselia Barnard
Drillia simplicicingula Barnard
Falsilunatia pseudopsila Barnard
Fusus africanae Barnard
Fusus bonaespei Barnard
Fusus faurei Barnard
Lima symmetrica Barnard
Mangilia muiri Barnard
Marginella differens form *eugenes* Barnard
Nassa muiri Barnard
Solidula niecaensis Barnard
Terebra thielei Barnard
Turbonilla bathybius Barnard
Turris ambages Barnard
Turris multiseriata Barnard
Venericardia nuculoides Barnard

TOXOGLOSSA

Fam. **Terebridae**

Terebra subulata L.

Terebra subulata Linnaeus, Barnard, 1958: 78. Macnae & Kalk, 1958: 128.

Additional record: Delagoa Bay.

Terebra loisae Smith, 1903

Terebra loisae Smith, 1903: 360. Barnard, 1958: 79.

Cox, 1939, compared this species with *marmorata* Deshayes, from the post-Pliocene of Chai-Chai (Inhambane).

Terebra lightfooti Smith, 1903

Terebra lightfooti Smith, Barnard, 1958: 79.

Description: Shell 20 mm. Protoconch nucleus plus 8 whorls; 3 whorls following the nucleus smooth, but this is evidently due to corrosion. No radula. Fulvous between the ribs, but leaving a clear pale spiral band from top of aperture around base.

Locality: Saldanha Bay.

Additional records: 33° 55′ S. 17° 55′ E., 31 fathoms. 35° 5′ S. 17° 56′ E., 23 fathoms (U.C.T.).

Terebra nebulosa Sow., 1844

Terebra nebulosa Sowerby, 1844: pl. 43, fig. 51. Barnard, 1958: 79.

Additional record: Inhaca Island.

Terebra capensis Smith, 1903

Terebra capensis Smith, Barnard, 1958: 79.

Additional records: Simon's Bay, 70 metres; St. Francis Bay, 80 metres.

Terebra diversa Smith, 1901

Hastula diversa (Smith), Kira, 1955, pl. 38, fig. 15.
Terebra diversa Smith, Barnard, 1958: 80.

Additional record: Inhaca Island.

Terebra affinis Gray, 1834

Terebra affinis Gray, 1834: 60. Melvill & Sykes, 1898: 41. Macnae & Kalk, 1958: 128. Barnard, 1958: 80.

Not *affinis* Basterot; see Dautzenberg, 1935: 5.

Terebra dimidiata L.

Terebra dimidiata Linnaeus, Swanton, 1902: 195. Barnard, 1958: 80.

Swanton records a specimen in the Durban Museum.

Terebra sp.

Fig. 1a

Description: Shell 62·5 × 10·5 mm. No radula. Apex broken. Axial ribs slightly curved and slightly retractive, 14 increasing to 17, extending on to base. Spiral groove on penultimate whorl 1·3 mm below the suture. Very fine spiral

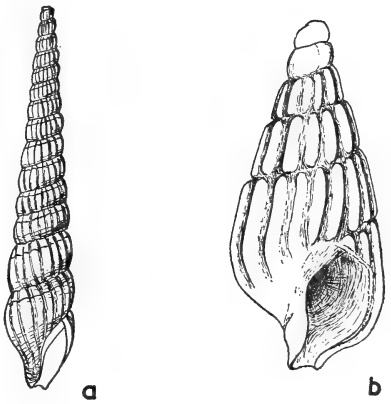

Fig. 1. a. *Terebra* sp. b. *Terebra thielei* Brnrd.

striae, 2 between suture and spiral groove, 8 (4–4) below the spiral groove; on base about 10, also very faint.

Locality: 29° 47′ S. 31° 22½′ E., 100 fathoms. Fisheries Survey Station K 214.

Fam. **Conidae**

Since the publication of Part 1 (1958) I am indebted to the Library of the Council for Scientific and Industrial Research for the use of a copy of Sowerby's *Thesaurus*, vol. 3 (1857–8). Sowerby's plates are suggestive of several synonymies, but certainty can only be obtained by examination of the actual specimens or types (if extant).

The two species *crotchii* and *gilvus* described by Reeve from Saldanha Bay may perhaps be referable to one of the west African species. But the locality cannot be accepted as reliable. Only *gradatulus* and *elongatus* are known from the west coast of South Africa, and Sowerby's figures of Reeve's species differ in shape from both of these.

The identity of Port Alfred shells with west African species (Bartsch, Turton: *grayi*, *guttatus*) is unlikely.

Kohn (1960) has described the spawning, egg-masses, and larval development of Indian Ocean species.

Kohn (1963, 1964) has reported on the existence of the type specimens, and the identity of the recently described species. Part 1 deals with the Linnaean species, 1758–67, Part 2 with those of Chemnitz and others, 1766–86.

Conus figulinus L.

Conus figulinus Linnaeus, Barnard, 1958: 82. Kohn, 1960: 318, fig. 3 (egg-mass).

This species is a sand-dweller. There are no solid objects in this habitat to which the egg-cases could be attached. Consequently the first five cases are buried in the sand as an anchor; they contain no eggs. The following cases, with eggs, are attached to this anchor.

Conus orbignyi Audouin, 1831
Fig. 2

Conus orbignyi Audouin, Sowerby, 1858: 12, pl. 202, fig. 368. Kira, 1955, pl. 38, fig. 5.

Description: Apex broken (? 2 or 3 whorls) 6 whorls remaining. Each whorl above the shoulder with 4 (5) fine spiral lirae, crossed by slightly procurved growth-lines, producing a more (early whorls) or less (later whorls) distinct clathrate sculpture. Shoulder with 14 knobs on uppermost remaining whorl, increasing to 17 (18) on last whorl, rounded on earlier whorls, but obliquely oval on later whorls; immediately below shoulder 2 spiral sulci close together. On base about 24 similar sulci, the upper one separated from the pair of sulci (below the shoulder) by a wider space than that between each of the following pairs of sulci. All the sulci are crossed by growth lines, which thus produce a series of squarish pits.

Locality: Northern Natal, deep water (Mrs. H. Boswell, 1962).

Remarks: A second specimen has its apex embedded in a *Xenophora pallidula*, 4 whorls being visible.

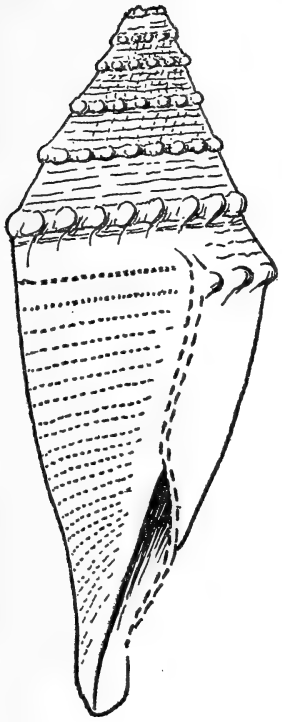

FIG. 2. *Conus orbignyi* Audouin.

Conus eucoronatus Sow., 1903

Conus eucoronatus Sowerby, Barnard, 1958: 83.

Mrs. H. Boswell has shown me (1962) a specimen taken off Pemba, which seems to me to agree with *varius* Linn. as figured by Sowerby (1857: 7, pl. 189, figs 40–42). Mrs. Boswell disagreed, saying she had examples of *varius* in her collection, which were different from the Pemba shell. It is true there is a resemblance between the latter and *eucoronatus*; but there is considerable difference between the axial plications cut by spiral grooves into narrow (axially) oblong nodules of *eucoronatus* and the prominent rounded nodules shown in Sowerby's figures of *varius*. The Pemba shell agrees with the latter.

The fragment from off O'Neil Peak (S.A.M. A8660) has the oblong nodules slightly broader than in the type and the other specimens; but does not really resemble Sowerby's figures of *varius*.

Conus coronatus Dillwyn, 1817

Conus coronatus (Gmelin, *pars*) Dillwyn, 1817: 403. Dautzenberg, 1937: 75.
Conus minimus Linnaeus, Sowerby, 1858: 9, pl. 189, figs 54, 55, pl. 191, figs 99, 111. Barnard, 1958: 85.

According to Dautzenberg, Linnaeus' description of *minimus* is unrecognizable as a species, and should be replaced by Dillwyn's name.

Conus aplustre Rve, 1843

Conus aplustre Reeve, Sowerby, 1858: 32, pl. 205, fig. 448.
Conus infrenatus Reeve, Sowerby, 1858: 32, pl. 205, figs 451–453. Barnard, 1958: 87.
Conus bairstowi Sowerby, 1889: 9, pl. 1, fig. 12.

Sowerby's figures in the *Thesaurus* (especially fig. 452) show that *infrenatus* and *bairstowi* are synonymous. But *infrenatus* Reeve, 1848 appears to be synonymous with *aplustre* Reeve, 1843.

On the explanation to Sowerby's plate 205, Delagoa Bay is given as the locality for *infrenatus*. This probably means Algoa Bay (cf. *Thesaurus Conchyliorum* **3**: 70 'Delagoa Bay, Cape Colony').

Additional records: Fossil, Algoa Bay. 33° 04′ S., 27° 57′ E., 84 metres. This specimen has the *bairstowi* colour pattern.

Conus natalis Sow., 1858

Conus natalis Sowerby, 1858: 31, pl. 199, figs 292, 293. Melvill, 1914: 180 (related to *rosaeus* and *tinianus*, i.e. *aurora* Lamarck.). Barnard, 1958: 88.

Sowerby's two figures show the extremes of variation in the colour pattern.

Mr. P. Elston of Durban has shown me a fine specimen of 55 × 29 mm with the shape of *gilchristi* and the colour pattern of *natalis*, taken off Natal from a fish stomach by the late H. W. Bell-Marley.

There is no doubt in my mind that *gilchristi* should be considered a synonym of *natalis*. In circular no. 43 of the Conchological Society of Southern Africa, Mrs. C. Connolly states that *natalis* and *gilchristi* live together under large stones just below low-tide in the East London area; the *natalis* pattern was more common than the *gilchristi* pattern.

Conus papilionaceus Hwass in Bruguière, 1792

Conus papilionaceus Hwass *in* Bruguière, 1792. Sowerby, 1858: 26, pl. 197, fig. 233. Nicklès, 1950: 131, fig. 264, and var. *prometheus*, fig. 265. Paes-da Franca, 1960*b*: 26, pl. 2, figs 15, 16.

I have seen a specimen, 133 × 67 mm from deep water off Natal in the collection of Mrs. H. Boswell (1962). It agrees with an Angolan specimen of the var. *prometheus* Brug.

Conus pictus Rve, 1843—*scitulus* Rve, 1849

Conus pictus Reeve and *Conus scitulus* Reeve, Barnard, 1958: 88, 89.

Sowerby (1858) in the explanation to plate 205 quoted *jaspideus* Kien, pl. 55, fig. 4, and *scitulus* Reeve as synonyms of *pictus* Reeve, and on page 55 (index to species) puts *scitulus* as a synonym of *pictus* with a query.

On page 31 under *pictus* Sowerby included his figure 'var. ?309', but figure 309 on page 200 was named *simplex*. The figure with its white shoulder patches resembles *simplex* (cf. Barnard, 1958: 89).

C. pictus, *scitulus* and *simplex* are not spirally striate above the shoulder; *aurora* (and *elongatus*) are.

Conus elongatus Chemn., 1791

Conus mozambicus Krauss, 1852: 39.
C. elongatus Chemnitz, Barnard, 1958: 90.

Additional record: Lüderitzbucht.

Conus aurora Lam., 1810

Conus aurora Lamarck, 1810: 423. Tomlin & Winslow, 1927: 43–45 (synonymy). Tomlin, 1931: 440–441 (synonymy), 1937: 216. Barnard, 1958: 91. Janus, 1961: 8, pl. 3, figs 11, 12 (type of *caffer* Krauss).

Tomlin (1931) quotes the names which he and Miss Winslow (1927) considered synonyms, viz. *beckeri*, *caffer*, *fulvus*, *lavendulus*, *loveni*, *rosaceus*, *secutor*, *succinctus* and *tinianus* Sowerby (*non* Bruguière). In his 1937 catalogue of cones, Tomlin included also *alfredensis*, *kraussi* and *lautus*, but transferred *succinctus* to the synonymy of *infrenatus*. I have suggested (1958: 91) that Tomlin intended to make *algoensis* (not *alfredensis*) a synonym of *aurora*, but a *lapsus calami* or a typographical error intervened.

Adams's use of the word 'carneola' in his description of *succinctus* seems to me to indicate *aurora* rather than *infrenatus* but Sowerby's figure (1858, fig. 257) approximates more to the latter and its varieties than to any of the varieties of *aurora*. (*Conus infrenatus* does sometimes become pink when worn.)

If *verreauxii* Kiener 1849* was collected at the Cape by Verreaux, and if it resembles Sowerby's figures (1858: pl. 205, figs 463, 464) of *conspersus* Reeve (with which Sowerby said it was synonymous) then it is another synonym of the common and very variable *aurora*.

Periostracum furry, setose-fimbriate around the shoulder, 14–15 spiral lines of setae on body-whorl, some of those in the middle of the series double.

Fam. **Turritidae**

Powell (1964) gives a revision of the Turridae, of which some of the generic changes are followed here.

Clavatula sinuata (Born, 1778)

Clavatula sinuata (Born), Tomlin, 1931: 439 (synonymy). Barnard, 1958: 98, figs 3d, 5a.

Description: Shell 29 × 13 mm. Protoconch apex corroded, 6 whorls remaining. 3rd and 4th whorl with 11 axial ribs, 5th with 10, 6th with 8. Towards the end of the last whorl the outer lip has been broken three times. Fine spiral striae over whole whorl and base. The final whorl (back of outer lip) has no projections which could be termed ribs. No cingulum. The unusually wide spacing of the ribs occurs on all the whorls and is especially noticeable on the last whorl.

Locality: Lüderitzbucht.

* Sherborn & Woodward (1901: 218) gave the date of Kiener p. 249 as 1849, but plate 60 was published earlier; on page 217 Sherborn & Woodward gave the date of the plates to *Conus* as 'Livr. 112. 1845', but in their summary on page 218 as 'Livr. 105–112. Plates, 1846'.

var. *sigillata* Rve, 1844

Clavatula sinuata (Born) var. *sigillata* Reeve, Barnard, 1958: 99, fig. 5b.

Three specimens from Sea Point, Cape Town (University of Cape Town, C P 618).

Protoconch and 1st whorl missing	4 whorls	10 × 5 mm.
Protoconch missing	8 „	20 × 8 mm.
Protoconch missing	8 „	18 × 8 mm.

Clavatula semicostata Kiener

(Date impossible to trace)

Drillia halidoma Bartsch, 1915. Tomlin, 1931: 439.
Clavatula semicostata Kiener, Barnard, 1958: 141, fig. 5f.

Radula of a small specimen from Port Elizabeth examined and the genus confirmed.

Clavatula tripartita Weink. *in* Küster, 1876

Clavatula tripartita Weinkauff *in* Küster, 1876, Smith, 1912: 53. Barnard, 1958: 143, fig. 4d.

Description: Protoconch 2 whorls, junction with 1st post-natal whorl not very distinct. Post-natal whorls 8. Previous description confirmed (*tripartita* form). Spiral striae distinct on cingulum, sulcus and shoulder. Operculum oval, nucleus in middle of inner margin which is thickened. Shell 29 × 11·5 mm.

Radula (which confirms the genus) with 47 rows, central plate small, oblong (longer than wide), with median cusp, lateral plate with wing-like appendage.

Animal pale, foot speckled with grey. Tentacles short, lobate, eyes in middle of outer margin.

Periostracum very thin, brown. The shell carries 15 egg-capsules of a *Marginella*. Wherever an egg-capsule has been affixed the periostracum and surface of the shell have disappeared, leaving a very shallow oval depression.

Locality: Port St. Johns.

Additional records: 31° 38′ S. 29° 34′ E. (Port St. Johns), 26 fathoms. Another specimen (fresh but empty) 30° 47′ S. 30° 27′ E., 36 metres. Also found in the 10 ft raised beach at Port Alfred.

Clavatula turriplana Sow., 1903

Clavatula turriplana Sowerby, Barnard, 1958: 144.

Description: Shell 46·5 × 13 mm. Diameter of uppermost whorl 5 mm. Protoconch and 1st post-natal whorl missing; 11 whorls remaining. Upper 3 whorls slightly worn, smooth, with sigmoid growth-lines, here and there one (temporary outer lip) more prominent than the others. Fourth and following whorls with fine spiral striae over whole whorl, but feeble and evanescent on last whorl, base with about 23 additional striae. Fourth whorl with 15 low oblique protractive axial ribs below sulcus, 14 on each of the 5th to 8th whorls,

thereafter evanescent, obsolete on last whorl. Profile of whorls nearly straight, not quite so convex as in the type, slightly concave at lip sinus, which is deep and not quite as wide as the slight cingulum or the lower portion of whorl.

Upper half of whorls (sulcus) dirty yellowish, lower half castaneous; aperture suffused within; columella upper part white lower part (rostrum) lemon yellow (cf. colour of type, p. 144).

Operculum oval, nucleus in middle of inner margin, which is thickened; 8 × 4 mm in aperture 17 mm.

Radula as in *C. sinuata*, 22 pairs of teeth, central plate with acicular cusp, lateral plate with 'accessory' plate.

Locality: 34° 30′ S. 24° 40′ E., 56 fathoms.

Clavatula sp.

Fig. 4b

Description: Shell 44 × 15·5 mm. Apex broken, 8 whorls remaining. Tripartite, upper third (cingulum) not prominently convex, middle third (sinus) straight or slightly concave, lower third with oblique nodules, 17 on 5th, 6th and 7th whorls, evanescent on 8th. Sinus deep.

Operculum oval, nucleus at middle of inner margin, which is thickened.

Shell fawn, somewhat mottled, nodules pale. Animal removed.

Locality: Off Natal coast. (Mrs. H. Boswell, 1960.)

Remarks: Differs from *tripartita* in the wider sinus. Cf. *Surcula pyramidalis* Schepman, 1913: 423, pl. 27, fig. 10, but the latter has a narrower rostrum, and a series of nodules (about 30) on the cingulum, the latter is much narrower and consequently the middle third (sinus) is much broader.

Turris stolida (Hinds, 1844)

Turris stolida (Hinds, 1844*a*), Barnard, 1958: 101, fig. 3e.

Additional record: 34° 15′ S. 25° 5′ E., 6 fathoms, one juvenile.

Turris indica Röding, 1798

Turris indica Röding, Steuer, 1939: 1. Barnard, 1958: 105.

Additional record: 29° 53′ S. 31° 06′ E., 71 metres.

Turris multiseriata (Smith, 1877)

Fig. 3c

Turris multiseriata (Smith), Barnard, 1958: 109.

Additional record: Off Umhlanga River (Natal), 22–26 fathoms, one dead (S.A.M. A8855, Pieter Faure collection).

This opportunity is taken to figure the protoconch.

Turris flavidula (Lam., 1822)

Drillia flavidula (Lamarck), Barnard, 1958: 128, fig. 12b.

Remarks: Further distinguishing characteristics: some specimens white with a brown sutural band.

Radula like that of *T. stolida*, 30 rows, no central plate, lateral plate with wing-like appendage.

Additional records: 29° 53′ S. 31° 06′ E., 71 metres. A specimen from deep water, Natal, 60 × 14 mm, apex (?4 whorls) missing, 10 whorls remaining. A specimen 42 mm long attached to a *Xenophora pallidula* from the Zululand Coast. (S.A.M.) A specimen 32 mm long attached to *X. pallidula* from same locality (Durban Museum).

Mr. Dance of the British Museum (Natural History) considered (*in litt.*) the last specimen to be '*Brachytoma* cf. *alata* Smith' (*sic* ? = *albata* Smith, 1882). The South African Museum specimen appears to be conspecific with the specimen previously recorded as *flavidula*.

Turris ambages Barnard, 1958

Fig. 3a, b

Turris ambages Barnard 1958: 148, fig. 23b.

A figure of the complete shell which is now given, indicates that this is a true *Turris* as defined by Powell (1964).

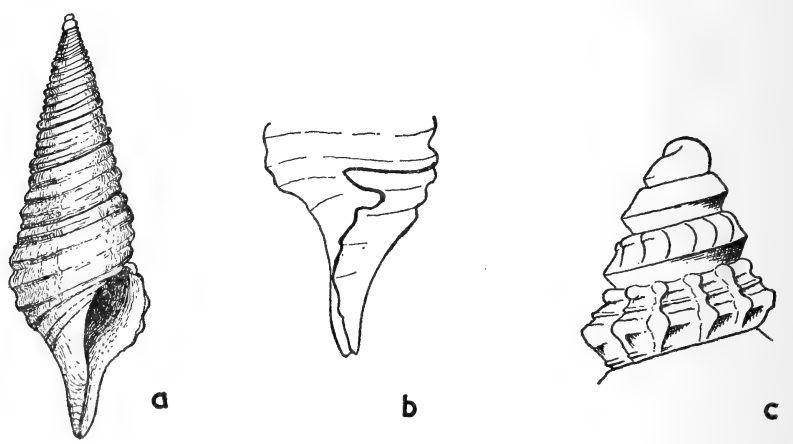

FIG. 3. a. *Turris ambages* Brnrd. b. *Turris ambages* Brnrd. Outline of lip-sinus. c. *Turris multiseriata* (Smith). Protoconch.

Surcula aditus n.sp.

Fig. 4a

Description: Aperture 5·5, spire 4·5 mm. Protoconch 2 whorls, smooth, but with traces of microsculpture (? spiral striae), altitude and diameter 0·6 mm. Post-natal whorls 4. Axial ribs 9 on 1st and 2nd whorls, 10 on 3rd, 11 on body

whorl, crossing sulcus but petering out on base. Spiral lirae 4 on 1st whorl, 5 on 2nd, 6–7 on 3rd, 8 on 4th, 9–10 additional lirae on base with a few intermediaries, passing into fine lirae on rostrum. Sulcus with a few fine spiral lirae, but indistinct, as are the growth-lines. Lip sinus moderate; canal short. Shell 10 × 4·5 mm. Pale buff.

Locality: Off Cove Rock (East London), 22 fathoms.

Type: S.A.M. A29759, Pieter Faure collection.

Remarks: Near *Surcula faurei* Barnard, 1958, but more slender, with higher shoulder and fewer ribs.

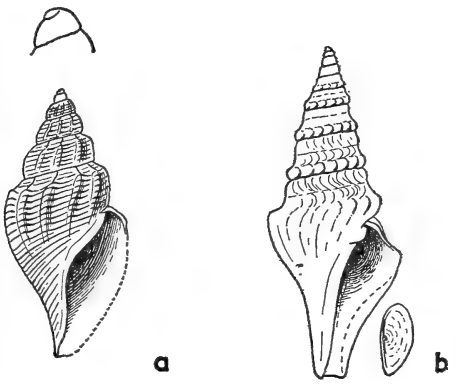

FIG. 4. a. *Surcula aditus* n.sp. b. *Clavatula* sp.
With operculum.

**Drillia fultoni* (Sow., 1888)

Drillia fultoni (Sowerby), Barnard, 1958: 118.
Tomopleura (*Maeritomella*) *fultoni* (Sow.), Powell, 1942: 110.

Description: Radula seen and confirmed. Absence of operculum confirmed. Protoconch 2 whorls, smooth, often corroded as are 1st and 2nd post-natal whorls, but sometimes remains polished when 1st post-natal whorl is corroded.

Additional record: False Bay, 47 specimens.

Asthenotoma vertebrata (Smith, 1875)

Asthenotoma vertebrata (Smith), Barnard, 1958: 113, figs 8c, 9c.

Additional record: 29° 50′ S. 31° 04′ E., 20 metres, 2 dead.

†*Drillia platystoma* (Smith, 1877)

Drillia platystoma (Smith), Barnard, 1958: 125.

Delete from synonymy given in Barnard, 1958: 126 *Surcula macilenta* Melvill (see below).

* In sculpture, form and radula, this species is a typical *Tomopleura*. The paucispiral protoconch, however, places it in *Maoritomella* Powell, 1942.—ED.

† This species should perhaps be placed in the genus *Austrodrillia* (see Powell, 1942)—Ed.

Additional records: Off Cape Vidal (Zululand) 80–100 fathoms, one broken. Off Hood Point (East London), 49 fathoms, 2 dead, South African Museum, Pieter Faure collection.

Drillia macilenta (Melvill, 1923)

Surcula macilenta Melvill, 1923*b*: 168, pl. 5, fig. 13. Tomlin, 1931: 438.
Drillia platystoma (Smith, *pars*), Barnard, 1958: 126.

Description: One specimen, 10 × 3·3 mm, has a smaller protoconch (altitude and diameter 0·75 mm), than *platystoma*; also the shoulder is above the middle of the whorl as shown in Melvill's figure, instead of in the middle.

Nevertheless, the two forms are very closely similar.

Locality: Off Hood Point (East London), 49 fathoms, one dead. (S.A.M. A29765, Pieter Faure collection).

Drillia perfluans Barnard, 1958

Drillia perfluans Barnard, 1958: 132, fig. 15a.

Close to *thetis* Smith, but with fewer spiral striae.

Drillia spiralis Barnard, 1958

Drillia spiralis Barnard, 1958: 134, fig. 17b.

Bears a very close resemblance to *Belalora thielei* Powell, 1951: 172, pl. 6, fig. 20, and fig. 115, protoconch from off the Falkland Islands, 110–219 metres, but is more slender.

B. thielei has fine axial lines on the last whorl of the protoconch (not traceable in *spiralis*); 14 axial ribs on the penultimate and 15 on the body whorl; 12 spiral lirae below the shoulder and about 58 on the body whorl plus base.

Drillia dovyalis n.sp.

Fig. 6a

Description: Spire about 1½ times length of aperture. Protoconch 1½ whorls, altitude and diameter 0·5 mm, smooth. Post-natal whorls 4. Axial ribs 15 on 1st and second whorls, 16 on 3rd, 17 on 4th, crossing sulcus, but not strongly developed, petering out on base. Spiral lirae 4 on last whorl, 5 on 2nd and 3rd, 6 on 4th, the uppermost one forming a shoulder, a fine lira on sulcus; on upper part of base 6 lirae, on lower part 8–9 close together. Sulcus not concave. Lip sinus moderate. Shell 4·8 × 2 mm, white.

Locality: Off Sandy Point (North of Kei River), 51 fathoms, one, dead but fresh.

Type: S.A.M. A29760, Pieter Faure collection.

Remarks: In sculpture not unlike *Lienardia grayi* (Rve) and *Pleurotomella elisa* Thiele, but more slender. Differs from *collina* Barnard, in having all the spiral lirae of equal strength (except the one on the sulcus).

Dovyalis is the botanical name for the Kei Apple tree (see Marloth, 1925, *Flora of South Africa*, II, Section 2, p. 194).

Drillia pecus n.sp.

Fig. 5b

Description: Protoconch 1½ whorls, altitude and diameter 1 mm, smooth (possibly minutely punctate or spirally striate when fresh). Post-natal whorls 3¼ (last whorl broken). Axial ribs 15 on each whorl, oblique, protractive, crossing sulcus, petering out on base; crossed by weak spiral lirae 4–5 on 1st whorl, 7–8 on 2nd, 10 on 3rd, with feebly impressed intervening striae. Sutures not undulate. Sulcus not concave, lip sinus adjoining suture. Shell 6·5 × 2·75 mm.

Locality: Off East London, 400–450 fathoms, one with last whorl broken.

Type: S.A.M. A29761, Pieter Faure collection.

Remarks: Like *Drillia perfluans* Barnard, but with larger protoconch, more axial ribs and stronger spiral sculpture. Named after the Buffalo River at East London.

Drillia sp.

Fig. 5c

Description: Protoconch 1½ whorls, altitude 0·5, diameter 0·75 mm, smooth. Post-natal whorls 3. Axial ribs 10–11. Spiral striae may be present, but the shells are not in a good condition. 4·5 × 2 mm.

Locality: Five dead specimens from off Cape Natal (Durban) 85 fathoms.

Type: S.A.M. A29762, Pieter Faure collection.

Remarks: These specimens belong to the same group as *perfluans*, *falcicosta*, *morgana* and the above n.sp. *pecus*, characterized by feeble or obsolete spiral sculpture.

Drillia omia Barnard, 1958

Drillia omia Barnard, 1958: 123, fig. 11a.

Four specimens from dredgings off the Orange River mouth (1962, S.A.M. A29667) indicate that the locality originally suggested (? Port Alfred) was incorrect. It now seems probable that the type set came from Table Bay, or Dassen Island, or Saldanha Bay, from which localities the South African Museum has at one time or another received specimens.

The largest specimen is 8·5 mm long. The shells are not beach-worn and polished like the type set, but are more or less corroded, especially at the apex, like many other molluscs from the west coast.

The original description is confirmed. The ribs, however, encroach a little more on the sulcus, sometimes almost reaching the suture above.

Drillia sp.

Fig. 5d

Description: Protoconch corroded. Post-natal whorls 4. Axial ribs 11, or 12 on 1st whorl (indistinct), increasing to 14 on last whorl, crossing the sulcus, narrow, rather sharp, sigmoid; crossed by 12–14 fine spiral lirae on last whorl from shoulder downwards, indistinct in sulcus, at least 20 additional lirae on base.

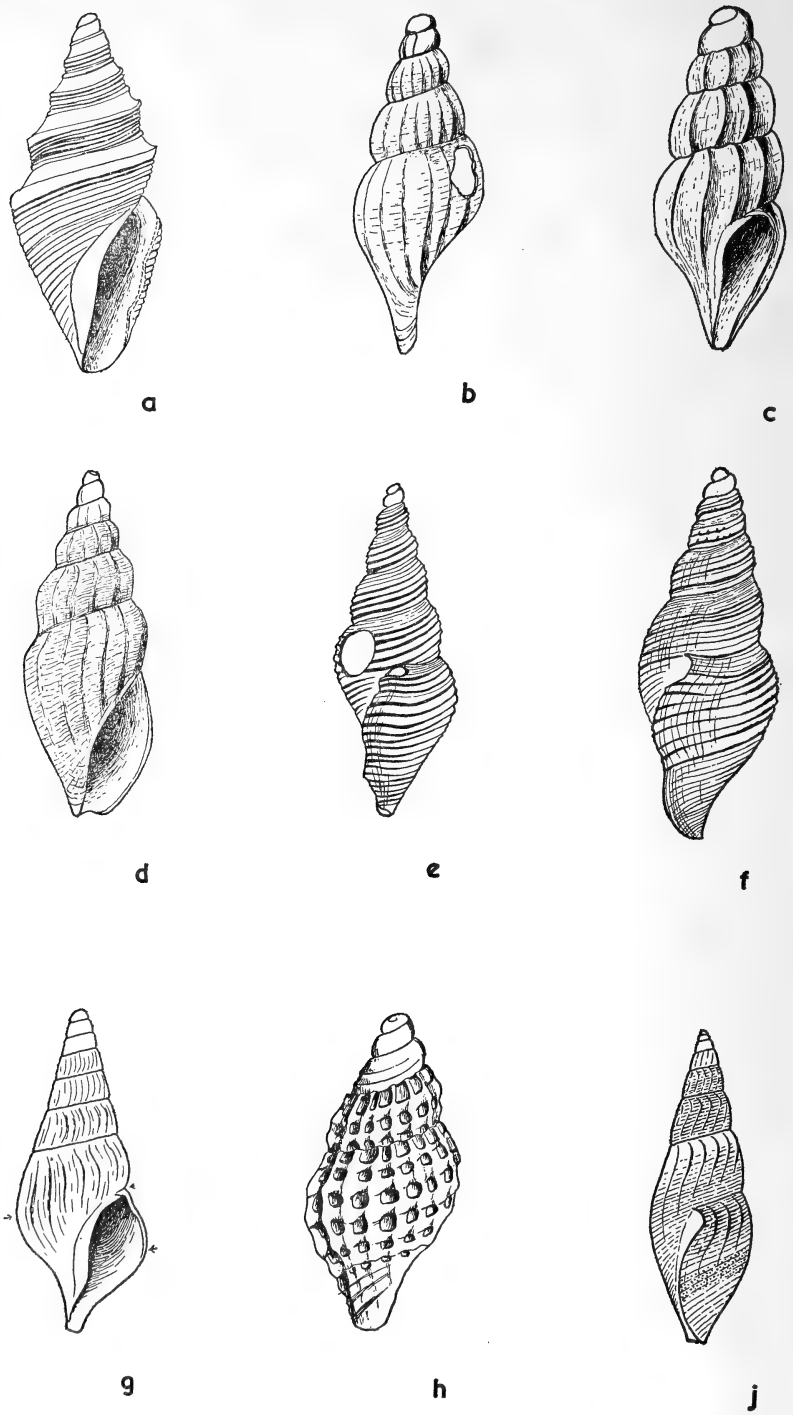

FIG. 5. a. *Drillia simplicicingula* Brnrd. b. *D. pecus* n.sp. c. *Drillia* sp. d. *Drillia* sp. e. *D. armilla* Brnrd. f. *D. pselia* Brnrd. g. '*Clavatula*' *tumida* (Sow.) h. *Mangilia muiri* Brnrd. j. *Mangilia*?

Shoulder not prominent, sulcus not concave, lip sinus broad, adjoining suture, no parietal callus.

Shell 8 × 3 mm, greyish white, 3 faint brown bands, one below the shoulder, the broadest one in middle of base, starting from the suture (only just visible above the suture), upper and lower margins of the band with darker spots and edging.

Locality: Langebaan (Saldanha Bay), U.C.T.

Drillia diasi Barnard, 1958

Drillia diasi Barnard, 1958: 137.

Additional record: 34° 16′ S. 18° 14′ E., 158 metres, one dead.

Drillia erepta n.sp.

Fig. 6b

Thesbia algoensis non Thiele, Barnard, 1958: 161, fig. 30.

Description: Protoconch 1½ whorls, smooth. Axial ribs about 15 on 1st whorl, 18–19 on 2nd, 21 on 3rd; spiral lirae 4 on 1st whorl, 4–5 on 2nd, 5 on 3rd, also one weaker lira on the sulcus (in my 1958 description the lira on the sulcus was included in the numbers of the spiral lirae).

Shell 4·5 × 2·25 mm.

Locality: Off Cape Morgan, 47 fathoms, one worn specimen; 33° 50′ S. 25° 54′ E. (Algoa Bay) (probably about 30 fathoms). Off Cape St. Blaize, 125 fathoms, 2 dead.

Type: S.A.M. A8734, A29763, A29764, Pieter Faure collection.

Remarks: The three additional specimens are less worn than the Cape Morgan one, which is now shown to have been wrongly referred to *T. algoensis*, and must be rescued from its false position.

The sutures are more impressed, the profile more convex than in *T. algoensis*, and there is a definite, though not concave, sulcus; and as previously remarked the ribs and lirae are fewer in number. The protoconch and lip sinus show that this is not a columbellid.

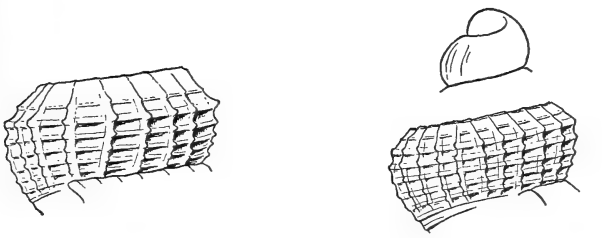

FIG. 6. a. *Drillia dovyalis* n.sp. One whorl. b. *D. erepta* n.sp. One whorl & protoconch.

'Clavatula' tumida (Sow., 1870)

Fig. 5g

'Clavatula' tumida (Sowerby), Barnard, 1958: 111, figs 4e, 8a, 9a.

A six-whorled specimen from off Cape St. Blaize, 21 × 9 mm in 125 fathoms. (Pieter Faure collection): 2nd–5th whorls and upper half of last whorl yellowish-brown, base of latter white, sharply demarcated.

Clathurella crassilirata Smith, 1904

Clathurella crassilirata Smith, 1904*a*: 27, pl. 2, fig. 6.

A specimen from East London, 9 mm long, presented to the South African Museum by R. N. Kilburn (1960). A specimen was also found at Jeffrey's Bay.

Acrobela acus Barnard, 1958

Acrobela acus Barnard, 1958: 149.

Description: A dead but well-preserved specimen, 7·5 × 2·5 mm, from False Bay. Post-natal whorls 6. On 3rd whorl the uppermost of the 3 lirae separates into 2, a fine upper lira bordering the sulcus, and a thicker one; on 4th whorl a fine intermediary develops between the upper and middle original lirae, and another between the middle and lower lirae, total thus 7 (an injury on 6th whorl has caused a slight irregularity in the sequence of the lirae. Outer lip strongly produced beyond the deep sulcus.

Additional records: Algoa Bay, 67 fathoms, 2 dead (S.A.M. A8805, Pieter Faure collection).

**Cythara alfredi* (Smith, 1904)

Cythara alfredi (Smith, 1904), Tomlin, 1931: 440. Barnard, 1958: 150.
Cythara ima Bartsch, 1915, Tomlin, 1931: 440. Barnard, 1958: 150.
(*non*) *Mangilia septangularis* (Montagu), Sowerby, 1892: 7.

Additional record: Olifantsbos, west coast of Cape Peninsula.

**Cythara deliciosa* Barnard, 1958

Cythara deliciosa Barnard, 1958: 151, fig. 24.

Compare *Mangilia ichthys* Melvill, 1910: 13, off Mekran coast (Persian Gulf), 90 fathoms, with 6 ribs.

**Cythara amplexa* (Gould, 1860)

Mangilia amplexa Gould, Barnard, 1958: 151.

Radula with 28 pairs of short, dagger-like teeth, with ovoid base and process. The structure of the radula indicates that this species should be placed in the genus *Cythara*.

Additional record: 34° 02′ S. 23° 28′ E., 27 fathoms, Lüderitzbucht, living.

* The genus *Cythara* has been rejected as a *nomen dubium* (Powell, 1942). *C. alfredi* and *amplexa* have been placed in the genus *Anacithara* (Hedley, 1922). *C. deliciosa* Barnard should be placed in the genus *Eucithara* (Fischer, 1883)—Ed.

Mangilia tranquilla Barnard, 1958

Mangilia tranquilla Barnard, 1958: 158, fig. 28b.

Additional record: Keiskamma Point, NE. × E. 5 miles, 33 fathoms, one dead (S.A.M., Pieter Faure collection).

? *Mangilia* sp.

Fig. 5j

Description: Protoconch 2 whorls, smooth ? (worn). Post-natal whorls 5. Axial pliculae on 1st whorl ? 14 (partly worn), on 2nd, 3rd and 4th whorls 15, on 5th 16, sigmoid, starting from the suture above, evanescent on lower part of whorls, and on base. Crossed by fine spiral lirae, 7–8 on 2nd whorl, 9–10 on 3rd, 15 on 4th and about 17 on 5th; about 18 additional lirae on base. No shoulder; no sulcus; lip sinus as indicated by the pliculae, deep. Spire longer than aperture (about $1\frac{1}{4}$ times). Shell 8·2 × 2·5 mm. White, a very faint brown band slightly below middle on last whorl, seen better on inside of aperture than on outside of outer lip.

Locality: Simonstown (one, somewhat worn).

Daphnella sulcata (Sow., 1892)

Daphnella sulcata (Sowerby), Barnard, 1958: 160, fig. 30b.

Delete from localities: off Cape Vidal, 80–100 fathoms, one broken. See below: *Mitromorpha* n.sp.

Daphnella ? *sulcicancellata* (Barnard, 1958)

Surcula sulcicancellata Barnard, 1958: 145, fig. 22c.

Description: Protoconch corroded. No operculum. Radula with 16 pairs of dagger-like, unbarbed teeth. Animal pale, tentacles short, blunt, eyes?

Locality: Off Cape Point. 200 fathoms. 7 specimens, 3 alive. In collection Mrs. H. Boswell.

Remarks: The absence of an operculum, and the dagger-like radula teeth necessitate transferring this species to one of the cytharine genera. Quite provisionally *Daphnella* is here chosen, chiefly because of the likeness between the shell of the present species and that of *Daphnella* (?) *verecunda* Barnard, 1963*b*. This species differs from the latter in having more axial ribs (18–21 as against 12–15) and more spiral lirae on base (18–20 as against 15).

Daphnella alfredensis Bartsch, 1915

Fig. 7b

Daphnella alfredensis Bartsch, Turton, 1932: 30. Barnard, 1958: 161. See also *Columbella capensis* (Sowerby), *infra* p. 635.

No operculum, radula with about 33 rows.

Additional records: Gordons Bay, 2 (length 10 mm). S.A.M. A29965. Gonubie, East London, 2, alive. S.A.M. A29938.

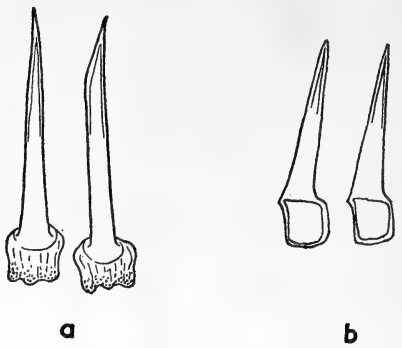

FIG. 7. Radulae of: a. *Daphnella* (?) *sulcicancellata* (Brnrd). b. *D. alfredensis* Bartsch.

'*Pleurotoma*' *curricula* n.sp.

Fig. 8

Description: Shell thin. Protoconch 1½ or 2 whorls, corroded. Post-natal whorls 4; 1st corroded; 2nd, 3rd and 4th with a narrow cingulum projecting beyond the incised suture; about 22–34 axial pliculae (or enlarged growth-lines), strongly sigmoid, concave in sulcus, protractive below, each plicula forming a small point on the cingulum; pliculae evanescent on base. On 2nd and 3rd whorls 5, on 4th whorl 6 spiral grooves often crossing the pliculae, but more distinct between them; about 15 grooves on base. Sinus in profile straight; a slight shoulder where the pliculae become protractive.

Shell 8·5 × 3·75 mm. White, somewhat translucent.

Locality: 34° 36′ S. 17° 00′ E., 1500–1760 fathoms. One dead but fresh, 2 broken.

Type: S.A.M. A9859.

Remarks: There is a superficial resemblance to *Pleurotoma truncata* Schepman, 1913, and *Drillia rubidofusca* Schepman, 1913, both of which have a narrow cingulum; but both of them have axial ribs, at least on the earlier whorls, whereas in the present specimens the axial sculpture consists of enlarged growth-lines, which at most form pliculae and can scarcely be called ribs.

Pleurotomella ida Thiele, 1925

Pleurotomella ida Thiele, 1925: 230, pl. 40, fig. 21.

Description: Aperture subequal to spire. Protoconch 3 whorls, altitude and diameter 0·5 mm, with criss-cross sculpture. Post-natal whorls 5. Axial ribs 10 on 1st and 2nd whorls, 11 on 3rd and 4th, 12 on 5th, crossing sulcus and continued on base; crossed by 2 spiral lirae, intersections rather sharply nodulose; on 3rd and following whorls a fine lira between the 2 main ones, on 4th another fine lira between lower main lira and suture; on base about 12 lirae, the uppermost one (at top of aperture) the strongest. Canal longer than in Thiele's figure. Lip sinus adjoining suture. Suture undulate, the axial

ribs on one whorl alternating with those on whorl above. Shell 8 × 4 mm. Thiele: 5 × 2·7 mm.

Localities: 35° 19′ S. 20° 12′ E., 126 metres (Thiele), 34° 3′ S. 25° 10′ E. (St. Francis Bay), 24–34 fathoms, one dead. (S.A.M. A29766, Pieter Faure collection).

Remarks: This specimen shows my suggestion (1958: 118) that *ida* was the juvenile of *Philbertia capensis* to have been incorrect. The two species are clearly differentiated by having two (*ida*) and three (*capensis*) spiral keels.

Mitromorpha volva Sow., 1892

Mitromorpha hewitti Tomlin, Barnard, 1958: 162.

There is little doubt that both *hewitti* Tomlin, 1921 and *striolata* Turton, 1932 should be regarded as synonyms of *volva* Sowerby. Smith (1904: 31) said the typical form of *volva* 'usually' had 5 lirae on the penultimate whorl; Tomlin said 5–7; the variety later named *hewitti* has 4; Turton's figure (front view) of *striolata* shows 7 on the penultimate, 8 on the last whorl, and 12 on the base.

The two East London specimens recorded in 1958 (p. 163) have 4 lirae, and 16 on the base; there is also a broken specimen with 4 + 17 lirae. Four Pondoland specimens (*ex* Dr. Becker) have 4 + 17, 4 + 18, 5 + 15, and 6 + 15 lirae.

Apart from possible variation in the number of the lirae, the number of visible lirae depends on the variable extent to which one whorl overlaps the preceding whorl; and this is scarcely a satisfactory feature on which to base specific distinctions.

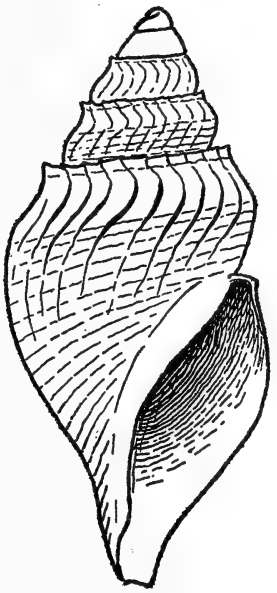

FIG. 8. '*Pleurotoma*' *curricula* n.sp.

The colour, uniform brown, or pale brown with darker spots, is also not a satisfactory distinction.

? *Ptychosyrinx* sp.
Fig. 9

A very worn shell, for which Tomlin declined to suggest any identification, is so distinctive among the known South African shells that it is worth a figure and some comparisons.

Description: Shell 8·3 mm × 4 mm. Four whorls are traceable. The last whorl shows a slight cingulum below the suture; shoulder well marked but not lirate followed by 5–6 weak spiral lirae, and then a strong lira about midway between shoulder and end of anterior canal, no lirae visible below this. No indication of axial ribs, but there are 2 or 3 very faint indications of possible granules on the shoulder. No sinus is visible, but the space between the subsutural cingulum and the shoulder is slightly concave. Growth-lines are not traceable. Columella without pleats.

Locality: Off Cove Rock (East London), 22 fathoms.

Type: S.A.M. A3528.

Remarks: The figures of *Latirus belcheri* (Rve) and *L. cingulifera* (Lamarck) in Chenu, 1859, figs 912 and 913, closely resemble the present shell. These, however, have an undulate periphery, pleats on the columella, and no cingulum Moreover the present shell seems to have the facies of a turritid.

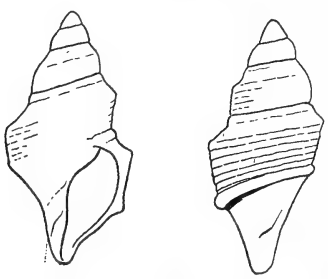

Fig. 9. ? *Ptychosyrinx* sp.

The west African *Pleurotoma spirata* Lamarck is somewhat similar but has no cingulum, and the shoulder is lirate, more or less sharply costate, and much nearer to the suture; there are no spiral lirae below the shoulder; there is no lower lira, the profile showing only a rounded angularity.

A figure closely resembling the present shell is fig. 11 of a 6·5 mm long fragment of *Pleurotomella annulata* Thiele (1912: 217, pl. 14) but fig. 10 of the whole shell is not so similar.

An even closer resemblance is the figure of a Tertiary Japanese fossil in Powell, 1964: 293, *Ptychosyrinx hyugaensis* (Shuto). This has blunt nodules on the peripheral lira on the early whorls, but obsolete on the body whorl. The

blunt biangulation of the body whorl is not so strongly marked as in the present shell. This biangulation is reminiscent of *Turris* (*Ptychosyrinx*) *lobata*. But in this species the strongly gemmate shoulder lira is more prominent than the basal lira. Even allowing for the greater abrasion on the shoulder than on the other parts, the lirae between the shoulder and the basal lira exclude the present shell from being a very worn young *lobata*.

RHACHIGLOSSA

Fam. **Marginellidae**

A large family with numerous species, many of which require anatomical investigation. Four patterns of radulae are known:

1. *Marginella sensu stricto:* Moderately wide, transversely oblong plates, with several denticles or cusps on the hind margin.
2. *Marginellona* (East Indies); *Afrivoluta* (South Africa): Very wide plates with very many denticles on the hind margin.
3. *Persicula:* Narrow, crescentic plates, concave in front, with a few denticles on the hind margin.
4. *Diluculum:* Narrow, V-shaped plates, concave in front, with a single large cusp on the hind margin.

The South African fauna list contains about 110 names of so-called species of '*Marginella*' which have been founded on the shells alone (Turton's 1932 and 1933 names are excluded). Some are already recognized as synonyms, and some are misidentifications. The radulae of only seven are known. These seven species fall into the following genera:

Marginella: biannulata, capensis, cystiscus, lucida, zeyheri* (*zeyheri* requires confirmation).

Afrivoluta: pringlei (radula like that of *Marginellona*).

Persicula: Two very small species with shells like those of *Marginella pseustes* and *M. aphanospira* (confirmation is required).

Diluculum: inopinatum.

There is thus a very wide field for investigation among the South African species of '*Marginella*'. There may be species with radulae differing from the above-mentioned four patterns. Cooke (1895) has already suggested, for evolutionary reasons, that a marginellid radula may be found with lateral plates in addition to the central (rhachidian) plate.

There seems to be a possibility that some species may have an entirely different method of feeding; not by means of a protrusible rasping radula, but by means of a suctorial structure. As indications of such a method, whole animals of some species have been dissolved in KOH without finding any trace of a radula. This, however, is not conclusive; section-cutting will be the final

* The genus *Cysticus* was described by Stimpson in 1865. This animal differed only in the shape of the tentacles. According to Thiele (1931) the shell is identical to *Marginella* and the radula only slightly different—Ed.

test. Species which appear to have no radula are:

rosea
musica (*diadochus*)
neglecta
cylindrica
} several examples of each examined

bairstowi
nebulosa
} one example of each examined.

Later research, of course, may show that many 'Marginellas' are acceptable as species; but several will always remain as mere names.

From this point of view the discussion of synonymies of 'species' based on shells is not very profitable. The following notes on specimens, however, may be useful.

Marginella capensis Krauss, 1848

Marginella capensis Krauss, Barnard, 1959: 3.
Marginella puella Gould, 1860: 385.
(In my reference to Krauss read: p. 125, not 25.)

Additional records: False Bay, 52 fathoms. Lüderitzbucht.

Marginella biannulata (Fabr., 1826)

Marginella biannulata (Fabricius), Barnard, 1959: 4.

Lucas (1913) records a sinistral specimen of *zonata* from Cape Town.

Additional record: Lüderitzbucht.

Marginella musica Hinds, 1844

Marginella musica Hinds, 1844*b*, Barnard, 1959: 5.

Additional record: 26° 37′ S. 15° 4′ E., 35 metres, living.

Marginella neglecta Sow., 1846

Marginella neglecta Sowerby, Barnard, 1959: 7.

Additional record: Olifantsbos (west coast of Cape Peninsula). Animal white.

Marginella bensoni Rve, 1865

Marginella bensoni Reeve, Tomlin, 1917: 253. Barnard, 1959: 7.
Marginella dulcis Smith, 1904: 32, pl. 2, fig. 30.

Tomlin unhesitatingly placed *dulcis* Smith as a synonym of *bensoni* Reeve on conchological grounds. As the type of the latter is lost, the comparison was made between shells of *dulcis* and the description and figure of *bensoni*. Such a comparison is unsatisfactory and the synonymy were better not accepted.

The type of *bensoni* being lost, the taxonomic status of this 'species' can never be determined; it is a *species delenda*. On the other hand *dulcis* is said to be common (Turton, 1932) at the type locality, and therefore the possibility exists of obtaining living specimens and examining the radulae; it is a *species inquirenda*.

Additional record: Olifantsbos (west coast of Cape Peninsula).

Marginella nebulosa (Röding, 1798)

Pterygia nebulosa Röding, 1798: 51.
Marginella nebulosa (Röding), Tomlin, 1917: 283.

Localities and records: Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton). Off Cape Infanta, 42 fathoms, one (South African Museum, Pieter Faure collection); Sebastian Bay, 30–40 fathoms, one (S.A.M., A6382, collected by K. H. Barnard, 1922); Simon's Bay (False Bay) 2 fathoms, one (S.A.M., A8764, collected by F. H. Talbot).

Measurements of False Bay examples: 34° 43′ S. 18° 35′ E., 44 metres; with thickened outer lip, 38 × 21, 39 × 21, 40 × 21 mm; also A8764 31 × 17 mm; with thin outer lip, 30 × 15, 29 × 14·5 mm. Sebastian Bay, with thickened lip, 44 × 24 mm.

Marginella lineolata Sow., 1889

Marginella lineolata Sowerby, 1889: 9; 1892: 19. Tomlin, 1917: 276.

Localities: False Bay, 51 fathoms, one; off Great Fish Point, 51 fathoms, one (South African Museum, Pieter Faure collection). 34° 29′ S. 21° 49′ E., 40 fathoms, 2 (University of Cape Town).

The P.F. specimens are somewhat faded or discoloured by the preserving fluid. The U.C.T. specimens measure 29 × 16, and 27 × 14 mm. The former is grey and has a thick outer lip, the latter yellowish with a thin lip; both have fine axial zigzag lines and two irregular spiral series of black dots.

Marginella differens Smith, 1904

Marginella differens Smith, 1904, Barnard, 1959: 8.

This is also at present only a species name, although the type is available for comparison. Living specimens will perhaps be obtained at the type locality, Port Alfred.

It may be suggested that the Port Elizabeth shell identified by Sowerby in 1892 as *inconspicua* Sow. may have been *differens*. *M. inconspicua* Sowerby (1846: 387) was described from an unknown locality. It was pale fulvous, with a low spire and four pleats, 5 mm.

If the radula of *differens* became known, and if the identity of *differens* and *inconspicua* were accepted on conchological grounds, even so the sinking of *differens* in favour of *inconspicua* could not be justified.

**Marginella keenii* Marrat, 1871

Marginella keenii Marrat, Turton, 1932: 37. Barnard, 1959: 9.
Marginella electrina Sowerby, 1892: 21.
Marginella electrum von Martens, 1903: 37 (quoted as *electrum non* Reeve).

* These species are here considered to be synonymous, but *M. electrina* normally has a more acute spire and a narrower base than *M. keenii*, and three columella pleats, not four as in *keenii*. The range of *M. keenii* is from Port Alfred to Umzamba, and is very common at East London. *M. electrina* extends from Table Bay to East London.—Ed.

Marginella epipolia Tomlin, 1921

Marginella epipolia Tomlin, 1921: 216.

The type, from off Sebastian Bluff, 24 fathoms, came originally from the Pieter Faure collection which was sent to Sowerby; it should have been returned to the South African Museum, but is now in the Tomlin collection, National Museum of Wales, Cardiff.

There is, however, in the South African Museum a topotype from the same Pieter Faure haul, measuring 14 × 8 mm, with thin outer lip, and markings similar to those of the type. A specimen of the same size as the type, and with thickened outer lip, was taken at the same locality in 27 fathoms. The grey spiral lines are distinct on the base, but below the shoulder the pattern is more patchy, as in *rosea* or *bairstowi*. A similar pattern is found in the larger specimen 23·5 × 13 mm from off Cape St. Blaize.

These last two may perhaps be referable to *rosea*, but much more material is necessary for a decision.*

Marginella zeyheri Krauss, 1848

Marginella zeyheri Krauss, Barnard, 1959: 10.

The University of Cape Town has taken three specimens (one damaged from which the radula was extracted) at 33° 6′ S. 17° 49′ E. in 48 fathoms. The two undamaged shells measure 6 × 3·5 and 6 × 3 mm. The greater width of the one is due to a greater thickening of the outer lip. This one resembles a typical *zeyheri*, whereas the narrower one is more like *atractus*. They are obviously conspecific, and must be identified as *zeyheri*.

Neither *zeyheri* nor *atractus* have been recorded from the west coast, although '*In litore capensi legit C. Zehyer*' (Krauss) could have included Table Bay. Zeyher probably collected on the shores of both Table Bay and the east coast of the Cape Peninsula (Muizenberg to Simonstown).

The radula of the damaged specimen has about 35 rows. The plates are narrower than in *capensis* and *biannulata* (Barnard, 1959: fig. 1) and the hind-margin projects angularly backwards; the central cusp is the largest, and is flanked on either side by two smaller cusps, with a minute denticle between each pair of cusps. Further specimens are desirable for confirmation.

Diluculum inopinatum Barnard, 1962

Diluculum inopinatum Barnard, 1962: 14.

Additional records: Saldanha Bay, Kommetjie (west coast of Cape Peninsula), Lüderitzbucht, 160 metres.

Remarks: The identity of the specimens from Kommetjie and Lüderitzbucht was confirmed by the radulae. The occurrence of this species at two localities

* The absence of the characteristic sinus in the posterior outer lip in *M. epipolia* appears to distinguish this species from *M. rosea*.—Ed.

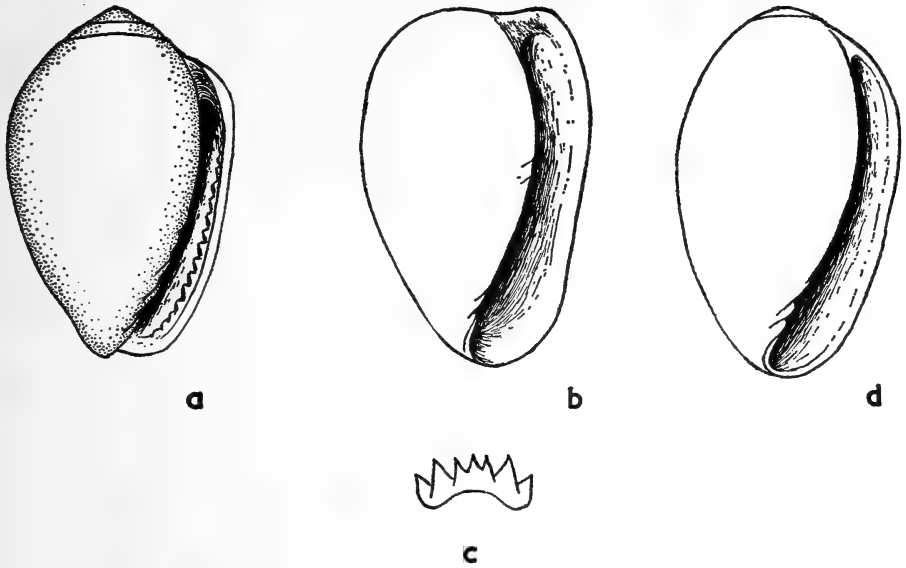

FIG. 10. a. *Marginella differens* form *eugenes* Brnrd. b. *Persicula nigrocr ocea* Brnrd. c. *P. nigrocrocea* radula d. *P. alborubida* Brnrd.

on the west coast of the Cape raises the suspicion that the '*bensoni*' shell from Green Point, Cape Town, was conspecific.

Type: Holotype in the Department of Zoology, University of Cape Town, paratypes in the South African Museum.

Persicula nigrocrocea n.sp.

Fig. 10b, c

Description: Shell resembling that of *Marginella aphanospira* Tomlin, 1913. Columella pleats 4, upper two barely visible. 3 × 2 mm.

Animal: Foot, body, tentacles, and mantle edge orange; mantle within the shell black, eyes red. Radula with at least 80 plates; plates crescentic, anterior margin concave, but not so strongly as in *P. persicula* (Thiele, 1929, fig. 425), 7 denticles, the median one very slightly larger than the others.

Locality: Simonstown.

Types: Holotype, S.A.M. A30049, paratype S.A.M. A30549.

Remarks: These shells would undoubtedly be identified by conchologists as *aphanospira*. This species is, however, known only from its shell, and is therefore a 'conchological' species. It must always remain so. Although the present living specimens might reasonably be assumed to be conspecific with *aphanospira*, nevertheless there could be no certainty. Strictly speaking it would be unscientific.

The institution of a new name therefore seems preferable and justifiable, the species being trebly diagnosed by the coloration of the animal, the shell, and the radula.

Tomlin assigned his species to the *persicula* group of marginellids. The form of the radula amply justifies the classification of *Persicula* as a full genus, as did Thiele (1929).

Persicula alborubida n.sp.

Fig. 10d

Description: Shell resembling that of *pseustes* Smith 1904. Columella pleats 3, with sometimes a trace of a 4th pleat. 2 × 1·3 mm (or a trifle over 2 mm long).

Animal: Foot, body, tentacles, and mantle edge translucent white, foot behind shell with a medio-dorsal opaque white line, mantle within the shell black with one or two white spots in the middle, proboscis orange-red, eyes black. Radula with at least 100 plates; plates crescentic, anterior margin concave, 5 cusps, the median one largest, the outermost one on each side small.

Locality: Kommetjie (west of Cape Peninsula).

Types: Holotype S.A.M. A30050, paratype S.A.M. A30550.

Remarks: The same remarks apply to this species as to '*nigrocrocea*' in justification of a new specific name.

Fam. **Volutidae**

Voluta ponsonbyi Smith, 1901

Voluta ponsonbyi Smith, Barnard, 1959: 20.

In 1959 (p. 19) I suggested that the young specimen recorded by Sowerby (1897), if South African, was far more probably an *africana* or a *ponsonbyi* than a *festiva*. Having now seen Sowerby's figures in his *Thesaurus* (**1**: 218) I think it is probably *ponsonbyi*.

In my remarks, for 'protoconchs' read: species. Smith did in fact give the sizes of the protoconchs.

Volutocorbis abyssicola (Ad. & Rve, 1848)

Volutocorbis abyssicola (Adams & Reeve), Barnard, 1959: 25.

The largest specimen I have seen was 108 × 46 mm, said to have been trawled in the Saldanha Bay area.

Fulgoraria blaizei Barnard, 1959

Fig. 11

Fulgoraria blaizei Barnard, 1959: 28.

Description: Apex broken, 5 whorls remaining. Axial ribs 19 on 2nd and 3rd whorls, about 20 on 4th whorl, but becoming evanescent; 3rd, 4th and 5th whorls with growth-lines; fine close-set spiral striae on 1st to 3rd whorls, becoming evanescent on 4th, obsolete on 5th. An obscure columellar pleat.

Rostrum and anterior part of outer lip broken. Rostrum and anterior part of base minutely crenulate. Shell 96 × 35 mm. Buff, orange-buff ('rusty') on back of outer lip.

This shell may possibly be the adult of *blaizei*, but the spiral striae continue on to the 3rd or 4th (remaining) whorl.

Locality: Unspecified area off Natal coast. In collection of Mrs. H. Boswell, Pretoria.

Fusivoluta pyrrhostoma (Watson, 1882)

Fusivoluta pyrrhostoma (Watson), Barnard, 1959: 29.

Description: Protoconchs removed from egg-capsules taken in False Bay in 1959. The 2nd whorl of the protoconch has minute spiral striae, and faint indications of axial riblets towards the outer lip. There are no unworn juveniles of *F. pyrrhostoma* available. These protoconchs appear to agree with apices (± corroded) of older shells, in size, spiral striae, and sigmoid pliculae.

Fusivoluta pyrrhostoma (Watson)
form *major* Barnard, 1959

Fusivoluta pyrrhostoma (Watson) form *major* Barnard, 1959: 30.

Description: Protoconch altitude 4, diameter 3 mm; post-natal whorls 6, first 2 whorls corroded, 3rd partially so. Axial ribs on 3rd whorl ?, 24 on 4th, 25 on 5th, about 27 on 6th but less well defined on back of outer lip. Shell 72 × 26 mm. Another specimen from same area, 82 × 29 mm.

Locality: Saldanha Bay, 200 fathoms.

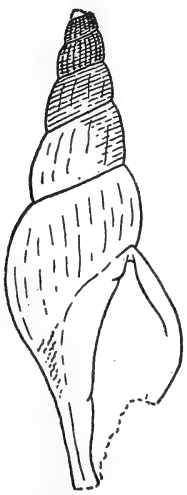

FIG. 11. *Fulgoraria blaizei.* Brnrd.

Fam. **Mitridae**

Gen. CHARITODORON Tomlin, 1932

Charitodoron Tomlin, Barnard, 1959: 144.

The genus *Charitodoron* Tomlin has been transferred from the Buccinidae to the Mitridae, and regarded as a subgenus of *Mitra* (Barnard, 1960: 402).

Mitra picta Rve, 1844

Mitra picta Reeve, Barnard, 1959: 41.

Additional record: Kommetjie, west coast of Cape Peninsula. Radula as in *M. aerumnosa.*

Mitra aerumnosa Melv., 1888

Mitra aerumnosa Melvill, Barnard, 1959: 41.

Additional record: Lüderitzbucht (U.C.T.).

Mitra (*Strigatella*) *litterata* Lam., 1811

Mitra (*Strigatella*) *litterata* Lamarck, Barnard, 1959: 44.

Recorded from the post-Pliocene of Inhambane by Cox, 1939.

Mitra rufescens A. Ad., 1851

Mitra rufescens A. Adams, 1851, Barnard, 1959: 46.

Additional record: Delagoa Bay.

Pusia patula (Rve, 1845)

Pusia patula (Reeve), Barnard, 1959: 57.

Additional record: Lüderitzbucht. Also recorded as a fossil from Algoa Bay.

Fam. **Olividae**

Ancilla fasciata Rve, 1864

Ancilla fasciata Reeve, Barnard, 1959: 69.

Additional records: 27° 54′ S. 33° 3′ E., 51 metres. Also recorded as a fossil from Algoa Bay.

Fam. **Fasciolariidae**

Latirus rousi Sow., 1886

Fig. 12c

Latirus rousi Sowerby, Barnard, 1959: 81.

Additional record: Simonstown, alive. Radulae mounted.

Latirus polygonus (L.)

Fig. 12b

Latirus polygonus (L.), Barnard, 1959: 83.

Description: Front of foot, head and tentacles crimson.

Radula with about 260 rows, central plate oblong, broader than long with subequal cusps, lateral plate with 10 cusps, no denticles between the cusps, but a minute denticle at inner corner.

Locality: Several examples were found living at Umzikaba (north of Port St. Johns) by Dr. F. H. Talbot of the South African Museum in 1959.

Latirus clausicaudatus (Hinds, 1844)

Fig. 12a

Latirus clausicaudatus (Hinds), Barnard, 1959: 83.

Description: Radula with about 155 rows; central plate oblong, broader than long, with 3 feeble cusps (not extending beyond hind margin of plate), lateral plate with 9 cusps (excluding the internal one), a gap between the 9th cusp and the denticle at the outer end of the plate; some of the cusps more or less reduced to denticles.

Additional record: 34° 3′ S. 25° 59′ E., 46 fathoms, one living.

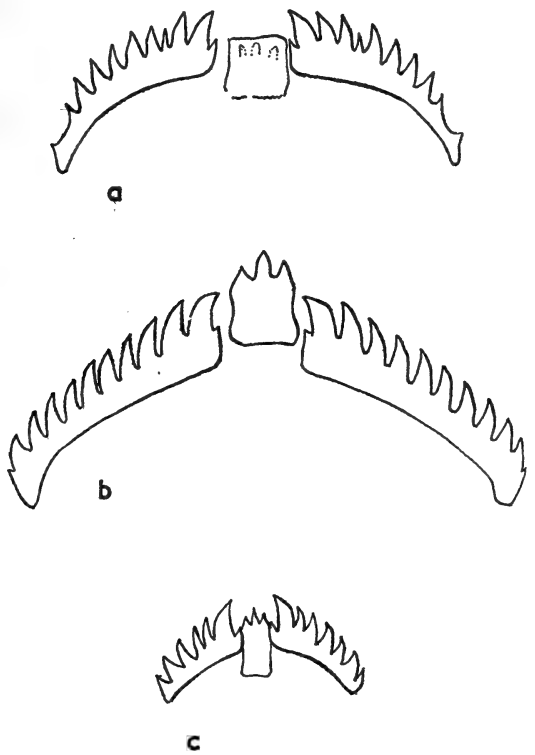

FIG. 12. Radulae of: a. *Latirus clausicaudatus* (Hinds). b. *L. polygonus* (L.). c. *L. rousi* Sow.

Fusus rubrolineatus Sow., 1870

Fusus rubrolineatus Sowerby, Barnard, 1959: 93.

The difference in the opercula of *rubrolineatus* and *rufinodis* was not mentioned in my remarks on these species (p. 94): according to Von Martens' (1903) figure (10a) the apex is curved slightly inwards, whereas in *rubrolineatus* it is slightly on the outer side of the oval operculum. Probably this small difference is accidental and without significance.

Fusus bonaespei Barnard, 1959
Fig. 13b

Fusus bonaespei Barnard, 1959: 95.

Additional record: St. Francis Bay, 30–40 fathoms, 90 mm, East London Museum.

A figure of the complete shell is now given.

Fusus cf. *retiarius* von Martens, 1903
Fig. 13c

Fusus cf. *retiarius* von Martens, 1903: 104, pl. 2, fig. 4.

Description: Protoconch plus 6 post-natal whorls. Axial ribs 12 on first whorl, increasing to 15 on the 6th. Spiral sculpture as in *rubrolineatus*. Snout broader than in *rubrolineatus*, straight, not flexuous; canal more definitely marked off from rest of aperture (i.e. indent in outer lip more marked). Columella slightly angular at the bend; interior of outer lip with 8–9 pliculae. Shell 39 × 17 mm.

Operculum oval-round, apex towards outer margin.

The ribs are slightly paler, and the 3 spiral lirae in the intervals between the ribs are slightly darker than the rest of the shell.

Radula like that of *rubrolineatus*, 165 rows, lateral plate with 6 cusps.

Locality: 34° 21′ S. 25° 4′ E., 110 metres. A single living specimen, taken by the University of Cape Town, has a shell much plumper than the normal *rubrolineatus*.

Remarks: The present specimen closely resembles the figure of *retiarius*, more so than it does the typical *rubrolineatus* or the figure of *rufinodis* von Martens (1903: 103).

The single dead shell from East Africa (1° 49′ N. 45° 29′ E., 1134 metres), described as possibly a *Fusus*, was stated by von Martens (1903) to have 7 whorls; 6 are shown in the figure, with a broken apex; 40 × 15·5 mm; 12 axial ribs on last whorl, 11 on the penultimate.

Fam. **Nassidae**

**Nassa analogica* Sow., 1903

Nassa analogica Sowerby, Barnard, 1959: 99.

Animal from Glencairn: trifasciate, animal whitish, foot, siphon, and tentacles greyish, eyes black. Spiral lirae visible through the periostracum when in water.

* The genus *Nassarius* Duméril, 1806 is used by most authors.—Ed.

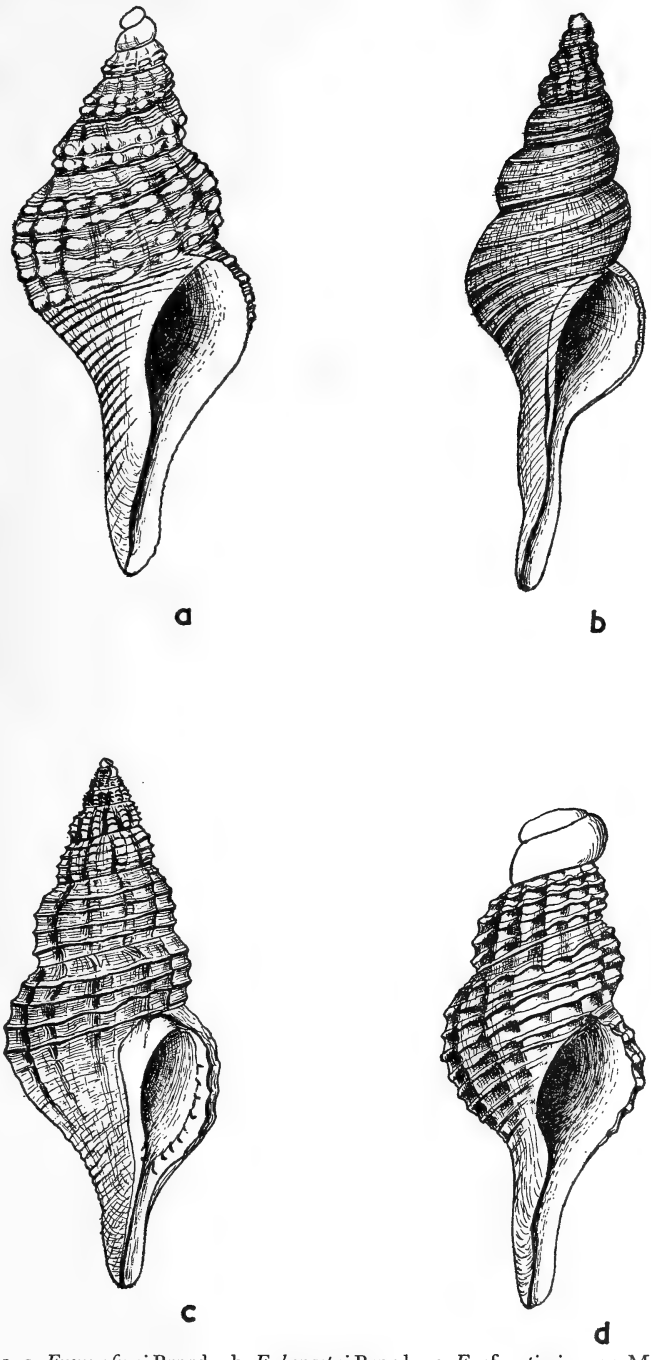

FIG. 13. a. *Fusus afurei* Brnrd. b. *F. bonaspei* Brnrd. c. *F.* cf. *retiarius* von Martens. d. *F. africanae* Brnrd.

Nassa capensis (Dunker, 1846)

Nassa capensis (Dunker), Barnard, 1959: 103.

Operculum oval, margins entire, as in *kochiana*. Radula as in *kochiana*.

Nassa horrida (Dunker, 1847)

Fig. 14a

Buccinum horridum Dunker, 1847: 59.
Nassa horrida: Sowerby, 1897: 5.
Nassarius horridus: Tomlin, 1928: 318. Peile, 1936: 141.
Nassarius (Scabronassa) horridus: Peile, 1939: 276.

Description: Radula with about 60 rows. Central plate with 20 cusps, graduated in length from centre outwards; no intermediate plate; lateral plate subtriangular, the distal margin (hypotenuse) divided into 8 cusps, the inner one blunt, the others pointed, which are curved over backwards.

Remarks: Peile described the lateral plate as a basal column expanded into 2 groups of 4 cusps; and his figure shows a basal projection in addition to the blunt basal cusp. Possibly his figure was drawn from two overlapping plates. In my specimen the lateral plate when isolated and flattened out is a simple triangle in shape.

Localities: Durban (Sowerby, Tomlin), Chaka's Rock (R. N. Kilburn, 1963).

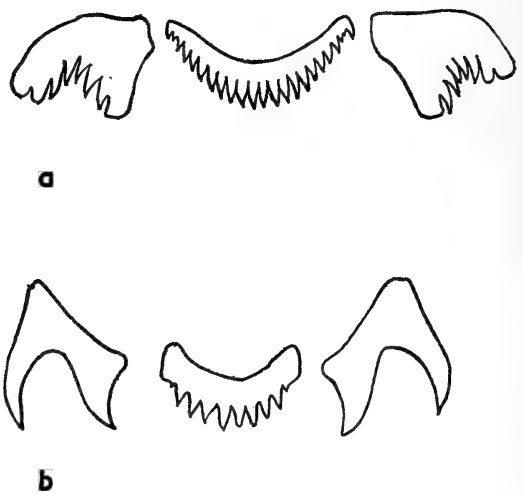

FIG. 14. Radulae of: a. *Nassa horrida* (Dunker). b. *Nassa fenestrata* Marrat. c. *Demoulia retusa* (Lam.).

Nassa plicatella A. Ad., 1851

Nassa plicatella A. Adams, 1851*b*, Barnard (*pars*), 1959: 114. (Not the Langebaan specimens nor the description of the operculum and radula.)

On page 115 (Barnard, 1959) delete: 'Operculum . . . margins', and 'Langebaan . . . (U.C.T.)' (see *scopularcus*, *infra*).

N. angolensis Odhner, 1923: 14, pl. 1, figs 6, 7 seems to be a juvenile *plicatella*. The operculum and radula of the true *plicatella* are not known to me. Odhner did not describe the operculum of *angolensis*.

Nassa scopularcus Barnard, 1959

Nassa scopularcus Barnard, 1959: 120; 1959: 115, *plicatella* (*non* A. Adams *pars*; the Langebaan specimens).

Further specimens from the type locality, and collected at the same time by Dr. Haughton, have recently (1961) become available in the South African Museum palaeontological collections (number 11352). These agree with the living specimens from Langebaan (Saldanha Bay) which were identified as *plicatella*. The species therefore is not extinct. It is questionable whether the Bogenfels clays from which Dr. Haughton collected the specimens are as old as Late Tertiary.

Description: The original description, in general, holds good. There are 5–6 post-natal whorls. There seem to be 12 (13) axial ribs on the 2nd whorl, decreasing to 11 on 3rd, 12–14 on last whorl, but towards end of latter on back of outer lip the strong ribs are succeeded by several less prominent and more closely aggregated ribs representing lip thickenings at successive stages of growth; the position of the main ribs, however, is indicated by undulations on the upper sutural margin of the whorl. Spiral lirae crossing the ribs, 6 on 3rd whorl, 7 on 4th, 8 on 5th, 9 on 6th, with additional ones on base.

Cream or greyish, darker in the intervals between the ribs when wet, uniform when dry; anterior canal pale (not purplish-brown as in *speciosa*).

Radula with 70 to 75 rows, central plate with 10 cusps, no intermediate plate, lateral plate without denticles between the two cusps.

Operculum triangularly oval, serrate on both margins. Up to 20 × 11·5 mm. All the shells are proportionally broader than the type, but somewhat variable; e.g. 13 × 8 and 14 × 8 mm.

Remarks: Distinguished from *plicatella* by fewer ribs; however, if the operculum and radula of *plicatella* correspond with those of *scopularcus*, the latter may eventually be shown to be merely a variant of *plicatella*.

Nassa rhysonepia n.sp.

Fig. 15a

Description: Juvenile, protoconch $2\frac{1}{2}$ whorls, with axial pliculae, about 24–25 on the 2nd whorl. Post-natal whorls 2. Spiral lirae 4, the subsutural one feeble, the other 3 strong; axial riblets about 25, forming slight nodules on the lirae,

but distinct in the intervening grooves, producing especially in the worn specimens a punctate appearance; on base 3 additional lirae. Columella sinuous, canal well marked. Shell 2·2 × 1·5 mm; two other specimens 3·2 mm long.

Locality: Cove Rock, East London. 22 fathoms, 2 (type and paratype), 34° 5′ S. 25° 55′ E., 67 fathoms, one. Cape Infanta, 46 fathoms, one. Gericke Point (Knysna area) 46 fathoms, one.

Type: Holotype S.A.M. A29990, paratype S.A.M. A30551.

Remarks: All the specimens are juvenile; the two from off Cove Rock are in good condition, the others from localities further west are worn. They seem to be referable to the genus *Nassa*, although the distinctive wrinkled protoconch differs from those of other species, so far as literature and material is here available.

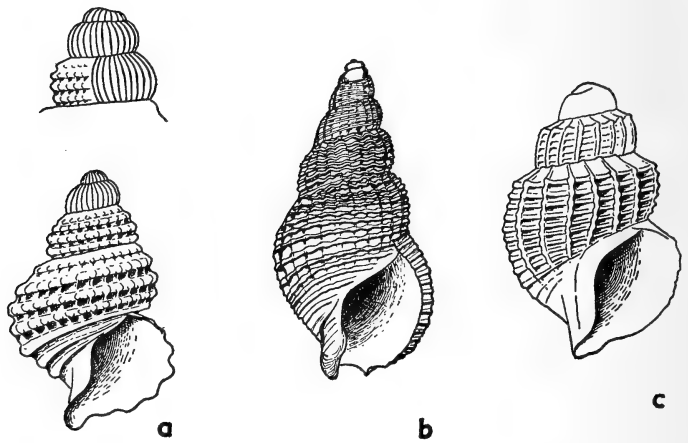

FIG. 15. a. *Nassa rhysonepia* n.sp. Protoconch further enlarged. b. *Nassa muiri* Brnrd. c. *Euthria ? fallax* Thiele.

Powell (1951, fig. N 117) figured the protoconch of *Pleurotomella simillima* Thiele with 2 axially plicate whorls; the original description (Thiele, 1912) stated that the apical whorls were smooth. But see Powell (1951: 172) for replacement of a sculptured sinusigera protoconch by a smooth 'internal case' (Powell quotes Dall, 1889).

Nassa fenestrata Marrat, 1877

Fig. 14b

Nassa fenestrata Marrat, Barnard, 1959: 111.

Operculum broadly subtriangular, broader than long, serrate on both margins.

Radula 60 rows. Central plate with 11 cusps, the outermost one on either

side very small; intermediate plate present, lateral plate without denticles below cusps.

Demoulia abbreviata (Gmelin, 1791)

Demoulia abbreviata (Gmelin), Barnard, 1959: 122.

Additional record: Saldanha Bay, living (U.C.T.).

Demoulia retusa (Lam., 1816)

Fig. 14c

Demoulia retusa (Lamarck), Smith, 1891c: 321 Barnard, 1959: 122.

Description: Nucleus of protoconch missing, apparently 1½ whorls but junction with 1st post-natal whorl indistinct, the spiral lirae distinguishing the latter beginning very gradually.

Operculum present. Triangularly ovoid, altitude 6, width 5 mm. Both margins irregularly serrate. On another specimen the scar of the operculum was clearly present.

Radula with 75–85 rows. Central plate with 9–10 cusps, lateral plate as in *abbreviata*.

Additional records: East London, 2 specimens, shells 20 and 17 mm. False Bay, animal pale orange.

Bullia trifasciata Smith, 1904

Bullia trifasciata Smith, 1904, Barnard, 1959: 127.

Radula about 60 rows, central plate with 11 cusps. Lateral and inner cusp with 2 prongs.

Operculum as in *annulata* (adult) but margins serrate.

Additional records: 33° S. 27° E., 7 metres (U.C.T.), 4 living, one uniform brown, somewhat plumbeous.

Bullia annulata (Lam.) Rve, 1846

Bullia annulata (Lamarck) Reeve, Barnard, 1959: 127.

Additional records: Saldanha Bay, 28 fathoms, dredged, U.C.T. Table Bay.

Fam. **Buccinidae**

Babylonia papillaris (Sow., 1825)

Babylonia papillaris (Sowerby), Barnard, 1959: 147.

Sowerby's figure in the *Thesaurus* (p. 70) shows numerous small spots (*millepunctata*). The locality 'Delagoa Bay, Cape Colony', obviously refers to Algoa Bay.

Cantharus carinifera Küster, 1858

Cantharus carinifera Küster, Barnard, 1959: 150.

Additional records: Umzikaba (S.A.M. A9261), Umhlali (S.A.M. A29967), living. Tomlin's (1922) record of this species from Lüderitzbucht may be the result of an error in labelling in the Kimberley Museum.

Gen. EUTHRIA Gray, 1850

Euthria Gray, Barnard, 1959: 169.

Barnard, 1959: 170, line 5. For '*clathrata*' read: *clathratula*. This is not *Buccinum clathratum* Adams & Reeve, 1850, which Sowerby (1897) transferred to *Metula*.

Euthria ? fallax Thiele, 1925
Fig. 15c

Euthria fallax Thiele, 1925: 181, pl. 32 (20), fig. 5, & pl. 46 (34), fig. 25.

Five specimens agreeing with Thiele's description and figure.

Description: Protoconch altitude 0·5, diameter 0·8–0·9 mm; a few feeble axial pliculae on the last whorl before its junction with 1st post-natal whorl. The axial ribs extend across the tabulate shoulder to the suture above, but peter out on the base; 14 on last whorl, 14 or 15 on 2nd, but towards end of the latter becoming feeble and irregular. Spiral lirae 5 on 1st whorl, obscure, 6 on 2nd, stronger but subordinate to the axial ribs. Up to 4 × 2·5 mm.

Localities: 35° 32′ S. 18° 20′ E., 2750 metres; 35° 19′ S. 20° 12′ E., 126 metres (Thiele). Cape Point N. 89° E., 36 miles, 700 fathoms, 5 dead (S.A.M. A7420, Pieter Faure collection).

Remarks: Twelve specimens were taken, 7 were sent to Tomlin and are presumably still in the Tomlin collection (National Museum, Cardiff).

There is a sculptural resemblance to *Fusivoluta capensis* (Thiele), which is found in the same area; but the latter has no tabulate shoulder.

Fam. **Pyrenidae** (**Columbellidae**)

Pyrene filmerae (Sow., 1900)

Pyrene filmerae (Sowerby), Barnard, 1959: 175.

In 1892 Sowerby identified a Port Elizabeth shell as *Columbella sagena* Reeve; in 1897 he recorded *obtusa* Sowerby from Durban; and in 1900 described *filmerae* from Pondoland. Smith (1906) regarded *sagena* Sowerby, 1892 *non* Reeve as a synonym of *filmerae*.

P. filmerae occurs as far north as Zululand (Barnard, 1959) and since then the South African Museum has received specimens (A29968) from Bazaruto Island. Some of the Natal shells show triangular or trapeziform brown marks as in *obscura* Sowerby, 1832 (Sowerby, 1844, *Thesaurus Conchyliorum* **1**, pl. 37, fig. 63). Sowerby identified a Pieter Faure specimen as '*splendidula*' Sowerby, 1844 (Barnard, 1959).

Columbella flava Bruguière was recorded by Krauss, 1848 (as *undata* Duclos) from Natal, and by Sowerby (1892) from Port Elizabeth.

All these species have a similar facies, and a variable colour pattern; and I suggest there is only the one species in South African waters. The name *filmerae* may be retained, leaving for future research the question whether it should become a synonym of *obscura* Sowerby, or the earlier *flava* Bruguière.

Pyrene atrata (Gould, 1860)

Pyrene atrata (Gould), Barnard, 1959: 180.

The following specimens, although mostly bleached, seem referable to this species:

Off Tugela River, Natal, 65–80 fathoms, 3.

Off Cape Natal (Durban), 54 fathoms, 3.

Off Umkomaas, Natal, 40 fathoms, 7. South African Museum, Pieter Faure collection.

Columbella turturina Lam., 1822

Fig. 16a

Columbella turturina Lamarck, 1822: 296. Sowerby, 1844: 116; 1892: 22. Bartsch, 1915: 234. Macnae & Kalk, 1958: 128.

Radula: with 100–120 rows, central plate wide, lateral plate with 4 cusps.

Locality: Chaka's Rock, Natal; Durban.

'*Columbella*' *adela* Thiele, 1925

'*Columbella*' *adela* Thiele, Barnard, 1959: 183.
Columbella kincaidi Tomlin, 1926: 292.

The white Still Bay shells have the protoconch with fine close-set very oblique (protractive) striae, as described for *kincaidi*; one specimen from Algoa Bay (Pieter Faure collection) is similar.

There is little doubt that the Still Bay shells are only a white variety of the yellowish *adela* (and *kincaidi*); or maybe the translucent fresh shells become opaque yellowish when dead.

'*Columbella*' *brunnescens* Thiele, 1925

'*Columbella*' *brunnescens* Thiele, Barnard, 1959: 183.

Description: Protoconch $1\frac{1}{2}$ whorls, altitude and diameter 0·5 mm, smooth, junction with 1st post-natal whorl distinct. Post-natal whorls 3. Spiral lirae 4 on 1st whorl, 5 on 2nd, 6 on 3rd, 13–15 additional lirae on base; lirae rounded, subequal to sulci in width. Growth-lines in places (back of outer lip) somewhat pliculose. Protoconch plus 1st whorl 1·3 mm long, protoconch plus 3 whorls 3·5 × 1·5 mm. Corneous brown.

Remarks: The two specimens (A8580, A8581) referred with some hesitation to this species, seem to me on further examination more like *hella* Thiele.

Some specimens, however, collected by Dr. Muir at Still Bay are undoubtedly *brunnescens*.

'*Columbella*' *vitula* Barnard, 1959

'*Columbella*' *vitula* Barnard, 1959: 184.

Additional record: 34° S. 25° E., 46 metres. 3 specimens, up to 6 × 2·5 mm, 4 whorls.

Spiral groove not so conspicuous; tops of ribs therefore not so granular

'*Columbella*' *spreta* Thiele, 1925
Fig. 16e

'*Columbella*' *spreta* Thiele, 1925: 174, pl. 30 (18), fig. 25.

One specimen 3 × 1·5 mm appears to agree with the description and figure.

Locality: Off Keiskamma Point (between East London and Port Alfred), 33 fathoms, one dead (S.A.M. A29991).

Distribution: Originally described from Great Fish Bay, Angola.

'*Columbella*' *metella* Thiele, 1925
Fig. 16b

'*Columbella*' *metella* Thiele, 1925: 175, pl. 31 (19), fig. 4.

Description: Protoconch 1½ whorls, smooth, junction with 1st post-natal whorl distinct. Post-natal whorls 3½–4. Axial ribs about 18 on 1st, about 20 on 2nd, 21 on 3rd, on last half whorl becoming irregular and evanescent. Spiral lirae subordinate to the ribs, 4–5 on 1st whorl, 5–6 on 2nd, 6–7 on 3rd, 7 on last part of shell, with about 12–15 additional lirae on base. Outer lip somewhat thickened, with indications of 2–3 denticles. Shell 5 × 2 mm, Thiele: 4·5 × 1·8 mm.

Localities: 34° 51′ S. 19° 37′ E., 80 metres, 3 (Thiele). Off Umhloti River (Natal), 100 fathoms, 3 and 2 broken. 34° 5′ S. 25° 55′ E., 67 fathoms, one (S.A.M. A29992, A29993).

Remarks: The ribs, and to a lesser degree the lirae, are sharp in the Natal specimens, and thus appear much less wide than the worn specimen figured by Thiele. The Algoa Bay (P.F.) specimen is also somewhat worn.

'*Columbella*' *consanguinea* Sow., 1897

'*Columbella*' *consanguinea* Sowerby, 1897: 11, pl. 8, figs 6, 7. Barnard, 1959: 182.
Mangilia consanguinea Bartsch, 1915: 25. Turton, 1932: 27.
Donovania stimpsoni Bartsch, 1915: 33, pl. 3, fig. 3.
Columbella mutabilis Turton var. *multicostata* (*non* Blanckenhorn) Turton and var. *convexa* Turton, 1932: 68.
Columbella langleyi Sowerby and *consanguinea* Sowerby.

Bartsch (1915) transferred *consanguinea* to *Mangilia* without giving any reason; and Turton followed suit.

I have seen three specimens of *consanguinea* in the Turton collection, presumably those which he said (p. 27) agreed with specimens in the British Museum. They have obscure axial riblets, about 14–16 on the last of the three post-natal whorls; the spiral striae are distinct (scarcely 'minute' as Sowerby and Turton described them) 7–8 on 2nd and 8–9 on 3rd, with about 10–12 on base (the anterior ones feeble and difficult to count; cf. Sowerby's figures).

The axial ribs (when not worn) are crossed by the spiral striae, and are close enough together to render the interstices punctate (cf. Sowerby; though the punctae are more horizontally oval than circular).

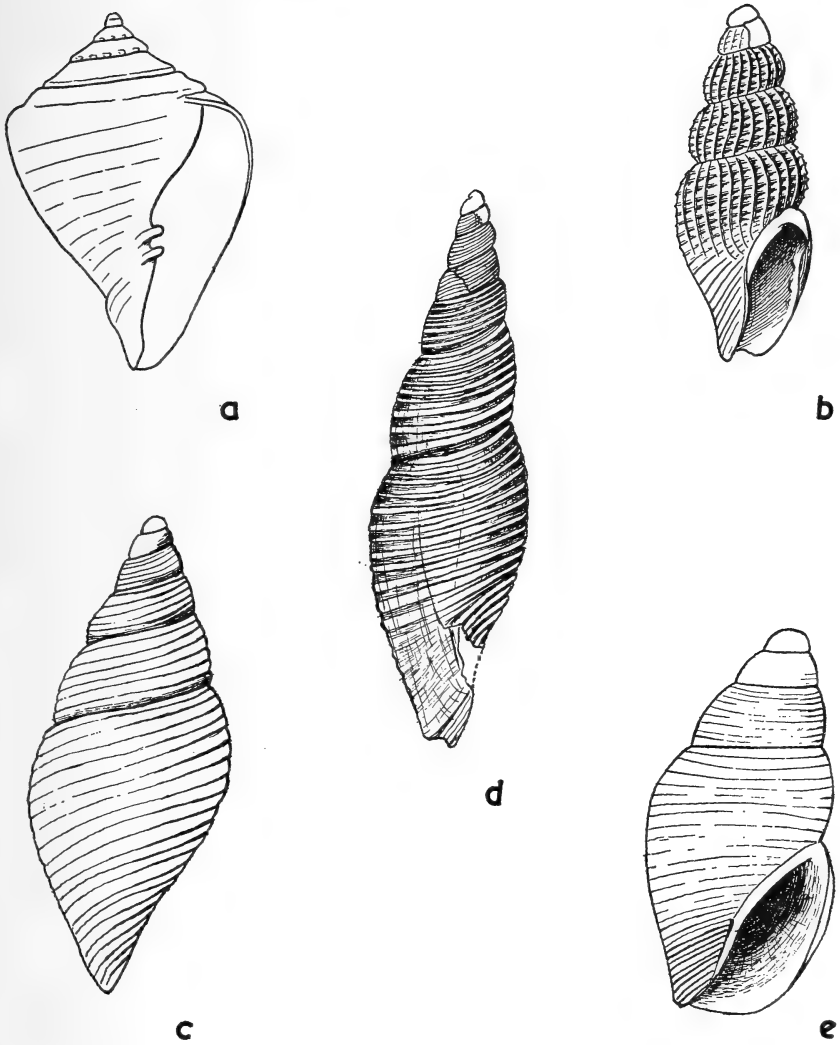

FIG. 16. a. *Columbella turturina* Lam. Juvenile. b. *C. metella* Thiele. c. '*Columbella*' *confertilirata* Brnrd. d. '*C*'. *polyarosus* Brnrd. e. '*C*'. *spreta* Thiele.

The protoconch of 1½–2 whorls is smooth, altitude and diameter 0·5 mm.

Turton said there were two rows of white spots, but these were not mentioned by Sowerby. In Turton's shells they have now (1961) faded, though in one shell faint traces of the row from the top remain.

Also in *langleyi* no mention of white spots was made by Sowerby, but Turton said there was one subsutural row.

The difference between the two species lies in the greater (*consanguinea*) or lesser (*langleyi*) development of the axial and spiral sculpture. Five worn specimens from False Bay agree with *langleyi*, and have two rows of white spots. Another specimen, identified by Tomlin as *langleyi*, appears smooth but when closely examined shows indications of the spiral striae. Two specimens were taken alive in False Bay, from which the radulae were extracted (Barnard, 1959: 179). These are also smooth but with indications of axial and spiral sculpture.

C. langleyi may be accepted as a relatively smooth form, normally with one or two rows of white spots; and *consanguinea* as the strongly sculptured form.

Both were described from specimens 4·5 mm and 4·25 mm long, respectively, with three post-natal whorls.

From its radula, *langleyi* can be placed in *Pyrene* (Barnard, 1959: 179), but up to the present no living examples of *consanguinea* or *mutabilis* have been obtained.

C. consanguinea Sowerby and *mutabilis* Turton, 1932

Turton said that *mutabilis* varies much in shape (p. 68, pl. 16, nos. 489, 490, 491; and also p. 68); when worn the axial ribs disappear and the shell appears smooth though the spiral lines are just visible (cf. *langleyi* above).

Thanks to Dr. A. J. Cain, Oxford University Museum, I have been able to examine Turton's type sets; *mutabilis* 5 shells, var. *multicostata* 6 shells, and var. *convexa* 5 shells.

All these are four-whorled (post-natal) shells from 4·75–6·25 mm long, except one three-whorled shell of 3 mm. The latter differs in no respect from his 4 mm *consanguinea* shells with indications of the subsutural white spots, but is somewhat paler.

In a series of nearly 50 shells from Still Bay there are examples agreeing with the various forms in Turton's type sets of *mutabilis* and vars, except that none of them is dark or chestnut brown like the *mutabilis* set. There are 4 or 5 which show faint traces of the subsutural white spots, and one with two rows of spots.

Thus there is no doubt that *mutabilis* is only the four-whorled (adult) stage of the three-whorled *consanguinea*, and consequently becomes a synonym of the latter.

Turton's varietal name *multicostata* is preoccupied for a fossil by Blanckenhorn, 1901; but there is no need to rename it.

'*Donovania*' *stimpsoni* Bartsch, 1915

From Bartsch's figure and the words 'nuclear whorls decollated' (i.e. abraded?) in his description, one assumes that Stimpson's shell was dead. If this is so, Bartsch was optimistic in assigning it to *Donovania*, which he included as a turritid genus.

Thiele (1929) assigned the genus to the Buccinidae, using *Chauvetia* Monterosato in place of the preoccupied name *Donovania*.

The specimen in question looks very like a columbellid; and anyone familiar with the fauna of Simon's Bay, where Stimpson dredged, would expect to find a columbellid rather than a representative of a Mediterranean genus. In fact, at least five species of columbellids are found in that area.*

The three species *consanguinea*, *lightfooti* and *mutabilis* have axial riblets and spiral lirae; in dead shells of *lightfooti* the brown colour is patchy, in the form of interrupted lines on the lirae; *mutabilis* is uniformly brown (Turton).

'*Donovania stimpsoni*' resembles the latter in coloration (not a very good specific character). Axial riblets may vary in number and are liable to wear, and therefore are not very reliable characters. The spiral lirae in '*D. stimpsoni*' are 6 or 7, and 10 on the base; these numbers correspond with those in *mutabilis* (Barnard, 1959: 181).

In the type set of *mutabilis* (Turton No. 489) there are two worn shells with faint axial ribs and more or less distinct spiral striae, corresponding with '*D. stimpsoni*'. In fact, the shell with the more distinct striae might have posed for the drawing given by Bartsch.

Consequently *mutabilis* becomes a synonym of *stimpsoni* and both become synonyms of *consanguinea*.

In dealing with unworn shells, it is preferable for the time being to keep the smooth shells (i.e. with very indistinct sculpture) (*langleyi*) separate from those with strong sculpture (*consanguinea*). As stated above, the radula of the latter is unknown.

Columbella ? *capensis* Sow., 1892

Columbella capensis Sowerby, 1892: 22, pl. 1, fig. 20.

Tomlin (1931: 437) said this is a turrid belonging to the genus *Daphnella*. If so, a comparison with *Daphnella alfredensis* Bartsch, 1915 would be useful. Sowerby's figure is too small to be helpful; such as it is, it shows the spire longer than the aperture; Bartsch's figure of *alfredensis* shows spire and aperture subequal, and a topotype of the latter in the South African Museum shows the aperture longer than the spire.

Turton (1932: 68) said the shells which Bartsch recorded as *C. capensis* Smith (*sic*: *laps. cal.* for Sowerby) were quite different from Sowerby's *capensis*,

* *fulminea* Gould, 1860 = *kraussi* Sowerby, 1844, *langleyi* Sowerby, 1897, *consanguinea* Sowerby, 1897, *lightfooti* Smith, 1901, and *mutabilis* Turton, 1932.

Stimpson obtained the first named species (incidentally *alfredensis* Bartsch, 1915 is also a synonym of *kraussi*); what more likely than that he obtained also one of the other species?—Ed.

and he named them *mutabilis*. The latter is a brown shell; *C. capensis* and *D. alfredensis* are both white shells (see above).

Fam. **Rapidae**

The following characters would seem to be useful in defining the South African species:

1. Spiral lirae approximately subequal, i.e. the intermediaries become as strong, or nearly as strong as the main lirae; and all the lirae are close together. The sculpture is therefore not clathrate.

   Spire 2/3 length of aperture:

   Latiaxis rosaceus
   Coralliophila fritschi (& *fragosa*)
   C. isosceles
   C. zuluensis

2. Spiral lirae alternately strong and weak. Axial ribs and strong spiral lirae forming a clathrate sculpture.

   a. Spire 2/3 length of aperture. Weak spiral lirae between the suture and uppermost strong (prominent) lira.

   Chaka's Rock (A29995)
   Tongaat (11246)
   Empangeni (U.C.T. G. 13 C.)

   b. Spire half length of aperture. Conspicuously clathrate. Area between suture and uppermost lirae with axial ribs but no spiral lirae. Aperture somewhat patulous.

   Chaka's Rock (A29994).

Coralliophila sp.

Fig. 17a

Description: Spire 2/3 length of aperture. Protoconch and 1st whorl worn away. Remaining post-natal whorls: 2nd corroded, 3rd, 4th and 5th, profile convex. Axial ribs 15 on 3rd, 13 on 4th and 12 on 5th whorl (probably 13 on 5th but outer lip broken); starting from suture above, and crossing base. Crossed by spiral lirae, 4 (5) on 3rd (somewhat worn) 8 on 4th whorl, of which the 4th, 6th and 8th lirae are more prominent than the others, 5th and 7th being intermediaries, 8th peripheral, on 5th whorl 10 lirae, 4th, 6th and 8th prominent, 10 becoming prominent beyond the aperture and on back of outer lip; in addition, smaller intermediaries above and below the 5th, 7th and 9th lirae. 3 lirae on base with 2–3 intermediaries between each pair, followed by 2 lirae above the costate and squamose rostrum. All lirae squamose.

Columella nearly straight, rimate anteriorly. Umbilicus closed by columellar callus. Canal short, anteriorly worn but probably slightly reflexed

when perfect. Aperture piriform, posterior margin of outer lip oblique to preceding whorl.

Shell 25 × 17 mm. White.

Locality: Chaka's Rock, Natal, one dead (S.A.M. A29995.)

Coralliophila sp.

Fig. 17b

Coralliophila fritschi von Martens, Barnard, 1959: 189.

On further consideration, this specimen appears to be different from *fritschi*, and resembles the large Chaka's Rock specimen.

Description: Axial ribs 15 on 2nd, 13 on 3rd, 12 (penultimate one is double) spiral lirae on same scheme as those of the Chaka's Rock specimen, i.e. the 2 peripheral ones and the 3 basal ones are stronger than the others. Sculpture clathrate. Shell 15 × 9 mm.

Locality: Tongaat, Natal.

Description: A similar specimen, 17 × 10 mm, but the axial ribs become irregular and obsolete on the 4th whorl. Spiral lirae unequal in strength. Sculpture clathrate, but not so conspicuous as in the Chaka's Rock and Tongaat shell. Animal examined, no radula.

Locality: Empangeni Coast, Zululand. One living (U.C.T. G.13.C.).

? *Coralliobia* sp.

Fig. 17c

Description: Spire half length of aperture. Protoconch 1½ whorls, smooth, diameter 0·75 mm. Post-natal whorls 4, profile shouldered. Axial ribs 13 on 2nd, 13 on 3rd, 11 on 4th whorl, narrow between suture and uppermost spiral lirae, thickening below; on 4th whorl crossing base.

Spiral lirae 2 on 2nd and 3rd whorls, subequal or on the lower one peri-

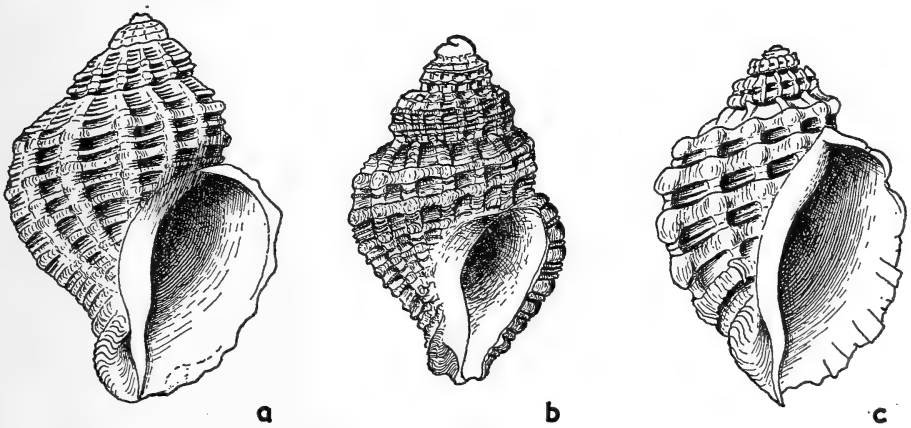

FIG. 17. a. *Coralliophila* sp. b. *Coralliophila* sp. c. *Coralliobia* sp.

pheral, the upper one forming the shoulder; on base 3 lirae, on 4th whorl feeble intermediaries, one between the two main lirae, 2 between each of the following pairs of lirae. All lirae squamose. Hollows between ribs and lirae deep, forming a strong, clathrate sculpture. Rostrum costate and squamose.

Columella gently curved, scarcely rimate, umbilicus closed. Canal short, anteriorly recurved. Aperture oval, somewhat patulous, the posterior margin of the outer lip (tabulate shoulder) slightly oblique to preceding whorl. Shell 12 × 8 mm. White.

Another specimen, 10 × 7 mm, but with more numerous axial ribs: 16 or 17 on 3rd, 14 on 4th whorl; lowermost basal lira more prominently squamose; intermediaries between developed.

Locality: Chaka's Rock, Natal, 2 dead (A29994).

Fam. **Muricidae**

Murex maurus Broderip, 1832

Murex maurus Broderip, 1832: 174. Tomlin, 1931: 435.

Locality: Durban, 3 alive, S.A.M. A29970.

Pteropurpura (*Poropteron*) *uncinarius* (Lam., 1822)

Fig. 19f

Pteropurpura (*Poropteron*) *uncinarius* (Lamarck), Vokes, 1964: 3.
'*Murex*' *uncinarius* Lamarck, Barnard, 1959: 198.

Pteropurpura (*Poropteron*) *mitraeformis* (Sow., 1841)

Pteropurpura (*Poropteron*) *mitraeformis* (Sowerby, 1841), Vokes, 1964: 3.
'*Murex*' *mitraeformis* Sowerby, Barnard, 1959: 200.

Additional record: Umhlali, Natal, living, S.A.M. A29971.

Trophon acceptans Barnard, 1959

Trophon acceptans Barnard, 1959: 202.

The further material which has recently (August and December 1959) been obtained has necessitated a revised definition of the species. The juveniles are now regarded as belonging to another species, which will remain unnamed pending more material.

The reference now reads: p. 202, fig. 40d (radula), 43b (adult only). S.A.M. A3449, A3473 (type) and A3480.

An amended description and a full discussion of the material is included in my report on Dr. Talbot's deep-sea Mollusca (Barnard, 1963*c*: 435).

The suggestion is also offered that *acceptans* may be synonymous with *guineensis* Thiele, 1925.

Trophon beatum n.sp.

Fig. 18c

Description: Protoconch 1½ whorls, 0·4 × 0·4 mm, smooth but when seen highly magnified minutely shagreened. Post-natal whorls 4, profile angular.

1st whorl with 3 spiral lirae, the middle one strongest and peripheral lirae above and below weak at beginning of whorl; at end of 1st whorl a 2nd lira starts below, and at end of 2nd whorl, a 2nd lira starts above the peripheral keel, i.e. 5 lirae on 3rd and 4th whorls; crossed by axial riblets, the first 2 or 3 on the first whorl wider apart than the following riblets, about 25 on 1st whorl, increasing to about 40–50, retractive above and protractive below the peripheral keel, narrower than the lirae, the hollows axially oblong. 4 mm, white.

Locality: False Bay (University of Cape Town).

Remarks: The front part of the animal has been torn out, and no operculum or radula was obtained. Inclusion in the genus *Trophon* is therefore only provisional.

Afritrophon agulhasensis (Thiele, 1925)

Afritrophon agulhasensis (Thiele), Barnard, 1959: 208.

Additional records: Olifantsbos and Kommetjie, west coast of Cape Peninsula. One sinistral specimen from Olifantsbos.

**Tritonalia fenestrata* (Gould, 1862)

Peristernia fenestrata Gould, 1862: 124.
Tritonalia puncturata (Sowerby), Barnard, 1959: 212.

Tritonalia scrobiculata (Dunker, 1846)

Tritonalia scrobiculata (Dunker), Barnard, 1959: 212.

Additional record: Lüderitzbucht (U.C.T.).

Tritonalia juritzi n.sp.

Fig. 18d

Description: Protoconch 1½ whorls, altitude 0·75, diameter 0·5 mm, smooth. Post-natal whorls 6 (7th broken off). Axial ribs 10 on each whorl; spiral lirae 2 on 1st whorl, 3 on 2nd–5th whorls, 4 on 6th, the uppermost forming a well-marked shoulder, all of the lirae stronger than the axial ribs; space between suture and 1st lira smooth except for growth-lines and axial ribs; spaces between the lirae narrow; intersections bluntly nodulose. Shell incomplete, base and aperture broken. Shell 8 × 3 mm. White.

Locality: Doubtful, possibly Cape Peninsula.

Type: Holotype in South African Museum. S.A.M. A30051.

Remarks: This single specimen was found amongst a large number of *T. purpuroides* collected and sorted by the late C. Juritz, a resident of Cape Town. In style the sculpturing closely resembles that of *purpuroides*: a rather broad subsutural tabulate space followed by *thick* lirae, the hollows between them

* *Tritonalia* Fleming, 1828 may be a *nomen dubium*, in which case it must be replaced by *Ocinebra* (Leach), Gray, 1847.

horizontally narrow oblong. The protoconch is higher than wide, thus resembling that of *scrobiculata* more than that of *purpuroides*.

The greater number of whorls is an obvious difference; even adult *purpuroides* has at most 5 whorls, and at 8 mm length has only $3\frac{1}{2}$–4. There are fewer axial ribs, and only 2 spiral lirae. These differences would seem to exclude the possibility of this shell being a narrow scalariform aberration of *purpuroides*. *Mangilia gemmula* Turton, 1932: 26, is comparable in having the same number of whorls at a length of 4 mm and 2 spiral lirae; but these are more widely spaced, and there are 12 axial ribs, consequently the hollows are more squarish, less horizontally narrow oblong. Turton's description stated one protoconchal whorl and 4 post-natal whorls; his figure gives the impression of 2 and 3 respectively.

Although provisionally included in *Tritonalia* on account of its resemblance to *purpuroides*, the possibility remains that the present shell is a turritid.

Tritonalia aedicularum n.sp.
Fig. 18e

Description: Protoconch $1\frac{1}{2}$ whorls, smooth, altitude and diameter 0·6 mm. Post-natal whorls 5, whorls convex, sutures deep. Axial ribs on 1st whorl 12 or 13, on 2nd 13, on 3rd 13 or 14, on 4th 18 or 19, on 5th 20; on 4th and 5th whorls the ribs are at somewhat irregular intervals and some of them are duplicated (hence sudden increase on 4th whorl). On 1st and 2nd whorls 2 peripheral spiral lirae, on 3rd a 3rd lira develops between the suture and the upper peripheral lira; on 4th whorl 2 lirae between suture and upper peripheral lirae and one between lower peripheral lira and the suture below, i.e. 5 lirae; on 5th whorl 3 lirae above the upper peripheral lirae, i.e. total 6 lirae; a fine lira is visible immediately above the lower suture on 2nd, 3rd and 4th whorls, forming on the 5th whorl the uppermost basal lira; on base 8 lirae.

Junctions of ribs and lirae nodular on 1st and 2nd whorls, thereafter becoming squamulose (crispate), squamae on basal lirae or rostrum close together.

Aperture subequal to spire; canal narrow, well marked off from rest of aperture. 14·5 × 6·5 mm (5 whorls); 11 × 5 mm (4 whorls).

Locality: 33° 50′ S. 25° 47′ E., 36 metres, one living (4 whorls), one dead (U.C.T.).

Remarks: The radula has more resemblance to that of *Thais castanea* (Barnard, 1959; fig. 40i) than to that of *Tritonalia puncturata* (= *fenestrata*) ibid., fig. 40c): lateral cusp with a denticle on inner margin, and 2–3 denticles externally.

Thais capensis (Petit, 1852)

Thais capensis (Petit), Barnard, 1959: 220.

Remarks: In addition to *succincta natalensis* n.var., Nardini also recorded *tumulosa* Reeve from Umkomaas (1934: 206, pl. 15, fig. 16). Nardini's photo of his specimen undoubtedly represents *capensis*. He claimed that the latter

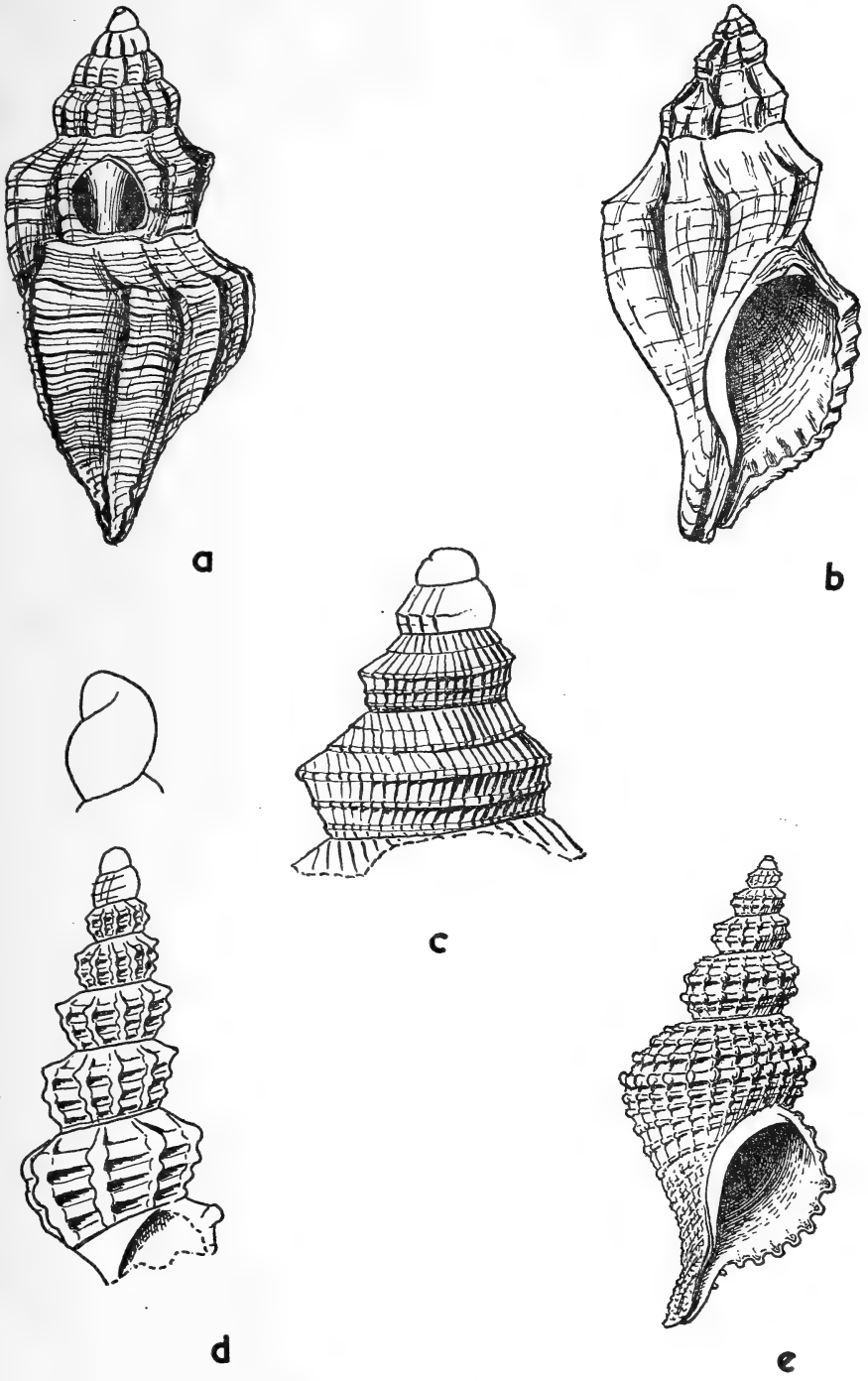

FIG. 18. a. '*Purpura*' *wahlbergi* (Krss). b. '*Purpura*' *wahlbergi* (Krss). c. *Trophon beatum* n.sp. d. *Tritonalia juritzi* n.sp. Protoconch further enlarged. e. *T. aedicularum* n.sp.

species, i.e. what he called *tumulosa*, had been 'found fossil for the first time'; but his specimens were not true fossils in the usual sense, but were obtained from kitchen-middens; there are no Pleistocene deposits at Umkomaas.

'*Purpura*' *wahlbergi* (Krss, 1848)

Fig. 18a

Thais wahlbergi (Krauss), Barnard, 1959: 223.

Description: Shell 23 × 13 mm. Protoconch plus 5 whorls. 1st whorl: 11 or 12 ribs (corroded), 2nd whorl: 11 ribs, 4 spiral lirae; 3rd whorl: 11 ribs, 5 spiral lirae; 4th whorl: 10 ribs, 6 spiral lirae plus 2 or 3 intermediaries; 5th whorl: incomplete. On the 3rd whorl the ribs tend to become lamellate and shouldered, increasingly so on the 4th and 5th whorls. Shoulder not sharply angular as in '*Murex*' *w.*

Spiral lirae ± crispate. Aperture pinkish-fawn. Radula as in Langebaan and Oudekraal specimens.

Locality: One living specimen of the lamellate form was taken by the University of Cape Town (L.B. 552A) at Langebaan.

Remarks: At first sight resembling '*Murex*' *wahlbergi* Krauss, but the shoulders are less sharply angular, and the lirae are for the most part crispate.

In the non-lamellate form the growth-lines at intervals tend to become slightly lamellate, each lira forming a squamule, but not raised more than 0·5 mm above the surface. In the lamellate form some of the lamellae project 1 mm at the shoulder.

Fig. 18b

Four specimens, probably of this species, were obtained from dredgings in Simonstown dockyard, by Mrs. Connolly. Largest: 26 × 14 mm. (See figure.)

Protoconch corroded away, 5 whorls remaining. 9 axial ribs on the earliest whorl, 8 on each of the others. Traces of spiral lirae on 2nd remaining whorl, and on back of outer lip. Outer lip varicoid, 6-plicate within, canal narrow.

? **Muricidae**

Fig. 19a–e

Description: Protoconch about 1 & 1/5th whorls, bluntly conical, spirally hollowed, ending with a varix (1); followed by about half a whorl, with 4 varices (2–5), the last forming the outer lip; the 2nd–5th varices lamellar, auriculate above. Two spiral lirae, with faint indication at outer lip of the formation of a third lira. 1·5 × 1 mm, diameter of protoconch (as seen from aperture side) 0·4 mm. White, shiny.

Locality: Still Bay.

Remarks: The apical, spirally hollowed portion of the protoconch bears some resemblance to that of *Afritrophon* (Barnard, 1959: fig. 45a and c), but in other respects is quite different.

The size of the present protoconch seems to indicate a small species about the size of the species of *Afritrophon*. Probably a muricid, less likely a turritid.

From its fresh unworn condition the shell cannot have been washed up from far off the coast.

FIG. 19. a–e. Genus? f. Radula of *Pterynotus* (*Poropteron*) *mitraeformis* (Sow.).

Fam. **Columbariidae**

Columbarium cf. *formosissimum* Tomlin, 1928

Fig. 20b

Columbarium formosissimum Tomlin, 1928: 331, pl. 25, figs 1, 2.

Description: Protoconch, altitude 1·5, diameter 1·3 mm, smooth, 2 whorls, junction with 1st post-natal whorl not distinct. 7 post-natal whorls, profile angulate a little below the middle of the whorl; axial ribs 12 on 1st 3 whorls, reduced to 10 on later whorls, stronger below than above the peripheral angulation where they form ± complanate rounded lobes. On the body whorl the ribs are slightly angular below the peripheral lobes. Fine spiral lirae above the periphery, 2 on 2nd whorl, increasing to 6 (7) on 6th whorl, but becoming obsolete on 7th whorl except 2 or 3 faint ones just above the lobes; below periphery one on 2nd whorl increasing to 3 on 6th and 4 on 7th whorl; on body whorl 3 slightly stronger lirae form small projections on the profile, with a fine intermediary between each pair; below these, on base and rostrum at least 25 lirae. Growth-lines rather prominent, forming axial striation above the peri-

pheral lobes, less distinct below the lobes. Sutures undulate. Periostracum thin, fibrous, pale brown.

Locality: 29° 56′ S. 31° 12½′ E., 200 fathoms (off Durban). Fisheries Survey Station K220. Two dead, both with hermit crabs. 39 × 16 mm, nucleus of protoconch missing, 7 whorls. 47 × 17 mm, protoconch plus 7 whorls.

Remarks: Very close to *formosissimum* Tomlin, but the whorls are more angulate, less carinate at the periphery, the axial ribs are better developed above the periphery, the peripheral lobes become fewer on the later whorls instead of increasing in number (12 to 10, instead of 8 to 11), the subperipheral angulation on the body whorl has 3 fine lirae instead of 2 (or only one) prominent lirae between the prominent keels. The shell is thus less pagoda-like.

Proportionally broader than *angulare* Barnard, 1959, and without the prominent spiral lirae of *radiale* (Watson, 1882 & 1886).

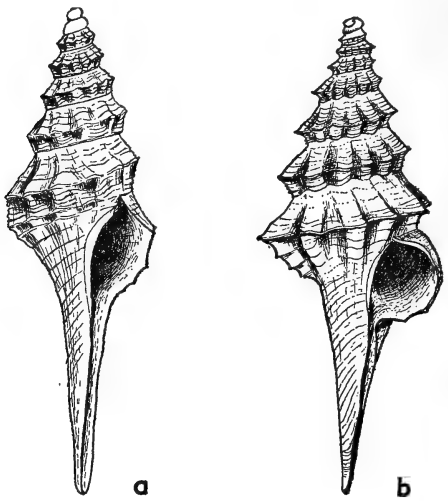

FIG. 20. a. *Columbarium angulare* Barnard.
b. *C.* cf. *formosissimum* Tomlin.

TAENIOGLOSSA

Fam. **Tonnidae**

Tonna ampullacea (Phil., 1845)

Tonna ampullacea (Philippi), Jackson, 1927: 77.

Jackson states that a specimen was collected from the 'Natal coast near Durban'.

Tonna perdix (L.)

Tonna perdix (L.), Barnard, 1963*a*: 7.

Dr. A. C. van Bruggen of the Natal Museum reports that this species is moderately common in Durban Bay; it has been collected by H. C. Burnup

(Natal Museum) and recently by P. Elston, and there is a specimen from Vetch's Pier, Durban, in the collection of Mrs. H. Boswell.

Fam. **Cymatiidae**

Mayena gemmifera (Euthyme, 1889)

Argobuccinum (*Eugyrina*) *gemmifera* (Euthyme), Macnae & Kalk, 1958: 128. Dell & Dance, 1963: 159. Barnard, 1963*a*: 23.

The genus has been confirmed by the radula and operculum.

Additional record: Scarborough, west coast of Cape Peninsula.

Argobuccinum (*Gyrineum*) *pusilla* (Brod., 1832)

Fig. 21

Argobuccinum (*Gyrineum*) *pusilla* (Broderip), Barnard, 1963*a*: 24.

Description: Protoconch altitude 1, diameter 1·25 mm, 2 whorls, smooth, with growth-lines only. Junction with 1st post-natal whorl distinct. 1st whorl with 15 axial riblets, the 8th and 15th varicoid, and 2 spiral lirae.

Radula with about 110 rows, as in *Argobuccinum argus*: lateral plate with 3 small denticles outside the main cusp, inner (posterior) marginal with one denticle at the bend of the plate.

Fam. **Lamellariidae**

The following table which has been adapted from Bergh, 1908, is useful in distinguishing the three species of *Lamellaria*.

	capensis	*perspicua*	*leptoconcha*
Radula	Hind margin straight. Several denticles on either side of median cusp.	Hind margin strongly indented.	Hind margin less strongly indented. Lateral plates very stout.
Colour	Uniform whitish	Grey with numerous ± large blackish spots.	Upper side of mantle greenish white; underside of mantle, neck and upper side of foot velvet black; tentacles and sole of foot white.
Shell	White (? Calcareous)	'Very fragile'	Membranous.

Fam. **Naticidae**

Azuma, 1961: 196–204, pls. 12–15.

Natica forata Reeve

Natica forata Reeve, Bartsch, 1915: 138. Turton, 1932: 158. Barnard, 1963*a*: 59.

Radula like that of *genuana*; both marginals simple.

Locality: East London.

Natica saldontiana Bartsch, 1915

Natica saldontiana Bartsch, 1915, Barnard, 1963*a*: 60.

Additional records: 26°37′ S. 15° 4′ E., 35 metres, living. U.C.T. 30° 42′ S. 15° 59′ E., 201 metres.

FIG. 21. Radula of *Argobuccinum pusilla* (Brod.).

Fam. **Xenophoridae**

Morton, 1958: 89, pl. 9 (adaptations and relationships).

Xenophora solaris (L.)

Xenophora (*Haliphoebus*) *solaris* (L.), Barnard, 1963*a*: 69.

Description: Diameter: 48 mm without processes, 58 mm with. Up to a diameter of 20 mm small stones are attached approximately one between each pair of processes; thereafter, no attachments. Umbilicus open.

Additional record: 29° 42′ S. 31° 21′ E., 57 fathoms. Fisheries Survey Station K241.

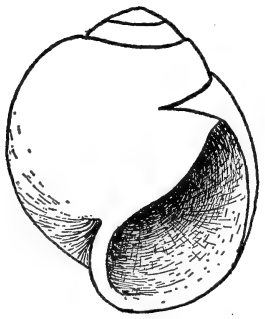

FIG. 22. *Falsilunatia pseudopsila* Brnrd.

Fam. **Fossaridae**

Fossarus translucens n.sp.

Fig. 23a

Description: Shell thin, translucent. Protoconch 2 whorls, smooth; junction with 1st post-natal whorl distinct. Post-natal whorls 2. Two spiral lirae from the start of the 1st whorl; on second half of this whorl a lira develops between the suture and the upper lira; so that the latter becomes the second lira on the 2nd whorl; a fourth lira develops below the original lower lira (later the 3rd); on base, 2 lirae and an indistinct 3rd. All lirae evanescent towards back of outer lip. Growth-lines retractive, more or less feebly pliculose. Umbilicus narrow, deep. Columella straight, aperture large, subcircular. Shell 4·75 × 5 mm. White, protoconch pale corneous.

Locality: Gordon's Bay (False Bay), one, dead.

Type: Holotype in the South African Museum. S.A.M. A30052.

Remarks: Without operculum and radula the position of this shell is doubtful, but it appears referable to *Fossarus*. Similar in shape to *F. ambiguus* but with relatively larger and more circular (less semicircular) aperture. Compared with the only available specimen of *ambiguus* (one from Natal) the present shell is thinner and more delicate, the protoconch is larger, and the lirae weaker; *ambiguus* has only 2 lirae above the periphery on the 2nd whorl.

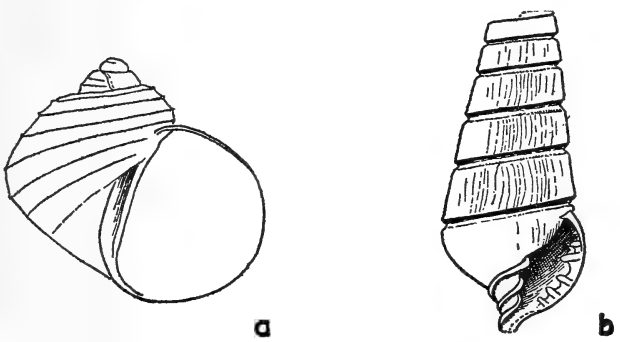

FIG. 23. a. *Fossarus translucens* n.sp. b. *Pyramidella turrita* (A. Ad.).

Fam. **Pyramidellidae**

Pyramidella (*Longchaeus*) *turrita* (A. Adams, 1854)

Fig. 23b

Obeliscus turritus A. Adams, 1854: 807, pl. 171, fig. 17.
Pyramidella turrita (A. Adams), Schepman, 1909: 24. Nardini, 1934: 239, pl. 18, (5), fig. 4.

Description: Five whorls, apex missing. Whorls straight-sided, finely crenulate on upper margin, polished. Sutures channelled. Growth-lines slightly concave, extending from suture to suture, but at variable intervals and often indistinct

(surface worn in places). Spiral striae microscopic. Last whorl with peripheral sulcus. Not umbilicate. Three columellar pleats. Outer lip internally with 6 plicae, the posterior one minute. Shell 19 × 8·5 mm. White, with a few extremely faint brownish patches.

Fossil: Quaternary, Adulis (Erythrea, Red Sea) (Nardini, 1934). Durban Harbour sediments, 0′ — 30′, one specimen (Professor Lester King, 1963).

Distribution: Living: Red Sea (Issel, 1869), North Australia, Queensland, East Indies.

Remarks: The present specimen agrees with Adams's description. Hedley, (1899) states that the adults develop plicae within the outer lip. Laseron (1959) gave reasons for rejecting *Longchaeus* and proposed *Wingenella* instead, with the North Australian *eburnea* Laseron as the type species. He did not mention *turrita*. Where the growth-lines are far apart, the intervals appear like low flat ribs; but these are not strong enough to warrant putting this specimen into the subgenus *Pharcidella* Dall.

Nardini (1934) figured a specimen 13 × 3·5 mm, with 9–10 whorls.

Turbonilla trachealis Gould, 1861

Turbonilla trachealis Gould, Barnard, 1963*a*: 84.

Additional record: Lüderitzbucht, U.C.T.

Turbonilla pellucida (Sow., 1897)

Turbonilla pellucida (Sowerby), Barnard, 1963*a*: 84.

Additional record: West coast of Cape Peninsula.

Turbonilla tegulata Sow., 1892

Turbonilla tegulata Sowerby, Barnard, 1963*a*: 86.

Additional record: West coast of Cape Peninsula.

Turbonilla similans Smith, 1903

Turbonilla similans Smith, 1903*a*, Barnard, 1963*a*: 87.

Additional record: Kommetjie, west coast of Cape Peninsula.

Odostomia lavertinae Smith, 1901

Odostomia lavertinae Smith, Barnard, 1963*a*: 91.

Additional record: West coast of Cape Peninsula.

Odostomia crispa (Sow., 1892)

Odostomia crispa (Sowerby), Barnard, 1963*a*: 92.

Additional record: False Bay.

Fam. **Scalidae**

**Scala aculeata* (Sow., 1844)

Scala aculeata (Sowerby), Barnard, 1963*a*: 101.

Additional record: Queensbury, East London.

Scala munda n.sp.

Fig. 24b

Description: Protoconch 2 whorls, smooth, shiny, pale corneous. Post-natal whorls 3. Axial pliculae beginning on later half of 1st whorl, about 20; 32 on 2nd, 33 on 3rd becoming feeble and indistinct towards end of 3rd whorl, distinct only in upper quarter of whorl near suture, though a few cross the whorl, rather stronger than the other growth-lines. On upper part of the base, 3–5 fine spiral striae. Umbilicus a mere chink. Aperture oval. Shell 4·5 × 3 mm. White.

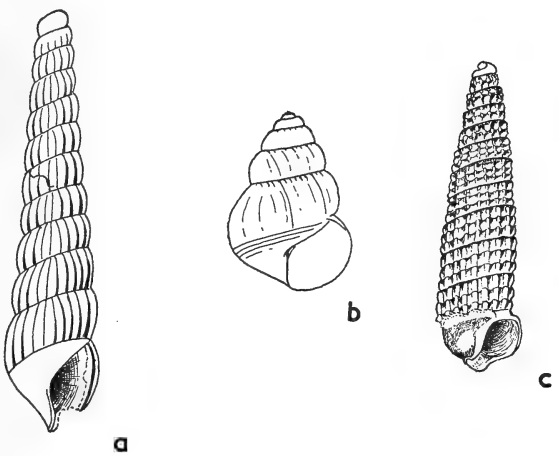

Fig. 24. a. *Turbonilla bathybius* Brnrd. b. *Scala munda* n.sp. c. *Cerithiella vidalensis* Brnrd.

Locality: Cape Point N. 89° E., 36 miles, 700 fathoms, 4.

Type: Holotype S.A.M. A30552, paratypes S.A.M. A7419, Pieter Faure collection.

Remarks: Nine specimens were taken; five were sent to Tomlin, and are presumably still in the Tomlin collection (National Museum, Cardiff). The shells appear to be referable to *Scala*.

Fam. **Triforidae**

Trifora natalensis Barnard, 1963

Trifora natalensis Barnard, 1963*a*: 112.

Additional record: 33° 9′ S. 28° 2′ E., 84 metres, one, U.C.T.

* Most authors regard *Scala* (Klein), Bruguière, 1792 as an invalid name, and replace it by *Epitonium* Röding, 1798.—Ed.

Fam. **Potamididae**

Annandale, 1924: 549, fig. 11 (note on the reduction of cusps in the radula).

Pirenella boswellae Barnard, 1963

Fig. 25a, b

Pirenella boswellae Barnard, 1963*a*: 140 (preliminary description).

Description: In general, similar to *stowi* Newton, 1913, from the mid-Pliocene deposits at Redhouse, Port Elizabeth. Larger than the fossil, seemingly increasing more rapidly in width, and with less prominent nodules.

Nucleus broken, 15 whorls. Obscure nodules at top of whorl, and another series on lower part of whorl; the latter less distinct than the upper series because half concealed by the following whorl, but on last whorl, where they are fully exposed, they are slightly larger than the upper series; 8 or 9 on 5th whorl, 11 on 9th and following whorls. Profile of whorls slightly concave in the middle. Two faint varices, i.e. the upper and the lower nodules are connected, on 5th to 9th whorls, more or less on opposite sides of the whorl. Fine spiral striae on whole whorl, 11 or 12 on 5th whorl (earlier whorls slightly worn), increasing to 17 or 18 on last whorl. On base 6 striae, then a slight spiral ridge, followed by about 20 striae. Shell 52 × 19 mm. Fulvous, the hollows between the nodules and the concave part between the upper and the lower series of nodules somewhat darker.

Locality: Off Durban, from fish stomach. Holotype in collection of Mrs. Boswell.

Remarks: It is not known, owing to the worn condition of the fossils, whether there are any spiral striae; and therefore the present specimen cannot be identified as *stowi*.

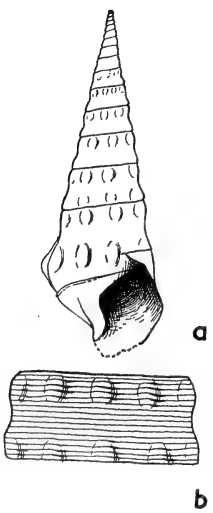

FIG. 25. a. *Pirenella boswellae* Brnrd. b. One whorl, further enlarged.

The original description stated that the lower series of nodules was double, and the figure shows this. But specimens in the South African Museum show only a single series, thereby increasing the likeness between the recent and fossil shells.

Both appear referable to the same genus, but whether such large shells should be included in *Pirenella* is a matter of opinion. Newton remarked that the 39 × 12 mm *stowi* was larger than other species of the genus.

Fam. **Rissoidae**

Alvania alfredensis Bartsch, 1915

Alvania alfredensis Bartsch, 1915, Barnard, 1963*a*: 186.

Additional record: Olifantsbos and Kommetjie, west coast of Cape Peninsula.

Amphithalamus turtoni Bartsch, 1915

Amphithalamus turtoni Bartsch, 1915, Barnard, 1963*a*: 188.

Additional record: West coast of Cape Peninsula.

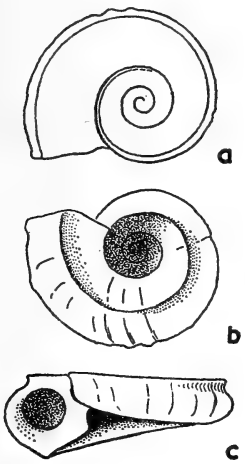

FIG. 26. *Retrotortina* ? *cuniculus* n.sp. a. Dorsal view. b. Ventral view. c. Apertural view.

? Fam. **Skeneopsidae**

? *Retrotortina cuniculus* n.sp.

Fig. 26a, b, c

Description: Shell sinistral, 3 whorls, planorboid, flat above, bordered by a slight but distinct keel; profile of whorl convex, the periphery in dorsal view showing beyond the keel. A keel in middle of lower surface of whorl. A few (5–6) weak varicoid growth-lines, at irregular intervals. Widely umbilicate. Aperture circular, exsert. Diameter 1·5, altitude at aperture 0·5 mm. White, somewhat glistening.

Locality: Algoa Bay (probably 30–40 fathoms).

Type: S.A.M. A30053, Pieter Faure number 580.

Remarks: Resembling a juvenile *Heliacus* (cf. Barnard, 1963*a*: fig. 31) more than a juvenile *Astraea* (cf. Barnard, 1963*b*: fig. 7d, e) but differing in profile from *Bifrontia zanclea* (see Sowerby, 1868: pl. 254, fig. 102).

Thiele's diagnosis (1929: 176) of *Retrotortina* Chaster, 1896, would include the present shell; very small, sinistral, flattened, widely umbilicate, aperture subcircular. Placed with a '?' in the Skeneopsidae by Thiele. The present species may be placed with a '?' in Chaster's genus. It is thrice as large as *fuscata* Chaster from the Mediterranean. *Vermetus agulhasensis* Thiele, 1925, is sinistral and has a similar exsert peristome, but has nothing else in common with the present shell. In spite of their being dextral, some of the Liotiidae described by Laseron (1954) are somewhat similar in general shape.

RHIPIDOGLOSSA, DOCOGLOSSA, TECTIBRANCHIATA

Fam. **Turbinidae**

Turbo boswellae n.sp.

Fig. 27a

Description: Protoconch nucleus plus 5 whorls. Nucleus and 1st whorl corroded. 2nd whorl with 4 spiral lirae of equal strength, but later the 2nd and 3rd lirae become stronger; 3rd whorl with 2 stronger lirae and 4 weaker ones above; 4th with 2 strong lirae and 5 or 6 weaker ones above. There is a third strong lira on the periphery but this is hidden under the suture and appears only towards the end of the whorl where the 5th whorl drops down towards the aperture; below the 3rd lira 4 or 5 weaker ones, 5th whorl with indications of 8 or 9 weak lirae between the suture and the 1st strong lirae, 4 between 1st and 2nd lirae, 3 between 2nd and 3rd, and 5 between 3rd or peripheral lira and the basal lira which begins at the top of the aperture. Base with indications of about a dozen weak lirae. Growth-lines retractive, rather well-marked on 2nd and early part of 3rd whorls, forming almost a cancellate sculpture.

Imperforate columella without knob or pleat. Interior nacreous. Operculum round-oval, with a slight notch on inner margin and faint indication of a spiral line, above which faint growth-lines can be traced; surface concave, the upper part slightly thickened. White, rather shiny. Altitude 17·5, diameter 17 mm. Dull whitish. Operculum 6·5 × 5·75 mm.

Radula with about 50 rows. Central plate broad, front margin curved, cutting edge weak; 5 lateral plates, the 5th only slightly broader than the rest; inner marginals apically strongly falcate, minutely serrulate, middle marginals sigmoid, apically minutely serrulate, outer marginals slender, apically somewhat spatulate, minutely serrulate on both margins.

Locality: Off Cape Point, about 200 fathoms.

Type: Holotype in South African Museum, S.A.M. A30031.

Remarks: Similar to the almost smooth *Turbo* (*Cantrainea*?) *incoloratus* Smith (1899; 1901), from off South India, 430 fathoms; but definitely lirate and with

perfectly smooth columella. It is very similar to the North Atlantic *Turbo peloritanus* Contraine and its varieties as figured by Locard (1897: pl. 21, figs 28–36). In shape it is almost like var. *cingulatus* Locard (fig. 31) but the liration is not quite like that in any of Locard's figures. For the time being this solitary specimen from a widely distant region may be regarded as a new species.

Fam. **Trochidae**

Calliostoma circus n.sp.

Fig. 27b

Description: Protoconch nucleus plus 6 whorls. Profile straight. Sutures sunken. 1st to 3rd whorls with 2 beaded spiral lirae, the upper margin (bordering the suture) also beaded. On 4th whorl an intermediary develops between the beaded upper margin and the 1st lira, and one below the 2nd lira; both becoming stronger on 5th whorl; the beaded upper margin also moves away from the

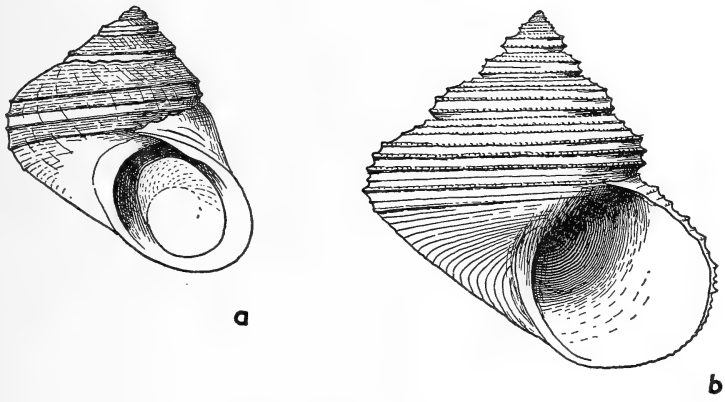

Fig. 27. a. *Turbo boswellae* n.sp. b. *Calliostoma circus* n.sp.

actual sutural margin, becoming a separate beaded lira. The 5th and 6th whorls thus show 2 beaded lirae in the upper half of the whorl and 3 in the lower half, on the 6th whorl a fine non-beaded intermediary develops between the suture and the 1st lira, between the 1st and 2nd lira, and between the 2nd and 3rd; also one below the 5th lira, below it and the 1st basal lira; at the end of the 6th whorl (back of outer lip) the latter intermediary becomes double. Base with 1st lira strong, followed by about 20 lirae, more or less subequal in strength. Aperture subcircular, nonperforate.

Radula with 5 (6) laterals, 1st marginal stout, 4–5 dentate, the outermost marginal strap-shaped. Truncate apex slightly turned over.

Shell 23 × 23 mm. White, iridescent when wet.

Locality: Presumably somewhere off Cape Point. Taken by trawler.

Type: In South African Museum, S.A.M. A30032.

Remarks: Differs from *perfragile* Sowerby by having fewer spiral lirae on the whorls, and stronger lirae on the base. Very similar in shape and liration to the Northern Atlantic *Zyziphinus triporcatus* Fischer as figured by Locard (1897: pl. 2, figs 13–15), but in having granulate lirae and more numerous lirae on the base, it resembles *cleopatra* Fischer (Locard, 1897: 12, figs 20–23).

Also very near *leptophyrna* Dautzenberg & Fischer, 1896, from the Azores, 550–845 metres. Differs in being a larger shell (*leptophyrna* with same number of whorls 16 × 16 mm), with 5 spiral lirae (instead of 4) on last whorl, and more numerous lirae (20 instead of 12) on the base.

Fam.? Gen.?

Fig. 28a, b

Description: Fine apical whorls, very finely cancellate with close-set axial and spiral threads. The following whorl creeps up the spire so as to conceal the lower half of the 5th apical whorl; the 5 apical whorls are thus oblique to the axis of the large last whorl.

Last whorl thin-shelled, with a weak keel forming a shoulder; on back of last whorl midway between upper suture and keel, an opaque white line, which

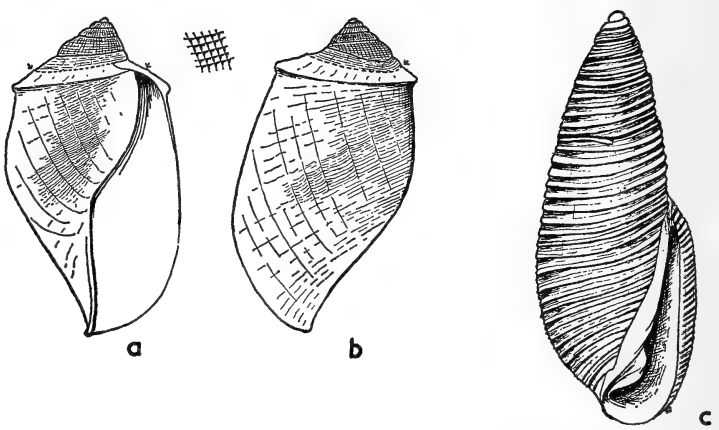

FIG. 28. a, b, ? genus, with enlarged view of cancellate sculpture on apical whorls. c. *Solidula niecaensis* Brnrd.

would form the sutural line of a succeeding whorl. Fine spiral striae above the white line, but none traceable below; a few obscure growth-lines cross the whorl. On last whorl, innumerable very fine spiral stirae, minutely crinkly and feebly scalloped or kinked where they are interrupted by the growth-lines; on later half of whorl (back of outer lip) most of the striae cease more or less abruptly while some combine at wider intervals.

Columella straight. 5·5 × 2·5 mm. White, last whorl semitranslucent.

Locality: Off Illovo River, Natal, 27–30 fathoms, one.

Type: S.A.M. A30054, Pieter Faure 11097.

Remarks: The thin shell and fine sculpturing suggest a tectibranch.

LAMELLIBRANCHIATA

Fam. **Pectinidae**

Amussium cf. *sibogai* Dautz. & Bav., 1904

Pl. 1

Amussium sibogai Dautzenberg & Bavay, 1904: 207–211, figs 1–4. Dautzenberg & Bavay, 1912: 31.

Description: Upper (right) valve corneous, with 6 radiating dull orange-brown streaks, widening distally, with rounded ends, margin paler.

Lower valve pale, flesh-coloured, with 6 faint pale brown radial streaks. Margin white (opaque).

Both valves with fine close concentric growth-lines only; ears similar. Upper valve internally with 6 ribs, appearing narrow, but actually corresponding in width with the external coverings, whitish, but ending in a brown more or less circular expansion. Lower valve internally with 6 ribs, white. No trace of a byssus sinus.

Animal (as perserved in formalin) whitish, mantle margins pale salmon-pink. One, 44 (altitude) × 42 mm—upper valve.

Locality: 29° 55′ S. 31° 16′ E., 222 fathoms. Fisheries Survey Station K247.

Remarks: Agrees with the coloured figures in Dautzenberg & Bavay, 1912, except that it has only 6 ribs instead of 7. (I have not seen the original description.)

Amussium sp.

Pl. 2

Description: Upper (right) valve orange-salmon, with 7 radiating white streaks, narrow, not (or scarcely) widening distally, not extending to margin. Lower valve pale pink, with 7 white radiating streaks, widening distally, extending to margin. Right valve with fine close concentric growth-lines; early part of shell up to about 8–10 mm altitude, with fine radial lirae, later obsolescent, only 2 or 3 reaching the margin (anterior part). Lower valve with regular fine concentric lirae, a few lirae on posterior ear; dorsal margin of anterior ear very finely crenulate. A minute sinus on posterior ear of left valve.

Upper valve with 11 internal ribs (12 if a short one between distal ends of 8th and 9th ribs be included), narrow.

Lower valve with 11 internal ribs, narrow.

One, living, 20 × 19 mm (upper valve slightly smaller).

Animal in formalin whitish, mantle edges mottled with grey.

Locality: 29° 55′ S. 31° 16′ E., 222 fathoms. Fisheries Survey Station K247.

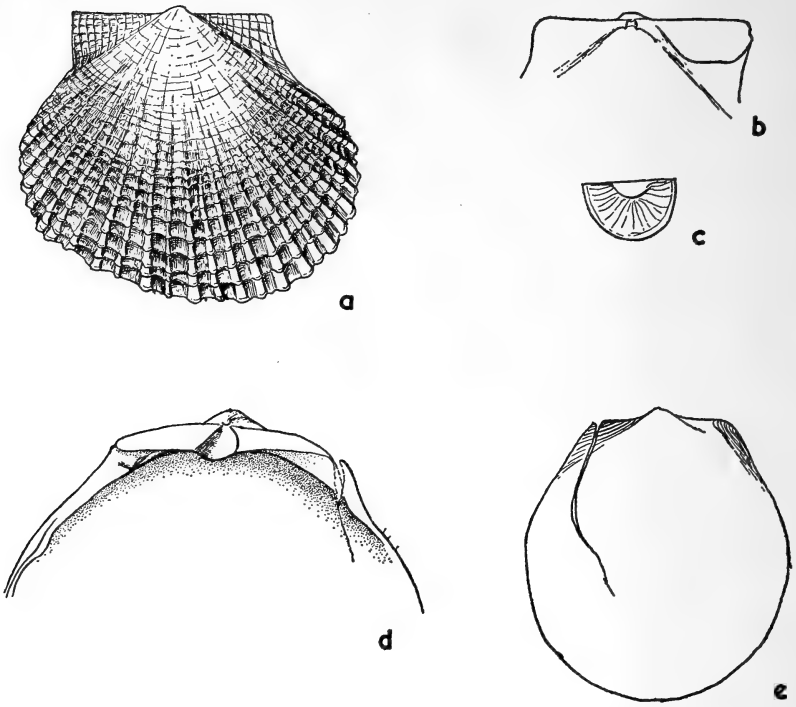

FIG. 29. a. *Cyclopecten incubans* Brnrd. Left valve, external view. b. *Cyclopecten incubans* Brnrd. Hinge of left valve. c. *C. incubans* Brnrd. Juvenile. d. *Lima symmetrica* Brnrd. Hinge. e. *L. symmetrica* Brnrd. External view of valve.

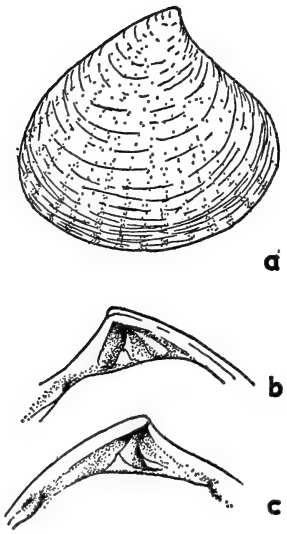

FIG. 30. a. *Venericardia nuculoides* Brnrd. Right valve. b. Right hinge. c. Left hinge.

Remarks: Similar to *A. jeffreysii* Smith, 1885, in colour, with small sinus on left posterior ear, but with fewer ribs (11 instead of 15).

Possibly *A. zoniferum* Dautzenberg & Bavay, 1912 but more highly coloured and has radial striae on right valve (not mentioned for *zoniferum*).

Possibly *A. lacteum* Dautzenberg & Bavay, 1912 but coloured; and it has an extra rib. Recorded from South Africa by Thiele & Jaeckel, 1931.

Acknowledgements

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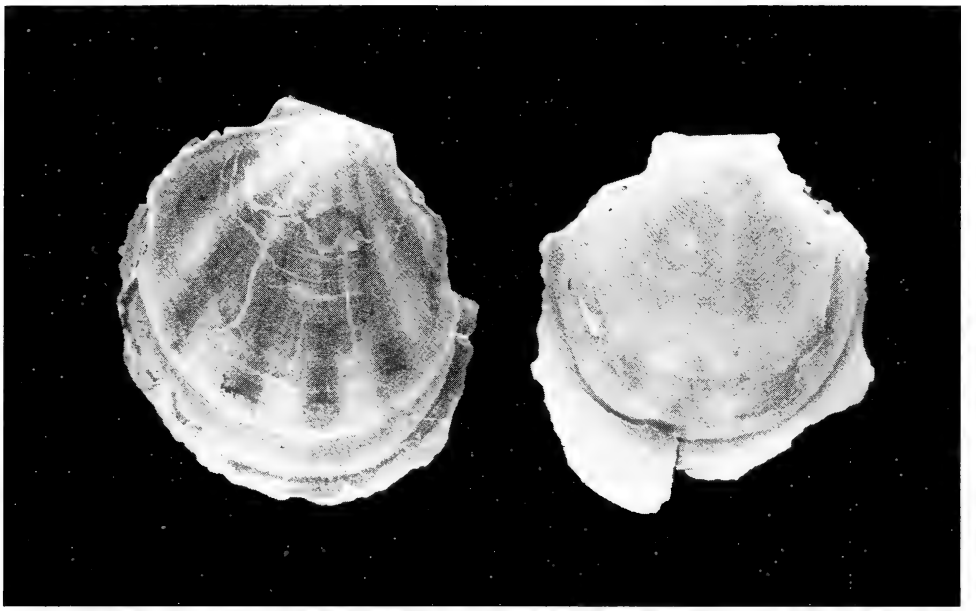

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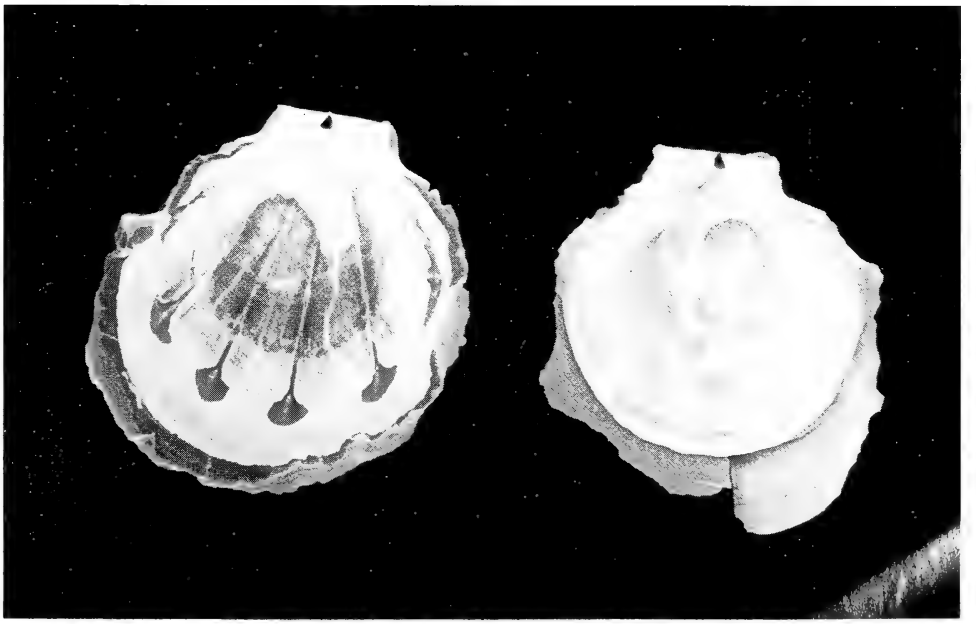
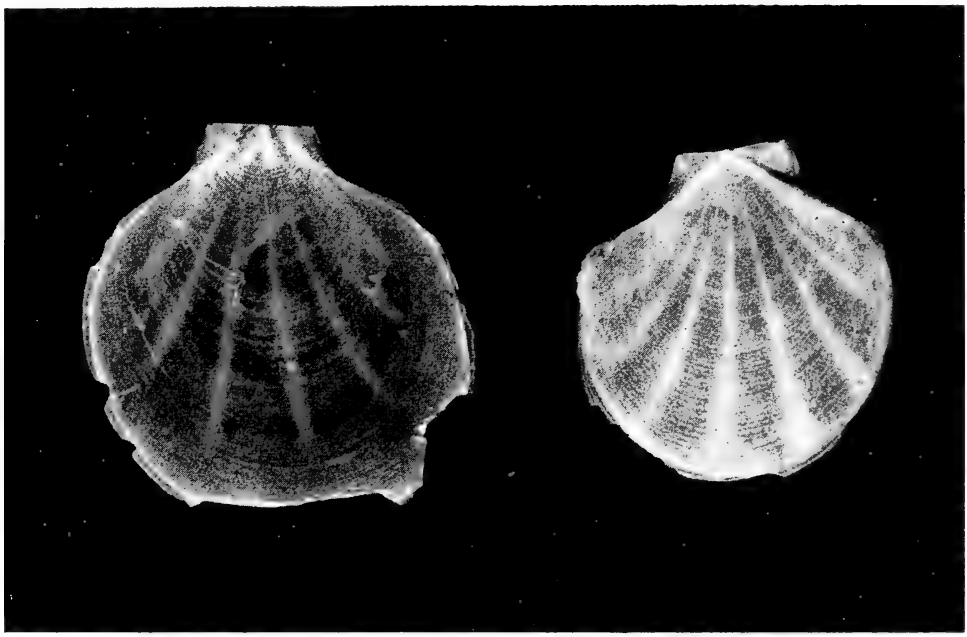


c d

Amussium cf. *siboga*. a. Upper view, right valve. b. Upper view, left valve. c. Lower view, right valve. d. Lower view, left valve.



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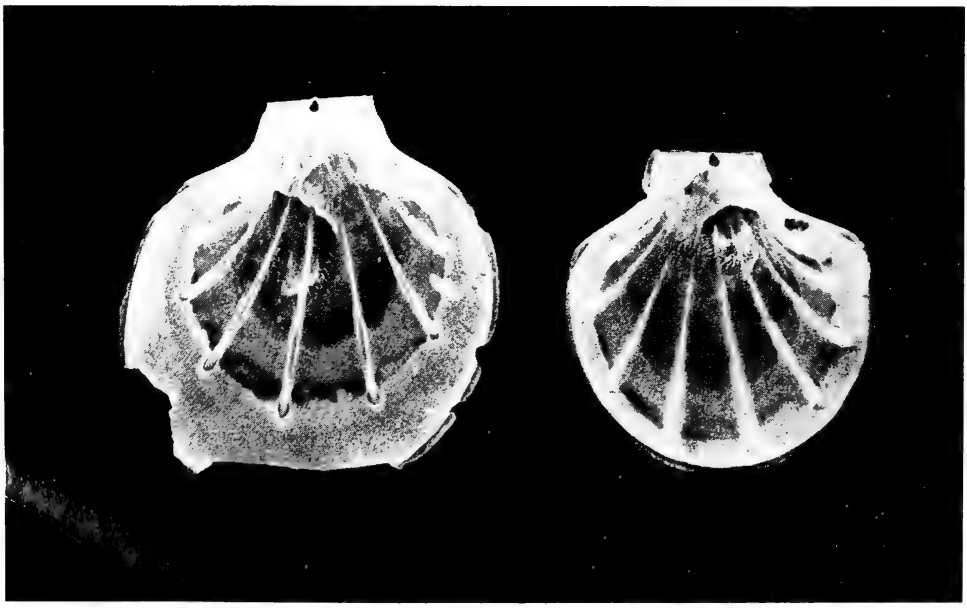

c d

Amussium sp. a. Upper view, right valve. b. Upper view, left valve. c. Lower view, right valve. d. Lower view, left valve.

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CONFERENCE OF BIOLOGICAL EDITORS, COMMITTEE ON FORM AND STYLE. 1960.
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Examples (note capitalization and punctuation)

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ZOOLOGICAL NOMENCLATURE

To be governed by the rulings of the latest *International code of zoological nomenclature* issued by the International Trust for Zoological Nomenclature (particularly articles 22 and 51). The Harvard system of reference to be used in the synonymy lists, with the full references incorporated in the list at the end of the article, and not given in contracted form in the synonymy list.

Example

Scalaria coronata Lamarck, 1816: pl. 451, figs 5 *a*, *b*; Liste: 11. Turton, 1932: 80.

ANNALS

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CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART VII. REVISED FAUNA LIST

By

†K. H. BARNARD

South African Museum, Cape Town

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South African Museum, Cape Town

Contents

Foreword

Amongst the manuscripts left uncompleted by Dr K. H. Barnard at the time of his death in 1964, was a Fauna List of South African marine Mollusca. With his incomparable knowledge of the South African molluscs, it was indeed unfortunate that Dr Barnard could not complete this work, which must inevitably suffer from any editor's lack of this knowledge.

He had almost completed the Gastropoda and Lamellibranchiata sections and with the kind help of several people, Mr B. Kensley has prepared the manuscript for press, adding the groups not dealt with, and bringing the list, as far as possible, up to date to 1969. Dr W. MacNae of the Zoology Department of the University of the Witwatersrand has assisted with the tectibranch and nudibranch molluscs. The cephalopod list has been compiled by Miss M. Roeleveld of the South African Museum. Because many of this group, particularly the squids, are oceanic animals, the list includes species which have been collected from oceanic waters surrounding South Africa, as well as those from the immediate coastal waters.

Where the radula of a species is unknown, i.e. where the species is based only on the shell, the generic name is placed in inverted commas—'*Marginella*'.

A list of references has not been included, as most of the dates given in this list may be found in the reference lists of parts I to VI of the 'Contributions to the knowledge of South African Marine Mollusca' (*Annals of the South African Museum* **44** (4), **45** (1), **47** (1–4).

† Died September 1964.

Ann. S. Afr. Mus. **47** (5), 1974: 663–781

Abbreviations used

A —*Africana*
AII —*Africana II*
Ch —*Challenger*
D.S.E. —Deutsche Südpolar-Expedition
K.H.B. —Dr K. H. Barnard
P —*Pickle*
P.E. Mus. —Port Elizabeth Museum
P.F. —*Pieter Faure*
S.A.M. —South African Museum
S.N.A.E. —Scottish National Antarctic Expedition
Su —*Sulphur*
U.C.T. —University of Cape Town
U.W. —University of the Witwatersrand
V —*Valdivia*

Introduction

Geographical limits

(*a*) Coastal: 15° S. latitude on west and east coasts (i.e. Moçâmedes–Moçambique Island), as adopted for fishes (Barnard 1925: 3) and decapod Crustacea (Barnard 1950: 2), seems too wide, especially on the west coast. In the present list, therefore, the Tropic of Capricorn is adopted, i.e. Walvis Bay–Inhambane. (*b*) Off-shore: for fishes (Barnard 1925:3) the roughly rectangular area 10° E. 40° S. was adopted. This may stand, although towards the outskirts of this area there are very few records of benthic mollusca.

The list includes only those species which

(1) have been collected alive by shore collecting, dredging or pelagic netting;
(2) if not taken alive, have been dredged in South African waters or occur on shore sufficiently frequently as to warrant the assumption that they are living not far distant;
(3) are known from fossils from late Tertiary and Quaternary deposits (†).

The hobby of shell-collecting, though it may often contribute to a knowledge of the molluscan fauna of a country or region, has one feature which may vitiate the endeavours of scientists to compile a fauna list of the genuine inhabitants of that country or region. Shell collectors do not always restrict their collections to a particular region, or to specimens which they themselves have collected. They may exchange with other collectors, or accept shells from friends. Thus the provenance of some shells in their collection cannot be vouched for; it is 'hearsay evidence'.

The records of some of the shells in the Crawford and Bairstow collections, alleged to be 'South African', have already been questioned; the former by Von Martens (1903: 51) in general; the latter by Turton (1932: 113) with

reference to the species of *Cypraea*. The Bairstow collection is at Oxford, but although available for examination, the original provenance of the shells cannot be investigated.

On the other hand Turton (1932) confined himself to one small area, and his collections contain only shells which he himself found in that area; even shells from the Cape and Natal were not included. Whether or not conchologists agree with Turton's *identifications*, his third collection is available (also at Oxford) for critical re-examination, and all the shells can be regarded as *strictly South African*. The same applies to his first collection at the British Museum reported on by E. A. Smith (1904) and his second collection at Washington, reported on by Bartsch (1915).

Bartsch, in addition to reporting on Turton's second collection, included specimens in the United States National Museum whose provenance can no longer be checked. He also included the specimens obtained by the U.S. Exploring Expedition vessel which visited Simonstown in 1853. Most of these records are from Simon's Bay, but not all; e.g. specimens from Port Elizabeth were mentioned (Bartsch 1915: 120), which shows that W. Stimpson, the naturalist on the expedition, must have obtained some shells at second hand, because the expedition did not put in at Port Elizabeth.

The locality records of other expeditions have not always been above suspicion, e.g. H.M.S. *Samarang* and H.M.S. *Sulphur*, whose captain relied to a large extent on his memory (Tomlin 1925: 310). Instances of mis-labelling on board the *Challenger* occurred (Barnard 1950: 3), and even on the *Valdivia* the possibility of errors cannot be excluded.

No such doubts arise in connection with collections made by the Cape Government trawler *Pieter Faure* in South African waters. Faulty numbering has come to light in very few instances, but that merely results in a wrong depth being recorded, or the wrong locality *within the South African area* (e.g. Cape instead of Natal). The vessel made no collections from extra-territorial waters; and the collection has been kept intact.

The same may be said of the later survey vessels the *Pickle*, *Africana* and *Africana II*.

Equally above suspicion are the littoral and shallow water collections assembled by the Zoology Department of the University of Cape Town (coast of the Republic of South Africa and Inhambane), and of the University of the Witwatersrand (Inhaca Island and Delagoa Bay).

H. C. Burnup was also a reliable collector, and shells collected by him (identified by Smith and Tomlin) can be accepted as South African.

The above comments are not made in any carping spirit, but to show the difficulties which may arise in attempting to compile a reliable list of the *indigenous* South African species, not to mention vexatious questions of synonymy and contrary opinions of specialists.

The list therefore errs on the side of omission rather than inclusion. If evidence is forthcoming that an omitted species should rightfully be included,

it is easily inserted, but once the name of a species has appeared in a list, it is not so easily removed.

The proposed new list will not contain all those included in the existing so-called 'official' list of South African Mollusca (Tomlin 1923: 40–52) or 'faunistic' list (Tomlin 1931: 415) compiled from the following: Sowerby (1892, 1897); Smith (1903, 1904, 1906, 1910, 1914); Bartsch (1915); Tomlin (1923, 1926, 1931); Sowerby's reports in *Marine Investigations in South Africa* (1898, 1902, 1903, 1904) were included in Smith (1903, 1904).

To the above references must be added Thiele (1912, 1925, gastropods); Thiele & Jaeckel (1931, pelecypods); Ashbey (1932, chitons); Turton (1932, 1933 [renaming of preoccupied names]); also numerous 'paperlets' describing single species, or a few species, or comments on synonymy, etc.

Perhaps a new list may be called the official 'South African' list.

Further, it is desirable to exclude records of fossil specimens unless they belong unmistakably to, or have been thoroughly compared with, recent South African species, e.g. Johnson (1904: 9) records *Loripes flexuosus* Mont., identified by Crawford, as very common in raised beaches in Algoa Bay.

Records contained in the following palaeontological papers should be critically examined: Smith (1900: 61, 1906: 291, 1910: 112); Johnson (1904: 9), Bullen Newton (1913: 315); Myburgh (1920: 46); Haughton (1926*a*: 27, 1926*b*: 159, 1932: 19); Tomlin (1926: 81); Krige (1927: 68, 1933: 37).

PROSOBRANCHIATA

Terebridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Terebra	*affinis* Gray	Burnup	Smith 1903	
		McBean, U.W.	Tomlin 1928	
	apicitincta Sowerby	Becker, Turton	Sowerby 1900	
	capensis Smith	V, P.F., Muir	Smith 1873	
			Barnard 1958	
	casta Hinds	McBean	Smith 1903	
	var. *natalensis* Smith			
	cingulifera Lamarck	Boshoff		Seen by K.H.B.
	circinata Deshayes	U.W., U.C.T.	Barnard 1958	
	diversa Smith	Burnup, K.H.B., Lightfoot	Smith 1901	
			Barnard 1958	
	evoluta Deshayes	Burnup, P.F.	Smith 1901	
			Barnard 1958	
	filmerae Sowerby	Mrs. Filmer	Sowerby 1906	Only one specimen known
	laevigata Gray	McBean	Sowerby 1897	
			Tomlin 1928	
	lightfooti Smith	Lightfoot, P.F., U.C.T.	Smith 1899	Paratype in S.A.M.
			Barnard 1958	
	loisae Smith	Burnup	Smith 1903	
	longiscata Deshayes	P.F., U.W.	Sowerby 1897	
			Tomlin 1928	
	monilis Quoy & Gaimard	Burnup, U.W.	Smith 1903	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Terebra	*myuros* Lamarck	P.F.	Barnard 1958	
	nebulosa Sowerby	McBean	Sowerby 1897 Tomlin 1928	
	planecosta Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	spectabilis Hinds	P.F.	Barnard 1958	
	straminea Gray	P.F., U.W.	Barnard 1958	
	subulata L.	U.W.	Sowerby 1897	
	suspensa Smith	Turton, Muir	Smith 1904 Barnard 1958	Also Pleistocene
	thielei Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
Diplomeriza	*dimidiata* (L.)	U.W.	MacNae & Kalk 1958 Barnard 1958	
	duplicata (L.)	U.W.	Barnard 1958	
	fictilis (Hinds)	Burnup, McBean	Sowerby 1897 Tomlin 1928 Barnard 1958	

Synonymy

geminata Deshayes 1859	= *spectabilis*
gracilis Gray 1834, *non* Lea 1833	= *grayi*
pertusa Sowerby 1892, *non* Born 1778	= *suspensa*
rufopunctata Sowerby 1897, *non* Smith	= *Parviterebra separanda*

Conidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Conus	*aplustre* Reeve	P.F., U.C.T.	Smith 1903 Barnard	See also *infrenatus*
	arenatus Hwass	Burnup, U.W.	Barnard 1958	
	aurora Lamarck	Krauss, Becker	Krauss 1958 Tomlin & Winslow 1927 Barnard 1958	
	betulinus L.	U.W.	Barnard 1958	
	catus Bruguière	Burnup	Smith 1910 Barnard 1958	
	ceylanensis Bruguière	Burnup	Barnard 1958	
	coronatus Dillwyn	Burnup, U.C.T., U.W.	Barnard 1969	
	ebraeus L.	Krauss, Burnup, U.C.T., U.W.	Krauss 1848 Barnard 1958	
	elongatus Chemnitz	S.A.M., P.F., U.C.T.	Barnard 1958	
	eucoronatus Sowerby	P.F.	Sowerby 1903 Barnard 1958	Holotype in S.A.M.
	figulinus L.	U.C.T.	Barnard 1969	
	flavidus Lamarck		Barnard 1958	cf. *lividus*
	gradatulus Weinkauff	V, P.F.	Sowerby 1870 Von Martens 1903 Barnard 1958	
	imperialis L.		Smith 1906 Barnard 1958	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Conus	*infrenatus* Reeve	P.F., U.C.T.	Sowerby 1889, 1892 Bartsch 1915 Barnard 1958	See also *aplustre*
	lividus Bruguière	Burnup, U.C.T., K.H.B., U.W.	Barnard 1958	cf. *flavidus*
	miles L.	P.F.	Barnard 1958	
	miliaris Bruguière	Burnup, U.W.	Smith 1903 Barnard 1958	
	natalis Sowerby	Burnup	Barnard 1958	
	orbignyi Audouin	Mrs. Boswell, *ex* Natal trawler	Barnard 1969	
	papilionaceus Hwass	Mrs. Boswell	Barnard 1969	
	papillaris A. Adams & Reeve	Su, P.F.	Barnard 1958	
	patens Sowerby	P.F.	Sowerby 1903 Barnard 1958	Holotype in S.A.M.
	pictus Reeve	Becker, U.C.T.	Barnard 1958	
	piperatus Dillwyn	Burnup	Smith 1903 Barnard 1958	
	rattus Reeve	Krauss, S.A.M.	Barnard 1958	
	scitulus Reeve	Krauss, S.A.M.	Barnard 1958	S.Afr. specimens? = *aurora*
	simplex Sowerby	P.F., U.C.T.	Barnard 1958	
	tessulatus Born	U.W.	Barnard 1958	
	textile L.	U.W.	Barnard 1958	
	vermiculatus Lamarck	Burnup	Sowerby 1897	
	vexillum Gmelin	Burnup	Barnard 1958	
	zeylanicus Gmelin	Burnup	Barnard 1958	

Synonymy

alfredensis Bartsch 1915	= *aurora* = *elongatus*
algoensis Sowerby 1834	= *aurora*
altispiratus Sowerby 1873	= *papillaris*
anceps A. Adams 1854	= *consors*
bairstowi Sowerby 1889	= *aplustre*
balteatus Sowerby 1833	= *lividus*
beckeri Sowerby 1911	= *aurora*
bruguieri Sowerby 1858, Turton 1932, *non* Kiener	= *aurora*
caffer Krauss 1848	= *aurora*
comptus A. Adams 1854, *non* Gould 1853	= *minimus*
danieli Crosse 1858	= *scitulus*
elisae Kiener 1849/1850	= *lamarckii*
elongatus Reeve 1843, *non* Chemnitz	= *moreleti*
fulvus Sowerby 1889	= *aurora*
grayi Turton 1932, *non* Reeve	= ? *aurora*
infrenatus Reeve 1848	= *aplustre*
innexus A. Adams 1854	= *consors*
jaspideus Kiener 1848, *non* Gmelin	= *scitulus*
kraussi Turton 1932	= *aurora*
lautus Sowerby 1911, Turton 1932, *non* Reeve	= *aurora*
lavendulus Bartsch 1915	= *aurora*
loveni Krauss 1848	= *aurora*
minimus L. 1758	= *coronatus*

mozambicus Bruguière 1792	= *elongatus*
natalensis Sowerby typ. err. 1892	= *natalis*
oblitus Reeve 1849, *non* Michelotti	= *moreleti*
pictus Sowerby 1897, *non* Reeve	= *scitulus*
primula Reeve 1849, Sowerby 1897	= *lividus*
queketti Smith 1906	= *imperialis*
rosaceus Dillwyn 1817	= *aurora*
roseotinctus Sowerby 1866, Turton 1932	= *aurora*
secutor Crosse 1865	= *aurora*
succinctus A. Adams 1854	= *aurora*
	= *infrenatus*
	= *aplustre*
tinianus Sowerby 1892, *non* Bruguière	= *aurora*
turritus Sowerby 1870, *non* Lamarck 1803	= *gradatulus*
verreauxi Kiener 1849	= *aurora*

Turridae

Many of the species are known only from shells, the radulae are unknown, and consequently the generic position is uncertain. Sometimes when the radula is known it does not fit in with the radulae of the other known genera.

In both cases the generic name is placed in inverted commas.

The majority of Turton's 'species' are ignored, pending re-examination of his material.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
'*Acrobela*'	*acus* Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
Asthenotoma	*eva* (Thiele)	V, P.F.	Thiele 1925 Barnard 1958	
	vertebrata (Smith)	P.F., U.C.T.	Smith 1903 Barnard 1958	
'*Bela*'	*alma* Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	anna Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	bella Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
'*Clathurella*'	*crassilirata* Smith	Turton	Smith 1904 Turton 1932	
'*Clavatula*'	*confusa* (Smith)	Turton, S.A.M.	Smith 1906 Barnard 1958	
Clavatula	*gravis* (Hinds)	V, P.F., U.C.T.	Sowerby 1903 Barnard 1958	
'*Clavatula*'	*halistrepta* Bartsch	Turton	Bartsch 1915 Barnard 1958	? = *Drillia diversa*
Clavatula	*kraussi* (Smith)	U.C.T.	Smith 1877 Barnard 1958	
	lobatopsis Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
'*Clavatula*'	*rosaria* (Reeve)		Smith 1906 Barnard 1958	
Clavatula	*semicostata* Kiener	Krauss, S.A.M.	Barnard 1958	
	sinuata Born	S.A.M., U.C.T., Turton	Smith 1877 Bartsch 1915 Barnard 1958	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Clavatula	var. *sigillata* Reeve	U.C.T.	Barnard 1958	
	subventricosa (Smith)	U.C.T.	Smith 1877 Barnard 1958	
	taxus (Chemnitz)	V, P.F., U.C.T.	Barnard 1958	
	tripartita Weinkauff	P.F., U.C.T.	Smith 1877, 1902 Bartsch 1915 Barnard 1958	
'*Clavatula*'	*tumida* Sowerby	P.F., U.C.T.	Barnard 1958	
Clavatula	*turriplana* Sowerby	P.F., U.C.T.	Sowerby 1903 Barnard 1958	Holotype in S.A.M.
Cythara	*africana* (Sowerby)	P.F.	Sowerby 1903 Barnard 1958	Holotype & Paratype in S.A.M.
'*Cythara*'	*alfredi* (Smith)	Turton, S.A.M.	Smith 1904 Barnard 1958	
Cythara	*amplexa* (Gould)	Stimpson, Turton	Barnard 1969	
'*Cythara*'	*dagama* Barnard	S.A.M.	Barnard 1958	Syntypes in S.A.M.
	deliciosa Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	glaucocreas Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
Daphnella	*alfredensis* Bartsch	Bartsch	Barnard 1958, 1969	
	bitrudis Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
	phyxelis Barnard	P.F.	Barnard 1964	Holotype in S.A.M.
'*Daphnella*'	*recifensis* Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	sulcata (Sowerby)	P.F.	Sowerby 1892 Barnard 1958	
	sulcicancellata (Barnard)	P.F.	Barnard 1969	
	verecunda Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
'*Drillia*'	*ancilla* Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	armilla Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	bruchia Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	caffra (Smith)	Turton, P.F.	Smith 1904 Tomlin 1931 Barnard 1958	
	collina Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	diasi Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	diversa (Smith)		Sowerby 1892 Smith 1904 Barnard 1958	
	dolorosa Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	dovyalis Barnard	P.F.	Barnard 1969	Holotype in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Drillia	*erepta* Barnard	P.F.	Barnard 1969	Holotype in S.A.M.
	eva Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	falcicosta Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
Drillia	*falsa* Barnard	A	Barnard 1958	Holotype in S.A.M.
'*Drillia*'	*fossata* Sowerby	P.F.	Sowerby 1903 Barnard 1958	Holotype & Paratype in S.A.M.
Drillia	*fultoni* Sowerby	V, P.F.	Barnard 1958	
'*Drillia*'	*hottentota* (Smith)		Barnard 1958	? may be a *Clavatula*
	laterculoides Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	latisulcus Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	lea Thiele	V, P.F.	Thiele 1925 Barnard 1958	Holotype in S.A.M.
	macilenta Barnard	P.F.	Barnard 1969	
	morgana Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	omia Barnard		Barnard 1958	Syntypes in S.A.M.
	oneili Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	paula Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	pecus Barnard	P.F.	Barnard 1969	Syntypes in S.A.M.
	perfluans Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	platystoma (Smith)	V, P.F.	Barnard 1958	
	pleonastica Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	pselia Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	rousi (Sowerby)	Turton, Burnup	Barnard 1958	
	scitecostata Sowerby	P.F.	Sowerby 1903 Barnard 1958	Holotype & Paratype in S.A.M.
	simplicicingula Barnard	P.F.	Barnard 1958	Holotype & Paratype in S.A.M.
	sowerbyi Turton	Turton, P.F.	Turton 1932 Barnard 1958	
	spiralis Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	subcontracta Smith	Turton	Smith 1904 Barnard 1958	
	thetis Smith	Turton, P.F.	Smith 1904 Barnard 1958	
	tholos Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	variabilis Smith	P.F.	Barnard 1958	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
'*Genotia*'	*belaeformis* Sowerby	P.F.	Sowerby 1903 Barnard 1958	Paratypes in S.A.M.
'*Gymnobela*'	*angusta* Thiele	V	Thiele 1925	
Lienardia	*grayi* (Reeve)	Turton, P.F., U.C.T.	Barnard 1958	
'*Mangilia*'	*eucosmia* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1958	
	extans Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	kowiensis Turton	Turton, P.F.	Turton 1932 Barnard 1958	
	miniscula Smith	S.A.M., U.C.T.	Smith 1910 Barnard 1958	
	muiri Barnard	Muir	Barnard 1958	Syntypes in S.A.M.
	nisga Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1958	
	phoxos Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	ponsonbyi (Sowerby)	Turton	Sowerby 1892	
	sciola Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	serrula Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	shepstonensis Smith	Burnup, P.F.	Smith 1914 Barnard 1958	
	tranquilla Barnard	Muir	Barnard 1958	Syntypes in S.A.M.
	translucens Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	verrucosa (Sowerby)	Sowerby, Turton	Sowerby 1897	
'*Mitromorpha*'	*apollinis* Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	hewitti Tomlin	P.F.	Tomlin 1921 Barnard 1958	
	veneris Barnard	P.F.	Barnard 1964	Holotype in S.A.M.
	volva Sowerby		Sowerby 1892	
Moniliopsis	*psilarosus* Barnard	F. H. Talbot	Barnard 1963	
'*Philbertia*'	*alfredensis* Turton	Turton, P.F.	Turton 1932 Barnard 1958	
Philbertia	*cala* (Watson)	S.A.M.	Watson 1886 Barnard 1963	
	capensis (Smith)	P.F., U.C.T.	Sowerby 1892 Thiele 1925 Barnard 1958	
'*Philbertia*'	*natalensis* Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
'*Pleurotoma*'	*curricula* Barnard	F. H. Talbot	Barnard 1969	Syntypes in S.A.M.
	spirotropoides Thiele	V	Thiele 1925	
	vilma Thiele	V	Thiele 1925	
'*Pleurotomella*'	*elisa* Thiele	V	Thiele 1925	
	helena Thiele	V	Thiele 1925	
	ida Thiele	V, P.F.	Thiele 1925 Barnard 1969	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
'*Pleurotomella*'	*ursula* Thiele	V, P.F.	Thiele 1925 Barnard 1958	
'*Surcula*'	*aditus* Barnard	P.F.	Barnard 1969	Holotype in S.A.M.
	amplisulcus Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	anteridion (Watson)	Ch, V, P.F.	Watson 1886 Barnard 1958	
	faurei Barnard	P.F.	Barnard 1958	Holotype in S.A.M.
	opulenta Thiele	V, P.F.	Thiele 1925 Barnard 1958	
	scalaria Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
'*Thesbia*'	*algoensis* Thiele	V, P.F.	Thiele 1925 Barnard 1958	cf. some columbellids
'*Turris*'	*acuta* (Perry)	S.A.M.	Barnard 1958	
	ambages Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	cingulifera (Lamarck)	S.A.M., P.F.	Barnard 1958	
	flavidula (Lamarck)	P.F.	Barnard 1958	
Turris	*gilchristi* (Sowerby)	P.F.	Sowerby 1902 Barnard 1958	
	indica Röding	P.F.	Sowerby 1902 Barnard 1958	
'*Turris*'	*lignaria* (Sowerby)	P.F.	Sowerby 1903 Barnard 1958	Paratype in S.A.M.
Turris	*lobata* (Sowerby)	P.F.	Sowerby 1903 Barnard 1958	Paratypes in S.A.M.
'*Turris*'	*multiseriata* (Smith)	P.F.	Smith 1877 Melvill 1917 Barnard 1958	
Turris	*saldanhae* Barnard	P.F.	Barnard 1958	Syntypes in S.A.M.
	stolida (Hinds)	Su, P.F., U.C.T.	Hinds 1844 Barnard 1958	
Typhlomangilia	*polythele* Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
Typhlosyrinx	*chrysopelex* Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
	pyrropelex Barnard	P.F., S.A.M.	Barnard 1958, 1963	Syntypes (adult & juv.) in S.A.M.
	subrosea Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.

Synonymy

Generic synonyms

Bellardiella, *Clathurella*, *Defrancia* } see *Philbertia*
Glyphostoma see *Lienardia*
Clionella see *Clavatula*

Bellardiella	*sultana* Thiele 1925	= ? *Philbertia alfredensis*
Buccinum	*phallus* Gmelin 1791	= *Clavatula sinuata*
Clavatula	*haliplex* Bartsch 1915	= *C. taxus*
	halistrepta Bartsch 1915	= ? *Drillia diversa*

Clavatula	*halistrepta* var. *albocincta* Turton 1932	= *Clavatula halistrepta*
	helena Bartsch 1915	= *C. tripartita*
	hera Turton 1932	= ? *Drillia diversa*
	parilis Smith 1901	= *Clavatula tripartita*
	rufanensis Turton 1932	= *C. taxus*
	taxus var. *affinis* Turton 1932	= *C. taxus*
	turtoni Bartsch 1915	= *C. sinuata*
Clionella	*bipartita* Smith 1877	= *C. tripartita*
	bornii Smith 1877	= *C. sinuata*
	kowiensis Turton 1932	= *C. confusa*
	kowiensis var. *viridis* Turton 1932	= *C. confusa*
	nereia Bartsch 1915	= *C. subventricosa*
	semicostata Von Martens 1903	= *Turris lignaria*
	sybaritica Bartsch 1915	= *Clavatula rosaria*
Cythara	*alfredensis* Bartsch 1915	= *Cythara alfredi*
	ima Bartsch 1915	= *C. alfredi*
	thetis Turton 1932	= *C. alfredi*
Daphnella	*reeveana* Tryon	= *C. alfredi*
Drillia	*albonodulosa* Smith 1904	= *Drillia diversa*
	albotessellata Smith 1906	= *D. rousi*
	burnupi Sowerby 1897	= *D. hottentota*
	castanea Reeve	= *Cythara alfredi*
	castenea Von Maartens 1903, *non* Reeve	= *Drillia platystoma*
	distincta Thiele 1925	= *D. platystoma*
	halidoma Bartsch 1915	= *Clavatula semicostata*
	hottentota var. *fuscescens* Sowerby 1921	= *Drillia hottentota*
	lara Bartsch 1915	= *D. caffra*
	neptuni Turton 1932	= *D. hottentota*
	nivosa Smith 1904	= *D. caffra*
	praetermissa Smith 1904	= *D. caffra*
	pretiosa Turton 1932	= *D. thetis*
	rugisculpta Sowerby 1901	= *Lienardia grayi*
Glyphostoma	*siren* Smith 1904	= ? *Lienardia grayi*
Haedropleura	*dora* Thiele 1925	= *Cythara alfredi*
	thea Thiele 1925	= *Mangilia amplexa*
Mangilia	*arata* Bartsch 1915	= *Lienardia grayi*
	beckeri Sowerby 1906	= *Drillia hottentota*
	bimarginata Odhner 1923, *non* Lamarck	= *Clavatula taxus*
	casta non Reeve	= *Cythara alfredi*
	clathrata M. de Serres 1883	= *Mangilia verrucosa*
	consanguinea Sowerby 1897	= '*Columbella*' *consanguinea*
	costata Sowerby 1892, *non* Donovan	= *Cythara alfredi*
	costata var. *coarctata* Sowerby 1897	= *C. alfredi*
	elizabethae Smith 1910	= *Drillia rousi*
	fulgurans Krauss 1848	= *Pyrene kraussi*
	gisna Bartsch 1915	= *Mangilia miniscula*
	grayi var. *assimilans* Turton 1932	= *Lienardi grayi*
	helena Turton 1932	= ? *Lienardia grayi*
	herilda Bartsch 1915	= *Drillia subcontracta*
	humerosa Bartsch 1915	= *Lienardia grayi*
	innotabilis Turton 1932	= *Drillia ancilla*
	misera Thiele 1925	= *Cythara alfredi*
	nereia Turton 1932	= *Drillia subcontracta*
	rietensis Turton 1932	= *Mangilia amplexa*
	rufanensis Turton 1932	= *M. eucosmia*
	septangularis Sowerby 1892, *non* Montagu	= *Cythara alfredi*
Mitromorpha	*jovis* Thiele 1925	= ? *Mitromorpha apollinis*
Pleurotoma	*bairstowi* Sowerby 1886	= *Drillia diversa*
	buccinoides Lamarck 1822	= *Clavatula sinuata*

Pleurotoma	*fucata* Sowerby 1892	= *C. kraussi*
	layardi Sowerby 1886	= *Drillia hottentota*
	tigrina Lamarck 1822	= *Turris acuta*
	wilkiae Sowerby 1889	= *Drillia platystoma*
Pleurotomella	*ida* Thiele 1925	= *Philbertia capensis*
Surcula	*macilenta* Melvill 1923	= *Drillia hottentota*
Turris	*marmorata* var. *maculata* Reeve 1843	= *Turris indica*

Marginellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Afrivoluta	*pringlei* Tomlin	V, P.F., P.E. Mus., Mrs. Boswell	Tomlin 1947 Barnard 1959 Barnard 1969	Radula known
'*Marginella*'	*adela* Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	alfredensis Bartsch	Turton	Bartsch 1915	
	algoensis Smith		Smith 1901	
	almo Bartsch	Turton	Bartsch 1918	
	aphanacme Tomlin		Tomlin 1918	
	aphanospira Tomlin	Burnup, P.F.	Tomlin 1913 Barnard 1959	
	atractus Tomlin	P.F.	Tomlin 1918 Barnard 1959	
	augusta Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	bairstowi Sowerby		Sowerby 1886 Bartsch 1915 Thiele 1925	
	bensoni Reeve	S.A.M.	Barnard 1969	
Marginella s.s.	*biannulata* (Fabricius)		Barnard 1959	Radula known
'*Marginella*'	*bicatenata* Sowerby	P.F.	Barnard 1959	Holotype of *tomlini* in S.A.M.
	brocktoni Shackleford	P.F.	Shackleford 1914 Barnard 1959	Holotype & Paratype in S.A.M.
	burnupi Sowerby	P.F.	Sowerby 1897 Barnard 1959	
Marginella s.s.	*capensis* Krauss	Krauss, P.F., S.A.M.	Krauss 1848 Barnard 1959	Radula known
'*Marginella*'	*clara* Thiele	V	Thiele 1925	
	cleo Bartsch	Stimpson	Bartsch 1915	
	cylindrica Sowerby	V	Krauss 1852 Thiele 1925	
Marginella s.s.	*cystiscus* Redford	Stimpson	Stimpson 1865	Radula known
'*Marginella*'	*differens* Smith		Smith 1904 Barnard 1959	Holotype & Paratype of *taylori* = *barnardi* in S.A.M.
	forma *eugenes* Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	dimidiata Thiele	V	Thiele 1925	
	epipolia Tomlin	P.F.	Tomlin 1921	
	fallax Smith	Turton, P.F.	Smith 1903	
	floccata Sowerby	Bairstow	Tomlin 1917	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
'*Marginella*'	*grata* Thiele	V	Thiele 1925	
	ingloria Smith	Becker	Smith 1910	
	ithychila Tomlin		Tomlin 1918	
	keenii Marrat	V, P.F.	Barnard 1959	
	kerochuta Shackleford	V, P.F.	Shackleford 1914 Barnard 1959	Holotype & Paratype in S.A.M.
	lepta Bartsch	Turton	Bartsch 1915	
	lineolata Sowerby		Sowerby 1886	
Marginella s.s.	*lucida* Marrat	P.F.	Barnard 1959	Radula known
'*Marginella*'	*mosaica* Sowerby	P.F.	Barnard 1959	
	munda Smith	P.F.	Smith 1904 Barnard 1959	
	musica Hinds	Su, Ch, V, P.F., U.C.T.	Barnard 1959	
	nebulosa Röding	P.F., U.C.T.		
	neglecta Sowerby		Bartsch 1915 Barnard 1959	
	ornata Redford	P.F.	Bartsch 1915	
	pachista Tomlin	Burnup	Tomlin 1913	
	paula Thiele	V	Thiele 1925	
	perla Marrat	Muir, S.A.M.	Barnard 1959	
	perminima Sowerby	V, P.F.	Sowerby 1897 Barnard 1959	
	piperata Hinds	V, P.F.	Tomlin 1917	
	pseustes Smith	Turton	Smith 1904	
	rosea Lamarck	P.F.	Krauss 1848	
	seminula Gould	Stimpson	Gould 1860	
	shepstonensis Smith	Burnup, P.F.	Smith 1906 Barnard 1959	
	walvisiana Tomlin		Tomlin 1920	
	zeyheri Krauss	P.F.	Krauss 1852 Barnard 1959	Radula known, but needs checking
Diluculum	*inopinatum* Barnard	U.C.T., Mrs. Connolly	Barnard 1962	Holotype & Paratype in S.A.M. Radula known
Persicula	*alborubida* Barnard	Mrs. Connolly	Barnard 1969	Syntypes in S.A.M.
	nigrocrocea Barnard	Mrs. Connolly	Barnard 1969	Syntypes in S.A.M.

Synonymy

Marginella	*agulhasensis* Thiele 1925	= *keenii*
	albocincta Sowerby 1846	= *piperata*
	angustata Smith 1906	= *Ancilla errorum*
	aurelia Thiele 1925	= *zeyheri*
	barnardi Tomlin 1919	= *differens*
	becki Turton 1933	= *piperata*
	bilineata Krauss 1848	= *biannulata*
	biplicata Krauss 1852, *non* Risso	= *perla*
	bulbosa Sowerby 1892, *non* Reeve	= *differens*
	capensis Stimpson 1865, *non* Krauss	= *cystiscus*
	chrysea Watson 1886	= *perla*
	cinerea Sowerby 1897, *non* Jousseaume	= *burnupi*
	cosmia Bartsch 1915	= *punctilineata*
		= *piperata*

Marginella	*crassilabrum* Sowerby 1846, *non* Bory	= *labrosa*
	diadochus A. Adams & Reeve 1848	= *musica*
	dulcis Smith 1904	= *bensoni*
	dunkeri Krauss 1848	= *biannulata*
	electrina Sowerby 1892	= *keenii*
	epigrus Sowerby 1892, *non* Reeve	= *burnupi*
	eucosmia Bartsch 1915	= *piperata*
	flammea Link 1807	= *nebulosa*
	fusiformis Sowerby 1903, *non* Hinds	= *atractus*
	helena Turton 1932, *non* Thiele	= *neglecta*
	helena Turton 1932, *non* Thiele	= *piperata*
	inconspicua Sowerby 1892, *non* Sowerby 1846	= *differens*
	innocens Turton 1932	= *perla*
	intermedia Sowerby 1846, *non* Menke 1828	= *ornata*
	julia Thiele 1925	= *atractus*
	laetitia Thiele 1925	= *bensoni*
	leai Jousseaume 1875	= *labrosa*
	lineata Sowerby 1889	= *piperata*
	lineatolabrum Gaskoin 1849	= *piperata*
	lutea Sowerby 1889	= *piperata*
	meta Thiele 1925	= *atractus*
	metcalfei Sowerby 1892, *non* Angas	= *zeyheri*
	multizonata Krauss 1852	= *cylindrica*
	nubeculata Lamarck	= *nebulosa*
	pallida Meuschen 1787, *non* binom.	= *nebulosa*
	paxillus Sowerby 1892, Von Martens 1903, *non* Reeve	= *fallax*
	pellucida Weinkauff 1879	= *lucida*
	picta Dillwyn 1817	= *nebulosa*
	puella Gould 1861	= *capensis*
	punctilineata Smith 1899	= *piperata*
	pura Smith 1904	= *zeyheri*
	pyrum Gronovius 1781, *non* binom.	= *nebulosa*
	reevei Krauss 1852	= *neglecta*
	ros Von Martens 1903, *non* Reeve	= *burnupi* and *dulcis* = *bensoni*
	rufula Gaskoin 1853	= *neglecta*
	savignyi Sowerby 1892, *non* Issel	= *algoensis*
	serpentina Jousseaume 1875	= *ornata*
	strigata Sowerby 1889	= *piperata*
	taylori Shackleford 1916, *non* Olsson	= *barnardi* = *differens*
	tomlini Shackleford 1916	= *bicatenata*
	turtoni Bartsch 1915	= *lucida*
	vittata Reeve 1864, *non* Edwards	= *ornata*
	zeyheri Von Martens 1903, *non* Krauss	= *kerochuta*
	zonata Kiener 1841, *non* Swainson	= *biannulata*

Cancellariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cancellaria	*bifasciata* Deshayes	P.F.	Barnard 1959	
	euetrios Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	euthymei Barnard	S.A.M.	Barnard 1960	Holotype in S.A.M.
	foveolata Sowerby	S.A.M., U.C.T.	Barnard 1959	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cancellaria	*imbricata* Watson	Ch, P.F.	Watson 1886 Barnard 1959	
	lamellosa Hinds	Su, P.F.	Hinds 1844 Barnard 1959	
	lyrata (Brocchi)	A	Barnard 1959	
	plebeja Thiele	V	Thiele 1925	
	producta Sowerby	P.F.	Sowerby 1903 Barnard 1959	Holotype in S.A.M.
	semidisjuncta Sowerby	S.A.M.	Barnard 1959	
Admete	*decapensis* Barnard	S.A.M.	Barnard 1960	Holotype in S.A.M.

Volutidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Fulgoraria	*blaizei* Barnard	P.F.	Barnard 1959, 1963	Holotype & Paratype in S.A.M.
Fusivoluta	*barnardi* Rehder	Mrs. Boswell	Rehder 1969	
	capensis (Thiele)	V, P.F.	Thiele 1925 Barnard 1959	Holotype of *Glypteuthria capensis* Tomlin in S.A.M.
	clarkei Rehder	Mrs. Boswell	Rehder 1969	
	decussata Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	elegans Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	pyrrhostoma (Watson)	Ch, V, P.F.	Watson 1886 Von Martens 1903 Barnard 1959	
	forma *major* Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.
Guivillea	*alabastrina* (Watson)	S.A.M.	Barnard 1960	
Neptuneopsis	*gilchristi* Sowerby	P.F.	Sowerby 1898 Barnard 1959	
Voluta	*africana* Reeve	S.A.M.	Barnard 1959	
	bullata Swainson	S.A.M.	Swainson 1829 Barnard 1959	
	ponsonbyi Smith	Smith, S.A.M.	Smith 1901 Barnard 1959	
	queketti Smith	P.F.	Smith 1901 Barnard 1959	
Volutocorbis	*abyssicola* (A. Adams & Reeve)	S.A.M., Ch, V, P.F.	Adams & Reeve 1848 Watson 1886 Barnard 1959	
	var. *lutosa* Koch	A, P.F.	Koch 1948 Barnard 1959	
	boswellae Rehder	P.F.	Rehder 1969	Paratypes in S.A.M.
	disparilis Rehder	P.F.	Rehder 1969	Holotype & Paratype in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Volutocorbis	*gilchristi* (Sowerby)	P.F.	Sowerby 1902 Barnard 1959	Paratype in S.A.M.

Harpidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
	amouretta Röding		Sowerby 1892	
Harpa	*davidus* Röding	P.F.	Smith 1903 Barnard 1959	

Vasidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Vasum	*truncatum* (Sowerby)	S.A.M.	Sowerby 1892 Smith 1902 Barnard 1959	

Mitridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Mitra	*acutilirata* Sowerby	K.H.B., U.W.	Barnard 1959	
	aerumnosa Melvill	S.A.M., U.C.T.	Melvill 1888 Barnard 1959	
	bathyraphe Sowerby	P.F.	Sowerby 1900 Barnard 1959	
	cadaverosa Reeve	P.F.	Sowerby 1900 Barnard 1959	
	caffra (L.)	U.C.T., U.W.	Barnard 1959	
	canaliculata Sowerby		Sowerby 1900	Paratypes in S.A.M.
	circula Kiener	P.F., U.W.	Cooke 1920 Barnard 1959	
	crenifera Lamarck	P.F., U.W.	Barnard 1959	
	cylindracea Reeve	P.F.	Sowerby 1903	See *punctostriata* A. Adams
	distincta Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	euzonata Sowerby		Sowerby 1900 Barnard 1959	? = *Vexillum capense*
	foveolata Dunker	K.H.B.	Barnard 1959	
	kowieensis Sowerby	Turton, P.F.	Sowerby 1901 Barnard 1959	
	latruncularia Reeve	Turton, S.A.M.	Barnard 1959	
	limbifera Lamarck	Krauss	Barnard 1959	
	litterata Lamarck	U.C.T., U.W.	Barnard 1959	
	luctuosa A. Adams	Cooke	Cooke 1919 Barnard 1959	
	ocellata (Swainson)	S.A.M.	Barnard 1959	
	picta Reeve	Krauss, Muir	Barnard 1959	
	punctostriata A. Adams	P.F.	Smith 1906	? = *cylindracea* Reeve
	rufescens A. Adams	S.A.M., U.W.	Barnard 1959	
	subulata (Lamarck)	P.F.	Barnard 1959	
	teretiuscula Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	texturata Lamarck	Sowerby 1897, S.A.M.	Barnard 1959	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Charitodoron	*agulhasensis* Thiele	V, P.F.	Thiele 1925 Tomlin 1932 Barnard 1959	Holotype of *aglaia* in S.A.M.
	bathybius (Barnard)	P.F.	Barnard 1959	Holotype in S.A.M.
	euphrosyne Tomlin	P.F.	Barnard 1959	Holotype in S.A.M.
	pasithea Tomlin	P.F.	Tomlin 1943 Barnard 1959	
	thalia Tomlin	P.F.	Tomlin 1932 Barnard 1959	Holotype in S.A.M.
Pusia	*patula* (Reeve)	U.C.T., S.A.M., Turton	Barnard 1959	Paratypes of *fidis* in S.A.M.
Vexillum	*alauda* (Sowerby)	Burnup, U.C.T.	Barnard 1959	
	capense (Reeve)	S.A.M., U.C.T. P.F., Muir	Barnard 1959	
	daedalum (Reeve)	P.F.	Sowerby 1903 Barnard 1959	
	discoloria (Reeve)	P.F.	Barnard 1959	
	exasperatum (Gmelin)	U.W.	Sowerby 1897 Barnard 1959	
	sculptile (Reeve)	K.H.B.	Barnard 1959	
	torulosum (Lamarck)	U.W.	Barnard 1959	

Synonymy

aglaia Tomlin 1943 (*Charitodoron*)	= *agulhasensis*
albanyana Turton 1932	= *capense*
albozonata Turton 1932	= *latruncularia*
alfredensis Turton 1932	= *patula*
arenosa Lamarck 1811	= *exasperatum*
becki Turton 1932	= *helena*
	= *kowieensis*
burnupiana Cooke 1920	= *circula*
carifa Bartsch 1915	= *limbifera*
chinensis Sowerby 1897, *non* Gray	= *punctostriata*
didyma Turton 1932	= *bathyraphe*
eucosmia Turton 1932	= *kowieensis*
fidis Sowerby 1916	= *patula*
flammigera Reeve 1844	= *flammea*
helena Bartsch 1915	= *sculptile*
helena Turton 1932	= *kowieensis*
hera Turton 1932	= *capense*
hottentota Thiele 1925	= *patula*
ima Bartsch 1915	= *capense*
interlirata Reeve 1844	= *flammea*
lurida Turton 1932	= *patula*
merula Sowerby 1889	= *patula*
pica Reeve 1845, *non* Chemnitz	= *patula*
polita Reeve	= *luctuosa*
pruinosa Küster 1840	= *patula*
simplex Dunker 1846	= *patula*
tessellata Kiener 1839, *non* Martyn	= *picta*

Olividae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ancilla	*bullioides* Reeve	V, P.F.	Sowerby 1903 Barnard 1959	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ancilla	*contusa* Reeve	P.F.	Sowerby 1903 Barnard 1959	
	errorum Tomlin	P.F.	Tomlin 1921 Barnard 1959	
	fasciata Reeve	V, P.F.	Von Martens 1903 Barnard 1969	
	hasta Von Martens	V, P.F.	Von Martens 1903 Barnard 1959	
	marmorata Reeve	P.F.	Barnard 1959	
	obesa Sowerby		Barnard 1959	
	obtusa Swainson	P.F.	Barnard 1959	
	optima Sowerby	P.F.	Sowerby 1897 Barnard 1959	
	reevei Smith	V	Smith 1904 Thiele 1925 Barnard 1959	
Melapium	*elatum* (Schubert & Wagner)	S.A.M.	Smith 1903 Barnard 1959	
	lineatum (Lamarck)	V, P.F.	Krauss 1848 Von Martens 1903 Thiele 1925 Barnard 1959	
	†*patersonae* Newton		Newton 1913	Mio-Pliocene
Oliva	*bulbosa* Röding	Elston	Barnard 1959	
	elegans Lamarck	Burnup, Kilburn	Kilburn 1964	
	ispidula L.	P.F.	Barnard 1959	
	paxillus Reeve	Kilburn	Kilburn 1963	
	scitula Marrat	Kilburn	Sowerby 1897 MacNae & Kalk 1958	
Sylvanocochlis	*ancilla* (Harly)	P.F., U.C.T.	Sowerby 1903 Barnard 1959	

Synonymy

Ancilla	
agulhasensis Thiele 1925, part	= *fasciata*
part	= ? *marmorata*
albozonata Smith 1904	= *fasciata*
angustata Sowerby 1903, *non* Sowerby 1859	= *errorum*
australis Sowerby 1892, *non* Sowerby 1859	= *optima*
bipartita Turton 1932	= *reevei*
callifera Thiele 1925	= *reevei*
cinnamomea Sowerby 1892, *non* Lamarck	= *fasciata*
decipiens Sowerby 1897	= *contusa*
dimidiata Von Martens 1903, *non* Sowerby	= *bullioiodes*
major Turton 1932	= *marmorata*
montrouzieri Watson 1886, *non* Souverbie	= *bullioides*

Fasciolariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Fasciolaria	*filamentosa* Lamarck	Sowerby, V.	Barnard 1959	
	heynemanni Dunker	P.F., S.A.M., K.H.B., Turton, Sowerby	Bartsch 1915 Turton 1932 Barnard 1959	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Fasciolaria	*lugubris* Reeve	P.F., S.A.M., U.C.T., Krauss	Krauss 1848 Tomlin 1932 Barnard 1959	
	rutila Watson	Ch., P.F., AII, Sowerby	Barnard 1959	
	trapezium L.	AII, S.A.M.	Smith 1903 Barnard 1959	
? *Fasciolaria*	*holcophorus* Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
Fusus	*africanae* Barnard	V, P.F., A	Barnard 1959	Holotype in S.A.M.
	africanus (Sowerby)	Turton, S.A.M.	Sowerby 1897 Turton 1932 Barnard 1959	
	bonaespei Barnard	V, P.F.	Barnard 1959, 1969	Holotype in S.A.M.
	colus L.	P.F., U.C.T., U.W.	Barnard 1959	
	faurei Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	rubrolineatus	V, P.F.,	Sowerby 1880, 1903	
		Sowerby	Barnard 1959, 1969	
	torulosus Lamarck	P.F.	Lamarck 1816 Barnard 1959	
	verruculatus Lamarck	Ch., V, P.F., U.C.T., Turton	Lamarck 1816 Barnard 1959	
Latirus	*abnormis* Sowerby	P.F., Sowerby	Sowerby 1894 Barnard 1959	
	alboapicatus Smith	Burnup, S.A.M.	Smith 1902 Barnard 1959	
	clausicaudatus (Hinds)	P.F.	Sowerby 1892 Barnard 1959, 1969	
	polygonus (L.)	Smith, S.A.M.	Smith 1903 Barnard 1959	
	rousi Sowerby	U.C.T.	Barnard 1969	
	subcontractus (Sowerby)		Sowerby 1902	
		P.F., Tomlin, Sowerby	Tomlin 1932 Barnard 1959	
Peristernia	*fuscotincta* (Sowerby)	Sowerby, Turton,	Sowerby 1886, 1892	
		Burnup, U.C.T.	Barnard 1959	
	leucothea Melvill	P.F., K.H.B., S.A.M., U.C.T.	Melvill 1891 Barnard 1959	
	nassatula (Lamarck)	Krauss, U.W.	Barnard 1959	

Synonymy

Cominella fuscotincta Stephenson 1947	= *Peristernia fuscotincta*
Euthria eburnea Sowerby 1900	= *P. leucothea*
Euthria fuscotincta Sowerby 1886	= *P. fuscotincta*
Euthria ordinaria Turton 1932	= *P. leucothea*
Fasciolaria agulhasensis Tomlin 1932	= *Fasciolaria lugubris*
Fasciolaria alfredensis Bartsch 1915	= *F. heynemanni*

Fasciolaria badia Krauss 1848	= *F. lugubris*
Fasciolaria dunkeri Strebel 1911	= *F. heynemanni*
Fasciolaria scholvieni Strebel 1911	= *F. heynemanni*
Fusus adamsii Kobelt 1876	= *Fusus verruculatus*
Fusus capensis Thiele 1925	= *F. bonaespei*
Fusus clausicaudatus Hinds 1844	= *Latirus clausicaudatus*
Fusus kowiensis Turton 1932	= *Fusus africanus*
Fusus longicauda Lamarck 1816	= *Fusus colus*
Fusus ocelliferus Lamarck 1816	= *F. verruculatus*
Fusus polygonus Lamarck 1816	= *Latirus polygonus*
Fusus robustior Sowerby 1892	= *Fusus verruculatus*
Fusus subcontractus Sowerby 1902	= *Latirus subcontractus*
Fusus ventricosus Adams 1870	= *Fusus verruculatus*
Latirus burnupi Smith 1906	= *Latirus alboapicatus*
Latirus imbricatus Sowerby 1902	= *L. abnormis*
Latirus mosselensis Tomlin 1932	= *L. subcontractus*
Plicatella nassatula Von Martens 1880	= *Peristernia nassatula*

Nassidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Bullia	*annulata* (Lamarck)	P.F., U.C.T.	Sowerby 1902 Barnard 1959	
	callosa (Gray)	P.F., U.C.T.	Barnard 1959	
	digitalis Meuschen	V, P.F., U.C.T., S.A.M.	Barnard 1959	
	diluta (Krauss)	Krauss, S.A.M.	Krauss 1848 Von Martens 1874 Barnard 1959	
	laevissima (Gmelin)	Ch, P.F., V, U.C.T.	Barnard 1959	
	†*magna* Haughton		Haughton 1932	Pleistocene
	mozambicensis Smith	S.A.M.	Barnard 1959	
	natalensis (Krauss)	Krauss, U.C.T.	Krauss 1848 Barnard 1949	
	osculata (Sowerby)	P.F.	Sowerby 1900 Barnard 1959	
	pura Melvill	Muir, S.A.M.	Barnard 1959	
	rhodostoma (Gray)	S.A.M.	Barnard 1959	
	similis Sowerby	P.F.	Barnard 1959	
	tenuis Gray	U.C.T.	Barnard 1959	
	tenuistriata Tomlin	Turton	Tomlin 1920 Barnard 1959	? = *pura*
	trifasciata Smith	Muir	Smith 1904 Barnard 1959	
Demoulia	*abbreviata* (Gmelin)	P.F.	Barnard 1959	
	retusa (Lamarck)	P.F.	Barnard 1959	
Nassa	*analogica* Sowerby	V, P.F.	Sowerby 1903 Von Martens 1903 Barnard 1959	
	arcularia L.	Krauss, U.C.T.	Barnard 1959	
	babylonica Watson	P.F.	Barnard 1959	
	bicallosa Smith	P.F.	Smith 1876 Barnard 1959	
	capensis Dunker		Tomlin 1928 Barnard 1959	
	coronata Bruguière	Krauss, U.W., U.C.T.	Barnard 1959	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Nassa	*desmoulioides* Sowerby	P.F.	Sowerby 1903 Barnard 1959	
	eusulcata Sowerby	P.F.	Sowerby 1902 Barnard 1959	
	fenestrata Marrat	U.W.	Barnard 1959	
	gemmulata Lamarck	U.C.T.	Barnard 1959	
	glans L.		Barnard 1959	
	horrida (Dunker)	Kilburn	Tomlin 1928	
	kochiana Dunker	S.A.M., U.C.T.	Tomlin 1928 Barnard 1959	
	kraussiana Dunker	S.A.M.	Krauss 1848 Barnard 1959	
	margaritifer Dunker		Barnard 1959	
	muiri Barnard	Muir	Barnard 1959	Syntypes in S.A.M.
	natalensis Smith		Barnard 1959	
	papillosa (L.)	Braga	Barnard 1959	Specimen in P.E. Mus.
	plebecula Gould		Tomlin 1928 Barnard 1959	
	plebeja Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	plicatella A. Adams	U.C.T.	Barnard 1959	
	pyramidalis A. Adams	P.F., U.C.T.	Barnard 1959	
	rhysonepia Barnard	P.F.	Barnard 1969	Holotype in S.A.M.
	scopularcus Barnard	Haughton, U.C.T.	Barnard 1959	Holotype in S.A.M.
			Barnard 1962	Also Pleistocene
	speciosa A. Adams	P.F., U.C.T.	Barnard 1959	
	vidalensis Barnard	P.F.	Barnard 1959	Holotype in S.A.M.

Synonymy

Bullia	*achatina* Lamarck 1816	= *digitalis*
	aepynota Bartsch 1915	= *diluta*
	albanyana Turton 1932	= ? *diluta*
	alfredensis Bartsch 1915	= *diluta*
	almo Bartsch 1915	= *digitalis*
	ancillaeformis Smith 1906	= ? *Ancilla ancillaeformis*
	balteata Sowerby 1921	= *pura*
	capensis Euthyme 1885	= *digitalis*
	digitata Von Martens 1903, typ. err.	= *digitalis*
	dulcis Sowerby 1921	= *digitalis*
	globulosa Turton 1932	= *laevissima*
	kraussi Turton 1932	= *pura*
	laevigatum Lamarck 1816	= *laevissima*
	lara Bartsch 1915	= ? *tenuis*
	mauritiana Von Martens 1874, *non* Gray	= *annulata*
	mediolaevis Von Martens 1874	= *diluta*
	polita Bartsch 1915, *non* Lamarck	= *rhodostoma*
	pustulosa Sowerby 1894	= *mozambicensis*
	rietensis Turton 1932	= ? *diluta*
	scitula Turton 1932	= ? *diluta*
	semiflammea Reeve 1846	= *digitalis*
	semiplicata Gray 1839	= ? *callosa*

Bullia	*semiusta* Reeve 1847	= *digitalis*
	spectrum Turton 1932	= ? *diluta*
	subventricosa Turton 1932	= *diluta*
	sulcata Reeve 1846	= *digitalis*
	sulcata Sowerby 1889	= *callosa*
	zenobia Turton 1932	= ? *diluta*
Demoulia	*globosa* Sowerby 1825	= *abbreviata*
	ventricosa Lamarck 1816	= *retusa*
Nassa	*affinis* Turton 1932, *non* Sowerby 1832	= *rufanensis*
		= *pyramidalis*
	algida Tomlin 1928, *non* Reeve (part)	= *bicallosa*
		= *glans*
	ambigua Turton 1932, *non* Montagu	= *muiri*
	carinata Turton 1932	= *kochiana*
	cerotina Reeve 1853, typ. err.	= *Serotina capensis*
	circumtexta Von Martens 1903 (Dec.)	= *analogica*
	clathrata Lamarck 1816	= *gemmulata*
	coccinea Sowerby 1886	= *kochiana*
	coccinella Sowerby 1897, *non* Lamarck	= *kochiana*
	costellifera A. Adams 1853	= *margaritifera*
	crawfordi Sowerby 1892	= *kochiana*
	diluta Smith 1899	= *babylonica*
	erecta Turton 1932	= ? *plebecula*
	eucosmia Turton 1932	= *kochiana*
	filmerae Sowerby 1900	= *pyramidalis*
	filosa Reeve 1853	= *picta*
	gallandiana Fischer 1862	= ? *analogica*
	glabella Marrat 1877, *non* Sowerby	= *bicallosa*
	incrassata Sowerby 1900, *non* Müller	= *kochiana*
	kraussi Turton 1932	= *capensis*
	kusteri Krauss 1848, in litt.	= *kraussiana*
	laevigata Marrat 1877	= *bicallosa*
	limata Thiele 1925, *non* Chemnitz	= *kochiana*
	marginulata Krauss 1848, *non* Lamarck	= *fenestrata*
	microstoma Turton 1932, *non* Pease	= *muiri*
	orbiculata A. Adams 1851	= *kraussiana*
	ordinaria Turton 1932	= *capensis*
	plicosa Dunker 1846, *non* Kenke	= *speciosa*
	poecilosticta Smith 1904	= *kochiana*
	producta Sowerby 1897	= *plebecula*
	pulchella A. Adams 1852	= *capensis*
	pulla Lamarck	= *arcularia*
	punctilineata Turton 1932	= *pyramidalis*
	quantula Gould 1860	= *kochiana*
	regularis Küster 1858	= *kochiana*
	rufanensis Turton 1933	= *pyramidalis*
	rumphi Deshayes 1844	= *arcularia*
	serotina A. Adams 1852	= *capensis*
	signata Dunker 1847	= *kochiana*
	spurca Gould 1860	= *kochiana*
	sturmii Reeve 1853, *non* Philippi	= *natalensis*
	subcancellata Turton 1932	= *plebecula*
	sulcifera A. Adams 1852 (monstrosity)	= *arcularia*
	suturale Lamarck 1822	= *glans*
	trifasciata A. Adams 1853, *non* Gmelin	= *analogica*

Volemidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Volema	*paradisaica* (Reeve)	K.H.B., U.C.T., U.W.	Barnard 1959	

Buccinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Afrocominella	*capensis* (Dunker)	U.C.T.	Barnard 1959	
	elongata (Dunker)	U.C.T.	Barnard 1959	
	turtoni (Bartsch)	Turton, U.C.T.	Bartsch 1915 Barnard 1959	
Babylonia	*papillaris* (Sowerby)	P.F., U.C.T.	Sowerby 1902 Barnard 1959	
Burnupena	*cincta* (Bolten)	U.C.T.	Orr 1956 Barnard 1959	
	delalandi (Kiener)	U.C.T.	Orr 1956 Barnard 1959	
	lagenaria (Lamarck)	U.C.T.	Orr 1956 Barnard 1959	
	limbosa (Reeve)	U.C.T.	Orr 1956 Barnard 1959	
	papyracea (Bruguière)	U.C.T.	Orr 1956 Barnard 1959	
	tigrina (Kiener)	U.C.T.	Orr 1956 Barnard 1959	
Cantharus	*carinifera* (Küster)	P.F., U.C.T.	Smith 1901 Barnard 1959	
	fumosus (Dillwyn)	U.W.	Barnard 1959	
	insculpta (Sowerby)		Barnard 1959	
	shepstonensis Tomlin		Tomlin 1959	
Engina	*marmorata* (Reeve)	Burnup	Barnard 1959	
	mendicaria (L.)	U.C.T., U.W.	Barnard 1959	
	perlata (Küster)	U.C.T.	Barnard 1959	
Euthria	*filmerae* Sowerby	P.F.	Sowerby 1900 Barnard 1959	
	ponsonbyi Sowerby	P.F.	Sowerby 1889 Barnard 1959	
	queketti Smith	P.F.	Smith 1901 Barnard 1959	
Metula	*crenilabrum* (A. Adams)	S.A.M.	Sowerby 1900 Smith 1903	
Nassaria	*gracilis* Sowerby	P.F.	Sowerby 1902 Barnard 1959	
Neptunea	*bonaespei* Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
Prosipho	*torquatus* Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.

Synonymy

Babylonia	*millepunctata* Sowerby	= *B. papillaris*
Buccinum	*biseriale* Küster	= *Burnupena cincta*
	cingulatum L.	= *Thais cingulata*
	clathratum A. Adams & Reeve 1850	= *Metula clathrata*
	dunkeri Küster	= *Burnupena* sp.
	fumosum Dillwyn 1817	= *Cantharus fumosus*
	homoleucum Küster	= *Burnupena cincta*
	intinctum Reeve 1846	= *B. papyracea*
	kochianum Dunker	= *Nassa kochiana*
	ligatum Kiener 1834	= *Burnupena cincta*
	limbosum Lamarck	= *B. limbosa*
	marmoratum Reeve 1846	= *Engina marmorata*
	proteum Reeve 1846	= *Cantharus fumosus*
	pubescens Küster	= *Burnupena tigrina*

Buccinum	*robustum* Küster	= *B. papyracea*
	rubiginosum Reeve 1846	= ? *Cantharus carinifera*
	subcostatum Krauss 1848, var. '*scabricostata*' Sowerby 1892 typ. err. for *subcostata*	= ? *Cantharus carinifera*
'*Cominella*'	*acutispira* Sowerby 1921	= *Trophon acutispira*
	adjacens Turton 1932	= *Burnupena cincta*
	alfredensis Bartsch 1915	= *Afrocominella elongata*
	anglicana Martini (Sowerby 1892)	= *Burnupena* ? *papyracea*
	angusta Sowerby 1886	= *Mangilia ponsonbyi*
	capensis Dunker 1844	= *Afrocominella capensis*
	concolor Sowerby 1897	= *Thais castanea*
	dunkeri Küster	= *Burnupena* sp.
	fuscopicta Turton 1932	= ? *Tritonalia puncturata*
	multilirata Bartsch 1915	= *Burnupena limbosa*
	nigronodulosa Turton 1932	= *Thais castanea*
	porcata Gmelin 1790, *non* Da Costa	= *Burnupena cincta*
	prolongata Smith 1899	= *Afrocominella elongata*
	robusta Küster (Turton 1932)	= *Burnupena papyracea*
	semisulcata Sowerby 1892	= *B. tigrina*
	sulcata Sowerby 1892	= *Daphnella sulcata*
	tigrina Kiener 1834	= *Burnupena tigrina*
	translucida Turton 1932	= *B. tigrina*
	unifasciata Sowerby 1886	= *Thais castanea*
	wahlbergi Krauss 1848 (Stephenson 1947)	= *T. wahlbergi*
Engina	*natalensis* Melvill 1895	= *Engina perlata*
Euthria	*capensis* Dunker (Smith 1903)	= *Afrocominella capensis*
	eburnea Sowerby 1900	= *Peristernia leucothea*
	fuscotincta Sowerby 1886	= *P. fuscotincta*
	lacertina Gould 1860	= *Afrocominella capensis*
	lineolatus Krauss (Sowerby 1892)	= '*Cominella*' *dunkeri*
	magelliani Velain 1877	= *Afrocominella capensis*
	ordinaria Turton 1932	= ? *Peristernia leucothea*
	pura Von Martens 1903	= *Pyrene pura*
	turtoni Bartsch 1915	= *Afrocominella turtoni*
	wahlbergi Krauss 1848 (Sowerby 1892)	= *Thais wahlbergi*
Glypteuthria	*capensis* Thiele 1925 *capensis* Tomlin 1931 *sculpturata* Tomlin 1945	= *Fusivoluta capensis*
	solidissima Tomlin 1932	= *Afrocominella elongata*
Metula	*marmorata* Reeve 1846	= *Engina marmorata*
Pisania	*costata* Thiele 1925	= *Afrocominella capensis*
	fumosus Dillwyn 1817	= *Cantharus fumosus*
	montrouzieri Crosse 1862	= *Metula crenilabrum*
Pollia	*shepstonensis* Tomlin 1926	= *Cantharus shepstonensis*
Siphonalia	*mandarinus* Studer 1889, Von Martens 1903, *non* Duclos	= *Fusivoluta pyrrhostoma*
Tritonidea	*carinifera* Küster 1858	= *Cantharus carinifera*
	insculpta Sowerby 1900	= *C. insculpta*
	marmorata Reeve 1846	= *Engina marmorata*
	natalensis Smith 1901	= *Cantharus carinifera*
	subrubiginosus Sowerby 1894, *non* Smith	= *C. carinifera*

Pyrenidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Alcira	*elegans* A. Adams	S.A.M.		
Columbella	*fulgurans* Lamarck	U.W.	Barnard 1959	
	mercatoria L.		Sowerby 1897	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Columbella	*turturina* Lamarck	Kilburn	Sowerby 1897 Barnard 1969	
Parviterebra	*separanda* Tomlin	Burnup	Smith 1903 Tomlin 1923	
Pyrene	*albuginosa* (Reeve)	P.F., U.C.T.	Barnard 1959	
	atrata (Gould)	U.C.T.	Barnard 1959	
	burnupi (Smith)	Burnup	Smith 1901 Barnard 1959	
	dianae (Thiele)	V, P.F.	Thiele 1925 Barnard 1959	
	filmerae (Sowerby)	P.F., U.C.T.	Sowerby 1900 Barnard 1959	
	kraussi (Sowerby)	P.F., U.C.T.	Barnard 1959	
	langleyi (Sowerby)	S.A.M., U.C.T.	Sowerby 1897 Barnard 1959	
	lightfooti (Smith)	Lightfoot, P.F., U.C.T.	Smith 1901 Barnard 1959	Paratypes in S.A.M.
	parhelena Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.
	cf. *profundi* (Dall)	S.A.M.	Barnard 1963	
	pura (Von Martens)	V, P.F.	Von Martens 1903 Thiele 1925 Barnard 1959	
	retiaria Tomlin	Burnup	Tomlin 1931	? *Pyrene* s.s.
'*Columbella*'	*adela* Thiele	V, Muir	Thiele 1925 Barnard 1959	
	beckeri Sowerby	Becker, Turton	Sowerby 1900	
	brunnescens Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	confertilirata Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.
	consanguinea Sowerby	Turton	Barnard 1969	
	dibolos Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	eulimoides Turton	Turton, P.F.	Turton 1932 Barnard 1959	
	floccata Reeve		Von Martens 1903 Barnard 1959	
	hella Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	leptalia Smith		Smith 1902	
	meta Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	metella Thiele	P.F.	Barnard 1969	
	mutabilis Turton	Turton, S.A.M., P.F.	Turton 1932 Barnard 1959	
	polyarosus Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	pyramidalis Sowerby	P.F.	Sowerby 1894, 1897 Barnard 1959	
	sigma Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	spreta Thiele	P.F.	Barnard 1969	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
'Columbella'	*vitula* Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
Zafra	*troglodytes* Souverbie	Burnup	Tomlin 1926	

Synonymy

adjacens Smith ined. (listed 1904)	= *pyramidalis*
albanyana Turton 1932	= *kraussi*
alfredensis Bartsch 1915	= *kraussi*
approximata Sowerby 1921	= *albuginosa*
arcuata Turton 1932	= *apicata*
assimilans Turton 1932	= *lightfooti*
brunescens Turton 1932, *non* Thiele	= *hella*
capensis Sowerby 1892	= *Daphnella capensis*
cereale Menke, Krauss 1848	= *kraussi*
convexa Turton 1932	= *mutabilis*
distincta Turton 1932	= *pyramidalis*
fulgurans Krauss 1848	= *kraussi*
fulminea Gould 1859	= *kraussi*
fusca Turton 1932	= *pyramidalis*
helena Thiele 1925	= *pura*
helena Turton 1932, *non* Thiele	= *kraussi*
io Bartsch 1915	= *kraussi*
kitchingi Sowerby 1897	= *kraussi*
kowiensis Turton 1932	= *burnupi*
major Turton 1932	= *rietensis*
	= *albuginosa*
mendicaria L.	= *Pusiostoma* (*Engina*) *m.*
mitraeformis Smith 1903, *non* A. Adams	= *leptalia*
multicostata Turton 1932	= *mutabilis*
natalensis Tomlin 1926	= *albuginosa*
pumila Souverbie	= *atrata*
regulus Souverbie	= *atrata*
rietensis Turton 1932	= *albuginosa*
sagena Sowerby 1892, *non* Reeve	= *filmerae*
undata Duclos, Krauss 1848	= *flava*
veneris Thiele 1925	= *meta*

Rapidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Coralliobia	*madreporarum* (Sowerby)	U.W.	Barnard 1959	
Coralliophila	*fritschi* Von Martens	U.C.T.	Von Martens 1874 Barnard 1959	
	isosceles Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.
	zuluensis Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
Latiaxis	*capensis* Tomlin	P.F.	Tomlin 1928	Holotype in S.A.M.
	elstoni Barnard	Bell Marley, Elston	Barnard 1962	Holotype in S.A.M.
	kylix Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	rosaceus Smith	Turton, Muir, P.F.	Smith 1903 Barnard 1959	
	tortilis H. & A. Adams	P.F.	Barnard 1959	? = *gyratus* Hinds 1844

Synonymy

Coralliophila	*carduus* Broderip (Smith 1906)	= *Trophon carduus*
	wahlbergi Krauss (Smith 1891)	= *Thais wahlbergi*
Latiaxis	*fritschi* Barnard 1957, Von Martens	= *Tritonalia sperata*
Pseudomurex	*meyendorffi* Sowerby 1892, *non* Calcara	= *Coralliophila fritschi*

Muricidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Afritrophon	*agulhasensis* (Thiele)	V, U.C.T., P.F.	Thiele 1925 Barnard 1959	
	insignis (Sowerby)	P.F.	Sowerby 1900 Barnard 1959	
	kowieensis (Sowerby)	P.F., U.C.T.	Sowerby 1901	
Aspella	*acuticostata* Turton	Muir, Turton	Barnard 1959	
Drupa	*anaxares* (Kiener)		Krauss 1848 Cooke 1919	
	aspera Lamarck		Krauss 1848 Smith 1903	
	cancellatum (Quoy & Gaimard)	Burnup	Smith 1903	
	granulata (Duclos)	U.C.T.	Krauss 1848 Barnard 1969	
	margariticola (Broderip)	Burnup	Barnard 1959	
	ricinus (L.)	Krauss, Kilburn		
	squamilirata (Smith)	Burnup, P.F., U.C.T.	Smith 1903 Barnard 1959	
	squamosa (Pease)	U.C.T.	Barnard 1959	
Drupella	*bracteata* (Hinds)	Kilburn	Sowerby 1900 Smith 1903	
	elata (Blainville)	Burnup, U.W.	Barnard 1959	
	sp.	U.W.	Barnard 1959	
Murex	*adustus* Lamarck	P.F., U.C.T.	Barnard 1959	
	axicornis Lamarck	P.F., A	Barnard 1959	
	brevispina Lamarck	K.H.B., U.W., U.C.T.	Barnard 1959	
	fallax Smith	P.F.	Smith 1901 Barnard 1959	
	maurus Broderip	Elston, Kilburn	Tomlin 1931	
	ramosus L.	P.F., U.W., U.C.T.	Barnard 1959	
	sp. Barnard	P.F.	Barnard 1959	
	sp. Barnard	P.F.	Barnard 1959	
'*Murex*'	*wahlbergi* Krauss	Krauss	Kraus 1848 Barnard 1959	
Ocinebra	*natalensis* Smith	Burnup	Smith 1906	
Pinaxia	*coronata* A. Adams	Burnup	Smith 1906	
Pteropurpura	*mitraeformis* Sowerby	Krauss, Muir	Barnard 1959, 1969	
	uncinarius Lamarck	V, P.F., U.C.T.	Barnard 1959, 1969	
Rapana	*bulbosa* (Solander)	Cooke, P.F.	Cooke 1919 Barnard 1959	
Thais	*bitubercularis* (Lamarck)	U.W.	Barnard 1959	
	bufo (Lamarck)	Krauss	Krauss 1848	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Thais	*capensis* (Petit)	P.F., U.C.T.	Petit 1852 Barnard 1959	
	(*Cymia*) *carinifera* (Lamarck)	Braga, U.C.T.	Barnard 1959	
	castanea (Krauss)	P.F., U.C.T.	Sowerby 1886, 1892	
	cingulata (L.)	S.A.M., U.C.T.	Barnard 1959	
	distinguenda (Dunker)	K.H.B., U.C.T., U.W.	Barnard 1959	
	dubia (Krauss)	Muir, U.C.T., S.A.M., K.H.B.	Krauss 1848 Barnard 1959	
	gemmulata (Lamarck)	Burnup, K.H.B., U.C.T., U.W.	Barnard 1959	
	rudolphi (Lamarck)	Krauss	Krauss 1848	
	squamosa (Lamarck)	Muir, U.C.T., S.A.M.	Krauss 1848 Barnard 1959	
'*Purpura*'	*wahlbergi* Krauss	S.A.M., U.C.T.	Krauss 1848 Barnard 1959	
Tritonalia	*aedicularum* Barnard	U.C.T.	Barnard 1969	Holotype in S.A.M.
	fenestrata (Gould)	S.A.M., U.C.T.	Sowerby 1886 Barnard 1969	
	juritzi Barnard	Juritz	Barnard 1969	Holotype in S.A.M.
	kieneri (Reeve)	V, Muir	Barnard 1959	
	purpuroides (Dunker)	V, S.A.M.	Krauss 1848 Barnard 1959	
	scrobiculata (Dunker)	P.F., U.C.T.	Krauss 1848 Barnard 1959	
	sperata (Cossmann)	P.F., U.C.T.	Smith 1904 Barnard 1959	
Trophon	*acceptans* Barnard	P.F.	Barnard 1959, 1969	Holotype in S.A.M.
	acutispira (Sowerby)	U.C.T., Turton	Sowerby 1921 Barnard 1959	
	beatum Barnard	U.C.T.	Barnard 1969	Holotype in S.A.M.
	carduus (Broderip)	P.F.	Sowerby 1903 Barnard 1959	
	cf. *droueti* Dautzenberg	S.A.M.	Barnard 1963	
	incertus Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.
	johannthielei Barnard	V, P.F.	Thiele 1925 Barnard 1969	Holotype in S.A.M.
	jucundus Thiele	V, P.F.	Thiele 1925 Barnard 1959	
	mioplectos Barnard	P.F.	Barnard 1959	Holotype in S.A.M.
	pistillum Barnard	P.F.	Barnard 1969	Holotype in S.A.M.
	sp. Barnard	P.F.	Barnard 1959	
Typhis	*arcuatus* Hinds	V, P.F., U.C.T.	Hinds 1844 Barnard 1959	cf. *transcurcens* Von Martens 1903, Zanzibar Channel
	pentaphasios Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Urosalpinx	*heptagonalis* (Reeve)	P.F., U.C.T., U.W.	Reeve 1846 Smith 1879 Barnard 1959	

Synonymy

Afritrophon	*acutispira* Sowerby 1921 (Tomlin 1947)	= *Trophon acutispira*
	jucunda Thiele 1925 (Tomlin 1947)	= *T. jucunda*
Murex	*babingtoni* Sowerby 1892	= *Tritonalia scrobiculata*
	capensis Sowerby, Krauss	= '*Murex*' *uncinarius*
	crawfordi Sowerby 1892	= *Tritonalia scrobiculata*
	dunkeri Krauss 1848	= *T. purpuroides*
	kieneri Reeve 1845	= *T. kieneri*
	mancinella L.	= *Thais gemmulata*
	margariticola Broderip 1832	= *Drupa margariticola*
	purpuroides Dunker, Reeve 1845	= *Tritonalia purpuroides*
	scrobiculata Sowerby 1892	= *T. scrobiculata*
	undatus Chemnitz 1795	= *Drupa margariticola*
Purpura	*cataracta* Sowerby 1892, *non* Chemnitz	= *Thais dubia*
	clathrata Blainville 1832	= *T. squamosa*
	lagenaria Kiener 1836	= *T. dubia*
	luteostoma Krauss 1848, *non* Deshayes	= *T. capensis*
	mancinella L.	= *T. gemmulata*
	morus Kiener	= *Drupa aspera*
	pura Smith 1903	= *Thais capensis*
	savignyi Deshayes 1844	= *T. distinguenda*
	scobina Sowerby 1889, 1892, *non* Quoy & Gaimard	= *T. dubia*
	succincta var. *natalensis* Nardini 1934	= *T. capensis*
	texturata Smith 1904	= *T. capensis*
	tumulosa Nardini 1934, *non* Reeve	= *T. capensis*
	zeyheri Krauss 1852	= *T. dubia*
Ricinula	*contracta* Reeve 1846	= *Urosalpinx heptagonalis*
	tuberculata Blainville (Braga 1952)	= *Thais distinguenda*
Sistrum	*affine* Pease 1862	= *Drupa marginatrum*
	arachnoides Lamarck 1816	= *D. ricinus*
	coronatum H. Adams 1869 (Sowerby 1897)	= *Coralliophila coronata*
	elongatum Reeve, *non* Blainville (Sowerby 1897)	= *Drupa cancellata*
	fenestratum Tryon	= *D. cancellatum*
	tuberculatum Blainville 1832	= *D. granulata*
	undatum Chemnitz 1795	= *D. margariticola*
Thais	*albolineata* Turton 1932	= *Thais capensis*
	cataracta Sowerby 1892, *non* Chemnitz	= *T. dubia*
	clathrata Blainville 1832	= *T. dubia*
	clavus Lamarck 1822	= *T. cingulata*
	concolor Sowerby 1897	= *T. castanea*
	hippocastanum Küster	= *T. distinguenda*
	intermedia Kiener 1835–6	= *T. distinguenda*
	luteostoma Krauss 1848, *non* Deshayes	= *T. capensis*
	mancinella L.	= *T. gemmulata*
	pura Smith 1903	= *T. capensis*
	pyramidalis Turton 1932	= *T. dubia*
	rufanensis Turton 1932	= *T. dubia*
	scobina Sowerby 1889, *non* Quoy & Gaimard	= *T. dubia*
	sculpturata Turton 1932	= *T. squamosa*
	trochlea Lamarck 1816	= *T. cingulata*
	unifasciata Krauss, Küster 1886	= *T. castanea*

Thais	*zeyheri* Krauss 1852	= *T. dubia*
Tritonalia	*bipartita* Turton 1932	= *Tritonalia puncturata*
	fritschi Barnard 1957, *non* Von Martens	= *T. sperata*
Trophon	*insignis* Sowerby 1900	= *Afritrophon insignis*
	kowieensis Sowerby 1901	= *A. kowieensis*
	wahlbergi Krauss 1848 (Sowerby 1892)	= '*Murex*' *wahlbergi*
Typhis	*transcurrens* Von Martens 1903	= *Typhis* ? *arcuatus*
Urosalpinx	*innotabilis* Smith 1879	= *Urosalpinx heptagonalis*

Columbariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Columbarium	*angulare* Barnard	P.F.	Barnard 1959	Syntypes in S.A.M.
	formosissimum Tomlin	P.F.	Tomlin 1928 Barnard 1959	Syntypes in S.A.M.
	natalense Tomlin	P.F.	Tomlin 1928 Barnard 1959	Holotype in S.A.M.
	radiale (Watson)	P.F., Ch, V	Watson 1886 Barnard 1959	
	rotundum Barnard	P.F.	Barnard 1959	Holotype in S.A.M.

Synonymy

Fusus	*radialis* Watson 1886	= *Columbarium radiale*

*(Rachiglossa)

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Nux	*alabaster* Barnard	S.A.M.	Barnard 1960	Holotype in S.A.M.

Ficidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ficus	*ficus* L.	P.F., U.C.T.	Barnard 1963	

Synonymy

Pyrula	*ficus* L.	= *Ficus ficus*
	ficoides Lamarck	= *F. ficus*

Tonnidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Eudolium	*aulacodes* Tomlin	P.F.	Tomlin 1927	Holotype in S.A.M.
	crosseanum (Monterosato)	P.F.	Tomlin 1927 Barnard 1963	
Tonna	*costata* Menke	S.A.M., U.W.	Barnard 1963	
	dunkeri Hanley	S.A.M.	Barnard 1963	Also †
	sp. ('*galea*' Tomlin)		Tomlin 1927 Barnard 1963	
	perdix (L.)	Van Bruggen	Barnard 1969	
	tessellata (Lamarck)	P.F.	Barnard 1963	
	variegata (Lamarck)	P.F.	Barnard 1963	

Synonymy

Dolium	*costatum* Menke 1829	= *Tonna costata*
	crosseanum Monterosato 1869	= *Eudolium crosseanum*
	dunkeri Hanley 1859	= *Tonna dunkeri*
	luteostoma Küster	= *T. variegata*
	procellarum Euthyme 1885	= *T. variegata*
	variegatum Lamarck 1822	= *T. variegata*

Oocorythidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Oocorys	*watsoni* Locard	S.A.M., P.F., A, Ch	Tomlin 1927 Banard 1963	

Cassididae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cypraecassis	*rufa* (L.)	U.W.	Barnard 1963	
Lambidium	*macandrewi* (Sowerby)	P.F.	Sowerby 1903 Barnard 1963	
Phalium	*areola* (L.)	Burnup, U.W.	Barnard 1963	
	glaucum (L.)	U.W.	Barnard 1963	
	pila (Reeve)	P.F.	Bayer 1935 Barnard 1963	
	ponderosum (Gmelin)	P.F.	Smith 1903 Barnard 1963	
(*Xenogalea*)	*labiata* Perry	Krauss, S.A.M., P.F.	Bayer 1935 Barnard 1963	Also †
	zeylanica (Lamarck)	P.F., U.C.T.	Bayer 1935 Barnard 1963	Also †

Synonymy

Cassis	*achatina* Lamarck 1816	= *Phalium pila*
	africana Fulton 1930	= *P. pila*
	areola Lamarck 1816	= *P. areola*
	glauca L.	= *P. glauca*
	nodulosa Gmelin	= *P. ponderosa*
	pila Reeve 1848	= *P. pila*
	pyrum Lamarck 1822	= *Xenogalea zeylanica*
	torquata Adam & Leloup 1938	= *Phalium ponderosa*
Oniscia	*macandrewi* Sowerby 1888	= *Lambidium macandrewi*

Bursidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Bursa	*bufonia* (Gmelin)	Krauss, S.A.M.	Krauss 1848 Barnard 1963	
	cruentata (Sowerby) var. *ranelloides* Reeve	P.F.	Sowerby 1902 Barnard 1963 Bayer 1932	
	crumena (Lamarck)	P.F., U.W., A	Barnard 1963	
	granularis (Bolten)	K.H.B., U.C.T., U.W.	Krauss 1848 Barnard 1963	
	rubeta (L.)	Smith	Smith 1914 Barnard 1963	

Synonymy

Bursa (*Bufonaria*)	*lampas* Lamarck	= *Bursa rubeta*
	rhodostoma Sowerby 1841	= *B. cruentata* var. *rhodostoma*
Lotorium	*ranelloides* Reeve	= *B. cruentata* var. *ranelloides*
Ranella	*affinis* Broderip 1838	= *B. granularis* var. *corrugata*
	crumena Lamarck 1816	= *B. crumena*
	granifera Lamarck 1816	= *B. granularis*
	semigranosa Lamarck 1822	= *B. granularis*
	siphonata Reeve 1844	= *B. bufonia* var. *siphonata*

Cymatiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Argobuccinum	*argus* (Gmelin)	P.F., U.C.T., S.A.M.	Bayer 1933 Barnard 1963	Also †

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Argobuccinum	*murrayi* (Smith)	V, P.F., U.C.T.	Smith 1891 Tomlin 1947 Barnard 1963	
	nassariforme (Sowerby)	P.F.	Sowerby 1902 Barnard 1963	
	pusilla (Broderip)	Burnup, P.F.	Barnard 1963	
Charonia	*pustulata* (Euthyme)	Krauss, P.F., S.A.M.	Krauss 1848 Euthyme 1889 Barnard 1963	Also †
Cymatium	*africanum* (A. Adams)	P.F., S.A.M.	Barnard 1963	Also †
	cingulatum (Lamarck)	P.F.	Sowerby 1897 Barnard 1963	
	dolarium (L.)	P.F., U.C.T., U.W.	Krauss 1848 Barnard 1963	
	durbanense (Smith)	Burnup	Smith 1899 Barnard 1963	
	gallinago (Reeve)	Burnup, U.C.T., U.W.	Barnard 1963	
	gemmatum (Reeve)	Burnup, U.C.T., U.W.	Barnard 1963	
	klenei (Sowerby)	S.A.M., P.F.	Sowerby 1889, 1892 Barnard 1963	Also †
	olearium (L.)	Krauss, K.H.B., U.C.T., U.W.	Krauss 1848 Barnard 1963	Also †
	pileare (L.)	Burnup, U.W.	Krauss 1848 Barnard 1963	
	rubecula (L.)		Tomlin 1931	
	vespaceum (Lamarck)	P.F.	Krauss 1848 Barnard 1963	
Distortrix	*reticulata* (Bolten)	P.F., U.C.T.	Barnard 1963	
Mayena	*gemmifera* (Euthyme)	P.F., U.C.T., U.W.	Barnard 1963, 1969	
Thalassocyon	*bonus* Barnard	S.A.M.	Barnard 1960	Holotype in S.A.M.

Synonymy

Bursa	*kowiensis* Turton 1932	= *Charonia pustulata*
Cassidaria	*cingulata* Lamarck 1822	= *Cymatium cingulatum*
Charonia	*gemmifera* var. *lepta* Bartsch 1933	= *Mayena gemmifera*
	poecilostoma Smith 1915	= *M. gemmifera*
Cymatium	*cretaceum* (sic) Smith 1906	= *Cymatium doliarium*
	labiosum Turton 1932, *non* Wood	= *C. durbanense*
	parthenopus Von Salis, Bayer 1933	= *C. olearium*
Distorsio	*reticulata* Bolten 1798	= *Distortrix reticulata*
Eugyrina	*gemmifera* Bartsch 1915	= *Argobuccinum gemmifera*
Fusitriton	*algoensis* Tomlin 1947	= *A. murrayi*
Fusus	*cutaceus* Lamarck 1816	= *Cymatium cingulatum*
Lotorium (sic)	*cretaceum* Krige 1933	= *C. pileare*
	cingulata Sowerby 1897	= *C. cingulatum*
Lolarium (sic)	*cretaceum* Krige 1933	= *C. doliarium*
	durbanense Smith 1899	= *C. durbanense*
	nassariforme Sowerby 1902	= *Argobuccinum murrayi*
Lolarium (sic)	*olearium* Krige 1933	= *Cymatium olearium*
	rubecula L.	= *C. rubecula*
	vespaceum Kesteven 1902	= *C. vespaceum*
Murex	*argus* Gmelin 1791	= *Argobuccinum argus*

Murex	*cancellinus* De Rousy 1805	= *Distortrix reticulata*
Nyctilochus	*alfredensis* Bartsch 1915	= *Charonia pustulata*
Ranella	*argus* Krauss 1848	= *Argobuccinum argus*
	leucostoma var. *poecilostoma* Lamarck 1822	= *A. gemmifera*
	polyzonalis Lamarck 1816	= *A. argus*
Tritonium	*gemmifera* Euthyme 1889	= *A. gemmifera*
	olearium Kesteven 1902	= *Cymatium olearium*
	pustulatum var. *minor* & *varicosa* Euthyme	= *Charonia pustulata*
Triton	*africanum* A. Adams 1855	= *Cymatium africanum*
	clathratum Lamarck 1816	= *Distortrix reticulata*
	costatus Born, Watson 1886	= *Cymatium olearium*
	cutaceum var. *doliarius* Schwarz 1910	= *C. doliarium*
	doliarium Krauss 1848	= *C. doliarium*
	gallinago Reeve 1844	= *C. gallinago*
	klenei (sic) Sowerby 1889	= *Cymatium klenei*
	nodifer Sowerby 1892, *non* Lamarck	= *Charonia pustulata*
	sauliae Krauss 1848, *non* Reeve	= *C. pustulata*
	vespaceum Krauss 1848	= *Cymatium vespaceum*
Trophon	*magellanicus* Von Martens 1900, *non* Chemnitz	= *Argobuccinum murrayi*

Colubrariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Colubraria	*alfredensis* Bartsch	Turton	Bartsch 1915	
	crebrilirata (Sowerby)	P.F.	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	fictilis (Hinds)	Su, V, P.F.	Hinds 1844 Barnard 1963	

Synonymy

Colubraria	*bracteata* (Hinds) 1844	= *Drupa bracteata*
Epidromus	*crebrilirata* Sowerby 1903	= *Colubraria crebrilirata*
Triton	*fictilis* Hinds 1844	= *C. fictilis*

Cypraeidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cypraea	*algoensis* Gray	Krauss	Krauss 1848 Barnard 1963	
	annulus L.	U.C.T., U.W.	Barnard 1963	
	arabica L. var. *eglantina* Duclos	U.C.T., U.W.	Barnard 1963	
	barclayi Reeve	P.F.	Sowerby 1903 Barnard 1963	
	broderipi Gray in Sowerby	Bell Marley	Dance 1960	
	capensis Gray	P.F.	Krauss 1848 Barnard 1963	
	caputserpentes L.	U.C.T., U.W.	Barnard 1963	
	carneola L.	U.C.T.		
	caurica L.	U.W.		
	chinensis Gmelin	Burnup, U.W.	Barnard 1963	
	edentula Sowerby	P.F.	Barnard 1963	
	erosa L.	Burnup, U.C.T., U.W.	Barnard 1963	
	felina Gmelin	U.C.T., U.W.	Barnard 1963	
	fultoni Sowerby	P.F.	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	fuscodentata Gray	Dead specimens only	Krauss 1848 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cypraea	*fuscorubra* Shaw	P.F., U.C.T.	Sowerby 1903	
	Globose form	A	Barnard 1963	
	helvola L.	U.W.	Barnard 1963	
	isabella L.	U.W.	Barnard 1963	
	lamarckii Gray	Burnup, U.W.	Barnard 1963	
	mauritiana L.	U.W.		
	moneta L.	U.W.	Barnard 1963	
	ocellata L.	U.W.		
	onyx L.	U.W.	Barnard 1963	
	staphylea Lamarck	Burnup		
	talpa L.	U.W.	Tomlin 1923	
	tigris L.	U.W.	Tomlin 1923 Barnard 1963	
	vitellus Lamarck	Burnup, U.W.	Barnard 1963	
	ziczac L.	Burnup		

Synonymy

Cypraea	*amphithales* Melvill 1833	= *C. capensis*
	angustata Gmelin	= *C. fuscodentata*
	castanea Higgens 1868, *non* Bolten	= *C. fuscorubra*
	cruenta Gmelin 1791	= *C. chinensis*
	listeri Gray 1825	= *C. felina*
	lurida Day & Morgans 1956, *non* L.	= *C. caputserpentes*
	milearis L.	= *C. lamarckii*
	similis Gray 1831, *non* Gmelin	= *C. fuscorubra*
	tortirostris Sowerby 1906	= *C. chinensis*
	variolaria Lamarck 1810	= *C. chinensis*
	violacea Rous 1905	= *C. chinensis*

Triviidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Trivia (*Triviella*)	*aperta* (Swainson)		Schilder & Schilder 1929	
	ovulata (Lamarck)	P.F.	Schilder & Schilder 1929 Barnard 1963	
	splendidissima Tomlin & Schilder	P.F.	Tomlin & Schilder 1934 Barnard 1963	Type *ubi*? Not returned to S.A.M.
	vesicularis Gaskoin		Schilder & Schilder 1929	
Trivia (*Pusula*)	*globosa* (Sowerby)	Burnup, P.F.	Barnard 1963	
	sauvis Schilder	P.F., U.C.T.	Barnard 1963	
Trivia (*Trivirostris*)	*hordacea* (Kiener)	Burnup	Barnard 1963	
	oryza (Lamarck)	Burnup	Barnard 1963	
	pellucidula (Gaskoin)	Burnup, P.F.	Barnard 1963	

Synonymy

Trivia	*aperta* subsp. *neglecta* Schilder 1930	= *T. aperta*
	formosa Gaskoin, *non* Gray	= *T. sauvis*
	gaskoini Roberts 1870	= *T. oryza*
	insecta Mighels 1870	= *T. hordacea*
	oniscus Lamarck	= *T. aperta*
	ovulata var. *amaryllis* Schilder & Schilder 1929	= *T. ovulata*
	ovulata var. *rubra* Shaw 1909	= *T. ovulata*

Trivia	*pellucidula* subsp. *natalensis* Schilder 1932	= *T. pellucidula*
	scabriuscula Gray 1827	= *T. oryza*
	sulcata Shaw 1909	= *T. oryza*
	vesicularis subsp. *phalacra* Schilder 1930	= *T. vesicularis*
	vesicularis subsp. *pseudovulata* Schilder & Schilder 1929	= *T. vesicularis*

Eratoidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Proterato	*sulcifera* (Sowerby)	Burnup, P.F.	Barnard 1963	
Synonymy				
Erato	*capensis* Schilder 1933		= *Proterato sulcifera*	
	guttula Sowerby, Smith 1903		= *P. sulcifera*	
	smithi Schilder 1933		= *P. sulcifera*	

Pediculariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pedicularia	*elegantissima* Deshayes	P.F.	Sowerby 1903 Barnard 1963	
Synonymy				
Pedicularia	*sicula* Sowerby 1903, *non* Swainson		= *P. elegantissima*	

Amphiperatidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Primovula	*beckeri* (Sowerby)	P.F.	Sowerby 1900 Barnard 1963	
Volva	*aurantia* (Sowerby)	P.F.	Sowerby 1889, 1892 Barnard 1963	
	birostris (L.)	P.F.	Barnard 1963	
	sowerbyana Weinkauff		Barnard 1963	
	volva (L.)	U.C.T.	Barnard 1963	
Synonymy				
Amphiperas	*aurantia* Sowerby 1889		= *Volva aurantia*	
	beckeri Sowerby 1900		= *Primovula beckeri*	
	smithi Bartsch 1915		= *Volva sowerbyana*	
Birostra	*birostris* Chenu 1859		= *V. birostris*	
	volva Chenu 1859		= *V. volva*	
Ovula	*aurantia* Sowerby 1889		= *V. aurantia*	
	birostris Sowerby 1892		= *V. birostris*	
	spelta Sowerby 1892, *non* L.		= *V. sowerbyana*	

Lamellariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lamellaria	*capensis* (Bergh)	P.F., V	Bergh 1907 Barnard 1963	
	leptoconcha (Bergh)	P.F.	Bergh 1907 Barnard 1963	
	perspicua (L.)	P.F., K.H.B.	Bergh 1907 Barnard 1963	
Synonymy				
Lamellaria	*tenera* Thiele 1925		= *L. capensis*	
Marsenia	*capensis* Bergh 1907		= *L. capensis*	
	leptoconcha Bergh 1907		= *L. leptoconcha*	
	perspicua Bergh 1907		= *L. perspicua*	

Naticidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Eunaticina	*papilla* (Gmelin)	Burnup, K.H.B.	Barnard 1963	
Falsilunatia	*pseudopsila* Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
Natica	*forata* Reeve	U.C.T.	Barnard 1969	
	genuana Reeve	V, Muir, K.H.B.	Barnard 1963	Also †
	marochiensis (Gmelin)	U.C.T., U.W.	Barnard 1963	Also †
	saldontiana Bartsch	P.F., U.C.T.	Bartsch 1915 Barnard 1963	
	taeniata Menke	Burnup, U.W.	Barnard 1963	
Polynices	*cleistopsila* Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
	didyma (Bolten)	P.F., U.C.T., U.W.	Barnard 1963	Also †
	mamilla (L.)	U.C.T., U.W.	Barnard 1963	Also †
	psila (Watson)	Ch, P.F., U.C.T.	Watson 1886 Barnard 1963	
	sebae (Souleyet)	U.W.	Souleyet 1852 Barnard 1963	
Sigaretus	*delessertii* Recluz		Barnard 1963	
	planulatus Recluz	Von Martens, P.F., U.W.	Von Martens 1879 Barnard 1963	

Synonymy

Natica	*alfredensis* Bartsch 1915	= *N. genuana*
	ampla Braga 1952	= *Polynices didyma*
	aureozona Tomlin 1921	= *N. genuana*
	imperforata Gray 1839, *non* Jay	= *N. genuana*
	lurida Krauss 1848	= *N. marochiensis*
	mamilla Krauss 1848	= *Polynices mamilla*
	maroccana Von Martens 1903	= *N. marochiensis*
	maroccana var. *tesselata* Schepman 1907	= *N. marochiensis*
	nemo Bartsch 1915	= *N. marochiensis*
	psila Watson 1886	= *Polynices psila*
	sagraiana d'Orbigny 1903	= *N. saldontiana*
	sebae Souleyet 1852	= *Polynices sebae*
	stimpsoni Bartsch 1915	= *N. genuana*
	unifasciata Lamarck 1822	= *N. marochiensis*
Sigaretus	*planus* Von Martens 1879	= *S. planulatus*

Strombidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Strombus	*decorus* (Röding)	Elston	Barnard 1963	
	gibberulus L.	Elston	Barnard 1963	
	mutabilis Swainson		Barnard 1963	

Synonymy

Lambis	*decora* Röding 1798	= *Strombus decorus*
Strombus	*coniformis* Sowerby 1842	= *S. decorus*
	cylindricus Swainson 1821	= *S. decorus*
	floridus Lamarck 1822	= *S. mutabilis*
	labiatus Perry 1811	= *S. gibberulus*
	mauritianus Lamarck 1822	= *S. decorus*

HETEROPODA

Atlantidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Atlanta	*lesueuri* Souleyet	P.F.	Tomlin 1931 Barnard 1963	
	peronii Lesueur	Turton, Dana	Tomlin 1931 Tesch 1949 Barnard 1963	
	turriculata d'Orbigny	Dana	Tesch 1949 Barnard 1963	
Oxygyrus	*keraudreni* (Lesueur)	Dana, Turton	Tesch 1949 Barnard 1963	
Protatlanta	*souleyeti* (Smith)	Dana	Tesch 1949 Barnard 1963	

Carinariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cardiopoda	*placenta* (Lesson)	Dana	Tesch 1949 Barnard 1963	
	richardi Vayssière	Dana	Tesch 1949 Barnard 1963	
Carinaria	*cithara* Benson	Dana	Tesch 1949 Barnard 1963	
	galea Benson	Dana	Tesch 1949 Barnard 1963	
	lamarcki Peron & Lesueur	Dana	Tesch 1949 Barnard 1963	
Pterosoma	*planum* Lesson	Dana	Tesch 1949 Barnard 1963	

Pterotracheidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Firoloida	*desmaresti* Lesueur	Dana	Tesch 1949 Barnard 1963	
Pterotrachea	*coronata* (Forskål)		Okutani & Habe 1960	
	hippocampus (Philippi)	Dana, S.A.M.	Tesch 1949 Grindley & Penrith 1965	
	scutata Gegenbaur	Dana	Tesch 1949 Barnard 1963	

Aporrhaidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Aporrhais	*pesgallinae* Barnard	A	Barnard 1963	Holotype in S.A.M.

Xenophoridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Xenophora	*corrugata* (Reeve)	P.F., U.C.T.	Barnard 1963	
	pallidula (Reeve)		Barnard 1963	
	solaris (L.)	Div. Fish.	Braga 1952	

Calyptraeidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Calyptraea	*aurita* Reeve	P.F.	Barnard 1963	
	chinensis (L.)	V, P.F., U.C.T.	Barnard 1963	Also †
	helicoidea (Sowerby)	V, P.F., U.C.T.	Barnard 1963	
Crepidula	*aculeata* (Gmelin)	P.F., U.C.T.	Adam & Leloup 1936 Barnard 1963	Also †
	porcellana Lamarck	V, P.F., U.C.T.	Adam & Leloup 1936 Barnard 1963	Also †
	rugulosa Dunker	U.C.T., Muir	Krauss 1848 Barnard 1963	

Synonymy

Calyptraea	*capensis* Tomlin 1931	= *C. chinensis*
	sinensis Bartsch 1915	= *C. chinensis*
	solida Von Martens 1874, *non* Reeve	= *C. chinensis*
	striata Broderip 1834, *non* Say	= *C. aurita*
Crepidula	*adspersa* Turton 1932	= *Crepidula porcellana*
	hepatica Krauss 1848	= *C. porcellana*
	lentiginosa Turton 1932	= *C. porcellana*
Trochita	*helicoidea* Von Martens 1903	= *Calyptraea helicoidea*

Capulidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Capulus	*intortus* (Lamarck)	P.F.	Barnard 1963	

Synonymy

Pileopsis	*intortus* Lamarck 1822	= *Capulus intortus*

Amaltheidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Amalthea	*acuta* (Quoy & Gaimard)	Burnup, U.W.	Barnard 1963	Also †
	barbata (Sowerby)	Burnup, K.H.B.	Barnard 1963	
Cheilea	*equestris* (L.)	P.F.	Smith 1910 Barnard 1963	
	microstriata Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.

Synonymy

Calyptra	*equestris* H. & A. Adams 1854	= *Cheilea equestris*
Hipponyx	*acuta* Quoy & Gaimard 1835	= *Amalthea acuta*
	australis Sowerby 1897	= *A. acuta*
	barbata Sowerby 1846	= *A. barbata*
Mitrularia	*equestria* Schiller 1909	= *Cheilea equestris*
Pileopsis	*pilosus* Krauss 1848	= *Amalthea barbata*

Trichotropidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lippistes	*cornu* (Gmelin)	P.F.	Turton 1932	
	var. *multilineata* Turton	K.H.B., P.F.	Barnard 1963	
Trichotropis	*capensis* Thiele	V	Thiele 1925	
	zuluensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.

Synonymy

Separatista	*grayi* A. Adams 1850	= *Lippistes cornu*

Fossaridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Fossarus	*ambiguus* (L.)	Burnup	Smith 1910	
	capensis Pilsbry	Burnup, U.W.	Pilsbry 1901 Smith 1910	
	translucens Barnard		Barnard 1969	
Megalomphalus	*mosselensis* Barnard	U.C.T.	Barnard 1957	Holotype in S.A.M.

Vanikoroidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Vanikoro	*africana* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	cancellata (Lamarck)	P.F.	Barnard 1963	
	ligata (Recluz)	U.C.T., U.W.	Sowerby 1900 Smith 1908 Barnard 1963	
	natalensis Smith		Smith 1908	

Synonymy

Narica	*cancellata* Chenu 1859	= *Vanikoro cancellata*
	deshayesiana Recluz 1844	= *V. ligata*

Pyramidellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Odostomia	*aethra* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	agana Bartsch	Turton, Muir	Bartsch 1915	
	crispa (Sowerby)	Turton, Muir	Sowerby 1892 Turton 1932 Barnard 1963	
	ficara Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	gea Bartsch	Turton, V, P.F.	Bartsch 1915 Thiele 1925 Barnard 1963	
	jucunda Turton	Turton, Muir	Turton 1932 Barnard 1963	Also †
	lavertinae Smith	Turton, Muir, V	Smith 1901 Thiele 1925	
	ornata Turton	Turton, Muir, P.F.	Turton 1932 Barnard 1963	
	robusta Sowerby	Turton, Muir	Sowerby 1901 Barnard 1963	
	tugelae Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	turtoni Bartsch	Turton, V	Bartsch 1915 Thiele 1925	
Pyramidella	*aganea* Bartsch	Turton	Smith 1904 Bartsch 1915 Thiele 1925 Barnard 1963	Also †

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pyramidella	*dolobratus* (L.)	P.F., U.C.T., U.W.	Barnard 1963	
	minor (Smith)	Turton, Muir	Smith 1904	
	mitralis A. Adams	K.H.B., U.W., U.C.T.	Barnard 1963	
	pyrrha Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	tarpeia Bartsch	Turton, Muir	Bartsch 1915	
Turbonilla	*adaba* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	bathybius Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	bathyraphe Sowerby	Becker, Muir, P.F.	Sowerby 1901 Barnard 1963	
	bifasciata A. Adams	Turton, Muir	Barnard 1963	
	? *bifilosa* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	carifa Bartsch	Turton, Muir	Bartsch 1915	
	columna Turton	Turton, P.F.	Turton 1932 Barnard 1963	
	deprofundis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	helena Bartsch	Turton, Muir	Bartsch 1915	
	kraussi Clessin	Krauss, Muir, U.C.T.	Krauss 1848 Barnard 1963	Also †
	pellucida (Sowerby)	Turton, Lightfoot, Muir	Sowerby 1897 Barnard 1963	
	similans Smith	Muir, P.F.	Barnard 1963	
	tefunta Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	
	tegulata Sowerby	Turton, Muir, V	Sowerby 1892 Thiele 1925 Barnard 1963	
	tincta Sowerby	Turton, Muir	Sowerby 1900 Barnard 1963	
	trachealis Gould	Stimpson, P.F., U.C.T.	Bartsch 1915 Barnard 1963	
	tugelae Barnard	P.F.	Barnard 1963	Holotype in S.A.M.

Synonymy

Chemnitzia	*lactea* Krauss 1838, *non* L.	= *Turbonilla kraussi*
Cingulina	*acutilirata* Sowerby 1892	= *T. trachealis*
	circinata Sowerby 1892, *non* A. Adams	= *T. trachealis*
Cioniscus	*pellucida* Sowerby 1897	= *T. pellucida*
Eulimella	*minor* Smith 1904	= *Pyramidella minor*
	nivea Smith	= *P. aganea*
Miralda	*crispa* Sowerby 1892	= *Odostomia crispa*
Obeliscus	*dolobratus* MacNae & Kalk 1958	= *Pyramidella dolobratus*
Odostomia	*acrifa* Bartsch 1915	= *Odostomia gea*
	angasi Sowerby 1892, *non* Tryon	= *O. lavertinae*
	? *arfica* Bartsch 1915	= *O. robusta*
	crassicostata Turton 1932	= *O. ficara*
	formosa Turton 1892	= *O. ornata*
	? *semiplicata* Turton 1932	= *O. robusta*
Pyramidella	*mitralis* MacNae & Kalk 1958	= *Pyramidella sulcatus*
Pyrgulina	*algoensis* Thiele 1925	= *Odostomia turtoni*

Turbonilla	*fusca* A. Adams 1855	= *Turbonilla bifasciata*
	lactea Sowerby 1892, *non* L.	= *T. similans*
	olga Thiele 1925	= *T. tegulata*
	? *sculpturata* Turton 1932	= *T. tefunta*
	sophia Thiele 1925	= *T. tegulata*
	trochlearis (sic) Gould 1897	= *T. trachealis*

Styliferidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Apicalia	*chuni* Thiele	V	Thiele 1925	
	leptostoma (Smith)	Burnup P.F.	Smith 1910 Barnard 1963	
	sowerbyi Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Mucronalia	sp.	U.W.	MacNae & Kalk 1958	
	linckiae MacNae & Kalk	U.W.	MacNae & Kalk 1958	

Synonymy

Eulima	*leptostoma* Smith 1910	= *Apicalia leptostoma*

Melanellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Melanella	*agulhasensis* (Thiele)	V, Muir	Thiele 1925	
	algoensis (Smith)	Turton, Muir, U.C.T.	Smith 1901	Also †
	capensis (Thiele)	V, Muir	Thiele 1915, 1925	
	cylindrica (Thiele)	V, Muir	Thiele 1925 Barnard 1963	
	dilecta (Smith)	Turton, Muir, P.F.	Smith 1899	
	elata (Thiele)	V, P.F.	Thiele 1925 Barnard 1963	
	gratiosa (Thiele)	V, P.F.	Thiele 1925 Barnard 1963	
	jucunda (Thiele)	V, P.F.	Thiele 1925 Barnard 1963	
	modesta (Thiele)	V, Muir	Thiele 1925	
Strombiformis	*bivittatus* (H. & A. Adams)	Su, P.F.	Adams & Reeve 1848 Barnard 1963	

Synonymy

Eulima	*agulhasensis* (Thiele) 1915	= *Melanella agulhasensis*
	algoensis Smith 1901	= *M. algoensis*
	bilineata A. Adams & Reeve 1848, *non* Alder	= *Strombiformis bivittatus*
	bivittatus Melvill & Standen 1901	= *S. bivittatus*
	capensis Thiele 1915	= *Melanella capensis*
	cylindrica Thiele 1925	= *M. cylindrica*
	dilecta Smith 1899	= *M. dilecta*
	elata Thiele 1925	= *M. gratiosa*
	gratiosa Thiele 1925	= *M. jucunda*

Eulima	*jucunda* Thiele 1925	= *M. jucunda*
	modesta Thiele 1925	= *M. modesta*
	nitida Krauss 1848, *non* Lamarck	= *M. dilecta*
Leiostraca	*bivittatus* A. & H. Adams 1853	= *Strombiformis bivittatus*
Melanella	*carifa* Bartsch 1915	= *Melanella capensis*

Aclididae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Aclis	*africana* (Bartsch)	Turton, Muir	Bartsch 1915	
Synonymy				
Graphis	*africana* Bartsch		= *Aclis africana*	

Scalidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Acrilla	*acuminata* (Sowerby)	Turton	Bartsch 1915 Tomlin 1923	
	analogica Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	natalis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Scala	*aculeata* (Sowerby)	Burnup	Sowerby 1844 Barnard 1963	
	blaisei Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	bonaespei Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
	bullata (Sowerby)	Burnup	Sowerby 1844 De Boury 1912	
	coronata (Lamarck)	Turton, Muir, U.C.T.	Barnard 1963	
	crassilabrum (Sowerby)	P.F.	Sowerby 1844	
	eborea Smith	Burnup	Smith 1906 Barnard 1963	
	gemmula Turton	Turton, Muir	Turton 1932 Barnard 1963	
	illovoensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	kraussi (Nyst)	Krauss, Muir, P.F., V	Krauss 1848 Smith 1910 Barnard 1963	
	macromphalus Smith	Burnup	Smith 1910	
	multicostata (Sowerby)	Burnup, Turton	Sowerby 1844 Smith 1906	
	munda Barnard	A II	Barnard 1969	Holotype in S.A.M.
	tenebrosa Sowerby	P.F., V, A II	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	trochoides De Boury	P.F.	De Boury 1912 Barnard 1963	
Synonymy				
Acrilla	*thalia* Bartsch 1915		= *A. acuminata*	
Epitonium	*africanum* Bartsch 1915		= *Scala coronata*	
	coronatum Day & Morgans 1956		= *S. coronata*	

Epitonium	*durbanensis* Bartsch 1915	= *S. multicostata*
	macromphalus Smith 1910	= *S. macromphalus*
	papyraceum Tomlin 1923	= *S. bullata*
	shepstonensis Smith 1910	= *S. kraussi*
	tenebrosa Bartsch 1915	= *S. tenebrosa*
Scala	*durbanensis* Smith 1906	= *S. multicostata*
	papyracea De Boury 1912	= *S. bullata*
Scalaria	*aculeata* Sowerby 1844	= *S. aculeata*
	albocostata Turton 1932	= *S. coronata*
	bullata Sowerby 1844	= *S. bullata*
	clathratulum Sowerby 1892, *non* Montagu	= *S. kraussi*
	coronata Lamarck 1816	= *S. coronata*
	crassilabrum Sowerby 1844	= *S. crassilabrum*
	durbanensis Turton 1932	= *S. multicostata*
	gemmula Turton 1932	= *S. gemmula*
	kraussi Nyst 1871	= *S. kraussi*
	lactea Krauss 1848	= *S. kraussi*
	multicostata Sowerby 1844	= *S. multicostata*
	rietensis Turton 1932	= *S. coronata*

Janthinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Janthina	*exigua* Lamarck	Muir	Laursen 1953 Barnard 1963	
	janthina (L.)	U.C.T., S.A.M.	Laursen 1953 Barnard 1963	
	pallida (Harvey)	Thompson	Laursen 1953 Barnard 1963	
	prolongata Blainville	S.A.M., U.C.T.	Laursen 1953 Barnard 1963	
	umbilicata d'Orbigny	Turton, Muir	Laursen 1953 Barnard 1963	
Recluzia	*jehennei* Petit	Sowerby, S.A.M.	Smith 1910 Barnard 1963	

Synonymy

Janthina	*globosa* Swainson 1822	= *J. prolongata*
	iricolor Reeve 1858	= *J. prolongata*
	nitens Menke, Smith 1903	= *J. prolongata*
Recluzia	*montrouzieri* Sowerby 1892	= *R. jehennei*

Triforidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Trifora	*africana* Bartsch	P.F., V, U.C.T.	Bartsch 1915 Thiele 1925 Barnard 1963	Also †
	algoensis Thiele	V, P.F., Muir	Thiele 1925 Turton 1932 Barnard 1963	
	bactron Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	baculus Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	capensis Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	
	cerea Smith	Burnup, Turton	Smith 1906 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Trifora	*dagama* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	madria Bartsch	Turton, Muir	Bartsch 1915 Sowerby 1921 Turton 1932 Barnard 1963	
	milda Bartsch	Turton, V	Bartsch 1915 Thiele 1925 Barnard 1963	
	morgani Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	natalensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	sabita Bartsch	V, P.F.	Bartsch 1915 Thiele 1925	
	scala Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	shepstonensis Smith	Burnup, Turton, P.F.	Smith 1906 Barnard 1963	
	superba Thiele	V, P.F.	Bartsch 1915 Barnard 1963	
Viriola	*alboguttata* Tomlin	? Burnup	Tomlin 1926 Barnard 1963	
	cingulata A. Adams		Barnard 1963	
	corrugata (Hinds)	Burnup, P.F.	Hinds 1844 Barnard 1963	
	erecta (Thiele)	V, P.F.	Thiele 1925 Barnard 1963	
	fuscescens (Smith)	Turton, Muir, P.F.	Smith 1904 Turton 1932 Barnard 1963	
	thielei Barnard	V, P.F.	Thiele 1925 Barnard 1963	
	vitraea (Hinds)	P.F.	Hinds 1844 Barnard 1963	

Synonymy

Trifora	? *apicibulbus* Turton 1932	= *T. madria*
	barnardi Tomlin 1945	= *T. milda*
	brevis Thiele 1925	= *T. sabita*
	capensis Thiele 1925, *non* Bartsch	= *T. milda*
	erecta Thiele 1925	= *Viriola erecta*
	fuscescens Smith 1904	= *V. fuscescens*
	? *innocens* Sowerby 1921	= *Trifora madria*
	innocens Thiele 1925, *non* Sowerby	= *Viriola thielei*
	perversa Sowerby 1892 *non* L.	= *Trifora africana*
	plebeja Thiele 1925	= *T. africana*
	retusa Turton 1932	= *T. algoensis*
Triforis	*cingulata* A. Adams 1853	= *Viriola cingulata*
	cingulata Sowerby 1892 *non* A. Adams	= *V. fuscescens*
	? *cingulatus* A. Adams, Sowerby 1892	= *V. corrugata*
	corrugata Hinds, Sowerby 1897	= *V. corrugata*
	ima Bartsch 1915	= *V. fuscescens*
	vitrea Hinds 1844	= *V. vitraea*
Viriola	? *crebricingulata* Turton 1932	= *V. fuscescens*
	minuta Turton 1932	= *V. fuscescens*
	? *sowerbyi* Turton 1932	= *V. fuscescens*

Cerithiopsidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cerithiella	*argentea* Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	nonnitens Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	taylori Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
	vidalensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Cerithiopsis	*agulhasensis* Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	alfredensis Bartsch	Turton, Muir, P.F., U.C.T.	Bartsch 1915 Barnard 1963	
	erna Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	exquisita Sowerby	Turton, Muir, P.F.	Sowerby 1897 Barnard 1963	
	nina Bartsch	P.F., U.C.T.	Bartsch 1915 Barnard 1963	
	rota Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Eumeta	*bia* Bartsch	Turton, P.F.	Bartsch 1916 Barnard 1963	
Seila	*africana* Bartsch	Turton, Muir, U.C.T.	Bartsch 1915 Barnard 1963	
	alfredensis Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	lirata (Sowerby)	Turton, P.F.	Sowerby 1897 Barnard 1963	
	smithi Bartsch		Bartsch 1915 Barnard 1963	

Synonymy

? *Cerithiopsis*	*admirabilis* Turton 1932	= *C. exquisita*
?	*agulhasensis* Thiele 1925	= *Eumeta bia*
?	*becki* Turton 1932	= *Cerithiopsis exquisita*
?	*fulgens* Turton 1932	= *C. exquisita*
?	*kraussi* Turton 1932	= *C. erna*
	lirata Sowerby 1897	= *Seila lirata*
	nisaba Bartsch 1915	= *Cerithiopsis alfredensis*
	purpurea Sowerby 1892, *non* Angas	= *Seila alfredensis*
?	*saba* Bartsch 1915	= *Cerithiopsis nina*
?	*scitula* Turton 1932	= *C. erna*
	trilineata Smith 1904, *non* Philippi	= *Seila alfredensis*
	tubercularis Sowerby 1892, *non* Montagu	= *Cerithiopsis alfredensis*
?	*virgo* Thiele 1925	= *C. erna*
?	*virgo* var. *fuscescens* Thiele 1925	= *C. alfredensis*
Seila	*capitata* Thiele 1925	= *Seila smithi*
	gloriosa Turton 1932	= *S. alfredensis*
	lineata Thiele 1925	= *S. lirata*

Cerithiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Alabina	*africana* Bartsch	Tomlin, Muir	Bartsch 1915 Barnard 1963	
	formosa Turton	Turton, Muir U.C.T.	Turton 1932 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Alabina	*fulva* (Watson)	U.C.T.	Watson 1886 Barnard 1963	
	telamon Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Bittium	*quadricinctum* Smith	P.F.	Smith 1903 Barnard 1963	
Cerithium	*alexandri* Tomlin	Alexander, P.F.	Tomlin 1923 Barnard 1963	
	caeruleum Sowerby	Smith	Sowerby 1855 Barnard 1963	
	columna Sowerby		Barnard 1963	
	crassilabrum Krauss	Krauss, Turton	Krauss 1848 Barnard 1963	
	dialeucum Philippi	K.H.B., U.C.T.	Barnard 1963	
	guinaicum Philippi	Haughton	Nickles 1950 Haughton 1932	†
	kochi Philippi	U.C.T., U.W.	Smith 1878 Barnard 1963	Also †
	macrostoma Hinds	K.H.B.	Barnard 1963	
	morus Lamarck	K.H.B., U.C.T., U.W.	Barnard 1963	Also †
	pingue A. Adams		Sowerby 1855 Barnard 1963	Also †
	rufonodulosum Smith	Geol. Surv.	Smith 1901 Barnard 1963	† ? living
	rugosum Wood		Barnard 1963	
Diala	*almo* Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	
	capensis Sowerby	Turton, Muir	Sowerby 1889, 1892 Barnard 1963	Also †
	infrasulcata Sowerby	Turton	Sowerby 1892 Barnard 1963	Also †
	pinnae (Krauss)	Krauss, Turton, U.C.T.	Krauss 1848 Barnard 1963	Also †

Synonymy

Alaba	*fulva* Watson 1886	= *Diala pinnae*
	pinnae Bartsch 1915	= *D. pinnae*
Cerithium	*contractum* Sowerby 1855	= *Cerithium pingue*
	liratula Turton 1932	= *C. crassilabrum*
	taeniatum Sowerby 1866, *non* Quoy & Gaimard	= *C. pingue*
Obtortia	*fulva* Laseron 1956	= *Alabina fulva*
Rissoa	*pinnae* Krauss 1848	= *Diala pinnae*

Finellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cerithidium	*fragrans* Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M. † ? living
Finella	*natalensis* Smith		Smith 1899	

Potamididae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cerithidea	*decollata* L.	K.H.B., U.C.T.	Barnard 1963	
Pirenella	*boswellae* Barnard		Barnard 1963	Holotype in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pirenella	*cailliaudii* (Potiez & Michaud)		Tomlin 1926	
	stowi Newton		Newton 1913	
Terebralia	*palustris* (Bruguière)		Barnard 1963	
Tympanotonus	*fuscatus* (L.)		Barnard 1963	

Planaxidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Planaxis	*lineatus* (Da Costa)	Burnup, Alexander	Smith 1903 Barnard 1963	
	sulcatus (Born)	Krauss, K.H.B., S.A.M.	Krauss 1848 Barnard 1963	
Synonymy				
Planaxis	*pyramidalis* Gray	Krauss 1848	= *P. sulcatus*	

Abyssochrysidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Abyssochrysos	*melanioides* Tomlin	P.F.	Tomlin 1927 Barnard 1963	Holotype in S.A.M.
	tomlini Barnard	P.F.	Barnard 1963	Holotype in S.A.M.

Caecidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Caecum	sp.	Turton, Muir, P.F.	Barnard 1963	

Vermetidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Tenagodus	*chuni* Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	wilmanae (Tomlin)	P.F.	Tomlin 1918 Barnard 1963	
Vermetus	*corallinaceus* Tomlin	U.C.T.	Tomlin 1939	
	corrugatus Thiele	V, U.C.T.	Thiele 1925 Barnard 1963	
	periscopium Barnard	U.C.T.	Barnard 1963	Holotype & Paratypes in S.A.M.
	quincunx Barnard	P.F., U.C.T.	Barnard 1963	Holotype & Paratypes in S.A.M.
Subgenus *Caporbis*	*africanus* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	agulhasensis Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	natalensis (Mörch)	V, U.C.T.	Thiele 1925 Turton 1932 Barnard 1963	
Synonymy				
Dendropoma	*corallinaceus* Keen & Morton		= *Vermetus corallinaceus*	
Siliquaria	*wilmanae* Tomlin 1918		= *Tenagodus wilmanae*	
	sp. Von Martens 1903		= *T. chuni*	

Thylacodes	*natalensis* Mörch 1862	= *Vermetus natalensis*
? *Vermetus*	*capensis* Thiele 1925	= *V. natalensis*
	formosus Turton 1932	= *V. natalensis*
	franciscanus Thiele 1925	= *V. natalensis*
	subcancellatus Turton 1925, *non* Bivona	= *V. corrugatus*
	tricuspe Sowerby 1892, *non* Mörch	= *V. quincunx*

Solariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Heliacus	*asper* (Hinds)	P.F.	Hinds 1844 Barnard 1963	
	crenellus (L.)	Smith	Bayer 1948 Barnard 1963	
	dorsuosus (Hinds)	Turton, P.F.	Hinds 1844 Bayer 1948 Barnard 1963	
	numulus Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	obolos Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	petasus Tomlin	P.F.	Tomlin 1928 Barnard 1963	Holotype in S.A.M.
	trochoides (Deshayes)	Burnup	Bayer 1948 Barnard 1963	
	variegatus (Gmelin)	K.H.B.	Bayer 1948 Barnard 1963	
Philippia	*layardi* A. Adams	Turton, S.A.M.	Bayer 1940 Barnard 1963	
'*Solarium*'	*cancellatum* Krauss	Krauss, P.F.	Krauss 1848 Barnard 1963	
Solarium	*maximum* Philippi	P.F.	Bayer 1940 Barnard 1963	
	perspectivum (L.)	K.H.B., U.W., P.F.	Bayer 1940 Barnard 1963	
	reevei Hanley	P.F.	Tomlin 1928 Bayer 1940 Barnard 1963	

Synonymy

Architectonica	*perspectivum* (part) Tomlin 1928	= *Solarium perspectivum*
	perspectivum (part) Tomlin 1928	= *S. maximum*
	reevei Tomlin 1928	= *S. reevei*
Heliacus	*africanus* Bartsch 1915	= *Heliacus dorsuosus*
	hybridum Tomlin 1928, *non* L.	= *Philippia layardi*
Solarium	*africanus* Turton 1932	= *Heliacus dorsuosus*
	alfredensis Turton 1932	= *H. dorsuosus*
	asper Hinds 1844	= *H. asper*
	cingulum Kiener, Sowerby 1892	= *Philippia layardi*
	cylindraceum Sowerby 1897, *non* Chemnitz	= *Heliacus crenellus*
	dorsuosum Hinds 1844	= *H. dorsuosus*
	hybridum Sowerby 1897, *non* L.	= *Philippia layardi*
	kowiensis Turton 1932	= *P. layardi*
	perspectivum Lamarck 1816, *non* L.	= *Solarium maximum*
	trochoides Smith 1903	= *Heliacus trochoides*
	variegatum Sowerby 1892	= *H. variegatus*

Torinia	*asper* Thiele 1925	= *H. asper*
	crenellus Smith 1910	= *H. crenellus*
	dorsuosa Bayer 1948	= *H. dorsuosus*
	gyrus Meuschen 1781	= *H. variegatus*
	trochoides Smith 1903	= *H. trochoides*

Turritellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Turritella	*capensis* Krauss	Krauss, U.C.T.	Krauss 1848 Barnard 1963	Also †
	carinifera Lamarck	V, P.F., U.C.T.	Barnard 1963	Also †
	forma *kowiensis* Sowerby	P.F., U.C.T.	Sowerby 1900 Tomlin 1925 Barnard 1963	Also †
	chrysotoxa Tomlin	P.F.	Tomlin 1925 Barnard 1963	Holotype in S.A.M.
	declivis A. Adams & Reeve	P.F., U.C.T.	Adams & Reeve 1848 Tomlin 1925 Barnard 1963	
	ferruginea Reeve	P.F., U.C.T., A	Reeve 1849 Tomlin 1925 Barnard 1963	Also †
	? *minuta* Turton	Turton, Muir, P.F.	Turton 1932 Barnard 1964	
	sanguinea Reeve	V, P.F., U.C.T., A	Reeve 1849 Tomlin 1925 Barnard 1963	Syntypes of *salisburyi* in S.A.M.

Synonymy

Turritella	*carinifera* var. *angustata* Turton 1932	= *Turritella carinifera* forma *kowiensis*
	excavata Sowerby 1870	= *T. declivis*
	knysnaensis Krauss 1848	= *T. capensis*
	kowiensis Sowerby 1900	= *T. carinifera* forma *kowiensis*
	natalensis Sowerby 1900	= *T. sanguinea*
	puncticulata Sowerby 1870	= *T. sanguinea*
	punctata Sowerby 1892	= *T. sanguinea*
	salisburyi Tomlin 1925	= *T. sanguinea*
	spina Van Hoepen 1940	= *T. carinifera*
	spinella Van Hoepen 1940	= *T. carinifera*
	stimpsoni Bartsch 1915	= *T. capensis*

Mathildidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Mathilda	*salve* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.

Homalogyridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Homalogyra	*gemmulata* Turton	Turton, Muir	Turton 1932 Barnard 1963	

Adeorbidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cochliolepis	*catherinae* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cochliolepis	*planulata* (Sowerby)	Turton, Muir, V	Sowerby 1892 Bartsch 1915 Barnard 1963	
	tugelae Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	turtoni (Bartsch)	Turton, Muir	Bartsch 1915 Barnard 1963	
Pondorbis	*alfredensis* Bartsch	Turton, Muir, P.F.	Bartsch 1915 Turton 1932 Barnard 1963	
Vitrinella	*agulhasensis* Thiele	V	Thiele 1925 Barnard 1963	
	arifca Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	
	inclinans Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
	rifaca Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	

Synonymy

Cyclostrema	*planulata* Sowerby 1892	= *Cochliolepis planulata*
Discopsis	*africana* Bartsch 1915	= *C. planulata*
	planulata Bartsch 1915	= *C. planulata*
Naricava	*planulata* Thiele 1925	= *C. planulata*
Pondorbis	*admirabilis* Turton 1932	= *Pondorbis alfredensis*
	inconspicua Turton 1932	= *P. alfredensis*
	iotoides Turton 1932	= *P. alfredensis*

Rissoidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Alvania	*alfredensis* Bartsch	Turton, Muir, P.F.	Bartsch 1915 Barnard 1963	
	argentea (Sowerby)	Turton, V, P.F.	Sowerby 1892 Thiele 1925 Barnard 1963	Also †
	deweti (Thiele)	V, P.F.	Thiele 1925 Barnard 1963	
	farquhari (Smith)	Turton, Muir, U.C.T.	Smith 1910 Bartsch 1915 Barnard 1963	
	fenestrata (Krauss)	Turton, Muir, P.F., K.H.B., V	Krauss 1848 Thiele 1925 Barnard 1963	
	kowiensis Tomlin	Turton	Bartsch 1915 Tomlin 1931 Barnard 1963	
	outis Tomlin	Turton, Muir	Bartsch 1915 Tomlin 1931 Barnard 1963	
	winslowae Bartsch	Turton, Muir, P.F.	Bartsch 1915 Barnard 1963	
Amphithalamus	*denseplicatus* Turton	Turton, Muir	Turton 1932 Barnard 1963	
	muiri Barnard	Muir	Barnard 1963	Syntypes in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Amphithalamus	*turtoni* Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	
Anabathron	*africanum* (Bartsch)	Turton, Muir, P.F.	Bartsch 1915 Barnard 1963	
	eucosmia (Turton)	Turton	Turton 1932	
Cingula	*agulhasensis* (Thiele)	V, P.F.	Thiele 1925 Barnard 1963	
Coriandria	*gisna* (Bartsch)	Turton, Muir	Bartsch 1915 Barnard 1963	
	halia (Bartsch)	Turton, Lightfoot	Bartsch 1915 Barnard 1963	
Eatoniella	*nigra* (Krauss)	Krauss, Turton, K.H.B., U.C.T.	Krauss 1848 Barnard 1963	
Pyramidelloides	*eucosmia* (Bartsch)	Turton, P.F.	Bartsch 1915 Turton 1932 Barnard 1963	
Rissoa	*algoensis* Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	candidata Turton	Turton, Muir	Turton 1932 Barnard 1963	
	capensis Sowerby	Turton, Muir	Sowerby 1892 Turton 1932 Barnard 1963	
	crawfordi Smith	V, P.F., U.C.T.	Smith 1901 Thiele 1925 Barnard 1963	
Rissoina	*alfredi* Smith	Turton, P.F.	Smith 1904	
	annulata Dunker	Burnup, P.F.	Smith 1903 Barnard 1963	
	calia Bartsch	Lightfoot, Muir, Turton, V, P.F.	Bartsch 1915 Thiele 1925 Barnard 1963	
	crassa Angas	Burnup, P.F.	Angas 1871 Barnard 1963	
	durbanensis Smith	P.F.	Smith 1906 Barnard 1963	
	shepstonensis Smith	Burnup	Smith 1906 Barnard 1963	

Synonymy

Alvania	*almo* Bartsch 1915, *non* Bartsch 1911	= *A. winslowae*
	ima Bartsch 1915, *non* Bartsch 1911	= *A. kowiensis*
	nemo Bartsch 1915, *non* Bartsch 1911	= *A. outis*
Ampullarina	*africana* Smith 1904	= *Rissoa capensis*
Jeffreysia	*capensis* Bartsch 1915	= *R. capensis*
Microsetia	*gisna* Bartsch 1915	= *Coriandria gisna*
	halia Bartsch 1915	= *C. halia*
Rissoa	*argentea* Sowerby 1892	= *Alvania argentea*
	farquhari Smith 1910	= *A. farquhari*
	fenestrata Krauss 1848	= *A. fenestrata*
	nigra Krauss 1848	= *Eatoniella nigra*
Rissoina	*denseplicata* Thiele 1926	= *Rissoina calia*
	elegantula Sowerby 1892, *non* Angas	= *R. calia*
	eucosmia Bartsch 1915	= *Pyramidelloides eucosmia*
	fenestrata Schwarz 1910	= *Alvania fenestrata*
	gemmulata Turton 1932	= *Pyramidelloides eucosmia*
Turritella	? *africanus* Bartsch 1915	= *Anabathron africanum*
	? *eucosmia* Turton 1932	= *A. eucosmia*

Littorinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Littorina	*punctata* Philippi	Muir, U.C.T.	Barnard 1963	
Tectarius	*granosus* (Philippi)	K.H.B.	Barnard 1963	
	natalensis (Philippi)	K.H.B., U.C.T., U.W.	Krauss 1848 Barnard 1963	

Synonymy

Littorina	*glans* Reeve	= *Tectarius granosus*
	granosus Philippi	= *T. granosus*
	natalensis Philippi	= *T. natalensis*

Cocculinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cocculina	sp.	P.F.	Barnard 1963	

Neritidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Nerita	*albicilla* L.	P.F., U.C.T., U.W.	Krauss 1848 Barnard 1963	Also †
	plexa Chemnitz	U.C.T.	Barnard 1963	
	plicata L.	U.C.T.	Barnard 1963	
	polita L.	U.C.T.	Barnard 1963	
	umlaasiana Krauss	Burnup, U.C.T.	Krauss 1848 Barnard 1963	
	undata L.	U.W.	Barnard 1963	
Neritina	*natalensis* Reeve	U.C.T.	Connolly 1939 Barnard 1963	
Septaria	*porcellana* (L.)	S.A.M.	Sowerby 1850 Barnard 1963	
	tessellaria (Lamarck)		Connolly 1939	
Smaragdia	*rangiana* Recluz	U.W.	Barnard 1963	
	souverbiana (Montrouzier)	Burnup U.C.T., U.W.	Connolly, 1939 Barnard 1963	

Synonymy

Navicella	*elliptica* Lamarck	= *Septaria porcellana*
	porcellana Sowerby 1850	= *S. porcellana*
Neritina	*rangiana* Von Martens 1880	= *Smaragdia rangiana*
	souverbiana Smith 1910	= *S. souverbiana*

Phenacolepadidae

GENUS	SPECIES	COLLECTOR	REFERECNES	REMARKS
Phenacolepas	*asperulata* (H. & A. Adams)	U.W.	H. & A. Adams 1854 Barnard 1963	

Synonymy

Scutellina	*asperulata* H. & A. Adams	= *Phenacolepas asperulata*

Phasianellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Phasianella	*jaspidea* Reeve	U.C.T.	Reeve 1862 Barnard 1963	
Tricolia	*bicarinata* (Dunker)	U.C.T.	Krauss 1848 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Tricolia	*neritina* (Dunker)	Krauss, U.C.T.	Krauss 1848 Barnard 1963	
	tropidophora Tomlin	U.C.T.	Tomlin 1931 Barnard 1963	
Synonymy				
Phasianella	*bicarinata* Bartsch 1915, *non* Dunker		= *Tricolia tropidophora*	
	insignis Turton 1932		= *T. tropidophora*	
	neritina Dunker 1846		= *T. neritina*	

Turbinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Astraea	*andersoni* (Smith)	P.F.	Smith 1902 Barnard 1963	
	gilchristi (Sowerby)	P.F.	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	tayloriana (Smith)	P.F., A	Smith 1880 Barnard 1963	
Calcar	*rhysopoma* Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
Turbo	*argyrostomus* L.	U.W.	MacNae & Kalk 1958 Barnard 1963	
	boswellae Barnard		Barnard 1969	Holotype in S.A.M.
	chrysostomus L.	Burnup	Smith 1903	
	cidaris Gmelin	U.C.T. etc.	Barnard 1963	Also †
	coronatus Gmelin	P.F., U.C.T., U.W.	Barnard 1963	
	foveolatus Barnard		Barnard 1963	Syntypes in S.A.M.
	natalensis Krauss	P.F., U.C.T., S.A.M.	Barnard 1963	
	petholatus L.	U.W.	MacNae & Kalk 1958	
	sarmaticus L.	P.F., S.A.M.	Barnard 1963	
	splendidulus Sowerby	Burnup	Smith 1903	
Synonymy				
Astralium	*andersoni* Smith 1902		= *Astraea andersoni*	
	gilchristi Sowerby 1903		= *A. gilchristi*	
	tayloriana Odhner 1923		= *A. tayloriana*	
Ilaira	*fulgens* Bartsch 1915		= *Turbo cidaris*	
Liotia	*fulgens* Gould 1899		= *T. cidaris*	
Pachypoma	*tayloriana* Sowerby 1897		= *Astraea tayloriana*	
Turbo	*ponsonbyi* Sowerby 1897		= *Turbo natalensis*	
	tayloriana Smith 1880		= *Astraea tayloriana*	
	tricarinulatus Euthyme 1885		= *Turbo cidaris*	
	tricarinulatus var. *bicarinulatus* Euthyme 1885		= *T. cidaris*	

Liotiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cynisca	*forticostata* Smith	Turton, P.F.	Smith 1904 Barnard 1963	
	granulosa Dunker	Krauss, Turton, U.C.T.	Krauss 1848 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Leptothyra	*africana* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	alfredensis Bartsch	Turton, Muir	Bartsch 1915 Barnard 1963	
	atomus Turton	Turton, Muir	Turton 1932 Barnard 1963	
	quantilla (Gould)	Turton, V, P.F.	Bartsch 1915 Barnard 1963	
	sola Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Liotia	*bicarinata* Von Martens	V, P.F.	Von Martens 1903 Barnard 1963	
Rufanula	*sextula* Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
Teinostoma	*africanum* (Smith)	Turton	Smith 1904 Bartsch 1915	

Synonymy

Cynisca	*africana* Bartsch 1915	= *C. forticostata*
	alfredensis Bartsch 1915	= *C. forticostata*
	bicarinata Thiele 1925	= *Liotia bicarinata*
	formosa Turton 1932	= *Cynisca granulosa*
	gloriosa Bartsch 1915	= *C. granulosa*
	rufanensis Turton 1932	= *Leptothyra alfredensis*
	semiclausa Thiele 1925	= *L. africana*
Delphinula	*granulosa* Krauss 1848	= *Cynisca granulosa*
Ethalia	*africana* Smith 1904	= *Teinostoma africanum*
? *Leptothyra*	*agulhasensis* Thiele 1925	= *Leptothyra quantilla*
	armillata A. Adams (MSS. ?)	= *L. africana*
	carminea Bartsch 1915	= *L. quantilla*
	eucosmia Turton 1932	= *Cynisca granulosa*
Liotia	*semiclausa* Thiele	= *Leptothyra africana*
Monilea	*spuria* Gould 1861	= *Cynisca granulosa*
Teinostoma	*lucidum* Sowerby 1892, *non* A. Adams	= *Teinostoma africanum*
Turbo	*sanguineus* Sowerby 1892	= *Leptothyra quantilla*

Trochidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Angaria	*lacunosa* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Basilissa	*gelida* Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
Calliostoma	*africanum* Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1963	
	burnupi Smith	S.A.M.	Smith 1899 Barnard 1963	
	circus Barnard		Barnard 1969	
	eucosmia Bartsch	P.F., U.C.T.	Bartsch 1915 Barnard 1963	
	glaucophaos Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
	iridescens Sowerby	P.F.	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	layardi Sowerby	Becker, P.F.	Sowerby 1897 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Calliostoma	*multiliratum* (Sowerby)	Becker	Sowerby 1875 Barnard 1963	
	perfragile Sowerby	P.F., V	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
Calliotropis	*chenoderma* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	granolirata (Sowerby)	P.F., V	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	metallica (Wood-Mason & Alcock)	P.F.	Wood-Mason & Alcock 1891 Barnard 1963	
	persculpta (Sowerby)	P.F.	Sowerby 1903 Barnard 1963	Holotype in S.A.M.
	pompe Barnard	S.A.M.	Barnard 1963	Holotype in S.A.M.
Cantharidus	*fultoni* (Sowerby)	K.H.B., U.C.T., U.W.	Sowerby 1889, 1892 Smith 1906 Barnard 1963	Also †
Clanculus	*atricatena* Tomlin	Krauss, P.F.	Tomlin 1921 Barnard 1963	
	miniatus (Anton)	Krauss, P.F., U.C.T.	Bartsch 1915 Barnard 1963	
	mixtus Smith	Turton	Smith 1903 Barnard 1963	
	puniceus (Philippi)	Krauss, U.C.T.	Krauss 1848 Barnard 1963	
	waltonae Sowerby	Turton, P.F.	Sowerby 1892	
Euchelus	*natalensis* Smith	Turton, Muir	Smith 1906 Barnard 1963	
Gibbula	*beckeri* Sowerby	Lightfoot, U.C.T.	Sowerby 1901 Barnard 1963	Paratype in S.A.M.
	benzi (Krauss)	Krauss, S.A.M., Stimpson, U.C.T.	Krauss 1848 Bartsch 1915 Barnard 1963	
	capensis (Gmelin)	Krauss, S.A.M., U.C.T.	Krauss 1848 Barnard 1963	Also †
	cicer (Menke)	Krauss, Stimpson, S.A.M., U.C.T.	Bartsch 1915 Barnard 1963	Also †
	multicolor (Krauss)	Krauss, Stimpson, S.A.M.	Krauss 1848 Bartsch 1915 Barnard 1963	
	perspectiva Sowerby	Becker	Sowerby 1900 Barnard 1963	Paratype in S.A.M.
	rosea (Gmelin)	Krauss, Stimpson, S.A.M., U.C.T.	Bartsch 1915 Barnard 1963	
	tryoni Pilsbry	Turton, S.A.M.	Pilsbry 1889 Barnard 1963	
	zonata (Wood)	Krauss, Stimpson, S.A.M., U.C.T.	Bartsch 1915 Barnard 1963	
Guttula	*blanda* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Minolia	*adarticulata* (Gould)	P.F.	Bartsch 1915 Barnard 1963	Also †
	cycloma Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	splendens (Sowerby)	P.F.	Sowerby 1897 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Monodonta	*australis* Lamarck	Krauss, K.H.B., U.C.T.	Krauss 1848 Barnard 1963	
Oxystele	*sinensis* (Gmelin)	Muir, P.F.	Barnard 1963	
	tabularis (Krauss)	Krauss, Stimpson, S.A.M., U.W.	Krauss 1848 Barnard 1963	Also †
	tigrina (Chemnitz)	S.A.M., U.C.T.	Barnard 1963	
	variegata (Anton)	S.A.M., U.C.T.	Barnard 1963	Also †
Priotrochus	*alexandri* Tomlin	Martin	Tomlin 1926 Barnard 1963	Also †
	obscurus (Wood)	U.C.T., U.W.	Krauss 1848 Barnard 1963	
Seguenzia	*simplex* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	sykesi Schepman	P.F.	Schepman 1909 Barnard 1963	
Solariella	*agulhasensis* Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	franciscana Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	gilchristi Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	intermissa Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	laevissima (Von Martens)	V, P.F.	Sowerby 1903 Von Martens 1903 Barnard 1963	Holotype of *congener* in S.A.M. Paratype of *beckeri* in S.A.M.
	macleari Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	multistriata Thiele	V, U.C.T.	Thiele 1925 Barnard 1963	
	turbynei Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	undata Sowerby	V, P.F., A	Sowerby 1870 Von Martens 1903 Barnard 1963	
Stomatella	*articulata* A. Adams	Krauss, U.C.T., Martin	Adams 1850 Barnard 1963	
Trochus	*nigropunctatus* Reeve	S.A.M., U.C.T., U.W.	Barnard 1963	
Turcica	*helix* Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
	konos Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
	salpinx Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
Umbonium	*vestiarium* (L.)	Sowerby, S.A.M.	Barnard 1963	

Synonymy

Basilissa	*aethiopica* Von Martens 1903	= *Calliotropis metallica*
Calliostoma	*albolineata* Turton 1932	= *Calliostoma eucosmia*
	bisculptum Smith 1906	= *Cantharidus fultoni*
	capense Thiele 1925	= *Calliostoma perfragile*
	convexa Turton 1932	= *C. eucosmia*
	euglyptum Sowerby 1892, *non* A. Adams	= *C. eucosmia*

Calliostoma	*farquhari* Sowerby 1892	= *Cantharidus fultoni*
	fultoni Sowerby 1889	= *C. fultoni*
	granoliratum Sowerby 1903	= *Calliotropis granolirata*
	liratum Sowerby 1900	= *Calliostoma multiliratum*
	mosselense Tomlin 1926	= *Cantharidus fultoni*
	ornata var. *similis* Turton 1932	= *Calliostoma eucosmia*
	ornatum Von Martens 1903, (part) *non* Lamarck	= *C. perfragile*
Calliotropis	*aethiopica* Thiele 1925	= *Calliotropis metallica*
Clanculus	*alfredensis* Bartsch 1915	= *Clanculus miniatus*
	becki Turton 1932	= *C. miniatus*
	carinatus A. Adams 1851	= *C. miniatus*
	depressus Von Martens 1874, *non* Philippi	= *C. miniatus*
	elevatus Turton 1932	= *C. miniatus*
	eucosmia Turton 1932	= *C. miniatus*
	kowiensis Turton 1932	= *C. miniatus*
	kraussi Sowerby 1897, *non* Philippi	= *C. atricatina*
	miniatus Turton 1932, *non* Anton	= *C. waltonae*
	trochiformis Turton 1932	= *C. miniatus*
Euchelus	*gemmula* Turton 1932	= *Euchelus natalensis*
Gibbula	*aglaia* Bartsch 1915	= *Gibbula tryoni*
	bifurcata Sowerby 1889	= *G. multicolor* forma *biporcata*
	distincta Turton 1932	= *G. multicolor*
	fucata Gould, *non* Sowerby	= *G. multicolor*
	fucata Sowerby 1894	= *G. multicolor* forma *biporcata*
	gaudiosa Gould 1861	= *G. rosea*
	hera Turton 1932	= *G. multicolor* forma *biporcata*
	incincta Sowerby 1894	= *G. tryoni*
	kowiensis Turton 1932	= *G. benzi*
	lauta Turton 1932	= *G. multicolor*
	leaensis Watson 1886	= *G. zonata*
	loculosa Gould 1861	= *G. benzi*
	medusa Bartsch 1915	= *G. tryoni*
	musiva Gould 1861	= *G. cicer*
	ornata Turton 1932	= *G. multicolor*
	pintado Gould 1861	= *G. benzi*
	polychroma Turton 1932	= *G. multicolor*
	pulchella Turton 1932	= *G. multicolor*
	thalia Bartsch 1915	= *G. cicer*
Margarita	*aethiopica* Von Martens 1901	= *Calliotropis metallica*
Minolia	*bleeki* Thiele 1925	= *Minolia articulata*
	undata Von Martens 1903	= *Solariella undata*
Monodonta	*puniceus* Philippi 1846	= *Clanculus puniceus*
	tigrinus Odhner 1923	= *Oxystele tigrina*
Oxystele	*impervius* Menke 1843	= *O. variegata*
	inflata Turton 1932	= *O. sinensis*
	sagittifera Lamarck 1822	= *O. variegata*
	sagittifera var. *perdix* (Koch) Turton 1932	= *O. tigrina*
	sagittifera var. *rufanensis* Turton 1932	= *O. variegata*
	tabularis var. *pulchra* Turton 1932	= *O. variegata*
	zonata Wood, Sowerby 1892	= *Gibbula zonata*
Rotella	*vestiara* L.	= *Umbonium vestiarium*
Solariella	*algoensis* Thiele 1925	= *Minolia articulata*
	beckeri Sowerby 1901	= *Solariella laevissima*
	congener Sowerby 1903	= *S. laevissima*
	fuscomaculata Sowerby 1892	= *S. laevissima*
	infundibulum Von Martens 1903, *non* Watson	= *Calliotropis granolirata*
	nitens Thiele 1925	= *Solariella laevissima*

Solariella	*persculpta* Sowerby 1903	= *Calliotropis persculpta*
	rufanensis Turton 1932	= *Solariella laevissima*
	splendens Sowerby 1897	= *Minolia splendens*
	valdiviae Thiele 1925	= *Solariella undata*
Solariellopsis	*metallica* Schepman 1908	= *Calliotropis metallica*
Stomatella	*biporcata* A. Adams 1850	= *Gibbula multicolor* forma *biporcata*
	margaritana A. Adams 1850	= *G. rosea*
	sulcifera Krauss 1848	= *Stomatella articulata*
Trochus	*benzi* Krauss 1848	= *Gibbula benzi*
	bicingulatus Krauss 1852, *non* Lamarck	= *Calliostoma eucosmia*
	capensis Gmelin, Krauss 1848	= *Gibbula capensis*
	cicer Menke, Krauss 1848	= *G. cicer*
	cingulatus Von Mahlberg 1818	= *G. zonata*
	dilectus Sowerby 1889	= *Minolia articulata*
	impervius Menke 1843	= *Oxystele variegata*
	indecorus Philippi 1844	= *O. variegata*
	laevissima (Von Martens) 1889	= *Solariella laevissima*
	ludwigi Krauss 1848	= *Gibbula benzi*
	menkeanus Philippi 1844	= *G. zonata*
	merula Lamarck 1822	= *Oxystele sinensis*
	meruloides Krauss 1848	= *O. sinensis*
	mineatus Anton, Krauss 1848	= *Clanculus miniatus*
	multicolor (Krauss)	= *Gibbula multicolor*
	obscurus Wood, Krauss 1848	= *Priotrochus obscurus*
	ornatus Krauss 1848, *non* Lamarck	= *Calliostoma eucosmia*
	puniceus Krauss 1848 (part)	= *Clanculus puniceus*
	puniceus Krauss 1848 (part)	= *C. atricatena*
	roseus Gmelin, Krauss 1848	= *Gibbula rosea*
	tabularis Krauss 1848	= *Oxystele tabularis*
	tigrinus Chemnitz	= *O. tigrina*
	variegatus Anton 1839	= *O. variegata*
	zeyheri Krauss 1848	= *Gibbula cicer*
	zonata Wood, Sowerby 1892	= *G. zonata*
Ziziphinus	*multiliratus* Sowerby 1897	= *Calliostoma multiliratum*

Fissurellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Amblychilepas	*scutella* (Gmelin)	Krauss, S.A.M., P.F., U.C.T.	Krauss 1848 Barnard 1963	Also †
Diodora	*australis* (Krauss)	Krauss, P.F.	Krauss 1848 Smith 1906 Barnard 1963	
	calyculata (Sowerby)	Muir, P.F.	Sowerby 1862 Barnard 1963	
	crucifera Pilsbry	Krauss, S.A.M.	Krauss 1848 Barnard 1963	
	elevata (Dunker)	Muir, P.F., U.C.T.	Krauss 1848 Smith 1914 Barnard 1963	Also †
	elizabethae (Smith)	Muir, P.F.	Smith 1901 Barnard 1963	
	parviforata (Sowerby)	S.A.M., Muir, U.C.T.	Sowerby 1889, 1892	Also †
	ruppellii (Sowerby)	K.H.B., U.C.T., U.W.	Sowerby 1835 Barnard 1963	
	spreta (Smith)	Muir, P.F., U.C.T.	Smith 1901 Barnard 1963	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Emarginula	*agulhasensis* Thiele	V, P.F.	Thiele 1925 Barnard 1963	
	natalensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	oppressa Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	pulchreclathrata Tomlin	P.F.	Tomlin 1932 Barnard 1963	Syntypes in S.A.M.
	vadum Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
Fissurella	*mutabilis* Sowerby	S.A.M., V, U.C.T., Turton	Sowerby 1834 Barnard 1963	
	natalensis Krauss	Krauss, U.C.T., U.W.	Krauss 1848 Barnard 1963	Also †
	robusta Sowerby	Sowerby, Haughton	Sowerby 1892	†
Fissurellidea (*Pupillaea*)	*aperta* (Sowerby)	Krauss, S.A.M., P.F., U.C.T.	Sowerby 1825 Krauss 1848 Barnard 1963	
Macrochisma	*africana* Tomlin	Lightfoot, P.F., K.H.B.	Tomlin 1932 Barnard 1963	
Megatebennus (*Cosmetalepas*)	*africanus* Tomlin	Muir, V, U.C.T.	Tomlin 1926 Barnard 1963	
Puncturella	*noachina* (L.)	P.F., V	Sowerby 1903 Barnard 1963	
Scutus	*unguis* (L.)	Krauss, U.W., P.F.	Smith 1879 Barnard 1963	
Tugalia	*barnardi* (Tomlin)	P.F., V, U.C.T.	Tomlin 1932 Barnard 1963	Type in S.A.M.
Zeidora	*reticulata* A. Adams	P.F.	Barnard 1963	

Synonymy

Diodora	*lima* Sowerby, MacNae & Kalk 1958	= *D. ruppellii*
	natalensis Krauss 1848	= *Fissurella natalensis*
Emarginula (*Tugalia*)	*carinata* A. Adams, Thiele 1925	= *Tugalia barnardi*
Fissuridea	*algoensis* Thiele 1925	= *Diodora parviforata*
	australis Krauss, Bartsch 1915	= *D. australis*
	calyculata Sowerby 1823	= *D. calyculata*
	concatenata Sowerby 1892, *non* Crosse & Fischer	= *Megatebennus africanus*
	elevata Dunker, Thiele 1925	= *Diodora elevata*
	elizabethae Smith 1901	= *D. elizabethae*
	parviforata Bartsch 1915	= *D. parviforata*
	spreta Smith, Bartsch 1915	= *D. spreta*
Fissurella	*alboradiata* Turton 1932	= *Fissurella mutabilis*
	aperta Sowerby 1825	= *Fissurellidea aperta*
	australis Krauss 1848	= *Diodora australis*
	calyculata Sowerby 1823	= *D. calyculata*
	cruciata Krauss 1848, *non* Gould	= *D. crucifera*
	crucifera Pilsbry 1890	= *D. crucifera*
	dubia Sowerby 1862	= *Amblychilepas scutella*
	dysoni Braga 1952, *non* Reeve	= *Diodora ruppellii*
	elevata Dunker, Sowerby 1892	= *D. elevata*
	fimbriata Sowerby 1892, *non* Reeve	= *D. spreta*

Fissurella	*fumata* Watson 1886	= *D. elevata*
	incarnata Krauss, Turton 1932	= *Amblychilepas scutella*
	indistincta Turton 1932	= *Fissurella mutabilis*
	mutabilis var. *aurantia* Sowerby 1921	= *F. mutabilis*
	mutabilis var. *obtusa* Sowerby 1835	= *F. mutabilis*
	parviforata Sowerby 1889	= *Diodora parviforata*
	rota Reeve, Turton 1932	= *Fissurella mutabilis*
	ruppellii Sowerby 1835	= *Diodora ruppellii*
	sagittata Reeve, Turton 1932	= *Fissurella mutabilis*
	scutella Gmelin 1790	= *Amblychilepas scutella*
	scutella var. *trapezina* Krauss 1848	= *A. scutella*
	sieboldi Sowerby 1892, *non* Reeve	= *Diodora elizabethae*
	trapezina Sowerby 1834	= *Amblychilepas scutella*
Fissurellidea	*albanyana* Turton 1932	= *A. scutella*
	hiantula Sowerby 1892, *non* Lamarck	= *A. scutella*
	incarnata Krauss, Turton 1932	= *A. scutella*
	multilineata Turton 1932	= *A. scutella*
	nigrostriata Turton 1932	= *A. scutella*
	scutella Gmelin, Turton 1932	= *A. scutella*
	sella Sowerby 1862	= *A. scutella*
Glyphis	*anima* Turton 1932	= *Diodora elevata*
	australis Krauss, Turton 1932	= *D. australis*
	elevata Dunker, Smith 1901	= *D. elevata*
	elizabethae Smith 1901	= *D. elizabethae*
	fuscocrenulata Smith 1906	= *D. australis*
	levicostata Smith 1914	= *D. elevata*
	parviforata Sowerby, Turton 1932	= *D. parviforata*
	spreta Smith, Bartsch 1915	= *D. spreta*
Lucapina	*concatenata* Thiele 1925	= *Megatebennus africanum*
Macrochisma	*compressa* Sowerby 1897, *non* A. Adams	= *Macrochisma africana*
	producta Sowerby 1892, *non* A. Adams	= *M. africana*
Megatebennus	*incarnatus* Krauss, Janus 1961	= *Amblychilepas scutella*
Megatebeunus (sic)	*scutellum* Gmelin, Krige 1933	= *A. scutella*
	scutella Gmelin, Smith 1903	= *A. scutella*
Parmaphorella	*barnardi* Tomlin 1932	= *Tugalia barnardi*
Parmaphorus	*imbricatus* Krauss 1848	= *Scutus unguis*
Puncturella	*analoga* Von Martens 1903	= *Puncturella noachina*
Pupillaea	*aperta* Sowerby 1825	= *Fissurellidea aperta*

Scissurellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Schismope	*insignis* Smith	Turton, Muir	Smith 1910	
Scissurella	*agulhasensis* Thiele	V, P.F.	Thiele 1925	
	smithi Thiele	Turton, Muir	Smith 1910	
	tabulata Barnard	P.F.	Barnard 1963	Holotype in S.A.M.

Synonymy

Scissurella	*jucunda* Smith 1910, *non* Smith 1906	= *S. smithi*

Haliotidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Haliotis	*assinina* L.	Boshoff		
	midae L.	Krauss, S.A.M.	Barnard 1963	
	parvum L.	S.A.M., P.F., U.C.T.	Barnard 1963	
	queketti Smith	S.A.M., U.W., P.F.	Smith 1910	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Haliotis	*spadicea* Donovan	S.A.M.	Barnard 1963	
	speciosum Reeve	Turton	Talmadge 1958 Barnard 1963	

Synonymy

Haliotis	*alfredensis* Bartsch, Turton 1932	= *H. speciosum*
	capensis Dunker 1844	= *H. midae*
	elatior Pilsbry 1890	= *H. midae*
	ficiformis Menke 1844	= *H. spadicea*
	kraussi Turton 1932	= *H. parvum*
	midae elatior Turton 1932	= *H. midae*
	midae capensis Turton 1932	= *H. midae*
	nebulata Turton 1932, *non* Reeve	= *H. spadicea*
	pertusa Bartsch 1915, *non* Reeve	= *H. spadicea*
	pertusa Sowerby 1900, *non* Reeve	= *H. speciosum*

Pleurotomariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pleurotomaria	*africana* Tomlin	A	Tomlin 1948	Holotype in S.A.M.

Synonymy

Pleurotomaria	*quoyana* Fish. Mar. Biol. Surv. 1933, *non* Fischer & Bernardi	= *P. africana*

Acmaeidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Acmaea	*roseoradiata* Smith	S.A.M., U.C.T.	Smith 1901 Barnard 1963	
Patelloida	*profunda* (Deshayes)	Krauss, Burnup, U.C.T.	Pilsbry 1891 Smith 1901 Barnard 1963	

Synonymy

Acmaea	*albonotata* Smith 1901	= *Patelloida profunda*
?	*coppingeri* Turton 1932, *non* Smith	= *P. profunda*
Helcioniscus	*profundus* Deshayes, Pilsbry 1891	= *P. profunda*
Patella	*profunda* Deshayes, Von Martens 1880	= *P. profunda*
Patelloidea	*conoidea* Quoy & Gaimard, Krauss 1848	= *P. profunda*

Patellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cellana	*capensis* (Gmelin)	Krauss, S.A.M., K.H.B., U.C.T., U.W.	Krauss 1848 Barnard 1963	
Helcion	*dunkeri* (Krauss)	Krauss, Lightfoot, K.H.B., U.C.T.	Krauss 1848 Barnard 1963	
	pectunculus (Gmelin)	Krauss, S.A.M., U.C.T.	Krauss 1848 Barnard 1963	
Patella	*argenvillei* Krauss	U.C.T., Koch	Tomlin & Stephenson 1942 Koch 1949	
	barbara L.	U.C.T., Koch	T. & S. 1942 Koch 1949	
	cochlear Born	U.C.T., Koch	T. & S. 1942 Koch 1949	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Patella	*compressa* L.	U.C.T., Koch	T. & S. 1942 Koch 1949	
	granatina L.	U.C.T., Koch	T. & S. 1942 Koch 1949	
	granularis L.	U.C.T., Koch	T. & S. 1942 Koch 1949	
	longicosta Lamarck	U.C.T., Koch	T. & S. 1942 Koch 1949	
	miniata Born	U.C.T., Koch	T. & S. 1942 Koch 1949	
	oculus Born	U.C.T., Koch	T. & S. 1942 Koch 1949	
	tabularis Krauss	U.C.T., Koch	T. & S. 1942 Koch 1949	
	variabilis Krauss	U.C.T., Koch	T. & S. 1942 Koch 1949	

Synonymy

? *Acmaea*	*ordinaria* Turton 1932	= *Helcion pectunculus*
?	*punicea* Turton 1932	= *H. pectunculus*
Cellana	*capensis* subsp. *karachiensis* Winckworth 1930	= *Cellana capensis*
Helcion	*pectinata* Krauss 1848	= *Helcion pectunculus*
Helcioniscus	*capensis* Gmelin 1790	= *H. capensis*
Patella	*capensis* Krauss 1848	= *Cellana capensis*
	? *decemcostata* Smith	= *Patella longicostata*
	dunkeri Krauss 1848	= *Helcion dunkeri*
	dunkeri var. *approximata* Turton 1932	= *H. pruinosus*
	dunkeri var. *formosa* Turton 1932	= *H. dunkeri*
	echinulata Krauss 1848	= *Patella granularis*
	morbida Reeve	= *P. granularis*
	natalensis Krauss 1848	= *P. granularis*
	obtecta Krauss 1848	= *P. barbara*
	patriacha Pilsbry 1891	= *P. tabularis*
	pectinata Krauss 1848	= *Helcion pectunculus*
	plicata Born 1778	= *Patella barbara*
	pruinosa Krauss 1848	= *Helcion pruinosus*
	pruinosa var. *fuscoradiata* Turton 1932	= *H. pruinosa*
	rustica L.	= *Patella tabularis*
	sanguineus Reeve 1856	= *P. miniata*
	testudinaria Turton, *non* L.	= *Helcion dunkeri*
	umbella Gmelin, Nardini 1934	= *Patella miniata*

TECTIBRANCHIATA

Actaeonidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Actaeon	*flammeus* (Gmelin)	Sowerby	Sowerby 1897 Barnard 1963	
	fortis Thiele	P.F.	Thiele 1925 Barnard 1963	
Bullina	*scabra* Gmelin	Turton	Bartsch 1915	
	ziczac Muhlfeldt	K.H.B.	Sowerby 1892	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pseudactaeon	*albus* (Sowerby)	S.A.M., U.C.T., V, Martin, Schwarz	Sowerby 1873 Thiele 1925 Barnard 1963	Also †
Solidula	*affinis* A. Adams	Sowerby	Sowerby 1897	
	niecaensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	solidula L.	Sowerby	Sowerby 1892	
	sulcata (Gmelin)	P.F., S.A.M., Martin	Barnard 1963	†
	suturalis (A. Adams)	P.F.	Sowerby 1892 Barnard 1963	
	tessellata (Reeve)		Smith 1903	

Synonymy

Actaeon (*Solidula*)	*affinis* A. Adams, Sowerby 1897	= *Pseudactaeon albus*
Actaeon (*Solidula*)	*albus* Sowerby 1892	= *P. albus*
	solidulus L., Sowerby 1892	= *Solidula solidula*
(*Solidula*)	*suturalis* A. Adams, Sowerby 1892	= *S. suturalis*
Tornatella	*albus* Sowerby 1873	= *Pseudactaeon albus*
	tessellata Reeve 1842	= *Solidula tessellata*

Ringiculidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ringicula	*turtoni* Bartsch	P.F., U.C.T., V	Barnard 1963	Also †

Synonymy

Ringicula	*africana* Bartsch 1915, Tomlin 1931	= *R. turtoni*
	agulhasensis Thiele 1925	= *R. turtoni*
	australis Sowerby 1892, *non* Hinds, Smith 1910	= *R. turtoni*
	scalaris Turton 1932	= *R. turtoni*
	solida Turton 1932	= *R. turtoni*

Hydatinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Hydatina (*Aplustrum*)	*cinctoria* (Perry)	U.C.T.	MacNae 1962	
	aplustre L.	Sowerby	Sowerby 1897 MacNae 1962	
	physis L.	Turton	Krauss 1848 MacNae 1962	
	velum (Gmelin)	U.C.T.	Eales 1938 MacNae 1962	
Micromelo	*undata* Bruguière	Kilburn, Sowerby	Sowerby 1897	

Synonymy

Aplustrum	*amplustre* L., Sowerby 1897	= *Hydatina* (*Aplustrum*) *amplustre*
Aplustrum	*albocinctum* (Hoeven), Bergh 1901	= *H. cinctoria*
	physis (L.), Bergh 1901	= *H. physis*
	velum (Gmelin), Bergh 1901	= *H. velum*
Bulla	*albocincta* Hoeven 1839	= *H. cinctoria*
Hydatina	*undata* Bruguière, Sowerby 1897	= *Micromelo undatus*
	albocincta Auct.	= *Hydatina cinctoria*

Bullariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Bullaria	*ampulla* (L.)	Muir, Martin, S.A.M.	Turton 1932 Barnard 1963	Also †

Synonymy

Bulla	*ampulla* L., Krauss 1848, Sowerby 1892	= *Bullaria ampulla*

Atyidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Atys	*cylindrica* Sowerby	Sowerby, Smith	Sowerby 1897 Smith 1903 MacNae 1962	
	petersi Von Martens		Von Martens 1879 MacNae 1962	
Haminea	*alfredensis* Bartsch	S.A.M., Turton	Bartsch 1915 Barnard 1963	
	gracilis Sowerby	V, U.C.T., S.A.M.	Sowerby 1897 Barnard 1963	
	natalensis (Krauss)	Sowerby, Krauss	Krauss 1848 Sowerby 1892	
	subcylindrica Sowerby	Sowerby, Smith	Sowerby 1897	
Smaragdinella	*andersonii* G. & H. Nevill	Smith	Smith 1910	

Synonymy

Atys	*elongata* A. Adams 1850	= *A. cylindrica*
Bulla	*natalensis* Krauss 1848, *non* Sowerby	= *Haminea natalensis*
Glauconella	*andersonii* G. & H. Nevill 1871	= *Smaragdinella andersoni*

Aceridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Acera	*soluta* Gmelin	Smith	Smith 1903 Barnard 1963	Also †
Cylindrobulla	*pusilla* G. & H. Nevill		Tomlin 1923	
	sculpta G. & H. Nevill	Sowerby	Sowerby 1897	
Volvatella	*laguncula* Sowerby	Sowerby, Turton	Sowerby 1894, 1897 Bartsch 1915	

Synonymy

Cylindrobulla	*turtoni* Bartsch 1915	= *Volvatella laguncula*

Retusidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Retusa	*agulhasensis* Thiele	V	Thiele 1925 Barnard 1963	
	natalensis Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	cf. *nicobarica* Thiele	P.F.	Thiele 1925 Barnard 1963	
	cf. *semen* Thiele	P.F.	Thiele 1925 Barnard 1963	
	truncatula (Bruguière)	V, Turton, Muir	Smith 1904 Bartsch 1915 Barnard 1963	Also †

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Volvula	*mutabilis* Barnard	P.F.	Barnard 1963	Type in S.A.M.
	pia Thiele	V	Thiele 1925 Barnard 1963	
	rostrata A. Adams		Sowerby 1892	
Synonymy				
Retusa	*atlantica* Thiele 1925		? = *R. truncatula*	

Scaphandridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Actaeocina	*agulhasensis* (Thiele)	V	Thiele 1925	
	fusiformis (A. Adams)	Kilburn	Kilburn 1963	
	meridionalis (Smith)		Smith 1902, 1903	
	natalensis Barnard	P.F.	Barnard 1963	
	nitens (Thiele)	V	Thiele 1925	
	smithi Bartsch	P.F., Turton, Lightfoot	Sowerby 1892 Bartsch 1915 Barnard 1963	
	sp. A	P.F.	Barnard 1963	
	sp. B	P.F.	Barnard 1963	
Cylichna	*africana* Bartsch	Turton	Bartsch 1915	
?	*bistriata* Tomlin	Turton	Tomlin 1920	
	dulcis Thiele	V, P.F.	Thiele 1925 Barnard 1963	
?	*nitens* Smith		Smith 1903	
	tubulosa Gould	V, Turton, P.F., U.C.T.	Gould 1859 Bartsch 1915 Barnard 1963	
?	*umbilicata* Montagu	Ponsonby	Sowerby 1892	
Sabatia	*utriculus* (Brocchi)	P.F., V	Thiele 1925 Barnard 1963	
Scaphander	*punctostriatus* Mighels	P.F., Ch, S.A.M.	Watson 1886 Sowerby 1903 Barnard 1963	
	sp.	P.F.	Barnard 1963	
Synonymy				
Atys	*utriculus* Brocchi 1814		= *Sabatia utriculus*	
Cylichna	*affinis* Thiele 1925		= *Cylichna tubulosa*	
	algoensis Thiele 1925		= *C. tubulosa*	
	cylindracea Pennant, Sowerby 1892		= *C. tubulosa*	
Cylichnella	*bistriata* Tomlin 1920		= *C. bistriata*	
	tubulosa Gould 1859		= *C. tubulosa*	
Roxania	*simillima* Thiele 1925		= *Sabatia utriculus*	
	utriculus (Brocchi), Barnard 1963		= *S. utriculus*	
Tornatina	*agulhasensis* Thiele 1925		= *Actaeocina agulhasensis*	
	meridionalis Smith 1902		= *A. meridionalis*	
	nitens Thiele 1925		= *A. nitens*	
	soluta (sic) Sowerby 1889		= *A. smithi*	
	voluta Quoy & Gaimard 1850		= *A. smithi*	

Philinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Philine	*aperta* (L.)	U.C.T., S.A.M.	Bergh 1907 Barnard 1963	? †
	berghi Smith		Smith 1910 Barnard 1963	

Synonymy

Philine	*capensis* Bergh 1907, *non* Pfeiffer	= *P. berghi*
	capensis Pfeiffer	= *P. aperta*
	schroeteri Philippi, Bartsch 1915	= *P. aperta*

Gastropteridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Gastropteron	sp.	S.A.M.	Barnard 1963	

Dorididae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chelidonura	*hirundinina* (Quoy & Gaimard)	U.W.	MacNae 1962	
Doridium	*capensis* Bergh	U.W.	Bergh 1907 MacNae 1962	
	cyanea Bergh	U.W.	MacNae 1962	
	dubia O'Donoghue	Fish. Mar. Biol. Surv.	O'Donoghue 1929	

Aplysiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Aplysia	*dactylomela* Rang	U.C.T., U.W.	Rang 1828 MacNae 1955 Eales 1960	
	juliana Quoy & Gaimard		Quoy & Gaimard 1832 MacNae 1955 Eales 1960	
	maculata Rang	U.C.T.	MacNae 1955 Bergh 1907 Krauss 1848 Eales 1960	
	oculifera A. Adams & Reeve		A. Adams & Reeve 1850 MacNae 1957 Eales 1960	
	parvula Guilding	V, Turton	Sowerby 1892 Bartsch 1915 Eales 1960	
Dolabella	*auricularia* (Solander)	Krauss, U.W.	Krauss 1848 MacNae 1962	
	gigas (Rang)	U.W.	MacNae 1962	
Dolabrifera	*dolabrifera* (Rang)	Ch, Engel	Watson 1886 MacNae 1962	
Notarchus	*cirrhifera* (Quoy & Gaimard)	U.W.	Eales & Engel 1953 MacNae 1962	
(*Bursatella*)	*leachi* var. *africana* Engel	U.C.T., P.F.	Eales & Engel 1953 MacNae 1962 Sowerby 1892 Krauss 1848	
(*Stylocheilus*)	*longicaudus* (Quoy & Gaimard)	U.W.	MacNae 1962	
Paraplysia	*lowii* Gilchrist		Gilchrist 1900 Smith 1903 Engel 1936	

Synonymy

Aclesia	*africana* Engel 1926	= *Notarchus leachii* var. *africana*
Aplysia	*allochroa* Bergh 1907	= *Aplysia parvula*
	cirrifera Bergh 1907	= *Notarchus* (*Bursatella*) *leachii*
	eusiphonata Bergh 1907	= *Aplysia maculata*
	gargantua Bergh 1907	= *A. maculata*
	gilchristi Bergh 1907	= *A. maculata*
	lobata Bergh 1907	= ? *A. parvula*
	lobata Bergh 1907	= ? *A. dactylomela*
	monochroa Bergh 1907	= *A. parvula*
	poikila Bergh 1907	= *A. maculata*
	savignyana Sowerby 1892	= *Notarchus* (*Bursatella*) *leachii*
	spuria (Krauss) 1848	= ? *Aplysia parvula*
	woodi Bergh 1907	= *A. juliana*
Barnardaclesia	*cirrhifera* Quoy & Gaimard 1832	= *Notarchus* (*Bursatella*) *cirrhifera*
Dolabella	*rumphii* Cuvier, Bergh 1907	= *Dolabella auricularia*
	scapula (Martyn) 1789	= *D. auricularia*
Notarchus	*villosus* O'Donoghue 1929	= *Notarchus* (*Bursatella*) *leachii*
Paraplysia	*geographica lowii* Engel 1936	= *Paraplysia lowii*
Tethys	*allochroa* O'Donoghue 1929, *non* Bergh	= *Aplysia oculifera*
	capensis O'Donoghue 1929	= *A. juliana*
	concava Sowerby 1892	= *A. parvula*
	dactylomela (Rang), Baba 1937	= *A. dactylomela*
	fimbriata A. Adams & Reeve 1850	= *A. dactylomela*
	nigropuncta Von Martens 1880	= *A. parvula*
	operta Burne 1906, Smith 1910	= *A. dactylomela*

PTEROPODA

Spiratellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Spiratella	*bulimoides* (d'Orbigny)	Ch, V	Pelseneer 1888 Meisenheimer 1905	
	helicina (Phipps)	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	
	inflata (d'Orbigny)	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	
	lesueuri (d'Orbigny)	Ch, V	Pelseneer 1888 Meisenheimer 1905	
	trochiformis (d'Orbigny)	Ch, V	Pelseneer 1888 Meisenheimer 1905	
Styliola	*africana* Bartsch	Turton	Bartsch 1915	
	recta Lesueur	Ch, V	Sowerby 1892	
	subula Quoy & Gaimard	Ch, V	Pelseneer 1888 Meisenheimer 1905	

Synonymy

Genus *Limacina* Lamarck 1819 = Genus *Spiratella* Blainville 1817

Cavoliniidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cavolinia	*gibbosa* Rang	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	
	globulosa Rang	Ch, V, Turton	Pelseneer 1888 Meisenheimer 1905 Bartsch 1915 Tomlin 1923	
	inflexa Lesueur	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	
	tridentata Forskål	Ch, V, S.A.M.	Pelseneer 1888 Meisenheimer 1905 Sowerby 1892	
Clio	*andraea* Boas	V	Meisenheimer 1905 Tomlin 1923	
	australis d'Orbigny	Ch, V	Pelseneer 1888 Meisenheimer 1905	
	capensis Rang		Tomlin 1923	
	chaptali Souleyet	V	Meisenheimer 1905	
	cuspidata Bosc	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	
	pyramidata L.	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	
Creseis	*acicula* Rang	V, Bonite	Souleyet 1852 Meisenheimer 1905 Smith 1910	
	virgula Rang	V, Bonite	Souleyet 1852 Meisenheimer 1905 Smith 1910	
Diacria	*quadridentata* Lesueur	Ch, V	Pelseneer 1888 Smith 1903 Meisenheimer 1905	
	trispinosa Lesueur	Ch, V	Pelseneer 1888 Smith 1903 Meisenheimer 1905	
Herse	*columnella* (Rang)	Ch, V	Pelseneer 1888 Meisenheimer 1905 Smith 1910	
Synonymy				
Cuvierina	*columnella* Rang		= *Herse columnella*	

Peraclidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Peracle	*moluccensis* (Tesch)	V, Siboga	Tesch 1904 Meisenheimer 1905 Tomlin 1923	
	reticulata (d'Orbigny)	Ch, V	Pelseneer 1888 Meisenheimer 1905	
Synonymy				
Genus *Peraclis* Pelseneer 1888			= Genus *Peracle* Forbes 1844	

Cymbuliidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cymbulia	*sibogae* Tesch	Siboga, V	Tesch 1904 Meisenheimer 1905	
Gleba	*cordata* Forskål	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	

Desmopteridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Desmopterus	*papilio* Chun	V	Meisenheimer 1905 Tomlin 1923	

Pneumodermatidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Spongiobranchaea	*australis* d'Orbigny	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	

Clionidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Clione	*limacina* Phipps	Ch, V	Pelseneer 1888 Meisenheimer 1905 Tomlin 1923	

Oxynoidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lobiger	*capensis* Thiele	V	Thiele 1912, 1925	
Oxynoe	*natalensis* Smith	Turton	Sowerby 1892 Smith 1903 Bartsch 1915	
Synonymy				
Oxynoe	*pellucidus* A. Adams, Sowerby 1892		= *O. natalensis*	

Stiligeridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Hermaeina	*sinusmensalis* MacNae	U.W.	MacNae 1954	
Hermaea	*capensis* MacNae	U.W.	MacNae 1954	
Stiliger	*ornata* Ehrenberg	U.W.	MacNae & Kalk 1958	

Elysiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Elysia	*halimedae* MacNae	U.W.	MacNae 1954	
	ornata (Swainson)	U.W.	MacNae & Kalk 1958	
	punctata var. *rubropunctata* MacNae	U.W.	MacNae 1954	

Umbraculidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Umbraculum	*sinicum* (Gmelin)	U.W., Krauss	O'Donoghue 1929 MacNae 1962	

Synonomy

Umbrella	*indica* Lamarck, Krauss 1848, Sowerby 1892	= *Umbraculum sinicum*

Pleurobranchidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Berthella	*granulata* (Krauss)	Gilchrist, Krauss	Krauss 1848 Sowerby 1892 Bergh 1907	
	punctata (Quoy & Gaimard)	U.W.	MacNae 1962	
Euselenops	*luniceps* (Cuvier)	U.W.	MacNae 1962	
Pleurobranchaea	*algoensis* Thiele	V	Thiele 1925	
	brocki Bergh	U.W.	Bergh 1907 MacNae 1962	
	capensis Vayssière	P.F., Purcell	Bergh 1907 Smith 1910 Thiele 1925	
	gemini MacNae	U.W.	MacNae 1962	
	melanopus Bergh	P.F.	Bergh 1907 Smith 1910	
	pleurobrancheana (Bergh)	V	Thiele 1925 Bergh 1907 Smith 1910	
Pleurobranchus	*inhacae* MacNae	U.W.	MacNae 1962	
	mobii Vayssière	U.W.	MacNae 1962	
	nigropunctata Bergh		Bergh 1907 Smith 1910	
	peroni Cuvier	U.W.	MacNae 1962	
	perrieri Vayssière	U.W.	MacNae 1962	
	xhosa MacNae	U.W.	MacNae 1962	

Synonymy

Oscaniopsis	*pleurobranchaeana* Bergh 1907	= *Pleurobranchaea pleurobrancheana*
Pleurobranchella	*pleurobrancheana* Thiele 1925	= *P. pleurobrancheana*
Pleurobranchus	*granulatus* Krauss 1848, Sowerby 1892	= *Berthella granulata*

NUDIBRANCHIATA

Doridiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Aphelodoris	*brunnea* Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	
Archidoris	*capensis* Bergh		Bergh 1907 Smith 1910 Barnard 1927	
	granosa Bergh		Bergh 1907 Smith 1910 Barnard 1927	
?	*scripta* Bergh		Bergh 1907 Smith 1910 Barnard 1927	
Argus	*scabra* (Cuvier)		Barnard 1927	
Chromodoridella	*mirabilis* Eliot		Eliot 1905 Smith 1910 Barnard 1927	
Dendrodoris	*caesia* Bergh		Bergh 1907 Smith 1910 Barnard 1927	
	callosa (Bergh)		Bergh 1907 Smith 1910 Barnard 1927	
	capensis (Bergh)		Bergh 1907 Smith 1910 Barnard 1927	
	kalkensis (Barnard)	K.H.B.	Barnard 1927	
	nigra (Stimpson)	K.H.B.	Bergh 1905 O'Donoghue 1924 Barnard 1927	
Diaulula	*capensis* Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	
?	*morosa* Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	
Discodoris	*coerulescens* Bergh	K.H.B., Burnup	Bergh 1888 Eliot 1910 Barnard 1927	
	glabella Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	
	natalensis Krauss	Krauss	Krauss 1848 Smith 1903 Barnard 1927	
	perplexa Bergh		Bergh 1907 Barnard 1927	
	pseudida Bergh	K.H.B.	Bergh 1907 Barnard 1927	
	verrucosa (Cuvier)	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	
Geitodoris	*capensis* Bergh		Bergh 1907 Smith 1910 Barnard 1927	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Glossodoris	*albolimbata* (Bergh)		Bergh 1907 Smith 1910 Tomlin 1926 Barnard 1927	
	annulata (Eliot)	Burnup	Smith 1910 Barnard 1927	
	capensis Barnard	K.H.B.	Barnard 1927	Types in S.A.M.
	carnea (Bergh)	Burnup	Eliot 1910 Barnard 1927	
	euelpis (Bergh)		Bergh 1907 Smith 1910 Barnard 1927	
	lineata (Souleyet)		Smith 1910 Barnard 1927	
	porcata (Bergh)	Burnup	Eliot 1910 Barnard 1927	
	runcinata (Bergh)		Smith 1910 Barnard 1927	
Thordisa	*burnupi* Eliot	Burnup	Eliot 1910 Barnard 1927	
	punctilifera Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	

Synonymy

Chromodoris	*albolimbata* Bergh 1907	= *Glossodoris albolimbata*
	annulata Eliot 1904, Smith 1910	= *G. annulata*
	carnea Bergh 1888	= *G. carnea*
	euelpis Bergh 1907	= *G. euelpis*
	porcata Bergh 1888	= *G. porcata*
	runcinata Bergh 1877	= *G. runcinata*
Doridigitata	*verrucosa* (Cuvier), Barnard 1927	= *Doris verrucosa*
Doriopsis	*caesia* Bergh 1907	= *Dendrodoris caesia*
	callosa Bergh 1907	= *D. callosa*
	capensis Bergh 1907	= *D. capensis*
	nigra var. *coerula* Bergh 1881	= *D. nigra*
	nigra var. *nigerrima* Bergh 1888	= *D. nigra*
	lineata Souleyet, Eliot 1904, Smith 1910	= *Glossodoris lineata*
	kalkensis Barnard 1927	= *Dendrodoris kalkensis*
Doris	*nigra* Stimpson 1855	= *D. nibra*
	scabra Cuvier 1804	= *Platydoris scabra*
Platydoris	*coriacea* Smith 1903	= *P. scabra*

Hexabranchidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Hexabranchus	*marginatus* Quoy & Gaimard	U.W.	Eliot 1905 Smith 1910 Barnard 1927 MacNae & Kalk 1957	

Synonymy

Hexabranchus	*adamsi* H. & A. Adams	= *H. marginatus*
	punctatus Bergh 1905	= *H. marginatus*

Polyceridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Caloplocamus	*ramosus* (Cantraine)	K.H.B., U.C.T.	Bergh 1907 Smith 1910 Barnard 1927 Odhner 1939 MacNae 1958	
Gymnodoris	*bicolor* A. & H. Adams	U.W.	MacNae 1958	
	ceylonica (Kelaart)	U.W.	MacNae 1958	
	inornata (Bergh)	U.W.	MacNae 1958	
Lecithophorus	*capensis* MacNae	U.W.	MacNae 1958	
Limacia	*clavigera* (Müller)	K.H.B., U.C.T., U.W.	Bergh 1907 Smith 1910 Barnard 1927 Odhner 1939 MacNae 1958	
Kalinga	*ornata* A. & H. Adams	Bergh	Bergh 1907 Smith 1910 Barnard 1927	
Nembrotha	*morosa* Bergh	Bergh	Bergh 1907 Smith 1910 Barnard 1927 MacNae 1958	
Plocamopherus	*apheles* Barnard	Gilchrist	Barnard 1927	
Polycera	*capensis* Quoy & Gaimard	K.H.B., U.C.T.	Barnard 1927 Odhner 1939 Pruvot-Fol 1934 MacNae 1958	
Thecacera	*maculata* Eliot	K.H.B.	Barnard 1933 MacNae 1958	
	inhacae MacNae	U.W.	MacNae 1958	

Synonymy

Euphurus	*claviger* (Müller 1781)	= *Limacia clavigera*
Euplocamus	*croceus* Philippi 1836	= *Caloplocamus ramosus*
Nembrotha	*capensis* Bergh 1907	= *Nembrotha morosa*
Polycera	*nigrocrocea* Barnard 1927	= *Polycera capensis*
Thecacera	*lamellata* Barnard 1933	= *Thecacera maculata*
Triopa	*lucida* Stimpson 1855	= *Limacia clavigera*

Goniodorididae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Goniodoris	*brunnea* MacNae		MacNae 1958	
	mercurialis MacNae		MacNae 1958	
	ovata Barnard	K.H.B.	Barnard 1934	Holotype in S.A.M.
Okenia (*Idaliella*)	*amoenula* Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927 MacNae 1958	

Synonymy

Idaliella	*amoenula* Bergh 1907	= *Okenia amoenula*

Tritoniidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Duvaucelia				
(*Sphaerostoma*)	*aurantiacum* Barnard	K.H.B.	Barnard 1927	Holotype in S.A.M.
(*Sphaerostoma*)	*pallida* (Stimpson)	K.H.B.	Bergh 1807 Smith 1910 Barnard 1927	
(*Tritonidoxa*)	*capensis* Bergh		Bergh 1907 Smith 1910 Barnard 1927	
Marionia	*arborescens* Bergh	Burnup	Eliot 1910 Barnard 1927	
Synonymy				
Sphaerostoma	*aurantiacum* Barnard 1927		= *Duvaucelia* (*Sphaerostoma*) *aurantiacum*	
	pallida (Stimpson) 1854		= *D.* (*Sphaerostoma*) *pallida*	
Tritonidoxa	*capensis* Bergh 1907		= *D.* (*Tritonidoxa*) *capensis*	

Arminidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Armina	*berghi* Thiele	V	Thiele 1925	
	capensis (Bergh)	P.F.	Bergh 1907 Smith 1910 Barnard 1927	
	euchroa (Bergh)		Bergh 1907 Smith 1910 Barnard 1927	
	gilchristi (Bergh)	P.F.	Bergh 1907 Smith 1910 Barnard 1927	
	microdonta (Bergh)	P.F.	Bergh 1907 Smith 1910 Barnard 1927	
	natalensis (Bergh)	Krauss	Krauss 1848 Smith 1903 Barnard 1927	
	simoniana Thiele	V	Thiele 1925	
Synonymy				
Pleurophyllidia	*berghi* Thiele 1925		= *Armina berghi*	
	capensis Bergh 1907		= *A. capensis*	
	euchroa Bergh 1907		= *A. euchroa*	
	gilchristi Bergh 1907		= *A. gilchristi*	
	microdonta Bergh 1907		= *A. microdonta*	
Diphyllidia	*lineata* Krauss 1848		= *A. natalensis*	
Pleurophyllidia	*natalensis* Bergh 1866		= *A. natalensis*	
	simoniana Thiele 1926		= *A. simoniana*	

Coryphellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Coryphella	*capensis* Thiele	V	Thiele 1925	

Facelinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Amanda	*armata* MacNae	MacNae	MacNae 1954	
Echinopsole	*fulvus* MacNae	MacNae	MacNae 1954	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Facelina	*annulata* MacNae	MacNae	MacNae 1954	
	faurei Barnard	K.H.B.	Barnard 1927	Holotype in S.A.M.
	olivacea MacNae	MacNae	MacNae 1954	
Favorinus	*horridus* MacNae	MacNae	MacNae 1954	Paratypes in S.A.M.
Godiva	*quadricolor* (Barnard)	K.H.B., MacNae	Barnard 1927 MacNae 1954	Holotype in S.A.M.
Rizzolia	*capensis* Barnard	K.H.B.	Barnard 1927	Holotype in S.A.M.

Synonomy

Cratena	*capensis* Barnard 1927	= *Rizzolia capensis*
Hervia	*quadricolor* Barnard 1927	= *Godiva quadricolor*

Aeolidiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Aeolidiella	*multicolor* MacNae	MacNae	MacNae 1954	
	saldanhensis Barnard	K.H.B.	Barnard 1927	

Glaucidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Glaucus	*atlanticus* Forster	K.H.B., V, MacNae	Bergh 1907 Smith 1910 Barnard 1927 MacNae 1954	

Scyllaeidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Scyllaea	*pelagica* L.	K.H.B., P.F.	Iredale & O'Donoghue 1923	

Tethyidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Melibe	*rosea* Rang	K.H.B., U.C.T.	Rang 1829 Bergh 1907 Smith 1910 Barnard 1927	
	vexillifera (Bergh)	U.W.	MacNae & Kalk 1958	

Zephyrinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Janolus	*capensis* Bergh	K.H.B.	Bergh 1907 Smith 1910 Barnard 1927	

Iduliidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Idulia	*cinerea* (Trinchese)	K.H.B.	Trinchese 1881 Barnard 1927	
	splendida (Trinchese)	K.H.B.	Trinchese 1881 Barnard 1927	

Synonymy

Doto	*cinerea* Trinchese 1881	= *Idulia cinerea*
	splendida Trinchese 1881	= *I. splendida*

POLYPLACOPHORA

Cryptoplacidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Acanthochiton	*garnoti* Blainville	Krauss, U.C.T., S.A.M.	Nierstrasz 1906 Ashby 1913 Barnard 1963	
	variegatus Nierstrasz		Nierstrasz 1906 Ashby 1913 Barnard 1963	
Craspedochiton	*isipingoensis* (Sykes)	Koch, U.C.T.	Tomlin 1926 Ashby 1931 Koch 1951 Barnard 1963	
Cryptoplax	*sykesi* Thiele	Burnup	Smith 1903 Thiele 1907 Ashby 1931 Barnard 1963	
Notoplax	*productus* (Pilsbry)	Turton	Sowerby 1897 Bartsch 1915 Ashby 1931 Barnard 1963	

Synonymy

Acanthochites	*carpenteri* Pilsbry 1893	= *Notoplax productus*
	garnoti Blainville, Nierstrasz 1906	= *Acanthochiton garnoti*
Acanthochiton	*turtoni* Ashby 1931	= *A. garnoti*
	turtoni var. *tenuigranosus* Ashby 1931	= *A. garnoti*
Chiton	*garneti* (sic) Sowerby 1892	= *A. garnoti*
Cryptoplax	*striatus* Lamarck, Sykes 1900	= *Cryptoplax sykesi*
Notoplax	*productus* Pilsbry (part), Ashby 1931	= *Craspedochiton isipingoensis*
	umgaziana Koch 1951	= *C. isipingoensis*
Onithochiton	? *isipingoensis* Sykes 1901	= *C. isipingoensis*
Thaumastochiton	*isipingoensis* Sykes, Thiele 1909	= *C. isipingoensis*

Lepidopleuridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lepidopleurus	*chariessa* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	sykesi (Sowerby)	P.F.	Sowerby 1903 Thiele 1906 Ashby 1931 Barnard 1963	Holotype in S.A.M.

Synonymy

Chiton (*Hanleya*)	*sykesi* Sowerby 1903	= *Lepidopleurus sykesi*
Lepidopleura	*sykesi* Thiele 1906	= *L. sykesi*

Lepidochitonidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Callochiton	*castaneus* (Wood)	U.C.T., Krauss, Turton	Krauss 1848 Sowerby 1892 Nierstrasz 1906 Ashby 1931 Barnard 1963	

Synonymy

Callochiton	*dentatus* Spengler, Smith 1910	= *C. castaneus*
	planatus Spengler, Smith 1910	= *C. castaneus*

Mopaliidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Plaxiphora	*parva* Nierstrasz	U.C.T.	Nierstrasz 1906 Leloup 1942 Barnard 1963	
Synonymy				
Plaxiphora	*tricolor* Thiele 1909		= *P. parva*	
	indica Thiele 1909		= *P. parva*	
	platei Von Knorre 1925		= *P. parva*	

Ischnochitonidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chaetopleura	*papilio* (Spengler)	Krauss, P.F., U.C.T., S.A.M.	Krauss 1848 Sowerby 1892 Smith 1910 Ashby 1931 Barnard 1963	
	pertusa (Reeve)	Krauss, U.C.T.	Krauss 1848 Sowerby 1892 Ashby 1931 Barnard 1963	
	pomarium Barnard	Mrs. Connolly, U.C.T.	Barnard 1963	Holotype S.A.M.
Dinoplax	*fossus* Sykes	S.A.M., U.C.T., Turton	Krauss 1848 Bartsch 1915 Ashby 1928, 1931 Barnard 1963	
	gigas (Gmelin)	S.A.M., U.C.T., Turton, Krauss	Krauss 1848 Sowerby 1892 Bartsch 1915 Ashby 1931 Barnard 1963	
	validifossus Ashby	Ashby, U.C.T.	Nardini 1934 Ashby 1934 Barnard 1963	
Ischnochiton	*hewitti* Ashby	U.C.T.	Nierstrasz 1906 Ashby 1931 Barnard 1963	Paratypes S.A.M.
	oniscus Krauss	Krauss, Turton	Krauss 1848 Sowerby 1892 Bartsch 1915 Ashby 1931 Barnard 1963	
	oniscus var. *alfredensis* Ashby	Ashby	Ashby 1931 Barnard 1963	
	var. *elizabethensis* Pilsbry		Sowerby 1892, 1897 Ashby 1931 Barnard 1963	
	simplicissimus Thiele	V	Thiele 1906 Barnard 1963	
	textilis (Gray)	V, S.A.M., U.C.T.	Krauss 1848 Nierstrasz 1905 Ashby 1931 Barnard 1963	

Synonymy

Chaetopleura	*destituta* Ashby 1931, *non* Sykes	= *C. papilio*
	destituta Sykes 1902	= *C. pertusa*
	pertusus Reeve, Ashby 1931	= *C. pertusa*
	pustulatus Krauss 1848	= *C. pertusa*
	watsoni Krauss 1848	= *C. papilio*
Chiton	*gigas* Krauss 1848, *non* Gmelin	= *Dinoplax fossus*
	marginatus Sowerby 1892, *non* Pennant	= *Ischnochiton oniscus* var. *elizabethensis*
	oniscus Krauss 1848	= *Ischnochiton oniscus*
	pruinosus Sowerby 1892, *non* Gould	= *I. oniscus*
	textilis Krauss 1848	= *I. textilis*
	textilis var. *punctulata* Krauss 1848	= *I. textilis*
	tigrinus Krauss 1848	= *I. textilis*
Dinoplax	*gigas* Ashby 1928, *non* Gmelin	= *Dinoplax fossus*
	gigas Nardini 1934, *non* Gmelin	= *D. fossus*
	gigas subsp. *alfredensis* Bartsch 1915	= *D. fossus*
Ischnochiton	*eucosmia* Turton 1932	= *Ischnochiton oniscus*
	ludwigi Pilsbry, Ashby 1932	= *I. textilis*
	oniscus subsp. *alfredensis* Ashby 1931	= *I. oniscus*
	var. *albocarinatus* Turton 1932	= *I. oniscus*
	var. *aurantius* Turton 1932	= *I. oniscus*
	var. *pyramidalis* Turton 1932	= *I. oniscus*
	pertusus Reeve, Turton 1932	= *Chaetopleura papilio*
	punctulatis (sic) Krauss 1848, Turton 1932	= *C. papilio*
	reticulatus Turton 1932, *non* Reeve	= *Ischnochiton textilis*
? *Ischnochiton*	*textilis* Nierstrasz 1906, *non* Gray	= *I. hewitti*
	tigrinus Krauss 1848, Ashby 1931	= *I. textilis*
Lophyriscus	*oniscus* Tomlin 1931	= *I. oniscus*
	textilis Tomlin 1931	= *I. textilis*

Chitonidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chiton	*ashbyi* Barnard	P.F.	Barnard 1963	Holotype in S.A.M.
	crawfordi Sykes	U.C.T., S.A.M., Turton	Sykes 1899 Bartsch 1915 Ashby 1928, 1931 Barnard 1963	
	nigrovirescens Blainville	Krauss, U.C.T., S.A.M.	Krauss 1848 Sowerby 1892 Ashby 1931 Tomlin 1931 Barnard 1963	
	tulipa Quoy & Gaimard	Krauss, U.C.T., S.A.M.	Ashby 1931 Turton 1932 Barnard 1963	

Synonymy

Acanthochiton	*tulipa* Tomlin 1931	= *Chiton tulipa*
Chiton	*alfredensis* Turton 1932	= *C. tulipa*
	capensis Gray, Krauss 1848	= *C. nigrovirescens*
	nigrovirens (sic) Blainville, Nierstrasz 1906	= *C. nigrovirescens*
Plaxiphora	*wahlbergi* Krauss, Eyre & Stephenson 1938	= *Onithochiton literatus*

SCAPHOPODA

Dentaliidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Dentalium	*africanum* Sowerby	P.F.	Sowerby 1903 Barnard 1963	Paratypes in S.A.M.
	capense Tomlin	P.F.	Tomlin 1931 Barnard 1963	Holotype in S.A.M.
	capillosum Jeffreys	P.F., Ch	Watson 1886 Tomlin 1931 Barnard 1963	
	engischistum Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
	eualdes Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
	exasperatum Sowerby	P.F., Turton, V	Sowerby 1903 Bartsch 1915 Barnard 1963	
	inflexum Sowerby	Burnup, P.F.	Sowerby 1903 Barnard 1963	Paratypes in S.A.M.
	lardum Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
	natalense Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.
	octangulatum Donovan	L. King, Siboga	Boissevain 1906	
	platypleurum Tomlin	P.F.	Tomlin 1931 Barnard 1963	Holotype in S.A.M.
	plurifissuratum (Sowerby)	P.F., U.C.T., V, Turton	Sowerby 1903 Plate 1908 Bartsch 1915 Barnard 1963	
	regulare Smith	Burnup, Turton	Smith 1903 Bartsch 1915	
	salpinx Tomlin	P.F.	Tomlin 1931 Barnard 1963	Holotype in S.A.M.
	strigatum Gould	V, P.F., U.C.T., Ch, Turton	Smith 1903 Bartsch 1915 Tomlin 1931 Barnard 1963	
	subterlineatum Tomlin	P.F.	Tomlin 1931 Barnard 1963	Holotype in S.A.M.

Synonymy

Dentalium	*agulhasensis* Plate 1908	= *D. strigatum*
	belcheri Sowerby 1903	= *D. strigatum*
	lessoni Sowerby 1892, *non* Deshayes	= *D. strigatum*
	longitrorsum Smith, Oct. 1903	= *D. inflexum*
	multistriatum Plate 1908, *non* Deshayes	= *D. plurifissuratum*
	novemcostatum Sowerby 1903, *non* Lamarck	= *D. strigatum*
	platei Jaeckel 1932	= *D. exasperatum*
	politum Sowerby 1903, *non* L.	= *D. engischistum*
Fissidentalium	*plurifissuratum* Sowerby, Pilsbry & Sharp 1897	= *D. plurifissuratum*
Schizodentalium	*plurifissuratum* Sowerby 1894	= *D. plurifissuratum*

Cadulidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cadulus	cf. *booceras* Tomlin	P.F.	Tomlin 1926 Barnard 1963	
	cylindratus Jeffreys	P.F.	Jeffreys 1877 Barnard 1963	
	platei Jaeckel	U.W.	Jaeckel 1932 Barnard 1963	
	promontorii Barnard	P.F.	Barnard 1963	Syntypes in S.A.M.

CEPHALOPODA

Spirulidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Spirula	*spirula* (L.)	Krauss, Dana, S.A.M., Turton	Krauss 1848 Sowerby 1892 Bartsch 1915 Bruun 1943 Voss 1967	
Synonymy				
Spirula	*peronii* Lamarck, Krauss 1848, Sowerby 1892, Bartsch 1915		= *S. spirula*	

Sepiidae

For full synonymy of southern African Sepiidae, see Roeleveld 1972 (*Ann. S. Afr. Mus.* **59**: 193–313).

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Sepia	*acuminata* Smith	Ponsonby & Spencer, P, Bell Marley, Turton, U.C.T., Dautzenberg, Burnup	Smith 1916 Tomlin 1923 Robson 1924 Massy 1928 Turton 1932 Adam 1941 Voss 1962 Adam & Rees 1966	
	australis Quoy & Gaimard	Astrolabe, Krauss, S.N.A.E., Burnup, Ponsonby, D.S.E., P, Toppin, P.F., Turton, Mercator, U.C.T., S.A.M.	Quoy & Gaimard 1832 Férussac & d'Orbigny 1835–48 Krauss 1848 Rochebrune 1884 Hoyle 1886, 1912 Gibbons 1888 Bartsch 1915 Smith 1916 Thiele 1920 Tomlin 1923 Robson 1924 Massy 1925, 1927 Turton 1932 Adam 1941, 1944 Voss 1962 1967 Adam & Rees 1966	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Sepia	*burnupi* Hoyle	Burnup Turton, P.F.	Hoyle 1904 Bartsch 1915 Smith 1916 Turton 1932 Barnard 1962 Voss 1962 Adam & Rees 1966	Holotype of *S. exsignata* in S.A.M.
	confusa Smith	Spencer, Burnup, P, Bell Marley, Turton	Hoyle 1904 Smith 1916 Tomlin 1923, 1926 Robson 1924 Massy 1925, 1928 Turton 1932 Voss 1962 Adam & Rees 1966	
(*Hemisepius*)	*dubia* Adam & Rees	U.C.T.	Adam & Rees 1966	
	hieronis (Robson)	Burnup, P, P.F., S.A.M., U.C.T.	Smith 1916 Robson 1924 Massy 1927 Voss 1962, 1967 Adam & Rees 1966	
	incerta Smith	Spencer, Burnup, Bell Marley, Toppin, Turton, P.F., Falcon, Chubb	Hoyle 1904 Smith 1916 Tomlin 1923 Massy 1925, 1928 Turton 1932 Barnard 1962 Voss 1962 Adam & Rees 1966	
	insignis Smith	Burnup	Smith 1916 Tomlin 1923 Voss 1962 Adam & Rees 1966	
	oubini Massy	P.F.	Massy 1927 Voss 1962 Adam & Rees 1966	
	officinalis vermiculata Quoy & Gaimard	Astrolabe, P, Bell Marley, Toppin, K.H.B., Turton, U.C.T., Ayres, Ponsonby, Spencer, Falcon	Quoy & Gaimard 1832 Férussac & d'Orbigny 1835–48 Rochebrune 1884 Gibbons 1888 Bartsch 1915 Smith 1916 Robson 1924 Massy 1925, 1927, 1928 Turton 1932	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
	officinalis vermiculata Quoy & Gaimard	Falcon	Adam 1940, 1941, 1944 Voss 1962 Adam & Rees 1966	
	papillata Quoy & Gaimard	Astrolabe, Toppin, Bell Marley, Turton, U.C.T., Spencer	Quoy & Gaimard 1832 Krauss 1848 Férussac & d'Orbigny 1835–48 Rochebrune 1884 Steenstrup 1875 Gibbons 1888 Hoyle 1910 Bartsch 1915 Tomlin 1923 Massy 1925, 1928 Turton 1932 Adam 1939, 1941, 1944 Voss 1962 Adam & Rees 1966	
	robsoni (Massy)	P.F.	Massy 1927 Voss 1962 Adam & Rees 1966	
	simoniana Thiele	Ponsonby & Spencer, Burnup, D.S.E., Skoog, Bell Marley, Toppin, U.C.T., Falcon	Gray 1849 Smith 1916 Thiele 1920 Odhner 1923 Tomlin 1923, 1926 Massy 1925 Voss 1962 Adam & Rees 1966	
	tuberculata Lamarck	Stephenson	Lamarck 1798 Férussac & d'Orbigny 1835–48 Rochebrune 1884 Hoyle 1886 Gibbons 1888 Smith 1903, 1916 Adam 1941, 1944 Voss 1962 Adam & Rees 1966	
(*Hemisepius*)	*typica*	Andréa, S.N.A.E., V, P.F., Carlgren, U.C.T., S.A.M.	Steenstrup 1875 Rochebrune 1884 Hoyle 1886, 1912 Gibbons 1888 Smith 1903, 1916 Chun 1915	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
(*Hemisepius*)	*typica*	S.A.M.	Massy 1927 Thore 1945 Voss 1962, 1967 Adam & Rees 1966	
	zanzibarica Pfeffer	Burnup	Hoyle 1886 Smith 1916 Tomlin 1923 Voss 1962	
Sepiella	*cyanea* Robson	P, Burnup, Mosley, Spencer, Ponsonby, Chubb, Falcon	Robson 1924 Massy 1928 Adam 1939 Voss 1962 Adam & Rees 1966	

Sepiolidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Euprymna	sp.	S.N.A.E.	Hoyle 1912	
Heteroteuthis	*hawaiiensis* Berry var. *dagamensis* Robson	P, S.A.M.	Robson 1924 Voss 1962, 1967	
Inioteuthis	*capensis* Voss	U.C.T., S.A.M., P.F.	Massy 1927 Voss 1962, 1967	Holotype in S.A.M.
Rondeletiola	*minor* (Naef)	Mercator	Adam 1941	
Rossia	*enigmatica* Robson	P, P.F., S.A.M.	Robson 1924 Massy 1927 Voss 1962, 1967	

Synonymy

Inioteuthis	*japonica* Verrill, Massy 1927	? = *I. capensis*
Inioteuthis	sp. Massy 1927	? = *I. capensis*
Inioteuthis	sp. Adam 1941	? = *Rondeletiola minor*
Smirossia	sp. A. Robson 1924	= *Rossia enigmatica*

Idiosepiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Idiosepius	*biserialis* Voss	U.C.T.	Voss 1962	Holotype in S.A.M.
	macrocheir Voss	U.C.T.	Voss 1962	Holotype in S.A.M.

Loliginidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Loligo	*duvaucelii* d'Orbigny	P, P.F., Bell Marley	Robson 1924, 1926 Massy 1925, 1927, 1928 Adam 1962 Voss 1962	
	reynaudii d'Orbigny	U.C.T., V, D.S.E., S.N.A.E., Bell Marley, P.F.	Smith 1903 Hoyle 1920, 1912 Thiele 1920 Massy 1925, 1927 Voss 1962	
Lolliguncula	*mercatoris* Adam	Mercator	Adam 1941	
Sepioteuthis	*lessoniana* Lesson		Adam 1962	

Synonymy

Loligo	*indica* Pfeffer 1884, Robson 1924, 1926, Massy 1925, 1927, 1928, Voss 1962	= *L. duvaucelii*
	reynaudii d'Orbigny 1845, Smith 1903, Hoyle 1910, Thiele 1920, Massy 1925, 1927, Voss 1962	? = *L. vulgaris* Lamarck 1798

Gonatidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Gonatus	*fabricii* (Lichtenstein)	P.F.	Steenstrup 1882 Barnard 1934	

Lycoteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lycoteuthis	*diadema* (Chun)	V, P, S.A.M.	Chun 1910 Robson 1924, 1926 Voss 1962, 1967	

Synonymy

Leptodontoteuthis	*inermis* Robson 1926	= *Lycoteuthis diadema*
Lycoteuthis	sp. Robson 1924	= *L. diadema*
Thaumatolampas	*diadema* Chun 1910	= *L. diadema*

Enoploteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Abraliopsis	*gilchristi* (Robson)	P, S.A.M.	Robson 1924 Voss 1962, 1967	
	pfefferi Joubin	S.A.M.	Voss 1967	
Ancistrocheirus	*lesueuri* (d'Orbigny)		Clarke 1966	
Pterygioteuthis	*gemmata* Chun	S.A.M.	Voss 1967	
	giardi Fischer	V	Chun 1910	
Pyroteuthis	*margaritifera* (Rüppell)	S.A.M.	Voss 1967	

Synonymy

Abralia	*gilchristi* Robson 1924	= *Abraliopsis gilchristi*

Octopoteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Octopodoteuthopsis	sp.	V, P, S.A.M.	Chun 1910 Robson 1924 Voss 1967	
Octopoteuthis	sp.	V	Chun 1910	
Taningia	*danae* Joubin	Clarke	Clarke 1966, 1967	

Onychoteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Moroteuthis	*robsoni* Adam	P, P.F.	Robson 1924 Massy 1927	
Onychoteuthis	*banksii* (Leach)	Skoog, S.A.M.	Pfeffer 1912 Odhner 1923 Voss 1962, 1967	
Onykia	*caribaea* Lesueur	D.S.E.	Pfeffer 1912 Thiele 1920 Voss 1962	

Synonymy

Moroteuthis	sp. A. Robson 1924, Massy 1927	= *M. robsoni*
Teleoteuthis	*caribaea* (Lesueur), Pfeffer 1912, Thiele 1920	= *Onykia carribaea*

Lepidoteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Tetronychoteuthis	*dussumierii* (d'Orbigny)	P, S.A.M.	Robson 1926 Voss 1967	

Synonymy

Tetronychoteuthis	*massyae* Pfeffer 1912	= *T. dussumierii*
Tetronychoteuthis	sp. Robson 1926	? = *T. dussumierii*

Architeuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Architeuthis	sp.		Clarke 1966	

Histioteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Calliteuthis	sp.	V	Chun 1910	
Histioteuthis	*bonnellii* (Férussac)	P, P.F., S.A.M.	Robson 1926 Voss 1962, 1967	
	dofleini (Pfeffer)	S.A.M.	Voss 1967	
	macrohista N. Voss	P, S.A.M.	Robson 1924 Voss 1967 N. Voss 1969	Paratype in S.A.M.
	meleagroteuthis (Chun)	S.A.M.	Voss 1967	

Synonymy

Histioteuthis	*bonelliana* (*non* Férussac) Robson 1924	= *H. macrohista*
Histioteuthis	sp. Voss 1967	= *H. macrohista*

Bathyteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Bathyteuthis	*abyssicola* Hoyle	V, D.S.E.	Chun 1910 Thiele 1920 Voss 1962	

Synonomy

Benthoteuthis	*megalops* Verrill 1885, Thiele 1920	= *Bathyteuthis abyssicola*

Ctenopterygidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ctenopteryx	*sicula* (Vérany)	S.A.M.	Voss 1967	

Brachioteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Brachioteuthis	*riisei* (Steenstrup)	Andréa	Hoyle 1905 Voss 1962	

Synonymy

Trracheloteuthis	*riisei* Steenstrup, Hoyle 1905	= *Brachioteuthis riisei*

Ommastrephidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ommastrephes	*bartramii* (Lesueur)	Bell Marley, D.S.E.	Gray 1849 Thiele 1920 Tomlin 1923 Massy 1925, 1928 Voss 1962	
Ornithoteuthis	sp.	S.A.M.	Voss 1967	
Symplectoteuthis	*oualaniensis* (Lesson)	Tryon	Tryon 1879 Smith 1903 Voss 1962	
Todarodes	*sagittatus* (Lamarck)	S.A.M.	Barnard 1934	
Todaropsis	*eblanae* (Ball)	P, S.A.M., U.C.T., P.F., Carlgren	Robson 1924 Massy 1927 Thore 1945 Voss 1962, 1967	

Synonomy

Loligo	*bartramii* Lesueur 1821, Tomlin 1923	= *Ommastrephes bartramii*
Loligo	*oualaniensis* Lesson 1830, Tryon 1879	= *Symplectoteuthis oualaniensis*
Ommatostrephes	*oualaniensis* (Lesson), Smith 1903	= *S. oualaniensis*
Stenoteuthis	*bartrami* (Lesueur), Massy 1925, 1928	= *Ommastrephes bartramii*

Thysanotheuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Thysanoteuthis	*rhombus* Troschel	S.A.M., McLean	Gray 1828, 1849 Smith 1903 Barnard 1934, 1947 Van Bruggen 1962 Voss 1962	

Synonomy

Sepioteuthis	*major* Gray 1828, 1849, Smith 1903	? = *Thysanoteuthis rhombus*

Chiroteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chiroteuthis	*capensis* Voss	S.A.M.	Voss 1967	Holotype in S.A.M.

Mastigoteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Mastigoteuthis	sp. A	P	Robson 1924	

Cranchiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Anomalocranchia	*impennis* Robson	P	Robson 1924 Voss 1962	
Cranchia	*scabra* Leach	P, S.A.M.	Robson 1924 Voss 1962, 1967	
Galiteuthis	*armata* Joubin	P	Robson 1924 Voss 1962	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Leachia	*cyclura* Lesueur	S.A.M.	Férussac & d'Orbigny 1835–48 Voss 1962 Barnard 1963	
Liocranchia	*intermedia* Robson	P	Robson 1924 Voss 1962	
	reinhardti Steenstrup	P	Robson 1924	
Megalocranchia	*maxima* Pfeffer	Schneehagen	Pfeffer 1884 Smith 1903 Voss 1962	
	megalops subsp. *australis* Voss	S.A.M.	Voss 1967	Holotype in S.A.M.
Pyrgopsis	*pacifica* (Issel)	P, S.A.M.	Robson 1924 Voss 1962, 1967	
	rhynchophorus Rochebrune		Rochebrune 1884	
Taonius	*pellucida* (Chun)	V	Chun 1910 Pfeffer 1912	

Synonymy

Desmoteuthis	*pellucida* Chun 1910	= *Taonius pellucida*
Loligopsis	*cyclura* (Lesueur), Férussac & d'Orbigny 1835–48	= *Leachia cyclura*
Megalocranchia	*pellucida* (Chun), Pfeffer 1912	= *Taonius pellucida*

Vampyroteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Vampyroteuthis	*infernalis* Chun	Discovery, Galathea	Pickford 1952, 1959	

Cirroteuthidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cirroteuthis	*gilchristi* Robson	P	Robson 1924 Tomlin 1926 Voss 1962	

Bolitaenidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Eledonella	*pygmaea* Verrill	P, S.A.M., Dana	Robson 1924, 1932 Tomlin 1926 Thore 1949 Voss 1962, 1967	

Synonymy

Bolitaena	*massyae* (Robson), Robson 1932	= *Eledonella pygmaea*
Eledonella	*massyae* Robson 1924, Tomlin 1926	= *E. pygmaea*

Amphitretidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Amphitretus	*pelagicus* Hoyle	V, S.A.M., Discovery	Thiele 1915 Robson 1930, 1932 Voss 1962, 1967	

Synonymy

Amphitretus	*thielei* Robson 1930, 1932	= *A. pelagicus*

Octopodidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Bathypolypus	*valdiviae* (Thiele)	V, P, P.F.	Thiele 1915 Robson 1924, 1932 Tomlin 1926 Massy 1927 Voss 1962	
Benthoctopus	*berryi* Robson	P	Robson 1924, 1932 Voss 1962	
Eledone	*moscata* (Lamarck)		Robson 1932	
	thysanophora Voss	U.C.T.	Voss 1962	Holotype in S.A.M.
Octopus	*aegina* Gray		Adam 1962	
	capensis Eydoux & Souleyet	Bonite	Eydoux & Souleyet 1852	
	fontanianus d'Orbigny	Crystal	Massy 1925 Robson 1929	
	horridus d'Orbigny	Krauss	Krauss 1848 Gibbons 1888 Smith 1903 Robson 1929 Voss 1962	
	schultzei (Hoyle)		Hoyle 1910 Tomlin 1926 Robson 1929	
	vulgaris Cuvier	Krauss, Ch, D.S.E., P, P.F., Carlgren, Toppin, U.C.T., Burnup, Bell Marley	Krauss 1848 Hoyle 1886 Smith 1903 Thiele 1915, 1920 Robson 1924, 1929 Massy 1925, 1927 Tomlin 1926 Thore 1945 Voss 1962	
Pareledone	*carlgreni* Thore	Carlgren	Thore 1945 Voss 1962	
	nigra (Hoyle)		Hoyle 1910 Tomlin 1926 Robson 1932 Voss 1962	
Velodona	*togata* var. *capensis* Robson	P	Robson 1924, 1932 Tomlin 1926 Voss 1962	

Synonymy

Bathypolypus	*grimpei* Robson 1924, Tomlin 1926, Voss 1962	= *B. valdiviae*
Eledone	*nigra* (Hoyle), Tomlin 1926	= *Pareledone nigra*
Joubinia	*fontaniana* (d'Orbigny), Robson 1929	= *Octopus fontanianus*
Moschites	*nigra* Hoyle 1910	= *Pareledone nigra*

Octopus	*argus* Krauss 1848	= *Octopus horridus*
	granulatus Lamarck, Hoyle 1886, Tomlin 1926, Voss 1962	= *O. vulgaris*
	rugosus (Bosc), Robson 1929, Thore 1945	= *O. vulgaris*
Polypus	*fontanianus* (d'Orbigny), Massy 1925	= *O. fontanianus*
	granulatus (Lamarck), Thiele 1915, 1920, Massy 1925, 1927	= *O. vulgaris*
	horridus (d'Orbigny), Smith 1903	= *O. horridus*
	rugosus (Bosc), Smith 1903, Robson 1924	= *O. vulgaris*
	schultzei Hoyle 1910	= *O. schultzei*
	valdiviae Thiele 1915	= *Bathypolypus valdiviae*
	vulgaris (Cuvier), Thiele 1920	= *Octopus vulgaris*

Tremoctopodidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Tremoctopus	*violaceus* Delle Chiaje	S.A.M.	Barnard 1934 Voss 1967	

Ocythoidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Ocythoe	*tuberculata* Rafinesque	S.A.M.	Voss 1967	

Argonautidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Argonauta	*argo* L.	Krauss, Turton, P.F.	Férussac & d'Orbigny 1835–48 Krauss 1848 Tryon 1879 Hoyle 1886 Gibbons 1888 Sowerby 1892 Bartsch 1915 Voss 1962	
	boettgeri Maltzan		Sowerby 1892 Voss 1962	
	hians Solander	P.F.	Bartsch 1915 Voss 1962	
	nodosa Solander	Krauss, P.F.	Krauss 1848 Smith 1903 Voss 1962	

Synonymy

Argonauta	*kochiana* Dunker, Bartsch 1915	= *A. hians*
Argonauta	*tuberculata* Shaw, Krauss 1848, Smith 1903	= *A. nodosa*

PULMONATA

Gadiniidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Gadinia	*costata* (Krauss)	Krauss, K.H.B., Turton	Krauss 1848 Sowerby 1892 Bartsch 1915	

Synonymy

Mouretia	*costata* Krauss 1848	= *Gadinia costata*

Siphonariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Siphonaria				
SUBGENUS				
Patellopsis	*anneae* Tomlin	Stephenson, Burnup	Tomlin 1944 Allanson 1958	
SUBGENUS				
Siphonaria	*aspera* Krauss	Krauss, Turton	Krauss 1848 Sowerby 1892 Bartsch 1915 Allanson 1958	
	var. *pallida* Allanson	U.C.T.	Allanson 1958	Syntypes in S.A.M.
	sub. sp. *patellopsis* *capensis* Quoy & Gaimard	Krauss, Turton, S.A.M.	Krauss 1848 Sowerby 1892 Bartsch 1915 Allanson 1958	
	carbo Hanley	U.C.T.	Hubendick 1946 Allanson 1958	
SUBGENUS				
Sacculosiphonaria	*compressa* Allanson	U.C.T.	Allanson 1958	Syntypes in S.A.M.
SUBGENUS				
Patellopsis	*deflexa* (Helbling)	Krauss, Turton, P.F., U.C.T.	Krauss 1848 Bartsch 1915 Hubendick 1947 Allanson 1958	
	oculus Krauss	Krauss, Turton, K.H.B.	Krauss 1848 Bartsch 1915 Allanson 1958	

Synonymy

Siphonaria	*adjacens* Hubendick 1946	= *S. deflexa*
	becki Turton 1932	= *S. oculus*
	concinna Sowerby 1820	= *S. deflexa*
	concinna var. *adjacens* Turton 1932	= *S. deflexa*
	kowiensis Turton 1932	= *S. capensis*
	natalensis Krauss 1848	= *S. aspera*
	nigerrima Smith 1903	= *S. carbo*
	tenuicostulata Smith 1903	= *S. anneae*
	variabilis Krauss 1848	= *S. deflexa*
	variabilis var. *albofasciata* Krauss 1848	= *S. deflexa*

LAMELLIBRANCHIATA

Nuculidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Nucula	*aequalitas* Barnard	P.F.	Barnard 1964	Holotype in S.A.M.
	irregularis Sowerby	P.F.	Sowerby 1904 Barnard 1964	Paratype in S.A.M.
	nucleus L.	P.F., U.C.T.	Thiele 1931 Barnard 1964	
	pulchra Hinds	P.F.	Sowerby 1904 Barnard 1964	Paratypes of *sculpturata* in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Nucula	*sultana* Thiele	K.H.B.	Thiele 1931 Barnard 1964	
(*Pronucula*)	*benguelana* Clarke	S.A.M.	Clarke 1961 Barnard 1963	

Synonymy

Nucula	*distincta* Turton 1932	= *N. nucleus*
	rugosa Odhner 1919	= *N. pulchra*
	sculpturata Sowerby 1904	= *N. pulchra*
	tumidula Thiele 1931, *non* Malm	= *N. nucleus*

Ledidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Leda	*belcheri* (Hinds)	Su, P.F.	Sowerby 1904 Barnard 1964	
	compta (Sowerby)	P.F.	Sowerby 1904 Barnard 1964	Paratype in S.A.M.
	gemmulata (Sowerby)	P.F.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	lamellata (Sowerby)	P.F.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	parceplicata Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	parsimonia Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.
	sinuata Thiele	P.F.	Thiele 1931 Barnard 1964	
	spreta Thiele	V, P.F.	Thiele 1931 Barnard 1964	
	vestita Locard	S.A.M.	Barnard 1963 Knudsen (in litt.)	Holotype of *macella* in S.A.M.
Sarepta	*natalensis* Barnard	P.F.	Barnard 1964	Holotype & Paratype in S.A.M.

Synonymy

Leda	*macella* Barnard 1963	= *L. vestita*
Nucula	*belcheri* Hinds 1843	= *L. belcheri*
Nuculana	*belcheri* Sowerby 1904	= *L. belcheri*
	compta Sowerby 1904	= *L. compta*
	gemmulata Sowerby 1904	= *L. gemmulata*
	lamellata Sowerby 1904	= *L. lamellata*

Malletiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Malletia	*estheriopsis* Barnard	S.A.M.	Barnard 1963	Syntypes in S.A.M.

Solenomyidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Solenomya	*occidentalis* Deshayes	P.F., U.C.T.	Barnard 1964	

Arcidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Arca	*afra* Gmelin	Turton, U.W., U.C.T.	Thiele 1931 Barnard 1964	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Arca	*africana* Sowerby	P.F.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	antiquata Gray var. *hankeyana* Reeve	Boshoff	Boshoff 1965	
	avellana Lamarck	Krauss	Krauss 1848 Barnard 1964	Also †
	bistrigata Dunker	K.H.B.	Braga 1952 Barnard 1964	
	cafria Bartsch	Turton, P.F.	Bartsch 1915 Barnard 1964	
	erythraeensis Jones	K.H.B., U.W.	Braga 1952 Barnard 1964	
	fusca Bruguière	Boshoff	Boshoff 1965	
	gibba Krauss	Boshoff	Krauss 1848 Barnard 1964 Boshoff 1965	
	granosa L.	Boshoff	Boshoff 1965	
	helblingii (Bruguière)	Krauss, K.H.B., P.F.	Krauss 1848 Barnard 1964	Also †
	holoserica Reeve	Boshoff	Boshoff 1965	
	natalensis Krauss	Krauss, P.F.	Krauss 1848 Barnard 1964	
	navicularis Bruguière	Braga, K.H.B.	Barnard 1964	
	obliquata Gray	Krauss, Turton, K.H.B.	Bartsch 1915 Barnard 1964	Also †
	orientalis Thiele	V, P.F.	Thiele 1931	
	plicata Dillwyn	Krauss, Burnup, Muir, P.F.	Barnard 1964	
	semitorta Lamarck	Braga, K.H.B.	Braga 1952 Barnard 1964	
	tortuosa L.	K.H.B.	Barnard 1964	
	uropigimelana Bory	K.H.B.	Barnard 1964	
Deltaodon	*tugelae* Barnard	P.F.	Barnard 1962	Syntypes in S.A.M.

Synonymy

Arca	*acuminata* Krauss 1848	= *A. avellana*
	agulhasensis Thiele 1931	= *A. plicata*
	alfredensis Bartsch 1915, Turton 1932, Day & Morgans 1956	= *A. olbiquata*
	domingensis Lamarck, Smith 1903, Turton 1932	= *A. plicata*
	gradata Broderip & Sowerby 1829, Turton 1932	= *A. plicata*
	imbricata Bruguière	= *A. avellana*
	imbricata var. *arabica* Nardini 1937	= *A. avellana*
	kraussi Krauss 1848	= *A. avellana*
	nivea Chemnitz, Krauss 1848 Turton 1932	= *A. helblingi*
	ovata Gmelin 1790	= *A. helblingi*
	scabra Sowerby 1892	= *A. avellana*
	squamosa Krauss 1848	= *A. plicata*
	velata Sowerby 1833 Von Martens 1880	= *A. helblingi*
Cardita	*rufanensis* Turton 1932	= *A. cafria*
Noetia	*cafria* Reinhart 1935	= *A. cafria*

Glycimeridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Glycimeris	*connollyi* Tomlin	S.A.M., P.F.	Tomlin 1923 Barnard 1964	Also †
	pectiniformis Lamarck	P.F.	Barnard 1964	
	pilosa (L.)		Bullen Newton 1913	†
	queketti (Sowerby)	S.A.M., P.F.	Sowerby 1897 Barnard 1964	

Synonymy

Glycimeris	*multistriata* Turton 1932	= *G. connollyi*
Pectunculus	*arabicus* Sowerby 1892	= *G. connollyi*
	castaneus Sowerby 1904	= *G. connollyi*
	inaequalis Krauss 1848, *non* Sowerby	= *G. connollyi*
	kraussi Thiele 1931	= *G. connollyi*
	pectiniformis (Lamarck), Bruguière 1797	= *G. pectiniformis*
	queketti Sowerby 1897, Braga 1952	= *G. queketti*

Limopsidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Hochstetterina	*velaini* (Smith)	Turton, V, P.F., U.C.T.	Smith 1904 Thiele 1931 Barnard 1964	
Limopsilla	*pumilio* (Smith)	Turton, V, P.F.	Smith 1904 Thiele 1931 Barnard 1964	
Limopsis	*anceps* Thiele	V, P.F.	Thiele 1931 Barnard 1964	
	chuni Thiele	V, P.F.	Thiele 1931 Barnard 1964	
	multistriata (Forskål)	U.W., U.C.T.	Barnard 1964	
	natalis Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	straminea Smith	S.A.M.	Smith 1885 Barnard 1964	
Philobrya	*africana* Bartsch	Turton, V, P.F.	Bartsch 1915 Barnard 1964	
	angulata (Sowerby)	S.A.M., V, P.F., U.C.T.	Sowerby 1892 Bartsch 1915 Barnard 1964	
	limoides (Smith)	Turton, V, P.F., U.C.T.	Smith 1904 Barnard 1964	
	paramoea (Bartsch)	Turton, V	Bartsch 1915 Barnard 1964	
	pileata Thiele	V, P.F.	Thiele 1931 Barnard 1964	
Pleurodon	*pretiosus* (Gould)	Stimpson, Ch, V, P.F.	Smith 1885 Barnard 1964	

Synonymy

Arca	*multistriata* (Forskål), Lamy 1912, Nardini 1937	= *Limopsis multistriata*
Hochstetteria	*alfredensis* Bartsch 1915	= *Philobrya angulata*
	decapitata Thiele 1931	= *Hochstetterina velaini*
	kowiensis Turton 1932	= *H. velaini*
	limoides Smith 1904	= *Philobrya limoides*

Hochstetteria	*paramoea* Bartsch 1915	= *P. paramoea*
	velaini Smith 1904	= *Hochstetterina velaini*
Limopsis	*agulhasensis* Thiele 1931	= *Limopsis chuni*
	lata Braga 1952, *non* Smith	= *L. multistriata*
	pretiosus Thiele 1931	= *Pleurodon pretiosus*
	pumilio Smith 1904	= *Limopsilla pumilio*
	sp. Turton 1932	= *Pleurodon pretiosus*
Neocardia	*angulata* Sowerby 1892	= *Philobrya angulata*
Nuculina	*ovalis* Smith 1885, *non* Wood	= *Pleurodon pretiosus*
	pretiosus Gould 1861	= *P. pretiosus*

Mytilidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Adipicola	*pelagica* Forbes M.S.	Woodward	Woodward 1854 H. & A. Adams 1857 Barnard 1964	
Aulacomya	*magellanica* (Chemnitz)	S.A.M.	Barnard 1964	
Brachidontes	*variabilis* (Krauss)	Krauss, Turton, Burnup, S.A.M.	Krauss 1848 Barnard 1964	
Choromytilus	*meridionalis* Krauss	Krauss, Turton, S.A.M.	Krauss 1848 Barnard 1964	Also †
Crenella	*striatissima* Sowerby 1904	P.F., V	Sowerby 1904 Bartsch 1915 Thiele 1931 Barnard 1964	Holotype & Paratype in S.A.M.
Gregariella	*simplicifilis* Barnard	S.A.M., U.C.T.	Barnard 1964	Syntypes in S.A.M.
Lamya	*capensis* (Krauss)	Krauss, U.C.T.	Krauss 1848 Soot-Ryen 1960 Barnard 1964	Also †
Lanistina	*cuneata* (Gould)	Stimpson, S.A.M., U.C.T.	Bartsch 1915 Barnard 1964	Also †
Lithophaga	*barnardi* Boshoff	Boshoff	Boshoff 1965	
	cylindrica (Krauss)	Krauss, U.C.T., K.H.B.	Barnard 1964	
	lithophagus (L.)		Barnard 1964	
	mucronata (Philippi)		Barnard 1964	
	nasuta (Philippi)	Boshoff	Boshoff 1965	
	obesa (Philippi)	Boshoff	Boshoff 1965	
Modiolus	*auriculatus* Krauss	Krauss, Bartsch, Turton	Krauss 1848 Barnard 1964	Also †
	philippinarum Hanley	K.H.B., U.W., Braga	Braga 1952 Barnard 1964	? Also †
	pseudocapensis Lamy	Boshoff	Boshoff 1965	
	sirahensis Jousseaume	P.F.	Lamy 1937 Barnard 1964	
Musculus	*difficilis*	K.H.B., Braga	Deshayes 1863 Bartsch 1915 Barnard 1964	
	virgiliae Barnard	S.A.M., U.C.T., Muir	Barnard 1964	Syntypes in S.A.M.
Perna	*perna* L.	Krauss, S.A.M.	Barnard 1964	Also †
Rhomboidella	*capensis* Thiele	V, P.F.	Thiele 1931 Turton 1932 Barnard 1964	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Septifer	*bilocularis* L.	S.A.M., U.C.T., U.W.	Barnard 1964	Also †
	bisculpturatum Barnard	P.F.	Barnard 1964	Holotype in S.A.M.

Synonymy

Adula	*pelagica* (Woodward), Tomlin 1926, Lamy 1937	= *Adipicola pelagica*
Aulacomya	*ater* Soot-Ryen 1955	= *Aulacomya megellanica*
Brachidontes	*capensis* Eyre & Stephenson 1938, *non* Krauss	= *Brachidontes variabilis*
	capensis Stephenson 1948, *non* Krauss	= *Gregariella simplicifilis*
Crenella	*alfredensis* Bartsch 1915	= *Crenella striatissima*
	minuta Thiele 1931	= *C. striatissima*
Modiola	*albanyana* Turton 1932	= *Gregariella simplicifilis*
	auriculatus Krauss 1848, Smith 1891, Odhner 1919, Turton 1932, Lamy 1936	= *Modiolus auriculatus*
	capensis Day, Millard & Broekhuysen 1954, *non* Krauss	= *Musculus virgiliae*
	capensis Krauss 1848, Schwarz 1910, Bartsch 1915	= *Lamya capensis*
	cylindrica Krauss 1848, Turton 1932	= *Lithophaga cylindrica*
	difficilis Deshayes, Dautzenberg 1929	= *Musculus difficilis*
	lignea Sowerby 1892, *non* Reeve	= *Modiolus philippinarum*
	mucronata Philippi, Krauss 1848	= *Lithophaga mucronata*
	petagnae Sowerby 1892, *non* Scacchi	= *Gregariella simplicifilis*
	petagnae var. *rietensis* Turton 1932	= *G. simplicifilis*
	philippinarum Hanley, Braga 1952	= *Modiolus philippinarum*
	rhomboidea Hanley, Sowerby 1904	= *M. sirahensis*
	rhomboidea Reeve, *non* Hanley, Tomlin 1923	= *M. sirahensis*
	tenerrima Smith 1904, Bartsch 1915	= *Lamya capensis*
Modiolaria	*africana* Bartsch 1915, Braga 1952	= *Musculus difficilis*
	cuneata Gould 1861, Smith 1885	= *Lanistina cuneata*
	difficilis (Deshayes), Lamy 1937	= *Musculus difficilis*
	discors Sowerby 1892, *non* L.	= *Lanistina cuneata*
	marmorata Sowerby 1892, *non* Forbes	= *L. cuneata*
	pelagica Forbes MS., Woodward 1854	= *Adipicola pelagica*
Musculus	*cuneatus* (Gould), Prashad 1932	= *Lanistina cuneata*
Myrina	*denhami* (Woodward), A. & H. Adams 1854	= *Adipicola pelagica*
	pelagica (Woodward), Tomlin 1926, Lamy 1937	= *A. pelagica*
Mytilus	*capensis* Dunker 1846, Lamy 1936	= *Aulacomya magellanica*
	chorus f. *meridionalis* Lamy 1936	= *Choromytilus meridionalis*
	crenatus Lamarck, Krauss 1848	= *Aulacomya megellanica*
	edulis Krige 1933, *non* L.	= *Choromytilus meridionalis*
	magellanicus Chemnitz, Lamy 1936	= *Aulacomya magellanica*
	meridionalis Krauss 1848, Swart 1926, Lamy 1931	= *Choromytilus meridionalis*
	perna (L.), Krauss 1848, Lamy 1931, Braga 1952	= *Perna perna*
	thalia Turton 1932	= *Rhomboidella capensis*
	variabilis Krauss 1848, Turton 1932	= *Brachidontes variabilis*
	variabilis var. *semistriata* Krauss 1848	= *B. variabilis* var. *semistriata*
Septifer	*kraussi* (Kiener), Turton 1932	= *Septifer bilocularis*
	nicobaricus Sowerby 1897	= *S. bilocularis*
Tapes (sic)	*auriculata* (Krauss), Schwarz 1910	= *Modiolus auriculatus*

Tichogonia	*kraussi* (Kiener), Krauss 1848	= *Septifer bilocularis*
Volsella	*capensis* (Krauss), Day & Morgans 1956	= *Lamya capensis*

Isognomonotidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Isognomon	*perna* (L.)	Burnup, Falcon, Koch	Koch 1953 Barnard 1964	
Malleus	*anatinus* Gmelin	U.C.T.	Barnard 1964	
	regula (Forskål)	Turton, P.F.	Barnard 1964	
Parviperna	*dentifera* (Krauss)	Krauss, K.H.B., U.C.T.	Krauss 1848 Barnard 1964	
Vulsella	*minor* Röding	U.C.T., P.F.	Barnard 1964	

Synonymy

Isognomon (*Melina*)	*costellata* Dall, Bartsch Rehder 1938	= *Isognomon perna*
	dentifera (Krauss), Day & Morgans 1956	= *Parviperna dentifera*
	roberti Koch 1953	= *Isognomon perna*
Malleus	*decurtata* Lamarck, Prashad 1932	= *Malleus regula*
	tigrinus Reeve, Sowerby 1897	= *M. regula*
Melina	*costellata* Tomlin 1931	= *Isognomon perna*
	perna (L.), Smith 1910	= *I. perna*
Ostrea	*anatina* Gmelin 1790	= *Malleus anatina*
	regula Forskål 1775	= *M. regula*
Perna	*costellata* Conrad 1837	= *Isognomon perna*
	dentifera Krauss 1848, Braga 1952	= *Parviperna dentifera*
	sulcata Deshayes 1850	= *Isognomon perna*
Pinna	*aenigmatica* Turton 1932	= *Malleus regula*
	saccata Turton 1932, *non* Reeve	= *M. regula*
	saccata var. *similis* Turton 1932	= *M. regula*
Vulsella	*attenuata* Reeve, Smith 1911, Tomlin 1923	= *Vulsella minor*
	nuttalli Conrad 1837	= *Malleus regula*
	vulsella Smith 1910, *non* L.	= *Vulsella minor*

Pteriidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Electroma	*vexillum* Reeve	U.W.	Barnard 1964	
Pinctada	*anomioides* Reeve	K.H.B.	Barnard 1964	
	capensis (Sowerby)	Krauss, S.A.M., P.F., U.C.T.	Sowerby 1889, 1892 Barnard 1964	
	var. *natalensis* Jameson	U.C.T., K.H.B.	Jameson 1901 Barnard 1964	
Pteria	*chinensis* (Leach)	Burnup, U.W.	Barnard 1964	
	zebra (Reeve)	K.H.B., U.C.T., U.W.	Barnard 1964	

Synonymy

Avicula	*chinensis* Leach 1814	= *Pteria chinensis*
	crocea Lamarck 1819, Chenu 1892	= *P. chinensis*
	margaritifera L., Krauss 1848	= *Pinctada capensis*
	meleagrina capensis Sowerby 1889, 1892	= *P. capensis*
	vexillum Reeve, Herdman 1906	= *Electroma vexillum*
	zebra Reeve, Sowerby 1897	= *Pteria zebra*
Electroma	*zebra* (Reeve), Iredale 1939	= *P. zebra*
Margaritifera	*natalensis* Jameson 1901	= *Pinctada capensis* var. *natalensis*
Pteria	*capensis* (Sowerby), Paes da Franca 1960	= *P. capensis*
	margaritifera Odhner 1923, *non* L.	= *P. capensis*

Pinnidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Atrina	*squamifera* (Sowerby)	Krauss, S.A.M., P.F., U.W., U.C.T.	Krauss 1848 Barnard 1964 Rosewater 1961	Also †
	vexillum (Born)	U.W.	Barnard 1964 Rosewater 1961	
Pinna	*bicolor* Gmelin	U.W.	Rosewater 1961 Barnard 1964	
	muricata L.	S.A.M., U.C.T., U.W.	Smith 1906 Rosewater 1961 Barnard 1964	
Streptopinna	*saccata* (L.)	S.A.M.	Rosewater 1961 Barnard 1964	

Synonymy

Atrina	*alfredensis* Bartsch	= *A. squamifera*
	nuttallii (Conrad), Dall, Bartsch & Rehder 1938	= *Streptopinna saccata*
Avicula (sic)	*aequilatera* (Von Martens), Day & Morgans 1956	= *Pinna muricata*
Pinna	*aequilatera* Von Martens 1880	= *P. muricata*
	afra Sowerby 1835	= *Atrina squamifera*
	dolobrata Lamarck, Hedley 1924	= *Pinna bicolor*
	kraussi Hanley 1858	= *Atrina squamifera*
?	*natalensis* Smith 1906	= *Pinna bicolor*
	nigra Dillwyn 1817	= *Atrina vexillum*
	nigrina Lamarck	= *A. vexillum*
	nuttallii Conrad 1837	= *Streptopinna saccata*
	pernula Sowerby 1892, *non* Chemnitz	= *Atrina squamifera*
	rufanensis Turton 1932	= *A. squamifera*
	saccata L., Sowerby 1897	= *Streptopinna saccata*
(*Streptopinna*)	*saccata* L., Von Martens 1880, Prashad 1932	= *S. sacata*
	segmenta Turton 1932	= *Atrina squamifera*
	semicostata Conrad, Dall, Bartsch & Rehder 1938	= *Pinna muricata*
	squamifera Paes da Franca 1960, *non* Sowerby	= *P. muricata*
	squamifera Sowerby 1835, 1904, Krauss 1848, Smith 1903	= *Atrina squamifera*
	vexillum Born, Sowerby 1897, Winckworth 1929	= *A. vexillum*
	whitechurchi Turton 1932	= *A. squamifera*

Pectinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Amussium	*texturatum* Dautzenberg & Bavay	P.F.	Barnard 1964	
Chlamys	*bullatus* Dautzenberg & Bavay	P.F.	Barnard 1964	
	eucosmia (Turton)	Boshoff	Boshoff 1965	
	fultoni Sowerby	P.F.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chlamys	*gilchristi* Sowerby	P.F., A	Sowerby 1904 Barnard 1964	Holotype in S.A.M.
	natalensis Smith	Turton	Smith 1906 Barnard 1964	
	senatorius (Gmelin)	U.W.		
	tinctus (Reeve)	S.A.M., Krauss, P.F.	Smith 1885 Sowerby 1904 Barnard 1964	Also † Paratype of *humilis* in S.A.M.
Cyclopecten	*incubans* Barnard	P.F., U.C.T.	Barnard 1964	Syntypes in S.A.M.
	vidalensis Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
Palliolum	*vitreum* (Chemnitz)	P.F., A	Sars 1878 Barnard 1964	
Pecten	*erythraeensis* Sowerby	P.F., A	Barnard 1962, 1964	Also †
	noduliferus Sowerby	Boshoff	Boshoff 1965	
	sulcicostatus Sowerby	P.F., U.C.T.	Sowerby 1892	Also †
	sulcicostatus var. *casa* Van Bruggen		Barnard 1964 Van Bruggen 1961 Barnard 1964	

Synonymy

Chlamys	*humilis* Sowerby 1904, Thiele 1931	*C. tinctus*
(*Palliolum*)	*vitrea* (Chemnitz, Schröter), Dautzenberg & Fischer 1912	= *Palliolum vitreum*
Ostrea	*senatorius* Gmelin 1790	= *Chlamys senatorius*
Pecten	*alcocki* Smith 1904, 1907	= *Palliolum vitreum*
(*Pseudamussium*)	*alcocki* Smith, Thiele 1931	= *P. vitreum*
	bullatus Dautzenberg & Bavay 1912	= *Chlamys bullatus*
	capensis Gray MS., Sowerby 1892	= *Pecten sulcicostatus*
	crassicostatus Sowerby 1842	= *Chlamys senatorius*
	fumatus Barnard 1962, *non* Reeve	= *Pecten erythraensis*
	limatula var. Smith 1885	= *Chlamys tinctus*
	natalensis (Smith), Bartsch 1915, Turton 1932	= *C. natalensis*
	pusio Krauss 1848, *non* Pennant	= *C. tinctus*
	senatorius (Gmelin), Sowerby 1842	= *C. senatorius*
	senatorius Dautzenberg & Bavay 1912	= *C. senatorius*
	squamosus Sowerby 1897, *non* Gmelin	= *C. natalensis*
	vitreus (Chemnitz, Schröter), Sars 1878	= *Palliolum vitreum*
(*Cyclopecten*)	*vitreus* (Chemnitz, Schröter), Dautzenberg & Bavay 1912	= *P. vitreum*

Spondylidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Plicatula	*plicata* (L.)	P.F.	Barnard 1964	
	squamosissima Smith	Burnup, Turton	Smith 1899 Barnard 1964	
Spondylus	*hystrix* (Röding)	U.C.T., S.A.M.	Barnard 1964	
	regius L.	Boshoff	Boshoff 1965	

Synonymy

Chama	*nicobaricus* (Sowerby), Turton 1932	= *Spondylus hystrix*
? *Plicatula*	*australis* Krauss 1848, *non* Lamarck	= *Plicatula plicata*

? *Plicatula*	*imbricata* Menke, Sowerby 1847	= *P. plicata*
	ramosa Lamarck, Sowerby 1847	= *P. plicata*
Spondylus	*ciliatus* Sowerby 1847	= *Spondylus hystrix*
	nicobaricus (Sowerby), Turton 1932	= *S. hystrix*

Limidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lima	*abscisa* Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	divaricata Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	fragilis (Chemnitz)	S.A.M., P.F., A, U.W.	Thiele 1918–20 Barnard 1964	Also †
	lima (L.)	S.A.M., U.C.T.	Thiele 1918–20 Barnard 1964	Also †
	perfecta Smith	Turton, P.F.	Smith 1904 Barnard 1964	
	rotundata Sowerby	S.A.M., P.F., U.C.T.	Bartsch 1915 Barnard 1964	Also †
	symmetrica Barnard	P.F.	Barnard 1964	Holotype in S.A.M.
(*Limatula*)	*agulhasensis* Thiele	V, P.F.	Thiele 1920 Barnard 1964	

Synonymy

Lima	*africana* Bartsch 1915, Turton 1932	= *L. rotundata*
	angulata Thiele 1931, *non* Sowerby	= *L. rotundata*
	arcuata Turton 1932, *non* Sowerby	= *L. fragilis*
	hians var. *tenera* Turton (non *tenera* Chemnitz), Sowerby 1897	= *L. rotundata*
	multicostata Sowerby 1892	= *L. lima*
	rufanensis Turton 1932	= *L. rotundata*
	squamosa Lamarck, Sowerby 1843	= *L. lima*
	subventricosa Turton 1932	= *L. rotundata*
(*Limatula*)	*densecostata* Thiele 1920	= *L.* (*Limatula*) *agulhasensis*
(*Limatula*)	*exigua* Thiele 1920	= *L.* (*Limatula*) *agulhasensis*

Anomiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Anomia	*ephippium* L.	S.A.M.	Barnard 1964	Also †
Monia	*squama* (Gmelin)	S.A.M.	Barnard 1964	

Ostreidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Crassostrea	*margaritacea* (Lamarck)	S.A.M., U.C.T., U.W.	Korringa 1956 Barnard 1964	
	cucullata (Born)	U.C.T., U.W.	Barnard 1964	
Ostrea	*algoensis* Sowerby	S.A.M., U.C.T.	Korringa 1956 Barnard 1964	
	atherstonei Newton	S.A.M., U.C.T.	Newton 1913 Korringa 1956 Barnard 1964	Also †
	cristagalli (L.)	Boshoff	Boshoff 1965	
	rosacea Deshayes	Boshoff	Boshoff 1965	
Pycnodonta	*hyotis* (L.)	P.F., U.W.	Barnard 1964	

Synonymy

Gryphea	*margaritacea* (Lamarck), Ranson 1949	= *Crassostrea margaritacea*
Ostrea	*cochlear* Odhner 1923 (part), *non* Poli	= *C. margaritacea*
	cucullata Born 1778, Braga 1952	= *C. cucullata*
	hyotis L., Nicklès 1950	= *Pycnodonta hyotis*
	iridescens Gray, Haughton 1929	= *Crassostrea margaritacea*
	margaritacea Lamarck 1819	= *C. margaritacea*
	margaritacea Ranson 1913, *non* Lamarck	= *Ostrea atherstonei*
	prismatica Gray, Haughton 1929	= *Crassostrea margaritacea*
	procellosa Valenciennes, Lamy 1929	= *C. margaritacea*
	redhousiensis Newton 1913	= *Ostrea atherstonei*
	stentina Ranson 1951	= *O. algoensis*
	tuberculata Krauss 1848, *non* Lamarck	= *Crassostrea margaritacea*

Astartidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Astarte	*africana* Bartsch	Turton, V	Bartsch 1915	
	agulhasensis Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	
	lunulata Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
Cuna	*bartschi* Barnard	Turton, V, P.F.	Bartsch 1915 Barnard 1964	

Synonymy

Cuna	*concentrica* Hedley, Jaeckel & Thiele 1931	= *C. bartschi*
	concentrica Bartsch 1915, *non* Hedley 1902	= *C. bartschi*
Digitaria	*africana* Jaeckel & Thiele 1931	= *Astarte africana*

Crassatellidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Crassatella	*abrupta* Sowerby	P.F., U.C.T.	Sowerby 1904 Barnard 1964	
	capensis Lamy	P.F.	Sowerby 1904 Odhner 1923 Barnard 1964	
	crebrilirata Sowerby	P.F.	Sowerby 1904 Barnard 1964	
	gilchristi Sowerby	P.F.	Sowerby 1904 Barnard 1964	Topotypes in S.A.M.
	natalensis Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	pilula Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	sowerbyi Lamy	Turton, P.F.	Sowerby 1892 Barnard 1964	
	tenuis Sowerby	P.F., V, A	Sowerby 1904 Barnard 1964	

Synonymy

Crassatella	*acuminata* Sowerby 1889, *non* Kobelt	= *C. sowerbyi*
	africana Sowerby 1904, *non* Marrat	= *C. capensis*
	angulata Sowerby 1904	= *C. crebrilirata*
	odhneri Tomlin 1930	= *C. capensis*
Crassatellites	*sowerbyi* (Lamy), Tomlin 1931	= *C. sowerbyi*
Eucrassatella	*tenuis* (Sowerby), Jaeckel & Thiele 1931	= *C. tenuis*

Carditidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cardita	*pulcherrima* Sowerby	P.F.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	variegata Bruguière	Krauss, U.C.T., U.W., P.F.	Krauss 1848 Barnard 1964	Also †
Thecalia	*concamerata* (Bruguière)	Krauss, S.A.M., P.F., Turton, V	Krauss 1848 Barnard 1964	
Venericardia	*elata* (Sowerby)	Turton, S.A.M.	Sowerby 1892 Barnard 1964	
	fortisculpta Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	minima (Smith)	Turton, V	Smith 1904 Jaeckel & Thiele 1931 Barnard 1964	
	nuculoides Barnard	S.A.M., U.C.T.	Barnard 1964	Syntypes in S.A.M.

Synonymy

Cardita	*africana* (Bartsch), Turton 1932	= *Venericardia elata*
	concamerata Bruguière, Krauss 1848, Turton 1932	= *Thecalia concamerata*
	elata Sowerby 1892	= *Venericardia elata*
	formosa Turton 1932	= *V. minima*
	minima Smith 1904	= *V. minima*
	minima var. *uniradiata* Turton 1932	= *V. minima*
	rietensis Turton 1932	= *Thecalia concamerata*
Miodontiscus	*minima* (Smith) Bartsch 1915	= *Venericardia minima*
Venericardia (*Miodontiscus*)	*africana* Bartsch 1915	= *V. elata*
	agulhasensis Jaeckel & Thiele 1931	= *V. minima*

Condylocardiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Carditella	*capensis* Smith	Ch, V, P.F., U.C.T.	Smith 1885 Barnard 1964	
	laticosta Smith	Turton, V, P.F.	Smith 1904 Barnard 1964	
	rugosa Sowerby	Turton, V, P.F.	Sowerby 1892 Turton 1932 Barnard 1964	
	similis Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	
	subradiata Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	
	valdiviae Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	

Synonymy

Cardita	*laticostata* (sic) Bartsch 1915, Turton 1932	= *Carditella laticosta*

Ungulinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Diplodonta	*agulhasensis* Jaeckel & Thiele	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Diplodonta	cf. *sansibarica* Jaeckel & Thiele	P.F., U.C.T.	Jaeckel & Thiele 1931 Barnard 1964	Also †
	cf. *senegalensis* Reeve	S.A.M.	Smith in Rogers 1906 Barnard 1964	†
	subradiata (Sowerby)	Turton, S.A.M.	Sowerby 1892 Turton 1932 Barnard 1964	
Thyasira	*investigatoris* (Smith)	P.F., S.A.M.	Smith 1895, 1897 Barnard 1964	
	polygonia (Gould)	Gould, V, P.F., A, U.C.T.	Gould 1861 Barnard 1964	
	unilateralis Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.

Synonymy

Cryptodon	*investigatoris* Smith 1895, Sowerby 1904	= *Thyasira investigatoris*
	polygonius Gould 1861	= *T. polygonius*
Diplodonta	*diaphana* Gmelin, Nicklès 1950	= *Diplodonta* cf. *senegalensis*
	rotundata Montagu, Smith 1903	= *D. sansibarica*
Felania	*subradiata* Sowerby 1892, Turton 1932	= *D. subradiata*
	whitechurchi Turton 1932	= *D. subradiata*
Tellina	*crassa* (*non* Pennant), Turton 1932	= *D. subradiata*

Lucinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Codakia	*punctata* (L.)	U.W.	Prashad 1932 Barnard 1964	
	tigerina (L.)	Krauss, U.W.	Prashad 1932 Barnard 1964	
Divaricella	*dalliana* Vanatta	S.A.M.	Vanatta 1901 Barnard 1964	
	liratula Sowerby	Turton, S.A.M.	Sowerby 1889, 1892	Also †
Loripes	*clausus* (Philippi)	Krauss, S.A.M., Turton, U.W.	Braga 1952 Barnard 1964	Also †
	philippinarum (Hanley)	P.F.	Barnard 1964	
	rosacea Smith	P.F.	Smith 1889 Barnard 1964	
Lucina	*edentula* (L.)	Krauss, S.A.M., U.C.T.	Sowerby 1892 Lynge 1909 Tomlin 1921 Barnard 1964	Also †
Phacoides	*aequalis* Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	
	capensis Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	
	peritaphros Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	rosea (Angas)	S.A.M., U.C.T.	Angas 1878 Barnard 1964	
	saldanhae Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Phacoides	*semperiana* (Issel)	U.W., U.C.T.	Issel 1869 Barnard 1964	
	sepes Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	sudis Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	valida (Smith)	Turton, S.A.M.	Smith 1904 Barnard 1964	

Synonymy

Axinus	*globosus* Sowerby 1889, *non* Forskål	= *Lucina edentula*
Codakia	*exasperata* (Sowerby), MacNae & Kalk 1958	= *Codakia tigerina*
Cryptodon	*eutornus* Tomlin 1921, MacNae & Kalk 1958	= *Lucina eduntula*
	globosus Schwarz 1900, *non* Forskål	= *L. edentula*
Loripes	*edentula* (L.), Chenu 1862	= *L. edentula*
	flexuosus Johnson 1904, *non* Montagu	= *Loripes clausus*
	globosus Sowerby 1889, *non* Forskål	= *Lucina edentula*
	lactea Sowerby 1889, *non* Lamarck	= *Loripes clausus*
	lacteus Sowerby 1892, *non* L.	= *L. clausus*
	leucoma Krige 1933, *non* Turton	= *L. clausus*
	rosea (Angas), Van Bruggen 1952	= *Phacoides rosea*
Lucina	*columbella* Sowerby 1892, *non* Lamarck	= *P. rosea*
	contempta Cossmann 1921, Tomlin 1931	= *P. rosea*
	contempta Turton 1932, *non* Cossmann	= *Divaricella liratula*
	dalliana Vanatta 1901, Smith 1903	= *D. dalliana*
	despecta Smith 1904	= *Phacoides rosea*
	eutornus (Tomlin), Turton 1932	= *Lucina edentula*
	exasperata Sowerby 1897	= *Codakia tigerina*
	fragilis Krauss 1848, *non* Philippi	= *Lucina edentula*
	globosus Bartsch 1915, Braga 1952, *non* Forskål	= *Lucina edentula*
	jacksoniensis Braga 1952, *non* Smith	= *Loripes clausus*
	lactea Krauss 1848, *non* Lamarck	= *L. clausus*
	liratula Turton 1932, *non* Sowerby	= *Phacoides rosea*
	liratula Sowerby 1889, 1892	= *Divaricella liratula*
	liratula (Sowerby), Smith in Rogers 1906	= *D. liratula*
	punctata (L.), Tomlin 1931	= *Codakia punctata*
	quadrisulcata Sowerby 1892, *non* d'Orbigny	= *Divaricella dalliana*
	rosacea (Smith), Cox 1939	= *Loripes rosacea*
	rosea Angas 1878	= *Phacoides rosea*
	tigerina (L.), Krauss 1848	= *Codakia tigerina*
	valida Smith 1904	= *Phacoides rosea*
Phacoides	*despecta* (Smith), Bartsch 1915	= *P. rosea*

Erycinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Erycina	*subradiata* (Gould)	Stimpson, V, P.F.	Gould 1861 Bartsch 1915 Jaeckel & Thiele 1931 Barnard 1964	
Kellya	*rubra* (Montagu)	Turton, S.A.M., U.C.T.	Bartsch 1915 Barnard 1964	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lepton	*fortidentatum* Smith	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	
	puncticulatum Jaeckel	V, P.F.	Jaeckel & Thiele 1931 Barnard 1964	? adult of *mactroides*
Pythina	*mactroides* Hanley	S.A.M., Turton, P.F.	Sowerby 1892 Nicklès 1950 Barnard 1964	
	paula A. Adams	U.C.T.	Smith 1885 Barnard 1964	
Solecardia	sp.	S.A.M., U.C.T.	Barnard 1964	
Tellimya	*rotunda* (Deshayes)	Turton, P.F., S.A.M.	Smith 1885 Bartsch 1915 Barnard 1964	
	biradialis Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	trigona Barnard	U.C.T.	Barnard 1964	Syntypes in S.A.M.

Synonymy

Bornia	*fortidentata* (Smith), Bartsch 1915	= *Lepton fortidentata*
	rotundata (sic) Bartsch 1915	= *Tellimya rotundata*
	seminulum Philippi, Krauss 1848	= *Kellya rubra*
Cryptodon	*subradiatus* Gould 1861	= *Erycina subradiata*
Erycina	*alfredensis* Bartsch 1915, Jaeckel & Thiele 1931	= *E. subradiata*
	rifaca Bartsch 1915	= *E. subradiata*
	rotunda Deshayes 1856	= *Tellimya rotunda*
	rugosa Jaeckel & Thiele 1931	= *Erycina subradiata*
? *Kellia*	*mactroides* (Hanley), Sowerby 1892	= *Pythina mactroides*
	rotunda (Deshayes), Smith 1885, Sowerby 1892	= *Tellimya rotunda*
Kellya	*adansoni* Nicklès 1950	= *Kellya rubra*
Lasaea	*australis* Souverbie, Sowerby 1892	= *K. rubra*
	rubra Montagu, Smith 1903	= *K. rubra*
	turtoni Bartsch 1915, Tomlin 1931	= *K. rubra*
Montacuta (*Mysella*)	*paula* (A. Adams), Prashad 1952	= *Pythina paula*
(*Tellimya*)	*paula* (A. Adams), Lynge 1909	= *P. paula*
Pythina	*peculiaris* A. Adams 1856	= *P. paula*
Tellimya	*paula* var. *peculiaris* A. Adams, Smith 1903	= *P. paula*

Montacutidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Montacuta	*ornata* Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	siliqua Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
Mysella	*convexa* (Gould)	Turton, U.C.T., S.A.M.	Gould 1861 Barnard 1964	
Rochefortia	*agulhasensis* Jaeckel	V, P.F.	Jaeckel & Thiele 1931	

Synonymy

Montacuta	*capensis* Sowerby 1889	= *Mysella convexa*
Rochefortia	*convexa* (Gould), Bartsch 1915	= *M. convexa*

Chamidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chama	*gryphoides* L.	Krauss, S.A.M., V, P.F.	Krauss 1848 Jaeckel & Thiele 1931 Barnard 1964	
	ratoi Boshoff	Boshoff	Boshoff 1965	

Cardidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cardium	*asiaticum* Bruguière	Krauss, U.W.	Sowerby 1897 Braga 1952 Barnard 1964	
	assimile Reeve	Boshoff	Boshoff 1965	
	flavum L.	S.A.M., U.W.	Prashad 1932 Braga 1952 Barnard 1964	
	gilchristi Sowerby	P.F.	Sowerby 1904 Barnard 1964	
	rubicundum Reeve	Boshoff	Boshoff 1965	
	turtoni Sowerby	S.A.M., P.F.	Sowerby 1894, 1897 Barnard 1964	Also †
Fragum	*fragum* (L.)	P.F.	Prashad 1932 Barnard 1964	
Laevicardium	*biradiacum* (Bruguière)	Boshoff	Boshoff 1965	
	lyratum (Sowerby)	U.W.	Barnard 1964	
Lunulicardia	*retusa* (L.)	S.A.M.	Barnard 1964	
Papyridea	*papyracea* (Bruguière)	Krauss, S.A.M., P.F. U.C.T.	Krauss 1848 Turton 1932 Braga 1952 Barnard 1964	Also †

Synonymy

Cardium	*burnupi* Sowerby 1897, MacNae & Kalk 1958	= *C. asiaticum*
	fasciatum Sowerby 1892, Johnson 1904, *non* Montagu	= *C. turtoni*
	fragum L., Von Martens 1880	= *Fragum fragum*
	lima Gmelin, Sowerby 1892	= *Cardium asiaticum*
	lyratum Sowerby 1841, Nardini 1937	= *Laevicardium lyratum*
	natalense Krauss 1848	= *Papyridea papyracea*
	papillosum Jaeckel 1931, *non* Poli	= *Cardium turtoni*
	papyraceum Krauss 1848	= *Papyridea papyracea*
	pectiniforme Dautzenberg 1929	= *Cardium flava*
	rugosum Lamarck 1819, Sowerby 1897, Braga 1952	= *C. flava*
	tenuicostatum Sowerby 1897, *non* Lamarck	= *Papyridea papyracea*
Discors	*lyratum* (Sowerby), Kira 1955	= *Laevicardium lyratum*

Veneridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chione	*costellifera* (A. Adams & Reeve)	P.F.	Adams & Reeve 1848 Barnard 1964	Also †

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Chione	*mindanensis* (Smith)	P.F.	Smith 1885 Barnard 1964	
Circe	*jucunda* Smith	P.F.	Smith 1885 Barnard 1964	
	scripta (L.)	Braga, U.W.	Braga 1952 Barnard 1964	
Comus	*platyaulax* (Tomlin)	S.A.M., P.F.	Sowerby 1897 Cox 1930 Barnard 1964	Holotype in Durban Museum
Dosinia	*africana* (Gray)	V, P.F.	Dollfus 1911 Barnard 1964	Also †
	hepatica (Lamarck)	Krauss, S.A.M., U.C.T., U.W.	Braga 1952 Barnard 1964	Also †
	pubescens (Philippi)	P.F.	Paes da Franca 1960 Barnard 1964	
Gafrarium	*divaricatum* (Gmelin)	S.A.M., U.W.	Prashad 1932 Braga 1952 Paes da Franca 1960 Barnard 1964	
	pectinatum (L.)	Krauss, Turton, S.A.M., P.F.	Prashad 1932 Barnard 1964	
Pitaria	*florida* (Lamarck)	S.A.M.	Tomlin 1923 Barnard 1964	
	floridella (Gray)	Boshoff	Boshoff 1965	
	hebraea (Lamarck)	Krauss, S.A.M., U.C.T., U.W., P.F.	Krauss 1848 Barnard 1964	Also †
	kochii (Philippi)	Turton, S.A.M., U.C.T., U.W.	Bartsch 1915 Braga 1952 Barnard 1964	Also †
	manillae Sowerby	S.A.M., P.F.	Braga 1952 Barnard 1964	
Sunetta	*contempta* Smith	S.A.M., V, P.F.	Sowerby 1892 Barnard 1964	Also †
Tapes	*corrugata* (Gmelin)	S.A.M., U.C.T.	Barnard 1964	Also †
	deshayesii Hanley	S.A.M.	Barnard 1964	†
	malabarica (Chemnitz)	Boshoff	Boshoff 1965	
	sulcaria Lamarck	Boshoff	Boshoff 1965	
Tivela	*compressa* (Sowerby)	S.A.M., P.F., U.C.T.	Smith 1914 Barnard 1964	Also †
	natalensis Dunker	S.A.M.	Sowerby 1897 Barnard 1964	Also †
	polita (Sowerby)	S.A.M.	Sowerby 1851 Barnard 1964	Also †
	transversa (Sowerby)	V, P.F.	Sowerby 1897 Barnard 1964	Also †
Venerupis	*macrophylla* Deshayes	S.A.M.	Deshayes 1855 Barnard 1964	
Venus	*arakana* (Nevill)	P.F., U.C.T.	Vanatta 1901 Barnard 1964	Also †
	declivis Sowerby	Boshoff	Boshoff 1965	
	lamellaris (Schumacher)	Boshoff	Boshoff 1965	
	marica L.	Boshoff	Boshoff 1965	
	meretrix L.	Boshoff	Boshoff 1965	

Synonymy

Anaitis	*foliacea* (Philippi), Braga 1952	= *Venus tiara*
Anomalocardia	*alfredensis* Bartsch 1915, Turton 1932	= *Pitaria kochii*
Antigona	*lamellaris* (Schumacher), Prashad 1932	= *Venus lamellaris*
	reticulata (L.), Tomlin 1931, Prashad 1932	= *V. reticulata*
Arthemis	*africana* Gray 1838	= *Dosinia africana*
Artemis	*pubescens* (Philippi), Sowerby 1852	= *D. pubescens*
Caryatis	*hebraea hebraea* (Lamarck), Jaeckel 1931	= *Pitaria hebraea*
Chamelea	*schwarzi* Newton, Barnard 1962	= *P. manillae*
Chione	*ambigua* Deshayes 1853	= *P. kochii*
	curiosa Turton 1932	= *Venus arakana*
	kochii Deshayes 1853	= *Pitaria kochii*
	kraussi Deshayes 1853, Schwarz 1900	= *P. hebraea*
	tiara (Dillwyn), Prashad 1932	= *Venus tiara*
Circe	*alfredensis* Bartsch 1915	= *Gafrarium pectinatum*
	(*Christa*) *divaricata* (Gmelin), Adam & Leloup 1939	= *G. divaricatum*
	pectinata L., Smith 1904, MacNae & Kalk 1958	= *G. pectinatum*
	savignyi Lamy 1931	= *G. pectinatum*
Crista	*pectinata* Braga 1952, *non* L.	= *G. divaricatum*
Cryptogramma	*alfredensis* (Bartsch), Braga 1952	= *Pitaria kochii*
	arakana Nevill 1871	= *Venus arakana*
Cytheraea	*compressa* Sowerby 1851	= *Tivela compressa*
	dolabella Sowerby 1851	= *T. polita*
	erycinella Sowerby 1851	= *Pitaria florida*
	manillae Sowerby 1851, 1897	= *P. manillae*
	polita Sowerby 1851	= *Tivela polita*
	pulchra (Wood), Sowerby 1851	= *Pitaria florida*
	semisulcata Sowerby 1851	= *P. florida*
Cytherea	*alucinans* Sowerby 1897	= *Tivela natalensis*
	florida Lamarck 1818	= *Pitaria florida*
	hepatica var. *subquadrata* Krauss 1848	= *Dosinia hepatica*
	hepatica Lamarck, Krauss 1848	= *D. hepatica*
	pubescens Philippi 1847	= *D. pubescens*
	transversa Sowerby 1897	= *Tivela transversa*
Cytheria	*hebraea* Lamarck, Smith 1855, Sowerby 1892	= *Pitaria hebraea*
Dione	*manillae* (Sowerby), Deshayes 1853	= *P. manillae*
Dosinia	*becki* Turton 1932	= *Dosinia hepatica*
	consobrina Deshayes 1853, Lamy 1931	= *D. africana*
	cretacea Sowerby 1899, *non* Reeve	= *D. africana*
	japonica Paes da Franca 1960, *non* Reeve	= *D. pubescens*
	lincta Sowerby 1892, *non* Pult	= *D. africana*
	lupinus L., var. *afra* Gmelin, Nicklès 1950	= *D. africana*
	pubescens Gevers 1932, *non* Philippi	= *D. africana*
Gafrarium	*aduncum* Paes da Franca 1960	= *Gafrarium pectinatum*
	discors Paes da Franca 1960	= *G. divaricatum*
	dispar Prashad 1932	= *G. divaricatum*
	scripta (L.), Paes da Franca 1960	= *Circe scripta*
Gomphina	*ambigua* Deshayes 1853, Day & Morgans 1956	= *Pitaria kochii*
Macrocallista	*florida* Tomlin 1923	= *P. florida*
Marcia	*kochii* (Sowerby), Jukes Brown 1915	= *P. kochii*
Meretrix (*Pitar*)	*hebraea* (Lamarck), Dautzenberg 1929	= *Pitaria hebraea*
	kochii (Sowerby), Smith 1904	= *P. kochii*
Meroe	*ovalis* Sowerby 1892	= *Sunetta contempta*

Paphia	*corrugata* (Gmelin), Haughton 1932	= *Tapes corrugata*
	dactyloides (Sowerby), Turton 1932	= *T. corrugata*
	deshayesii (Hanley), Haughton 1932	= *T. deshayesi*
	disrupta Römer, Bartsch 1915, *non* Sowerby	= *T. corrugata*
	cf. *gallus* (Gmelin), Cox 1939	= *T. malabarica*
Pitar	*manillae* (Sowerby), Prashad 1932	= *Pitaria manillae*
Pullastra	*malabarica* (Chemnitz), Chenu 1862	= *Tapes malabarica*
Sunetta	*ovalis* (Sowerby), Bartsch 1915, Jaeckel 1931	= *Sunetta contempta*
Sunettina	*sunettina* Jousseaume, Lamy 1931	= *S. contempta*
Tapes	*dactyloides* Sowerby 1852, Lamy 1931	= *Tapes corrugata*
	disrupta Römer, Smith 1903, *non* Sowerby	= *T. corrugata*
	kochi Sowerby 1892	= *Pitaria kochii*
	(*Protapes*) *malabarica* (Chemnitz), Lynge 1909	= *Tapes malabarica*
	pullastra Montagu, Sowerby 1852	= *T. corrugata*
	textrix Sowerby 1892	= *T. textile*
Tapex	*textile* (Gmelin), Sowerby 1852	= *T. textile*
Tivela	*dolabella* (Sowerby), Smith 1877, Lamy 1931	= *Tivela polita*
	tomlini Haughton 1932, Barnard 1962	= *T. compressa*
Venerupis	*cordieri* Sowerby 1892, *non* Deshayes	= *Tapes corrugata*
	corrugata (Gmelin), Nicklès	= *T. corrugata*
	corrugata var. *senegalensis* Nicklès 1950	= *T. corrugata*
	lajonkari Sowerby 1897, *non* Payraudeau	= *T. corrugata*
	multicostata Turton 1932	= *Venerupis macrophylla*
	robusta Smith 1904	= *Tapes corrugata*
	rugosa Sowerby 1842, *non* Deshayes	= *T. corrugata*
Ventricola	*verrucosa* Newton 1913	= *Venus verrucosa*
Venus	*arakanensis* Nevill 1871, Smith 1903	= *Venus arakana*
	corrugata Gmelin, Lamy & Fisher-Piette 1939	= *Tapes corrugata*
	costellifera A. Adams & Reeve 1848	= *Chione costellifera*
	dunkeri Römer 1864	= *Tivela dunkeri*
	foliacea Philippi, MacNae & Kalk 1958	= *Venus tiara*
	intersculpta Sowerby 1904, Jaeckel 1931	= *V. verrucosa*
	kochii Philippi 1843	= *Pitaria kochii*
	latilirata Sowerby 1897, *non* Conrad	= *Comus platyaulax*
	layardi Sowerby 1892, *non* Reeve	= *Venus arakana*
	listeri Gray, Sowerby 1897	= *V. reticulata*
	malonei Vanatta 1901	= *V. arakana*
	(*Chione*) *mindanensis* Smith 1885	= *Chione mindanensis*
	paupercula Philippi 1844, *non* Chemnitz	= *Pitaria kochii*
	paupercula var. *abbreviata* Krauss 1848	= *P. hebraea*
	platyaulax Tomlin 1924	= *Comus platyaulax*
	pulchra Wood 1829	= *Pitaria florida*
	pullastra (Montagu), Krauss 1848	= *Tapes corrugata*
	verrucosa var. *capensis* Sowerby 1889, Turton 1932	= *Venus verrucosa*

Petricolidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Petricola	*bicolor* Sowerby	S.A.M., Turton, U.C.T.	Turton 1932 Barnard 1964	
	divergens (Gmelin)	S.A.M.	Prashad 1932 Barnard 1964	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Petricola	*ponsonbyi* Sowerby	S.A.M.	Sowerby 1892 Barnard 1964	
Synonymy				
Choristodon	*divaricata* (Chemnitz), H. & A. Adams 1857		= *Petricola divergens*	
Petricola	*albanyana* Turton 1932		= *P. bicolor*	
	divaricata (Chemnitz), Sowerby 1854		= *P. divergens*	
	ponsonbyi Bartsch 1915, *non* Sowerby		= *P. bicolor*	
	robusta Sowerby 1892, Turton 1932, *non* Sowerby		= *P. bicolor*	
	typica Sowerby 1892, Turton 1932, *non* Jonas		= *P. bicolor*	
Venus	*divaricata* (Chemnitz), Sowerby 1854		= *P. divergens*	
	divergens Gmelin 1790		= *P. divergens*	

Mesodesmatidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Donacilla	*africana* Turton	Turton, S.A.M., U.C.T.	Turton 1932 Barnard 1964	Also †
	delagoae Barnard	U.W.	Barnard 1964	Syntypes in S.A.M. Paratypes in U.W.
Mesodesma	*glabratum* (Gmelin)	Boshoff	Boshoff 1965	

Mactridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lutraria	*angustior* Philippi	S.A.M., U.C.T.	Holme 1959 Barnard 1964	
	inhacaensis Boshoff	Boshoff	Boshoff 1965	
	lutraria (L.)	S.A.M., U.C.T., P.F.	Holme 1959 Barnard 1964	Also †
	? *oblonga* (Chemnitz, Gmelin)	U.C.T., P.F.	Barnard 1964	
Mactra	*aequisulcata* Sowerby	S.A.M., U.W., P.F.	Sowerby 1892, 1897 Barnard 1964	
	cuneata Chemnitz, Gmelin	Krauss, S.A.M., U.C.T.	Braga 1952 Barnard 1964	
	fragilis Chemnitz	Boshoff	Boshoff 1965	
	glabrata L.	S.A.M., P.F., U.C.T.	Nicklès 1950 Barnard 1964	Also †
	lilacea Lamarck	S.A.M., Braga, Paes da Franca	Paes da Franca 1960 Barnard 1964	
	ovalina Lamarck	Turton, S.A.M., P.F., U.C.T.	Sowerby 1892 Bartsch 1915 Barnard 1964	Also †
Schizodesma	*spengleri* (L.)	S.A.M., U.C.T.	Newton 1913 Barnard 1964	Also †
Standella	*nicobarica* (Gmelin)	S.A.M., U.C.T.	Paes da Franca 1960 Barnard 1964	Also †

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Standella	*solanderi* (Gray)	Turton, Van Bruggen	Bartsch 1915 Van Bruggen 1952 Barnard 1964	
Synonymy				
Eastonia	*africana* Bartsch 1915, Turton 1932		= *Standella solanderi*	
	nicobarica (Gmelin), MacNae & Kalk 1958		= *S. nicobarica*	
Lutraria	*albanyana* Turton 1932		= *Lutraria lutraria*	
	capensis Deshayes, Sowerby 1892, Bartsch 1915, Lamy 1918, Haughton 1932		= *L. lutraria*	
	elliptica Lamarck, Turton 1932		= *L. lutraria*	
	elliptica var. *angustior* Philippi 1844		= *L. angustior*	
	elliptica var. *intermedia* Sowerby 1859, *non* Deshayes		= *L. lutraria*	
	oblonga var. *australis* Lamy 1918		= *L. oblonga*	
?	*senegalensis* Gray 1837		= *L. angustior*	
Mactra	*adansoni* Sowerby 1892, *non* L.		= *Mactra lilacea*	
	adansonii Philippi, Sowerby 1889, Bartsch 1915, Turton 1932, Day 1959		= *M. glabrata*	
	adansoni var. *decora* Turton 1932, *non* Deshayes		= *M. glabrata*	
	adansoni var. *elongata* Turton 1932		= *M. glabrata*	
	adansoni var. *semistriata* Turton 1932		= *M. lilacea*	
	aegyptiaca (Chemnitz), Smith 1910		= *Standella nicobarica*	
	alfredensis Bartsch 1915, Turton 1932		= *Mactra ovalina*	
	australis Krauss 1848, *non* Lamarck		= *M. cuneata*	
	capensis Sowerby 1892, Jaeckel 1931, MacNae & Kalk 1958		= *M. ovalina*	
	decora Reeve 1854, Deshayes 1855		= *M. lilacea*	
	depressa Spengler, Lamy 1917, *non* Lamarck		= *M. ovalina*	
	fragilis Paes da Franca 1960, *non* Chemnitz		= *M. ovalina*	
	glabrata Braga 1952, MacNae & Kalk 1958		= *M. lilacea*	
	intuspicta Lamy 1917, Tomlin 1923, *non* Deshayes		= *M. lilacea*	
	laevis Dunker 1871		= *M. glabrata*	
	lurida Braga 1952, Paes da Franca 1960		= *M. cuneata*	
	nicobarica Gmelin 1790		= *Standella nicobarica*	
	semisulcata Braga 1952		= *Mactra lilacea*	
	spengleri L., Von Martens 1874		= *Schizodesma spengleri*	
Mactrinula	*ovalina* (Lamarck), Sowerby 1897, Schwarz 1900		= *Mactra ovalina*	
Spisula	*solanderi* Gray 1837		= *Standella solanderi*	
(*Schizodesma*)	*spengleri* Lamy 1918		= *Schizodesma spengleri*	
Standella (*Eastonia*)	*nicobarica* (Gmelin) Lamy 1918		= *Standella nicobarica*	
	rugosa Paes da Franca 1960 *non* Helbling		= *S. nicobarica*	
	solandri (sic) (Gray), Sowerby 1892		= *S. solanderi*	

Donacidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Donax	*aemulus* Smith	Burnup, S.A.M., U.C.T., U.W.	Smith 1877 Odhner 1919 Barnard 1964	Also †

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Donax	*bertini* Pilsbry	Burnup, P.F., Turton	Pilsbry 1901 Barnard 1964	Also †
	bipartitus Sowerby	Burnup, S.A.M.	Sowerby 1892 Barnard 1964	Also †
	faba Gmelin	U.W., Paes da Franca	Sowerby 1866 Barnard 1964	
	incarnatus Schröter	U.W.	Sowerby 1866 Barnard 1964	
	madagascariensis Wood	S.A.M., K.H.B.	Krauss 1848 Barnard 1964	Also †
	serra Bolten	Krauss, S.A.M., U.C.T.	Krauss 1848 Barnard 1964	
	sordidus Hanley	Krauss, S.A.M.	Krauss 1848 Barnard 1964	
(*Capsella*)	*burnupi* Sowerby	S.A.M., P.F., U.C.T.	Sowerby 1897 Turton 1932 Barnard 1964	Also †
	longissimus Jaeckel	V, P.F.	Jaeckel 1931 Barnard 1964	Also †

Synonymy

Donax	*elegans* Odhner 1919, Dautzenberg 1929	= *D. aemulus*
	exaratus Krauss 1848, Turton 1932, Cox 1939	= *D. madagascariensis*
	? *helena* Turton 1932	= *D. serra*
	lubricus Krige 1933, *non* Hanley	= *D. aemulus*
	nereia Turton 1932	= *D. bertini*
	productus Odhner 1919, Dautzenberg 1929	= *D. aemulus*
	radians Chenu 1862	= *D. faba*
	ringens Chenu 1862	= *D. serra*
	semisulcatus Turton 1932, *non* Hanley	= *D. sordidus*
	serra var. *aurantiaca* Krauss 1848, Turton 1932	= *D. serra*
	simplex Sowerby 1897, Turton 1932	= *D. aemulus*

Psammobiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Asaphis	*dichotoma* (Anton)	K.H.B.	Prashad 1932 Barnard 1964	Also †
Psammobia	*corrugata* Deshayes	Boshoff	Boshoff 1965	
	costulata Turton	V, P.F.	Jaeckel 1931 Barnard 1964	
	maculosa Lamarck	S.A.M., P.F.	Prashad 1932 Barnard 1964	
	pallida Deshayes	U.W., U.C.T.	Barnard 1964	Also †
Psammotaea	*lunulata* (Deshayes)	Burnup, U.C.T.	Barnard 1964	
Psammotellina	*capensis* Sowerby	Turton, S.A.M., U.C.T.	Sowerby 1889 Barnard 1964	Also †
Solecurtus	*divaricatus* (List)	Boshoff	Boshoff 1965	
Tagelus	*cunhai* Boshoff	Boshoff	Boshoff 1965	

Synonomy

Asaphis	*deflorata* Von Martens 1880, Cox 1927	= *A. dichotoma*
Capsa (*Capsella*)	*lunulata* Deshayes 1853	= *Psammotaea lunulata*
Ervilia	*purpurea* Sowerby 1904, *non* Deshayes	= *Psammotellina capensis*
Gari	*maculosa* (Lamarck), Prashad 1932	= *Psammobia maculosa*

Psammobia	*albanyana* Turton 1932	= *P. maculosa*
	ornata Sowerby 1897	= *P. maculosa*
	vespertina Sowerby 1892, *non* Gmelin	= *P. costulata*
Psammotellina	*capensis* var. *livida* Turton 1932	= *Psammotellina capensis*
	lara Turton 1932	= *P. capensis*
	pyrrha Turton 1932	= *P. capensis*
Sanguinolaria	*dichotoma* Anton 1838	= *Asaphis dichotoma*

Semelidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Abra	*longicallus* (Sacchi)	S.A.M.	Barnard 1964	
Iacra	*seychellarum* A. Adams	Burnup, K.H.B.	Odhner 1919 Barnard 1964	
	trotteriana (Sowerby)	Burnup	Sowerby 1894, 1897 Barnard 1964	
Leptomya	*psittacus* Hanley	Boshoff	Barnard 1964	
Semele	*radiata* (Rüppell, Reeve)	U.W.	Braga 1952 Paes da Franca 1960 Barnard 1964	
Theora	*alfredensis* Bartsch	Turton, V, P.F.	Bartsch 1915 Barnard 1964	Also †
	ovalis Smith	Turton, S.A.M.	Smith 1904 Barnard 1964	

Synonymy

? *Aligena*	*ovalis* (Smith), Bartsch 1915, Turton 1932	= *Theora ovalis*
Amphidesma	*radiata* Rüppell MS., Reeve 1853	= *Semele radiata*
Iacra	*lactea* (Odhner), Dautzenberg 1929	= *Iacra seychellarum*
Scrobicularia	*seychellarum* A. Adams 1856	= *I. seychellarum*
Strigillia	*trotteriana* Sowerby 1894	= *I. trotteriana*
Syndesmya (*Iacra*)	*lactea* Odhner 1919	= *I. seychellarum*

Tellinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Apolymetis	*orbicularis* (Sowerby)	Turton, Muir, P.F.	Sowerby 1899 Barnard 1964	
Gastrana	*abildgaardiana* (Spengler)	S.A.M., Muir, U.C.T., U.W.	Krauss 1848 Barnard 1964	Also †
Macoma	*crawfordi* Sowerby	V, P.F.	Sowerby 1892, 1904 Barnard 1964	
	inclinata Sowerby	P.F., U.C.T.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	levior Sowerby	P.F., U.C.T.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	litoralis (Krauss)	Krauss, S.A.M., Muir, P.F., U.C.T.	Krauss 1848 Turton 1932 Barnard 1964	
	ordinaria Sowerby	P.F., U.C.T.	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	retrorsa Sowerby	P.F., V	Sowerby 1867, 1894, 1897 Barnard 1964	
Tellina	*acropisthus* Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Tellina	*analogica* Sowerby	P.F., A	Sowerby 1904 Barnard 1964	
	capsoides Lamarck	Puzey, U.W.	MacNae & Kalk 1958	
	dispar Conrad	Krauss, S.A.M.	Sowerby 1846 Barnard 1964	
	europisthus Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.
	gilchristi Sowerby	V, P.F., U.C.T., A	Sowerby 1904 Barnard 1964	Paratypes in S.A.M.
	immaculata Philippi	K.H.B.	Barnard 1964	
	ludwigi Krauss	Krauss, K.H.B., U.C.T.	Krauss 1848 Sowerby 1897 Barnard 1964	
	madagascariensis Gmelin	S.A.M., U.C.T.	Barnard 1964	Also †
	natalensis Krauss	Krauss, S.A.M., U.C.T.	Krauss 1848 Sowerby 1897 Barnard 1964	
	perna Spengler	Paes da Franca	Paes da Franca 1960	
	ponsonbyi Sowerby	Turton, P.F.	Sowerby 1889 Barnard 1964	
	rastellum Hanley	Paes da Franca	Paes da Franca 1960	
	regularis Smith	Turton, Muir	Smith 1904 Barnard 1964	Also †
	rhomboides Quoy & Gaimard	K.H.B.	Sowerby 1846	
	rugosa Born	Boshoff	Boshoff 1965	
	scobinata (L.)	Boshoff	Boshoff 1965	
	triangularis Chemnitz	Turton, S.A.M., U.C.T.	Sowerby 1846 Barnard 1964	Also †
	vidalensis Sowerby	P.F.	Sowerby 1904 Barnard 1964	Holotype in S.A.M.
	virgata L.	Boshoff	Boshoff 1965	
	vulsella Hanley	K.H.B.		

Synonymy

Macoma	*africana* Sowerby 1904, Jaeckel 1931, Turton 1932	= *M. crawfordi*
	calcerea Sowerby 1892, *non* Chemnitz	= *M. litoralis*
	neptuni Turton 1932	= *M. litoralis*
	orbicularis (Sowerby), Newton 1913	= *Apolymetis orbicularis*
	? *patula* Turton 1932	= *Macoma litoralis*
Metis	*orbicularis* (Sowerby), Bartsch 1915	= *Apolymetis orbicularis*
Petricola	*ventricosa* Krauss 1848	= *Gastrana abildgaardiana*
Pinguitellina	cf. *culter* Day & Morgans 1956	= *Macoma litoralis*
Tellina (*Macoma*)	*candida* Sowerby 1894, Turton 1932	= *M. retrorsa*
	crawfordi Sowerby 1892, Jaeckel 1931	= *M. crawfordi*
	cumana Sowerby 1892, Smith 1904	= *M. crawfordi*
	ordinaria Sowerby 1904	= *M. ordinaria*
	rousi Sowerby 1892, Turton 1932	= *M. litoralis*
Tellina	*abildgaardiana* Spengler 1798	= *Gastrana abildgaardiana*
	albinella var. *alfredensis* Bartsch 1915, Turton 1932	= *Tellina madagascariensis*
	becki Turton 1932	= *T. gilchristi*
	calcarea Sowerby 1892, *non* Chemnitz	= *Macoma litoralis*

Tellina	*fabula* Krauss 1848, Turton 1932, *non* Gmelin	= *Tellina dispar*
	kraussi Turton 1932	= *T. ponsonbyi*
	litoralis Krauss 1848, Sowerby 1892	= *Macoma litoralis*
	natalensis Smith 1885, *non* Philippi, Krauss	= *Tellina gilchristi*
	? *nobilis* Von Martens 1874, *non* Hanley	= *Macoma crawfordi*
	orbicularis Sowerby 1889, 1892	= *Apolymetis orbicularis*
	cf. *perna* Newton 1913, Barnard 1962	= *Tellina madagascariensis*
	planissima Sowerby 1897, *non* Anton	= *T. natalensis*
	prismatica Sowerby 1897	= *T. natalensis*
	quecketti Sowerby 1897, Schwarz 1910	= *T. ludwigi*
	rietensis Turton 1932	= *T. ponsonbyi*
	rosea Spengler 1798, Schwarz 1910	= *T. madagascariensis*
	scalpellum Day & Morgans 1956, *non* Hanley	= *T. natalensis*
	? *tenuis* Sowerby 1892, *non* Da Costa	= *Macoma crawfordi*
	umbonella Sowerby 1892, *non* Lamarck	= *Apolymetis orbicularis*
	vidalensis Bartsch 1915, Jaeckel 1931, *non* Sowerby	= *Tellina gilchristi*

Solenidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Phaxas	*cultellus* L.	P.F., U.W.	Barnard 1964	
	pellucidus (Pennant)	S.A.M., V, P.F.	Turton 1932 Barnard 1964	
Siliqua	*polita* (Wood)	P.F., U.W.	Barnard 1964	
	radiata (L.)	Burnup, U.W., P.F.	Barnard 1964	
Solen	*capensis* Fischer	Krauss, S.A.M., P.F., U.C.T.	Bartsch 1915 Barnard 1964	Also †
	corneus Lamy	Boshoff	Boshoff 1965	
	gouldi Conrad	S.A.M, P.F., U.C.T., U.W.	Barnard 1964	
	roseomaculatus Pilsbry	U.W., U.C.T.	Pilsbry 1901 Barnard 1964	

Synonymy

Cultellus	*cultellus* (L.), Chenu 1862	= *Phaxas cultellus*
(*Cultellus*)	*cultellus* (L.), Prashad 1932	= *P. cultellus*
(*Ensiculus*)	*cultellus* (L.), Lynge 1909	= *P. cultellus*
	decipiens Smith 1904, Turton 1932	= *P. pellucidus*
	pellucidus (Pennant), Sowerby 1892, Jaeckel 1931	= *P. pellucidus*
? *Cultellus*	*pellucidus* MacNae & Kalk 1958, *non* Pennant	= *P. cultellus*
Machaera	*radiata* (L.), Chenu 1862	= *Siliqua radiata*
Siliqua	*japonica* Sowerby 1892	= *S. polita*
Solen	*alfredensis* Bartsch 1915	= *Solen capensis*
	marginatus Koch, Krauss 1848, Sowerby 1892, *non* Pulteney	= *S. capensis*
	pellucidus Pennant 1777	= *Phaxas pellucidus*
	polita Wood, Sowerby 1892, MacNae & Kalk 1958	= *Siliqua polita*

Saxicavidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Panopea	*aldrovandi* Ménard	S.A.M., Haughton	Valenciennes 1839	

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Panopea	*aldrovandi* Ménard	S.A.M., Haughton.	Van Hoepen 1940 Barnard 1964	†
Saxicava	*arctica* (L.)	Krauss, Ch, P.F., U.C.T.	Barnard 1964	
	rugosa (L.)	Muir, P.F., U.C.T.	H. & A. Adams 1855, 1856 Barnard 1964	

Synonymy

Glycimeris	*rugosa* Bosc, H. & A. Adams 1855	= *Panopea aldrovandi*
Panopaea	*australis* non Sowerby, Valenciennes 1839	= *P. aldrovandi*
	natalensis Woodward 1856, Schwarz 1910	= *P. aldrovandi*
Panopea	*attenuata* Sowerby, Reeve 1873, Sowerby 1889	= *P. aldrovandi*
	dreyeri Van Hoepen 1940	= *P. aldrovandi*
	natalensis Smith 1903, Barnard 1962	= *P. aldrovandi*
Saxicava	*australis* Sowerby 1892, *non* Lamarck	= *Saxicava rugosa*

Aloididae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Aloidis	*persica* (Smith)	P.F.	Barnard 1964	
	valdiviae (Jaeckel)	P.F.	Smith 1903 Jaeckel 1931 Barnard 1964	

Synonymy

Corbula	*persica* Smith 1906	= *Aloidis persica*
	rugifera A. Adams MS., Smith 1903	= *A. valdiviae*
	tahitensis Braga 1952, *non* Lamarck	= *A. valdiviae*

Myidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
? *Cryptomya*	*philippinarum* (A. Adams)	Martin	Barnard 1964	

Synonymy

Sphaenia	*philippinarum* A. Adams 1851	= *Cryptomya philippinarum*

Gastrochaenidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Fistulana	sp.	U.W.	Barnard 1964	
Gastrochaena	cf. *dubia* (Pennant)	S.A.M., P.F., U.C.T., Turton	Barnard 1964	Also †
	cuneiformis (Spengler)	U.W.	Barnard 1964	
	mytiloides Lamarck	Boshoff	Boshoff 1965	
	retzi Deshayes	Boshoff	Boshoff 1965	

Synonymy

Gastrochaena	*cuneiformis* var. *ruppelli* Lamy 1925	= *Gastrochaena cuneiformis*
	dubia MacNae & Kalk 1958, *non* Pennant	= *G. cuneiformis*
	lamellosa Smith 1885	= *G. cuneiformis*
cf. *Rocellaria*	*dubia* (Pennant), H. & A. Adams 1855/56	= *G. dubia*

Pholadidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Barnea	*alfredensis* Bartsch	Turton, V, P.F.	Bartsch 1915 Barnard 1964	
	manilensis (Philippi)	Van Hoepen, S.A.M., U.C.T.	Van Hoepen 1941 Barnard 1964	
Martesia	*striata* (L.)	S.A.M., U.C.T.	Van Hoepen 1941 Barnard 1964	
Parpholas	*incei* Sowerby	Boshoff	Boshoff 1965	
Pholas	*dactylus* L.	S.A.M.	Van Hoepen 1941 Barnard 1964	Also †

Synonymy

Barnea	*durbanensis* Van Hoepen 1941	= *B. manilensis*
Barnia (sic)	*erythraea* Gray 1851	= *B. manilensis*
Martesia	*falcata* Sowerby 1892, *non* Gray, *non* Wood	= *Martesia striata*
Pholas	*alfredensis* Bartsch 1915, Turton 1932	= *Barnea alfredensis*
	erythraea (Gray), Cox 1929	= *B. manilensis*
	fragilis Smith 1904, *non* Sowerby	= *B. alfredensis*
	jordani Van Hoepen 1941, Van Bruggen 1963	= *Pholas dactylus*
	manilensis Philippi 1847	= *Barnea manilensis*
	manillensis (sic) Smith 1891	= *B. manilensis*

Teredinidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Bankia	*capensis* (Calman)	S.A.M., Calman	Calman 1920 Barnard 1964	
	stutchburyi Leach	P.F., U.C.T.	Smith 1910 Barnard 1964	
Teredo	*clava* Gmelin	Roch & Moll	Roch & Moll 1929 Barnard 1964	
	robsoni Roch	Calman, Moll & Roch	Roch 1931	

Synonymy

Teredo (*Hyperota*)	*gragata* Sowerby 1892, *non* Lamarck	= *T. clava*
	navalis Calman 1920 (part, *non* L.)	= *T. robsoni*
?	*stutchburyi* (Leach, Sowerby), Turton 1932	= *Bankia stutchburyi*
Uperotis	*clava* (Gmelin), Smith 1910	= *Teredo clava*
Xylotrya	*capensis* Calman 1920	= *Bankia capensis*
	stutchburyi (Leach, Sowerby), Smith 1910	= *B. stutchburyi*

Lyonsiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Lyonsia	*formosa* Jeffreys	P.F.	Jeffreys 1881 Barnard 1964	

Pandoridae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pandora	*dissimilis* Sowerby	S.A.M., P.F., U.C.T.	Sowerby 1894, 1897 Barnard 1964	Paratype in S.A.M.

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pandora	*similis* Sowerby	S.A.M., P.F.	Sowerby 1897 Barnard 1964	Paratypes in S.A.M.

Myochamidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Myodora	*rectangulata* Barnard	P.F.	Barnard 1964	Syntypes in S.A.M.

Pholadomyidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Pholadomya	sp.	P.F.	Barnard 1964	

Thraciidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Thracia	*alfredensis* (Bartsch)	Turton, S.A.M.	Bartsch 1915 Barnard 1964	Also †
	capensis Sowerby	S.A.M.	Sowerby 1889 Barnard 1964	
Thraciopsis	*agulhasensis* Bartsch	U.C.T.	Barnard 1964	Holotype in S.A.M.

Synonymy

Ungulina	*alfredensis* Bartsch 1915, Turton 1932, Barnard 1962	= *Thracia alfredensis*

Laternulidae (Anatinidae)

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Clistoconcha	*insignis* Smith	Burnup, U.C.T.	Smith 1910 Barnard 1964	

Synonymy

Clistoconcha	*constata* Turton 1932	= *C. insignis*

Verticordiidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Halicardia	*flexuosa* (Verrill & Smith)	P.F.	Tomlin 1937 Barnard 1964	
Verticordia	*ericia* Hedley	P.F.	Barnard 1964	
	inornata Jaeckel	V, P.F.	Jaeckel 1931 Barnard 1964	
	lamothei Dautzenberg & Fischer	V, P.F.	Dautzenberg & Fischer 1897 Barnard 1964	
Lyonsiella	*agulhasensis* Jaeckel & Thiele 1931	P.F.	Barnard 1964	

Poromyidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Poromya	*curta* Sowerby	P.F.	Sowerby 1904	
	gilchristi Sowerby	P.F.	Sowerby 1904 Barnard 1964	
	granosissima Sowerby	P.F., U.C.T.	Sowerby 1904 Barnard 1964	Topotypes in S.A.M.
	striata Sowerby	P.F.	Sowerby 1904 Barnard 1964	

Cuspidariidae

GENUS	SPECIES	COLLECTOR	REFERENCES	REMARKS
Cuspidaria	*approximata* Smith	P.F.	Smith 1896, 1898	
	capensis Smith	Ch, P.F., A, V	Smith 1885 Sowerby 1904 Barnard 1964	Holotype & Paratype in S.A.M.
	forticostata Sowerby	P.F.	Sowerby 1904 Barnard 1964	Topotype in S.A.M.
	gilchristi Sowerby	P.F.	Sowerby 1904 Barnard 1964	Topotype in S.A.M.
	macrorhynchus Smith	P.F.	Smith 1895 Prashad 1932 Barnard 1964	
	maxima Dautzenberg	S.A.M.	Barnard 1964	
	optima Sowerby	P.F., V	Sowerby 1904 Jaeckel 1931 Barnard 1964	Paratype in S.A.M.

Synonomy

Cuspidaria	*agulhasensis* Jaeckel 1931	= *C. optima*
	nasuta Sowerby 1904, Jaeckel 1931, *non* A. Adams	= *C. capensis*
	rara Jaeckel 1931	= *C. optima*
Neaera	*capensis* Smith 1885	= *C. capensis*

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OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLVII (ie V.

PART VI

CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. INDEX: PARTS I–VII

Compiled by

B. KENSLEY

South African Museum, Cape Town

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PART I (supplement), containing the References of:—

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PART II. GASTROPODA: PROSOBRANCHIATA: RHACHIGLOSSA

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†K. H. BARNARD

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Style manual for biological journals. Washington: American Institute of Biological Sciences.

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To be governed by the rulings of the latest *International code of zoological nomenclature* issued by the International Trust for Zoological Nomenclature (particularly articles 22 and 51). The Harvard system of reference to be used in the synonymy lists, with the full references incorporated in the list at the end of the article, and not given in contracted form in the synonymy list.

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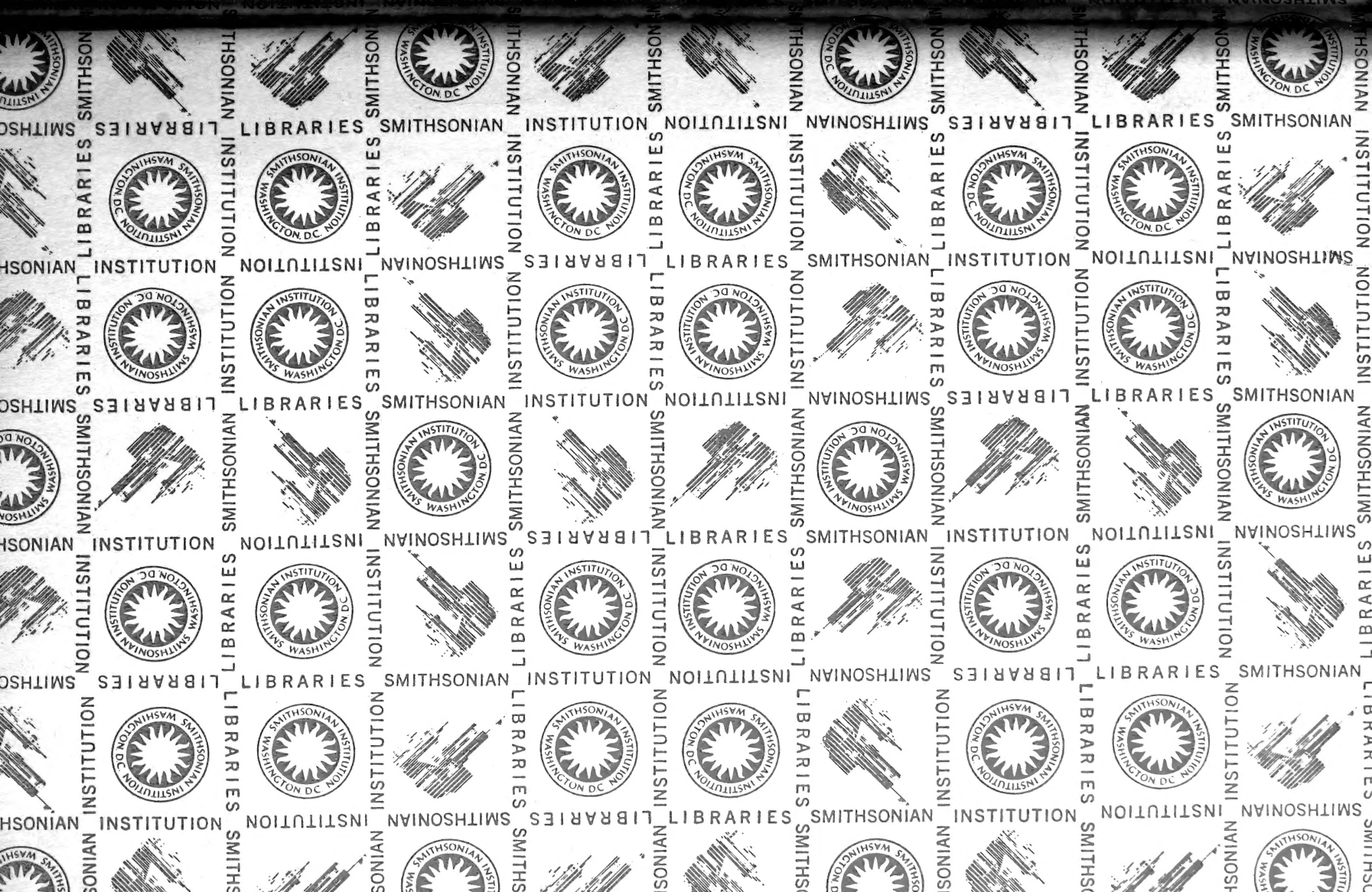
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