SUPPLEMENTARY NOTES ON THE TAXONOMY OF BUCCINID SPECIES OF THE SUBFAMILY PISANIINAE (MOLLUSCA : GASTROPODA)

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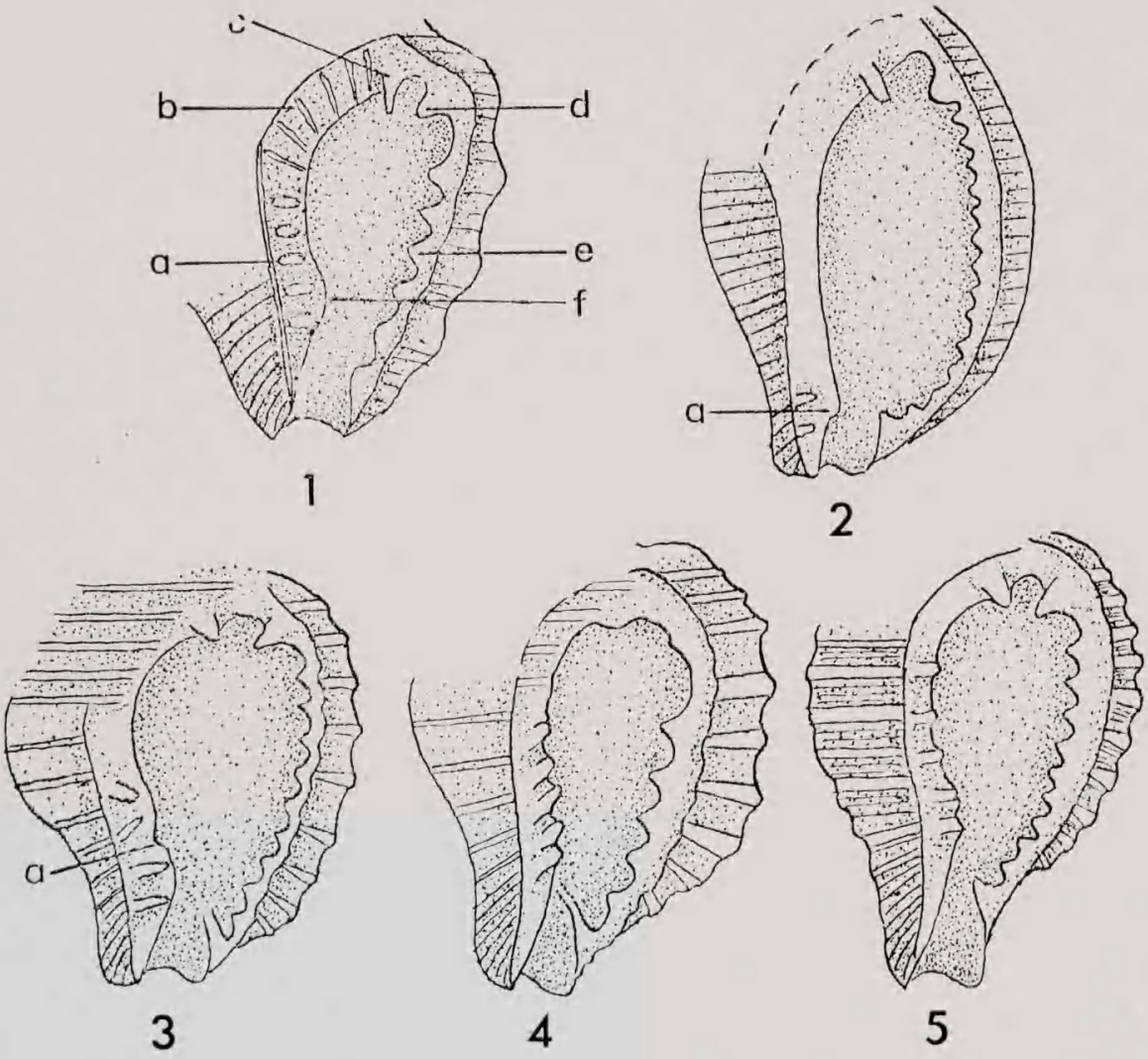
Abstract. The systematics of species of the genus-groups *Engina, Pisania, Jeannea, Caducifer, Monostiolum, Pollia, Prodotia, Enginella, Zeapollia* and *Clivipollia* are discussed. *Cantharus (Prodotia) iostomus* (Gray in Griffith & Pidgeon, 1834), is considered to be the earliest name applicable to the species previously known under the homonymous names *Buccinum marmoratum* Reeve, 1846, and *B. gracile* Reeve, 1846. The West American species *Engina fusiformis* Stearns, 1894, is found to be a primary homonym of *E. fusiformis* Pease, 1865, and will have to be replaced by its junior synonym *E. solida* Dall, 1917. *Ricinula siderea* Reeve, 1846, the type-species of the muricid genus *Drupella* Thiele, is shown to be a buccinid *Engina* species. *Triton tessellatus* Reeve, 1844, described from the Philippines, appears to be a finely sculptured variant of the Caribbean *Caducifer (Monostiolum) swifti* (Tryon, 1881), while 3 species usually placed in the buccinid genus *Engina* actually belong to the muricid genus *Morula* Schumacher. The identity of the majority of species discussed, is elucidated on the basis of their type-specimens.

Recent papers dealing with species of Pisaniinae are those by Cernohorsky (1971), Ponder (1972) and Cernohorsky (1974 — synonymy of *Engina contracta* Reeve). From studies of the radulae of Buccinidae it has become evident that due to its high variability in features of length and numbers of cusps on the lateral teeth, not only within species of a subfamily or genus but within individual specimens of a species, the radula is not particularly suited as a diagnostic tool below the family level. The denticulate cutting edge of the inward facing cusp of the lateral tooth was thought to be a feature peculiar to *Cantharus, Pollia* and *Clivipollia*. This denticulate cutting edge has made its appearance in a Queensland specimen of *Pisania ignea* (Gmelin) examined by Ponder (1972, fig. 2) and has also been found to occur in *Engina australis* (Pease) (Hedley, 1917, pl. 50, fig. 30). Specimens of *Pisania ignea* from Fiji (Cernohorsky, 1971, fig. 20) and from Japan (Habe & Kosuge, 1967, p. 79, bottom figure) have a radula with a smooth cutting edge and the lateral tooth is decidedly *Engina*-like. *Cantharus (Pollia) proteus* (Reeve, an unquestionable *Pollia* species, also lacks the cantharid-like denticles on the cutting edge of the lateral tooth (Habe & Kosuge, *op. cit.*, p. 79, top figure). *Caducifer truncatus* (Hinds) has a *Pisania*-like radula (Cernohorsky, *op. cit.*, fig. 27), that of *Engina resta* (Iredale) has a long outer cusp of the lateral as in *Engina* but a denticulate inner cusp as in *Cantharus* (Ponder, *op. cit.*, fig. 11). The radula of *Cantharus (Prodotia) iostomus* (Gray in Griffith & Pidgeon) from Papua New Guinea (Ponder, *op. cit.*, fig. 5 — as *marmorata* Reeve) is *Engina*-like while a specimen from Fiji (Cernohorsky, *op. cit.*, fig. 21) is of the *Pisania* type. It is clear that radulae of buccinid species not only vary within populations and individuals, but some of the radular variation may also be due to sexual dimorphism similarly to that of *Pisania luctuosa* (Tapparone-Canefri) (Cernohorsky, *op. cit.*).

Within the *Pisania* group, a generic and subgeneric allocation will therefore largely depend on shell-morphology, particularly features of the aperture, i.e. the formation of the columella callus and denticulation.

In the Pisaniinae, 3 basic types of apertural features are found:

1. *Engina* (Fig. 1). Columella with 1 parietal denticle, a spreading callus near the parietal area in adult individuals which is sculptured with 4-7 radially placed, raised lirae (Fig. 1-b), lower half of columella with 3-7 denticles which are more or less positioned horizontally. Outer lip with an anal denticle and 5-8 additional denticles; in more rotund species of *Engina*, the posterior 1-2 denticles are sometimes larger and fused. The interior ledge of the columella (Fig. 1-f) is prominently or moderately swollen and projecting and is either smooth or centrally grooved as in some Columbellidae. The anal canal is distinct and excavated into the callus. The radially oriented lirae are found only in species of *Engina*.



Figs. 1-5. Apertural features. 1. *Engina* (a. Lower columellar denticles. b. Radial lirae on parietal callus. c. Parietal denticle. d. Anal denticle. e. Outer lip denticles. f. Swelling on interior ledge of columella). 2. *Pisania* (a. Columellar terminal denticle or projection). 3. *Pollia* (a. Groove posterior to columellar projection). 4. *Clivipollia*. 5. *Prodotia*.

2. *Pisania* (Fig. 2). Columella regularly concave, parietal wall smooth and with a denticle near the anal canal, lower half of columella either completely smooth or with half a dozen denticles as in *P. striata* (Gmelin) or *P. pusio* (Linnaeus). Adult specimens with a raised, almost vertical calloused columella ledge which terminates on reaching the smooth, thinly glazed or weakly calloused parietal wall. The interior ledge of the columella lacks the swelling of *Engina* and the protrusion of *Cantharus* and is replaced by only a slightly projecting terminal denticle (Fig. 2-a). Outer lip with small, distinct and numerous denticles which become lirate within the aperture, anal notch distinct. In the subgenus *Jeannea* and the species *Pisania ignea* (Gmelin), the denticles on the outer lip are rather feeble. The apertural features of *Pisania* are shared by *Jeannea* Iredale, *Caducifer* Dall and *Monostiolum* Dall.

3. *Cantharus* (Fig. 3). Columella concave but projecting anteriorly, calloused, callus usually thinned on the parietal wall where the intruding spiral sculpture of the body whorl is usually visible, columella sculptured with a few or more numerous denticles. Anal canal distinct and flanked by a parietal and anal denticle, outer lip with 7-15 denticles which usually extend partly into the aperture. The anterior inner ledge of the columella is convex and projecting and is preceded by a prominent or shallow oblique groove (Fig. 3-a). *Cantharus* and *Pollia* share the same apertural features, but *Pollia* species lack the angulate, shouldered whorls of *Cantharus*.

a. *Clivipollia* (Fig. 4). Essentially similar to *Pollia*, but the apertural opening is constricted due to the development of larger but fewer denticles. The outer lip has only 5-6 rather large denticles, with the last anterior denticle usually prominent and angulate and extending deep into the aperture thus rendering the siphonal canal deeply excavated. The interior ledge of the columella has the preceding anterior groove broader and deeper than in *Cantharus* or *Pollia* and the anal canal is shallower.

b. *Prodotia* (Fig. 5). The apertural features are similar to *Cantharus-Pollia* but due to the more fusiform shape of the shell the aperture is narrower and the parietal callus is entire and smooth in adult individuals and effectively covers the underlying horizontal sculpture seen in *Cantharus, Pollia* and *Clivipollia*. The columella has up to half a dozen denticles, the anal canal is bordered by a parietal and anal denticle and the outer lip has 8-11 denticles some of which extend as lirae into the aperture. The groove preceding the projection on the interior ledge of the columella is also present but is shallower than in *Cantharus*.

In the New Zealand Miocene *Zeapollia* Finlay, the apertural features are similar to those of *Cantharus-Pollia*, with 2-3 cords of the spiral sculpture of the body whorl intruding onto the parietal wall, and the outer lip has only 5-6 denticles. In the Caribbean Miocene *Trachypollia* Woodring, the columella callus is entire as in *Prodotia*, the anterior columellar projection is present and the outer lip has only 5 denticles. *Trachypollia sclera* Woodring, 1928, from the Jamaican Miocene and *T. aneureta* Woodring, 1964, from the Gatun formation of Panama, lack the sculpture of radially oriented raised lirae on the parietal wall and cannot therefore be admitted as members of *Engina* as suggested by Ponder (1972).

Family BUCCINIDAE Rafinesque, 1815

Subfamily PISANIINAE Gray, 1857

1857. Pisaniana Gray, Guide Syst. Distr. Moll. Brit. Mus. Pt. 1: 13.

The subfamily name has been credited to Tryon, 1881 (Cernohorsky, 1971 and Abbott, 1974) but Gray (1857) was actually the first author to utilise the subfamily

taxon Pisaniinae (*ex*-Pisaniana). Cominellinae (*ex*-Cominellina) and Photinae (*ex*-Phosina) were also already established by Gray (*op. cit.*) in the same publication, and since both are considered synonyms, Photinae Gray, 1857, is here selected as the subfamily name in preference to Cominellinae Gray, 1957, under the "first reviser" rule (Art. 24 (a) of I.C.Z.N.).

Genus **Engina** Gray, 1839

Engina Gray, 1839, Zool. Capt. Beechey's Voy. "Blossom", p. 112. Type species by SD (Gray, 1847) *E. zonata* Gray, 1839 = *Purpura turbinella* Kiener, 1836. Recent, Caribbean.

1847. *Enzina* Gray, Proc. Zool. Soc. Lond. p. 133 *(nom. null.)*

1940. *Enzinopsis* Iredale, Aust. Zoologist 9: 434. Type species by OD *E. gannita* Hedley, 1915 = *Ricinula contracta* Reeve, 1846. Recent, Indo-Pacific.

Ovate, biconic species of *Engina* appear at first glance readily separable from the more slender, fusiform species with a more produced siphonal canal such as *E. contracta* (Reeve) and *E. obliquicostata* (Reeve). However, the whole series of *Engina* species gradually merge into representative species of both forms and stout, ovate forms and taller, fusiform forms occur within a single species (see Keen, 1971, fig. 1124, as *E. fusiformis* = *E. solida*). *Enzinopsis* has been synonymised with *Engina* by Ponder (1972) who also remarked on the artificial separation of the two genus-groups.

Engina species are sculptured with axial and spiral cords and always have a secondary spiral sculpture of fine intermediate striae. The apertural form and sculpture (Fig .1) of radially oriented lirae is unique to *Engina*. *Engina* species live in the Caribbean, the west coast of America and the Indo-Pacific (including S.E. Australia and Sth. Africa).

Engina lineata (Reeve, 1846) (Fig. 6)

1846. *Ricinula lineata* Reeve, Conch. Icon. 3: pl. 6, fig. 51.

1869. *Ricinula lineata* var. *maculata* Pease, Amer. J. Conch. 5: 76, pl. 8, fig. 12 (Apaian I = Abaiang I, Gilbert Is).

1971. *Engina lineata* (Reeve), Cernohorsky, Rec. Auckl. Inst. Mus. 8: 159, fig. 78.

TYPE LOCALITY. Island of Ticao, Philippines.

The 3 syntypes of *Ricinula lineata* Reeve are in the B.M.N.H. No. 1968463, dimensions of illustrated syntype length 13.0 mm, width 7.4 mm. The species is easily separated from *Engina zonalis* (Lamarck) by its narrower spiral bands, presence of a few additional round or crescent-shaped black spots and the colouring of the aperture, which is always white in *E. lineata* but is purplish-brown in *E. zonalis*.

Engina alveolata (Kiener, 1836) (Fig. 10)

1836. *Purpura alveolata* Kiener, Spéc. gén. icon. coq. viv. 8: 42, pl. 9, fig. 23.

1846. *Ricinula lauta* Reeve, Conch. Icon. 3: pl. 4, fig. 24 (Hab: ?).

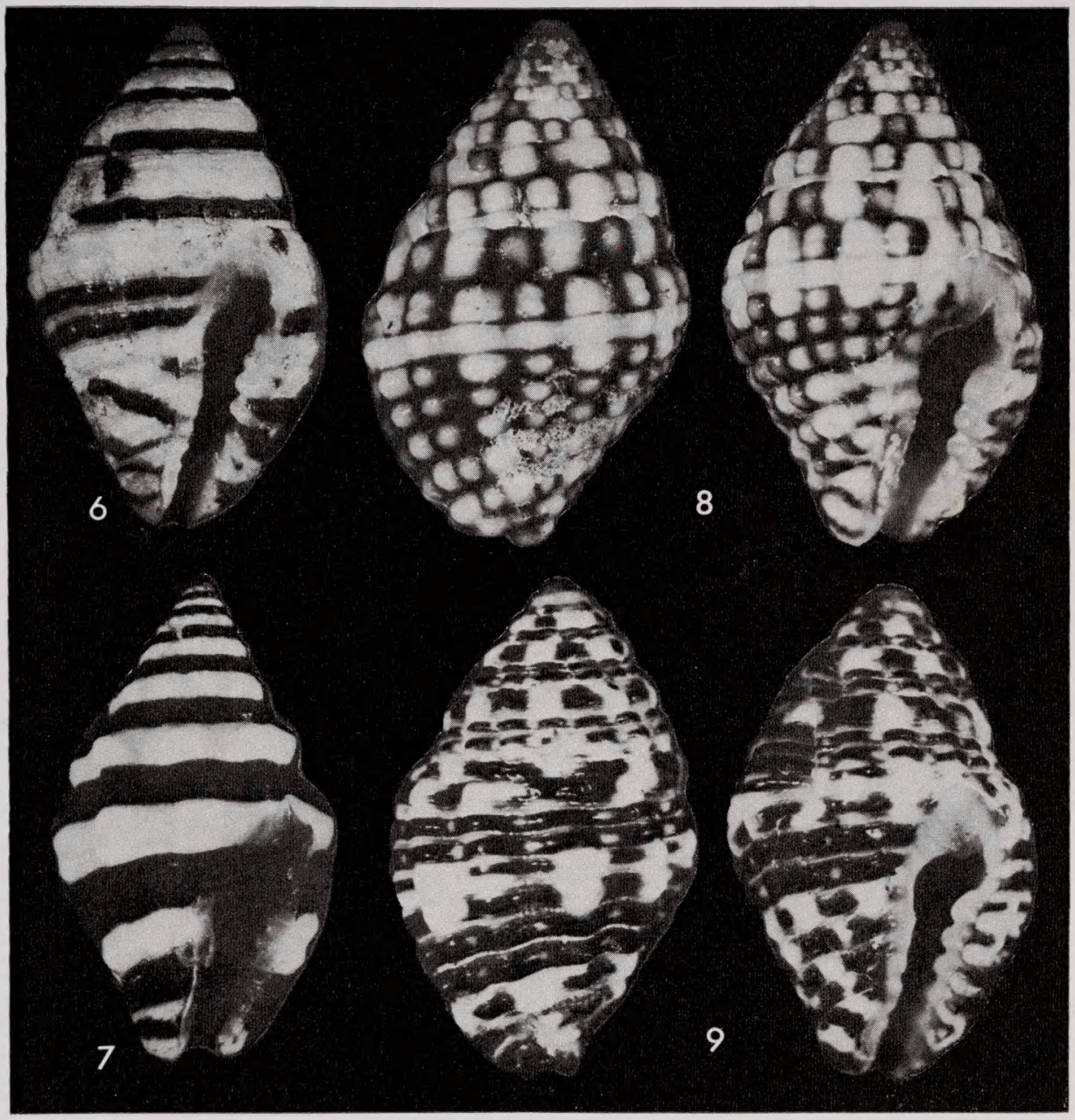
1846. *Ricinula histrio* Reeve, Conch. Icon. 3: pl. 5, fig. 36.

1865. *Engina fusiformis* Pease, Proc. Zool. Soc. Lond. p. 513 (Central Pacific); 1868 Pease, Amer. J. Conch. 3: 273, pl. 23, fig. 5 (Howland I); 1965 Kay, Bull. Brit. Mus. (Nat. Hist.) Zool. Suppl. 1: 81, pl 13, figs 15, 16 (figd. lectotype).

1883. *Engina reevei* Tryon, Man. Conch. 5: 191, pl. 62, fig. 29 (Panama to L. California = error; Australia).

1895. *Engina mundula* Melvill & Standen, J. Conch. 8: 105, pl. 2, fig. 6 (Lifu, Loyalty Is).

1971. *Engina alveolata* (Kiener), Cernohorsky, Rec. Auckl. Inst. Mus. 8: 158, fig. 39 (protoconch), fig. 65 (radula). figs. 76, 77 (shell).



Figs. 6-9. 6. *Engina lineata* (Reeve); syntype BMNH No. 1968463, 13.0 × 7.4 mm. 7. *E. zonalis* (Lamarck). Syntype of *Ricinula trifasciata* Reeve, BMNH No. 1968470, 14.5 × 7.7 mm. 8. *E .phasinola* (Duclos); specimen from the New Hebrides, 11.0 × 6.7 mm. 9. *E. zatricium* Melville; topotype from Lifu, Loyalty Is, 14.2 × 8.8 mm.

TYPE LOCALITY. None (Island of Ticao, Philippines — for *histrio* Reeve).

The 3 syntypes of *Ricinula lauta* Reeve, B.M.N.H. No. 1968478 and 4 syntypes of *R. histrio* Reeve, B.M.N.H. No. 1968467, are conspecific with *Engina alveolata* (Kiener). The lectotype of *E. fusiformis* Pease, B.M.N.H. No. 1964309, length 15.3 mm,

width 8.0 mm, is also synonymous with *E. alveolata* (Fig. 10). The 3 syntypes of *Ricinula trifasciata* Reeve, 1846, from Bohol I, Philippines, B.M.N.H. No. 1968470, are not the species *E. alveolata* as suggested by Adam & Leloup (1938), but are a colour-form of *E. zonalis* (Lamarck, 1822). In *R. trifasciata* the rhomboidal spots have fused into blackish, continuous bands (Fig. 7).

The currently used taxon *Engina fusiformis* Stearns, 1894 (described as *E. carbonaria* var. *fusiformis*) from the Gulf of California and Mexico, is a primary homonym of *E. fusiformis* Pease, 1865, and must be replaced with its next available junior synonym *E. solida* Dall, 1917.

Engina phasinola (Duclos, 1840) (Fig. 8)

1840. *Columbella phasinola* Duclos, Hist. nat. coq. univ. pl. 8, figs. 13-16.
1902. *Engina phasinola* Duclos, Pace, Proc. Malac. Soc. Lond. 5: 121.
1961. *Engina phasianola (sic)* (Duclos), Habe, Col. Ill. Shells Japan 2: 61, pl. 31, fig. 2.

TYPE LOCALITY. None.

The recent collection of specimens which conform with the depicted type-figure of *Columbella phasinola*, necessitate a separation of the similar and sympatric *Engina zatricium* Melvill, 1893. *E. phasinola* has the axial ribs studded with regular round nodules, the shell is white with chocolate-brown between the nodules which themselves are white and pale orange and the aperture is reddish-brown or purplish-brown.

Engina zatricium Melvill, 1893 (Fig. 9)

1893. *Engina zatricium* Melvill, Proc. Malac. Soc. Lond. 1: 51, textfig.; 1895 Melvill & Standen, J. Conch. 8: 106, pl. 2, fig. 4.
1971. *Engina phasinola* (Duclos), Cernohorsky, Rec. Auckl. Inst. Mus. 8: 159, fig. 79; 1972 Cernohorsky, Mar. shells Pacific 2: 144, pl. 39, fig. 5 (*non Columbella phasinola* Duclos, 1840).

TYPE LOCALITY. Lifu, Loyalty Islands.

This species differs from *E. phasinola* (Duclos) in not having distinct nodules but coarse axial ribs which are overridden by nodulose spiral cords. The colour is blackish-brown with irregular, scattered white spots and the aperture is purplish-brown in fresh specimens.

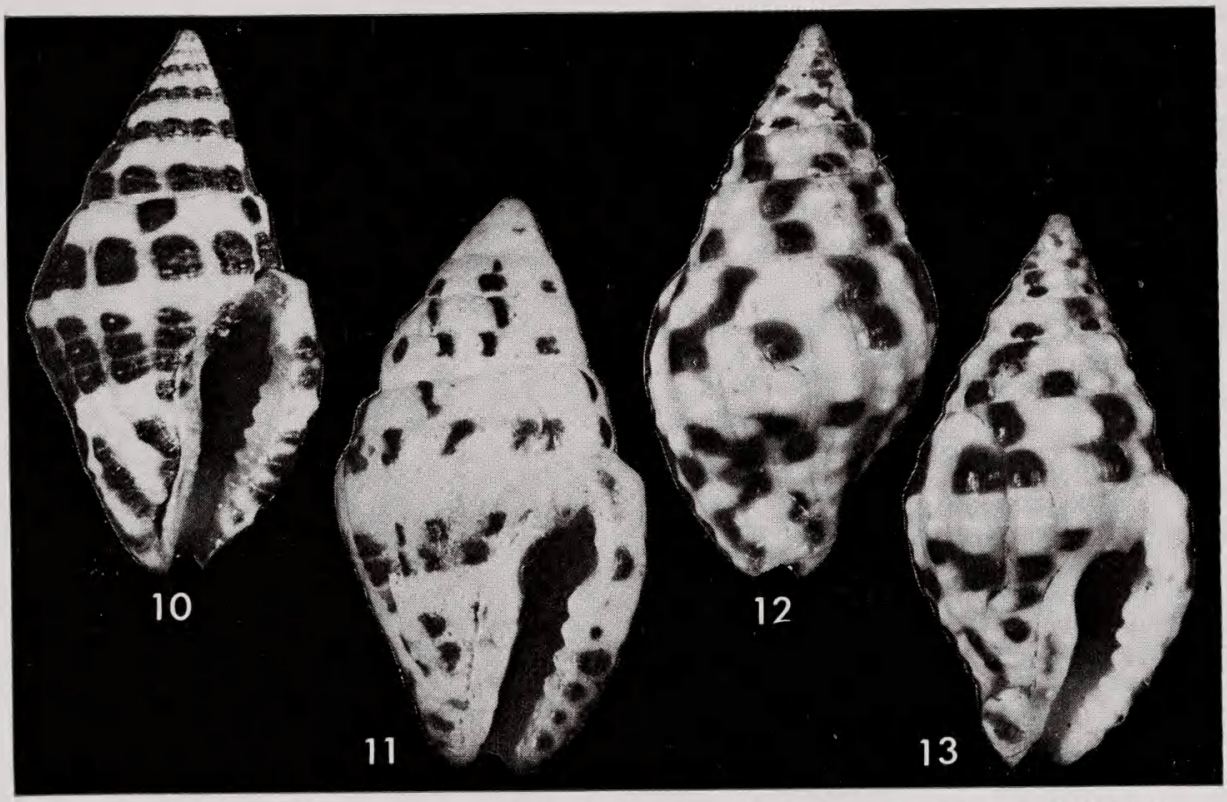
Engina siderea (Reeve, 1846) (Figs. 11-14)

1846. *Ricinula siderea* Reeve, Conch. Icon. 3: pl. 3, fig. 14; 1902 Pace, Proc. Malac. Soc. Lond. 5: 135; 1970 Cernohorsky, Bull. zool. Nomencl. 26: 233.
1880. *Ricinula (Sistrum) siderea* Reeve, Tryon, Man. Conch. 2: 190, pl. 59, fig. 276.
1933. *Engina siderea* Reeve, Dautzenberg & Bouge, J. Conchyl. 77 (2): 210.

TYPE LOCALITY. Islands of Burias and Masbate, Philippines.

The taxonomy of *Ricinula siderea* (Reeve) has remained confused since the time of its description. Originally described as a *Ricinula*, a synonymous genus in the Muricidae, it has been transferred to the Columbellidae by Tryon (1880) and has been

retained in that family by Cernohorsky (1970). In 1925 Thiele (1925) established the genus *Drupella* for a group of tropical Indo-Pacific *Morula*-like species, which included the species *Purpura elata* Blainville, 1832, *Ricinula spectrum* Reeve, 1846, *Sistrum ochrostoma* (Blainville, 1832) and "*Ricinula siderea* Reeve, 1846". He also illustrated the radula of the misidentified *R. siderea* which shows it to be the radula of the muricid *Drupa cornus* Roeding, 1798, but not of the real *R. siderea* Reeve. Thiele (*op. cit.*) did not designate a type-species for *Drupella* in his original publication but v. Ihering and Haas (1927) subsequently selected the misidentified "*Ricinula siderea* Reeve" as the type-species of *Drupella*. Examination of recently collected specimens of *Ricinula siderea* show that the species is actually an *Engina* and has a buccinid radula (Fig. 14). If the designation by v. Ihering and Haas (*op. cit.*) is allowed to stand then *Drupella* Thiele, 1925, would become a synonym of *Engina* Gray. A petition for the suppression of v. Ihering and Hass' type designation of "*Ricinula siderea* Reeve" has been lodged with the International Commission on Zoological Nomenclature (Cernohorsky, 1970).



Figs. 10-13. 10. *Engina alveolata* (Kiener); lectotype of *E. fusiformis* Pease, BMNH No. 1964309, 15.3 × 8.0 mm. 11-13. *E. siderea* (Reeve). 11. Syntype BMNH No. 1968474, 14.0 × 7.8 mm. 12, 13. Specimen from Nukuhiva, Marquesas Is, 13.2 × 7.0 mm.

The 3 syntypes of *Ricinula siderea* Reeve are in the B.M.N.H. No. 1968474, dimensions of illustrated syntype length 14.0 mm, width 7.8 mm. The syntypes are worn shells, but fresh specimens are creamy-white with some of the nodules brown, the penultimate whorl has 2 spiral rows of moderately large nodules and the body whorl *c.* 10, and the spaces between the nodules cary numerous, very fine spiral striae. The interior ledge of the columella is swollen and grooved, the anterior half of the columella has 5-6 denticles, the parietal wall 6 radially oriented lirae, the anal canal is bordered by a parietal and anal denticle and the outer lip has 5 prominent denticles. The aperture is porcellaneous-white. We have seen specimens from the Marquesas, Howland I, Cook Is and the Fiji Is.

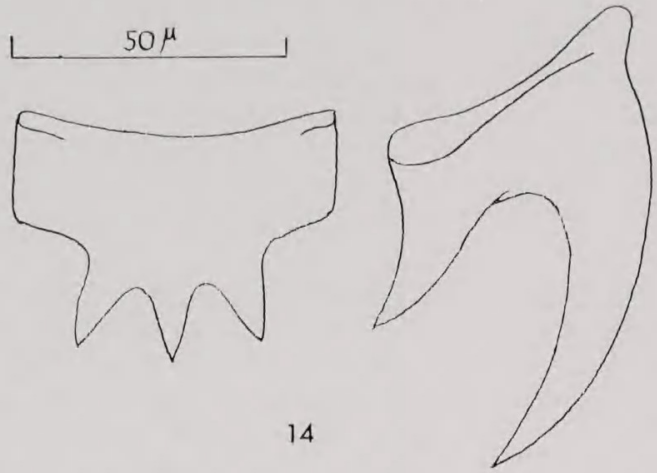


Fig. 14. Half-row of radula of *Engina siderea* (Reeve); Nukuhiva, Marquesas Is.

Engina pulchra (Reeve, 1846) (Fig. 15)

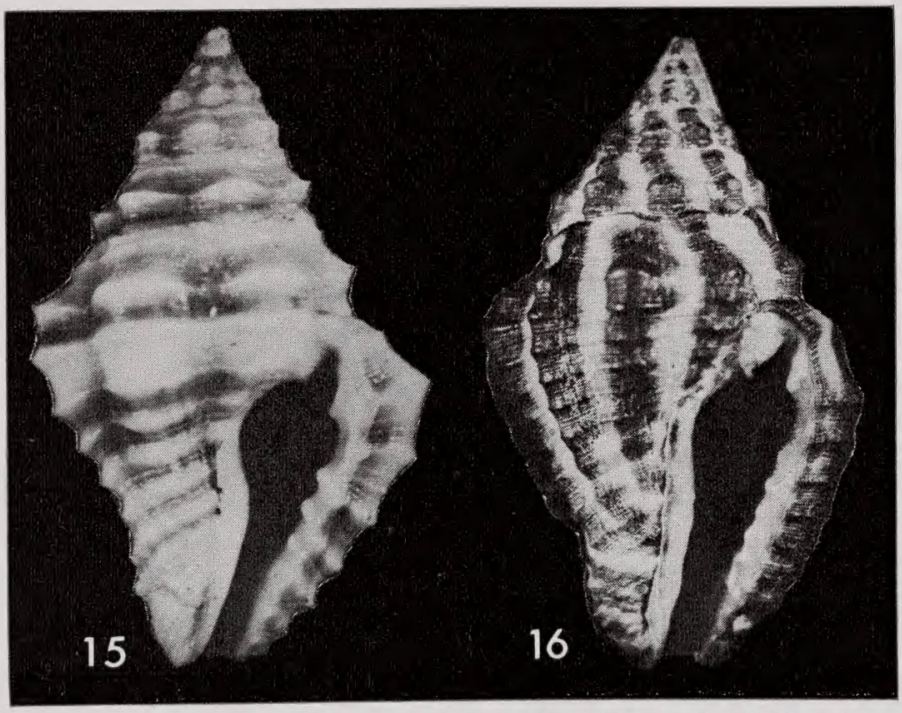
1846. *Buccinum pulchrum* Reeve, Conch. Icon. 3: pl. 11, fig. 80.

1852. *Ricinula reeviana* C. B. Adams, Ann. Lyc. Nat. Hist. New York 5: 326 (*nom. subst. pro Buccinum pulchrum* Reeve, 1846).

1883. *Engina pulchra* (Reeve), Tryon, Man. Conch. 5: 191, pl. 62, fig. 33; 1971 Keen, Sea shells trop. W. America, ed. 2: 565, textfig. 1128.

TYPE LOCALITY. Galápagos Is.

The 4 syntypes of *Buccinum pulchrum* Reeve are in the B.M.N.H. No. 1966608, dimensions of illustrated syntype length 18.0 mm, width 11.0 mm.



Figs. 15, 16. 15. *Engina pulchra* (Reeve); syntype BMNH No. 1966608, 18.0 × 11.0 mm. 16. *E. pyrostoma* (Sowerby); syntype of *Ricinula forticostata* Reeve, BMNH No. 1968479, 19.5 × 10.7 mm.

Engina pyrostoma (Sowerby, 1832) (Fig. 16)

1832. *Columbella pyrostoma* Sowerby, Proc. Zool. Soc. Lond. Pt. 2: 116.

1846. *Ricinula crocostoma* Reeve, Conch. Icon. 3: pl. 5, fig. 40 (Capul I, Philippines = error).

1846. *Ricinula forticostata* Reeve, Conch. Icon. 3: pl. 4, fig. 29 (Hab: ?).

1883. *Engina pyrostoma* (Sowerby), Tryon, Man. Conch. 5: 195; 1971 Keen, Sea shells trop. W. America ed. 2: 565, textfig. 1129.

TYPE LOCALITY. Panama and Galápagos Is.

The 3 syntypes of *Ricinula forticostata* Reeve are in the B.M.N.H. No. 1968479, dimensions of illustrated syntype length 19.5 mm, width 10.7 mm. The syntype lacks the angular outline of *Engina pyrostoma* and in shape and colour pattern resembles *E. tabogaensis* Bartsch, 1931.

Engina incarnata (Deshayes in Laborde & Linant, 1834) (Fig. 17)

1834. *Peristernia incarnata* Deshayes in Laborde & Linant, Voy. L'Arabie & Pétrée, figs. 20, 21.

1846. *Ricinula astricta* Reeve, Conch. Icon. 3: pl. 4, sp. 30 (Hab: ?).

1879. *Peristernia paulucciae:* Tapparone-Canefri, J. Conchyl. 27: 325 (Mauritius); 1880 Tapparone-Canefri, Ann. Soc. Malac. Belg. 15 (1): 71, pl. 2, figs. 14, 15 (Mauritius and Aden).

1880. *Peristernia kobeltiana* Tapparone-Canefri, Ann. Soc. Malac. Belg. 15 (1): 72, pl. 3, figs. 17, 18 (Mauritius) (*non. P. kobeltiana* T.-C., 1879).

1907. *Engina astricta* (Reeve), Schepman, Samml. geol. Reichs-Mus. Leiden (1), 8: 173 (Post-Tertiary of Celebes).

1971. *Engina incarnata* (Deshayes in L. & L.), Cernohorsky, Rec. Auckl. Inst. Mus. 8: 161, figs. 80, 81.

TYPE LOCALITY. Red Sea.

The 3 syntypes of *Ricinula astricta* Reeve are in the B.M.N.H. No. 1968480, dimensions of illustrated syntype length 16.6 mm, width 8.4 mm. For a detailed discussion on *E. incarnata* see Cernohorsky (1971).

Engina fuscolineata E. A. Smith, 1913 (Figs. 18, 19)

1913. *Engina fuscolineata* E. A. Smith, Ann. Mag. Nat. Hist. (8) 12: 413, pl. 9, fig. 1.

TYPE LOCALITY. Henderson I (= Pitcairn I group, Polynesia).

The holotype is in the B.M.N.H. No. 1913.7.28.107., length 8.9 mm, width 4.3 mm. This small species is sculptured with 15 axial ribs on the penultimate and 15 ribs on the body whorl, the axial ribs are constricted below the suture by a shallow groove and spiral sculpture consists of grooves and striae. The outer lip, apart from the bordering anal denticle, has 5 prominent denticles, the columella has 4 denticles, some radial lirae on the parietal wall and a grooved swelling on the interior ledge of the columella. It is white in colour, ornamented with brown axial streaks between axial ribs.

The species is similar to *E. siderea* (Reeve) and has the same sculpture of centrally constricted whorls which produce 2 rows of nodules on the spire whorls. The sculpture in *E. fuscolineata* is finer, the spiral striae more distinct and the blackish-brown blotches upon the nodules in *E. siderea* are replaced by blackish-brown streaks between the nodules in *E. fuscolineata.*

Engina layardi Melvill, 1895 (Fig. 20)

1895. *Engina layardi* Melvill, Proc. Malac. Soc. Lond. 1: 227, pl. 14, fig. 15.

TYPE LOCALITY. Ceylon.

The 3 syntypes are in the B.M.N.H., dimension of illustrated syntype length 10.4 mm, width 4.5 mm. The species is very similar to *E. anakisia* (Duclos, 1840), has obsolete axial ribs, 3 spiral cords on the penultimate and 16 on the body whorl, the outer lip is plicate on the edge and denticulate and the columella is lirate on the parietal wall. It is white in colour, some nodules are brown, interspaces between the outer lip plicae brown.

Engina menkeana (Dunker, 1860) (Fig. 21)

1860. *Cantharus (Pollia) menkeana* Dunker, Malakozool. Blaetter 6: 222.
1861. *Cantharus menkeanus* Dunker, Moll. Japon. p. 7, pl. 1, fig. 7.
1882. *Pollia menkeana* Dunker, Ind. Moll. Mar. Japon. p. 18.
1895. *Tritonidea (Cantharus) menkeana* Dkr., Pilsbry, Cat. Mar. Moll. Jap. p. 33.
1901. *Tritonidea submenkeana* Pilsbry, Proc. Acad. Nat. Sci. Philad. 53: 387, pl. 21, fig. 24 (Hirado, Hizen, W. Kiusiu, Japan).
1943. *Engina menkeana* (Dunker), Habe, Jap. J. Malac. 13: 70, pl. 4, fig. 6 (radula).
1961. *Enzinopsis menkeana* (Dunker), Habe, Col. Ill. shells Japan 2: 61, pl. 31, fig. 3; 1971 Kuroda & Habe, Sea shells Sagami Bay, p. 166, pl. 44, fig. 7.

TYPE LOCALITY. Decima (= Dejima, Nagasaki City, Kyushu, Japan).

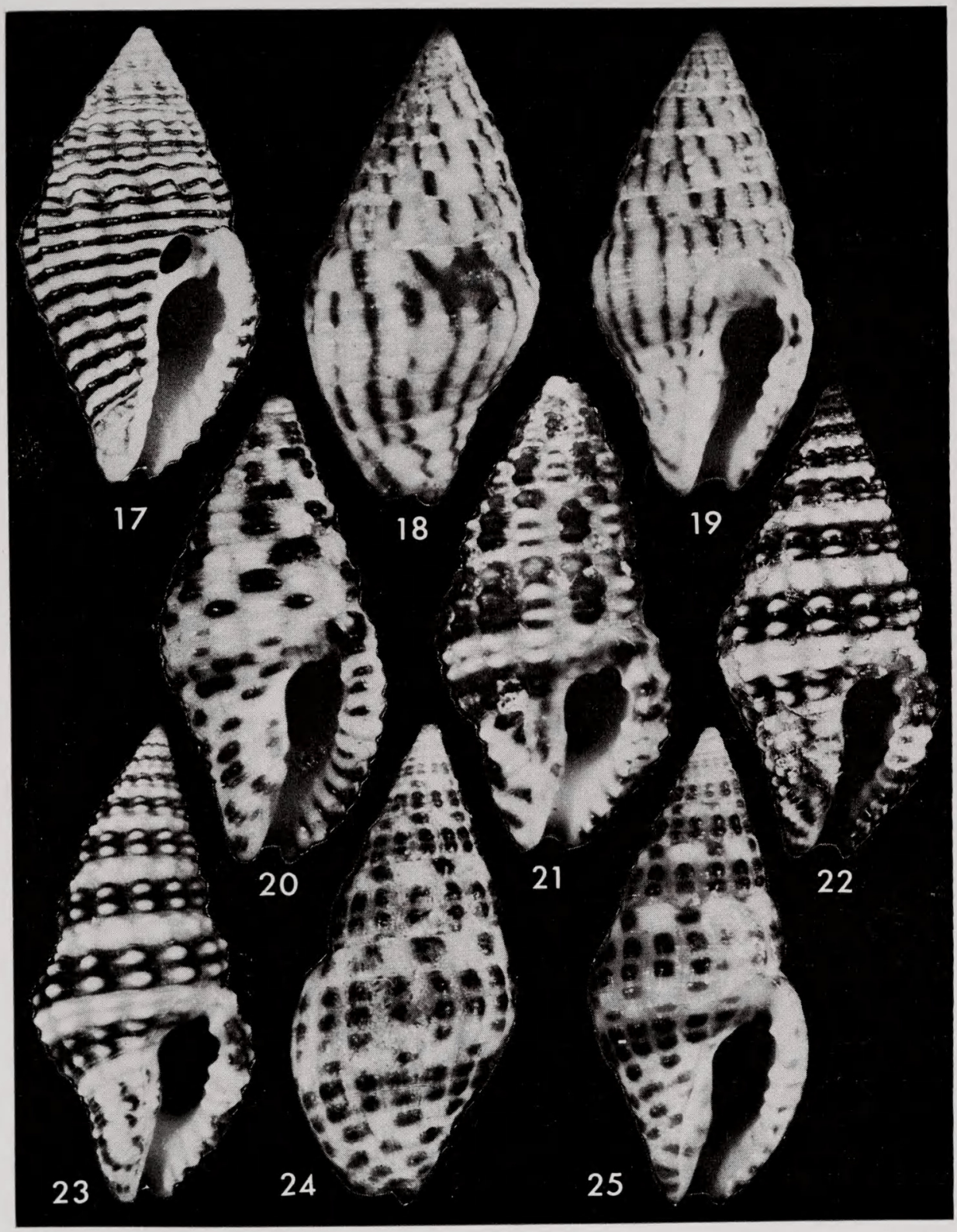
The species has a sculpture of coarse, nodulose axial ribs, 3-4 spiral rows of nodules on the penultimate and 10-11 on the body whorl, interspaces with fine spiral striae, 1 anal and 6 denticles on the outer lip, 3 denticles on the anterior of the columella, 4-6 radially placed lirae and a denticle on the parietal wall. It is white in colour, some nodules are brown, the anal canal and interspaces of denticles on the outer lip are stained with brown.

Engina concinna (Reeve, 1846) Figs. 22, 23)

1846. *Ricinula concinna* Reeve, Conch. Icon. 3: pl. 5, fig. 35.
1883. *Engina concinna* Reeve, Tryon, Man. Conch. 5: 194, pl. 63, fig. 54.

TYPE LOCALITY. Cagayan, Mindanao I, Philippines.

The 3 syntypes are in the B.M.N.H. No. 1968466, dimensions of illustrated syntype length 15.0 mm, width 6.4 mm. The species is sculptured with regular axial ribs, 4 spiral rows of laterally elongated nodules on the penultimate and 10-12 rows on the body whorl and very fine intermediate spiral striae. The outer lip has 6 prominent denticles, the columella 3-5 denticles, the parietal wall 6 radial lirae, the interior ledge a protruded swelling, and the anal canal is bordered by a parietal and anal denticle. It is white in colour, ornamented with dark brown bands which contain 2 spiral rows of white odules. The specimen illustrated from Broome, West Australia (Fig. 23) has a tilted spire due to an injury on the fifth post-embryonic whorl.



Figs. 17-25. 17. *Engina incarnata* (Deshayes in L. & L.); syntype of *Ricinula astricta* Reeve, BMNH No. 1968480, 16.6 × 8.4 mm. 18, 19. *E. fuscolineata* E. A. Smith; holotype BMNH No. 1913.7.28.107., 8.9 × 4.3 mm. 20. *E. layardi* Melvill; syntype BMNH, 10.4 × 4.5 mm. 21. *E. menkeana* (Dunker); specimen from Fukura, Japan, 11.0 × 5.2 mm. 22, 23. *E. concinna* (Reeve). 22. Syntype BMNH No. 1968466, 15.0 × 6.4 mm. 23. Specimen from Broome, W. Australia, 16.0 × 7.3 mm. 24, 25. *E. natalensis* Melvill; syntype BMNH, 11.6 x 5.3 mm.

Engina natalensis Melvill, 1895 (Figs. 24, 25)

1858. *Buccinum perlatum* Küster, Syst. Conch.-Cab. Mart. Chemnitz ed. 2, 3 (14): 61, pl. 12, figs. 5, 6 (*non* Conrad, 1833).

1895. *Engina natalensis* Melvill, Proc. Malac. Soc. Lond. 1: 226, pl. 14, fig. 12.

1903. *Engina perlata* (Küster), E. A. Smith, Proc. Malac. Soc. Lond. 5: 372; 1959 Barnard, Ann. Sth. Afric. Mus. 45 (1): 149; 1973 Kensley, Sea-shells Sth Africa p. 154, textfig. 568 (figure 560 given in error).

TYPE LOCALITY. Natal, South Africa.

The 4 syntypes of *E. natalensis* are in the B.M.N.H., dimensions of illustrated syntype (marked with an "X") length 11.6 mm, width 5.3 mm. The shell is white with reddish-brown nodules. The species is known in current South African literature as *Engina perlata,* but *Buccinum perlatum* Küster, 1858, being a primary homonym of the American fossil *B. perlatum* Conrad, 1833, will have to be substituted with *Engina natalensis* Melvill.

Engina armillata (Reeve, 1846) (Figs. 26, 27)

1846. *Ricinula armillata* Reeve, Conch. Icon. 3: pl. 6, fig. 47.

1883. *Engina armillata* Reeve, Tryon, Man. Conch. 5: 194, pl. 63, fig. 59.

1972. *Engina (Engina) armillata* (Reeve), Ponder, J. Malac. Soc. Aust. 2 (3): 256, textfig. 9 (radula).

TYPE LOCALITY. Island of Ticao, Philippines.

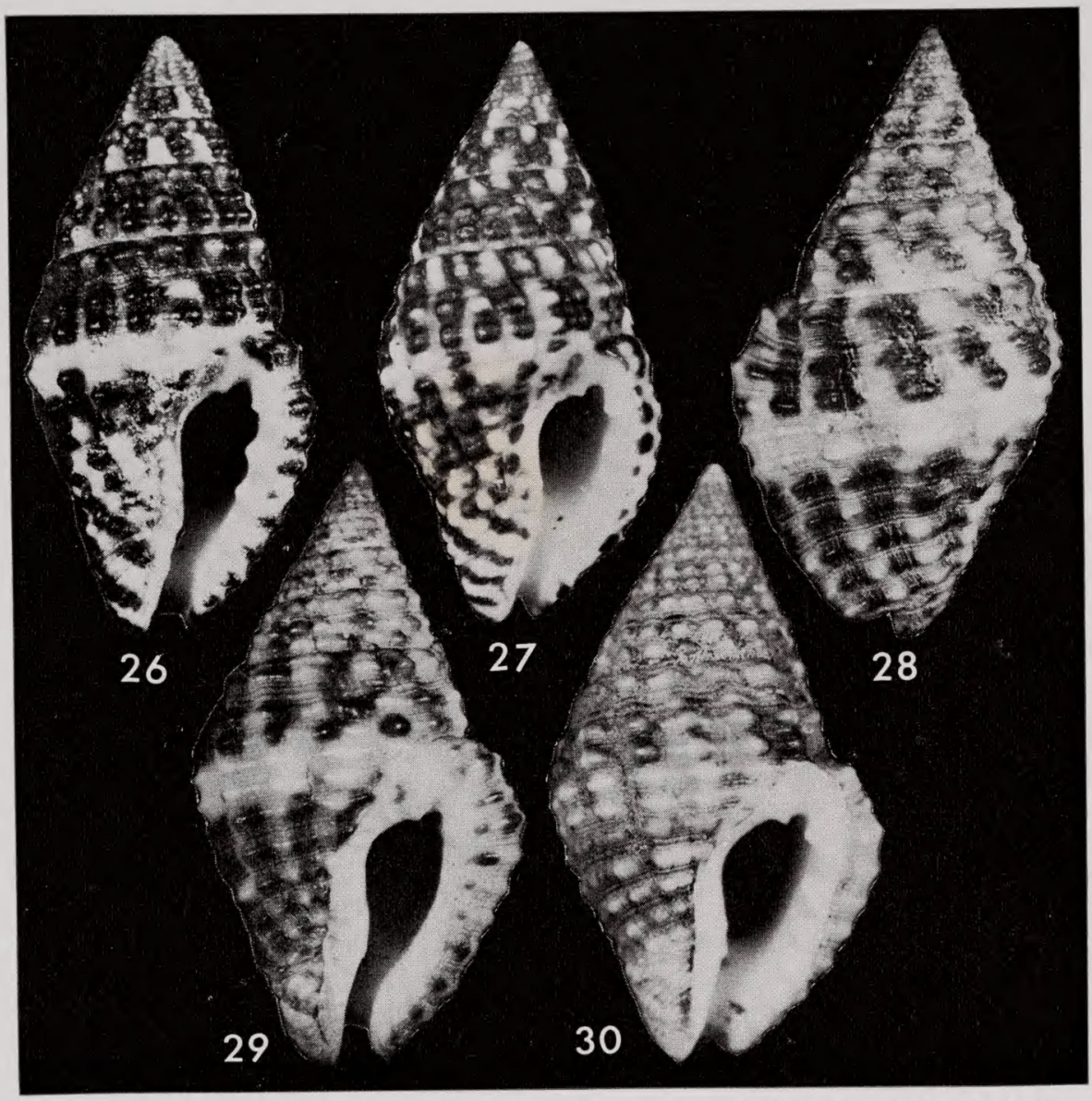
The 4 syntypes are in the B.M.N.H. No. 1968459, dimensions of illustrated syntype length 13.2 mm, width 6.5 mm. The species is dark brown in colour with a white median band on the body whorl, whitish interspaces and nodules coloured white or pale brown. Sculpture consists of 3 spiral rows of nodules on the penultimate and *c.* 12 rows on the body whorl. The interior ledge of the columella is protruding and smooth, the columella has *c.* 5 prominent denticles, 5-6 radial lirae on the parietal wall, the anal canal is bordered by a parietal and anal denticle and the outer lip is denticulate. The aperture is white.

Engina zea Melvill, 1893 (Figs. 28-30)

1893. *Engina zea* Melvill, Mem. Proc. Manch. Lit. Soc. 7: 55, fig.; 1901 Melvill & Standen, Proc. Zool. Soc. Lond. p. 416 (Karachi; Bombay; Ceylon; Aden; Persian Gulf).

TYPE LOCALITY. Bombay, India.

The holotype of *E. zea* is in the B.M.N.H. No. 1893.2.16.5., length 16.6 mm, width 9.2 mm. The species is similar in sculpture and ornamentation to *E. armillata* (Reeve), especially the pale colour-forms, but is broader and has a more solid, slightly angulate outer lip. As in *E. armillata, E. zea* has 3 spiral rows of nodules on the penultimate and 10-11 on the body whorl and the interspaces are sculptured with very fine spiral striae.



Figs. 26-30. 26, 27. *Engina armillata* (Reeve). 26. Syntype BMNH No. 1968459, 13.2 × 6.5 mm. 27. Specimen from Keppell Bay, Qld., Australia, 15.0 × 7.2 mm. 28-30. *E. zea* Melvill. 28, 29. Holotype BMNH No. 1893.2.16.5., 16.6 × 9.2 mm. 30. Specimen from Bombay, India, USNM, 16.1 × 9.0 mm.

Engina curtisiana (E. A. Smith, 1884) (Figs. 31-34)

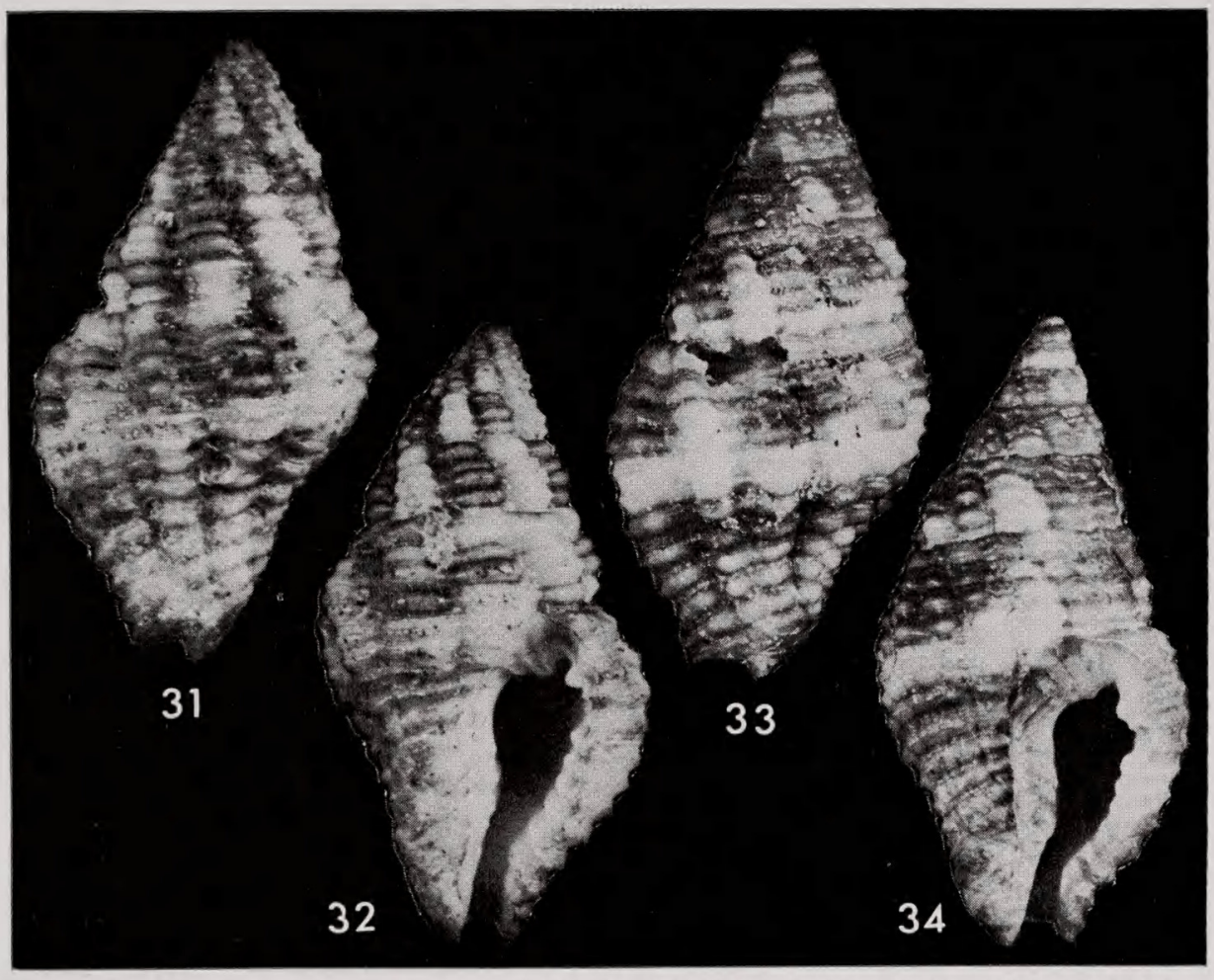
1884. *Tritonidea curtisiana* E. A. Smith, Rept. Zool. Coll. voy. H.M.S. "Alert", p. 47, pl. 5, fig E.

1895. *Engina sinensis* Melvill, Proc. Malac. Soc. Lond. 1: 227, pl. 14, fig. 14 (China Seas); 1895 Melvill & Standen, J. Conch. 8: 106, pl. 3, fig. 27 (Lifu, Loyalty Is); 1911 Schepman, Siboga-Exped. 49d: 307 (Indonesia, 9-45 m); 1942 Yen, Proc. Malac. Soc. Lond. 24: 229, pl. 23, fig. 159 (figd. syntype).

TYPE LOCALITY. Port Curtis, Queensland, Australia, 1-11 fathoms (2-20 m).

The holotype of *Tritonidea curtisiana* E. A. Smith is in the B.M.N.H. No. 1881.11.10.136., length 13.7 mm, width 7.3 mm. The 2 syntypes of *Engina sinensis* Melvill, B.M.N.H., dimensions of illustrated syntype length 11.0 mm, width 5.4 mm, are the same specis as *E. curtisiana*. The species is sculptured with coarse axial ribs

which number from 9-13 on the penultimate and from 8-10 on the body whorl; spiral cords, which produce laterally elongated nodules, encircle the shell and number 4 on the penultimate and 13-15 on the body whorl. The outer lip has 6 distinct denticles, the columella has 4-5 denticles and *c.* 6 radial lirae on the parietal wall and the anal canal is bordered by a parietal and anal denticle. It is reddish-brown in colour, ornamented with a white median band on the body whorl, with the occasional axial ribs also white.



Figs. 31-34. *Engina curtisiana* (E. A. Smith). 31, 32. Holotype BMNH No. 1881.11.10.136., 13.7 ×7 .3 mm. 33, 34. Syntype of *E. sinensis* Melvill, BMNH, 11.0 × 5.4 mm.

Engina lanceolata (Kuroda & Habe, 1971) from Japan is rather similar to *E. curtisiana* in sculpture, form and colour-pattern.

Engina obliquicostata (Reeve, 1846) (Figs. 35-38)

1846. *Buccinum obliquicostatum* Reeve, Conch. Icon. 3: pl. 12, fig. 91.

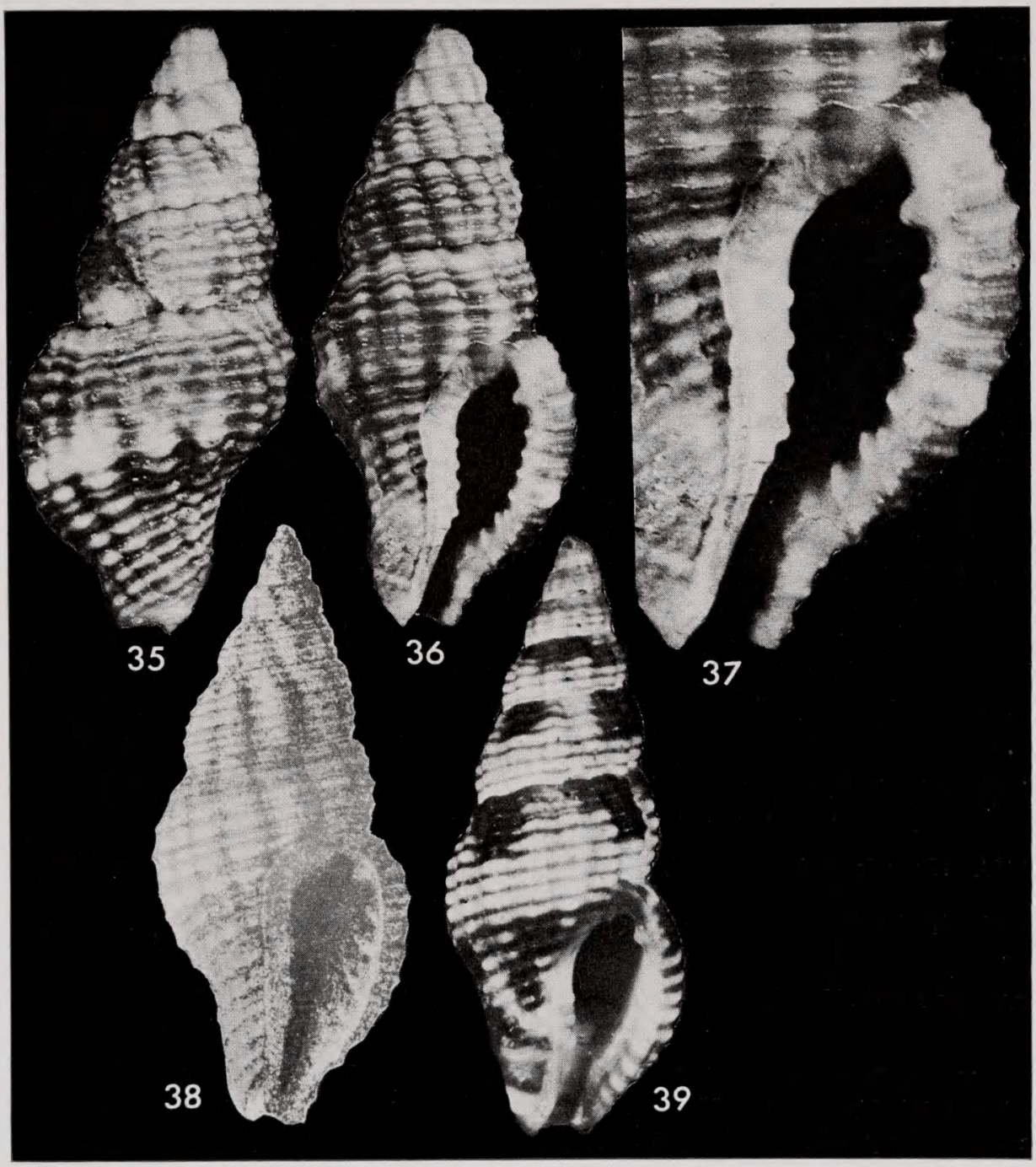
1880. *Tritonidea obliquecostata (sic)* Reeve, Tapparone-Canefri, Ann. Soc. Malac. Belg. 15 (1): 64.

1880. ? *Tritonidea proxima* Tapparone-Canefri, Ann. Soc. Malac. Belg. 15 (1): 64, pl. 3, figs. 9, 10 (Mauritius).

1881. *Cantharus obliquecostatus (sic)* Reeve, Tryon, Man. Conch. 3: 161, pl. 74, figs. 277, 278.

TYPE LOCALITY. Island of Ticao, Philippines.

The holotype of *B. obliquicostatum* is in the B.M.N.H., length 14.6 mm, width 6.2 mm. The species is sculptured with moderately broad, oblique axial ribs which number 13 on the penultimate and 10 on the body whorl and prominent nodulose spiral cords which number from 6-7 on the penultimate and *c.* 20 on the body whorl. The outer lip is thickened and has 7 distinct denticles and a larger anal denticle, columella is calloused, anteriorly with 4-6 denticles and 6 radial lirae on the parietal wall. It is reddish-brown in colour with a white median band on the body whorl and whitish sutures and nodules.



Figs. 35-39. 35-38. *Engina obliquicostata* (Reeve). 35, 36. Holotype BMNH, 14.6 × 6.2 mm. 37. Aperture enlarged. 38. Type-figure of *Tritonidea proxima* Tapparone-Canefri, 13.0 mm (from T.-C. 1880, pl. 3, fig. 9). 39. *Engina australis* (Pease); specimen from Sydney, N.S.W., Australia, 14.4 × 5.3 mm.

The species is a typical fusiform *Engina* with a distinctly lirate parietal callus. The species *Pisania (Prodotia) obliquicostata* Ponder, 1972, is the species *Cantharus (Prodotia) iostomus* (Gray in Griffith & Pidgeon).

Engina australis (Pease, 1871) (Fig. 39)

1867. *Cantharus (Tritonidea) assimilis* Angas, Proc. Zool. Soc. Lond. p. 187 (*non Buccinum assimile* Reeve, 1846 = *Cantharus (Pollia)*).

1871. *Tritonidea australis* Pease, Amer. J. Conch. 7 (1): 21 (*nom. subst. pro Cantharus (Tritonidea) assimilis* Angas, 1867).

1881. *Cantharus australis* Pease, Tryon, Man. Conch. 3: 161, pl. 73, fig. 269.

1882. *Pollia australis* Pease, Kobelt, Jahrb. deut. Malak. Gesell. 9 (1): 21.

1917. *Maculotriton australis* Pease, Hedley, Proc. Linn. Soc. N.S.W. 41 (4): 711, pl. 50, figs. 28-30 (animal. operculum and radula); 1962 Macpherson & Gabriel, Mar. Moll. Victoria p. 176, fig. 211.

1972. *Engina (Engina) australis* (Pease), Ponder, J. Malac. Soc. Aust. 2 (3): 250, pl. 24, figs. 1, 2, textfig. 12 (radula), figs. 15, 16, 24 (protoconch and operculum).

TYPE LOCALITY. Watson Bay, New South Wales, Australia.

A description of the species has been given by Ponder (1972). Hedley's (1917) illustration of the radula shows an *Engina*-like lateral with a long, slender outer cusp, but the cutting edge of the inward-facing inner cusp is denticulate as in *Cantharus*.

Couturier (1907) and Dautzenberg & Bouge (1933) report the species from the Gambier Is, Polynesia. A misidentification is suspected since *E. australis* occurs only in S.E. Australia.

Engina farinosa (Gould, 1850) (Figs. 40-42)

1850. *Buccinum (Pollia) farinosum* Gould, Proc. Bost. Soc. Nat. Hist. 3: 152; 1852 Gould. U.S. Expl. Exped. 12: 255, pl. 19, figs. 323, 323a; 1964 Johnson, U.S. Nat. Mus. Bull. 239: 75.

1860. *Hindsia angicostata* Pease, Proc. Zool. Soc. Lond. p. 142 (Sandwich Is = Hawaiian Is); 1965 Kay, Bull. Brit. Mus. (Nat. Hist.) Zool. Suppl 1: 16, pl 1, figs. 15, 16 (figd. lectotype).

1868. *Nassaria farinosa* Gould, Pease, Amer. J. Conch. 4 (3): 109 (*Hindsia angicostata* placed in synonymy).

1883. *Engina farinosa* Gould, Tryon, Man. Conch. 5: 192, pl. 62, fig. 40.

TYPE LOCALITY. Kauai, Sandwich Is = Hawaiian Is.

The holotype of *B. farinosum* Gould is in the National Museum of Natural History, Washington, No. USNM 5719, length 15.0 mm, width 8.0 mm. The species is cream or very light brown in colour, ornamented with brown in the interspaces of the spiral threads upon the axial ribs. The sculpture consists of broad axial ribs, sharp and thin spiral cords and fine striae in the interspaces. The outer lip has 5 denticles in addition to the anal denticle, the anterior half of the columella is noduled and the expanding parietal callus is plicate.

Engina egregia (Reeve, 1844) (Fig. 43)

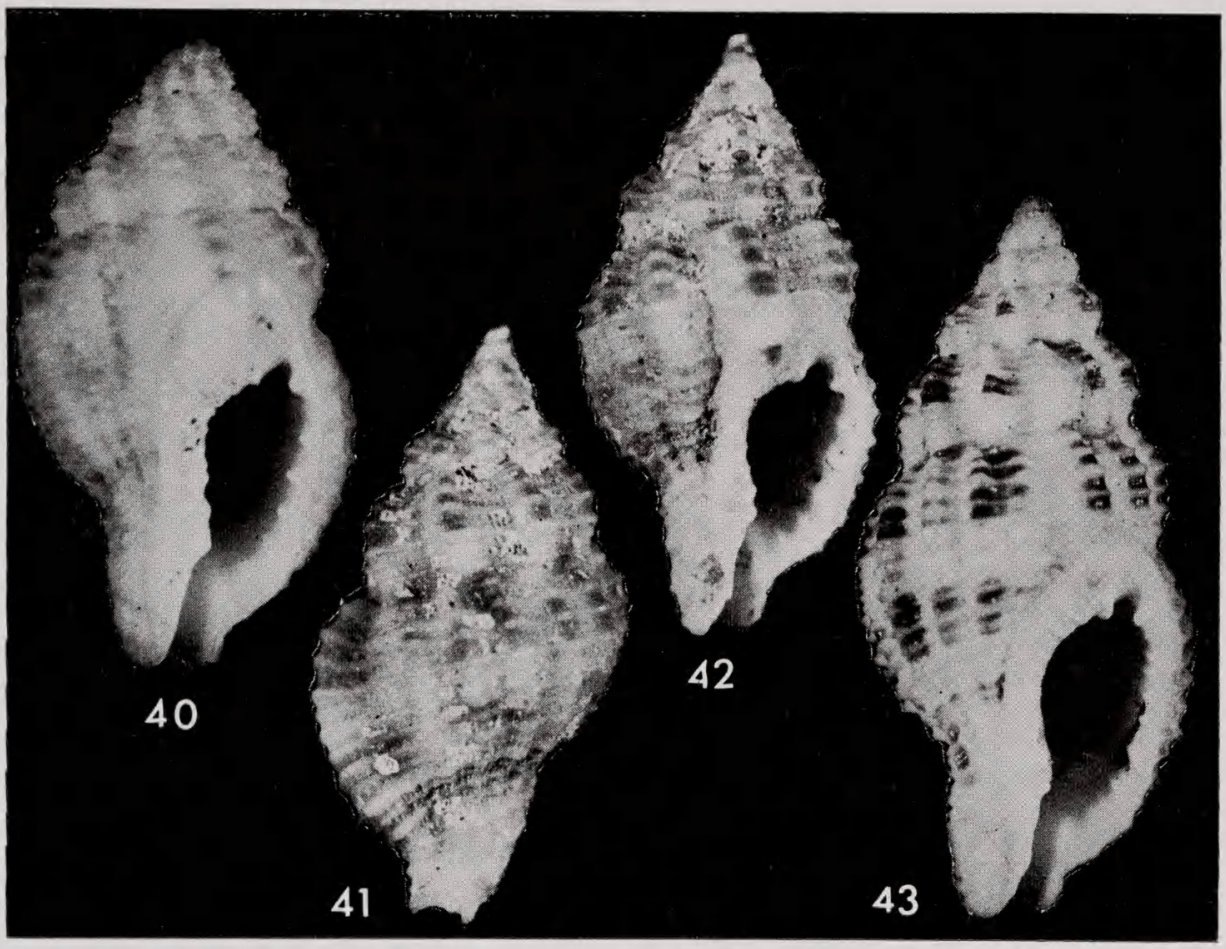
1844. *Triton egregius* Reeve, Conch. Icon. 2: pl. 18, fig. 78.

1881. *Nassaria egregia* Tryon, Man. Conch. 3: 222, pl. 84, fig. 553.

1907. *Tritonidea egregia* Reeve, Schepman, Samml. geol. Reichs-Mus. Leiden (1), 8: 173 (Post-Tertiary of Celebes).

1950. *Phos amoenus* Schwengel, Nautilus, 63 (3): 81, pl. 5, fig. 4 (Mbega I = Beqa I, Fiji Is).

TYPE LOCALITY. Island of Masbate, Philippines.



Figs. 40-43. 40-42. *Engina farinosa* (Gould). 40. Holotype USNM No. 5719, 15.0 × 8.0 mm. 41, 42. Specimen from the Hawaiian Is, USNM, 14.7 × 7.4 mm. 43. *Engina egregia* (Reeve); syntype BMNH No. 1967643, 17.2 × 8.0 mm.

The 3 syntypes are in the B.M.N.H. No. 1967643, dimensions of illustrated syntype length 17.2 mm, width 8.0 mm. The shell is sculptured with 12 axial ribs and 8 sharp cords on the penultimate and 11 ribs and 16 cords on the body whorl. The columella has 10 plicae and 12 denticles are on the outer lip. It is creamy-white in colour, ornamented with reddish-brown lines on and between the ribs.

Engina farinosa and *E. egregia* show a marked departure in shell-form from typical *Engina* but the apertural features conform to those of *Engina*. The West American *Buccinum cinis* Reeve, 1846, may possibly belong in the same group as *E. farinosa* and *E. egregia*.

Genus **Pisania** Bivona, 1832

Pisania Bivona, 1832, Effem. Sci. Lett. Sicil. Palermo 2: 8. Type species (Opinion 740 of I.C.Z.N.) *P. striatula* Bivona, 1832 = *Voluta striata* Gmelin, 1791. Recent, Mediterranean.

1832. *Proboscidea* Schmidt in Moeller, Isis, col. 131. Type species by M *P. ignea* = *Buccinum igneum* Gmelin, 1791 (non Bruguière, 1791; nec Spix, 1824). Recent, Indo-Pacific.

1848. *Ecmanis* Gistl, Nat. Thierr. Schulen, p. 10. Type species (art. 67 (i) of I.C.Z.N.) *Buccinum igneum* Gmelin, 1791 (*nom. subst. pro Proboscidea* Schmidt in Moeller, 1832).

1850. *Polliana* E. M. Gray, Figs. Moll. Anim. 5: 67 (equated with *Pisania* Bivona).

1904. *Taeniola* Dall, Smiths. Misc. coll. 47: 137. Type species by OD *Triton decollatus* Sowerby, 1833 (*non* Pallas, 1760). Recent, Pacific.

1929. *Appisania* Thiele, Handb. syst. Weicht. p. 314. Type species by M *Metula (Appisania) montrouzieri* Crosse, 1862 = *Buccinum facsiculatum* Reeve, 1846. Recent, Indo-Pacific.

1966. *Sukunaia* Cernohorsky, Veliger, (9) (2): 229. Type species by OD *S. jenningsi* Cernohorsky, 1966. Recent, Pacific.

The thin, more fragile shell, wider aperture and obsolete denticles on the outer lip are in themselves of insufficient diagnostic value to retain the monotypic genus *Ecmanis* Gistl as a valid subgeneric group, and in agreement with Ponder (1972) *Ecmanis* is synonymised with *Pisania* Bivona. Ponder (*op. cit.*) suggested that *Taeniola* Dall, 1904, could hold subgeneric rank, but all the differentiating characters listed by Ponder (*op. cit.*) are also present in species of *Pisania*. *Taeniola* Dall is unavailable, being a primary homonym of *Taeniola* Pallas, 1760.

Pisania (Pisania) fasciculata (Reeve, 1846) (Fig. 44)

1846. *Buccinum fasciculatum* Reeve, Conch. Icon. 3: pl. 10, fig. 76.

1855. *Pisania crenilabrum* A. Adams, Proc. Zool. Soc. Lond. for 1854, Pt. 22: 138 (West Indies = error); 1971 Cernohorsky, Rec. Auckl. Inst. Mus. 8: 138, figs. 3-9, 18, 30 (figd. lectotype).

1862. *Pisania montrouzieri* Crosse, J. Conchyl. 10: 251, pl. 10, fig. 5 (New Caledonia).

1901. *Pisania delicatula* Sowerby, J. Malac. 8: 101, pl. 9, fig. 2 (Bird I, Pacific).

1968. *Appisania sugimotoi* Habe, Jap. J. Malac. 27 (3): 85, textfig. 1 (Okinoshima, near Cape Ashizuri, Shikoku, Japan).

1972. *Pisania (Pisania) fasciculata* (Reeve), Ponder, J. Malac. Soc. Aust. 2 (3): 261, pl. 25, fig. 2, textfigs. 4, 20, 21.

TYPE LOCALITY. Island of Mindanao, Philippines.

It was pointed out (Cernohorsky, 1971) that intergrading specimens connecting *P. fasciculata* with *P. crenilabrum* have been observed from Tonga, Fiji and N.E. Australia. Ponder (1972) observed the same variation and also suggested that *P. delicatula* Sowerby, 1901, from Bird I, Pacific, is synonymous with *P. fasciculata*. Examination of the holotype of *P. delicatula*, B.M.N.H. No. 1902.5.28.20, length 16.4 mm, width 6.3 mm, shows the species to be a worn, faded and immature specimen of *P. fasciculata*. The label accompanying the holotype reads "Bird I, Coral Sea".

Pisania (Pisania) hermannseni A. Adams, 1855 (Figs. 45, 46)

1855. *Pisania (Pisania) hermannseni* A. Adams, Proc. Zool. Soc. Lond. for 1854, Pt. 22: 138, pl. 28, fig. 7; 1881 Tryon, Man. Conch. 3: 146, pl. 71, fig. 199; 1942 Yen, Proc. Malac. Soc. Lond. 24: 230, pl. 23, fig. 161 (figd holotype).

TYPE LOCALITY. China.

The holotype is in the B.M.N.H. No. 1967930, dimensions length 38.6 mm, width 15.5 mm. The shell is worn smooth apart from 12 spiral cords on the lower third of the body whorl, the columella is smooth and the outer lip is prominently denticulate. The shell has obviously faded since the original illustration was published and is now yellowish-white with traces of a brown pattern. The present author has seen no report of recently collected specimens of this species.

Pisania (Pisania) lirocincta Sowerby, 1910 (Fig. 47)

1910. *Pisania lirocincta* Sowerby, Proc. Malac. Soc. Lond. 9: 65, textfig.

TYPE LOCALITY. None.

The holotype is in the B.M.N.H. No. 1910.9.30.10., length 33.7 mm, width 15.2 mm. The early whorls are clathrate, penultimate whorl with 6 strong cords, body whorl with 17 cords, columella smooth apart from a parietal and a terminal denticle, outer lip denticulate and lirate. It is creamy-yellow in colour, streaked and blotched with brown.

The species is similar in form to *Pisania ignea* (Gmelin, 1791) and *P. tritonoides* (Reeve, 1846), but differs from both in features of strong spiral cords. No recent shells of the species have been seen and the species apparently remains unlocalised.

Subgenus **Jeannea** Iredale, 1912

Jeannea Iredale, 1912, Proc. Malac. Soc. Lond. 10: 220. Type species by OD *J. hedleyi* Iredale, 1912. Recent, S.W. Pacific.

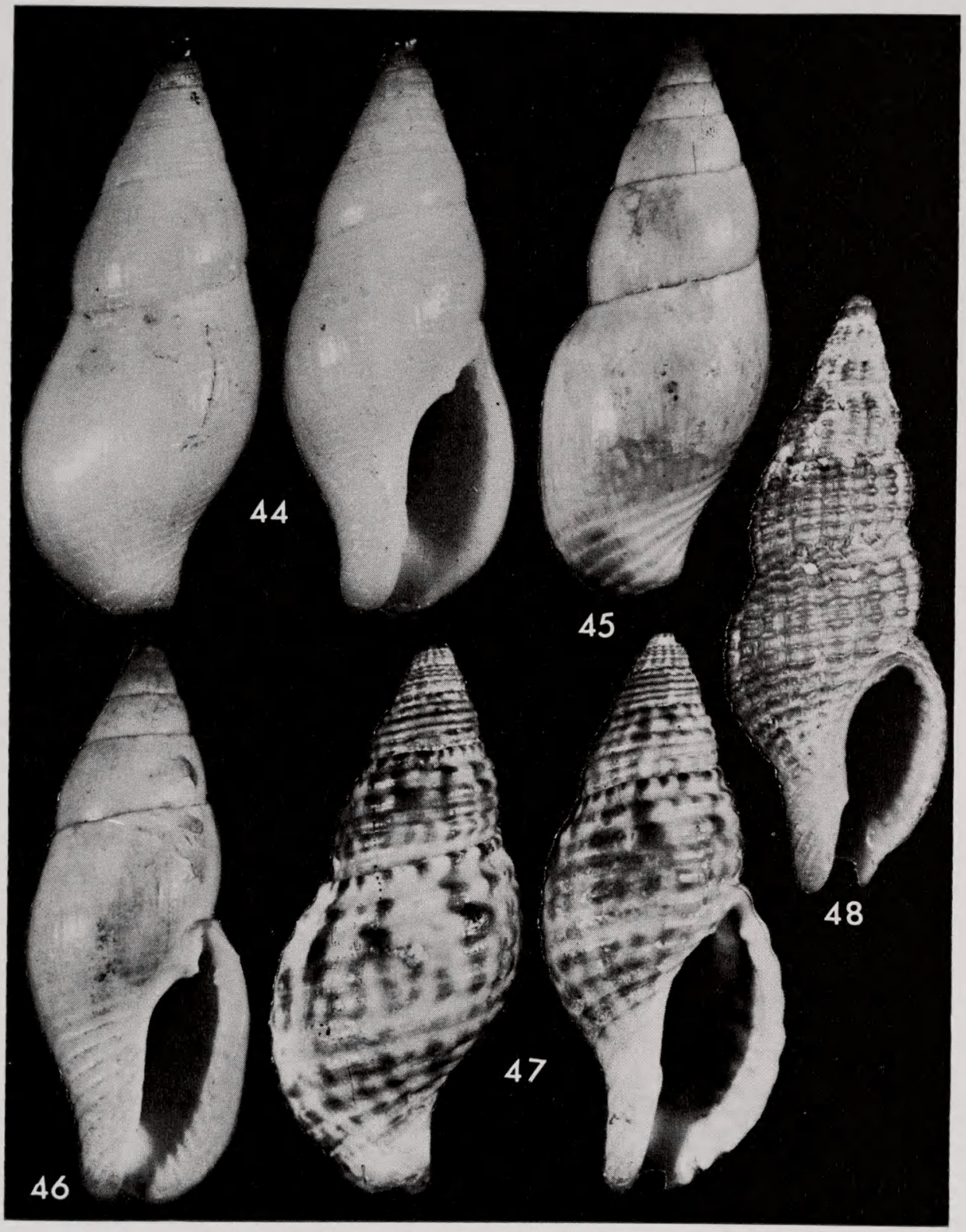
Pisania (Jeannea) gracilis (Sowerby, 1859) (Fig. 48)

1859. *Phos gracilis* Sowerby, Thes. Conchyl. 3: 91, pl. 222, fig. 33.
1915. *Maculotriton gracilis* (Sowerby), Hedley, Proc. Linn. Soc. N.S.W. 39: 733, pl. 84, fig. 79.
1972. *Engina* ? *gracilis* (Sowerby), Ponder, J. Malac. Soc. Aust. 2 (3): 254, pl. 24, fig. 3.

TYPE LOCALITY. Sydney, New South Wales, Australia.

The holotype of *P. gracilis* is in the B.M.N.H., length 14.5 mm, width 5.4 mm. The type is brown in colour, the penultimate whorl has 16 axial ribs and 8 spiral cords, body whorl 12 axial ribs. The columella appears smooth, but under magnification a very shallow groove cuts across the anterior of the concave columella a short distance above the anterior terminal denticle. It may have been this feature which prompted the describer to place *gracilis* in *Phos*.

Pisania (Jeannea) gracilis is similar in shell features to *Jeannea*, and does not bear any traces of radially oriented raised lirae on the parietal wall as do species of *Engina*. *Pisania (Jeannea) unicolor* (Angas, 1867) is usually separated from *P. (J.) gracilis* on the basis of 1 more spiral cord (7-8 in *gracilis* and 9-11 in *unicolor*) and the stouter, slightly broader shell, weaker axial ribs and less convex whorls in *P. (J.) unicolor*. Further study into the relationship of the two species is clearly indicated, since these minor differentiating characters are greatly exceeded by the range of individual variation in the Buccinidae.



Figs. 44-48. 44. *Pisania fasciculata* (Reeve); holotype of *P. delicatula* Sowerby, BMNH No. 1902.5.28.20., 16.4 × 6.3 mm. 45, 46. *P. hermannseni* A. Adams; holotype BMNH No. 1967930, 38.6 × 15.5 mm. 47. *P. lirocincta* Sowerby; holotype BMNH No. 1910.9.30.10., 33.7 × 15.2 mm. 48. *P. gracilis* (Sowerby); holotype BMNH, 14.5 × 5.4 mm.

Genus **Caducifer** Dall, 1904

Caducifer Dall, 1904, Smiths. Misc. coll. 47: 136. Type species by OD *Triton truncatus* Hinds, 1844. Recent, Indo-Pacific.

Authors hold different opinions on the inter-relationship of *Caducifer* and *Monostolium* with other buccinid genera. Cernohorsky (1971) assigned *Caducifer* as a subgenus of *Pisania,* Keen (1971) considered *Caducifer* as a full genus with *Monostiolum* as a subgenus, Ponder (1972) placed *Caducifer* as a subgenus in the genus *Monostiolum* and Abbott (1974) assigned *Monostiolum* as a subgenus of the genus *Colubraria.* The writer agrees with Keen (*op. cit.*) and Ponder (*op. cit.*) that *Caducifer* and *Monostiolum* are closely allied, *Caducifer* differing in the terebriform shape and decollate spire from *Monostiolum.* Both groups, however, are closely related to *Pisania* and differ from the Indo-Pacific group of *Pisania* species only in their more fusiform shape and shorter aperture. The genera *Caducifer* and *Monostiolum* were published simultaneously and their relative priority has been effectively determined by the action of the first reviser, i.e. Keen *(op. cit.).*

Caducifer (Caducifer) concinnus (Reeve, 1844) (Fig. 49)

1844. *Triton concinnus* Reeve, Conch. Icon. 2: pl. 19, fig. 87.
1878. *Triton (Epidromis) concinnus* Reeve, Kobelt, Jahrb. deut. Malak. Gesell. 5: 367.
1881. *Triton (Epidromus) concinnus* Reeve, Tryon, Man. Conch. 3: 29, pl. 15, fig. 144.
1928. *Nyctilochus concinnus* Reeve, Faustino, Summ. Philipp. mar. fresh-wat. Moll. p. 228.

TYPE LOCALITY. Philippine Is.

The holotype is in the B.M.N.H. No. 1967646, length 10.7 mm, width 4.0 mm. The penultimate whorl has 21 slender axial riblets and 14 fine spiral threads, and the body whorl 21 riblets and *c.* 23 spiral threads. The aperture is angulate, the columella smooth, and the outer lip finely denticulate. It is white in colour, ornamented with orange axial streaks and small spots.

The species is similar to *Caducifer truncatus,* especially the finely sculptured form *decapitatus* Reeve. Tryon (1881) erroneously confounded the species with *C. (Monostiolum) tessellatus* (Reeve).

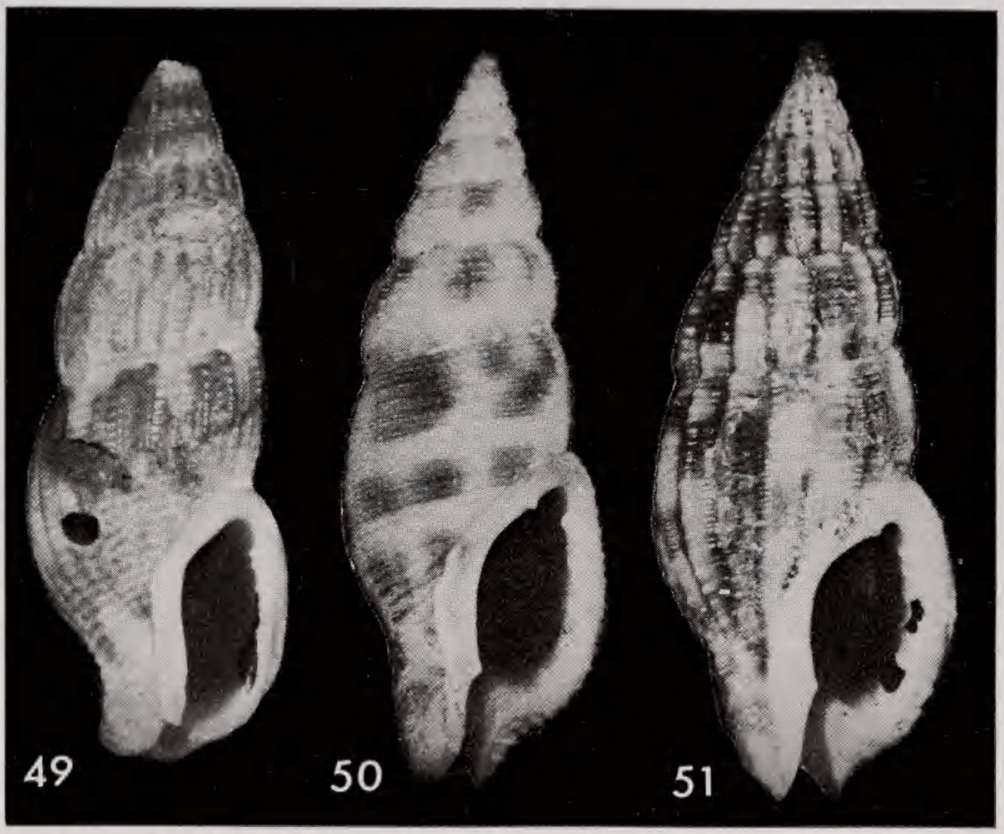
Subgenus **Monostiolum** Dall, 1904

Monostiolum Dall, 1904, Smiths. Misc. coll. 47: 136. Type species by OD *Triton (Epidromus) swifti* Tryon, 1881. Recent, Caribbean.

Caducifer (Monostiolum) tessellatus (Reeve, 1844) (Fig. 50)

1844. *Triton tessellatus* Reeve, Conch. Icon. 2: pl. 19, fig. 91; 1911 Peile, Proc. Malac. Soc. Lond. 9 (4): 227, textfig. (radula).
1845. *Pleurotoma igniflua* Reeve, Conch. Icon. 1: pl. 24, fig. 214 (Hab: ?); 1936 Fulton, Proc. Malac. Soc. Lond. 22 (1): 7.

TYPE LOCALITY. Island of Burias, Philippines = probably an error.



Figs. 49-51. 49. *Caducifer (Caducifer) concinnus* (Reeve); holotype BMNH No. 1967646, 10.7 × 4.0 mm. 50. *C. (Monostiolum) tessellatus* (Reeve); syntype BMNH No. 1967647, 16.8 × 6.0 mm. 51. *C. (M.) pictus* (Reeve); syntype BMNH No. 1966646, 16.7 × 6.8 mm.

The 4 syntypes of *Triton tessellatus* are in the B.M.N.H. No. 1967647, dimensions of illustrated syntype length 16.8 mm, width 6.0 mm. The penultimate whorl has 25 weak axial riblets and 17 spiral threads, the body whorl 40 spiral threads but no well-formed axial ribs, the columella has a parietal and an anterior terminal denticle but is otherwise smooth, the outer lip has an anal denticle and 7 smaller denticles. It is white, ornamented with brown blotches of varying size.

Peile (1911) pointed out that Tryon (1881) incorrectly synonymised *Triton tessellatus* Reeve with *T. concinnus* Reeve. He further stated that the Philippine locality for *T. tessellatus* has never been confirmed and that it is probably incorrect since he collected a specimen in Bermuda. Peile's (*op. cit.*) assumptions appear to be correct and *Triton tessellatus* very closely resembles *Caducifer (Monostiolum) swifti* (Tryon, 1881) from the Caribbean except that the spiral sculpture is finer than is generally seen in specimens of *C. (M.) swifti.*

Another earlier name for the species which has been overlooked in recent literature is *Pleurotoma igniflua* Reeve, 1845, described from unknown locality. Fulton (1936) placed the specis in *Pisania (Monostiolum)*, reported it from Bermuda and considered it very close if not conspecific with *Triton swifti* Tryon. The type-figure of *Pleurotoma igniflua* is the same form as has been illustrated by Ponder (1972) and is clearly recognisable as the Caribbean *swifti.* Fulton's (*op. cit.*) elucidation of *Pleurotoma igniflua* clearly prevents a retention of *Triton swifti* in malacological literature under the 50 year rule applicable to unused senior synonyms.

Caducifer (Monostiolum) pictus (Reeve, 1844) (Fig. 51)

1844. *Triton pictus* Reeve, Conch. Icon. 2: pl. 20, fig. 99.

1878. *Triton (Epidromis) pictus* Reeve, Kobelt, Jahrb. deut. Malak. Gesell. 5: 368.

1881. *Triton (Epidromus) pictus* Reeve, Tryon, Man. Conch. 3: 30, pl. 15, fig. 154.

1928. *Colubraria pervaricosa* Dall & Ochsner, Proc. Calif. Acad. Sci. (4), 17: 107, pl. 6, fig. 11 (N.E. of Vilamil, Albemarle I, Galapagos Is, Pleistocene).

1971. *Caducifer (Monostiolum) pictus* (Reeve), Keen, Sea shells trop. W. America ed. 2: 558, fig. 1103.

TYPE LOCALITY. Galápagos Is.

The 3 syntypes of *Triton pictus* are in the B.M.N.H. No. 1966646, dimensions of illustrated syntype length 16.7 mm, width 6.8 mm. The penultimate whorl has 15 axial ribs and 11 thin sharp spiral threads, the body whorl 11 ribs and 25 spiral threads, the columella has a parietal and an anterior terminal denticle but is otherwise smooth, the outer lip has an anal denticle and 8 only slightly smaller denticles. It is white in colour, mottled and streaked with brown.

Genus **Cantharus** Röding, 1798

Cantharus Röding, 1798, Mus. Bolten. p. 132. Type species by SD (Cossmann, 1901) *Buccinum tranquebaricum* Gmelin, 1791. Recent, Indian Ocean.

1807. *Nassaria* Link, Beschr. Nat. Samml. Univ. Rostock 3 Abth., p. 123. Type species by SD (Dell, 1967) *N. tranquebarica* Link = *Buccinum tranquebaricum* Gmelin, 1791.

1826. *Anna* Risso, Hist. Nat. L'Europe merid. 4: 214. Type species by M *A. massena* Risso, 1826. Recent, Mediterranean.

1971. *Muricantharus* Olsson, Stud. trop. Amer. Moll. Miami, p. 61. Type species by OD *Pseudoneptunea panamica* Hertlein & Strong, 1951. Recent, W. coast of America.

The generic group *Anna* Risso, 1826, has recently been re-introduced into buccinid literature by Wenz (1941), who questionably assigned *Anna* Risso under *Pollia* Gray, and by Nordsieck (1968) who placed *Anna* as a subgenus of *Cantharus* and cited the type species as "*pictus* Scacchi". *Purpura picta* Scacchi, 1836, is a primary homonym of *P. picta* Turton 1825, and *Anna massena* Risso, 1826, is in any case a prior name for *Purpura picta* Scacchi. Abbott (1974) listed the species as *Cantharus massena* and reported its occurrence in the Caribbean. In shell-form *A. massena* is closer to *Pollia* than *Cantharus*, but if regarded as a synonym of *Pollia* then *Anna* Risso would gain priority over *Pollia*, which is taxonomically undesirable.

Muricantharus panamicus (Hertlein & Strong) does not differ in either radular or shell-features from *Cantharus*. Abbott's (1974) placement of *Solenosteira* Dall, 1890, as a subgenus of *Cantharus* appears to be a more natural grouping than the full generic status accorded to *Solenosteira* by Keen (1971).

Subgenus **Pollia** Gray in Sowerby, 1834

Pollia Gray in Sowerby, 1834, Gen. Rec. foss. shells 2: footnote to *Purpura*, pl. 237, fig. 12. Type species by M *Triton undosus* Lamarck = *Buccinum undosum* Linnaeus, 1758. Recent, Indo-Pacific.

1834. *Pusio* Gray in Griffith & Pidgeon, Anim. Kingd. Bar. Cuvier, Moll. Rad. 12: 600, pl. 25, fig. 2. Type species by SD (Gray, 1847) *P. elegans* = *Triton (Pusio) elegans* Gray in Griffith & Pidgeon, 1834. Recent, W. coast of America.

1840. *Tritonidea* Swainson, Treat. Malac. p. 302. Type species by SD (Gray, 1847) *T. undosus* = *Buccinum undosum* Linnaeus, 1758.

1953. *Gemophos* Olsson & Harbison, Acad. Nat. Sci. Philad. Mon. No. 8: 225. Type species by OD *Buccinum gemmatum* Reeve, 1846. Recent, W. coast of America.

Robertson (1957) placed *Gemophos* Olsson & Harbison in the synonymy of *Pollia* and in this he is followed by Abbott (1974). Keen (1971), however, placed *Gemophos* as a valid subgenus under *Cantharus,* together with the related species *Triton (Pusio) elegans* Gray in Griffith & Pidgeon. Even if a finer subdivision of the *Cantharus-Pollia* group would be required for the West American species placed by Keen (*op. cit.*) in *Gemophos,* then the generic group *Pusio* Gray in Griffith & Pidgeon, 1834, would have clear priority over *Gemophos,* a fact mentioned by Robertson already in 1957.

Cantharus (Pollia) fuscopictus (Sowerby, 1905) (Figs. 52, 53)

1905. *Tritonidea (Cantharus) fuscopicta* Sowerby, Ann. Mag. Nat. Hist. (7) 16: 191.

TYPE LOCALITY. Ceylon.

The holotype is in the B.M.N.H. No. 1905.10.23.13., length 13.8 mm, width 7.1 mm. The penultimate whorl has 4 main spiral cords, the body whorl 11 cords and finer intermediate spiral striae in interspaces, the columella has 3 weak denticles anteriorly, the anal canal is bordered by a parietal and anal denticle, and the outer lip has 7 small denticles. It is white in colour, ornamented with dark brown, oblique streaks at the body whorl suture, the spiral cords are maculated with brown, and the aperture is white.

Sowerby (1905) described some new species based on specimens contained in H. Nevill's collection, and according to the author the majority of specimens were unlabelled and bore no locality indications. It appears that Sowerby's (*op. cit.*) locality indication of "Ceylon" must have been based on his knowledge of Nevill's shell-collecting activities in that area. The present author has examined specimens of *C. (P.) fuscopictus* from Rarotonga, Cook Is (Fig. 53).

Cantharus (Pollia) rawsoni (Melvill, 1897) (Fig. 55)

1897. *Sistrum rawsoni* Melvill, Mem. Proc. Manch. Lit. Phil. Soc. 41 (3): 5, pl. 6, fig. 3.

TYPE LOCALITY. Persian Gulf.

Four syntypes are in the B.M.N.H. No. 1903.6.23.15., dimensions of illustrated syntype length 14.0 mm, width 7.0 mm. The penultimate whorl has prominent axial ribs and 6 main spiral cords, and the body whorl 15 cords with finer intermediate spiral threads in the interspaces. The columella is projecting anteriorly and has 7 plicae which are more or less extensions of the spiral sculpture, the anal canal is bordered by a parietal and anal denticle, and the outer lip has 8 denticles. It is fawn in colour, ornamented with an indistinct paler median band on the body whorl, with some axial ribs occasionally lighter.

Cantharus (Pollia) eximius (Reeve, 1846) (Fig. 54)

1846. *Ricinula eximia* Reeve, Conch. Iconica, 3: pl. 6, fig. 45.
1883. *Engina eximia* Reeve, Tryon, Man. Conch. 5: 193, pl. 62, fig. 43.

TYPE LOCALITY. Corregidor, Manila Bay, Philippines.

Figs. 52-58. 52, 53. *Cantharus (Pollia) fuscopictus* (Sowerby). 52. Holotype BMNH No. 1905.10.23.13., 13.8 × 7.1 mm. 53. Specimen from Rarotonga, Cook Is, 12.3 × 6.6 mm. 54. *C. (P.) eximius* (Reeve); syntype BMNH No. 1968473, 9.8 × 4.5 mm. 55. *C. (P.) rawsoni* (Melvill); syntype BMNH No. 1903.6.23.15., 14.0 × 7.0 mm. 56-58. *C. (Enginella) spica* (Melvill & Standen); topotypes from Lifu, Loyalty Is. 56, 57. Specimen with echinate nodules, 9.6 × 4.8 mm. 58. Specimen with smooth nodules, 6.0 × 3.0 mm.

Four syntypes are in the B.M.N.H. No. 1968473, dimensions of illustrated syntype length 9.8 mm, width 4.5 mm. The penultimate whorl has angulate axial ribs and 6 main spiral cords, and the body whorl *c.* 15 main spiral cords and 1-2 irregular-sized, weaker cords in interspaces. The columella has a projecting anterior shelf which bears at this point 2-3 plicae, the canal is bordered by a parietal and anal denticle, and the outer lip has 6-7 low denticles and plicae. It is creamy-white in colour, the spiral cords are ornamented with dark brown upon the right-hand slope of the axial ribs, and a few scattered brown spots are present.

Subgenus **Enginella** Monterosato, 1917

Enginella Monterosato, 1917, Boll. Soc. zool. Ital. (3) 4: 22 (in separate). Type species by OD *Pollia bicolor* Cant. = *Murex bicolor* Cantraine, 1835 (*non* Risso, 1826; *nec* Valenciennes, 1832) = *Buccinum leucozonum* Philippi, 1844. Recent, Mediterranean.

The type species is usually cited as *Engina (Enginel!a) bicolor* (Cantraine) (Wenz 1941; Nordsieck 1968), but *Enginella* does not belong in *Engina* since it lacks the typically radially oriented lirae on the parietal callus. It is a convenient subgenus group for the small *Engina*-shaped *Cantharus* species which have a thin parietal callus without the *Engina*-like lirae. The taxon *Murex bicolor* Cantraine, 1835, is twice pre-occupied and *Cantharus (Enginella) leucozonus* (Philippi, 1844) would be the appropriate name for the small Mediterranean species.

Cantharus (Enginella) spica (Melvill & Standen, 1895) (Figs. 56-58)

1895. *Engina spica* Melvill & Standen, J. Conch. 8: 105, pl. 2, fig. 12.

TYPE LOCALITY. Lifu, Loyalty Is.

Topotypes from Lifu show that the species is not an *Engina*. The sutural cords are more prominent than the spiral cords and are either smooth and undivided or separated in elongated rectangles. One or two cords posteriorly to the sutures of the spire whorls and the third, fourth and fifth cord on the body whorl are occasionally sculptured with spikey nodules. The columella is projecting anteriorly and has 2-4 small denticles, the anal canal is bordered by a parietal denticle and an anal denticle, the parietal wall lacks radial plicae and the outer lip has 6 small denticles. It is variable in colour, either white with reddish-brown streaks or reddish-brown, sometimes with a white median band and some white nodules. The size-range is 6.0 - 12.0 mm.

Subgenus **Prodotia** Dall, 1924

Prodotia Dall, 1924, Proc. Biol. Soc. Washington 37: 89. Type species by OD *Pisania billeheusti* Souverbie (= Petit de la Saussaye) = *Triton iostoma* Gray in Griffith & Pidgeon, 1834. Recent, Indo-Pacific.

Cantharus (Prodotia) iostomus (Gray in Griffiths & Pidgen, 1834) (Figs. 59-62)

1834. *Triton iostoma* Gray in Griffith & Pidgeon, Anim. Kingd. Bar. Cuvier, Moll. Rad. 12: 600, pl. 23, fig. 4.

1846. *Buccinum marmoratum* Reeve, Conch. Icon. 3: pl. 12, fig. 95 (*non* Link, 1807; *nec* Anton, 1839).

1846. *Buccinum gracile* Reeve, Conch. Icon. 3: pl. 12, fig. 96 (Masbate I, Philippines) [*non* da Costa, 1778].

1846. ? *Buccinum crocatum* Reeve, Conch. Icon. 3: pl. 12, fig. 97 (Capul I, Philippines).

1853. *Phos billeheusti* Petit de la Saussaye, J. Conchyl. 4 (3): 244, pl. 8, fig. 5 (Nukuhiva, Marquesas Is).

1864. *Pisania billeheusti* var. C, *P. artensis* Souverbie & Montrouzier, J. Conchyl. 12: 266 (Art 1, New Caledonia).

1864. ? *Fusus (Pisania) desmoulinsi* Montrouzier in Souverbie & Montrouzier, J. Conchyl. 12: 268, pl. 10, fig. 3 (Art I, New Caledonia).

1865. *Fusus crosseanus* Souverbie, J. Conchyl. 13: 160, pl. 5, fig. 6 (immature) (Art I, New Caledonia).

1880. *Tritonidea marmorata* Reeve, Tapparone-Canefri, Ann. Soc. Malac. Belg. 15 (1): 63.

1880. *Tritonidea gracilis* Reeve, Tapparone-Canefri, Ann. Soc. Malac. Belg. 15 (1): 63.

1913. *Tritonidea difficilis* E. A. Smith, Ann. Mag. Nat. Hist. (8) 12: 414, pl. 9, fig. 2 (Henderson I, Pitcairn I group, Polynesia).

1938. *Pisania (Prodotia) marmorata* (Reeve), Adam & Leloup, Mem. Mus. Roy. d'Hist. Nat. Belg. 2 (19): 179.

1950. *Phos lannumi* Schwengel, Nautilus, 63 (3): 80, pl. 5, fig. 3 (Guam I, Marianas Is).

1958. *Engina billeheusti* (Petit), Tinker, Pacific Sea Shells ed. 2: 130, plate facing page, figs. lower row.

1967. *Pisania marmorata* (Reeve), Orr-Maes, Proc. Acad. Nat. Sci. Philad. 119 (4): 135, pl. 13, fig. B.

1971. *Pisania gracilis* (Reeve), Cernohorsky, Rec. Auckl. Inst. Mus. 8: 143, figs. 21, 32, 41-44 (figd. lectotype of *Buccinum marmoratum* Reeve).

1972. *Engina (Prodotia) obliquicostata* (Reeve), Ponder, J. Malac. Soc. Aust. 2 (3): 256, pl. 25, figs. 3, 4, textfigs. 6, 17 *(non Buccinum obliquicostatum* Reeve, 1846).

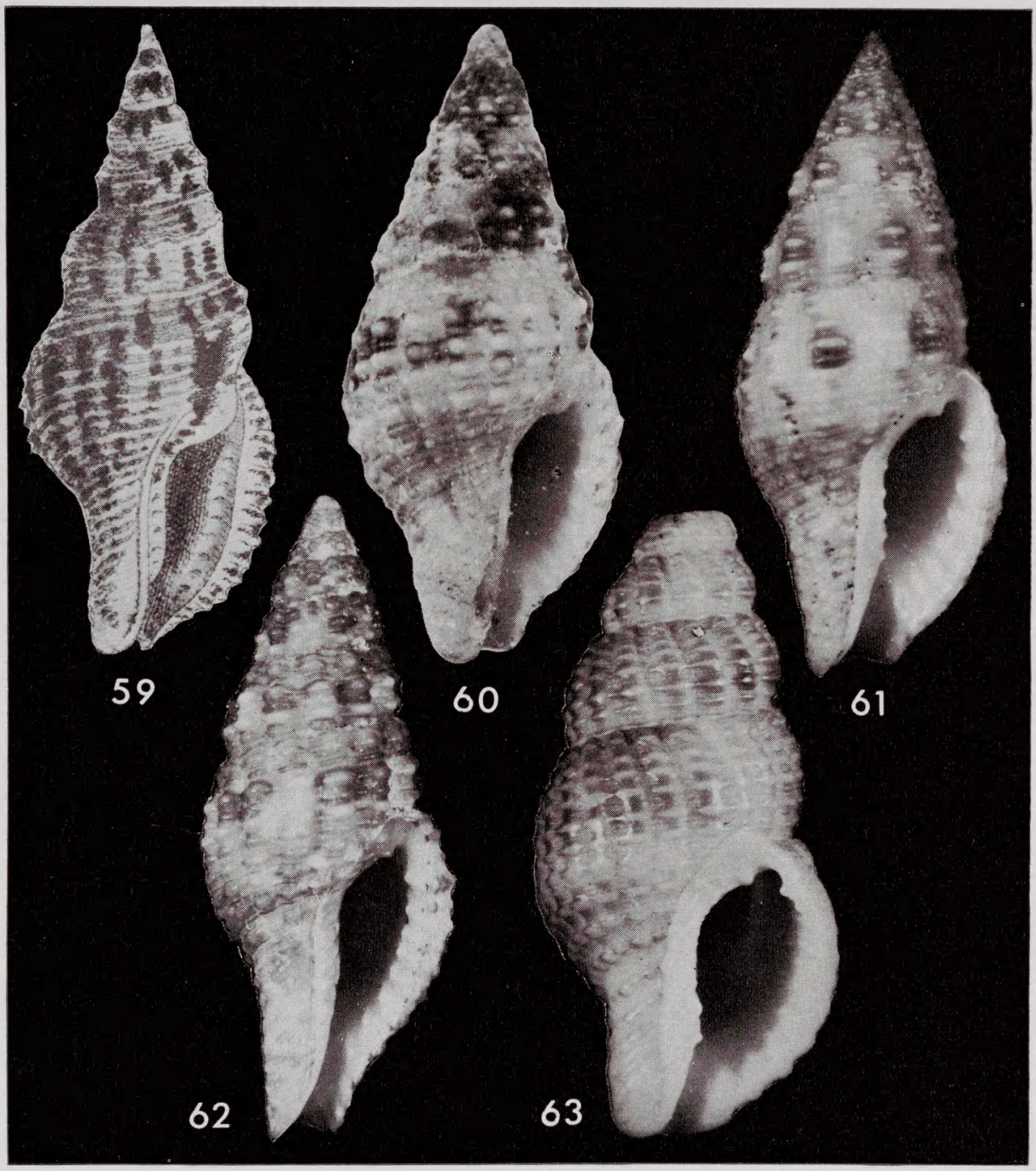
1972. *Engina (Prodotia) marmorata* (Reeve), Ponder, J. Malac Soc. Aust. 2 (3): 256, pl. 25, fig. 5, textfigs. 5, 18.

TYPE LOCALITY. None. (Capul I, Philippines — for *marmoratum* Reeve).

The species is extremely variable in shape, length of siphonal canal and number of mature and embryonic whorls. In Hawaii and the Fiji Islands where the species is moderately common, broad and slender specimens occur frequently intermingled in populations (see Tinker, 1952, plate facing p. 78). The width-ratio ranges from 37%-46% of shell-length. The number of mature whorls ranges from 7-9 and embryonic whorls from $1\frac{3}{4}$-$3\frac{1}{4}$. In general, specimens from 15-20 fathoms (27-37 m) have fewer embryonic whorls than individuals collected in shallow water of the intertidal zone.

The sculpture is variable, consisting of prominent or weak and irregular axial ribs which number from 11-24 on the body whorl and from 13-21 on the penultimate whorl. The spiral cords vary in intensity and it is often difficult to differentiate between primary and secondary sculpture, but in general there are 3-7 primary spirals on the penultimate and 15-22 on the body whorl. One feature which is common to all the named variants of *C. (P.) iostomus*, is the arrangement of the spiral cords: on the antepenultimate and penultimate whorls 2, rarely 3, of the spiral cords are more prominent, with larger nodules, and the fourth and fifth spiral cord anterior to the suture of the body whorl is equally more prominent. If these spiral cords are very prominent, the whorls appear subangulate and if subdued, they appear convex. This strengthening of the presutural ramp cords can also be seen in the type-figure of *C. (P.) iostomus* (Fig. 59). In fresh specimens finer spiral and axial striae are visible in the interspaces of the spiral cords. The outer lip has 8-11 denticles in adult individuals and the columella, which has either a narrow or broader elevated callus, has 5-7 denticles or plicae, the parietal area is smooth and the anal canal is bordered by a parietal denticle. The shell is white or creamy-white, marbled, spotted or streaked with brown or reddish-brown and some individuals show a pinkish-violet cast at least on the spire whorls or protoconch and sometimes even in the aperture.

The radula is as variable as the shell, rachidians have 5-8 cusps, which are either regular or serrated (Ponder, 1972, figs. 5, 6) or stunted (Cernohorsky, 1971, fig. 21); laterals are either *Pisania*-like, tri-cuspid, with the outer cusp only moderately long, or bi-cuspid with the outer cusp as long as in *Engina*. Some of the radular differences may be due to sexual dimorphism, similarly to *Pisania luctuosa* Tapparone-Canefri (Cernohorsky, *op. cit.*).



Figs. 59-63. 59-62. *Cantharus (Prodotia) iostomus* (Gray in G. & P.). 59. Type-figure from Griffith & Pidgeon, 1834, pl. 23, fig. 4. 60-62. Specimens from Rat Tail Passage, Suva, Fiji Is. 60. Broad specimen, 19.3 × 8.7 mm. 61. Intermediate specimen, 17.3 × 7.2 mm. 62. Slender specimen, 14.6 × 5.6 mm. 63. *C. (P.) shepstonensis* (Tomlin); holotype BMNH No. 1926.12.6.6., 23.3 × 11.3 mm.

The majority of authors have appplied the name *Buccinum marmoratum* Reeve, to the broad individuals and *B. gracile* Reeve, to slender examples of the species, and *Phos billeheusti* Petit de la Saussaye has, with few exceptions, been synonymised with either *B. marmoratum* or *B. gracile*. Both *B. marmoratum* and *B. gracile* are primary homonyms and unavailable for usage (see synonymy). At this stage there is no taxon applicable to the species which can be considered to have been in general current use and the unused senior synonym *Triton iostoma* Gray in Griffith & Pidgeon, 1834, is here re-introduced into literature. Tapparone-Canefri (1880) was the first author to recognise the identity of *Triton iostoma* which he synonymised with the later *Buccinum marmoratum* Reeve. The type-figure of *Triton iostoma* has been so well executed that there can be little doubt that it is the species under discussion (Fig. 59, from Griffith & Pidgeon 1834).

The holotype of *Tritonidea difficilis* E. A. Smith, 1913, B.M.N.H. No. 1913.7.28.108., from Henderson I, Pitcairn group, Polynesia, is a very worn and faded individual of *C. (P.) iostomus*. The species range extends from Polynesia to East Africa.

Since its description, *Triton iostoma* has been placed in the genera *Triton, Buccinum, Phos, Fusus, Tritonidea* (= *Cantharus*), *Engina* and *Pisania*. In features of prominent spiral sculpture and form of aperture the species is closer to *Pollia* than to *Pisania*. The more slender species of *Pollia* approach *Prodotia* in form, and the subgenus *Prodotia* is therefore utilised as a subgeneric group containing the fusiform species of *Cantharus*.

Cantharus (Prodotia) shepstonensis (Tomlin, 1926) (Fig. 63)

1926. *Pollia shepstonensis* Tomlin, Ann. Natal Mus. 5 (3): 291, pl. 16, fig. 4.

TYPE LOCALITY. Beach end near Port Shepstone [Natal], Sth. Africa.

The holotype is in the B.M.N.H. No. 1926.12.6.6., length 23.3 mm, width 11.3 mm. It is a worn shell with the apical whorls missing, 18 axial ribs and 7 main spiral cords on the penultimate and 15 ribs and 13 cords on the body whorl, with additional fine spiral striae situated between the main cords. The columella has 9 small plicae and the outer lip is denticulate. The colour is a faded orange-brown with a darker brown staining on ribs and in the interspaces.

On the label accompanying the holotype of *P. shepstonensis* is written "same as *difficilis* Smith". Tomlin (1926) did compare his species to *Buccinum marmoratum* Reeve (= *iostomus* Gray in G. & P.), a species which lives on the Natal coast, and the possibility that *Pollia shepstonensis* is a very worn *C. (P.) iostomus* cannot be excluded. *Pollia shepstonensis* has remained unlisted in South African faunal lists.

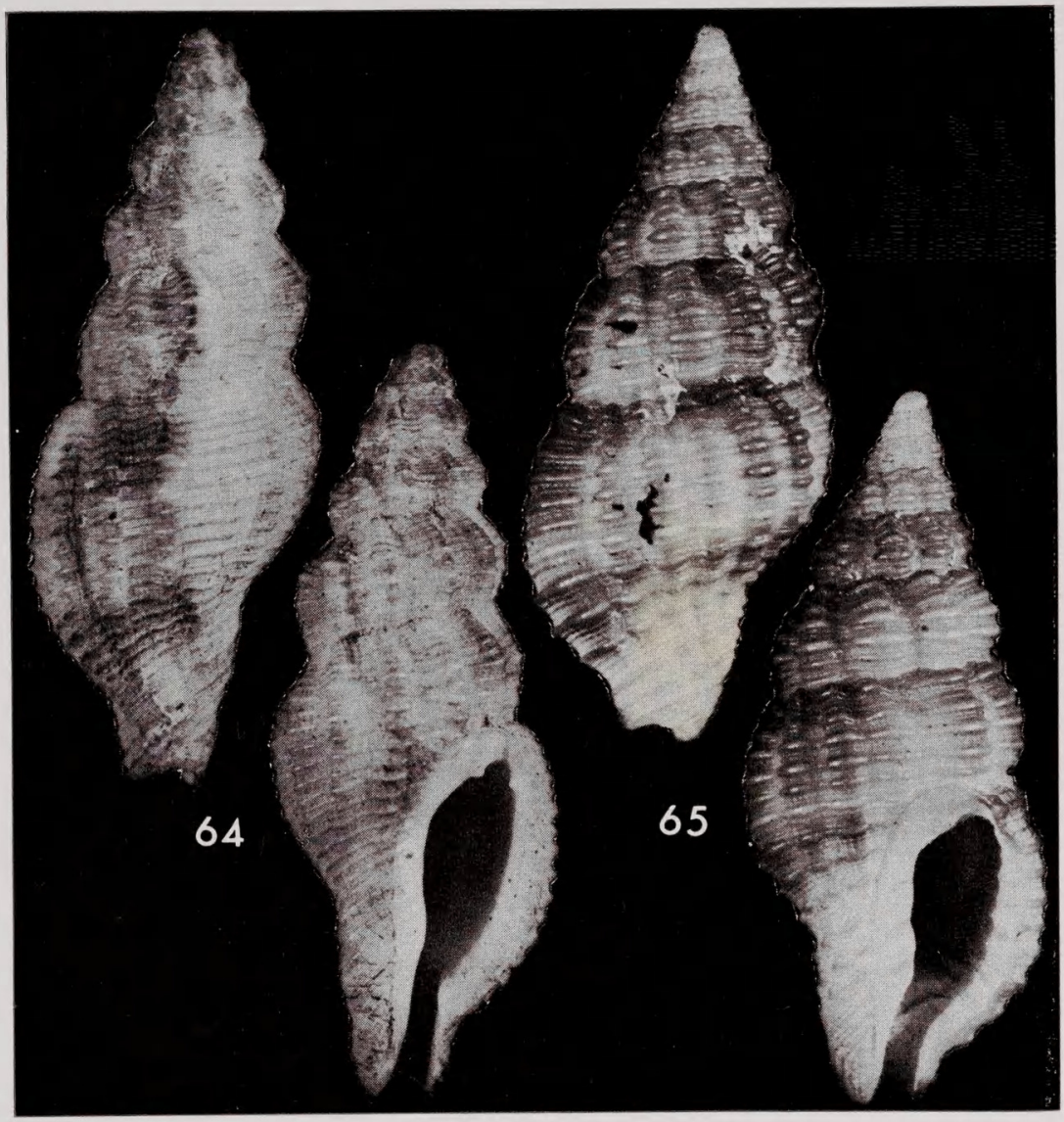
Cantharus (Prodotia) townsendi (Melvill, 1918) (Fig. 64)

1918. *Pisania townsendi* Melvill, Ann. Mag. Nat. Hist. (9) 1: 140, pl. 4, fig. 5.

TYPE LOCALITY. Karachi.

The holotype is in the B.M.N.H. No. 1921.1.28.5., length 21.6 mm, width 8.0 mm. The shell is fusiform with a produced siphonal canal, angulate whorls, 11 axial ribs on each of the last two whorls, 11 main spiral threads and 3 intersticial spiral striae on the penultimate and 24 main spiral threads and 3-4 intersticial spirals on the body

whorl. The columella has 2 anterior denticles, the parietal wall is smooth, the anal canal is bordered by a parietal and an anal denticle, and the outer lip has 10-11 small denticles. The holotype is light brown in colour and the aperture is yellowish.



Figs. 64, 65. 64. *Cantharus (Prodotia) townsendi* (Melvill); holotype BMNH No. 1921.1.28.5., 21.6 × 8.0 mm. 65. *C. (P) castaneus* (Melvill); holotype BMNH No. 1912.9.17.7., 13.8 × 5.8 mm.

Cantharus (Prodotia) castaneus (Melvill, 1912) (Fig. 65)

1912. *Tritonidea castanea* Melvill, Proc. Malac. Soc. Lond. 10 (3): 249, pl. 12, fig. 16.

TYPE LOCALITY. Mussandam, Persian Gulf, 55 fathoms (101 m).

The holotype is in the B.M.N.H. No. 1912.9.17.7, length 13.8 mm, width 5.8 mm. The holotype is not fully mature, has 10 thick axial ribs on each of the last two whorls, penultimate whorl with 6 main undulate spiral cords, body whorl with 11, and with additional finer intermediate spiral striae. The columella has 4 plicae and a smooth parietal wall, the outer lip is denticulate and plicate, and the shell is cream in colour with brown spiral cords.

Subgenus **Zeapollia** Finlay, 1927

Zeapollia Finlay, 1927, Trans. Proc. N.Z. Inst. 57: 418. Type species by OD *Tritonidea acuticingulata* Suter, 1917. L. Miocene of New Zealand.

The genus is monotypic and closely resembles other subgenera of *Cantharus*. The type-species *Cantharus (Zeapollia) acuticingulata* has 2 smooth embryonic and 4 mature whorls and the sculpture consists of axial ribs, overriding main spiral cords and finer intermediate spiral striae. The columella has a projecting anterior ledge and at this point carries 2 low denticles, the anal canal is bordered by a parietal and an anal denticle and the outer lip has 5-6 about equally sized denticles. (Fig. 66).

Subgenus **Clivipollia** Iredale, 1929

Clivipollia Iredale, 1929, Aust. Zoologist 5 (4): 347. Type species by M *C. imperita* Iredale, 1929 = ? *Ricinula pulchra* Reeve, 1846. Recent, Indo-Pacific.

The radula of *Ricinula pulchra* Reeve (Ponder, 1972, fig. 13) is typical of the *Cantharus-Pollia* group of species (Robertson, 1957, figs. 14-19; Cernohorsky, 1971, fig. 62 and 1974, fig. 13). In shell-morphology *Clivipollia* resembles *Pollia* except that species of *Clivipollia* are stouter and more biconic, the aperture is restricted and narrow and the denticles on the outer lip are more prominent with the first 2-3 posterior denticles usually larger and intruding into the aperture. The columella is more bulging and coarsely denticulate and the anal notch is shallower and more squarish.

The morphological differences in *Clivipollia* are by no means sharply defined and the transition from *Pollia* to *Clivipollia* is gradual rather than abrupt. In a world-wide survey of buccinid genera the finer subdivisions of *Pollia* and *Cantharus* may be found to be superfluous. The following examined species would qualify for inclusion in *Clivipollia: Voluta fragaria* Wood, 1828 (= *Turbinella carolinae* Kiener, 1840 = *Ricinula bella* Reeve, 1846), *Turbinella wagneri* Anton, 1839, *Ricinula pulchra* Reeve, 1846, *R. recurva* Reeve, 1846, *Engina costata* Pease, 1860, *E. albocincta* Pease, 1860, and *E. cumingiana* Melvill, 1895.

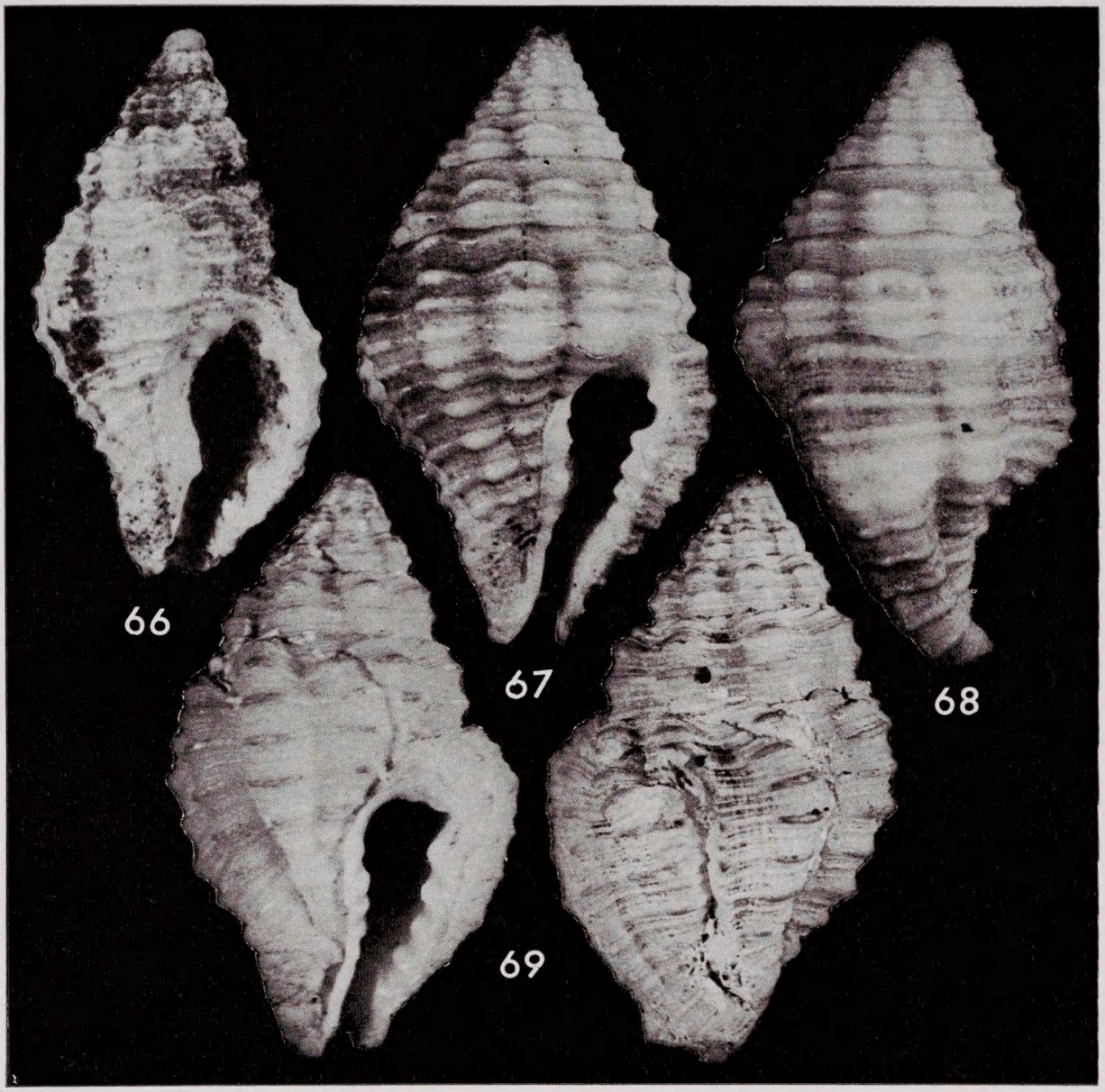
Cantharus (Clivipollia) recurva (Reeve, 1846) (Figs. 67, 68)

1846. *Ricinula recurva* Reeve, Conch. Icon. 3: pl. 6, fig. 53.

1907. *Engina recurva* Reeve, Schepman, Samml. geol. Reichs-Mus. Leiden (1), 8: 173 (Post-Tertiary of Celebes); 1933 Dautzenberg & Bouge, J. Conchyl. 77 (2): 210.

TYPE LOCALITY. Lord Hood's I [= S. Marutea I, S.E. end of the Tuamotu Archipelago].

Two syntypes are in the B.M.N.H. No. 1968465, dimensions of illustrated syntype length 11.0 mm, width 6.0 mm. The shell is sculptured with broad, roundly angulate ribs, 3 strong main spiral cords on the penultimate and 11 on the body whorl, the cords are nodulose on the summits of the ribs, and the interspaces have finer spiral threads. The ventral side of the body whorl recedes backwards towards the dorsum, the siphonal canal is recurved, the columella is swollen and has 5 prominent denticles, the anal canal is bordered by a parietal and an anal denticle, and the outer lip has 5 strong denticles. It is yellowish-brown in colour, ornamented with a white band posteriorly to the sutures on spire whorls and a median band on the body whorl.



Figs. 66-69. 66. *Cantharus (Zeapollia) acuticingulata* (Suter); specimen from Target Gully, Oamaru, L. Miocene of New Zealand, 9.6 × 5.0 mm. 67, 68. *C. (Clivipollia) recurva* (Reeve); syntype BMNH No. 1968465, 11.0 × 6.0 mm. 68. Lateral view. 69. *C. (C.) costatus* (Pease); holotype BMNH No. 1961163, 16.5 × 10.0 mm.

Cantharus (Clivipollia) costatus (Pease, 1860) (Fig. 69)

1860. *Engina costata* Pease, Proc. Zool. Soc. Lond. p. 142; 1965 Kay, Bull. Brit. Mus. (Nat. Hist.) Zool. Suppl 1: 14, pl 1, figs 17, 18 (figd. holotype).

1918. *Peristernia thaanumi* Pilsbry & Brian, Nautilus 31 (3): 101, pl. 9, figs. 6, 7 (off Waikiki, 35-50 fathoms (64-92 m) and Honolulu Harbour, Hawaiian Is).

TYPE LOCALITY. Hawaiian Is.

The holotype of *Engina costata* is in the B.M.N.H. No. 1961163, length 16.5 mm, width 10.0 mm. The penultimate whorl has 8 broad, angulate axial ribs and 3 strong main spiral cords, the body whorl 7 ribs and 9 main spirals, the interspacial sculpture is variable but usually has 1 median intermediate cord and 1-2 finer spiral threads on

either side of the median. The outer lip is thickened, the columella has a flat parietal denticle and 5 denticles on the somewhat swollen centre pillar, the outer lip has a flattish anal denticle and 5 strong denticles. It is yellowish-brown in colour, and the aperture is white.

Cantharus (Clivipollia) albocinctus (Pease, 1860) (Fig. 70)

1860. *Engina albocincta* Pease, Proc. Zool. Soc. Lond. p. 142; 1965 Kay, Bull. Brit. Mus. (Nat. Hist.) Zool. Suppl. 1: 16, pl. 2, figs. 9, 10 (figd. lectotype).

TYPE LOCALITY. Hawaiian Is.

The lectotype is in the B.M.N.H. No. 1961454, length 7.4 mm, width 4.0 mm. This minute species is orange-brown in colour with a median white band on the body whorl and is sculptured with coarse axial ribs and spiral cords; the sutures are sculptured with slightly more elongated nodules which are slightly separated from the subsequent rows of coarse nodules, and the interspaces have finer spiral striae. The columella has 3-4 small denticles anteriorly, the parietal wall lacks the radial lirae of *Engina*, the anal canal is bordered by a parietal and an anal denticle, and the outer lip has 6 small denticles.

Cantharus (Clivipollia) cumingianus (Melvill, 1895) (Fig. 71)

1895. *Engina cumingiana* Melvill, Proc. Malac. Soc. Lond. 1: 226.

TYPE LOCALITY. St. Thoms [Virgin Is, Caribbean = error ?].

The holotype is in the B.M.N.H., length 11.6 mm, width 6.3 mm. The penultimate whorl has 7 strong, broad and nodulose axial ribs and 4 main spiral cords, the body whorl 6 ribs and 12 main cords, and the interspaces finer intermediate spiral threads. The columella is projecting anteriorly and is sculptured with 5 weak central denticles, the anal canal is bordered by a parietal and an anal denticle, and the outer lip has 5 strong denticles. It is yellowish-brown in colour, the spaces between the axial ribs are darker, and the aperture and median band on the body whorl are white.

Melvill (1895) described *E. cumingiana* from a single shell in the Cuming collection in the British Museum (Nat. Hist.), and gave the locality as "St. Thomas" which is presumably St. Thomas in the Virgin Islands. The holotype, which compares in length within one-tenth of a mm with Melvill's given dimensions and is undoubtedly the Cumingian holotype, bears a label with no known locality. It is unknown on whose authority Melvill cited the "St. Thomas" locality, but no similar species has been reported from the Caribbean and the species remains unlocalised.

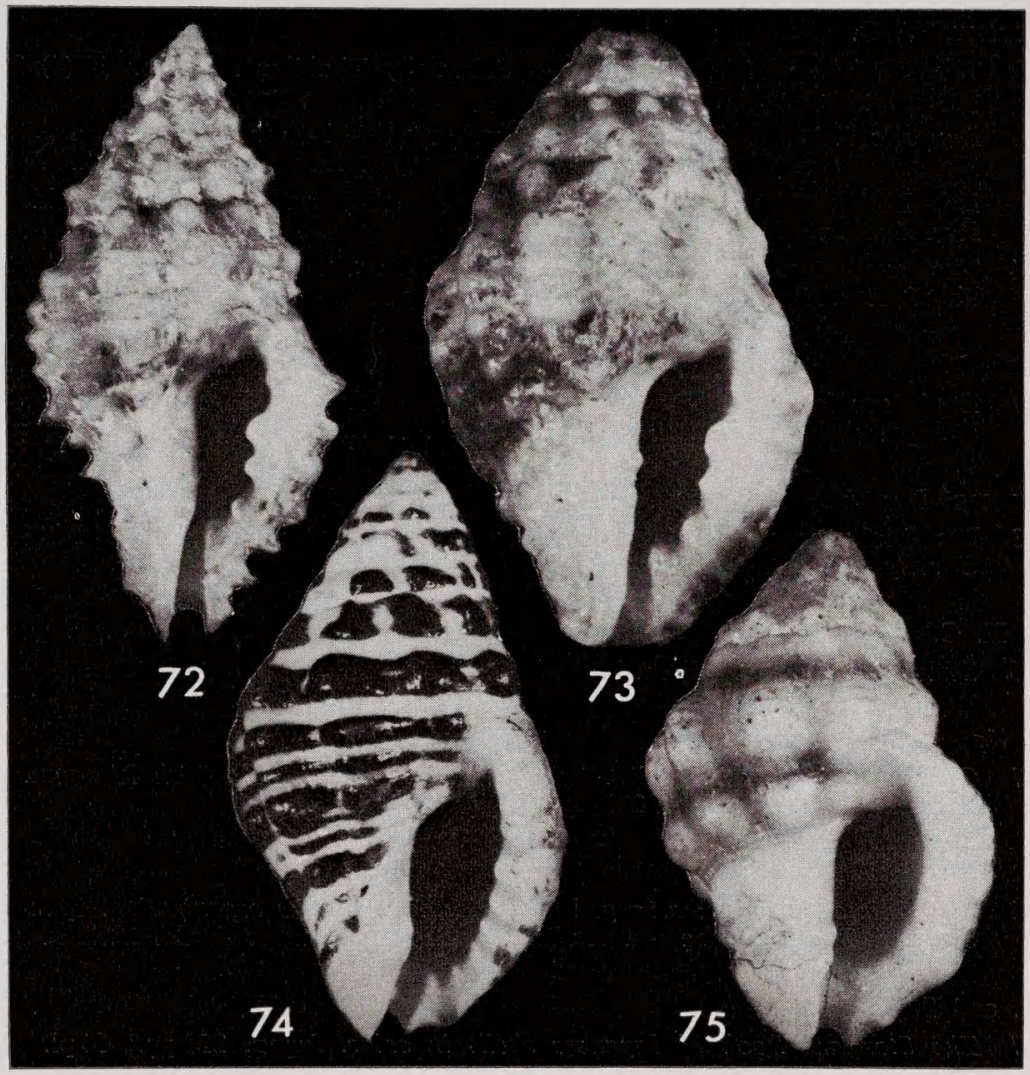
REMARKS ON NON-BUCCINID SPECIES

Engina monilifera Pease, 1860. The lectotype in the B.M.N.H. No. 1961454, length 7.4 mm, width 4.0 mm, is a very worn *Morula* Schumacher, from the Hawaiian Is (Fig. 73). The species is conspecific with the holotype of *Ricinula echinata* Reeve, 1846, B.M.N.H. No. 1968456, length 9.3 mm, width 4.5 mm, from unknown locality (Fig. 72). The species has been reported as *Morula parva* (Reeve, 1846) by Cernohorsky (1969) from the Fiji Is, and has been erroneously synonymised with *M. echinata* (Reeve). Melvill & Standen (1895) reported the species from the Loyalty Is as *Engina iodosia*

(Duclos, 1840), which they considered a prior name for *Ricinula echinata* Reeve, and *Engina monilifera* Pease. The type-figure of *Columbella iodosia* shows a shell with a prominently constricted outer lip and a sculpture of round nodules, features which do not correspond with those of *Morula echinata*.

Figs. 70, 71. 70. *Cantharus (Clivipollia) albocinctus* (Pease); lectotype BMNH No. 1961454, 7.4 × 4.0 mm. 71. *C. (C.) cumingianus* (Melvill); holotype BMNH, 11.6 × 6.3 mm.

Ricinula funiculata Reeve, 1846. Three syntypes from unknown locality are in the B.M.N.H. No. 1968475, dimensions of illustrated syntype length 17.0 mm, width 10.0 mm (Fig. 74). Tryon (1883) reported the species as an *Engina* and illustrated a species which bears no resemblance to Reeve's *funiculata*. The real *Ricinula funiculata* is a worn *Morula* with a white base colour, blackish-brown nodes and ridges, a violet aperture, 3 plicae on the anterior of the columella and denticles on the outer lip. The species *Engina siderea* (Reeve) is often found mislabelled "*E. funiculata*" in Museum collections.



Figs. 72-75. 72, 73. *Morula echinata* (Reeve). 72. Holotype BMNH No. 1968456, 9.3 × 4.5 mm. 73. Lectotype of *Engina monilifera* Pease, BMNH No. 1961454, 7.4 × 4.0 mm. 74. *Morula funiculata* (Reeve); syntype BMNH No. 1968475, 17.0 × 10.0 mm. 75. *M. purpureocincta* (Preston); holotype BMNH No 1915.1.6.28., 8.9 × 5.8 mm.

Engina purpureocincta Preston, 1909. The holotype from Ceylon is in the B.M.N.H. No. 1915.1.6.28., length 8.9 mm, width 5.8 mm (Fig. 75). The species is a *Morula* which is conspecific with *Engina nodicostata* Pease, 1868, from the Tuamotus. The species has been recently discussed by Orr-Maes (1967) and Cernohorsky (1969).

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