INDO-PACIFIC NASSARIIDAE (MOLLUSCA: GASTROPODA)

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Abstract. The systematics, shell-morphology, radular anatomy where known, and habitat of 55 Indo-Pacific species of the Buccinacean family Nassariidae are here recorded.

The Nassariidae, a rachiglossate group of species within the superfamily Buccinacea, are a conspicuous and prolific intertidal faunal element of tropical Indo-Pacific reefs and lagoons. The group is cosmopolitan in distribution and some genera live also in temperate waters of major continents. Many species are found in colonies in muddy, clean or weedy coral sand or on reef-platforms, and intertidal species outnumber those from the sublittoral zone.

The animal is moderately large in relation to shell-size and rather agile, and apart from the usual Neogastropod features of tentacles, eyes and proboscis, the rear of the foot generally has a pair of metapodial tentacles. Being mainly carrion feeders, the proboscis is long and capable of great extension. The detailed anatomy of British Nassariidae has been recorded by Fretter & Graham (1962).

TAXONOMY

Towards the second half of the 18th century, species of Nassariidae were included in *Buccinum* Linnaeus, 1758. Subsequent authors either assigned nassarid species to the newly created genus *Nassa* Lamarck, 1799 (non Röding, 1798), or retained them in *Buccinum*. A. Adams (1852 - 1853) published the first catalogue of *Nassa* which was followed by Reeve's (1853 - 1854) first comprehensive world-wide monograph of the genus. Apart from Tryon's last monograph of Nassariidae (1882), no attempt has been made to evaluate the taxonomy of even common species, especially those from the tropical Indo-Pacific region. While some Mediterranean and British Nassariidae have advanced to the beta-level in taxonomy, tropical Indo-Pacific species are at present at the sub-alpha level.

Tomlin's papers on Nassariidae (1932a, 1932b, 1940) are invaluable evaluations of the types of species described by A. Adams, Reeve and Marrat. Shuto (1969) proposed a supraspecific arrangement of Nassariidae based on features of radula, operculum, protoconch, number of metapodial tentacles and egg-capsules. The results obtained during examination of radulae and opercula of Indo-Pacific Nassariidae for this paper, cut in some instances, right across the arrangement proposed by Shuto *(op. cit.)*.

SHELL MORPHOLOGY AND RADULA

Morphological features, particularly those of shell and operculum, are extremely variable, but probably no more or less than in other groups of rachiglos-

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sate gastropods. Similarly to the Mitridae, species of Nassariidae come in broad and slender forms, with a sculpture which may persist to the body whorl or become obsolete on the last 2 - 3 whorls. These slender and broad forms and sculptural variants have been mainly responsible for the overnaming in this group. Great stress has been put on the size and expansion of the columellar callus-shield in Nassariidae, a feature which is highly variable and not always reliable as a diagnostic feature. The size of the columellar shield depends on the developmental stage of the individual: juvenile specimens of species with a large callus-shield, e.g. *N.arcularius* (Linnaeus), lack the shield completely, but mature adults display a wide, flaring shield. In certain populations of the species, the callus-shield does not even reach the body whorl suture in mature specimens.

The shape and serrations of the operculum have been found to be variable to a high degree and of little use as a diagnostic feature (Fig. 1). *Nassarius (Plicarcularia) graniferus* (Kiener), generally has an operculum with a serrated margin, but in certain individuals the operculum is smooth.

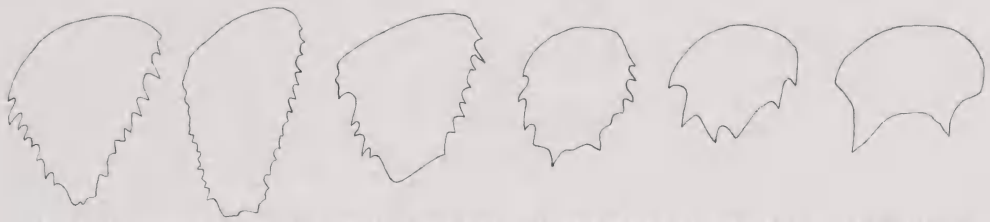


Fig. 1. *Nassarius arcularius arcularius* (Linnaeus). Kakula I., New Hebrides. Variation in outline of opercula.

The radula of Nassariidae is typically Buccinacean, consisting of 3 teeth per row, and occasionally an additional small, ovate to trigonal, cuspless plate which is interposed between the rachidian and lateral tooth, and partly overlapped by the latter. This small plate was recognized by Troschel (1867), who called it the "accessorische Platte", and for want of a better term will be referred to as the accessory lateral plate. A similar plate of unknown function has been recorded in the taenioglossate ovulid genus *Pedicularia* Swainson. Troschel *(loc. cit.)* was not quite certain whether the accessory lateral plate was a rudimentary lateral, in which case the actual lateral would become the inner marginal, or if this plate is an inner, degenerate lateral tooth. From a structural viewpoint, the small accessory plate would make an excellent pivoting point for the laterals, but would not account for the variation in size and shape, and random presence or absence among related or even identical species of Nassariidae. The real function and origin of the accessory lateral plate remains obscure.

Troschel *(loc. cit.)* remarked that the radulae of Nassariidae he examined were all so similar in basic characters, and on the basis of the radula, there appears to be no reason to separate the various groups generically. Radular studies of Indo-Pacific Nassariidae tend to confirm Troschel's contention, with the sole exception of 2 species of the genus *Hebra* H. & A. Adams. *H.horrida* (Dunker) and *H.subspinosa* (Lamarck), have a radula which differs widely, particularly in the form of laterals, from the stereotyped pattern of tropical Nassariidae (Figs. 94-96).

The species of Indo-Pacific Nassariidae treated in this paper have been assigned to their respective genera or subgenera on shell-morphology, and *Hebra* is acknowledged as a distinct genus on the basis of a divergent radula.

Order NEOGASTROPODA

RACHIGLOSSA

Superfamily BUCCINACEA

Family NASSARIIDAE Iredale, 1916

1840. Nassinae Swainson, Treat. Malac., pp. 63, 69, 299 (not available, art. 39 of ICZN).
1871. Nassininae Gill, Smiths. Misc. Coll. 10 (2): 5.
1871. Cyclonassinae Gill, Smiths. Misc. Coll. 10 (2): 5.
1901. Dorsaninae Cossman, Ess. paléoc. comp. 4: 195, 197.
1908. Alectrionidae Dall, Bull. Mus. Comp. Zool. Harv. 43: 306.
1916. Arculariidae Hedley, J. R. Soc. W. Aust. 1: 61 (on cover "publ. August 1915", date at bottom is 1916).
1916. Nassariidae Iredale, Proc. Malac. Soc., Lond. 12: 82.

Usage of the family name Nassidae has to be abandoned because of homonymy of the type-genus *Nassa* Lamarck, 1799 (non Röding, 1798). Although several chronologically prior family-group names are in existence, the family name Nassariidae has been almost universally adopted during the last 40 years by malacological writers. Some of the earlier names, particularly Dorsaninae, may be utilized in a subfamilial arrangement of the group, and a petition for the preservation of Nassariidae is before the Commission on Zoological Nomenclature.

The subfamily name Truncariinae erected by Cossmann (1901) in the Nassariidae and based on *Truncaria* Adams & Reeve, 1850, should be transferred to the Buccinidae.

Genus **Nassarius** Duméril, 1806

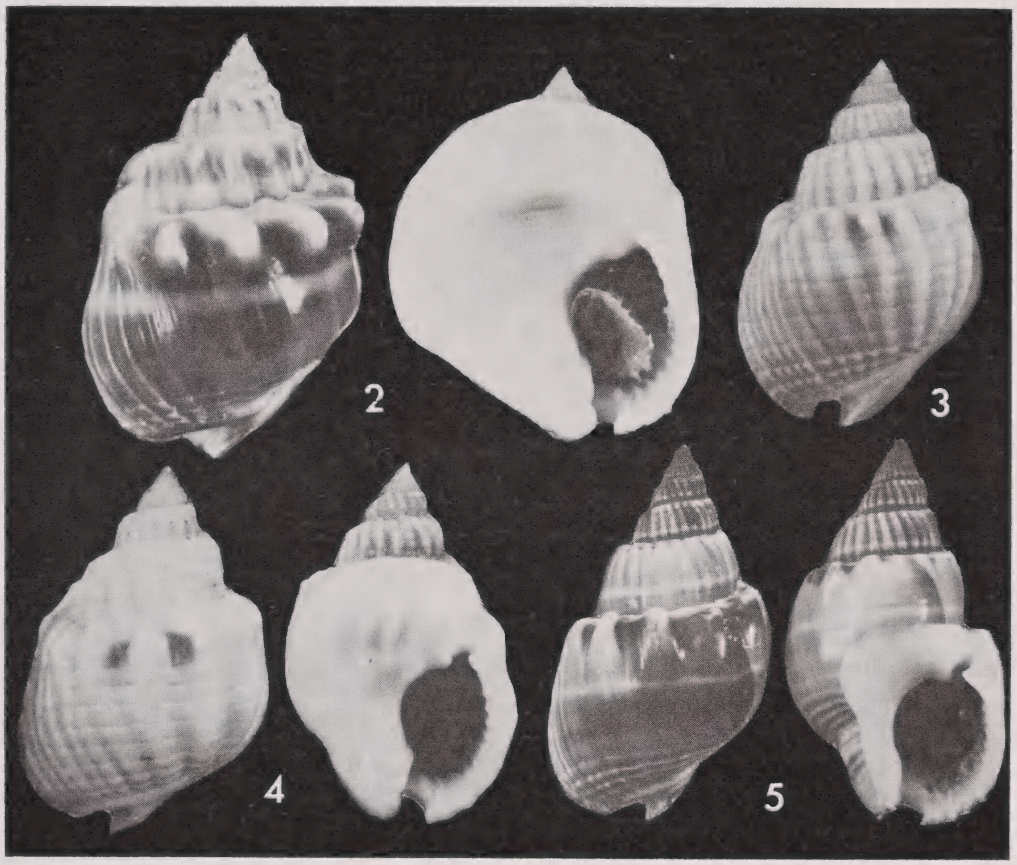
Nassarius Duméril, 1806, Zool. analyt. p. 166. Type species by SM (Froriep, 1806) *Buccinum arcularia* L. = *B. arcularia* Linnaeus, 1758. Recent, Indo-Pacific.
1807. *Arcularia* Link, Beschr. Nat.-Samml. Univ. Rostock p. 126. Type species by SD (Mörch, 1863) *A. coronata* Link, 1807 (non Bruguière, 1789) = *Buccinum arcularia* Linnaeus, 1758.
1828. *Nasa* Fleming, Hist. Brit. Anim. p. 340 (inv. emend.).
1933. *Acicularia* Dautzenberg & Bouge, J. Conchyl. 77: 213 (*nom. null.*).

Shell moderate in size, 20-35mm in length, whorls convex or angulate, sculptured with axial ribs and spiral threads, columella calloused and expanded laterally, anteriorly denticulate; outer lip dentate, aperture lirate, siphonal canal short and notched. Operculum corneous and serrate at margin, radula with laterals consisting of 2 single cusps, accessory lateral plate present.

Iredale (1916) considered *Nassarius* Duméril to be a substitute name for *Nassa* Lamarck, 1799. No evidence can be found in Duméril (1806) that his *Nassarius* has been proposed as a substitute name, and *Nassarius* is considered a genus without included nominal species, with the type *Buccinum arcularia* Linnaeus, by subsequent monotypy of Froriep (1806).

Recent authors use *Arcularia* Link, 1807, as a subgenus of *Nassarius*, on the basis of Cossman's (1901) designation of *Buccinum gibbosulum* Linnaeus,

1758, as the type of the genus. An earlier designation by Mörch (1863) of *Arcularia coronata* Link, 1807 (non Bruguière, 1789) as the type species of *Arcularia,* makes the latter an objective synonym of *Nassarius*. The Mediterranean species *N. gibbosulus* would be appropriately placed in *Plicarcularia* Thiele, 1929. *Nassa* Lamarck, 1799 (non Röding, 1798) and *Nassaria* Rafinesque, 1815 (non Link, 1807) are synonyms of *Sphaeronassa* Locard, 1886, with *Buccinum mutabile* Linnaeus, 1758, as its type.



Figs. 2-5. 2. *Nassarius arcularius arcularius* (Linnaeus). Port Havannah, New Hebrides; 24.0mm. 3-5. *N. arcularius plicatus* (Röding). 3. Mnemba I., N.E. Zanzibar; 20.0mm. 4. Pt. Mahatsinjo, S. Nossi-Bé, Madagascar; 22.0mm. 5. Ceylon; 36.0mm.

Nassarius arcularius arcularius (Linnaeus, 1758) (Figs. 2, 19)

1758. *Buccinum arcularia* Linnaeus, Syst. Nat. ed. 10: 737.

1773. *"Galeodes Arcularia major"* Martini, Syst. Conch. Cab. 2: 89, pl. 41, figs. 409, 410 *(non binom.).*

1798. *Distorsio arcularia* Röding, Mus. Bolten. p 133 (Ref. Martini, figs. 409, 410).

1807. *Arcularia coronata* Link *(pars),* Besch. Nat.-Samml. Univ. Rostock, 3 Abth: 126 (ref. Martini, figs. 409-412 [non *Buccinum coronatum* Bruguière, 1789].

1816. *Nassa arcularia* Lamarck, Tabl. Encycl. Méth. p. 1, pl. 394, figs. 1a, b.

1833. *Buccinum arcularia* Lamarck, Quoy & Gaimard, Voy. L'Astrolabe 2: 438, pl. 32, figs. 1-4 (animal).

1834. *Buccinum arcularia* Lamarck, Kiener, Spéc. gén. icon. coq. viv. 9: 94, pl. 28, fig. 115.
1853. *Nassa arcularia* Linnaeus, Reeve, Conch. Icon. 8: pl. 4, figs. 25a, b.
1956. *Buccinum arcularia* Linnaeus, Dodge, Bull. Amer. Mus. Nat. Hist. 111: 190.

Shell 18-30mm in length, sculptured with coarse axial ribs which number from 12-14 on the penultimate and from 16-20 on the body whorl; ribs become thin, numerous and crowded on the back of the outer lip. Interstices smooth, base with 4 spiral cords overriding axial ribs. Columellar callus large and spreading to either the body whorl or penultimate whorl suture; anal canal "U"-shaped, interior of aperture prominently lirate, anterior of columella with 3-6 small denticles. Creamy-yellow, sometimes with a broad brown band on the body whorl and dark brown spots between sutural coronations; interior of aperture uniformly creamy-yellow or banded with purple-brown. Operculum serrate at the margin.

TYPE LOCALITY: None.

HABITAT: In coral and weedy sand, intertidal.

Material examined: Haapai, Tonga I.; Nuku'alofa, Tonga I.; Nananu-i-Ra I., Fiji I.; Levuka, Ovalau, Fiji I.; New Hebrides: Kakula I., Tuki Tuki Pt., Port Havannah and Pango Pt., all Efate I.; Green I., N.Qld., Australia; Soepiori, Schouten I., W New Guinea; Solomon I.

Nassarius arcularius plicatus (Röding, 1798) (Figs. 3 - 5, 20)

1773. *"Galeodes Arcularia major"* Martini, Syst. Conch. Cab. 2: 91, pl. 41, figs. 411, 412 *(non binom.)*.
1798. *Distorsio plicata* Röding, Mus. Bolten. p. 133 (ref. Martini, figs. 411, 412).
1816. *Nassa arcularia* var. *spira cancellata* Lamarck, Tabl. Encycl. Méth. p. 1, pl. 394, fig. 2.
1834. *Buccinum obvelatum* Deshayes in Laborde & Linant, Vol. L'Arabie & Petrée p. 66, figs. 5, 6 (Red Sea).
1844. *Buccinum rumphii* Deshayes & Edwards, Hist. nat. anim. s. vert. 2nd ed., 10: 179 (ref. Martini, figs. 411, 412; Lamarck, pl. 394, fig. 2) [non *B. rumpfii* Gmelin, 1971].
1853. *Nassa pulla* Reeve, Conch. Icon. 8: pl. 4, figs. 22a, b (non *Buccinum pullus* Linnaeus, 1758).
1957. *Nassarius pullus* Linné, Kaicher, Indo-Pacif. sea shells pl. 7, fig. 9 (non *Buccinum pullus* Linnaeus, 1758).

The Indian Ocean subspecies differs from the Pacific form in being spirally striate. The spire whorls have 3-4 finely incised spiral grooves and the body whorl 7-12 grooves. Specimens from Port Sudan, Red Sea, are considerably smaller than specimens from other Indian Ocean localities and average only 17.0 mm in length.

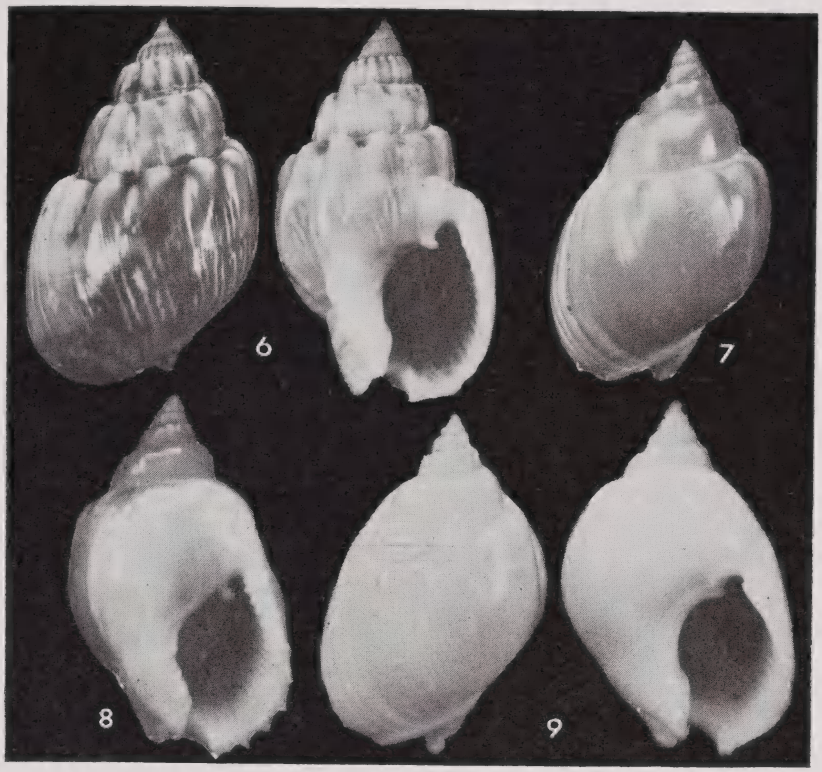
TYPE LOCALITY: None.

Material examined: Tarut Bay, Persian Gulf; Dubai, Oman coast; Port Sudan, Red Sea; Raskamoni reef, Dar-es-Salaam, E. Africa; Mnemba I. and Jembiani, Zanzibar; S. of Nossi-Bé, Madagascar.

Nassarius coronatus (Bruguière, 1789) (Figs. 6-9,21)

1789. *Buccinum coronatum* Bruguière, Encycl. Méth. vers. 1: 277.
1825. *Buccinum coronatum* Bruguière, Wood, Ind. Test. p 106, pl. 22, fig. 41a.

1834. *Buccinum coronatum* Bruguière, Kiener, Spéc. gén. icon. coq. viv. 9: 97, pl. 28, fig. 112.
1849. *Buccinum bronnii* Philippi, Zeit. Malakozool. 5: 137 (non Anton, 1839) [Java].
1851. *Buccinum bronni* Philippi, Abb. Beschr. Conch. 3: 49, pl. 1, fig. 17 (non Anton, 1839).
1853. *Nassa coronata* Lamarck, Reeve, Conch. Icon. 8: pl. 3, figs. 20a-c.
1936. *Nassarius fasciolatus* (Gronovius), Hirase, Coll. Jap. shells p. 75, pl. 106, fig. 1 *(non binom.)*.
1959. *Nassa coronata* Bruguière, Barnard, Ann. Sth. Afric. Mus. 45: 109, fig. 22j (radula).



Figs. 6-9. *Nassarius coronatus* (Bruguière). 6. Raskamoni reef, Dar-es-Salaam, E. Africa; 24.8mm. 7, 8. Keppel Bay, Qld., Australia; 28.0mm. 9. Schonian Harbour, Peleliu I., Palau I.; 24.6mm.

Shell 20-36mm in length, similar to *N. arcularius* but differs in the following features: axial ribs on the body whorl are indicated only at the sutures in the form of coronations or elongated crenules, ribs disappearing on lower two-thirds of body whorl; only 4-6 crowded and slender ribs are continuous on the back of the outer lip. Early whorls crenulate but spiral threads becoming obsolete towards the penultimate whorl. Columellar callus smaller than in *N. arcularius* and not expanding laterally. Mature specimens have up to 7 sharp, small denticles on the edge of the outer lip. Creamy-white, golden-brown, greenish-brown or dark brown, frequently with a light coloured, narrow band below the body whorl suture, darker brown between coronations, and with fine, white hair-lines; interior of aperture purple-brown, banded with white. Operculum serrate at the margin.

TYPE LOCALITY: Foulepoint, Madagascar.

HABITAT: In silty and weedy sand, intertidal.

Material examined: Raskamoni reef, Dar-es-Salaam, E. Africa; Kepwani, Zanzibar; Ceylon; Cebu, Philippines; Hongkong; Schonian Harbour, N. Peleliu, Palau I.; Mios Woendi, Padaido I., W. New Guinea; Australia: Kurrimine beach; Magnetic I.; Caloundra; Yorkey's Knob, N. of Cairns; N. Keppel I.; Gloucester I., all Queensland.

Nassarius coronatus does not appear to live in the Pacific Ocean east of Australia.

Subgenus **Plicarcularia** Thiele, 1929

Plicarcularia Thiele, 1929, Handb. syst. Weicht. p. 324. Type species by M *Nassa (Plicarcularia) thersites* Bruguière = *Buccinum pullus* Linnaeus, 1758. Recent, Indo-Pacific.

1826. *Eione* Risso, Hist. nat. Eur. merid. 4: 171. Type species by SD (Herrmannsen, 1847) *Buccinum gibbosulum* Linnaeus, 1758. Recent, Mediterranean. (non *Eione* Rafinesque, 1814.)

1936. *Parcanassa* Iredale, Rec. Aust. Mus. 19: 322. Type species by OD *P. ellana* Iredale, 1936 = *Buccinum burchardi* Dunker in Philippi, 1849. Recent, S.E. Australia.

1955. *Plicularia* Cotton, R. Soc. Sth. Aust. Malac. Sect. No. 7: 2, 4 *(nom. null.).*

1969. *Retiarcularia* Shuto, Mem. Fac. Sci. Kyushu Univ., ser D., Geol. 19: 23 *(nom. nud.).*

1969. *Chelenassa* Shuto, Mem. Fac. Sci. Kyushu Univ., ser. D., Geol. 19: 142. Type species by OD *Nassarius (Chelenassa) elegantissimus* Shuto, 1969 = *Nassa bellula* A. Adams, 1852. Recent, Philippines.

Similar to *Nassarius s. str.* but smaller, rarely exceeding 20.0 mm in length, more elongate-ovate, columellar callus generally spreading in a longitudinal direction; aperture rather small. Sculptured with axial ribs and spiral threads, siphonal canal short. The inner cusp of the lateral of the radula has a tendency to become denticulate on the outer cutting edge, but at least two species have simple cusps as in *Nassarius*. Accessory lateral plates are present, and the operculum is serrate at the margin.

Nassarius (Plicarcularia) pullus (Linnaeus, 1758) (Figs. 10 - 12, 24)

1758. *Buccinum pullus* Linnaeus, Syst. Nat. ed. 10: 737.

1789. *Buccinum thersites* Bruguière, Encycl. Méth. vers 1: 279 (Asiatic Ocean).

1816. *Nassa thersites* Lamarck, Tabl. Encycl. Méth. p. 1, pl. 394, figs. 8a, b.

1833. *Buccinum thersites* Lamarck, Quoy & Gaimard, Voy. L'Astrolabe 2: 447, pl. 32, figs. 22-24 (animal).

1834. *Buccinum thersites* Bruguière, Kiener, Spec. gén. icon. coq. viv. 9: 99, pl. 28, fig. 113.

1853. *Nassa thersites* Bruguière, Reeve, Conch. Icon. 8: pl. 10, fig. 65.

1868. *Nassa gracilis* Pease, Amer. J. Conch. 3: 273, pl. 23, fig. 4 (Ascension I., Pacific = Ponape, Caroline I.).

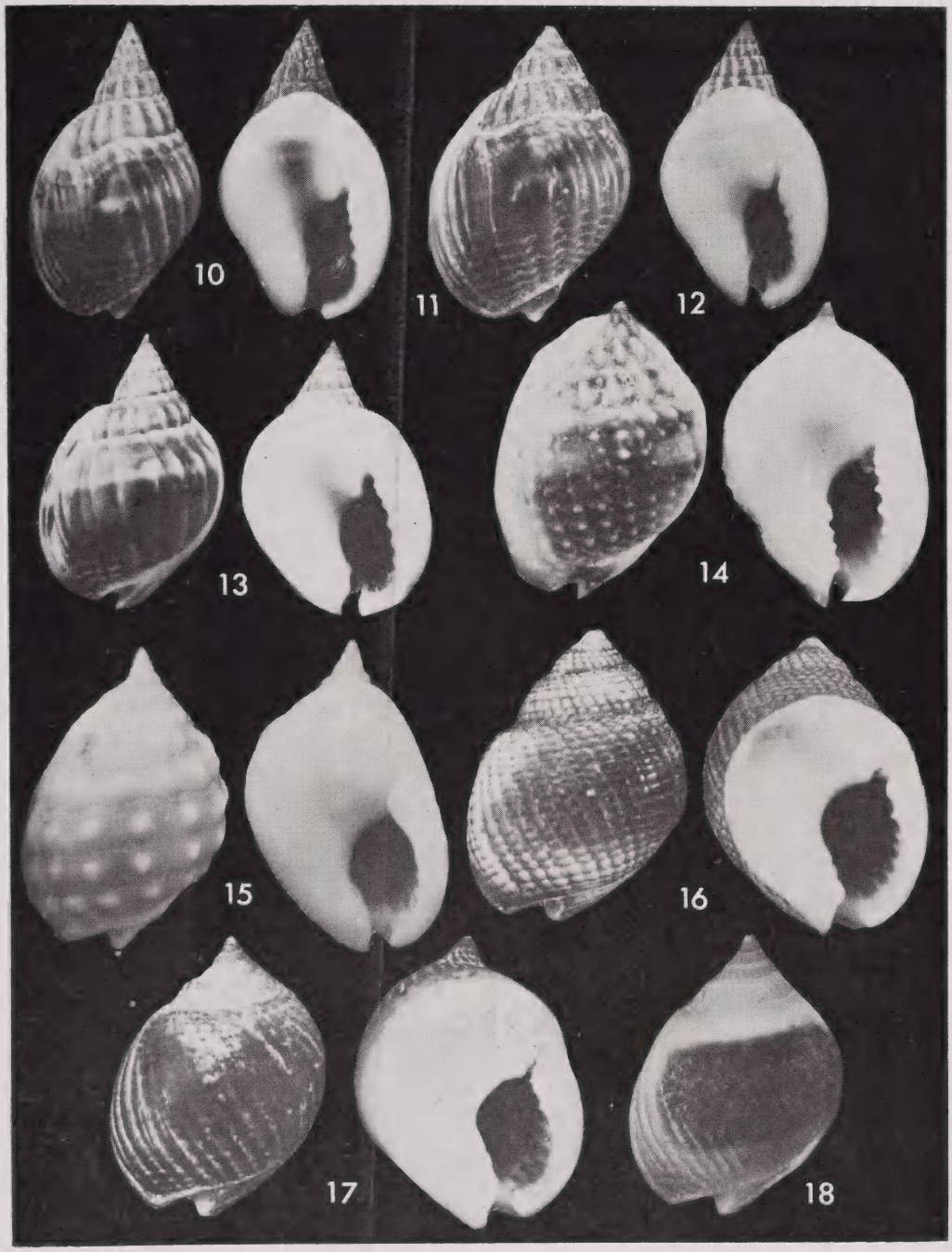
1887. *Nassa thersites* var. *acypha* von Martens, J. Linn. Soc. Lond. Zool. 21: 182, pl. 16, figs 1a-c (Mergui Arch.).

1956. *Buccinum pullus* Linnaeus, Dodge, Bull. Amer. Mus. Nat. Hist. 111: 190.

1957. *Nassarius jonasi* Dunker, Demond, Pacific Sci. 11: 320, fig. 21 (non *Buccinum jonasii* Dunker, 1846).

1967. *Plicarcularia bellula* (A. Adams), Habe & Kosuge, Stand. Book Jap. shells col. 3: 76, pl. 29, fig. 40 (non *Nassa bellula* A. Adams, 1852).

Shell 15-21mm in length, sculptured with slender axial ribs which number from 12-16 on the penultimate and from 11-18 on the body whorl; ribs become obsolete



Figs. 10-18. 10-12. *Nassarius (Plicarcularia) pullus* (Linnaeus). 10. Lucinda Pt., Qld., Australia; 18.3mm. 11. Port Havannah, New Hebrides; 13.0mm. 12. Horseshoe Bay, Magnetic I., Qld., Australia; 21.4mm. 13. *N. (P.) bimaculosus* (A. Adams). Koeroedoi I., Geelvink Bay, W. New Guinea; 17.0mm. 14. *N. (P.) callospira* (A. Adams). Tuki Tuki Pt., New Hebrides; 12.0mm. 15. *N. (P.) graniferus* (Kiener). Manava I., Fiji I.; 17.4mm. 16-18. *N. (P.) globosus* (Quoy & Gaimard). 16. Guadalcanal, Solomon I. Sculptured form; 14.0mm. 17. Tuki Tuki Pt., New Hebrides. Intermediate form; 11.4mm. 18. Smooth form from same locality; 13.4mm.

adjacent to the dorsal hump towards the aperture, but regain their strength on the back of the outer lip. Spire whorls spirally corded, threads becoming obsolete towards the body whorl where on the upper half they appear as weakly impressed striae in interstices and become cords again towards the base. Hump on the centre of dorsum usually prominent but weakly developed in some specimens. Columellar callus prominent, pointed at the top and extending up to one-half of the antepenultimate whorl. Parietal denticle distinct, anal canal narrow, outer lip with 6-11 denticles, interior of the aperture smooth, lower half of the columella with 4-8 small denticles. Brown or greyish-brown in colour, sometimes dark green, body whorl with a narrow band below suture and a darker blotch on the hump; columellar callus yellow or orange, occasionally cream, with a darker pattern showing through above the parietal wall; aperture purplish-brown, banded with white.

TYPE LOCALITY: Mediterranean = error! (Asiatic Ocean — Bruguière, 1789).

HABITAT: In coral and weedy sand, intertidal.

Material examined: Port Havannah, Efate I., New Hebrides; Australia: Lucinda Pt., Qld.; Pt. Martin, Townsville, Qld.; Green I., Qld.; Horseshoe Bay, Magnetic I., Qld.; Soepiori, Schouten I., W. New Guinea; Alligator I., Singapore.

The name *Nassarius pullus* was erroneously applied to *N.arcularius plicatus* (Röding) by several authors until Dodge (1956) unravelled the nomenclatural tangle involving *N.pullus*, *N.thersites* and *N.arcularius*, and advocated the reinstatement of *N.pullus* for *N.thersites*. The existence of a specimen of *N.pullus*, which is the *N.thersites* of authors, in a marked box in the Linnean collection in London, confirms Dodge's conclusions as to the true identity of the Linnaean *pullus*.

Nassarius (Plicarcularia) bimaculosus (A. Adams, 1852) (Figs. 13, 23)

1852. *Nassa bimaculosa* A. Adams, Proc. Zool. Soc. Lond. p. 102.

1853. *Nassa bimaculosa* A. Adams, Reeve, Conch. Icon. 8: pl. 10, fig. 61.

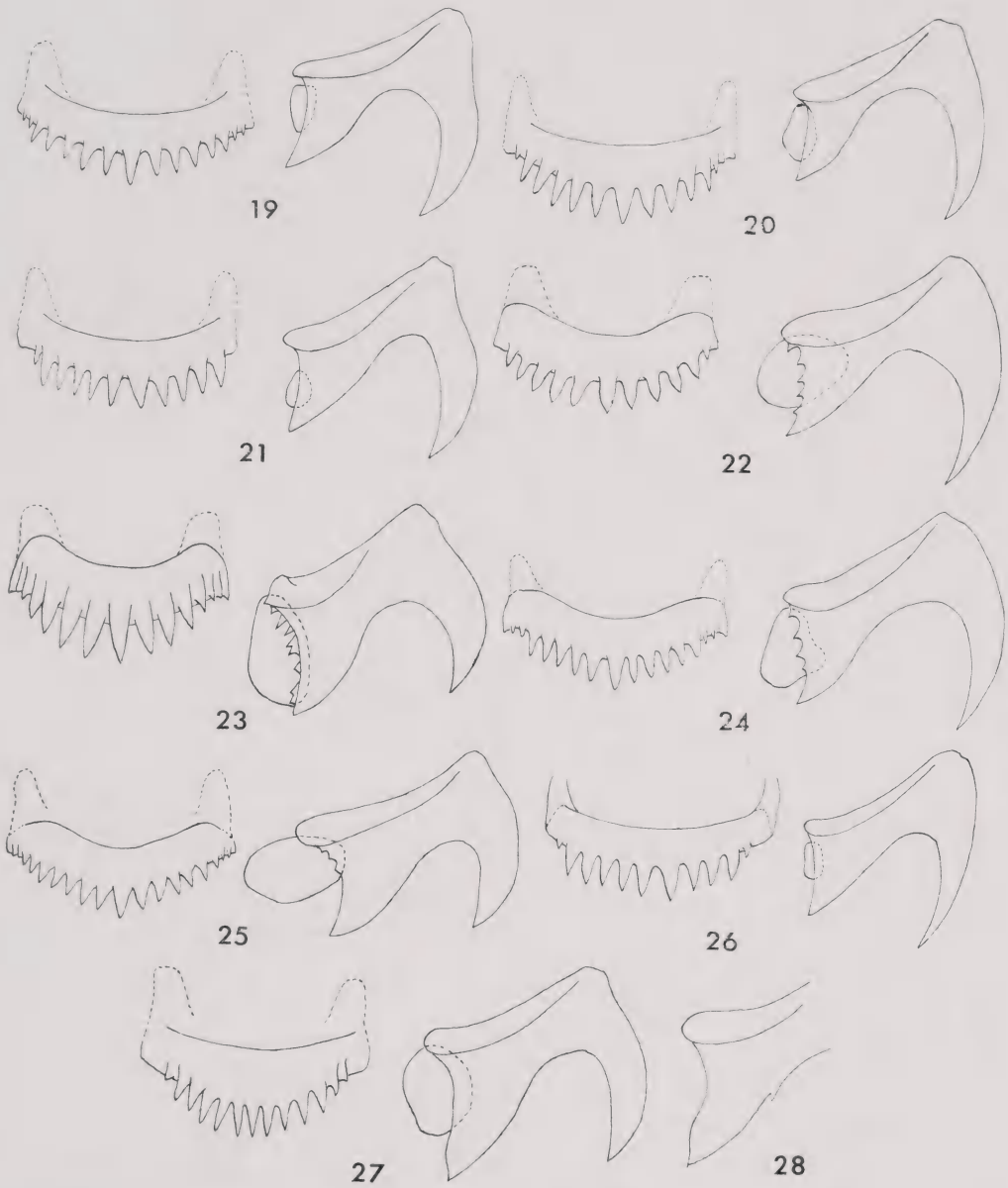
1938. *Nassa (Arcularia) bimaculosa* A. Adams, Adam & Leloup, Mém. Mus. R. d'Hist. Nat. Belg. 2: 182, pl. 8, fig. 5a, b.

1966. *Plicarcularia bimaculosa* (A. Adams), Habe & Kosuge, Shells world col. 2: 61, pl. 22, figs. 20, 21.

Only slightly smaller and similar to *N. pullus*, but differs in the following features: squatter and broader, axial ribs on body whorl wider apart and interrupted below the sutures by a shallow channel giving rise to small sutural nodules; interstices smooth, lacking the impressed lines of *N. pullus*. Columellar callus more orbicular and not pointed posteriorly and always white in colour; dorsal hump smaller and more knob-like and the dark brown blotch present in *N. pullus* is absent. Greenish-grey to bluish-grey, ornamented with a narrow white subsutural band and a darker central band on the body whorl; the back of the outer lip usually with 2 dark brown spots, but some individuals uniformly dark brown in colour.

TYPE LOCALITY: Siquijor I., Philippines.

HABITAT: In silty sand, intertidal.



Figs. 19-28. Half-row of radulae. 19. *Nassarius arcularius arcularius* (Linnaeus). Kakula I., New Hebrides. 20. *N. arcularius plicatus* (Röding). Jembiani, S.E. Zanzibar. 21. *N. coronatus* (Bruguière). Kepwani, Zanzibar. 22. *N. (Plicarcularia) globosus* (Quoy & Gaimard). Tuki Tuki Pt., New Hebrides. 23. *N. (P.) bimaculosus* (A. Adams). Koeroedoi I., W. New Guinea. 24. *N. (P.) pullus* (Linnaeus). Port Havannah, New Hebrides. 25. *N. (P.) callospira* (A. Adams). Tuki Tuki Pt., New Hebrides. 26. *N. (P.) sordidus* (A. Adams). Koror I., Palau I. 27. *N. (P.) graniferus* (Kiener). Manava I., Fiji I. 28. Inner cusp of lateral of *N. (P.) graniferus* from same radula.

Material examined: Kaipoeri, Koeroedoi I., Geelvink Bay, W. New Guinea; Marinduque, Philippines.

Nassarius (Plicarcularia) callospira (A. Adams, 1852) (Figs. 14, 25)

1852. *Nassa callospira* A. Adams, Proc. Zool. Soc. Lond. p. 102.

1853. *Nassa callospira* A. Adams, Reeve, Conch. Icon. 8: pl. 10, fig. 66a, b.

1938. *Nassa (Arcularia) callospira* A. Adams, Adam & Leloup, Mém. Mus. R. d'Hist. Nat. Belg. 2: 183, pl. 8, figs. 6a, b.

Shell 10-13mm in length, spire whorls sculptured with thick and broad axial ribs and spiral threads in interstices; on the body whorl axial ribs become thinner but granulose through overriding spiral cords. Axial ribs number from 8-11 on the body whorl and from 5-7 on the penultimate whorl; on the centre of the dorsum is a small but distinct, longitudinally elongated hump. Columellar shield thick and very large, extending almost to the tip of the spire; the ventral part of the whorls are solidly submerged within the callus and only the protoconch is free. Aperture very small, outer lip with 7-10 denticles which extend only for a short distance into the aperture, anterior of columella with 2-6 small denticles. White in colour, spire whorls with a single dark green subsutural band, body whorl with a narrow band at the suture, followed by a whitish band and a broad, dark green band towards the base; columellar shield white but frequently with an orange flush above the parietal wall; interior of aperture white, broadly banded with purple-brown. Operculum serrate at the margin.

TYPE LOCALITY: Burias I., Philippines.

HABITAT: in coral sand, intertidal.

Material examined: Samoa I.; Lifu, Loyalty I.; New Hebrides: Tuki Tuki Pt.; Port Havannah; Malapoa Pt., Vila Harbour.

Nassarius (Plicarcularia) graniferus (Kiener, 1834) (Figs. 15, 27 - 28)

1789. *Buccinum verrucosum* Bruguière, Encycl. Méth. vers 1: 279 (ref. Lister, pl. 972, fig. 27) [*nom. oblitum*].

1817. *Buccinum verrucosum* Bruguière, Dillwyn, Desc. cat. rec. shells 2: 605.

1825. *Buccinum verrucosum* Wood, Ind. Test. p. 107, pl. 22, fig. 45.

1834. *Buccinum graniferum* Kiener, Spéc. gén. icon. coq. viv. 9: 100, pl. 27, fig. 111.

1853. *Nassa granifera* Kiener, Reeve, Conch. Icon. 8: pl. 1, fig. 72.

1854. *Nassa obliqua* Hombron & Jaquinot, Voy. Pole Sud 5: 84, pl. 21, figs. 43, 44 (non *Buccinum obliqum* Kiener, 1841).

1856. *Buccinum verrucosum* Hanley in Wood, Ind. Test. p. 113, pl. 22, fig. 45 (with *B. graniferum* in synoymy).

1904. *Nassa perlata* "Meuschen", Hidalgo, Rev. R. Acad. Cienc. Madrid 1: 203 *(non binom.)*.

1957. *Nassarius graniferus* Kiener, Kaicher, Indo-Pacific sea shells pl. 7, fig. 4.

1964. *Arcularia (Plicarcularia) granulifera (sic)* (Kiener), Habe, Shells west. Pacific col. 2: 99, pl. 32, fig. 12.

Shell 14-23mm in length, sculptured with 2 spiral rows of pointed granules on the penultimate whorl and 4-5 rows on the body whorl; a spiral groove, which is paired on the penultimate whorl and at the body whorl suture, separates rows of nodules, intervening spaces containing macroscopic hairlines. Columellar callus inturned

and moulded to the shell and spreading almost to the nuclear whorls; the nodulose sculpture is visible underneath the callus shield above the parietal wall. Aperture lirate, anterior of columella either smooth or with 1-3 denticles. Cream, flesh to light fawn in colour, nodules whitish, columellar callus white, back of anterior canal bordered with yellow or orange, interior of aperture yellow. Operculum generally serrate at margin, but rare individuals are smooth at the margin.

TYPE LOCALITY: East Indies.

HABITAT: In coral and weedy sand, intertidal.

Material examined: Gambier I., Pacific; Rarotonga, Cook I.; Manava I., Fiji I.; Lifu, Loyalty I.; S.W. of Biak wharf, W. New Guinea; Direction I., Cocos-Keeling I.

Buccinum verrucosum Bruguière, is a prior but unused name for *Nassarius graniferus* (Kiener). Kiener's taxon has been in general use in the last 50 years and *Buccinum verrucosum* is considered a *nomen oblitum*.

Nassarius (Plicarcularia) globosus (Quoy & Gaimard, 1833) (Figs. 16 - 18, 22)

1833. *Buccinum globosum* Quoy & Gaimard, Voy. L'Astrolabe 2: 448, pl. 32, figs. 25-27.

1834. *Buccinum clathratum* Kiener, Spéc. gén. icon. coq. viv. 9: 101, pl. 27, fig. 108 *(nom. subst. pro B. globulosum (sic)* Quoy & Gaimard) [non *B. clathratum* Born, 1778].

1853. *Nassa globosa* Quoy & Gaimard, Reeve, Conch. Icon. 8: pl. 10, figs. 62a, b.

1957. *Nassarius globosus* Quoy & Gaimard, Kaicher, Indo-Pacific sea shells pl. 7, fig. 23.

1966. *Plicarcularia gibbosuloidea* Habe & Kosuge, Shells world col. 2: 60, pl. 22, figs. 5, 6 *(nom. nud.)*.

1966. *Plicarcularia globosa* (Quoy & Gaimard), Habe & Kosuge, Shells world col. 2: 60, pl. 22, figs. 10, 11.

1966. *Plicarcularia gibbosuloidea* Habe & Kosuge, Jap. J. Malac. 24: 317, 331, pl. 29, figs. 2, 3 (New Caledonia).

Shell 8-15mm in length, globose, sculptured with numerous, close-set and oblique axial ribs which number from 24-32 on the penultimate and from 18-34 on the body whorl; axial ribs occasionally completely absent on the dorsal side of the body whorl with the exception of a few crowded axials on the back of the outer lip. Dorsal hump either well developed or absent in some individuals. In the granose form of the species, finely incised spiral striae render axial ribs granulose. Aperture small, columellar callus spreading and orbicular, not quite reaching body whorl suture; outer lip with 5-10 denticles which extend as lirae into the aperture, anterior of columella with 2-4 small denticles. Variable in colour, white, fawn or tan, ornamented with a broad, light to dark brown band on the body whorl; some specimens are white, with a faint body whorl band. Aperture purple-brown, banded with white. Operculum serrate at the margin.

TYPE LOCALITY: Carteret Harbour, New Ireland.

HABITAT: In coral and weedy sand, intertidal.

Material examined: Oahu, Hawaiian I.; Tonga I.; Apia, Upolu, Samoa I.; Malua, Samoa I.; Naviti I., Yasawa group, Fiji I.; Manava I., Fiji I.; New Hebrides: Port

Havannah; Tuki Tuki Pt.; Malapoa Pt., Vila Harbour, all Efate I.; Tevuki, Kadavu, Fiji I.; Guadalcanal, Solomon I.; Lifu, Loyalty I.; Moreton Bay, Qld., Australia; N.E. Ambai, Japen I., W. New Guinea; N. Babelthuap, Palau I.; Philippines; Singapore.

Kiener's substitute name for *Buccinum globosum* was unnecessary since *Nassa globosa* Sowerby, 1828 (= *Demoulea abbreviata* Gmelin, 1791) does not preoccupy *Buccinum globosum* Quoy & Gaimard. Habe & Kosuge (1966) proposed *Plicarcularia gibbosuloidea* for the smooth, white and brown-banded form of *N.globosus*. This particular form is moderately common in Melanesian localities and there is a gradual integradation from the typical reticulated form to the smooth form in populations from Samoa, Fiji and the New Hebrides.

Nassarius (Plicarcularia) sordidus (A. Adams, 1852) (Figs. 26, 29)

1852. *Nassa sordida* A. Adams, Proc. Zool. Soc. Lond. p. 97.

1853. *Nassa sordida* A. Adams, Reeve, Conch. Icon. 8: pl. 15, fig. 96.

1969. *Nassarius (Chelenassa) elegantissimus* Shuto, Mem. Fac. Sci. Kyushu Univ., ser. D, Geol. 19: 142, pl. 13, figs. 1-10, 13, 14, 19-21, textfigs. 27, 28 (Panay I., Neogene of Philippines).

Shell 18-22mm in length, sculptured with numerous, slender axial ribs which number from 25-28 on the penultimate and from 28-32 on the body whorl; ribs continue on the body whorl in undiminishing strength towards the back of the outer lip. Finely incised spiral grooves override axial ribs and separate them into nodules. The centre of the dorsum lacks a hump or callus, and in some specimens an obsolete gibbosity is only faintly indicated. Columellar callus thick, truncated at the top and either short or barely overlapping body whorl suture; labial lip with 9-10 denticles which continue as lirae inside the aperture, lower half of columella with 4-5 small denticles. Base colour white, banded with a broad, brown band leaving a narrow white central line exposed; some specimens predominantly brown and paling towards sutures and either side of the centre of the dorsum. Columellar callus white or yellow, aperture purplish-brown, banded with white. Operculum serrated at the margin.

TYPE LOCALITY: Ilo Ilo, Panay I., Philippines.

HABITAT: In silty sand, intertidal.

Material examined: Passage west of Koror I., Palau I.; Bohol, Philippines.

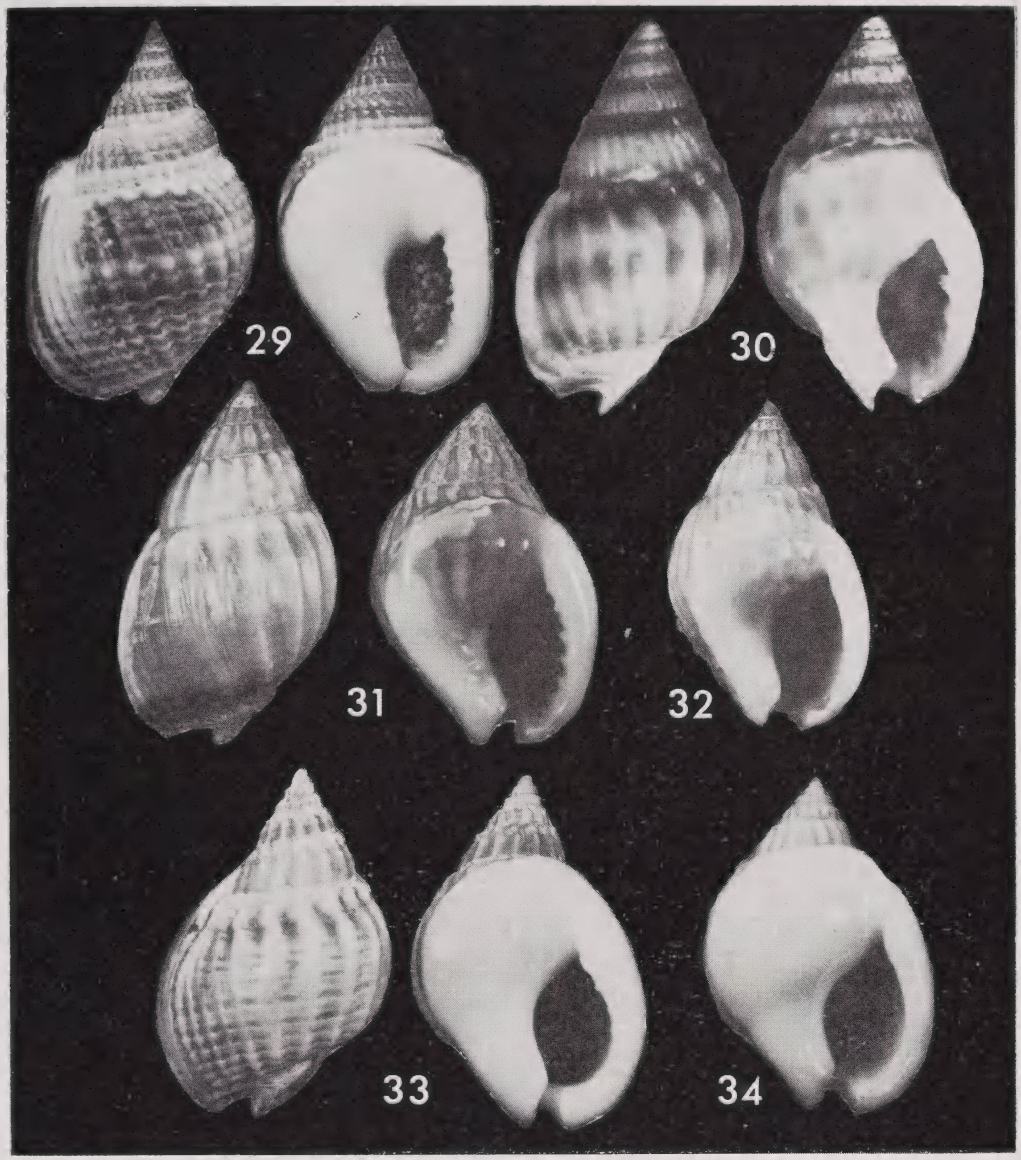
Nassarius (Plicarcularia) callosus (A. Adams, 1852) (Fig. 30)

1852. *Nassa callosa* A. Adams, Proc. Zool. Soc. Lond. p. 98.

1854. *Nassa callosa* A. Adams, Reeve, Conch. Icon. 8: pl. 28, figs. 185a, b.

1932. *Nassa delicata* A. Adams, Tomlin, Proc. Malac. Soc. Lond. 22: 42 (synonymised with *N. callosa*).

Shell 6-8mm in length, shining, sculptured with oblique axial ribs which number from 20-28 on the penultimate and from 14-20 on the body whorl; a shallow presutural groove separates axial ribs from a row of small sutural nodules. Interstices of axial ribs on the body whorl with finely incised spiral grooves, last 3-4 grooves becoming over-



Figs. 29-34. 29. *Nassarius (Plicarcularia) sordidus* (A. Adams). W. of Koror I., Palau I. 21.0mm. 30. *N. (P.) callosus* (A. Adams). N.W. of Black River, Mauritius; 7.8mm. 31-32. *N. (P.) burchardi* (Dunker). Clontarf, Sydney, Australia. 31. Denticulate outer lip; 13.0mm. 32. Smooth outer lip; 12.0mm. 33-34: *N. (P.) jonasii* (Dunker). 33. Shellharbour, N.S.W., Australia. Outer lip denticulate; 13.6mm. 34. Clontarf, Sydney, Australia. Outer lip smooth; 12.5mm.

riding spiral threads. Columellar callus spreading, orbicular and moderately thin, reaching the body whorl suture; columella with 1-7 small denticles anteriorly, outer lip with 5-7 denticles, back of outer lip thickened and varied. Shining, translucent-white to fawn in colour, spire whorls with a brown sutural band, body whorl with 3 brown bands; central band frequently more saturated in the interstices than upon the axial ribs. Callus white, interior of aperture white with brown spotted bands.

TYPE LOCALITY: Bais, Negros I., Philippines, 7 fathoms.

HABITAT: On a sand and weed substratum, sublittoral.

Material examined: N.W. of Black River, W. Mauritius, 16 metres.

Nassarius (Plicarcularia) burchardi (Dunker in Philippi, 1849) (Figs. 31 - 32, 56)

1849. *Buccinum burchardi* Dunker in Philippi, Abb. Beschr. Conch. 3: 69, pl. 2, fig. 14.

1936. *Parcanassa ellana* Iredale, Rec. Aust. Mus. 19: 322 (New South Wales).

1962. *Parcanassa burchardi* (Philippi), Macpherson & Gabriel, Mar. Moll. Victoria p. 195, fig. 232.

Shell 9-15mm in length, sculptured with slender but slightly swollen and often corrugated axial ribs which number from 10-17 on the penultimate and from 9-20 on the body whorl; axial ribs somewhat nodulose at sutures and becoming weak or obsolete on the dorsum towards the outer lip. Interstices smooth, but some individuals have 2 weak spirals on the penultimate whorl, and the lower half of the body whorl bears 3-7 spiral threads. Columellar callus orbicular and expanded, reaching the body whorl suture but thinner above the parietal wall; anterior of columella with 2-5 small denticles, edge of outer lip either smooth or with up to 9 denticles. These denticles, whenever present, are confined to the margin of the outer lip and the interior of the aperture is smooth. Light to dark brown in colour, penultimate whorl with a blackish-brown sutural band, body whorl with a sutural band and an additional brown band at the base; columellar callus flushed with yellowish-brown, interior of aperture white, yellow or brown, inside of siphonal canal usually violet.

TYPE LOCALITY: Adelaide, South Australia.

HABITAT: Intertidal and sublittoral.

Material examined: Port Adelaide River, S. Australia; Outer Harbour, Adelaide, S. Australia; North Harbour, Port Jackson, N.S.W.; Clontarf, Sydney Harbour, N.S.W.; Balmoral, Sydney, N.S.W.; La Perouse, N.S.W.; Moreton Bay, Queensland.

Nassarius (Plicarcularia) jonasii (Dunker, 1846) (Figs. 33, 34)

1846. *Buccinum jonasii* Dunker, Zeit. Malakozool. 3: 171.

1849. *Buccinum jonasi* Dunker, Philippi, Abb. Beschr. Conch. 3: 66, pl. 2, fig. 10.

1955. *Parcanassa jonasi* Dunker, Cotton, R. Soc. Sth. Aust. Malac. Sect. No. 7: fig. 7.

Species similar in size and sculpture to *N. burchardi* but differs in the following features: interstices of axial ribs prominently grooved, grooves extending along the entire length of the body whorl forming 4-6 clathrate cords at the base. Columellar callus thicker and more solid, orbicular, reaching, or only slightly extending past the body whorl suture; callus shield completely smooth on the columellar side, lacking the small denticles which are present in *N. burchardi*. Similarly to the latter, the margin of the outer lip either smooth or denticulate. Columellar callus white and not flushed with brown, area above the parietal wall not thinned as in *N. burchardi* but solid. Fawn to ash-grey rather than brown, interior of aperture brown.

TYPE LOCALITY: None.

HABITAT: Intertidal and sublittoral.

Material examined: Clontarf, Sydney Harbour; Gunnamatta; Balmoral, Sydney; Maroubra; Shellharbour, all New South Wales.

Cotton (1955) describes the aperture of *N.jonasii* as non-denticulate, but similarly to other Australian temperate water nassarids, the aperture is either smooth or denticulate.

Subgenus **Niotha** (H. & A. Adams, 1853)

Niotha H. & A. Adams, 1853, Gen. Rec. Moll. 1: 117. Type species by SD (Cossmann, 1901). *N. cumingi* A. Adams = *Nassa cumingii* A. Adams, 1852 = ? *N. stigmarius* A. Adams, 1852. Recent, Indo-Pacific.

1936. *Tavaniotha* Iredale, Rec. Aust. Mus. 19: 321, 337. Type species by OD *Nassa optata* Gould, 1860 = *N. nigella* Reeve, 1854. Recent, S.E. Australia (a *nomen nudum* — does not conform with requirements of art. 13 (i) of ICZN).

Shell moderately small, 15-30mm in length, sculptured with axial ribs, spiral striae, granules or spinose nodules; aperture ovate, columellar callus frequently thick but less expanding than in *Nassarius s. str.* or *Plicarcularia,* denticulate anteriorly. Outer lip denticulate, aperture smooth or lirate, siphonal canal short. Laterals of radula generally with simple cusps but occasionally inner cusps denticulate; accessory lateral plate usually present. Operculum serrate at the margin.

Nassarius (Niotha) variegatus (A. Adams, 1852) (Figs. 35 - 37)

1816. *Nassa clathrata* Lamarck, Tabl. Encycl. Méth. p. 1, pl. 394, figs. 5a, b (non *Buccinum clathratum* Born, 1778).

1822. *Buccinum gemmulatum* Lamarck, Hist. Nat. anim. s. vert. 7: 271 (non Wood, 1818).

1825. *Buccinum clathratum* Wood, Ind. Test. p. 112, pl. 23, fig. 114 (E. Indies) [non Born, 1778].

1834. *Buccinum gemmulatum* Lamarck, Deshayes in Laborde & Linant, Voy. L'Arabie Petrée p. 66, figs. 35, 36 (Red Sea) [non Wood, 1818].

1834. *Buccinum gemmulatum* Lamarck, Kiener, Spéc. gén. icon. coq. viv. 9: 85, pl. 22, fig. 84 (non Wood, 1818).

1852. *Nassa verucosa* A. Adams, Proc. Zool. Soc. Lond. p. 97 (Eastern Seas) [non *Buccinum verrucosum* Bruguière, 1789; nec Gmelin, 1791].

1852. *Nassa variegata* A. Adams, Proc. Zool. Soc. Lond. p. 97.

1853. *Nassa gemmulata* Lamarck, Reeve, Conch. Icon. 8: pl. 5, fig. 29.

1853. *Nassa verrucosa* A. Adams, Reeve, Conch. Icon. 8: pl. 6, fig. 36.

1853. *Nassa variegata* A. Adams, Reeve, Conch. Icon. 8: pl. 11, fig. 70.

1913. *Nassa (Niotha) gemmulata* var. *variegata* A. Adams, Schepman, Siboga-Exp. 49d: 328.

1929. *Niotha comtessei* Iredale, Aust. Zool. 5: 349, pl. 38, fig. 13 (Sydney Harb., Aust.).

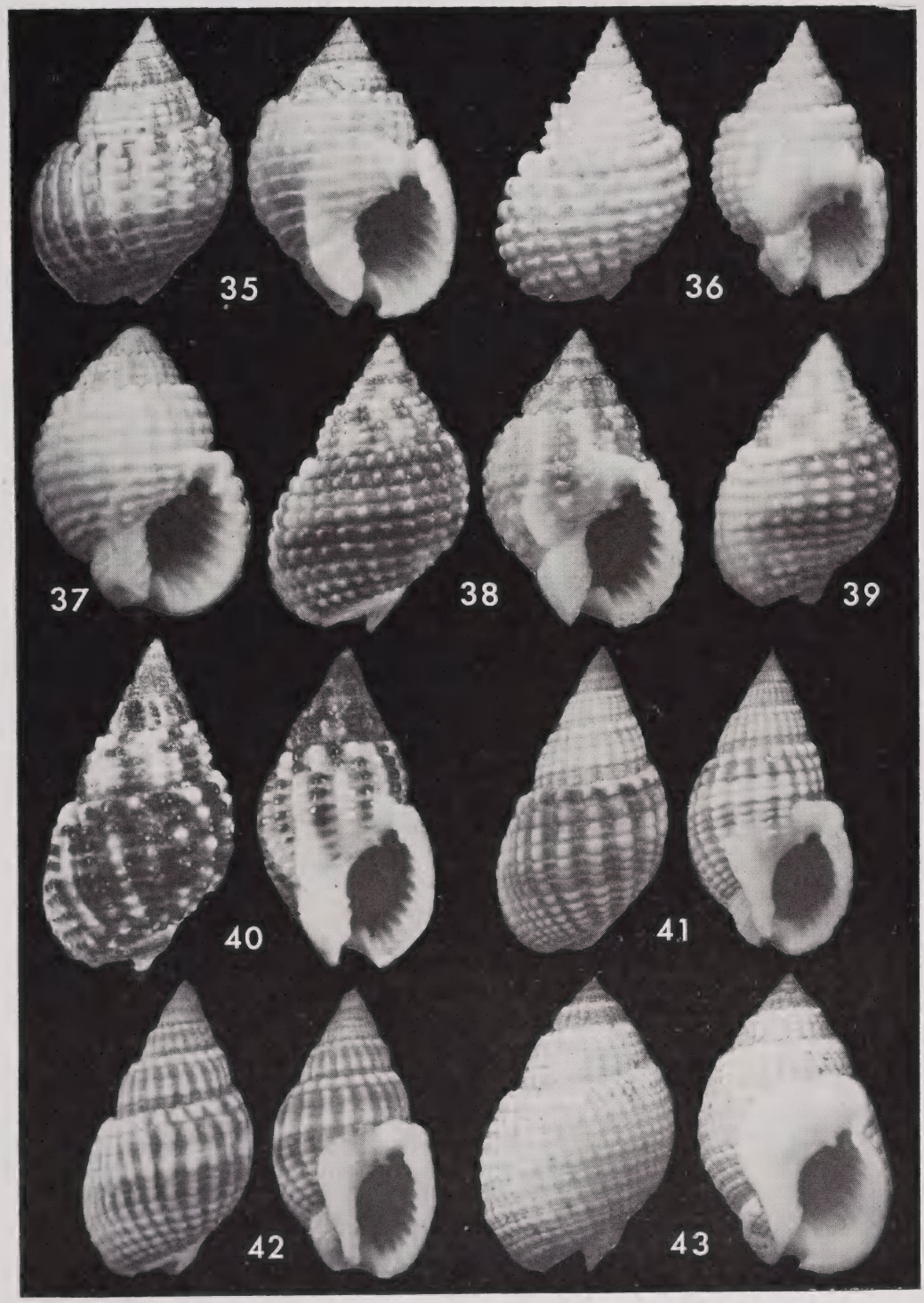
1932. *Nassa variegata* A. Adams, Tomlin, Proc. Malac. Soc. Lond. 22: 44.

1932. *Nassa verrucosa* A. Adams, Tomlin, Proc. Malac. Soc. Lond. 22: 44.

1945. *Nassarius (Niotha) gemmulatus* (Lamarck), Habe, Jap. J. Malac. 14: 195, fig. 16 (radula).

1957. *Nassarius gemmulatus* Gray, Kaicher, Indo-Pacific sea shells pl. 7, fig. 19.

1967. *Niotha clathrata* (Lamarck), Habe & Kosuge, Stand. Book Jap. shells col. 3: 76, pl. 29, fig. 38.



Figs. 35-43. 35-37. *Nassarius (Niotha) variegatus* (A. Adams). 35. Kii, Japan; 28.0mm. 36. Muscat, Gulf of Oman; 23.0mm. 37. Ballina, N.S.W., Australia; 26.0mm. 38, 39. *N. (N.) stigmarius* (A. Adams). 38. Teuma Bay, New Hebrides; 16.2mm. 39. Manava I., Fiji I.; 15.2mm. 40. *N. (N.) bifarius* (Baird). Teuma Bay, New Hebrides; 14.0mm. 41, 42. *N. (N.) livescens* (Philippi). 41. Kagashima, Japan; 21.0mm. 42. Sandakan, Borneo, Indonesia; 19.8mm. 43. *N. (N.) albescens albescens* (Dunker). Caboni beach, Fiji I.; 15.0mm.

Shell 23-30mm in length, inflated, sutures broad and flat or narrow and canaliculate, sculptured with regular granules which are arranged in 15-21 axial ribs on the body whorl and 17-29 ribs on the penultimate whorl; the granules form 4, rarely 5 spiral rows on the penultimate and 10, rarely 8 or 9 rows on the body whorl. Columellar callus extends on to the body whorl, and is thin next to the parietal wall, wrinkled and laminated anteriorly; columellar denticles irregular, numbering from 5-10, and generally appearing as small plicae or wrinkles. Aperture wide and striate within, outer lip with 8-10 denticles and occasionally short spines, siphonal notch very deep. Fawn to brown in colour, body whorl occasionally with 2 broad but very faint bands, columellar callus white or cream, interior of aperture white, banded with purplish-brown.

TYPE LOCALITY: Dalmaguete, Negros I., Philippines.

HABITAT: In coral and weedy sand, sometimes mud, intertidal and sublittoral.

Material examined: Balina, N.S.W., Australia; Horseshoe Bay, Magnetic I., Qld., Australia; Mikawa, Japan; Shioya Ki, Japan; Kinomotu, Kii, Japan; Tateyama, Japan; Minoshima, Wakayama-Ken, Japan; Gulf of Oman.

Nassa clathrata Lamarck, 1816, is undoubtedly congeneric with Born's Italian Pliocene *Buccinum clathratum,* and is a secondary homonym. Tomlin (1932a) considers *B.clathratum* Born to be a homonym of *B.clathratum* Linnaeus, and uses *Nassa subclathrata* d'Orbigny, 1852, for the fossil. Since Linnaeus did not describe a *Buccinum clathratum,* Born's specific name is available for the Italian Pliocene species. *Nassa verrucosa* A. Adams is a secondary homonym of *Buccinum verrucosum* Bruguière, 1789, which is a forgotten name for *Nassarius graniferus* (Kiener), and of *Buccinum verrucosum* Gmelin, 1791, a species very similar to *Nassarius stigmarius* (A. Adams). *Buccinum gemmulatum* Lamarck, 1822, is a primary homonym of *B.gemmulatum* Wood, 1818.

Nassarius (Niotha) stigmarius (A. Adams, 1852) (Figs. 38 - 39, 57)

1852. *Nassa stigmaria* A. Adams, Proc. Zool. Soc. Lond. p. 96.

1852. *Nassa retecosa* A. Adams, Proc. Zool. Soc. Lond. p. 97 (Albay, Luzon, Philippines).

1852. ? *Nassa cumingii* A. Adams, Proc. Zool. Soc. Lond. p. 98 (China).

1853. *Nassa retecosa* A. Adams, Reeve, Conch. Icon. 8: pl. 5, figs. 28a, b.

1853. ? *Nassa cumingii* A. Adams, Reeve, Conch. Icon. 8: pl. 5, figs. 30a, b.

1853. *Nassa stigmaria* A. Adams, Reeve, Conch. Icon. 8: pl. 7, figs. 42a, b.

1854. *Nassa densigranata* Reeve, Conch. Icon. 8: pl. 27, fig. 181 (Philippines)

1880. *Nassa adamsiana* Marrat, Var. shells gen. *Nassa* p. 99 (*nom subst. pro N. retecosa* A. Adams, 1852).

1925. ? *Nassa perligera* Thiele, Wiss. Erg. Deut. Tief.-Exp. "Valdivia" 17: 259, pl. 20, fig. 13 (Padang, Sumatra and Upolu, Samoa I.).

1934. *Nassa baguenai* Giner-Marí, J. Conchyl. 78: 30 (*nom. subst. pro N. reticosa (sic)* A. Adams, 1852).

1936. ? *Niotha hawleyi* Iredale, Rec. Aust. Mus. 19: 322, pl. 24, fig. 11 (Sydney Harb., Aust.).

1939. *Nassarius (Niotha) conoidalis* (Deshayes), Oostingh, Ing. Nederl.-Indie 5 (12): 183, pl. 16, figs. 286, 287 (non *Buccinum conoidale* Deshayes in Bélanger, 1832).

1961. *Niotha stigmaria* (A. Adams), Habe Col. Illust. shells Jap. 2: 64, pl. 32, fig. 13.

Smaller than *N.variegatus*, generally 14 - 18 mm in length, differing at first appearance in features of finer sculpture. The number of axial ribs and spiral rows of granules, however, do not differ from the number present in *N.variegatus*, but being smaller specimens, the axial ribs appear more closely set. The sutural ramp in *N.variegatus* is either broad and flat or deeply channelled, but in *N.stigmarius* the sutures lack the flat ramp or channel and are tightly pressed onto the succeeding whorl. The colour is cream to fawn, blotched with brown, last whorl with 2 brown bands. In all other respects, the two species are very similar. The operculum is serrate at the margin.

TYPE LOCALITY: Siquijor I., Philippines.

HABITAT: In weedy and muddy sand, to a depth of 25 fathoms (46 metres).

Material examined: Christmas I., Pacific, 22 metres; Manava I., Fiji I., intertidal; Teuma Bay, Efate I., New Hebrides, 37-46 metres; Horseshoe Bay, Magnetic I., Qld., Australia.

The large *Nassarius variegatus* has not been recorded from Fiji and the New Hebrides, but *N.stigmarius* is occasionally collected in that area. Further research is indicated as to the relationship and validity as biospecies of the two forms.

Nassarius (Niotha) bifarius (Baird, 1873) (Figs. 40, 58)

1873. *Nassa bifaria* Baird, Cruise "Curacao" p. 436, pl. 38, figs. 1, 2 (New Caledonia).

1879. *Nassa bifaria* Baird, E. A. Smith, Proc. Zool. Soc. Lond. p. 803, pl. 50, fig. 7.

Similar to *N. stigmarius*, 11-15mm in length, more slender and with a longer and more pointed spire. Sculptured with 15-23 axial ribs on the body whorl and 16-21 ribs on the penultimate whorl; axial ribs decussated into granules by 4-5 elevated and flattened spiral cords on the penultimate and 9-11 cords on the body whorl. Interstices of axial ribs with macroscopic hairlines, sutural nodules occasionally larger than remaining ones. Columellar callus extends on to the body whorl and appears only as a thin glazing above the parietal wall and as a laminated callus on the columellar side; outer lip with 9-12 denticles which extend only halfway into the aperture, and minute sharp denticles on the edge of the lip. Columella with 4-8 irregular plicae or denticles. Cream to fawn in colour, ornamented with irregular dark brown streaks, spots and bands, interior of aperture white, banded with purple-brown. Operculum serrate at the margin.

TYPE LOCALITY: New Caledonia.

HABITAT: In weedy and black sand, from 18 - 46 metres.

Material examined: Teuma Bay, Efate I., New Hebrides, 37 - 46 metres.

The species is very similar to *N.stigmarius* and may represent only a population variant from deeper water.

Nassarius (Niotha) livescens (Philippi, 1849) (Figs. 41 - 42, 61)

1849. *Buccinum livescens* Philippi, Zeit. Malakozool. 5: 135.

1882. *Nassa livescens* Philippi, Tryon, Man. Conch. 4: 54, pl. 16, fig. 304.

1906. *Nassa nevilliana* Preston, Proc. Malac. Soc. Lond. 7: 34, textfig. (Ceylon ?).

1945. *Nassarius (Niotha) livescens* (Philippi), Habe, Jap. J. Malac. 14: 195, fig. 17 (radula).

1967. *Niotha livescens* (Philippi), Habe & Kosuge, Stand. Book Jap. shells col. 3: 76, pl. 29, fig. 36.

Shell 17-23mm in length, sculptured with 14-24 slender axial ribs on the body whorl and 16-26 ribs on the penultimate whorl; finely incised, deep or moderately shallow spiral grooves cut axial ribs into granules and number from 4-6 on the penultimate and from 11-13 on the body whorl. A slightly broader presutural groove separates a row of sutural granules from the axial ribs. Columellar callus extending on to the body whorl without reaching body whorl suture, callus occasionally thin above parietal wall but thick and laminated on the columellar side. Columella with 3-10 denticles, outer lip with 10-13 denticles which continue as lirae only for a short distance into the aperture; anal canal prominent. Base colour white or creamy-white, ornamented with 2-3 broad, brown or greenish-brown bands on the body whorl, colouring often more saturated on the dorsal side of the body whorl; aperture white, banded with purple-brown, columellar callus and outer lip white. Operculum serrate at the margin.

TYPE LOCALITY: Manila, Philippines.

HABITAT: In weedy and coral sand, intertidal.

Material examined: Manava I., Fiji I.; Kakula I., New Hebrides; Kagoshima Bay, Japan; Togi, Noto, Japan; Sandakan, N. Borneo, Indonesia; Siglap, Singapore.

Specimens collected in Fiji and the New Hebrides are dwarf populations of *N.livescens,* and range in size from 10 - 15 mm. Some of these individuals are almost dark brown in colour, with small areas of white, others are banded and a few are uniformly creamy-white. Beach-worn specimen of *N.livescens* are occasionally confused with *N.albescens gemmuliferus,* but the latter species lacks the deeply incised spiral grooves and the lirate interior of the aperture.

Nassarius (Niotha) albescens albescens (Dunker, 1846) (Figs. 43 - 44, 59)

1846. *Buccinum albescens* Dunker, Zeit. Malakozool. 3: 170.

1849. *Buccinum albescens* Dunker, Philippi, Abb. Beschr. Conch. 3: 68, pl. 2, fig. 15.

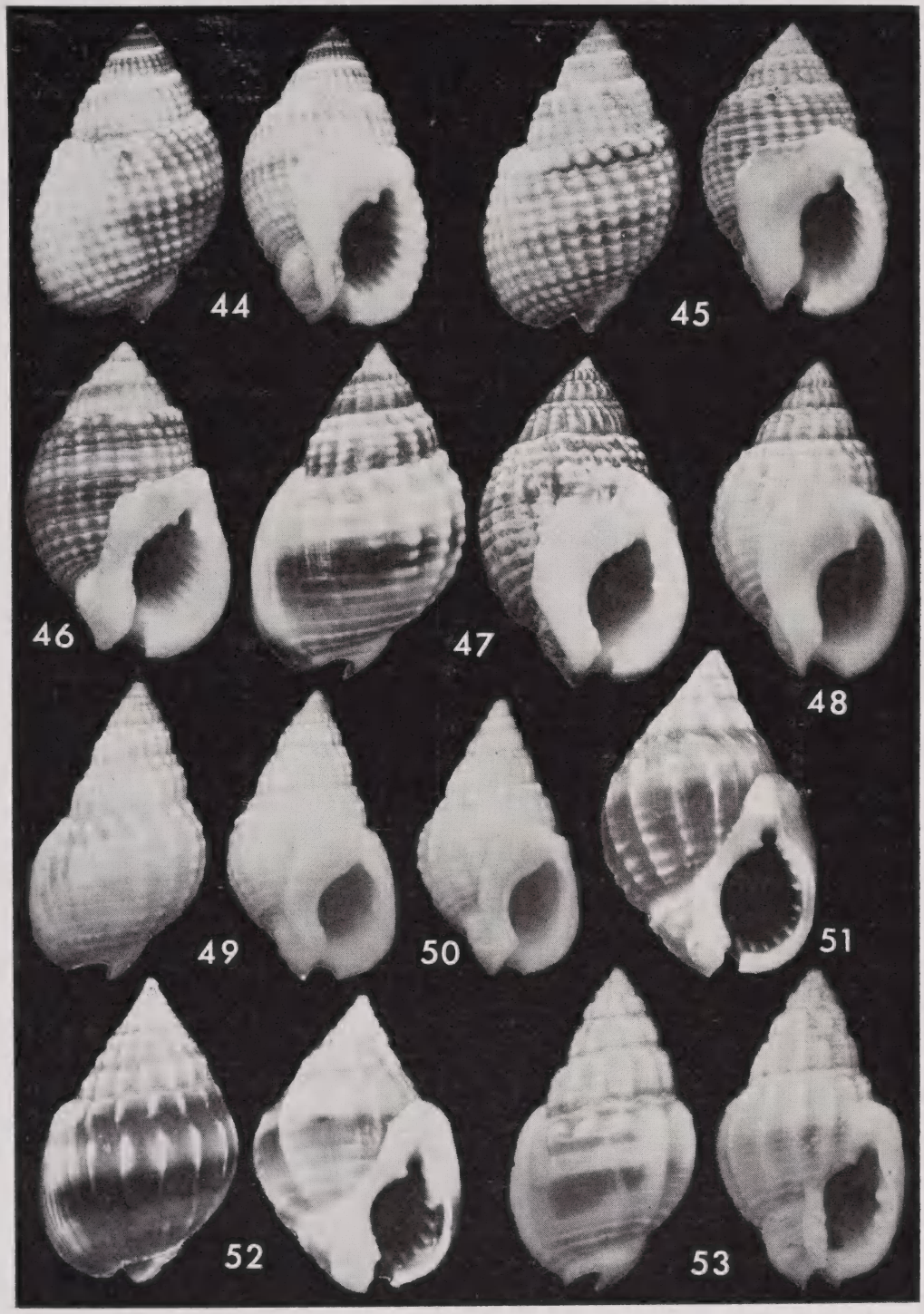
1853. *Nassa albescens* Dunker, Reeve, Conch. Icon. 8: pl. 15, fig. 100.

1854. *Nassa bicolor* Hombron & Jaquinot, Voy. Pole Sud 5: 84, pl. 21, figs. 41, 42 (non *Buccinum bicolor* Philippi, 1851 = *Nassarius).*

1877. *Nassa praecallosa* Marrat, Prop. new forms gen. *Nassa,* p. 11 (*fide* Tomlin, 1940).

1957. *Nassarius albescens* Dunker, Kaicher, Indo-Pacific sea shells pl. 7, fig. 12.

Shell 12-18mm in length, sculptured with numerous small granules which are arranged in the form of axial ribs, numbering from 20-30 on the penultimate and from 30-40 on the body whorl; at the sutures, 2 rows of granules are usually doubled up. Columellar callus thick and porcellaneous, squared on top and extending on to the body whorl without reaching the body whorl suture. Interior of aperture lirate, outer lip with 10-12 denticles, columella with 3-9 small plicae or short denticles. Cream, yellow or fawn in colour, occasionally faintly banded and sprinkled with brown, proto-



Figs. 44-53. 44. *Nassarius (Niotha) albescens albescens* (Dunker). S. Barnard I., Qld., Australia; 14.0mm. 45, 46. *N. (N.) albescens gemmuliferus* (A. Adams). 45. Kepwani, Zanzibar; 18.0mm. 46. Mauritius; 18.0mm. 47, 48. *N. (N.) pauperatus* (Lamarck). Port Lincoln, Sth. Australia. 47. Outer lip denticulate; 18.0mm. 48. Outer lip smooth; 17.2mm. 49, 50. *N. (N.) nigellus* (Reeve). Rosebud, Victoria, Australia. 49. Outer lip denticulate; 13.0mm. 50. Outer lip smooth; 12.4mm. 51. 52. *N. (N.) acuticostus* (Montrouzier). 51. Kakula I., New Hebrides; 19.0mm. 52. Tuki Tuki Pt., New Hebrides; 14.5mm. 53. *N. (N.) jacksonianus* (Quoy & Gaimard). Siglap, Singapore; 14.0mm.

conch golden-brown, 3-4 postnuclear whorls violet or purplish-brown; aperture white. Operculum serrate at the margin.

TYPE LOCALITY: West Indies = error!

HABITAT: In weedy and coral sand, intertidal.

Material examined: Toloa Pt., Upolu I., Samoa I.; Suva reef, Viti Levu, Fiji I.; Caboni beach, Fiji I.; New Hebrides: Malapoa Pt., Vila Harbour; Erakor lagoon; Port Havannah; Kakula I., Undine Bay, all Efate I.; Vailele beach, W. Samoa I.; Lifu, Loyalty I.; Australia: Long beach, Keppel Bay; Townsville; Horseshoe Bay, Magnetic I.; S. Barnard I.; Daydream I., Whitsunday group, all Queensland; Bourail, New Caledonia; Aoeri I., Geelvink Bay, W. New Guinea; Schonian Harbour, Peleliu, Palau I.

Dunker's (1846) locality indication of "West Indies" is either a slip of the pen for "East Indies" or simply an error; his description and subsequent illustration by Philippi, do not fit any known Caribbean species of *Nassarius*. The nominate species is confined to the Pacific Ocean.

Nassarius (Niotha) albescens gemmuliferus (A. Adams, 1852) (Figs. 45 - 46, 60)

1834. *Buccinum conoidale* Deshayes, Kiener, Spec. gen. icon. coq. viv. 9: 92, pl. 27, fig. 109 (? non Deshayes in Bélanger, 1832).

1852. *Nassa gemmulifera* A. Adams, Proc. Zool. Soc. Lond. p. 99.

1853. *Nassa isabellei* Reeve, Conch. Icon. 8: pl. 7, fig. 47 (non d'Orbigny, 1841).

1853. *Nassa gemmulifera* A. Adams, Reeve, Conch. Icon. 8: pl. 20, figs. 132a, b.

1877. *Nassa fenistrata* Marrat, Prop. new forms gen. Nassa p. 10 (*nom. subst. pro N. isabellei* Reeve, 1853).

1882. *Nassa fenestrata* Marrat, Tryon, Man. Conch. 4: 51, pl. 16, fig. 281 (emended spelling).

1891. *Nassa albescens* var. *fenestrata* Marrat, E. A. Smith, Proc. Zool. Soc. Lond. p. 408.

1930. *Nassarius (Niotha) fenestrata* var. *gastroi* Bisacchi, Ann. Mus. Civ. Stor. Nat. Genova 55: 49 (Aquaba, Red Sea).

The Indian Ocean subspecies differs from the nominate species in the following features: The sculpture is coarser in *gemmuliferus*, particularly on the body whorl where axial ribs number from 20 - 25. The protoconch is glassy-white or cream and the postnuclear whorls lack the violet or purplish-brown colouring of the Pacific *albescens*. The interior of the aperture is usually banded with purple-brown. In some individuals from East Africa, the main rows of gemmules on the body whorl have intermediate narrow fillets. The operculum is serrate at the margin.

TYPE LOCALITY: Burias I., Philippines, 6 fathoms.

HABITAT: In coral and muddy sand, intertidal.

Material examined: Tarut Bay, Persian Gulf; Raskamoni reef, Dar-es-Salaam, E. Africa; Kepwani, Uzi I., S.W. Zanzibar; Chawaka village, E. Zanzibar; Pt. Fievre, Nossi-Bé, N.W. Madagascar; Flic Flac, Mauritius; Natal, Sth. Africa.

Kiener (1834) considered *N.conoidalis* (Deshayes in Bélanger) to be a synonym of *N.marginulatus* (Lamarck), which is a Mediterranean species, but his figured specimen appears to be *albescens gemmuliferus*. Tryon (1882) synonymizes *N.conoidalis* with *N.gemmulatus* (Lamarck) (= *variegatus* A. Adams), while Hedley (1915) suggests *N.conoidalis* as an earlier name for *N.crematus* (Hinds). Oostingh's (1939) figure of *N.conoidalis* appears to be the species *N.stigmarius* (A. Adams). Only an examination of Deshayes' type, if still extant, can solve the nomenclatorial problem surrounding *N.conoidalis*.

Tomlin (1931), who examined the 2 syntypes of *Nassa gemmulifera* A. Adams, considers them to be small specimens of *Nassa fenestrata* Marrat.

Nassarius (Niotha) pauperatus (Lamarck, 1822) (Figs. 47 - 48, 55, 73)

1822. *Buccinum pauperatum* Lamarck, Hist. Nat. anim. s. vert. 7: 278.

1834. *Buccinum pauperatum* Lamarck, Kiener, Spéc. gén. icon. coq. viv. 9: 90, pl. 29, fig. 118 (Great Ocean and Tongatabu = error!).

1843. *Buccinum australe* Menke, Moll. Nov. Hollandiae p. 21 (New Holland) [non Gmelin, 1791].

1853. *Nassa pauperata* Lamarck, Reeve, Conch. Icon. 8: pl. 5, fig. 27.

1853. *Nassa lirella* Reeve, Conch. Icon. 8: pl. 14, fig. 95 (Hab: ?).

1932. *Nassa lirella* Reeve, Tomlin, Proc. Malac. Soc. Lond. 22: 96.

1962. *Parcanassa pauperata* (Lamarck), Macpherson & Gabriel, Mar. Moll. Victoria p. 193, fig. 231.

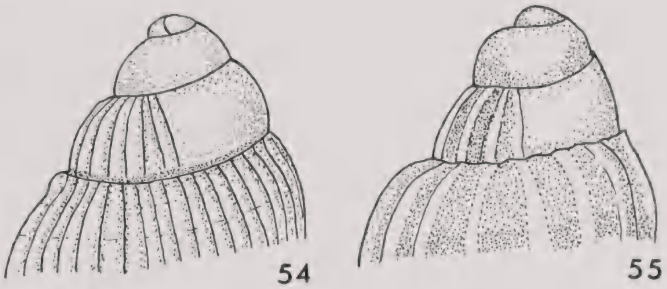
Shell moderately thin and inflated, 11-20mm in length, sculptured with coarse and granulose axial ribs and overriding spiral cords; sutural gemmules separated from the axial ribs by a shallow, smooth channel, ribs becoming obsolete on the dorsal side of the body whorl. Columellar callus orbicular and expanding partly on to the body whorl without reaching the body whorl suture; callus has a tendency to thin above the parietal wall. Outer lip backed by a varix, interior of lip either smooth or denticulate, columella with small, prominent or obsolete denticles. Variable in colour, generally creamy-white, ornamented with a broad brown band on the body whorl, some individuals uniformly creamy-white or brown; columellar callus and aperture white, sides of the siphonal canal frequently flushed with dark brown. Operculum generally serrate at margin, but sometimes smooth at the edges.

TYPE LOCALITY: None. (Australia - Menke, 1843).

HABITAT: In rock pools, among weed, intertidal.

Material examined: Albany, W. Australia; Tasmania; South Australia: Pt. Lincoln; N. of Stansbury, Yorke's Peninsula; Outer Harbour; Semaphore beach; Mulaton; Ceduna; Sultana Bay; Port Adelaide River; Arno Bay; Victoria: Port Fairy; Port Phillip Bay.

The syntypes of *Buccinum pauperatum* Lamarck (Fig. 73) are in the Museum d'Histoire Naturelle, Geneva No. 1102/13/1-5. The two illustrated syntypes measure 15.9 mm and 17.7 mm, and the label reads "Australie".



Figs. 54-55. Protoconchs. 54. *Nassarius (Niotha) nigellus* (Reeve). 55. *N. (N.) pauperatus* (Lamarck).

Nassarius (Niotha) nigellus (Reeve, 1854) (Figs. 49 - 50, 54, 64 - 66)

1846. *Buccinum semigranosum* Dunker, Zeit. Malakozool. 3: 170 (Hab: ?) [non Wood, 1828].

1849. *Buccinum semigranosum* Dunker, Philippi, Abb. Beschr. Conch. 3: 45, 68, pl. 1, figs. 9a-c; pl. 2, fig. 12 (non Wood, 1828).

1853. *Nassa semigranosa* Dunker, Reeve, Conch. Icon. 8: pl. 17, fig. 116.

1854. *Nassa nigella* Reeve, Conch. Icon. 8: pl. 26, figs. 173a, b.

1860. *Nassa optata* Gould, Proc. Bost. Soc. Nat. Hist. 7: 331.

1864. *Nassa munieriana* Crosse, J. Conchyl. 12: 345, pl. 13, fig. 6 (Gulf St. Vincent, S. Aust.).

1867. *Nassa (Alectrion) jacksoniana* Angas, Proc. Zool. Soc. Lond. p. 190 (non *Buccinum jacksonianum* Quoy & Gaimard, 1833).

1876. *Nassa tasmanica* Tenison-Woods, Proc. R. Soc. Tasmania p. 150 (N. & E. coast of Tasmania).

1915. *Arcularia semigranosa* Dunker, Hedley, Proc. Linn. Soc. N.S.W. 39: 735, pl. 83, fig. 78.

1915. *Arcularia tasmanica* Tenison-Woods, Hedley, Proc. Linn. Soc. N.S.W. 39: 737, pl. 84, fig. 81.

1932. *Nassa nigella* Reeve, Tomlin, Proc. Malac. Soc. Lond. 22: 96.

1932. *Nassa munieriana* Crosse, Tomlin, Proc. Malac. Soc. Lond. 22: 96.

1964. *Nassa optata* Gould, Johnson, Bull. U.S. Nat. Mus. 239: 119, pl. 16, fig. 4 (figd. lectotype).

Shell similar to *N. pauperatus* but smaller, 8-13mm in length, thinner and less bulbous at the body whorl; axial ribs on spire whorls more distinctly angulate on the presutural ramp, sculpture finer and more discreet. Outer lip either smooth or denticulate, columellar callus orbicular and not thinning in adult specimens. Protoconchs are slightly different, that of *N. nigellus* being convexly bulbous with first postnuclear whorls axially striate; protoconch of *N. pauperatus* is more button-shaped with first postnuclear whorls heavily ribbed (Figs. 54, 55). Uniformly cream in colour, some individuals light brown or occasionally banded with brown; aperture and columellar callus white or flushed with brown.

TYPE LOCALITY: New Zealand = error! (Sydney Harbour, Australia = *optata* Gould).

HABITAT: In rock pools, intertidal to a depth of 100 metres.

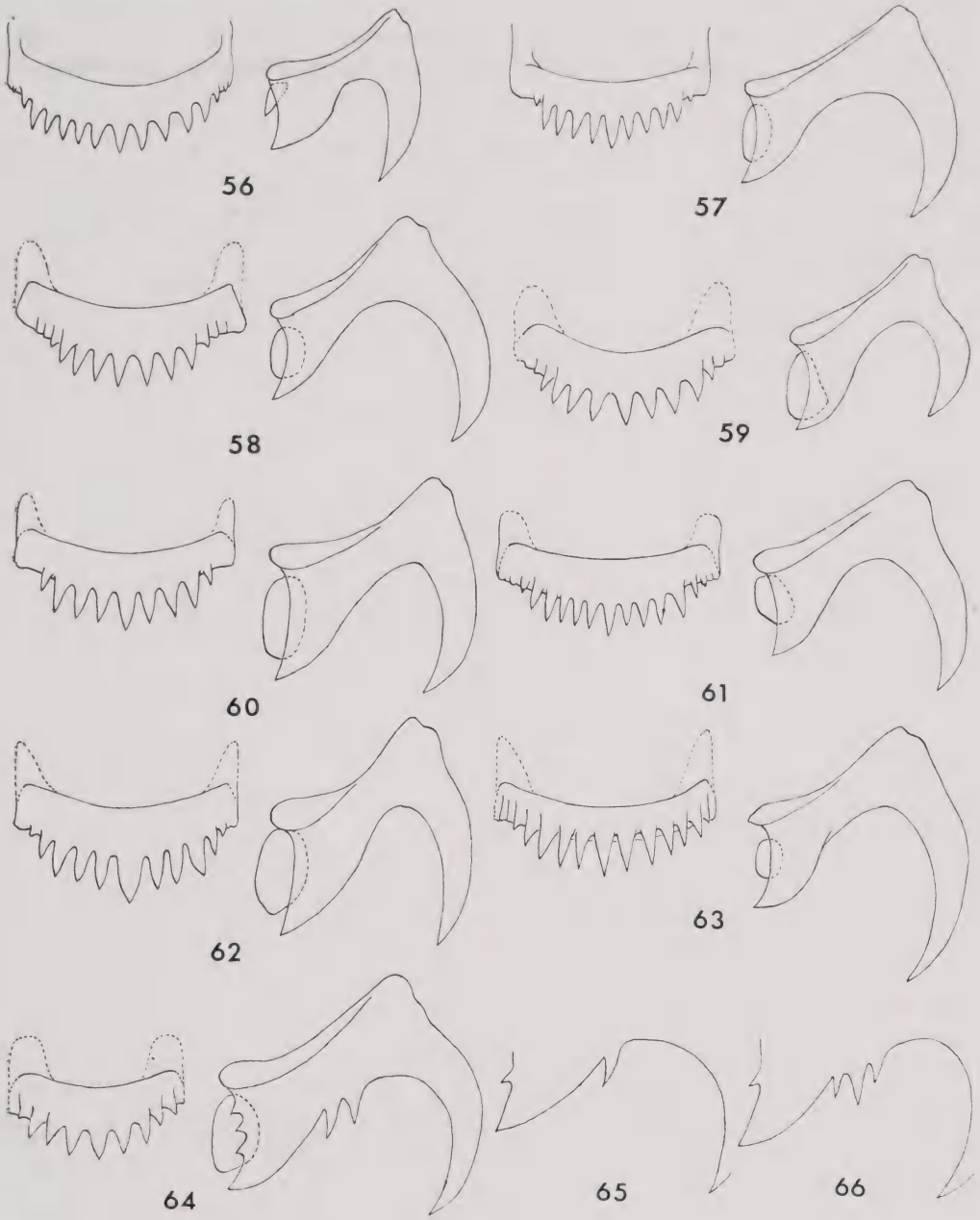
Material examined: Port Arthur, Tasmania; E. of Kangaroo I., Sth. Australia, 64 m; Rosebud, Victoria; Port Fairy, Victoria; New South Wales: Quarantine Bay, Port Jackson; Twofold Bay; Balmoral, Sydney; Shellharbour; Maroubra; off Coila; off Cronulla, 60 - 100 m.

Several writers have attempted to separate *N.nigellus* into species or subspecies on the basis of differences in apertural features, size and presence or absence of a varix on the body whorl. Examination of 181 specimens from 10 Australian localities has shown, that features of smooth or denticulate outer lip and the occasional presence of a varix are represented in almost all populations and not confined to a particular geographical area (Table 1). From these specimens examined, 17% of individuals had a dentate outer lip and only 4½% a varix on the body whorl. It is suspected that the majority of temperate water nassarids do not develop the heavily calloused outer lip of mature specimens and hence do not always develop denticles. The presence of a varix on the body whorl is probably due to an unusual rest-period during growth.

Table 1. Analysis of characters of *Nassarius nigellus* (Reeve) from Australia.

LOCALITY	No. of specimens	Specimens with a smooth outer lip	Specimens with a denticulate outer lip	Specimens with a varix
Off Coila, N.S.W.; 66-119 m	10	5	5	—
Port Jackson, N.S.W.	5	5	—	—
Twofold Bay, N.S.W.	2	2	—	—
Balmoral, Sydney, N.S.W.	24	16	8	—
Shellharbour, N.S.W.	88	85	3	7
Maroubra, N.S.W.	8	8	—	1
Rosebud, Victoria	10	5	5	—
Port Fairy, Victoria	4	—	4	—
Kangaroo I., S. Austr., 64 m	24	24	—	—
Port Arthur, Tasmania	6	—	6	—
TOTAL	181	150	31	8
PERCENTAGE		83	17	4.5

Iredale (1936) considered *Arcularia tasmanica* to be undoubtedly identical with *Nassa nigella* Reeve, but advocated the retention of *tasmanica* in a subspecific sense for Tasmanian shells because of their more pronounced sculpture. He further proposed the retention of *N.optata* Gould, for the New South Wales specimens which develop denticles on the outer lip and *N.munieriana* Crosse, for the Southern populations, which he differentiated as being larger and non-denticulate on the outer lip. *Buccinum semigranosum* Dunker, is the creamy-white, brown-banded form with an edentulous outer lip and *Nassa nigella* Reeve the brown-coloured form which is also edentulous. The type of *N.optata* Gould is the creamy-white form which also lacks denticles and *N.munieriana* Crosse the white, obsoletely banded form with a smooth outer lip and a varix on the body whorl. Hedley (1915) synonymized all these forms but accepted *tasmanica* as a good species because of the denticulate aperture. None of these described forms can be considered valid biospecies.



Figs. 56-66. Half-row of radulae. 56. *Nassarius (Plicarcularia) burchardi* (Dunker). Outer Harbour, Adelaide, Sth. Australia. 57. *N. (Niotha) stigmarius* (A. Adams). Manava I., Fiji I. 58. *N. (N.) bifarius* (Baird). Teuma Bay, New Hebrides. 59. *N. (N.) albescens albescens* (Dunker). Vila Harbour, New Hebrides. 60. *N. (N.) albescens gemmuliferus* (A. Adams). Kepwani, S.W. Zanzibar. 61. *N. (N.) livescens* (Philippi). Manava I., Fiji I. 62. *N. (N.) distortus* (A. Adams). Port Havannah, New Hebrides. 63. *N. (N.) acuticostus* (Montrouzier). Tuki Tuki Pt., New Hebrides. 64-66. *N. (N.) nigellus* (Reeve). Off Cronulla, N.S.W., Australia, 60-100 metres. 64. Half-row of radula. 65, 66. Laterals with 1 and 3 cusps from same radula.

Nassarius (Niotha) acuticostus (Montrouzier in Souverbie & Montrouzier, 1864) (Figs. 51 - 52, 63)

1849. *Buccinum crassum* Koch in Philippi, Abb. Beschr. Conch. 3: 43, pl. 1, fig. 4 (non Nyst, 1844; nec Catlow & Reeve, 1845).

1853. *Nassa crassa* Koch, Reeve, Conch. Icon. 8: pl. 7, figs. 46a, b; pl. 10, fig. 67.

1864. *Nassa acuticosta* Montrouzier in Souverbie & Montrouzier, J. Conchyl. 12: 273, pl. 10, fig. 8.

1934. *Nassa percrassa* Giner-Marí, J. Conchyl. 78: 24 *(nom. subst. pro N. crassa* Reeve, 1853, pl. 10, fig. 67).

1964. *Phrontis crassus* (Philippi), Habe, Shells west. Pac. col. 2: 99, pl. 32, fig. 11.

Shell broad, solid and crassate, 14-20mm in length, sculptured with wide-spaced and thin axial ribs which number from 11-17 on the penultimate and from 10-20 on the body whorl; axial ribs separated from the axially elongated sutural nodules by a shallow, concave depression; ribs becoming thin and crowded on the back of the outer lip, and in some individuals ribs become obsolete on the dorsal side of the body whorl. Postnuclear whorls with numerous, up to 15, crisp spiral striae which become obsolete on the last 2 whorls. Interstices on body whorl either smooth or with traces of rugose cords, and occasionally 4-5 rows of granules at the base. Columellar callus intrudes on to the body whorl only a short distance above the anal canal; back of outer lip thickened, interior with 6-12 denticles which extend as lirae for a short distance into the aperture. Columella with 5-14 irregular, small plicae. Cream or light green in colour, ornamented with 1-3 green or blackish-brown bands on the body whorl, sutural nodules occasionally flushed with light orange; interior of aperture white, banded with purple-brown.

TYPE LOCALITY: Art I., New Caledonia.

HABITAT: In coral sand, intertidal.

Material examined: Watson's I., Apia, Samoa I.; Tonga I.; Suva reef, Fiji I.; Kakula I., Undine Bay, New Hebrides; Tuki Tuki Pt., New Hebrides; Pango Pt., New Hebrides; Lifu, Loyalty I.; Nissan I., N. of Bougainville, Papua - New Guinea; Pt. Hedland, W. Australia; China Str., Papua - New Guinea; Oshima I., Ryuku I.; Chwaka, E. Zanzibar.

Buccinum crassum Koch in Philippi, is twice preoccupied and has been replaced with the available synonym *N.acuticostus*.

Nassarius (Niotha) jacksonianus (Quoy & Gaimard, 1833) (Fig. 53)

1833. *Buccinum jacksonianum* Quoy & Gaimard, Voy. L'Astrolabe 2: 452, pl. 32, figs. 28, 29.

1915. *Nassa jacksoniana* Quoy & Gaimard, Hedley, Proc. Linn. Soc. N.S.W. 39: 736.

Shell solid, 13-15mm in length, sculptured with prominently angulate and wide-spaced axial ribs which number from 12-13 on the penultimate and from 6-8 on the body whorl; axial ribs disappear on the dorsal side of the body whorl and are visible only as prominent nodules at the suture. Penultimate whorl with 4 strong and overriding spiral cords, body whorl with 12-15; on the last whorl, spiral cords tend to be weak or obsolete centrally. Columellar callus extending only for a short distance on to the

body whorl, strongly laminated on the columellar side; outer lip with 4-6 denticles which extend only for a short distance into the aperture, columella with 4-6 strong denticles anteriorly, varix on back of outer lip strong and broad. Cream in colour, ornamented with a narrow brown sutural band on the penultimate whorl and a broad and narrow band on the body whorl; in some individuals the bands have a bluish-green cast, and the aperture is white, banded with purple-brown.

TYPE LOCALITY: Port Jackson, Australia = error!

HABITAT: Unknown.

Material examined: Siglap, Singapore.

I have seen only 3 specimens of this contentious species which was erroneously described from Australia and has subsequently been included in the Australian fauna. Langdon (1875) correctly reported the species from Ceylon, and Hedley (1915) saw unnamed specimens of *N.jacksonianus* from Bombay in the British Museum. Quoy and Gaimard did not collect the species but were given a specimen by the Sydney botanist Fraser, and Hedley *(loc.cit.)* correctly suspects that the species did not originate from Australian shores.

Nassarius (Niotha) distortus (A. Adams, 1852) (Figs. 62, 67)

1834. *Buccinum monile* Kiener, Spéc. Gén. icon. coq. viv. 9: 68, pl. 11, fig. 40 (Purbeck & Weymouth = error! and coast of New Guinea) [non Linnaeus, 1771].

1852. *Nassa distorta* A. Adams, Proc. Zool. Soc. Lond. p. 105.

1853. *Nassa distorta* A. Adams, Reeve, Conch. Icon. 8: pl. 5, figs. 32a, b.

1853. *Nassa monile* Kiener, Reeve, Conch. Icon. 8: pl. 6, fig. 38.

1853. *Nassa lachrymosa* Reeve, Conch. Icon. 8: pl. 8, fig. 52 (Hab: ?).

1932. *Nassa distorta* A. Adams, Tomlin, Proc. Malac. Soc. Lond. 22: 42.

1957. *Nassarius monile* Kiener, Kaicher, Indo-Pacific sea shells pl. 7, fig. 21.

Shell solid, 16-28mm in length, sculptured with slender axial ribs which number from 13-16 on the penultimate and from 12-17 on the body whorl; axial ribs separated from sutural nodules by a shallow, concave trough, and on the body whorl ribs become wide-spaced and usually arcuate. Interstices completely smooth and coarse spiral cords develop only towards the base. Columellar callus thick and spreading in a circular sweep on to the body whorl, base of columella with 2-7 denticles. Outer lip with 11-17 lirae which extend only halfway into the aperture, edge of outer lip with small and spinose denticles. White to cream in colour, banded with green or greenish-brown, bands usually confined to the interstices of the axial ribs; columellar callus and apertural lirae white, smooth part of aperture banded with purple-brown. Operculum serrate at the margin, but in some individuals only 2 serrations at either side are present.

TYPE LOCALITY: None. (Coast of New Guinea – *monile* Kiener).

HABITAT: In weedy and coral sand, intertidal.

Material examined: Apia Harbour, Samoa I.; Vaoto, Vailele Bay, Upolu I., Samoa I.; Suva reef, Fiji .; Manava I., Fiji I.; Lifu, Loyalty I.; New Hebrides: Pango Pt.;

Meli I.; Port Havannah; Malapoa Pt., Vila Harbour, all Efate I.; Hundred I., Lucap, Philippines; Cebu, Cebu I., Philippines.

The well-known but preoccupied name *Nassarius monile* (Kiener) has been replaced with the next available *N.distortus* (A. Adams). According to Tomlin (1932a) the 3 syntypes of *N.distortus* are the not uncommon distorted form of *N.monile*.

Nassarius (Niotha) festivus (Powys, 1835) (Fig. 68)

1835. *Nassa festiva* Powys, Proc. Zool. Soc. Lond. p. 95.

1853. *Nassa festiva* Powys, Reeve, Conch. Icon. 8: pl. 18, fig. 17.

1967. *Hinia festiva* (Powys), Habe & Kosuge, Stand. Book Jap. shells col. 3: 76, pl. 29, fig. 33.

Shell 13-20mm in length, solid, sculptured with coarsely nodulose axial ribs which number from 9-14 on the penultimate and body whorl; the nodules on the axial ribs are connected by flat and often obsolete spiral cords which become more prominent towards the base of the shell. Columella calloused, generally laminated anteriorly, thin and glazed above the parietal wall; columella with a parietal denticle and 2-5 oblique plicae anteriorly. Outer lip thickened by a varix, interior with 5-7 prominent denticles. White to bluish-white in colour, transversely banded with reddish-brown, columellar callus white, aperture banded with purple-brown; some individuals are uniformly dark brown.

TYPE LOCALITY: Panama and St. Elena = error! (Japan - Tryon, 1882).

HABITAT: In muddy sand, intertidal and sublittoral.

Material examined: Takasago, Hyogoken, Japan; Tomioka, Tokyo Bay, Japan; Tsa Ise, Japan.

The original locality indication is incorrect and the species appears to be endemic to Japan.

Nassarius (Niotha) nodiferus (Powys, 1835) (Figs. 69, 70)

1835. *Nassa nodifera* Powys, Proc. Zool. Soc. Lond. p. 95.

1853. *Nassa nodifera* Powis, Reeve, Conch. Icon. 8: pl. 4, fig. 23.

1882. *Nassa hirta* Kiener, Tryon, Man. Conch. 4: 28, pl. 8, fig. 55 (non *Buccinum hirtum* Kiener, 1834).

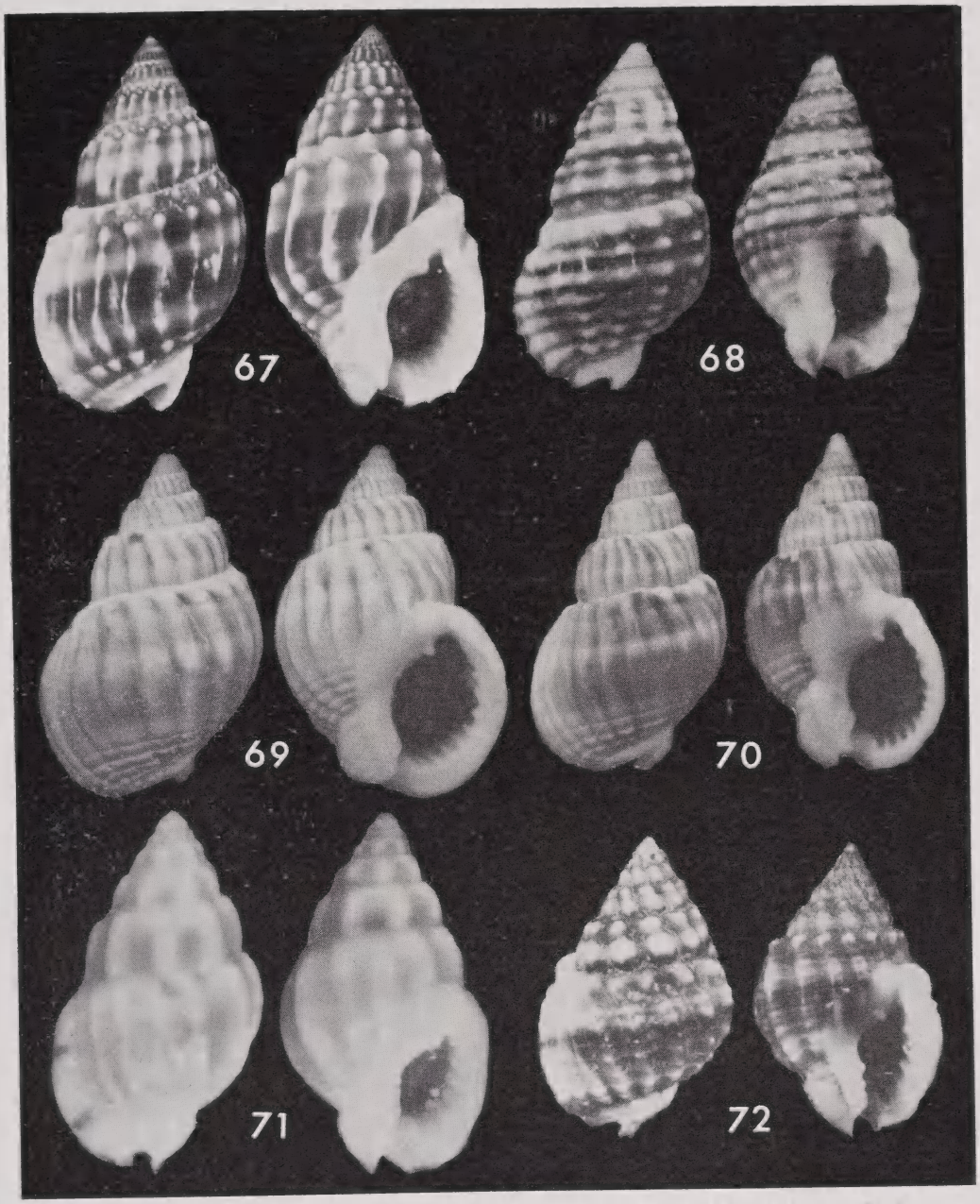
1901. *Nassa (Alectryon) nodifera* Powis, Melvill, Proc. Zool. Soc. Lond. p. 411 (Bombay).

1911. *Nassa nodifera* Powis, Schepman, Siboga-Exp. 49d: 315 (Indonesia & Singapore).

1934. *Nassa nodifera* Powis, Giner-Marí, J. Conchyl. 78-42.

Shell 20-30mm in length, whorls nearly convex, sculptured with coarse axial ribs which number from 13-18 on the penultimate and from 16-22 on the body whorl; axial ribs weakly constricted and subnodulose at sutures, interstices smooth, lower half of body whorl with spiral cords. Columella calloused and partly spreading on to the body whorl, anterior with 6-13 irregular denticles or short plicae; outer lip with 10-11 short plications, back of lip thickened by doubled up axial ribs. Greenish-grey or greyish-

brown in colour, occasionally darker in interstices at the sutures, ornamented with a pale and narrow spiral band; siphonal fasciole, columella and edge of outer lip white, aperture dark purple-brown, narrowly banded with white.



Figs. 67-72. 67. *Nassarius (Niotha) distortus* (A. Adams). Efate I., New Hebrides; 23.5mm. 68. *N. (N.) festivus* (Powys). Takasago, Hyogoka, Japan; 15.0mm. 69, 70. *N. (N.) nodiferus* (Powys). Hong Kong. 69. Broad form; 25.0mm. 70. Slender form; 28.4mm. 71. *N. (N.) ecstilbus* (Melvill & Standen). Tuki Tuki Pt., New Hebrides; 7.0mm 72. *Nassarius (Niotha)* sp. Malolo Barrier reef, Fiji I.; 13.0mm.

TYPE LOCALITY: Gallapagos and Panama, 6 - 10 fathoms = error!

HABITAT: Unknown.

Material examined: Hongkong.

The species has been confused with *N.hirtus* (Kierner) by Tryon (1882), a species which appears to be endemic to the Hawaiian chain, has a smooth columella and belongs to the subgenus *Alectrion*. Originally described from the Galapagos I. and Panama, the species has not been recognized as a member of the West American fauna, but has been reported by several authors from the Philippines, Singapore, Indonesia and Bombay (see Giner-Marí, 1934).

The similar species *N.hirtus* (Kiener) differs from *N.nodiferus* in being less solid and more slender, with more numerous and more slender axial ribs, prominently crenulate sutures, smaller columellar callus and smooth columella.

Nassarius (Niotha) ecstilbus (Melvill & Standen, 1896) (Fig. 71)

1896. *Nassa (Telasco) ecstilbus* Melvill & Standen, J. Conch. 8: 274, pl. 9, fig. 4.

Shell 6-10mm in length, shining, whorls convex, sculptured with coarse and widely spaced axial ribs which number from 10-12 on the body whorl and from 8-11 on the penultimate whorl; interstices only moderately broad and almost smooth on the spire whorls apart from a few presutural striae, but prominently striate on the dorsal side of the body whorl. Columellar callus prominent, partly overlapping on to the body whorl, columella with 2-6 very small and short plicae or denticles anteriorly; outer lip thick and backed by a varix, interior with 7-12 short denticles. White or creamy-white in colour, ornamented with a single, interrupted, orange-brown band on the spire whorls and 2 such bands on the body whorl; the narrow brown bands are almost obsolete in the interstices but more saturated upon the ribs, and also appear as two streaks on the outer lip varix. Most specimens have an orange-brown blotch on the dorsal side of the body whorl near the suture; columella and aperture white.

TYPE LOCALITY: Lifu, Loyalty Islands.

HABITAT: In clean coral sand, intertidal and sublittoral.

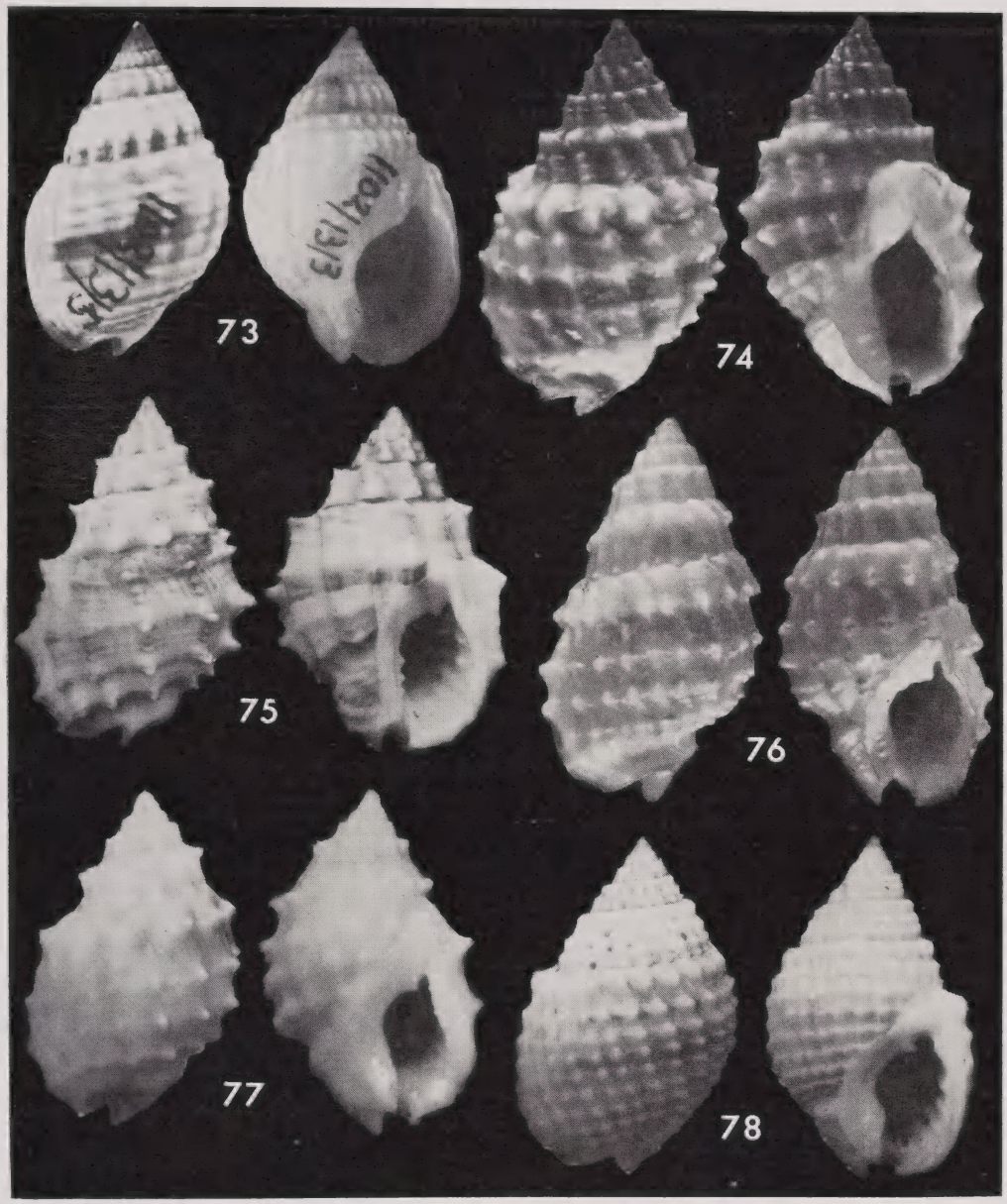
Material examined: Yanuca I., S.W. Viti Levu, Fiji, I., 5 m; Lifu, Loyalty I.; Tuki Tuki Pt., Efate I., New Hebrides.

Nassarius (Niotha) quadrasi (Hidalgo, 1904) (Figs. 74 - 75, 80, 87, 90 - 91)

1853. *Nassa gruneri* Reeve, Conch. Icon. 8: pl. 12, fig. 75 (non *Buccinum gruneri* Dunker, 1846).

1904. *Nassa quadrasi* Hidalgo, Rev. R. Acad. Cienc. Madrid 1 (3): 204 (ref. Reeve, 1853, fig. 75).

Shell 10-16mm in length, sculptured with angulate axial ribs which number from 8-10 on the penultimate and from 9-15 on the body whorl; overriding cords produce 2 rows of primary spines upon the axial ribs on the penultimate whorl and 4 rows on the body whorl. Interstices with 2-4 intermediate spiral threads which produce smaller



Figs. 73-78. 73. *Nassarius (Niotha) pauperatus* (Lamarck). Syntypes Mus. d'Hist. Nat. Geneva, No. 1102/13/5, 15.9mm and No. 1102/13/3, 17.7mm. 74, 75. *N. (N.) quadrasi* (Hidalgo). 74. Figured type of *Nassa gruneri* Reeve (= type of *quadrasi*), B.M.N.H. No. 197132, 15.1mm. 75. Manava I., Fiji I.; 14.5mm. 76, 77. *N. (N.) echinatus* (A. Adams). 76. Lectotype B.M.N.H. No. 1971131; 14.0mm. 77. Port Havannah, New Hebrides; 12.7mm. 78. *N. (N.) gruneri* (Dunker). Donsol, Luzon, Philippines; 16.5mm.

and less spinose nodules between the main spines. Aperture elongate, columella calloused but not expanding and laminated on the columellar side; outer lip with 6-10 denticles which extend only halfway into the aperture, base of columella with 3-4 main denticles and sometimes an additional 2-4 very small denticles posteriorly. White, cream

or light yellow in colour, occasionally flecked or banded with rusty-brown, columella and aperture white or cream, columella frequently flushed with yellow. Operculum serrated at the margin, but in some specimens the serrations are almost obsolete.

TYPE LOCALITY: Bohol and Cebu Islds., Philippines.

HABITAT: In coral sand, from the intertidal zone to a depth of 22 metres.

Material examined: Pilot Pt., Apia, Samoa I.; lagoon off Fuailalo, Upolu I., Samoa I., 4 - 6 m; Suva reef, Fiji I.; Manava I., Fiji I.; New Hebrides: Port Havannah; Kakula I., Undine Bay; Malapoa Pt., Vila harbour; Tuki Tuki Pt., all Efate I.

For further discussions see under *Nassarius echinatus* (A. Adams).

Nassarius (Niotha) echinatus (A. Adams, 1852) (Figs. 76-77, 79, 88, 92)

1852. *Nassa echinata* A. Adams, Proc. Zool. Soc. Lond. p. 101.

1853. *Nassa echinata* A. Adams, Reeve, Conch. Icon. 8: pl. 20, fig. 131.

1879. *Nassa echinata* A. Adams, E. A. Smith, Proc. Zool. Soc. Lond. 1878: 810, pl. 50, fig. 9 (Andaman I.).

1886. ? *Nassa echinata* A. Adams, Watson, Rep. Voy. H.M.S. Challenger 15: 184 (Levuka, Fiji I.).

1904. *Nassa quadrasi* var. *alba* Hidalgo, Rev. R. Acad. Cienc. Madrid 1 (3): 204 (ref. E. A. Smith, 1879, pl. 50, fig. 9 [non *N. alba* Say, 1826].

1939. ? *Nassarius echinatus* (A. Adams), Peile, Proc. Malac. Soc. Lond. 23: 276, fig. 46 (radula).

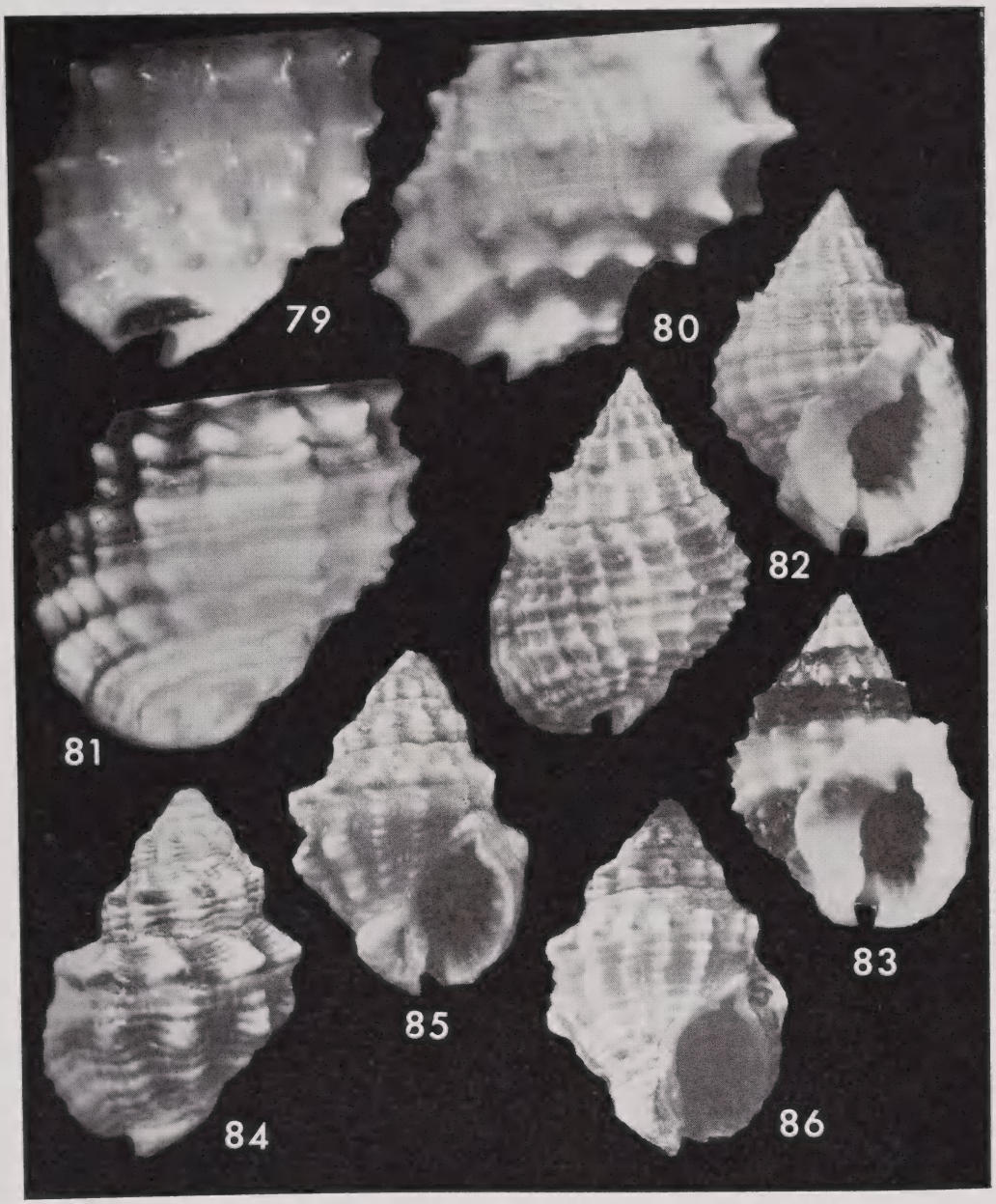
Shell small, 11-14mm in length, similar to *N. quadrasi* but differs in the following features: the surface is shining and not dull and the spines are more discreet and noduled at the tips; the body whorl usually has 4 spiral rows of spines but occasionally a fifth row merges with the fourth row anteriorly. Axial ribs less coarse than in *N. quadrasi,* and interstices completely smooth apart from macroscopic longitudinal striae; spiral cords only faintly indicated on the body whorl where they are confined to the walls of the axial ribs without intruding into interstices. Laminated anterior of columella filled with callus and recurved towards the aperture which is smaller than in *N. quadrasi.* White in colour, dorsal side frequently stained with orange-brown, back of siphonal canal with a horizontally oriented dark brown stain.

TYPE LOCALITY: Galeo, Mindoro I., Philippines.

HABITAT: In coral sand, intertidal.

Material examined: Port Havannah, Efate I., New Hebrides.

The species is frequently confused with *Nassarius quadrasi* and sometimes with *Hebra horrida* (Dunker), but the differences in sculpture (Figs. 79 - 81) and apertural features (Figs. 87 - 89) are sufficiently prominent to be considered separate species. *N.quadrasi* and *N.echinatus* are sympatric at Port Havannah, New Hebrides, without intergrades having been encountered.



Figs. 79-86. 79-81. Sculptural detail of body whorl. 79. *Nassarius (Niotha) echinatus* (A. Adams). 80. *N. (N.) quadrasi* (Hidalgo). 81. *Hebra horrida* (Dunker). 82, 83. *H. horrida* (Dunker). 82. Manava I., Fiji I.; 12.8mm. 83. Tuki Tuki Pt., New Hebrides; 13.0mm. 84-86. *H. subspinosa* (Lamarck). 84. Cape Santiago, Luzon, Philippines; 14.5mm 85. Bushmens Bay, Malekula I., New Hebrides; 13.0mm. 86. Syntype Mus. d'Hist. Nat. Geneva No. 1102/6/2; 14.0mm.

Smith (1879) described *N.echinatus* from the Andaman slands, and commented on the dark brown staining of the anterior canal, a feature omitted in the original description but present in all live-taken specimens of *echinatus*. Two syn-

types of *N.echinatus* (A. Adams) are in the British Museum (Nat. Hist.) No. 197131, and the illustrated specimen (Fig. 76), length 14.0 mm, is designated as the lectotype of *Nassa echinata* A. Adams, 1852; the dark brown stain on the back of the siphonal canal is only faintly visible on the worn and faded lectotype.

The holotype of *Nassa quadrasi* Hidalgo, which is the specimen figured by Reeve (1853, pl. 12, fig. 75) under the name *Buccinum gruneri* (non Dunker, 1846), is in the Brit. Mus. (Nat.Hist.) No. 197132, length 15.1 mm (Fig. 74).

Nassarius (Niotha) gruneri (Dunker, 1846) (Fig. 78)

1846. *Buccinum gruneri* Dunker, Zeit. Malakozool. 3: 171.

1849. *Buccinum gruneri* Dunker, Philippi, Abb. Beschr. Conch. 3: 63, pl. 2, fig. 2.

1850. *Nassa acinosa* Gould, Proc. Bost. Soc. Nat. Hist. 3: 154 (Hab: ?).

1852. *Nassa acinosa* Gould, U.S. Expl. Exp. 12: 261, pl. 19, figs. 329a, b.

1852. *Nassa hispida* A. Adams, Proc. Zool. Soc. Lond. p. 101 (Loon, Bohol I., Philippines).

1853. *Nassa hispida* A. Adams, Reeve, Conch. Icon. 8: pl. 6, figs. 37a, b.

Superficially similar to *Hebra horrida* (Dunker), but slightly larger, 15-18mm in length, more inflated, aperture less crassate and wider, sculptured with numerous and regular, small, pointed but non-spinose nodules which are arranged in 3-4 spiral rows on the penultimate and 8-10 rows on the body whorl. Axial ribs numerous, thin and close-set, numbering from 19-23 on the last two whorls. Columellar callus almost as large as in *Hebra horrida*, columella, although finely plicate, lacks the numerous wrinkles of *H. horrida;* columellar denticles number from 4-8 and extend only a short distance into the aperture, deep interior being smooth. Cream in colour, last whorl with 1-2 faint, bluish-green bands, columella and aperture cream, aperture banded with purple-brown.

TYPE LOCALITY: Philippines.

HABITAT: Unknown.

Material examined: Donsol, Luzon I., Philippines.

A radula was not available for examination and the assignment of this species to the subgenus *Niotha* is only tentative. The numerous, close-set and thin axial ribs and regular arrangement of nodules, separate this species from *Nassarius echinatus* and *Hebra horrida*.

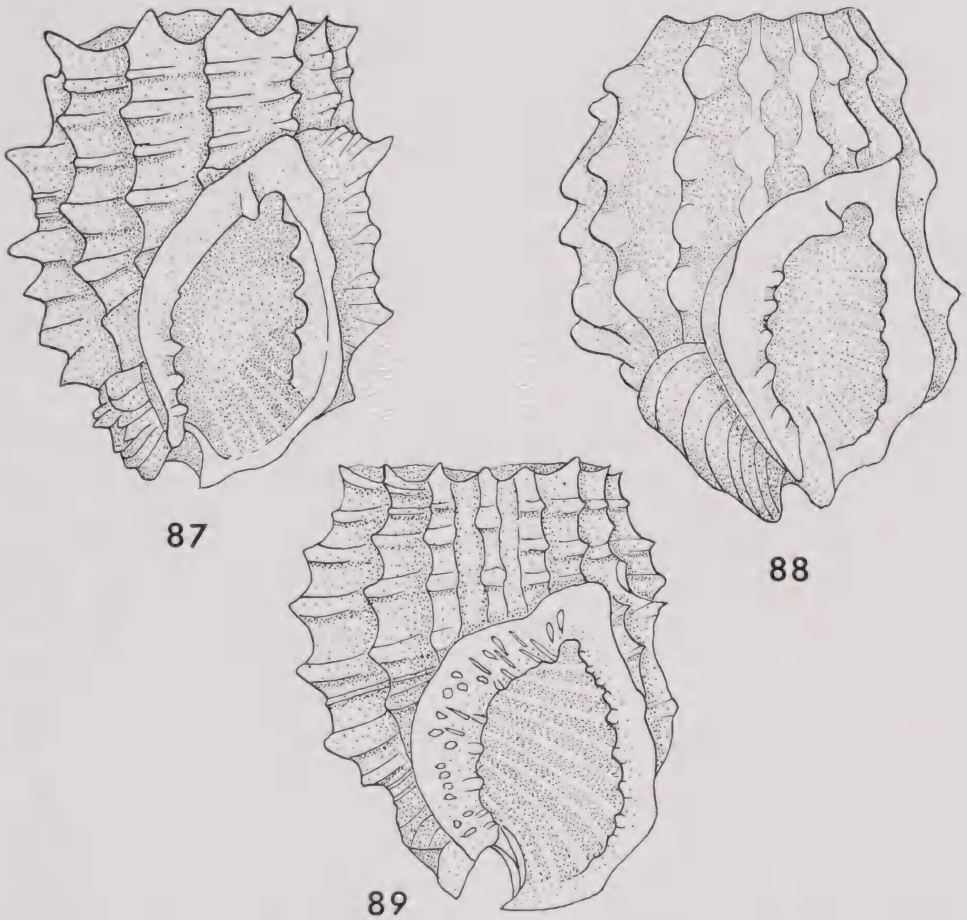
Nassarius (Niotha) sp. (Figs. 72, 93)

Shell 10-14mm in length, solid and squat, sculptured with broad, coarse nodulose and frequently oblique axial ribs, and a row of prominent nodules at the sutures; interstices carry spiral grooves which give rise to broad and flat and occasionally rope-like cords which override the ribs. Aperture narrow, outer lip thickened and varied on the back, interior with coarse denticles which continue as lirae halfway into the aperture; columella calloused and partly overlapping on to the body whorl, similarly as in *H. horrida*, and prominently denticulate anteriorly, siphonal fasciole calloused and recurved.

HABITAT: In coral and muddy sand, intertidal.

Material examined: Manava I., Fiji I.; Malolo Barrier reef, Mamanuca group, Fiji I.

The species has a superficial resemblance to *Hebra horrida* but the radula (Fig. 93) is of the *Nassarius* type. The identity of the species may be established when the type specimens of Nassariidae are examined.



Figs. 87-89. Apertural features. 87. *Nassarius (Niotha) quadrasi* (Hidalgo). 88. *N. (N.) echinatus* (A. Adams). 89. *Hebra horrida* (Dunker).

Subgenus **Telasco** H. & A. Adams, 1853

Telasco H. & A. Adams, 1853, Gen. Rec. Moll. 1: 119. Type species by SD (Oostingh, 1939) *Nassa variabilis* (Phil.) = *Buccinum variabile* Philippi, 1836 = *B. costulatum* Renier, 1804. Recent, Mediterranean & E. Atlantic.

1936. *Tarazeuxis* Iredale, Rec. Aust. Mus. 19: 322. Type species by OD *Nassa mucronata* A. Adams, 1852 = *N. gaudiosa* Hinds, 1844. Recent, Indo-Pacific. *(nom. nud.).*

Species of the subgenus *Telasco* are intermediate in shell-characters between *Niotha* and *Zeuxis*. The sculpture is less prominent, columellar callus less expanded and calloused than in *Niotha*, and the columella is not denticulate along the entire length as in *Zeuxis*. The laterals of the radula have 2 simple cusps and an accessory lateral plate is present.

Cossmann (1901) designated *Buccinum costulatum* Brocchi, 1814, a European Pliocene fossil as the type of *Telasco*, while Wenz (1943) cites *Buccinum cuvieri* Payraudeau, 1826, as the type, and equals it to *B.ferussaci* Payraudeau, 1826. Glibert (1963) follows Wenz, and Nordsieck (1968) lists *B.costulatum* Renier, 1804, as the type of *Telasco*, and considers it a prior name to *Buccinum cuvieri* Payraudeau. None of these species were among the originally included species, and the type designations are invalid. The first valid type designation the writer was able to trace, is the one by Oostingh (1939).

Tarazeuxis Iredale, 1936, is considered to be a *nomen nudum*. Iredale's (1936) statement when referring to *Nassa mucronata:* "It has been placed under *Zeuxis* but it does not correlate with *taenia* Gmelin, the type of *Zeuxis*", could hardly be construed to be a statement purporting to give characters differentiating the taxon, as required under the provisions of art.13(a)(i) of the Code of ICZN.

Nassarius (Telasco) gaudiosus (Hinds, 1844) (Figs. 97, 100 - 104)

1844. *Nassa gaudiosa* Hinds, Zool. Voy. "Sulphur" p. 36, pl. 9, figs. 16, 17.

1846. *Buccinum pictum* Dunker, Zeit. Malakozool. 3: 172 (? East Indies) [non Fleming, 1828].

1847. *Buccinum reevcanum* Dunker, Zeit. Malakozool. 4: 62. (? East Indies).

1849. *Buccinum pictum* Dunker, Philippi, Abb. Beschr. Conch. 3: 65, pl. 2, fig. 6 (non Fleming, 1828).

1849. *Buccinum reevcanum* Dunker, Philippi, Abb. Beschr. Conch. 3: 64, pl. 2, fig. 3.

1852. *Nassa filosa* "Gray MS", A. Adams, Proc. Zool. Soc. Lond. (publ. in synonymy of *N. reeveana* Dunker).

1852. *Nassa mucronata* A. Adams, Proc. Zool. Soc. Lond. p. 105 (Dumaguete, Negros I., Philippines, 11 fathoms).

1853. *Nassa mucronata* A. Adams, Reeve, Conch. Icon. 8: pl. 2, fig. 8.

1853. *Nassa gaudiosa* Hinds, Reeve, Conch. Icon. 8: pl. 8, fig. 48.

1853. *Nassa picta* Dunker, Reeve, Conch. Icon. 8: pl. 2, figs. 9a, b.

1876. *Nassa marratii* E. A. Smith, J. Linn. Soc. Lond., Zool. 12: 544, pl. 30, fig. 5 (San Christoval, Solomon I.).

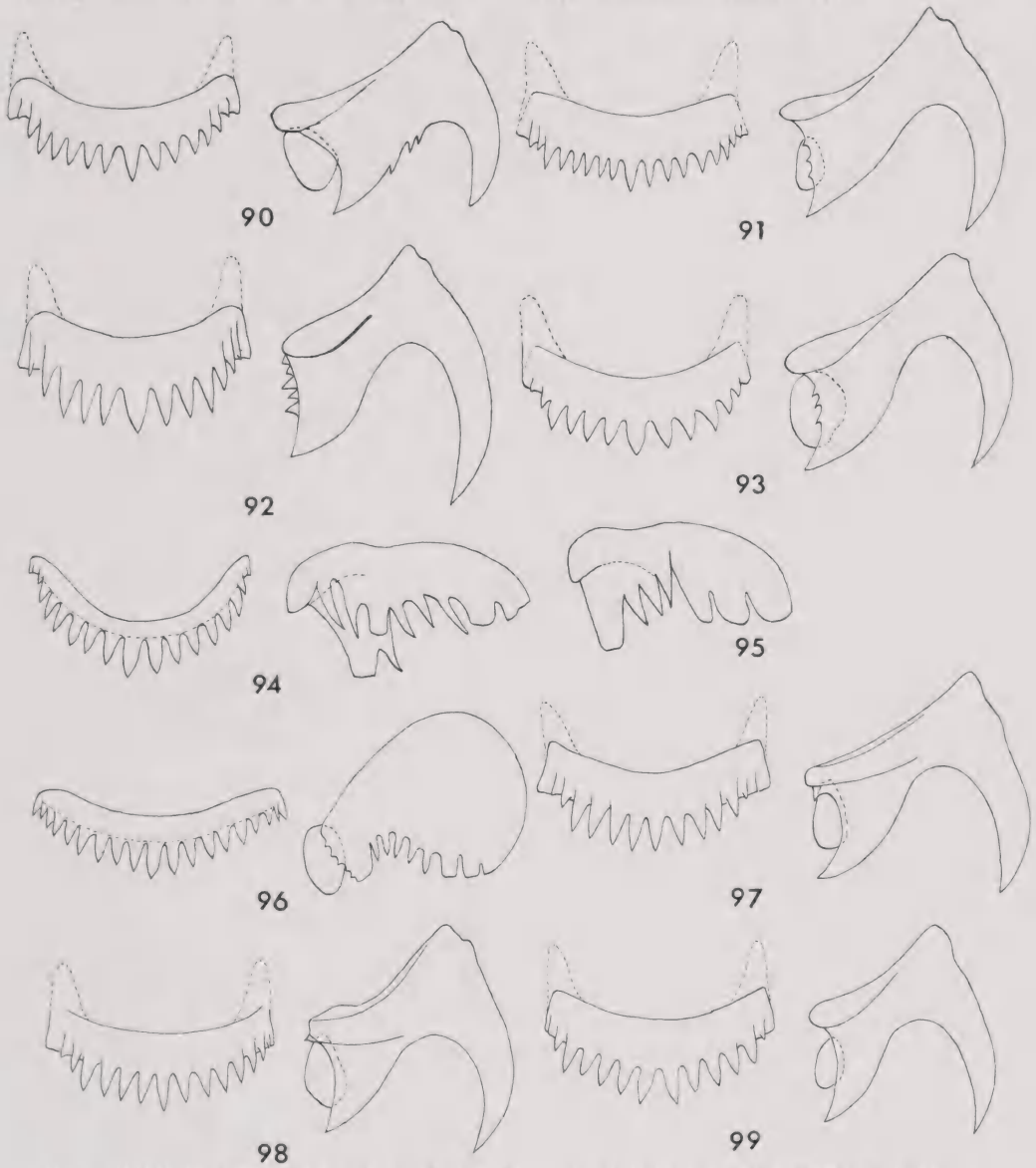
1879. *Nassa marratii* E. A. Smith, Proc. Zool. Soc. Lond. p. 809, pl. 50, fig. 8 (Andaman I.).

1913. *Nassa (Zeuxis) multipunctata* Schepman, Siboga-Exp. 49d: 321, pl. 20, figs. 4a, b. (Samau I. near Timor & Banda I., Indonesia, 9-45 m).

1957. *Nassarius pictus* Dunker, Kaicher, Indo-Pacific sea shells pl. 7, fig. 18.

Shell 12-25mm in length, slender or moderately broad, whorls regularly convex, postnuclear whorls with axial ribs and crisp spiral striae; axial ribs either persisting to the first half turn of the body whorl or becoming obsolete on the last 2½ whorls, axial ribs sometimes only indicated by sutural crenulations. Spiral striae disappear on the last 3 whorls. Columellar callus partly expanding on to the body whorl, becoming often transparent and highly glazed above the parietal wall; columella smooth, with only 1 or

2 denticles anteriorly, outer lip with 9-17 lirae which extend for a short distance into the aperture. Variable in colour, white or cream, marbled and banded with brown and lined with brown spiral lines; some individuals almost completely light or dark brown with a minimum of exposed white area. Columella white, aperture white, banded with purple-brown in light-coloured specimens, or purple-brown, banded with white in darkly coloured individuals. Operculum finely serrate at the margin.



Figs. 90-99. Half-row of radulae. 90, 91. *Nassarius (Niotha) quadrasi* (Hidalgo). Kakula I., New Hebrides. 90. ♂. 91. ♀. 92. *N. (N.) echinatus* (A. Adams). Port Havannah, New Hebrides. 93. *Nassarius (Niotha)* sp. Malolo Barrier reef, Fiji I. 94, 95. *Hebra horrida* (Dunker). Kakula I., New Hebrides. 94. ♂. 95. Lateral only ♀. 96. *H. subspinosa* (Lamarck). Olango I., Cebu I., Philippines. 97. *N. (Telasco) gaudiosus* (Hinds). Teuma Bay, New Hebrides. 98. *N. (T.) luridus* (Gould). Port Havannah, New Hebrides. 99. *N. (Zeuxis) bicallosus* (E. A. Smith). Broome, W. Australia.

TYPE LOCALITY: Straits of Malacca (Indo-Malaya).

HABITAT: In coral, muddy and black sand, from the intertidal region to a depth of 46 metres.

Material examined: Huahine, Society I.; Rarotonga, Cook I.; Oahu, Hawaiian I.; Apia, Samoa I.; Lomalagi, Fiji I.; Lifu, Loyalty I.; Kermadec I.; Teuma Bay, New Hebrides, 37 - 46 m; Pango Pt., New Hebrides; Horseshoe Bay, Magnetic I., Qld., Australia; Beaver reef, Qld., Australia; Pt. Hedland, W. Australia; The Rips, S.end of Direction I., Cocos-Keeling I.

The species is highly variable in form, sculpture and colour, and with more detailed examinations of the types, several other synonyms will undoubtedly be added in the future. *Buccinum reeveanum* Dunker, is sometimes associated with *N.luridus,* but the original description of a smooth columella disassociates the species from *luridus.*

The form *mucronata* A. Adams, (Fig. 104) is the broad, axially plicate form in which the axial ribs persist to the body whorl; the form is wide-spread and not confined to any particular geographical area.

Nassa marratii Smith (Fig. 101) is the dark brown, slender form of the species, and is also occasionally collected in the Fiji Islands. Tomlin (1940) cites *N.sesarma* Marrat, 1877, and *N.ferruginea* Marrat, 1880, as synonyms of *N.marratii.*

Kaicher (1957) has adopted the name *Buccinum kieneri* Anton, 1839, for this species, but Anton's taxon remains a *nomen dubium.*

As previously observed in temperate water Nassariidae, populations of *N.gaudiosus* from the Kermadec Islands appear to have a retarded development stage. In the majority of specimens the apertural lirae never develop and some individuals do develop a single varix on the body whorl, similarly to the S. E. Australian species *N.nigellus* (Reeve).

Nassarius (Telasco) luridus (Gould, 1849) (Figs. 98, 105 - 107)

1849. *Nassa lurida* Gould, Proc. Bost. Soc. Nat. Hist. 3: 153.

1852. *Nassa lurida* Gould, U.S. Expl. Exp. 12: 257, pl. 19, figs. 325a, b.

1852. *Nassa dispar* A. Adams, Proc. Zool. Soc. Lond. p. 96 (Philippines) [synonym *fide* Smith, 1879 and Tomlin, 1932a].

1852. *Nassa punctata* A. Adams, Proc. Zool. Soc. Lond. p. 105 (Puerto Galero, Albay, Luzon, Philippines) [non *Buccinum punctatum* Kiener, 1834 = *Nassarius*].

1852. *Nassa lentiginosa* A. Adams, Proc. Zool. Soc. Lond. p. 105 (Masbate, Philippines, 7 fathoms).

1853. *Nassa dispar* A. Adams, Reeve, Conch. Icon. 8: pl. 7, fig. 45.

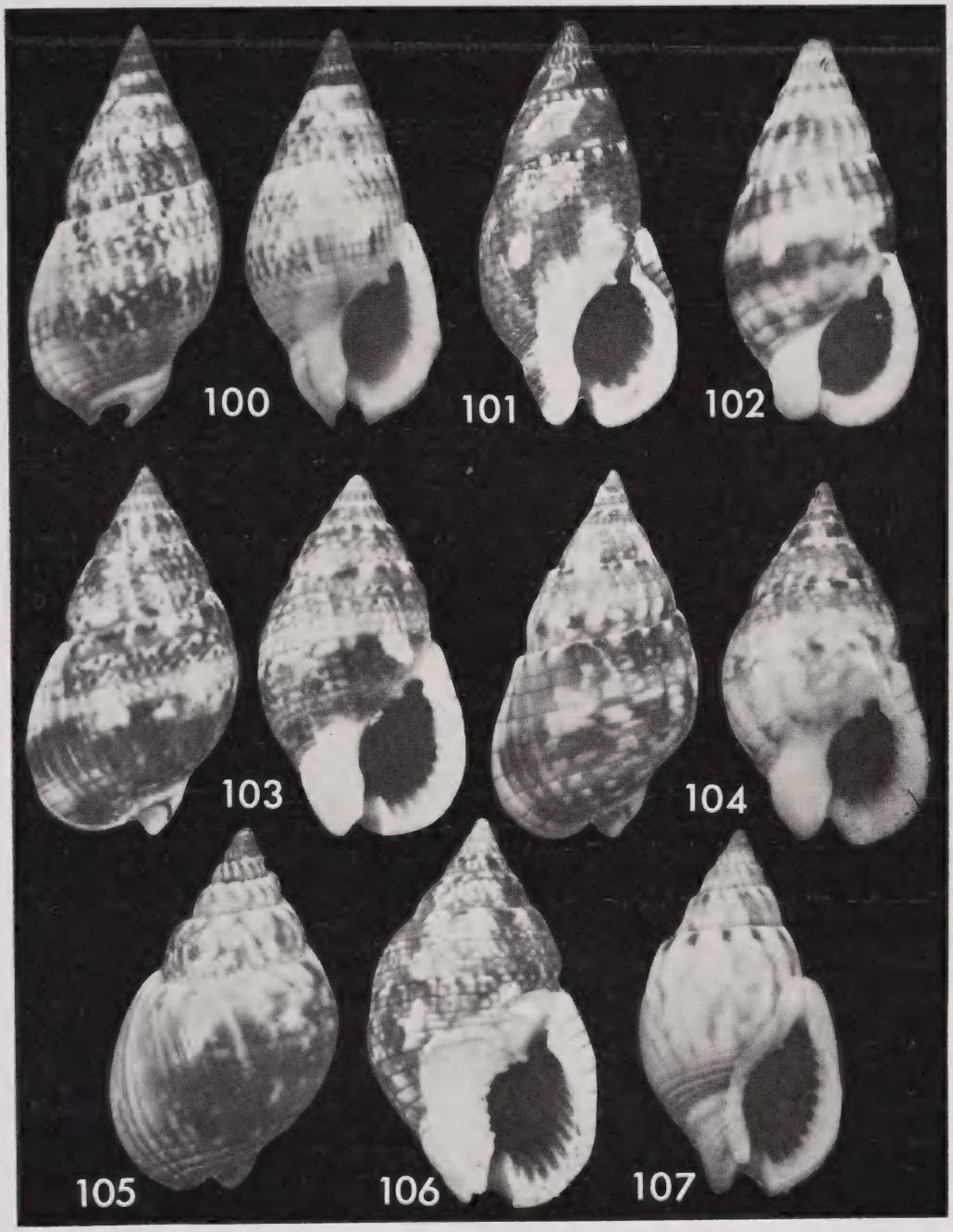
1853. *Nassa lentiginosa* A. Adams, Reeve, Conch. Icon. 8: pl. 3, fig. 15.

1853. *Nassa dispar* A. Adams, Reeve, Conch. Icon. 8: pl. 7, fig. 45.

1913. *Nassa (Arcularia) elegans* var. *fulgurans* Schepman, Siboga-Exp. 49d: 314, pl. 19, figs. 10a, b (Indonesia).

1957. *Nassarius kieneri* Anton, Kaicher, Indo-Pacific sea shells pl. 7, fig. 24 (? non *Buccinum kieneri* Anton, 1839).

1964. *Tarazeuxis reeveanus* (Dunker), Habe, Shells west. Pacific col. 2: 100, pl. 32, fig. 19 (non *Buccinum reeveanum* Dunker, 1847).



Figs. 100-107. 100-104. *Nassarius (Telasco) gaudiosus* (Hinds). 100. Slender smooth form. Pt. Hedland, W. Australia; 24.0mm. 101. Forma *marrati* E. A. Smith. Lomalagi, Fiji I.; 17.4mm. 102. Plicate form. Oahu, Hawaiian I.; 17.0mm. 103. Broad, smooth form. Teuma Bay, New Hebrides; 15.4mm. 104. Forma *mucronata* A. Adams. Pango Pt., New Hebrides; 16.0mm. 105-107. *N. (T.) luridus* (Gould). 105. Magnetic I., Qld., Australia; 19.2mm. 106. Caboni beach, Fiji I.; 18.6mm. 107. Boac, Philippines; 19.5mm.

Similar in size and general appearance to *N. gaudiosus*, but thinner and more inflated, last whorl rather ventricose. In contrast to *N. gaudiosus*, the columella with prominent, short denticles and plicae along its entire length, and in mature specimens the outer lip has 3-4 small, sharp denticles on the anterior edge. Columellar callus spreads only occasionally on to the body whorl, and usually the columella only appears calloused. Variable in colour, sometimes cream, axially streaked and spotted at sutures with brown, at other times dark green or greenish-brown, with a fine network of white lines or short streaks; columellar callus and edge of outer lip white, interior of aperture purple-brown, narrowly banded with white. Operculum serrate at the margin.

TYPE LOCALITY: Tutuila, Samoa Islands.

HABITAT: In coral and weedy sand, from the intertidal region to a depth of 18 metres.

Material examined: Watson's I., Apia, Samoa I.; Suva reef, Fiji I.; Caboni beach, Fiji I.; Port Havannah, Efate I., New Hebrides; Australia; Horseshoe Bay, Magnetic I.; Kurrimine beach; Lucinda Pt.; Four Mile beach, Port Douglas; Pt. Pallarenda near Townsville, all Queensland; Pt. Hedland, W. Australia; Boac I., Marinduque, Philippines; Doupe, Philippines.

The smooth columella in *N.gaudiosus* and the plicate and wrinkled columella in *N.luridus* aid in a quick separation of adult specimens, which sometimes may approach each other in shape and colouring.

Nassarius (Telasco) shacklefordi (Melvill & Standen, 1896) (Fig. 111)

1896. *Nassa (Telasco) shacklefordi* Melvill & Standen, J. Conch. 8: 274, pl. 9, fig. 3.

1964. *Tarazeuxis shackelfordi (sic)* (Melvill & Standen), Habe, Shells west. Pacific col. 2: 99, pl. 32, fig. 14 (Japan).

Shell 8-14mm in length, ovate and shining, early postnuclear whorls axially costate, last 2-3 whorls smooth, base of shell with about half a dozen spiral striae. Columella not calloused, smooth apart from a parietal denticle, a prominent fold anteriorly and occasionally 1-2 minute denticles; outer lip thickened, backed by a varix and with 12-15 denticles which extend as lirae into the aperture. White, pink or rose in colour, usually ornamented with wide-spaced small orange-brown spots at the sutures; under magnification, 2 bands of a latticed pattern can be observed on the dorsal side of the body whorl.

TYPE LOCALITY: Lifu, Loyalty Islands.

HABITAT: Unknown.

Material examined: Lifu, Loyalty Islands (beach-worn specimens).

Subgenus **Zeuxis** H. & A. Adams, 1853

Zeuxis H. & A. Adams, Gen. Rec. Moll. 1: 119. Type species by SD (Cossmann, 1901) *Buccinum taenia* Gmelin, 1791 = *B. olivaceum* Bruguière, 1789. Recent, Indo-Pacific.

1929. ? *Allanassa* Iredale, Mem. Queensl. Mus. 9 (3): 289, 295. Type species by OD *Nassa eximia* H. Adams, 1872. Recent, W. Pacific.

Shell small to moderate in size, 15-45mm in length, solid, whorls convex, sculptured with axial ribs and spiral striae or grooves; aperture generally more open, columella calloused but not expanded and denticulate along its entire length. Outer lip thickened and backed by a varix, denticulate interiorly, aperture smooth or lirate within, siphonal canal short. Laterals of radula with 2 simple cusps, accessory lateral plates usually absent.

The identity of *Nassa eximia* H. Adams, is uncertain, and the described specimen could be a small *Nassarius concinnus* (Powys).

Figs. 108-111. 108-110 *Nassarius (Zeuxis) comptus* (A. Adams). 108. Pt. Hedland, W. Australia; 22.2mm. 109. Mauritius; 21.4mm. 110. Muscat, Gulf of Oman; 25.7mm. 111. *N. (Telsca) shacklefordi* (Melvill & Standen). Topotype, Lifu, Loyalty I.; 8.0mm.

Nassarius (Zeuxis) comptus (A. Adams, 1852) (Figs. 108 - 110)

1852. *Nassa compta* A. Adams, Proc. Zool. Soc. Lond. p. 107.

1853. *Nassa compta* A. Adams, Reeve, Conch. Icon. 8: pl. 16, figs. 106a, b.

1880. *Nassa polita* Marrat, Nar. shells gen. Nassa pp. 24, 79 (Mauritius).

1964. ? *Zeuxis excellens* Kuroda & Habe, Habe, Shells west. Pacif. col. 2: 100, pl. 32, fig. 22.

The species is rather similar to *N. luridus* Gould, but differs in the following features: the body whorl is more ventricose, the siphonal fasciole is less calloused, the

spire is higher and the siphonal canal is more produced. Sutures have a narrow and flat presutural ramp, and the columellar callus is thinly glazed above the parietal wall. Cream to brown in colour, shining, ornamented with orange-brown axial streaks and spots at sutures; columella and edge of outer lip white, interior of aperture light orange-brown.

TYPE LOCALITY: Cape St. Antonio, South Africa.

HABITAT: Unknown.

Material examined: Pt. Hedland, W. Australia; Mauritius; Muscat, Gulf of Oman.

There is some doubt as to the correctness of the type locality, since neither Tomlin (1928) nor Barnard (1959) report the species from South Africa.

Nassarius (Zeuxis) olivaceus (Bruguière, 1789) (Figs. 112 - 114)

1789. *Buccinum olivaceum* Bruguière, Encycl. Méth. vers 1: 272.

1791. *Buccinum taenia* Gmelin, Syst. Nat. ed. 13: 3493 (Hab: ?).

1816. *Nassa olivacea* Lamarck, Tabl. Encycl. Méth. p. 1, pl. 394, fig. 7.

1833. *Buccinum olivaceum* Lamarck, Quoy & Gaimard, Voy. L'Astrolabe 2: 442, pl. 32, figs. 13-15 (animal).

1834. *Buccinum olivaceum* Bruguière, Kiener, Spéc. gén. icon. coq. viv. 9: 59, pl. 15, fig. 53.

1852. *Nassa mitralis* A. Adams, Proc. Zool. Soc. Lond. p. 108 (Isinimalan, Negros I., Philippines).

1853. *Nassa mitralis* A. Adams, Reeve, Conch. Icon. 8: pl. 19, fig. 128.

1868. *Nassa approximata* Pease, Amer. J. Conch. 3: 272, pl. 23, fig. 3 (Polynesia).

1957. *Nassarius taenius* Gmelin, Kaicher, Indo-Pacific sea shells pl. 7, fig. 16.

1966. *Zeuxis olivaceus* (Bruguière), Habe & Kosuge, Shells world col. 2: 63, pl. 22, fig. 38.

1966. *Zeuxis exilis* (Powys), Habe & Kosuge, Shells world col. 2: 63, pl. 22, fig. 41 (non *Nassa exilis* Powys, 1835).

Shell 25-45mm in length, solid, sculptured with axial ribs which number from 0-20 on the penultimate and from 0-17 on the body whorl; in axially ribbed specimens, interstices have short impressed grooves, but in smooth individuals spiral sculpture is absent on the last whorl with the exception of the base of the shell. Columella calloused and denticulate along entire length, outer lip with 7-14 denticles which are confined to the edge of the aperture, interior smooth, outer lip backed by a varix. Tan to dark brown in colour, occasionally ornamented with 1-2 narrow, yellow bands on the body whorl; columella and edge of outer lip violet or brown, interior of aperture brown or purplish-brown and occasionally banded.

TYPE LOCALITY: Coast of Guadeloupe, American Ocean = error! (Bourou I. and Moluccas – Quoy & Gaimard, 1833).

HABITAT: On reef flats, under rocks and coral on a sand substrate and in muddy sand, intertidal.

Material examined: Suva reef, Fiji I.; Port Douglas, Qld., Australia; Soepiori, Schouten I., W. New Guinea; Philippines: Cebu City, Cebu I.; Doural, Sorsogon; Donzol, Luzon; Ceylon; Mauritius.

Habe & Kosuge (1966) have applied the name *Nassa exilis* Powys, 1835, to the axially plicate form of *Nassarius olivaceus*. *Nassa exilis*, however, was originally described from Payta, Peru, and has been recognized by subsequent authors as a member of the West central American fauna. *Nassarius exilis* is a small, 12 - 16 mm long, common Panamanian species which only superficially resembles *N.olivaceus*.

Nassarius (Zeuxis) dorsatus (Röding, 1798) (Figs. 115 - 118)

1791. *Buccinum trifasciatum* Gmelin, Syst. Nat. ed. 13: 3489 (non Gmelin, 1791, p. 3477).

1798. *Buccinum dorsatum* Röding, Mus. Bolten. p. 111 (ref. Chemnitz, vol. 4, pl. 125, figs. 1194, 1195).

1822. *Buccinum canaliculatum* Lamarck, Hist. Nat. anim. s. vert. 7: 267 (Hab: ?) [non Gmelin, 1791].

1827. *Nassa livida* Gray in King, Narrat. Surv. Aust. 2: App. p. 484.

1834. *Buccinum canaliculatum* Lamarck, Kiener, Spéc. gén. icon. coq. viv. 9: 61, pl. 23, fig. 89 (Indian Ocean) [non Gmelin, 1791].

1834. *Buccinum unicolorum* Kiener, Spéc. gén. icon. coq. viv. 9: 60, pl. 19, fig. 69 (Hab: ?).

1852. *Nassa badia* A. Adams, Proc. Zool. Soc. London, p. 107 (Sinaat, N. Ilocos, Luzon, Philippines).

1853. *Nassa badia* A. Adams, Reeve, Conch. Icon. 8: pl. 19, fig. 124.

1853. *Nassa unicolorata* Reeve, Conch. Icon. 8: pl. 3, fig. 17 (N. Australia).

1853. *Nassa rutilans* Reeve, Conch. Icon. 8: pl. 22, fig. 147 (New Zealand = error!).

1957. *Nassarius canaliculatus* Lamarck, Kaicher, Indo-Pacific sea shells pl. 7, fig. 17.

1966. *Tarazeuxis unicolorus* (Kiener), Habe & Kosuge, Shells world col. 2: 62, pl. 22, fig. 30.

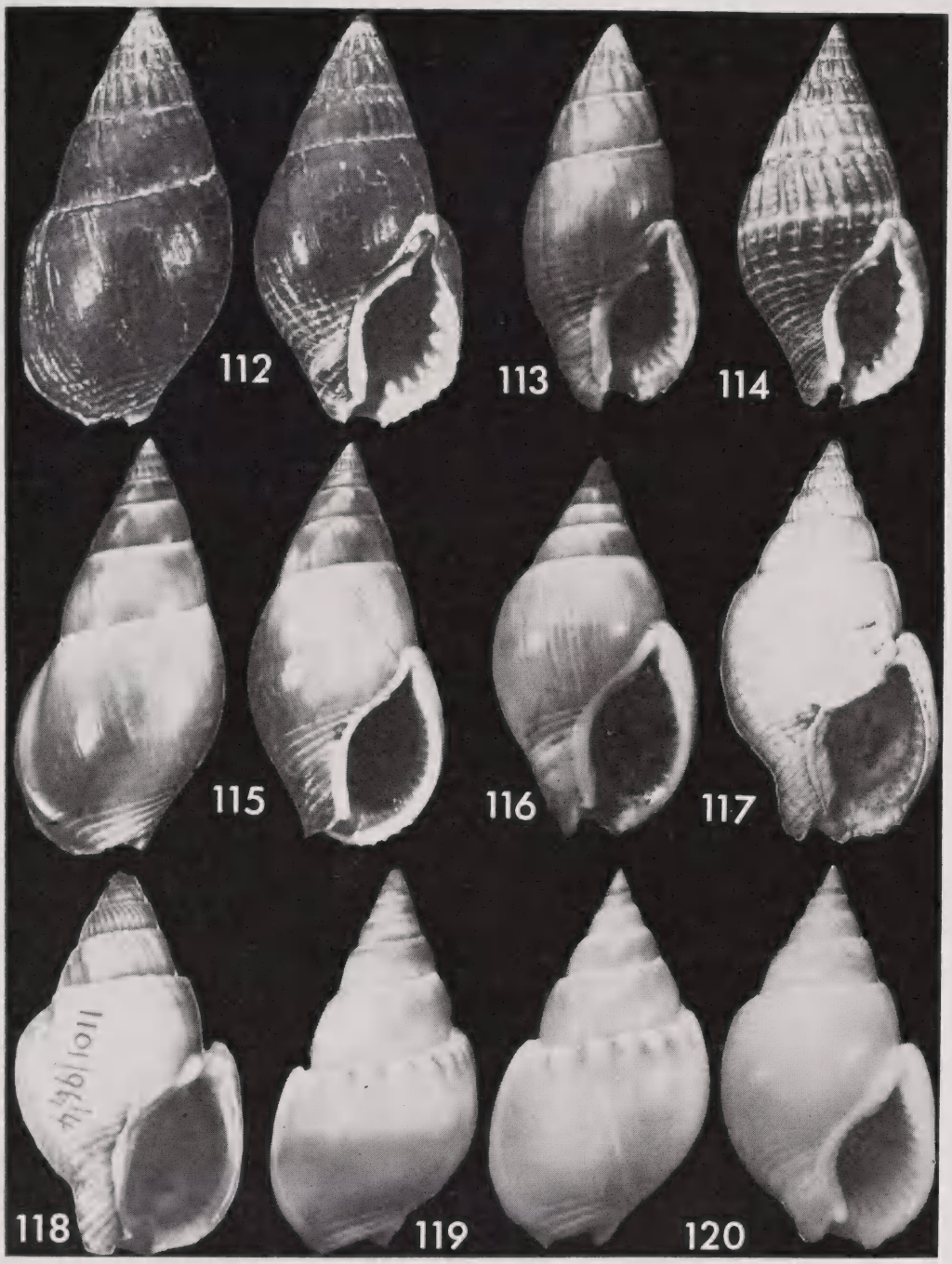
Shell 18-40mm in length, moderately thin, frequently shining, last whorl occasionally ventricose, postnuclear whorls sculptured with axial ribs and sutural nodules, last 3-4 whorls smooth; occasional individuals are weakly plicate up to the ventral side of the body whorl. The back of the outer lip has a prominent varix, base of shell with about half a dozen spiral cords. Columella calloused and finely denticulate along entire length, outer lip with short denticles which do not extend into the aperture, edge of lip with 3-4 small, spinose denticles anteriorly. Variable in colour, uniformly steel-grey, obsoletely banded with brown, some specimens tan or dark brown in colour; columella and edge of outer lip white, interior of aperture purple-brown.

TYPE LOCALITY: None. (Tranquebar – Chemnitz, 1880).

HABITAT: On reef-flats and sand-bars, intertidal.

Material examined: Australia: Gloucester I.; Lucinda Pt.; Dingo beach; Cairns; Keppel Bay; Round Hill Heads; Pt. Marlowe, Townsville, all Queensland; Broome, W.A.; Yampi Sound, W.A.; Darwin, N.A.; Sydney, N.S.W.

The syntypes of *Buccinum canaliculatum* Lamarck (non Gmelin, 1791) [Figs. 117, 118] are in the Museum d'Histoire Naturelle, Geneva, No. 1101/96, and measure 36.4 mm and 35.0 mm in length.



Figs. 112-120. 112-114. *Nasarius (Zeuxis) olivaceus* (Bruguière). 112. Suva reef, Fiji I.; 32.0mm. 113. Forma *mitralis* A. Adams. Cebu I., Philippines; 27.0mm. 114. Plicate form. Port Douglas, Qld., Australia; 33.0mm. 115-118. *N. (Z.) dorsatus* (Röding). 115. Slender form. Townsville, Qld., Australia; 32.0mm. 116. Broad form. Broome, W. Australia; 26.0mm. 117, 118. Syntypes of *Buccinum canaliculatum* (Lamarck). Mus. d'Hist. Nat. Geneva No. 1101/96, 36.4 and 35.0mm respectively. 119, 120. *Nassarius (Zeuxis) bicallosus* (E. A. Smith). Broome, West Australia. 119. Slender form; 22.0mm. 120. Broad form; 24.0mm.

Nassarius (Zeuxis) bicallosus (E. A. Smith), 1876) (Figs. 99, 119 - 120).

1876. *Nassa bicallosa* E. A. Smith, J. Linn. Soc. Lond. Zool. 12: 543, pl. 30, fig. 1.

1877. *Nassa glabella* Marrat, Prop. new forms *Nassa* p. 3, pl. 1, fig. 7 (Hab: ?).

1877. *Nassa laevigata* Marrat, Prop. new forms *Nassa* p. 3, pl. 1, fig. 7 *(Nom. subst. pro N. glabella* Marrat, 1877) [non *N. laevigata* Pusch, 1836].

1903. *Nassa optima* Sowerby, J. Malacology 10: 73, pl. 5, figs. 1, 2 (N.W. Australia).

1913. *Nassa (Alectryon) elegantula* Schepman, Siboga-Exp. 49d: 315, pl. 19, figs. 11a, b (Madura Str. and Timor).

1959. *Nassa bicallosa* Smith, Barnard, Ann. Sth. Afric. Mus. 45: 107, fig. 22h (radula), fig. 23d (protoconch).

Shell 20-28mm in length, similar to *N. dorsatus* but more ventricose, postnuclear whorls sculptured with oblique axial ribs, a presutural groove and a row of sutural nodules; axial ribs becoming obsolete on last 3-4 whorls and appearing as prominent coronations at the sutures. In some individuals, sutural nodules become obsolete. Aperture ovate, columella calloused and finely denticulate along entire length, outer lip with denticles which extend as lirae one-half to three-quarter way into the aperture; outer lip backed by a varix, anterior edge with a few, small and sharp denticles. White, cream or light fawn in colour, occasionally banded with brown on the dorsal side of the body whorl; axial ribs separated from sutural nodules by a shallow, smooth channel, reddish-brown in colour; columella and edge of aperture white, interior orange or purple-brown.

TYPE LOCALITY: Cape Natal, South Africa.

HABITAT: Sublittoral, at depth ranging from 18 - 73 metres.

Material examined: Sand banks at Yampi Sound; 2 miles E. of jetty, Broome, both W. Australia.

The species has a moderately restricted range which extends from West Australia to South Africa and Madagascar. The original localities from which the species was described were Swan River, W. Australia and Cape Natal. Tomlin (1928) remarked that the 3 syntypes of *N.bicallosus* marked by Smith as types, originated from Cape Natal.

Nassarius (Zeuxis) margaritiferus (Dunker, 1847) (Figs. 122, 141)

1833. *Buccinum reticulatum* Quoy & Gaimard, Voy. L'Astrolabe 2: 444, pl. 32, figs. 16, 17 (Vanikoro I., Solomon I.) [non Linnaeus, 1758].

1847. *Buccinum margaritiferum* Dunker, Zeit. Malakozool. 4: 60 (Hab: ?).

1849. *Buccinum margaritiferum* Dunker, Philippi, Abb. Beschr. Conch. 3: 47, pl. 1, fig. 12.

1853. *Nassa costellifera* A. Adams, Proc. Zool. Soc. Lond. p. 113 (Curimans, Philippines) [*fide* Smith, 1879, and Tomlin, 1928, 1932a]

1853. *Nassa costellifera* A. Adams, Reeve, Conch. Icon. 8: pl. 9, figs. 58a, b.

1853. *Nassa margaritifera* Dunker, Reeve, Conch. Icon. 8: pl. 9, figs. 59a, b.

1957. *Nassarius crematus* Hinds, Kaicher, Indo-Pacific sea shells pl. 7, fig. 20 (non *Nassa cremata* Hinds, 1844).

1966. *Zeuxis margaritiferus* (Dunker), Habe & Kosuge, Shells world col. 2: 62, pl. 22, fig. 31.

Shell 20-27mm in length, elongate-ovate and solid, sculptured with numerous, nodulose axial ribs which number from 20-30 on the penultimate and from 20-26 on the body whorl ;axial ribs separated from sutural nodules by a shallow, smooth channel. Interstices smooth apart from macroscopic axial striae, spiral cords commence at centre of body whorl and extend to the base. Aperture moderately small and ovate, columella calloused and denticulate along entire length, outer lip with 7-10 denticles which extend as lirae halfway into the aperture. White or cream in colour, banded, streaked and marbled with purple-brown, columella and outer lip white or cream, interior of aperture banded with purple-brown.

TYPE LOCALITY: None.

HABITAT: On reef flats, among sand, grass and coral, intertidal.

Material examined: Bushmens Bay, Malekula I., New Hebrides; Chukwani, W. Zanzibar, E. Africa.

The species has been reported from Cabinda, West Africa by Knudsen (1955). The figured specimen, which undoubtedly is *N.margaritiferus*, may have been an accidental introduction from South Africa and the species probably does not live on the west African coast.

Nassarius (Zeuxis) pyrrhus (Menke, 1843) (Figs. 121, 142)

1822. *Buccinum fasciatum* Lamarck, Hist. nat. anim. s. vert. 7: 271 (New Holland) [non Müller, 1774]

1833. *Bucccinum fasciatum* Lamarck, Quoy & Gaimard, Voy. L'Astrolabe 2: 445, pl. 32, figs. 18-21 (non Müller, 1774).

1843. *Buccinum pyrrhum* Menke, Moll Nov. Holl. p. 21 *(nom. subst. pro B. fasciatum* Lamarck, 1822) [New Holland].

1852. ? *Nassa dealbata* A. Adams, Proc. Zool. Soc. Lond. p. 112 (Dumaguete, Negros I., Philippines = error) [*fide* Tomlin, 1932].

1853. *Nassa fasciata* Quoy & Gaimard, Reeve, Conch. Icon. 8: pl. 6, fig. 40.

1913. *Alectrion fasciata* Lamarck, Suter, Man. N.Z. Moll. p. 397, pl. 45, fig. 16 (Bay of Islands, New Zealand).

1915. *Alectrion victorianus* Iredale, Trans. Proc. N.Z. Inst. 47: 467, *(nom. subst. pro Buccinum fasciatum* Lamarck, 1822).

1927. *Alectrion fasciata* (Lamarck), Finlay, Trans. Proc. N.Z. Inst. 57-418 (eliminated from the New Zealand fauna).

1962. *Niotha pyrrhus* (Menke), Macpherson & Gabriel, Mar. Moll. Vict. p. 196, fig. 233.

Shell 10-22mm in length, sculptured with slender and angulate axial ribs which number from 14-20 on the last two whorls; ribs are crossed by coarse spiral cords which divide the ribs into nodules, sutural nodules separated from the ribs by a shallow presutural groove. Columella calloused and irregularly denticulate along its entire length, denticles frequently doubled up; denticles on outer lip confined to the margin, interior of aperture smooth. White to pinkish-white in colour, ornamented with a dark rusty-brown band on the spire whorls and 2 bands on the body whorl; some specimens are brown and have yellowish-white spiral bands. Columella brown or mauve but white on the parietal wall, aperture white, narrowly banded with brown, interior of siphonal canal flushed with violet in fresh specimens.

TYPE LOCALITY: New Holland.

HABITAT: On sand banks, intertidal.

Material examined: Albany, W. Australia; Port Augusta, W.A.; Tasmania; South Australia: Henley Beach: Semaphore: Glenelg; N. of Stansbury, Yorke's Peninsula; Port Lincoln; Outer Harbour, Adelaide; Victoria: Melbourne; Phillip I.; Sandringham; Port Fairy; Cowes, Western Port.

The species is generally assigned to the subgenus *Niotha*, but on shell-characters a placement in *Zeuxis* appears more appropriate. *Nassarius pyrrhus* has been reported from New Zealand in two recent publications (Macpherson & Gabriel, 1962 and Wilson & Gillett, 1971), but it does not occur there. The specimen described by Suter (1913) from the Bay of Islands, New Zealand as *Alectrion fasciatus* Lamarck, most probably originated from Australia.

Nassarius (Zeuxis) crematus (Hinds, 1844) (Figs. 123 - 125)

1844. *Nassa cremata* Hinds, Zool. Voy. "Sulphur" p. 35, pl. 9, figs. 8, 9.

1852. *Nassa siquijorensis* A. Adams, Proc. Zool. Soc. Lond. p. 97, (Siquijor I., Philippines)

1852. *Nassa crenellifera* A. Adams, Proc. Zool. Soc. Lond. p. 98 (Hab: ?).

1853. *Nassa cremata* Hinds, Reeve, Conch. Icon. 8: pl. 4, figs. 26a, b.

1853. *Nassa siquijorensis* A. Adams, Reeve Conch. Icon. 8: pl. 8, figs. 53a, b.

1853. *Nassa crenellifera* A. Adams, Reeve, Conch. Icon. 8: pl. 8, fig. 49.

1879. *Nassa siquijorensis* A. Adams, E. A. Smith, Proc. Zool. Soc. Lond. p. 210, pl. 20, figs. 45, 45a.

1880. *Nassa quadrata* Marrat, Var. shells gen. *Nassa* p. 103 (Singapore) [*nom. subst. pro N. cremata* Reeve, 1853]

1914. *Nassa euglypta* Sowerby, Proc. Malac. Soc. Lond. 11: 6, textfig. (Kii, Japan).

1931. *Nassa (Hinia) kueneni* Koperberg, Jaarb. Mijn. Ned. Indie p. 112, pl. 3, fig. 44 (Pliocene of Timor).

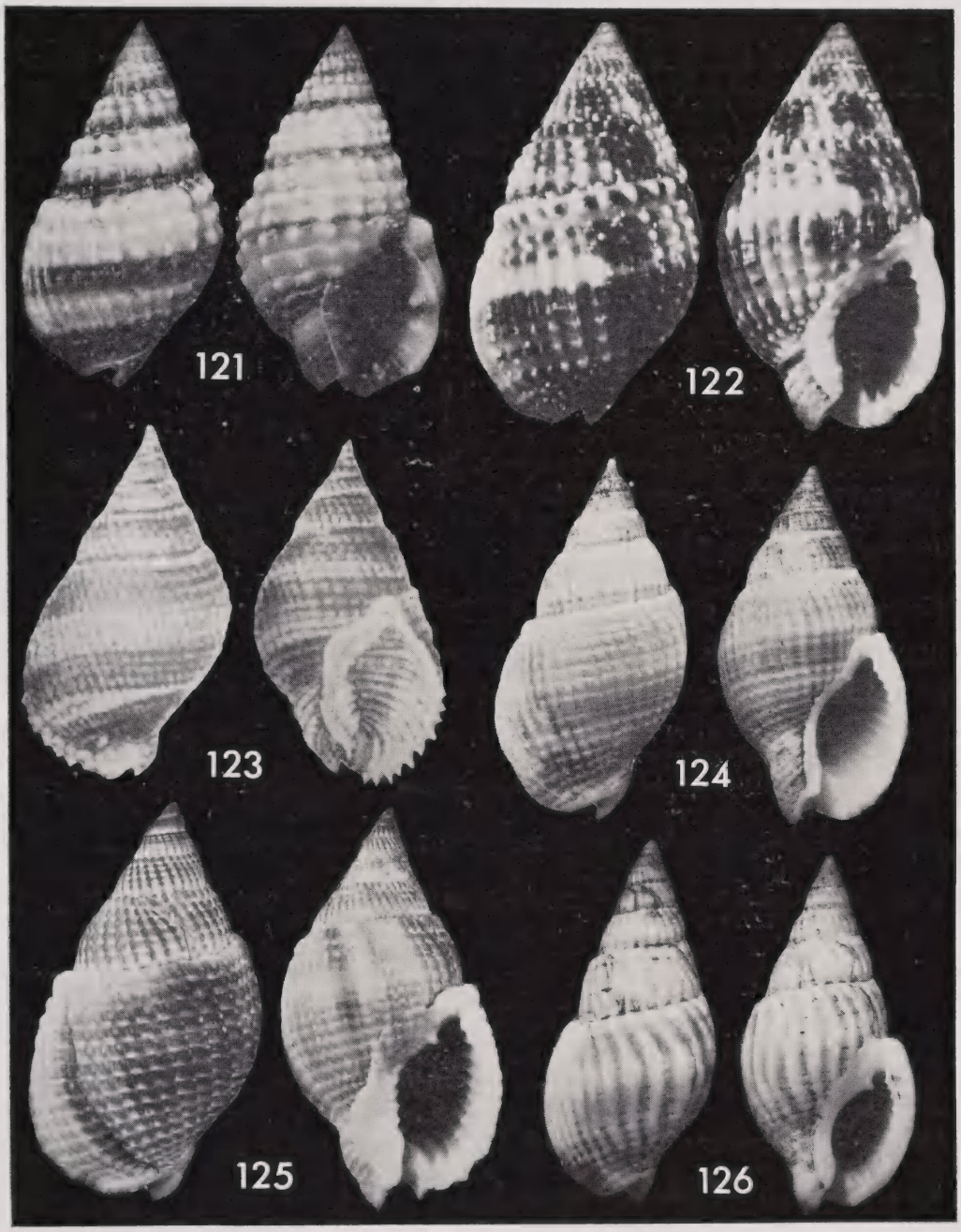
1934. *Nassa crenata* Giner-Marí, J. Conchyl. 78: 15, 64 *(nom. van.)*.

1934. *Nassa crenata* var. *scutulata* Giner-Marí, J. Conchyl. 78: 16 *(nom. subst. pro N. cremata* Reeve, 1853).

Shell 12-30mm in length, moderately ventricose, sculptured with numerous, close-set and slender axial ribs which number from 25-40 on the last 2 whorls; spiral cords decussate axial ribs into small nodules and form 5-7 rows on the penultimate and 14-15 rows on the body whorl. The longitudinally oriented nodules are separated from the axial ribs by a shallow presutural groove. Columella calloused and in some individuals broadly laminated anteriorly, and with 5-10 denticles or plicae which are generally more prominent at the base; outer lip with 10-13 lirae which extend one-half to three-quarter way into the aperture, lip margin with small and sharp denticles. White, cream, fawn or light grey in colour, ornamented with 2-3 moderately broad, brown bands on the body whorl, bands occasionally more saturated on the dorsal side; columella and edge of outer lip white, aperture frequently flushed with brown.

TYPE LOCALITY: Straits of Malacca.

HABITAT: In coral sand, from the intertidal region to a depth of 10 metres.



Figs. 121-126. 121. *Nassarius (Zeuxis) pyrrhus* (Menke). Sandringham, Vict., Australia; 18.0mm; 122. *N. (Z.) margaritiferus* (Dunker). Malekula I., New Hebrides; 21.4mm. 123-125. *N. (Z.) crematus* (Hinds). 123. Type figure (from Hinds, 1844, pl. 9, figs. 8, 9). 124. Tosa Bay, Japan; 29.3mm. 125. Manava I., Fiji I.; 22.0mm. 126. *N. (Z.) caelatus* (A. Adams). Tokyo Bay, Japan; 27.5mm.

Material examined: Diamond Head, Oahu, Hawaiian I.; Manava I., Fiji I., 11 m; Horseshoe Bay, Magnetic I., Qld., Australia; Daydream I., Whitsunday Passage, Qld., Australia; Mantoewoeri Pt., Koeroedoi I., Geelvink Bay, W. New Guinea, 7 m; Tosa Bay, Japan; Minoshima, Wakayama - Ken, Japan; Tokushima, Japan.

Several names have been bestowed on this species, some of them based on such variable features as number of axial ribs and density of spiral cords. *Nassa euglypta* Sowerby, is frequently placed in the synonymy of the related *Nassarius caelatus* A. Adams, but Sowerby's species is the spirally decussate *N.crematus*.

There is a possibility that *Nassa conoidalis* Deshayes in Bélanger, 1832, may be a prior name for *Nassarius crematus*, but the true identity of the species is rather dubious. Kiener (1834) figures under the name *Buccinum conoidale* a species very similar to *Nassarius albescens gemmuliferus* (A. Adams), and the figure supplied by Tryon (1822) appears to be *N.distortus* (A. Adams). Hedley (1915) equals *Buccinum conoidale* to *Nassa cremata* Hinds, and considers *N.ravida* A. Adams, 1852, to be a synonym. Oostingh (1939) follows Hedley and also includes *Nassa (Hinia) kurodai* Makiyama, 1927, in the synonymy of *N.conoidalis*. Makiyama's species appears to be *Nassarius crematus* (Hinds). In view of the different applications of the name and the dubious identity of *Buccinum conoidale*, *Nassarius crematus* (Hinds) has been retained for the species.

Nassarius (Zeuxis) caelatus (A. Adams, 1852) (Figs. 126, 143)

1852. *Nassa caelata* A. Adams, Proc. Zool. Soc. Lond. p. 97.

1853. *Nassa caelata* A. Adams, Reeve, Conch. Icon. 8: pl. 20, fig. 133.

1927. *Nassarius (Hinia) caelatus dainitiensis* Makiyama, Mem. Coll. Sci. Kyoto Univ., ser. B 3 (1): 122, pl. 5, figs. 17, 18.

1959. *Nassarius (Zeuxis) caelatus* (A. Adams), Kira, Col. Illust. shells Jap. 1: 73, pl. 28, fig. 16.

1961. *Zeuxis eugylptus (sic)* Sowerby, Habe, Col. Illust. shells Jap. 2: 65, pl. 32, fig. 24 (non *Nassa euglypta* Sowerby, 1914).

1967. *Zeuxis caelatus* (A. Adams), Habe & Kosuge, Stand. Book Jap. shells col. 3: 76, pl. 29, fig. 35.

Shell 20-30mm in length, similar to *N. crematus*, but differs in the following features: axial ribs are slightly broader, wider spaced and less numerous than in *N. crematus* and smooth on the last 2 whorls. The shell is not spirally corded but has short, finely incised grooves in the interstices of the axial ribs; spiral cords become apparent towards the base where they override axial ribs. Sutural nodules are separated from the ribs by a continuous presutural groove. The species is yellowish-cream, and nebulously banded with brown on the body whorl.

TYPE LOCALITY: Cagayan, Mindanao, Philippines, in 25 fathoms.

HABITAT: On sandy mud substrate, sublittoral.

Material examined: Tokyo Bay, Japan.

Tomlin (1940), who examined Marrat's type specimens of Nassariidae, lists *Nassa elongata* Marrat, 1874 (non *Buccinum elongatum* J. de Sowerby, 1815),

N.oblonga Marrat, 1877, *N.sinensis* Marrat, 1877, *N.oriens* Marrat, 1880, and *N.lactea* Marrat, 1880, as synonyms of *Nassarius caelatus* (A. Adams).

Nassarius (Zeuxis) vitiensis (Hombron & Jaquinot, 1853) (Figs. 127 - 130, 144)

1834. *Buccinum crenulatum* Bruguière, Kiener, Spéc. gén. icon. coq. viv. 9: 62, pl. 23, fig. 90 (non Linnaeus, 1758).

1853. *Nassa crenulata* Bruguière, Reeve, Conch. Icon. 8: pl. 1, fig. 2 (non *Buccinum crenulatum* Bruguière, 1789).

1853. *Nassa vitiensis* Hombron & Jaquinot, Voy. Pole Sud Astr. Zélée, Atlas, pl. 21, figs. 23-25.

1854. *Nassa vitiensis* Hombron & Jaquinot, Voy. Pole Sud Astr. & Zélée, text 5: 79.

1880. ? *Nassa cingenda* Marrat, Var. shells gen. *Nassa* p. 102 (fide Tomlin, 1940 [Hab: ?].

1925. *Nassa incognita* Thiele, Wiss. Erg. Deut. Tief.-Exp. "Valdivia" 17: 183, pl. 20, fig. 11 Dar-es-salaam, E. Africa).

1966. *Zeuxis crenulatus* (Lamarck) var. Habe & Kosuge, Shells world col. 2: 63, pl. 22, fig. 36.

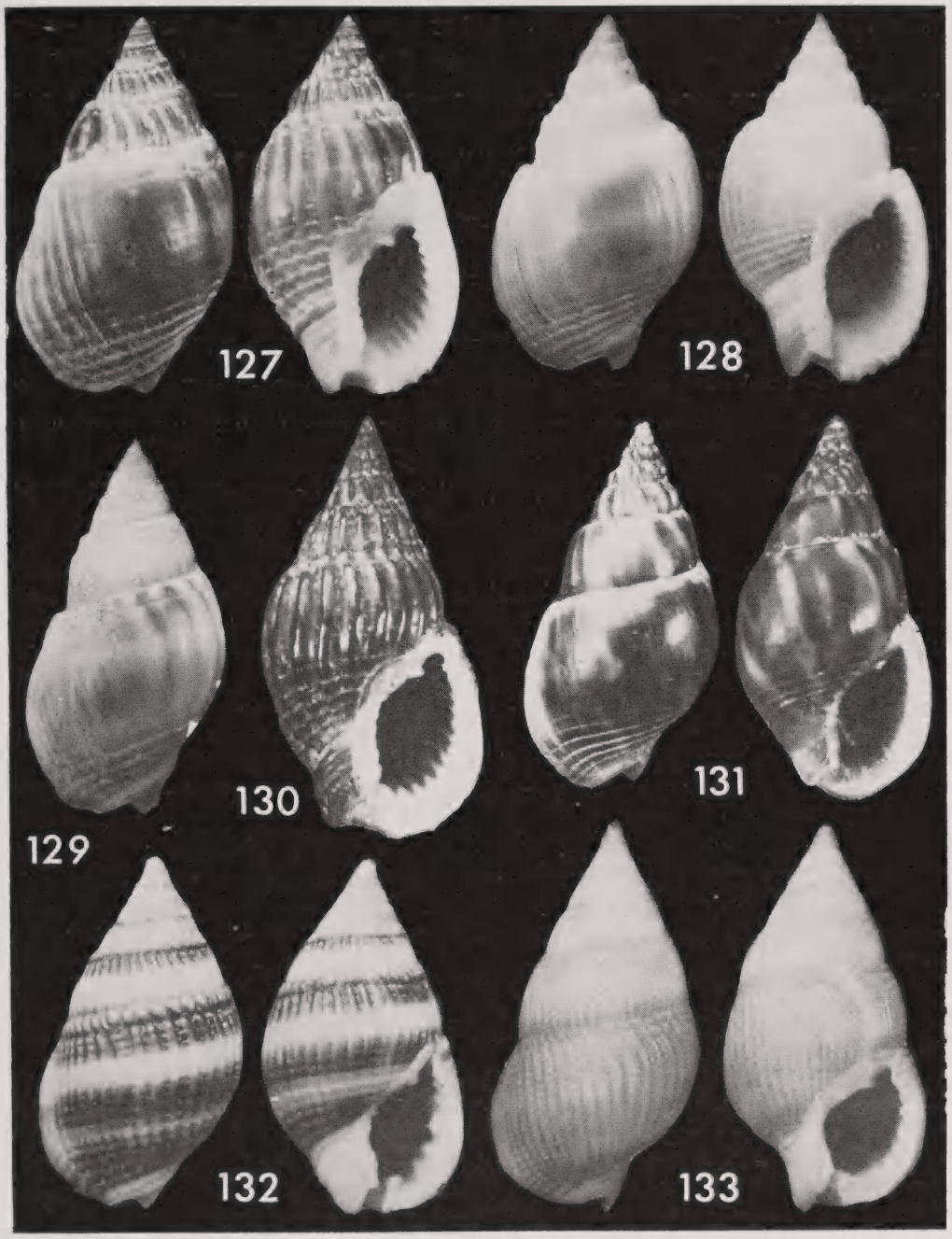
Shell 20-30mm in length, similar to *N. caelatus* in form, number of axial ribs and apertural features, but differs in the following characters: axial ribs become obsolete in a small area on the dorsal side of the body whorl, and the impressed intersticial spiral grooves are fewer, weaker and at times absent. The anterior of the columella in *N. vitiensis* is laminated but tends to be more impressed on to the body whorl in *N. caelatus*. Creamy-grey, broadly banded on the body whorl with dark brown, or steel-grey in colour, and banded with dark grey; some individuals are uniformly dark brown with patches of yellowish-brown on the dorsal side of the body whorl and the sutural girdle, or creamy-white, with traces of broad bands on the dorsum of the body whorl. Columella and edge of outer lip white, interior of aperture violet or purple-brown. Operculum serrated at the margin.

TYPE LOCALITY: Fiji Islands.

HABITAT: In weedy and muddy sand, from the intertidal region to a depth of 46 metres.

Material examined: Apolima Strait, W. Samoa; Caboni beach, Fiji I.; Port Havannah, Efate I., New Hebrides; Teuma Bay, New Hebrides, 46 m; Rabaul, New Britain; Mios Woendi, Geelvink Bay, W. New Guinea, 2 - 4 m; Yorkey's Knob, N. of Cairns, Qld., Australia; Hongkong; Chango I., Zanzibar, 26 - 29 m.

This species is the *Nassarius crenulatus* of authors, not of Bruguière, 1789. The identity of Bruguière's species has never been satisfactorily solved, and his only reference not accompanied by a query is to Petiver (pl. 64, fig. 8), an illustration which has been cited for the Mediterranean *Buccinum reticulatum* Linnaeus. The *Nassa crenulata* Lamarck, 1816, appears to be the species *N.scalaris* A. Adams, 1852. Bruguière's taxon is a homonym of *Buccinum crenulatum* Linnaeus, 1758, and *Nassa vitiensis* Hombron & Jaquinot appears to be the next available name, provided an earlier name is not available from among A. Adams' unfigured *Nassa* species.



Figs. 127-133. 137-130. *Nassarius (Zeuxis) vitiensis* (Hombron & Jaquinot). 127. Topotype. Caboni beach, Fiji I.; 21.7mm. 128. Fine-ribbed form. Mios Woendi, Geelvink Bay, W. New Guinea; 24.2mm. 129. Slender form. Chango I., W. Zanzibar; 26.0mm. 130. Dark brown form. Teuma Bay, New Hebrides; 21.0mm. 131. *N. (Z.) flammulatus* (Schepman). Teuma Bay, New Hebrides; 15.5mm. 132, 133. *N. (Z.) concinnus* (Powys). 132. Broad form. Lomalagi, Fiji I.; 12.0mm. 133. Slender form. Mauritius; 18.0mm.

Nassarius (Zeuxis) flammulatus (Schepman, 1913) (Figs. 131, 145)

1913. *Nassa (Alectryon) flammulata* Schepman, Siboga-Exp. 49d: 314, pl. 19, figs. 12a, b.

Shell 14-16mm in length, whorls convex, protoconch glassy golden-brown with a darker brown sutural band and a peripheral keel, postnuclear whorls sculptured with strong axial ribs and spiral striae. On the last two whorls sculpture becomes obsolete apart from 2-4 finely incised spiral striae at the sutures and 5-6 striae towards the base; the body whorl suture is tabulate. Columella calloused but not expanded, plicate along its entire length, aperture lirate for a short distance from the outer lip. Flesh to yellowish-brown in colour, ornamented with dark brown axial flames, back of outer lip whitish; columella and edge of outer lip light orange-brown, interior of aperture purple-brown. The operculum of one specimen examined was smooth, the other feebly serrated at the margin.

TYPE LOCALITY: Ruma-Kuda Bay, Roma I., Indonesia, 36 metres, mud and sand.

HABITAT: Sublittoral, in muddy sand, from 27 - 46 metres.

Only a few specimens of this rare species were available and its relationship to *Nassarius vitiensis* remains obscure. The protoconchs of the two species are identical, but the postnuclear whorls in *N.vitiensis* have a row of sutural nodules, whereas in some specimens of *N.flammulatus* these are only feebly indicated. Both species have been taken from the same dredge-haul in the New Hebrides, but since the radula of *N.flammulatus* has an intermediate lateral plate which is lacking in *N.vitiensis,* combined with differences in shell-morphology, the two species are considered tentatively distinct.

Nassarius (Zeuxis) concinnus (Powys, 1835) (Figs. 132, 133)

1835. *Nassa concinna* Powys, Proc. Zool. Soc. Lond. pt. 3: 95.

1853. *Nassa concinna* Powis, Reeve, Conch. Icon. 8: pl. 13, fig. 82 & pl. 14, fig. 91 (figd. type).

1874. *Nassa concentrica* Marrat, Ann. Mag. Nat. Hist. 13: 71 *(nom. subst. pro N. concinna* Powys, 1835).

1877. *Nassa smithii* Marrat, Prop. new forms *Nassa* p. 7 (types labelled "Singapore" *fide* Tomlin, 1940).

1877. *Nassa rotundicostata* Marrat, Prop. new forms *Nassa* p. 8 (Hab: ?).

1877. *Nassa cribraria* Marrat, Prop. new forms *Nassa* p. 12, pl. 1, fig. 20 (types labelled "Philippines" *fide* Tomlin, 1940).

1877. *Nassa smithii* Marrat, J. Conch. 1: 204.

1964. *Zeuxis concinnus* (Powys), Habe, Shells west. Pacific col. 2: 100, pl. 32, fig. 23.

1966. *Allanassa concinna* (Powys), Habe & Kosuge, Shells world col. 2: 62, pl. 22, fig. 32.

Shell 10-20mm in length, whorls convex and frequently swollen anteriorly in large mature individuals, spire long or moderately short, sculptured with numerous, regular and close-set axial ribs which number from 30-50 on the penultimate and from 25-40 on the body whorl; a moderately deep spiral groove separate a row of sutural nodules from the axial ribs. Narrow interstices with numerous fine spiral striae which extend on to the wall of the axial ribs, rarely crossing them. Columella calloused without being expanded and with 5-10 denticles or short plicae, outer lip with 7-9 short lirae, siphonal

canal short. White to cream in colour, penultimate whorl with a dark brown sutural band, body whorl with 3 broad bands; columella and outer lip white, aperture banded with brown.

TYPE LOCALITY: Tubuai I., Austral Islands.

HABITAT: In coral sand, sublittoral to a depth of 47 metres.
Material examined: Tahiti, Society I.; Rarotonga, Cook I.; Apia Harbour, Upolu I., Samoa I.; Lomalagi, S. Viti Levu, Fiji I.; Teuma Bay, Efate I., New Hebrides, 47 m; Daydream I., Whitsunday Passage, Qld., Australia; Mauritius.

Subgenus **Alectrion** Montfort, 1810

Alectrion Montfort, 1810, Conch. Syst. 2: 566. Type species by OD *A. papillosus* = *Buccinum papillosum* Linnaeus, 1758. Recent, Indo-Pacific.

1827. *Alectryon* Berthold in Latreille, Nat. Fam. Thierr. pp. 187, 564 *(nom. null.)*.

Shell moderate in size, 25-50mm in length, occasionally inflated, sometimes moderately thin, sculptured with prominent or obsolete axial ribs or spinose nodes; columella calloused but not expanded, completely smooth apart from a parietal denticle. Outer lip only moderately thickened, lirate or completely smooth; edge of outer lip frequently with spinose denticles. Laterals of radula with 2 simple cusps, but occasionally denticulate in between cusps and on outward edge of the inner cusp; accessory lateral plate is present.

Nassarius (Alectrion) papillosus (Linnaeus, 1758) (Fig. 134)

1758. *Buccinum papillosum* Linnaeus, Syst. Nat. ed. 10: 737.

1816. *Buccinum papillosum* Lamarck, Tabl. Encycl. Méth. p. 2, pl. 400, figs. 2a, b.

1834. *Buccinum papillosum* Linnaeus, Kiener, Spéc. gén. icon. coq. viv. 9: 58, pl. 15, fig. 54.

1929. *Nassa (Alectryon) papillosa* var. *seminuda* Dautzenberg, Moll. test. mar. Madagascar, p. 203 (ref. Tryon, 1882, pl. 9, figs. 71, 74).

1957. *Nassarius papillosus* Linné, Kaicher, Indo-Pacific sea shells pl. 7, fig. 25.

1964. *Cominella (Eucominella) nassoides fovcauxana* Powell, Shikama, Sel. shells world col. 2: 120, pl. 65, fig. 6 (non Powell, 1946).

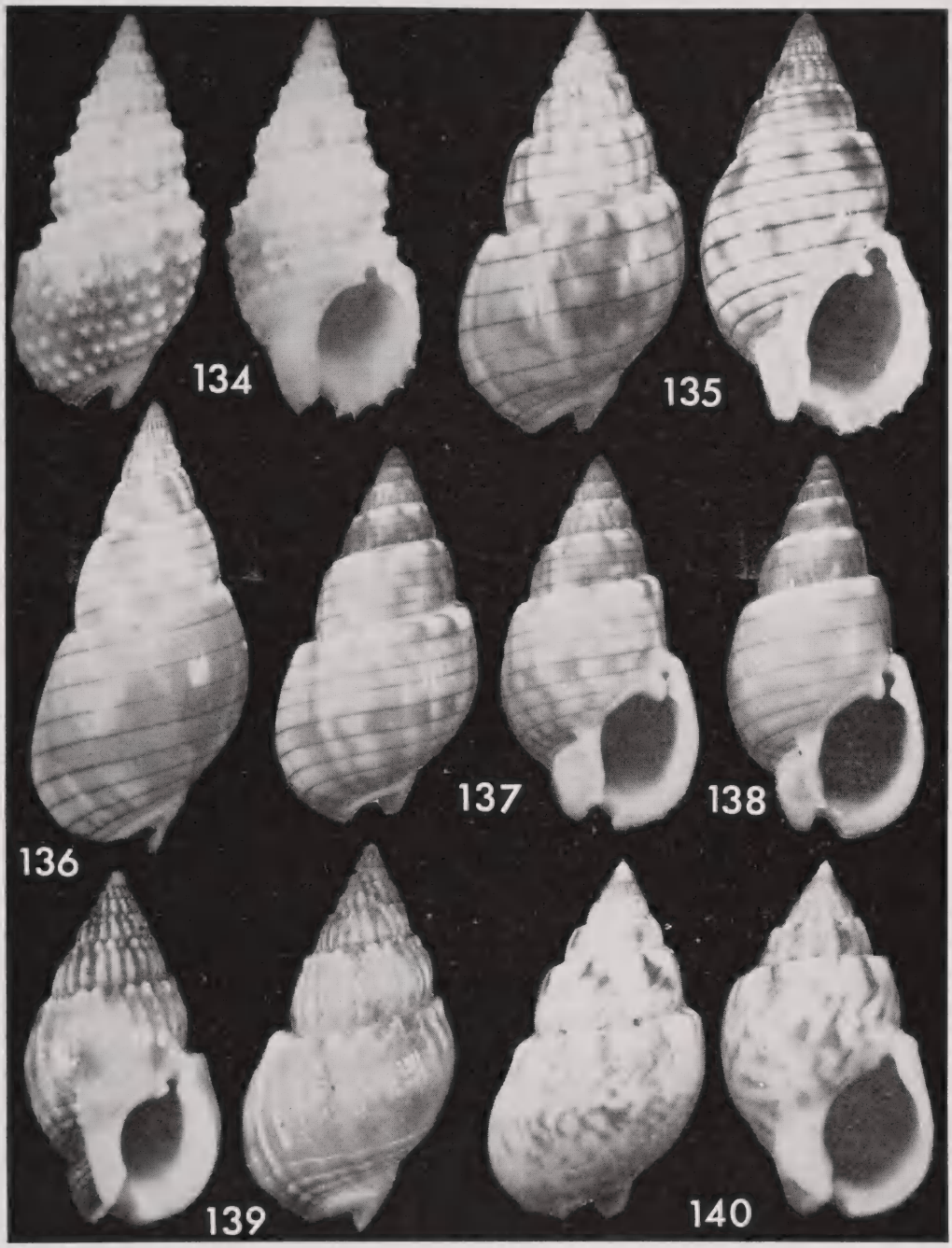
1967. *Alectrion papillosus* (Linné), Habe & Kosuge, Shells world col. 2: 63, pl. 22, fig. 37.

Shell 27-50mm in length, sculptured with spiral rows of bluntly spinose or rounded nodules which are connected by feeble or prominent axial ribs; presutural ramp frequently angulate, sutural nodules smaller than the rest. Interstices of nodules with longitudinal striae. Columella calloused and only slightly spreading on to the body whorl, smooth apart from a parietal denticle; aperture finely striate, margin of outer lip with spinose denticles. Cream in colour, irregularly blotched or clouded with orange-brown or rusty-red; columella and aperture cream in colour.

TYPE LOCALITY: Asiatic Ocean.

HABITAT: In coral sand, intertidal and sublittoral.

Material examined: Tahiti, Society I.; Rarotonga, Cook I.; Manava I., Fiji I.; Philippine I.; Amboina, Indonesia; Mauritius.



Figs. 134-140. 134. *Nassarius (Alectrion) papillosus* (Linnaeus). Amboina, Indonesia; 45.5mm. 135, 136. *N. (A.) glans glans* (Linnaeus). 135. Noduled form, Anse Vata, Noumea, New Caledonia; 27.3mm. 136. Smooth form. Nuku'alofa, Tonga I.; 51.0mm. 137, 138. *N. (A.) glans particeps* (Hedley). 137. Long reef, Sydney, Australia; 22.7mm. 138. Port Jackson, Sydney, Australia; 30.5mm. 139. *N. (A.) hirtus* (Kiener). Kakaako, Honolulu, Hawaiian I.; 25.0mm. 140. *N. (A.) spiratus* (A. Adams). Matapouri, N.E. of Whangarei, New Zealand; 21.0mm.

Nassarius (Alectrion) glans glans (Linnaeus, 1758) (Figs. 135 - 136, 146)

1758. *Buccinum glans* Linnaeus, Syst. Nat. ed. 10: 737.

1780. *"Buccinum lineatum glans"* Chemnitz, Syst. Conch. Cab. 4: 60, pl. 125, figs. 1196-1200 *(non. binom.).*

1798. *Buccinum lineatum* Röding, Mus. Bolten. p. 112 (ref. Chemnitz, op. cit., figs. 1196, 1197) [non da Costa, 1778].

1811. *Ancilla lineata* Perry, Conchology pl. 31, fig. 7.

1816. *Buccinum glans* Lamarck, Tabl. Encycl. Méth. p. 2, pl. 400, figs. 5a, b.

1822. *Buccinum suturale* Lamarck, Hist. Nat. anim. s. vert. 7: 269 (Hab: ?).

1834. *Buccinum glans* Linnaeus, Kiener, Spéc. gén. icon. coq. viv. 9: 54, pl. 15, fig.52.

1834. *Buccinum suturale* Lamarck, Kiener, Spéc. gén. icon. coq. viv. 9: 55, pl. 24, fig. 96 (Mauritius).

1866. *Nassa intermedi*a Dunker, Verh. zool-bot. Gesell. Wien 16: 909 (Sydney, Australia = ? error) [non Forbes, 1844].

1867. *Nassa (Alectrion) intermedia* Frauenfeld, "Novara" Exp. Zool. Moll. 2 (3): 5, pl. 1, fig. 2.

1908. *Nassa suturalis dunkeri* Suter, Trans. Proc. N.Z. Inst. 40: 350 *(nom. subst. pro N. intermedia* Dunker, 1866).

1945. *Nassarius (Alectrion) glans* (Linné), Habe, Jap. J. Malac. 14: 195, fig. 18 (radula).

1957. *Nassarius glans* Linnaeus, Kaicher, Indo-Pacific sea shells pl. 7, fig. 13.

1967. *Alectrion glans* (Linnaeus), Habe & Kosuge, Stand. book Jap. shells 3: 76, pl. 29, fig. 37.

Shells 25-52mm in length, moderately thin and inflated, postnuclear whorls sculptured with axial ribs and overriding spiral cords, last 2-3 whorls smooth, sutures either smooth or crenulate. Columella calloused and laminated anteriorly, smooth apart from a parietal denticle, aperture smooth; outer lip with short lirae and spiny denticles at the margin in mature specimens. White to cream in colour, ornamented with brown spiral bands and occasionally axial flames and blotches of the same colour; columella and aperture cream in colour, upper spire whorls frequently flushed with rose or violet. Operculum serrate at the margin.

TYPE LOCALITY: Asiatic Ocean.

HABITAT: In silty and weedy coral sand, intertidal and sublittoral.

Material examined: Nuku'alofa, Tonga I.; Manava I., Fiji I.; Australia: Bowen; Kurrimine beach; Cape Moreton, 117 m; Horseshoe Bay, Magnetic I., all Queensland; Plage de Poe, Bourail, New Caledonia; Anse Vata Bay, Noumea, New Caledonia; off Korak I., Babelthuap, Palau I.; Mikawa, Japan; Kagashima Bay, Japan, 9 m.

Nassarius (Alectrion) glans particeps (Hedley, 1915) (Figs. 137 - 138, 147)

1853. *Nassa suturalis* var. Reeve, Conch. Icon. 8: pl. 2, figs. 11a, b (Hab: ?) [non *Buccinum suturale* Lamarck, 1822].

1913. *Alectrion suturalis* subsp. *dunkeri* Suter, Man. N.Z. Moll. p. 398, pl. 45, fig. 17 (non *Nassa suturalis dunkeri* Suter, 1908) [Kermadec I.; Cuvier I., New Zealand = error?].

1915. *Alectrion suturalis* subsp. *dunkeri* (Suter), Iredale, Trans. Proc. N.Z. Inst. 47: 467.

1915. *Arcularia particeps* Hedley, Proc. Linn. Soc. N.S.W. 39: 738 (ref. Reeve, pl. 2, fig. 11 and Marrat, 1877, pl. 1, fig. 3).

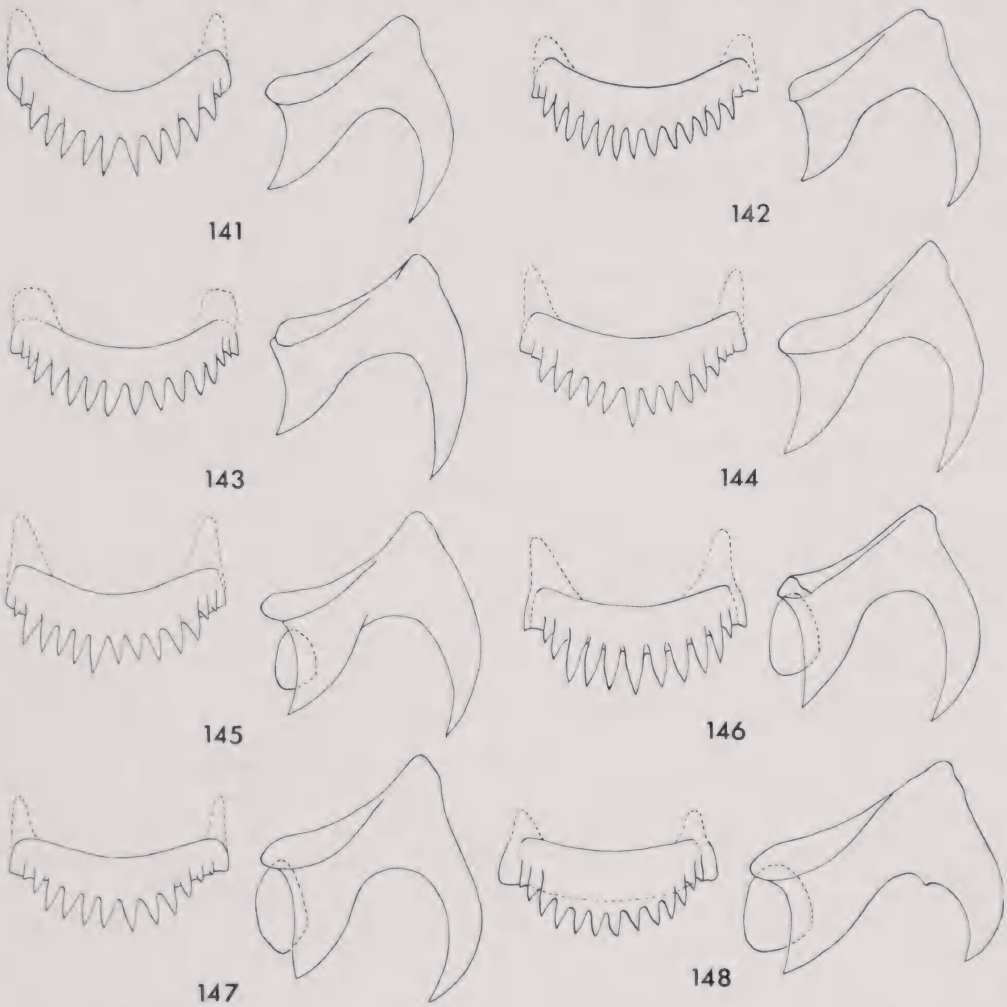
1917. *Arcularia particeps* Hedley, Proc. Linn. Soc. N.S.W. 41 (4): 712, pl. 49, fig. 20 (animal).

1927. *Alectrion suturalis* subsp. *dunkeri* Suter, Finlay, Trans. Proc. N.Z. Inst. 57: 419.

1952. *Nassarius particeps* (Hedley), Powell, Rec. Auckland Inst. Mus. 4: 181 (Cavalli I., New Zealand).

1962. *Alectrion particeps* (Hedley), Macpherson & Gabriel, Mar. Moll. Vict. p. 193, fig. 230.

Similar to *N. glans* (Linnaeus), but smaller, rarely exceeding 32.0mm in length, body whorl generally less ventricose, sutures of last 2 whorls not crenulate, denticles



Figs. 141-148. Half-row of radulae. 141. *Nassarius (Zeuxis) margaritiferus* (Dunker). Chukwani, Zanzibar. 142. *N. (Z.) pyrrhus* (Menke). Sandringham, Vict., Australia. 143. *N. (Z.) caelatus* (A. Adams). Tokyo Bay, Japan. 144. *N. (Z.) vitiensis* (Hombron & Jaquinot). Port Havannah, New Hebrides. 145. *N. (Z.) flammulatus* (Schepman). Teuma Bay, New Hebrides. 146. *N. (Alectrion) glans glans* (Linnaeus). Anse Vata, Noumea, New Caledonia. 147. *N. (A.) glans particeps* (Hedley). Shellharbour, N.S.W., Australia. 148. *N. (A.) spiratus* (A. Adams). Matapouri, New Zealand.

on margin of outer lip either absent or only feebly developed anteriorly. Similar in colour to *N. glans*, but the rosy or violet cast on the spire whorls usually extends to the penultimate whorl.

TYPE LOCALITY: Sydney, Australia.

HABITAT: In sand pools, intertidal and sublittoral.

Material examined: Australia: Port Jackson; Long reef, Sydney; Kurnell, Botany Bay; Shellharbour; Manly; Cronulla, all New South Wales. New Zealand: Cavalli I.

When Hedley described the temperate water species *N.particeps*, he based his separation between his new species and the tropical *N.glans* on the following differences: absence of sutural beads, evanescence of prickly denticles on the outer lip, more slender shape and a broad sutural shelf or gutter in *N.particeps*. In the nominate species, the sutural crenulations are usually only present in small specimens and become absent in large adults, but in the subspecies *particeps* the sutural nodules are always absent. Tabulated sutures are a feature common to both, and the sutural shelf varies in width in individuals. Although the majority of specimens of the subspecies *particeps* are less inflated at the body whorl, occasional ventricose individuals are encountered. The small, prickly denticles are usually not as prominent in *N.particeps* as in *N.glans*, but some large individuals of the former do have 3 - 4 denticles anteriorly; in small, immature specimens of the tropical *glans*, the denticles are also absent.

In view of the overlap in size and diagnostic characters of *particeps* and *glans*, the former has been reduced to a subspecies of the latter.

Nassarius (Alectrion) hirtus (Kierner, 1834) (Fig. 139)

1834. *Buccinum hirtum* Kiener, Spéc. gén. icon. coq. viv. 9: 63, pl. 19, fig. 72.

1853. *Nassa hirta* Kiener, Reeve, Conch. Icon. 8: pl. 1, fig. 1 (Swan River, New Holland = error!).

1952. *Alectrion hirtus* (Kiener), Tinker, Pacif. sea shells, p. 82, pl. facing page, bottom figs.

1957. *Nassarius hirtus* (Kiener), Kaicher, Indo-Pacific sea shells pl. 7, fig. 14.

Shell 20-35mm in length, solid, sutures narrow and channelled, whorls convex, sculptured with slender and close-set axial ribs which tend to become obsolete on the last whorl, especially on the dorsal side; axial ribs constricted below sutures, forming a row of sutural coronations. Postnuclear whorls spirally corded, but interstices on the last 2-3 whorls are smooth; base of shell with up to half a dozen spiral cords which are occasionally granulose. Columella calloused, smooth apart from a parietal denticle, outer lip thick, backed by a varix and lirate for a short distance inside the aperture. Yellowish-brown to tan in colour, some sutural nodules paler, occasionally nebulously banded with darker brown; columella and aperture white.

TYPE LOCALITY: New Holland and Tongatabu = error!

HABITAT: Intertidal and sublittoral.

Material examined: Kakaako, Honolulu, Hawaiian I.

The species has been credited with a wide geographical distribution but appears to be confined to the Hawaiian chain. The species is represented in the collections of the National Museum of Natural History, Washington, only from the Hawaiian Islands, with a similar but coarsely sculptured form from Wake I. (Dr. H. A. Rehder, *in litt.*). The species may have been confused with the Indian Ocean *Nassarius nodiferus* (Powys), which would account for the erroneous locality indications.

Nassarius (Alectrion) spiratus (A. Adams, 1852) (Figs. 140, 148)

1852. *Nassa spirata* A. Adams, Proc. Zool. Soc. Lond. p. 106.

1853. *Nassa spirata* A. Adams, Reeve, Conch. Icon. 8: pl. 2, figs. 13a, b.

1882. *Nassa glans* var. *elegans* Kiener *(pars)*, Tryon, Man. Conch. 4: 27, pl. 8, fig. 49 (non *Buccinum elegans* Kiener, 1834).

1910. *Alectrion spiratus* A. Adams, Iredale, Proc. Malac. Soc. Lond. 9: 77.

1952. *Nassarius spiratus* (A. Adams), Powell, Rec. Auckland Inst. Mus. 4: 182.

1968. *Nassarius (Alectrion) spiratus* (A. Adams), Ponder, Rec. Dom. Mus. 6: 41, pl. 1, figs. 11, 12 (radula & operculum).

Shell 15-22mm in length, body whorl suture tabulated, first 2 postnuclear whorls axially ribbed and spirally corded, axial ribs persisting to penultimate whorl but becoming obsolete on the body whorl. Columellar callus thickened anteriorly but thin and glazed above the parietal wall, columella smooth except for a parietal denticle, outer lip edentulous, aperture smooth. Cream in colour, ornamented with irregular, short, reddish-brown lines and arrow-shaped markings, and short axial streaks at sutures; protoconch white, first 2 postnuclear whorls flushed with light purple or violet. Columellar callus and edge of aperture white, interior of aperture light orange-brown.

TYPE LOCALITY: Swan River, Australia.

HABITAT: In sand-pools, intertidal.

Material examined: Shellharbour, N.S.W., Australia; Coral Bay, Sunday I., Kermadec I.; Norfolk I.; Lord Howe I.; New Zealand: Matauri Bay, N. Auckland; Whangaroa; Cavalli I.; Tom Bowling Bay; Kaitoke, Gt. Barrier I.; Arid I., Gt. Barrier I.; Takau Bay; Matapouri, N.E. of Whangarei.

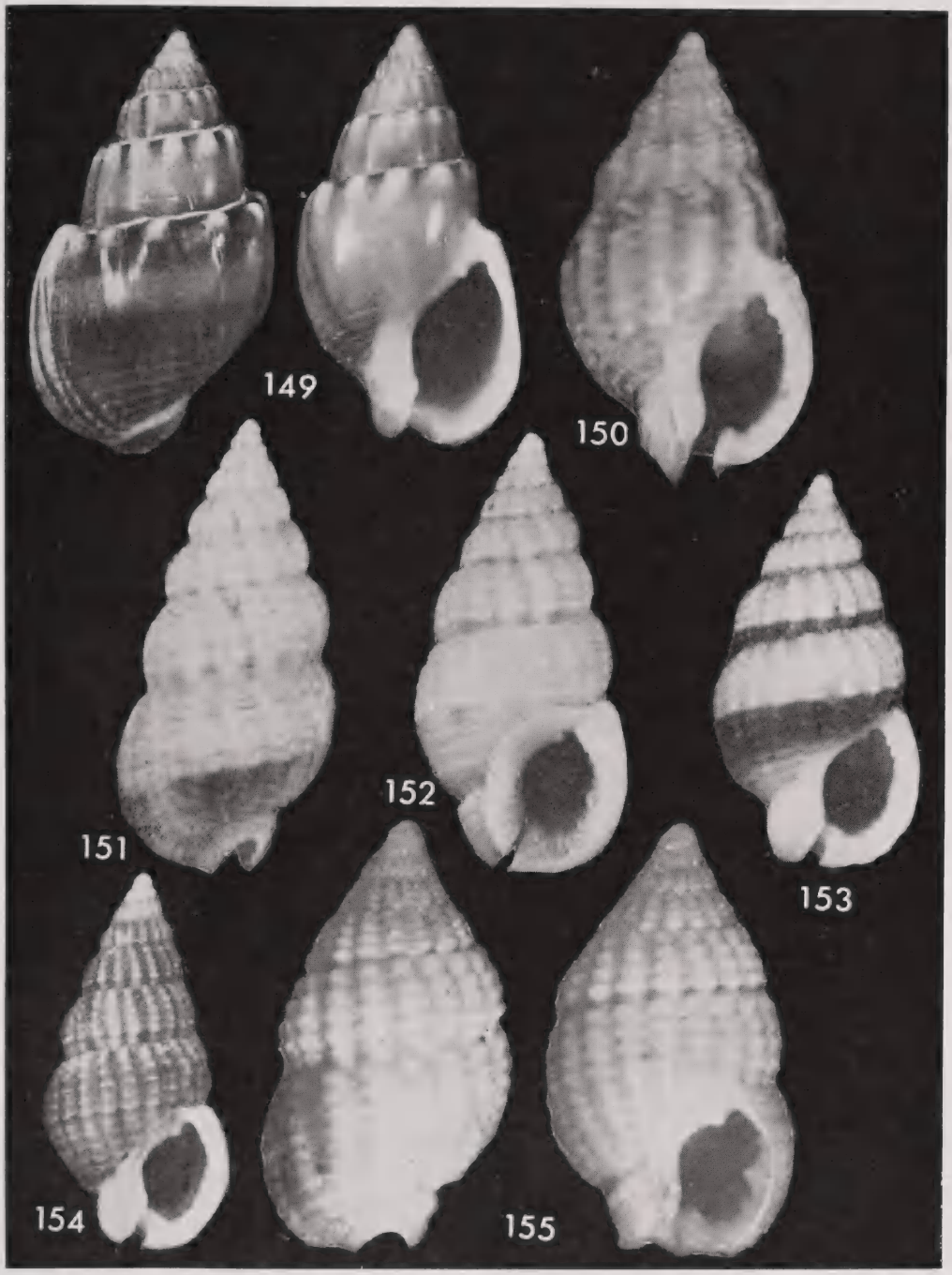
The radula of *Nassarius spiratus* examined by Ponder (1968) from Doubtless Bay, New Zealand, had laterals which were minutely denticulate between the 2 cusps.

Nassarius (Alectrion) aoteanus Finlay, 1927 (Figs. 149, 156 - 159)

1915. *Arcularia coronata* var. E. A. Smith, Brit. Ant. (Terra Nova) Exp., Zool. 2 (4): 85, pl. 1, fig. 28 (non *Buccinum coronatum* Bruguière, 1789).

1927. *Nassarius aoteanus* Finlay, Trans. Proc. N.Z. Inst. 57: 419 *(nom. subst. pro Arcularia coronata* E. A. Smith, 1915).

1968. *Nassarius (Alectrion) aoteanus* Finlay, Ponder, Rec. Dom. Mus. 6 (4): 41, pl. 1, figs. 13, 14 (radula & operculum).



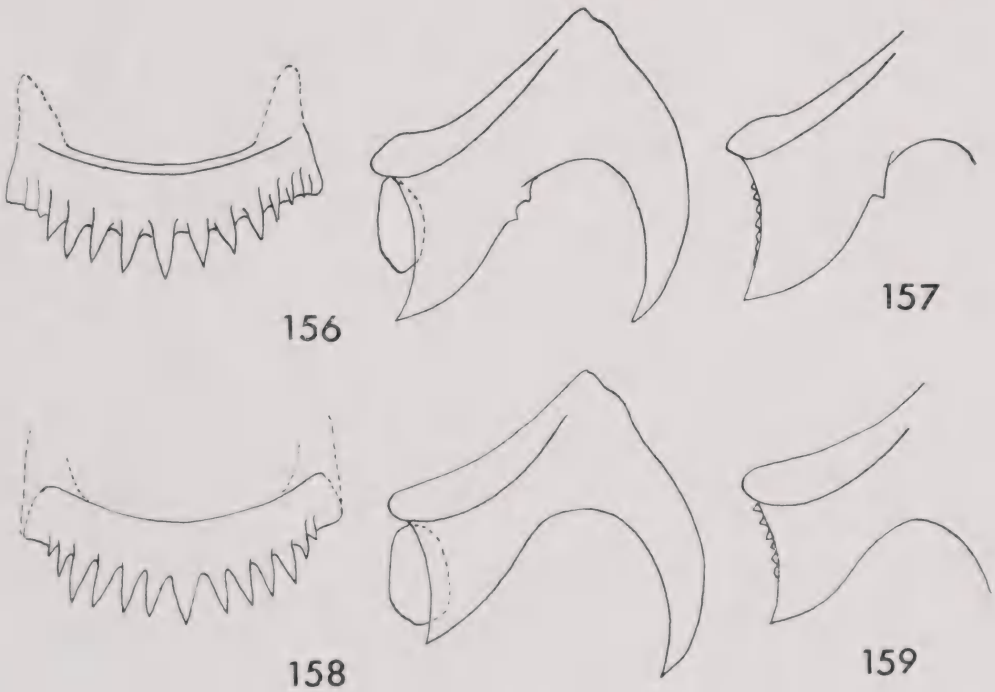
Figs. 149-155. 149. *Nassarius (Alectrion) aoteanus* Finlay. Bergen's Pt., Doubtless Bay, New Zealand; 27.0mm. 150. *Nassarius (Hima) incrassatus* (Ström). Melilla, Morocco, N. Africa; 11.0mm. 151-154. *N. (H.) pauperus* (Gould). 151. Pango Pt., New Hebrides; 12.4mm. 152. Manava I., Fiji I.; 11.0mm. 153. Port Jackson, Sydney, Australia; 10.5mm. 154. Dark brown variant from same locality; 12.6mm. 155. *N. (H.) rotundus* (Melvill & Standen. Topotype. Lifu, Loyalty I.; 6.8mm.

Shell 20-30mm in length, sutures tabulated, first 3 postnuclear whorls with axial ribs and fine spiral grooves, grooves becoming obsolete on last 2 whorls, and if present, confined to sutures; axial ribs on last 2 whorls most prominent at sutures where they become coronate and weaken towards the base. Base of shell with about half a dozen spiral grooves, back of outer lip thickened by 2-3 crowded axial ribs. Columellar callus partly overlapping on to the body whorl, slightly thinner and glazed above parietal wall; columella smooth apart from a parietal denticle, outer lip edentulous, aperture smooth. In mature specimens, the edge of the outer lip has a few, small and blunt denticles. Tan to brown in colour, ornamented with 1-2 faint, broad and darker brown bands on the body whorl and dark brown spots between the sutural coronations; columellar callus and edge of outer lip white, interior of aperture brown.

TYPE LOCALITY: Near North Cape, New Zealand, 11 - 20 fathoms.

HABITAT: Sublittoral, from 13 - 113 metres, in sandy mud.

Material examined: New Zealand: Tryphena, Gt. Barrier I.; Outer Hauraki Gulf; Between Outer Chicken I. and Mokohinau, 113 m; Kaitoke, Gt. Barrier I.; off Cuvier I., 73 m; off Alderman I., 275 m (dead specimens); off Hen & Chicken I.; Whangamumu Harbour, E. coast North I., 11 - 13 m; Oke Bay and Ninepin Rock, Bay of Islands, 55 m; Cradock Channel, between Little and Gt. Barrier I., 37 m; Bergen's Pt., Doubless Bay, 37 m.



Figs. 156-159. Half-row of radulae of *Nassarius (Alectrion) aoteanus* Finlay. 156. Oke Bay, Bay of Islands, New Zealand. 157. Denticulate lateral tooth from same radula. 158. Whangamumu Harbour, New Zealand. 159. Denticulate lateral tooth from same radula.

Subgenus **Hima** Leach in Gray, 1852

Hima Leach in Gray, 1852, Moll. Brittan. Synop. p. 123. Type species by SD (Marwick, 1931) *Buccinum minutum* Pennant, 1777 = *B. incrassatum* Ström, 1768. Recent, Mediterranean.

1852. *Tritonella* A. Adams, Proc. Zool. Soc. Lond. p. 111 (non Swainson, 1839).

1936. *Reticunassa* Iredale, Rec. Aust. Mus. 19 (5): 322. Type species by OD *Nassa paupera* Gould, 1850. Recent, Indo-Pacific.

Shell small, 5-15mm in length, elongate-ovate or ovate, sutures distinct, whorls prominently convex, sculptured with axial ribs and spiral striae; aperture short and roundly ovate, columella calloused and plicate or wrinkled, outer lip usually denticulate and backed by a varix, siphonal canal short. Laterals of radula with 2 simple cusps, accessory lateral plate present.

Confusion surrounds the usage of *Tritonella* A. Adams and *Hima* Leach in Gray. Anderson (1964) cites *Tritonella* A. Adams in H. & A. Adams, 1853, as a subgenus of *Hinia* Leach in Gray, 1847, and the same arrangement is adopted by Nordsieck (1968). Shuto (1969) uses *Tritonella* A. Adams in H. & A. Adams, as a subgenus of *Tritia* Risso, 1826, and considers the type to be *Buccinum incrassatum* Ström (Fig. 150) by original designation. The genus *Tritonella* has been erected by A. Adams already in 1852, with 12 included species and no designated type; the species *B.incrassatum* was included by A. Adams *(loc.cit.)* in the synonymy of *Nassa (Tritonella) ascanias* Bruguière, 1789. A year later H. & A. Adams placed *Tritonella* in the synonym of *Hima* Leach in Gray, 1852, without designating a type. *Tritonella* A. Adams, 1852, is not available as it is a primary homonym of *Tritonella* Swainson, 1839, in Amphibia.

The genus *Hima* was established with 3 included species, i.e. *H.minuta* (Pennant), *H.reticulata* (Linnaeus) and *H.laevigata* Leach in Gray. Since the species *Buccinum incrassatum* Ström was not cited by name, Cossmann's (1901) and Dall's (1908) designations of this species as the type of *Hima* are invalid. Woodring's (1928) designation does not appear to be valid either, as the sentence "if *Hima minuta* (Pennant) is taken as the type of *Hima*" is a designation made in an ambiguous and qualified manner (art. 67(c) of ICZN). The next valid type designation of *Hima* is the one by Marwick (1931).

Nassarius (Hima) pauperus (Gould, 1850) (Figs. 151 - 154)

1850. *Nassa paupera* Gould, Proc. Bost. Soc. Nat. Hist. 3: 155.

1852. *Nassa paupera* Gould, U.S. Expl. Exp. 12: 262, pl. 19, figs. 330a, b.

1860. *Nassa microstoma* Pease, Proc. Zool. Soc. Lond. p. 145 (Hawaiian I.) [publ. February-May 1860].

1860. *Nassa dermestina* Gould, Proc. Bost. Soc. Nat. Hist. 7: 331 (Kikaigashima, Ryukyu I.) [publ. September, 1860].

1860. *Nassa plebecula* Gould, Proc. Bost. Soc. Nat. Hist. 7: 332 (Amami-O-Shima, Ryukyu I.).

1864. *Nassa tringa* Souverbie in Souverbie & Montrouzier, J. Conchyl. 12: 272, pl. 10, fig. 7 (New Caledonia).

1865. *Nassa microstoma* Pease, Carpenter, Proc. Zool. Soc. Lond. p. 516.

1869. *Nassa balteata* Pease, Amer. J. Conch. 5: 71, pl. 8, fig. 5 (Ebon I., Marshall I.).

1877. *Nassa scalarina* Marrat, Prop. new forms *Nassa*, p. 12, pl. 1, fig. 27 (Hab: ?).

1964. *Nassa dermestina* Gould, Johnson, Bull U.S. Nat. Mus. 239: 67, pl. 16, fig. 1 (figd. holotype).

1964. *Nassa plebecula* Gould, Johnson, Bull. U.S. Nat. Mus. 239: 128, pl. 16, fig. 6 (figd. lectotype).

1965. *Nassa microstoma* Pease, Kay, Bull. Brit. Mus. (Nat. Hist.) Zool., Suppl. 1: 24, pl. 3, figs. 5, 6 (figd. holotype = *spec. juv.*).

Shell 8-16mm in length, spire generally long, whorls convex, fusiformly elongate to fusiformly-ovate, sculptured with prominent and moderately thick axial ribs and spiral threads; spiral striae either discreet or prominent and override axial ribs. Columella calloused, minutely plicate or finely denticulate in mature specimens, outer lip backed by a varix and denticulate on the interior, aperture smooth, siphonal canal short. Variable in colour, creamy-white to creamy-yellow, occasionally banded with brown, some individuals uniformly brown; columellar callus and aperture white or cream.

TYPE LOCALITY: Pacific Ocean.

HABITAT: In coral sand, intertidal and sublittoral.

Material examined: Apia Harbour, Upolu, Samoa I.; Luatuanu'u, Upolu, Samoa I.; Manava I., Fiji I.; Lifu, Loyalty I.; Pango Pt., Efate I., New Hebrides; Norfolk I.; Fumba, S.W. Zanzibar, E. Africa. Australia: Yorke's Peninsula, Sth. Australia; Port Willunga, S.A.; Balmoral, N.S.W.; Port Jackson, N.S.W.; Long reef, Sydney, N.S.W.; Kurnell, Botany Bay, N.S.W.; Cronulla, N.S.W.; Cape Moreton, Qld.; Jumpin Pin Bar, Qld.

The species is rather common and very variable in colour and shape and consequently has received several names. *Tritia (Tritonella) crenulicostata* Shuto, 1969, from the Neogene of the Philippines, is very similar, if not conspecific with *Nassarius pauperus* (Gould).

Nassarius (Hima) rotundus (Melvill & Standen, 1896) (Fig. 155)

1896. *Nassa (Niotha) rotunda* Melvill & Standen, J. Conch. 8: 273, pl. 9, fig. 2.

Shell 5-7mm in length, globular, whorls flatly convex, sutures sharply incised, sculptured with close-set axial ribs which are rendered granulose by overriding spiral cords. Aperture short and rounded, columella calloused and shortly plicate, outer lip backed by a prominent varix; outer lip denticulate, lirae extending halfway into the aperture. Cream in colour, faintly banded and stained with yellowish-brown, columellar callus and aperture white.

TYPE LOCALITY: Lifu, Loyalty Islands.

HABITAT: Unknown.

Material examined: Lifu, Loyalty I.

No other specimens, apart from those from the type locality, have been seen.

Subgenus **Aciculina** A. Adams, 1853

Aciculina A. Adams, 1853, Proc. Zool. Soc. Lond. p. 114. Type species by SD (Cossmann, 1901) *Nassa vittata* A. Adams = *Aciculina vittata* A. Adams, 1853. Recent, Indo-Pacific (29 April 1853).

1853. *Aciculina* H. & A. Adams, Gen. Rec. Moll. 1: 121 (August 1853).

Shell small, 10-15mm in length, elongate-ovate, often terebroid in shape, spire long, whorls almost flat, smooth or sculptured with axial ribs and spiral grooves; aperture very short and narrowly ovate, columella calloused but not expanded, parietal denticle prominent, columella denticulate anteriorly. Outer lip thickened and backed by a varix, interior of lip denticulate, aperture partially lirate. Radula unknown.

Nassarius (Aciculina) vittatus (A. Adams, 1853) (Figs. 161, 162)

1853. *Aciculina vittata* A. Adams, Proc. Zool. Soc. Lond. p. 114.

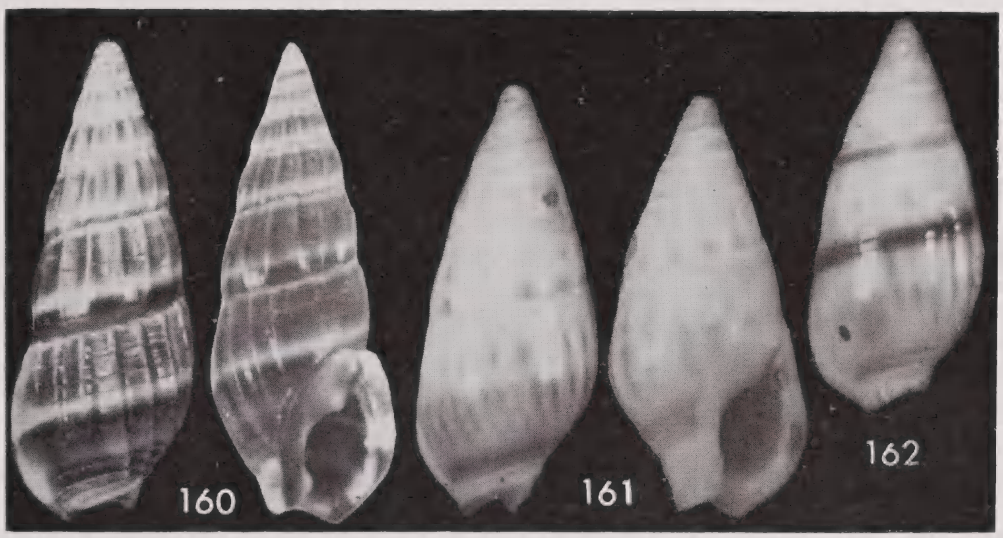
1853. *Nassa vittata* A. Adams, Reeve, Conch. Icon. 8: pl. 24, figs. 160a, b.

Shell 10-15mm in length, smooth and shining, postnuclear whorls smooth apart from a presutural groove, sculptured with angulate axial ribs which become stronger on the last whorl; wide-spaced and finely incised spiral grooves encircle the shell, base with a few spiral cords. Aperture short and narrow, columellar callus thick and prominent and with 2-5 small denticles anteriorly; outer lip backed by a prominent varix, interior with 6-8 denticles which extend as lirae for a short distance into the aperture. White to creamy-white in colour, ornamented with reddish-brown, short or long axial streaks or lines, and occasionally with a dark brown band at the sutures of the body whorl and another at the base; columellar callus and aperture white.

TYPE LOCALITY: Ticao I., Philippines, in 6 fathoms.

HABITAT: In coral and muddy sand, sublittoral.

Material examined: Colombo, Ceylon.



Figs. 160-162. 160. *Nassarius (Aciculina) labiatus* (A. Adams). Manava I., Fiji I.; 14.0mm
161, 162. *N. (A.) vittatus* (A. Adams). Colombo, Ceylon; 13.0mm and 11.0mm respectively.

Nassarius (Aciculina) labiatus (A. Adams, 1853) (Fig. 160)

1853. *Aciculina costata* A. Adams, Proc. Zool. Soc. Lond. p. 114 (Hab: ?) [non *Nassa costata* A. Adams, 1852].

1853. *Nassa labiata* A. Adams, Proc. Zool. Soc. Lond. p. 114 (April 1853).

1853. *Nassa labiata* A. Adams, Reeve, Conch. Icon. 8: pl. 24, fig. 159.

1853. *Nassa terebroides* Reeve, Conch. Icon. 8: pl. 24, fig. 161 *(nom. subst. pro Aciculina costata* A. Adams, 1853 [December 1853].

Shell 10-15mm in length, similar to *N. vittatus* but the sutures are deeper and the whole shell has angulate axial ribs from the first mature whorl to the edge of the outer lip of the last whorl; interstices of ribs wide, concave, and wide-spaced, finely incised spiral grooves encircle the shell, aperture very short and narrow. Columella prominently calloused and with an inward-turned tooth anteriorly and a denticle on the parietal wall; outer lip backed by a varix, interior margin denticulate. Brown in colour, shining, ornamented with a creamy-white or yellow band adjacent to the sutures on the spire whorls and a central band on the body whorl, and occasionally another, fainter band a short distance below. Columella white, stained with brown on the margin, interior of aperture brown, banded with white.

TYPE LOCALITY: Malacca, in 10 fathoms.

HABITAT: In coral and muddy sand, intertidal and sublittoral.

Material examined: Manava I., Fiji I.; Malapoa Pt., Vila Harbour, New Hebrides.

Genus **Hebra** H. & A. Adams, 1853

Hebra H. & A. Adams, 1853, Gen. Rec. Moll. 1: 120. Type species by SD (Cossman, 1901) *Buccinum muricatum* Quoy & Gaimard, 1833 (non Schröter, 1805) = *B. horridum* Dunker, 1847. Recent, Indo-Pacific.

1939. *Scabronassa* Peile, Proc. Malac. Soc. Lond. 23: 276. Type species by OD *Buccinum horridum* Dunker, 1847.

Shell small, rarely exceeding 20mm in length, squat and ovate, sculpture spinose, spiral cords usually prominent, spire short, whorls angulate; aperture small and ovate, columellar callus generally weakly spreading on to the body whorl, plicate or prominently wrinkled. Siphonal canal short. The radula differs from other Nassariidae: the rachidians are very low and bow-shaped, while the laterals are complicated in structure, being humped, and having squared cusps which are reminiscent of some species of Columbellidae.

Hebra horrida (Dunker, 1847) (Figs. 81 - 83, 89, 94 - 95)

1833. *Buccinum muricatum* Quoy & Gaimard, Voy. L'Astrolabe 2: 450, pl. 32, figs. 32, 33 (non Schröter, 1805).

1834. *Buccinum muricatum* Quoy & Gaimard, Kiener, Spéc. gén. icon. coq. viv. 9: 93, pl. 27, fig. 110 (non Schröter, 1805).

1846. *Buccinum scabrum* Dunker, Zeit. Malakozool. 3: 171 (Hab?) [non Anton, 1839].

1847. *Buccinum horridum* Dunker, Zeit. Malakozool. 4: 59 *(nom. subst. pro B. scabrum* Dunker, 1846).

1849. *Buccinum horridum* Dunker, Philippi, Abb. Beschr. Conch. 3: 66, pl. 2, fig. 8.

1850. *Nassa curta* Gould, Proc. Bost. Soc. Nat. Hist. 3: 153 (Samoa I.).

1852. *Nassa curta* Gould, U.S. Expl. Exp. 12: 258, pl. 19, figs. 326a-c.

1853. *Nassa horrida* Dunker, Reeve, Conch. Icon. 8: pl. 11, figs. 69a, b.

1853. *Nassa muricata* Quoy & Gaimard, Reeve, Conch. Icon. 8: pl. 11, figs. 73a, b.

1880. *Nassa decorata* Marrat, Var. shells gen. Nassa p. 36 (Hab: ?) [*fide* Tomlin, 1940].

1886. *Nassa (Hebra) muricata* Quoy & Gaimard, Watson, Rep. Voy. H.M.S. Challenger 15: 184).

1936. *Nassarius* (?) *horridus* (Dunker), Peile, Proc. Malac. Soc. Lond. 22: 141, fig. 6 (radula).

1966. *Scabronassa horrida* (Dunker), Habe & Kosuge, Shells world col. 2: 60, pl. 22, fig. 3.

Similar to *N. echinatus* (A. Adams), 11-15mm in length, but more depressed, ovate and barrel-shaped, with about the same number of axial ribs as in *N. echinatus*. On the body whorl, the spines more regular and numerous, and composed of 6-9 rows of close-set spicules which decrease in size towards the base. Aperture more rounded, columellar callus more expanded and orbicular and prominently wrinkled along its entire length; denticles on outer lip numerous and irregular, lirae extending deep into the aperture. White, cream to light brown in colour, flecked or banded with reddish-brown or dark brown, aperture and columellar callus cream, deep interior of aperture banded with purple-brown.

TYPE LOCALITY: None. (Carteret Harbour, New Ireland – *muricatum* Quoy & Gaimard).

HABITAT: In coral and weedy sand, from the intertidal zone to a depth of 22 metres.

Material examined: Samoa: Apia harbour; Mauono I., Upolu I. 4 - 6 m; Vailele beach; lagoon off Fuailalo, Upolu I., 4 - 6 m; Suva reef, Fiji I.; Manava I., Fiji I.; New Hebrides: Port Havannah; Kakula I., Undine Bay; Malapoa Pt., Vila harbour; Pango Pt.; Tuki Tuki Pt., all Efate I.; Lifu, Loyalty I.; Pt. Pimente, Arsenal Bay, Mauritius; Mazizini, W. Zanzibar, E. Africa.

Hebra horrida is superficially similar to *Nassarius echinatus* but differs in apertural features (Figs. 87 - 89) and radular characters. (Figs. 92, 94 - 95). Both species are sympatric in several Pacific localities, particularly Tonga, Fiji and the New Hebrides. Large samples taken at 9 localities in these islands, yielded 60 specimens of *Hebra horrida* to 33 specimens of *Nassarius echinatus*, a ratio of 2:1. Watson (1886) found both species in 12 fathoms (22 metres) at Levuka, Fiji I.

Buccinum muricatum Quoy & Gaimard and *B.scabrum* Dunker, are both homonyms, and the next available synonym, i.e. *B.horridum* has been utilized for this species.

Hebra subspinosa (Lamarck, 1822) (Figs. 84 - 86, 96)

1822. *Buccinum subspinosum* Lamarck, Hist. Nat. anim. s. vert. 7: 273.

1834. *Buccinum subspinosum* Lamarck, Kiener, Spéc. gén. icon. coq. viv. 9: 94, pl. 26, fig. 103.

1876. *Nassa trinodosa* E. A. Smith, J. Linn. Soc. Lond., Zool. 12: 545, pl. 30, fig. 2.

1957. *Nassarius subspinosus* Lamarck, Kaicher, Indo-Pacific sea shells pl. 7, fig. 22.

1966. *Scabronassa subspinosa* (Lamarck), Habe & Kosuge, Shells world col. 2: 60, pl. 22, fig. 9.

Shell 11-22mm in length, solid, sculptured with prominently noduled and coarse axial ribs which number from 8-14 on the penultimate and from 7-10 on the body worl; in some specimens the nodules are large and arranged in 2-3 spiral rows on the body whorl, while in others the nodes are subdued. Prominent spiral cords override axial ribs and number from 3-10 on the penultimate and from 9-18 on the body whorl. Aperture ovate, columella calloused without being expanded, smooth in centre, and with 2, rarely up to 4, denticles anteriorly; outer lip with 6-10 denticles which extend only for a short distance into the aperture. White to bluish-grey in colour, frequently banded with dark brown; columella and edge of outer lip violet, aperture purple-brown, banded with white.

TYPE LOCALITY: None. (San Christoval, Solomon I. – *trinodosa* E. A. Smith).

HABITAT: This intertidal species is generally found on reef flats, in small pockets of sand under coral rocks, and does not live in sandy lagoons or sand-banks.

Material examined: Tuki Tuki Pt., New Hebrides; Bushmens Bay, Malekula I., New Hebrides; Pt. Hedland, W. Australia; Philippines: Cebu City, Cebu I.; Cape Santiago, Luzon I.; Masingin I., Bohol; Olangold, Cebu I.

The two syntypes of *Buccinum subspinosum* are in the Museum d'Histoire Naturelle, Geneva, No. 1102/6/1-2, length 13.3 mm and 14.0 mm (Fig. 86).

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