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A REVIEW OF THE GENERA OF THE CINGULOPSIDAE WITH A REVISION OF THE AUSTRALIAN AND TROPICAL INDO-PACIFIC SPECIES (MOLLUSCA: GASTROPODA: PROSOBRANCHIA)

W. F. PONDER AND E. K. YOO

The Australian Museum

This paper is dedicated to Jacques Voorwinde.

SUMMARY

The genera of the Cingulopsidae (= Coriandriidae Nordsieck and Eatoninidae Golikov & Starobogatov) are reviewed and 30 species and subspecies are described from Australia and the tropical Indo-West Pacific, 24 of them new. Four genera are recognised in the family. *Eatonina* Thiele, 1912 has 5 subgenera; *Eatonina* s.s. (= *Saginofusca* Ponder, 1965) with 15 species and subspecies, *Coriandria* Tomlin, 1917 (= *Cingulopsis* Fretter & Patil, 1958 and probably *Globisetia* Nordsieck, 1972) with 2 species, *Otatara* Ponder, 1965 and *Mistostigma* Berry, 1947 with no Australian species and *Captitonia* nov. with 1 species. *Eatoniopsis* Thiele, 1912 has 4 subgenera; *Eatoniopsis* s.s. with no Australian species, *Boogina* Thiele, 1913 with 1 species, *Rufodardanula* Ponder, 1965 with 2 species and *Pilitonia* nov. with 2 species. *Tubbreva* Ponder, 1965 contains 2 species and *Pseudopisinna* nov. has 4 species and 1 subspecies.

The family Cingulopsidae has not previously been recognised from Australia, the named species having formerly been included in the Rissoidae.

CONTENTS

Records of The Australian Museum, 1980, **Vol. 33 No. 1,** 1-88, Figures 1-24.

INTRODUCTION

The family Cingulopsidae is a group of minute prosobranch gastropods in the superfamily Rissoacea. They live in shallow seas throughout the world and are sometimes relatively abundant components of the algal-living micro-mollusc fauna. The family name was introduced as recently as 1958 by Fretter and Patil on anatomical evidence. Their work was based on a minute, common British species which had previously been placed in the Rissoidae under a variety of generic names and for which they created the name *Cingulopsis*. The Cingulopsidae has not previously been recognised from Australia, the few described species shown herein to be cingulopsids have been included in the Rissoidae.

Members of the Cingulopsidae have a number of distinct anatomical characters which separate them from the Rissoidae and the Eatoniellidae, although the shell forms in all three families are very similar. It was only from studies on the radulae, opercula and anatomy that the family could be properly delineated.

The two earliest valid generic names given to cingulopsids, *Eatonina* and *Eatoniopsis*, date from Thiele's (1912) work on Antarctic and Subantarctic molluscs. A third genus name based on a cingulopsid, *Watsoniella*, proved to be a homonym which Thiele later (1913) replaced with *Boogina*. *Eatonina* was actually based on a South African species. Thiele regarded these three genera as members of the Rissoidae.

Coan (1964) in his review of the genera of the Rissoidae, Rissoinidae and Cingulopsidae included *Coriandria* Tomlin, 1917 in the last family as a possible additional genus on shell characters. Ponder (1965a) introduced a new genus name and 3 new subgenera for New Zealand species, recognised Thiele's southern genera as cingulopsids, and split the family into 2 subfamilies. Ponder (1968) described the anatomy of a New Zealand cingulopsid, *Eatonina micans* (Webster). Nordsieck (1972) placed *Cingulopsis* as a synonym of *Coriandria*, and unnecessarily introduced Coriandriidae to replace Cingulopsidae (see International Code on Zoological Nomenclature, Article 40). He also included *Rudolphosetia* Monterosato in the family, following Wenz (1943), who regarded *Coriandria* as a synonym of *Rudolphosetia*.

Fretter and Patil (1958) placed the Cingulopsidae tentatively in the Rissoacea, but Golikov and Starobogatov (1975) included it in a new superfamily grouping Trachysmatoidea along with a new family Eatoninidae. The Eatoninidae was erected solely on the basis of a more conical shell and the "absence of a second pallial duct connecting the distal end of the renal gonoduct with the mantle cavity". In view of the close similarity in all other features of *Coriandria (=Cingulopsis)* and *Eatonina* (we believe them to be congeneric) the family name Eatoninidae is, in our opinion, unwarranted.

Ponder (1965a) introduced a subfamily Eatoniopsinae for species with a smaller opercular peg, different radular characters and a relatively larger stomach. However, no species of the group as recognised by Ponder (1965a) (*Eatoniopsis* Thiele, 1912, *Boogina* Thiele, 1913, *Rufodardanula* Ponder, 1965 and *Tubbreva* Ponder, 1965) has been fully investigated anatomically, and because of the general similarity in shell, radula and operculum to typical members of the Cingulopsidae, we are not retaining this subfamilial

division here.

The family Cingulopsidae appears to be centred in the Southern Hemisphere where the majority of known species are located. Little is known of the fossil history of this family because few fossil cingulopsids can be identified with certainty owing to the lack of definitive shell characters. *Eatonina (Mistostigma) punctulum* Berry (=*albida* Carpenter) occurs in the Pliocene of California and *Pseudopisinna* (gen. nov.) *gregaria* (Laseron) is known from the Pliocene of Bass Strait, Australia.

MATERIALS AND METHODS

The methods used are described by Ponder & Yoo (1977). All material, unless otherwise noted, is housed in the Australian Museum, Sydney. The number of specimens examined is indicated in brackets after each locality.

ABBREVIATIONS

AM ..... Australian Museum, Sydney.

ANSP ..... Academy of Natural Sciences of Philadelphia, Philadelphia.

BMNH ..... British Museum (Natural History), London.

coll. .....collected by.

Coll. .....collection.

NMV .....National Museum of Victoria, Melbourne.

NMNH .....National Museum of Natural History, Washington D.C.

N.S.W. .....New South Wales.

Qld .....Queensland.

QM .....Queensland Museum, Brisbane.

S.A. .....South Australia.

SAM .....South Australian Museum, Adelaide.

SEM .....Scanning Electron Microscope.

sev .....several.

S.W.A. .....South Western Australia.

Tasm. .....Tasmania.

TM .....Tasmanian Museum, Hobart.

Vic. .....Victoria.

W.A. .....Western Australia.

WAM .....Western Australian Museum, Perth.

w .....used in 'material examined' to indicate the number of 'wet' (i.e. formalin preserved) specimens.

Note: In the locality data, and sometimes elsewhere, compass points (north, south, etc.) are abbreviated to N., S. etc.

TAXONOMY

Family **Cingulopsidae** Fretter & Patil, 1958.

Synonyms Eatoniopsinae Ponder, 1965.
Coriandriidae Nordsieck, 1972.
Eatoninidae Golikov & Starobogatov, 1975.

DIAGNOSIS. Shell minute, pupoid to depressed trochiform, umbilicate to nonumbilicate, smooth or with spiral or axial sculpture. Aperture simple, lacking a varix. Protoconch paucispiral, almost smooth, with no true sculpture. Operculum paucispiral, oval, transparent, horny, with a peg arising from the nucleus on the inner surface. Radula taenioglossan; central teeth with small to obsolete cusps; lateral teeth large; inner marginal teeth long, with prominent cusps; outer marginal teeth of moderate size and hook-like or short and triangular. Radula absent in one genus (*Tubbreva*). Headfoot unpigmented or orange to orange-red in colour. Head with a pair of simple, rather short to long tentacles with eyes in bulges at their outer bases, and a bilobed snout. Foot simple, with longitudinal mucous slit in metapodial portion of sole, anterior mucous gland opens supramarginally. Metapodial and pallial tentacles absent. Jaws absent. Oesophageal gland present, crystalline style and style sac absent, intestine short and lacking typhlosoles. Circumoesophageal ganglia concentrated. Renal organ simple. Sexes separate, genital ducts closed, male aphallate, female pallial duct monaulic or diaulic (Fretter & Patil, 1958; Ponder, 1968). Eggs laid singly in capsules, no free larval stage in development (Lebour, 1937; Fretter & Patil, 1958).

RELATIONSHIP WITH OTHER FAMILIES. The Cingulopsidae are very similar to some genera of the Rissoidae, Eatoniellidae and Rastodentidae in having smooth, simple, conical shells. A similarly pegged operculum also occurs in these three families (Eatoniellidae (Ponder, 1965c), Rastodentidae (Ponder, 1965b), some Rissoidae (e.g. *Barleeia, Rissoina, Fictonoba* (Ponder, 1967). All of these groups can, however, be readily distinguished on radular characters and are very distinct anatomically (Ponder, 1968) from the two species of Cingulopsidae so far investigated.

KEY TO GENERA

1. Shell ovate, elongate-conical, ovate-conical, to depressed trochiform, aperture subcircular to circular with narrow inner lip, smooth or with spiral striae or spiral keels; central teeth of radula moderately large to small, each lateral tooth without a long inner extension, or radula absent 2

   Shell pupoid, aperture circular with broad inner lip, smooth or with axial sculpture; central teeth of radula relatively minute, each lateral tooth with long inner extension ..... *Pseudopisinna*

2. Aperture of shell subcircular to circular, with simple, concave columella; operculum usually with internal longitudinal ridge ..... *Eatonina*

   Aperture of shell subcircular, with columella more or less straight (vertical) and bearing a weak bulge; operculum without internal ridge 3

3. Shell ovate-conical to depressed-trochiform; operculum with peg projecting beyond margin; radula present ..... *Eatoniopsis*

   Shell elongate-conical; operculum with peg not projecting beyond margin; radula absent ..... *Tubbreva*

Genus **Eatonina** Thiele, 1912:279.

Type species (original designation): *Eatoniella (Eatonina) pusilla* Thiele, 1912: 279.

DIAGNOSIS. Shell minute, ovate-conical to ovate, nonumbilicate to narrowly umbilicate, smooth except for axial growth lines and (usually) indistinct spiral grooves, or with spiral keels, with rounded body whorl and weakly to strongly convex spire whorls. Protoconch dome-shaped, smooth, of less than 2 whorls. Aperture subcircular to circular, inner lip rather narrow to moderately broad, merging with the weakly and evenly concave columella. Operculum thick, yellowish, transparent, usually with longitudinal, internal ridge; peg strong, straight, short, usually grooved. Radula with moderate-sized central teeth each bearing small to minute cusps on cutting edge, with lateral fold-like thickenings and with or without denticles on inner-face. Lateral teeth large, approximately rectangular to nearly triangular, cutting edge long, straight or weakly curved, with 1 to many cusps, often 1-3 larger than rest. Inner marginal teeth each curved, simple except for large cusps on distal cutting edge and usually with 1-2 peg-like protuberances (supporting structures) projecting from proximal half of tooth on which outer marginal tooth rests. Outer marginal teeth short, uni to multicuspate, with relatively broad bases. Headfoot and anatomy as in family diagnosis.

DISTRIBUTION. South Africa, west coasts of North and South America, New Zealand, Australia and the tropical Indo-Pacific.

REMARKS. Genus-group taxa which appear to be congeneric with *Eatonina* are *Coriandria* Tomlin, 1917, *Cingulopsis* Fretter and Patil, 1958, *Globisetia* Nordsieck, 1972 (all here regarded as forming one subgenus), *Otatara* Ponder, 1965 and *Mistostigma* Berry, 1947. The anatomy of *Coriandria (=Cingulopsis) fulgida* is very similar to that of *Eatonina micans* (Fretter & Patil, 1958; Ponder, 1968) although it differs in a few details, notably in *C. fulgida* having a ciliated accessory pallial duct in the female reproductive system, and a more complex osphradium. In view of the similarity in shell, radular, and opercular characters, the anatomical differences are considered here to be of subgeneric importance only. In our opinion further species need to be investigated anatomically before the significance of the anatomical differences can be fully assessed. Fretter and Patil (1958) described a short metapodial tentacle in *C. fulgida* but examination of living material of that species and of several other species in the family has indicated that there is not a true tentacle present but merely the posterior part of the opercular lobe which sometimes projects very slightly beyond the posterior edge of the operculum.

The tropical species of this genus have, with two exceptions, a rather complex colour pattern unlike the uniform coloration of most of the Australian temperate species. This characteristic is not, however, associated with parallel peculiarities in radular or shell features.

Eatonina was introduced by Thiele for a new species *(pusilla)* from Simons Bay, South Africa. The type specimen is, unfortunately, totally destroyed by corrosion and one of us (W.F.P.) could not locate any other author's material in the Humbolt-Universität Museum, although Thiele stated that several specimens existed in the original lot. Thiele's original figures and description, however, allows *E. pusilla* to be recognised with reasonable certainty and it appears to be synonymous with *Barleeia smithi* Bartsch, 1915. Specimens assumed to be *E. pusilla* were made available by Mrs E. Connolly and the shell, radula and operculum are figured for comparison with Australian species (figs 14j-m). A New Zealand species placed in *Eatonina* by Ponder (1965a), *E. micans* (Webster 1905), agrees well with the type of the genus in radular, shell and opercular features and can be taken as being typical. This species has been described anatomically by Ponder (1968).

Saginofusca Ponder was introduced as a subgenus of *Eatonina* for two New Zealand species (Ponder, 1965a) and one species was later named under this subgenus from Chile (Marincovich, 1973). The subgenus was chiefly characterised by a rather globose, umbilicate shell and multicuspate lateral teeth (figs 14d-g). Examination of the Australian fauna leads us to the view that *Saginofusca* cannot be usefully distinguished from *Eatonina s.s.* when the subgenus is considered in a broader context. Most species show some secondary cusps on the lateral teeth and some with multicuspate lateral teeth are ovate-conical and nonumbilicate. In other respects *Saginofusca* is like *Eatonina*.

The denticles on the inner face of the central teeth of species of this subgenus are useful in species determination as they appear to be consistent within a species. All gradations between 2 pairs of large denticles, a single pair of denticles and no denticles are found among the various species. Thus the presence or absence of denticles cannot be used alone as a taxonomic character at the subgeneric level. The hump-like inner, upper edge of the lateral teeth is characteristic of the subgenus, although in some species (e.g. *sanguinolenta* nov.) this hump is only weakly developed. The cusp patterns on the lateral and marginal teeth show much greater diversity than in the subgenus *Coriandria* and whereas there is some minor intraspecific variation, they are generally useful in separating the species.

The radulae of species of *Eatonina* can be grouped into 3 main types (fig. 1). The first group, and perhaps the most primitive, is exhibited by the type species of the subgenus *Mistostigma (albida)*. The central teeth each have 3 prominent cusps (the median one the smallest) and 4 denticles on the face. The lateral margins of each central tooth are only slightly thickened. The lateral teeth have 3 large cusps and a fourth small cusp, an evenly convex upper margin and two weak denticles on the face. The radulae of species in the remainder of the genus can be derived from this type by the loss or modification of various structures. A Chilean species, *E. atacamae* Marincovich, 1973 shows a radula which presents some intermediate features between the type species of *Mistostigma* and species included in *Eatonina* s.s. It has weak denticles on the face of each lateral tooth and the dorsal margin of this tooth has developed a weak hump near its inner edge, although the 4 cusps are all approximately equal in size. The central teeth have apparently lost the median cusp and this appears to have been replaced by a low denticle on the upper margin, and the lateral cusps are reduced to weak denticles. Perhaps to compensate for this reduction in cusps the 4 denticles on the face of each central tooth have become large and cusp-like and the lateral thickenings have also developed a cusp-like appearance and become separated from part of the lower margins of the tooth. Three southern Australasian species of *Eatonina (rubrilabiata* nov., *shirleyae* nov. and *atomaria* (Powell)) have a radula which may have been derived from the type seen in *E. atacamae* by a strengthening of the lateral folds of the central teeth, and, in the lateral teeth, the loss of the denticles on the face, an increase in the development of the hump on the dorsal margin and, perhaps associated with this, a corresponding disparity in the development of the cusps.

Further evolution within the subgenus *Eatonina* appears to have resulted in a greater development of the lateral folds of the central teeth to a point where these structures apparently take over the function of cusps, with a resultant decrease in the size of the "pseudo-cusps" or denticles on the face of these teeth. A progressive series demonstrating this is seen in 3 groups of species. In the first group *(micans* (Webster), *hutchingsae* nov. (figs 1, 10b, f), *hedleyi* nov. (fig. 10l) and *capricornea* (Hedley) (figs 8i, j)), there are 4 weak to moderate denticles on the face of the central teeth, but in the second group the outer pair of denticles is absent and has presumably been lost *(pusilla* (Thiele) (fig. 14m), *pulicaria* (Fischer) (figs 1, 7h, j), *lunata* (Laseron) (fig. 8e),

heliciformis nov. (fig. 10i) and *ardeae* nov. (fig. 6d)). The loss of the remaining paired denticles would give rise to the last group *(colorata* nov. (figs 1, 7e) and *striata* nov. (figs 1, 9l)). The type species of the new subgenus *Captitonia (lirata* nov.*)* has a radula which also falls into this latter group (figs 1, 15m) and is presumably derived from a species such as *striata* nov. The third type of radula occurs in the subgenus *Coriandria*. It has a central tooth which may have been derived from a *Mistostigma*-like ancestor by the loss of the denticles on the face of the tooth, the development of the lateral folds and a retention of a pair of cusps (Fig. 1). The lateral teeth are essentially like those of *Mistostigma* but have one of the denticles on the face of these teeth, whereas there is a pair in *Mistostigma*.

Three species *(sanguinolenta* nov. (figs 1, 9i, j), *lactea* nov. (figs 1, 8n, o) and *condita* nov. (figs 1, 9e)) appear to fall between *Eatonina* s.s. and *Coriandria* in radular features. Two *(lactea, sanguinolenta)* lack any denticles on the face of the central teeth and one *(condita)* has 2 very weak denticles. The lateral teeth in *lactea* and *sanguinolenta* are multicuspate and the cusps show a reasonable amount of disparity in size. The dorsal margin of the lateral teeth has only a weak hump giving an outline more similar to that seen in *Coriandria* than in *Eatonina* s.s. One species *(lactea)* has a shell almost identical to that of *E. pulicaria* and the radula could have been derived from that species by a reduction in the dorsal hump on the lateral teeth with associated greater uniformity of the cusps. A fusion of the upper ends of the lateral folds of the central teeth to form a continuous structure dorsally and laterally and a loss (?) of the denticles on the face would result in the type of central tooth observed in *E. lactea*. In *E. sanguinolenta* the face of the central tooth has been thickened, possibly by fusion and spreading of the denticles. The lateral teeth are weakly humped and there is little discrepancy in the size of the cusps. In shell features this species resembles several species here placed in *Eatonina* s.s. The third species, *E. condita,* has very weak denticles on the face of the central teeth and has almost no hump on the lateral teeth. This species is very similar to *E. sanguinolenta* in shell and radular features and they are probably closely related. Another interpretation of the observed radular features in these 3 discordant species is that they form a separate group which arose independently from a *Mistostigma*-like ancestor. There is, however, little supportive evidence for this view other than the common feature of the evenly convex dorsal outline of the lateral teeth. In fact the available evidence suggests that the radula observed in *E. lactea* developed quite independently from that of *E. condita* and *E. sanguinolenta*.

The radula of the subgenus *Otatara* has not been re-examined using the SEM and, consequently, its relationships with *Eatonina* s.s. are difficult to assess. The available information suggests that the radula of *E. (Otatara) subflavescens* (Iredale) has been derived from a typical *Eatonina* radula by reduction of the cusps to one on all teeth.

KEY TO SUBGENERA OF *EATONINA*.

1. Shell with smooth or with weakly spirally striate surface and sometimes a sutural cord 2

   Shell with heavy spiral keels ..... *Captitonia*

2. Outer marginal teeth each with a single cusp ..... *Otatara*

   Outer marginal teeth each with 2 or more cusps 3

3. Central teeth of radula with conspicuous cusps on cutting edge 4

   Central teeth of radula with very inconspicuous denticle-like cusps on cutting edge or 1 short median cusp ..... *Eatonina* s.s.

4. Central teeth of radula with 1-2 blunt cusps on cutting edge and no denticles on its inner face ..... *Coriandria*

   Central teeth of radula with 3 cusps on cutting edge and with denticles on inner face ..... *Mistostigma*

KEY TO THE AUSTRALIAN AND TROPICAL INDO-PACIFIC SPECIES OF EATONINA.

This key will have a reasonable reliability when used with live-collected adults and preferably with more than one specimen. Because of the simplicity of the shells and the subtle nature of the differences separating the species any identification made on shell characters alone must always have an element of doubt.

1. Shell with distinct dense-white blotches or bands 2

   Shell more-or-less uniformly coloured 7

2. Shell greater than 1.7 mm in length ..... *E. (E.) lunata* (Laseron)

   Shell less than 1.6 mm in length 3

3. Shell ovate-conical or conical 4

   Shell depressed-ovate ..... *E. (E.) heliciformis* nov.

4. Shell with distinct brown and white bands 6

   Shell with brown and/or white markings not arranged in simple bands 5

5. Shell with ground colour (dark brown) arranged in a single spiral series of dark rectangles or spots adapical to periphery ..... *E. (E.) pulicaria* (Fischer)

   Shell with ground colour (colourless to brown) arranged in two spiral series of irregular markings adapical to periphery ..... *E. (E.) lactea* nov.

6. Shell with the white bands made up of alternating dense-white and colourless patches ..... *E. (E.) colorata* nov.

   Shell with simple white bands ..... *E. (E.) ardeae* nov.

7. Shell smooth or finely spirally striate 8

   Shell spirally carinate ..... *E. (Captitonia) lirata* nov.

8. Shell with weak sutural cord and distinct spiral striae ..... *E. (E.) striata* nov.

   Shell smooth or with indistinct spiral striae 9

9. Shell distinctly umbilicate 10

   Shell not distinctly umbilicate (but sometimes with a very narrow umbilicus or umbilical chink) 11

10. Shell ovate conical ..... *E. (E.) capricornea* (Hedley)

    Shell broadly ovate ..... *E. (E.) hedleyi* nov.

11. Shell with inner lip very much darker than rest of shell 12

    Shell with inner lip slightly or not darker than rest of shell 17

12. Shell orange or red-brown 13

    Shell pale yellow or yellow-brown .....*E. (Coriandria) fulvicolumella* nov.

13. Shell broadly ovate-conic, outer lip prosocline 14

    Shell narrowly ovate-conic to conical, outer lip prosocline to orthocline..... 15

14. Shell medium orange-brown .....*E. (E.) hutchingsae* nov.

    Shell dark red-brown.....*E. (Coriandria) rubicunda* nov.

15. Shell with very distinct dark red-brown false-margined sutures.....
    E. (E.) sanguinolenta nov.

    Shell lacking distinct darker sutural band..... 16

16. Shell ovate-conic.....*E. (E.) rubrilabiata* nov.

    Shell conical .....*E. (E.) condita* nov.

17. Shell ovate-conic 18

    Shell conical .....*E. (E.) ardeae* nov.

18. Shell with distinctly convex whorls, outer lip weakly prosocline, surface almost smooth .....*E. (Coriandria) rubicunda* nov.

    Shell with weakly convex whorls, outer lip distinctly prosocline, surface with very fine spiral striae.....*E. (E.) shirleyae* nov.

Subgenus **Eatonina** s.s.

Synonym *Saginofusca* Ponder, 1965a: 121.

Type species (original designation): *Notosetia atomaria* Powell, 1933.

DIAGNOSIS. Shell as for genus, smooth except for growth lines, or rarely very weak axial riblets and sometimes spiral striae. A sutural cord rarely present. Usually unicoloured, most species coloured various shades of brown, sometimes spotted. Operculum as for genus. Radula with each central tooth having 0-2 pairs of conspicuous denticles on its inner face and very small denticle-like processes on its cutting edge; lateral teeth large, subrectangular, with few to many cusps, usually 1-3 cusps predominant, inner upper edge raised into a moderate to strong hump; each inner marginal tooth elongate, with few long cusps distally, a conspicuous cusp-like swelling about half way along its length on which outer marginal tooth rests; outer marginal teeth short, with wide bases and with 3 or more cusps. Head-foot as in family diagnosis, female genital duct monaulic.

DISTRIBUTION. Australasia, tropical Indo-Pacific and South Africa (fig. 18).

REMARKS. The shells of the species placed in this subgenus vary considerably in size, colour and shape but the overall similarity of their radular features suggests that they are probably a natural group.

Eatonina (Eatonina) ardeae sp. nov.

Figs 2b, c; 6a-d

Derivation of name: *ardea* (Latin) = heron, named for Heron Is., Qld.

DESCRIPTION. *Shell.* Minute, conical, solid, smooth except for very fine spiral striae, non-umbilicate, dark orange brown to chocolate-brown, some with white spiral bands. Protoconch of 1½ whorls; teleoconch of 2¼-3 very lightly convex whorls, smooth except for extremely fine spiral striae (rather distinct in holotype, indistinct in some other specimens) and indistinct growth lines. Aperture subcircular, with narrow inner lip, abapical portion raised as a thin lamella from base; outer lip thin, weakly prosocline, sharply bent abapically at suture. Colour dark orange-brown to chocolate brown, a darker band abapical to suture (false margined rather than a true colour band). Some specimens with a creamy white band on penultimate and body whorls encompassing most of abapical half of each whorl and a second faint band usually present on base. Free part of inner lip and outer lip yellowish-brown. A zig-zag or simple vertical white streak about ⅛-¼ whorl abapertural to outer lip in some specimens (including holotype), absent in others.

Dimensions

	Length	Diameter
Holotype	1.02 mm	0.64 mm
Paratype	0.96 mm	0.65 mm
Paratype	1.04 mm	0.68 mm
Figured specimens		
Paratype (SEM stub 476)	1.16 mm	0.73 mm
Heron Is., Qld (SEM stub no. 490) (banded specimen)	1.12 mm	0.68 mm
Heron Is., Qld (banded specimen)	1.00 mm	0.66 mm
Heron Is., Qld (large banded specimen)	1.32 mm	0.82 mm

Operculum. Typical of genus (fig. 6c).

Radula. Typical of subgenus; central tooth with a pair of long denticles on inner face; a rudimentary denticle below upper edge; lateral folds long, curved ventrally. Lateral teeth with low swelling on upper inner edge; 5-6 comb-like cusps on inner side of large, blunt, main cusp and 2 small, blunt cusps on outer side. Inner marginal teeth with 4 cusps, third about twice as large as the others. Outer marginal teeth with 6 rather short, sharp cusps (fig. 6d).

Opercula and radulae examined from type locality (stub no. 476) and Heron Is., Qld, same data as last except 8 m, 27 Dec., 1976 (banded form) (SEM stub no. 490).

Head-foot. Translucent white, odontophore orange, snout pale orange.

TYPES. Holotype (C. 106169) and 2 paratypes (C. 106170), 3 paratypes (C. 106171), AM; 1 paratype (MO 6313), QM; 1 shell, 1 operculum and 1 radula (SEM stub no. 476).

TYPE LOCALITY. S. side of Heron Is., Qld, opposite Research Station, over reef edge, 2 m, in coral rubble with algal coating, 26 Dec., 1976, coll. W. F. Ponder.

ADDITIONAL LOCALITY FOR PARATYPES. Heron Is., Qld, 26 m, J. Voorwinde Coll. (C. 106171).

ADDITIONAL MATERIAL EXAMINED. *Qld:* S. side of Heron Is., 8m in coral rubble with algal coating, over reef edge (12/2w). S.E. of Heron Is. 6m (3). Heron Is. 4m (1); 11m (1).

DISTRIBUTION AND HABITAT. Known only from Heron Is., Queensland, in the sublittoral living in coral rubble with algae (fig. 19).

REMARKS. This species is similar in general appearance to some of the southern *Eatonina* species but differs in its evenly conical form, dimorphic colour pattern and radular features. The radulae of the 2 colour forms are identical but the colour pattern does not appear to intergrade in the material available, suggesting that it may be a genetically based colour dimorphism.

Eatonina (Eatonina) capricornea (Hedley, 1907)

Figs 2a; 8f-j

Amphithalamus capricorneus Hedley, 1907: 495, pl. 17, fig. 22.

Scrobs capricorneus. — Cotton, 1944: 311.

Lucidestea capricornea. — Laseron, 1956: 450, fig. 174.

DESCRIPTION. *Shell*. Minute, ovate-conical, solid, opaque to subopaque, smooth, very narrowly to narrowly umbilicate, yellowish to orange-brown, sometimes banded. Protoconch of 1¾ smooth whorls, teleoconch of 2¼-2½ moderately convex whorls, smooth and shining except for weak growth lines and very indistinct spiral scratches. Aperture subcircular, to almost pyriform; inner lip narrow, its edge nearly straight, abapical portion a thin lamella separated from base; outer lip thin, its edge orthocline. Suture slightly inclined abapically just abaperturally to outer lip. Colour yellowish-white to orange-brown, paler shells sometimes with 2 rather indistinct pale brown bands, one on middle base, the other between suture and periphery of body whorl; umbilical area and inner lip usually orange-brown.

Dimensions

	Length	Diameter
Holotype	1.54 mm	1.05 mm
Figured specimens		
Paratypes (SEM stub no. 445)	1.55 mm	1.00 mm
	1.44 mm	0.90 mm

Operculum. Typical (fig. 8h).

Radula. Typical of subgenus; central tooth with a pair of very weak denticles on inner face; low, triangular swelling on upper edge with convex cutting edge below; lateral folds broad, almost straight. Lateral teeth with massive, knob-like swelling on upper inner edge which fits socket formed by large, sharp triangular cusp and cusp-like protrusion on inner side; 2 small cusps on median part of cutting edge. Inner marginal teeth with 3 sharp cusps, middle one longest, inner edge near base with weak serrations. Outer marginal teeth small, with 3 short cusps (figs 8i, j).

Opercula and radulae examined from type locality (SEM stub nos, 444, 445) and operculum from Port Denison, Bowen, Qld (SEM stub no. 446).

TYPES. Holotype (C. 19354) and many paratypes (C. 106276), AM; 2 paratypes (MO 6315), QM; 2 shells, 3 opercula and 3 radulae (SEM stub nos 444,445).

TYPE LOCALITY. Masthead Is., Capricorn Group, Qld, 31-36 m, coll. C. Hedley.

ADDITIONAL MATERIAL EXAMINED. *Qld:* Port Denison, Bowen, dredged (8). Shoal

Point, Mackay, on reef at low tide (25). Sarina Beach, S. of Mackay (1). 3 km N.E. of W. side of Gillet Cay, Swains Reef, 64-73 m (27). 5.6 km W. of North Keppel Is., Keppel Bay (1). N.E. of Rockhampton, 64 m (1).

DISTRIBUTION AND HABITAT. Bowen to the Capricorn Group, Queensland, from low water to about 70 m. The only material available that was collected alive includes a few dredged off Bowen and at Masthead Island. In both cases the details of the substrate are not known but was probably coral sand and algae (fig. 19).

REMARKS. The radulae of specimens with shells representing the two extremes of colour have been examined and found to be identical. There is a little variation in the relative height of the spire amongst the extensive paratype series, but otherwise the species appears to be very uniform in shape.

The shell of this species differs from the common tropical species *Eatonina (Eatonina) lunata* in colour and shape. It is somewhat similar to some of the species from temperate Australia but differs in sometimes having a colour pattern and in the presence of a narrow umbilicus as well as in radular features.

Eatonina (Eatonina) colorata sp. nov.

Figs 3a; 7a-e

Derivation of name: *coloratus* (Latin) = coloured.

DESCRIPTION. *Shell.* Minute, solid, conical, nonumbilicate, brown and white, with brown bands on body whorl. Protoconch of 1½ whorls; teleoconch of 2½, very weakly convex whorls, smooth except for weak prosocline growth lines and very indistinct spiral scratches. Aperture subcircular, inner lip narrow, its edge distinctly concave, adapical portion hardly separated from base; outer lip rather strongly prosocline. Suture bent a little adapically just abaperturally to outer lip. Umbilical chink minute or absent, no umbilicus. Colour dark brown, protoconch and first whorl of teleoconch a little paler than rest of shell; a white band on about abapical ⅔ of all whorls to last 1½ whorls of teleoconch, last ½ of penultimate whorl with narrow brown band adapical to suture as well as one abapical to suture; base with a narrow white band in middle; all bands clearly visible within aperture; inner lip dark brown. White bands made up of close-set, dense white blotches usually alternating with vertical, narrow, translucent, colourless patches.

Dimensions

	Length	Diameter
Holotype	0.88 mm	0.60 mm
Paratype	0.86 mm	0.60 mm
Figured specimen Paratype (SEM stub no. 138)	0.90 mm	0.62 mm

Operculum. Typical (figs 7b, c).

Radula. All but central teeth typical of subgenus; central tooth with prominent, vertical, lateral folds and a narrow, vertical median thickening; no other structures apparent. Lateral teeth with a low swelling on upper inner edge; 5 comb-like cusps on inner side of large, blunt main cusp and 3 small cusps on outer side. Inner marginal teeth with 7 cusps spread evenly along most of the tooth, second cusp slightly longer than others. Outer marginal teeth with 3 short cusps (figs 7d, e).

Opercula and radulae examined from type locality (SEM stub no. 479).

TYPES. Holotype (C. 106193) and 28/3w paratypes (C. 106194), AM; 1 shell (SEM stub no. 138) and 1 shell, 2 opercula and 2 radulae (SEM stub no. 479).

TYPE LOCALITY. Pt. Ardel, Port Vila, Efate, New Hebrides, coral block washings, low tide, Jan. 16, 1967, coll. W. F. Ponder.

ADDITIONAL MATERIAL EXAMINED. *New Hebrides:* Pt. Ardel, Port Vila, Efate, on brown algae, low tide (2). Hotel Tanna, Tanna Is., on algae, low tide (2).

DISTRIBUTION AND HABITAT. New Hebrides, on algae and dead coral at low water (fig. 19).

REMARKS. This species is similar to the banded form of *E. (E.) ardeae* nov. in general appearance but is broader, with a more distinct, white basal band and a wider white band on the penultimate and body whorls, leaving only a relatively narrow brown band abapical and another adapical to the suture. The central white band is made up of close-set, dense white blotches usually alternating with narrow, translucent, colourless patches, whereas this band (when present) is uniformly dense-white in *E. (E.) ardeae*. The outer lip is more strongly prosocline in *E. (E.) colorata* than in *E. (E.) ardeae* and it lacks the vertical white marking which is often present abaperturally to the outer lip in *E. (E.) ardeae*. The radula of *E. (E.) ardeae* is similar to that of *E. (E.) colorata* only in the characters of the lateral teeth. The lack of denticles on the inner face of the central teeth of *E. (E.) colorata* is atypical for the subgenus and in marked contrast to the structure of the central teeth in *E. (E.) ardeae*.

E. (E.) colorata is probably more closely related to *E. (E.) pulicaria* (Fischer) but differs sufficiently in its radular features to allow full specific differentiation. It can be distinguished from both subspecies of *E. (E.) pulicaria* by its distinctly banded shell. The apertural details, general appearance and basic colour pattern are closer to those of *E. (E.) pulicaria pulicaria* than to *E. (E.) pulicaria pacifica*.

Eatonina (Eatonina) condita sp. nov.

Figs 2e; 9a-f

Derivation of name: *conditus* (Latin) = secret, hidden.

DESCRIPTION. *Shell.* Minute, conical, opaque to subopaque, smooth, nonumbilicate, dark brown. Protoconch of 1½ smooth whorls, teleoconch of 3 very weakly convex whorls; surface smooth except for very indistinct growth lines. Periphery weakly subangled to rounded. Aperture subcircular, inner lip narrow, with almost straight edge, abapical portion separated a little from base. Outer lip orthocline to slightly prosocline. Suture sharply bent just abaperturally to outer lip. Umbilical chink small, no umbilicus. Colour uniformly dark brown, sometimes with a reddish or orange tinge. Inner lip of aperture red-brown, darker than rest of shell; yellowish or yellowish-brown immediately abaperturally to edge of outer lip.

Dimensions	Length	Diameter
Holotype	1.30 mm	0.80 mm
Figured specimens		
Paratypes (SEM stub no. 425)	1.31 mm	0.83 mm
(SEM stub no. 541)	1.28 mm	0.86 mm
(SEM stub no. 542)	1.30 mm	0.87 mm

Operculum. Typical of genus (fig. 9b).

Radula. Central tooth with cutting edge reduced to an almost straight line with only 2 very weak denticles representing cusps and a weak median denticle on upper edge; lateral folds well developed. Lateral teeth with upper edge straight, upper inner edge swung sharply downwards at 45° to upper edge; innermost 2 cusps broad, rather blunt, outer 2 cusps small, sharp. Inner lateral teeth with 3 cusps, innermost long, middle very long, outer short. Outer marginal teeth with 4 sharp cusps, the third the longest (figs 9e, f).

Opercula and radulae examined from type locality and the localities from which additional paratypes were obtained (SEM stub nos 425, 531, 541, 542) and Normanville, S.A. (SEM stub no. 438).

TYPES. Holotype (C. 107151), Paratypes 4 (C. 107152); 18/9w (C. 107153), 11 (C. 107154), 21 (C. 107155) AM; 2 (E10104) TM; 2 (F 30096) NMV; 2 (D. 16107) SAM; 3 shells, 2 opercula and 4 radulae (SEM stub nos 425, 531, 541, 542).

TYPE LOCALITY. Goat Is., near Ulverstone, N. Tasm., stone washings (C. 107151, C. 107152), on coralline algae (C. 107153), on brown algae (C. 107154), 18 Mar. 1975, coll. W. F. Ponder and R. Kershaw.

LOCALITY FOR ADDITIONAL PARATYPES. Wedge Bay, S. Tasm., 13 m, J. Voorwinde Coll. (C. 107155).

ADDITIONAL MATERIAL EXAMINED *Tasm.:* West Head, Green Beach, under stones, rocky shore, low tide (2). Browns River, S. of Hobart (3). Fluted Cape, Bruny Is., 13-15 m, on algae at base of cliff (4). *Vic.:* S.E. side of Gabo Is., 28 m, on algae in sponge bed (1). S.S.E. of Gabo Is., 28 m, on red algae (2). Bastion Pt., S. tip of Mallacoota, intertidal (1). *S.A.:* ca. 3 km S. of Normanville, rocky platform (5). Hardwicke Bay (1). Streaky Bay, exposed coast, S. of township, on algae (9).

DISTRIBUTION AND HABITAT. Tasmania, Victoria and South Australia, on algae and under stones in the lower littoral and sublittoral (fig. 21).

REMARKS. This species is very similar in shell characters to *E. (Coriandria) fulvicolumella* nov. which is contrasted with *E. (E.) condita* where *E. (C.) fulvicolumella* is introduced below. The shell of *E. (E.) rubrilabiata* nov. is very similar in general appearance and in the aperture having a dark inner lip, but it is more ovate in shape. The shell of *E. (E.) sanguinolenta* nov. is also very similar to *E. (E.) condita* in general appearance but is slightly larger, has a rather glossy surface and is usually slightly more ovate in outline. *E. (E.) sanguinolenta* is also more red than brown and tends to be more translucent. The distribution of *E. (E.) hutchingsae* nov. overlaps that of *E. (E.) condita* but can be readily distinguished by its ovate shell, strongly convex whorls and relatively pale orange-brown colour.

Despite the similarity in shell characters the radulae serve to readily separate all of the above species (compare figs 6g; 9e, f; 9i, j; 10c, f; 11c, d).

Eatonina (Eatonina) hedleyi sp. nov.

Figs 3e; 10j-l

DESCRIPTION. *Shell.* Minute, turbinate, with convex whorls, umbilicate, uniformly brown. Protoconch of 1½ smooth, shining whorls; teleoconch of up to 2 strongly convex whorls, smooth except for rather distinct growth lines, these particularly conspicuous within umbilical area. Aperture broadly oval, inner lip with weakly concave edge, connected to parietal wall for about ⅓ of its length, remainder free, thin, lamella-like;

outer lip simple, very slightly prosocline. Umbilicus broad externally, perforation narrow. Colour dark orange-brown, outer lip yellowish-brown; inner lip slightly darker than rest of shell.

Dimensions

	Length	Diameter
Holotype	0.77 mm	0.66 mm
Figured specimen Paratype (SEM stub no. 503)	0.70 mm	0.66 mm

Operculum. Typical (fig. 10k).

Radula. Typical of subgenus; very similar to that of *E. (E.) capricornea* except outer marginal teeth relatively smaller, about ⅓ length of lateral teeth, compared with about ½ length of lateral teeth in *E. (E.) capricornea*. Both species peculiar in having inner edge of basal part of inner lateral teeth serrated (fig. 10l).

Opercula and radulae examined from type locality (SEM stub nos 487, 503).

TYPES. Holotype (C. 106267) and 10 paratypes (C. 106268), AM; 2 shells, 3 opercula and 2 radulae (SEM stub nos 487, 503).

TYPE LOCALITY. Off Sow and Pigs Reef, Sydney, N.S.W., shell sand, 5 m, 30 Sept. 1976, coll. A. Jones and J. Lowry.

DISTRIBUTION AND HABITAT. Known only from the type locality in Sydney Harbour, N.S.W., where it was obtained living in shelly sand in the sublittoral (fig. 19).

REMARKS. The radular features of this species show that it is related to *E. (E.) capricornea* but the shell of *E. (E.) hedleyi* differs in being much smaller and having a relatively shorter spire, a wider umbilicus and more convex whorls than *E. (E.) capricornea*. The serrated inner edge of the inner marginal teeth has not been observed in any species other than *E. (E.) hedleyi* and *E. (E.) capricornea*.

This species is named in recognition of Charles Hedley (1862-1926) who contributed so much to the knowledge of Australian Mollusca.

Eatonina (Eatonina) heliciformis sp. nov.

Figs 3d; 10g-i

Derivation of name: shell shaped like *Helix*.

DESCRIPTION. *Shell*. Minute, depressed, heliciform, smooth, subopaque to translucent, umbilicate, with dark spiral bands and white blotches. Protoconch of about 1½ whorls; teleoconch of about 2 convex, smooth whorls. Aperture subcircular, weakly angled adapically, inner lip thin, narrow, separated from base at umbilical area; edge of outer lip prosocline. Umbilicus broad externally, perforation minute. Colour of body whorl pale yellowish-white to yellowish, with 4 narrow, dark red-brown bands on body whorl and a fifth, usually broad, band around umbilicus. Two rows of rather irregular dense white blotches on body whorl, one just abapical to suture, extending on to last half of penultimate whorl, and the other on periphery, these two sometimes coalescing on last ¼ of body whorl. Inner lip dark red-brown, outer lip yellowish-white; spire and protoconch dark red-brown, body whorl coloration developing on last half of penultimate whorl.

Dimensions

	Length	Diameter
Holotype	0.95 mm	0.82 mm
Paratype	0.96 mm	0.80 mm
Figured specimen Paratype (SEM stub no. 461)	0.96 mm	0.76 mm

Operculum. Typical (fig. 10h).

Radula. Typical of subgenus; central teeth with a pair of long denticles on inner face, a small, low protuberance on upper edge and broad, curved lateral folds. Lateral teeth with low swelling on upper inner edge; 5 comb-like cusps on inner side of large, blunt, main cusp and 3-4 small cusps and 0-2 denticles on outer side. Inner marginal teeth with 3-4 cusps, first and second long, second largest. Outer marginal teeth with 3-4 short cusps (fig. 10i).

Opercula and radulae examined from type locality (SEM stub no. 461) and from Noumea, New Caledonia (SEM stub no. 216).

TYPES. Holotype (C.106172) and 5/3w paratypes (C.106173), AM; 1 shell, 1 operculum and 1 radula (SEM stub no. 461).

TYPE LOCALITY. Pt. Ardel, Port Vila, Efate, New Hebrides, on brown algae, low tide, 16 Jan. 1967, coll. W. F. Ponder.

ADDITIONAL MATERIAL EXAMINED. *New Hebrides:* Port Vila, Efate, on algae, sheltered reef (4). Pt. Ardel, Port Vila, Efate, coral block washings, low tide (2). *New Caledonia:* Baie de Radio Etat, Magenta, semi-sheltered, rock, algae and coral (4).

DISTRIBUTION AND HABITAT. New Hebrides and New Caledonia in the lower littoral on algae, dead coral and rocks (fig. 20).

REMARKS. The depressed, heliciform shell with its distinctive colour pattern and prominent umbilicus readily distinguish this species from all other named Australian and tropical Pacific species. *Eatonina (Eatonina) maculosa* Ponder from northern New Zealand is similar in shape and also has 2 rows of dense-white spots but lacks any colour bands. An unnamed species known only from two subadults collected at Heron Is., Queensland is very similar to *E. (E.) heliciformis* but there is insufficient material to describe it adequately.

Eatonina (Eatonina) hutchingsae sp. nov.

Figs 2f; 10a-f

DESCRIPTION. *Shell*. Minute, ovate-conical, solid, smooth, opaque, orange-brown, nonumbilicate. Protoconch of 1½ smooth whorls; teleoconch of 2½ convex whorls, smooth except for fine growth lines and very inconspicuous spiral scratches. Aperture subcircular, sometimes slightly separated from body whorl; outer lip thin, slightly prosocline; inner lip with weakly concave edge, rather narrow. Colour orange-brown, fading to yellow at the outer lip; inner lip and columella darker brown than rest of shell.

Dimensions

	Length	Diameter
Holotype	1.24 mm	0.83 mm
Paratype	1.23 mm	0.80 mm

Figured specimens		
Solitary Is., N.S.W. (SEM stub no. 437)	1.14 mm	0.82 mm
Gabo Is., Vic. (SEM stub no. 467)	1.28 mm	0.87 mm

Operculum. Typical (fig. 10e).

Radula. Typical of subgenus; central tooth with 2 pairs of denticles on inner face, a low, knob-like swelling on upper edge and prominent lateral folds. Lateral teeth with 4-6 comb-like cusps on inner side of long, rather sharp main cusp; 3-4 small cusps, and usually a few very small accessory denticles, on outer side of main cusp. Inner marginal teeth with 4-5 sharp cusps, the second from inside longest. Outer marginal teeth with 7-8 cusps, 3(?)-4 on outer end, 2-3 shorter cusps on lower forward edge (figs 10b, c, f).

Opercula and radulae examined from type locality (SEM stub no. 457), Solitary Is., N.S.W. (SEM stub no. 437) and Gabo Is., Vic. (SEM stub nos 135, 467).

TYPES. Holotype (C. 106175), 5 paratypes (C. 106176), 7/5w paratypes (C. 106174), 3 paratypes (C. 106177), AM; 2 paratypes (MO 6314), QM; 1 paratype (E 9815), TM; 1 paratype (F 30044), NMV; 1 shell, 1 operculum and 1 radula (SEM stub no. 457).

TYPE LOCALITY. S. side of Caloundra Head, Caloundra, Qld, on coralline algae (C. 106176), on algae (C. 106174) and under rocks (C. 106177), on exposed rock platform, from tide pool, 20 Oct. 1976, coll. I. Loch and B. Duckworth.

ADDITIONAL MATERIAL EXAMINED. *Qld:* Noosa Heads (1). Caloundra Beach (3). *N.S.W.:* Ballina, on algae (1). S.W. of Solitary Is., 15 m (3). Fingal Bay, Port Stephens (9). Pittwater, Broken Bay, dredged (1). Chinamans Beach, Middle Harbour, Sydney, 5 m (13). Sow and Pigs Reef, Sydney, 9 m (9); 13-16 m (6). Parsley Bay, Sydney, 9 m, on red algae (1). Green Cape, Disaster Bay, 15 m (4). S. end of Green Cape, Disaster Bay, 2-4 m, on algae (1). *Tasm.:* Pirates Bay, Eaglehawk Neck (5); under stones (4). Derwent Estuary (1). *Vic.:* E. of Monument Bay, Gabo Is., 7-10 m (2). Below lighthouse, E.S.E. side of Gabo Is., 15-18 m on algae and detritus (10). S.S.E. side of Gabo Is., 28 m, red algae (1); 28 m, algae in sponge bed (3). Pt. Hicks, Cape Everard, 18 m (5).

DISTRIBUTION AND HABITAT. Noosa Heads, southern Queensland to eastern-most Victoria and eastern Tasmania on algae and debris in the lower littoral and sublittoral (fig. 20).

REMARKS. This species is similar in shape and colour to *Eatonina atomaria* (Powell) from New Zealand but differs in having less convex whorls and being a little more conical in shape and nonumbilicate. *Eatonina shirleyae* nov. is also similar to *E. (E.) hutchingsae* but is darker in colour, has a more strongly retracted outer lip, more conspicuous spiral striae and less convex whorls. Another somewhat similar species, *E. rubrilabiata* nov. is contrasted with *E. hutchingsae* below.

This species has been named for Dr Patricia Hutchings who has provided us with numerous sublittoral samples containing micro-molluscs.

Eatonina (Eatonina) lactea sp. nov.

Figs 3f; 8k-o

Derivation of name: *lacteus* (Latin) = milky white.

DESCRIPTION. *Shell*. Minute, narrowly conic, solid, smooth, nonumbilicate, translucent to subopaque white to reddish-brown, with 2 rows of large opaque white spots on body whorl. Protoconch of 1½ whorls, teleoconch of 3½ slightly convex whorls,

smooth except for growth lines. Aperture circular to sub-circular, inner lip moderately wide, its edge convex in mature examples, adapical portion separated from base as a thin lamella; outer lip slightly prosocline, a weak varix usually present. Suture bent sharply abapically just abaperturally to edge of outer lip. Umbilical chink very small or absent, no umbilicus. Colour translucent white with very broad axial patches of dense white on spire whorls which reduce translucent parts of shell to narrow, broken, often zig-zag axial streaks of the basic shell colour. White patches broken into 2 series on body whorl with a series of large, squarish blotches on adapical part of whorl terminating just above periphery, these separated from, or narrowly connected to, a row of rounded blotches on adapical half of base sometimes about twice as numerous as the larger series of blotches. Remainder of base and aperture translucent white to reddish-brown.

Dimensions

	Length	Diameter
Holotype	1.54 mm	0.84 mm
Paratypes	1.40 mm	0.76 mm
Figured specimen Paratypes (SEM stub no. 527)	1.52 mm	0.80 mm

Operculum. Typical of genus (figs 8l, m).

Radula. Central tooth much wider than deep, with weakly convex "cutting edge", a weak median denticle on concave upper edge; lateral folds well developed; inner face much reduced, denticles probably absent. Lateral teeth with upper edge convex, with 7-9 cusps, innermost bifid, the next larger and blunt, the following cusps sharp and decreasing in size outwards. Inner marginal teeth with long, sharp cusps, innermost (2?) slightly shorter than the next, which is followed by 1-2 short cusps and then another long cusp and 2-4 short cusps. Outer marginal teeth with 3 sharp inner cusps followed by a larger sharp cusp and 1-2 short cusps (figs 8n, o).

Opercula and radulae examined from type locality (SEM stub no. 527) and W. Rarotonga, S. Cook Ids (SEM stub no. 493).

TYPES. Holotype ANSP (278391) and 11 paratypes ANSP (344916); 12 paratypes ANSP (278043); 5 paratypes AM (C. 108289); 1 shell, 1 operculum and 2 radulae (SEM stub no. 527).

TYPE LOCALITY. 1.6 km S.W. of Aitutaki, N. Cook Ids, 1-6 m, on coral, 19 Feb. 1962, coll. R. W. Forster & R. Ostheimer, holotype and 11 paratypes, ANSP (278391, 344916).

LOCALITY FOR ADDITIONAL PARATYPES. E. side Akitua, N.E. Aitutaki, N. Cook Ids, 0-1 m, rocks, sand, sea grass and coral, Feb. 1962, coll. D Ashton, R. W. Forster & R. Ostheimer (ANSP 278043); (AM C. 108289).

ADDITIONAL MATERIAL EXAMINED. *S. Cook Ids:* 1.6 km N. of Arorangi Village, W. Rarotonga, 0-1.5 m, amongst coral, sand and rocks (14) ANSP (279105), SEM stub no. 493. 4 km N. of Matavera, N.E. Rarotonga (4) ANSP (278830). Avarua Passage, N. Rarotonga, 12-14 m, sand pebbles and stones (16) ANSP (278581).

DISTRIBUTION AND HABITAT. Cook Ids, living in the lower littoral and sublittoral (fig. 18).

REMARKS. The ground colour varies from translucent to subopaque white through yellow to red-brown. Two series (ANSP 279105, 278581), show a range of colour varying

from pale yellow to pale or dark brown, another lot (ANSP 278830) are all red-brown, and the type lot and one other (ANSP 278043) are all white to pale yellow. There is also fairly considerable variation in size. This species is very similar to *E. (E.) pulicaria pacifica* nov. in most features but can be distinguished by its more elongate form and the details of the colour pattern as well as by the different radula. *E. (E.) lunata* (Laseron) is also similar but is larger, has a more variable and slightly different colour pattern and the radula is also distinct.

The peculiar central tooth of this species may have been derived from a tooth similar to that of *E. (E.) pulicaria* (Fischer) by the lateral folds meeting dorsally. The face of the tooth has shortened and is swung backwards and upwards and, presumably because the denticles in this position would be functionless, they have apparently been lost (no photographs are available that show the face sufficiently well to determine the total absence of any denticles). The lateral teeth lack a distinct bulge on their upper edges and their cusps are, probably as a result, more uniform in size than those seen in most species of *Eatonina* s.s. The radula of *E. (E.) lactea,* although not typical of *Eatonina* s.s., is, as shown above, capable of being derived from a radula more typical of the subgenus and, because the shell also bears a close resemblance of the shell to *E. (E.) pulicaria,* this species is included in *Eatonina* s.s.

Eatonina (Eatonina) lunata (Laseron, 1956)

Figs 3g; 5g, h; 8a-e

Estea lunata Laseron, 1956: 441, fig. 147.

DESCRIPTION. *Shell.* Minute, ovate-conical, solid, smooth, subopaque to opaque, nonumbilicate, yellowish-white to dark brown, with white blotches. Protoconch of 1½ smooth whorls; teleoconch of up to 4 weakly convex whorls, smooth except for inconspicuous growth lines and spiral striae. Aperture subcircular to circular, constricted adapically when mature, peristome thin, outer lip sharp, thickened abaperturally in adapical portion to form a weak varix-like swelling. Abapical portion of inner lip separated from base as a thin lamella; outer lip orthocline. Suture swings sharply abapically just adaperturally to aperture. Colour yellowish-white to dark orange-brown, patterned with dense milky-white markings. Pattern in form of blotches, spots, zig-zag lines, or a broad band on adapical half of spire whorls; blotches sometimes merge to give an almost uniform dense-white shell colour; often a row of small white spots on periphery. Base usually with zig-zag markings but sometimes uniform white, spotted, or without any white markings.

Dimensions

	Length	Diameter
Holotype	1.86 mm	1.10 mm
Paratype	1.93 mm	1.10 mm
Figured specimens		
Noumea, New Caledonia (SEM stub no. 140)	1.48 mm	0.88 mm
Lizard Is., Qld (SEM stub No. 157)	2.20 mm	1.18 mm

Operculum. Typical (fig. 8d).

Radula. Typical of subgenus; central tooth with a pair of weak denticles on inner face; upper edge horizontal to slightly concave, weakly thickened, with a very low median swelling present when tilted forward; lateral folds broad, curved. Lateral teeth with prominent swelling on upper inner edge; 2-3 small cusps on inner side of large,

rather blunt, main cusp and 6-9 cusps on outer side. Inner marginal teeth with 5-8 cusps spread along most of forward edge, innermost two cusps longer than rest, second cusp longest (fig. 8e).

Opercula and radulae examined from Lizard Is., Qld (SEM stub no. 157) and Noumea, New Caledonia (SEM stub no. 140).

Head-foot. Typical of family; tentacles rather long, lash rapidly up and down as animal moves, with eyes in small bulges at their outer bases. A small triangular dense-white patch immediately behind eyes. Snout small, bilobed, pale yellow to orange, rest of head usually colourless or yellowish, sometimes orange. Buccal mass bright orange. Foot long, bluntly rounded in front, sharply rounded posteriorly, propodium small, its edge usually not extending to margin of foot, posterior mucous slit along posterior half of foot. Dorsal foot reddish-orange posteriorly, yellowish with red margins anteriorly. Opercular lobe with small, dense-white patch on either side (specimens examined from Lizard Is., Qld).

TYPES. Holotype (C. 105673) and 44 paratypes (C. 106178), AM.

TYPE LOCALITY. Bowen, Qld, on algae, coll. J. Laseron.

ADDITIONAL MATERIAL EXAMINED. *Papua New Guinea:* Amazon Bay, Milne Bay Province, 13 m, on algae (1). *Coral Sea:* Herald Cay, 5-7 m (33). *New Caledonia:* Recif Bay, Poum, 1-4 m, algae on dead coral on sandy mud (2). Bay of Magenta, Noumea, 0-1 m, under rocks (1). W. side of Ile Signal, Noumea, 0-2 m, on algae on sand and coral bottom (42). *Qld:* S. end of Casuarina Beach, Lizard Is., 1-2 m (17). Between Lizard and Palfrey Is., Lizard Is., 1.5 m, on coralline algae, on sandy bottom with coral outcrops (40/12w). S.W. of Euston Reef, off Cairns, 21 m (9). King Reef, off Kurrimine Beach, S. of Innisfail, on algae (1). Headland between Kings and Queens Beaches, Port Denison, Bowen, 1 m, on algae (43). Heron Is., 11 m (1); 91 m (1).

DISTRIBUTION AND HABITAT. Papua New Guinea, New Caledonia, Coral Sea and the Great Barrier Reef, Queensland, on algae and debris, lower littoral and sublittoral (fig. 20).

REMARKS. The shell of this species differs from the other Australian species of the genus in having a distinctive colour pattern, an elongate conical form and nearly circular to circular, somewhat constricted, aperture. *Eatonina (E.) pulicaria* (Fischer) and its subspecies *pacifica* nov. have a somewhat similar colour pattern but are much smaller.

The type series of this species represents a population with shells slightly smaller than the normal form of the species. This species probably has a wider range in the S.W. Pacific than is known at present.

Eatonina (Eatonina) pulicaria pulicaria
(Fischer (in Folin & Périer, 1873))

Figs 3b; 7f-k

Cingula pulicaria Fischer (in Folin & Périer), 1873:207, pl. 9, fig. 4.

DESCRIPTION. *Shell.* Minute, rather narrowly ovate-conical, solid, opaque to subopaque, smooth, nonumbilicate, white with rectangular markings, base and inner lip dark brown. Protoconch of 1½ whorls; teleoconch of 2½ lightly convex whorls; smooth except for growth lines. Aperture subcircular, slightly angled in adapical corner; inner lip narrow, edge nearly straight, abapical portion hardly separated from base; outer lip

orthocline, simple. Suture bent abapically just abaperturally to edge of outer lip. Umbilical chink distinct, no umbilicus. Colour milky white, abapical half of base and inner lip dark brown; vertically elongated rectangular patches on spire whorls and body whorl translucent yellow-brown with dark brown spots in their adapical and abapical extremities, the abapical row of spots occasionally connected to form a spiral band; abapical row of spots clearly visible within aperture.

Dimensions

	Length	Diameter
"Type" (from original description)	1 mm	0.33 mm
Paratype (?) (from deFolin Coll.)	1.13 mm	0.78 mm
Figured specimens		
Mauritius (SEM stub no. 306)	1.08 mm	0.68 mm
Mauritius (SEM stub no. 494)	1.16 mm	0.70 mm

Operculum. Typical (figs 7g, k).

Radula. Typical of subgenus; central tooth with a pair of weak denticles on inner face; a small median cusp on upper edge and strongly curved lateral folds. Lateral teeth with low swelling on upper inner edge; 1-2 weak denticles on inner side of massive, almost square, main cusp and 3-6 small cusps on outer side; straight edge of main cusp very weakly serrated. Inner marginal teeth with 3 sharp, rather long, cusps, middle one longest, up to 5 additional small cusps sometimes present; 2 supporting structures present, outermost larger. Outer marginal teeth with 4-5 small cusps (fig. 7j).

The radula of a specimen of this species from Arsenal Bay, Mauritius (SEM stub no. 306) agrees with that of the other 2 lots of Mauritius material examined except that the inner marginal teeth have 3-5 cusps on the outer side of the median cusp, instead of 1-2 (fig. 7h).

Opercula and radulae examined from Tombeau Bay and Point Fayette, Mauritius (SEM stub nos 494, 495) and Mauritius (SEM stub no. 462).

TYPES. deFolin material in BMNH and AM (C. 106213) (paratypes?).

TYPE LOCALITY. Mauritius, coll. M. Dupont.

ADDITIONAL MATERIAL EXAMINED. *Mauritius:* No other data (Muséum National d'Histoire Naturelle, Paris). *W. Mauritius:* Flicq-en-Flacq, Arsenal Bay (many) (NMNH 716525 & 716538); weed rock and coral, 9 m (4) (ANSP 273191). Pt. Pimente, N. side Arsenal Bay, rocks, sand and coral, 0-1 m (11) (ANSP 273068). N.W. tip, Arsenal Bay (15) (NMNH 716576). 2.4 km N.W. of Black River, 14 m, sand, shell and some weed (3) (ANSP 273342). S. side of Tombeau Bay, weed, sand and rocks, 0-5 m (many) (ANSP 273271) (SEM stub no. 494). *E. Mauritius:* Pt. Fayette, weed, sand, rock and coral, 0-2.5 m (many) (ANSP 273727) (SEM stub no. 495). Pt. des Puits, near Centre dé Flacq, on algae (many/23w). *S.E. Mauritius:* Le Chaland, 4 km S. of Mahebourg, on algae, semi-exposed rocks, low tide (many).

DISTIRIBUTION AND HABITAT. Mauritius, Indian Ocean, on algae and debris in the lower littoral and in the sublittoral (fig. 18).

REMARKS. This subspecies is compared with *E. (E.) pulicaria pacifica* nov. below.

Eatonina (Eatonina) pulicaria pacifica subsp. nov.
Figs 3c; 71-n

Derivation of name: from Pacific Ocean.

DESCRIPTION. *Shell*. Minute, rather broadly ovate-conical, solid, opaque to subopaque, smooth, nonumbilicate, white with small dark brown spots; inner lip and base brown. Protoconch of 1½ whorls; teleoconch of 2¼ lightly convex whorls; smooth except for growth lines. Aperture subcircular, slightly angled in adapical corner, inner lip narrow, edge nearly straight, abapical portion separated from base as a low lamella; outer lip orthocline, simple. Suture bent abapically just abaperturally to edge of outer lip. Umbilical chink distinct, but no umbilicus. Colour dense white, base pale to dark brown, usually with a row of small peripheral brown spots and sometimes a much weaker median row of spots abapical to suture, both rows, when present, visible on spire whorls as well as on body whorl; peripheral row of spots sometimes connected by narrow flames to abapical half of base; inner lip with pale edge, dark brown within aperture.

Dimensions

	Length	Diameter
Holotype	1.20 mm	0.82 mm
Figured specimen Paratype (SEM stub no. 107)	1.30 mm	0.87 mm

Operculum. Typical (fig. 7m).

Radula. Typical of subgenus; central tooth with a pair of rather small denticles on inner face; a small, knob-like denticle on upper edge and prominent, curved lateral folds. Lateral teeth with prominent swelling on upper inner edge, a rather large cusp inside and outside massive triangular main cusp, 1-2 small cusps on median part of cutting edge; supporting structure weakly bifid or single. Inner marginal teeth with 4 short cusps (fig. 7n).

Opercula and radulae examined from type locality (SEM stub no. 107).

TYPES. Holotype (C. 106179) and 37 paratypes (C. 106180), and many paratypes/many wet (C. 106181, C. 106182) AM; 4 paratypes (345990) ANSP; 2 shells, 1 operculum and 2 radulae (SEM stub no. 107).

TYPE LOCALITY. Pt. Ardel, Port Vila, Efate, New Hebrides, on brown algae (C. 106180); on algae (C. 106182); coral block washings (C. 106181), all low tide, Jan 1967, coll. W. F. Ponder.

DISTRIBUTION AND HABITAT. New Hebrides, on algae and rubble in the lower littoral (fig. 18).

REMARKS. The shell of the new subspecies differs from *Eatonina pulicaria pulicaria* in being a little broader, in having a more distinct umbilical chink, 1-2 rows of brown spots on the body whorl instead of a single row of brown rectangular markings and the abapical portion of the inner lip separated from the base to a greater extent. The radula shows a number of minor distinctions, the most notable being the differences in the lateral teeth, and in particular in the shape of the median cusp which is pointed in *E. (E.) pulicaria pacifica* and has a broad, straight edge in *E. (E.) pulicaria pulicaria*.

It is not known whether the disjunct distribution of this species is the result of poor collecting in intervening areas or if the two subspecies are relict populations of a previously much more widely distributed species.

Eatonina (Eatonina) rubrilabiata sp. nov.
Figs 2g; 6e-g

Derivation of name: *ruber* (Latin) = red, *labia* (Latin) = lip.

DESCRIPTION. *Shell.* Minute, ovate-conical, rather solid, surface smooth and shining, slightly translucent, dark orange brown. Protoconch of 1½ whorls; teleoconch of 2½-2¾ lightly convex to moderately convex whorls, smooth except for fine growth lines. Aperture subcircular, inner lip narrow, its edge slightly concave, somewhat thickened and raised from parietal wall in adapical portion and well separated from the base abapically; outer lip simple, orthocline; suture bent abapically just abaperturally to outer lip. Umbilical chink distinct, umbilicus closed or very narrowly open. Colour dark orange brown, umbilical area and a narrow line just abapical to suture darker than rest of shell; outer lip and a narrow zone adapertural to it yellow; inner lip very dark reddish-purple to dark orange-brown.

Dimensions

	Length	Diameter
Holotype	1.33 mm	0.90 mm
Paratype	1.26 mm	0.87 mm
Figured specimen		
Paratype (SEM stub no. 460)	1.28 mm	0.83 mm

Operculum. Typical, internal ridge very weak to absent (fig. 6f).

Radula. Typical of subgenus; central teeth with 2 pairs of very prominent denticles on inner face, cutting edge weakly convex, a very small denticle at either end of cutting edge and one in middle. Lateral teeth with very prominent, knob-like swelling on upper inner edge; 3 small cusps on inner side of sharp, prominent main cusp and 3-4 small cusps on outer side. Inner marginal teeth with 3 long, sharp cusps, and sometimes 2 additional small cusps on outer side of third cusp; 2 supporting structures present, outer one longest. Outer marginal teeth rather large, with 3 sharp cusps (fig. 6g).

Opercula and radulae examined from type locality (SEM stub nos 330, 459 & 460).

TYPES. Holotype (C. 106184) and 16/10w paratypes (C. 106185), AM; 3 paratypes (F. 30045), NMV; 3 shells, 6 opercula and 5 radulae (SEM stubs nos 330, 459 & 460).

TYPE LOCALITY. On seaward side of the long rocky point at Batehaven, Batemans Bay, N.S.W. on *Champia*, medium exposure, 6 Jan. 1970, coll. W. F. Ponder and P. H. Colman.

ADDITIONAL MATERIAL EXAMINED. *N.S.W.*: Fingal Bay, Port Stephens (11). Pittwater, Broken Bay, dredged (1). Off Patonga Beach, Broken Bay, dredged (5). Collaroy Beach, near Sydney (3). Ocean beach, Manly (14). North Harbour, Sydney dredged (2). Off Chinamans Beach, North Harbour, Sydney, 5m (35). Off Sow and Pigs Reef, Sydney (6); 9m (14). 2.6km E. of Maroubra Beach, Sydney, 58 m (1). Ocean beach, Kurnell, Botany Bay (1). Ulladulla (5). Wimbie Beach, Batemans Bay, under stones, rocky, exposed shore (1). Batemans Bay (7). Merimbula Jetty, Merimbula, stone washings, exposed shore (3). Green Cape, Disaster Bay side, 15 m (2). N. side Black Head, Nadgee, coralline algae on exposed rocks (2).

DISTRIBUTION AND HABITAT. New South Wales, at least as far north as Port Stephens and to the southernmost part of the state, in the lower littoral and the sublittoral on algae and under rocks (fig. 20).

REMARKS. This species has a similar shell to *Eatonina (E.) hutchingsae* nov., *Eatonina (E.) sanguinolenta* nov., and *Eatonina (Coriandria) rubicunda* nov. It is contrasted with the latter two species where they are introduced. It differs from *Eatonina (E.) hutchingsae* with which it is sympatric, in being darker in colour, more conical in outline and in having a relatively smaller body whorl. The outer lip is orthocline, not prosocline as in *Eatonina (E.) hutchingsae,* and the adapical portion of the inner lip is raised from the parietal wall and is very dark in colour, whereas it is flush with the parietal wall and relatively paler in *E. (E.) hutchingsae*. The abapical portion of the inner lip is well separated from the base in *E. (E.) rubrilabiata* but not in *E. (E.) hutchingsae*. The radulae of the two species differ in the details of the cusp patterns of all the teeth. Beach shells frequently appear to have the entire peristome coloured red-brown, but this is generally not apparent in fresh material.

Eatonina (Eatonina) sanguinolenta sp. nov.
Figs 2d; 9g-j

Derivation of name: *sanguinolentus* (Latin) = stained with blood; refers to the colour of the shell.

DESCRIPTION. *Shell.* Minute, ovate-conical, subopaque to translucent, smooth, shining nonumbilicate, dark red-brown. Protoconch of about 1½ smooth whorls; teleoconch of 2¾-3 weakly convex whorls; surface smooth except for weak growth lines and extremely fine spiral scratches. Periphery evenly convex. Aperture subcircular, inner lip narrow, with edge almost straight, abapical portion separated a little from base. Outer lip orthocline to slightly prosocline. Suture sharply bent abapically just abaperturally to outer lip. Umbilical chink small, no umbilicus present. Colour dark red-brown, inner lip darker wine-red to dark purplish-red; outer lip yellowish-brown; sutures often false margined and appear darker in colour than rest of spire, umbilical area usually very dark red-brown.

Dimensions

	Length	Diameter
Holotype	1.46 mm	0.92 mm
Paratype	1.43 mm	0.93 mm
Figured specimen Paratype (SEM stub no. 329)	1.42 mm	0.90 mm

Operculum. Typical of genus (fig. 9h).

Radula. Central tooth with upright denticle in middle of concave upper edge; face of tooth thickened, otherwise simple; lateral folds extending ventrally beyond reduced inner face of teeth. Lateral teeth with weak swelling on upper inner edge; 6-7 cusps, innermost cusp weakly denticulate in one specimen, second cusp long, remainder decrease in size toward outside of teeth. Inner marginal teeth with 4 cusps, middle 2 cusps very long. Outer marginal teeth rather long, with 3 long cusps and one short cusp (figs 9i-j).

Opercula and radulae examined from type locality (SEM stub nos 329, 532) and Elliston, S.A. (SEM stub no. 428).

TYPES. Holotype (C. 106202) and 20/10w paratypes (C. 106203), 22 paratypes (C. 106204), AM; 2 (E 9817), TM; 2 (F 30046), NMV; 2 (D 15982), SAM; 1 shell, 5 opercula and 3 radulae (SEM stub no. 329) and 2 radulae (SEM stub no. 532).

TYPE LOCALITY. Point Sinclair, S.A., on algae, 0-1 m, limestone reef (C. 106203); shell sand (C. 106204), 9 Feb. 1972, coll. W. F. and J. M. Ponder.

ADDITIONAL MATERIAL EXAMINED. *Tasm*: Wedge Bay, 13 m (6). *Vic*: Ocean side of Queenscliff, Port Phillip, green algae on rock platform (1). *S.A.*: 0.6 km off Middle Pt., near Cape Northumberland, 6 m, on algae (2). Tumby Bay (90). Elliston, 0-5 m on algae (4).

DISTRIBUTION AND HABITAT. Tasmania, Victoria and South Australia, on littoral and sublittoral algae (fig. 21).

REMARKS. Paratypes of *Estea erma* Cotton, 1944 (SAM) are this species but the marked holotype is a species of *Microfossa* (Rissoidae). The radula of this species is somewhat atypical of the subgenus *Eatonina* in that the lateral teeth only have a weak swelling on the upper inner edge and the cusps are rather equally developed. The swelling on the face of the central tooth superficially resembles, in some specimens, a single broad cusp. This thickened area appears to be bilobed in some specimens and may represent a fused pair of denticles. The shell of this species is distinguishable from that of most other Australian species in the subgenus by its glossy surface, red colour and the dark inner lip of the aperture. *E. (E.) rubrilabiata* nov. is very similar in shell features but has a slightly duller surface, has a less prominent umbilical chink and its thinner lip is more distinctly raised from the parietal wall. *Eatonina (C.) rubicunda* nov. and *E. (E.) condita* nov. are both similar in shell features to *E. (E.) sanguinolenta* and are contrasted in the remarks on those species.

Eatonina (Eatonina) shirleyae sp. nov.
Figs 2i; 6h-j

DESCRIPTION. *Shell*. Minute, ovate-conical, solid, smooth, subopaque, dark orange-brown, nonumbilicate to very narrowly umbilicate. Protoconch of 1½ smooth whorls; teleoconch of 2½ weakly convex whorls; smooth except for weak spiral striae and axial growth lines. Aperture subcircular to subpyriform in juveniles, inner lip thin, narrow, with a weakly concave edge, outer lip sharp, moderately prosocline. Colour uniform dark orange-brown,inner lip slightly darker in some specimens.

Dimensions

	Length	Diameter
Holotype	1.37 mm	0.94 mm
Paratype	1.33 mm	0.90 mm
Figured specimen Paratype (SEM stub no. 148)	1.35 mm	0.91 mm

Operculum. Typical (fig. 6i).

Radula. Typical of subgenus; central tooth similar to those of *E. rubrilabiata* nov., having 2 pairs of large denticles on inner face, but with narrower cutting edge and lateral folds more pointed below. Lateral teeth with moderate swelling on upper inner edge; a rather large cusp on inside separated by 2 small cusps from a large rectangular cusp followed by a slightly longer triangular cusp and then one small cusp. Inner marginal teeth with 4 cusps: —2 middle cusps large with rounded distal ends, third cusp longest. Outer marginal teeth with 3 moderate cusps; one very small cusp on outer side (fig. 6j).

Operculum and radula examined from type locality (SEM stub no. 148).

TYPES. Holotype (C. 106187) and 9 paratypes (C. 106188), AM; 2 paratypes (WAM 393-77), WAM; 1 shell, 2 opercula and 2 radulae (SEM stub no. 148).

TYPE LOCALITY. Mississippi Bay, 48 km E. of Esperance, S.W.A., on sheltered side of

W. head of bay, 0-2 m, on algae, 6 Feb. 1972, coll. W. F. Ponder.

ADDITIONAL MATERIAL EXAMINED. *S.A.*: W. side of Thevenard, near Ceduna, low tide, short algae on semi-sheltered rock platform (2).

DISTRIBUTION AND HABITAT. Known only from the type locality in south Western Australia and one locality in South Australia where it was obtained on algae at low tide (fig. 21).

REMARKS. This species is most readily distinguished by its uniform dark coloration and retracted (i.e. prosocline) outer lip. The shell surface is sculptured with fine spiral striae which, in contrast with most related species, are easily visible under high magnification with a stereo-microscope. The most similar Australian species is *Eatonina (E.) hutchingsae* but that species is paler, has a noticably dark inner lip and the outer lip is less noticeably retracted (i.e. prosocline). *E. (Coriandria) rubicunda* nov. has a somewhat similar shell and is contrasted under that species.

This species is named for Mrs. Shirley Slack-Smith of the Western Australian Museum as a token of appreciation for her help in many ways to us.

Eatonina (Eatonina) striata sp. nov.

Figs 2h; 9k, l

Derivation of name: *striatus* (Latin) = furrowed, ridged.

DESCRIPTION. *Shell.* Minute, conical, rather solid, surface shining, base with distinct spiral grooves, nonumbilicate, orange-brown. Protoconch of 1½ smooth whorls; teleoconch of 2¼ lightly convex whorls, with faint to moderate spiral striae on spire, usually with a strong spiral cord immediately abapical to suture and fine but distinct spiral grooves on base and periphery, usually becoming indistinct adapical to periphery. Weak, sometimes fairly distinct, prosocline growth lines (sometimes weak riblets) on spire and body whorl; growth lines sometimes render sutural cord weakly and finely nodulous. Aperture almost circular, inner lip narrow, abapical portion only slightly separated from base; outer lip simple, curved markedly adaperturally in its adapical portion. Colour dark orange-brown, outer lip yellowish, inner lip slightly darker orange-brown than rest of shell.

Dimensions

	Length	Diameter
Holotype	1.08 mm	0.70 mm
Paratype	1.03 mm	0.72 mm

Operculum. Typical (fig. 9k).

Radula. Typical of subgenus with the exception of the central tooth which is rather small, with lateral folds at about 45° to vertical axis, without any structures on face of tooth apart from a weak vertical ridge; upper edge strongly convex. Lateral teeth with weak swelling on upper inner edge; a massive, subtriangular main cusp with about 3 denticles on its inner side and 2 on its outer. Inner marginal teeth with 5 small, widely-spaced cusps and a single supporting structure. Outer marginal teeth with 3 cusps and 1-3 denticles (fig. 9l).

Operculum and radula examined from type locality (SEM stub no. 473).

TYPES. Holotype (C. 106189) and 4 paratypes (C. 106190), AM; 1 paratype (WAM 394-77), WAM; 1 operculum and 1 radula (SEM stub no. 473).

TYPE LOCALITY. W. side Carnac Is., off Fremantle, W.A., on algae, 4-8 m, 18 Dec. 1971, coll. W. F. and J. M. Ponder, B. R. Wilson and N. Coleman.

DISTRIBUTION AND HABITAT. Known only from the type locality in Western Australia where it lives on algae in the sublittoral (fig. 21).

REMARKS. This species is the only one of the subgenus with distinct spiral sculpture, a sutural cord and, in some specimens very weak axial riblets. No other species appears to be closely related and it should not be confused with any other. The unusual central teeth are somewhat similar to those of *E. (E.) colorata* nov. which also has the inner marginal teeth bearing widely spaced cusps. In other respects the radulae are generally similar, but differ in detail, and the shells are extremely dissimilar.

Subgenus **Captitonia** nov.

Type species: *Eatonina (Captitonia) lirata* sp. nov.

Derivation of name: *captio* (Latin) = a cheat, deception; refers to the greatly different features of the shell compared with other species of *Eatonina*.

DIAGNOSIS. Shell conical, with strong spiral keels, nonumbilicate, aperture with slightly retracted outer lip, protoconch with single weak keel, otherwise smooth. Operculum and radula as for *Eatonina* s.s.

DISTRIBUTION. South Western Australia and possibly northern New Zealand.

REMARKS. This subgenus is based on a strongly keeled species which, on shell characters, is very readily distinguishable from *Eatonina*. The radula and operculum are, however, so similar to those of species of *Eatonina*, the shells of which in some instances develop weak spiral sculpture, that *Captitonia* is here regarded as being only subgenerically distinct.

Some rissoid and eatoniellid genera such as *Tropidorissoia* Tomlin & Shackleford, 1915, *Liratoniella* Ponder, 1965 and *Lironoba* Iredale, 1915, resemble *Captitonia* particularly in the sculptural characters of the shell. *Tropidorissoia* is based on a thick-shelled rissoid with a protoconch bearing several weak spiral ridges. The aperture has a thickened peristome and the type species (*taphrodes* Tomlin & Shackleford) is umbilicate. The microsculpture of the teleoconch of both species included in the genus (*taphrodes* and *varicifera* Smith) is of fine spiral ridges which are not present in *Captitonia*.

The radular and opercular features of *Tropidorissoia* are not known but it is considered to be likely that they will be typically rissoid in character. The rissoid genera *Lironoba* and its subgenus *Nobolira* Finlay, 1926 are only superficially similar, having very different teleoconch and protoconch features when compared in detail. Ponder (1967) has described the radula of a species of *Nobolira*. *Liratoniella* is an eatoniellid with a different operculum which has an opaque muscle insertion area over most of its surface and a typical eatoniellid radula. *Estea crassicarinata* Powell, 1936, tentatively placed in *Liratoniella* by Ponder (1965c) on shell characters, agrees more closely with the type species of *Captitonia*.

Eatonina (Captitonia) lirata sp. nov.

Figs 4a; 15l, m

Derivation of name: *liratus* (Latin) = ridged.

DESCRIPTION. *Shell.* Minute, conical, solid, nonumbilicate, with very strong spiral carinae; orange-brown. Protoconch of 1½ whorls, apex rounded, last whorl stepped; teleoconch of 2½ lightly convex whorls, each with 2 strong, rounded, spiral carinae, with two additional weaker carinae on base and another just abapical to suture, this latter carina becoming prominent on body whorl. Aperture subcircular, inner lip narrow, separated from base in abapical portion; outer lip opisthoclinal; suture bent abapically just abaperturally to outer lip. Colour dark orange-brown, fading to yellowish-brown in dead material, although carinae remain darker.

Dimensions

	Length	Diameter
Holotype	1.00 mm	0.64 mm
Paratype	1.08 mm	0.66 mm

Operculum. Typical of genus but with very weak internal ridge (fig. 15l).

Radula. Central tooth with weakly convex upper edge with a small thickened area at apex; inner face with very weak, short horizontal ridge-like thickening; lateral folds well developed, curved. Lateral teeth with prominent knob-like swelling on upper inner edge, a massive main cusp immediately below; a small cusp on either side of main cusp and a weak denticle about half way along tooth. Inner marginal teeth with 1 long, sharp cusp with a small cusp on either side. Outer marginal teeth short, with 3 cusps (fig. 15 m).

Operculum and radula examined from type locality (SEM stub no. 337).

TYPES. Holotype (C. 106206) and 7 paratypes (C. 106207), 6 paratypes (C. 106208), AM; 2 paratypes (WAM 395-77), WAM; 1 shell, 1 operculum and 1 radula (SEM stub no. 337).

TYPE LOCALITIES. Garden Is., off Fremantle, W.A., shell sand, 9 Sept. 1972, coll. J. Hewitt (C. 106206, C. 106207). S.W. end of Garden Is., off Fremantle, W.A., on algae, 0-3 m, 21 Jan. 1972, coll. W. F. and J. M. Ponder, B. R. Wilson and N. Coleman (C. 106208).

ADDITIONAL MATERIAL EXAMINED. *S.W.A.:* Ellensbrook (=South Cowaramup), near Margaret River mouth (1). Quininup (11). Yallingup, on algae on limestone platform (1). *W.A.:* S.W. side of Pt. Peron, S. of Fremantle, 3.5 m (1). Bathurst Pt., Rottnest Is. (4).

DISTRIBUTION AND HABITAT. Margaret River to Fremantle and Rottnest Is., Western Australia, living on algae in the sublittoral off Garden Island locality, all other material dead specimens (fig. 22).

REMARKS. This species differs from the New Zealand *Eatonina (? Captitonia) crassicarinata* (Powell) in its smaller size and relatively broader spire.

Subgenus **Coriandria** Tomlin, 1917:221, nom. nov. pro *Microsetia* Monterosato, 1884a: 280, non Stephens, 1829.

Type species (subsequent designation, Crosse, 1885: 140): *Rissoa cossurae* Calcara, 1841.

Synonyms

Minosetia Crosse, 1885b: 148, err. pro *Microsetia.*

Cingulopsis Fretter & Patil, 1958: 114.

Type species (original designation): *Cingulopsis fulgida* (J. Adams, 1797) = *Helix fulgidus* J. Adams, 1797).

? *Globisetia* Nordsieck, 1972: 155.

Type species (original designation): *Putilla (Globisetia) globulina* (Monterosato, 1884) = *Setia globulinus* Monterosato, 1884.

DIAGNOSIS. Shell as for genus; usually uniformly coloured, sometimes banded. Operculum as for genus. Radula like that of *Eatonina* s.s. but lacks any denticles on inner faces of central teeth, typically with a pair of cusps on cutting edge; lateral teeth usually with evenly convex upper edge and about 4 subequal cusps, a weak "denticle" on inner face; inner marginal teeth with 3 rather long cusps (sometimes a small fourth cusp present); outer marginal with about 4 cusps. Animal with female genital system diaulic.

DISTRIBUTION. Europe and the Mediterranean Sea; southern Australia.

REMARKS. The radular, shell, opercular and head-foot characters of the type species of *Cingulopsis* and *Coriandria* have been examined and, as already indicated by Nordsieck (1972) on shell characters, they appear to be so similar that they may be considered consubgeneric (figs 5j-m; 11g-n).

Wenz (1943) lists *Coriandria* as a synonym of *Rudolphosetia* Monterosato, 1917 but Nordsieck (1972) maintains them as full genera within the "Coriandridae". Examination of "cotypes" of the type species of *Rudolphosetia (Truncatella? fusca* Philippi, 1841) held in the BMNH (1911.10.26. 24362-24381), shows it to be a member of the Rissoidae as judged on shell, radular and opercular characters. The genus-group taxon *Globisetia* was introduced as a subgenus of *Putilla* A. Adams in the Rissoidae. Paratypes of the type species *(globulina* (Monterosato)) in the BMNH show it to be virtually inseparable in shell characters from *Eatonina (C.) fulgida* and consequently *Globisetia* is tentatively regarded as a synonym of *Coriandria*.

When Tomlin (1917) introduced the name *Coriandria* in a note entitled "New name for *Microsetia* (preoccupied)" he stated "I now propose the new generic name *Coriandria* for the shell I described as *Microsetia durbanensis*". Thus it could be construed that Tomlin intended *durbanensis* to be the type of his new genus, but it has been generally interpreted that Tomlin intended *Coriandria* as a replacement name for *Microsetia* as Barnard (1963) has indicated. Tomlin (1923) when listing *Coriandria durbanensis* states "For the generic name, *vice Microsetia* preoccupied, see . . ." This clearly indicates that Tomlin himself did intend *Coriandria* as a replacement name, as the title of his former article also indicates. Connolly in the "Zoological Record" for 1917 (published 1919) lists *durbanensis** as the type of *Coriandria*. The ICZN Article 67 (i) states that "if a zoologist proposes a new generic name expressly as a replacement for a prior name, both nominal genera must have the same type-species . . ." We concur with Barnard (1963) that *Coriandria* was only intended as a replacement name and will thus have the same type species as *Microsetia*. The first type designation for *Microsetia* was that of Crosse (1885a), not of Monterosato (1884b) as given by Barnard (1963).

Monterosato introduced his new name *Microsetia* almost simultaneously in separate publications (1884a, 1884b). Tomlin (1931:118) has shown that the part of the *Naturalista Siciliano* (1884a) in which *Microsetia* was introduced appeared before the other publication (1884b), which Wenz (1943) gives as the prior one.

Crosse (1885a, b) lists the new names introduced by Monterosato in both publications although the *Nomenclatura* (Monterosato, 1884b) was missed by the Zoological Record until 1900. In listing these names Crosse, possibly inadvertently, made the first type species selections for some of the generic names, including *Microsetia*. In his list of Monterosato's new names in the *Naturalista Siciliano* (Crosse, 1885b) Crosse misspells *Microsetia* as *Minosetia* but as this is clearly an error it cannot be used as a replacement name for *Microsetia* Monterosato (ICZN Art. 33(b)).

* Examination of the type material of *Coriandria durbanensis* in the BMNH indicates that this species is not a cingulopsid but it possibly belongs in the Hydrobiidae.

Two Southern Australian species are here included in *Coriandria*, mainly on the basis of their considerable similarity in radular features with their northern hemisphere counterparts. It is possible that these similarities are due to convergence but they may equally well reflect the remnants of a Tethyan distribution.

Eatonina (Coriandria) fulvicolumella sp. nov.

Figs 3h; 11a-d

Derivation of name: *fulvus* (Latin) = brown, *columella* (Latin) = a little column; refers to the brown columella of the shell.

DESCRIPTION. *Shell.* Minute, ovate-conical, moderately solid, smooth, opaque, very narrowly umbilicate, pale yellowish-brown, with dark brown columella and umbilical area. Protoconch of 1½ smooth whorls; teleoconch of 2½ very weakly convex whorls, smooth except for growth lines and weak spiral scratches. Periphery slightly subangled. Aperture almost circular, lips thin, inner lip narrow, edge straight, abapical portion separated from base as a thin lamella; outer lip moderately prosocline. Suture bent slightly abapically on abapertural side of outer lip. Umbilicus very narrow, sometimes closed leaving only a distinct umbilical chink. Colour yellow-brown or very pale yellow-brown to almost dirty white, middle base with a very faint, narrow brown band, stronger within aperture, umbilical area and columella dark brown.

Dimensions

	Length	Diameter
Holotype	1.15 mm	0.75 mm
Paratype	1.11 mm	0.76 mm
Figured specimen Paratype (SEM stub no. 385)	1.14 mm	0.76 mm

Operculum. Typical of genus (fig. 11b).

Radula. Typical of subgenus; central tooth having almost straight upper edge with a small knob-like swelling in middle and two broad, rounded cusps; lateral folds prominent. Lateral teeth with 4 cusps, middle rather large, inner-most cusp with 3-4 filament-like structures (easily worn off as in fig. 11c). Inner marginal teeth with 4 cusps, middle 2 large, third cusp largest, first and fourth cusps small. Outer marginal teeth with 3 sharp cusps and a denticle (fig. 11d).

Operculum and radula examined from type locality (SEM stub no. 385) and Goat Is., N. Tasm. (SEM stub no. 531).

TYPES. Holotype (C. 106195) and 8/3w paratypes (C. 106196), AM; 2 paratypes (E9816), TM; 1 shell, 2 opercula and 2 radulae (SEM stub no. 385).

TYPE LOCALITY. Great Taylor Bay, South Bruny Is., Tasm., 7.6 m, on algae, sandy bottom, 14 Feb. 1973, coll. N. Coleman.

ADDITIONAL MATERIAL EXAMINED. *N.S.W.*: N. side of Black Head, Nadgee, coralline algae, exposed rocks (2). *Tasm.:* Goat Is., near Ulverstone, on coralline algae (1). Wedge Bay, 13 m (4). Nubeena, Tasman Peninsula, 7 m (1). *S.A.:* Pearson Is., Investigator Group, 18 m, on algae (2).

DISTRIBUTION AND HABITAT. Southern New South Wales, Tasmania to South Australia, in the sublittoral living on algae (fig. 22).

REMARKS. This species is easily distinguished from other Australian species of the family by its pale, rather conical shell with its dark columella and umbilical area. It is, however, very similar to *"Rissoa atkinsoni* T. Woods" with which it occurs sympatrically. The general coloration of *R. atkinsoni* is very similar, including the pale brown band on the base, but differs in having a second band bordering the otherwise pale umbilical area. The inner lip is less heavily pigmented in *R. atkinsoni,* the whorls are more convex and the shell lighter in build. It will be shown elsewhere that *R. atkinsoni* is correctly placed in the rissoid genus *Lucidestea* Laseron, 1956 (Ponder and Yoo, in preparation).

Eatonina (E.) condita nov. is sympatric with *E. (C.) fulvicolumella* and the shells of these two species are very similar in shape and size but can be distinguished by the uniform dark brown coloration of *E. (E.) condita* and the more distinctly prosocline outer lip of *E. (C.) fulvicolumella.*

Eatonina (Coriandria) rubicunda sp. nov.
Figs 3i; 11e, f.

Derivation of name: *rubicunda* (Latin) = ruddy, red; refers to the colour of the shell.

DESCRIPTION. *Shell.* Minute, ovate-conical, solid, opaque to subopaque, smooth, with rather dull surface, nonumbilicate to very narrowly umbilicate, dark red-brown. Protoconch of 1½ whorls (surface worn); teleoconch of 2½ convex whorls, sculptured with fine growth lines and very indistinct spiral scratches. Aperture subcircular to circular, inner lip narrow, with slightly concave edge, raised above base in abapical portion. Outer lip thin, slightly prosocline; suture inclined slightly abapically a little abaperturally to edge of outer lip where a very weak varix formed. Colour dark red-brown, inner rim of aperture and umbilical area very dark, a narrow yellowish-brown zone abaperturally to outer lip.

Dimensions

	Length	Diameter
Holotype	1.22 mm	0.83 mm
Paratype	1.33 mm	0.90 mm
Figured specimen Paratype (SEM stub no. 424)	1.28 mm	0.91 mm

Operculum. Not examined.

Radula. Typical of subgenus; central tooth with 2 close-set, blunt cusps and prominent lateral folds; upper edge strongly convex, a weak, knob-like swelling in middle. Lateral teeth with 4 long, sharp cusps, innermost with 2 filament-like processes. Inner marginal teeth with 4 sharp cusps, second and third cusps long; two supporting structures, innermost small. Outer marginal teeth with 4 sharp cusps, outermost small (fig. 11f).

Radula examined from type locality (SEM stub no. 424).

TYPES. Holotype (C. 106197) and 4 paratypes (C. 106198), AM; 1 paratype (D15981), SAM; 1 shell and 2 radulae (SEM stub no. 424).

TYPE LOCALITY. Elliston, S.A., 0-5 m, on algae, Feb. 1974, coll. V. Taylor.

DISTRIBUTION AND HABITAT. Known only from the type locality in South Australia where it lives on lower littoral and sublittoral algae (fig. 22).

REMARKS. The shell of *E. (C.) rubicunda* is similar to that of *E. (E.) sanguinolenta* nov. but *sanguinolenta* has a relatively taller spire, a more glossy surface, is more translucent and has a relatively paler inner lip. *Eatonina (E.) shirleyae* nov. is very similar to *E. (C.) rubicunda* in the general appearance of the shell but it has a relatively paler inner lip, less convex whorls and a more strongly prosocline outer lip. *Eatonina (E.) rubrilabiata* nov. is also somewhat similar in shell features to *E. (C.) rubicunda* but is paler and more orange than red, has a slightly taller spire, a relatively smaller body whorl and aperture, and the outer lip is orthocline, not prosocline. All of these species markedly differ from *E. (C.) rubicunda* in radular features.

Subgenus **Mistostigma** Berry, 1947: 9 (265)

Type species (original designation): *Mistostigma punctulum* Berry, 1947 = ? *Cithna orvieta* Dall, 1919 = *Cythnia albida* Carpenter, 1864.

DIAGNOSIS. Shell broadly ovate, umbilicate, uniform brown in colour. Operculum as for genus. Radula similar to that of *Eatonina* s.s. except central tooth bears 3 prominent cusps on cutting edge (in type species), lateral folds weak and with 2 pairs of denticles on inner face. Lateral teeth with 2 denticles on inner face. Animal unknown.

DISTRIBUTION. Pacific coast of North and South America.

REMARKS. The types species was originally described as a Pliocene fossil from Bath-house Cliff, Santa Barbara, California. Paratypes have been examined in the San Diego Museum of Natural History and these agree closely with Lower Pleistocene specimens from the Lomita Formation, San Pedro, California and Recent specimens held by the Los Angeles County Museum of Natural History (figs 14 a, b,). Dr J. H. McLean has pointed out to us *(in litt.)* that the name *Cythnia albida* Carpenter is probably the earliest one for the species and that *Cithna orvieta* Dall is probably another synonym. Palmer (1958) has figured Carpenter's type specimen which is held in the NMNH (No. 15569).

Eatonina atacamae Marincovich from Chile is here placed in *Mistostigma* although the cusps on the central tooth are very reduced and the two pairs of denticles are more strongly developed than in the type species. In most respects the central teeth are more like those of some species of *Eatonina (Eatonina)* but the lateral teeth each have two weak denticles on their inner face, 4 rather uniformly-sized cusps and a slightly humped upper margin (figs 14 h-i).

Subgenus **Otatara** Ponder, 1965a: 120

Type species (original designation): *Notosetia subflavescens* Iredale, 1915 (nom. nov. pro *Rissoa atomus* Suter, 1908, non Smith, 1890).

DIAGNOSIS. Shell and operculum similar to that of *Eatonina* s.s. but radula with a single cusp on each lateral tooth and inner and outer marginals unicuspid.

DISTRIBUTION. North eastern New Zealand and the Bounty Islands.

REMARKS. This subgenus is tentatively retained because of the recorded radular features. It is, however, possible that the re-examination of the radula of *Eatonina subflavescens* using the SEM will indicate that there are insufficient differences to retain subgeneric status. Another possible problem is the considerable distance between the type locality of *N. subflavescens* and the material examined by Ponder (1965). There is considerable difficulty experienced in separating species on shell characters in this group and the status of the subgenus cannot be fully determined until the radula of specimens from the Bounty Islands is examined.

Genus **Eatoniopsis** Thiele, 1912: 237

Type species (monotypy): *Eatoniella paludinoides* Smith, 1902.

DIAGNOSIS. Shell minute, ovate-conical to depressed-trochoid, smooth, umbilicate or non-umbilicate. Protoconch smooth, of about 1½ whorls. Aperture subcircular, columella usually almost straight, with a distinct, low bulge which renders its free edge slightly convex. Usually uniformly coloured. Operculum rather thin, flexible, transparent, yellowish, with a short, curved peg extending beyond the margin; no internal ridge. Radula with small central teeth, subtriangular lateral teeth and long, curved marginal teeth; marginal and lateral teeth all multicuspate, central teeth with lateral folds, each usually with a relatively large, simple, blunt, easily shed cusp. Head foot typical of family.

DISTRIBUTION. Antarctica, New Zealand, Australia and New Hebrides.

REMARKS. *Boogina* Thiele, *Rufodardanula* Ponder and *Eatoniopsis* Thiele have been regarded by Ponder (1965) as sufficiently distinct to allow them full generic status. However, the examination of the radulae of a number of species of *Eatoniopsis s.l.* has shown that the cusp pattern and shape of the teeth, although falling into these three groups, are sufficiently similar to allow only subgeneric distinction. An additional subgenus *(Pilitonia* nov.) is described below which, unlike the other three subgenera, also has a distinctive shell. *Tubbreva* Ponder, regarded by Ponder (1965a) as a subgenus of *Rufodardanula,* is here given generic status.

The central teeth of most of the observed species of this genus have a large, blunt, cusp-like structure which is uniquely difficult to clean in mounts and which is easily shed. Specimens lacking this structure on all or some of the central teeth in the ribbon have a shallow socket indicating its positon. It is probable that this cusp is chemically or structurally different from the rest of the radula.

KEY TO SUBGENERA OF *EATONIOPSIS*

1. Shell ovate-conic 2
   Shell depressed trochiform ..... *Pilitonia*
2. Central teeth of radula with vertical structures on face of teeth; lateral teeth with numerous cusps subequal in size 3
   Central teeth of radula without vertical structures on face of teeth; lateral teeth with few cusps, 1-2 much larger than others ..... *Eatoniopsis* s.s.
3. Central teeth with 1-3 strong vertical structures on face of teeth, lateral folds usually well developed ..... *Rufodardanula*
   Central teeth with 1-2 weak, vertical structures on face of teeth, lateral folds weak ..... *Boogina*

KEY TO THE AUSTRALIAN AND TROPICAL INDO-PACIFIC SPECIES OF *EATONIOPSIS*

1. Shell ovate-conic 2
   Shell depressed trochiform 4
2. Shell brown 3
   Shell white with brown protoconch ..... *E. (R.) porcellana* nov.
3. Shell narrowly umbilicate, 1.4 mm or longer ..... *E. (B.) voorwindei* nov.
   Shell not umbilicate, less than 1.4 mm long ..... *E. (R.) castanea* (Laseron)
4. Shell pale orange-brown with brown band on shoulder ..... *E. (P.) westralis* nov.
   Shell yellowish-white, with 2 narrow brown bands ..... *E. (P.) translucida* nov.

Subgenus **Eatoniopsis** s.s.

DIAGNOSIS. Shell as for genus, ovate-conical, non-umbilicate or narrowly umbilicate. Operculum as for genus. Radula with central teeth lacking any structures on the face apart from lateral folds and a short, broad, simple to weakly bifid cusp; lateral teeth with few cusps, one cusp (second or third from inner end) much larger than others; inner marginal slightly longer than outer marginal tooth, both with relatively few cusps, inner marginal with at least one cusp much longer than others (figs 13j-n).

DISTRIBUTION. Antarctica.

REMARKS. This subgenus is distinguished by the radula having simple central teeth and conspicuously unequally developed cusps on the lateral and inner marginal teeth. The peculiar, cusp-like structure seen in the other species of *Eatoniopsis* appears to be represented in *E. paludinoides* by a weakly bifid cusp (figs 13m, n) which is much shorter than any of the other species of the genus. A second species of *Eatoniopsis* from Antarctica, probably attributable to *Rissoa edwardiensis* Watson, 1886 (figs 13 f-i) is very like *E. paludinoides* in radular features except for the central teeth which have a large cusp like that of other species of the genus (figs 13h, i).

Subgenus **Boogina** Thiele, 1913: 86.

Nom. nov. pro *Watsoniella* Thiele, 1912: 237, non Berg, 1898.

Type species (original designation): *Rissoa (Setia) sinapi* Watson, 1886.

DIAGNOSIS. Shell ovate-conical to ovate, very narrowly umbilicate, otherwise as in generic diagnosis. Operculum as in generic diagnosis. Radula with central teeth each bearing 1-2 weak, vertical structures with weak lateral folds, cusp large, on narrow neck. Lateral teeth with inner edge slightly extended, cusps all small, numerous. Inner marginal teeth long with 1 long and several short cusps; outer marginal teeth long, multicuspate.

DISTRIBUTION. Subantarctic (Kerguelen Is.); temperate Australia.

REMARKS. The specimens on which Thiele based his genus name have been destroyed by corrosion and are completely unidentifiable (Humbolt Universität Museum, No. 63066). The figure given by Thiele (1912, pl. 15, fig. 2) does not agree very closely with that given by Watson (1886, pl. 45, fig. 13). Watson's figure shows a slightly higher spire and neither the figure nor the description indicates the columellar bulge which is distinctive in Thiele's figure, although a weak bulge is present in the two syntypes in the BMNH. One syntype is a juvenile and the other a larger, doubtfully adult, specimen (reg. no. 87.2.9.2020-1). The larger specimen (1.05 mm in length) is here designated the lectotype as it clearly represents the basis of Watson's description and figure. Until a series of topotypes of *Eatoniopsis (Boogina) sinapi* can be examined and the shell variation and radular structure assessed the question of the actual identity of Thiele's specimens must remain in some doubt.

Eatoniopsis (Boogina) voorwindei sp. nov.

Figs 4g; 13a-e

DESCRIPTION. *Shell.* Minute, ovate-conical, translucent, smooth and shining, narrowly umbilicate, pale orange-brown. Protoconch of 1½ whorls; teleoconch of about 3 convex whorls, smooth except for exceedingly fine spiral scratches and indistinct axial growth lines. Suture false-margined. Aperture subpyriform; inner lip thin over parietal wall, thicker and slightly separated from base in abapical portion. Columella with

distinct, broad bulge; outer lip thin, simple. Umbilicus narrow, partly hidden by inner lip. Colour pale orange-brown, umbilical area and inner lip slightly darker.

Dimensions

	Length	Diameter
Holotype	1.56 mm	1.06 mm
Paratype	1.53 mm	1.01 mm
Figured specimen Paratype (SEM stub no. 432)	1.42 mm	1.00 mm

Operculum. Typical of genus (fig. 13b).

Radula. Typical of subgenus; central tooth with 0-2 weak vertical processes which are suspended from the arched middle face of each tooth; cusp square, sometimes weakly bifid. Lateral teeth with about 18 short, sharp cusps which gradually decrease in size towards outside. Inner marginal teeth with a large distal "cusp" and about 4-6 small, sharp cusps on either side. Outer marginal teeth with several small, sharp cusps on either side (figs 13c-e).

Operculum and radula examined from type locality (SEM stub no. 432).

TYPES. Holotype (C. 106214) and 2/1w paratypes (C. 106215), AM; 1 shell, 1 operculum and 1 radula (SEM stub no. 432).

TYPE LOCALITY. S. side, tip of Green Cape, N.S.W., on vertical rock faces, 16 m, Feb, 1973, coll. S.A. Shepherd.

ADDITIONAL MATERIAL EXAMINED. *N.S.W.*: Fingal Bay, Port Stephens (1). Narrabeen, Sydney (4). Off Chinamans Beach, Middle Harbour, Sydney, 4-7m (7). Off Sow and Pigs Reef, Sydney Harbour, dredged (1). Little Coogee Bay, Sydney (2). Ocean beach, Kurnell, Botany Bay (1). Ocean beach, Cronulla (1). Ulladulla (1). S. end of Green Cape, 2-4 m on algae, exposed coast (1); 16 m on algae on vertical rock faces (4). *Tasm.*: Murray Pass., Deal Is., Bass Strait, 30-50m, on red algae (1).

DISTRIBUTION AND HABITAT. Port Stephens, New South Wales, to Bass Strait, on algae in the lower littoral and sublittoral (fig. 23).

REMARKS. *Eatoniopsis (Boogina) voorwindei* differs from *Eatoniopsis (Rufodardanula) castanea,* with which it is sympatric, in its larger size, thinner, more translucent shell, paler colour, its umbilicus and its more convex whorls.

This species is only the second known *Boogina,* the shell differing from the type species from Kerguelen Is. by its larger size and more prominent columellar bulge.

This species is named for Mr J. Voorwinde of Sydney as a small mark of appreciation for the many services which he has rendered us in the course of this work.

Subgenus **Rufodardanula** Ponder, 1965a: 124.

Type species (original designation): *Rufodardanula spadix* Ponder, 1965.

DIAGNOSIS. Shell ovate-conical, non-umbilicate, otherwise as in generic diagnosis. Operculum as in generic diagnosis. Radula with central tooth bearing a prominent, easily shed, simple or weakly bifid cusp which is sometimes raised above body of tooth by a short neck; face of each tooth with 1-3 strong vertical ridges and strong to weak lateral folds. Lateral teeth multicuspate, cusps all small, sharp and numerous; inner and outer

marginal teeth long, of similar size, curved, multicuspate, inner marginal teeth with one cusp longer than others, outer marginal teeth with several small cusps.

DISTRIBUTION. New Zealand and eastern Australia.

REMARKS. *Rufodardanula* is very similar to *Boogina* in shell, radular and opercular characters. The central teeth differ, however, in that the very strong, median pillar-like vertical thickening and the thick lateral folds seen in the type species of *Rufodardanula* (and one of the 2 Australian species described herein) are represented in Thiele's drawing (1912, pl. 15, fig. 25) of *Eatoniopsis (Boogina) sinapi* as only 3 small denticles. In addition the lateral teeth have considerable extensions on the lower part of the inner edge in *Rufodardanula spadix* (figs 12j-l) which do not occur in *Eatoniopsis (Boogina) sinapi,* nor in *E. (Boogina) voorwindei* nov. There do not appear to be intermediate situations encountered in the radulae of the species described herein.

Eatoniopsis (Rufodardanula) castanea (Laseron, 1950)

Figs 4b; 5i; 12a-e.

Notosetia castanea Laseron, 1950: 281, fig. 78.

DESCRIPTION. *Shell.* Minute, ovate-conical, semitranslucent, smooth and shining, nonumbilicate, dark to medium orange or red-brown. Protoconch of 1½ whorls; teleoconch of up to about 2¼ weakly convex whorls, smooth except for rather distinct axial growth rugae and exceedingly fine spiral scratches. Suture distinctly false-margined. Aperture sub-pyriform; inner lip thin over parietal wall, broader and separated from base in abapical portion. Columella with weak, broad bulge, outer lip thin, simple. Umbilical chink present but no umbilicus. Colour uniform dark orange to red-brown, sometimes paler orange-brown with darker inner lip and umbilical area.

Dimensions

	Length	Diameter
Lectotype	1.30 mm	0.88 mm
Paralectotype	1.16 mm	0.80 mm
Figured specimen		
Fairlight, Sydney, N.S.W (SEM stub no. 137)	1.18 mm	0.77 mm

Operculum. Typical of genus (figs 12b, c).

Radula. Typical of subgenus; central tooth with blunt, rather narrow cusp, a prominent median vertical ridge extending just beyond face of tooth and two lateral vertical ridges; narrow outgrowths of lateral ridges may represent weakened lateral folds. Lateral teeth with 11-13 small, sharp cusps, and a blunter cusp (innermost), all gradually decrease in length outwards. Inner marginal cusp with about 8 small sharp cusps on outside of long median cusp, at least 1 on inside (number not determinable from available photographs). Outer marginal teeth with small, sharp cusp (number not determinable) (figs 12d, e).

Opercula and radulae examined from Nambucca Heads, N.S.W. (SEM stub no. 134) and Fairlight, Sydney, N.S.W. (SEM stub no. 137).

Head-foot. Snout short, bilobed, tentacles rather long, constantly lashing up and down. Foot bluntly rounded in front, sharply rounded behind. Posterior mucous slit long, extending about two-thirds of length of foot, posterior mucous gland and anterior mucous gland denser whitish than rest of semitransparent white foot; opercular lobes

white (Long Reef and Fairlight, Sydney) (fig. 5i).

TYPES. Lectotype (C. 105674) (here chosen) and 3 paralectotypes (C. 105675), AM.

TYPE LOCALITY. Middle Harbour, Sydney, N.S.W., on *Galeolaria*.

ADDITIONAL MATERIAL EXAMINED. *Qld.*: Amity Pt., North Stradbroke Is., 0-4 m, on algae (1). *N.S.W.*: N. tip of Cape Byron, on algae, sheltered side (16). Ballina, on algae (4). Nambucca Heads, coralline algae (17/8w). Forster (2); green algae, low tide (1). Fingal Bay, Port Stephens (24). Off Patonga Beach, Broken Bay, dredged (4). Pittwater, Broken Bay, dredged (2). Narrabeen, Sydney (3). Collaroy, Sydney (5). N. side Long Reef, Collaroy, Sydney, coralline algae, semi-exposed platform, low tide (2). Long Reef, Collaroy, Sydney, on algae (11). N.E. side Long Reef, Collaroy, Sydney, under stones (6); on algae (5); coralline algae in pool, low tide (1). S. side of Long Reef, Collaroy, Sydney, on algae in pool, low tide (4). Harbord, Sydney, below R.S.L. Club, 10 m, rock washings (1w). Ocean beach, Manly, Sydney (10). S.E. side of Reef Beach, Sydney (4). North Harbour, Sydney, dredged (20). Fairlight, Middle Harbour, Sydney, on *Zonaris* (7); coralline algae (9); mixed short algae (19/10w); amongst *Galeolaria* (2); under stones (5w). Near Fairlight Pool, Middle Harbour, Sydney, coralline algae (17). Wyargine Pt., Middle Harbour, Sydney, on algae (1w). Off Chinamans Beach, Middle Harbour, Sydney, 5 m (15). Balmoral, Middle Harbour, on algae (3w); on brown algae (3w); 18 m, dredged (2); on coralline and red algae, 1-2 m, N. end (3w). Off Sow and Pigs Reef, Middle Harbour, Sydney, 9 m, dredged (4). Parsley Bay, Sydney, 3 m on green algae (1). Ocean beach, Kurnell, Botany Bay (2). Gunnamatta Bay, Port Hacking (1). Shell Harbour, on algae (2). Honeymoon Beach, Jervis Bay, on algae, low tide (1). Wreck Bay, just S. of Jervis Bay, 4.5 m, on coralline algae (13). Inside breakwater, S. side of Ulladulla, on small brown algae, sheltered reef (2); on coralline algae (14/4w). Outside breakwater, S. side of Ulladulla, on coralline algae, moderately exposed rock platform (3). On seaward side of long rocky point, Batehaven, Batemans Bay, on red algae, medium exposure (4). Wimbie Beach, Batemans Bay, on fairly exposed rocky shore, under stones (4); on large brown algae (12); on coralline algae (4). Shelly Beach, Bermagui (21). Eden Harbour (2). Eden, Twofold Bay, 10 m, on coralline algae (5). Bitangabee, N. side of Green Cape, 15 m, between rocks (2); below lighthouse, on algae, low to mid-tide (2). *Tasm.*: Murray Pass., Deal Is., Bass Strait, 30-50 m, on red algae (1). Boat Harbour, under stones (2). Goat Is., near Ulverstone, on coralline algae (1); under stones (1). Roches Beach, Frederick Henry Bay, on short brown algae, on semisheltered reef (2). Primrose Pt., Frederick Henry Bay, on coralline algae, in pool, low tide (1); matted green algae, low tide (1). *Vic.*: Monumental Bay, Gabo Is., 15-18 m, on algae (1). Bastion Pt., S. tip of Mallacoota, intertidal (13).

DISTRIBUTION AND HABITAT. North Stradbroke Is., S. Qld, to Tasmanina and eastern-most Victoria, on algae, stones and debris in the mid to lower littoral and sublittoral; often abundant (fig. 23).

REMARKS. This species is distinguished from the other two species of the subgenus by its uniform brown colour and evenly-conical form. It is one of the commoner minute molluscs living on algae in New South Wales and is readily distinguished from other species living with it by its rather conical shell, the bulge on the columella and its orange-brown colour.

Eatoniopsis (Rufodardanula) porcellana sp. nov.
Figs 4c; 12f-h.

Derivation of name: porcelain-like.

DESCRIPTION. *Shell.* Minute, ovate-conical, semitransparent, smooth, white with pale brown protoconch, nonumbilicate. Protoconch of 1½ whorls; teleoconch of 2½ weakly convex whorls, smooth except for weak growth lines. Aperture pyriform, angled in adapical corner; inner lip thickened, narrow, edge nearly straight, columella with a prominent bulge, abapical portion a little separated from base; outer lip thin, straight, prosocline. Suture bent abapically just abaperturally to outer lip. Umbilical chink very minute to absent. Colour of protoconch (and sometimes first whorl of teleoconch) very pale brown to translucent white, other whorls translucent white with a broad white band abapical to suture and white in umbilical area, sometimes two narrow brown lines on base.

Dimensions

	Length	Diameter
Holotype	1.06 mm	0.67 mm
Paratype	1.04 mm	0.65 mm
Figured specimen		
One Tree Is., Qld (SEM stub no. 463)	0.92 mm	0.60 mm

Operculum. Typical of genus (figs 12g, i).

Radula. Similar to that of *E. (R.) castanea* but with narrower, more triangular central tooth, lateral folds prominent with only a trace of vertical ridges under and below them; cusp not present in specimen examined and presumed shed. Lateral teeth with about 11 cusps gradually decreasing in size outwards. Inner marginal teeth with about 5 sharp cusps outside long median cusp, with at least 1 (probably more) cusps on inside. Outer marginal teeth finely cuspate (fig. 12h).

Operculum and radula from One Tree Is., Qld (SEM stub nos 263 & 463).

Head-foot. Translucent, nonpigmented.

TYPES. Holotype (C. 106209) and 18 paratypes (C. 106210), AM; 2 paratypes (MO 6316), QM.

TYPE LOCALITY. 3km E. of Heron Is., Qld, on algae on coral 'bommie', in middle of lagoon, 1-2.5m, 30 Dec. 1976, coll. W. F. Ponder.

ADDITIONAL MATERIAL EXAMINED. *Qld:* S.W. corner of Heron Is., Capricorn Group, on rubble with green filamentous algae, below beach (1). S. outer face, One Tree Is., Capricorn Group, 1-5m (11/4w).

DISTRIBUTION AND HABITAT. Heron Is. and One Tree Is., Capricorn Group, Southern Barrier Reef, Queensland, on algae and algal covered rubble in the lower littoral and sublittoral (fig. 23).

REMARKS. This species can be distinguished from the others in the genus by its lack of pigmentation and by the rather thick inner lip. It superfically resembles some minute species of *Eatoniella* but the shell can be distinguished by the bulge on the columella.

Three specimens tentatively associated with this species are similar in shape, a little smaller in size (largest specimen 0.81 x 0.54 mm), dark purplish-brown with a white aperture (fig. 4d). They probably represent an undescribed species but the shells are in rather poor condition and an assessment of their status should await the availability of additional material. The available material was collected on the south side of Heron

Island (opposite the Research Station) over the edge of the reef in 2m on coral rubble with an algal coating (26 Dec. 1976, coll. W. F. Ponder) (AM, C. 106212). One specimen was destroyed and provided an SEM mount (stub no. 478) of the operculum (fig. 12i), which closely resembles that of *E. porcellana,* but the radula was not successfully mounted.

Subgenus **Pilitonia** nov.

Type species: *Eatoniopsis (Pilitonia) westralis* sp. nov.

Derivation of name: *pila* (Latin) = a ball.

DIAGNOSIS. Shell minute, depressed-trochiform, narrowly umbilicate, smooth. Aperture oval, inner lip thin, narrow, convex, columella concave, with weak bulge, outer lip thin, simple. Operculum typical of genus. Radula with central tooth ∩-shaped bearing a weak, median, vertical structure probably representing a reduced cusp, and two lateral thickenings, no true cusps; lateral and marginal teeth as in *Eatoniopsis (Rufodardanula)* except that the lateral teeth have an even more pronounced inwards extension of their lower inside margin and this bears a few blunt cusps. Animal not known.

DISTRIBUTION. Western Australia, South Africa and the New Hebrides.

REMARKS. The three known species of this subgenus are readily distinguished from those of other subgenera of *Eatoniopsis* by the depressed spire of the globose shell. The cuspate inner extension of the lateral teeth and the shape of the central teeth of the radula are also distinctive, and the central teeth appear to lack the deciduous cusp seen in the other subgenera. In general, however, the radula and operculum are similar to *Eatoniopsis,* and in particular the subgenus *Rufodardanula,* and the shell is also similar in having a bulge on the columella. For these reasons the differences are here considered to be of subgeneric value only. Two species are described herein and a third undescribed species is known from South Africa (East London).

Eatoniopsis (Pilitonia) translucida sp. nov.
Figs 4e; 15a, b.

Derivation of name: *translucidus* (Latin) = transparent, translucent.

DESCRIPTION. *Shell.* Minute, depressed-trochiform, thin, translucent, usually umbilicate, yellowish-white with two narrow brown bands. Protoconch of 1½ smooth whorls; teleoconch of 1½ convex whorls, smooth except for fine axial growth lines. Aperture subcircular; inner lip narrow and thin on parietal wall, thick and free over umbilical area (i.e. in abapical portion). Columella with prominent broad bulge; outer lip thin. Umbilicus closed or partly closed by thickened abapical part of inner lip. Protoconch and first whorl of teleoconch pale orange-brown, remainder of shell translucent yellowish-white with a very narrow brown band adapical to periphery and another abapical to periphery, the former visible on penultimate whorl; inner lip white.

Dimensions

	Length	Diameter
Holotype	0.60 mm	0.73 mm
Paratype	0.52 mm	0.68 mm
Figured specimen Paratype (SEM stub no. 139)	0.48 mm	0.62 mm

Operculum. Typical of genus (fig. 15b).

Radula. Mount very poor but in general features similar to that of *E. (P.) westralis* nov.

Operculum and radula examined from type locality (SEM stub no. 139).

TYPES. Holotype (C. 106216) and 4 paratypes (C. 106217), AM; 3 shells, 2 opercula and 2 radulae (SEM stub no. 139).

TYPE LOCALITY. Hotel Tanna, Tanna Is., New Hebrides, on algae on exposed rocks, low tide, 1 Feb. 1967, coll. W. F. Ponder.

DISTRIBUTION AND HABITAT. Known only from the type locality in the New Hebrides where it lives on algae in the lower littoral on an exposed shore (fig. 23).

REMARKS. This species is distinguished from *Eatoniopsis (Pilitonia) westralis* nov. by its paler colour, two brown bands, the thicker, white abapical part of the inner lip and the narrower umbilicus. This species is superficially similar to *Eatonina (Eatonina) heliciformis* but that species differs in its higher spire, different colour pattern and in its simple inner lip.

Eatoniopsis (Pilitonia) westralis sp. nov.
Figs 4f; 15c-g.

Derivaton of name: from Western Australia.

DESCRIPTION. *Shell*. Minute, depressed-heliciform, thin, translucent, widely umbilicate, pale orange-brown with very weak orange-brown band on shoulder. Protoconch of 1½ smooth whorls; teleoconch of up to 2 convex whorls, smooth except for extremely fine spiral scratches and coarser axial growth lines. Aperture subpyriform; inner lip narrow and thin on parietal wall, wider and free across umbilical area; columella with a weak bulge; outer lip thin. Umbilicus wide for family, deep. Colour pale to moderate orange-brown, inner lip and umbilical area darker orange-brown. A faint brown band on shoulder of body whorl usually present.

Dimensions

	Length	Diameter
Holotype	0.87 mm	0.90 mm
Paratype	0.82 mm	0.82 mm
Figured specimen Paratype (SEM stub no. 149)	0.80 mm	0.80 mm

Operculum. Typical of genus (figs 15d, f).

Radula. As described for subgenus; central tooth with small, blunt, median cusp (?) and 2 rather narrow lateral folds supported by an arched upper surface; face of each tooth reduced to narrow plate, lower edge of which is parallel to dorsal arch. Lateral teeth with convex upper edge and concave lower edge, inner extension about ¼ total length of each tooth, with 4 blunt, short, cusp-like projections; innermost true cusp broad and blunt, of similar length to adjacent cusps, these very narrow, sharp, decreasing in length outwards, 9-10 in number. Inner marginal teeth with large distal cusp and 4 small cusps on outside of each tooth (number on inside not known). Outer margin with few small cusps (details not known) (figs 15e, g).

Opercula and radulae examined from type locality (SEM stub no. 149) and Rottnest Is., W.A. (SEM stub no. 275).

TYPES. Holotype (C. 106219) and 11/1w paratypes (C. 106220), AM; 2 paratypes (D

15983), SAM; 2 paratypes (WAM 396-77), WAM; 2 shells, 2 opercula and 1 radula (SEM stub no. 149).

TYPE LOCALITY. Mississippi Bay, 48km E. of Esperance, S.W.A., on algae, on sheltered side of W. head of bay, 0-2 m, 6 Feb. 1972, coll. W. F. Ponder.

ADDITIONAL MATERIAL EXAMINED. *S.A.*: Tumby Bay (1). Elliston, 0-5m, on algae (2). *S.W.A.:* Yallingup, on algae, on limestone platform (1). Cape Naturaliste (1). *W.A.*, S.W. side of Pt. Peron, S. of Fremantle, 2-3m (1); sandy bottom, low tide (1). S.W. end of Garden Is., off Fremantle (2). Garden Is. (8). W. side Carnac Is., off Fremantle, 4-8m, on algae (11); rubble washings, low tide (3). North Pt., Rottnest Is., on algae, protected reef (39/11w). W. end Salmon Bay, Rottnest Is., *Lithothamnion* washings from reef edge (9). W. end reef, Rottnest Is., *Lithothamnion* washings from intertidal reef edge (1). Near end of Natural Jetty, Rottnest Is., 1m, in crevices of walls of small pools (1w). Triggs, Perth, 0-2m, on coralline algae, on platform, open coast (2). Watermans Beach, Perth (3/2w).

DISTRIBUTION AND HABITAT. Tumby Bay, South Australia to the vicinity of Perth, Western Australia, living on algae and debris in the lower littoral and shallow sublittoral on open coasts (fig. 23).

REMARKS. This species is not similar to any other known species with the exception of the preceding with which it has already been contrasted. It is one of the commoner algae-living minute gastropods in south Western Australia and cannot be confused with any sympatric species.

Genus **Tubbreva** Ponder, 1965a: 125.

Type species (original designation): *Rufodardanula (Tubbreva) exigua* Ponder, 1965.

DIAGNOSIS. Shell minute, elongately conical, thin, smooth, columella nearly straight, with a weak bulge, nonumbilicate. Operculum thin, oval, lacking an internal ridge, peg very short, not projecting beyond margin. Radula absent. Head-foot typical of family.

DISTRIBUTION. New Zealand, Australia (and Hawaii?).

REMARKS. The type species (figs 15j, k), another New Zealand species *Tubbreva exaltata exaltata* (Powell) and the 2 new species of *Tubbreva* described herein were all examined and it has been confirmed that there is no radula present as was suspected by Ponder (1965a). Because of the absence of a radula and the very short opercular peg, *Tubbreva* is here considered to be sufficiently distinct to be given generic status. This genus is placed in the Cingulopsidae on the basis of the similarity in opercular and shell features to other members of the family. The external features of the head-foot are also very similar to other members of the family (Ponder, 1965a).

An undescribed species from Hawaii (E. A. Kay, pers. comm.) probably belongs in this genus and Ponder (1965a) recognises three species and one subspecies from the New Zealand region.

KEY TO THE AUSTRALIAN SPECIES OF *TUBBREVA*.

Shell with weakly sinuate outer lip and indistinct spiral bands .*T. insignificans* nov.
Shell with simple outer lip, uniformly pale orange.....*T. parva* nov.

Tubbreva insignificans sp. nov.

Figs 4h, i; 15h.

Derivation of name: *insignificans* (Latin) = insignificant.

DESCRIPTION. *Shell.* Minute, thin, translucent, elongate-conical, nonumbilicate yellowish-brown, with 2 indentations in outer lip. Protoconch of 1½ whorls; teleoconch of 2½ lightly convex, smooth whorls. Aperture oval, outer lip strongly prosocline with 2 weak, broad indentations; inner lip narrow, with concave edge, separated from base at abapical end; columella with very weak swelling visible inside aperture. Colour pale yellow-brown with 2 indistinct orange-brown bands, one in middle of whorls, the other just adapical to periphery/suture; abapical half of base and corresponding portion of inner lip orange-brown. One specimen has the 2 orange bands fused into a single broad, rather distinct band.

Dimensions

	Height	Diameter
Holotype	0.90 mm	0.50 mm
Paratype	0.90 mm	0.51 mm

Operculum. Typical of genus (fig. 15h).

Radula. Absent.

Operculum examined from W. side of Carnac Is., W.A. (SEM stub no. 491).

TYPES. Holotype (C. 106473) and 4 paratypes (C. 106474), AM; 1 paratype (WAM 299-79), WAM.

TYPE LOCALITY. Quininup, S.W.A., 1972, coll. J. Hewitt.

ADDITIONAL MATERIAL EXAMINED. *W.A.*: S.W. end of Garden Is., off Fremantle (1). Garden Is. (2). Bathurst Pt., Rottnest Is. (4).

DISTRIBUTION AND HABITAT. Known only from the vicinity of Perth and Rottnest Island, Western Australia, the single living specimen obtained on sublittoral algae (fig. 22).

REMARKS. The shell of this species suggests a tall-spired *Eatoniella* in its shape and, in particular, the 2 weak indentations in the outer lip. The operculum is, however, typical of *Tubbreva* and no trace of a radula was found in the one specimen available with soft parts.

Tubbreva parva sp. nov.

Figs 4j; 15i.

Derivation of name: *parva* (Latin) = minute.

DESCRIPTION. *Shell.* Minute, conical to elongately conical, smooth, shining, translucent, nonumbilicate, pale orange. Protoconch of 1½ smooth whorls; teleoconch of up to 4 (usually 3) slightly convex whorls, smooth except for weak axial growth lines. Aperture subquadrate; inner lip thin, columella with weak bulge; outer lip thin and simple. Colour uniform pale orange to yellowish-orange, inner lip slightly darker than rest of shell.

Dimensions

	Length	Diameter
Holotype	0.91 mm	0.55 mm

Paratype	0.90 mm	0.60 mm

Operculum. Typical of genus (fig. 15i).

Radula. Absent.

Operculum examined from type locality (SEM stub no. 458).

TYPES. Holotype (C. 106221) and 3 paratypes (C. 106222), 1 paratype (C. 106223), AM; 1 paratype (MO 6317), QM; a shell and 1 operculum (SEM stub no. 458).

TYPE LOCALITY. S. side of Caloundra Head, Caloundra, Qld, on algae (C. 106221, C. 106222) and on coralline algae (C.106223), semi-exposed rock platform, mid-tide pool, low tide, 20 Oct. 1976, coll. I. Loch and B. Duckworth.

ADDITIONAL MATERIAL EXAMINED. *Qld*: Off Flat Rock, North Stradbroke Is., Moreton Bay, 24-30 m (2).

DISTRIBUTION AND HABITAT. Caloundra to North Stradbroke Is., southern Queensland, living on littoral and sublittoral algae on exposed coasts (fig. 22).

REMARKS. This species differs from the preceding one by its simple outer lip and uniform orange colour.

Genus **Pseudopisinna** nov.

Type species: *Estea gregaria* Laseron, 1950.

DIAGNOSIS. Shell minute, pupoid nonumbilicate, smooth or with axial ribs and a subsutural groove. Protoconch smooth, simple, dome-shaped, paucispiral. Aperture circular, simple, inner lip uniformly broad, its edge convex, outer lip not sinuate. Operculum transparent, rather thin, with no internal ridge and with straight, simple peg projecting beyond margin. Radula with minute, simple central teeth; lateral teeth broadly ∩-shaped with few weak cusps; inner marginal teeth long, with 1-2 large, spade-like cusps and thickened in proximal half; outer marginal teeth very short, with 2 widely divergent, sharp cusps. Animal with head-foot typical of family.

DISTRIBUTION. Australia, Papua New Guinea and New Caledonia.

REMARKS. The genus name is based on the remarkable similarity in the shell characters between species of this genus and species of the rissoid genus *Pisinna* Monterosato (see Ponder & Yoo, 1976). The smooth protoconch of *Pseudopisinna* species is about the only reliable shell character separating *Pseudopisinna* from *Pisinna* species, which have a protoconch sculpture of rows of minute punctures, but the opercular, radular and head-foot characters are very different.

Pseudopisinna differs from other genera in the Cingulopsidae in the rudimentary central teeth of the radula and the ∩-shaped lateral teeth, as well as the circular aperture with its wide, simple inner lip. It is also the only cingulopsid genus to exhibit strong axial ribbing amongst the species it encompasses. The unusual radula can be derived from a more 'normal' cingulopsid radula by reduction of the central teeth and the lengthening of the inner edge of the lateral teeth, a trend commenced in two subgenera of *Eatoniopsis (Rufodardanula* and *Pilitonia)*. The marginal teeth are not greatly dissimilar from those of *Eatonina,* although the bases of the inner marginal teeth have become considerably thickened and no longer serve to support the very small outer marginal teeth as they do in *Eatonina*.

KEY TO THE AUSTRALIAN AND TROPICAL INDO-PACIFIC SPECIES OF *PSEUDOPISINNA*.

1. Shell uniform brown 2
   Shell yellow to white with brown band 3
2. Shell less than 1 mm in length, with aperture protruding beyond line of spire, with weak axial ribs .....*alvea* (Laseron)
   Shell usually greater than 1 mm in length, with aperture in line with spire, smooth or with weak to strong axial ribs .....*gregaria* (Laseron)
3. Shell with distinct axial ribs on body whorl .....*costata* nov.
   Shell without axial ribs .....*balteata* nov.

(?) Pseudopisinna alvea (Laseron, 1950)

Fig. 5a

Estea alvea Laseron, 1950: 271, fig. 45.

DESCRIPTION. *Shell.* Minute, elongate pupoid, yellowish-brown (faded), aperture protruding beyond line of spire, sculptured with weak, close, prosocline axial riblets. Protoconch of nearly 1½ apparently smooth whorls; teleoconch of very lightly convex whorls; spire outline convex over the first two whorls, almost parallel-sided over the following two. Aperture large, circular, inner lip broad, somewhat separated from base abaxially, outer lip slightly thickened behind edge, a very weak varix externally.

Dimensions

	Length	Diameter
Holotype	0.92 mm	0.48 mm

Operculum and Radula. Unknown.

TYPES. Holotype (C. 106224), AM.

TYPE LOCALITY. Sow and Pigs Reef, Sydney Harbour, N.S.W., 11-16 m.

DISTRIBUTION AND HABITAT. Known only from the type locality and has not been collected alive (fig. 24).

REMARKS. The holotype is the only specimen of this species available to us. It is similar to *Pisinna oblata* (Laseron, 1956) (see Ponder & Yoo, 1976) but is much smaller than that species or any other known species of *Pisinna*. The "dead", faded and rather worn shell cannot be placed in either *Pissinna* or *Pseudopisinna* with certainty, but we have tentatively included this species in *Pseudopisinna* mainly on the basis of its minute size and general similarity to *P. gregaria;* however, the protruding aperture and thickened outer lip are more typical of *Pisinna* species.

Pseudopisinna balteata sp. nov.

Figs 5b; 16a-g

Derivation of name: *balteatus* (Latin) = girdled.

DESCRIPTION. *Shell.* Minute, ovate-conical to broadly pupoid, smooth, translucent white with a narrow peripheral brown band. Protoconch dome-shaped, of 1½ smooth whorls; teleoconch of 2½ weakly convex whorls, spire outline convex. Aperture relatively large, circular, inner lip broad, separated from base abapically; outer lip simple. Surface smooth except for weak growth lines and an inconspicuous narrow spiral

depression abapical to sutures. Colour translucent dirty yellowish-white to white, with a narrow peripheral brown band also visible adapical to sutures on spire whorls.

Dimensions

	Length	Diameter
Holotype	0.94 mm	0.57 mm
Paratype	0.86 mm	0.52 mm
Figured specimens		
Paratype (SEM stub no. 427)	0.84 mm	0.51 mm
Port Moresby, P.N.G. (SEM stub no. 133)	0.86 mm	0.53 mm
Nouméa, New Caledonia (SEM stub no. 261)	0.92 mm	0.58 mm

Operculum. Typical of genus (figs 16d-f).

Radula. Identical to that of the Western Australian form of *P. gregaria gregaria* and of *P. gregaria rugifera* (see below) (fig. 16g).

Opercula and radulae examined from type locality (SEM stub no. 427), Port Moresby, Papua New Guinea (SEM stub no. 133) and off Nouméa, New Caledonia (SEM stub no. 261).

TYPES. Holotype (C. 106228) and many paratypes/24w (C. 106229), AM; 5 paratypes (MO 6319), QM; 1 shell, 2 opercula and 1 radula (SEM stub no. 427).

TYPE LOCALITY. Yam Is., Torres Strait, Qld, reef edge on S. side, on *Sargassum*, 6 July 1976, coll. W. F. Ponder and I. Loch.

ADDITIONAL MATERIAL EXAMINED. *Papua New Guinea:* Basilisk Passage, Port Moresby, 2 m, on algae on reef (8/3w). *New Caledonia:* Récif Bay, Poum, 1-4 m, on algae in dead coral in mud and sandy bottom (1). Baie de Radio État, Magenta, Nouméa, on and under stones with some algae and coral, semi-sheltered (1). Croissant Reef, Nouméa, 0-1 m, rock and algae washings on exposed sandy flat with some coral rubble and algae (11/5w). W. side of Île Signal, Nouméa, 0-2 m, on algae, on sandy and dead coral bottom (33/18w). W. end of Ricaudy Reef, Nouméa, 0-1 m, rock and weed (ANSP 271089) (16). 6.4 km N.W. of Gatope Is., off Voh, 1-4 m, sand, weed and rubble, inner edge of barrier reef (ANSP 269517) (2). *Qld:* Four Mile Reef, Port Douglas, in debris from outer reef, extreme low tide (2). Off Cairns (2).

DISTRIBUTION AND HABITAT. North Queensland, Papua New Guinea and New Caledonia on algae and debris on the lower littoral and shallow sublittoral (fig. 24).

REMARKS. The white shell with the narrow brown peripheral band and the absence of axial ribs are the features which readily distinguish this species from its congeners. It is probably more widely distributed in the tropical Indo-Pacific than indicated by the available material.

Pseudopisinna costata sp. nov.
Figs 5c; 16h-j.

Derivation: *costatus* (Latin) = ribbed.

DESCRIPTION. *Shell*. Minute, pupoid, yellowish-white with a brown sutural band and base, with axial riblets and a row of nodules abapical to suture. Protoconch of 1½ smooth whorls; teleoconch of 3 lightly convex whorls. Aperture circular, inner lip broad, abapical portion thickened and well separated from base. Axial ribs prominent on last 1½ whorls, prosocline, extending on to base, cut off abapical to suture by a narrow, rather

deep groove to form a row of nodules. Colour yellowish-white, protoconch pale brown, base and a narrow band abapical to suture orange-brown.

Dimensions

	Length	Diameter
Holotype	0.98 mm	0.50 mm
Paratype	0.92 mm	0.50 mm

Operculum. Typical of genus (fig. 16i).

Radula. Almost identical to that of *P. gregaria rugifera*, the Western Australian form of *P. gregaria gregaria* (see below) and *P. balteata* (see above) but with only a single inconspicuous protuberance on the thickened proximal part of the inner marginal teeth (fig. 16j).

Operculum and radula examined from type locality (SEM stub no. 174).

TYPES. Holotype (C. 106230) and 3/4 w paratypes (C. 106231), AM; 1 paratype (WAM1501-78), WAM; 1 shell, 2 opercula and 2 radulae (SEM stub no. 174).

TYPE LOCALITY. Houtman Abrolhos, W.A., on red algae, 6 m, Mar. 1970, coll. H. Klynsmith, pres. S. White.

ADDITIONAL MATERIAL EXAMINED. *S.W.A.*: Quininup (5). *W.A.*: S.W. end of Garden Is., off Fremantle (2). Garden Is. (3)

DISTRIBUTION AND HABITAT. South Western Australia to Perth area and Houtman Abrolhos, known living only on sublittoral algae (fig. 24).

REMARKS. This species is similar to the extreme Western Australian forms of *Pseudopisinna gregaria* in shape but is smaller and has a different colour pattern and heavier axial ribs. *P. gregaria rugifera* has similar sculpture but it is on all whorls of the teleoconch, is rather broader and a little larger, and has a different colour, being uniformly brown.

Pseudopisinna gregaria gregaria (Laseron, 1950)
Figs 5d,e; 17a-i

Estea gregaria Laseron, 1950: 271, fig. 44.

DESCRIPTION. *Shell*. Minute, broadly to narrowly pupoid, solid, dark brown to orange brown. Protoconch of 1½ dome-shaped, smooth whorls; teleoconch of about 2½ weakly convex whorls, spire outline lightly convex. Aperture circular, with broad inner lip well separated from base abapically. Surface smooth or with weak axial ribs separated from a row of nodules immediately abapical to suture by a weak groove. Intermediate forms have only a groove or a groove and a row of nodules. Colour dark orange-brown to red-brown, often translucent-yellowish behind outer lip.

Dimensions

	Length	Diameter
Lectotype	1.13 mm	0.64 mm
Paralectotype	1.12 mm	0.62 mm
Figured specimens		
Forster, N.S.W. (SEM stub no. 172)	1.02 mm	0.60 mm
Collaroy, Sydney, NSW	1.06 mm	0.61 mm
Yallingup, S.W.A. (SEM stub no. 131)	1.13 mm	0.64 mm

Operculum. Typical of genus (figs 17d, e, g).

Radula. Typical of genus; central teeth minute, simple. Lateral teeth with a broad but weak cusp at apex of arch and a cusp-like projection on inside extension. Inner marginal teeth with 3-4 cusps at distal end, outermost short and sharp, next largest, longest and blunt, inner 1-2 sharper; proximal half of teeth thickened, with 2-3 cusp-like projections. Outer marginal teeth small with two sharp "cusps", one directed inwards, the other downwards (figs 17b, c, h, i).

Opercula and radulae examined from Forster, N.S.W. (SEM stub no. 172), Jervis Bay, N.S.W. (SEM stub no. 333), Yallingup, S.W.A (SEM stub no. 131) and Cape Naturaliste, S.W.A. (SEM stub no. 332).

Head-foot. Tentacles rather long, constantly lashing up and down, eyes in small bulges at their outer bases, snout short, bilobed. Foot with bluntly rounded anterior end, posterior end sharply rounded; posterior mucous slit conspicuous, about two thirds length of foot. Colour semitransparent white. (Observed from North Harbour, Sydney, N.S.W. and Eaglehawk Neck, Tasmania).

TYPES. Lectotype (C. 105676) (here chosen) and 21 paralectotypes (C. 105677), AM.

TYPE LOCALITY. North Harbour, Sydney, N.S.W., alive under stones.

ADDITIONAL MATERIAL EXAMINED. *Qld*: Off Flat Rock, North Stradbroke Is., 24-30 m, on algae (1). *N.S.W.*: Woolgoolga (1). S.W. of Solitary Is., 15 m (1). Off Crowdy Head, 91 m (3). Forster, on green algae, low tide, open coast (1). Port Stephens (12). Off Port Stephens, 64 m (1). 3.2 km E. of Nelsons Bay, Port Stephens, on algae, moderately exposed rocks (5w). Off Broughton Is., near Port Stephens, 46 m (1). Collaroy Beach, Sydney (4). N. side Long Reef, Collaroy, on coralline algae, semi-exposed platform, low tide (7). N.E. side Long Reef, on coralline algae in pool, low tide (many). S. side Long Reef, on short brown algae (3). Long Reef, under rocks (1); on short brown algae, outer point (3w). Ocean beach, Manly, Sydney (3). North Harbour, Sydney, dredged (2). Forty Baskets Beach, North Harbour (2). Fairlight, North Harbour, on mixed short algae (4); under stones (1). Near Fairlight Pool, on coralline algae (9). S.E. side of Reef Bay, North Harbour (6). Chinamans Beach, Middle Harbour, 5 m (9). Wyargine Pt., Middle Harbour, on algae (10). Middle Harbour (4). Middle Head (many). Off Sow and Pigs Reef, Sydney Harbour, 11-16 m (21). E. side of Sow and Pigs Reef, 3.6 m (6). Bottle and Glass Rocks, Sydney Harbour, 9 m (4). 5 km E. of Long Pt., Malabar, Sydney, 39 m (2). Ocean beach, Kurnell, Botany Bay (1). Gunnamatta Bay, Port Hacking (1). Shell Harbour, on algae (1). Honeymoon Beach, Jervis Bay, on short turf, red and brown algae, low tide (13). S. side of Ulladulla, on small brown algae, sheltered reef, outside breakwater (8). On seaward side of long rocky point, Batehaven, Batemans Bay, on red algae, medium exposure (many). Wimbie Beach, Batemans Bay, on fairly exposed rocks, on coralline algae (many); under stones (9). Bermagui (19). Twofold Bay, Eden, on coralline algae (13). Bitangabee, N. side of Green Cape, on coralline algae, in sheltered pool (12); under stones medium exposure (2). Green Cape, Disaster Bay side, 15 m (1). *Tasm*. Murray Pass., Deal Is., Bass Strait, 30-50 m, on algae (many/many wet). East Cove, Deal Is., 6-15 m (13/40w). Little Squally Cove, Deal Is., 10-30 m, on algae (many/many wet). Deal Is., 6 m, on algae (9). S. of Cape Lodi, 28 m (6). Pirates Bay, Eaglehawk Neck, on brown algae, on intertidal rocks (25/7w); under stones (9). Eaglehawk Neck (23). Primrose Pt., Frederick Henry Bay., on matted green algae, low tide (1); on matted algae (16/22w); on coralline algae (11); low tide (9). *Vic.*: E.S.E. side Gabo Is., 21 m, on red algae (11); 15-18 m, on algae and detritus (6). S.S.E. side Gabo Is., 28 m, on red algae (28). Between Eagle and Crawfish Rock, Western Port, 3-6 m (8). Portarlington, Port Phillip Bay, mixed coralline, brown algae and *Caulerpa*, low tide (48). *S.A.*: 3 km S. of Normanville, on rock-strewn platform, medium exposure (2). Tumby Bay (3). Pearson Is., Investigator Group, 18 m on algae (3). *S.W.A.*: Mississippi

Bay., 48 km E. Esperance, 0-2 m, on algae, sheltered side of W. head of bay (1). Hopetoun Jetty, 0-2 m, on algae, semi exposed-semi sheltered reef (3), South Pt., S. of Two Peoples Bay, near Albany, 0-2 m, on algae in large sheltered pool, outer coast, low tide (2). Kilcarnup, N. side of Margaret River (3). Quininup (5). Yallingup,on algae, on limestone platform (many/many wet). N. side Cape Naturaliste lighthouse, under stones, low tide (many/many wet). Cape Naturaliste (2). Bunker Bay, 11 km W. of Dunsborough, 1-3 m, on short algae, semi-sheltered (8). Dunsborough, on short algae and coralline algae, low tide (42); 1-2 m, *Cymadocea* washings (5/3w). 4-8 km off Peppermint Grove, between Bunbury and Busselton, 4-8 m (31). *W.A.*: S. side Pt. Peron, S. of Fremantle, on algae and *Posidonia*, sheltered (5). Pt. Peron, 2-3 m (9); 0-4 m, sheltered side, on *Posidonia* and algae (9). S.W. side Pt. Peron, 3.5 m, on algae, exposed (many). S.W. end of Garden Is., off Fremantle (30); 0-3 m, on algae (30/15w). Garden Is. (24). W. side Carnac Is., on rubble, low tide (8); 4-8 m, on algae (many/2w). Woodmans Pt., S. of Fremantle, on coralline algae, low tide (11); on *Caulerpa* (4/7w); under stones (2); on algae, 1-3 m (21w). W. end Salmon Bay, Rottnest Is., *Lithothamnion* washings from reef edge (5). W. end reef, Rottnest Is., *Lithothamnion* washings from intertidal reef edge (6). Eagle Bay, Rottnest Is., *Lithothamnion* washings from reef edge (2). W. end Thomson Bay, Rottnest Is., 0-2 m, on coralline algae (many); on mixed algae (many). North Pt., Rottnest Is., on coralline algae, protected reef (many/22w). Triggs, Perth, 0-2 m, *Caulerpa* washings on platform, open coast (20); on coralline algae, on platform, open coast (many/20w). Cottesloe Beach, Perth, 0.5 m, on calcareous algae (20/3w). Cottesloe Reef, Perth, on algae (6).

FOSSIL RECORD. Upper Pliocene; Cameron Inlet Formation — Hills Dam at foot of Dutchman (E. side), Flinders Is., Bass Strait (NMV).

DISTRIBUTION AND HABITAT. North Stradbroke Is., southern Queensland to Tasmania and the south coast of Australia and Western Australia to Perth area (including Rottnest Is.), common on algae in the littoral and sublittoral (fig. 24).

REMARKS. This species shows considerable geographic and intrapopulation variation. Typical forms which have broadly pupoid, almost smooth to very weakly axially costate shells (figs 5d, 17a) are the predominant form encountered in N.S.W. The southern coast and Tasmanian populations have similar shells which generally tend to develop a row of weak nodules abapical to the suture and many specimens are slightly more elongately pupoid than the normal N.S.W. form. Western Australian specimens often develop rather distinct axial riblets and have a conspicuous row of nodules abapical to the suture (fig. 17f). There appears to be a complete, probably clinal, gradation between these forms.

The radulae of the N.S.W. and Western Australian specimens examined differ in the Western Australian specimens having 3 (not 2) more prominent projections on the basal part of the inner marginal teeth and 4 (not 2) cusps distally. In view of the virtually continuous distribution of this species around the southern coast and the probable clinal nature of the shell variation, the differences in radular structure are here assumed not to be important and may also follow a clinal pattern.

Pseudopisinna gregaria rugifera subsp. nov.

Figs 5f; 17j-l

Derivation of name: *rugiferus* (Latin) = bearing wrinkles.

DESCRIPTION. *Shell.* Minute, pupoid, solid, nonumbilicate, dark brown with strong axial ribbing. Protoconch of 1½ whorls; teleoconch of 3¼ very weakly convex whorls,

sculptured with prosocline, closely spaced axial ribs; rather weak and indistinct in a few specimens but well-developed in most. A narrow, usually distinct groove abapical to suture with a row of nodules corresponding to ribs between groove and suture; axials often weakly nodular immediately abapical to groove; base smooth except for growth lines; axials weak on last ¼ of body-whorl. Aperture circular, inner lip broad, edge convex, separated from base in abapical portion; outer lip weakly prosocline. Suture bent abapically just abapertually to outer lip. Colour dark brown, translucent yellowish-brown on last ⅛ of body whorl, inner lip slightly darker than rest of shell.

Dimensions

	Length	Diameter
Holotype	1.04 mm	0.58 mm
Paratype	0.98 mm	0.56 mm
Figured specimen Heron Is., Qld (SEM stub no. 208)	0.94 mm	0.52 mm

Operculum. Typical of genus (fig. 17k).

Radula. Identical to that of *P. gregaria gregaria* from Western Australia (see Remarks under *P. gregaria gregaria*) (fig. 17l).

Opercula and radulae examined from S.W. side of Heron Is., Qld (SEM stub no. 208).

Head-foot. As in *P. gregaria gregaria*.

TYPES. Holotype (C. 106225) and many paratypes (C. 106226 and C. 106227), AM; 5 paratypes (MO 6318), QM.

TYPE LOCALITY. S. side of Heron Is., Qld, opposite research station, in coral rubble with algal coating, 2-8 m, 27 Dec. 1976, coll. W. F. Ponder.

ADDITIONAL MATERIAL EXAMINED. *New Caledonia*: 6 km N.W. of Gatope Is., off Voh, 2-4 m, amongst sand, weed and rubble on inner edge of barrier reef (ANSP 269517) (2). *Qld:* Heron Is. (9); N. side, in coral rubble, in outer part of lagoon (18/22w); 3 km E. of Is., in lagoon, on weed, on coral 'bommie' (1); off S.E. side, 6 m (1); S.W. side, in coral rubble behind reef crest (many/many wet); on red algae, outer reef crest on S.W. side (5). Off Moreton Bay, 75-80 m (1).

DISTRIBUTION AND HABITAT. Heron Island, Capricorn Group, Great Barrier Reef, Queensland and New Caledonia, on algae and rubble, lower littoral and sublittoral (fig. 24).

REMARKS. This subspecies does not differ greatly from the Western Australian form of *P. gregaria gregaria* except that the axial costae are more strongly and regularly developed. Because no record of *P. gregaria gregaria* is known north of North Stradbroke Island on the east coast of Australia despite suitable habitat being sampled fairly extensively, it is assumed that there is a real break in the distribution of *P. gregaria* resulting in the effective isolation of a subspecies apparently restricted to the southern Barrier Reef and New Caledonia. There are no records of *P. gregaria* along the northern coast or north Queensland but the similarity of the shell and radula of the Queensland subspecies to the Western Australian form of *gregaria* suggest that the present distribution of *P. gregaria rugifera* may be a relic of a previously continuous tropical Australian distribution.

A single damaged specimen dredged off Moreton Bay is tentatively referred to this subspecies. The shell is pale and may be a Pleistocene fossil.

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LIST OF AUSTRALIAN AND TROPICAL INDO-PACIFIC SPECIES OF THE CINGULOPSIDAE

Eatonina (Eatonina)

ardeae nov., Capricorn Group, Qld.
capricornea (Hedley, 1907), Qld.
colorata nov., New Hebrides.
condita nov., Tasm., Vic., S.A.
hedleyi nov., N.S.W.
heliciformis nov., New Hebrides, New Caledonia.
hutchingsae nov., S. Qld., N.S.W., Tasm., E. Vic.
lactea nov., Cook Ids.
lunata (Laseron, 1956), Qld, Papua-New Guinea, New Caledonia
pulicaria pulicaria (Fischer (in Folin & Périer, 1873)), Mauritius.
pulicaria pacifica nov., New Hebrides.
rubrilabiata nov., N.S.W.
sanguinolenta nov., Tasm., Vic., S.A.
shirleyae nov., S.W.A.
striata nov., W.A.

(Coriandria)
fulvicolumella nov., S. N.S.W., Tasm., S.A.
rubicunda nov., S.A.

(Captitonia)
lirata nov., W.A.

Eatoniopsis (Boogina)
voorwindei nov., N.S.W., N. Tasm.

(Rufodardanula)
castanea (Laseron, 1950), S.Qld., N.S.W., Tasm., E. Vic.
porcellana nov., Capricorn Group, Qld.

(Pilitonia)
translucida nov., New Hebrides
westralis nov., W.A.

Tubbreva
insignificans nov., W.A.
parva nov., S. Qld.

Pseudopisinna
(?) alvea (Laseron, 1950), N.S.W.
balteata nov., N. Qld, Papua New Guinea, New Caledonia.
costata nov., W.A.
gregaria gregaria (Laseron, 1950), S. Qld, N.S.W., Vic., Tasm., S.A., W.A.
gregaria rugifera nov., Capricorn Group, Qld., New Caledonia.

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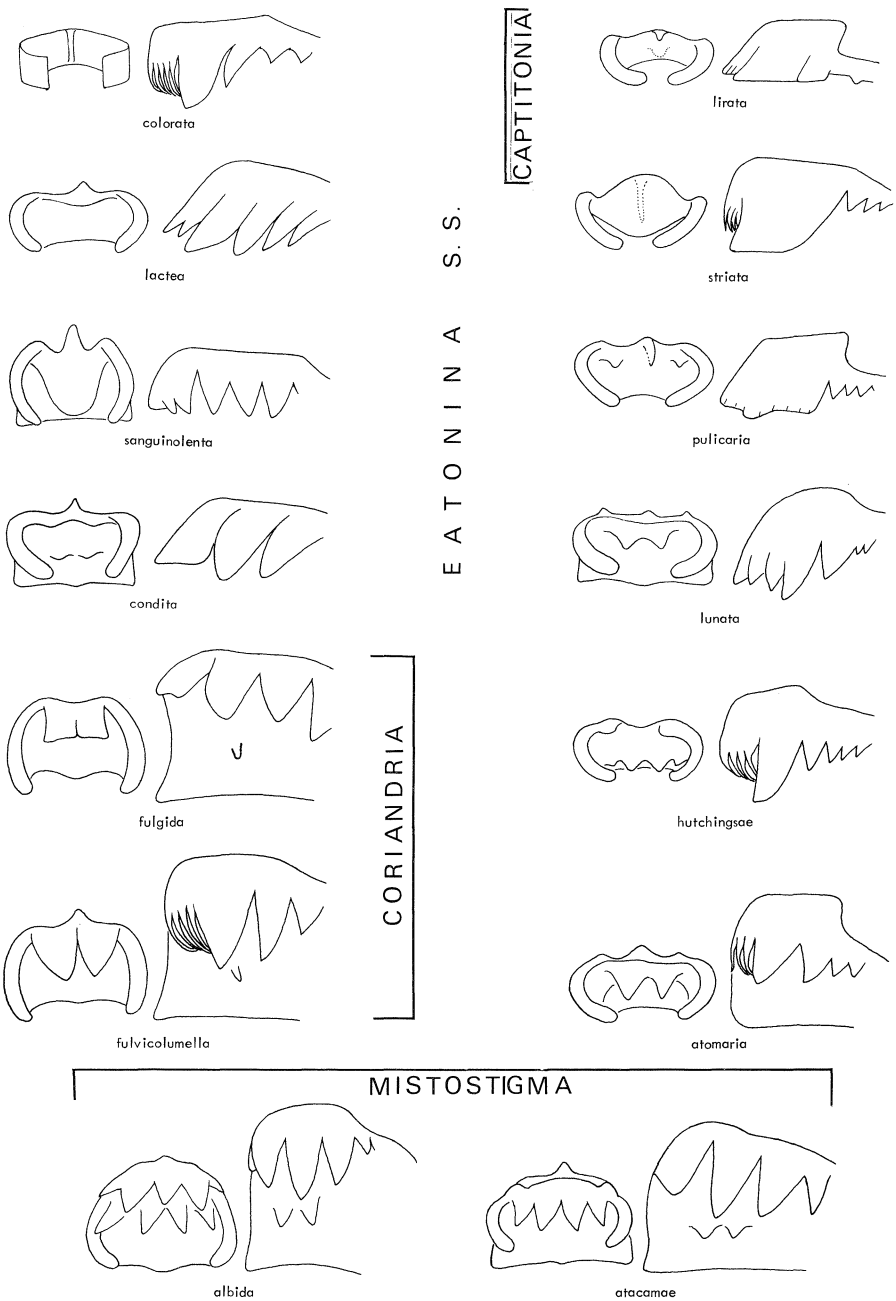

Fig. 1. A diagramatic representation of the relationships of species of *Eatonina* as expressed by radular characters. For further explanation see text.

Fig. 2

a. *Eatonina (Eatonina) capricornea* (Hedley) holotype. Masthead Is., Qld, AM (C. 19354). 1.54 mm x 1.05 mm.
b. *Eatonina (Eatonina) ardeae* sp. nov. holotype. Heron Is., Qld, AM (C. 106169). 1.02 mm x 0.64 mm.
c. *Eatonina (Eatonina) ardeae* sp. nov. (banded specimen) Heron Is., Qld, AM (C. 106191). 1.00 mm x 0.66 mm.
d. *Eatonina (Eatonina) sanguinolenta* sp. nov. holotype. Pt. Sinclair, S.A., AM (C. 106202). 1.46 mm x 0.92 mm.
e. *Eatonina (Eatonina) condita* sp. nov. holotype. Goat Is., near Ulverstone, N. Tasm., AM (C. 107151). 1.30 mm x 0.80 mm.
f. *Eatonina (Eatonina) hutchingsae* sp. nov. holotype. Caloundra, Qld, AM (C. 106175). 1.24 mm x 0.83 mm.
g. *Eatonina (Eatonina) rubrilabiata* sp. nov. holotype. Batehaven, Batemans Bay, N.S.W., AM (C. 106184). 1.33 mm x 0.90 mm.
h. *Eatonina (Eatonina) striata* sp. nov. holotype. Carnac Is., off Fremantle, W.A., AM (C. 106189). 1.08 mm x 0.70 mm.
i. *Eatonina (Eatonina) shirleyae* sp. nov. holotype. Mississippi Bay, E. of Esperance, S.W.A., AM (C. 106187). 1.37 mm x 0.94 mm.

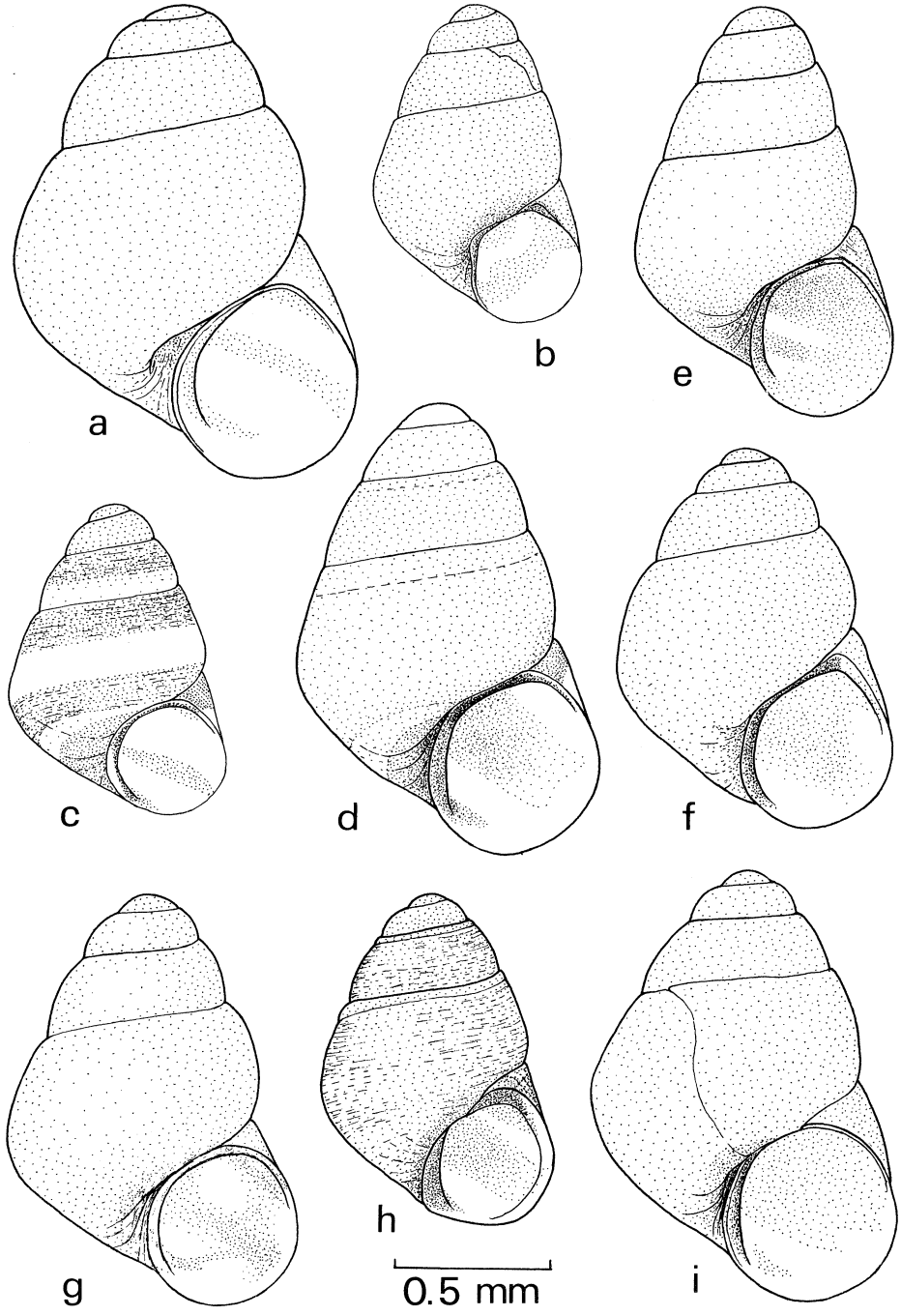
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Fig. 3

a. *Eatonina (Eatonina) colorata* sp. nov. holotype. Port Vila, Efate, New Hebrides, AM (C. 106193). 0.88 mm x 0.60 mm.
b. *Eatonina (Eatonina) pulicaria pulicaria* (Fischer) ?paratype. Mauritius, AM (C. 106213). 1.13 mm x 0.78 mm.
c. *Eatonina (Eatonina) pulicaria pacifica* subsp. nov. holotype. Port Vila, Efate. New Hebrides, AM (C. 106179). 1.20 mm x 0.82 mm.
d. *Eatonina (Eatonina) heliciformis* sp. nov. holotype. Port Vila, Efate, New Hebrides, AM (C. 106172). 0.95 mm x 0.82 mm.
e. *Eatonina (Eatonina) hedleyi* sp. nov. holotype. Off Sow and Pigs Reef, Sydney, N.S.W., AM (C. 106267). 0.77 mm x 0.66 mm.
f. *Eatonina (Eatonina) lactea* sp. nov. holotype. Aitutaki, N. Cook Ids, ANSP (278391). 1.54 mm x 0.84 mm.
g. *Eatonina (Eatonina) lunata* (Laseron) holotype. Bowen, Qld, AM (C. 105673). 1.86 mm x 1.10 mm.
h. *Eatonina (Coriandria) fulvicolumella* sp. nov. holotype. South Bruny Is., S. Tasm., AM (C. 106195). 1.15 mm x 0.75 mm.
i. *Eatonina (Coriandria) rubicunda* sp. nov. holotype. Elliston, S.A., AM (C. 106197). 1.22 mm x 0.83 mm.

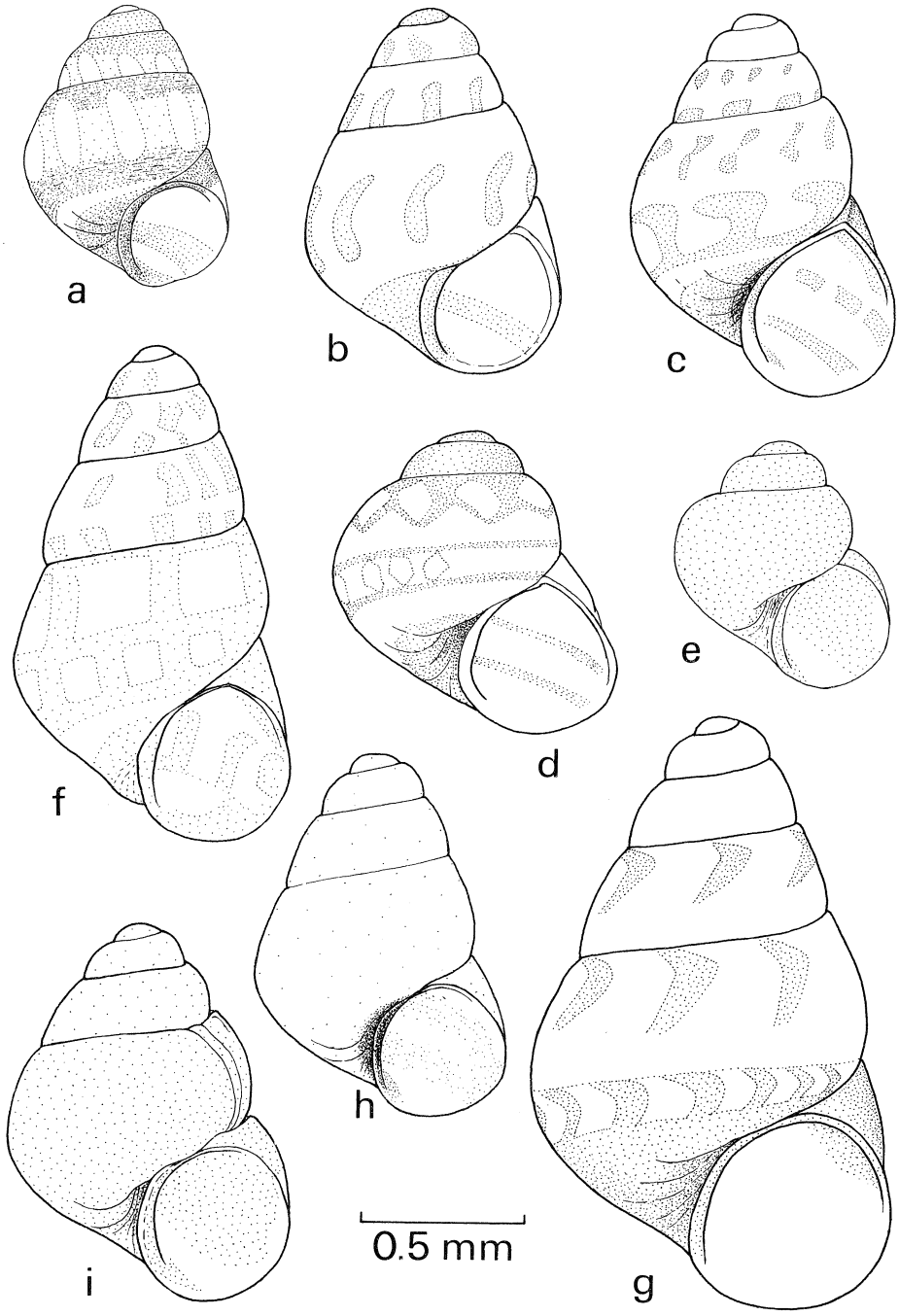
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Fig. 4

a. *Eatonina (Captitonia) lirata* sp. nov. holotype. Garden Is., off Fremantle, W.A., AM (C. 106206). 1.00 mm x 0.64 mm.
b. *Eatoniopsis (Rufodardanula) castanea* (Laseron) lectotype. Middle Harbour, Sydney, N.S.W., AM (C. 105674). 1.30 mm x 0.88 mm.
c. *Eatoniopsis (Rufodardanula) porcellana* sp. nov. holotype. Heron Is., Qld, AM (C. 106209). 1.06 mm x 0.67 mm.
d. *Eatoniopsis (Rufodardanula)* cf. *porcellana* sp. nov. Heron Is., Qld, AM (C. 106212). 0.81 mm x 0.54 mm.
e. *Eatoniopsis (Pilitonia) translucida* sp. nov. holotype. Tanna Is., New Hebrides. AM (C. 106216). 0.60 mm x 0.73 mm.
f. *Eatoniopsis (Pilitonia) westralis* sp. nov. holotype. Mississippi Bay, E. of Esperance, S.W.A., AM (C. 106219). 0.87 mm x 0.90 mm.
g. *Eatoniopsis (Boogina) voorwindei* sp. nov. holotype. Green Cape, N.S.W., AM (C. 106214). 1.56 mm x 1.06 mm.
h,i. *Tubbreva insignificans* sp. nov. holotype. Quininup, S.W.A., AM (C. 106473). 0.90 mm x 0.50 mm.
j. *Tubbreva parva* sp. nov. holotype. Caloundra, Qld, AM (C. 106221). 0.91 mm x 0.55 mm.

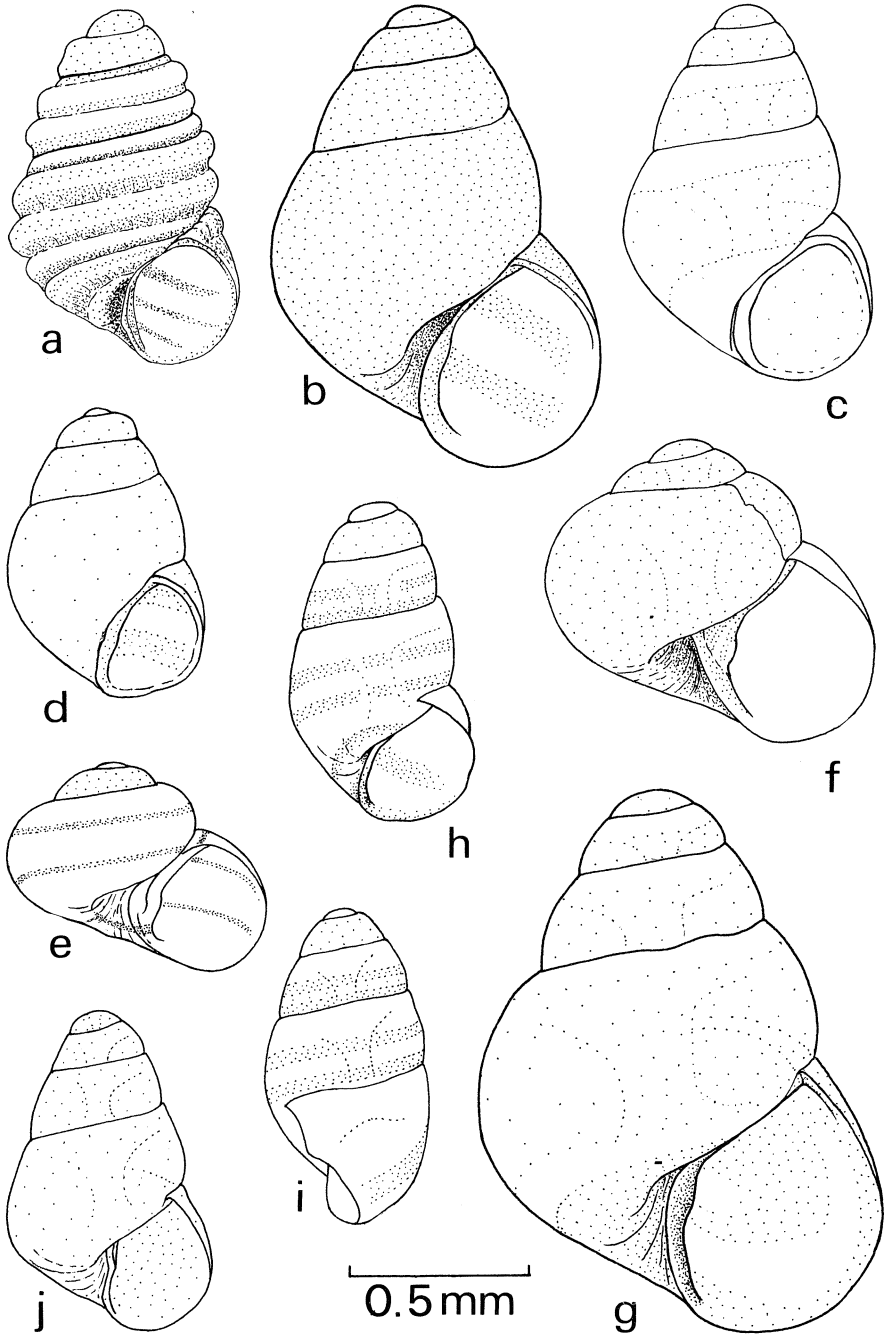
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Fig. 5

a. *(?)Pseudopisinna alvea* (Laseron) holotype. Sow and Pigs Reef, Sydney, N.S.W., AM (C. 106224). 0.92 mm x 0.48 mm.
b. *Pseudopisinna balteata* sp. nov. holotype. Yam Is., Torres Strait, Qld, AM (C. 106228). 0.94 mm x 0.57 mm.
c. *Pseudopisinna costata* sp. nov. holotype. Houtman Abrolhos, W.A., AM (C. 106230). 1.00 mm x 0.50 mm.
d. *Pseudopisinna gregaria gregaria* (Laseron) lectotype. North Harbour, Sydney, N.S.W., AM (C. 105676). 1.13 mm x 0.64 mm.
e. *Pseudopisinna gregaria gregaria* (Laseron) Long Reef, Collaroy, Sydney, N.S.W., AM (C. 108264). 1.06 mm x 0.61 mm.
f. *Pseudopisinna gregaria rugifera* subsp. nov. holotype. Heron Is., Qld, AM (C. 106225). 1.04 mm x 0.58 mm.
g,h. *Eatonina (Eatonina) lunata* (Laseron) head-foot. Palfrey Is. near Lizard Is., Qld.
i. *Eatoniopsis (Rufodardanula) castanea* (Laseron) head-foot. Fairlight, Sydney, N.S.W.
j,k. *Eatonina (Coriandria) cossurae* (Calcara) head-foot. "Tonnara" near San Vito La Capo, W. Sicily, Italy.
l,m. *Eatonina (Coriandria) fulgida* (Alder) head-foot. Wembury, England.

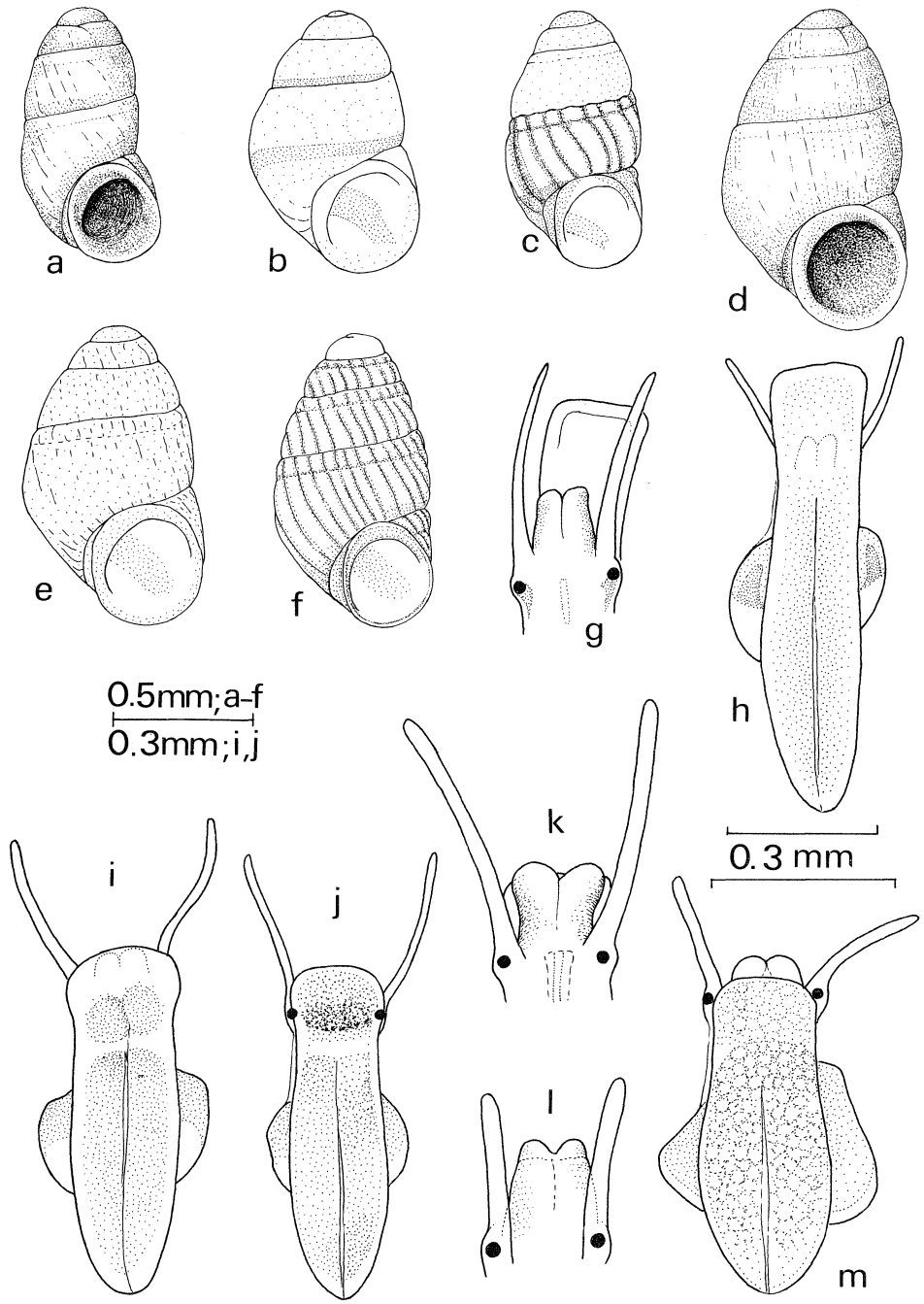
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Fig. 6

Eatonina (Eatonina) ardeae sp. nov. **a.** shell — 1.16 mm x 0.73 mm, **b.** shell (banded form) — 1.12 mm x 0.68 mm, **c.** operculum — x 180, **d.** radula — x 1500. S. side of Heron Is., Qld, SEM stub nos 476 (a, c, d) and 490 (b).

Eatonina (Eatonina) rubrilabiata sp. nov. **e.** shell — 1.28 mm x 0.83 mm, **f.** operculum — x 170, **g.** radula — x 1700. Batehaven, Batemans Bay, N.S.W., SEM stub nos 459 (operculum), 460 (shell and radula).

Eatonina (Eatonina) shirleyae sp. nov. **h.** shell — 1.35 mm x 0.91 mm, **i.** operculum — x 140, **j.** radula — x 1400. Mississippi Bay, E. of Esperance, S.W.A., SEM stub no. 148.

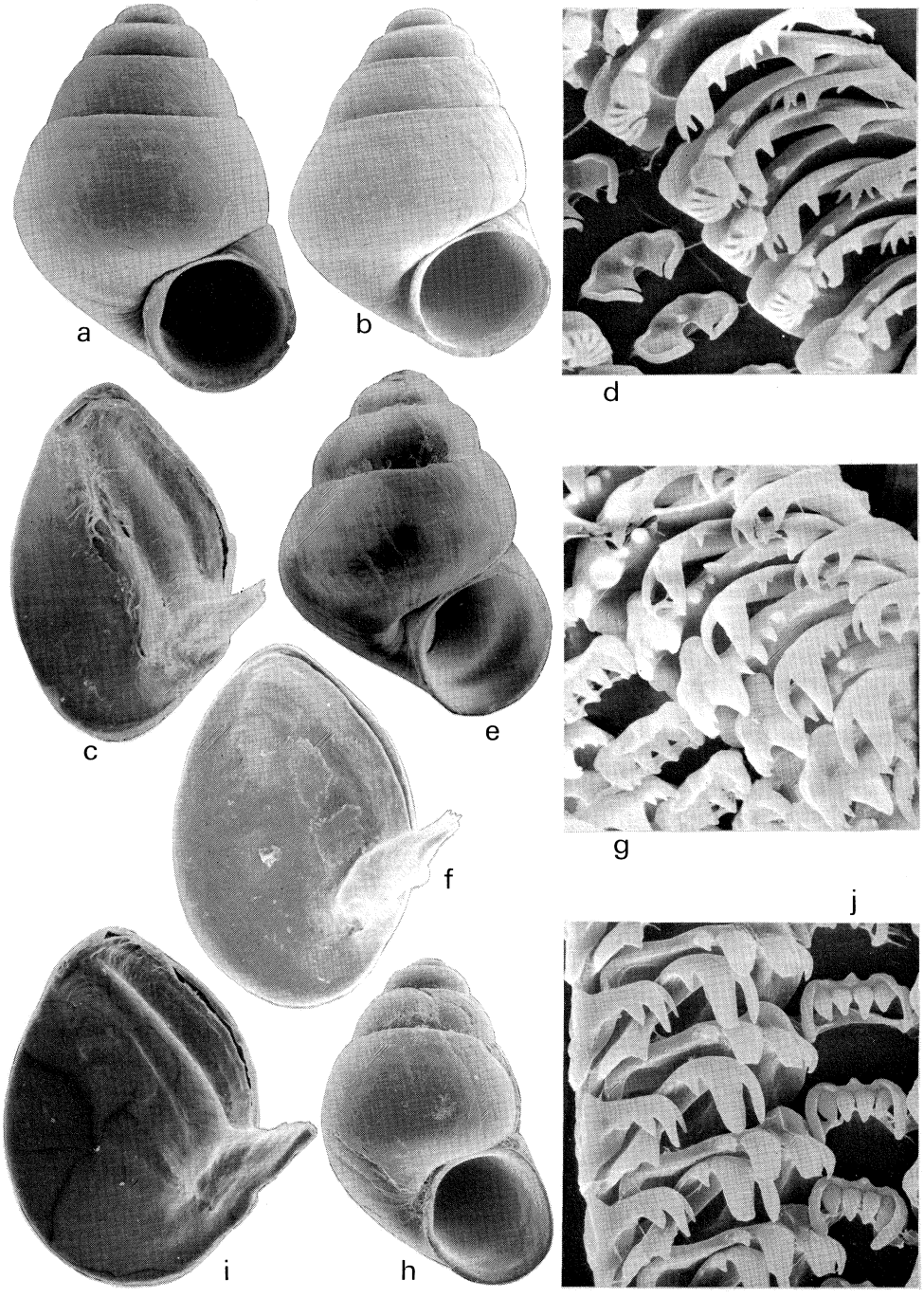
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Fig. 7

Eatonina (Eatonina) colorata sp. nov. **a.** shell — 0.90 mm x 0.62 mm, **b & c.** opercula — both x 220, **d.** radula — x 2700, **e.** radula — x 2000. Pt. Ardel, Port Vila, Efate, New Hebrides, SEM stub nos 138 (shell), 479 (opercula, radulae).

Eatonina (Eatonina) pulicaria pulicaria (Fischer) **f.** shell — 1.08 mm x 0.68 mm, **g.** operculum — x 160, **h.** radula — x 1200. Arsenal Bay, Mauritius, SEM stub no. 306, **i.** shell — 1.16 mm x 0.70 mm, **j.** radula — x 960. S. side Tombeau Bay, W. Mauritius, SEM stub no. 494, **k.** operculum — x 170. Pt. Fayette, E. Mauritius, SEM stub no. 495.

Eatonina (Eatonina) pulicaria pacifica subsp. nov. **l.** shell — 1.30 mm x 0.87 mm, **m.** operculum — x 130, **n.** radula — x 550. Port Vila, Efate, New Hebrides, SEM stub no. 107.

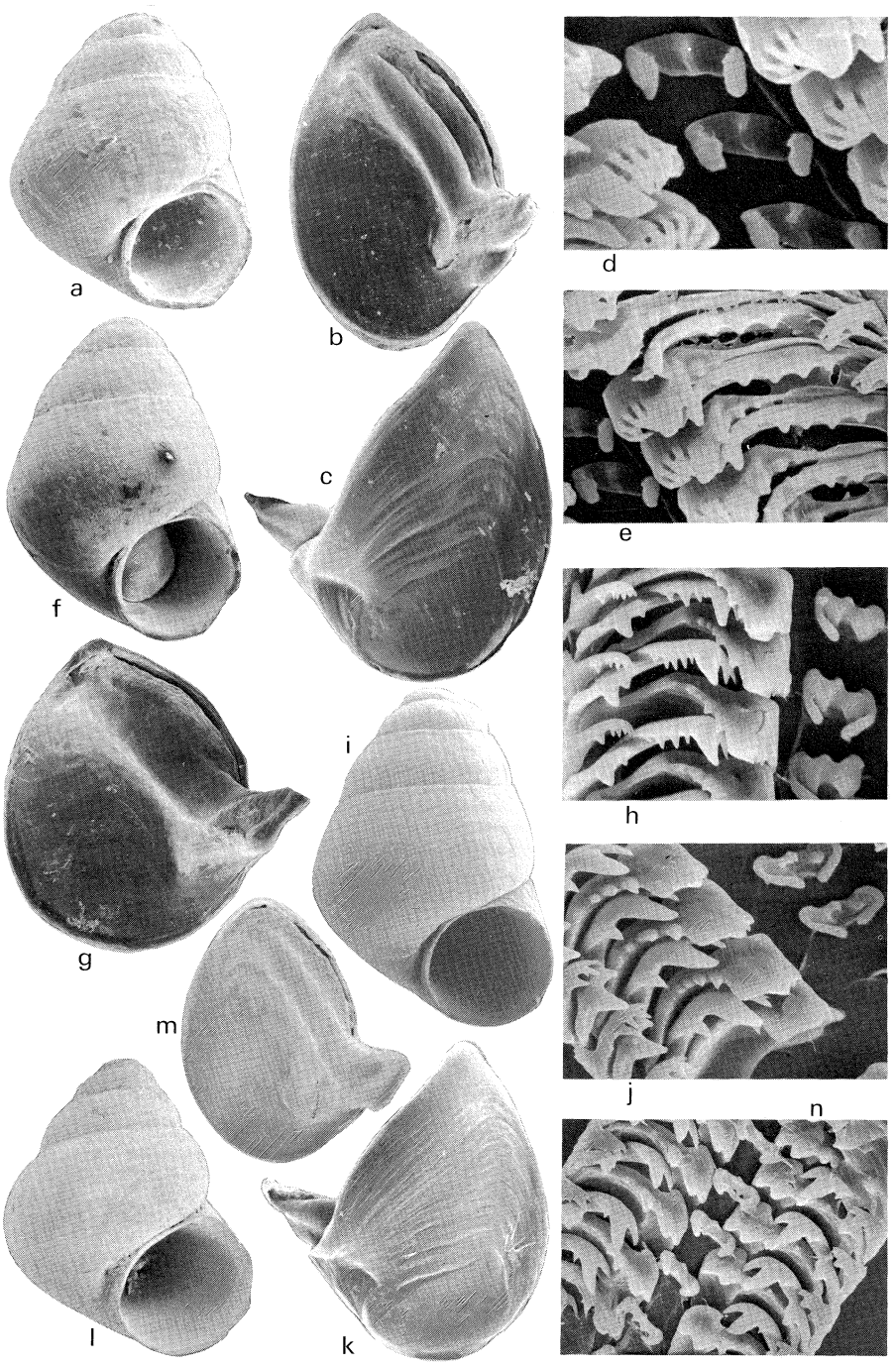
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Fig. 8

Eatonina (Eatonina) lunata (Laseron) **a & b.** shells (apertural and side views) — 2.20 mm x 1.18 mm, **e.** radula — x 1200. Lizard Is., Qld, SEM stub nos 157, 167. **c.** shell— 1.48 mm x 0.88 mm, **d.** operculum — x 110. Ile Signal, off Nouméa, New Caledonia, SEM stub no. 140.

Eatonina (Eatonina) capricornea (Hedley) **f & g.** shells — **f.** 1.55 mm x 1.00 mm, **g.** 1.44 mm x 0.90 mm, **h.** operculum — x 100, **i.** radula — x 1400, **j.** radula — x 700. Masthead Is., Qld, SEM stub nos 444 (radula), 445 (shells and operculum).

Eatonina (Eatonina) lactea sp. nov. **k.** shell — 1.52 mm x 0.80 mm, **l & m.** operculum — both x 150, **n.** radula — x 2200, **o.** radula — x 1400. Aitutaki, N. Cook Ids, SEM stub nos 493 (l., m., n.), 527 (k, o).

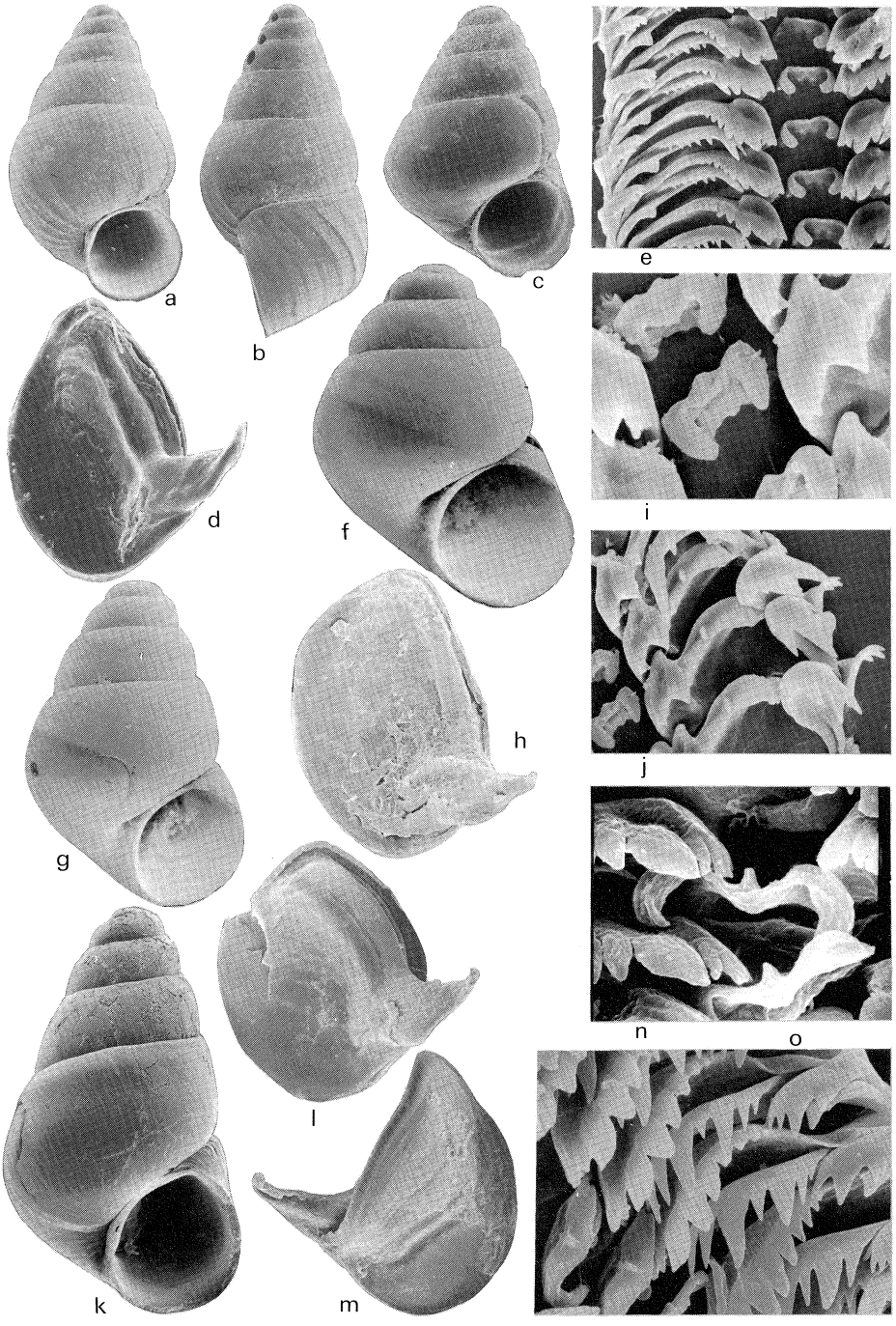
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Fig. 9

Eatonina (Eatonina) condita sp. nov. **a.** shell — 1.28 mm x 0.86 mm, **b.** operculum — x 150. Wedge Bay, S. Tasm., SEM stub no. 541. **c & d.** shells — **c.** 1.31 mm x 0.83 mm, **d.** 1.30 mm x 0.87 mm, **e.** radula — x 1100. Goat Is., near Ulverstone, N. Tasm., SEM stub nos 425, 542 (shells), 531 (radula). **f.** radula — x 1300. Normanville, S.A., SEM stub no. 438.

Eatonina (Eatonina) sanguinolenta sp. nov. **g.** shell — 1.42 mm x 0.90 mm, **h.** operculum — x 120, **i.** radula — x 1500, **j.** radula — x 1300. Pt. Sinclair, S.A., SEM stub nos 329 (shell, operculum), 532 (radula).

Eatonina (Eatonina) striata sp. nov. **k.** operculum — x 150, l. radula — x 1500. Carnac Is., off Fremantle, W.A., SEM stub no. 473.

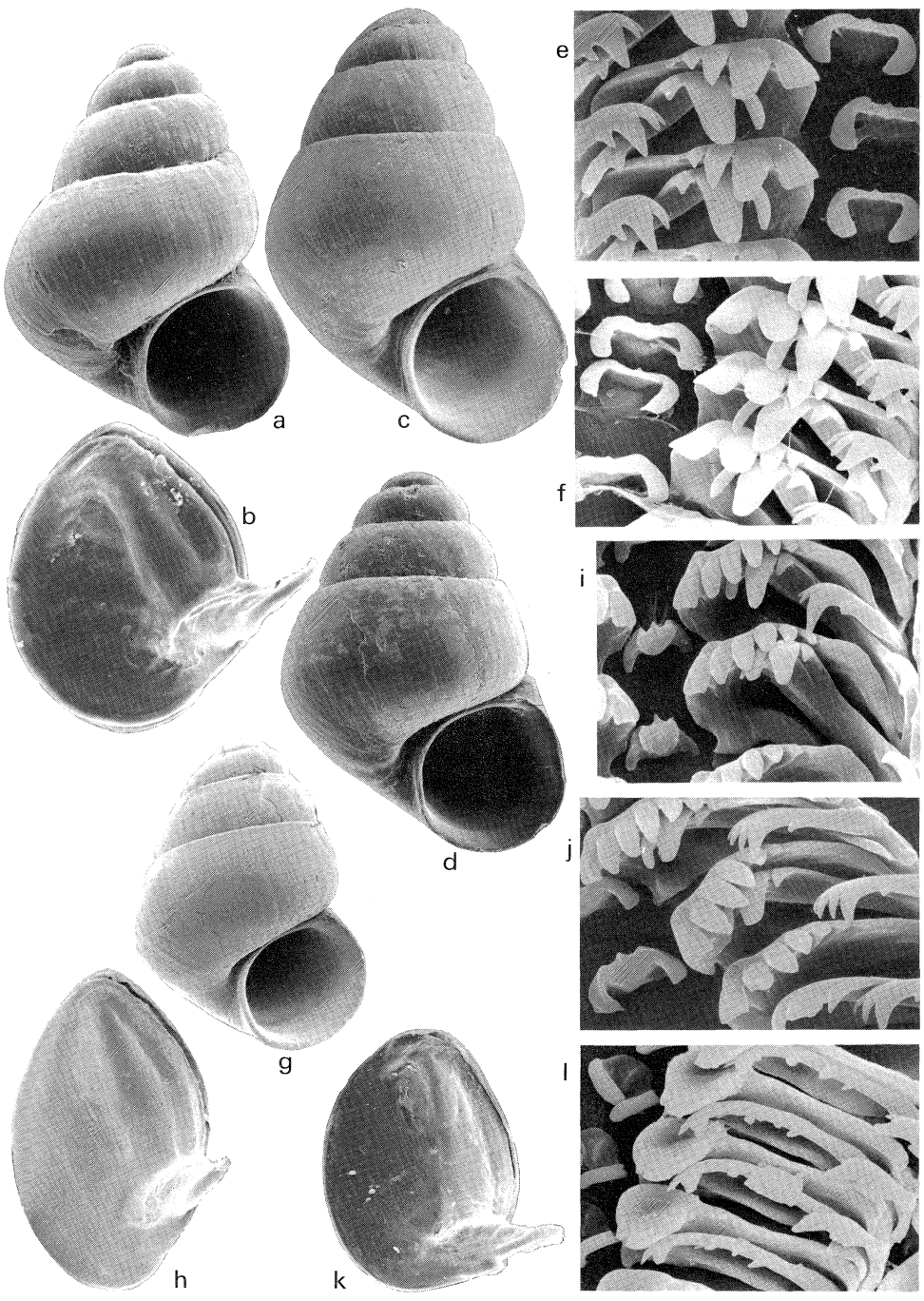
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Fig. 10

Eatonina (Eatonina) hutchingsae sp. nov. **a.** shell — 1.14mm x 0.82mm, **b.** radula (central) — x2200, **c.** radula — x1900. Solitary Is., N.S.W., SEM stub no. 437. **d.** shell — 1.28mm x 0.87mm, **e.** operculum — x110, **f.** radula — x1500. Gabo Is., Vic., SEM stub nos 467 (shell, radula), 135 (operculum).
Eatonina (Eatonina) heliciformis sp. nov. **g.** shell — 0.96mm x 0.76mm, **h.** operculum — x130. Pt. Ardel, Port Vila, Efate, New Hebrides, SEM stub no. 461. **i.** radula — x1000. Magenta, Nouméa, New Caledonia, SEM stub no. 216.
Eatonina (Eatonina) hedleyi sp. nov. **j.** shell — 0.70 mm x 0.66 mm, **k.** operculum — x160, **l.** radula — x1200. Sow and Pigs Reef, Sydney, N.S.W., SEM stub nos 503 (shell & operculum), 487 (radula).

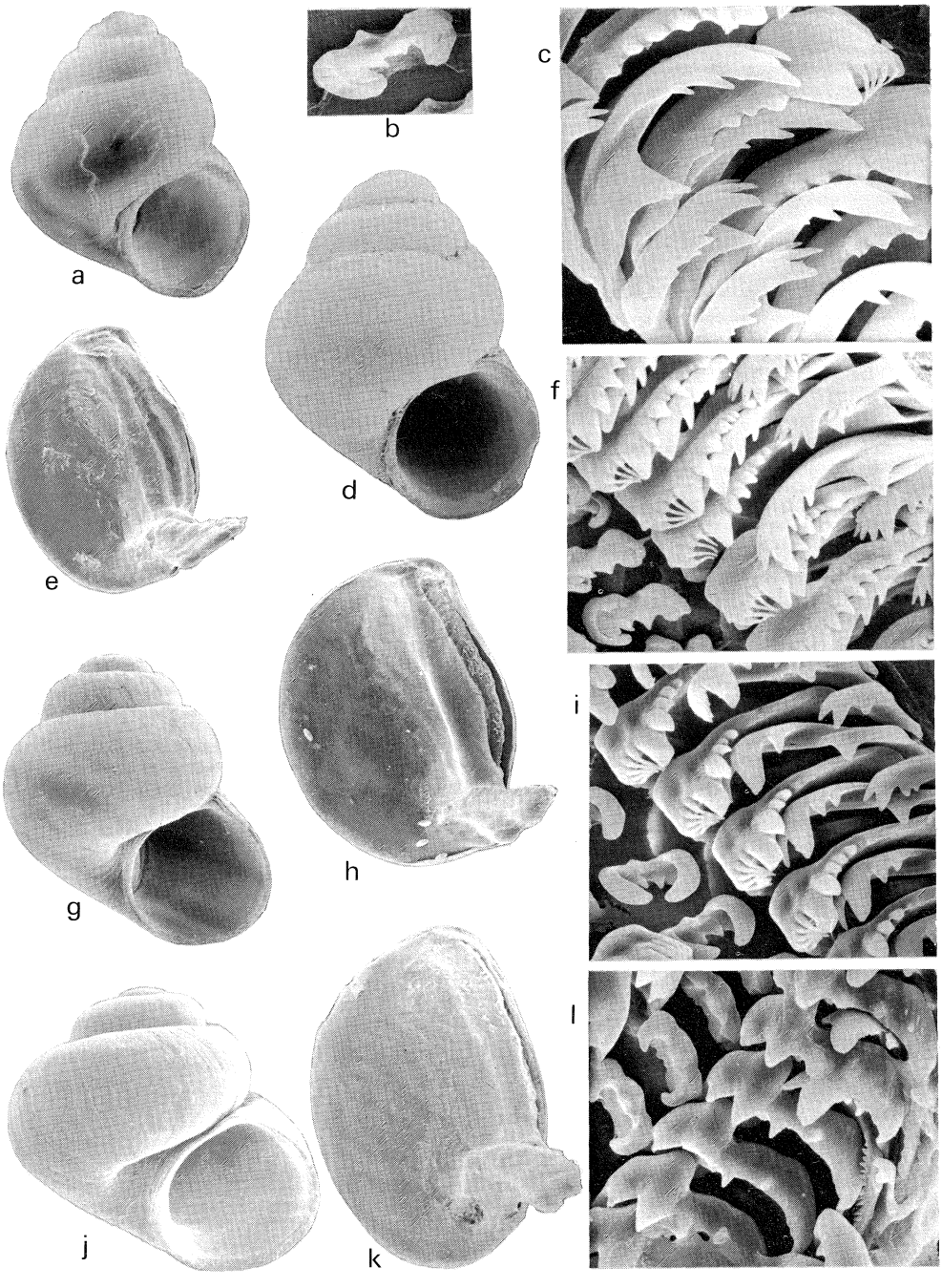
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Fig. 11

Eatonina (Coriandria) fulvicolumella sp. nov. **a.** shell — 1.14 mm x 0.76 mm, **b.** operculum — x160, **c.** radula — x1500. Great Taylor Bay, Bruny Is., S. Tasm., SEM stub no. 385. **d.** radula — x1900. Goat Is., near Ulverstone, N. Tasm., SEM stub no. 531.
Eatonina (Coriandria) rubicunda sp. nov. **e.** shell — 1.28 mm x 0.91 mm, **f.** radula — x2200. Elliston, S.A. SEM stub no. 424.
Eatonina (Coriandria) fulgida (Alder). **g.** shell — 1.04 mm x 0.72 mm, **h & i.** opercula — both x140. Falmouth, England, SEM stub no. 173. **j.** radula — x2200. Torquay, England, SEM stub no. 423.
Eatonina (Coriandria) cossurae (Calcara). **k.** shell — 1.13 mm x 0.70 mm, **l.** operculum — x120, **m.** radula (central — x2800. **n.** radula — x1600. Palermo, Sicily, Italy, SEM stub nos 141 (shell), 144 (operculum & radula).

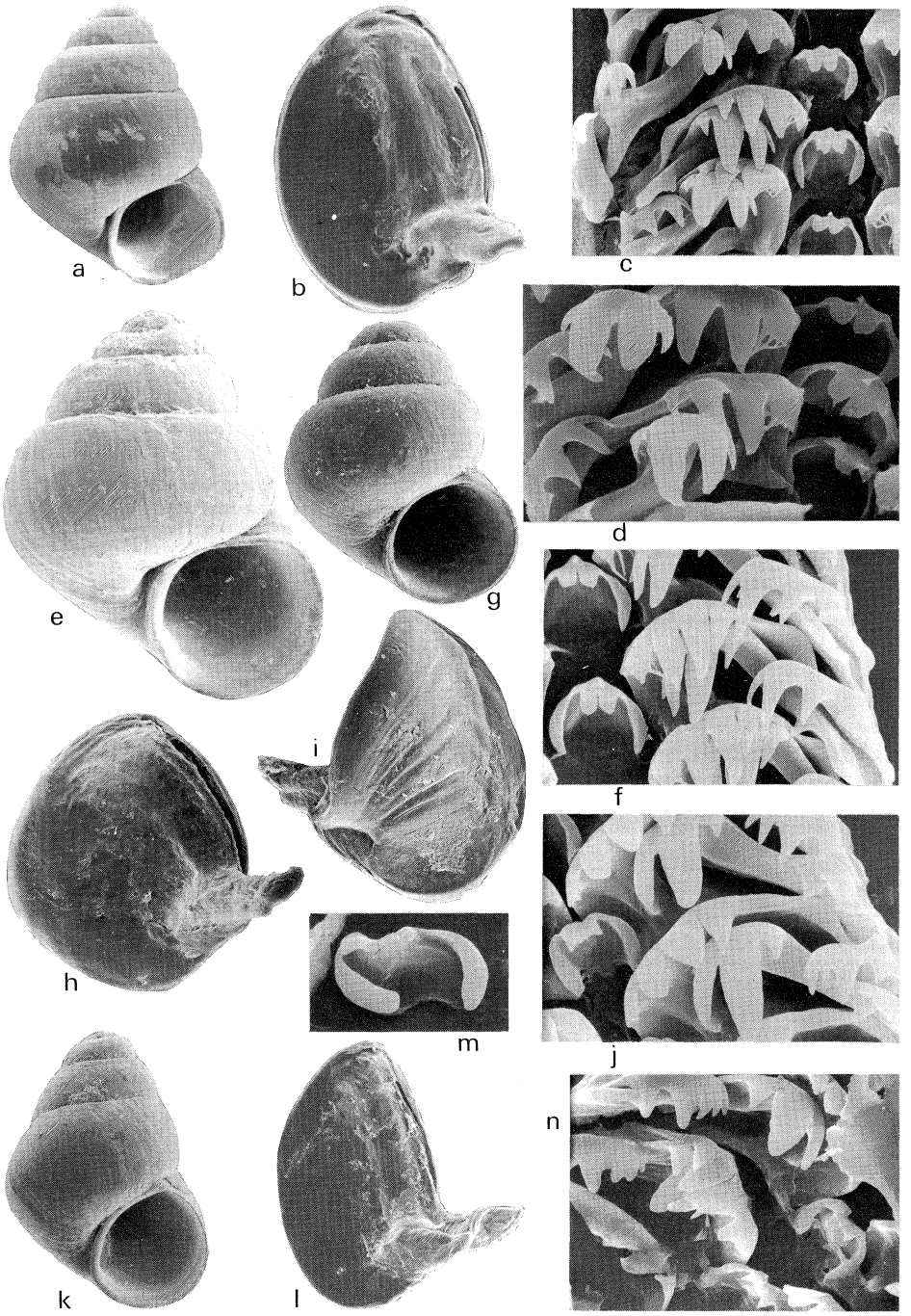
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Fig. 12

Eatoniopsis (Rufodardanula) castanea (Laseron). **a.** shell — 1.18 mm x 0.77 mm, **d.** radula — x4000, **e.** radula — x2000. Fairlight, Sydney, N.S.W. SEM stub no. 137. **b.** operculum — x60. Long Reef, Sydney, N.S.W., SEM stub no. 28. **c.** operculum — x140. Nambucca Heads, N.S.W., SEM stub no. 134. *Eatoniopsis (Rufodardanula) porcellana* sp. nov. **f.** shell — 0.92 mm x 0.60 mm, **g.** operculum — x180, **h.** radula — x2400. One Tree Is., Qld, SEM stub nos 263 (operculum & radula), 463 (shell). *Eatoniopsis (Rufodardanula)* cf. *porcellana* sp.nov. **i.** operculum — x270. Heron Is., Qld, SEM stud no. 478. *Eatoniopsis (Rufodardanula) spadix* Ponder. **j.** shell — 0.92 mm x 0.60 mm, **k.** operculum — x140, **l.** radula — x2600. Goat Island Beach, Leigh, New Zealand, SEM stub no. 466.

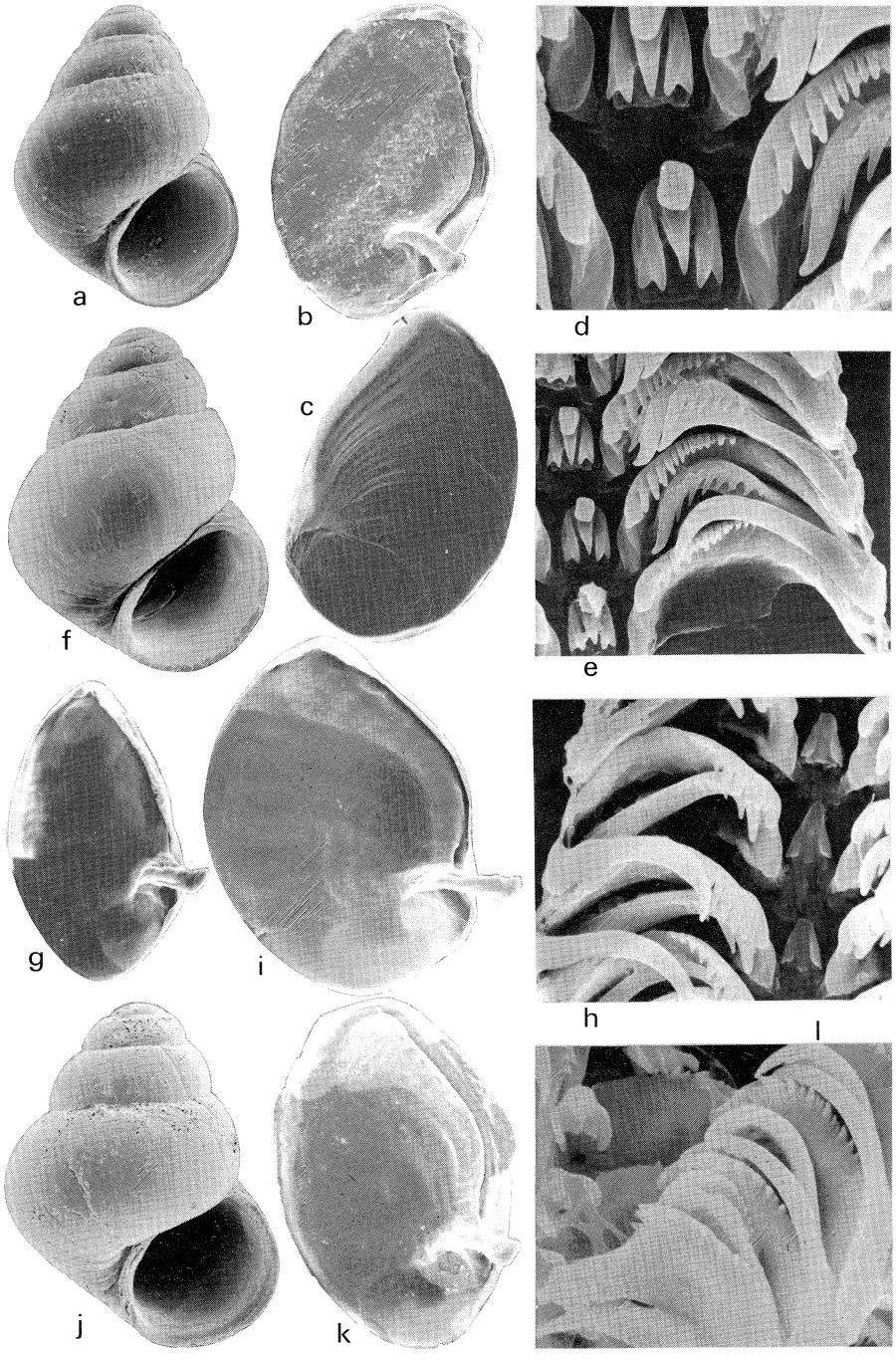
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Fig. 13

Eatoniopsis (Boogina) voorwindei sp. nov. **a.** shell — 1.42 mm x 1.00 mm, **b.** operculum — x110, **c.** radula (central) — x4300, **d.** radula — x1900, **e.** radula — x2100. Green Cape, N.S.W., SEM stub no. 432.

Eatoniopsis (Eatoniopsis) cf. *edwardiensis* (Watson). **f.** shell — 1.70 mm x 1.35 mm. Pointe Geologie Arch., Terre Adélie, Antarctic, SEM stub no. 500. **g.** operculum — x90, **h.** radula (central) — x2800, **i.** radula — x1700. Robertsons Bay, Duke of York Is., Antarctic, SEM stub no. 431.

Eatoniopsis (Eatoniopsis) paludinoides (Smith). **j.** shell — 1.90 mm x 1.35 mm, **k & l.** opercula — both x70, **m.** radula (central) — x2700, **n.** radula — x560. Robertsons Bay, Duke of York Is., Antarctic, SEM stub nos 429 & 430 (n).

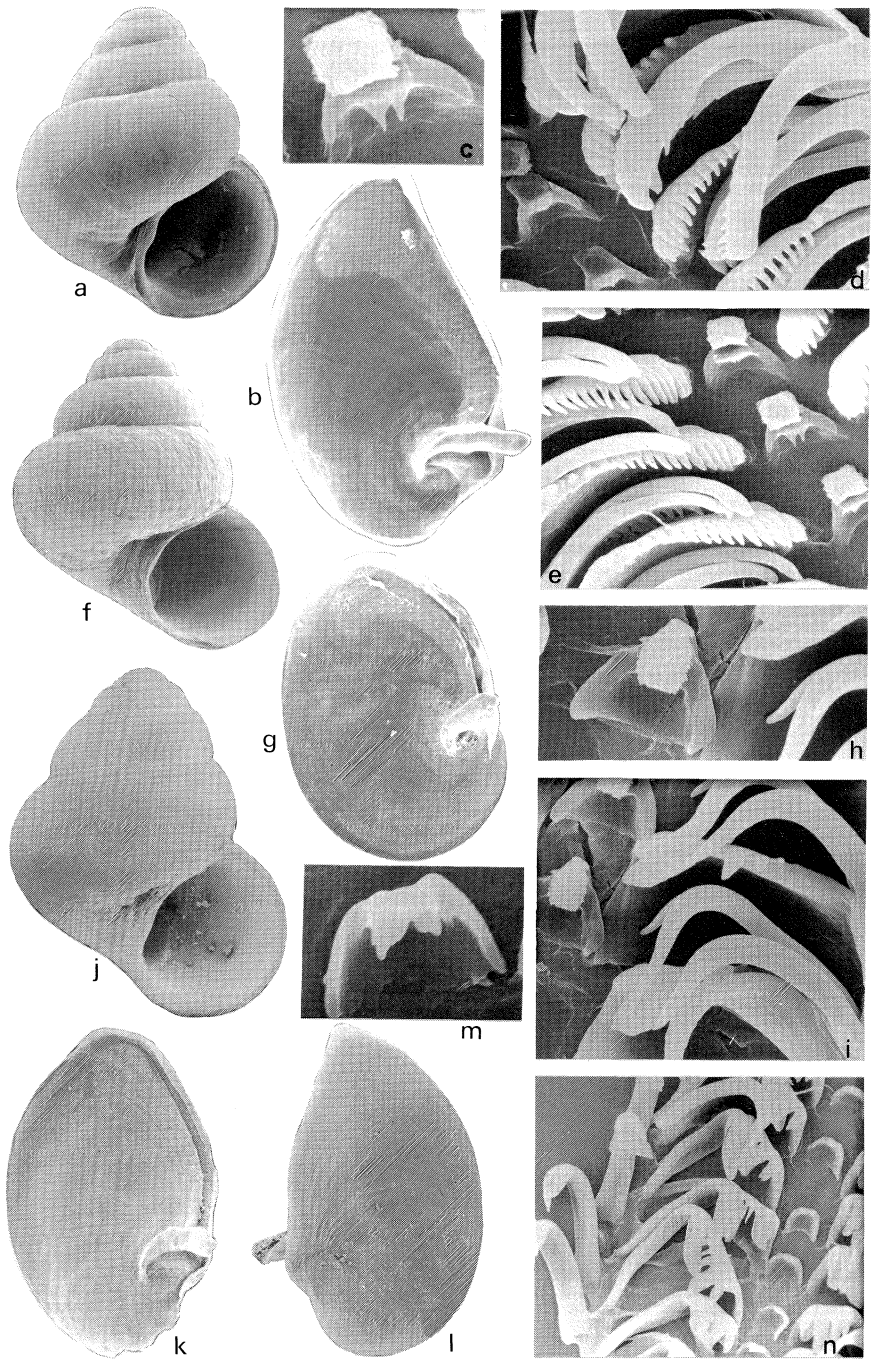
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Fig. 14

Eatonina (Mistostigma) albida (Carpenter). **a.** shell — 1.12 mm x 0.84 mm. N. of Ensenada, Baja California, Mexico, SEM stub no. 141. **b.** operculum — x100, c. radula — x960. Todos Santos Is., Baja California, Mexico, SEM stub no. 185.
Eatonina (Eatonina) atomaria (Powell). **d.** shell — 1.00 mm x 0.76 mm, **e.** operculum — x140, **f.** radula (central) — x3600. **g.** radula — x1300. High Is., Taruikura Bay, Whangerei Head, New Zealand, SEM stub no. 435.
Eatonina (Mistostigma) atacamae Marincovich **h.** radula — x770, **i.** radula (central tooth) — x1400. Iquique, Chile, SEM stub no. 434.
Eatonina (Eatonina) pusilla Thiele. **j.** shell — 1.32 mm x 0.96 mm, **k & l.** opercula — both x110, **m.** radula — x960. Millers Pt., South Africa, SEM stub no. 530.

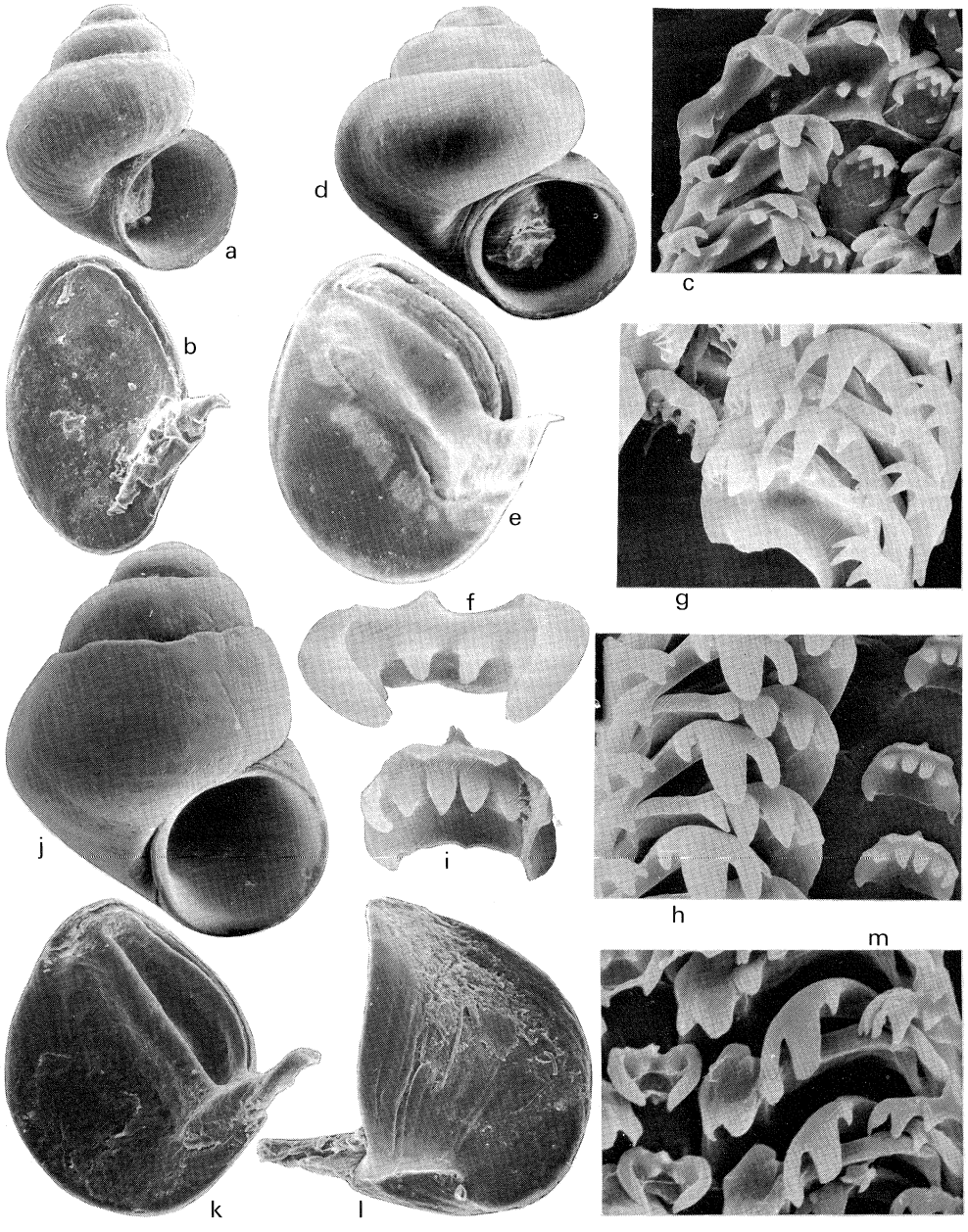
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Fig. 15

Eatoniopsis (Pilitonia) translucida sp. nov. **a.** shell — 0.48 mm x 0.62 mm, **b**. operculum — x190. Tanna Is., New Hebrides, SEM stub No. 139.

Eatoniopsis (Pilitonia) westralis sp. nov. **c.** shell — 0.80 mm x 0.80 mm, **d.** operculum — x130, **e.** radula — x2200. Mississippi Bay, S.W.A., SEM stub no. 149. **f.** operculum — x130, **g.** radula — x1800. Rottnest Is., W.A., SEM stub no. 275.

Tubbreva insignificans sp. nov. **h.** operculum — x190. Carnac Is., off Fremantle, W.A., SEM stub no. 491.

Tubbreva parva sp. nov. **i.** operculum — x190. Caloundra Head, Qld, SEM stub no. 458.

Tubbreva exigua (Ponder). **j.** shell — 1.00 mm x 0.58 mm, **k.** operculum — x130. Island Bay, Wellington, New Zealand, SEM stub no. 170.

Eatonina (Captitonia) lirata sp. nov. **l.** operculum — x220, **m.** radula — x2200. Garden Is., off Fremantle, W.A., SEM stub no. 337.

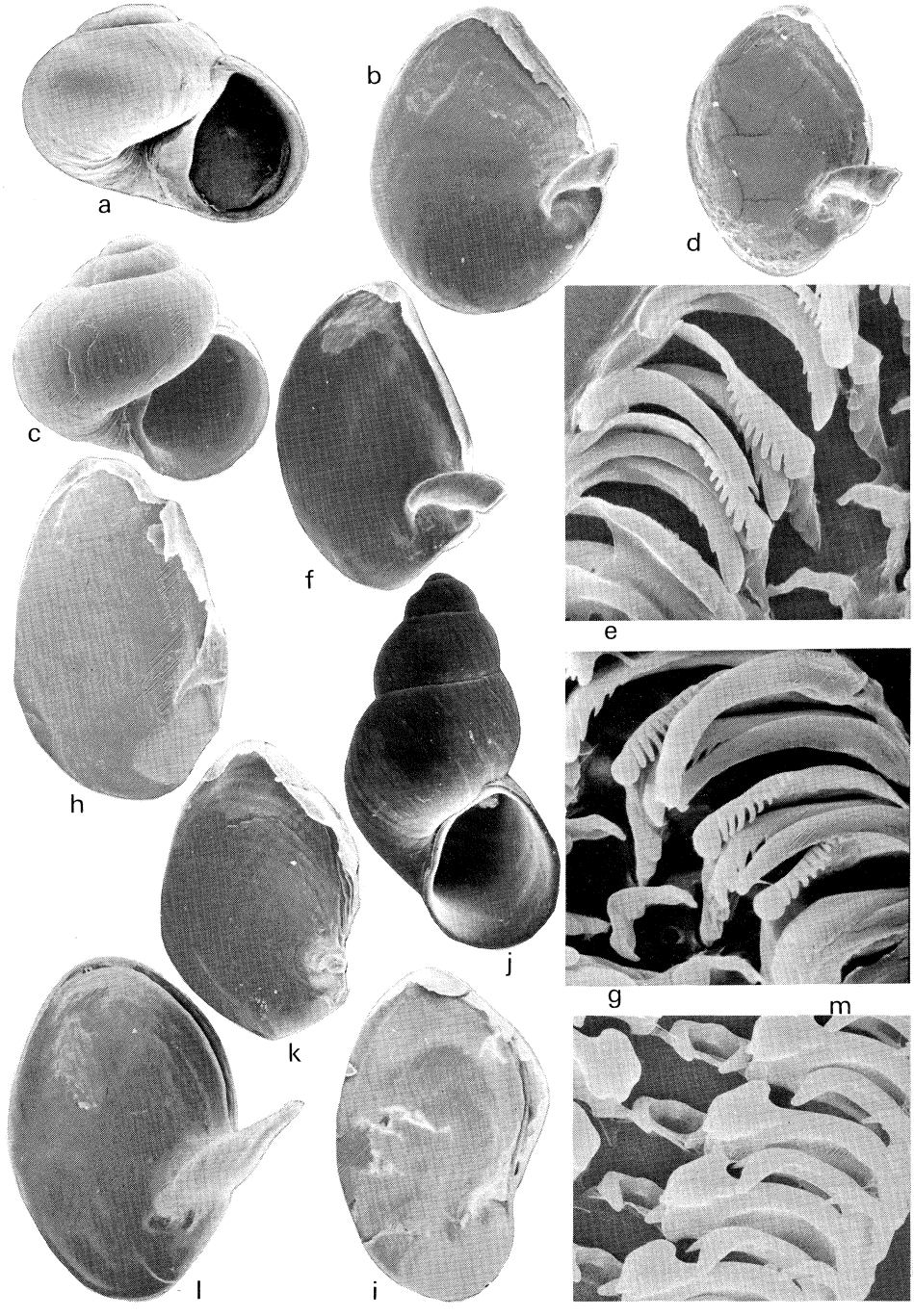
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Fig. 16

Pseudopisinna balteata sp. nov. **a.** shell — 0.86 mm x 0.53 mm, **e.** operculum — x240. Basilisk Passage, Port Moresby, Papua New Guinea, SEM stub no. 133. **b.** shell — 0.84 mm x 0.51 mm, **f.** operculum — x270. Yam Is., Torres Strait, Qld, SEM stub no. 427. **c.** shell — 0.92 mm x 0.58 mm, **d.** operculum — x270, **g.** radula — x2000. Croissant Reef, off Nouméa, New Caledonia, SEM stub no. 261.

Pseudopisinna costata sp. nov. **h.** shell — paratype, **i.** operculum — x270, **j.** radula — x1700. Houtman Abrolhos, W.A., SEM stub no. 174.

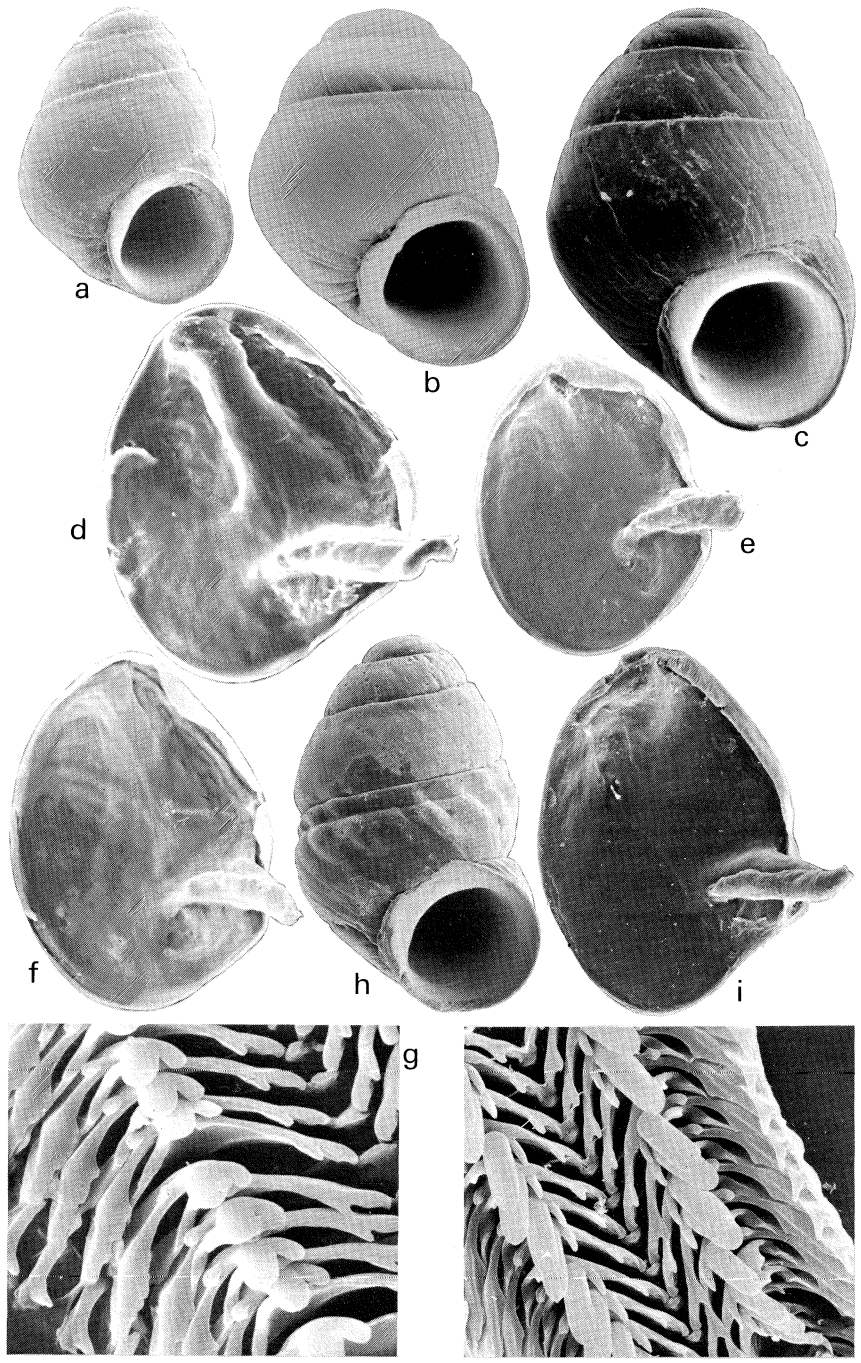
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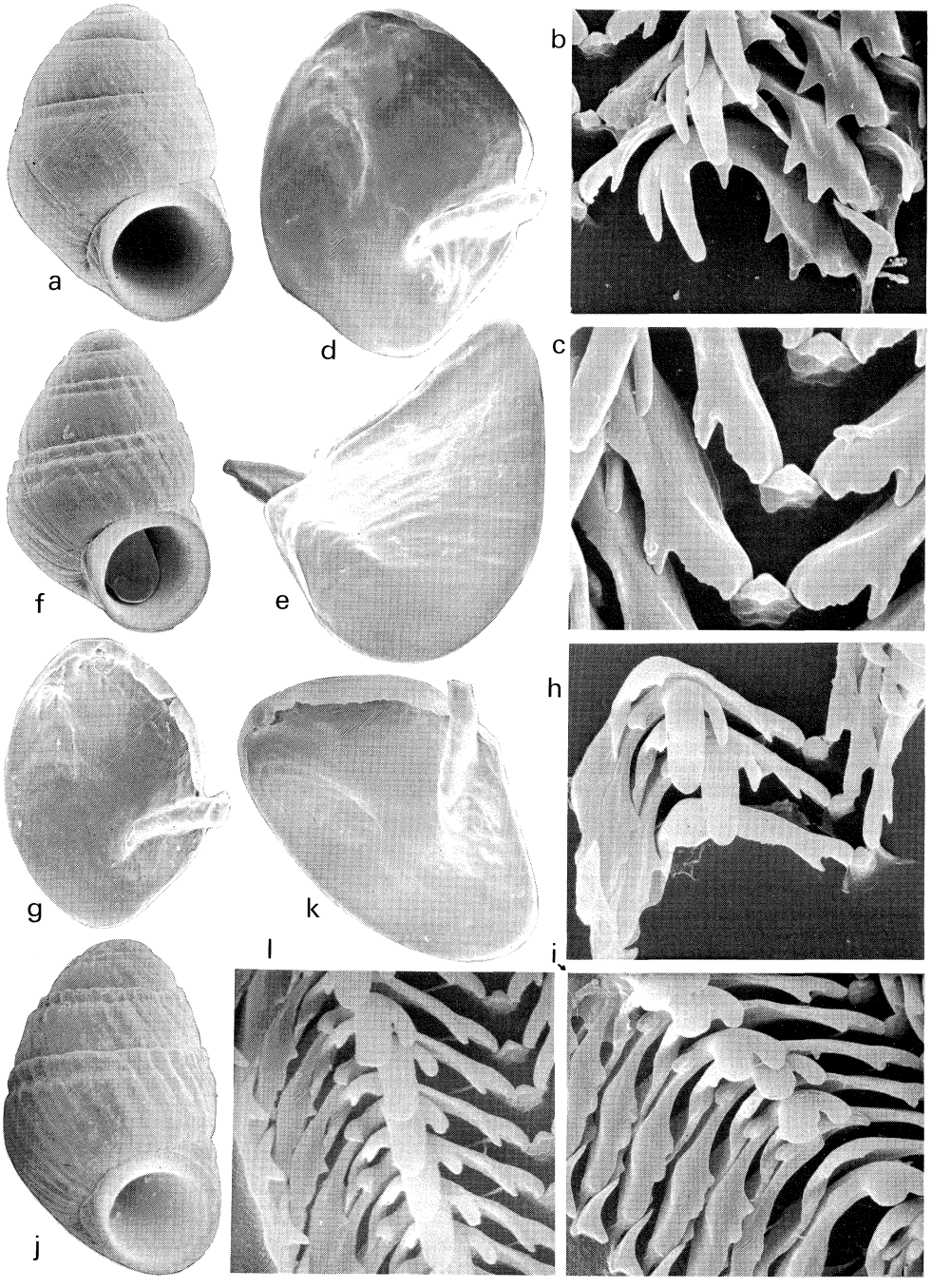
Fig. 17

Pseudopisinna gregaria gregaria (Laseron) **a.** shell — 1.02 mm x 0.60 mm, **b.** radula — x2300, **c.** radula — x4600. Forster, N.S.W., SEM stub no. 172. **d & e.** opercula — both x230. Honeymoon Beach, Jervis Bay, N.S.W., SEM stub no. 333. **f.** shell — 1.13 mm x 0.64 mm, **g.** operculum — x170, **h & i.** radulae — both x1400. Yallingup, S.W.A., SEM stub no. 131.
Pseudopisinna gregaria rugifera subsp. nov. **j.** shell — 0.94 mm x 0.52 mm, **k.** operculum — x250, **l.** radula — x2300. Heron Is., Qld, SEM stub no. 208.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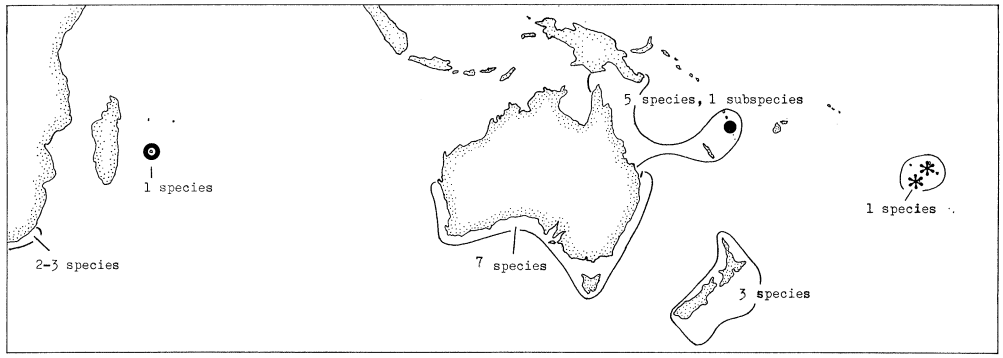

Fig. 18. Distribution of species of *Eatonina (Eatonina)*. ○ *Eatonina (E.) pulicaria pulicaria* (Fischer), ● *E. (E.) pulicaria pacifica* subsp. nov., * *E. (E.) lactea* sp. nov.

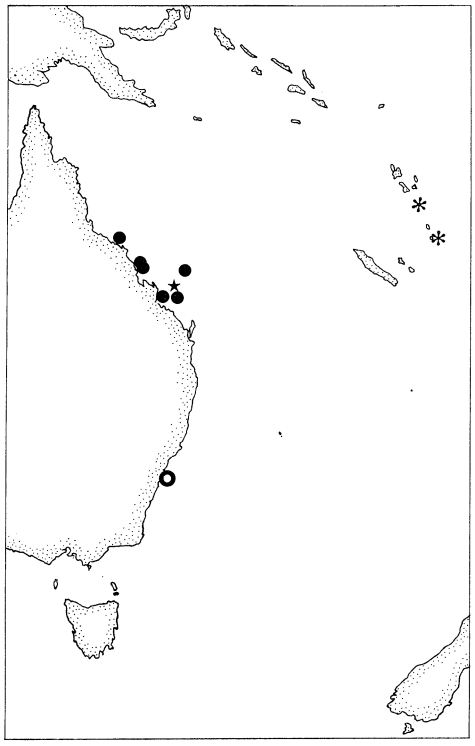

Fig. 19 Distribution of *Eatonina (Eatonina)* species. ★ *E. (E.) ardeae*. sp. nov., ● *E. (E.) capricornea* (Hedley), * *E. (E.) colorata* sp. nov., ○ *E. (E.) hedleyi* sp. nov.

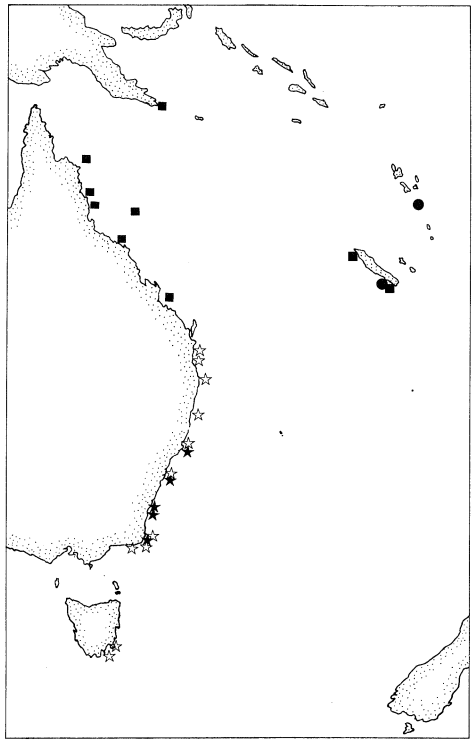

Fig. 20. Distribution of *Eatonina (Eatonina)* species. ● *E. (E.) heliciformis* sp. nov., ☆ *E. (E.) hutchingsae* sp. nov., ■ *E. (E.) lunata* (Laseron), ★ *E. (E.) rubrilabiata* sp. nov.

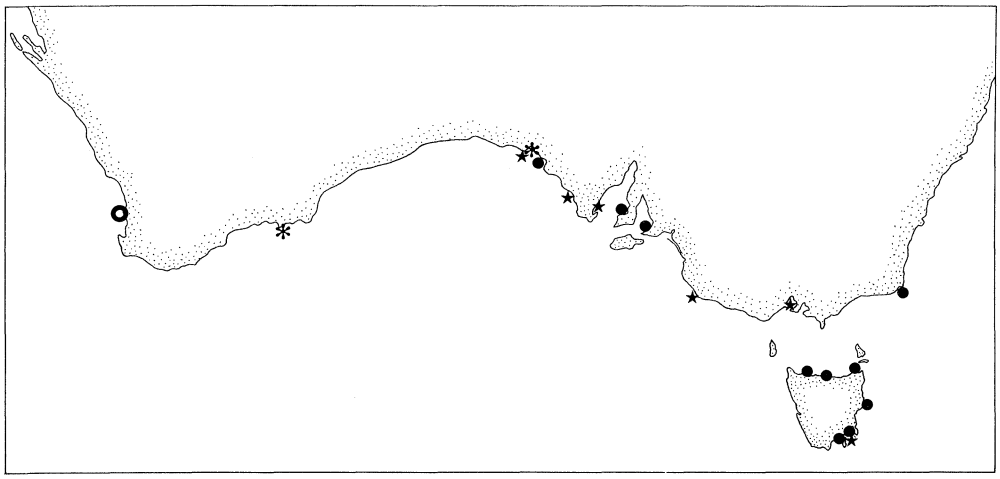

Fig. 21 Distribution of *Eatonina (Eatonina)* species. ● *E. (E.) condita* sp. nov., ★ *E. (E.) sanguinolenta* sp. nov., * *E. (E.) shirleyae* sp. nov., ○ *E. (E.) striata* sp. nov.

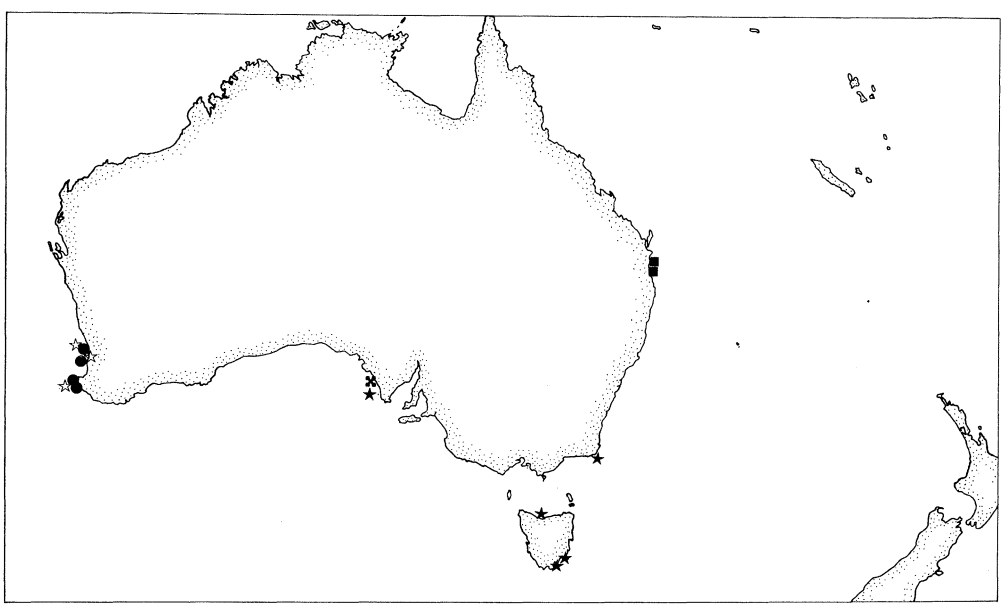

Fig. 22. Distribution of *Eatonina (Coriandria), Eatonina (Captitonia)* and *Tubbreva* species. ★ *E. (Coriandria) fulvicolumella* sp. nov. * *E. (C.) rubicunda* sp. nov., ● *E. (Captitonia) lirata* sp. nov., ☆ *Tubbreva insignificans* sp. nov., ■ *Tubbreva parva* sp. nov.

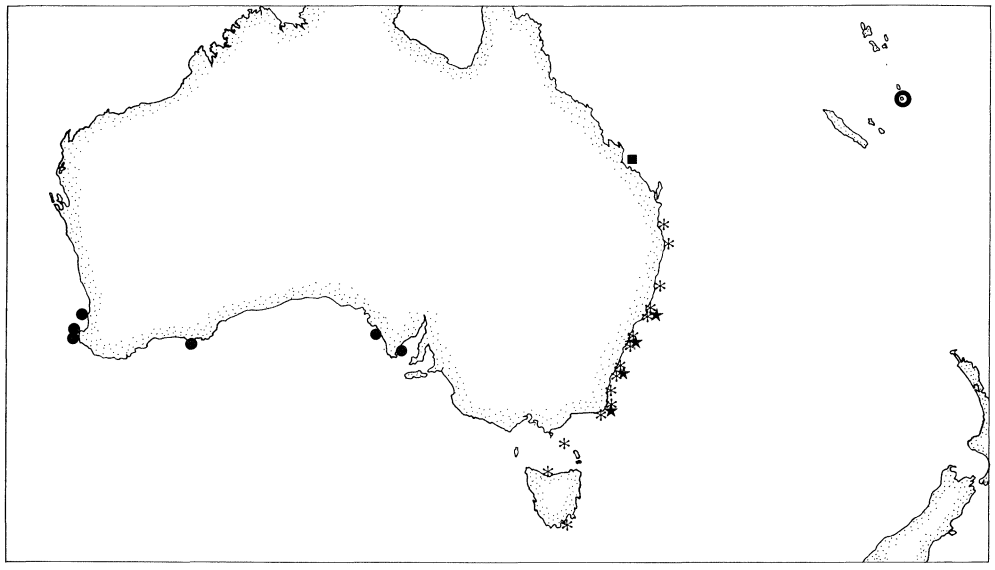

Fig. 23. Distribution of *Eatoniopsis (Boogina), (Rufodardanula)* and *(Pilitonia)* species. ★ *E. (B.) voorwindei* sp. nov., **E. (R.) castanea* (Laseron), ■ *E. (R.) porcellana* sp. nov., ◯ *E. (P.) translucida* sp. nov., ● *E. (P.) westralis* sp. nov.

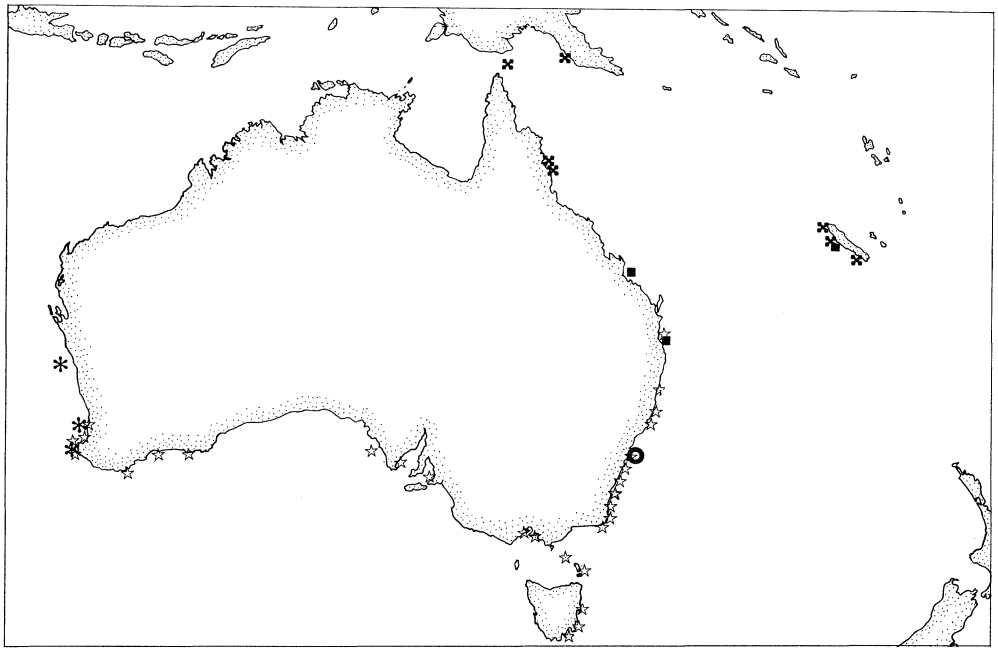

Fig. 24. Distribution of *Pseudopisinna* species. ◯ *P. (?) alvea* (Laseron), ★ *P. balteata* sp. nov., **P. costata* sp. nov., ☆ *P. gregaria gregaria* (Laseron), ■ *P. gregaria rugifera* subsp. nov.

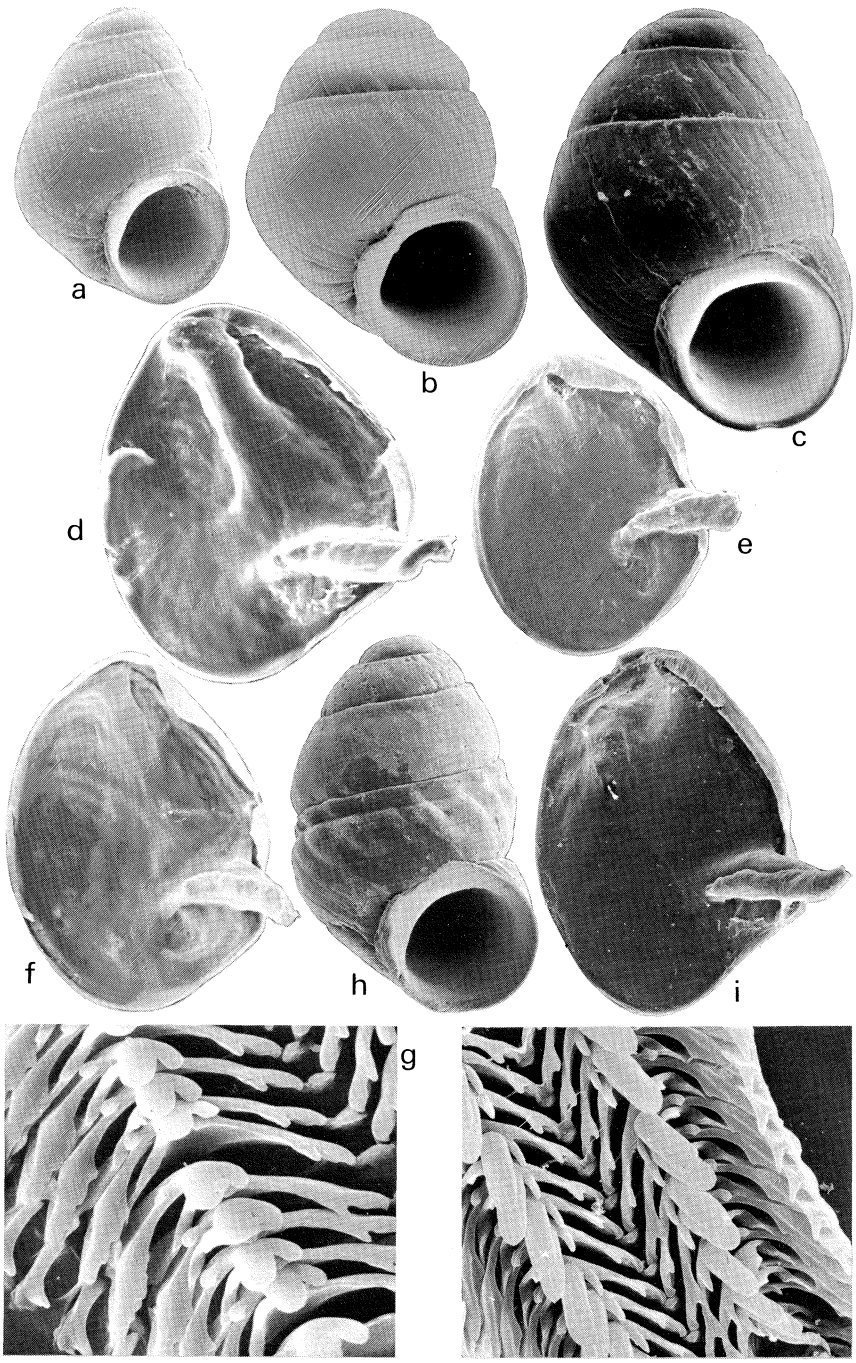
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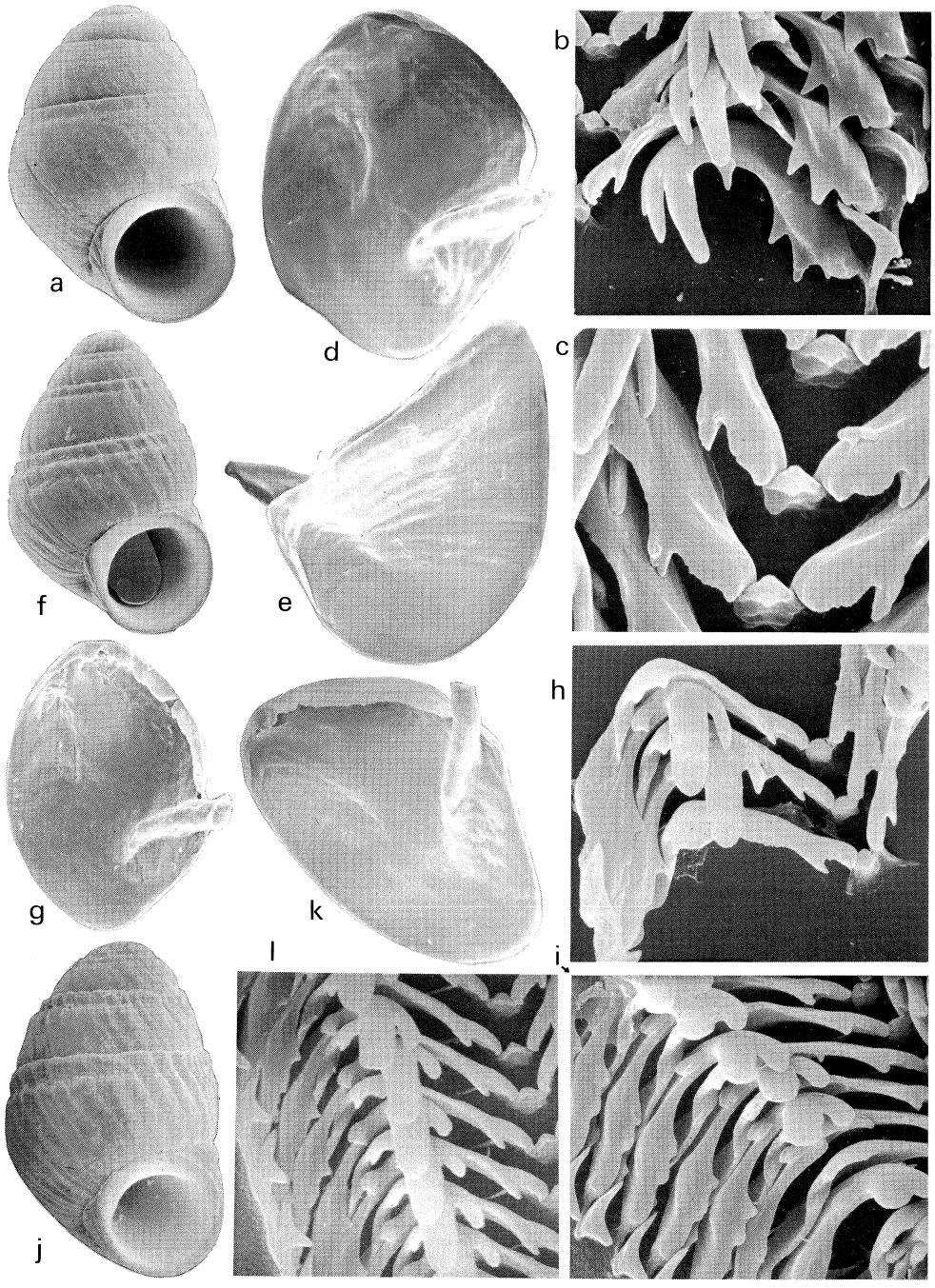
Fig. 17

Pseudopisinna gregaria gregaria (Laseron) **a.** shell — 1.02 mm x 0.60 mm, **b.** radula — x2300, **c.** radula — x4600. Forster, N.S.W., SEM stub no. 172. **d & e.** opercula — both x230. Honeymoon Beach, Jervis Bay, N.S.W., SEM stub no. 333. **f.** shell — 1.13 mm x 0.64 mm, **g.** operculum — x170, **h & i.** radulae — both x1400. Yallingup, S.W.A., SEM stub no. 131.
Pseudopisinna gregaria rugifera subsp. nov. **j.** shell — 0.94 mm x 0.52 mm, **k.** operculum — x250, **l.** radula — x2300. Heron Is., Qld, SEM stub no. 208.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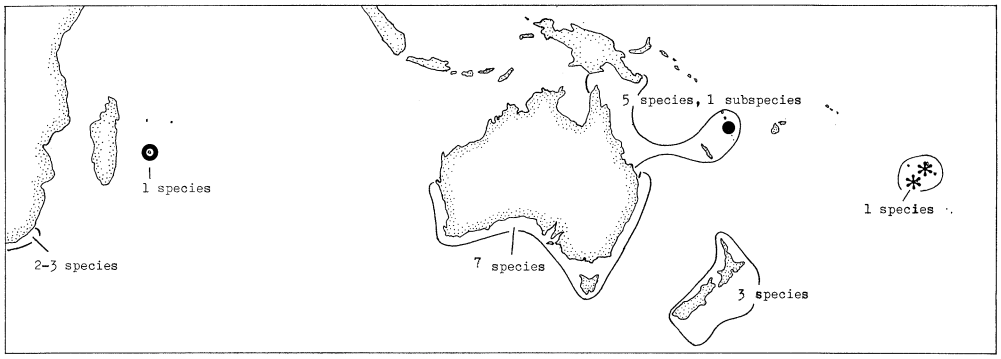

Fig. 18. Distribution of species of *Eatonina (Eatonina)*. ○ *Eatonina (E.) pulicaria pulicaria* (Fischer), ● *E. (E.) pulicaria pacifica* subsp. nov., * *E. (E.) lactea* sp. nov.

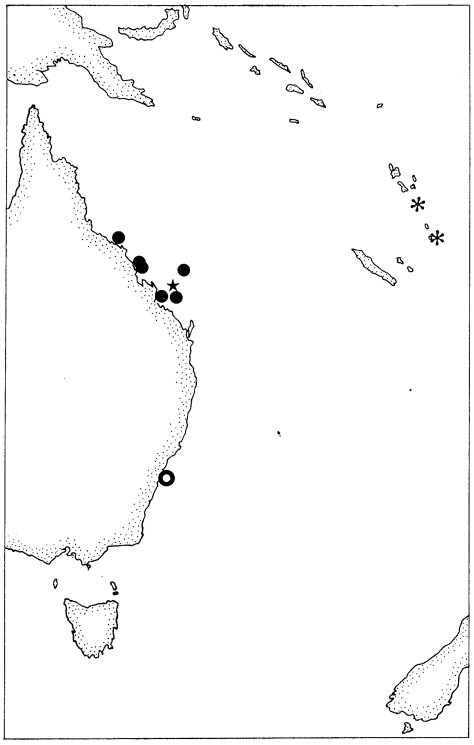

Fig. 19 Distribution of *Eatonina (Eatonina)* species. ★ *E. (E.) ardeae*. sp. nov., ● *E. (E.) capricornea* (Hedley), * *E. (E.) colorata* sp. nov., ○ *E. (E.) hedleyi* sp. nov.

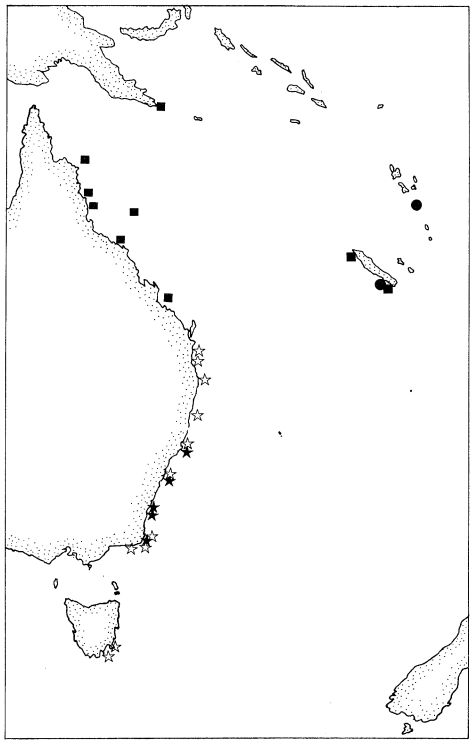

Fig. 20. Distribution of *Eatonina (Eatonina)* species. ● *E. (E.) heliciformis* sp. nov., ☆ *E. (E.) hutchingsae* sp. nov., ■ *E. (E.) lunata* (Laseron), ★ *E. (E.) rubrilabiata* sp. nov.