

A revision of the Recent species of *Rissoina* (*Moerchiella*), *R.* (*Apataxia*), *R.* (*Ailinzebina*) and *R.* (*Pachyrissoina*) (Gastropoda : Rissoidae)

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Abstract

The Recent species of *Rissoina* (*Moerchiella*), *R.* (*Ailinzebina*), *R.* (*Apataxia*) and *R.* (*Pachyrissoina*) are revised. A total of fourteen species are recognized. Two new species-group taxa are named: *Rissoina* (*Moerchiella*) *kilburni* sp. nov. and *R.* (*M.*) *okinawensis* sp. nov. Two probably new species, that belong to *R.* (*Ailinzebina*), known from only a few specimens are described but not named. Shell features of all species are redescribed or described in detail and, where available, data on the operculum, the radula and the internal anatomy is also provided. The known distribution of each species is reported.

Key Words: Gastropoda, Rissoininae, taxonomy, anatomy, geographical distribution.

Résumé

Les espèces Récentes de *Rissoina* (*Moerchiella*), *R.* (*Ailinzebina*), *R.* (*Apataxia*) et *R.* (*Pachyrissoina*) sont révisées. En total, 14 espèces sont reconnues. Deux nouvelles espèces sont décrites: *Rissoina* (*Moerchiella*) *kilburni* sp. nov. et *R.* (*M.*) *okinawensis* sp. nov. La nomenclature ouverte est utilisée pour deux espèces de *R.* (*Ailinzebina*), qui sont probablement nouvelles pour la science. Pour chaque espèce les caractères de la coquille sont données, ainsi que, pour quelques espèces, les caractères de la radule, de l'opercule et de l'anatomie. Pour chaque espèce, la répartition géographique connue est donnée.

Mots-clés: Gastropoda, Rissoininae, taxonomie, anatomie, répartition géographique.

Introduction

The present paper forms part of a comprehensive study of the Rissoininae, which is currently in progress.

Members of the subfamily Rissoininae differ from the sister-group, the Rissoinae, in the sperm duct of females being separated from the lower oviduct gland for most of its length (PONDER, 1985; pers. observ.). Within the subfamily the following genera are recognized as being valid: *Rissoina* d'ORBIGNY, 1840, *Zebina* H. & A. ADAMS, 1854 and *Stosica* BRUSINA, 1878. PONDER (*ibid.*) recognized the following subgenera within the genus *Rissoina* s.l.: *Rissoina* s.s., *Phosinella* MÖRCH, 1876, *Rissolina* GOULD, 1861, *Pachyrissoina* BOETTGER, 1893, *Apataxia* LASERON, 1956 and *Buvignieria* COSSMANN, 1921, the latter containing fossil species only.

Additional data, especially with respect to their anatomy, however, reveals that members of the subgenus *Rissolina* do not differ sufficiently from *Rissoina* s.s. species to consider it a distinct subgenus of *Rissoina* s.s. However, as species of this group are assumed to be closely related, they will be treated in a forthcoming paper as a separate species-group of *Rissoina* s.s. On the other hand, PONDER (*ibid.*) considered *Moerchiella* NEVILL, 1885 and *Ailinzebina* LADD, 1966 to differ insufficiently from *Rissoina* s.s. species to warrant the recognition of both *Moerchiella* and *Ailinzebina* as distinct subgenera. Additional data with respect to both

the radular structure – especially the morphology of the central tooth – and the internal anatomy, reveals that both groups differ in several aspects from *Rissoina* s.s. species and therefore they are considered here as distinct subgenera of *Rissoina* s.l.

Species of the subgenus *Pachyrissoina* differ from *Rissoina* s.s. species in shell characters; however, as no data on the anatomy of species of the subgenus *Pachyrissoina* were available, the latter is only tentatively regarded here as a separate subgenus, pending the examination of the internal anatomy.

The present paper attempts to review the Recent species of the subgenera *Moerchiella*, *Apataxia*, *Ailinzebina* and *Pachyrissoina* of the genus *Rissoina*.

Materials and methods

Shells have been examined in and/or borrowed from institutions listed under Abbreviations. All shell features were examined using a WILD M-5 stereomicroscope. Shell dimensions were measured by using an ocular with a micrometer of an accuracy of 0.001 mm. As a rule only adult specimens with an intact protoconch were included, except in the case of immature type specimens.

Shell measurements (Fig. 1) include the total shell length (L), the spire length (L_s) and the maximum diameter (D). Furthermore, in sculptured species, the number of axial ribs on the last whorl ($No.ax$) and on the penultimate whorl ($No.axp$) were counted. Finally, the number of teleoconch whorls was determined ($No.$ whorls), starting from the nucleus to the transition protoconch/teleoconch, with an accuracy of 0.25 whorl. The protoconch is considered here as the entire shell formed prior to metamorphosis; the type of development (planktotrophic, lecithotrophic or direct development) was inferred from the morphology of the protoconch (JABLONSKI & LUTZ, 1980).

The protoconch and the microsculpture of the teleoconch were studied by using photographs from a PHILIPS scanning electron microscope (SEM).

The operculum features are of little importance in the systematics of the Rissoinae; only the presence or absence of a peg on the inner side was used in the classification of the rissoinine genera. When opercula were available, the inner side was photographed.

Radulae have been examined by using SEM micrographs. The radula was dissected from the buccal mass and transferred to a solution of KOH, where it remained for a short time (usually 1 day) in order to remove the surrounding tissues. Subsequently, the radula was transferred into distilled water and eventually it was put into a small drop of distilled water on a cover glass. After the evaporation of the water, the radula stuck to the cover glass, which was glued with double tape on a SEM stub. The radula was coated with

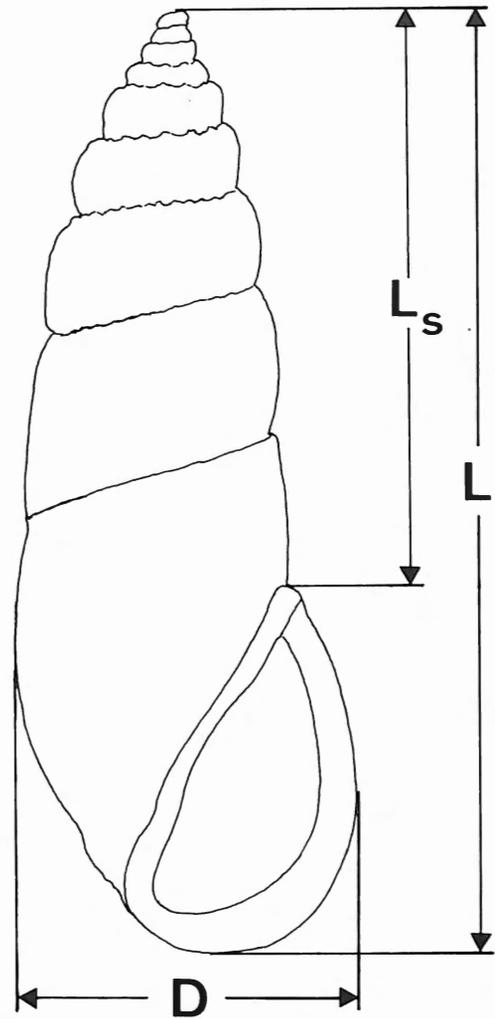


Fig. 1. – Shell dimensions: D , maximum diameter; L , total shell length; L_s , spire length.

an extremely thin layer (30 nm) of gold.

The shell was removed by dissolving the latter in a 10 % solution of HCl.

Immediately after dissolving the shell, the animal was cleaned with distilled water and eventually transferred to a 75 % solution of methylalcohol.

The spirally coiled animal was uncoiled and pinned in the dissection tank, with its inner side turned towards the observer. Observing the animal in this position, facilitates the examination of the relative position of the internal organs (especially the genital apparatus). Before dissecting the animal, a drawing of the entire animal in this position was made with the help of a camera lucida. After studying the relative position of the internal organs, the pallial cavity was opened from the middle of the anterior mantle edge to the posterior end of the mantle cavity. Further, the pallial gonoduct of the female was removed from the animal and observations were made of both the left and right side of the gonoduct. In male specimens, after determining

the position of the penis in the mantle cavity, the penis was cut near its base, just behind the base of the right cephalic tentacle, and several drawings in different positions were made.

After the study of the organs of the mantle cavity, the stomach was removed and the following parts were measured: the total length, the length of the style sac and the maximum diameter of the stomach (off the anterior chamber).

In order to study the circumoesophageal ganglia, a cut was made from the anterior end of the snout to the anterior end of the neck. After removing the buccal mass and the oesophagus, the circumoesophageal ganglia can be easily observed. The RPG ratio (length of the supraoesophageal connective: length of the right pleural ganglion + length of the supraoesophageal connective + length of supraoesophageal connective) (DAVIS e.a. 1976) and the LPG ratio (length of suboesophageal connective: length of left pleural ganglion + length suboesophageal connective + length of suboesophageal connective) were determined, at least when the left pleural ganglion and suboesophageal ganglion were not abutting.

All information about localities, mentioned in "Additional material examined", was taken from the original data labels associated with the specimen(s); the number between brackets, following the locality, refers to the number of specimens of each lot examined.

Museum and collection abbreviations

AMS: The Australian Museum, Sydney
 ANSP: Academy of Natural Sciences of Philadelphia, U.S.A.
 BMNH: British Museum (Natural History), London
 IY: private collection of Dr. Isaac YARON, Beer Sheva
 JS: private collection of Mr. Jim SPRINGSTEEN, Melbourne, Australia
 JT: private collection of Mr. Jean TRONDLE, La Force, France
 KBIN: Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels
 LACM: Los Angeles County Museum of Natural History, Los Angeles, U.S.A.
 MCZ: Museum of Comparative Zoology, Cambridge, Mass., U.S.A.
 MHNB: Muséum d'Histoire Naturelle, Bordeaux, France
 MM: Manchester Museum, U.K.
 MNHN: Muséum National d'Histoire Naturelle, Paris
 NM: Natal Museum, Pietermaritzburg, South Africa
 NMV: Naturhistorisches Museum, Vienna
 SAM: South Australian Museum, Adelaide, Australia

SMF: Senckenberg Museum, Frankfurt am Main, Germany
 USNM: National Museum of Natural History, Smithsonian Institution, Washington D.C.
 ZSI: Zoological Survey of India, Calcutta

Abbreviations used in figures

a.c. anterior chamber of stomach
 b.c. bursa copulatrix
 c.m. columellar muscle
 d.g. digestive gland
 e.m.c. end of the mantle cavity
 f.p. fecal pellet
 g.p. genital porus
 h.g. hypobranchial gland
 int. intestine
 k. kidney
 l.c.ga. left cerebral ganglion
 l.o.g. lower oviduct gland
 l.pl.ga. left pleural ganglion
 l.p.t. left pallial tentacle
 m.e. mantle edge
 oes. oesophagus
 ov. ovary
 p.c. posterior chamber of stomach
 pr.g. prostate gland
 r.c.ga. right cerebral ganglion
 r.c.t. right cephalic tentacle
 r.pl.ga. right pleural ganglion
 r.p.t. right pallial tentacle
 s.d. sperm duct
 s.s. style sac
 st. stomach
 sub.oes.ga. suboesophageal ganglion
 sup.oes.ga. supraoesophageal ganglion
 t. testis
 u.o.g. upper oviduct gland
 v.c. ventral channel
 v.s. vesicula seminalis

Taxonomic account

Class **GASTROPODA** CUVIER, 1797
 Order **Neotaenioglossa** HALLER, 1882
 Superfamily **Truncatelloidea** GRAY, 1840

Family **RISSOIDAE** GRAY, 1847
 Subfamily **Rissoininae** STIMPSON, 1865

Genus **RISSOINA** d'ORBIGNY, 1840

Rissoina d'ORBIGNY, 1840. Type species (by original designation): *Rissoa (Rissoina) inca* d'ORBIGNY, 1840.

DIAGNOSIS

Shell : length up to about 20 mm.

Protoconch : of planktotrophic, lecithotrophic or of larval type with intracapsular metamorphosis.

Teleoconch : smooth or with axial and/or spiral ribs or lirae.

Aperture : more or less D-shaped, with anterior channel more or less prominent.

Operculum : with prominent peg on inner side.

Radula : central tooth with 1 to 3 pairs of basal denticles; outer marginal teeth with cusps on both the inner and the outer side.

Head-foot : left (anterior) pallial tentacle simple or bilobed.

Internal anatomy : hypobranchial gland narrow and thin to wide and thick, consisting of a glandular mass or consisting of thin, densely packed lamellae.

Posterior chamber of stomach strongly elongate.

Male with prostate gland usually open; penis simple to very complex.

Female with weakly to strongly expanded anterior portion of sperm duct (vestibulum).

GEOGRAPHIC DISTRIBUTION OF RECENT SPECIES

Tropical and subtropical oceans.

Subgenus *Moerchiella* NEVILL, 1884

Moerchiella NEVILL, 1884. Type species (by original designation) : *Rissoia gigantea* DESHAYES, 1850.

DIAGNOSIS

Shell : medium-sized to large.

Internal anatomy : hypobranchial gland massive, pink, consisting of numerous thin lamellae.

Radula : central radular tooth with 2 to 4 pairs of basal denticles, the latter not connected with the lateral margins by dorsal ridges.

GEOGRAPHICAL DISTRIBUTION OF RECENT SPECIES

Tropical Indo-West Pacific.

REMARKS

PONDER (1985) considers *Moerchiella* to differ insufficiently from typical *Rissoina* s.s. species, to warrant the recognition of a separate subgenus for this species-group.

However, species that belong to this group differ from *Rissoina* s.s. species in being generally larger and in having a more cylindrical shell (except in *R. (M.) striata*) and in the teleoconch sculpture gradually changing from the adapical to the abapical whorls; furthermore they differ from *Rissoina* s.s. species in the central tooth of the radula bearing basal denticles which are not connected by a dorsal ridge with the lateral margin; finally, the hypobranchial gland is pink coloured and very thick and consists of numerous thin lamellae in species of *R. (Moerchiella)* instead of being white and simple in *Rissoina* s.s. species.

We consider these differences sufficient for the recognition of *R. (Moerchiella)* as a distinct subgenus.

Alphabetic list of valid species

Rissoina (Moerchiella) antoni SCHWARTZ, 1860

Rissoina (Moerchiella) artensis MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872

Rissoina (Moerchiella) dorbignyi A. ADAMS, 1851

Rissoina (Moerchiella) gigantea (DESHAYES, 1848)

Rissoina (Moerchiella) kilburni sp. nov.

Rissoina (Moerchiella) okinawensis sp. nov.

Rissoina (Moerchiella) striata (QUOY & GAIMARD, 1833)

Rissoina (Moerchiella) striolata A. ADAMS, 1851

***Rissoina (Moerchiella) antoni* SCHWARTZ, 1860**
(Figs. 2 A-H; 3 A-D; 4; 5 A-E; 53 A)

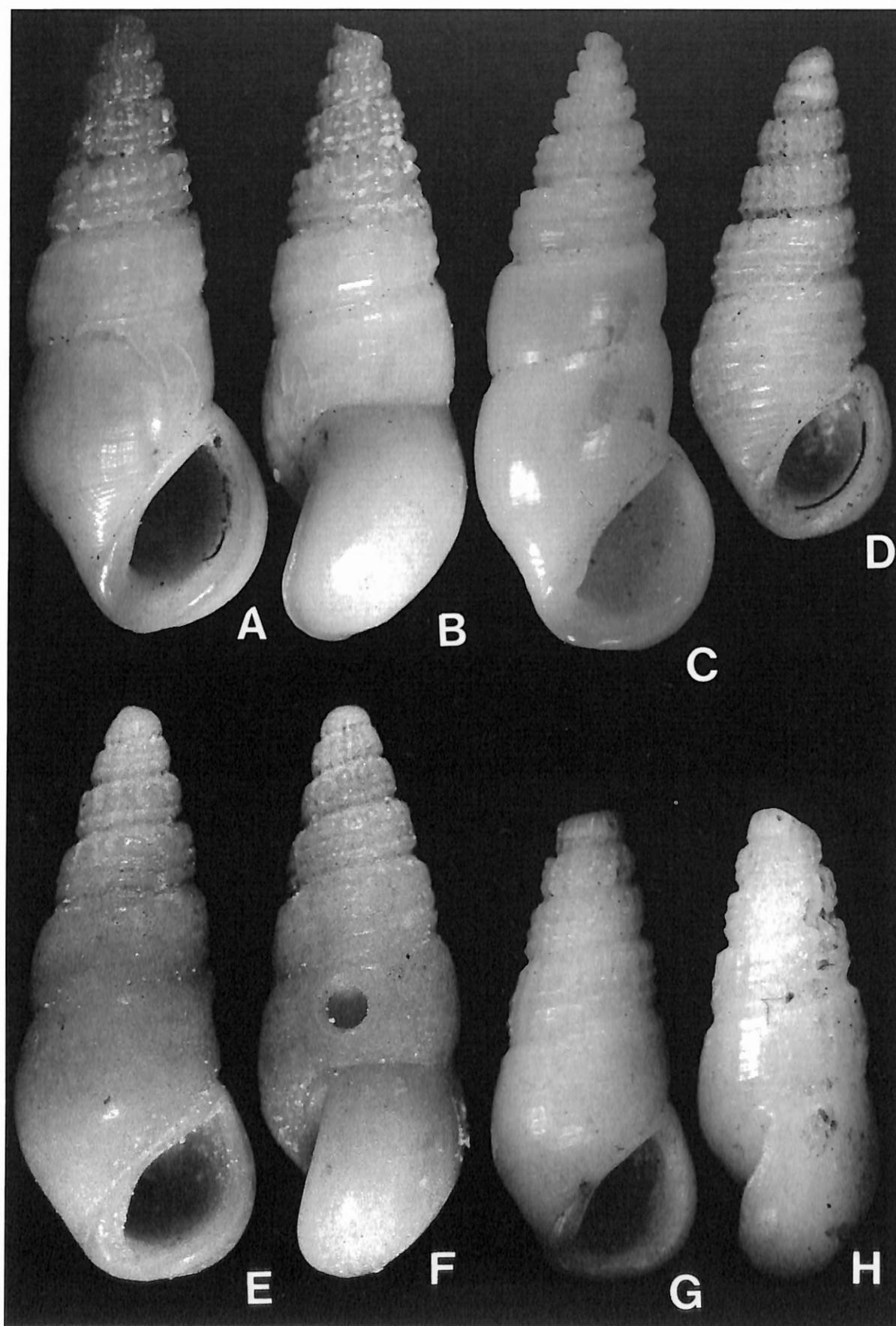
Rissoina antoni SCHWARTZ, 1860, p. 167, fig. 63; WEINKAUFF, 1877, p. 13, pl. 5, figs. 8-10; TRYON, 1887 p. 388, pl. 58, fig. 26.

Rissoina villica GOULD, 1861, p. 401; JOHNSON, 1964, p. 168, pl. 45, figs. 1-2.

Rissoina lamberti SOUVERBIE in SOUVERBIE & MONTROUZIER, 1870, p. 425, pl. 14, fig. 6; WEINKAUFF, 1881 p. 53, pl. 14, figs. 7-8.

Rissoina efficata BRAZIER, 1877, p. 366; HEDLEY, 1901, p. 127, pl. 17, fig. 26.

Fig. 2. – A-H. *Rissoina (Moerchiella) antoni* SCHWARTZ, 1860. – A-B. Lectotype of *Rissoina efficata* BRAZIER, No 3, Barnard Isles, Queensland, Australia (AMS, A.142), 8.2 x 3.3 mm. – C. Syntype of *Rissoina lamberti* SOUVERBIE in SOUVERBIE & MONTROUZIER, Ile Art, New Caledonia (MHNB), 9.8 x 3.9 mm. – D. Lectotype (here selected) of *Rissoina antoni* SCHWARTZ, Java, Indonesia (NMV, 25886), 5.4 x 2.3 mm. – E-F. Possible syntype of *Rissoina (Moerchiella) lankaensis* PRESTON, Sri Lanka (Coll. DAUTZENBERG, KBIN), 8.0 x 3.4 mm. – G-H. Holotype of *Rissoina semisculpta* TATE, "Tasmania" (erroneous type locality) (SAM, D.14437), 6.4 x 2.8 mm.



Rissoina antoni var. *pusilla* NEVILL, 1884 p. 89.
 pars *Rissoina spirata* SOWERBY; TRYON, 1887, p. 388, pl. 59,
 fig. 32 (not pl. 58, figs. 27-29; pl. 59, figs. 30-31, 35-37.)
Rissoina (*Moerchiella*) *thausasia* MELVILL & STANDEN, 1898,
 p. 31, pl. 1, fig. 3.
Rissoina semisculpta TATE, 1899, p. 241, pl. 7, fig. 10.
Rissoina (*Moerchiella*) *lankaensis* PRESTON, 1905, p. 5, pl. 1,
 fig. 21.
Moerchiella efficata (BRAZIER); LASERON, 1956 p. 413, figs.
 64-65.

TYPE MATERIAL

Rissoina antoni SCHWARTZ : lectotype (25886) (here
 selected) and 4 paralectotypes (25886) (one paralecto-
 type is not *Rissoina antoni* SCHWARTZ, 1860) in NMV.
Rissoina villica GOULD : lectotype (169424) and para-
 lectotype (225220) in MCZ (on permanent loan from
 New York State Museum).
Rissoina lamberti SOUVERBIE : 3 syntypes in MHNB.
Rissoina efficata BRAZIER : lectotype (A. 142) in AMS
 (on permanent loan from Mac Leay Museum, Sydney).
Rissoina antoni var. *pusilla* NEVILL : probable holotype
 (M.10955/2) in ZSI.
Rissoina (*Moerchiella*) *thausasia* MELVILL & STANDEN :
 holotype in MM (TREW, 1987 : 66) (not examined).
Rissoina semisculpta TATE : holotype (D. 14437) in
 SAM.

Rissoina (*Moerchiella*) *lankaensis* PRESTON : 1 possible
 syntype in KBIN, Coll. DAUTZENBERG.

TYPE LOCALITIES

Rissoina antoni : Java, Indonesia.
Rissoina villica : Loo Choo (Okinawa, Ryukyu Is.).
Rissoina lamberti : Ile Art, New Caledonia.
Rissoina efficata : Barnard I. N° 3, Queensland, Austra-
 lia.
Rissoina antoni var. *pusilla* : not mentioned.
Rissoina thausasia : Madras (India).
Rissoina semisculpta : "Tasmania" (very probably mis-
 localized).
Rissoina lankaensis : "Ceylon" (= Sri Lanka)

DESCRIPTION

Shell (Figs. 2 A-H, 3 A-D, 4 and 5 A) : length up to
 12.5 mm (N = 27); solid, narrowly to elongately conical.
Protoconch (Fig. 5 B-D) : of non-planktotrophic larval
 type, of 1 1/4 whorls; last whorl with 2-3, distantly
 spaced, spiral threads (only present in fresh specimens).
 Transition to teleoconch abrupt; sinus very shallow.
Teleoconch : of about 9 whorls; adapical 4-5 spire
 whorls strongly angulated below sutures, subsequent

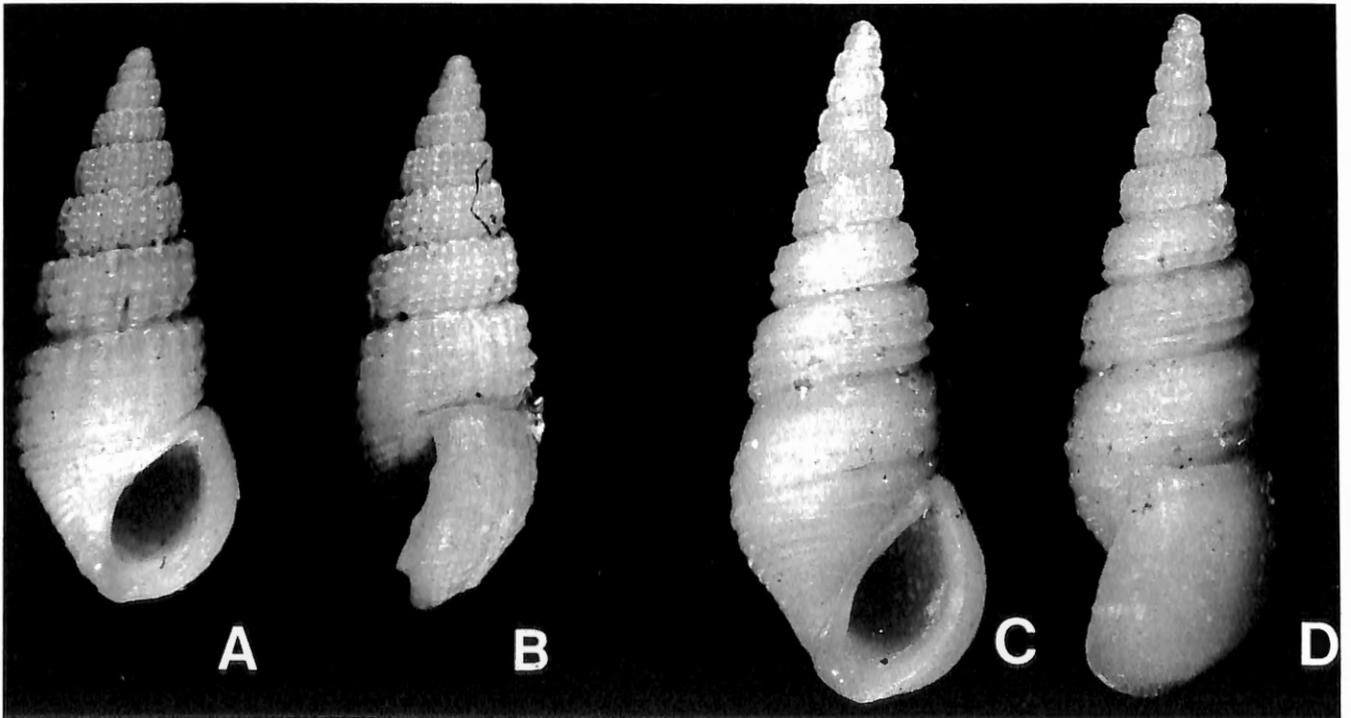


Fig. 3. – A-D. *Rissoina* (*Moerchiella*) *antoni* SCHWARTZ, 1860. – A-B. Lectotype of *Rissoina villica* GOULD, Loo Choo, Okinawa, Japan (MCZ, 169424), 5.5 x 2.3 mm. – C-D. Murray I., Torres Strait, Queensland, Australia, specimen figured by LASERON (1956 : fig. 64) as *Moerchiella efficata* BRAZIER (AMS, C. 29511), 5.7 x 2.4 mm.

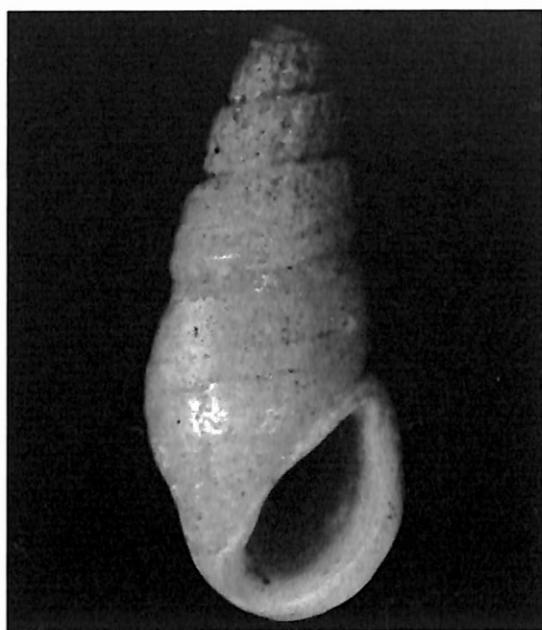


Fig. 4. – *Rissoina* (*Moerchiella*) *antoni* SCHWARTZ, 1860 : holotype of *Rissoina antoni* var. *pusilla* Nevill (ZSI, M.10955/2), 4.9 x 2.2 mm.

spire whorls becoming gradually less angulate; last whorl weakly inflated.

Axial sculpture of adapical spire whorls consisting of prominent, rounded, almost orthocline, axial ribs, gradually more prominent, wider and more distantly spaced on 3rd to 6th spire whorl, usually becoming gradually less prominent on subsequent spire whorls, eventually absent on last whorl; absent on last two whorls in some specimens; some with weak, very short axial ribs on adapical 1/3 of last whorl.

Spiral sculpture of moderate to very prominent spiral cords on adapical spire whorls, numbering 4-5 on first and second whorls and usually 3-4 on third to sixth whorl; spiral cords intersecting axial ribs, forming prominent, rounded nodules on latter; spiral cords usually becoming gradually less prominent, more irregular and more irregularly spaced on abapical spire whorls and on last whorl (usually with some very irregular and irregularly spaced spiral threads on last whorl, but some specimens with rather prominent spiral ribs on last whorl).

Microsculpture (Fig. 5 E) of crowded, flat-topped, spiral threads, with narrower interspaces.

Aperture : D-shaped to lenticular, rather small; inner lip very thin; columellar side moderately concave; anterior channel short, shallow; outer lip, with thick, rounded, wide, external varix; outer lip strongly opisthocline in profile.

Colour : white throughout.

Operculum, radula and internal anatomy : unknown.

SHELL DIMENSIONS

Table 1.

Rissoina (*Moerchiella*) *antoni*. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
<i>Rissoina antoni</i> : lectotype (NMV, 25886)				
Fig. 2 D	5.4	3.4	2.3	? *
<i>Rissoina lamberti</i> : syntype (MHNB)				
Fig. 2 C	9.8	6.3	3.9	9
syntype (MHNB)				
	9.8	6.3	3.9	?8°
<i>Rissoina efficata</i> : lectotype (AMS, A.142)				
Fig. 2 A-B	8.2	5.2	3.3	?*
<i>Rissoina villica</i> : lectotype (MCZ, 169424)				
Fig. 3 A-B	5.5	3.6	2.3	7
paralectotype (MCZ, 225220)				
	5.2	3.3	2.3	6 3/4
<i>Rissoina antoni</i> var. <i>pusilla</i> : probable holotype in ZSI (M.10955/2)				
Fig. 4	?4.9	?2.8	2.2	?
<i>Rissoina lankaensis</i> : possible syntype (KBIN)				
Fig. 2 E-F	?8.0	?5.2	3.4	? *
<i>Rissoina semisculpta</i> : holotype (SAM, D.14437)				
Fig. 2 G-H	?6.4	?3.9	2.8	? *
Conducia Bay (NM, J.4202)				
	6.2	4.0	2.5	7 1/2
	6.8	4.5	2.6	7 3/4
(NM, H.5606)				
	7.1	4.6	2.7	7 3/4
Nacala (NM, J.7165)				
	6.2	4.0	2.5	7 1/2
	6.8	4.6	2.6	7 3/4
Nosy Bé (MNHN)				
	9.3	6.3	3.2	9
	8.5	5.6	3.0	8 1/2
	8.2	5.6	3.0	?
Tuléar (MNHN)				
Stn. 156	10.0	6.7	3.6	9
Stn. 20	8.8	5.9	3.1	8
Stn. 217	7.5	4.9	2.8	8
Stn. 211	7.0	4.7	2.5	8
Stn. 240	6.3	4.1	2.5	7 1/2
Lifou (KBIN)				
	12.5	8.5	4.7	10
	8.5	5.6	3.4	8 1/2
Zamboanga (LACM, 81-6)				
	6.8	4.2	3.0	7 1/4
Fig. 5 A, E	6.8	4.4	2.7	7 3/4
E. end Santa Cruz (LACM, 81-7)				
	6.6	4.3	2.6	7 3/4
N. Sulawesi (LACH, 88-55)				
	9.6	6.2	3.8	9

Okinawa				
(LACM, 77-61)	6.6	4.4	2.4	8
(LACM, 77-60)	7.0	4.5	2.8	7 1/2
(LACM, 78-21)	6.9	4.5	2.6	8
(LACM, 78-23)	7.4	4.9	2.8	7 3/4
New Caledonia (KBIN)	8.5	5.6	3.2	8 1/2

* Adapical whorls broken
 ° Protoconch broken

VARIATION

Rissoina (Moerchiella) antoni shows considerable variation with respect to both the shell shape and shell sculpture; the spire ranges from strongly to weakly elongated; furthermore, the last whorl is usually moderately inflated, but in some specimens it is only weakly convex. In all specimens available from Mozambique, Madagascar, Réunion and the Maldives, the adapical spire whorls are weakly angulated, while the adapical spire whorls are strongly angulated in all specimens available from Java, Australia and New Caledonia (cf. Remarks). The strength of the spiral sculpture on the adapical spire whorl ranges from moderately prominent

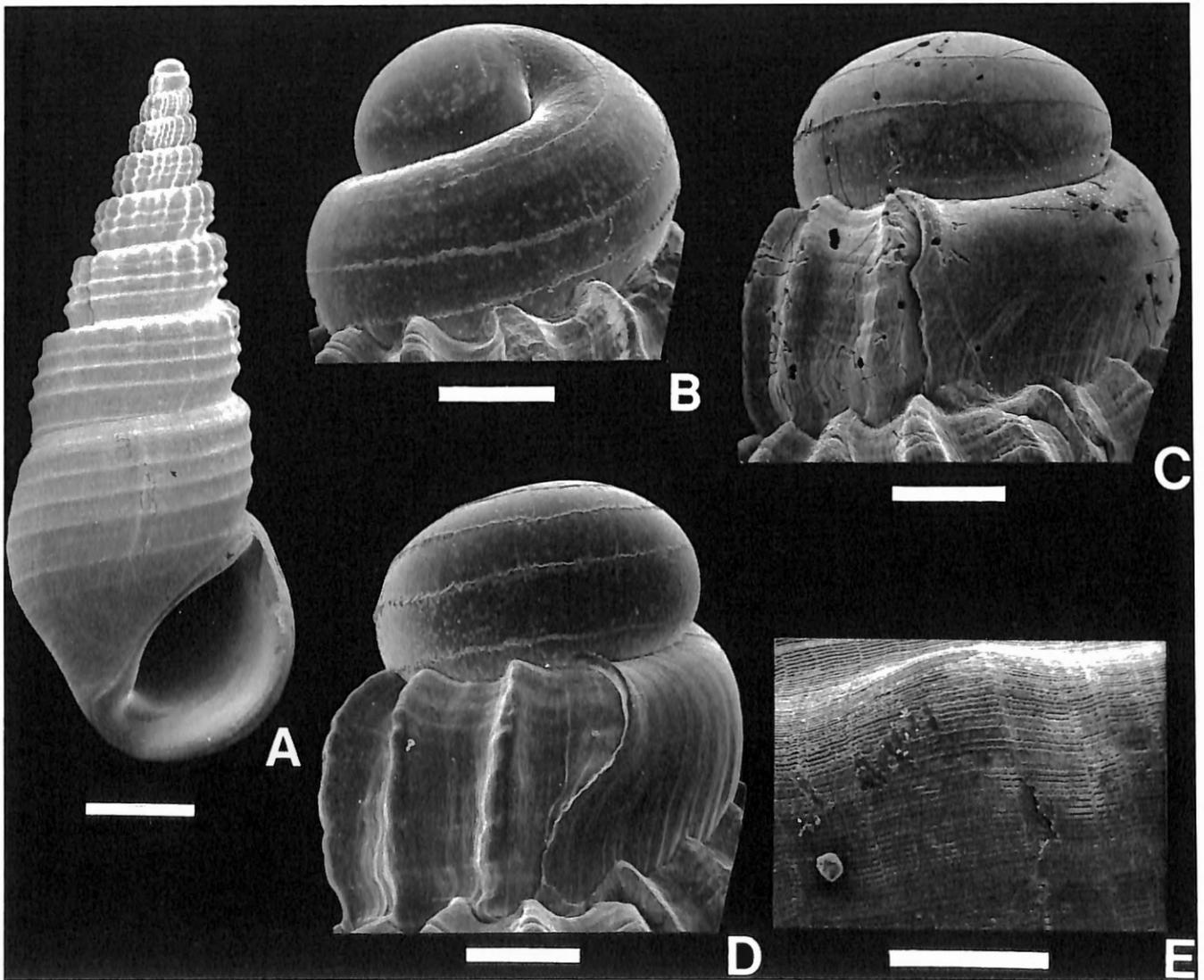


Fig. 5. – A-E. *Rissoina (Moerchiella) antoni* SCHWARTZ, 1860. – A,C,E. Santa Cruz I., off Zamboanga, Zamboanga Prov., Mindanao, Philippines (LACM, 91-06). – A. Shell (scanning electron micrograph). – C. Protoconch (scanning electron micrograph). – E. Microsculpture of penultimate whorl (scanning electron micrograph). – B. E. end of Santa Cruz I., off Zamboanga, Mindanao, Philippines, protoconch (scanning electron micrograph) (LACM, 81-07). – D. E. end of Santa Cruz I., off Zamboanga, Mindanao, Philippines, protoconch (scanning electron micrograph) (LACM, 81-07). Scale bars : A : 1 mm. – B-E : 0.1 mm.

in specimens from the Indian Ocean, to very strong in specimens from Java, Australia and New Caledonia. The strength of the spiral sculpture on the penultimate and last whorl is strongly variable, ranging from very weak, crowded, spiral threads to prominent, more or less distantly spaced, spiral ribs.

ADDITIONAL MATERIAL EXAMINED

Mozambique : Nacala, (3) (NM, J.7165); Conducia Bay, (1) (NM, K.1127), (4) (NM, J.4202), (1) (NM, H.5606), (1) (NM, H.5608). **Madagascar** : Nosy-Bé, Amporaka, 5 m, (3) (MNHN); Tuléar, Grand Récif, 36 m, (1) (MNHN); Tuléar, (6) (MNHN). **Réunion** : Boucan canot, 75 m, (1) (MNHN). **Maldives** : Wadu Channel, reefs between N. Malé Atoll and S. Malé Atoll, 6-10 m, (7) (KBIN). **Sri Lanka** : Kandekalli, (2) (KBIN). **Indonesia** : Bunaken and Siladen Islets, off Menado, N. Sulawesi, (2) (LACM, 88-55). **Japan** : **Okinawa** : Fitzwoody Beach, (1) (LACM, 77-60); 1 km N.N.W. of Oku, (3) (LACM, 77-61); 8 km E. of Kawata, 6-9 m, (11) (AMS, C.153859); 6.5 km N.E. of Kuzusaki, 9-21 m, (3) (AMS, C.153849); Tengen (Kogosuku), 2.5 km N.N.W. of Gushikawa, (4) (AMS, C.153857); ca. 5 km of Tsukenjima, (12) (LACM, 78-21); ca. 3.5 km S.E. of Hedo Point, (1) (LACM, 78-23). **Philippines** : Santa Cruz I., Mindanao, (2) (LACM, 81-6); E. end of Santa Cruz I., Mindanao, (11) (LACM, 81-7). **Papua New Guinea** : Yassi Reef, offshore from Nagada, Madang Prov., (1) (LACM, 80-13). **Australia** : **Queensland** : Albany Passage, Torres Strait, 7-26 m, (2) (AMS); Yam I., Torres Strait, S. side of reef flat, (1) (AMS); Murray I., Torres Strait, 9-15 m, (4) (AMS); No.3, Barnard Is., (1) (AMS, C.154519); No. 3, Barnard Is., (2) (AMS); Low Is., near Port Douglas, (2) (AMS); Red Bland Point, Cape York, (1) (AMS); Batt Reef, off Port Douglas, (1) (AMS); Double I., off Ellis Beach, (1) (AMS); Geoffrey Bay, Magnetic I., off Townsville, (1) (AMS); North-West I., (1) (AMS). **New Caledonia** : Lifou, (4) (KBIN); "New Caledonia", (3) (KBIN).

ADDITIONAL RECORDS FROM LITERATURE

Australia : **Queensland** : Murray I., Michaelmas Cay (LASERON, 1956).

GEOGRAPHIC DISTRIBUTION

Indo-West Pacific, from Mozambique to New Caledonia (Fig. 53 A).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) antoni* strongly resembles *R. (M.) dorbignyi*, but is distinguished by its markedly shorter aperture and by the less canaliculated sutures of the adapical spire whorls.

REMARKS

Possibly *R. (M.) antoni* SCHWARTZ is a species complex, consisting of two or more species; the morpho-

type from the East African Coast, Madagascar, Réunion and Maldives differs from the morphotype from Australia and New Caledonia in having less prominent spiral ribs on the adapical spire whorls and in having less angulated adapical spire whorls.

Nevertheless, additional data with respect to the anatomical characters (penial characters and possible differences in relative strength of the sperm duct in the female), are needed to judge whether the morphotypes are separate species or if the differences in sculpture are the consequence of a trans-Indo-West Pacific cline. In the original description of the nominal variety *pusilla* of *R. antoni*, NEVILL (1884) only referred to the small size of the specimen without reporting any further differences with the reference species. The shell dimensions of the specimen, housed in the collections of the ZSI (reg. No. M.10955/2), labeled "*Rissoina antoni* var. *pusilla* NEV., loc.?" agree with the dimensions given in the original description, so that it can be concluded with a relatively high certainty that it represents the holotype of this nominal variety.

Rissoina (Moerchiella) antensis

MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872
(Figs. 6 A-H; 7 A-D; 8; 9; 10; 52 A; 53 B)

Rissoina antensis MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872, p. 364; WEINKAUFF, 1881, p. 51, pl. 14, figs. 3-4. (not fig. 2 as erroneously indicated).

Rissoina supracostata GARRETT, 1873, p. 209, pl. 2, fig. 1.

Rissoina laeta PRESTON, 1908, p. 198, pl. 14, fig. 3.

? *Moerchiella persista* LASERON, 1956, p. 414, fig. 67.

Moerchiella vovera LASERON, 1956, p. 415, fig. 69.

Rissoina (Zebinella) lamberti SOUVERBIE; CERNOHOSKY, 1978, p. 46, pl. 12, fig. 2 (non *Rissoina lamberti* SOUVERBIE, 1870).

TYPE MATERIAL

Rissoina antensis MONTROUZIER in SOUVERBIE & MONTROUZIER : 5 syntypes in MHNH.

Rissoina supracostata GARRETT : 6 probable syntypes (19265) in ANSP.

Rissoina laeta PRESTON : holotype (M.4024/1) in ZSI.
Moerchiella persista LASERON : holotype (C.102454) in AMS.

Moerchiella vovera LASERON : holotype (C.102455) in AMS.

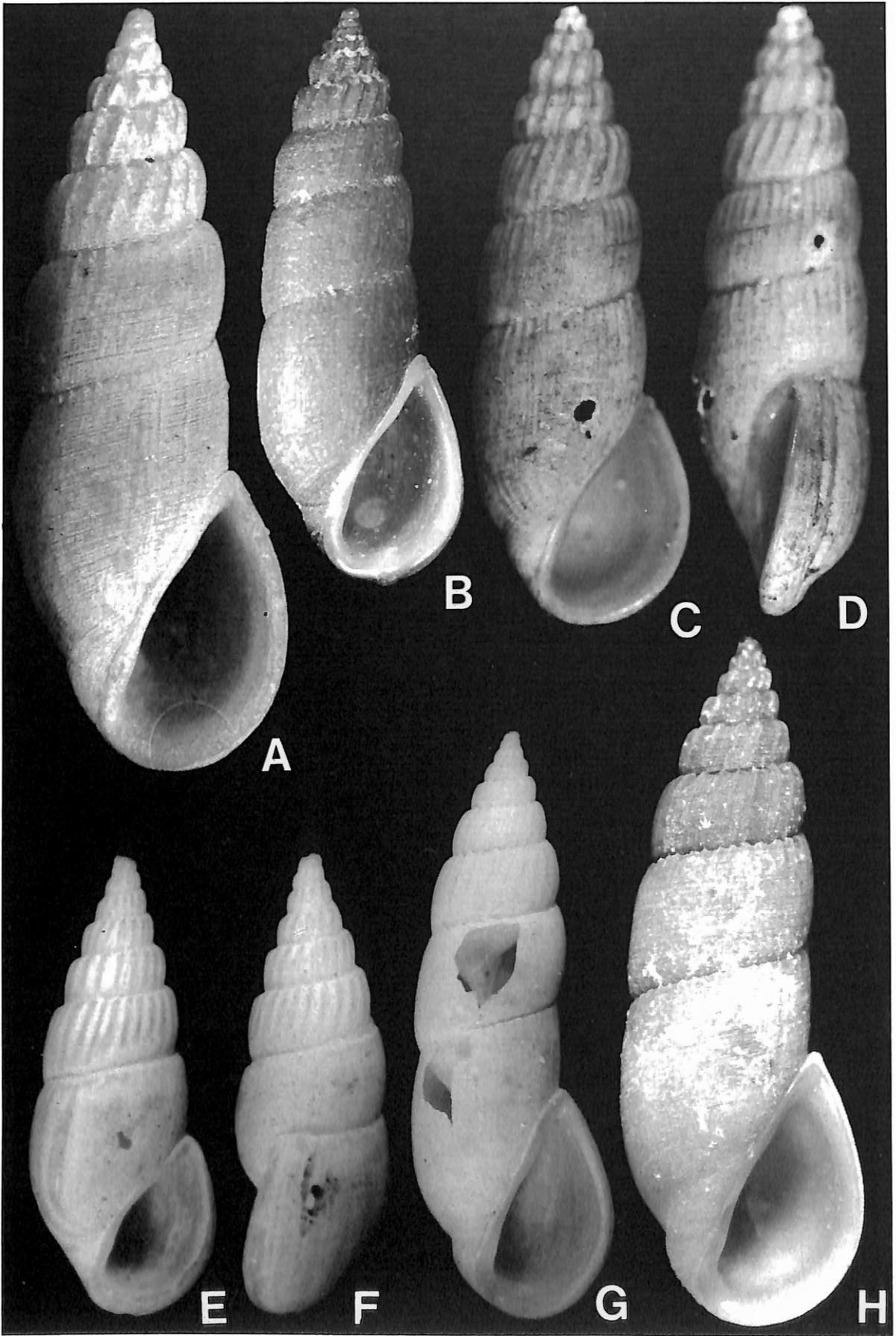
TYPE LOCALITIES

Rissoina antensis : Ile Art, New Caledonia.

Rissoina supracostata : Fiji.

Rissoina laeta : Andaman Islands.

Moerchiella persista : Thursday I., Torres Strait, Cape York, Queensland, Australia.



Moerchiella volvera: Annan River mouth, Cape York Peninsula, Queensland, Australia.

DESCRIPTION

Shell (Figs. 6 A-H, 7 A): length up to 10.1 mm (N = 21); strongly elongate, subcylindrical.

Protoconch (Fig. 7 B-C): very small, of planktotrophic larval type, of 1 1/4, smooth, strongly oblique, whorls; sinusigera notch deep, with margin weakly thickened. Transition to teleoconch abrupt.

Teleoconch: of about 8 whorls; 4-5 adapical spire whorls strongly convex, strongly angulate below sutures; subsequent spire whorls weakly convex to almost flat-sided; last whorl weakly convex, contracted near base.

4-5 adapical spire whorls with prominent, distantly spaced, very narrow, sharp and moderately opisthocline axial ribs with wider and deep interspaces; axial ribs gradually more densely spaced and less prominent on subsequent spire whorls; penultimate and last whorls with extremely short, densely spaced axial ribs, giving the sutures a strongly undulated appearance; last whorl with some, irregularly spaced axial folds, the latter somewhat more numerous near varix.

Spiral sculpture of threads, the latter more prominent and more distantly spaced on adapical spire whorls, gradually less prominent and more closely spaced on subsequent spire whorls; penultimate and last whorls with numerous, very weak and very densely spaced, spiral threads (Fig. 7 D); shell base with weak to moderately prominent spiral cord.

Aperture: D-shaped, moderately large; inner lip thin, narrow, sometimes slightly thicker near shell base; anterior channel very shallow to almost absent; outer lip very thin, with very narrow, moderately thickened external varix; outer lip slightly opisthocline in profile.

Colour: mostly rust-brown or white throughout.

Operculum (Fig. 52 A): typical of genus; peg open over all of its length.

Radula (Figs. 8-9): central tooth with formula:

$$\frac{2-3 + 1 + 2-3}{(2) + 1 \quad 1 + (2)}$$

inner and outer margin of lateral teeth with irregular and a rather irregular number of cusps.

Internal anatomy (only known from a single, badly preserved specimen): stomach-style sac ratio 3.0; stomach length-width ratio 3.5 (N = 1).

Male with a relatively small penis (Fig. 10); distal end of the latter relatively weakly expanded; open penial groove ending in a short filament, the latter situated at the distal end of penis; no prostate gland observed in single specimen available.

Nervous system not examined.

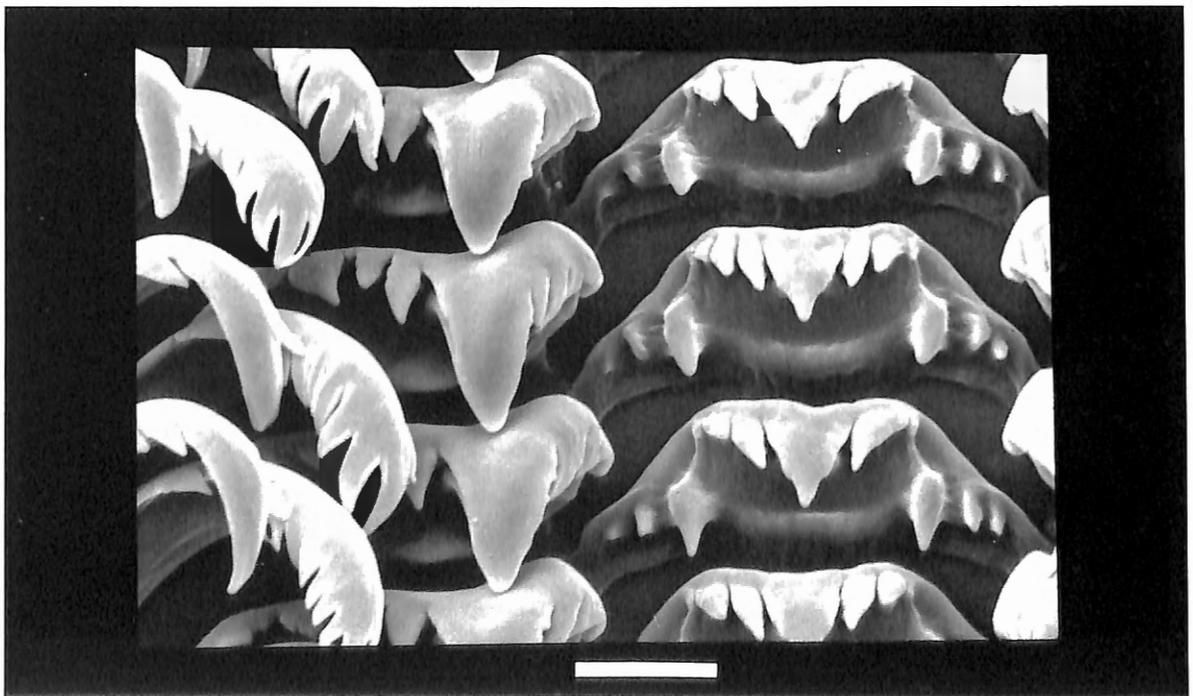
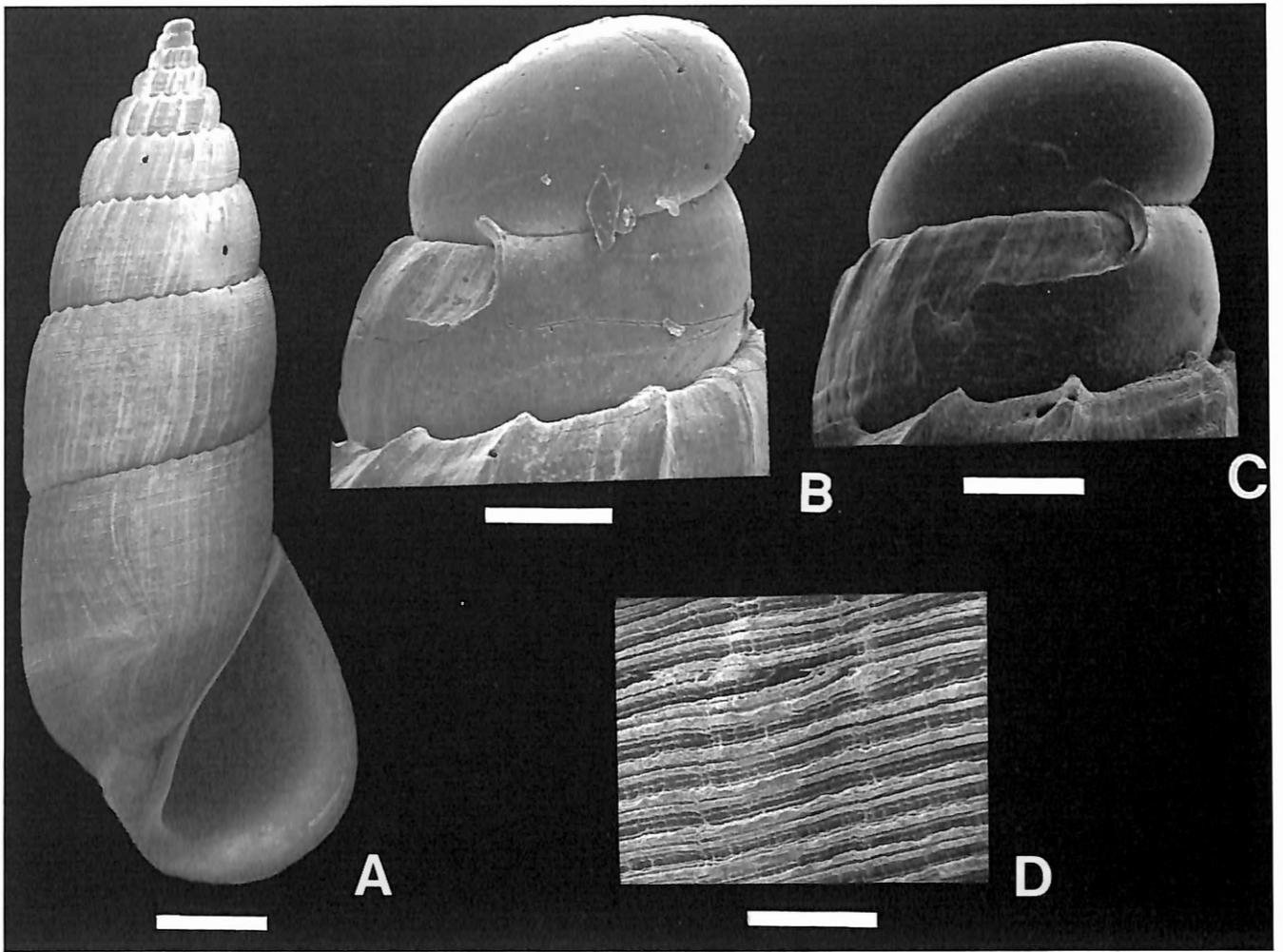
SHELL DIMENSIONS

Table 2.

Rissoina (*Moerchiella*) *artensis*. *Shell dimensions*. (*Dp*: diameter of last whorl of protoconch)

	L (mm)	Ls (mm)	D (mm)	Dp (mm)	No. whorls
<i>Rissoina artensis</i> : syntypes (MHNB)					
	9.4	5.9	3.2	?	8
Fig. 6 B	9.1	5.6	3.2	?	7 1/2
	8.7	5.3	3.0	?	8
	8.5	5.1	3.1	?	8
	8.0	4.9	2.9	?	8
<i>Rissoina laeta</i> : holotype					
Fig. 6 C-D	6.9	4.3	2.5	?	8
<i>Rissoina supracostata</i> : probable syntypes (ANSP, 19265)					
	8.4	5.3	3.0	?	8
Fig. 6 A	6.9	4.2	2.5	?	6 1/2
<i>Moerchiella volvera</i> : holotype (AMS, C.102455)					
Fig. 6 G	10.0	6.0	3.4	?	?
Murray I. (AMS, C.29509)					
	9.0	5.4	3.4	0.29	8
	9.6	5.9	3.4	0.31	8 1/2
Low Isles (AMS, C.154515)					
Fig. 7 A-B,D	10.1	6.1	3.6	0.31	8
	8.5	5.0	3.2	0.29	7 3/4
Nimoa, Papua New Guinea (AMS, C.154518)					
	7.8	4.9	2.8	0.30	8
Bingal Bay, Qld. (AMS, C.154529)					
	7.8	4.7	2.8	0.30	7 1/2
Lizard I. (AMS, C.154529)					
	7.7	4.7	2.8	0.32	7 1/2
(AMS, C.154516)					
	9.3	5.5	3.4	0.29	8
Kurrimine Beach (AMS, C.154513)					
	9.4	5.6	3.4	0.31	8
	9.3	5.8	3.2	0.30	8
	8.8	5.4	3.0	0.30	7 1/2
	8.4	5.1	3.0	?	8

Fig. 6. – A-H. *Rissoina* (*Moerchiella*) *artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. – A. Probable syntype of *Rissoina supracostata* GARRETT, Fiji (ANSP, 19265), 6.9 x 2.5 mm. – B. Syntype of *Rissoina artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, Ile Art, New Caledonia (MHNB), 9.1 x 3.2 mm. – C-D. Holotype of *Rissoina laeta* PRESTON, Andaman Is. (ZSI, M.402411), 6.9 x 2.5 mm. – E-F. Holotype of *Moerchiella persista* LASERON, Thursday I., Torres Strait, Cape York, Queensland, Australia (AMS, C.102454), 6.3 x 2.6 mm. – G. Holotype of *Moerchiella volvera* LASERON, Annan River mouth, Cape York, Queensland, Australia (AMS, C.102455), 10.0 x 3.4 mm. – H. stn. PNG 84-003, Laing I., Hansa Bay, Madang Prov., Papua New Guinea (KBIN).



- ◁ Fig. 7. – A-D. *Rissoina* (*Moerchiella*) *artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. – A-B, D. Low Is., Queensland, Australia (AMS, C.154515). – A. Shell (scanning electron micrograph). – B. Protoconch (scanning electron micrograph). – D. Microsculpture of teleoconch (scanning electron micrograph). – C. Deuba, Fiji, protoconch (scanning electron micrograph) (AMS, C.154536).
Scale bars : A : 1 mm. – B-D : 0.1 mm

VARIATION

Apart from some variation in the strength of the basal spiral fold and in shell colour, the latter ranging from rust-brown to white, *Rissoina* (*Moerchiella*) *artensis* is rather uniform in shell characters.

ADDITIONAL MATERIAL EXAMINED

Zanzibar : Mangapwani (N.W. Zanzibar), 0-3 m, (1) (ANSP, 212988; in alcohol). **Mozambique** : Porto Amelia, (1) (AMS, C.154539); Conducia Bay, (4) (NM, J.4182); Conducia Bay, (2) (NM, H.5607). **Réunion** : Iles Glorieuses (N.W. of Madagascar), (1) (KBIN). **Madagascar** : Diego-Suarez, (1) (KBIN). **Pakistan** : 4.8 km W. of the atomic power plant and 7 km W.N.W. of Bulegi Pt., Sind Prov., 4 m, (1) (LACM, 79-01). **Sri Lanka** : "Ceylon", (1) (NMV, 25889). **Philippines** : Mindanao, Salay, Cagayan de Misamis, (1) (NMNH, 610469); Baclayan I. (paralectotype of *Rissoina striolata* A.ADAMS), (1) (BMNH). **Australia** : Queensland : Putta Putta Beach, S. of Fly Point, Cape York Peninsula, (1) (AMS, C.108806); N. end of Prince of Wales I., Torres Strait, (7) (AMS); Murray I., Torres Strait, (5) (AMS, C.29509); Somerset Bay, Cape York Peninsula, (2) (AMS, C.154517), (1) (AMS); Lizard I., (1) (AMS, C.154529); N. side of Palfrey I., Lizard I., (2) (AMS, C.154516); Palfrey I., Lizard I., (1) (AMS); Palfrey I., Lizard I., (2) (AMS); Low Isles, (2) (AMS, C.154515); Four Mile Beach, Port Douglas, (1) (AMS); Green I., off Cairns, (1) (AMS); Green I., (2) (AMS); Bingil Bay, S. of Innisfail, (1) (AMS, C.154514); Green I., off Cairns, (1) (AMS); Kurrimine Beach, S. of Innisfail, (8) (AMS, C.154513), (2) (AMS); Bowen, (2) (AMS); Palm Is., N. of Townsville, (1) (AMS); Edgecombe Bay, Bowen, 3.5-7 m, (1) (AMS); Hayman I., (1) (AMS); Lindeman I., Whitsunday Passage, (1) (AMS); North West I., Capricorn Group, 2 (AMS). **Papua New Guinea** : Laing I. (Madang Prov.), (1) (KBIN); Nimoa, Calvados Chain, Louisiade Archipel, (7) (AMS, C.154518). **New Caledonia** : "New Caledonia", (3) (KBIN); Lifou, Loyalty Islands, (1) (KBIN). **Fiji** : Deuba, (4) (AMS, C.154517), (1) (AMS, C.154535); "Viti Isles", (6) (ANSP, 19260).

GEOGRAPHICAL DISTRIBUTION

Tropical Indo-West Pacific, from Mozambique to Fiji (Fig. 53 B).

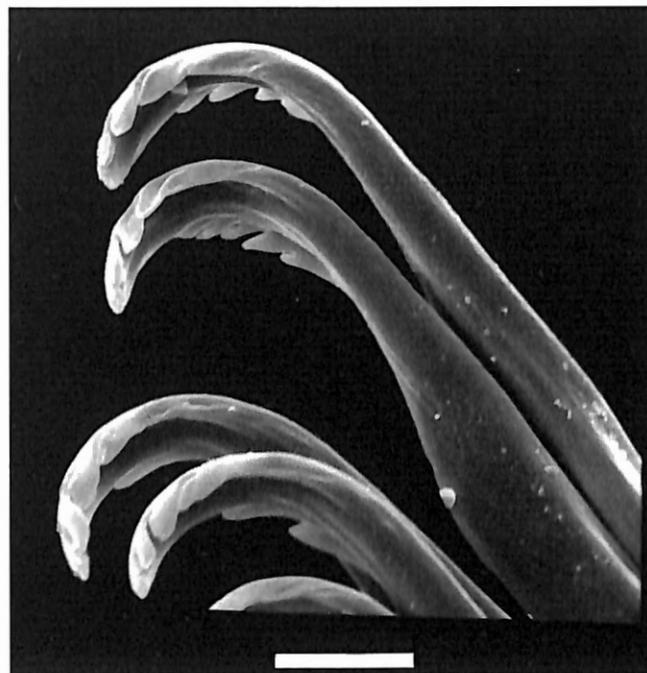


Fig. 9. – *Rissoina* (*Moerchiella*) *artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. Stn. 631, Zanzibar, radula (scanning electron micrograph) (ANSP, 212988). Outer marginal teeth.
Scale bar : 0.01 mm.

AFFINITIES AND DIFFERENCES

The shell of *Rissoina* (*Moerchiella*) *artensis* very strongly resembles *R. (M.) striolata*, but differs in having strongly angulated spire whorls and in having sharp, distantly spaced axial ribs on the adapical spire whorls, rather than the closely spaced, rounded axial ribs in *R. (M.) striolata*; *R. (M.) artensis* has moderately prominent spiral threads on the adapical spire whorls, which are absent in *R. (M.) striolata*; furthermore, the protoconch of *R. (M.) artensis* is much smaller than the protoconch of *R. (M.) striolata*.

- ◁ Fig. 8. – *Rissoina* (*Moerchiella*) *artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. Stn. 631, Zanzibar, radula (scanning electron micrograph) (ANSP, 212988). Lateral and inner marginal teeth.
Scale bar : 0.01 mm.



Fig. 10. – *Rissoina (Moerchiella) artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. Zanzibar, stn. 631, male, dorsal aspect of penis (ANSP, 212988).

R. (M.) artensis is superficially similar in shell characters to *R. (M.) dorbignyi*, and is contrasted under that species.

REMARKS

The holotype of *Moerchiella persista* LASERON is a slightly worn and immature specimen. Probably it is conspecific with *R. (M.) artensis* as it does not show any traces of spiral sculpture on the adapical spire whorls; the axial sculpture, however, is moderately prominent. At the other hand, the weak basal fold is absent in *Moerchiella persista*, probably because it represents an immature specimen, which usually lacks the basal spiral fold.

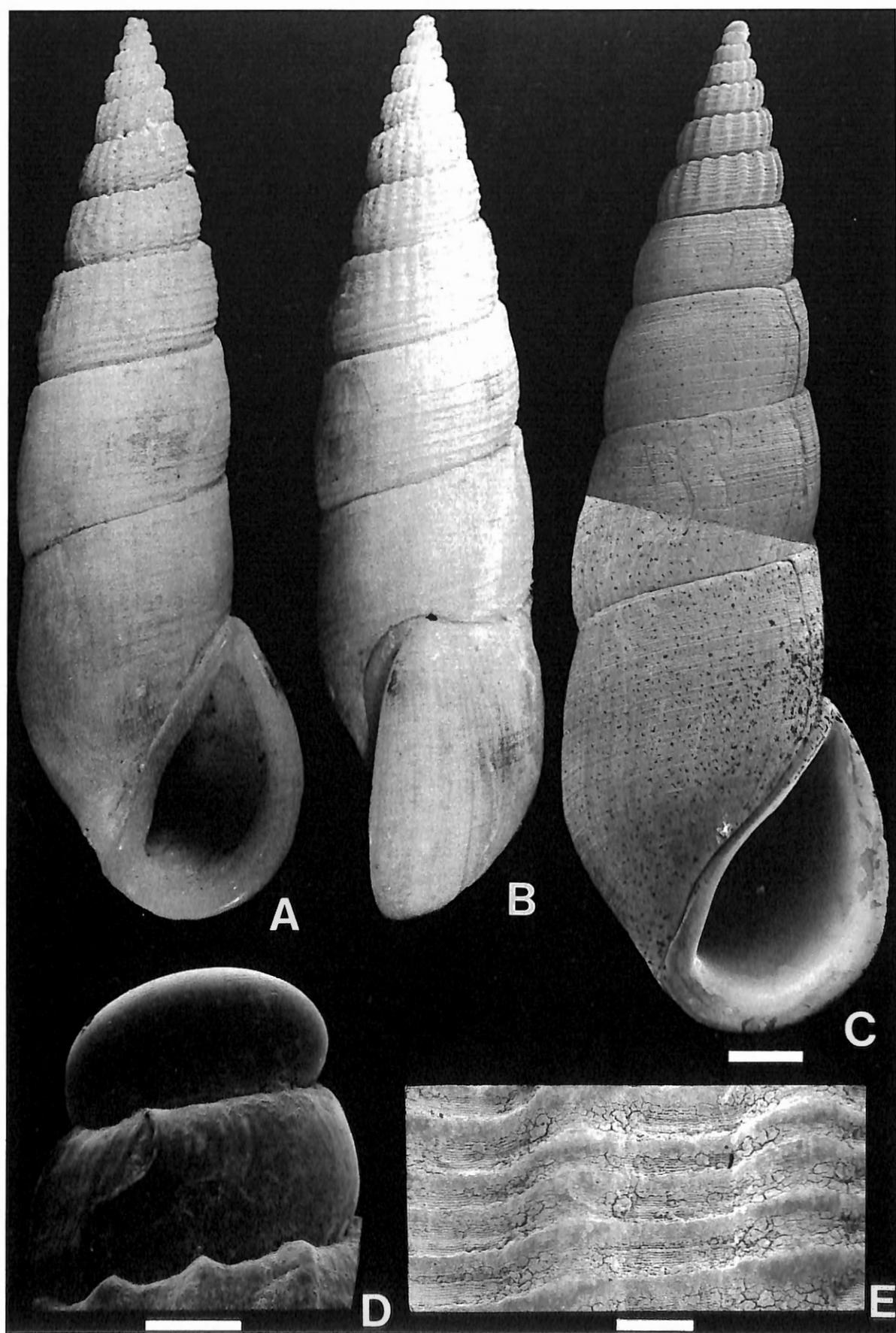
Rissoina (Moerchiella) dorbignyi A. ADAMS, 1851 (Figs. 11 A-E; 12 A-B; 13 A-D; 14; 15 A-D; 16; 17 A-C; 18 A-B; 19 A-B; 53 C)

- ? *Rissoa deformis* SOWERBY, 1830, pl. 50, fig. 2.
 ? *Rissoa spirata* SOWERBY, 1830, pl. 50, fig. 3.
Rissoina dorbignyi A. ADAMS, 1851, p. 265; SCHWARTZ, 1860 p. 168, fig. 64.
Rissoina deformis (SOWERBY); SCHWARTZ, 1860, p. 168, fig. 65; WEINKAUFF, 1881, p. 41, pl. 12, fig. 2.
Rissoina spirata (SOWERBY); SCHWARTZ, 1860, p. 169, fig. 67; WEINKAUFF, 1881, p. 42, pl. 12, fig. 4; JICKELI, 1884, p. 257; NEVILL, 1884, p. 91; CARAMAGNA, 1888, p. 125.
Rissoina montrouzieri SOUVERBIE in SOUVERBIE & MONTROUZIER, 1862, p. 237, pl. 9, fig. 5; WEINKAUFF, 1881, p. 57, pl. 14, fig. 15; NEVILL, 1884, p. 90.
Rissoina orbignyi A. ADAMS; WEINKAUFF, 1877, p. 7, pl. 4, figs. 5-6; NEVILL, 1884, p. 92.
 ? *Rissoina dimidiata* JICKELI, 1882, p. 368; JICKELI, 1884, p. 261, pl. 6, figs. 4-6.
Rissoina montrouzieri subvar. *monstrosa* NEVILL, 1884 p. 90.
Rissoina montrouzieri var. *substriolata* NEVILL, 1884, p. 91.
Rissoina montrouzieri var. *convexior* NEVILL, 1884, p. 91.
Rissoina orbignyi var. *subspirata* NEVILL, 1884, p. 92.
Rissoina orbignyi var. *pachylabris* NEVILL, 1884, p. 92.
Rissoina orbignyi var. *submarginata* NEVILL, 1884, p. 92.
 pars *Rissoina spirata* (SOWERBY); TRYON, 1887, p. 388, pl. 58, figs. 58-59 (not pl. 59, figs. 30-32, 35-37).
Rissoina (Moerchiella) detrita BOETTGER, 1893, p. 110.
Moerchiella artensis (MONTROUZIER); RIPPINGALE & McMICHAEL, 1961, p. 62, pl. 6, fig. 21.
Rissoina cfr. *spirata* (SOWERBY, 1820); BOGI e.a., 1984, p. 101, figs. 1-4.
Rissoina (Rissoina) spirata (SOWERBY); PONDER, 1985, p. 180, fig. 131 D-F.

TYPE MATERIAL

- Rissoa deformis* SOWERBY : unknown, but apparently lost (not in BMNH : *in litt.* Mrs K. WAY).
Rissoa spirata SOWERBY : considered to be lost (*in litt.* Mrs K. WAY).
Rissoina dorbignyi A. ADAMS : 7 syntypes (1984.135) in BMNH, Coll. H. CUMING.
Rissoina montrouzieri SOUVERBIE : lectotype here selected (= specimen marked by author) and 9 paralectotypes (here designated) in MHNB.
Rissoina dimidiata JICKELI : unknown.

Fig. 11. – A-E. *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. – A-B. Syntype of *Rissoina dorbignyi* A. ADAMS, Luzon I., Philippines (BMNH, 1984.135), 15.1 x 4.9 mm. – C, E. Murray I., Torres Strait, Queensland, Australia (AMS, C.29509). – C. Shell (scanning electron micrograph). – E. Microsculpture of penultimate whorl of teleoconch (scanning electron micrograph). – D. Murray I., Torres Strait, Queensland, Australia, protoconch (scanning electron micrograph) (AMS, C.29509).
 Scale bars : C : 1 mm. – D-E : 0.1 mm.



Rissoina montrouzieri subvar. *monstrosa* NEVILL : 2 probable syntypes (M.10961/2) in ZSI.

Rissoina montrouzieri var. *substriolata* NEVILL : 4 probable syntypes (M.10963/2) in ZSI.

Rissoina montrouzieri var. *convexior* NEVILL : 4 probable syntypes (10962/2) in ZSI.

Rissoina orbignyi var. *subspirata* NEVILL : probable holotype (2015) in ZSI.

Rissoina orbignyi var. *pachylabris* NEVILL : 3 possible syntypes (2018) in ZSI.

Rissoina orbignyi var. *submarginata* NEVILL : possible holotype (2017) in ZSI.

Rissoina detrita BOETTGER : syntype (225141/1) in SMF, Coll. O. BOETTGER.

TYPE LOCALITIES

Rissoina dorbignyi : Luzon I. (Philippines).

Rissoa deformis : no locality mentioned.

Rissoa spirata : no locality mentioned.

Rissoina montrouzieri : I. Art (New Caledonia).

Rissoina dimidiata : Dahlak Archipelago (Ethiopia).

Rissoina montrouzieri monstrosa : Andamans.

Rissoina montrouzieri substriolata : Andamans.

Rissoina montrouzieri convexior : Andamans.

Rissoina orbignyi subspirata : Aden.

Rissoina orbignyi pachylabris : Annesley Bay (N. Ethiopia).

Rissoina orbignyi submarginata : Andamans.

Rissoina detrita : Bisucay I., Philippines.

DESCRIPTION

Shell (Figs. 11 A-C, 12 A-B, 13 A-D, 14, 15 A-D, 16) : length up to 18.5 mm (N = 23); solid, strongly elongate, subcylindrical.

Protoconch (Fig. 11 D) : of 1 1/4, whorls; probably of planktotrophic larval type; with 2 weak spiral threads (observed in one fresh specimen from Fiji); transition to teleoconch abrupt, with a moderately deep sinusigera notch; margin weakly thickened.

Teleoconch : of about 8-10 whorls; adapical spire whorls weakly to strongly convex, angulate below suture; sutures deeply impressed to subcanaliculated; abapical spire whorls and last whorl very weakly convex with sutures deeply impressed but the latter less canaliculate than on early spire whorls.

Sculpture of 5-6 adapical spire whorls consisting of more or less prominent, rounded, closely spaced and slightly opisthocline axial ribs, crossed by moderately prominent spiral threads to spiral riblets, the latter forming weak nodules on the axial ribs; axial ribs gradually less prominent to absent on subsequent spire whorls and on last whorl; spiral ribs gradually less prominent, more numerous and more crowded on subsequent spire whorls (Fig. 11 E); last whorl with very densely spaced, spiral threads.

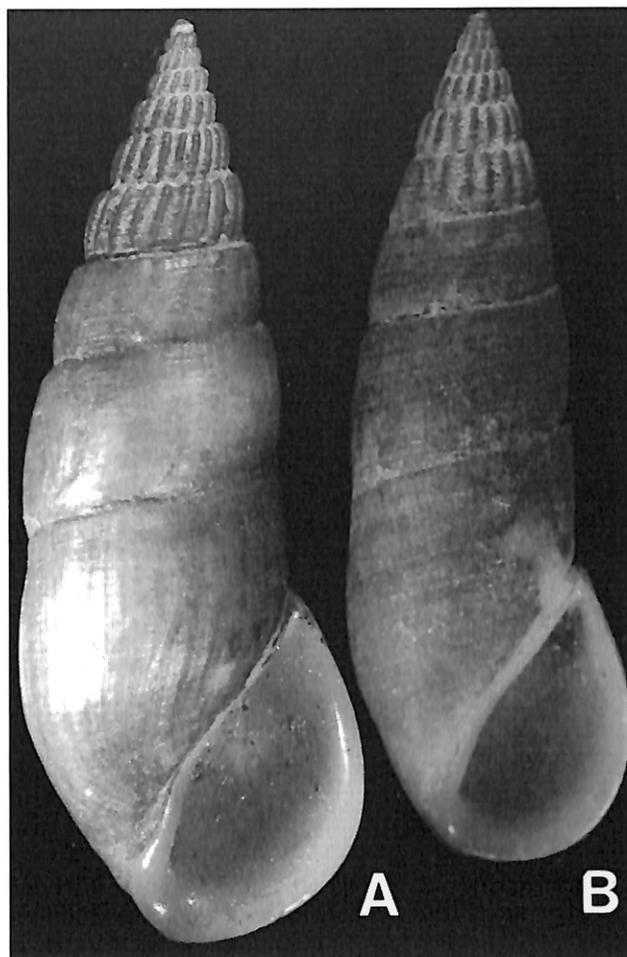


Fig. 12. – A-B. *Rissoina* (*Moerchiella*) *dorbignyi* A. ADAMS, 1851. – A. Paralectotype (here selected) of *Rissoina montrouzieri* SOUVERBIE in SOUVERBIE & MONTROUZIER, *Ile Art, New Caledonia* (MHNB), 15.0 x 5.4 mm. – B. Probable syntype of *Rissoina montrouzieri* var. *substriolata* NEVILL, *Andaman Is.* (ZSI, M.10963/2), 13.6 x 4.4 mm.

Aperture : D-shaped, outer lip weakly expanded; inner lip thin; columellar side weakly concave; anterior channel very shallow to almost absent; outer lip very thin, with a very weak and narrow external varix; outer lip weakly opisthocline.

Colour : white throughout; some specimens covered with a brown-blackish layer of an unidentified substance.

Operculum : typical of genus, with opercular peg open over all of its length (PONDER, 1985 : fig. 131 D).

Radula : central tooth with formula :

$$\frac{2-4 + 1 + 2-4}{2} \quad \frac{2-4}{2}$$

lateral teeth with ca. 5 cusps on its outer margin and 4-5 cusps on its inner margin (PONDER, 1985 : fig. 131 F).

Internal anatomy (Figs. 17-19): hypobranchial gland massive, very wide, weakly lobate, consisting of densely packed, pinkish brown lamellae.

Stomach-style sac ratio: 8.0; stomach length-width ratio: 3.5 (N = 1).

Male with vas deferens open throughout its length; penis (Fig. 18) slender with distal end bifurcated; penial duct entering outer (in dorsal view) lobe of bifurcation; inner side (ventral view) with a glandular lobe, situated just anterior to the distal bifurcation; penis with penial duct open over all of its length, except for the portion ending in the short distal lobe.

No female specimens available for dissection.

Nervous system (Fig. 17 C): RPG ratio: 0.55 (LPG ratio not determined) (N = 1).

VARIATION

Rissoina (Moerchiella) dorbignyi shows considerable variation with respect to the shape of the sutures of the adapical spire whorls, which can be deeply impressed to strongly canaliculated. Furthermore, there is some variation in the relative strength of the spiral sculpture on the adapical spiral whorls, but in other respects, this species appears to be rather uniform in both shell shape and sculpture.

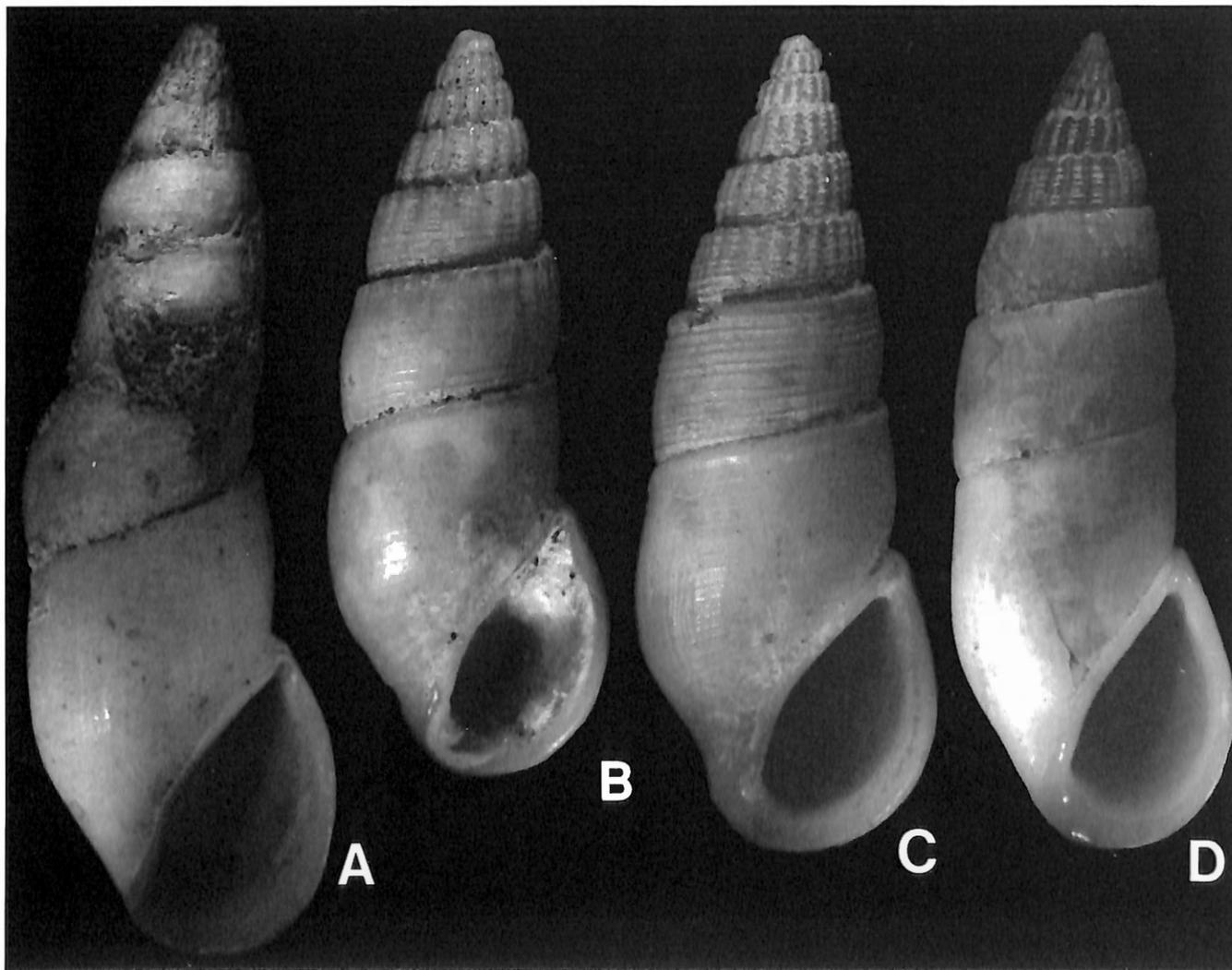


Fig. 13. – A-D. *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. – A. Probable syntype of *Rissoina montrouzieri* subvar. *monstrosa* NEVILL, Andaman Is. (ZSI, M.10961/2), 16.4 x 5.4 mm. – B. Possible holotype of *Rissoina orbignyi* var. *subspirata* NEVILL, Aden (ZSI, 2015), 10.3 x 3.8 mm. – C. Possible syntype of *Rissoina orbignyi* var. *pachylabris* NEVILL, Annesley Bay (N. Ethiopia), Red Sea (ZSI, 2018), 11.3 x 4.1 mm. – D. Probable syntype of *Rissoina montrouzieri* var. *convexior* NEVILL, Andaman Is. (ZSI, M.10962/2), 14.2 x 4.9 mm.

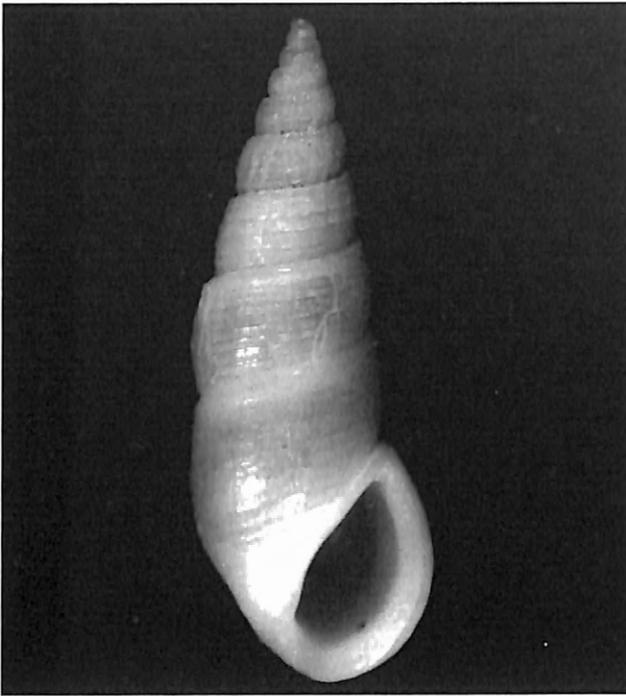


Fig. 14. – *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. Possible holotype of *Rissoina orbignyi* var. *submarginata* NEVILL, Aden (ZSI, 2017), 8.6 x 3.2 mm.

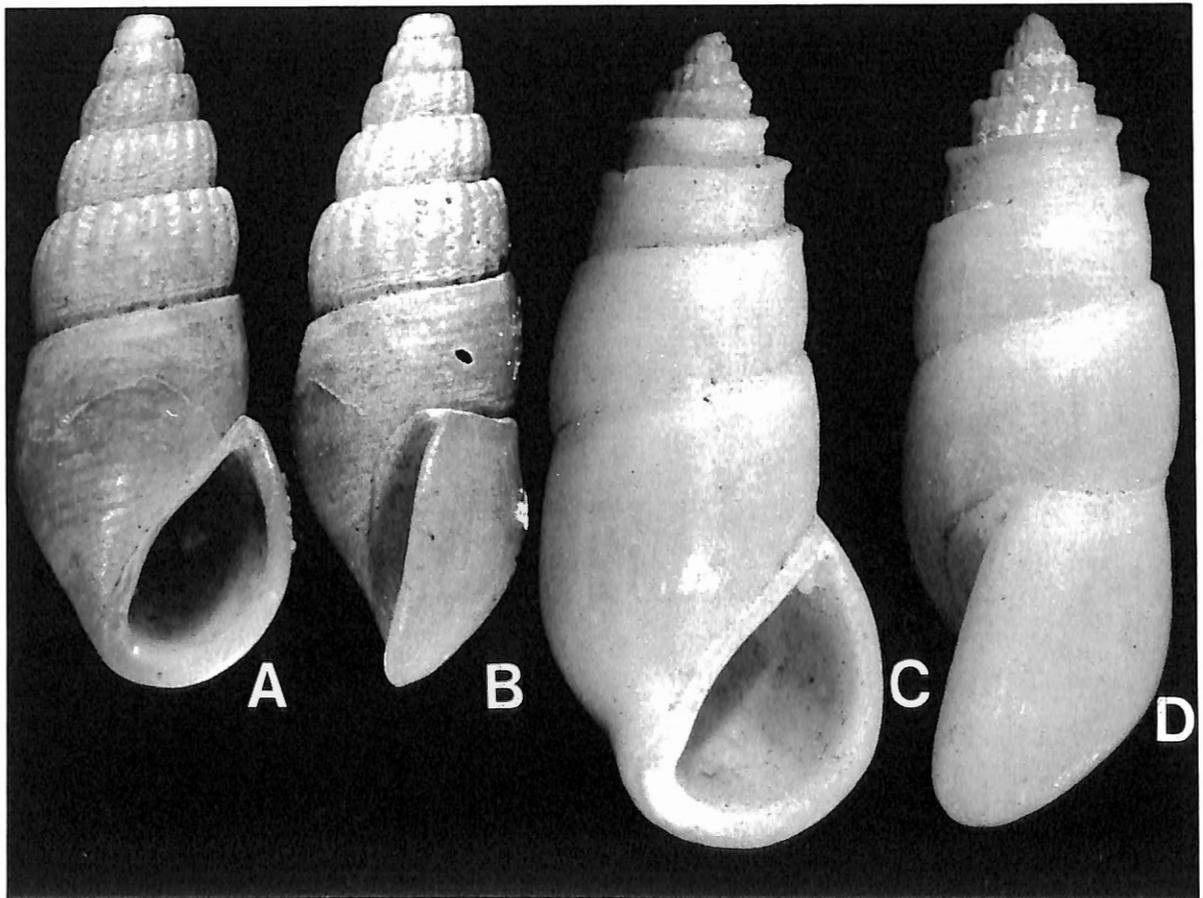


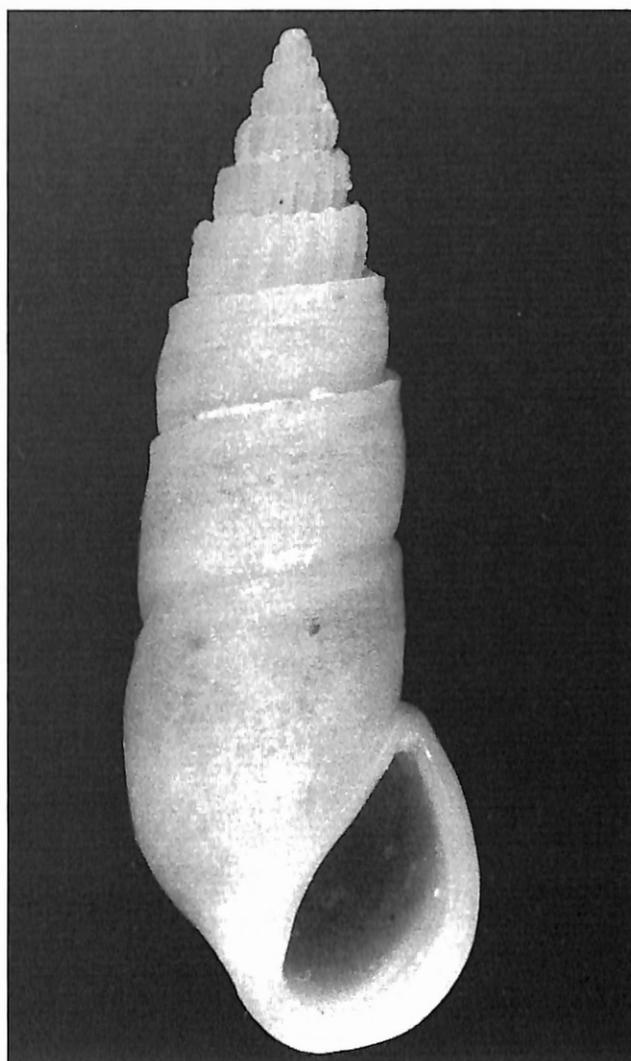
Fig. 15. – A-D. *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. – A-B. Syntype of *Rissoina (Moerchiella) detrita* BOETTGER, Bisucay I., Philippines (SMF, 225141/1), 5.6 x 2.3 mm. – C-D. Seychelles (Coll. DAUTZENBERG, KBIN), 10.5 x 4.4 mm.

SHELL DIMENSIONS

Table 3.

Rissoina (*Moerchiella*) *dorbignyi*. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
<i>Rissoina dorbignyi</i> : syntypes (BMNH, 1984.135)				
	15.1	10.4	4.9	11
	15.8	10.8	5.2	11
	15.6	11.0	5.6	10
<i>Rissoina montrouzieri</i> : lectotype (MHNB)				
	16.5	11.0	5.4	10
paralectotypes (MHNB)				
	18.5	13.3	5.9	?
	16.2	11.6	5.4	?
	15.0	10.4	5.1	?
	15.0	10.4	5.4	?
Fig. 12 A	13.8	8.6	5.0	?
	13.5	9.5	4.7	?
	11.0	7.1	3.9	?
<i>Rissoina montrouzieri monstrosa</i> : probable syntype (ZSI, M.10961/2)				
Fig. 13 A	16.4	10.7	5.4	8
<i>Rissoina montrouzieri substriolata</i> : probable holotype (ZSI, M.10963/2)				
Fig. 12 B	13.6	8.9	4.4	9 1/2
<i>Rissoina montrouzieri convexior</i> : probable syntypes (ZSI, M.10962/2)				
Fig. 13 D	14.2	9.0	4.9	9 1/2
	12.9	8.1	4.6	9 1/2
<i>Rissoina orbignyi subspirata</i> : probable holotype (ZSI, 2015)				
Fig. 13 B	?10.3	?6.5	3.8	>7 1/2
<i>Rissoina orbignyi submarginata</i> : probable holotype (ZSI, 2017)				
Fig. 14	8.6	5.5	3.2	7 3/4
<i>Rissoina orbignyi pachylabris</i> : probable syntype (ZSI, 2018)				
Fig. 13 C	11.3	7.0	4.1	8
<i>Rissoina detrita</i> : syntype (SMF, 225141/1)				
Fig. 15 A-B	?5.6	?3.4	2.3	>6
Elat (IY, 5684))				
Fig. 16	13.3	8.9	4.6	11
Nuweiba el Muzeina (IY, 3875)				
	11.1	7.2	4.0	?
Aden (KBIN)				
	15.1	9.8	5.3	9
Seychelles (KBIN)				
	13.7	8.2	5.7	9
Philippines (KBIN)				
	14.9	9.6	5.3	9
New Caledonia (NM, K.5906)				
	17.2	11.5	5.4	9

Fig. 16. – *Rissoina* (*Moerchiella*) *dorbignyi* A. ADAMS, 1851. Elat, Red Sea (IY, 5684), 13.3 x 4.6 mm.

ADDITIONAL MATERIAL EXAMINED

Red Sea : Elat, Almog Natural Reserve, (1) (IY, 5684); Ras Burqa, (1) (IY, 5245); Nuweiba el Muzeina, (1) (IY, 3875); Ras Muhammed-Mezakh, (1) (IY, 5196); Bir es Suweir, (1) (IY, 2795); "Mer Rouge", (3) (KBIN). **Yemen (Gulf of Aden)** : Aden, (1) (KBIN). **Seychelles** : "Séchelles", (15) (KBIN). **Thailand** : Phuket I., at S. tip of Phromthep Cape, (1) (LACM, 85-6); Big Lighthouse I., S. Pukhet I., (1) (ANSP, 286375). **Philippines** : Matabungkay, ca. 115 km S.S.W. of Manila City, Luzon Prov, (2) (AMS, C.154524); Matabungkay, (1) (AMS, C.154537); Mactam I., off E. side of Cebu I., (1) (LACM, 81-1); Punta Engano, Mactan I., Cebu I., (1) (JS, 075-033); Leyte I., (1) (USNM, 303746); Magallanes, Tablas, (2) (USNM, 303650); Capul, (1) (NMV, 25891); "Philippinen", (2) (NMV, 25887), (2) (NMV, 25888), (1) (NMV, 25890). **Indonesia** : **Irian Jaya** : 1.6 km N.E. of Mios Woendi I., Padaido Is., (1) (ANSP, 205491). **Solomon Islands** : Rua Sura, (1) (KBIN). **Australia** : **Queensland** : Murray I., Torres Strait, (78) (AMS, C.29509), (4) (AMS,

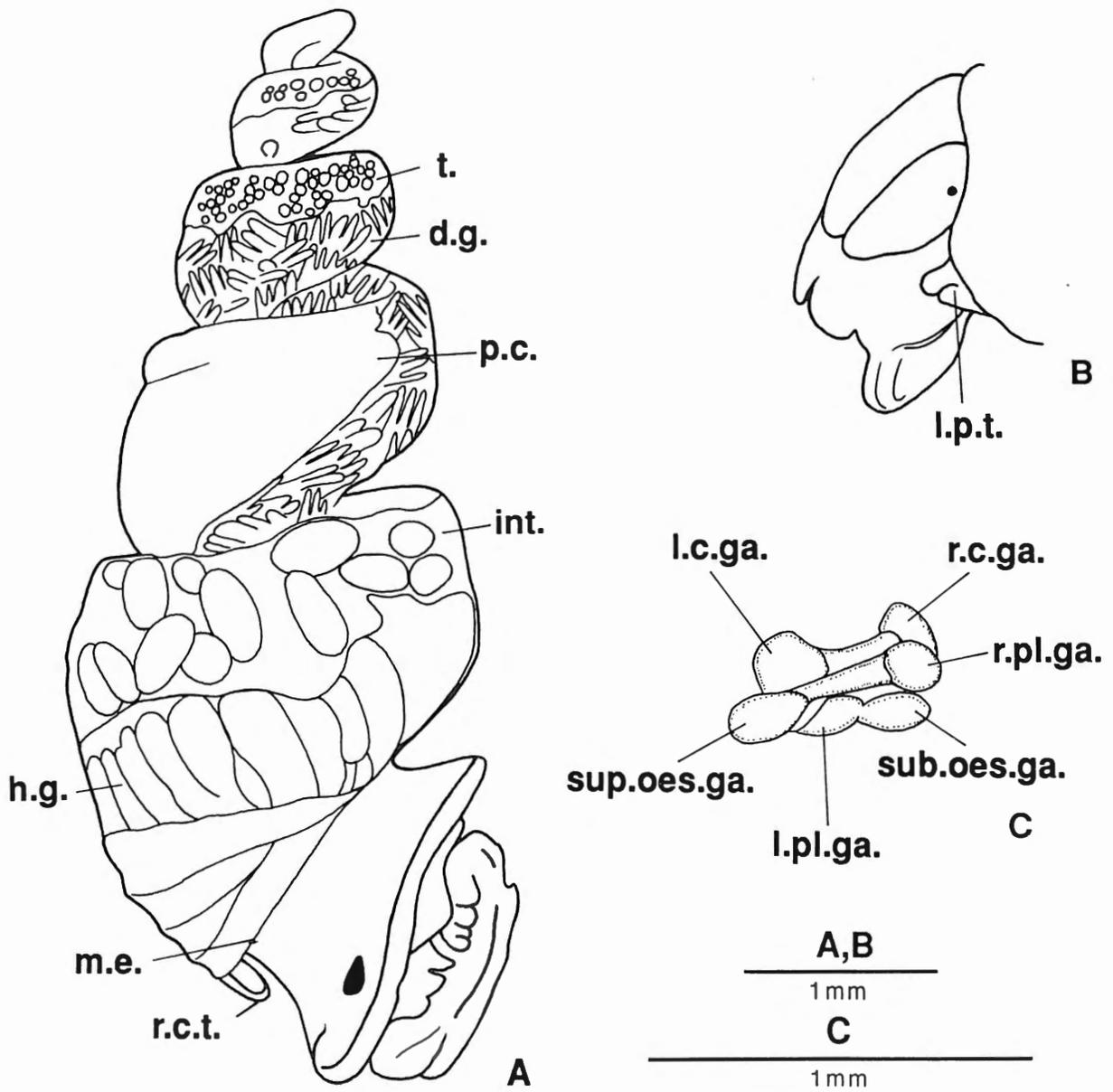


Fig. 17. – A-C. *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. Somerset Bay, Cape York Peninsula, Queensland, Australia (AMS, C.138690). – A. Male removed from shell. – B. Left cephalic tentacle and bilobed left pallial tentacle. – C. Dorsal aspect of the circumoesophageal ganglia and the oesophageal ganglia, excluding the pedal and buccal ganglia.

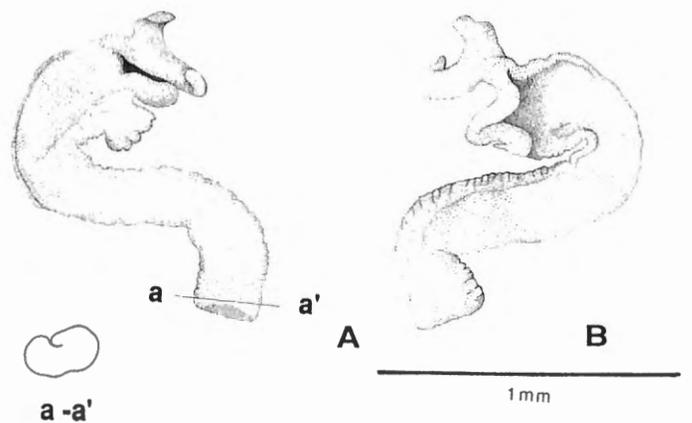


Fig. 18. – A-B. *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. Somerset Bay, Cape York Peninsula, Queensland, Australia (AMS, C.138690). – A. Ventral aspect of penis. – B. Dorsal aspect of penis.

C.154528); Thursday I., Torres Strait, (9) (AMS, C.154527); S. side of Thursday I., (7) (AMS, C.154508); Thursday I., (1) (AMS); N. of Terry Beach, W. side of Prince of Wales I., Torres Strait, (1) (AMS); Annon River, Cape York Peninsula, (3) (AMS, C.41439); Putta Putta Beach, S. of Fly Point, Cape York Peninsula, (4) (AMS, C.108806); Somerset Bay, Cape York Peninsula, (4) (AMS, C.139690; in alcohol); S. side of Somerset Bay, Cape York Peninsula, (1) (AMS, C.105688); Lizard I., S. end of South I., 15 m, (2) (AMS, C.154507); Lizard I., S.W. end of South I., 9-12 m, (1) (AMS); Cooktown, (1) (AMS); Near Jetty, Port Douglas, (3) (AMS); Port

Douglas, Jetty Beach, (4) (AMS); Green I., (1) (AMS, C.83738); Bingil Bay, S. of Innisfail, (1) (AMS); Dunk I., between Cairns and Townsville, (2) (AMS, C.9412); Palm Is., N. of Townsville, (1) (AMS, C.9414); Hayman I., (1) (AMS). **New Caledonia**: "New Caledonia", (63) (KBIN); "New Caledonia", (1) (AMS, C.54991); "New Caledonia", (5) (AMS, C.28912); Guache, Lifou, Loyalty I., (1) (AMS, C.25570); Poindimié, (3) (NM, K5906). **Vanuatu**: Hideaway I., Mele Bay, Efate I., (1) (AMS, C.154532). **Fiji**: Nadi Bay, Viti Levu, 9-35 m, (1) (AMS, C.154530); Douba, (1) (AMS, C.154536).

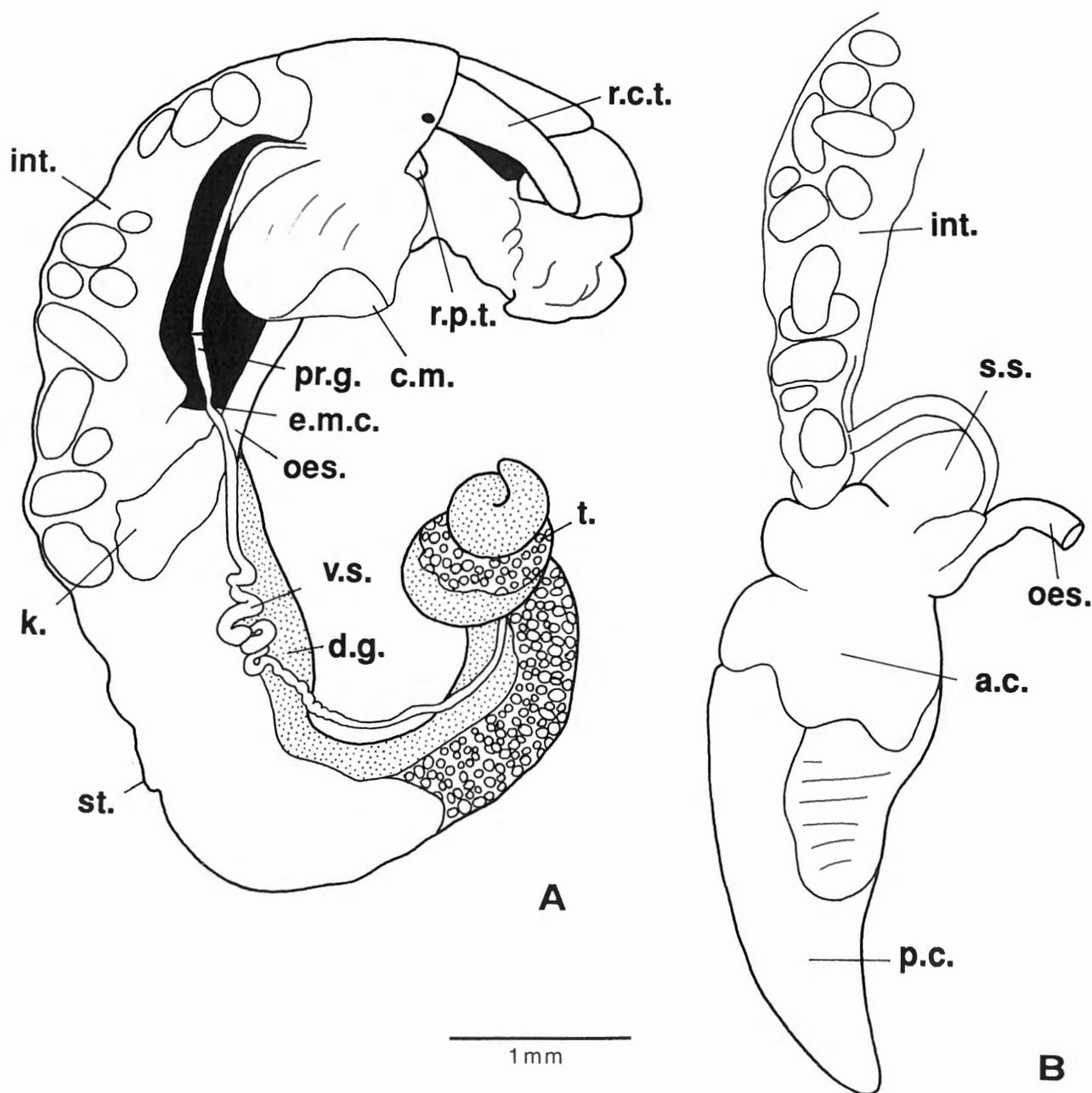


Fig. 19. – A-B. *Rissoina (Moerchiella) dorbignyi* A. ADAMS, 1851. Somerset Bay, Cape York Peninsula, Queensland, Australia (AMS, C.138690). – A. Uncoiled male. – B. Inner side of stomach.

ADDITIONAL RECORDS FROM LITERATURE

Tyrrhenian Sea : (BOGI e.a., 1984). **Red Sea** : "Zeite Point and Tor", "Djedda, Massana and Dahlak" (JICKELI, 1884); Assab (CARAMANGA, 1888).

GEOGRAPHICAL DISTRIBUTION

Tropical Indo-West Pacific from the Red Sea to Fiji; so far, no specimens were recorded from the area between the Seychelles and Thailand, but likely this disjunct distribution is the result of poor collecting in the intervening areas (Fig. 53 C). The presence of this species in the Mediterranean is probably due to recent immigration from the Red Sea through the Suez Canal (BOGI e.a., 1984).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) dorbignyi* strongly resembles *R. (M.) antoni* and is contrasted under the affinities and differences of that species.

The shell of *R. (M.) dorbignyi* strongly resembles *R. (M.) striolata*, but differs from the latter in having a paucispiral protoconch, and in having nodose axial ribs on the adapical spire whorls.

The shell of *R. (M.) dorbignyi* has a superficial resemblance to *R. (M.) artensis* but differs in having nodose, rounded, rather closely spaced axial ribs on the adapical spire whorls, rather than sharp, distantly spaced axial ribs in *R. (M.) artensis*; furthermore, the adapical spire whorls are much more angulated in *R. (M.) artensis* and the shell base has a weak to moderately prominent spiral cord, which is absent in *R. (M.) dorbignyi*. The shell of *R. (M.) artensis* is thinner and more fragile than the shell of *R. (M.) dorbignyi* and usually, *R. (M.) dorbignyi* is larger than *R. (M.) artensis*.

R. (M.) dorbignyi also resembles *R. (M.) kilburni* sp. nov. in shell characters and is contrasted where the latter species is introduced.

REMARKS

The type material of *Rissoa spirata* and *R. deformis* is considered lost, and the original illustrations are not accompanied by a description; the original illustrations, however, are too vague to permit species recognition, since *R. (M.) dorbignyi* and *R. (M.) striolata* are very similar in shell shape and sculpture and consequently the illustrations could be easily applied to both species. *Rissoa deformis* is very probably conspecific with *R. (M.) dorbignyi*, but also the original illustration of this species was neither accompanied by a description nor by the designation of the type locality; the specimen figured, very probably represents the morphotype with the very anomalous and tilted shell shape, which however, in other respects, is identical to typical specimens of *R. (M.) dorbignyi*.

Although the single syntype of *Rissoina detrita* BOETGER examined, is in a rather poor state of preservation, hardly any confusion exists about its conspecificity with the syntypes of *R. dorbignyi*.

NEVILL (1884) described several nominal varieties of *R. montrouzieri* and of *R. orbignyi*, which, after examination of the original material, seem to be conspecific with *R. dorbignyi*. Although the material in the ZSI was not labeled as "type-material", the original description (if given) or the given shell dimensions agree with the material mentioned above. One vial of *R. orbignyi* var. *pachylabris*, labeled "Annesley Bay, (Reg. no. 2018)" contains one adult and one immature specimen, which are conspecific with the type material of *R. dorbignyi* and agree with the original description of the nominal variety. One specimen of *R. orbignyi* var. *pachylabris* (vial without label), however, is *Stosicia annulata* (DUNKER) and probably does not belong to the type material of the latter nominal variety, as the author only refers to 2 specimens from Annesley Bay.

I could not locate the type material of *Rissoina dimidiata* JICKELI, 1882, which was originally described from a single specimen from the Dahlak Archipelago (Ethiopia). Two years later this species was depicted by the same author; both the original description and the illustration strongly suggest that it is conspecific with *R. (M.) dorbignyi*, especially since no other similar *Rissoina (Moerchiella)* species are known from that area.

***Rissoina (Moerchiella) gigantea* (DESHAYES, 1848)**
(Figs. 20 A-B; 54 A)

? *Rissoina grandis* PHILIPPI, 1847, p. 127.

Rissoa gigantea DESHAYES, 1848, pl. 77, figs. 18-20.

Rissoina gigantea (DESHAYES); SCHWARTZ, 1860, p. 166, fig. 62; WEINKAUFF, 1877, p. 7, pl. 4, figs. 3-4; TRYON, 1887, p. 387, pl. 58, fig. 25.

Zebina (Morchiella) gigantea (DESHAYES); CERNOHORSKY, 1978, p. 50, pl. 12, fig. 13.

Rissoina (Rissoina) gigantea (DESHAYES) : PONDER, 1985, p. 180, fig. 131A.

TYPE MATERIAL

Rissoa gigantea DESHAYES : unknown.

Rissoina grandis PHILIPPI : unknown.

TYPE LOCALITIES

Rissoa gigantea : no type locality mentioned.

Rissoina grandis : Philippines.

DESCRIPTION

Shell (Fig. 20 A-B) : length up to 20 mm (N = 2), solid, narrowly conical.

Protoconch : broken in all specimens available.

Teleoconch : of about 8, weakly convex whorls, weakly sub-angulated below the periphery; adapical spire whorls slightly more angulated than abapical whorls; last whorl weakly to moderately globose and moderately contracted near shell base.

Adapical spire whorls with weak to very prominent, slightly opisthocline to weakly prosocline, rather narrow to moderately large, rounded axial ribs, gradually weaker and eventually absent on abapical spire whorls and on last whorl; spire whorls with 4-5, rather weak spiral riblets, crossing the top of the axial ribs and forming small to moderately prominent nodules on the latter; spiral ribs becoming gradually less prominent, gradually changing into more closely spaced threads on penultimate and last whorls.

Aperture : D-shaped to lenticular; inner lip thin; anterior channel narrow, weakly to moderately deep; outer lip weakly thickened internally, with rather thick and

narrow external varix; outer lip moderately to strongly opisthocline in profile.

Colour : white throughout.

Operculum, radula and internal anatomy : unknown.

SHELL DIMENSIONS

Table 4.

Rissoina (*Moerchiella*) *gigantea*. *Shell dimensions*.

	L (mm)	Ls (mm)	D (mm)	No. whorls
Keppel Bay (AMS, C.154512)				
Fig. 20 A-B	18.4	11.8	6.6	?
Middelburg, West Irian (AMS, C.154520)	20.8	13.1	8.2	?

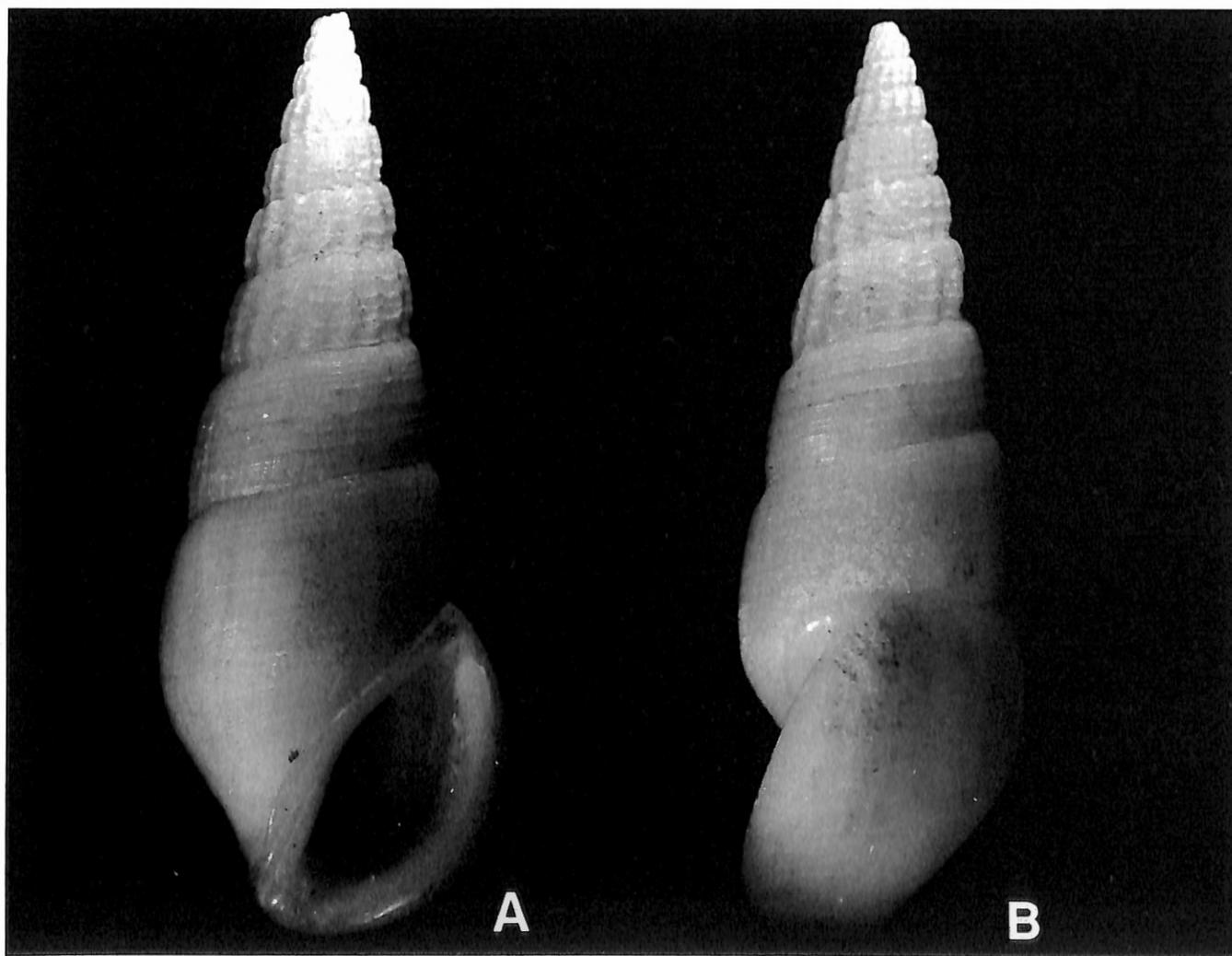


Fig. 20. — *Rissoina* (*Moerchiella*) *gigantea* (*DESHAYES*, 1848). Keppel Bay, Queensland, Australia, 4m (AMS, C.154512), 18.4 x 6.6 mm.

VARIATION

Usually, the last whorl is strongly inflated, but in some specimens it is only very weakly globose; furthermore, the axial ribs on the adapical whorls can be more or less prominent.

ADDITIONAL MATERIAL EXAMINED

Philippines : Matabungkay, ca. 115 km S.S.W. of Manila City, (2) (AMS, C.154394), (1) (AMS, C.139687); "Philippines", (1) (NMV, 25885). **Indonesia** : Irian Jaya : Middelburg I., West Irian, (1) (AMS, C.154520). **Australia** : **Western Australia** : Flats around Onslow Jetty, Onslow, (1) (AMS, C.101456). **Northern Territory** : West Point, Darwin, 1 (AMS, C.154521); Waigait, Darwin, (1) (AMS, C.121064). **Queensland** : Keppel Bay, 4 m, (1) (AMS, C.154512); Tryon I., Capricorn Group, (2) (AMS, C.154505); Tryon I., Capricorn Group, (1) (AMS, C.154510); North West I., Capricorn Group, (1) (AMS, C.154511). **Solomon Islands** : Laulasi I., S. of Aoki, W. coast of Malaita I., 6-11 m, (1) (AMS). **New Caledonia** : Loyalty I., (2) (AMS, C.154531); "New Caledonia", (2) (AMS, C.28912).

GEOGRAPHICAL DISTRIBUTION

Philippines, New Guinea and Solomon Islands, northern Australia and New Caledonia (Fig. 54 A).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) gigantea* superficially resembles that of *R. (M.) striata* from which it differs in being more elongated and less broadly conical, in having angulated whorls and in the last whorl being more inflated; furthermore, the axial and spiral sculpture is equally prominent on the adapical spire whorls of *R. (M.) striata*, while the axial sculpture is much more prominent than the spiral sculpture in *R. (M.) gigantea*.

R. (M.) gigantea resembles *R. (M.) dorbignyi* in shell characters, but differs in being usually much larger, in having more prominent axial ribs on the adapical spire whorls, in having less angulated adapical spire whorls, in having a shorter aperture and in the last whorl being much more inflated.

REMARKS

I did not examine the type material of *Rissoa gigantea*, but the original illustration is good, and there is little doubt about the identity of this species.

Rissoina grandis is very probably conspecific with *R. (M.) gigantea*, but since the original description is rather vague and not accompanied by any illustration, and because the whereabouts of the type material of PHILIPPI is unknown, we prefer to treat *R. grandis* as a nomen dubium.

***Rissoina (Moerchiella) kilburni* sp. nov.**
(Figs. 21 A-C; 22 A-C; 52 C)

DERIVATION OF NAME

Named after Dr. R. KILBURN (Natal Museum).

TYPE MATERIAL

Holotype (H.1078) : empty shell, leg. K.J. GROSCH, purchased by the Natal Museum in September 1975, in NM.

Paratypes (H.1078) : 7 specimens, leg. K.J. GROSCH, purchased by the Natal Museum in September 1975, in NM.

TYPE LOCALITY

Conducia Bay, Mozambique.

DESCRIPTION

Shell (Figs. 21 A-C, 22 A) : length up to 17 mm (N = 8), solid, with strongly elongated spire, narrowly to elongately conical.

Protoconch : entirely or partly broken in all specimens available, but probable of non-planktotrophic larval type, judging from the transition to teleoconch which lacks the sinusigera notch.

Teleoconch : of about 9, weakly convex to almost flat-sided spire whorls; last whorl weakly convex; 2-3 adapical spire whorls weakly angulated below suture; sutures weakly to moderately impressed.

Adapical spire whorls with weak, more or less distantly spaced, weakly opisthoclinal, rounded, axial ribs, gradually less prominent from about the fifth whorl and eventually entirely absent on the abapical spire whorls and on last whorl; spire whorls and last whorl with regularly spaced spiral threads, the latter somewhat more distantly spaced on adapical spire whorls than on remaining whorls; 2-3 abapical spiral threads of early spiral whorls slightly more prominent than adapical ones.

Microsculpture (Fig. 22 B-C) of extremely fine and narrow, rather regular spiral grooves.

Aperture : almost D-shaped; columellar side weakly concave to almost rectilinear; inner lip thin, with weak swelling near transition to anterior channel; the latter narrow, moderately deep; posterior channel very short, triangular; outer lip thin internally, with a moderately wide, rounded and moderately thick external varix; outer lip weakly opisthoclinal in profile.

Colour : white, throughout.

Operculum (Fig. 52 C) : typical of genus, with opercular peg open over all of its length.

Radula and *internal anatomy* : unknown.

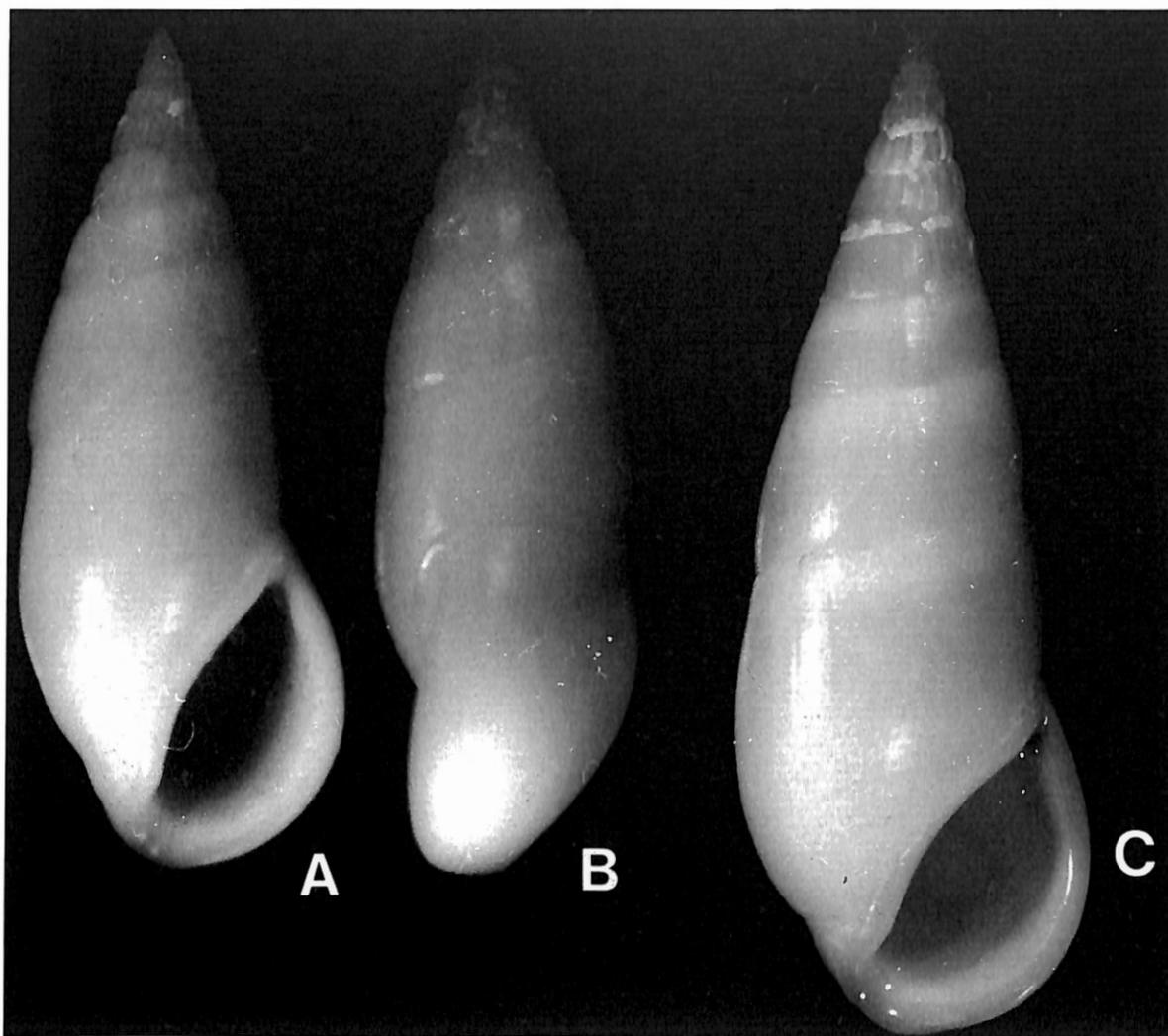


Fig. 21. – A-C. *Rissoina (Moerchiella) kilburni* sp. nov. – A-B. Holotype of *R. (M.) kilburni* sp. nov., Conducia Bay, Moçambique (NM, H.1078), 14.2 x 5.4 mm. – C. Conducia Bay, Moçambique (NM, J.4103), 18.9 x 6.4 mm.

VARIATION

R. (M.) kilburni sp. nov. appears to be very uniform in shell characters.

ADDITIONAL MATERIAL EXAMINED

Mozambique: Conducia Bay, 4 (NM, J.4103); Conducia Bay, 1 (NM, H.5537); Lungo Bay to Memba Bay, 2 (NM, H.5570); Nacala Bay, S.E. off Maxilone, 1 (NM, J.2899); Nacala, 5 (NM, J.7159), 2 (NM, J.7165); Moçambique I., 1 (NM, G.8443). **Madagascar:** I. Faty, N. Tuléar, 1 (MNHN); Tuléar, 1 (MNHN).

GEOGRAPHICAL DISTRIBUTION

Mozambique, Zanzibar and Madagascar.

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) kilburni* differs from *R. (M.) dorbignyi* in lacking the spiral threads on the adapical spire whorls and in the absence of the angulate spire whorls or channeled sutures.

The shell of *R. (M.) kilburni* differs from *R. (M.) artensis* in being more solid and in lacking the angulated spire whorls.

The shell of *R. (M.) kilburni* differs from *R. (M.) striolata* in being markedly larger [12.9-17 mm (N = 8) vs. 7.2-10.5 mm (N = 5)], the last whorl being less parallel-sided and the axial ribs on the adapical whorls being more distantly spaced.

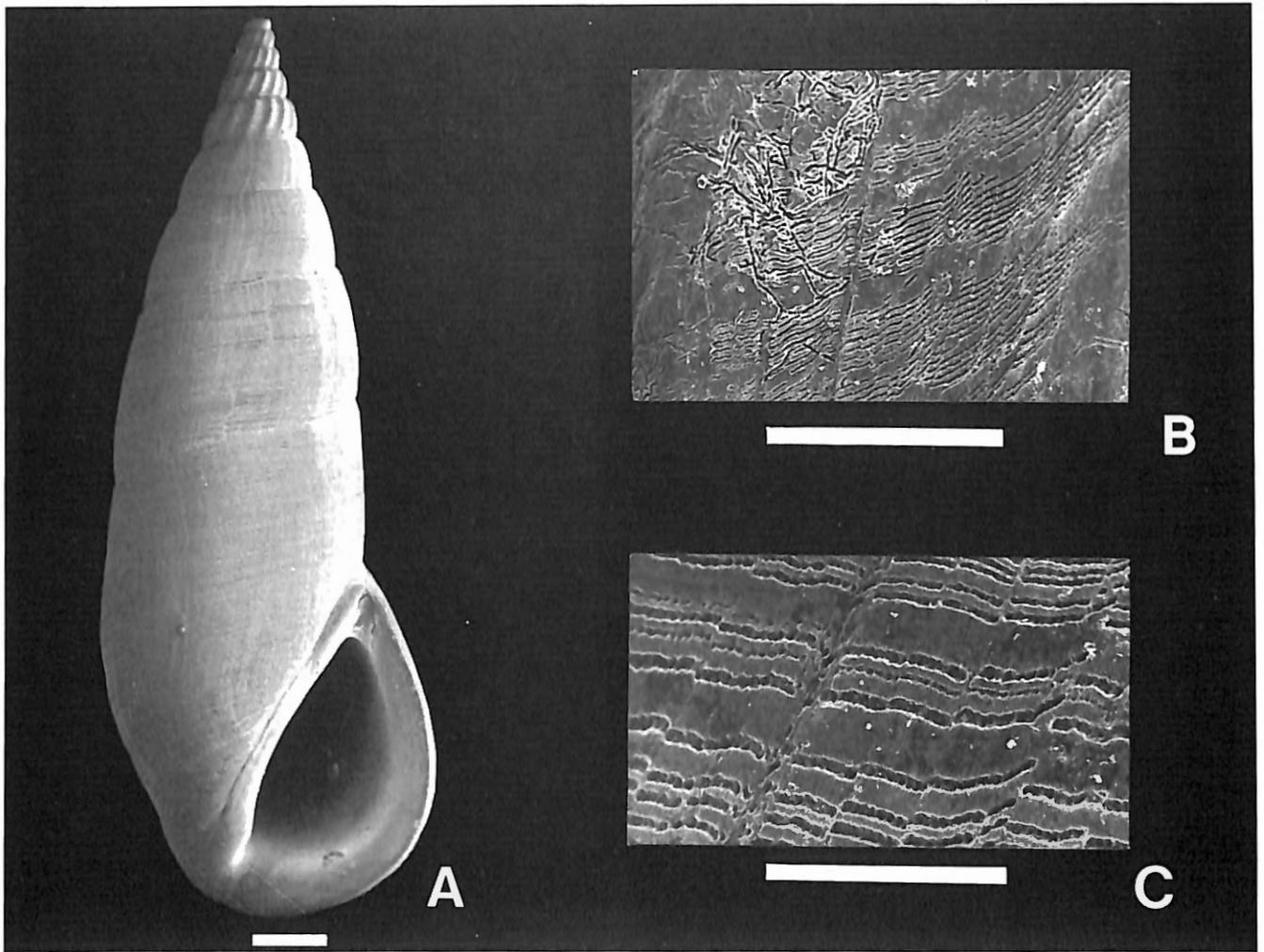


Fig. 22. – A-C. *Rissoina (Moerchiella) kilburni* sp. nov. Paratype of *Rissoina (Moerchiella) kilburni* sp. nov., Conducia Bay, Moçambique (NM, H.1078). – A. Shell (scanning electron micrograph). – B. Microsculpture of 3rd. whorl of teleoconch (scanning electron micrograph). – C. Detail of microsculpture of 3rd. whorl of teleoconch (scanning electron micrograph). Scale bars : A : 1 mm. – B-C : 0.1 mm.

SHELL DIMENSIONS

Table 5. — *Rissoina (Moerchiella) kilburni* sp. nov. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
Holotype (NM, H.1078)				
Fig. 21 A-B	14.2	8.5	5.4	9
Paratypes (NM, H.1078)	15.2	9.0	5.8	9 *
	15.1	9.3	5.6	9
	14.7	9.2	5.3	9 **
	13.6	8.1	5.3	9 **
	13.4	8.0	4.9	9
Fig. 22 A-C	12.9	8.0	4.5	10
Nacala Bay (NM)	17.0	10.1	6.1	10

* top of protoconch broken

** protoconch decollated

***Rissoina (Moerchiella) okinawensis* sp. nov.**
(Figs. 23 A-B; 24 A-C)

DERIVATION OF NAME

The specific name refers to the type locality of this new species.

TYPE MATERIAL

Holotype : empty shell from stn. 77-59 (Okinawa), coll. R.F. BOLLAND, 30.IX.1977, in LACM. Paratypes : 5 empty shells from stn. 77-59 (Okinawa) in LACM; 12 empty shells from stn. 77-57 (Okinawa), coll. R.F. BOLLAND, 24.IX.1977 & 14.X.1977, in LACM; 19 empty shells from stn. 77-57 in AMS (C.153851); 2 empty shells from stn. 77-60 (Okinawa), coll. R.F. BOLLAND, 30.IX.1977, in LACM; 5 empty shells from stn. 78-19 (Okinawa), coll. R.F. BOLLAND, 27.V.1978, in LACM.

TYPE LOCALITY

Intertidal, sand and strewn coral, 2 km S.S.W. of Fitzwoody Beach, Naha Air Force Base (26°11.1'N, 127°38.0'E), Okinawa, Japan.

DESCRIPTION

Shell (Figs. 23 A-B, 24 A) : length up to 6.9 mm, elongately conical, rather thin.

Protoconch (Fig. 24 B) : of 1 1/4, smooth whorls; of non-planktotrophic larval development; transition to teleoconch abrupt, with a wide and shallow sinus.

Teleoconch : of 6-7, moderately convex whorls; adapical spire whorls weakly angulated just below suture; sutures rectilinear, moderately impressed; last whorl moderately contracted near the base.

Axial sculpture of moderately prominent, narrow, rounded, opisthocline axial ribs on adapical spire whorls, with wider interspaces; axial ribs gradually less prominent on abapical spire whorls and eventually very weak to almost absent on penultimate and last whorls; spiral sculpture of 6-7, moderately prominent and rather distantly spaced, spiral threads, the latter crossing the top of the axial ribs and forming here weak to moderately prominent granules; spiral ribs gradually more numerous and more irregularly spaced on penultimate and last whorls.

Microsculpture (Fig. 24 C) of extremely fine spiral striations in interspaces between axial ribs.

Aperture : D-shaped to sub-lenticular; inner lip very thin; anterior channel shallow, narrow; outer lip thin, externally with a weak and narrow varix; outer lip moderately opisthocline in profile.

Colour : white throughout.

Operculum, radula and internal anatomy : unknown.

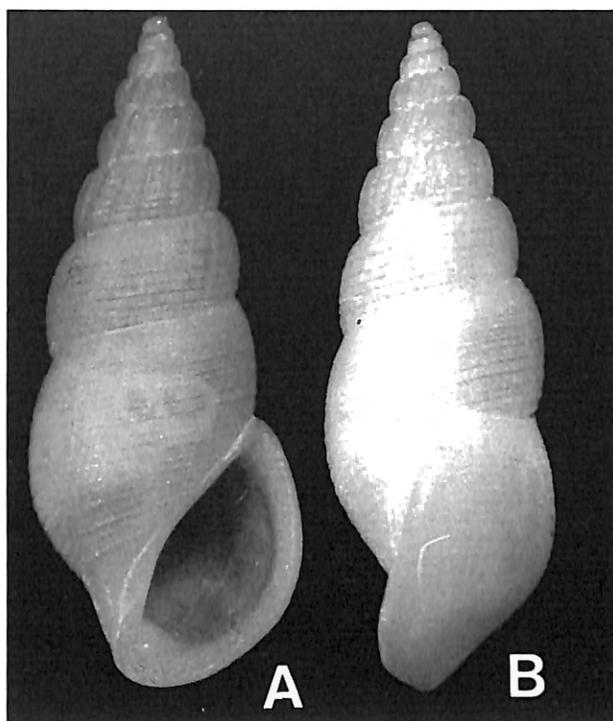


Fig. 23. – A-B. *Rissoina (Moerchiella) okinawensis* sp. nov. Holotype of *R. (M.) okinawensis* sp. nov., 2 k, S.S.W. of Fitzwoody Beach, Okinawa, Japan (LACM, 77-59), 6.9 x 2.8 mm.

VARIATION

The spiral threads on the adapical whorls are more or less prominent and consequently, the granules on the intersecting points with the axial ribs are more or less developed; furthermore, the axial ribs on the adapical whorls are more or less distantly spaced.

ADDITIONAL MATERIAL EXAMINED

Japan : Amami-Oshima : 2 (LACM, 115516). Kyushu : Toujushima I., near Amakusa Marine Lab., Kumamoto Pref., 6 (LACM, 82-25).

GEOGRAPHICAL DISTRIBUTION

Southern Japan (Amami-Oshima and Okinawa).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) okinawensis* superficially resembles *R. (M.) antoni* but differs in having less prominent spiral ribs on the spire whorls, a relatively higher aperture and a thinner shell.

R. (M.) okinawensis superficially resembles *R. (M.) artensis* in shell characters, but differs in having less numerous and more distantly spaced spiral threads on the last whorl.

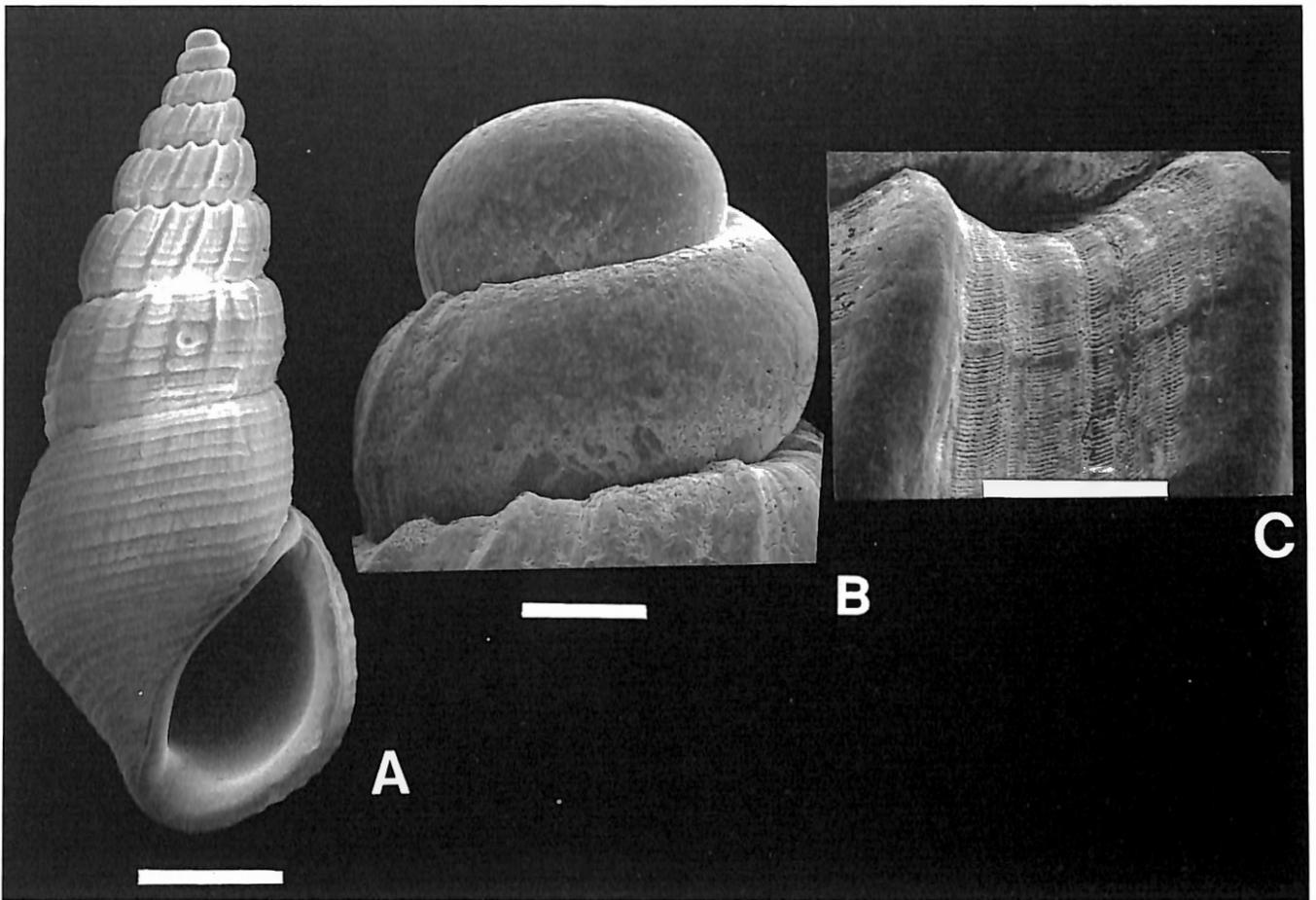


Fig. 24. – A-C. *Rissoina (Moerchiella) okinawensis* sp. nov. Amami-Oshima, Loo Choo Group (LACM, 115516). – A. Shell (scanning electron micrograph). – B. Protoconch (scanning electron micrograph). – C. Microsculpture of penultimate whorl of teleoconch (scanning electron micrograph). Scale bars : A : 1 mm. – B-C : 0.1 mm.

SHELL DIMENSIONS

Table 6. — *Rissoina (Moerchiella) okinawensis* sp. nov. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
Holotype (LACM, 77-59)				
Fig. 23 A-B	6.9	4.1	2.8	7
Paratypes				
(LACM, 77-59)	6.1	3.9	2.5	7
(LACM, 77-57)	4.7	2.9	2.0	6
	4.6	2.9	2.0	6
(AMS, C.153851)	5.2	3.2	2.0	6 1/2
	5.2	3.2	2.1	6 1/2
	4.6	2.9	2.0	6
(LACM, 78-19)	6.2	3.7	2.5	6 1/2
	5.9	3.6	2.4	6 1/2
Amami-Oshima (LACM, 115516)				
Fig. 24 A-C	5.8	3.6	2.4	6 3/4
	5.0	3.0	2.2	6

Rissoina* (Moerchiella) *striata

(QUOY and GAIMARD, 1833)

(Figs. 25; 26 A-B; 27; 28; 29 A-B; 52 B; 54 B)

- ? *Rissoa reticulata* SOWERBY, 1830, pl. 50, fig. 1.
Rissoa striata QUOY & GAIMARD, 1833, p. 493, pl. 33, figs. 38-39.
 ? *Rissoina grandis* PHILIPPI, 1847, p. 127.
Rissoina caelata A. ADAMS, 1851, p. 267; DANCE, 1974, p. 59.
Rissoina striata (QUOY & GAIMARD); SCHWARTZ, p. 161, fig. 57; WEINKAUFF, 1877, p. 6, pl. 4, fig. 17; WEINKAUFF, 1880, p. 38, pl. 11, fig. 7.
Rissoa cumingii SOWERBY, 1876, species 4, pl. 1, fig. 4. pars *Rissoina striata* (QUOY & GAIMARD); TRYON, 1887, p. 385, pl. 57, fig. 91; pl. 68, fig. 12 (not pl. 58, figs. 13 and 23).
Rissoina (*Zebinella*) *reticulata* (SOWERBY); CERNOHORSKY, 1978, p. 46, pl. 12, fig. 1; SPRINGSTEEN & LEOBRERA, 1986, p. 56, pl. 12, fig. 6.
Rissoina (*Rissoina*) *striata* (QUOY & GAIMARD); PONDER, 1985, p. 81, fig. 52, fig. 131 B-F.

TYPE MATERIAL

- Rissoa striata* QUOY & GAIMARD: 3 syntypes in MNHN.
Rissoina caelata A. ADAMS: 4 syntypes (1984.143) in BMNH.
Rissoina grandis PHILIPPI: unknown.
Rissoa cumingii SOWERBY: unknown.

TYPE LOCALITIES

- Rissoa striata*: no type locality mentioned.
Rissoina caelata: Siquijor (Philippines).
Rissoina grandis: "Philippines".
Rissoa cumingii: Philippines.

DESCRIPTION

Shell (Figs. 25, 26 A-B): length up to 19.6 mm, elongately conical; last whorl weakly to moderately contracted near the base.
Protoconch: broken or covered by calcareous deposition in all specimens available.
Teleoconch: of about 9, weakly convex whorls; sutures weakly impressed.
 Spire whorls with weak, distantly spaced, narrow, axial ribs, with wider interspaces; axial ribs gradually weaker and more closely spaced on penultimate whorl and on adapical part of last whorl, but absent on abapical part of last whorl; spire whorls and last whorl with spiral ribs, the latter more prominent on adapical spire whorls and gradually less prominent, more numerous and more densely and more irregularly spaced on subsequent spire whorls and on last whorl; spiral ribs intersecting axial ribs, forming weak, rounded nodules on intersection points.

Aperture: moderately large, D-shaped; inner lip thin, weakly thickened near transition to anterior channel; the latter narrow, shallow; posterior channel very short, rounded posteriorly, parallel-sided; outer lip thin, moderately opisthoclinal in profile, with weak, narrow external varix, bearing the same sculpture as remaining part of last whorl; spiral sculpture on outer lip giving the latter a weakly crenulated appearance.

Colour: white throughout.

Operculum (Fig. 52 B): typical of genus with opercular peg open over all of its length (PONDER, 1985: fig. 131 B; pers. observ.)

Radula (Figs. 27, 28): central tooth with formula:

$$\frac{2-3 + 1 + 2-3}{3-4 \quad 3-4}$$

lateral teeth with 5 to 6 cusps on its outer margin and ca. 4 cusps on its inner margin (PONDER, 1985: fig. 131 C; pers. observ.).

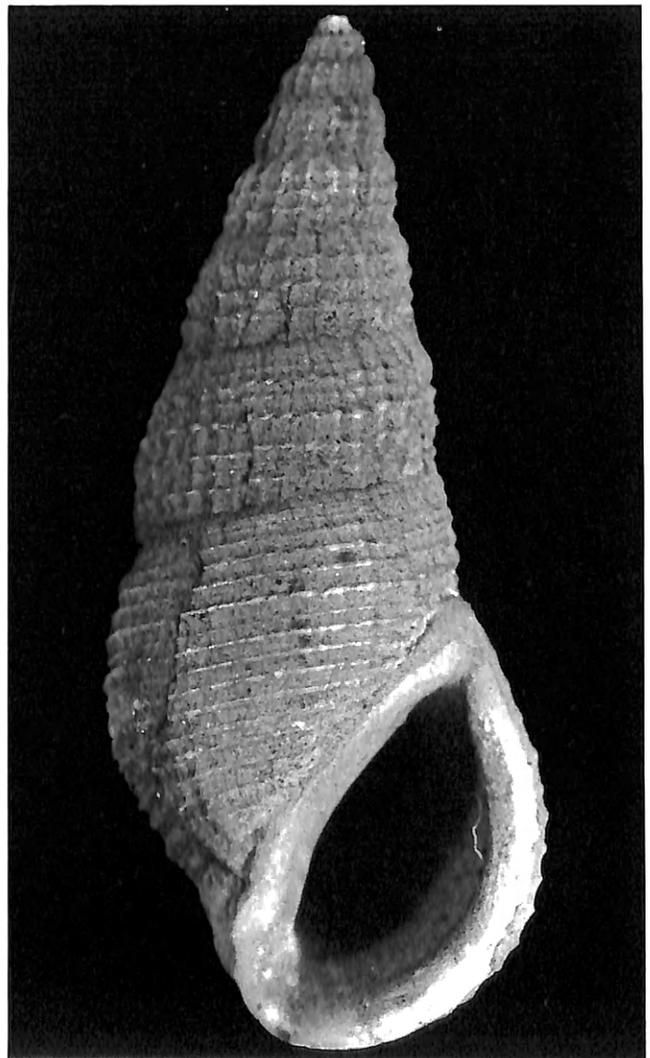


Fig. 25. – *Rissoina* (*Moerchiella*) *striata* (QUOY & GAIMARD, 1833). Syntype of *Rissoa striata* QUOY & GAIMARD, 1833, locality unknown (MNHN), 15.5 x 7.2 mm.

Internal anatomy : hypobranchial gland very wide and very thick, pinkish-brown, consisting of very closely spaced narrow lamellae.

Stomach not examined.

Male with a relatively small penis (Fig. 29); penial stalk slender with distal end bilobed into an outer and inner lobe; outer lobe elongate, narrow, cylindrical with rounded extremity, bearing moderately prominent

warty structures on distal 2/3; inner lobe smaller than outer lobe, spoon-shaped with thickened margins; penial groove open over all of its length, terminating near the base of the outer cylindrical lobe; prostate gland apparently absent in single male examined; palial vas deferens open at least over last half of its length, just before entering the penial stalk.

Female with sperm tube narrow, approximately as long

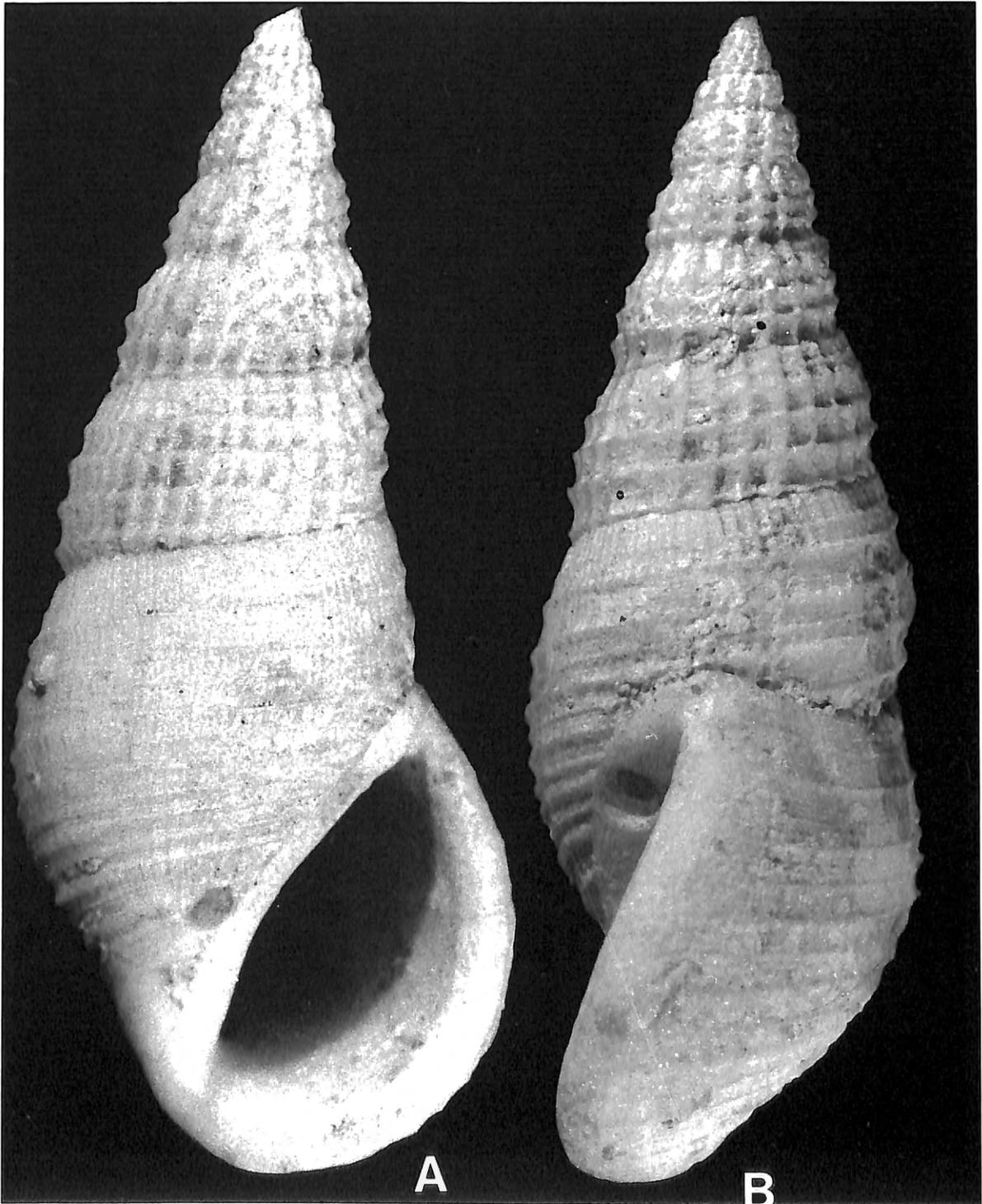


Fig. 26. – A-B. *Rissoina* (*Moerchiella*) *striata* (QUOY & GAIMARD, 1833). Syntype of *Rissoina caelata* A. ADAMS, *Siquijor*, Philippines (BMNH, 1984.143), 18.6 x 8.1 mm.



Fig. 27. – *Rissoina* (*Moerchiella*) *striata* (QUOY & GAIMARD, 1833). Kapa Kapa, Papua New Guinea, radula (scanning electron micrograph) (AMS, C.155171). General view of part of radular ribbon.
Scale bar : 0.1 mm.

as lower oviduct gland, moderately expanded anteriorly; bursa copulatrix subequal to upper oviduct gland (PONDER, 1985 : fig. 52; pers. observ.)
Nervous system not examined.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 7.

Rissoina (*Moerchiella*) *striata*. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
<i>Rissoina striata</i> : syntypes (MNHN)				
Fig. 25	16.5	9.8	7.2	9
	?15.1	?	7.0	>7 *
	?14.9	?	7.2	? *
<i>Rissoina coelata</i> : syntype (BMNH, 1984.143)				
Fig. 26 A-B	18.6	11.1	8.1	?
Philippines (AMS, C.154393)				
	19.6	11.6	8.2	>9 *
	19.3	11.3	7.9	>8 1/2 *
	18.5	11.0	7.6	>9 *
	16.5	9.9	6.7	>8 *
Cebu (AMS, C.43803)				
	16.1	9.1	7.0	9
New Caledonia (AMS, C.54991)				
	19.4	11.1	7.9	9 1/4
New Caledonia (AMS, C.154392)				
	17.1	10.0	7.3	9

* Apical whorls broken

VARIATION

The spiral sculpture on the last whorl is rather variable, ranging from moderately prominent spiral ribs to weak spiral ribs with very fine, densely spaced, spiral threads between.

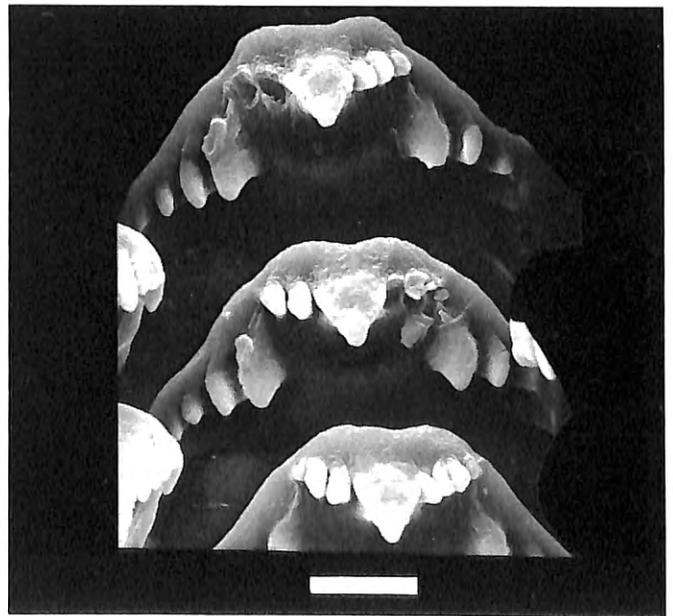


Fig. 28. – *Rissoina* (*Moerchiella*) *striata* (QUOY & GAIMARD, 1833). Kapa Kapa, Papua New Guinea, radula (scanning electron micrograph) (AMS, C.155171). Detail of central teeth.
Scale bar : 0.01 mm.

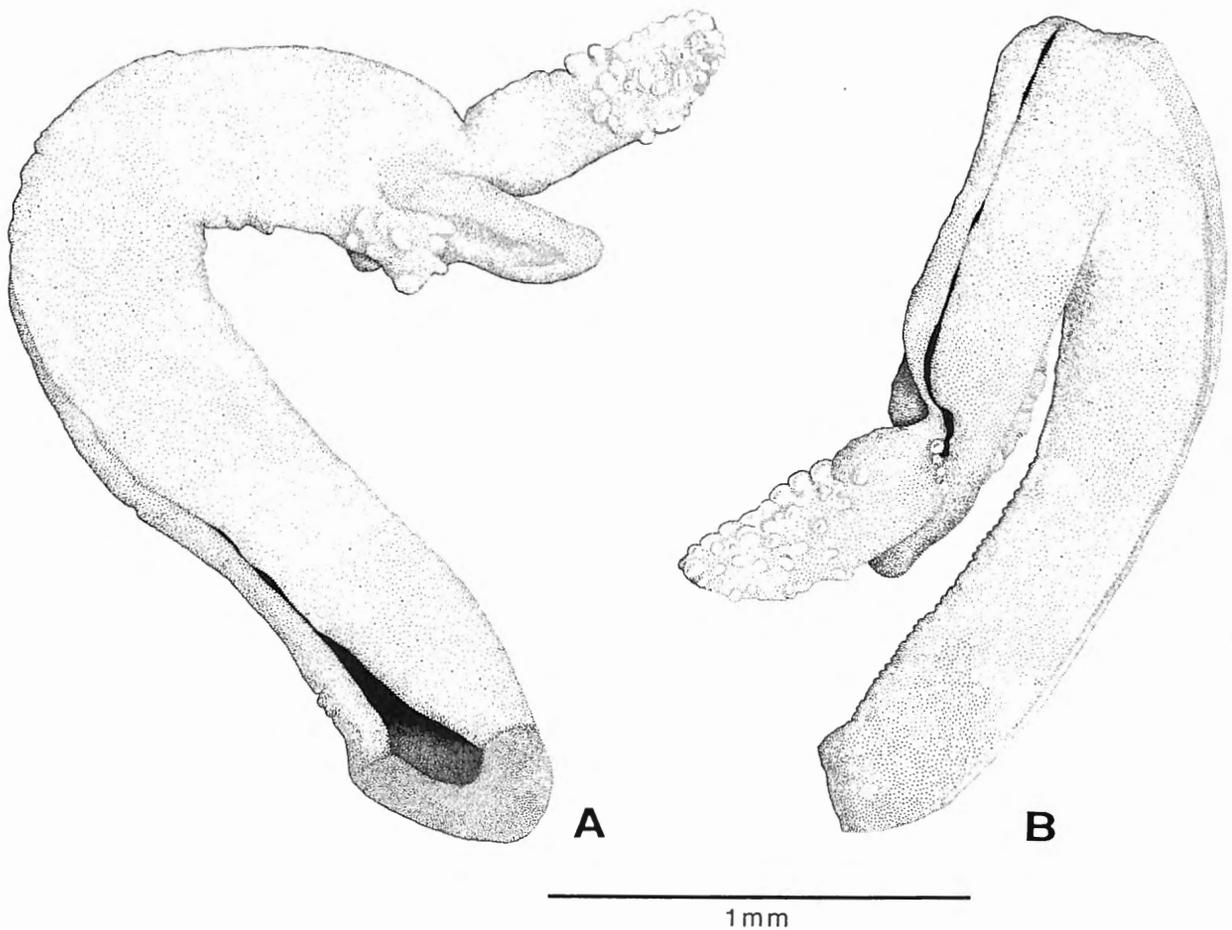


Fig. 29. – A-B. *Rissoina (Moerchiella) striata* (QUOY & GAIMARD, 1833). Buyong Beach, Mactan I., Cebu, Philippines, male (AMS, C.155152). – A. Ventral aspect of penis. – B. Same specimen as A, rotated 90°.

ADDITIONAL MATERIAL EXAMINED

Madagascar : N. Tuléar, I. Faty, 8 m, (1) (MNHN). **Singapore** : “Singapore”, (1) (ANSP, 19251). **Philippines** : Matabungkay, ca. 115 km S.S.W. of Manila City, (6) (AMS, C.154393); Matabungkay Cove, 14 km S. of Nasugbu, Batangas Prov., Luzon I., (2) (ANSP, 229392); Gaspar I., Tres Reyes Group, Marinduque I., S. of Luzon I., (1) (AMS, C.107463); Matabunki, Batangas Prov., S.W. Luzon I., (1) (AMS, C.154538); Buyong Beach, Mactan I., Cebu, 0.5 m, (1) (AMS, C.155152; in alcohol); Cebu, (2) (AMS, C.43803); “Philippinen”, (3) (NMV, 25874); “Philippines”, (2) (KBIN); “Philippines”, (4) (ANSP, 253985); “Philippines”, (1) (ANSP, 19250); “Philippine Islands”, (1) (USNM, 134802). **Caroline Islands** : E. lagoon of Melekeidz, E. side of Babelthuap, Palau Is., (1) (ANSP, 204580). **Indonesia** : **Irian Jaya** : Cape Tekopi, W. side of Samberbaba, Jaden, (1) (ANSP, 205197); Pulau Middelburg, (3) (AMS, C.158875). **Papua New Guinea** : Idlers Bay, 1 m, (1) (AMS, C.158873); Kapa Kapa, ca. 72 km S.E. of Port Moresby, (1) (AMS, C.158866); Kapa Kapa, (3) (AMS, C.158965); Kapa Kapa, (1) (AMS, C.155171 : in alcohol); Taurama, S.E. of Port Moresby, (2) (AMS, 158861). **Solomon Islands** : “Solomon Islands”, (1) (AMS, C.158878). **New Caledonia** : about 8 km W. of N. Gatope I., 2-4 m, (1) (ANSP, 269515); Koë Reef, ab. 3 km S.S.E. of Touho (N.W. New Caledonia), 0-1.5 m, (2) (ANSP, 270055); “New Caledonia”, (1) (AMS, C.54991); I. Nou,

Lifou, (1) (AMS, C.154540); Lifou, Loyalty Is., (1) (AMS, C.55220), (1) (AMS, C.30575); Taden Reef, N. of Heinghène, E. coast of New Caledonia, (1) (AMS, C.154392); Poindimié, (5) (AMS, C.154391). **Vanuatu (New Hebrides)** : Norsup, Male Kula I., (1) (AMS, C.154525).

GEOGRAPHICAL DISTRIBUTION

Indian Ocean and tropical western Pacific as far east as Vanuatu (Fig. 54 B).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) striata* most closely resembles *R. (M.) gigantea* and is contrasted under that species.

REMARKS

Rissoina grandis PHILIPPI may be conspecific with *R. (M.) striata*, but the original description, which is not accompanied by any illustration, could be applied to both *R. (M.) striata* and *R. (M.) gigantea*; the whereabouts of the type material of PHILIPPI's species are unknown. SOWERBY (1830) provides an illustration of

Rissoa reticulata without giving any further description or shell dimensions and without mentioning the type locality. The illustration strongly resembles the type material of *Rissoa striata*, but since the lack of any further information about this species and since the type material appears to be lost [*in litt.* Mrs K. WAY (BMNH)], *Rissoina reticulata* is only tentatively included in the synonymy of *R. (M.) striata*.

Very probably the disjunct distribution (no records between Madagascar and Singapore) is the result of poor collecting in the intervening areas; there is no reason to doubt about the exact locality of the specimen reported from Madagascar.

TRYON (1887) includes *Rissoina elegantula* and *Rissoina mohrensterni* in the synonymy of *Rissoa striata*; examination of the type material of those species, however, reveals that they both belong to *Rissoina* s.s.

***Rissoina (Moerchiella) striolata* A. ADAMS, 1851**
(Figs. 30 A-B; 31 A-C)

Rissoina striolata A. ADAMS, 1851, p. 266; SCHWARTZ, 1860, p. 170, fig. 66; WEINKAUFF, 1881, p. 41, pl. 12, fig. 3.

TYPE MATERIAL

Rissoina striolata A. ADAMS: lectotype and 2 paralectotypes (here designated) in BMNH (1984.139), Coll. H. CUMING; one paralectotype is *R. (M.) artensis*.

TYPE LOCALITY

Rissoina striolata: Baclayan Island, Philippines.

DESCRIPTION

Shell (Figs. 30 A-B, 31 A): shell length up to 10.5 mm; strongly elongate, subcylindrical.

Protoconch (Fig. 31 B): of planktotrophic larval type, of 2 smooth whorls; first whorl relatively wide; transition to teleoconch abrupt, with a deep sinusigera notch and with slightly thickened margin.

Teleoconch: of about 8 weakly convex to almost flat-sided whorls; adapical spire whorls weakly angulate below periphery; sutures deeply impressed.

6-7 adapical spire whorls with rounded axial ribs; the latter more prominent and less densely spaced on adapical whorls and gradually less prominent, more numerous and more crowded on subsequent spire whorls and eventually very weak to absent on penultimate and last whorls; axial ribs nearly orthocline on abapical spire whorls.

Spiral sculpture absent on 3-4 adapical spire whorls; very weak spiral threads in interspaces between axial ribs on subsequent spire whorls; penultimate and last whorl with numerous, crowded, prominent spiral

threads (Fig. 31 C), the latter more prominent on abapical half of last whorl. Last whorl with weak, rounded, spiral cord around the base.

Aperture: large, D-shaped; columellar side almost straight; inner lip thin; anterior channel very shallow; outer lip thin, slightly expanded, with weakly thickened, narrow, external varix; outer lip weakly opisthoclinal in profile.

Colour: white.

Operculum, radula and internal anatomy: unknown.

VARIATION

There appears to be very little or no variation among the small series of specimens of this species available.

ADDITIONAL MATERIAL EXAMINED

Philippines: Matabungkay, Luzon Prov., (1) (AMS, C.154537); Bolu I., (1) (NMV, 25892). **Papua New Guinea**: W. side of Pyramid Point, Taurama, (1) (AMS, C.154522); Nimoa, Calvados Chain, Louisiade Arch., (1) (AMS, C.154523).

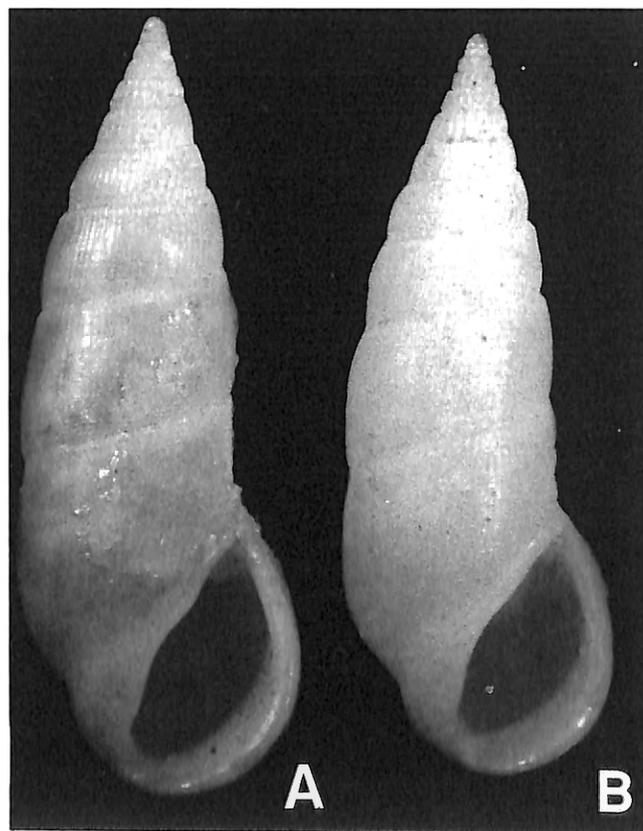


Fig. 30. – A-B. *Rissoina (Moerchiella) striolata* A. ADAMS, 1851. – A. Syntype of *Rissoina striolata* A. ADAMS, Baclayan I., Philippines (BMNH, 1984.139), 10.5 x 3.7 mm. – B. Syntype of *Rissoina striolata* A. ADAMS, Baclayan I., Philippines (BMNH, 1984.139), 10.0 x 3.5 mm.

SHELL DIMENSIONS

Table 8.

Rissoina (Moerchiella) striolata. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
<i>Rissoina striolata</i> : lectotype (BMNH, 1984.131)				
Fig. 30 A	10.5	6.6	3.7	9
paralectotype (BMNH, 1984.131)				
Fig. 30 B	10.0	6.3	3.5	9
Matabungkay (AMS, C.154537)				
Fig. 31 A-C	8.4	5.2	3.4	8 1/4
Nimoo (AMS, C.154523)				
	9.6	6.1	3.4	9
Taurama (AMS, C.154522)				
	7.2	4.5	2.5	8

DISTRIBUTION

Rissoina (Moerchiella) striolata is only known from the Philippines and from S.E. Papua New Guinea.

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Moerchiella) striolata* very strongly resembles *R. (M.) dorbignyi* but differs in lacking the nodose axial ribs on the adapical spire whorls and in the whorls being non-angulated; furthermore, *R. (M.) striolata* has a multispiral protoconch, while the latter is paucispiral in *R. (M.) dorbignyi*. *R. (M.) striolata* strongly resembles *R. (M.) artensis* in shell characters and is contrasted under that species.

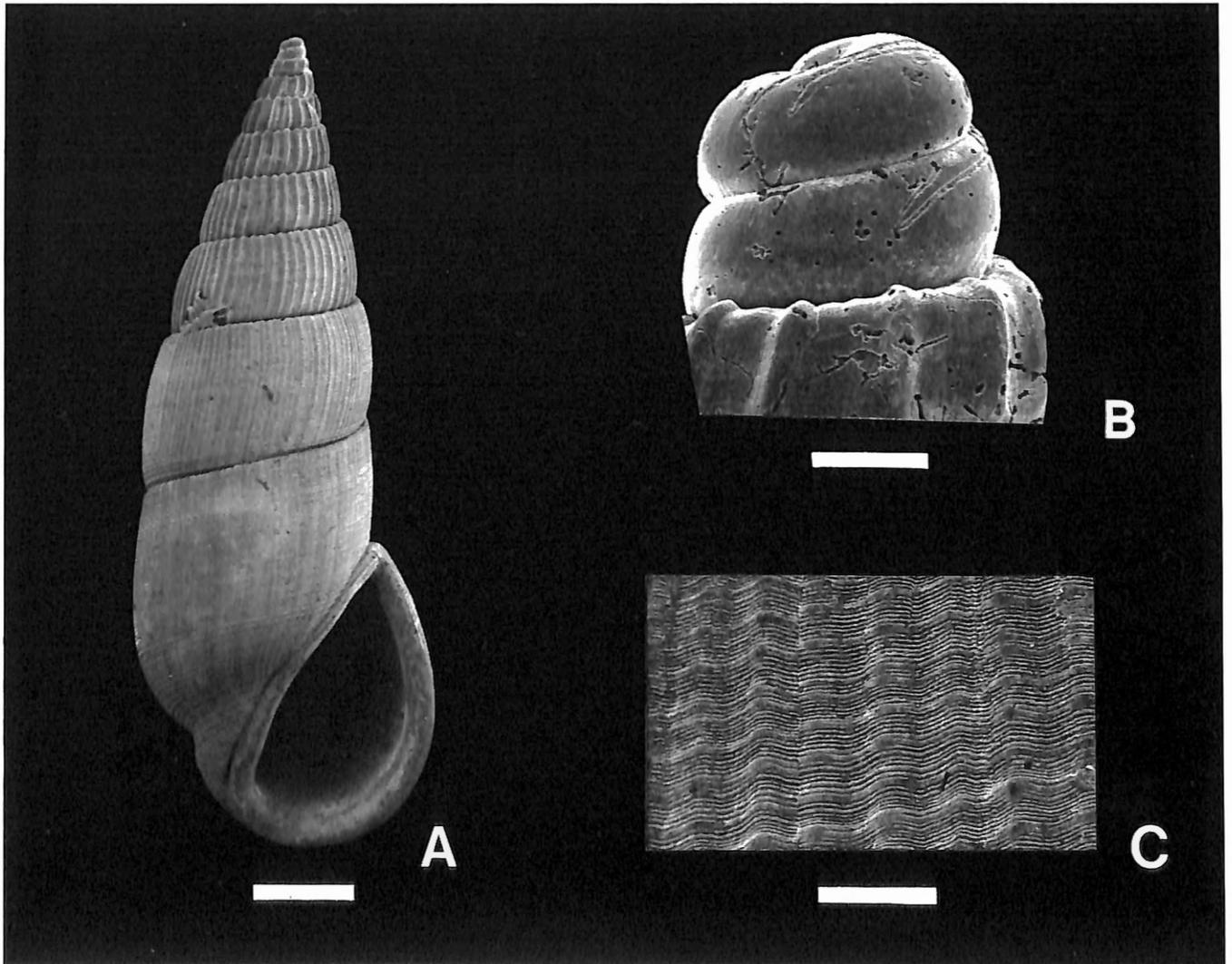


Fig. 31. – A-C. *Rissoina (Moerchiella) striolata* A. ADAMS, 1851. Matabungkay, Luzon Prov. Philippines (AMS, C.154537). – A. Shell (scanning electron micrograph). – B. Protoconch (scanning electron micrograph). – C. Microsculpture of penultimate whorl of teleoconch (scanning electron micrograph). Scale bars : A : 1 mm. – B-C : 0.1 mm

REMARKS

The type material of *Rissoina striolata* consists of 3 syntypes; one syntype, however, is *R. (M.) artensis*. I designate here the largest specimen of the two remaining syntypes as the lectotype and the smallest one as the paralectotype. Consequently, the specimen that is conspecific with *R. (M.) artensis* becomes the third paralectotype. Judging from the original description of *Rissoina striolata*, A. ADAMS obviously referred to the specimens, here designated as respectively the lectotype and the conspecific paralectotype, since he mentioned the flat-sided adapical whorls ("*anfractibus ... planulatis*"); in contrast, the adapical spire whorls are strongly convex and angulated below the suture in *R. (M.) artensis*.

Subgenus *Apataxia* LASERON, 1956

Apataxia LASERON, 1956. Type species (by original designation): *Apataxia erecta* LASERON, 1956 = *Rissoina cerithiiformis* TRYON, 1887.

DIAGNOSIS

Shell: axial ribs on teleoconch incised by fine spiral grooves, giving the former a granulated appearance.

Aperture: inner side of outer lip with some elongated ridges.

Radula: central radular tooth with 2 pairs of basal denticles, the latter interconnected and connected with the lateral margins by a dorsal ridge.

Internal anatomy: penis simple.

GEOGRAPHICAL DISTRIBUTION OF RECENT SPECIES

Indo-West Pacific.

REMARKS

Rissoina (Apataxia) differs from *Rissoina (Rissoina)* in the penis being rather simple. Furthermore, the subgenus differs from typical *Rissoina* s.s. species in the combination of the following shell characters: the presence of a granulated protoconch, the presence of prominent ridges in the aperture and in having incised axial ribs. Other features mentioned by PONDER (1985), viz. the massive opercular peg and the small vestibulum of the female, do not appear to characterize species of *Rissoina (Apataxia)* only, since these features were also observed in some other *Rissoina* s.l. species.

The subgenus *Rissoina (Apataxia)* contains only one Recent species and one fossil species that was described from the Miocene of the Bikini atoll; the fossil species probably has a protoconch of non-planktotro-

phic development, but this needs to be confirmed as only a few, rather worn specimens were examined.

Rissoina (Apataxia) cerithiiformis TRYON, 1887

(Figs. 32 A-C; 33 A-C; 34 A-D; 35 A-E; 36 A-B; 52 D; 54 C)

? *Rissoina erythraea* PHILIPPI, 1851, p. 93;

Rissoina erythraea PHILIPPI; SCHWARTZ, 1860, p. 163, fig. 59; DAUTZENBERG, 1929, p. 501.

Rissoina costulata PEASE, 1867, p. 295, pl. 24, fig. 28. (non *Rissoina costulata* DUNKER, 1859); TRYON, 1887, p. 372, pl. 55, fig. 32.

? *Rissoina balteata* PEASE, 1869 p. 72.

Rissoina cerithiiformis, DUNKER; TRYON, 1887, p. 384, pl. 57, fig. 92.

Rissoina miltozona TOMLIN, 1915, p. 321; KAY, 1971, p. 272; KAY, 1979, p. 84, figs. 26B and 29D.

Rissoina (Phosinella) erythraea PHILIPPI; DAUTZENBERG & BOUGE, 1933, p. 365.

Rissoina harperi DAUTZENBERG & BOUGE, 1933, p. 366 (*nom. nov. pro Rissoina costulata* PEASE non *Rissoina costulata* DUNKER).

Apataxia erecta LASERON, 1956, p. 401, fig. 35.

Apataxia eripona LASERON, 1956, p. 402, fig. 36.

Apataxia cerithiiformis (DUNKER); HABE, 1964, p. 32, pl. 10, fig. 18.

Rissoina (Apataxis) [sic] cerithiformis DUNKER; KOSUGE, 1965, p. 138, pl. 15, fig. 2; textfigs. 56-65.

Rissoina (Phosinella) balteata PEASE; ORR MAES, 1967, p. 110, pl. 5, fig. I; CERNOHORSKY, 1978, p. 47, pl. 12, fig. 7.

Rissoina (Apataxia) miltozona TOMLIN; PONDER, 1985, p. 84, figs. 55 and 132 F-H.

TYPE MATERIAL

Rissoina erythraea PHILIPPI: unknown.

Rissoina costulata PEASE: 35 syntypes (178856) in MCZ.

Rissoina balteata PEASE: probably lost (not in BMNH, MNHN, MCZ or ANSP).

Rissoina cerithiiformis TRYON; no type material designated.

Rissoina miltozona TOMLIN: holotype and one paratype (1915.6.12.2-3) in BMNH.

Apataxia erecta LASERON: holotype (C.102429) in AMS.

Apataxia eripona LASERON: holotype (C.102428) in AMS.

TYPE LOCALITIES

Rissoina cerithiiformis: no type locality designated (TRYON mentions: "Red Sea, Mauritius, Viti [= Fiji Is.] and Sandwich Is. [= Hawaiian Islands].

Rissoina erythraea: "M. Rubrum" (= Red Sea).

Rissoina costulata: "Paumotus" [= Tuamotu].

Rissoina balteata : Hawaii.

Rissoina miltozona : Lifou, New Caledonia.

Apataxia erecta : Heron I., Queensland, Australia.

Apataxia eripona : Port Moresby, Papua New Guinea.

DESCRIPTION

Shell (Figs. 32 A-C, 33 A) : length up to 4.9 mm (N = 33), narrowly conical, rather stout.

Protoconch (Fig. 33 B) : of planktotrophic larval type, conical, of about 2 1/2, moderately convex whorls; nucleus smooth, subsequent whorls with about 4-6, spirally arranged rows of chevron-shaped markings or granules; last whorl with a prominent carina near the centre of the whorl; transition to teleoconch abrupt with a rather deep sinusigera notch, the latter with a very thickened margin.

Teleoconch : of about 6, flat-sided whorls; spire whorls very weakly angulated just below and above the weakly undulated and weakly impressed sutures; last whorl subangulate near periphery, not contracted near the base. Axial sculpture of rather prominent, narrow, rounded, orthocline to slightly prosocline axial ribs, with moderately deep and wide interspaces.

Apical spire whorls with 2 prominent, rounded spiral ribs, forming prominent nodules where intersecting axial ribs; spiral ribs gradually less prominent and

wider on subsequent spire whorls and on last whorl, with very narrow and shallow interspaces; spiral ribs more prominent on abapical half of last whorl, numbering about 4 on penultimate whorl and about 10 on last whorl, intersecting axial ribs and forming weak nodules where intersecting the latter; nodules more prominent on last whorl and particularly on abapical half.

Microsculpture (Fig. 33 C) of very fine, densely spaced, spiral threads in interspaces between axial ribs. *Aperture* : very small, lenticular; inner lip very thin, apart from a very weak swelling near transition to the shallow, narrow and very weakly elongated anterior channel; outer lip thin internally with about 4-5 elongate ridges; outer lip externally with a moderately prominent, rather wide varix.

Shell colour : yellowish with a rather wide chestnut brown spiral band near the center of the whorl.

Operculum (Fig. 52 D) : typical of genus; distal half of opercular peg open; peg strongly bilobed at the columellar side.

Radula (Fig. 34 A-D) : central tooth with formula :

$$\frac{2-3 + 1 + 2-3}{2 \quad 2}$$

lateral teeth with ca. 4 cusps on its inner side and about 5 cusps on its outer margin.

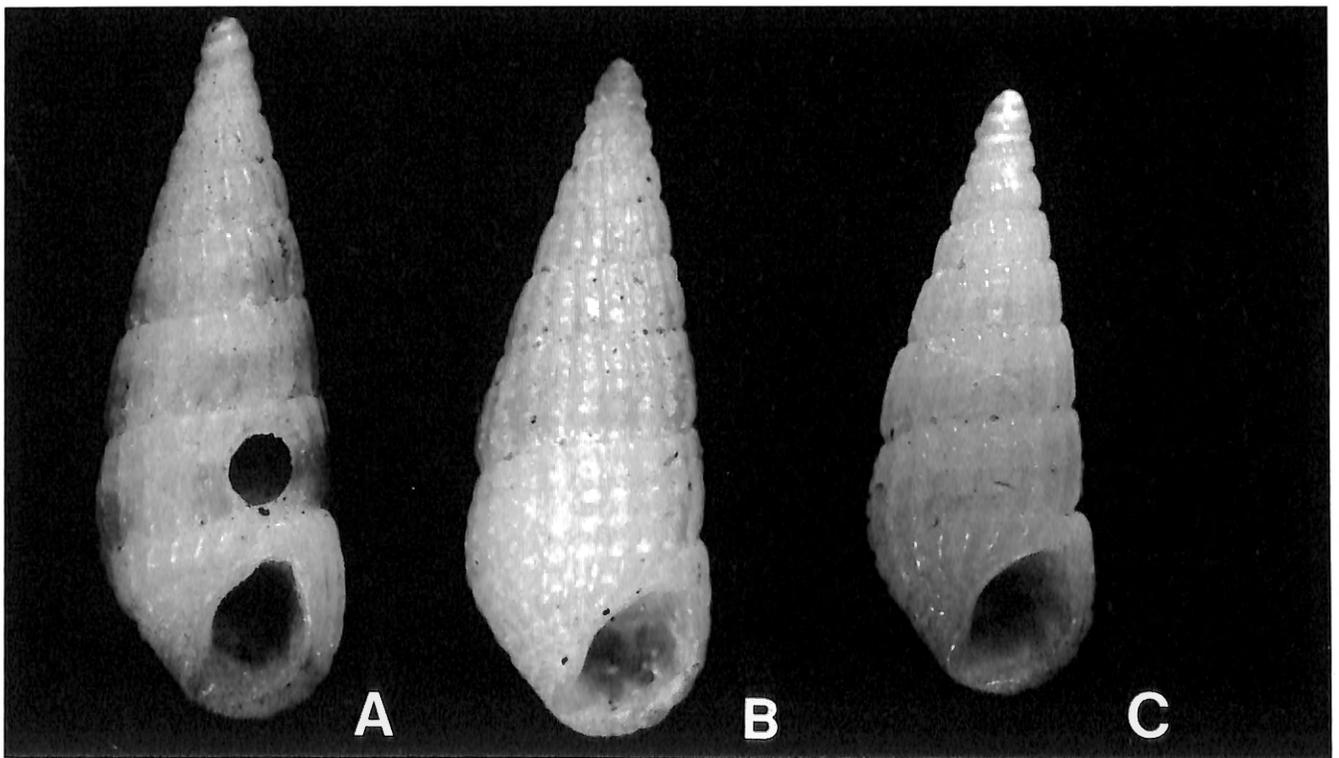


Fig. 32. – A-C. *Rissoina* (*Apataxia*) *cerithiiformis* TRYON, 1887. – A. Holotype of *Rissoina miltozona* TOMLIN, Lifou, New Caledonia (BMNH, 1915.6.12.2-3), 4.5 x 1.7 mm. – B. Holotype of *Apataxia erecta* LASERON, Heron I., Queensland, Australia (AMS, C.102429), 4.3 x 1.7 mm. – C. Syntype of *Rissoina costulata* PEASE, Tuamotu I. (MCZ, 178856), 4.8 x 1.8 mm.

Internal anatomy (Fig. 35 A-E, 36 A-B) : hypobranchial gland thin and narrow.

Stomach - style sac ratio 5.3; length - width ratio of stomach : 3.6 (N = 1).

Male (Fig. 36 A-B) with sperm duct closed; penis (Fig. 36 B) simple and slender without any lobes or glandular structures, weakly tapering towards its distal end; the latter with a very short filament in which the penial duct is ending; prostate gland narrow, transparent, open.

Female (Fig. 35 A, C-E) with sperm tube narrow and very short, reaching a little further than middle of lower oviduct gland, equally wide over all of its length; bursa copulatrix larger than upper oviduct gland.

LPG ratio and RPG ratio not determined.

VARIATION

There is some variation in the number of ridges on the inner side of the outer apertural lip, but otherwise *Rissoina (Apataxia) cerithiiformis* appears to be very uniform in both the shell shape and sculpture.

ADDITIONAL MATERIAL EXAMINED

Red Sea : Marsa el'Et, (8) (AMS); Strait of Tiran, (15) (LACM, 78-81), (36) (LACM, 78-81), (48) (LACM, 85-110), (41) (LACM, 85-114); N. of Sharm-el-Sheik, (2) (LACM, 78-79); Port Sudan, (1) (ANSP, 157823). **Tanzania** : N.W. corner of Mbudya I., ca. 16 km N. of Dar-es-Salaam, (1) (AMS), 9 (AMS); N.W. corner of Mbudya I., (1) (AMS); Mbudya I., N.W. corner of island, (1) (AMS); N.W. corner of Mbudya I., 1-2 m, (12) (AMS). **Mozambique** : Conducia Bay, (1) (NM, J.4101), (6) (MN, J.4169); Mozambique Channel, Bassas da India Reef, (4) (NM, E.2359). **South Africa** : **Zululand** : Sodwana Bay, Two-Mile Reef, 10-13 m, (5) (NM, D.5354); Sodwana Bay, Two-Mile Reef, 10-15 m, (1) (NM, D.5120); off Kosi Bay, 50 m, (2) (NM, A.5922); off St. Lucia, 100 m, (1) (NM, A.5922). **Zanzibar** : 5 km by E. of Bawi I., 9.2-14.6 m, (9) (ANSP, 251688); Chango (Prison) I., 0-1.8 m, (1) (ANSP, 214345). **Madagascar** : "Madagascar", (3) (USNM, 719437); Nosy Bé, Am-poraka, 5 m, (3) (MNHN); Tuléar, (1) (MNHN), 5 (MNHN); Tuléar, (5) (MNHN); Tuléar, (1) (MNHN). **Mauritius** : "I. Mauritius", (6) (NMV, 25867), (3) (NMV, 25880). **Réunion** : "Reunion", (35) (MNHN); 160-190 m, (1) (MNHN, MD32); 150-160 m, (3) (MNHN). **Seychelles** : N.E. Mahé, channel S. of St. Anne I.,

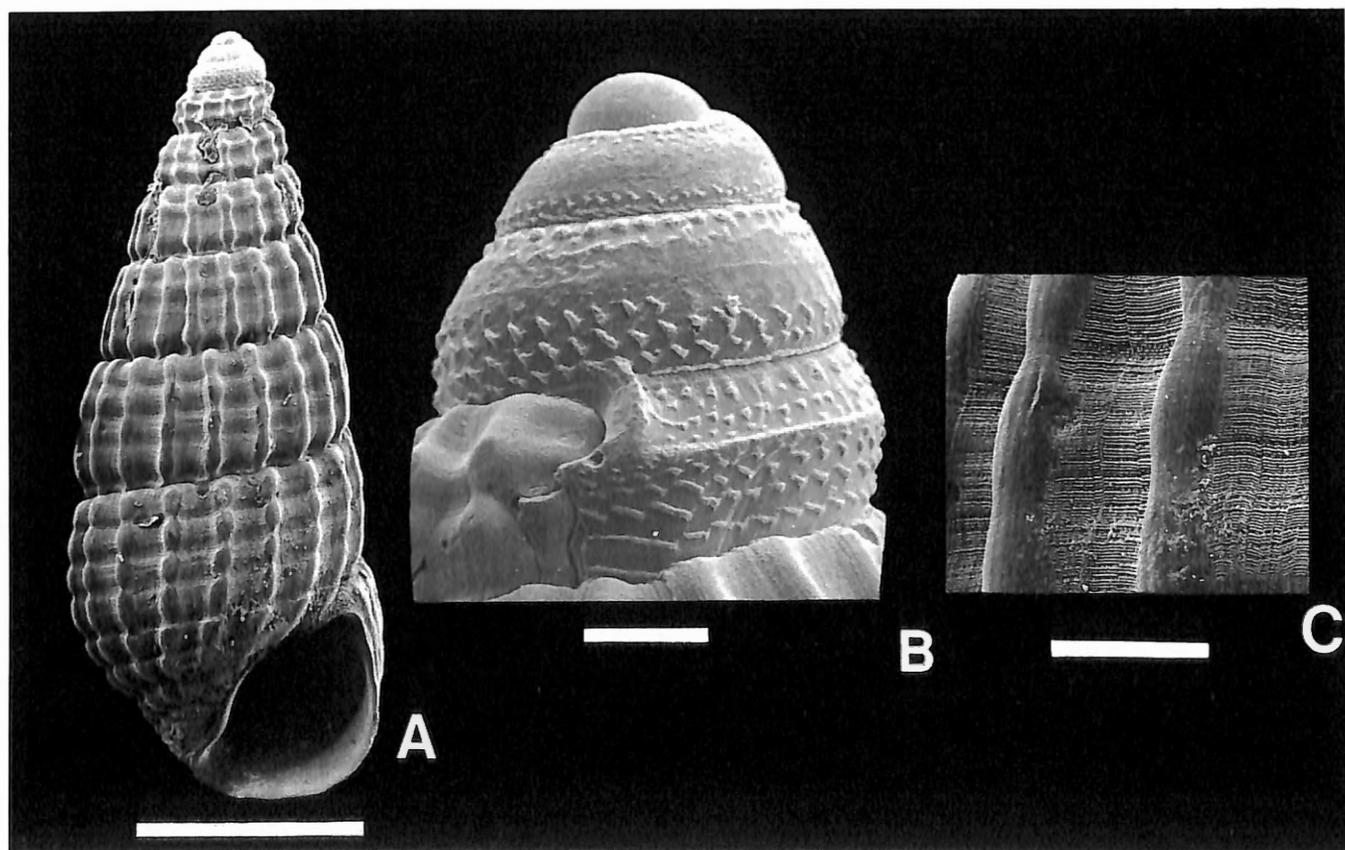


Fig. 33. – A-C. *Rissoina (Apataxia) cerithiiformis* TRYON, 1887. Reef flat between Lauwama I. and Gilgilen I., Madang Prov., Papua New Guinea, stn. PNG 81-486, (KBIN). – A. Shell (scanning electron micrograph). – B. Protoconch (scanning electron micrograph). – C. Microsculpture of teleoconch (scanning electron micrograph). Scale bars : A : 1 mm. – B-C : 0.1 mm.

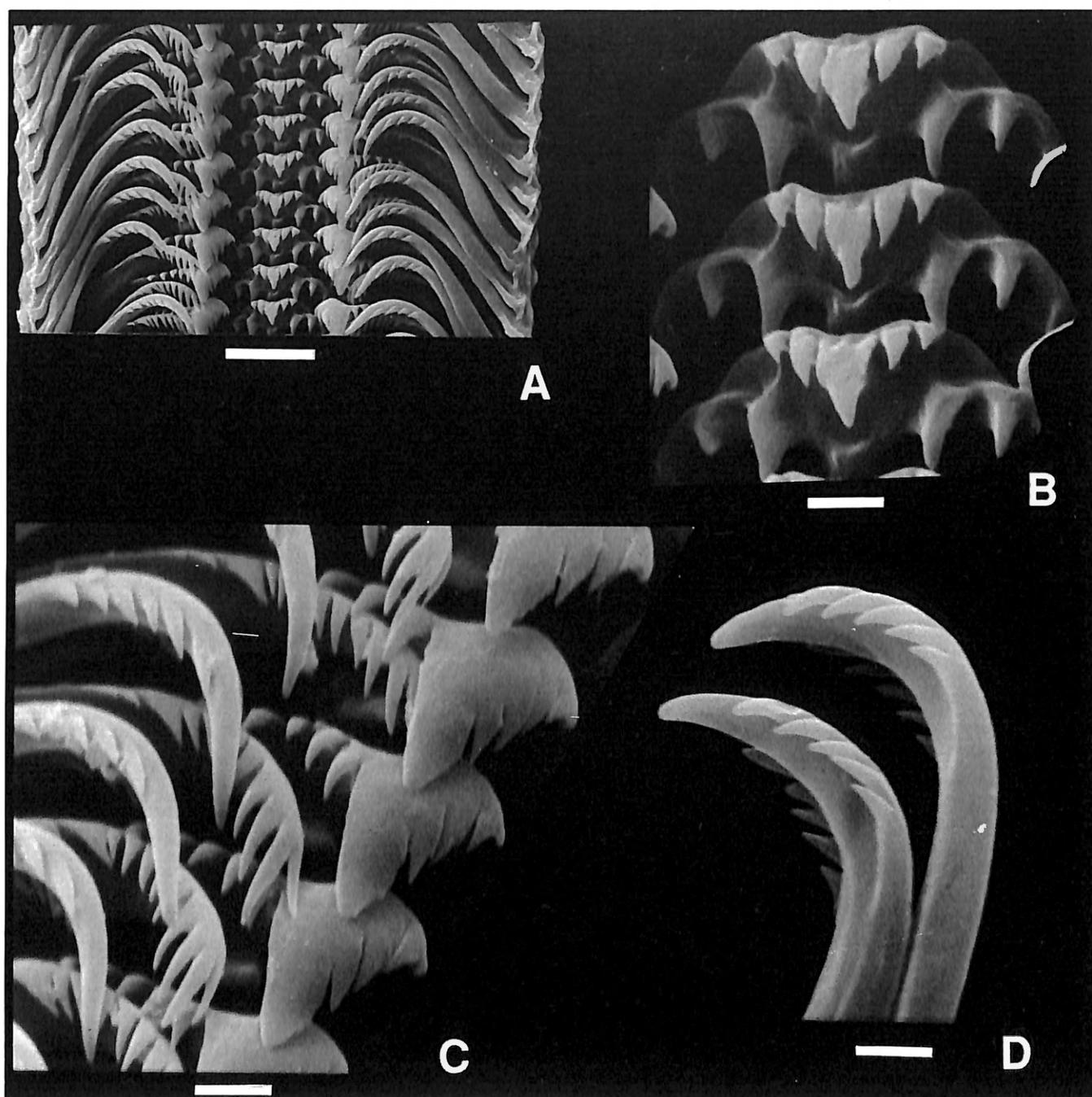


Fig. 34. – A-D. *Rissoina (Apataxia) cerithiiformis* TRYON, 1887. Reef flat between Lauwama I. and Gilgilen I., stn. PNG 81-486, Madang Prov., Papua New Guinea, radula (scanning electron micrographs) (KBIN). – A. General view of part of radular ribbon. – B. Detail of central tooth. – C. Distal portion of lateral and marginal teeth. – D. Distal portion of outer marginal teeth.
Scale bars : A : 0.1 mm. – B-D : 0.02 mm.

5.5 m, (50) (ANSP, 311433); N.E. Mahé, channel between Cerf I. and Long I., 2.7-3.7 m, (13) (ANSP, 311737); N.W. Mahé, Port Ternay, 4.6-12.2 m, (7) (ANSP, 311063); N.E. Mahé, channel S. of St. Anne I., 5.5 m, (1) (ANSP, 311400). **Maldivé Islands** : Fadiffolu Atoll, (1) (ANSP, 305070). **Baros I.** : North Malé Atoll, (14) (KBIN); Baros I., (3) (KBIN); Baros I., 1 m, (31) (KBIN); Baros I., (19) (KBIN); Baros I., 0.3 m, (4) (KBIN); Baros I., (4) (KBIN); Wadu

Channel, reefs between N. Malé Atoll and S. Malé Atoll, (161) (KBIN); Baros I., (24) (KBIN). **Cocos (Keeling) Atolls** : between Direction I. and Prison I., 1 m, (1) (AMS); between Direction I. and Prison I., 1 m, (1) (AMS); N. tip of West I., 0-1.5 m, (1) (ANSP, 287829); S.W. side of West I. 0.3-1.2 m, (1) (ANSP, 287693); reef off S.E. end of West I. and Pulo Maria, 0-1 m, (5) (ANSP, 288054); 3.2 km E. of W. tip of West I., 0-1.2 m, (1) (ANSP, 288717); N.W. side of

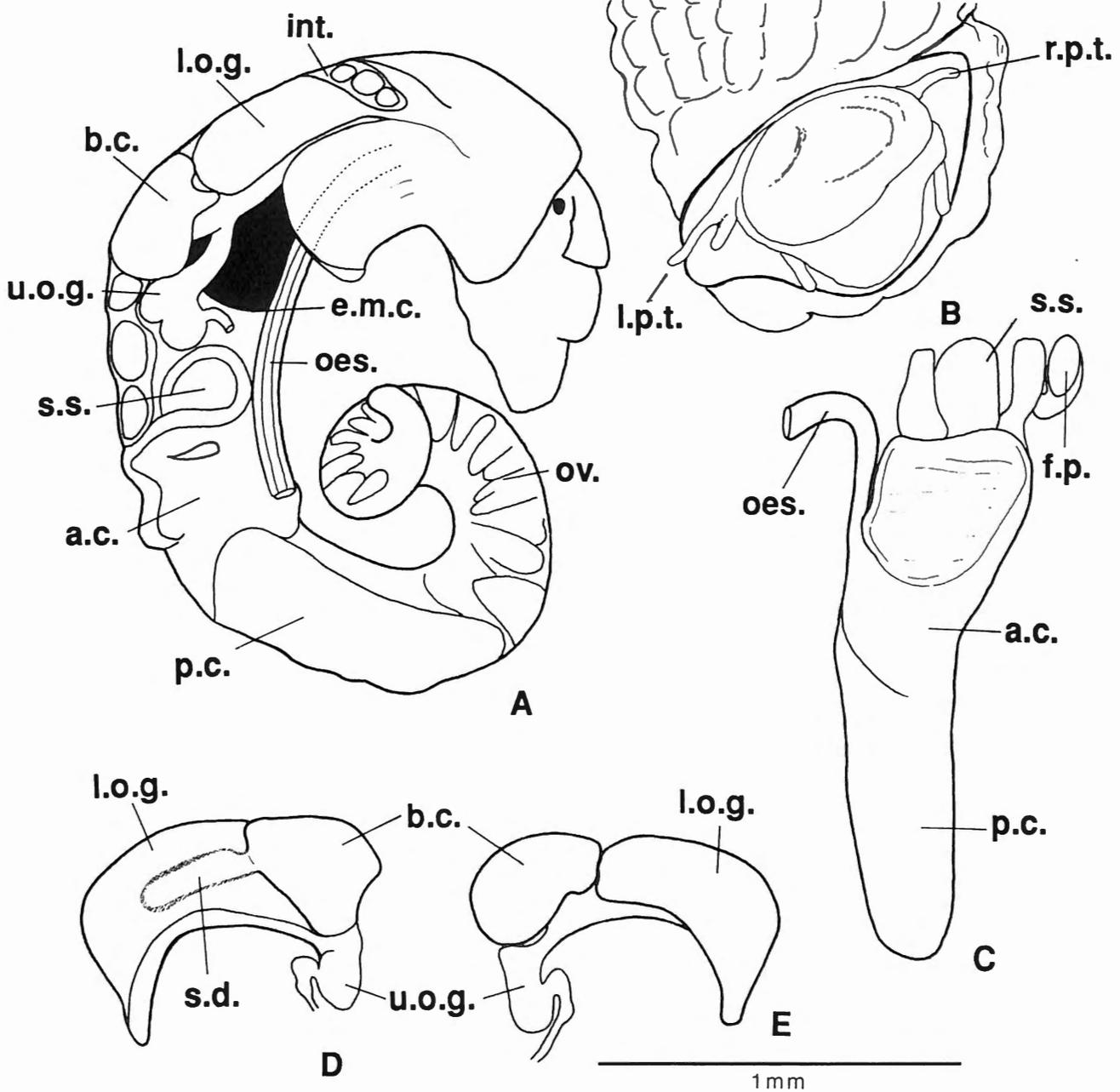


Fig. 35. — A, C-E. *Rissoina (Apataxia) cerithiiformis* TRYON, 1887. Barol Point, Hansa Bay, Madang Prov., Papua New Guinea (KBIN). — A. Uncoiled female (right side). — C-E. Female. — C. Outer side of stomach. — D. Female genitalia, excluding the uppermost section of the oviduct and ovary (left side). — E. Female genitalia, excluding the uppermost section of the oviduct and ovary (right side). — B. Ile Plate, Mauritius, L.T. Aperture, showing pallial tentacles (illustration kindly provided by Mr. F. BOYER).

West I., Alor Pinyu, 0-1 m, (1) (ANSP, 287921); West I., Klapa Tuju, 0-1.2 m, (1) (ANSP, 288258); S. end of Direction I., 0-5 m, (2) (ANSP, 288391). **Thailand** : S. of Phuket, (1)6 (LACM, 79-99); Phuket, (3) (LACM, 85-01); Mai Thon I., off Phuket I., (9) (LACM, 85-08). **Japan** : **Okinawa** : 1 km W. of Onna Village, (45) (LACM, 78-20); 1 km W.N.W. of Onna Village, (4) (LACM, 78-26); 1 km W.N.W. of Onna Village, (27) (LACM, 78-27); 1 km W.N.W. of Onna Village, (8) (LACM, 78-101); 1 km W.N.W. of Onna Village, (3) (LACM, 78-26); 1 km N.N.W. of Onna Village, (1) (LACM, 77-57); 1 km N.N.W. of Oku, (>50) (LACM, 77-61); 1 km W.N.W. of Onna Village, (12) (LACM, 79-76), (5) (LACM, 79-76); 1 km W.N.W. of Onna Village, (33) (LACM, 79-75); 1 km N.N.W. of Oku, (4) (LACM, 77-63); 1 km N.N.W. of Oku, (>50) (LACM, 77-64); 1 km N.N.W. of Onna Village, (24) (LACM, 78-99); 0.5 km S. of Yukimisaki, (33) (LACM, 78-23); 2 km S.S.W. of Fitzwoody Beach, (32) (LACM, 77-59); 0.5 km E.S.E. of Zampamisaki, (14) (LACM, 78-100); Nakijiu, (25) (LACM, 78-22); 1.5 km E.S.E. of Zampamisaki, (37) (LACM, 78-24); S.W. of Gishifu Shima, (37) (LACM, 77-72); Tsukenjima, (13) (LACM, 78-21); 3.5 km E. of Bisezaki, (3) (LACM, 77-58), (5) (LACM, 77-58); 28 km S.S.W. of Kadena, (8) (LACM, 77-55). **Honshu** : Cape Ban-shozaki, Wakayama Pref., (6) (LACM, 82-19). **Indonesia** : **Lombok** : off Ajer and Nemo Islets, (31) (LACM, 88-63). **Sulawesi** : N. of Menado, 1 (LACM, 82-39), (4) (LACM, 82-39); off Menado, (>50) (LACM, 88-55). **Philippines** : Matabungkay, ca. 115 km S.S.W. of Manila City, (2) (AMS); Matabungkay, (2) (AMS); Off Buyong Beach, Mactan I., Cebu, 18-23 m, (1) (AMS), 1 (AMS); Mactan I., Cebu, (1) (LACM, 79-35); Mactan I., off E. side Cebu I., (13) (LACM, 81-02); Mactan I., Cebu, (6) (LACM, 81-05); Punta Engano, Mactan I., Cebu I., (3) (JS, 075-047); E. end Santa Cruz I., off Zamboanga, (19) (LACM, 81-07); Palawan, (12) (LACM, 82-62); Polillo I., (2) (LACM, 59-19); Tubbataha Reefs, Palawan, (1) (LACM, 82-66); Simao Bank, off Luzon, 3 m, (1) (USNM, 233484); Scott's I., Luzon, (4) (LACM, 79-36); Governor's I., Luzon, (2) (LACM, 79-37); between Culebra I. and Malajibomanoc I., Luzon, (22) (LACM, 84-162); Manig Point, Luzon, (13) (LACM, 84-163); Ani Lao, Luzon, (43) (LACM, 84-161); S. side of Isla Apo, Negros, (2) (LACM, 79-32). **Papua New Guinea** : Port Moresby Harbour, (3) (AMS); Horseshoe Reef, Port Moresby, (9) (AMS); Horseshoe Reef, 25 m, (10) (AMS); Horseshoe Reef, 8 m, (1) (AMS); Kapa Kapa, E. of Port Moresby, (2) (AMS); Kapa Kapa, (1) (AMS); Kapa Kapa, (6) (AMS); Kapa Kapa, (15) (AMS); Gaire Beach, ca. 50 km E. of Port Moresby, (1) (AMS); W. end of Manubada (Local) I., off Port Moresby, 18-22 m, (1) (AMS); Eli Beach, Port Moresby, (2) (AMS); Port Moresby, (12) (AMS); Port Moresby, reef near Basilik Passage, 2 m, (30) (AMS); Idless beach, ca. 28 km W. of Port Moresby, 1 m, (3) (AMS); Taurama Beach, (1) (AMS); W. side of Pyramid Point, Taurama, (29) (AMS); W. side of Pyramid Point, (1) (AMS); Ejum I., Milne Bay, 1 m, (2) (AMS); Milne Bay, (15) (AMS); East Cape, (20) (AMS); Inlet, N. end of Kranket I., Madang, (1) (AMS); Inlet, N. end of Kranket I., (1) (AMS); Inlet, (30) (AMS); just S. of Kalibobo Point, Madang, (3) (AMS); Negiar Harbour, ca. 50 km N. of Madang, (7) (AMS); S. side of Tab I., Madang Harbour, 11 m, (1) (AMS); Laing Island, Hansa Bay (Madang Prov.), (464) (KBIN); Barol Point (ca. 20) (KBIN : in alcohol). **New Britain** : Duke of York I., off Rabaul, (6) (AMS); Duke of York I., (23) (AMS); Rabaul, (6) (AMS, C44249). **Trobrind**

Islands : N. tip of Buriwadi I., (1) (AMS); N.E. Samarai, near Okai-bolma Village, E. Kiri-wana I., (13) (AMS); near Okai-bolma Village, (18) (AMS); N.E. Samarai, off Kaibola Village, N. end of Kiriwina I., (2) (AMS); between Magulata and Kabulina Points, N.W. coast of Kiriwina I., ca. 73 m, (2) (AMS); Kuia I., Lusancay Is., N.E. Samorai, (6) (AMS); N. tip of Buriwadi I., (1) (AMS). **Solomon Islands** : Guadalcanal, (5) (AMS); Pou Pou I., New Georgia I., 1 m, (3) (AMS); Ndai I., N. of Malaita I., 3 m, (1) (AMS); reef at Aoki Harbour, W. coast of Malaita I., 3-7.5 m, (23) (AMS); N. entrance of Aoki Harbour, 6-12 m, (6) (AMS); exposed reef entrance to Aoki Harbour, (6) (AMS); Laulasi I., S. of Aoki, (4) (AMS); S.E. end of Santa Isabel, Central District, (9) (LACM, 78-54). **Caroline Islands** : E. side of Ponape I., (2) (LACM, 78-33); Palau Is., (2) (LACM, 78-32); Palau Is., Kayangel Lagoon, 1.5-4.6 m, (1) (ANSP, 203190). **Mariana Islands** : Western Shoal, Guam, (2) (LACM, 77-20); just E. of Apra Harbour, Guam, (2) (LACM, 77-06); just E. Apra Harbour, Guam, (18) (LACM, 77-14); Bile Bay, S.W. Guam, (2) (LACM, 77-07); S. side of Orote Peninsula, Guam, (1) (LACM, 77-21); Merizo, Guam, (1) (LACM, 77-18). **Marshall Islands** : Eniwetok, Parryld, (1) (ANSP, 312057). **Christmas Island** : "Christmas I., (3) (AMS); off N.E. point, 183 m, (3) (AMS). **Australia** : **Western Australia** : Sahul Bank, Timor Sea, 27 m, (4) (AMS); Sahul Bank, 27 m, (1) (AMS); Dirk Hartog I., (1) (AMS). **Queensland** : W. tip of Raine I., 20 m, (1) (AMS); W. end Raine I., 4.5-9 m, (20) (AMS); Great Detached Reef, near Raine I., 7 m, (3) (AMS); Yule Detached Reef, 9-15 m, (5) (AMS); Reef N. side of Nimrod Passage, 9 m, (30) (AMS); S. end of reef N. of Ferguson Reef, 10-12 m, (1) (AMS); No.5 Sandbank Reef, 8-10 m, (42) (AMS); Inner side of Carter Reef, 18 m, 2 (AMS); N. end of Carter Reef, 27-30 m, (2) (AMS); Lizard I., 13.5 m, (1) (AMS); Lizard I., 17 m, (1) (AMS); Lizard I., (2) (AMS); Yonge Reef, E. of Lizard I., 2-9 m, (5) (AMS); S. end of Lizard I., 15 m, (3) (AMS); Lizard I., Granite Bluff, 3-4.5 m, (2) (AMS); Carter Reef, E. of Lizard I., 1-2 m, (3) (AMS); N. end of Carter Reef, 27-30 m, (2) (AMS); N. end of South I., Lizard I., 10 m, (1) (AMS); between Palfrey and South I., (7) (AMS); Lizard I., off Chinamans Point, 6 m, (1) (AMS); between South I. and Bird I., 3 m, (2) (AMS); off Cairns, (1) (AMS, C46181); Mone Reef, Cairns, 7 m, (1) (AMS); Magnetic I., Townsville, (1) (AMS); Dingo Beach, S.E. of Bowen, (1) (AMS); off N.E. end of Heron I., 3-5 m, (1) (AMS); opposite middle of N. Heron I., (1) (AMS); Heron I., Capricorn Group, 6 m, (2) (AMS); S. side of Heron I., 10 m, (2) (AMS); S.E. Heron I., 3.5 m, (1) (AMS); Caloundra beaches, (2) (AMS); Shelly Beach, Caloundra, (1) (AMS). **Coral Sea** : Herald Cay, 5-8 m, (1) (AMS); Herald Cay, (6) (AMS). **New Caledonia** : **Main Island** : Panie, (1) (AMS). **Chesterfield Reef** : Chesterfield Reef, (1) (AMS). **Loyalty Islands** : "Loyalty Is.", (1) (AMS); Lifou, (26) (AMS, C.25743); Doking, N. end of Lifou, (4) (AMS); Doking, L.T. to 1.5 m, (2) (AMS); Luengoni, S.E. side of Lifou, (1) (AMS); Luengoni, (1) (AMS); Luengoni, (10) (AMS); Douédou, Lifou, (2) (AMS); Wassagne, E. side Lifou, (9) (AMS). **Vanuatu (New Hebrides)** : Pango Point, off Port Vila, Efate I., (4) (AMS); Point Ardel, Port Vila, Efate, (1) (AMS); Point Arad, Port Vila, Efate, (4) (AMS); Efate, (12) (LACM, 77-40); Tanna I., (2) (AMS); Norsup, Malakula I., (3) (AMS). **Kermadec Islands** : Raoul (= Sunday) I., (2) (AMS). **Kiribati (Gilbert Islands)** : Abaiang Atoll, N. Kiribati, 3 m, (2) (AMS). **Tuvalu (Ellice Islands)** : Tutago, Funafuti, (2)

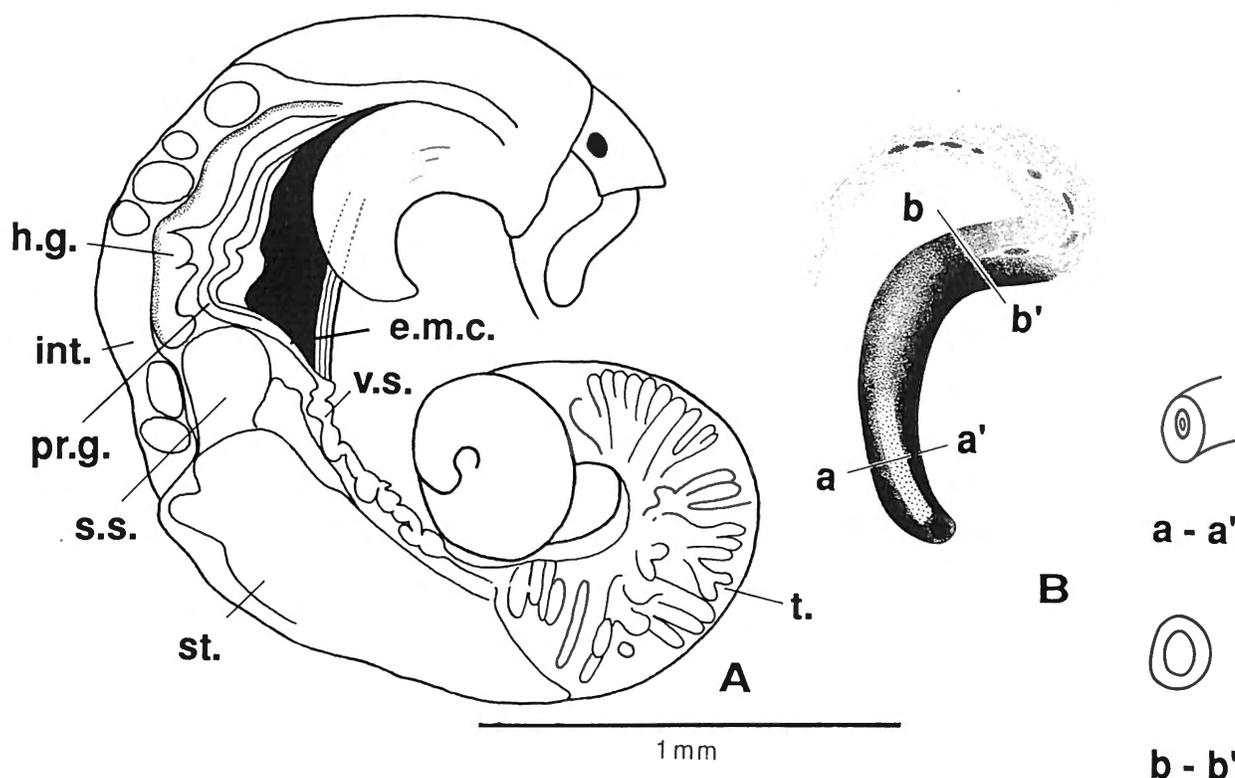


Fig. 36. — A-B. *Rissoina (Apataxia) cerithiiformis* TRYON, 1887. Barol Point, Hansa Bay, Madang Prov., Papua New Guinea (KBIN). Male. — A. Uncoiled male (right side). — B. Dorsal aspect of penis.

(AMS, C28527). **Fiji** : Souvi Bay, S.W. coast Viti Levu, (1) (AMS); Nadi Bay, Viti Levu, 9-34.5 m, (1) (AMS), 3 (AMS); Nadi Bay, Viti Levu, (3) (AMS); Nadi Bay, (1) (AMS, 70481); Korotongo, Coral Coast, (9) (AMS); Deuba, 0.5-1 m, (10) (AMS); Korotongo, Coral Coast, (3) (AMS); "Fiji Islands", (5) (ANSP, 19242); Avalon, "Viti Is.", 5 (NMV, 25883). **Tonga** : S. side of Mangau Peninsula, (2) (LACM, 85-88); N. side of Nuapapu I., (4) (LACM, 85-89). **Samoa** : Pango Pango Harbour, Tutuila, E. Samoa, (1) (AMS); Tutuila I., (1) (LACM, 76-33); Upolu I., lagoon N.E. of Toloa Point, 7.6 m, (1) (ANSP, 198844); "Samoa I.", (2) (ANSP, 19240); Upolu, (2) (ANSP, 59241). **Cook Islands** : Rarotonga, near Arorangi Channel, (1) (AMS); W. side Bitutaki, (24) (LACM, 87-79); E. side of Akitua, N.E. Aitutaki, 0-1 m, (32) (ANSP, 278048). **Society Islands** : Tahiti, Papara, (>50) (AMS); Tahiti, (2) (JT, BP1753); Tahiti, Punaauia, 0.3-1 m, (1) (ANSP, 283176); Pt. Hauru, Moorea, (28) (LACM, 77-113); W. side of Moorea I., (26) (LACM, 74-26); Bora Bora I., (1) (LACM, 74-39); near village of Fare, Huahine I., (10) (LACM, 74-37). **Hawaiian Islands** : Oahu, Mokapu Point, Kailua Bay, (19) (AMS); Kailua, Oahu, (36) (ANSP, 268598); Mokapu Point, (1) (AMS); Mokapu Point, Oahu, (6) (ANSP, 276147); N. side of Oahu, Kahuhu, (3) (AMS); N. side of Oahu, Haleiwa, (>50) (AMS); Paumalu, Oahu, (6) (ANSP, 9335); near Kamake, Kualoa, Oahu, (2) (ANSP, 268535); Paumolu, Oahu, (2) (ANSP, 9327); near Kaena Point, Kaiwaula, Oahu, (11) (ANSP, 276137); Waikiki Beach, Honolulu, (3) (ANSP, 93961); near Honolulu, Oahu, (24) (ANSP, 204956); Honolulu Harbour, (4) (ANSP, 276229); Waianae, Oahu, (>50) (ANSP, 268578); N. shore of Kahoo-

lawe I., (3) (ANSP, 116458), (>50) (ANSP, 116200); Mokuauia I., (7) (ANSP, 268608); Kauai I., Paipu, Waiohai, (1) (AMS); "Sandwich I.", (6) (NMV, 25882). **Tuamotu Islands** : Ahe Atoll, (>50) (LACM, 73-94); Fakarava Atoll, (7) (ANSP, 155806); Fakarava Atoll, (1) (ANSP, 155805); Kakarava Atoll, (2) (ANSP, 156073).

ADDITIONAL RECORDS FROM LITERATURE

Fanning Island : KAY, 1971.

GEOGRAPHICAL DISTRIBUTION

Tropical Indo-Pacific, from the E. African coast to the Hawaiian Islands and Tuamotu (Fig. 54 C).

AFFINITIES AND DIFFERENCES

Rissoina (Apataxia) cerithiiformis is easily distinguished from other rissoinine species by its distinctive sculpture of the teleoconch and by the presence of the prominent ridges in the aperture; the protoconch sculpture is somewhat similar to *R. (R.) honoluluensis* WATSON, 1886, but the teleoconch differs markedly in having a granulated sculpture instead of only axial ribs in the latter species.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 9.

Rissoina (*Apataxia*) *cerithiiformis*. Shell dimensions and sculpture counts.

	L (mm)	Ls (mm)	D (mm)	No.ax	No. whorls
<i>Rissoina costulata</i> : syntypes (MCZ, 178856)					
	4.9	3.4	1.8	16	7 1/4
Fig. 32 C	4.8	3.5	1.8	15	7 1/4
	4.8	3.4	1.7	16	7 3/4
	4.6	3.3	1.7	14	7
	3.9	2.7	1.5	15	6 1/2
	3.6	2.4	1.4	14	6
<i>Rissoina miltozona</i> : holotype (BMNH, 1915.6.12.2)					
Fig. 32 A	4.5	3.2	1.7	15	7
paratype (BMNH, 1915.6.12.3)					
	4.1	2.9	1.6	*	*
<i>Apataxia eripona</i> : holotype (AMS, C.102428)					
	3.7	2.6	1.4	12	? worn
<i>Apataxia erecta</i> : holotype (AMS, C.102429)					
Fig. 32 B	4.3	3.1	1.7	18	7
Nosy Bé, Madagascar (MNHN)					
	4.4	3.1	1.5	15	7
Tuléar, Madagascar (MNHN)					
	3.9	2.8	1.4	16	6 3/4
Réunion (MNHN)					
	3.4	2.4	1.2	15	6 3/4
Conducia Bay, Mozambique (NM, J.4101)					
	4.1	2.9	1.6	13	6 1/4
(NM, J.4169)					
	4.1	2.9	1.5	15	6 3/4
	4.0	2.8	1.5	15	6 1/2
Zululand (NM, A.5416)					
	3.4	2.4	1.4	17	6
(NM, D.5354)					
	3.6	2.6	1.4	14	6
	3.3	2.3	1.3	15	6
	3.3	2.3	1.3	15	5 3/4
	3.2	2.2	1.3	17	5 1/2
Okinawa (AMS, C.153859)					
	4.3	3.0	1.6	13	7
	4.0	2.8	1.6	14	6 1/2
Saumarez Reef, Coral Sea (AMS, C.153906)					
	4.6	3.3	1.7	15	7 1/4
	4.6	3.3	1.6	15	7
	4.3	3.1	1.5	13	7
	4.1	3.0	1.5	18	7
Papua New Guinea					
Reamuna Islet, Madang Prov. (KBIN)					
	3.1	2.1	1.2	16	5 1/4
	3.0	2.1	1.2	16	5 1/4
	2.8	2.0	1.1	11	5 1/4
Laing I., Madang Prov. (KBIN)					
	3.2	2.2	1.2	15	5 3/4

	3.1	2.1	1.1	16	5 1/2
Laing I., Madang Prov. (KBIN)					
	3.5	2.4	1.4	13	6

* glued on board

REMARKS

The original description of *Rissoina balteata* was not accompanied by any illustration and the type material of this species appears to be lost. Nevertheless, in the original description, the author mentions the "finely granulose ribbed whorls" which are "encircled by a single yellowish brown band". As far known, the only Hawaiian species to which these shell features can be applied is *R. (A.) cerithiiformis*. PEASE mentions that the last whorl is "grooved" near the base, possibly referring to the slightly deeper and narrower interspaces between the spiral ribs on the abapical fourth of the last whorl. However, as we are not entirely convinced of its conspecificity with *R. (A.) cerithiiformis*, we include it only tentatively in the synonymy. Further to these considerations, in a previous paper, PEASE (1867) described *Rissoina costulata* (non DUNKER), which is conspecific with *R. (A.) cerithiiformis*; taking into consideration that the latter species is very distinctive in shell features, it would be surprising that PEASE described the same species twice in a period of two years only.

The original description of *Rissoina erythraea* PHILIPPI, 1861, which was not accompanied by any illustration, is rather vague, as it could be easily applied to both *R. (A.) cerithiiformis* and to *Rissoina (Phosinella) seguenziana* ISSEL, 1869; consequently *Rissoina erythraea* is only tentatively included in the synonymy of *Rissoina (Apataxia) cerithiiformis*.

Rissoina cerithiiformis was used for the first time by DUNKER (1869), but it must be considered a nomen nudum; subsequently TRYON (1887) used the same specific name for a species, about which there is no discussion regarding its identity; as it was adequately described and depicted by TRYON, this name appears to be the oldest one available for this species.

Subgenus *Ailinzebina* LADD, 1966

Ailinzebina LADD, 1966. Type species (by original designation): *Zebina (Ailinzebina) abrardi* LADD, 1966.

DIAGNOSIS

Shell : with peristome duplicated; anterior channel of aperture extremely narrow, short and shallow.

Internal anatomy : left (anterior) pallial tentacle simple.

Radula : central tooth with 2 pairs of basal denticles, not interconnected by a dorsal ridge.

GEOGRAPHICAL DISTRIBUTION OF RECENT SPECIES

Tropical western Pacific and western Atlantic.

REMARKS

PONDER (1985) considers *Ailinzebina* a synonym of *Rissoina* s.s. However, *Rissoina (Ailinzebina) elegantissima* differs from typical *Rissoina* s.s. species in the central radular tooth having 2 pairs of basal denticles, which are not connected by a dorsal ridge with the lateral margins; furthermore, the left pallial tentacle is simple instead of bilobed as in *Rissoina* s.s. and the peristome is duplicated. Since radular and head-foot characters apparently are very conservative in the Rissoininae, we consider the observed differences sufficient to warrant a subgeneric status for *Ailinzebina*. Nevertheless, we examined the radula and the internal anatomy of one *Rissoina (Ailinzebina)* species only and consequently, the observed differences in radular and head-foot characters may be merely due to interspecific differences. The study of the anatomy of additional species of *Rissoina (Ailinzebina)* are needed to confirm the latter statement.

Alphabetical list of species recognized

- Rissoina (Ailinzebina) abrardi* (LADD, 1966)
Rissoina (Ailinzebina) bilabiata BOETTGER, 1893
Rissoina (Ailinzebina) elegantissima d'ORBIGNY, 1842
Rissoina (Ailinzebina) sp. A
Rissoina (Ailinzebina) sp. B

***Rissoina (Ailinzebina) abrardi* (LADD, 1966)** (Figs. 37; 38 A-C; 55)

? *Rissoina tomlini* BAVAY, 1917, p. 110, pl. 3, fig. 4. *Zebina (Ailinzebina) abrardi* LADD, 1966, p. 65, pl. 12, figs. 15-18.

TYPE MATERIAL

Rissoina tomlini BAVAY : probably lost. *Zebina (Ailinzebina) abrardi* LADD : holotype (648365), and 2 paratypes (648366-7) in USNM; 2 paratypes (C.77639) from Elugelab I., Eniwetok Atoll, Marshall Is., drill hole F-1, 20'-45' [= 6-13.7m]

TYPE LOCALITIES

Zebina (Ailinzebina) abrardi : Bikini lagoon, 36.6 m.
Rissoina tomlini : Ouvéa, Wallis I.

DESCRIPTION

Shell (Figs. 37, 38 A) : length up to 3.6 mm (N = 12), elongate, subcylindrical, thin.

Protoconch (Fig. 38 B) : glossy, of non-planktotrophic larval type with nucleus moderately tilted; of 1 to 1 1/4 whorls, roundly angulate below deeply impressed suture; transition to teleoconch abrupt with a slightly sinuous, non-thickened margin.

Teleoconch : of 4 1/2 to 6 whorls; spire whorls strongly convex to subangulate near periphery; last whorl moderately convex and very weakly contracted near its abapical 3/5; sutures rectilinear, with sutures of adapical spire whorls deeply impressed; sutures of abapical spire whorls weakly impressed.

Axial sculpture of weak, slightly sigmoid-shaped, very narrow, rather sharp, moderately opisthocline and rather distantly spaced ribs; axial ribs becoming rather abruptly weaker and much more closely spaced on adapical spire whorls and on last whorl; axial ribs on last whorl continuous to peristome.

Spiral sculpture of adapical spire whorls of rather irregular, fine, more or less densely spaced lirae, usually slightly more prominent and more distantly spaced on abapical half of adapical whorls; spiral lirae very fine and very crowded on subsequent spire whorls and on last whorl; last whorl with very weak, very wide and flattened spiral fold, bearing rather prominent, densely spaced spiral lirae (Fig. 38 C), crossing anterior portion of axial ribs.

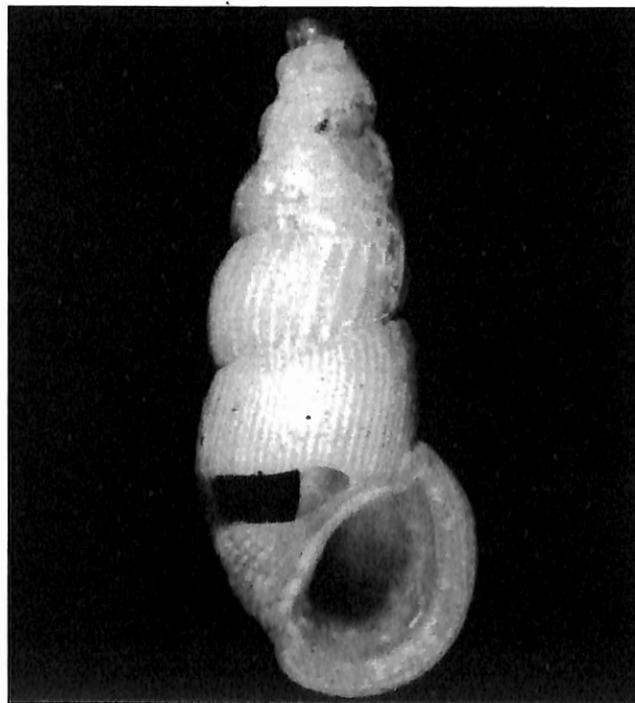


Fig. 37. – *Rissoina (Ailinzebina) abrardi* (LADD, 1966). Paratype of *Zebina (Ailinzebina) abrardi* Ladd, Eniwetok, drill hole F1, 20-45 feet, 2.8 x 1.2 mm.

Aperture : broadly lenticular; inner lip very narrow, apart from very weak thickening near transition to very wide and short posterior channel; anterior channel extremely short, very narrow and extremely shallow; outer lip duplicated with inner margin forming a sharp rim; space between inner and outer rim slightly concave; outer lip externally with very prominent, narrow varix; outer lip moderately opisthocline in profile.

Shell colour : white.

Operculum, radula and internal anatomy : unknown.

VARIATION

Rissoina (Ailinzebina) abrardi shows some variation with respect to the shell shape, the latter being more or less elongate. The specimen from Fiji (LACM, 79-42) has rather prominent, very distantly spaced axial ribs on the spire whorls. The specimen from

Marion Reef (LACM, 77-120) differs from the type specimens in having slightly more prominent and more distantly spaced axial ribs on the spire whorls and on the last whorl; furthermore, the spiral lirae on the abapical half of the last whorl are more prominent than in typical specimens of *R. (A.) abrardi*.

ADDITIONAL MATERIAL EXAMINED

Australia : Queensland : Marion Reef, Coral Sea, (2) (LACM, 77-120); W. end of Wilson I., Capricorn Group, 4.5m, (1) (AMS, C.153810); Yam I., Torres Strait, (1) (AMS, C.154015). **Mariana Islands :** Guam, E. of Apra Harbor, (1) (LACM, 77-11); Guam, narrow channel between Orote I. and Orote Point, (4) (LACM, 72-12); Guam, Apra Harbor, (1) (LACM, 77-13); E. of Apra Harbor, (1) (LACM, 77-14); Guam, Cocos Lagoon, (5) (LACM, 77-18). **Fiji :** Korolevu, Viti Levu, (2) (LACM, 79-42); Souvi Bay, S.W. coast of Viti Levu, (4) (AMS, C.153944), (1) (AMS, C.153945); Komave, Coral Coast, Viti Levu, (1) (AMS, C.153951).

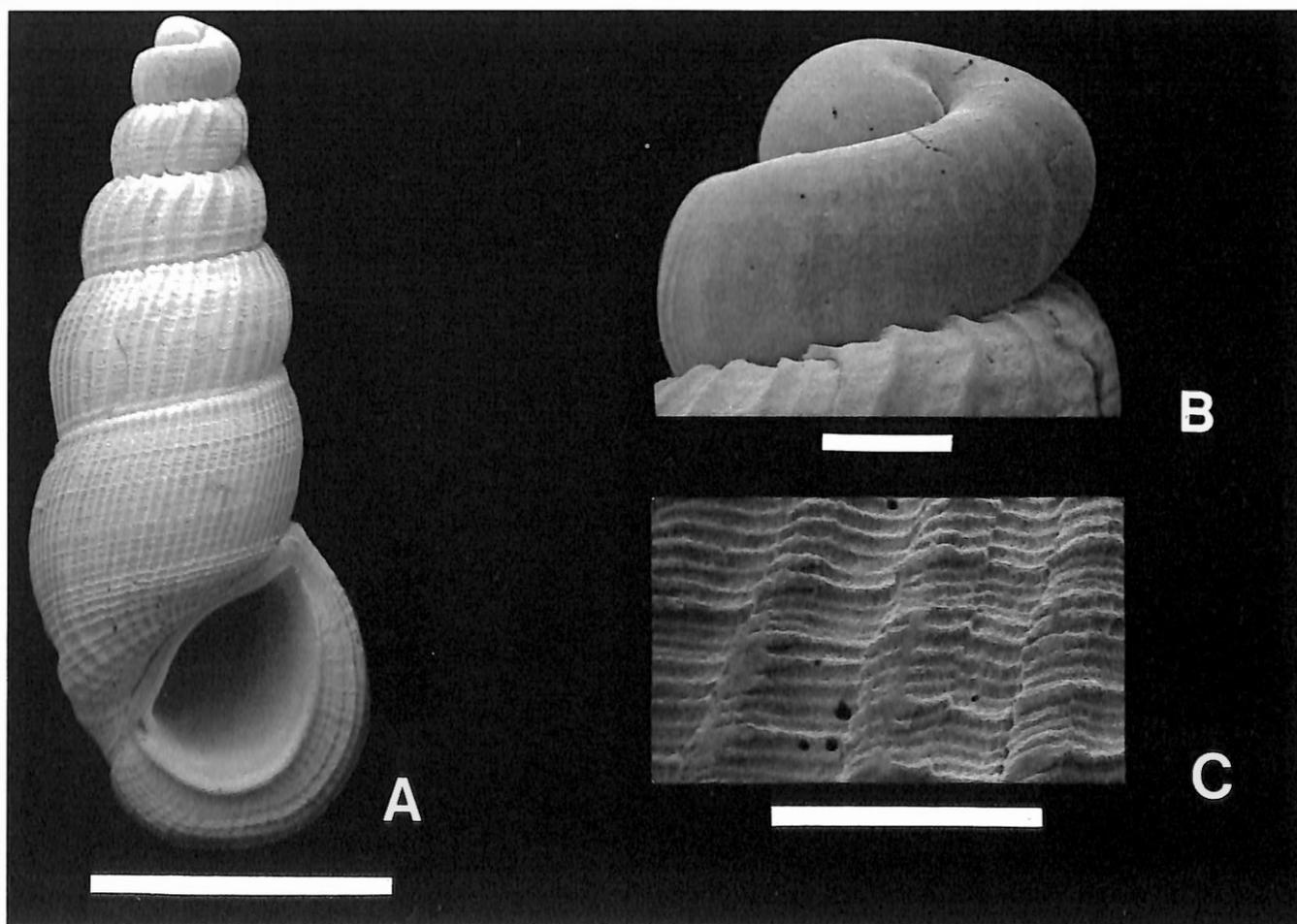


Fig. 38. – A-C. *Rissoina (Ailinzebina) abrardi* (LADD, 1966). Between Orote I. and Orote Point, Guam, Mariana Is. (LACM, 72-12). – A. Shell (scanning electron micrograph). – B. Protoconch (scanning electron micrograph). – C. Microsculpture of teleoconch (scanning electron micrograph). Scale bars : A : 1 mm. – B-C : 0.1 mm.

GEOGRAPHICAL DISTRIBUTION

Tropical western Pacific from the Torres Strait to Fiji or Wallis I. (Fig. 55).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Ailinzebina) abrardi* very strongly resembles *R. (A.)* sp. A from the Cook Is. and Tahiti, but differs essentially in having a protoconch of non-planktotrophic larval type, in the shell being markedly smaller and in the axial ribs on the adapical spire whorls being weaker and more distantly spaced.

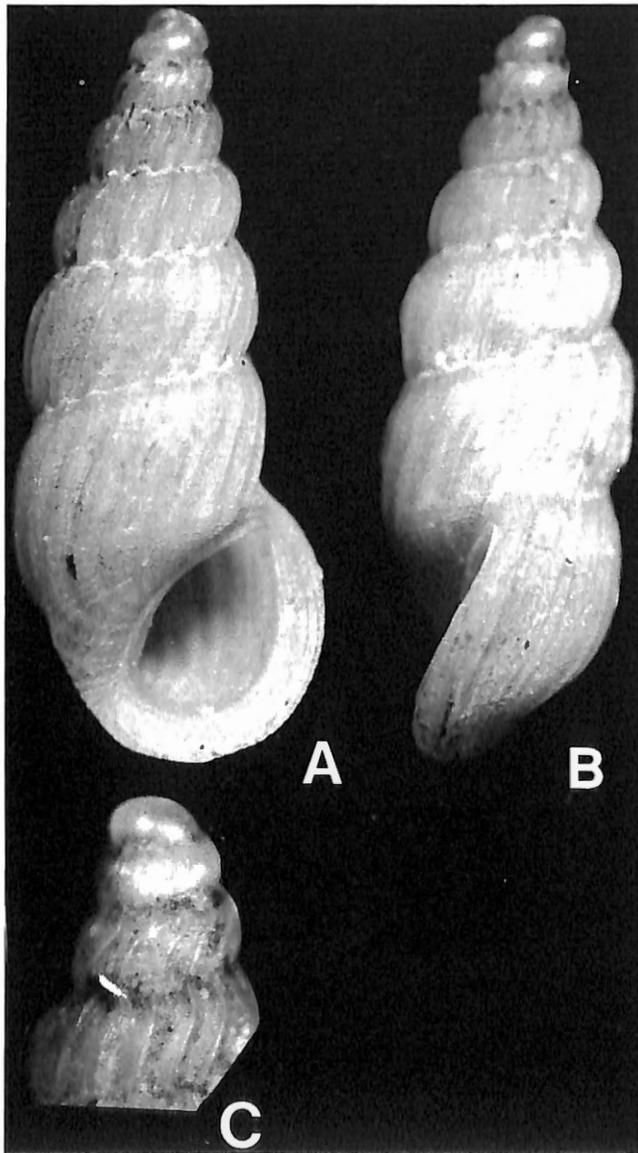


Fig. 39. – A-C. *Rissoina (Ailinzebina) bilabiata* BOETTGER, 1893. Syntype of *Rissoina (Rissoina) bilabiata* BOETTGER, Tanga-naan, N. Mindanao, Philippines (SMF, 225144/1), 3.7 x 1.5 mm.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 10.

Rissoina (Ailinzebina) abrardi. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
<i>Zebina (Ailinzebina) abrardi</i> :				
paratype (AMS, C.77639)				
Fig. 37	2.8	1.7	1.2	4 3/4
Wilson I. (AMS, C.153810)				
	3.1	2.0	1.2	4 3/4
Yam I. (AMS, C.153944)				
	3.4	2.2	1.3	5
Souvi Bay (AMS, C.153944)				
	3.6	2.4	1.2	5 1/4
Guam (LACM, 72-12)				
	3.0	1.8	1.2	4 3/4
	2.9	1.8	1.2	4 3/4
	2.8	1.7	1.1	4 1/2
Fig. 38 A-C	2.7	1.6	1.1	4 1/2
(LACM 77-18)				
	2.9	1.8	1.2	5
(LACM 77-14)				
	3.2	2.1	1.2	5 1/4
Fiji (LACM 79-42)				
	2.5	1.6	1.0	4 1/2
Marion Reef, Coral Sea (LACM, 77-120)				
	3.4	2.3	1.2	6

***Rissoina (Ailinzebina) bilabiata* BOETTGER, 1893**
(Figs. 39 A-C; 55)

Rissoina (Rissoina) bilabiata BOETTGER, 1893, p. 102.

TYPE MATERIAL

Rissoina (Rissoina) bilabiata BOETTGER: 1 syntype (225144/1) in SMF, ex QUADRAS, Coll. BOETTGER.

TYPE LOCALITY

Rissoina (Rissoina) bilabiata: Tanga-naan, N. Mindanao, Philippines.

DESCRIPTION

Shell (Fig. 39 A-B): length of syntype 3.7 mm, elongately conical, rather stout.

Protoconch (Fig. 39 C): of non-planktotrophic larval type; of 1 strongly convex whorl with strongly impressed suture; transition to teleoconch abrupt with an orthocline margin.

Teleoconch : of 5 1/2 whorls; spire whorls strongly convex; last whorl moderately convex, very weakly contracted near the shell base; sutures moderately undulating, weakly impressed.

Axial sculpture of moderately prominent, sigmoid-shaped, rounded, moderately distantly spaced ribs with slightly wider, rather deep interspaces; axial ribs gradually weaker near peristome, but continuous to the latter.

Spiral sculpture of very fine, very densely spaced spiral striae; last whorl with subperipherally located narrow zone, bearing about 6 weak spiral lirae, the latter crossing the abapical portion of axial ribs.

Aperture : lenticular; peristome duplicated; inner lip very thin, very narrow; anterior channel extremely shallow and extremely short; posterior channel very short, triangular; outer lip flaring, externally with rather prominent and narrow varix, bearing weak axial riblets; outer lip strongly opisthocline in profile.

Shell colour : white.

Operculum, radula and internal anatomy : unknown.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 11.

Rissoina (Ailinzebina) bilabiata. Shell dimensions and sculpture counts.

	L (mm)	Ls (mm)	D (mm)	No.ax	No. whorls
<i>Rissoina (Rissoina) bilabiata</i> : syntype (SMF, 225144/1) Fig. 39 A-C	3.67	2.39	1.53	22	5 1/2

ADDITIONAL MATERIAL EXAMINED

The syntype of *Rissoina (Rissoina) bilabiata* was the only specimen of this species available.

GEOGRAPHICAL DISTRIBUTION

Only known from the type locality (Fig. 55).

AFFINITIES AND DIFFERENCES

Rissoina (Ailinzebina) bilabiata differs from *R. (A.) abrardi* in having a less subcylindrical shell and in having a much weaker spiral sculpture.

The shell of *R. (A.) bilabiata* superficially resembles *R. (A.)* sp. A from the Cook Is. and Tahiti, but differs essentially in having a protoconch of non-planktotrophic larval type.

Rissoina (Ailinzebina) elegantissima

d'ORBIGNY, 1842

(Figs. 40; 41 A-C; 42 A-B; 43 A-F; 44 A-B; 45 A-B; 52 E; 56)

Rissoina elegantissima d'ORBIGNY, 1842, pl. 12, figs. 27-29; d'ORBIGNY, 1853, p. 26; TRYON, 1887, p. 374, pl. 56, fig. 51; LEAL & MOORE, 1989, p. 142, figs. 8-9.

Rissoina (Rissolina) elegantissima d'ORBIGNY; DESJARDIN, 1949, p. 195, pl. 9, fig. 3.

TYPE MATERIAL

Rissoina elegantissima d'ORBIGNY : 5 syntypes (1854.10.4.212) in BMNH (4 syntypes badly affected by BYNES' disease).

TYPE LOCALITY

Rissoina elegantissima : Santo Domingo, Dominican Republic.

DESCRIPTION

Shell (Figs. 40, 41 A) : length up to 3.6 mm (N = 16), rather stout, cylindrical to elongately conical.

Protoconch (Fig. 41 B) : cylindrical, of planktotrophic larval type; of 2 1/2, relatively wide, slightly abapically depressed, strongly convex whorls; sutures deeply impressed; transition to teleoconch abrupt, with a deep and narrow sinusigera notch, with moderately thickened margin.

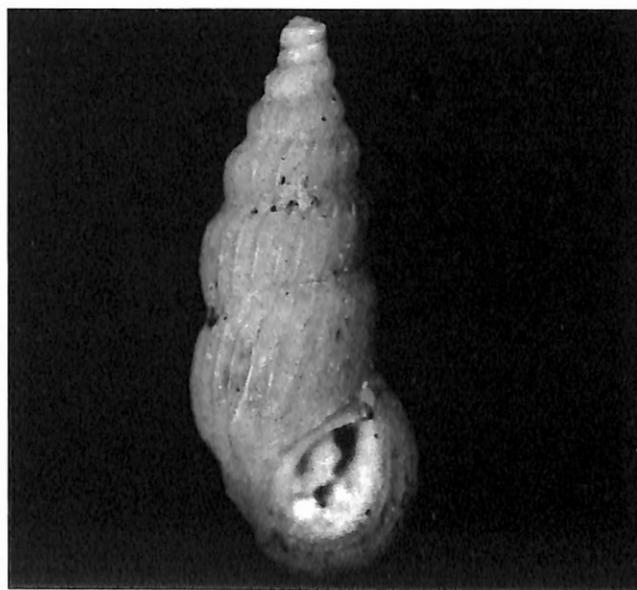


Fig. 40. – *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY, 1842. Syntype of *Rissoina elegantissima* d'ORBIGNY, Cuba (BMNH, 1854.10.4.212), 3.5 x 1.4 mm.

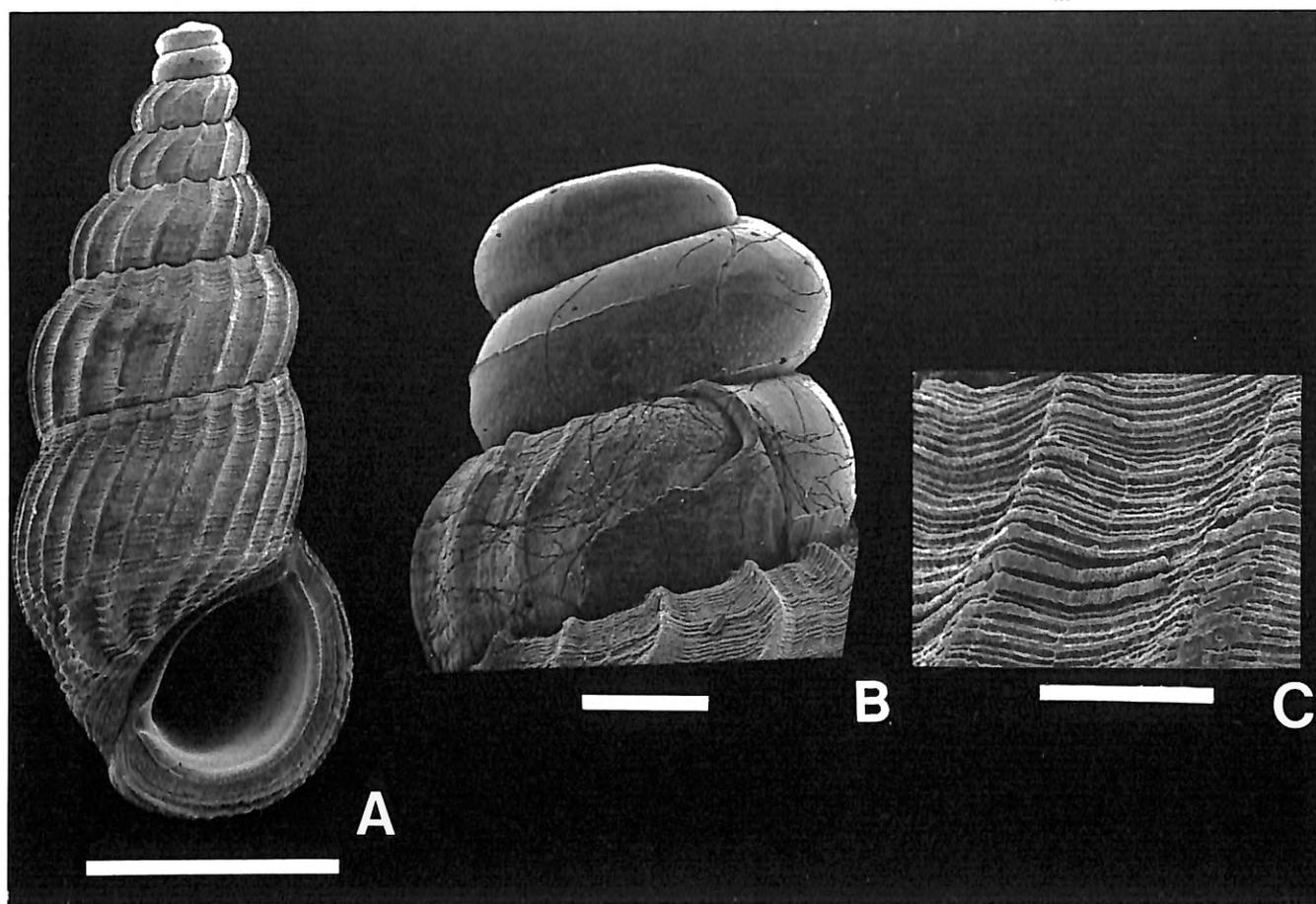


Fig. 41. – A-C. *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY, 1842. – A,C. Lucayan Waterway, off S. end of Grand Bahama I., Bahamas (ANSP, 369151). – A. shell (scanning electron micrograph). – C. microsculpture of teleoconch (scanning electron micrograph). – B. Lucayan Waterway, off S. end of Grand Bahama I., Bahamas, protoconch (scanning electron micrograph) (ANSP, 369151).
Scale bars : A : 1 mm. – B-C : 0.1 mm.

Teleoconch : of 5 to 5 1/2 strongly convex, relatively wide whorls; sutures slightly undulated, moderately impressed; abapical spire whorls subangulate below suture. Sculpture of moderately prominent, narrow, rounded, weakly to moderately opisthocline axial ribs with wider interspaces; the latter with sharp, densely-spaced, spiral lirae (Fig. 41 C); the latter relatively more prominent and slightly more distantly spaced on adapical spire whorls than on subsequent spire whorls and last whorl; spiral lirae sometimes crossing the top of the axial ribs; last whorl with a very weak, rather wide depression just below periphery, with axial ribs on this portion more prominent and wider than on remaining portion of last whorl.

Aperture : D-shaped to semicircular, with duplicated peristome; inner lip very thin; anterior channel extremely short and extremely narrow; very weak swelling near transition to the extremely short posterior channel; outer lip thin internally; externally with prominent and narrow varix; outer lip subangulate in profile.

Operculum (Fig. 52 E) : typical of genus with peg open over all of its length.

Radula (Fig. 42 A-B) : central tooth with formula

$$\frac{2+1+2.}{1+1 \quad 1+1'}$$

lateral teeth with ca. 3 cusps on its inner margin and with about 5 cusps on its outer margin.

Head-foot : both the left and right pallial tentacles simple.

Internal anatomy : last whorl with a thick layer of milky-white pigment, rendering the integument non-transparent; hypobranchial gland very wide and very thick posteriorly, very narrow anteriorly.

Stomach - style sac ratio 5.8, length - width ratio 3.1 (N = 2) (Fig. 44 A-B).

Male with a rather simple penis (Fig. 43 C-F) with very small lobe at the outer side; proximal half of penis with open groove; pallial vas deferens open over a short distance, just before entering the penis; prostate gland

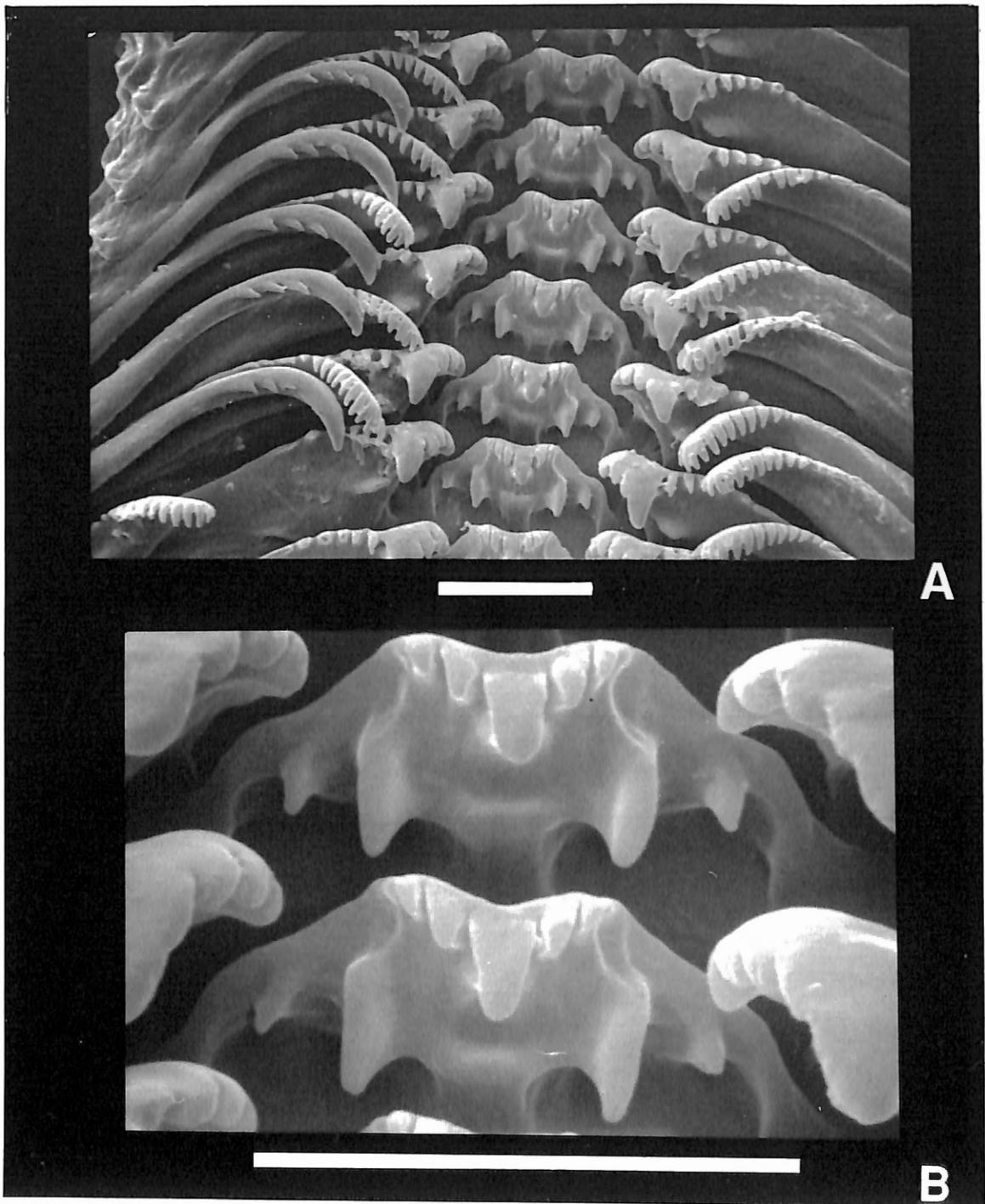


Fig. 42. – A-B. *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY, 1842. N.E. side of Peanut I., Lake Worth, Florida, U.S.A., radula (scanning electron micrographs) (AMS, C.162638). – A. General view of part of radular ribbon (left outer marginals obscured). – B. Detail of central teeth. Scale bars : 0.01 mm.

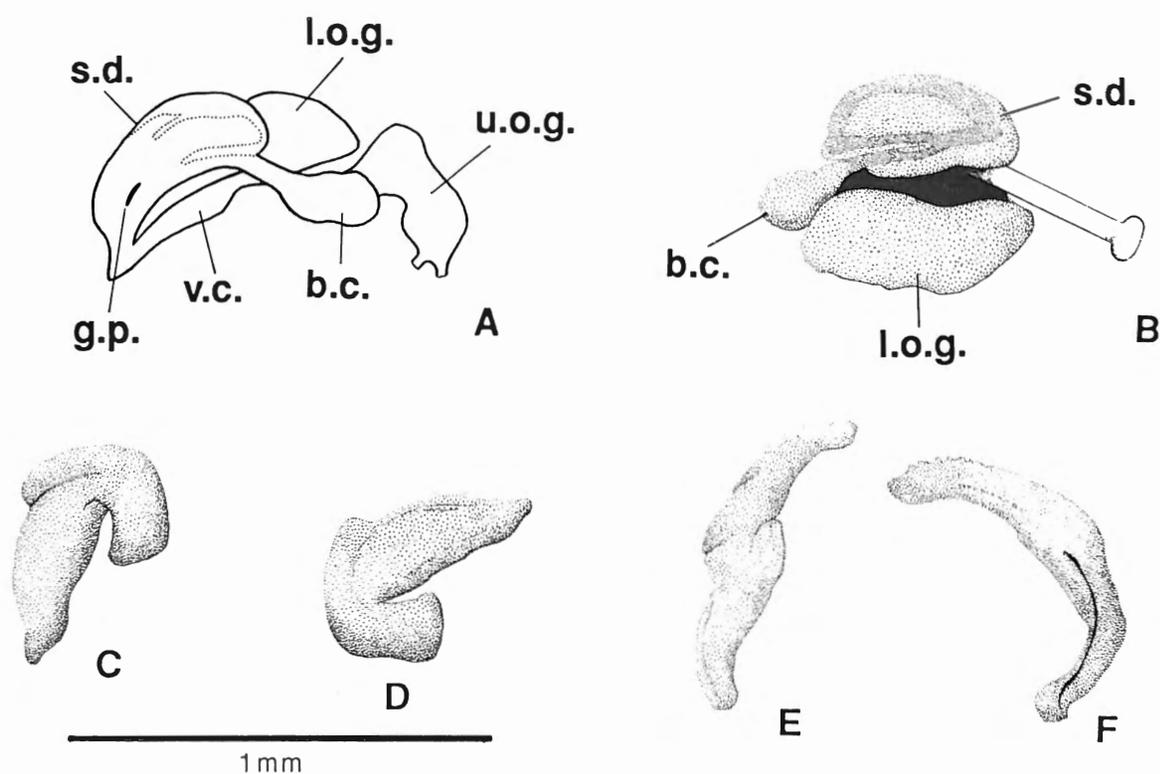


Fig. 43. – A-F. *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY in SAGRA, 1842. N.E. side of Peanut I., Lake Worth, Florida, U.S.A. (AMS, C.162638). – A-D. Female. – A. Female genitalia, excluding the uppermost section of the oviduct and ovary (left side). – B. Right lateral aspect of female genitalia (excluding the uppermost section of the oviduct and ovary) with lower oviduct gland folded down. – C-D. Penis of female, seen from two slightly different positions. – E-F. Penis of male, seen from two slightly different positions.

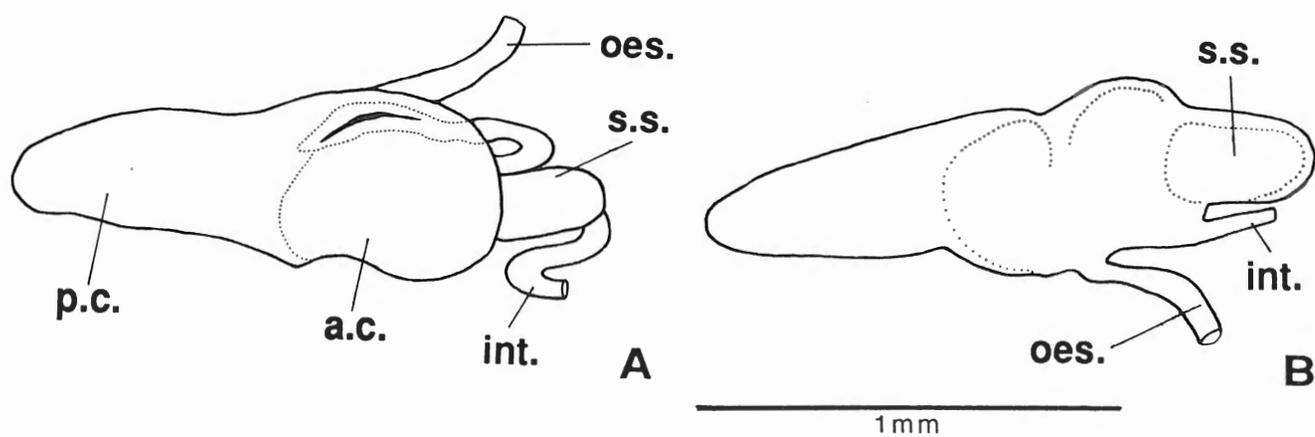


Fig. 44. – A-B. *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY in SAGRA, 1842. N.E. side of Peanut I., Lake Worth, Florida, U.S.A. (AMS, C.162638). Stomach. – A. Outer side. – B. Inner side.

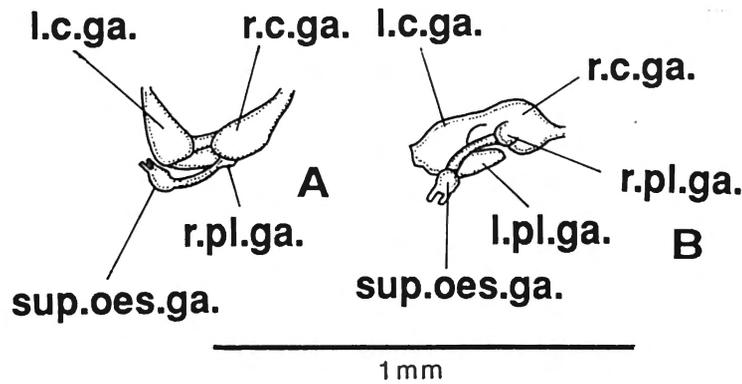


Fig. 45. – A-B. *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY in SAGRA, 1842. N.E. side of Peanut I., Lake Worth, Florida, U.S.A. (AMS, C.162638). – A. Dorsal view of cerebral ganglia and supraoesophageal ganglion. – B. Circumoesophageal ganglia (except suboesophageal ganglion); same specimen as 45 A, but slightly tilted anteriorly.

very narrow and very thin, apparently closed over all of its length.

Sperm tube of female slightly longer than lower oviduct gland, moderately wide and thick, weakly swollen anteriorly; bursa copulatrix smaller than upper oviduct gland (Fig. 43 A-B).

Nervous system (Fig. 45 A-B) : RPG ratio 0.56 (N = 1) (LPG ratio not determined).

VARIATION

No marked variation has been observed amongst the series of specimens examined.

ADDITIONAL MATERIAL EXAMINED

U.S.A. : Florida : Miami, 55m, (1) (USNM, 450516); N.E. side of Peanut I., Lake Worth, lower half of shore, under rocks, (2) (AMS, C.162638; in alcohol). **Bahamas :** Indian Cay, Grand Bahama I., (20) (ANSP, 366919); Lucaya, Grand Bahama I., (27) (ANSP, 368048); Lucayan Waterway, off South end of Grand Bahama I., 12m, (39) (ANSP, 369151); Tamarind, Grand Bahama I., 38m, (44) (ANSP, 368845); Gold Rock, Grand Bahama I., 24.3m, (64) (ANSP, 369423); Lucayan Waterway, off S. end of Grand Bahama I., 24.5m, (15) (ANSP, 369216); Caravel Beach (John Jack Point), Freeport, 0-0.5m, (16) (ANSP, 370115); "Garbage Hole", Hepburn Town, Eight Mile Rock, Grand Bahama I., 0m, (22) (ANSP, 370357); Great Abaco, off Reef N.E. of North Point, Elbow [Little Guana] Cay, 20-26m, (1) (ANSP, 298471). **Mexico :** S. end of Isla Mujeres, Quintana Rao, 0-1.8m, (3) (ANSP, 303100); Quintana Rao, Ascension Bay, central part of Micchehabin Reef, Bredin, (3) (USNM, 735975). **Belize :** Carrie Bow Cay, 40-42.5m, (1) (USNM, 798471); Carrie Bow Cay, 35-38m, (1) (USNM, 775421); Carrie Bow Cay, 18m, (1) (USNM, 798999); Carrie Bow Cay, AC-CBC-31, 5.2m, (3) (USNM, 798288); Carrie Bow Cay, (1) (USNM, ex 775222); Carrie Bow Cay, 24.4-27.4m, (2) (USNM); Carrie Bow Cay, 18m, (1) (USNM); Carrie Bow Cay, 39.6-42.7m, (6) (USNM); "Belize", (4) (USNM). **Cuba :** Guantanamo Bay, (1) (ANSP, ex 313039); near Havana, (2) (ANSP,

130773). **Cayman Islands :** Cayman Brac, 1.8 km E. of Southwest Point, 0-1m, (1) (ANSP, 296055). **Guadeloupe :** 1.8 km N.W. of Pointe des Chateaux, 1-1.8m, (7) (ANSP, 313874). **Barbados :** 186 m [sic], (2) (USNM, 460164); 69.5m, (1) (USNM, 460163).

ADDITIONAL RECORDS FROM LITERATURE

Belize : Hook Bank (LEAL & MOORE, 1989).

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 12.

Rissoina (Ailinzebina) elegantissima. Shell dimensions and sculpture counts.

	L (mm)	Ls (mm)	D (mm)	No. ax	No. axp	No. whorls
<i>Rissoina elegantissima</i> :						
syntype (BMNH, 1854.10.4.212)						
Fig. 40	3.52	2.23	1.44	26	26	5 1/4
Bahama Islands (ANSP, 369151)						
	3.61	2.36	1.45	26	21	5 1/2
	3.58	2.34	1.45	27	24	5 1/4
	3.55	2.29	1.42	23	24	5 1/4
	3.47	2.29	1.42	26	22	5
	3.37	2.14	1.41	29	24	5
	3.33	2.17	1.38	29	21	5 1/4
	3.27	2.22	1.42	24	21	5
	3.23	1.97	1.30	30	28	5
Fig. 41 A-C	3.20	2.05	1.36	26	21	5
	3.18	1.99	1.33	30	25	5
	3.15	1.96	1.27	35	28	5
Belize (USNM)						
	3.24	2.08	1.28	34	29	5
	3.18	1.99	1.28	34	27	5
	3.17	2.00	1.30	35	32	5
	3.15	1.96	1.27	35	28	5

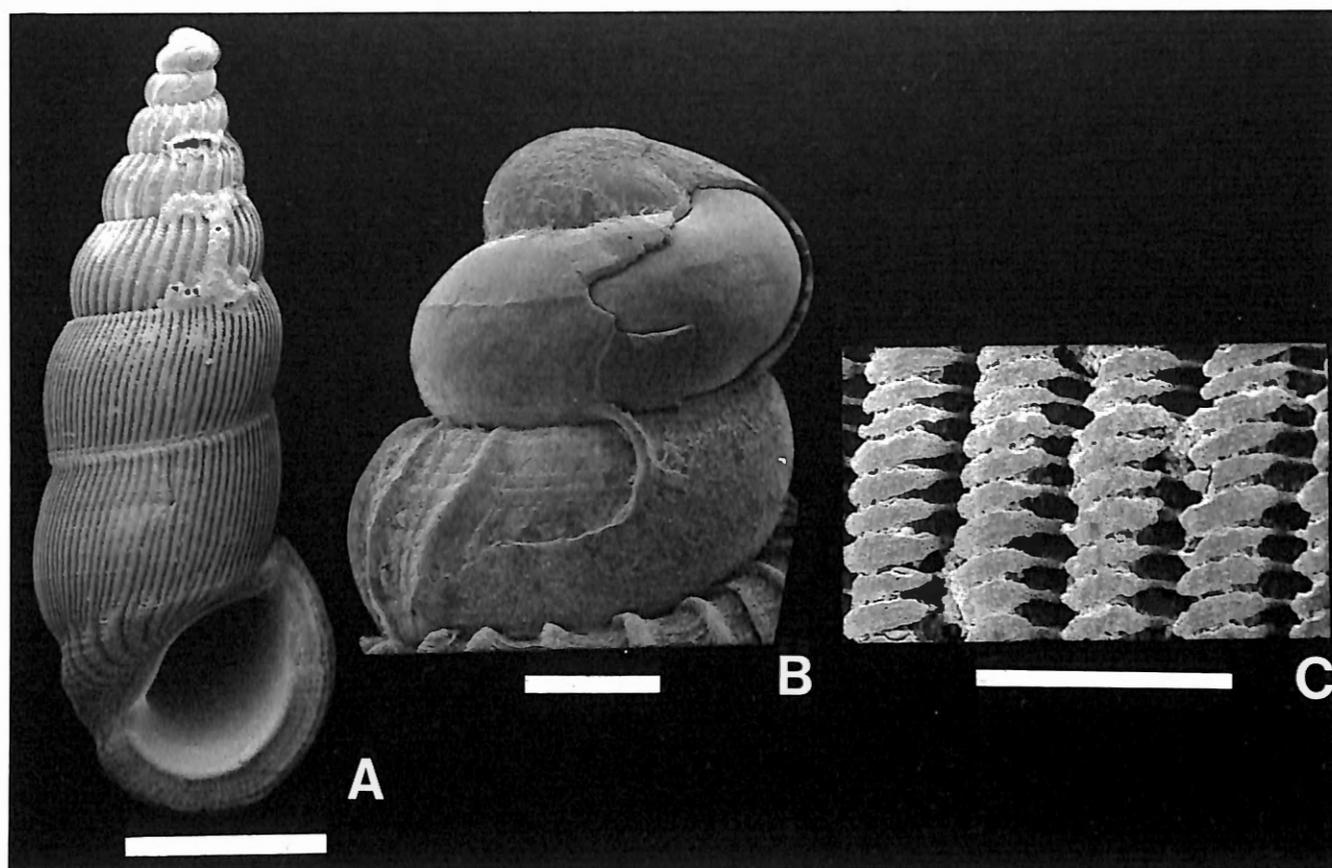


Fig. 46. – A-C. *Rissoina* (*Ailinzebina*) sp. A. W. side of Aitutaki, off Arutonga, Cook Is. (LACM, 87-79). – A. Shell (scanning electron micrograph). – B. Protoconch (scanning electron micrograph). – C. Microsculpture of teleoconch (scanning electron micrograph).
Scale bars : A : 1 mm. – B-C : 0.1 mm.

GEOGRAPHICAL DISTRIBUTION

Western Atlantic, from Florida to the Lesser Antilles (Fig. 56).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina* (*Ailinzebina*) *elegantissima* strongly resembles the tropical western Pacific species *R. (A.) abrardi*, but differs essentially in having a protoconch of planktotrophic larval type.

R. (A.) elegantissima superficially resembles *Rissoina* (? *R.*) *vanderspoeli* de JONG and COOMANS, 1988 in shell characters, but differs essentially in having a protoconch of planktotrophic larval type and in having a duplicate peristome; furthermore, there are some minor differences between both species such as the more prominent spiral sculpture and the more opisthocline axial ribs in *R. (A.) elegantissima*.

Rissoina (*Ailinzebina*) sp. A (Figs. 46 A-C; 55)

DESCRIPTION

Shell (Fig. 46 A) : length up to 4.1 mm, subcylindrical, rather thin.

Protoconch (Fig. 46 B) : of planktotrophic larval type, almost cylindrical, of $1\frac{3}{4}$, rather low and relatively wide, strongly convex whorls; transition to teleoconch abrupt with a deep sinusigera notch, the latter with a very narrow and rather thick margin.

Teleoconch : of about 6 whorls; adapical spire whorls strongly convex; abapical spire whorls and last whorl moderately convex; sutures very weakly undulating, deeply impressed.

Axial sculpture of very fine, narrow, numerous and very closely spaced, slightly sinuous riblets, slightly less numerous, more widely spaced and slightly more prominent on adapical spire whorls; axial ribs on last whorl continuous to peristome.

Spiral sculpture of fine, very numerous and very nar-

rowly spaced lirae, the latter crossing top of axial ribs (Fig. 46 C); shell base with very wide and weak spiral fold, intersected by abapical end of the axial ribs; spiral fold very flat, giving shell base a flattened appearance; spiral fold bearing moderately prominent, densely spaced spiral lirae.

Aperture : lenticular; peristome duplicate; inner lip thin and narrow; anterior channel extremely short, very narrow and extremely shallow; posterior channel extremely short and very wide; outer lip thin internally, externally with prominent, narrow and rounded varix; outer lip weakly opisthoclinal in profile.

Shell colour : white.

Operculum, radula and internal anatomy : unknown.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 13.

Rissoina (Ailinzebina) sp. A. Shell dimensions and sculpture counts.

	L (mm)	Ls (mm)	D (mm)	No. whorls
Arutonga, Cook Is. (LACM, 87-79) Fig. 46 A-C	4.1	2.6	1.6	5 3/4

VARIATION

No marked differences were observed among the small series of specimens examined.

MATERIAL EXAMINED

Cook Islands : off Arutonga, W. side of Aitutaki, (14) (LACM, 87-99). **Society Islands** : Tahiti, 57m, (1) (JT, BP1753).

GEOGRAPHICAL DISTRIBUTION

Only known from the Cook Is. and from Tahiti (Fig. 55).

AFFINITIES AND DIFFERENCES

The shell of *Rissoina (Ailinzebina) sp. A* strongly resembles *R. (A.) abrardi* and is contrasted under that species.

REMARKS

Since I found only one specimen, which has an intact protoconch, I prefer to delay establishing a specific name for it, pending the availability of additional material with an intact protoconch.

Rissoina (Ailinzebina) sp. B (Figs. 47 A-B; 55)

DESCRIPTION

Shell (Fig. 47 A) : length up to 5.3 mm, elongately conical, rather stout.

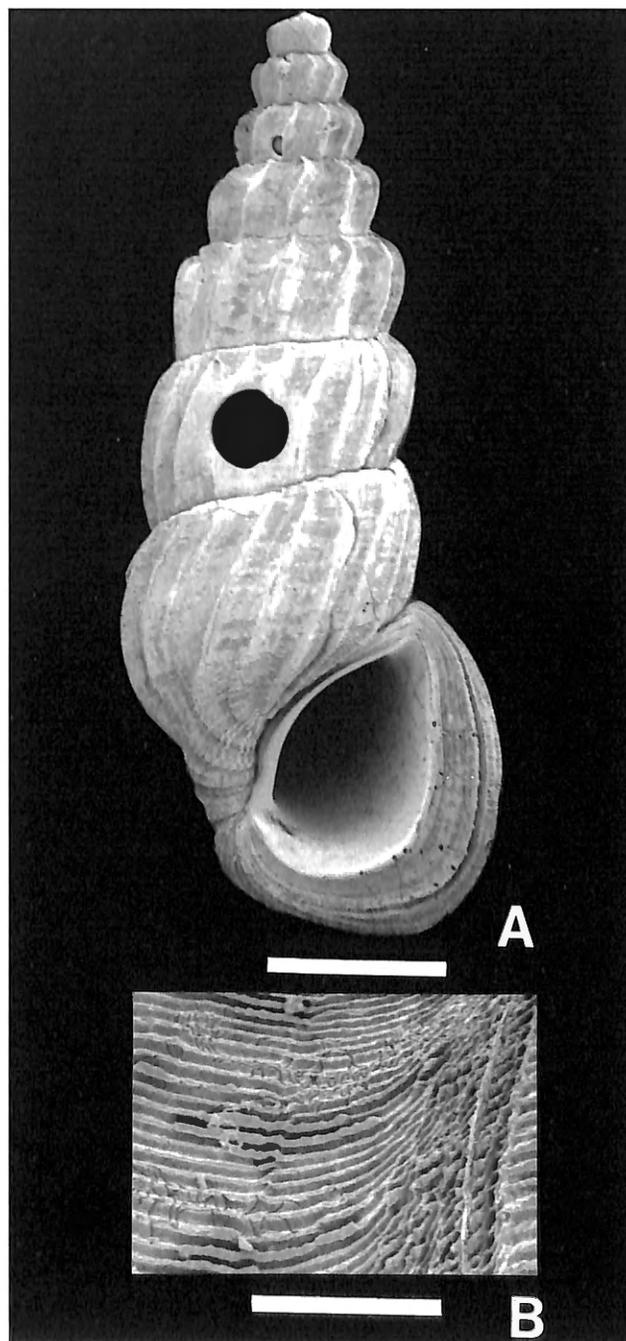


Fig. 47. – A-B. *Rissoina (Ailinzebina) sp. B*. S. side of Bunaken and Siladen Is., off Manado, N. Sulawesi, Indonesia (LACM, 88-55). – A. Shell (scanning electron micrograph). – B. Microsculpture of teleoconch (scanning electron micrograph).
Scale bars : A : 1 mm. – B : 0.1 mm.

Protoconch : broken in the single specimen available but transition to teleoconch abrupt with a deep sinuigera notch with a non-thickened margin, suggesting a larval development of planktotrophic type.

Teleoconch : of 7 moderately convex whorls; 5 adapical spire whorls strongly angulate below rectilinear, non-impressed sutures; penultimate whorl and last whorl very weakly angulate below suture.

Axial sculpture of very prominent, very narrow, sharp, distantly spaced, strongly opisthocline ribs, less prominent on penultimate whorl and on last whorl; anterior portion of axial ribs strongly curved on last whorl.

Spiral sculpture of very fine, very closely and regularly spaced threads, crossing the top of axial ribs (Fig. 47 B); last whorl with very weak and wide spiral fold near shell base; spiral fold bearing fine spiral lirae.

Aperture : broadly lenticular; inner lip very narrow and very thin; both the posterior and anterior channel inconspicuous; outer lip duplicated with sharp inner rim; outer lip externally with rather prominent, very narrow varix, bearing very weak axial riblets; outer lip strongly opisthocline in profile.

Shell colour : white.

Operculum, radula and internal anatomy : unknown.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 14.

Rissoina (Ailinzebina) sp. B. Shell dimensions and sculpture counts.

	L (mm)	Ls (mm)	D (mm)	No. ax	No. axp	No. whorls
Off Manado, N. Sulawesi (LACM, 85-55) Fig. 47 A-B	5.3	3.5	2.2	15	20	7

VARIATION

The specimen from Sulawesi (LACM, 88-55) was the only specimen of this species available for examination.

MATERIAL EXAMINED

Indonesia : S. side of Bunaken and Siladen Islets, off Manado, N. Sulawesi, (1) (LACM, 88-55).

GEOGRAPHICAL DISTRIBUTION

Only known from N. Sulawesi (Fig. 55).

AFFINITIES AND DIFFERENCES

Rissoina (Ailinzebina) sp. B resembles *R. (A.) abrardi* and *R. (A.) sp. A* in having a duplicate peristome, but differs essentially in being markedly larger and in having more prominent and more distantly spaced axial ribs; furthermore, the whorls are strongly angulated in *R. (A.) sp. B* and the spiral fold below the periphery of the last whorl is very poorly developed.

REMARKS

As only one specimen of this likely thus far undescribed species was available, I prefer to delay establishing a specific name for it, pending the availability of additional material.

Subgenus *Pachyrissoina* BOETTGER, 1893

Pachyrissoina BOETTGER, 1893. Type species (by subsequent designation, WENZ, 1938 : 628) : *Rissoina walkeri* SMITH, 1893).

DIAGNOSIS

Shell : with prominent spiral cord near the periphery of the last whorl.

Sculpture of very prominent, rounded axial ribs, crossed by relatively prominent spiral lirae.

REMARKS

The subgenus *Pachyrissoina* was established for *Rissoina walkeri*, a for the genus unusually large species, which is characterized by the presence of a very prominent spiral cord near the periphery of the last whorl. In other respects, the shell of *R. walkeri* does not differ markedly from other *Rissoina* s.s. species, but until the internal anatomy of this species is known, I maintain *Pachyrissoina*, with some reserve, as a distinct subgenus of *Rissoina* s.l.

The type species *Rissoina walkeri* strongly resembles *R. grateloupi* BASTEROT, 1825 [? = *Rissoina basteroti* SCHWARTZ, 1860] from the Tertiary of Europe. The latter species however, lacks the prominent spiral cord on the last whorl, and thus, according to PONDER (1985), it would be best included in *Rissoina* s.s. Both species, however, are very similar in other respects (shell shape, sculpture and microsculpture, aperture), suggesting that they may be closely related.

Alphabetical list of species recognized

Rissoina (Pachyrissoina) percrassa G. & H. NEVILL, 1874

Rissoina (Pachyrissoina) walkeri SMITH, 1893

Rissoina (Pachyrissoina) percrassa

G. & H. NEVILL, 1874

(Figs. 48 A-B; 49)

Rissoina percrassa G. & H. NEVILL, 1874, p. 26, pl. 1, fig. 13;
WEINKAUFF, 1881, p. 61, pl. 15, fig. 10 (not fig. 19 as
erroneously indicated); TRYON, 1887, p. 389, pl. 59, fig.
38 (not pl. 59, fig. 51).

TYPE MATERIAL

Rissoina percrassa G. & H. NEVILL : holotype (2024)
in ZSI.

TYPE LOCALITY

Rissoina percrassa : Mauritius.

DESCRIPTION

Shell (Figs. 48 A-B, 49) : length up to 9.1 mm (N = 3),
very stout, elongately conical, with moderately strongly
shouldered abapical spire whorls and last whorl.

Protoconch : unknown (decollated in all specimens
available).



Fig. 48. – A-B. *Rissoina (Pachyrissoina) percrassa* G. & H. NEVILL, 1874. Holotype of *Rissoina percrassa* G. & H. NEVILL, Mauritius (ZSI, 2024), 8.1 x 3.7 mm.

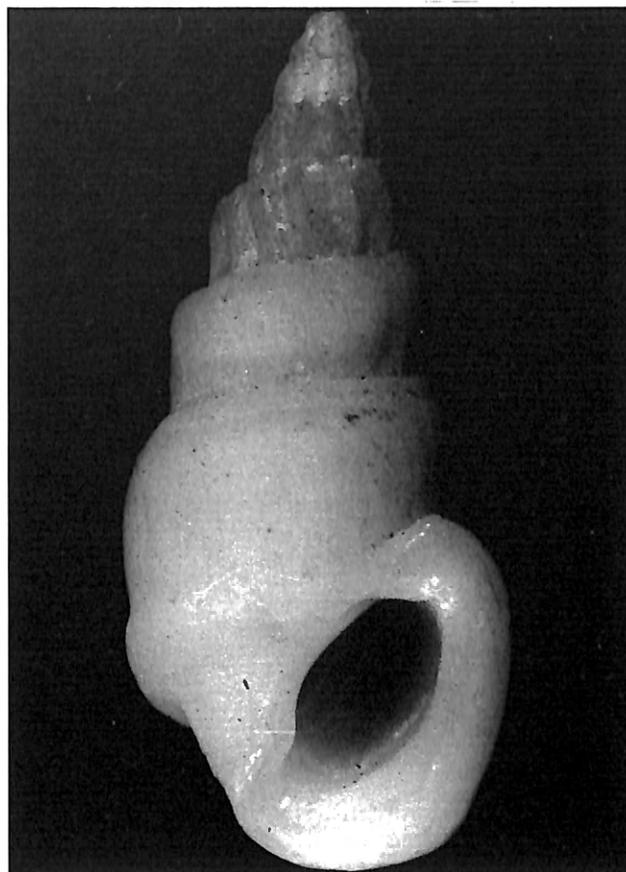


Fig. 49. – A-B. *Rissoina (Pachyrissoina) percrassa* G. & H. NEVILL, 1874. Breadhurst Reef, E. of Townsville, Queensland, Australia (AMS, C.153809), 9.1 x 4.0 mm.

Teleoconch : of more than 7 whorls; sutures of adapical spire whorls weakly undulated, deeply impressed to narrowly channeled; subsequent spire whorls and last whorl strongly angulate just below suture.

Adapical spire whorls with very prominent, orthocline to weakly prosocline, rounded, axial ribs, with deep and equal to somewhat wider interspaces; axial ribs absent on antepenultimate and subsequent whorls; interspaces between axial ribs on adapical spire whorls with moderately prominent, densely spaced, spiral threads, crossing axial ribs; spiral threads gradually less prominent and more densely spaced on abapical spire whorls and on last whorl; spiral threads intersected by microscopic, more or less irregularly spaced, axial threads, the latter less prominent than spiral threads; last whorl with rather prominent, wide and rounded spiral cord just below periphery.

Aperture : rather small; inner lip thin, with moderately prominent swelling near transition to anterior channel; the latter shallow and very narrow; outer lip very thick internally, externally with moderately prominent and narrow varix; outer lip weakly opisthocline in profile.

Colour : white throughout.

Operculum, radula and internal anatomy : unknown

SHELL DIMENSIONS

Table 15.

Rissoina (*Pachyrissoina*) *percrassa*. Shell dimensions.

	L (mm)	Ls (mm)	D (mm)	No. whorls
<i>Rissoina percrassa</i> : holotype (ZSI, 2024)				
Fig. 48 A-B E. of Townsville (AMS, C.153809)	8.1	4.7	3.7	>7
Fig. 49 Réunion (MNHN)	9.1	5.2	4.0	>7
	8.5	4.6	4.4	? *

* apex decollated

VARIATION

The three specimens available, which have been collected from widely separate localities, differ only in the

relative width of the spiral cord on the last whorl but are very uniform in other respects.

ADDITIONAL MATERIAL EXAMINED

Réunion : "Réunion", "Boucon canot", 47m, (1) (MNHN).
Australia : Queensland : Breadhurst Reef, E. of Townsville, (1) (AMS, C.153809).

GEOGRAPHICAL DISTRIBUTION

Only known from three specimens from respectively Mauritius (type locality), Reunion and N. Queensland.

AFFINITIES AND DIFFERENCES

The shell of *Rissoina* (*Pachyrissoina*) *percrassa* is superficially similar to *R. (P.) walkeri* mainly because of the presence of the distinctive spiral cord just below the periphery of the last whorl; *R. (P.) percrassa*, however, differs from *R. (P.) walkeri* in being markedly smaller and more elongated and in lacking the axial

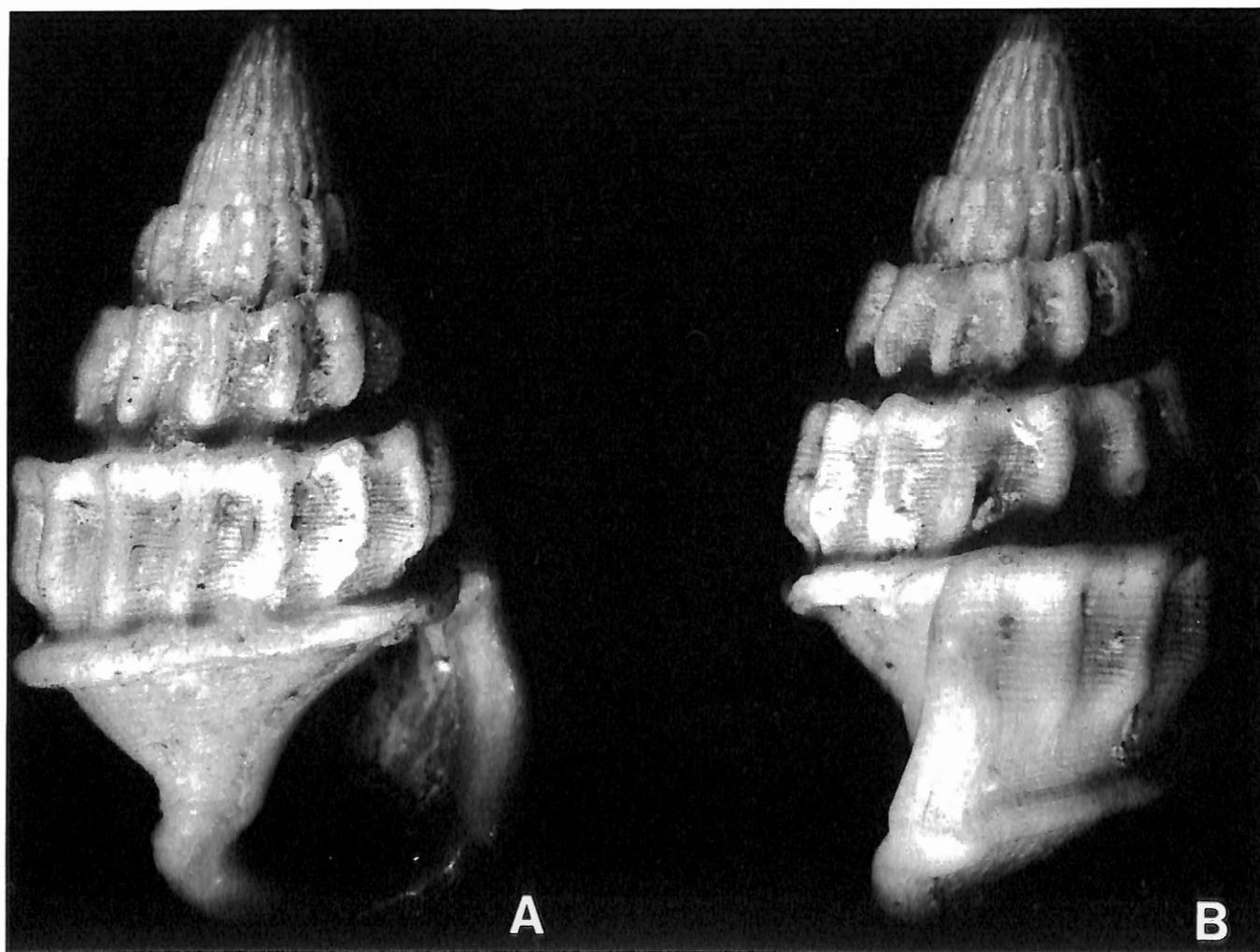


Fig. 50. – A-B. *Rissoina* (*Pachyrissoina*) *walkeri* SMITH, 1893. Syntype of *Rissoina walkeri* SMITH, Baudin I., Western Australia, Australia (BMNH, 1891.11.21.432-5), 16.7 x 9.1 mm.

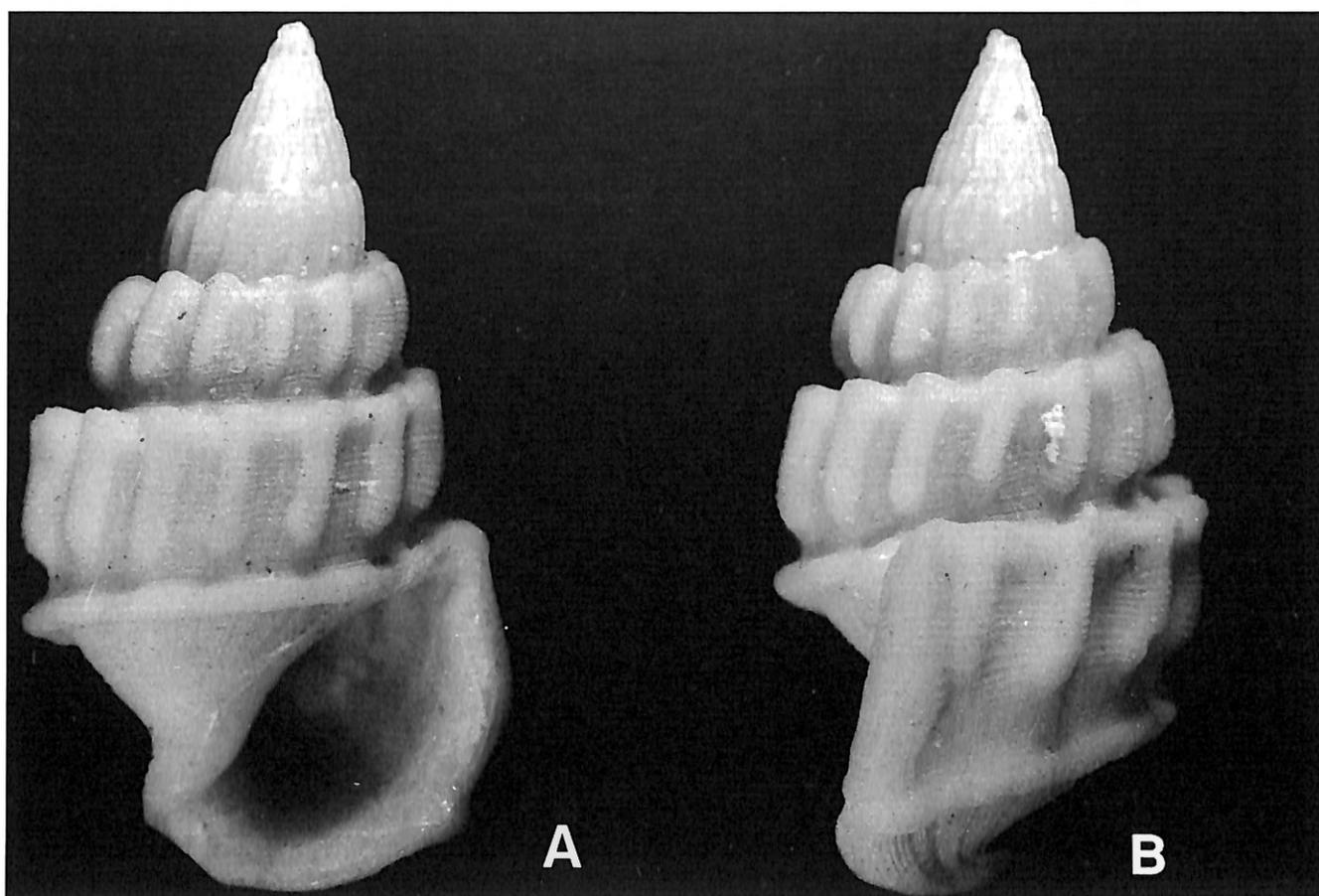


Fig. 51. – A-B. *Rissoina (Pachyrissoina) walkeri* SMITH, 1893. Wooli Beach, N.S.W., Australia (AMS, C.154387), 15.0 x 8.3 mm.

ribs on the abapical spire whorls and last whorl; furthermore, the aperture is ovate in *R. (P.) percassa*, while it is lenticular in *R. (P.) walkeri*.

REMARKS

R. (P.) percassa superficially resembles *R. (P.) walkeri*, the type species of the subgenus by the presence of the prominent spiral cord on the last whorl and by the almost identical sculpture of the adapical spire whorls. However, it is unknown whether these similarities are only due to convergent evolution, or if they are the result of a relatively recent common ancestry. Consequently, the present species is only tentatively

included in the subgenus *Pachyrissoina*, pending the examination of the head-foot characters and of the internal anatomy of both *R. (P.) walkeri* and *R. (P.) percassa*.

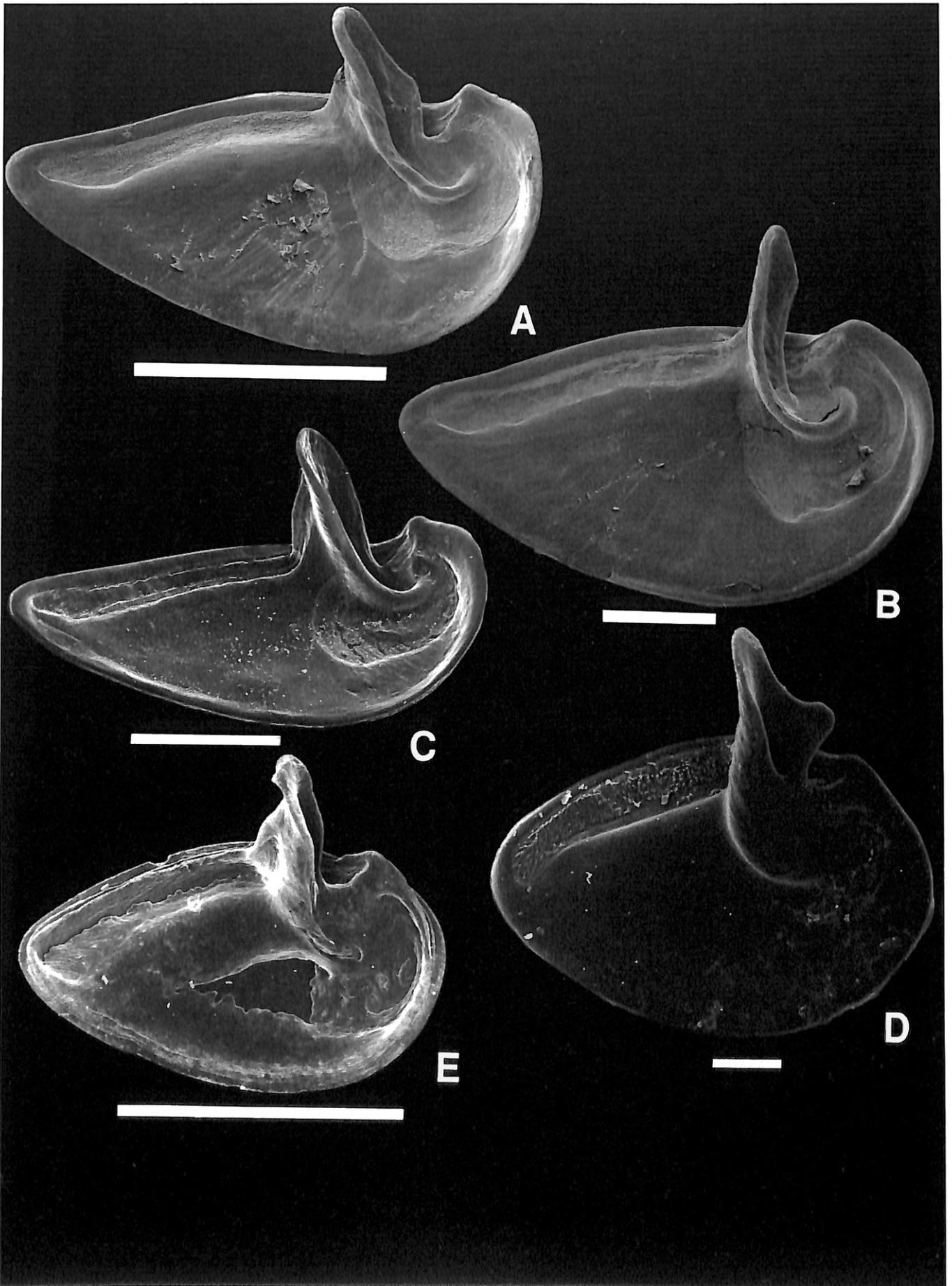
The disjunct distribution of *R. (P.) percassa* is probably only a reflection of the rarity of the species.

Rissoina (Pachyrissoina) walkeri SMITH, 1893 (Figs. 50 A-B; 51 A-B; 57)

Rissoina walkeri SMITH, 1893, p. 98.

Rissoina (Pachyrissoina) walkeri SMITH; WENZ, 1939, p.628, fig. 1761; PONDER, 1985, p. 85, fig. 56.

Fig. 52. – Opercula of *Rissoina (Moerchiella)*, *R. (Apataxia)* and *R. (Ailinzebina)* species. (Scanning electron micrographs) – A. *Rissoina (Moerchiella) artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. Stn. 631, Zanzibar (ANSP, 212988). – B. *Rissoina (Moerchiella) striata* (QUOY & GAIMARD, 1833). Buyong Beach, Mactan I., Cebu, Philippines (AMS, C.155152). – C. *Rissoina (Moerchiella) kilburni* sp. nov. Paratype of *Rissoina (Moerchiella) kilburni* sp. nov., Conducia Bay, Moçambique (NM, H.1074). – D. *Rissoina (Apataxia) cerithiiformis* TRYON, 1887. Tobinam Point, S. side of reef flat, stn. PNG 81-421, Madang Prov., Papua New Guinea (KBIN). – E. *Rissoina (Ailinzebina) elegantissima* d'ORBIGNY, 1842. Lucayan Waterway, off S. end of Grand Bahama, Bahamas (ANSP, 369151). Scale bars : A-D : 1 mm. – E : 0.5 mm.



TYPE MATERIAL

Rissoina walkeri SMITH : 4 syntypes (1891.11.21.432-5) in BMNH.

TYPE LOCALITY

Rissoina walkeri : Baudin I. (N.W. Australia), H.M.S. "Penguin", leg. J.J. WALKER, pres. The Admiralty.

DESCRIPTION

Shell (Figs. 50 A-B, 51 A-B) : length up to 16.7 mm (N = 9), extremely broadly conical.

Protoconch : broken in all specimens available.

Teleoconch : of about 8 whorls; 4-5 adapical spire whorls almost flat-sided; subsequent spire whorls and last whorl gradually more narrowly shouldered just below sutures; sutures on adapical spire whorls weakly undulating and very weakly impressed; sutures of subsequent spire whorls and last whorl rectilinear, very weakly impressed.

Axial sculpture of 4-5 adapical spire whorls with weak, more or less closely, but regularly spaced, narrow, rounded, orthocline to weakly opisthocline ribs, gradually more prominent to very prominent on subsequent spire whorls and on last whorl; axial ribs on abapical spire whorls and on last whorl distantly spaced (numbering 14-15 on last whorl), rounded, with very deep and wide interspaces; axial ribs on last whorl very short, abruptly ending at periphery by a prominent spiral cord; axial sculpture absent below spiral cord.

Spiral sculpture of adapical spire whorls of relatively prominent, densely and regularly spaced, spiral threads in interspaces between axial ribs, not crossing axial ribs; spiral threads gradually more prominent on subsequent spire whorls and on last whorl, crossing top of axial ribs (spiral threads numbering approximately 20 on penultimate whorl); last whorl with very prominent spiral cord at periphery; spiral threads continuous on abapical half of last whorl, below spiral cord.

Aperture : large, oblique, lenticular; inner lip thin, weakly thickened near transition to anterior channel; the latter rather short, weakly bent dorsally; posterior channel very short, narrow; outer lip moderately thickened, externally with very weak and narrow varix; outer lip weakly opisthocline in profile.

Colour : white throughout.

Operculum, radula and internal anatomy : unknown.

VARIATION

Little or no variation has been observed amongst the small series of specimens of *Rissoina (Pachyrissoina) walkeri* examined.

SHELL DIMENSIONS AND SCULPTURE COUNTS

Table 16.

Rissoina (Pachyrissoina) walkeri. Shell dimensions and sculpture counts. (All specimens with a broken apex)

	L (mm)	LS (mm)	D (mm)	No. ax	No. axp	No. whorls
<i>Rissoina walkeri</i> :						
syntypes (BMNH, 1891.11.21.432-5)						
Fig. 50 A-B	16.7	9.8	9.1	15	14	>7
	16.6	9.5	9.6	13	13	>6
	15.5	8.7	8.9	15	14	>6
	13.6	6.7	8.5	13	12	>5
Peacock I. (AMS, C.154390)						
	14.9	7.9	9.6	14	13	>6
Weld I. (AMS, C.154389)						
	13.8	7.4	7.8	15	15	>7
Onslow (AMS, C.134887)						
	13.8	7.7	7.6	14	15	>8
Wooli Beach (AMS, C.154387)						
	16.0	10.0	8.6	15	14	>8
Fig. 51 A-B	15.0	8.7	8.3	14	13	>8

ADDITIONAL MATERIAL EXAMINED

Australia : Western Australia : Weld I., (1) (AMS, C.154389); flat around Onslow Jetty, Onslow, (3) (AMS, C.134887). **Northern Territory :** Peacock I., N.W. Croker I., (1) (AMS, C.154390). ? **New South Wales :** Wooli Beach, (2) (doubtful record) (AMS, C.154387). **Papua New Guinea :** Idlers Beach, ca. 28 km W. of Port Moresby, 1m, (1) (AMS, C.154388).

GEOGRAPHICAL DISTRIBUTION

From Onslow, N.W. Australia to southern New Guinea (Fig. 57). According to Dr. W.F. PONDER (pers. comm.), the record from Wooli Beach (N.S.W.) is doubtful.

AFFINITIES AND DIFFERENCES

Adult specimens of *Rissoina (Pachyrissoina) walkeri* are highly distinctive because of the presence of the narrow abapical spire whorls and the prominent spiral cord at the periphery of the last whorl.

Immature specimens of *R. (P.) walkeri* are superficially similar to immature specimens of *Zebina (Tomlinella) insignis* (ADAMS & REEVE, 1848), but differ in the adapical spire whorls being not angulated and in having closely spaced, relatively weak axial ribs on the adapical spire whorls instead of distantly spaced, angulate, prominent axial ribs in *Z. (T.) insignis*; furthermore, immature specimens of *Z. (T.) insignis* lack the strong spiral cord on the last whorl, which is present in

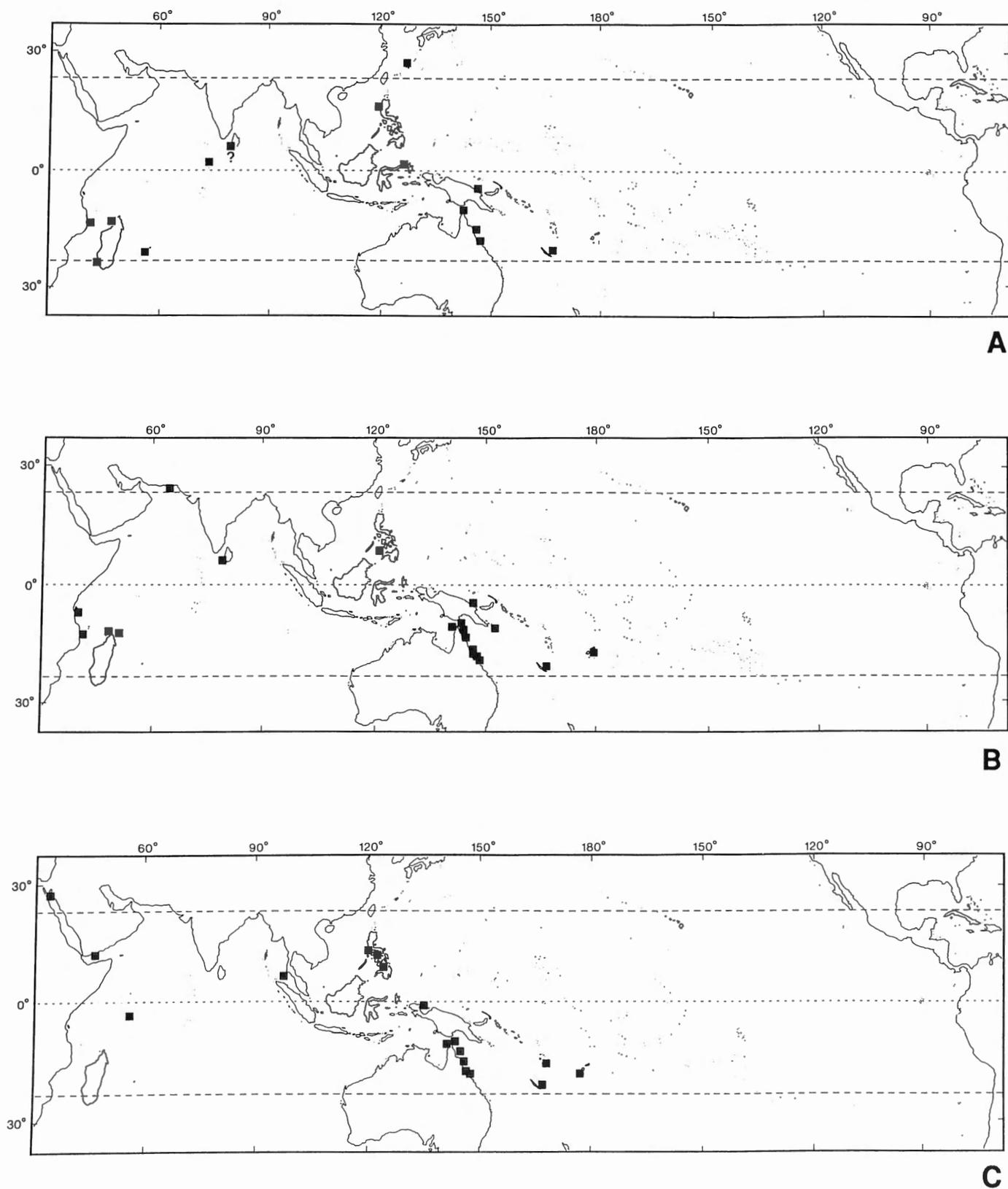


Fig. 53. – A. Distribution map of *Rissoina* (*Moerchiella*) *antoni* SCHWARTZ, 1860. – B. Distribution map of *Rissoina* (*Moerchiella*) *artensis* MONTROUZIER in SOUVERBIE & MONTROUZIER, 1872. – C. Distribution map of *Rissoina* (*Moerchiella*) *dorbignyi* A. ADAMS, 1851.

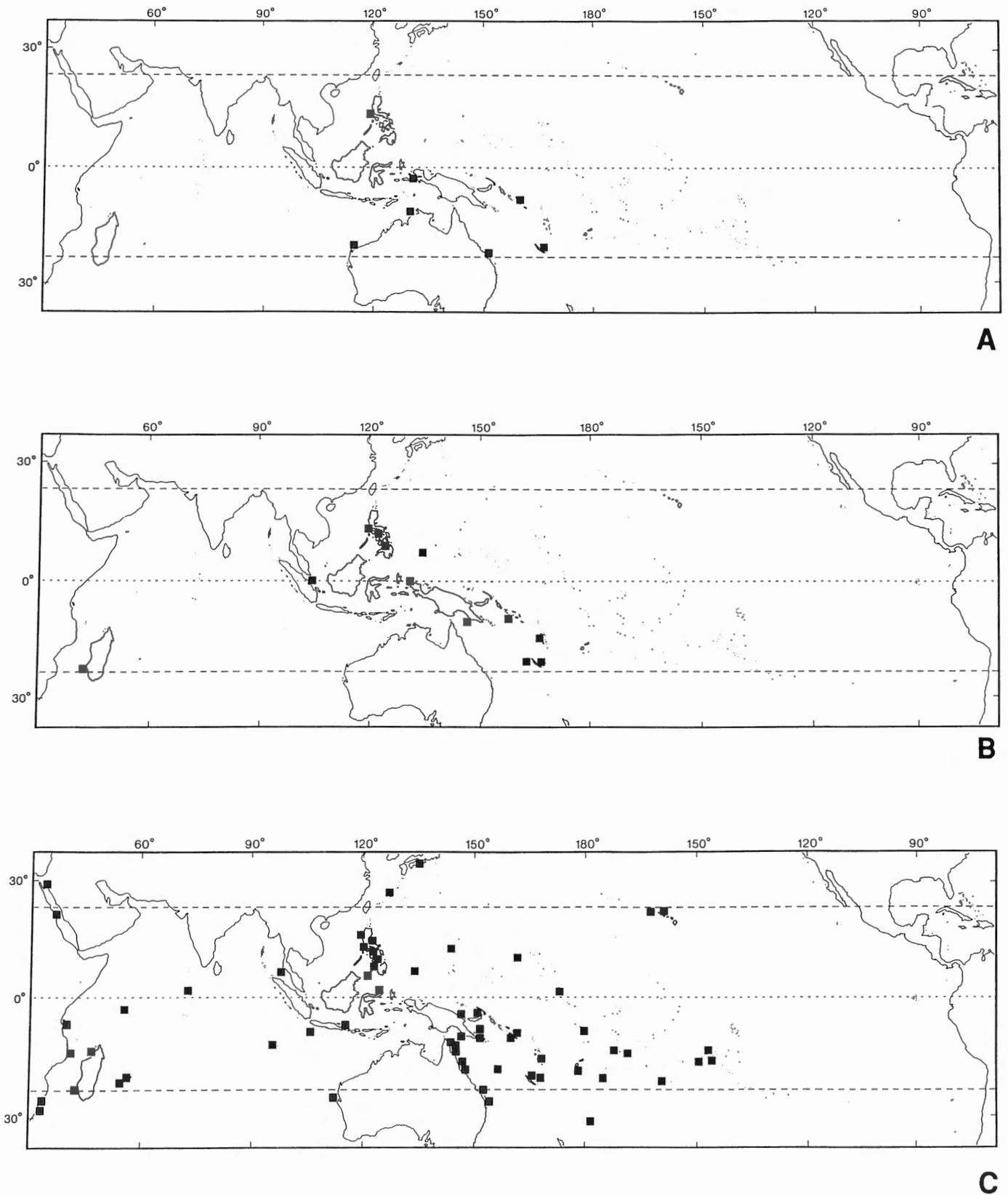


Fig. 54. – A. Distribution map of *Rissoina (Moerchiella) gigantea* (DESHAYES, 1848). – B. Distribution map of *Rissoina (Moerchiella) striata* (QUOY & GAIMARD, 1833). – C. Distribution map of *Rissoina (Apataxia) cerithiiformis* TRYON, 1877.

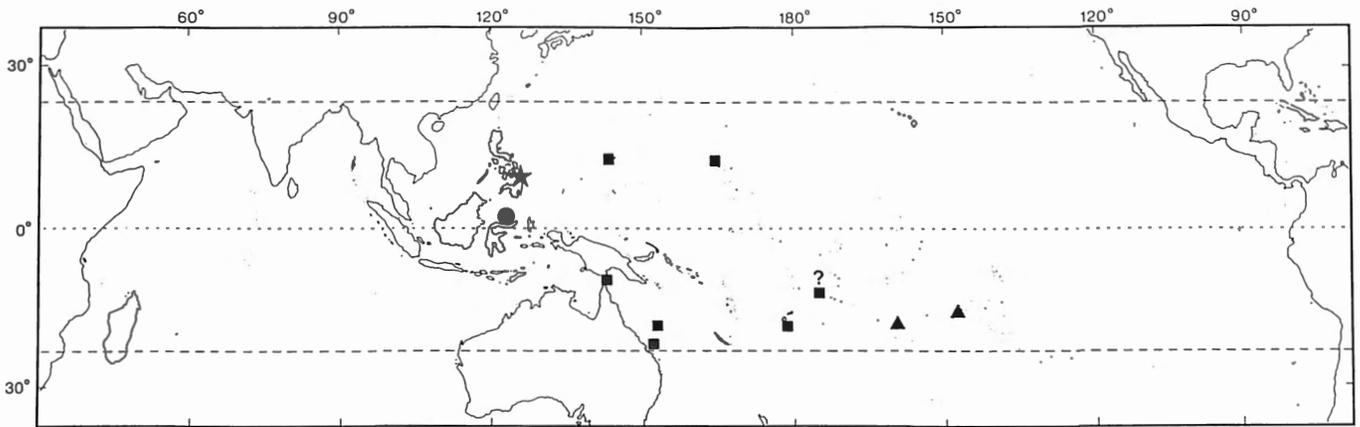


Fig. 55. — *Distribution map of Rissoina (Ailinzebina) abrardi* (LADD, 1966) (square), *R. (A.) bilabiata* BOETTGER, 1893 (star), *R. (A.) sp. A* (triangle) and *R. (A.) sp. B* (circle).

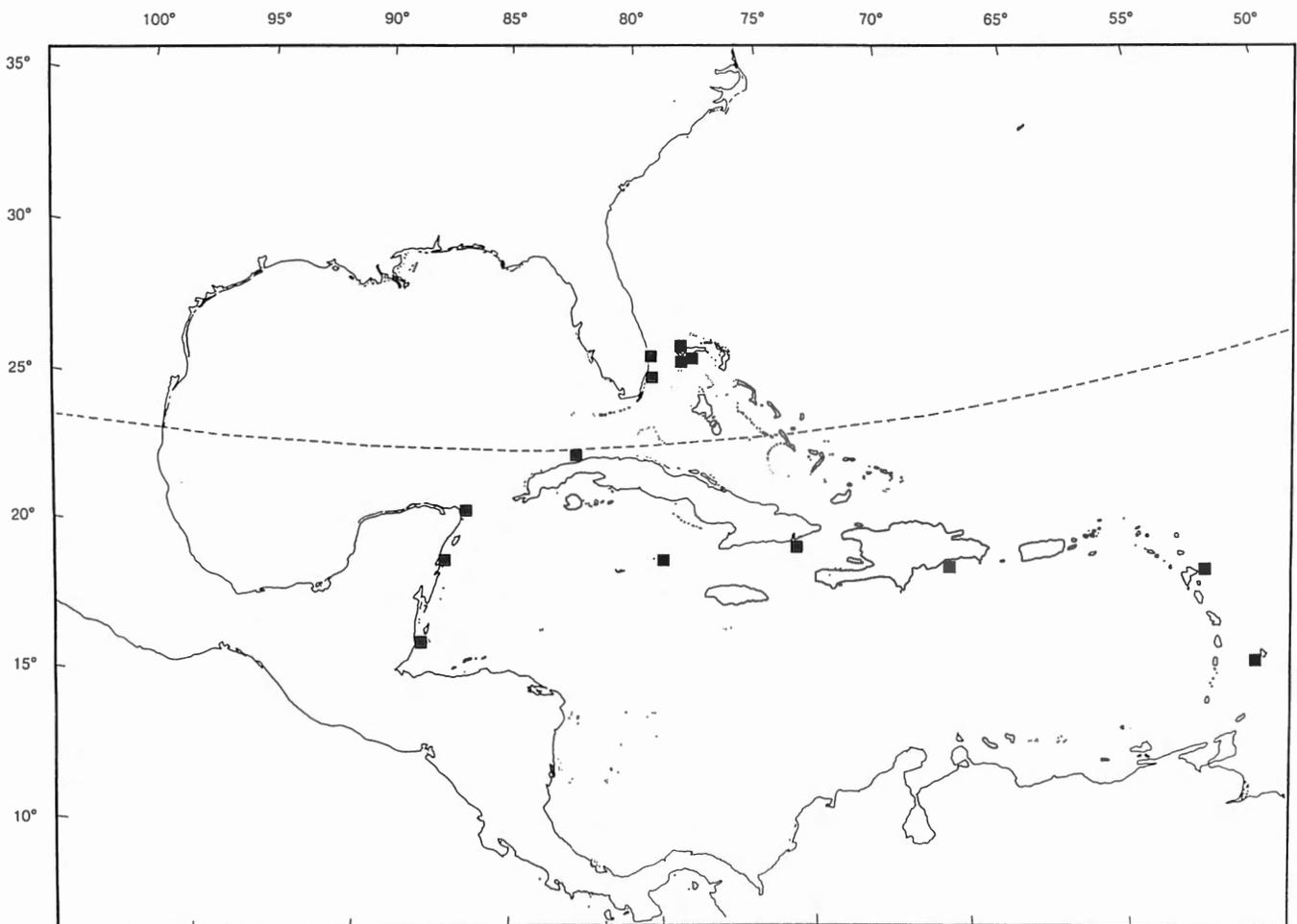


Fig. 56. — *Distribution map of Rissoina (Ailinzebina) elegantissima* d'ORBIGNY, 1842.

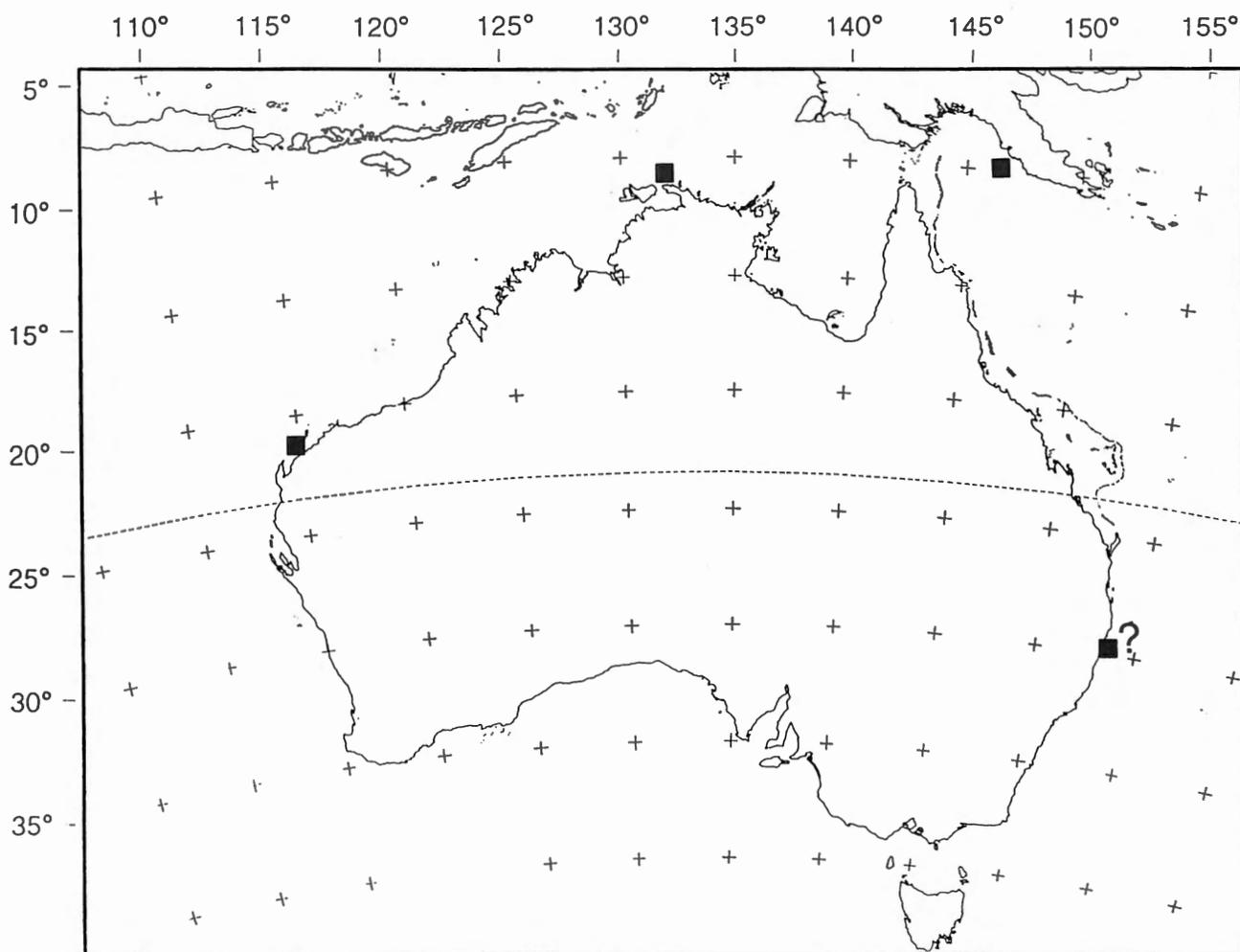


Fig. 57. — Distribution map of *Rissoina (Pachyrissoina) walkeri* SMITH, 1893.

immature specimens of *R. (P.) walkeri*; immature specimens of *Z. (T.) insignis* have weak denticles on the inner side of the inner lip, which are absent in both immature and adult specimens of *R. (P.) walkeri*.

Discussion

Rissoina (Moerchiella) is not a speciose subgenus, including only eight valid species and is confined to the Indo-West Pacific. I have seen one specimen from the Langhien (Middle-Miocene) of Indre and Loire (France), which very strongly resembles the Recent species *R. (M.) artensis* in shell characters, suggesting that this subgenus has a Tethyan origin.

Rissoina (Apataxia) is represented by a single, Recent species, which is very common in the Indo-West Pacific. From the late Miocene of Palau, LADD (1966) described *R. (R.) goikululensis*, that strongly resembles the Recent species *R. (A.) cerithiiformis* in teleoconch characters, but which differs in having a non-planktrophic larval development.

R. (A.) cerithiiformis most closely resembles *R. (Phosinella)* species in both shell and anatomical features, especially in having a simple penis. Consequently I suggest that *R. (A.) cerithiiformis* may have evolved from a *R. (Phosinella)*-like ancestor.

The subgenus *Rissoina (Ailinzebina)* is represented by at least five species, of which four apparently seem to be confined to the western Pacific, while one species has a tropical western Atlantic distribution. Species of this subgenus however are rather uncommon and therefore the distribution of two western Pacific species remains largely unknown, since they are only known from one specimen.

The oldest known fossil of this subgenus dates from the Lower Miocene of Bikini (LADD, 1966), but Dr. P. LOZOUET (MNHN, pers. comm.) reported a fossil *R. (Ailinzebina)* species from the Early Tertiary of France. The recent disjunct distribution of this subgenus remains unexplained.

The species-group of *R. (Pachyrissoina) walkeri* is only tentatively given a subgeneric status, pending the study of the anatomy of its member(s). I included *R.*

(*P.*) *percrassa* in this subgenus largely on the basis of its overall shell similarities with the type species.

From the Oligocene and Miocene of Europe dates *R. (P.) grateloupi* (BASTEROT, 1825) which very strongly resembles *R. (P.) walkeri* in the overall shape of the shell, in the shape of the aperture and in having the same sculpture and microsculpture; but the fossil species differs in lacking the prominent spiral cord on the last whorl. *R. (P.) walkeri* is only known from both the N.E. and N.W. coast of Australia and from the south coast of Papua New Guinea. If the fossil species *R. (P.) grateloupi* may be related to *R. (P.) walkeri*, the latter species can be considered a paleoendemic of a formerly more widespread Tethyan taxon.

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