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Mollusca Gastropoda : Seguenziidae from New Caledonia and the Loyalty Islands

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ABSTRACT

Three subfamilies are recognised : Asthelysinae new subfamily, Seguenziinae Verrill, and Guttulinae Goryachev. Two tribes are recognised in Seguenziinae. Fifty five seguenziids are newly recorded from off New Caledonia and the Loyalty Islands, of which 50 are new to science. These species are referable to 13 genera, including 2 new genera and *Anxietas* Iredale, which is transferred from Trochidae. *Asthelys nitidula* sp. nov. is based on type material from Queensland. Jaw plates and lateromarginal radular plates are recorded for the first time in the family. Seguenziid species richness and western Pacific biogeography are briefly discussed.

RÉSUMÉ

Mollusca Gastropoda : Seguenziidae de Nouvelle-Calédonie et des îles Loyauté.

Une remarquable faune de Seguenziidae est décrite des étages bathyal et abyssal de la région néo-calédonienne (bassin des Loyauté et sud de la Nouvelle-Calédonie). La richesse spécifique de la famille et son apport à la biogéographie de l'Ouest Pacifique sont brièvement discutés. L'existence de mâchoires et d'une plaque latéromarginale sur la radula est signalée pour la première fois chez les Seguenziidae. Cinquante des 55 espèces présentes sont décrites comme nouvelles de cette région ; une espèce est décrite du Queensland. *Ancistrobasis monodon* (Schepman) est transféré des Calliostomatinae, et *Anxietas* Iredale des Trochidae, aux Seguenziidae. Deux nouveaux genres, *Eratasthelys* et *Halystina*, et une nouvelle sous-famille, Asthelysinae, sont créés ; la sous-famille nominale Seguenziinae est divisée en deux tribus.

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INTRODUCTION

During the last ten years the deep-sea gastropods of the family Seguenziidae have received considerable attention from systematists, the number of genera increasing from 7 to 20, and the number of Recent species more than doubling to 139 with the present contribution. Through studies of shell structure (BANDEL, 1979 ; BARSKOV, GOLOVINOVA & GORYACHEV, 1980), radula (MARSHALL, 1983 ; QUINN, 1983b) and anatomy (QUINN, 1983b), this formerly enigmatic family is now firmly established as a member of the Archaeogastropoda. SALVINI-PLAWEN & HASZPRUNAR (1987) have recently referred the family to a new archaeogastropod suborder, Seguenziina.

Through the generosity of Philippe BOUCHET, I now have the privilege of recording by far the richest seguenziid fauna known, comprising 55 species in 13 genera. The fact that all are new records is testimony not only to the great diversity of the fauna occurring off New Caledonia and the Loyalty Islands, but also as to how little is actually known of the deep-sea molluscan fauna occurring off tropical and subtropical western Pacific islands in general.

Preserved specimens of several species recorded living were received too late for inclusion of descriptions and illustrations of their animals and radulae.

Abbreviations and text conventions :

AMS : Australian Museum, Sydney ;
BMNH : The Natural History Museum, London ;
D : Diameter ;
H : Height ;
MNHN : Muséum national d'Histoire naturelle, Paris ;
NMNZ : National Museum of New Zealand, Wellington ;
NMP : Natal Museum, Pietermaritzburg ;
NSMT : National Science Museum, Tokyo ;
TW : Teleoconch whorls (number) ;.
UD : Umbilicus/diameter as percentage of shell diameter ;
USNM : National Museum of Natural History, Washington DC ;
ZMA : Zoölogisch Museum, Amsterdam.

Height precedes diameter in all given dimensions. All shell measurements were taken on the longitudinal axis or at right angles to it. In descriptions of the posterior notch in the outer lip, " retraction depth " is the depth from the adapical insertion to the back of the notch, while " protraction depth " is the depth from the back of the notch to the tip of the forward-swinging abapical part of the lip. Unless otherwise stated these measurements were taken at the lip rim of mature specimens.

STATION DATA

Species taken alive are denoted by asterisks. Station number prefix CP = chalut à perche (beam trawl), DS = drague type Sanders (epibenthic sledge), DW = drague type Waren (rock dredge).

BIOCAL campaign stations : N. O. " *Jean-Charcot* ".

Station DS 04. — 21°16′ S, 166°40′ E, 2 340 m, 11.8.1985 : *Asthelys depressa, Halystina caledonica*, Seguenzia emmeles.*

Station DW 08. — 20°34′ S, 166°54′ E, 435 m, 12.8.1985 : *Anxietas exigua, Ancistrobasis monodon, A. tiara, Calliobasis spectrum, C. nepticula, C. merista, Fluxinella polita.*

Station CP 13. — 20°19′ S, 167°18′ E, 3 690-3 740 m, 13.8.1985 : *Basilissa superba*.*

Station DS 14. — 20°18′ S, 167°18′ E, 3 680-3 700 m, 13.8.1985 : *Seguenzia platamodes*, Fluxinella tenera.*

Station CP 17. — 20°35′ S, 167°25′ E, 3 680 m, 14.8.1985 : *Basilissa superba.*

Station CP 23. — 22°46′ S, 166°20′ E, 2 040 m,

28.8.1985 : *Quinnia laetifica*, Seguenzia richeri.*

Station CP 26. — 22°40′ S, 166°27′ E, 1 618-1 740 m, 28.8.1985 : *Carenzia serrata, C. acanthodes, Quinnia limatula, Seguenzia eidalima.*

Station DW 33. — 23°10′ S, 167°10′ E, 675-680 m, 29.8.1985 : *Ancistrobasis monodon, Fluxinella asceta*.*

Station DW 36. — 23°09′ S, 167°11′ E, 650-680 m, 29.8.1985 : *Fluxinella asceta.*

Station DW 38. — 23°00′ S, 167°15′ E, 360 m, 30.8.1985 : *Calliobasis phimosa, C. spectrum.*

Station DW 41. — 22°45′ S, 167°12′ E, 380-410 m, 30.8.1985 : *Calliobasis spectrum*.*

Station DW 44. — 22°47′ S, 167°14′ E, 440-450 m, 30.8.1985 : *Ancistrobasis tiara*, A. caledonica*, Calliobasis phimosa*, Fluxinella polita*.*

Station DW 46. — 22°53′ S, 167°17′ E, 570-610 m, 30.8.1985 : *Ancistrobasis tiara*, Fluxinella polita*, F. asceta*.*

Station DW 48. — 23°00′ S, 167°29′ E, 775 m, 31.8.1985 : *Eratasthelys corona, Ancistrobasis tiara, A. caledonica, A. adonis, Basilissopsis charcoti, Fluxinella asceta, F. runcinata.*

Station DW 49. — 23°03′ S, 167°32′ E, 825-830 m, 31.8.1985 : *Ancistrobasis adonis*, Fluxinella runcinata.*

Station DW 51. — 23°05′ S, 167°45′ E, 680-700 m, 31.8.1985 : *Ancistrobasis scitula*, Fluxinella asceta*, F. stirophora.*

Station DW 53. — 23°09′ S, 167°43′ E, 975-1 005 m, 1.7.1985 : *Fluxinella polita, F. asceta, F. runcinata.*

Station DW 56. — 23°35′ S, 167°12′ E, 695-705 m, 1.9.1985 : *Fluxinella stirophora.*

Station CP 57. — 23°44′ S, 166°58′ E, 1490-1 620 m, 1.9.1985 : *Asthelys nitidula*, Hadroconus grandiosus, Carenzia nitens, C. serrata.*

Station DS 59. — 23°56′ S, 166°41′ E, 2 650 m, 2.9.1985 : *Asthelys semiplicata, Fluxinella brychia, Basilissa superba, Carenzia ornata, Seguenzia chariessa, S. emmeles, S. levii.*

Station DW 64. — 24°48′ S, 168°09′ E, 250 m, 3.9.1985 : *Calliobasis festiva.*

Station DW 66. — 24°55′ S, 168°22′ E, 505-515 m, 3.9.1985 : *Ancistrobasis monodon.*

Station DW 70. — 23°25′ S, 167°53′ E, 965 m, 4.9.1985 : *Fluxinella polita, F. asceta, F. runcinata, Seguenzia eutyches.*

Station CP 72. — 22°10′ S, 167°33′ E, 2 100-2 110 m, 4.9.1985 : *Fluxinella brychia, Carenzia ornata, Quinnia patula, Seguenzia emmeles, S. levii.*

Station CP 75. — 22°19′ S, 167°23′ E, 825-860 m, 4.9.1985 : *Seguenzia chelina, S. chariessa*.*

Station DW 77. — 22°15′ S, 167°15′ E, 440 m, 5.9.1985 : *Ancistrobasis boucheti*, Fluxinella membranacea.*

Station DW 79. — 20°40′ S, 166°52′ E, 1 320-1 380 m, 5.9.1985 : *Asthelys nitidula, Fluxinella runcinata, F. euphanes, Carenzia nitens, C. acanthodes, Halystina carinata, Quinnia limatula, Seguenzia wareni, S. engonia, S. praeceps, S. chariessa.*

Station DW 80. — 20°32′ S, 166°48′ E, 900-980 m, 5.9.1985 : *Fluxinella asceta, F. runcinata, F. megalomphala, Seguenzia chelina, S. metivieri, S. matara, S. chariessa, S. stegastris.*

Station DW 83. — 20°35′ S, 166°54′ E, 460 m, 6.9.1985 : *Ancistrobasis tiara.*

Station DS 98. — 21°24′ S, 166°30′ E, 2 365-2 470 m, 7.9.1985 : *Carenzia ornata, Quinnia patula, Halystina caledonica, Seguenzia chariessa.*

Station DW 106. — 21°36′ S, 166°29′ E, 625-650 m, 8.9.1985 : *Fluxinella xysila.*

R. V. "*Vauban*" 1978-79.

Station 40. — 22°30′ S, 166°24′ E, 250-350 m, 7.6.1979 : *Anxietas inspirata, Fluxinella membranacea, Halystina vaubani, Seguenzia iota.*

SYSTEMATIC ACCOUNT

Subclass PROSOBRANCHIA Milne Edwards, 1848

Order ARCHAEOGASTROPODA Thiele, 1925

Suborder SEGUENZIINA Salvini-Plawen & Haszprunar, 1987

Superfamily SEGUENZIOIDEA Verrill, 1884

Family SEGUENZIIDAE Verrill, 1884

Seguenzidae Verrill, 1884 : 186 (emended).

The family Seguenziidae is divisible into four rather well defined groups characterised by distinctive combinations of shell, radula and external anatomy ; three of these groups are here allocated subfamilial status, the nominal subfamily containing two tribes, and are defined as follows :

Subfamily ASTHELYSINAE nov.

TYPE GENUS. — *Asthelys* Quinn, 1987.

INCLUDED GENERA. — *Anxietas* Iredale, 1917 ; *Thelyssina* Marshall, 1983 ; *Asthelys* Quinn, 1987 ; *Eratasthelys* gen. nov.

DIAGNOSTIC CHARACTERS. — Teleoconch with anastomosing dendritic threads on first whorl and/or minute punctations on subsequent whorls. Axials seldom present. Posterior notch shallow, no tooth on inner lip. Snout tip blunt. Central and lateral teeth stout, rigid, outer marginals each with fine cusps that extend around tip of cutting area.

Subfamily SEGUENZIINAE Verrill, 1884

TYPE GENUS. — *Seguenzia* Jeffreys, 1876.

INCLUDED GENERA. — *Seguenzia* Jeffreys, 1876 ; *Basilissa* Watson, 1879 ; *Ancistobasis* Dall, 1889 ; *Basilissopsis* Dautzenberg & Fischer, 1897 ; *Thelyssa* Bayle, 1971 ; *Carenzia* Quinn, 1983 ; *Seguenziopsis* Marshall, 1983 ; *Calliobasis* Marshall, 1983 ; *Fluxinella* Marshall, 1983 ; *Hadroconus* Quinn, 1987 ; *Rotellenzia* Quinn, 1987 ; *Quinnia* Marshall, 1988 ; *Halystes* Marshall, 1988 ; *Halystina* gen. nov.

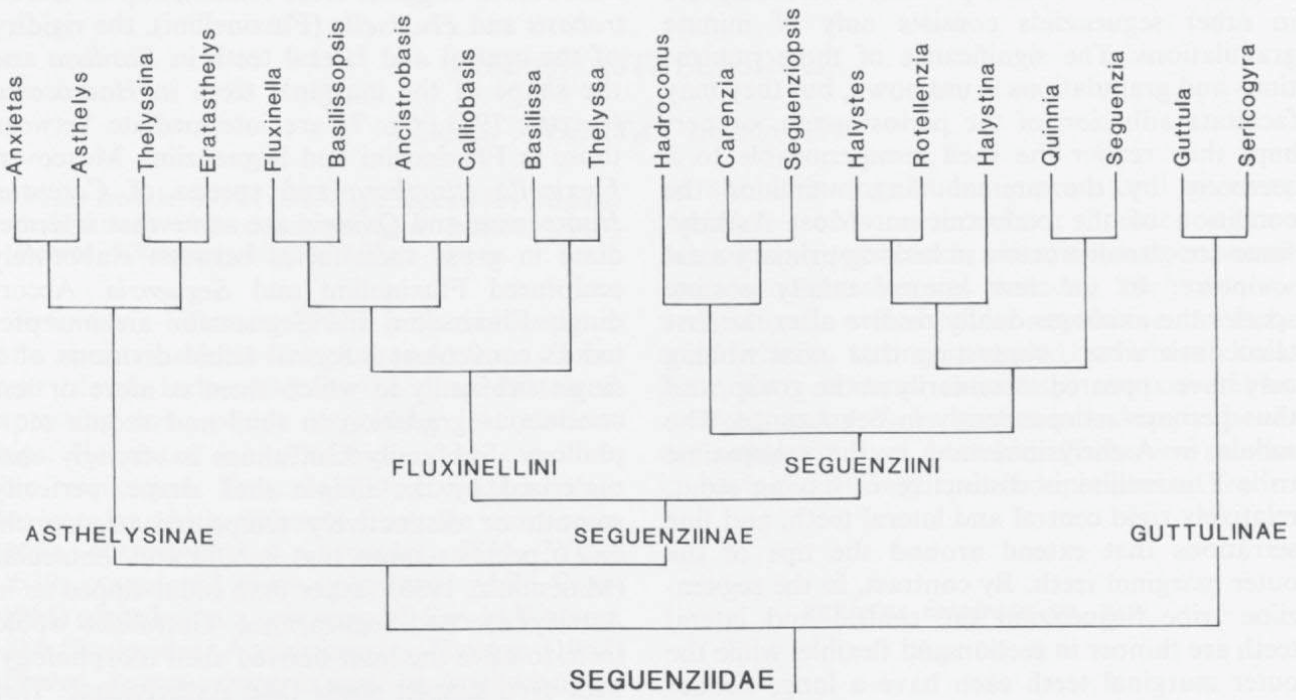
DIAGNOSTIC CHARACTERS. — Teleoconch microsculpture usually present, consisting of minute granulations. Axial sculpture present or absent. Posterior notch very shallow to very deep, inner lip with or without tooth. Snout tip blunt. Central and lateral teeth stoutly built and rigid, or thin and flexible, marginal teeth each with fine cusps that extend around cutting area, or with very long terminal cusp.

Tribe SEGUENZIINI Verrill, 1884

INCLUDED GENERA. — *Seguenzia, Carenzia, Seguenziopsis, Hadroconus, Rotellenzia, Quinnia, Halystes, Halystina.*

DIAGNOSTIC CHARACTERS. — Posterior notch of moderate to great depth. Central and lateral teeth thin and flexible, marginal teeth each with very long terminal cusp.

TABLE 1. — Suggested phylogenetic relationships between seguenziid subfamilies, tribes and genera (not cladistic).



Tribe FLUXINELLINI nov.

INCLUDED GENERA. — *Basilissa, Ancistrobasis, Basilissopsis, Thelyssa, Calliobasis, Fluxinella.*

DIAGNOSTIC CHARACTERS. — Posterior notch usually shallow, occasionally of moderate depth. Central and lateral teeth stoutly built and rigid, outer marginal teeth each with fine cusps that extend around cutting area.

Subfamily GUTTULINAE Goryachev, 1987

Guttulidae Goryachev, 1987 : 23.

TYPE GENUS. — *Guttula* Schepman, 1908.

INCLUDED GENERA. — *Guttula* Schepman, 1908 ; *Sericogyra* Marshall, 1988.

DIAGNOSTIC CHARACTERS. — Teleoconch entirely smooth throughout or with microsculpture of minute granulations. Anastomosing dendritic threads on first whorl resolving into riblets that are finer and closer than in Asthelysinae and Seguenziinae. Whorls strongly convex. Apertural rim simple, without notches or tooth. Snout bifid, tentacular. Central and lateral rather thin in section, somewhat flexible, marginal teeth each with long terminal cusp.

REMARKS

Asthelysinae stand well apart from other seguenziids in their distinctive microsculpture of wavy dendritic threads on the first teleoconch whorl and/or minute shallow punctations

that perforate the outer shell layer on subsequent whorls. Where present, microsculpture in other seguenziids consists only of minute granulations. The significance of these punctations and granulations is unknown, but they may facilitate adhesion of the periostracum, or perhaps they render the shell semipermeable to a secretion by the animal that maintains the condition of the periostracum. Most Asthelysinae are also distinctive in lacking primary axial sculpture. In the few known axially costate species the axials gradually resolve after the first teleoconch whorl, suggesting that axial ribbing may have appeared secondarily in the group, and thus perhaps independently in Segueziinae. The radula in Asthelysinae and in the seguenziine tribe Fluxinellini is distinctive in having stout, relatively rigid central and lateral teeth, and fine serrations that extend around the tips of the outer marginal teeth. By contrast, in the seguenziine tribe Seguenziini the central and lateral teeth are thinner in section and flexible, while the outer marginal teeth each have a long, slender terminal cusp. It seems reasonable to assume that the radula in Seguenziini has been derived from the plan exhibited in Asthelysinae and Fluxinellini through thinning of the central and lateral teeth, and modification of the marginal teeth. Although precise numbers of marginal teeth per transverse row are difficult to ascertain accurately from conventional views of the radula, the number is certainly greater in Asthelysinae and most Fluxinellini (up to about 20 pairs) than in Seguenziini (up to about 7 pairs), suggesting that there is a trend toward reduction in tooth number. If, as here interpreted, Seguenziini have been derived from Fluxinellini, there would seem to have been a trend toward deepening of the posterior notch and general elaboration of apertural features throughout the subfamily, which attains peak development in the genus *Seguenzia*. Although Seguenziinae are divisible into two groups on the basis of radula morphology and degree of elaboration of the apertural features, there is some degree of intergradation between the groups. For example, while the shell morphology in *Basilissa* and *Hadroconus* suggests close relationship to *Ancistrobasis* and *Fluxinella* (Fluxinellini), the rigidity of the central and lateral teeth in *Basilissa* and the shape of the marginal teeth in *Hadroconus* (BAYER, 1971, fig. 7) are intermediate between those in Fluxinellini and Seguenziini. Moreover, *Fluxinella stirophora* and species of *Carenzia, Hadroconus* and *Quinnia* are somewhat intermediate in gross shell facies between elaborately sculptured Fluxinellini and *Seguenzia*. Accordingly Fluxinellini and Seguenziini are interpreted as convenient informal tribal divisions of a single subfamily in which there is more or less continuous gradation in shell and radula morphology. Subfamily Guttulinae is strongly characterised by the simple shell shape, perfectly smooth or distinctively sculptured teleoconch, and a peculiar snout that is bifid and tentacular (MARSHALL, 1988) rather than blunt-tipped as in Asthelysinae and Seguenziinae. Guttulinae would seem to have the least derived shell morphology, with even simpler shells than Asthelysinae. This simplicity, together with the presence of dendritic threads in the first teleoconch whorl in *Sericogyra* (MARSHALL, 1988), suggests a direct relationship with Asthelysinae. The granulate shell microsculpture on later whorls (*Sericogyra*) and the radula, however, are similar to those in Seguenziini. On the sum of characters and character states it is concluded that Guttulinae and Seguenziinae have convergent radula morphologies, that Asthelysinae and Guttulinae diverged early in the history of the family, and that Seguenziinae originated from early Asthelysinae (Text Fig. 1). An equally parsimonious interpretation, however, is that Seguenziini and Fluxinellini arose independently from early Guttulinae and Asthelysinae respectively, which would suggest that Fluxinellini should perhaps be interpreted as a subfamily. Since early seguenziids probably resembled extant Asthelysinae and Guttulinae, it may be difficult or impossible to unequivocally recognise fossils among other groups of trochiform gastropods.

Subfamily ASTHELYSINAE

Genus *ANXIETAS* Iredale, 1917

Anxietas Iredale, 1917 : 334. Type species (by original designation) : *Anxietas perplexa* Iredale, 1917 ; Recent, Christmas Island, Indian Ocean.

REMARKS. — IREDALE (1917) proposed *Anxietas* for a minute barleeid-like gastropod from Christmas Island, Indian Ocean, the name bestowed expressing his opinion regarding its relationships. He placed it in Trochidae with considerable reservation. THIELE (1929) considered that *Anxietas* was little different from the rissoacean genus *Amphithalamus* Carpenter, 1865, WENZ (1939) considered them synonyms, while COAN (1964) placed it as a subgenus of *Scrobs* Watson, 1886 (Barleeidae, Anabathrinae). PONDER (1967) allowed *Anxietas* generic rank in Anabathrinae, but subsequently (1985) reported that *A. perplexa* has an internal nacreous layer and returned it to Trochidae. Although the nacreous layer was not mentioned by IREDALE, its presence may have influenced his decision to place the genus in Trochidae. *Anxietas perplexa* is clearly related to the type species of *Thelyssina* Marshall, 1983 (*T. sterrha* Marshall, 1983), which it resembles in gross shell morphology, including outer lip profile, the presence of anastomosing dendritic threads on the early teleoconch, and minute pits on subsequent whorls (MARSHALL, 1983, fig. 5 d, e, f-h ; PONDER, 1985, fig. 145 a, b). *Thelyssina* was referred to Seguenziidae because of similarity to seguenziids of the genera *Ancistrobasis* Dall, 1889 and *Fluxinella* Marshall, 1983 in outer lip profile. Although *Anxietas* and *Thelyssina* are unknown anatomically, placement in Seguenziidae is strongly supported by the characteristically seguenzoid animal and radula in *Asthelys* Quinn, 1987 (MARSHALL, 1988), most species of which they closely resemble in shell morphology, including the presence of pits on the teleoconch. Despite the fact that shell character differences between *Anxietas, Thelyssina* and *Asthelys* are matters of degree, I prefer to retain the latter two as distinct genera until animals and radulae can be compared. They are characterised thus : *Anxietas* — wavy threads on early teleoconch, no shoulder angulation, suprasutural groove ; *Asthelys* — no wavy threads or shoulder angulation on early teleoconch, close, similar peripheral and suprasutural spiral threads ; *Thelyssina* — wavy threads and shoulder angulation on early spire whorls, strong, rounded peripheral keel. Note that *Anxietas exigua* sp. nov. resembles *Anxietas* and *Asthelys* species in lacking a shoulder angulation, yet resembles *Thelyssina sterrha* in having a strong, rounded peripheral keel.

Anxietas inspirata sp. nov.

Figs 1-5, 8

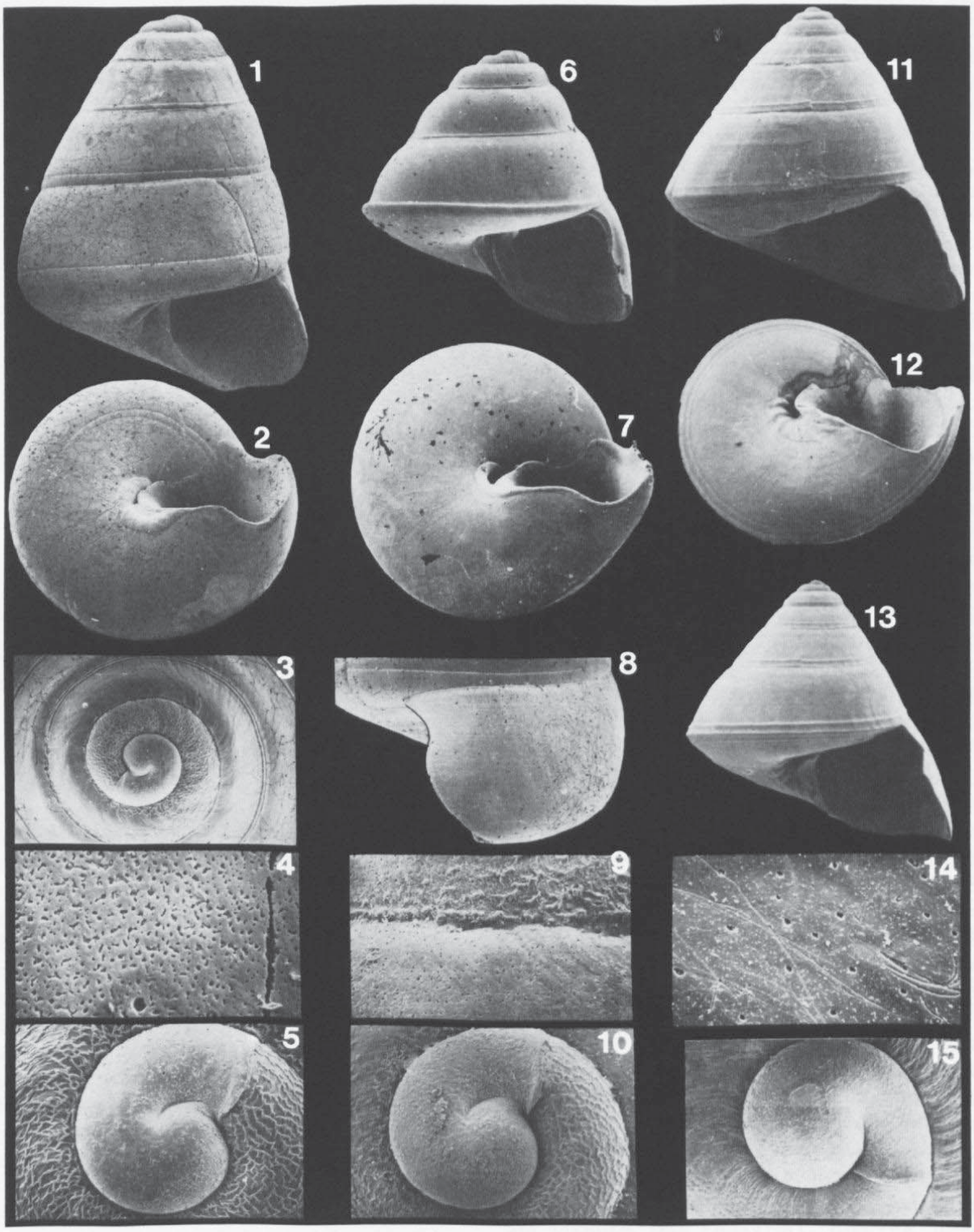
DESCRIPTION. — *Shell* (holotype) 1.85 mm high, markedly higher than broad, narrowly trochiform, stout, glossy, anomphalous ; spire weakly cyrtoconoid, 1.89 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 230 μm wide, minutely granulate.

Teleoconch of 4.8 whorls, 1st whorl convex, next whorl becoming flat, subsequent whorls very weakly convex, periphery tightly rounded, base very weakly convex. First whorl sculptured with fine, crisp, anastomosing, dendritic threads ; subsequent whorls with fine suprasutural groove and covered with minute, irregular pits. Base with 2 fine, close, shallow spiral grooves at about outer third, absent on last half whorl ; and strong, rounded, smooth inner spiral cord. Aperture subtrapezoidal. Outer lip thin at rim, rather strongly thickened within, posterior notch extremely shallow and broad, retraction depth 13 % of shell diameter, almost vertical below apex before retracting below periphery to shallow, broad, concave basal notch, no peripheral notch. Parietal glaze thin. Inner lip thick, spreading.

Animal unknown.

TYPE DATA. — Holotype MNHN (1.85 × 1.40 mm, 4.8 TW) : " *Vauban* ", stn 40.



FIGS 1-15. — Genera *Anxietas, Asthelys* : **1-5, 8,** *Anxietas inspirata*, holotype, 1.85 × 1.40 mm, 3 × 50, 4 (4th TW) × 73, 5 × 135, 8 × 35. — **6, 7,** *Anxietas exigua*, holotype, 1.60 × 1.65 mm. — **9, 10,** *A. exigua*, paratype, BIOCAL stn DW 08, 9 (end 1st TW) × 175, 10 × 120. — **11, 12, 14,** *Asthelys nitidula*, holotype, 3.90 × 3.75 mm, 14 (last TW) × 510. — **13, 15,** *A. nitidula*, BIOCAL stn DW 79, 3.50 × 3.55 mm, 15 × 90.

DISTRIBUTION. — Off southern New Caledonia, 250-350 m (dead).

REMARKS. — *Anxietas inspirata* differs from (AMS) syntypes of *A. perplexa* in attaining maturity at larger size (1.85 × 1.40 mm, 4.8 TW, cf. 1.60 × 1.30, 4.25 TW) and in having a larger protoconch (diameter 230 μm, cf. 200 μm). The two species are otherwise very similar.

ETYMOLOGY. — Inspiring (Latin).

Anxietas exigua sp. nov.

Figs 6, 7, 9, 10 ; Table 1

DESCRIPTION. — *Shell* up to 2.10 mm high, glossy, trochiform, rather thin, stout, umbilicus an elliptical chink, spire 1.36-1.41 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 230-240 μm wide, minutely granulate.

TABLE 1. — *Anxietas exigua*. Shell measurements (mm) and countings.

H	D	H/D	TW	
2.10	1.70	1.23	4.70	Paratype
1.80	1.75	1.03	4.00	Paratype
1.70	1.70	1.00	4.00	Paratype
1.60	1.65	0.97	3.90	Holotype

Teleoconch of up to 4.7 weakly convex whorls, periphery angulate, base weakly convex. Most of 1st whorl with fine, crisp, anastomosing, dendritic threads, subsequent whorls minutely pitted. Peripheral keel rounded, adapical edge sharply shelved and exposed on spire, abapical margin not defined. Umbilicus bounded by smooth spiral cord, very narrow, rendered an elliptical chink by invading inner lip. Aperture subtrapezoidal. Outer lip thin at rim, modestly thickened within ; posterior notch very shallow and broad, retraction depth 6.9 % of shell diameter, almost vertical below retracting to broad, shallow, concave basal notch. No peripheral notch. Parietal glaze rather thick. Inner lip curved towards umbilicus, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN : BIOCAL, stn DW 08.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 435 m (dead).

REMARKS. — *Anxietas exigua* differs from *A. perplexa* and *A. inspirata* primarily in being more broadly conical and in having a pronounced peripheral keel. It differs from *Thelyssina sterrha* in being considerably smaller, in lacking a shoulder angulation on the early teleoconch whorls and in lacking spiral threads on the outer part of the base.

ETYMOLOGY. — Small (Latin).

Genus *ASTHELYS* Quinn, 1987

Asthelys Quinn, 1987 : 66. Type species (by original designation) : *Basilissa munda* Watson, 1879 ; Recent, eastern Atlantic.

Asthelys nitidula sp. nov.

Figs 11-15, 268-270 ; Table 2

DESCRIPTION. — *Shell* up to 3.90 mm high, trochiform, glossy, with narrow umbilical chink, rather thin, spire 1.19-1.29 × as high as aperture, white, nacreous through thin, translucent outer shell layer.

Protoconch 330 μm wide, minutely granulate.

Teleoconch of up to 5.20 whorls, 1st whorl strongly convex at first, becoming weakly convex, subsequent whorls more or less flat, periphery angulate, base weakly convex. Sculpture on spire consisting of 2 close, crisp, smooth, similar spiral threads, suprasutural spiral commencing on 2nd half of 1st whorl, peripheral spiral partly covered by succeeding whorls. Fine collabral growth lines

TABLE 2. — *Asthelys nitidula*. Shell measurements (mm) and countings.

H	D	H/D	TW	
3.90	3.75	1.04	5.20	Holotype
3.80	3.55	1.07	5.00	BIOCAL stn DW 79
3.50	3.55	0.99	5.00	BIOCAL stn DW 79
3.45	3.65	0.94	4.75	Paratype

and minute circular pits throughout, pits arranged in spiral lines on 1st few whorls. Base with 2 or 3 similar spiral threads beside periphery, a rounded radially pleated spiral cord beside umbilical chink, broad intermediate space with weak or very weak rounded spiral threads or obscure spiral lines. Umbilicus very narrow, rendered a narrow crescentic chink by invading inner lip. Aperture subtrapezoidal. Outer lip rim damaged, thin ; posterior notch very broad and shallow, retraction depth 5.3 % of shell diameter, slightly projected below before retracting to broad, shallow, concave basal notch ; no peripheral notch. Parietal glaze thin. Inner lip thick, concave, spreading into umbilicus, tapered to base, toothless.

Animal unknown (dried).

Radula (Figs 268-270) with the formula c. 12 + 1 + 1 + c. 12. Central tooth rigid, about as long as broad, cutting area jutting forward at right angle from shaft, angulate, with 9-11 sharp, conical cusps, laterobasal projections prominent. Lateral teeth rigid, broad, sharply serrate on inner and outer edges of large, narrowly angulate cutting area. Marginals slender, each with long series of fine cusps along outer edge of tip and few on inner edge, inner marginals with strong terminal cusp, outer marginals with fine cusps that extend around tip of cutting area. *Operculum* thin, multispiral.

TYPE DATA. — Holotype (AMS C. 156439) and 3 paratypes (2 AMS, 1 NMNZ) : 24°28.2′ S, 153°31.2′ E, NE of Sandy Cape, Queensland, Australia, alive, 1 330 m-1 380 m, 8 July 1984, HMAS " *Kimbla* ".

OTHER MATERIAL EXAMINED (4 specimens). — BIOCAL, stn DW 79 (1 MNHN, 1 NMNZ). — Stn CP 57 (2 MNHN).

DISTRIBUTION. — Off Queensland, Loyalty Islands, and New Caledonia, 1 320-1 620 m, living at 1 330-1 620 m.

REMARKS. — New Caledonian specimens differ from the type material in having broader umbilical chinks, but are otherwise indistinguishable on shell characters. *Asthelys nitidula* is extremely similar to *A. munda* (Watson, 1879) (eastern Atlantic, 2 058-2 311 m) and *A. simplex* (Watson, 1879) (off Argentina, 3 475 m) and differs primarily in having more closely spaced peripheral spiral cords (see QUINN, 1987, figs 9, 10-14 ; MARSHALL, 1988, figs 1 f-i). It differs further from *A. simplex* in having radial pleats beside the umbilical chink. Compared with *A. antarctica* Marshall, 1988 (off South Shetland Islands, 3 715-3 752 m) it differs in having finer peripheral spirals and an almost closed umbilicus with a radially pleated rim. *Asthelys simplex*, or a species very like it, was taken off Westport, New Zealand at 4 421-4 419 m (MARSHALL, 1988).

ETYMOLOGY. — Somewhat shining (Latin).

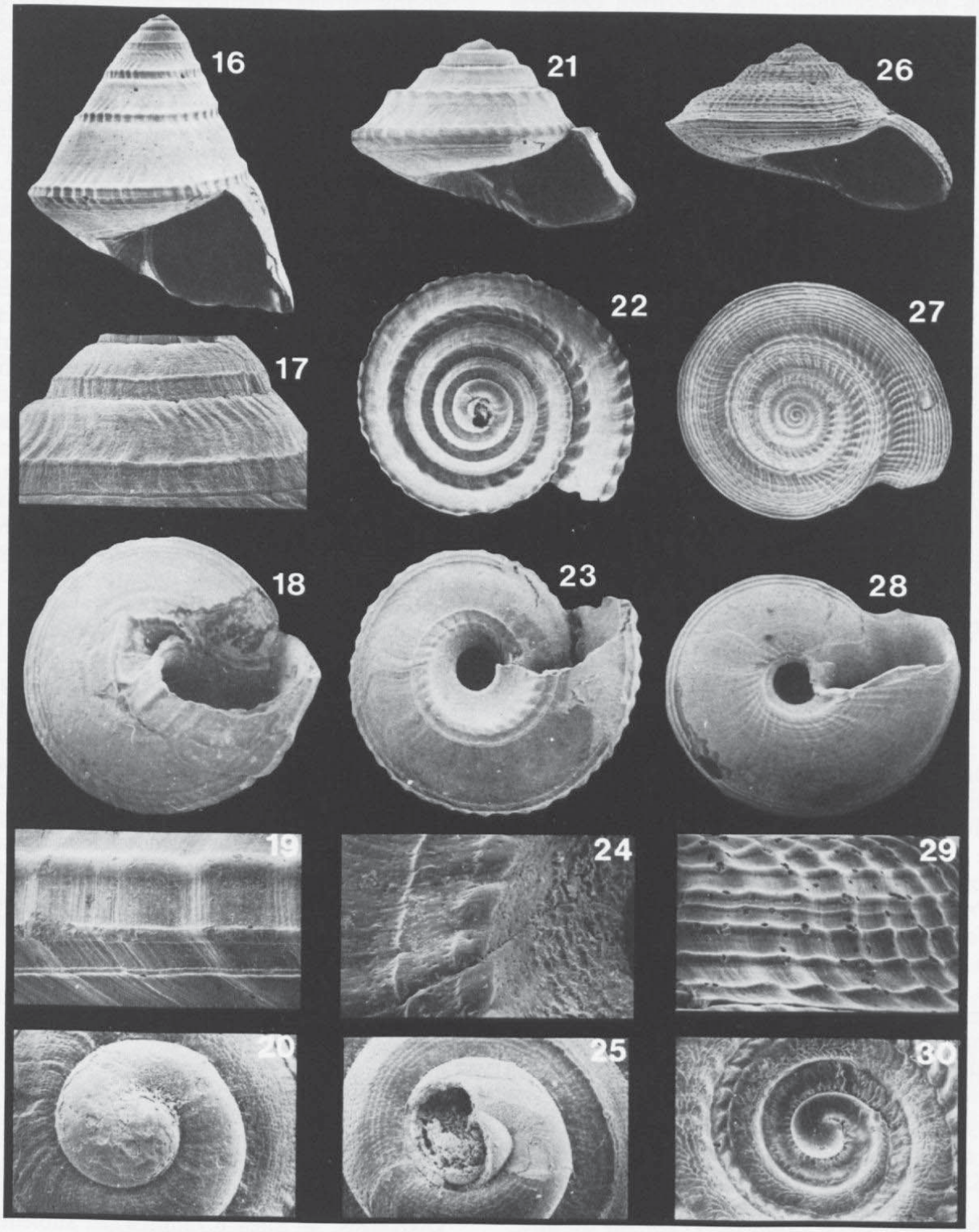
Asthelys semiplicata sp. nov.

Figs 16-20

DESCRIPTION. — *Shell* (holotype) 4.95 mm high, thin, narrowly trochiform, narrowly umbilicate, spire 1.26 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 330 μm wide, surface etched.

Teleoconch of 5.8 whorls ; 1st whorl strongly convex at first, becoming shallowly convex, next whorl becoming very weakly convex, subsequent whorls shallowly concave above flattened peripheral keel ; base suddenly contracted, weakly convex. Peripheral keel comprising 2 close, similar, rounded spiral threads, suprasutural spiral commencing on 2nd half of 1st whorl, peripheral spiral partly covered by succeeding whorls. Axial riblets commencing on 2nd whorl, rounded, collabral, opisthocline, becoming strongly defined on peripheral keel and rendering it undulant, weakly defined elsewhere, evanescent on outer part of base. Minute rounded pits throughout, arranged in spiral lines on 1st few whorls. Base with 3 similar spiral threads near periphery, and 3 smooth, rounded spiral cords on inner third, innermost bordering umbilicus. Umbilicus shallow, wall tapered. Aperture subtrapezoidal. Outer lip thin, rim damaged ; posterior notch very broad and shallow, retraction depth 7.3 % and protection



FIGS 16-30. — Genera *Asthelys, Eratasthelys* : **16-20,** *Asthelys semiplicata*, holotype, 4.95 × 4.55 mm, 17 (early TW) × 45, 19 (adult periphery) × 45, 20 × 75. — **21-25,** *A. depressa*, holotype, 1.40 × 2.22 mm, 24 (base) × 105, 25 × 75. — **26-30,** *Eratasthelys corona*, holotype, 3.65 × 6.70 mm, 29 (end 4th TW) × 35, 30 × 37.

depth 9.5 % of shell diameter (from collabral growth lines) ; basal notch broad, shallow, concave, no peripheral notch. Parietal glaze thin. Inner lip thin, gradually tapered to base, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (4.95 × 4.55 mm, 5.8 TW) : BIOCAL, stn DS 59.

DISTRIBUTION. — Off southern New Caledonia, 2 650 m (dead).

REMARKS. — *Asthelys semiplicata* is highly distinctive among its congeners in having axial riblets on the teleoconch that are strongly defined on the peripheral keel. *A. semiplicata* resembles *A. munda* in spacing of the spiral threads at the periphery, but differs from it, and from *A. simplex*, in lacking radial pleats at the umbilical rim. *A. semiplicata* further differs from *A. simplex* in having a broad, smooth median band on the base.

ETYMOLOGY. — Semiplicate (Latin).

Asthelys depressa sp. nov.

Figs 21-25

DESCRIPTION. — *Shell* (holotype) 2.22 mm wide, broader than high, of moderate thickness, stout, umbilicate, spire 0.71 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 330 μm wide, finely granulate.

Teleoconch of 3.5 whorls ; subsutural angulation strong, ramp narrow, more or less horizontal ; side broad, convex on 1st whorl, grading from flat to weakly concave on subsequent whorls ; peripheral keel bluntly angulate ; base weakly convex. Shoulder angulation commencing on 2nd half of 1st whorl, smooth on 1st 2 whorls, strong, rounded nodules on it and peripheral keel on subsequent whorls ; peripheral nodules partly covered by succeeding whorls, their adapical extremities bounded by crisp spiral thread on last whorl. Summit of peripheral keel and inner part of umbilical wall minutely granulate, whorls elsewhere pitted, pits arranged in spiral lines on 1st whorl. Base with 2 smooth, crisp, similar spiral threads beside periphery, and 2 spiral cords beside umbilicus, outer spiral smooth, innermost strong, with bluntly rounded nodules, bordering umbilicus. Umbilicus deep, wall angulate within, outer part shallowly tapered inwards, inner part steeply tapered outwards, diameter 26.0 % of shell diameter. Aperture subtrapezoidal. Outer lip rim damaged, from fine shallowly sigmoidal collabral growth lines posterior notch extremely broad and shallow, basal notch shallowly concave, no peripheral notch. Parietal glaze thin. Inner lip sharply flexed toward umbilical wall angulation, rim thin, rapidly thickened within, very thick against umbilical wall angulation, evenly tapered to base, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (1.40 × 2.22 mm, 3.5 TW) : BIOCAL, stn DS 04.

DISTRIBUTION. — Between New Caledonia and Lifou, Loyalty Islands, 2 340 m (dead).

REMARKS. — From the teleoconch pitting, *A. depressa* appears to be closely related to *Anxietas, Thelyssina*, and *Asthelys*, yet it differs markedly from members of these genera in the low spire, wide umbilicus, and nodular spiral cords. *A. depressa* is referred to *Asthelys* because of the lack of wavy threads on the early teleoconch, but this placement is obviously provisional.

ETYMOLOGY. — Low (Latin).

Genus ***ERATASTHELYS*** nov.

TYPE SPECIES. — *Eratasthelys corona* sp. nov., Recent, southern New Caledonia.

ETYMOLOGY. — From the Greek *eratos* (comely) and the seguenziid genus *Asthelys* Quinn, the latter an anagram of *Thelyssa* Bayer.

DIAGNOSIS. — Shell 6.7 mm wide, sublenticular, stout, umbilicate, white, nacreous within. Spire whorls reticulately sculptured with spiral threads and collabral axial riblets, with addition of fine, crisp, anastomosing, dendritic threads on 1st 2 teleoconch whorls. Posterior and basal notches very shallow and broad. Animal unknown.

REMARKS. — The type species of *Eratasthelys* is highly distinctive in combining the dendritic threads and very shallow labral sinuses characteristic of species of *Anxietas* and *Thelyssina* together with shell shape and reticulate sculpture similar to those in *Ancistrobasis* Dall and in some species of *Fluxinella* Marshall. On the basis of similarity in early teleoconch morphology, *Eratasthelys* is considered to be most closely related to *Thelyssina*. *Eratasthelys* is probably a minor offshoot of the Asthelysinae that has independently acquired some characteristics of *Ancistrobasis* species, rather than a descendant of the basal stock of *Ancistrobasis* and related genera.

Eratasthelys corona sp. nov.

Figs 26-30

DESCRIPTION. — *Shell* (holotype) 6.70 mm wide, markedly broader than high, stout, of moderate thickness, umbilicate ; white, nacreous through translucent outer shell layer.

Protoconch 330 μm wide, surface abraded.

Teleoconch of 5 whorls, almost flat above shallowly concave adapical side of sharply angulate periphery, last adult whorl becoming weakly and rather evenly convex, base weakly convex. Axial riblets weak and indistinct on 1st 1.5 whorls, strong, rounded and fold-like thereafter, confined to adapical half of 1st 2 whorls, extending to periphery on 3rd whorl. Spiral threads more crisply defined than axials, multiplying by intercalation ; 1 median spiral surmounting shoulder angulation on 1st 2 whorls, strong at first, gradually weakening until almost obsolete ; additional spirals commencing on 3rd whorl, gradually enlarging. Spirals numbering 8 at end of 2nd to last whorl, including peripheral spiral, summit of which is partly exposed on spire whorls. First 2 whorls with fine, crisp, anastomosing, vermiculate threads. Base with 2 similar, crisply defined spiral cords beside periphery ; fine inner spiral grooves that become more sharply defined towards umbilicus ; and low, rounded axial undulations that resolve between periphery and umbilicus and strengthen towards umbilicus. Umbilicus deep, wall obscurely spirally lirate, diameter 26 % of shell diameter. Aperture subtrapezoidal. Outer lip of moderate thickness, posterior notch very broad, extremely shallow, retraction depth 4.03 % and protraction depth 1.98 % of shell diameter ; basal notch broad and shallow, no peripheral notch. Parietal glaze thin. Inner lip thick, rim tightly folded towards umbilicus, concave below insertion, almost straight below, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (3.65 × 6.70 mm, 5 TW) : BIOCAL, stn DW 48.

DISTRIBUTION. — Off southern New Caledonia, 775 m (dead).

REMARKS. — An extremely distinctive species combining shell features of *Thelyssina* and *Ancistrobasis* species (see above).

ETYMOLOGY. — Crown (Latin).

Subfamily SEGUENZIINAE

Tribe FLUXINELLINI

Genus ***ANCISTROBASIS*** Dall, 1889

Ancistrobasis Dall, 1889 : 383. Type species (by subsequent designation of DALL, 1927) : *Basilissa costulata* Watson, 1879 ; Recent, south-eastern Florida and Gulf of Mexico.

Ancistrobasis monodon
(Schepman, 1908) comb. nov.

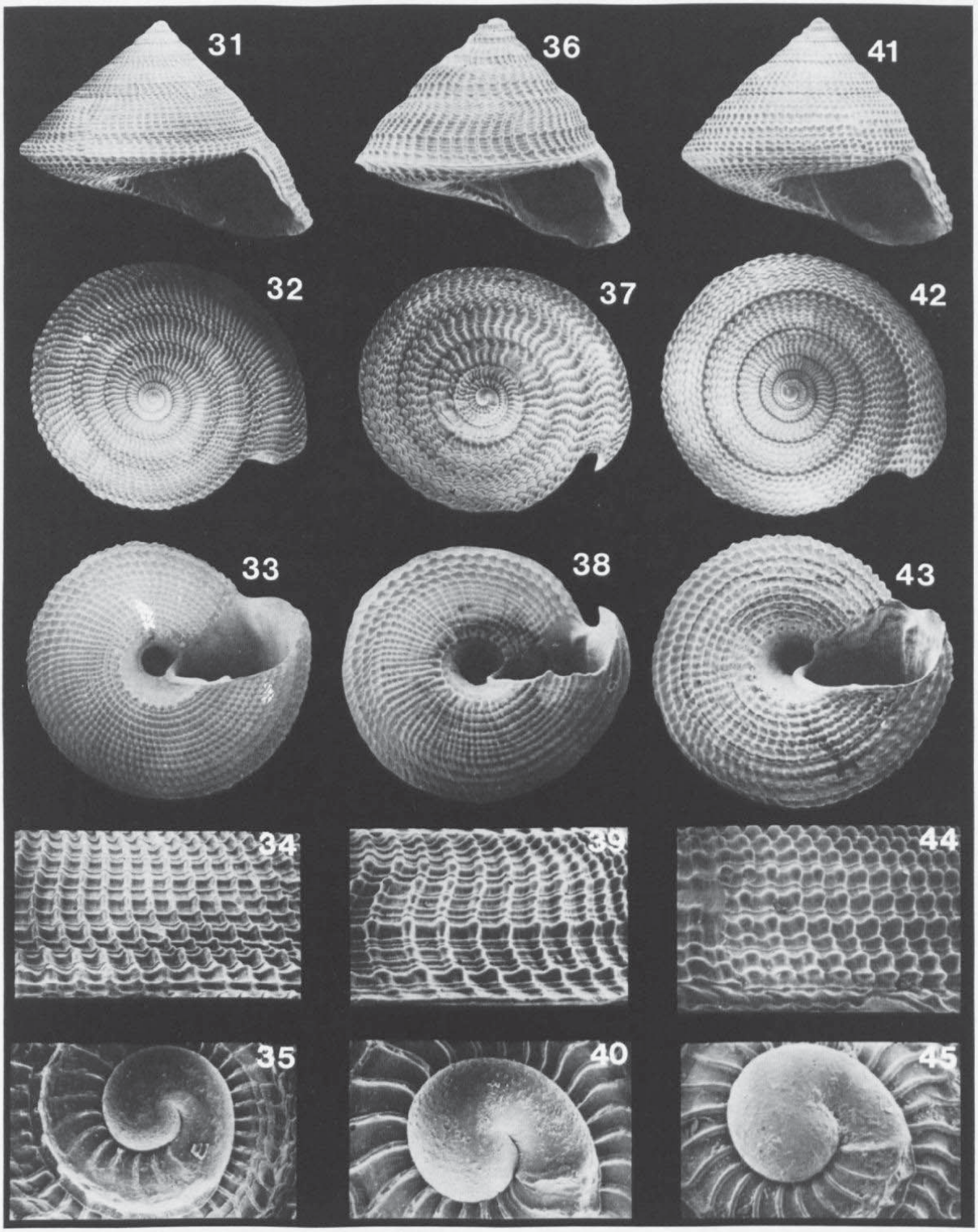
Figs 31-35

Calliostoma (Astele) monodon Schepman, 1908 : 68, pl. 6, fig. 2.

TYPE DATA. — Figured syntype ZMA 3.08.082 (4.70 × 5.75 mm, 5.25 TW) : " *Siboga* ", stn 95, 5°43.5′ N, 119°40′ E, off Sabah, Malaysia, 522 m.

OTHER MATERIAL EXAMINED (3 specimens MNHN). — BIOCAL, stn DW 08 (1). — Stn DW 33 (1). — Stn DW 66 (1).

DISTRIBUTION. — Off Sabah, Malaysia, and southern New Caledonia, 505-680 m (dead).



FIGS 31-45. — Genus *Ancistrobasis* : **31-35,** *Ancistrobasis monodon*, BIOCAL stn 66, 5.70 × 7.90 mm, 34 (last TW) × 20, 35 × 70. — **36-40,** *A. tiara*, holotype, 2.70 × 3.31 mm, 39 (last TW) × 35, 40 × 100. — **41-45,** *A. caledonica*, holotype, 4.05 × 5.05 mm, 44 (last TW) × 25, 45 × 80.

REMARKS. — New Caledonian specimens are indistinguishable from the holotype of *Calliostoma (Astele) monodon* — a typical *Ancistrobasis* species — in sculpture, shape, and shell size relative to the number of whorls. The present specimens differ, however, in having slightly larger protoconchs than the holotype (diameter 330 μm, cf. 310 μm), and in attaining maturity at larger shell size (5.70 mm × 7.90 mm, 5.9 TW), and may prove to represent a distinct, closely related species. See Discussion page 107.

Ancistrobasis tiara sp. nov.

Figs 36-40 ; Table 3

DESCRIPTION. — *Shell* up to 3.55 mm wide, broader than high, stout, of moderate thickness, umbilicate, spire 1.41-1.59 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 270-280 μm wide, rather coarsely granulate.

Teleoconch of up to 5.25 whorls. Shoulder angulation strong on 1st whorl, weakening and becoming obsolete on 2nd whorl, strongly supramedian at first, descending to submedian position ; subsequent whorls weakly convex ; base suddenly contracted below angulate, gently undulant periphery, weakly convex. Spire whorls sculptured with prominent, rounded, shallowly sigmoidal, collabral axial riblets, almost obsolete on peripheral spiral, interspaces about twice as wide as each axial, traversed by numerous finer spiral threads that multiply by intercalation. Submedian spiral and one submedially between it and periphery strong, others finer and similar, interspaces smooth apart from fine collabral growth lines. Base sculptured with low, rounded collabral riblets that extend to umbilical rim, and 9-11 spiral cords ; outer 2 or 3 spirals narrow, most prominent, distinctly nodular, outer 3 or 4 spirals with interspaces considerably wider than each spiral ; inner spirals closer, broadening towards umbilicus with narrowing interspaces, innermost spiral very broad, with rounded radial pleats. Umbilicus deep, diameter 22.6-28.5 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim of labial projection, elsewhere thick ; posterior notch broad, retraction depth 4.98-5.55 % and projection depth 6.95-9.25 % of shell diameter ; basal notch concave, no peripheral notch. Parietal glaze thin. Inner lip thick, slightly tapered at abapical extremity, toothless.

Animal unknown (dried).

TABLE 3. — *Ancistrobasis tiara*. Shell measurements (mm) and countings. (BIOCAL, stn DW 44).

Character	*n*	Range	Mean	SD
H	10	2.65-2.91	2.75	0.08
D	10	3.13-3.55	3.35	0.12
H/D	10	0.80-0.86	0.82	0.02
TW	10	5.00-5.25	5.07	0.10
UD%	10	22.6-28.5	25.0	1.66

TYPE DATA. — Holotype (2.70 × 3.31 mm, 5 TW) MNHN, and 20 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 44.

OTHER MATERIAL EXAMINED (13 specimens MNHN). — BIOCAL, stn DW 08 (5). — Stn DW 46 (5). — Stn DW 48 (1). — Stn DW 83 (2).

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, and southern New Caledonia, 435-775 m, living at 440-610 m.

REMARKS. — *Ancistrobasis tiara* closely resembles the Kermadec species *A. dilecta* Marshall, 1983, from which it differs primarily in having a considerably stronger shoulder angulation on the early teleoconch whorls, while the secondary spirals are considerably more numerous. It differs from *A. monodon* in being smaller, in having a shallow posterior notch, in having a shallowly instead of deeply undulant peripheral keel, and in lacking a denticle at the inner base of the outer lip. *A. tiara* and *A. monodon* occurred together at BIOCAL stn DW 08.

ETYMOLOGY. — Crown (Latin).

Ancistrobasis caledonica sp. nov.

Figs 41-45 ; Table 4

DESCRIPTION. — *Shell* up to 5.90 mm wide, broader than high, stout, of moderate thickness, umbilicate, spire 1.70-2.00 × as high as aperture ; white, nacreous through translucent outer shell layer.

Protoconch 330 μm wide, coarsely granulate.

Teleoconch of up to 5.8 whorls, 1st 2 whorls with distinct shoulder angulation, strong on 1st whorl, weakening and becoming obsolete on 2nd whorl, angulation descending from strongly supramedian to a submedian position, subsequent whorls weakly convex, periphery angulate, rendered strongly undulant by axial riblets, base weakly convex. Spire whorls sculptured with prominent, rounded, shallowly sigmoidal, collabral axial riblets that extend to periphery, interspaces slightly wider than each axial, traversed by finer spiral threads that multiply by intercalation, 9-11 major spirals at start of last adult whorl, small, rounded nodules at intersections, bases of interstitial pits finely granulate on later whorls. Base sculptured with low, rounded collabral riblets that extend to umbilical rim, and 10 or 11 similar, rounded spiral cords ; interspaces on outer part about twice as wide as each spiral, narrowing towards umbilicus, intersections with low, rounded nodules, innermost spiral more strongly beaded. Umbilicus deep, diameter 22.6-26.8 % of adult shell diameter. Aperture subquadrate. Outer lip rather thin at rim, thickened within, a spiral thickening near base of inner lip forming a prominent, rounded denticle at rim ; posterior notch very broad and shallow, retraction depth 6.78-7.98 % of shell diameter, descending more or less vertically before retracting to shallow, concave basal notch.

Animal unknown (dried).

TABLE 4. — *Ancistrobasis caledonica*. Shell measurements (mm) and countings. (BIOCAL, stn DW 44).

Character	*n*	Range	Mean	SD
H	10	3.90-4.45	4.23	0.20
D	10	5.05-5.90	5.46	0.27
H/D	10	0.73-0.82	0.77	0.03
TW	10	5.50-5.80	5.62	0.11
UD%	10	22.6-26.8	24.8	1.34

TYPE DATA. — Holotype (4.05 × 5.05 mm, 5.5 TW) MNHN, and 27 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 44.

OTHER MATERIAL EXAMINED (2 specimens MNHN). — BIOCAL, stn DW 48.

DISTRIBUTION. — Off southern New Caledonia, 440-775 m (alive).

REMARKS. — *Ancistrobasis caledonica* differs from the sympatric *A. tiara* sp. nov. and the Kermadec *A. dilecta* Marshall in having a larger protoconch, stronger spirals and closer axials on the teleoconch, and a more strongly undulant periphery, while the intersections are more distinctly nodular. It differs further from *A. tiara* in having a denticle at the inner base of the adult outer lip. From *A. monodon*, which it resembles in size, shape and in having a denticle at the inner base of the outer lip, *A. caledonica* differs in having broader, more closely spaced axial riblets, stronger nodules, and finer interstitial granules on the spire. *A. caledonica* and *A. monodon* have overlapping depth ranges off southern New Caledonia and the two species are probably locally sympatric.

ETYMOLOGY. — (New) Caledonian.

Ancistrobasis scitula sp. nov.

Figs 51-55, 271 ; Table 5

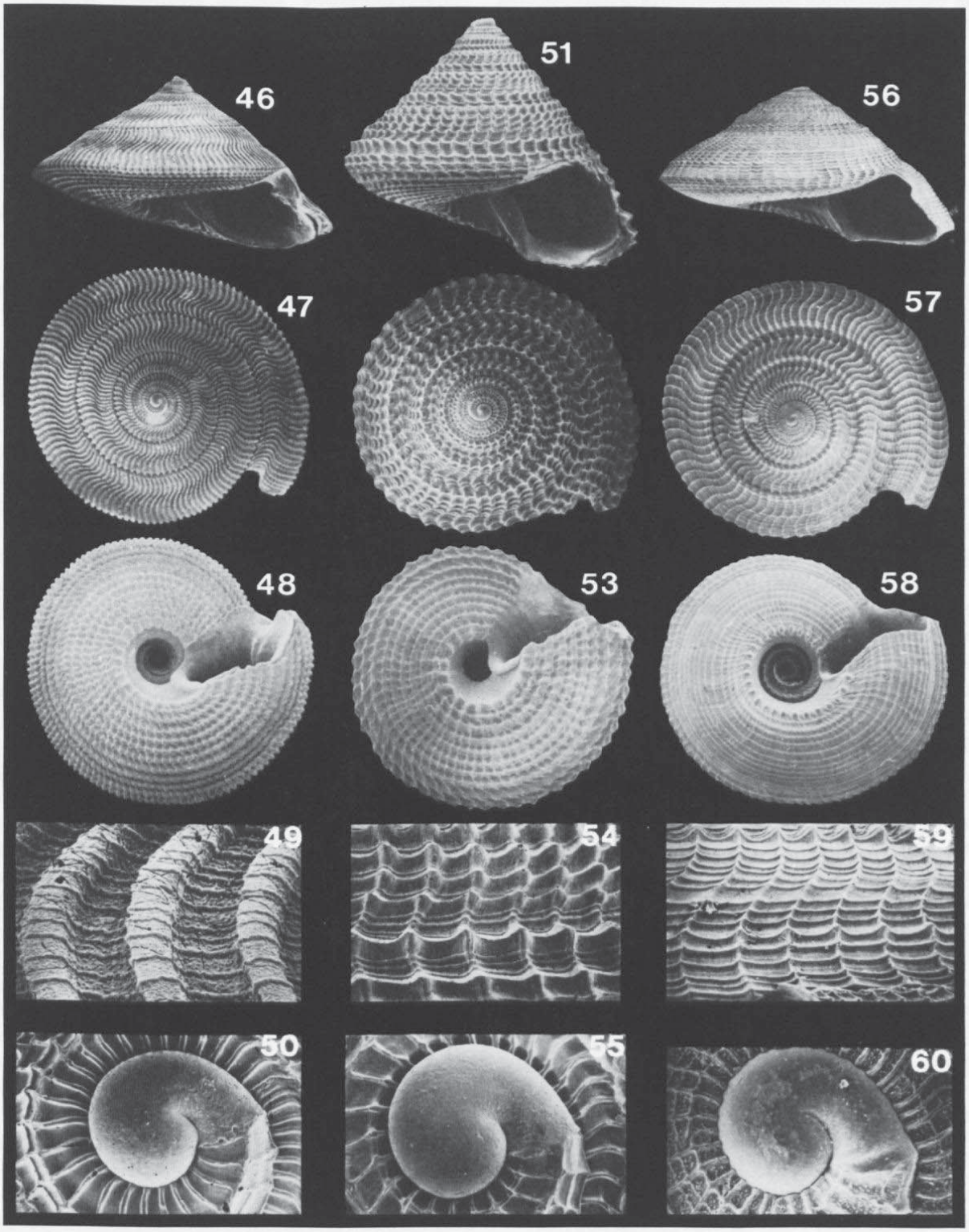
DESCRIPTION. — *Shell* up to 6.10 mm wide, broader than high, stout, of moderate thickness, umbilicate, spire 1.43-1.46 × as high as aperture ; white, nacreous through translucent outer shell layer.

Protoconch 350-370 μm wide, finely granulate.

Teleoconch of up to 5.80 whorls, 1st 3 whorls with supramedian shoulder angulation, subsequent whorls almost flat ; periphery narrowly rounded, rendered strongly undulant by axial riblets ; base weakly convex. Spire whorls sculptured with prominent, rounded, sigmoidal, collabral axial riblets, interspaces at least twice as wide as each axial, traversed by numerous spiral threads that multiply by intercalation, major spirals numbering about 7 at start of last adult whorl, a subsutural spiral vanishes at end of 1st whorl. Small, rounded, conical nodules at intersections, finely granulate at bases of interstitial depres-

TABLE 5. — *Ancistrobasis scitula*. Shell measurements (mm) and countings.

H	D	H/D	TW	UD%	
4.70	5.53	0.85	5.80	19.9	Paratype
4.50	5.50	0.82	5.75	25.4	Holotype
4.35	5.25	0.83	5.60	20.9	Paratype



FIGS 46-60. — Genus *Ancistrobasis* : **46-50,** *Ancistrobasis boucheti*, holotype, 3.10 × 5.71 mm, 49 (last TW) × 125, 50 × 70. — **51-55,** *A. scitula*, holotype, 4.50 × 5.50 mm, 54 (last TW) × 25, 55 × 70. — **56, 57, 59, 60,** *A. adonis*, holotype, 3.20 × 6.50 mm, 59 (last TW) × 30, 60 × 90. — **58,** *A. adonis*, paratype, BIOCAL stn DW 49, width 6.10 mm.

sions on later whorls. Shoulder spiral and spiral near abapical quarter strongest and similar on 1st 4 whorls, after which secondary spirals become as strong as shoulder spiral, that near abapical quarter remaining stronger. Base sculptured with narrow, rounded collabral riblets that are evanescent immediately within umbilical rim, and 9-11 stronger, rounded spiral cords, outer 3 with interspaces considerably wider than each spiral, interspaces narrowing towards umbilicus until about as wide as each spiral, small rounded nodules at intersections, innermost spiral strongly beaded at umbilical rim. Umbilicus deep, rim angulate, diameter, 19.9-25.4 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim, thickened within posterior notch, little thickened elsewhere ; posterior notch broad, shallow, retraction depth 8.2 % and protraction depth 5.2. % of shell diameter ; basal notch broadly concave, shallow, no peripheral notch. Parietal glaze thin. Inner lip thick, simple, gently tapered to abapical extremity.

Animal. Snout little over twice as long as broad, rounded lateral projections at tip, mouth a vertical slit beneath. Cephalic tentacles beside snout, inner bases at least twice as far apart as width of each tentacle base, narrowly tapered, dorsoventrally flattened, edges ciliate, left slightly longer than snout, right yet slightly longer, large black eyes at outer bases. Right suboptic tentacle slightly larger than right cephalic tentacle, longitudinally grooved beneath, the groove directly above tall, thin longitudinal ridge. Epipodial tentacles large, 6 on each side.

Radula (Fig. 271). Central tooth rigid, about as long as broad, cutting area jutting forward at right angle from shaft, angulate, with 7-9 stout, conical cusps, median cusp largest ; laterobasal projections prominent. Lateral teeth stout, broad, cutting area of each angulate, cusps sharp, terminal cusp largest, 5 or 6 smaller cusps on outer edge and 2 or 3 on inner edge. Marginal teeth slender ; innermost tooth broader than outer teeth, tip narrowly angulate, sharply serrate ; outer marginals each with finely and narrowly serrate, angulate tips, and long series of sharp slender cusps along outer edge.

Jaw plates thin, subrectangular, broader than long, elements short, anteriorly elongating.

TYPE DATA. — Holotype MNHN and 5 paratypes (4 MNHN, 1 NMNZ) : BIOCAL, stn DW 51.

DISTRIBUTION. — Off southern New Caledonia, 680-700 m (alive).

REMARKS. — *Ancistrobasis scitula* resembles *A. tiara* in lacking a tooth at the inner base of the outer lip at maturity, and differs in being more strongly sculptured with a more strongly rounded periphery. It differs from all other *Ancistrobasis* species in details of teleoconch sculpture, in its exceptionally large protoconch, and in having a subsutural spiral thread on the first teleoconch whorl. To my knowledge, jaw plates have not hitherto been recorded from this family. They are recorded herein from *Fluxinella, Calliobasis* and *Basilissa*. They are also present in at least one species of *Seguenzia* (*S. compta* Marshall, 1983).

ETYMOLOGY. — Beautiful (Latin).

Ancistrobasis boucheti sp. nov.

Figs 46-50, 272-277 ; Table 6

DESCRIPTION. — *Shell* up to 6.03 mm wide, considerably broader than high, very stout, rather thick, umbilicate, spire 1.00-1.13 × as high as aperture ; white, nacreous through translucent outer shell layer.

Protoconch 330-370 μm wide, surface granulate.

TABLE 6. — *Ancistrobasis boucheti*. Shell measurements (mm) and countings. (BIOCAL, stn DW 77).

Character	*n*	Range	Mean	SD
H	10	2.50-3.20	2.96	0.19
D	10	4.45-6.03	5.57	0.43
H/D	10	0.48-0.56	0.53	0.02
TW	10	4.40-5.10	4.84	0.21
UD%	10	24.7-29.3	27.3	1.55

Teleoconch of up to 5.10 whorls, 1st whorl with strong, strongly supramedian angulation, angulation weakening over next half whorl and vanishing while descending to median position, subsequent whorls weakly concave ; periphery sharply angulate, rendered sharply and closely serrate by axial riblets ; base weakly convex. Spire whorls sculptured with prominent, rounded, flexuous collabral axial riblets that extend

to periphery, summits broad, flattened, interspaces about 1.5 × as wide as each axial, traversed by numerous, considerably finer spiral threads, of which peripheral spiral is strongest, others similar ; intersections not nodular, entire surface covered with minute granules after 1st whorl. Base sculptured with rounded, flexuous collabral riblets that extend to umbilical rim, and 10 or 11 rounded spiral cords, interspaces wider than each spiral, outer 3 spirals similar, slightly narrower and closer than others, which are similar to each other, small, rounded nodules at intersections ; innermost spiral strongly beaded at umbilical rim. Umbilicus deep, rim angulate, diameter 24.7-29.3 % of adult shell diameter. Aperture subquadrate. Outer lip thick at rim, strongly thickened within, with prominent, angulate elliptical ridge against posterior notch, strong outer basal ridge, and prominent, rounded elliptical denticle near base of inner lip, interspaces concave, deeply so in front of labial projection. Posterior notch shallow, broad, retraction depth 3.50-4.60 % and protraction depth 4.72-5.84 % of shell diameter ; basal notch broad and shallow, no peripheral notch. Parietal glaze rather thick. Inner lip very thick, suddenly tapered at base to form bluntly rounded denticle.

Animal. Snout considerably longer than broad, sides subparallel, broad, rounded lateral extensions at tip, mouth a vertical slit below. Cephalic tentacles parallel to snout, lying above it, slightly longer than snout, right tentacle slightly longer than left, inner bases almost in contact, tapered, dorsoventrally flattened, edges and ventral surface ciliate, large black eyes at outer bases. Right suboptic tentacle larger than cephalic tentacles, dorsoventrally flattened, ventral surface longitudinally grooved directly above a narrow tentacle that emerges from its base. Epipodial tentacles large, tapered, 8 right and 7 left. Opercular lobe small, operculum thin, chitinous, spiral.

Radula (Figs 272-274) with the formula c. 13 + 1 + 1 + 1 + c. 13. Central tooth rigid, about as long as broad, cutting area jutting forward at right angle from shaft, angulate, with 9 large, sharp, narrowly conical cusps, median cusp largest. Lateral teeth stout, broad, cutting area of each angulate and sharply serrate. Innermost marginal long and narrow, stout, cutting area narrowly angulate, terminal cusp very large, subterminal cusps numbering about 7 on outer edge, fewer on inner edge. Outer marginals slender, each with numerous sharp slender cusps at tip and along outer distal edge.

Jaw plates (Figs 275-277) subrectangular, broader than long, thin, elements enlarging anteriorly, their tips minutely and sharply roughened.

TYPE DATA. — Holotype (3.10 × 5.71 mm, 5.10 TW) MNHN and 17 paratypes (AMS, BMNH, NMNZ, NMP, USNM) : BIOCAL, stn DW 77.

DISTRIBUTION. — Off southern New Caledonia, 440 m (living).

REMARKS. — *Ancistrobasis boucheti* is extremely distinctive in the combination of low spire, strongly thickened shell, shallowly concave spire whorls, and flattened axial riblets crossed by numerous much finer spiral threads.

ETYMOLOGY. — I take particular pleasure in naming this superb species after Philippe BOUCHET.

Ancistrobasis adonis sp. nov.

Figs 56-60 ; Table 7

DESCRIPTION. — *Shell* up to 6.65 mm wide, considerably broader than high, stout, of moderate thickness, umbilicate, spire about 1.25 × as high as aperture ; white, nacreous through translucent outer shell layer.

Protoconch 320-330 μm wide, surface slightly roughened, almost smooth.

TABLE 7. — *Ancistiobasis adonis*. Shell measurements (mm) and countings. (BIOCAL, stn DW 49).

Character	*n*	Range	Mean	SD
H	10	2.45-3.65	3.10	0.33
D	10	4.90-6.65	6.06	0.59
H/D	10	0.49-0.55	0.51	0.02
TW	10	4.70-5.60	5.20	0.23
UD%	10	26.8-33.8	30.2	2.16

Teleoconch of up to 5.60 whorls ; periphery angulate, rendered shallowly serrate by axial riblets ; base weakly convex. Shoulder angulation strong on 1st whorl, descending from strongly supramedian to submedian position, weak and at about abapical third on subsequent whorls.

becoming obsolete on last adult whorl. Spire whorls almost flat after 1st whorl, last adult whorl weakly convex, a low, immediately subsutural angulation develops late on 2nd whorl and becomes finely beaded, becoming obsolete on last adult whorl. Spire whorls sculptured with fine, crisp, sigmoidal, collabral axial riblets, these traversed by fine, crisp spiral threads that multiply by intercalation, numbering 16-18 at start of last adult whorl, thread surmounting shoulder angulation strongest, others finer and similar, interspaces finely granulate on all whorls. Basal axials flexuous, rounded, collabral, vanishing on outer part of umbilical wall, becoming almost obsolete on last adult whorl. Basal spirals numbering 14-18 in adults, interspaces finely granulate, outer 4 or 5 narrow and prominent, about as strong as axials, widely spaced, inner spirals lower than axials inwardly progressively widening then narrowing, interspaces narrower than each spiral ; innermost 2 spirals narrowest, widely spaced, connected by rounded radial pleats that extend onto outer part of umbilical wall. Umbilicus deep, rim angulate, diameter 26.8-33.8 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim, slightly thickened within ; posterior notch shallow, broad, retraction depth 3.03-3.07 % and protraction depth 4.54-4.61 % of shell diameter ; basal notch concave, no peripheral notch. Parietal glaze thin. Inner lip thick, simple, gently tapered abapically, toothless.

Animal unknown (dried).

TYPE DATA. — Holotype (3.20 × 6.50 mm, 5.3 TW) MNHN and 51 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 49. Paratype (1 MNHN) : BIOCAL, stn DW 48.

DISTRIBUTION. — Off southern New Caledonia, 775-830 m, living at 825-830 m.

REMARKS. — *Ancistrobasis adonis* is rendered highly distinctive by its low spire, fine axial riblets, internally slightly thickened outer lip, persistent shoulder angulation, subsutural angulation, and by the immediate appearance of secondary spirals and minute granules on the teleoconch.

ETYMOLOGY. — After Adonis, a beautiful youth beloved by Venus.

Genus ***BASILISSOPSIS*** Dautzenberg & Fischer, 1897

Basilissopsis Dautzenberg & Fischer, 1897 : 163. Type species (by monotypy) : *Basilissopsis watsoni* Dautzenberg & Fischer, 1897 ; Recent, northeastern Atlantic.

REMARKS. — The new species described below and *Ancistrobasis regina* Marshall, 1983 closely resemble *B. watsoni* in general facies and thus appear to be closely related. Their shells are essentially similar to those of *Ancistrobasis* species, and differ primarily in having a strong shoulder angulation on all teleoconch whorls. *Ancistrobasis* species have a shoulder angulation on the earliest teleoconch whorls that soon becomes obsolete, so this difference is clearly a matter of degree. *Basilissopsis* may eventually prove to be better treated as a subgenus of *Ancistrobasis*, or perhaps a synonym, but I prefer to maintain it at generic level until animals and radulae can be compared. An undescribed species occurs in Otaian (Early Miocene) beds at Parengarenga Harbour, northern New Zealand.

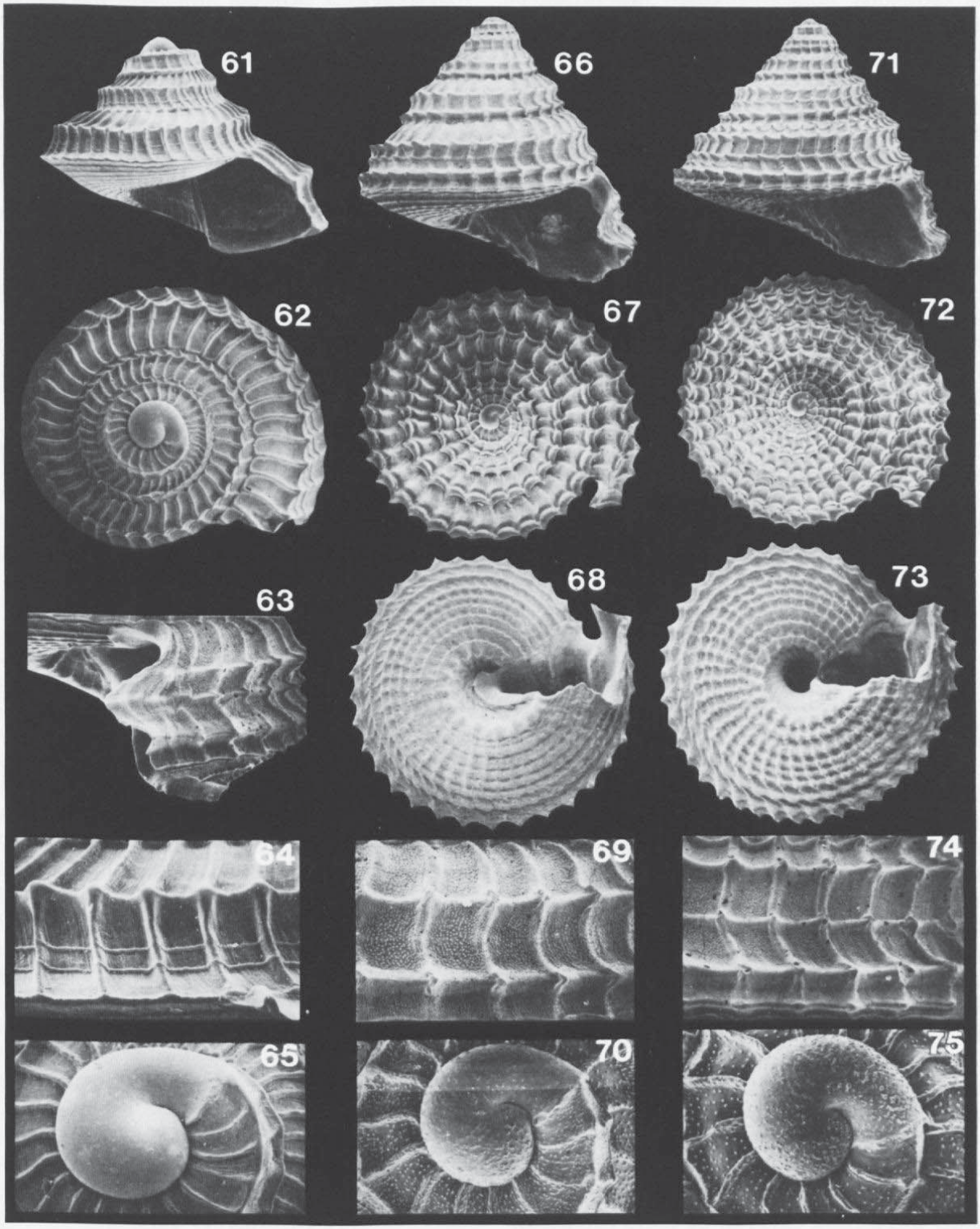
Basilissopsis charcoti sp. nov.

Figs 61, 62, 64-65

DESCRIPTION. — *Shell* (immature holotype) 1.60 mm wide, broader than high, thin, umbilicate, spire 1.18 × as high as aperture, white, nacreous through thin, translucent outer shell layer.

Protoconch 320 μm wide, smooth.

Teleoconch of 3 strongly shouldered whorls, shoulder angulation strongly supramedian at first, descending to an almost median position, ramp almost flat ; side steeply tapered, weakly concave ; periphery sharply angulate ; base weakly convex. Spire whorls axially and spirally ornamented. Axial riblets rounded, widely spaced, flexuous, collabral, interspaces with very fine granules and faint collabral growth lines, entirely traversing whorls, weak at periphery, prominent elsewhere. Shoulder and peripheral spirals strong, about as strong as axials, shoulder spiral with



FIGS 61-75. — Genera *Basilissopsis, Calliobasis* : **61, 62, 64, 65,** *Basilissopsis charcoti*, holotype, 1.12 × 1.60 mm, 64 (last TW) × 100, 65 × 90. — **63, 66-70,** *Calliobasis phimosa*, 2.50 × 5.25 mm, 63 × 25, 69 (last TW) × 50, 70 × 105. — **71-75,** *C. festiva*, holotype, 2.52 × 2.85 mm, 74 (last TW) × 45, 75 × 105.

small, rounded conical nodules where intersecting axials, peripheral spiral gently undulant, summit exposed on spire on 1st 2 whorls then covered by succeeding whorl ; interspace with 2 fine spiral threads that traverse axials. Base with 10 spiral cords, outer 3 narrow and widely spaced, inner spirals broader, closer and traversing weak, rounded, axial riblets. Umbilicus deep, rim rather sharply angulate, diameter 29 % of shell diameter. Aperture subquadrate. Outer lip thin, simple, posterior notch (from collabral sculpture) very broad and shallow, very slightly retracted from suture, weakly protractive below ; basal notch broad and concave. Parietal glaze very thin. Inner lip thin, straight, simple.

Animal unknown.

TYPE DATA. — Holotype MNHN (1.12 × 1.60 mm, 3 TW) : BIOCAL, stn DW 48.

DISTRIBUTION. — Off southern New Caledonia, 775 m (dead).

REMARKS. — Among nominate species, *Basilissopsis charcoti* most closely resembles *B. regina* (Marshall, 1983) from off the Three Kings Islands, northern New Zealand (622-805 m), differing primarily in lacking spiral threads on the ramp. The Atlantic *B. watsoni* has a much stronger peripheral keel. A species very similar to *B. charcoti*, perhaps the same, is represented by two fragmentary specimens from the northern Three Kings Rise (NZOI stn U602, 31°30.7′ S, 172°49.8′ E, 1 216-1 385 m). Judging from the simple apertural features, and particularly the size of the protoconch, the holotype of *B. charcoti* is immature, as are probably all of the specimens of *Basilissopsis* species known from northern New Zealand.

ETYMOLOGY. — After BIOCAL campaign ship N. O. "*Jean-Charcot*".

Genus ***CALLIOBASIS*** Marshall, 1983

Calliobasis Marshall, 1983 : 254. Type species (by original designation) : *Basilissa bombax* Cotton & Godfrey, 1938 ; Recent, southern Australia.

REMARKS. — *Calliobasis* and *Ancistrobasis* species are similar in gross shell and external animal morphology. The radula of *C. spectrum* sp. nov. (see below) differs from that in *Ancistrobasis* and all other known seguenziids in having lateromarginal plates — probably reduced inner marginal teeth — and in having a shallowly rounded rather than angulate cutting area on the lateral teeth with relatively much larger cusps. *Calliobasis* species differ further from *Ancistrobasis* in attaining smaller shell size and in being smaller relative to the number of whorls (maximum diameter 2.25-3.01 mm, 4.80-5.50 teleoconch whorls, cf. 3.55-7.90 mm, 5.10-5.90 teleoconch whorls). Moreover, they have fewer intercalating spiral threads on the spire, and stronger peripheral and suprasutural spirals, while the shoulder angulation tends to be more persistent. Apart from *C. nepticula* sp. nov., the available specimens of which are possibly bleached, the species are outstanding among known seguenziids in having yellowish green or greenish yellow shell pigmentation, which suggests an unusual diet. Unlike typical *Ancistrobasis* species, interstitial granulation commences immediately after the protoconch. The gap in shell morphology between *Calliobasis* and *Ancistrobasis* species is bridged to some extent by *Ancistrobasis adonis* sp. nov., and *A. scitula* sp. nov., the former having interstitial granules on all teleoconch whorls, *A. scitula* having both a distinct suprasutural angulation and a persistent shoulder angulation. Although *Calliobasis* and *Ancistrobasis* are undoubtedly closely related, I prefer to maintain *Calliobasis* as a genus rather than a subgenus of *Ancistrobasis*, primarily because of the distinctive radular morphology and because both groups have been separate since at least the Eocene (*Calliobasis eos* Marshall, 1983 and *Ancistrobasis pacifica* Ladd, 1970).

Calliobasis phimosa sp. nov.

Figs 63, 66-70 ; Table 8

DESCRIPTION. — *Shell* up to 2.80 mm wide, about as broad as high ; spire broadly conical, 1.17-1.60 × as high aperture, stout, of moderate thickness, umbilicus invaded by inner lip.

Colour of protoconch and 1st 1.5-1.75 teleoconch whorls pale lime green. Subsequent whorls white, nacreous through thin, translucent outer shell layer, narrowly axially maculated at about each 4th or 5th axial costa with greenish yellow, maculations occasionally darkening to yellowish brown on last adult whorl, pigmentation deepest on spirals ; base white.

TABLE 8. — *Calliobasis phimosa*. Shell measurements (mm) and countings. (BIOCAL, stn DW 44).

Character	*n*	Range	Mean	SD
H	10	2.15-2.60	2.45	0.12
D	10	2.40-2.80	2.63	0.13
H/D	10	0.87-1.01	0.93	0.04
TW	10	5.00-5.50	5.24	0.19
UD%	10	20.3-24.0	22.4	1.19

Protoconch 270 µm wide, coarsely granulate.

Teleoconch of up to 5.5 convex whorls, subsutural ramp weakly convex, base suddenly contracted, very weakly convex. Spire whorls sculptured with strong, similar, reticulating spiral cords and collabral axial costae, interspaces concave, sharp conical nodules at intersections, minute granules throughout. Spiral cords numbering 3 or 4 on last adult whorl. Shoulder spiral commencing immediately, at about adapical third ; suprasutural spiral commencing early 2nd whorl, rapidly enlarging to resemble shoulder spiral ; intermediate spiral (present in about 1 specimen in 3, including holotype) commencing on last adult whorl, remaining weaker than others ; peripheral spiral covered by succeeding whorls, weaker than shoulder and intermediate spirals. Base sculptured with collabral axial riblets that extend into umbilicus, and 8 or 9 spiral cords, outer 2 spirals narrowest, outer 3 widely spaced, innermost spiral strongest, beaded at umbilical rim, low rounded nodules at intersections with axials. Umbilicus shallow, conical, infilled by inner lip, diameter 20.3-24.0 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim of labial projections elsewhere strongly thickened, especially behind peripheral and basal notches ; posterior notch gently flared, retraction depth 4.87-6.07 % and protraction depth 10.98-13.34 % of shell diameter. Forward-swinging limb depressed adaperturally, basal notch smaller than anterior, rim slightly flared ; peripheral notch very small, very shallowly retracted. Parietal glaze thin. Inner lip thick, spreading into umbilicus.

Animal unknown (dried).

TYPE DATA. — Holotype MNHN (2.50 × 5.25 mm, 5.25 TW) and 25 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 44. Paratypes (3 MNHN) : BIOCAL, stn DW 38.

DISTRIBUTION. — Off southern New Caledonia, 360-450 m, living at 440-450 m.

REMARKS. — *Calliobasis phimosa* differs from hitherto named species of *Calliobasis* in having an infilled umbilicus, and in sculptural details, particularly in the late appearance or absence of the intermediate teleoconch spiral.

ETYMOLOGY. — From the Greek *phimos* (stopping an orifice) and refering to the infilled umbilicus.

Calliobasis festiva sp. nov.

Figs. 71-75

DESCRIPTION. — *Shell* (holotype) 2.85 mm wide, slightly broader than high ; spire broadly conical, 1.5 × higher than aperture, deeply umbilicate, stout, of moderate thickness.

Protoconch translucent white. First 1.5 teleoconch whorls reddish brown through translucent outer shell layer, next whorl translucent white. Succeeding whorls translucent, regularly axially maculated with yellowish brown, each 3rd or 4th nodule on peripheral spiral deeply pigmented, coinciding nodule on shoulder spiral more lightly pigmented, very lightly pigmented in a spiral band between shoulder spiral and median spiral. Base translucent white. Aperture nacreous within.

Protoconch 260 µm wide, coarsely granulate.

Teleoconch of 5.25 whorls, rather strongly convex at first, becoming weakly convex, subsutural ramp weakly convex, base suddenly contracted, very weakly convex. Spire whorls sculptured with strong, similar, reticulating spiral cords and collabral axial costae, interspaces concave, sharp conical nodules at intersections, minute granules throughout. Spiral cords numbering 7 on last adult whorl. Shoulder spiral commencing immediately, at about adapical quar-

ter, suprasutural spiral commencing on 2nd half of 1st whorl, rapidly enlarging to resemble shoulder spiral ; intermediate spiral commencing late on 3rd whorl, remaining weaker than shoulder and suprasutural spirals ; ramp spiral commencing late on 4th whorl, becoming about as strong as intermediate spiral ; peripheral spiral slightly weaker than suprasutural spiral, covered by succeeding whorls ; 2 spirals intercalate near end of first half of last adult whorl, one between shoulder and intermediate spiral, the other between intermediate spiral and suprasutural spiral. Base sculptured with collabral axial riblets that extend into umbilicus, and 8 spiral cords, low rounded nodules at intersections, innermost spiral beaded at umbilical rim. Umbilicus conical, deep, diameter 25 % of adult shell diameter. Aperture subquadrate. Outer lip strongly thickened within ; retraction depth of posterior notch 7.02 % of shell diameter, protraction depth unknown (labial projection broken) ; basal notch concave, peripheral notch very small. Parietal glaze thin. Inner lip thick, gently curved, suddenly tapered near abapical extremity to form a small projection.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.52 × 2.85 mm, 5.25 TW) : BIOCAL, stn DW 64.

DISTRIBUTION. — Off southern New Caledonia, 250 m (dead).

REMARKS. — *Calliobasis festiva* seems closest to the Kermadec *C. miranda* Marshall, 1983, from which it differs in attaining larger size, in the presence of a spiral cord on the ramp, and in having a stronger shoulder spiral and closer suprasutural and peripheral spirals. It differs from *C. phimosa* sp. nov. in having an open umbilicus and in sculptural details, notably in the presence of a spiral cord on the ramp, and in the early appearance of the intermediate spiral.

ETYMOLOGY. — Delightful (Latin).

Calliobasis spectrum sp. nov.

Figs 76-80, 278, 279 ; Table 9

DESCRIPTION. — *Shell* up to 2.26 mm wide, slightly broader than high, stout, openly umbilicate, spire 1.26-1.56 × as high as aperture.

Protoconch and 1st 2.75 whorls white, subsequent spire whorls white, narrowly axially maculated with yellow at about each 4th or 5th axial costa, base white, aperture nacreous within.

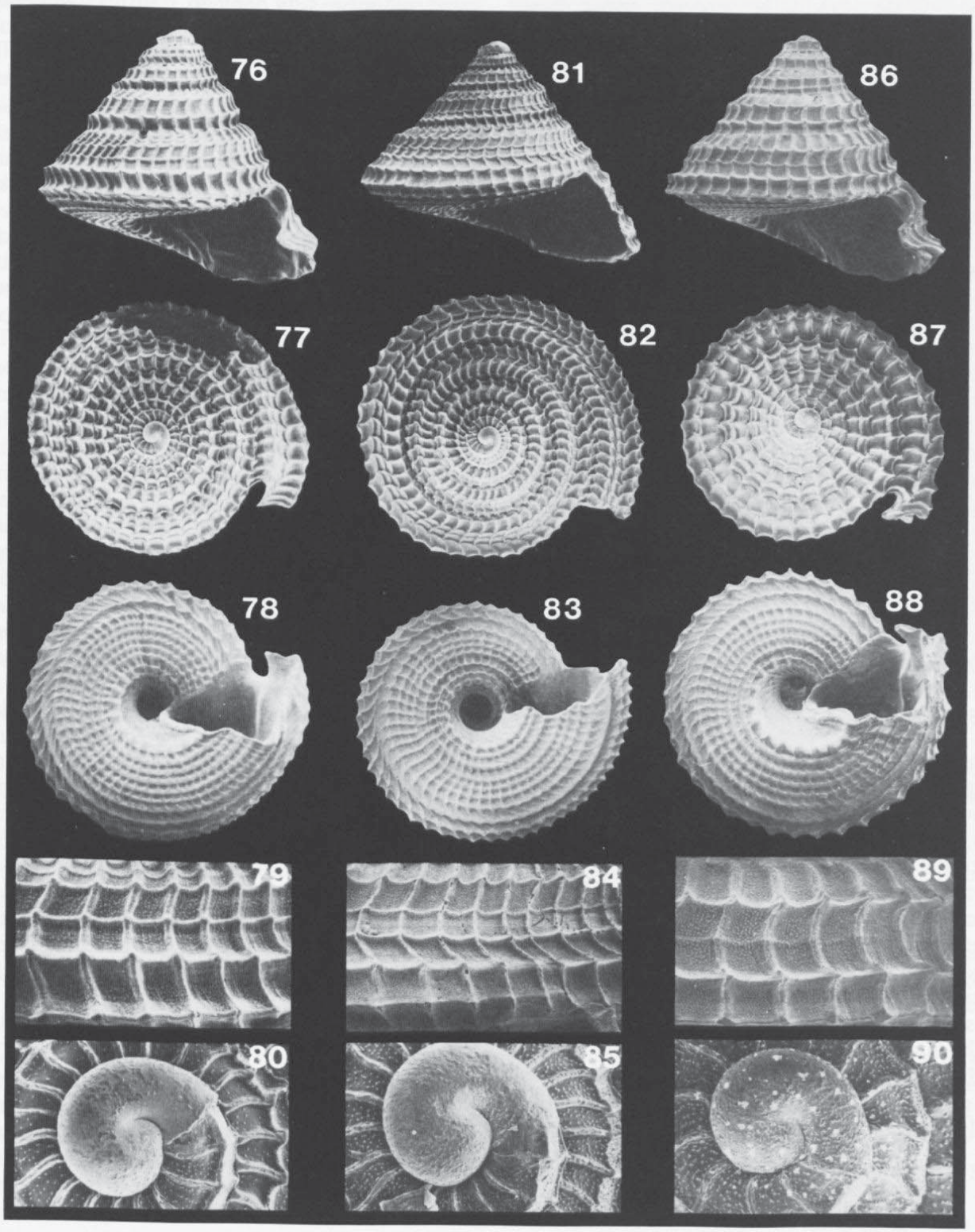
Protoconch 230-260 μm wide, coarsely granulate.

TABLE 9. — *Calliobasis spectrum*. Shell measurements (mm) and countings.

H	D	H/D	TW	UD%	
2.02	2.13	0.95	4.80	23.4	BIOCAL stn DW 41
2.00	2.26	0.88	5.00	28.0	BIOCAL stn DW 08
1.91	2.23	0.86	4.90	25.4	Holotype
1.90	2.20	0.86	4.75	30.3	BIOCAL stn DW 08

Teleoconch of up to 4.9 whorls, convex at first, becoming weakly convex, subsutural ramp more or less flat, base suddenly contracted, weakly convex. Spire whorls sculptured with strong, similar, reticulating spiral cords and collabral axial costae, interspaces concave, rounded conical nodules at intersections, minute granules throughout. Spiral cords numbering 6 on last adult whorl. Shoulder spiral commencing immediately, at about adapical quarter, relatively weak ; suprasutural spiral commencing on 1st half of 1st whorl, larger than shoulder spiral after 1st whorl ; intermediate spiral commencing late on 1st half of 4th whorl, enlarging to resemble shoulder spiral ; adapical ramp spiral commencing on 3rd whorl, abapical ramp spiral commencing of 2nd half of 4th whorl, both enlarging to resemble shoulder spiral ; peripheral spiral covered by succeeding whorls, intermediate in size between shoulder and intermediate spirals. Base sculptured with collabral axial riblets that extend into umbilicus, and 7-9 spiral cords, low rounded nodules at intersections, innermost spiral beaded at umbilical rim. Umbilicus conical, deep, diameter 23.4-30.3 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim of labial projection, elsewhere strongly thickened ; posterior notch shallow, retraction depth 6.24-8.96 % of shell diameter ; basal notch concave, no peripheral notch. Parietal glaze thin. Inner lip thick, tapered at abapical extremity to form a small projection.

Animal white. Snout about twice as long as broad, tip deeply cleft between strong, rounded lateral projections, mouth a vertical slit below. Cephalic tentacles similar, dorsoventrally flat-



FIGS 76-90. — Genus *Calliobasis* : **76-80,** *Calliobasis spectrum*, holotype, 1.91 × 2.23 mm, 79 (last TW) × 60, 80 × 105. — **81-85,** *C. nepticula*, holotype, 2.30 × 3.10 mm, 84 (last TW) × 45, 85 × 95. — **86-90,** *C. merista*, holotype, 2.10 × 2.40 mm, 89 (last TW) × 45, 90 × 100.

tened, ciliate, gradually tapered, inner bases about 2 tentacle base-widths apart, large swollen black eyes at outer bases. Right suboptic tentacle as large as cephalic tentacles, posteroventral surface concave. Epipodial tentacles large, 6 on each side. *Operculum* thin, chitinous, spiral.

Radula (Fig. 278). Central tooth rigid, about as long as broad, tip flattened, cutting area jutting forward at right angle from shaft, angulate, with about 9 conical cusps, median cusp largest, laterobasal projections prominent. Lateral teeth stout, broad, each with broad, shallowly rounded cutting area with 9 or 10 relatively large, long, narrow cusps. Innermost marginal reduced to form convoluted articulatory lateromarginal plate. Outer marginals slender, small, sharp, slender cusps at tips and in long series on outer edges.

Jaw plates (Fig. 279) thin, ovate, broader than long, elements short, longer anteriorly.

TYPE DATA. — Holotype and 2 paratypes MNHN : BIOCAL, stn DW 41. Paratypes (3) : BIOCAL, stn DW 08 (1 MNHN, 1 NMNZ) ; BIOCAL, stn DW 38 (1 MNHN).

DISTRIBUTION. — Off Ouvéa, Loyalty Islands and southern New Caledonia, 360-435 m, living at 380-410 m.

REMARKS. — *Calliobasis spectrum* superficially resembles the South Australian *C. bombax* (Cotton & Godfrey, 1938) (MARSHALL, 1983, fig. 7 g), from which it differs primarily in attaining maturity at considerably smaller size, and in the later appearance of spiral cords on the spire other than the shoulder and suprasutural spirals. From the New Caledonian *C. festiva* sp. nov., which also has a fully open umbilicus, it differs in having weaker spiral cords above the suprasutural spiral, which is set higher on late whorls, and in the later appearance of the intermediate spiral. It differs from the locally sympatric *C. phimosa* sp. nov. in having a fully open umbilicus and in sculptural details.

ETYMOLOGY. — Image (Latin).

Calliobasis nepticula sp. nov.

Figs 81-85

DESCRIPTION. — *Shell* up to 3.01 mm wide, broader than high, stout, openly umbilicate, spire rather broadly conical, 1.30-1.35 × as high as aperture. White (bleached ?), aperture nacreous within.

Protoconch 270 µm wide, coarsely granulate.

Teleoconch of up to 4.8 whorls, spire whorls convex at first, becoming very weakly convex ; sutural ramp flat throughout or becoming shallowly concave ; base suddenly contracted, weakly convex. Spire whorls sculptured with crisp, reticulating spiral cords and arcuate, collabral axial costae, interspaces concave, small conical nodules at intersections, minute granules throughout. Spiral cords numbering 6 on last adult whorl. Shoulder spiral commencing immediately, at about adapical quarter ; suprasutural spiral commencing almost immediately, becoming slightly larger than shoulder spiral ; intermediate spiral commencing on 2nd half of 3rd whorl, enlarging to resemble shoulder spiral ; subsutural spiral commencing at start of 2nd half of 3rd whorl, remaining weaker than shoulder spiral ; spiral between shoulder and intermediate spirals commencing on 2nd half of 4th whorl, enlarging to resemble adjacent spirals ; peripheral spiral covered by succeeding whorls, similar to suprasutural spiral. Base sculptured with arcuate collabral axial riblets that are evanescent on outer part of umbilical wall, and 7-9 similar, widely spaced spiral cords, low rounded nodules at intersections ; innermost spiral radially pleated at umbilical rim. Umbilicus conical, deep, diameter 25.4-31.0 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim of labial projection, elsewhere strongly thickened ; posterior notch broad, retraction depth 4.4 % and protraction depth 5.0 % of shell diameter ; basal notch concave, no peripheral notch. Parietal glaze thin. Inner lip rather thin, a small rounded denticle near base.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.30 × 3.10 mm, 4.8 TW), and 2 paratypes MNHN, NMNZ (2.40 (est.) × 3.00 mm, TW ? ; 2.10 × 2.87 mm, 4.6 TW) : BIOCAL, stn DW 08.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 435 m (dead).

REMARKS. — *Calliobasis nepticula* closely resembles *C. bombax* in general facies, but differs in attaining maturity at smaller size, in

being more broadly conical, and in having more densely crowded granules on the spire whorls. It differs from *C. phimosa* sp. nov. in having a fully open umbilicus and in sculptural details, from *C. festiva* in having a weaker shoulder spiral and more widely spaced suprasutural and peripheral spirals, and from *C. spectrum* in being more finely sculptured, and in having one spiral cord on the subsutural ramp. The lack of shell pigmentation is possibly a distinctive character, but the available specimens are obviously long dead and so may well be bleached.

ETYMOLOGY. — Young granddaughter (Latin).

Calliobasis merista sp. nov.

Figs 86-90 ; Table 10

DESCRIPTION. — *Shell* up to 2.40 mm wide, about as broad as high ; spire 1.33-1.79 × as high as aperture, stout, openly umbilicate.

Colour of protoconch and 1st 2 teleoconch whorls pale greenish yellow. Subsequent whorls white, narrowly maculated at each 4th or 5th axial costa with greenish yellow, most deeply pigmented on suprasutural spiral, base white, aperture nacreous within.

TABLE 10. — *Calliobasis merista*. Shell measurements (mm) and countings. (BIOCAL, stn DW 08).

Character	*n*	Range	Mean	SD
H	6	2.05-2.25	2.15	0.07
D	6	2.25-2.40	2.34	0.05
H/D	6	0.87-0.96	0.92	0.04
TW	6	4.75-5.25	5.03	0.21
UD%	6	21.2-33.3	27.3	3.93

Protoconch 270 μm wide, coarsely granulate.

Teleoconch of up to 5.25 whorls, markedly convex at first, becoming weakly convex ; ramp narrow, weakly convex or flat ; base suddenly contracted, very weakly convex. Spire whorls sculptured with strong, similar, reticulating spiral cords and sigmoidal, collabral axial costae, interspaces concave, conical nodules at intersections, minute granules throughout. Spiral cords numbering 4 on last adult whorl. Shoulder spiral commencing immediately, at about adapical quarter ; suprasutural spiral commencing on 2nd half of 1st whorl, rapidly enlarging to resemble shoulder spiral ; intermediate spiral commencing on 2nd half of 4th whorl, remaining weaker than adjacent spirals ; peripheral spiral similar to suprasutural spiral, summit covered by succeeding whorls. Base sculptured with collabral axial riblets that extend into umbilicus, and 8 spiral cords, outermost close beside peripheral spiral, interspaces of outermost 4 spirals widest, other interspaces about as wide as each spiral, innermost spiral beaded at umbilical rim, other spirals with low rounded nodules at intersections with axials. Umbilicus conical, deep, diameter 22.2-33.3 % of adult shell diameter. Aperture subquadrate. Outer lip thin at rim of labial projection, elsewhere strongly thickened, posterior notch broad, retraction depth 5.50-5.80 %, and protraction depth 8.00-9.00 % of shell diameter, basal notch concave, no peripheral notch, distinctly notched against umbilical rim. Parietal glaze thin. Inner lip thick, tapered at abapical extremity, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.10 × 2.40 mm, 4.90 TW) and 7 paratypes (1 AMS, 5 MNHN, 1 NMNZ) : BIOCAL, stn DW 08.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 435 m (dead).

REMARKS. — *Calliobasis merista* is most similar to *C. phimosa* in shape and sculpture, differing primarily in being openly umbilicate, in having stronger and sharper nodules on the shoulder and suprasutural spirals, and in having the shoulder spiral set lower on the adult whorls. *C. merista* occurred with *C. spectrum* and *C. nepticula* at the type locality.

ETYMOLOGY. — Divided (Greek).

Genus *FLUXINELLA* Marshall, 1983

Fluxinella Okutani, 1968 : 42 (*nomen nudum*).
Fluxinella Marshall, 1983 : 250. Type species (by original designation) : *Fluxinella lepida* Marshall, 1983 ; Recent, New Zealand.

Fluxinella membranacea sp. nov.

Figs 91, 93, 94, 97 ; Table 11

DESCRIPTION. — *Shell* up to 4.00 mm wide, considerably broader than high, sublenticular, thin, fragile, glossy, umbilicate, spire 0.78-1.00 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 280-300 μm wide, side very finely granulate, summit essentially smooth.

TABLE 11. — *Fluxinella membranacea*. Shell measurements (mm) and countings. (" *Vauban* ", stn 40).

Character	*n*	Range	Mean	SD
H	10	1.22-1.75	1.49	0.16
D	10	3.20-4.00	3.58	0.23
H/D	10	0.38-0.47	0.41	0.03
TW	10	3.90-4.50	4.31	0.26
UD%	10	27.0-30.3	28.8	1.15

Teleoconch of up to 4.5 whorls. Shoulder angulation sharp on 1st whorl, progressively weakening until obsolete near end of 1st half of 3rd whorl, summit level with adapical extremity of protoconch on 1st half whorl, gradually descending over subsequent whorls to supramedian position. Second and later spire whorls weakly convex, shallowly concave above and below sharp, very shallowly undulant peripheral keel, base well rounded. Spire smooth apart from fine collabral growth lines. Base smooth apart from collabral growth lines and obscure spiral lines. Umbilicus deep, rim narrowly rounded, projecting inwards to overhang almost vertical wall, diameter 27.0-30.3 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin and fragile, damaged in all available specimens, posterior notch very shallow and broad, from growth lines weakly retracted from suture and weakly projected below ; basal notch concave ; peripheral notch contained in keel, not retracted. Parietal glaze very thin. Inner lip thin, simple, flexed at umbilicall rim, channelled below.

Animal unknown.

TYPE DATA. — Holotype MNHN (1.35 × 3.45 mm, 4.10 TW) and 62 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : " *Vauban* ", stn 40. Paratypes (4 MNHN) : BIOCAL, stn DW 77.

DISTRIBUTION. — Off southern New Caledonia, 250-440 m (dead).

REMARKS. — *Fluxinella membranacea* differs from all hitherto named species of *Fluxinella* in the combination of smooth spire, flattened summit, persistent shoulder angulation, and distinctly overhung umbilical wall.

Fluxinella xysila sp. nov.

Figs 98, 101, 103 ; Table 12

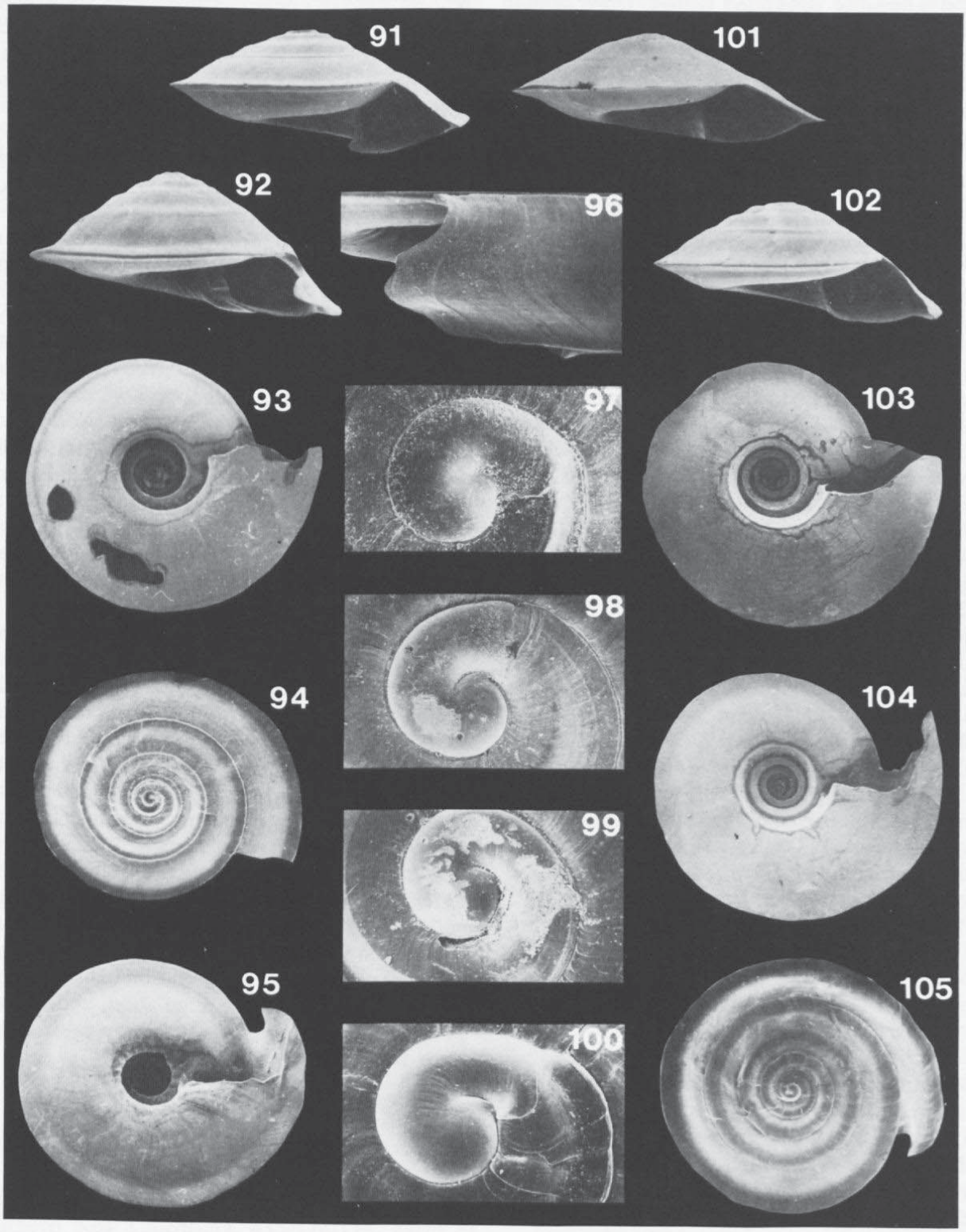
DESCRIPTION. — *Shell* up to 6.40 mm, markedly broader than high, sublenticular, thin, glossy, umbilicate, spire 0.91-1.17 × as high as aperture ; white, nacreous through thin, translucent shell layer.

Protoconch 350-370 μm wide, smooth.

TABLE 12. — *Fluxinella xysila*. Shell measurements (mm) and countings.

H	D	H/D	TW	UD%	
2.10	5.30	0.40	4.30	31.7	Holotype
2.45	6.40	0.38	4.40	31.3	Paratype
2.45	6.30	0.39	4.50	30.2	Paratype

Teleoconch of up to 4.50 whorls. First 2 whorls weakly convex, a weakly defined shoulder angulation on 1st half whorl, later whorls almost flat, peripheral keel prominent, sharp, flange-like, smooth ; base weakly convex. A crisp spiral thread bordering umbilicus, entire surface otherwise smooth apart from fine collabral growth lines. Umbilicus deep, wall steeply tapered, diameter 30.2-31.7 % of shell diameter. Aperture subrhomboidal. Outer lip rim damaged, thin,



FIGS 91-105. — Genus *Fluxinella* : **91, 93, 94,** *Fluxinella membranacea*, holotype, 1.35 × 3.45 mm. — **97,** *F. membranacea*, paratype, " *Vauban* " stn 40, × 105. — **92, 95, 96, 100, 105,** *F. polita*, holotype, 1.90 × 4.10 mm, 96 × 30, 100 × 95. — **98, 101, 103,** *F. xysila*, 2.10 × 5.20 mm, 98 × 73. — **99, 102, 104,** *F. brychia*, holotype, 2.10 × 5.20 mm, 99 × 70.

not, significantly thickened within, from growth lines posterior notch retraction and protraction depths 3.7 % of shell diameter ; basal notch shallow, concave, peripheral notch within keel. Parietal glaze thin. Inner lip thin, simple.

Animal unknown.

TYPE DATA. — Holotype (2.10 × 5.20 mm, 4.20 TW) and paratype (2.45 × 6.40 mm, 4.40 TW) MNHN, paratype NMNZ : BIOCAL, stn DW 106.

DISTRIBUTION. — Off southern New Caledonia, 625-650 m (dead).

REMARKS. — *Fluxinella xysila* appears to be most closely related to the New Zealand species *F. lenticulosa* (803-846 m), from which it differs in having a higher spire and a more weakly convex base. Other similar taxa are *F. discula* (Dall, 1889) (northwestern Atlantic, 1 597-1 796 m), *F. vitrea* (Okutani, 1968) (Japan, 2 100 m), *F. gellida* (Barnard, 1963) (South Africa, 2 268-2 377 m) and *F. lepida* Marshall, 1983 (New Zealand, 1 457-1 463 m). *F. xysila* differs from *F. gellida* in having a much more weakly convex base, and from the others in having a more weakly defined shoulder angulation on the first teleoconch whorl. It differs further from *F. discula* and *F. vitrea* in having a smaller protoconch (diameter 350-370 μm cf. 400 μm), from *F. vitrea* in having a flat rather than weakly convex umbilical wall, and from *F. lepida* in having a steeply tapered, rather than vertical umbilical wall.

ETYMOLOGY. — Smooth (Greek).

Fluxinella brychia sp. nov.

Figs 99, 102, 104

DESCRIPTION. — *Shell* up to 5.20 mm wide, considerably broader than high, sublenticular, thin, glossy, umbilicate, spire shallowly cyrtoconoid, 0.64-0.95 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 370 μm wide, smooth.

Teleoconch of up to 4.2 whorls. First whorl with supramedian shoulder angulation, sharp at first, progressively weakening, becoming obsolete early on 2nd half of 1st whorl. First 2 spire whorls weakly convex, subsequent spire whorls and base weakly convex, shallowly concave above and below very prominent, smooth, sharp peripheral keel. Smooth apart from flexuous collabral growth lines, and obscure spiral lines on base, a spiral thread at umbilical rim. Umbilicus very broad, deep, rim sharply angulate, wall steeply tapered, diameter 32.7-35.3 % of adult shell diameter. Aperture subquadrate. Outer lip thin, rim damaged, from growth lines posterior notch concave, retraction depth 2.6 % and protraction depth 7.7 % of shell diameter ; peripheral notch within keel, not retracted ; basal notch concave. Parietal glaze very thin. Inner lip thin, simple.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.10 × 5.20 mm, 4.2 TW) : BIOCAL, stn CP 72. Paratype (1 MNHN) : BIOCAL, stn DS 59.

DISTRIBUTION. — Off southern New Caledonia, 2 100-2 650 m (dead).

REMARKS. — *Fluxinella brychia* bears a strong general similarity to *F. xysila* sp. nov. and the following species with which it is compared. It differs from *F. discula* in having the whorls more weakly stepped within the umbilicus and in having a shallowly cyrtoconoid instead of rather evenly conical spire, from *F. discula* and *F. vitrea* in having a smaller protoconch (diameter 370 μm, cf. 400 μm), and from *F. vitrea* in having a flat rather than weakly convex umbilical wall. It differs from *F. lenticulosa* in having a higher spire, and a shoulder angulation on the first teleoconch whorl, and from *F. xysila* in having a weaker spiral thread at the umbilical rim, a more sharply defined shoulder angulation, and a deeper posterior notch. The base is more weakly convex than in *F. gellida*.

ETYMOLOGY. — From the deep (Greek).

Fluxinella polita sp. nov.

Figs 92, 95, 96, 100, 105 ; Table 13

DESCRIPTION. — *Shell* up to 4.40 mm wide, considerably broader than high, sublenticular, stout, glossy, umbilicate, spire 1.31-1.69 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

TABLE 13. — *Fluxinella polita*. Shell measurements (mm) and countings. (BIOCAL, stn DW 44).

Character	*n*	Range	Mean	SD
H	10	1.75-2.15	1.86	0.12
D	10	3.65-4.40	3.77	0.98
H/D	10	0.42-0.52	0.46	0.03
TW	10	4.25-4.75	4.51	0.17
UD%	10	18.2-21.7	20.0	1.29

Protoconch 300-330 μm wide, smooth apart from faint axial wrinkles at summit.

Teleoconch of up to 4.75 whorls. Spire whorls flat or very weakly convex above very prominent, sharp, thin, flange-like peripheral keel, which is shallowly concave above, and flat and almost horizontal below, drooping abapically at end of last adult whorl. Whorls smooth apart from fine collabral growth lines and obscure spiral lines, umbilical rim rendered shallowly undulant by weak, bordering radial pleats. Umbilicus deep, rim narrowly rounded, projecting inwards to overhang wall, diameter 18.2-21.7 % of adult shell diameter. Aperture trapezoidal. Outer lip thin at rim of labial projection and base, thick at inner basal extremity, thickened within, strongly so against posterior notch and peripheral keel ; posterior notch shallow, apical rim gently flared, retraction depth 2.38-2.50 % and protraction depth 5.82-7.55 % of shell diameter ; basal notch concave ; peripheral notch within keel, not retracted. Parietal glaze thin. Inner lip very thick, concave, flexed at base to form small, rounded tooth, below which is a narrow, shallow groove.

Animal unknown (dried).

TYPE DATA. — Holotype (1.90 × 4.10 mm, 4.7 TW) MNHN, and 755 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM): BIOCAL, stn DW 44.

OTHER MATERIAL EXAMINED (12 specimens MNHN). — BIOCAL, stn DW 08 (2). — Stn DW 46 (7). — Stn DW 53 (1). — Stn DW 70 (2).

DISTRIBUTION. — Off Ouvéa, Loyalty Is, and southern New Caledonia, 435-1 005 m, living at 440-610 m.

REMARKS. — *Fluxinella polita* differs from hitherto known species of *Fluxinella* in its stout glossy shell, smooth periphery, toothed inner lip, and radially pleated umbilical rim.

ETYMOLOGY. — Made smooth (Latin).

Fluxinella runcinata sp. nov.

Figs 106, 108, 110 ; Table 14

DESCRIPTION. — *Shell* up to 4.65 mm wide, considerably broader than high, stout, glossy, umbilicate ; spire weakly cyrtoconoid, 1.05-1.30 × as high as aperture ; white, nacreous through translucent outer shell layer.

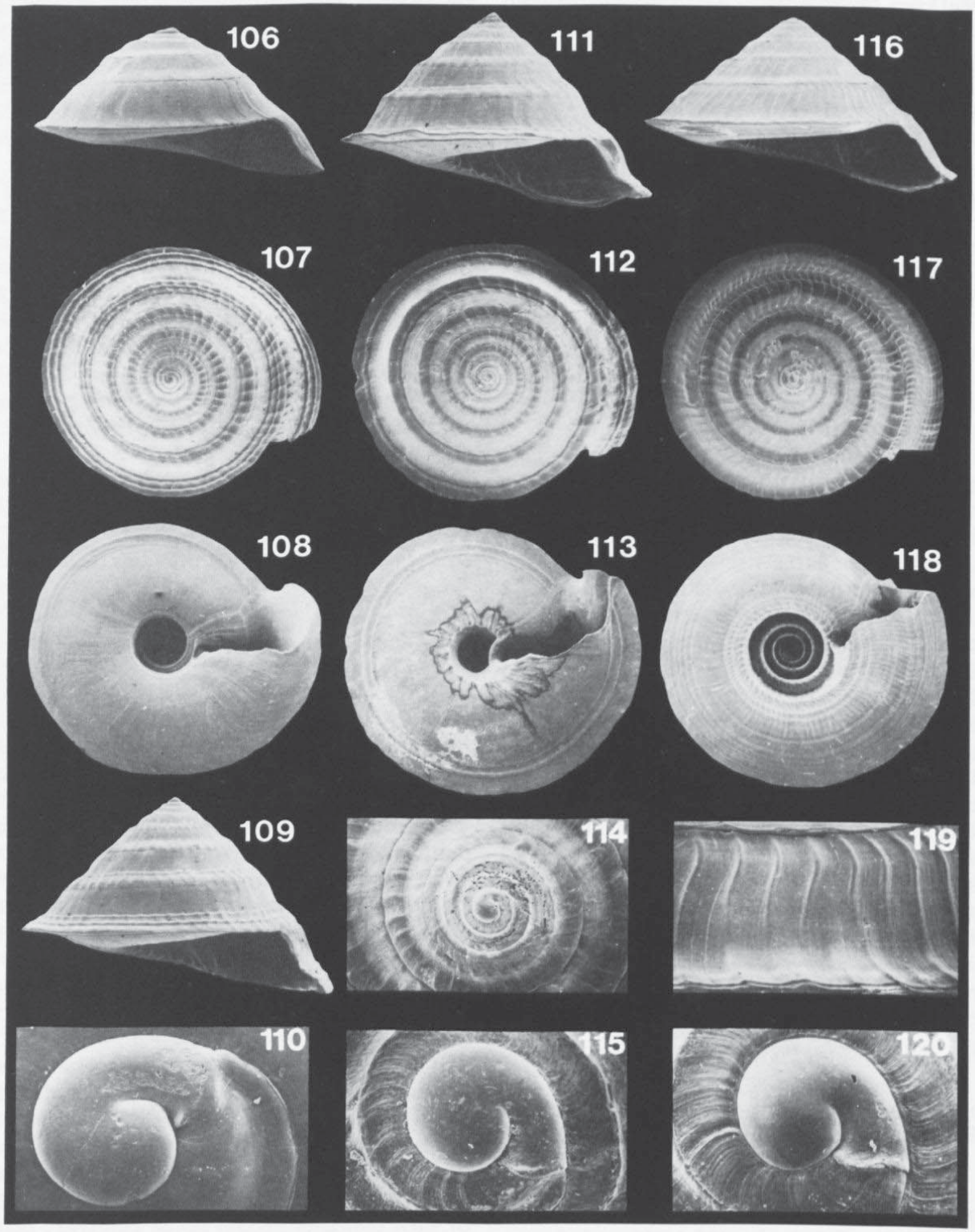
Protoconch 330-350 μm wide (usually 330 μm), smooth.

TABLE 14. — *Fluxinella runcinata*. Shell measurements (mm) and countings. (BIOCAL, stn DW 48, DW 53).

Character	*n*	Range	Mean	SD
H	10	2.00-2.68	2.33	0.24
D	10	3.75-4.65	4.16	0.31
H/D	10	0.53-0.59	0.55	0.02
TW	10	4.50-5.10	4.84	0.19
UD%	10	21.5-26.1	23.9	1.38

Teleoconch of up to 5.10 whorls. Spire whorls flat above shallowly concave adapical side of prominent, smooth, sharp peripheral keel, base very weakly and rather evenly convex from periphery to umbilical rim. Spire whorls smooth apart from fine collabral growth lines. Base with 2-4 fine, close, similar spiral threads near periphery, another crisply defined thread at umbilical rim, elsewhere smooth apart from collabral growth lines and obscure spiral lines. Umbilicus deep, rim smooth, narrowly rounded, weakly projecting inwards to slightly overhang wall, diameter 21.5-26.1 % of adult shell diameter. Aperture subtrapezoidal. Outer lip thin at rim of labial projection and base, moderately thickened within against posterior notch and peripheral keel ; posterior notch shallow, broad, retraction depth 2.59-3.54 % and protraction depth 1.30-4.45 % of shell diameter ; basal notch concave ; peripheral notch within keel, not retracted. Parietal glaze thin. Inner lip thick, concave, flexed at base to form small rounded tooth, below which is a narrow, shallow groove.

Animal unknown.



FIGS 106-120. — Genus *Fluxinella* : **106, 108, 110,** *Fluxinella runcinata*, holotype, 2.05 × 3.85 mm, 110 × 90. — **107, 109, 115,** *F. asceta*, paratype, BIOCAL stn DW 33, 3.80 × 6.50 mm, 115 × 80. — **111-114,** *F. asceta*, holotype, 4.00 × 6.90 mm, 114 × 20. — **116-119,** *F. megalomphala*, holotype, 4.05 × 7.80 mm, 119 (last TW) × 25. — **120,** *F. megalomphala*, paratype, BIOCAL stn DW 80, × 70.

TYPE DATA. — Holotype (2.05 × 3.85 mm, 4.6 TW) and 2 paratypes MNHN : BIOCAL, stn DW 48. Paratypes (31) : BIOCAL, stn DW 49 (2 MNHN). — Stn DW 53 (1 AMS, 1 BMNH, 6 MNHN, 2 NMNZ, 1 NMP, 1 USM). — Stn DW 70 (11 MNHN). — Stn DW 79 (2 MNHN). — Stn DW 80 (4 MNHN).

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, and southern New Caledonia, 715-1 380 m (dead).

REMARKS. — Compared with *Fluxinella polita*, which it most resembles, *F. runcinata* differs primarily in its higher spire and narrower peripheral keel, and in lacking radial pleats at the umbilical rim. The two species have overlapping bathymetric ranges and they occurred together at BIOCAL stations DW 53 and DW 70.

ETYMOLOGY. — Planed off (Latin).

Fluxinella asceta sp. nov.

Figs 107, 109, 111-115, 280, 281 ; Table 15

DESCRIPTION. — *Shell* up to 7.20 mm wide, markedly broader than high, trochiform, stout, glossy, umbilicate, spire shallowly cyrtoconoid, 1.74-2.29 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

TABLE 15. — *Fluxinella asceta*. Shell measurements (mm) and countings. (BIOCAL, stn DW 33).

Character	*n*	Range	Mean	SD
H	10	3.00-4.55	3.77	0.49
D	10	5.33-7.20	6.49	0.65
H/D	10	0.53-0.63	0.58	0.03
TW	10	6.00-7.00	6.47	0.26
UD%	10	20.8-24.4	22.5	1.18

Protoconch 270-300 μm wide, smooth, tip excert.

Teleoconch of up to 7 whorls. Shoulder angulation strong on 1st whorl, progressively weakening, vanishing on next whorl. Subsequent whorls shallowly concave, adapical two-thirds flat, abapical third weakly convex at first, becoming flat and less steeply sloping than adapical two-thirds or grading to shallowly concave. Peripheral keel sharp-edged, narrowly angulate in section, strongly projecting, summit very weakly undulant, basal side more or less horizontal, keel often distinctly drooping at maturity, occasionally slightly upturned. Base weakly convex. Axial riblets on spire low, rounded, collabral, shallowly sigmoidal, resolving from weak undulations that commence on 2nd whorl, most strongly defined over abapical third, becoming strongly defined over adapical two-thirds on last part of last adult whorl. Spire whorls at first with single spiral thread at summit of shoulder angulation, becoming obsolete on about mid 3rd whorl, 2nd spiral commencing at end of 2nd whorl between shoulder spiral and periphery, tending to persist throughout at abapical third, a 3rd spiral often appears after 4th whorl between 2nd spiral and periphery. Spire whorls otherwise smooth apart from fine collabral growth lines and obscure spiral lines over adapical two-thirds. Base with 2-4 crisp spiral threads on outer part, and strong rounded axial pleats at umbilical rim, otherwise smooth apart from collabral growth lines and obscure spiral lines. Umbilicus deep, wall shallowly concave, steeply tapered, diameter 20.8-24.4 % of adult shell diameter. Aperture subtrapezoidal. Outer lip rather thin at rim, modestly and rather uniformly thickened within ; posterior notch broad, concave, retraction and protraction depths, 2.4 % of shell diameter ; basal notch broad, concave ; peripheral notch within keel, not retracted. Parietal glaze thin. Inner lip thick, deeply curved towards umbilicus, gently flexed at base.

Animal. Snout at least twice as long as broad, lateral projections at tip rounded, mouth a vertical slit beneath. Cephalic tentacles about twice as long as snout, dorsoventrally flattened, narrow, very gradually tapered, inner bases at least 2 tentacle base-widths apart, edges ciliate, large swollen black eyes at outer bases. Right suboptic tentacle large, shorter and stouter than cephalic tentacles, gradually tapered, tip rather blunt, ventrally grooved. Epipodial tentacles numbering 9 on right and 1 or 2 on left, right tentacles decreasing in size towards opercular lobe, left tentacles small and short. *Operculum* chitinous, spiral.

Radula (Figs 280, 281) with the formula c. 20 + 1 + 1 + 1 + c. 20. Central tooth rigid, slightly longer than broad, cutting area jutting forward at right angle from shaft, broadly angulate, with about 9 stout cusps, median cusp largest, laterobasal projections prominent. Lateral teeth broad, cutting area of each angulate,

terminal cusp largest, finer cusps on outer edge, fewer on inner edge. Innermost marginal broader than outer marginals, cutting area narrowly angulate, terminal cusp large, finer cusps on outer edge, a few fine cusps on inner edge. Outer marginals slender, each with small, slender cusps at tip and on outer edge.

Jaw plates subrectangular, thin, broader than long, elements short, longer anteriorly.

TYPE DATA. — Holotype MNHN (4.00 × 6.90 mm, 6.70 TW) and 193 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 33.

OTHER MATERIAL EXAMINED (125 specimens MNHN). — BIOCAL, stn DW 36 (4). — Stn DW 46 (8). — Stn DW 48 (19). — Stn DW 51 (81). — Stn DW 53 (7). — Stn DW 70 (2). — Stn DW 80 (4).

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, and southern New Caledonia, 570-1 005 m, living at 570-700 m.

REMARKS. — *Fluxinella asceta* is highly distinctive in its large size, tall spire, low widely spaced axial riblets, and crisp peripheral spiral threads.

ETYMOLOGY. — Ornamented (Greek).

Fluxinella megalomphala sp. nov.

Figs 116-120

DESCRIPTION. — *Shell* up to 7.80 mm wide, considerably broader than high, depressed trochiform, stout, rather thin, spire 1.41-1.43 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 370 μm wide, essentially smooth.

Teleoconch of up to 6.30 whorls. Shoulder angulation sharp on 1st whorl, weakening and vanishing on 2nd whorl ; subsequent whorls grading from flat to weakly convex above prominent sharp, flange-like peripheral keel. Base suddenly contracted, weakly convex. Axial riblets commencing on 3rd whorl, widely spaced, low, rounded, weakly flexuous, rendering periphery weakly undulant. Base with 5 spiral threads on outer third, 3 or 4 spiral cords on inner quarter, and rounded, fold-like axial costae that resolve on inner half and enlarge towards umbilicus, extending onto outer part of umbilical wall. Additional spiral cords resolving on broad median basal zone on last half adult whorl. Umbilicus deep, wall steeply tapered, diameter 32.3-35.9 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin at rim, thicker within, posterior notch shallow and broad, retraction depth (from growth lines) 1.70-2.00 %, and protraction depth 2.10-2.60 % of shell diameter ; basal notch concave, peripheral notch within keel. Parietal glaze thin. Inner lip thick, curved towards umbilicus adapically, flexed below to form small, broadly rounded submedian projection.

Animal unknown.

TYPE DATA. — Holotype (4.05 × 7.80 mm, 6.30 TW) and paratype MNHN ; paratype NMNZ (3.40 × 6.50 mm, 6.00 TW) : BIOCAL, stn DW 80.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 900-980 m (dead).

REMARKS. — Compared with *Fluxinella asceta*, to which it is superficially similar, *F. megalomphala* differs principally in having a more broadly conical spire, finer spiral threads at the periphery, and a much wider umbilicus. The two species occurred together at the type locality.

ETYMOLOGY. — Big navel (Greek).

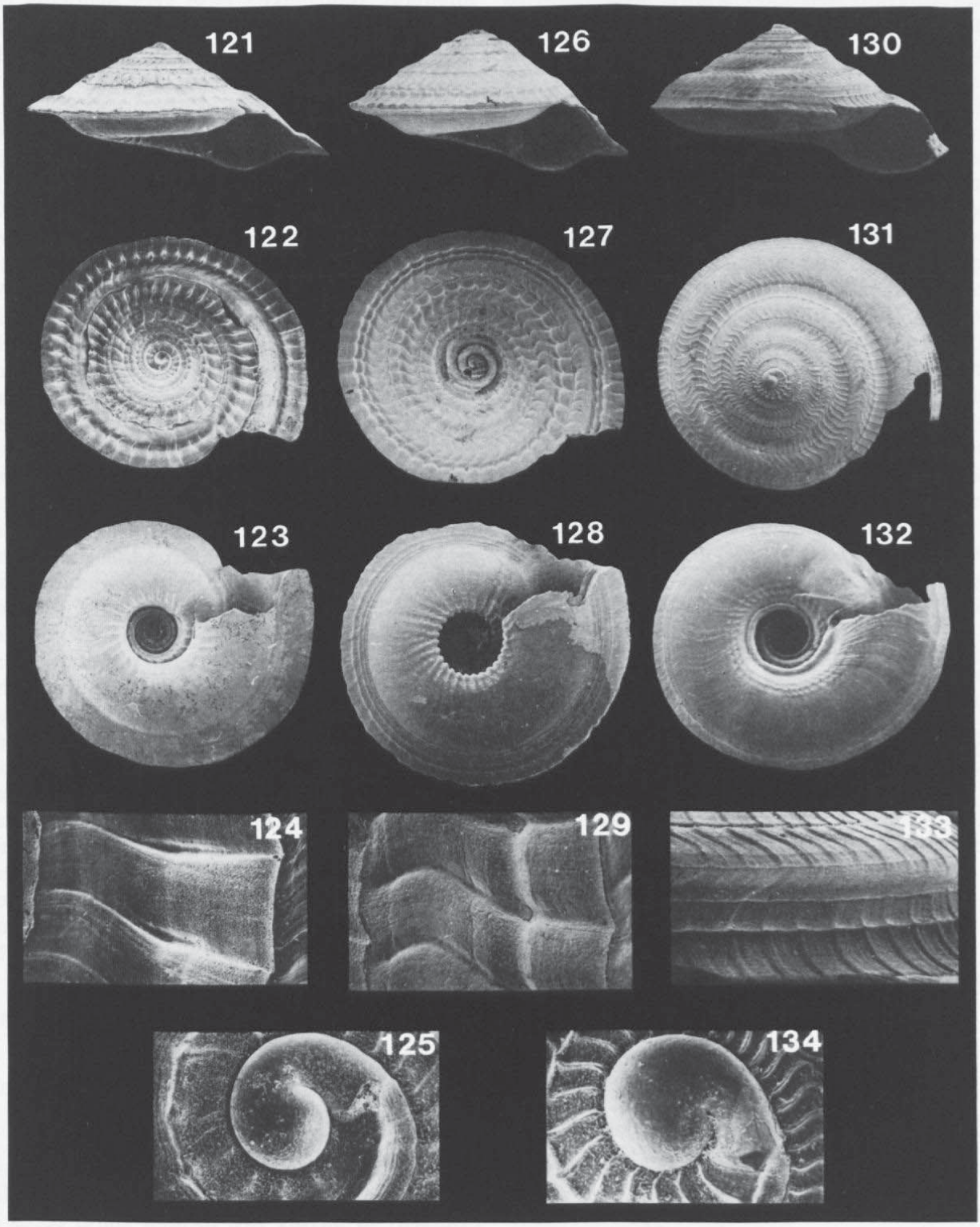
Fluxinella euphanes sp. nov.

Figs 121-125

DESCRIPTION. — *Shell* up to 4.65 mm wide, considerably broader than high, sublenticular, thin, spire 0.94-1.05 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 350-370 μm wide, minutely granulate.

Teleoconch of up to 4.90 whorls, periphery sharply angulate, flange-like ; base suddenly contracted, outer third below keel more or less horizontal, flat or shallowly concave, inner part convex. Shoulder angulation strong on 1st whorl, progressively weakening, vanishing early on 3rd whorl, commencing level with suture, descending to about adapical third, ascending late on 2nd whorl ; ramp and side



FIGS 121-134. — Genus *Fluxinella* : **121-125,** *Fluxinella euphanes*, holotype, 1.90 × 4.65 mm, 124 (late 3rd TW) × 60, 125 × 70. — **126-129,** *F. tenera*, holotype, 2.30 × 4.60 mm, 129 (last TW) × 60. — **130-134,** *F. stirophora*, holotype, 2.10 × 4.10 mm, 133 (last TW) × 50, 134 × 95.

concave. Third and later whorls with flattened sub and suprasutural zones, subsutural zone depressed, progressively grading from about third to half whorl height, becoming steeper than raised suprasutural zone. Spire whorls with prominent, widely spaced, shallowly flexuous axial riblets that render periphery gently undulant. Base with 3 or 4 fine, crisp spiral threads on outer third, and prominent, rounded axial pleats bordering umbilicus; elsewhere smooth apart from collabral growth lines and obscure spiral lines. Umbilicus deep, wall steep, weakly convex, diameter 25.0-25.4 % of adult shell diameter. Aperture subrhomboidal. Outer lip rim damaged, from growth lines posterior notch shallow and broad, retraction depth 2.20 % and protraction depth 5.7 % of shell diameter; basal notch concave, peripheral notch within keel. Parietal glaze thin. Inner lip hollow and comprising 2 thin parallel walls adapically, flexed submedially to form small, rounded tubular tooth; rim becoming covered over at maturity, thin and simple below tooth.

Animal unknown.

TYPE DATA. — Holotype (1.90 × 4.65 mm, 4.90 TW) and paratype (1.60 × 4.13 mm, 4.80 TW) MNHN : BIOCAL, stn DW 79.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 1 320-1 380 m (dead).

REMARKS. — Among previously described species of *Fluxinella, F. euphanes* is very distinctive in the stepped contour of the last adult and the strong, widely spaced axial riblets. The double or at least locally hollow inner lip wall in this and the following taxon is a most unusual character hitherto unknown from the family (see also *Quinnia limatula* sp. nov.).

ETYMOLOGY. — Very bright (Greek).

Fluxinella tenera sp. nov.

Figs 126-129

DESCRIPTION. — *Shell* (holotype) 4.60 mm wide, considerably broader than high, thin, spire 1.08 × as high as aperture; white, nacreous within.

Protoconch eroded, about 300 μm wide.

Teleoconch of 4.8 whorls, periphery sharply angulate, flange-like; base very suddenly contracted below periphery, convex. First 1.5 whorl eroded, next whorl shallowly concave below low subsutural bulge, subsequent whorls divided into 2 flattened zones, zone at abapical half slightly raised, shallowly concave on last adult whorl. Spire whorls entirely traversed by narrow, widely spaced, sigmoidal, collabral axial riblets. Abapical median spiral commencing on 2nd half of 3rd whorl, adapical median spiral commencing a whorl later, gradually enlarging to resemble abapical spiral; a weak secondary spiral commences at end of 4th whorl between abapical median spiral and periphery, vanishing within half a whorl. Spire whorls rendered dull by minute granules and obscure spiral lines. Outer base with 4 crisp spiral threads on peripheral flange, innermost 2 weaker. Inner base with 3 rounded spiral cords, innermost at umbilical rim; and rounded, fold-like axial riblets that resolve midway across base and enlarge towards umbilicus, extending around umbilical rim. Base with addition of minute granules, obscure spiral lines, and weak collabral growth lines, the latter most conspicuous on peripheral keel. Umbilicus deep, rim rounded to overhang minutely granulate, subvertical wall, diameter 22.8 % of shell diameter. Aperture subtrapezoidal, rim damaged. Outer lip simple within, posterior notch concave, from growth lines retraction depth 2.90 % and protraction depth 6.50 % of shell diameter; peripheral notch within keel, basal notch concave. Parietal lip thin. Inner lip thick, rim comprising inner and outer walls that are covered over at maturity, shallowly concave, produced and retracted at base to form low, rounded keel that borders narrow, concave basal channel.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.30 × 4.60 mm, 4.8 TW) : BIOCAL, stn DS 14.

DISTRIBUTION. — East of Ouvéa, Loyalty Islands, 3 680-3 700 m (dead).

REMARKS. — Compared with *Fluxinella euphanes*, which it most resembles, *F. tenera* differs primarily in having two median spiral cords on adult whorls, stronger basal spiral sculpture, an inwardly projecting umbilical rim, and a shallowly concave rather than convex umbilical wall.

ETYMOLOGY. — Delicate (Latin).

Fluxinella stirophora sp. nov.

Figs 130-134

DESCRIPTION. — *Shell* up to 4.20 mm wide, rather thin and fragile, umbilicate ; spire low, conical, 0.77-1.14 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 300 μm wide, surface obscurely and finely granulate.

Teleoconch of up to 5.25 whorls. First spire whorl weakly convex at first, grading to shallowly concave, 2nd and 3rd whorls shallowly concave, subsequently grading from concave to convex though remaining shallowly concave between suprasutural spiral and periphery ; periphery angulate, rendered shallowly serrate by axial riblets, base convex. Axial sculpture on spire consisting of fine, low, widely spaced, sigmoidal riblets. A suprasutural spiral thread commencing immediately, strong at first, progressively weakening, vanishing at end of 1st whorl. A second fine suprasutural spiral thread at about abapical third commencing at about mid 4th whorl, crisp throughout ; other fine threads commencing after 4th whorl and multiplying by intercalation, most crisply defined on abapical half of last adult whorl. Minute, crowded granules throughout. Base with a fine outer spiral thread, a very broad median zone that is smooth apart from fine collabral growth lines, and 3 or 4 inner spiral cords, the innermost strongest, smooth and separated by a conspicuous groove. Basal axial riblets confined to zone between periphery and outermost spiral thread, and between broad median zone and inner groove. Broad median zone and summits of inner basal spirals glossy, elsewhere roughened by minute granules. Umbilicus deep, rim angulate, diameter 23.6-23.8 % of adult shell diameter. Aperture ovate. Outer lip thin, not thickened within, mature rim damaged ; from growth lines posterior notch concave, retraction depth 4.9 % and protraction depth 8.1 % of shell diameter ; basal notch concave, no peripheral notch. Parietal glaze thin. Inner lip short, very thick, a strong, blunt, rounded denticle at base.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.10 × 4.10 mm, 5.25 TW) and paratype NMNZ (2.00 × 4.20 mm, 4.80 TW) : BIOCAL, stn DW 56. Paratype (MNHN) : BIOCAL, stn DW 51.

DISTRIBUTION. — Off southern New Caledonia, 694-705 m (dead).

REMARKS. — *Fluxinella stirophora* is highly distinctive among *Fluxinella* species in the combination of low spire, convex adult spire whorls, fine reticulate teleoconch sculpture, grooved umbilical rim, and deeply retracted posterior notch. *F. stirophora* is referred to *Fluxinella* because of its general resemblance to *F. euphanes* sp. nov. and *F. tenera* sp. nov. This placement is provisional, however, for when animals are available for comparison it may prove to belong in tribe Seguenziini, perhaps *Quinnia*, species of which have similarly shaped posterior notches and somewhat similar sculpture.

ETYMOLOGY. — Keeled (Greek).

Genus *BASILISSA* Watson, 1879

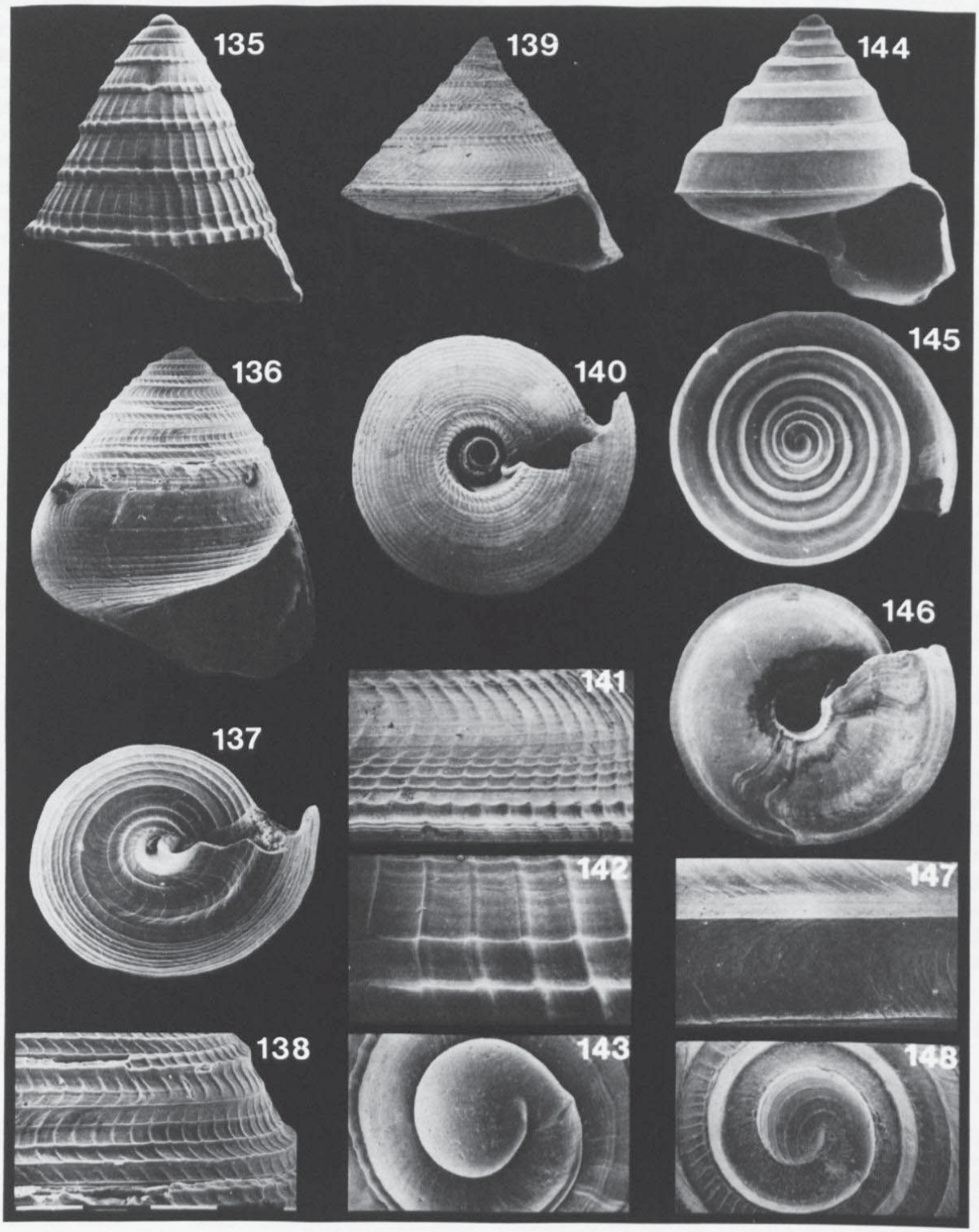
Basilissa Watson, 1879 : 593. Type species (by subsequent designation of COSSMANN, 1888) : *Basilissa superba* Watson, 1879 ; Recent, Coral Sea, east of Cape York.

REMARKS. — Although a number of species have been referred to *Basilissa* since its introduction, none are currently regarded as being congeneric with *B. superba* (QUINN, 1983b, 1987). It seems highly likely, however, that the Atlantic type species of *Thelyssa* Bayer, 1971 (*T. callisto* Bayer, 1971) belongs here.

Basilissa superba Watson, 1879

Figs 135, 142, 143, 284-287

Basilissa superba Watson, 1879 : 598 ; 1886 : 101, pl. 7, fig. 10. — CERNOHORSKY, 1978 : 33, pl. 8, fig. 4.



FIGS 135-148. — Genera *Basilissa, Halystina, Hadroconus, Carenzia* : **135, 142, 143,** *Basilissa superba* (juvenile), BIOCAL stn DS 59, 4.30 × 4.35 mm, 142 (last TW) × 30, 143 × 45. — **136, 138,** *Halystina siberutensis*, lectotype, 2.40 × 2.00 mm, 138 (late 3rd TW) × 55. — **137,** *H. siberutensis*, paralectotype, width 1.90 mm. — **139-141,** *Hadroconus grandiosus*, holotype, 9.00 × 11.0 mm, 141 (last TW) × 13. — **144-148,** *Carenzia nitens*, holotype, 2.50 × 2.60 mm, 147 (last TW) × 50, 148 × 70. (For various reasons Figs. 136-138 could not be included in systematic sequence).

DESCRIPTION (supplementary to the original). — Spire outline at first shallowly cyrtoconoid, becoming shallowly coeloconoid.

Protoconch globular, perfectly smooth, 530-600 μm wide, apertural rim flared.

Teleoconch : 1st whorl essentially smooth apart from peripheral keel, which is strong throughout. Axial riblets and traces of spiral threads gradually resolving late on 1st whorl, axials becoming clearly defined on 2nd whorl, spirals poorly defined on 1st 3 whorls, that beside peripheral keel enlarging more rapidly, becoming as strong as axials on 4th whorl, after which other spirals become as large.

Animal unknown (decayed).

Radula (Figs 284-287) whith the formula c. 12 + 1 + 1 + 1 + c. 12. Central tooth subrectangular, longer than broad, rigid, cutting area curving forward, angulate, median cusp strong, accessory cusps fine, 6-8 on each side, laterobasal projections weak. Lateral teeth broad, rigid, cutting area of each angulate, terminal cusp strong, accessory cups fine, about 18 on outer edge and 1 or 2 on inner edge. Innermost marginal broadest, thin in section, cutting area narrowly angulate, terminal cusp large, long series of fine accessory cusps on outer edge, fewer on inner edge. Outer marginals slender, cusps fine, narrowly conical, long series on outer edge, few on inner edge. Basal plate of each marginal flanged and grooved to interlock with laterals and with each other.

Jaw plates thin, subrectangular, considerably broader than long, elements short, longer anteriorly.

TYPE DATA. — Holotype BMNH 1887.2.9.354, Coral Sea, east of Cape York, Queensland, 2 560 m.

MATERIAL EXAMINED (5 specimens MNHN). — BIOCAL, stn CP 13 (1 adult). — Stn CP 17 (1 adult, 1 subadult). — Stn DS 59 (2 juveniles).

DISTRIBUTION. — Northern Coral Sea (2 560 m), off Lifou, Loyalty Islands (3 680-3 740 m) and off southern New Caledonia (2 560 m), living at 3 690-3 740 m.

REMARKS. — The present specimens agree well with the holotype. Judging from the description and illustrations (OKUTANI, 1982), specimens from the Philippine Sea (3 210-3 680 m) are also similar, but differ in having the umbilicus partly closed by a septum. The Coral Sea and Philippine Sea populations are separated by island arcs and deep trenches, and the status of the Philippine Sea form is uncertain. The jaw plates, which disintegrated during cleaning, are considerably broader relative to length than in *Ancistrobasis*, *Calliobasis* and *Fluxinella*. Convoluted interlocking marginal basal plates have not been hitherto recorded from the family, but since the bases of the marginal teeth of other seguenziids have not been studied, their significance is uncertain. This aptly named species is the largest seguenziid known, the largest of the present specimens (BIOCAL stn CP 17) having a diameter of 17.7 mm and an estimated height of 21 mm. See Discussion page 107.

Tribe SEGUENZIINI

Genus *HADROCONUS* Quinn, 1987

Hadroconus Quinn, 1987 : 61. Type species (by original designation) : *Basilissa alta* Watson, 1879 ; Recent, Atlantic central America.

Hadroconus grandiosus sp. nov.

Figs 139-141

DESCRIPTION. — *Shell* (holotype) 11.0 mm wide, broader than high, thin, umbilicate, spire 1.75 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 400 μm wide, surface eroded.

Teleoconch of 7.8 whorls ; 1st whorl convex, subsequent whorls flattened, suture flush, periphery angulate, base suddenly contracted, weakly convex. Axial riblets fine, crisp, opisthocline and noncollabral on spire ; sigmoidal, collabral and much weaker on base, though forming prominent, rounded, radial pleats at umbilical rim.

Spire spirals multiplying by intercalation, absent from broad median zone on 3rd-6th whorl, after which evenly distributed over adapical three quarters. Spiral at abapical quarter strongest, angulate in section, with small conical nodules at intersections with axials ; other spirals similar in size, thread-like. Basal spiral cords increasing in number to 18 ; outer 5 similar, angulate, interspaces broader than each spiral ; inner spirals flattened, interspaces narrower than each spiral. Umbilicus deep, diameter 25.4 % of shell diameter. Aperture trapezoidal. Outer lip thin, slightly thickened within ; posterior notch broad, rim damaged, retraction depth 3.6 % of shell diameter, protraction depth unknown (though certainly at least 11 % of shell diameter) ; basal notch shallow, concave ; peripheral notch within peripheral angulation, not retracted. Parietal glaze thin. Inner lip rather thick, rim tightly folded towards umbilicus, curved towards umbilicus at insertion, almost straight below, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (9.00 × 11.00 mm, 7.8 TW) : BIOCAL, stn CP 57.

DISTRIBUTION. — South of New Caledonia, 1 490-1 620 m (dead).

REMARKS. — Compared with the closely similar *H. altus* (Watson, 1879) (north-western Atlantic, c. 500-2 360 m), *H. grandiosus* differs primarily in having considerably closer, more numerous axial riblets that form weaker nodules at the periphery. It differs from *H. sibogae* (Schepman, 1908) (Indonesia, 1 158-1 301 m) in having more numerous spiral threads on the spire and weaker axials on the base, and from *H. diadematus* Marshall, 1988 (New Zealand, 1 463-1 457 m) in having fewer spiral threads on the spire before the last adult whorl, and in being smaller relative to the number of whorls.

ETYMOLOGY. — Enlarged (Latin).

Genus *CARENZIA* Quinn, 1983

Carenzia Quinn, 1983 : 355. Type species (by original designation) : *Seguenzia carinata* Jeffreys, 1877 ; Recent, North Atlantic.

Carenzia nitens sp. nov.

Figs 144-148

DESCRIPTION. — *Shell* up to 2.62 mm wide, about as broad as high, thin, umbilicate, spire 1.15-1.28 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

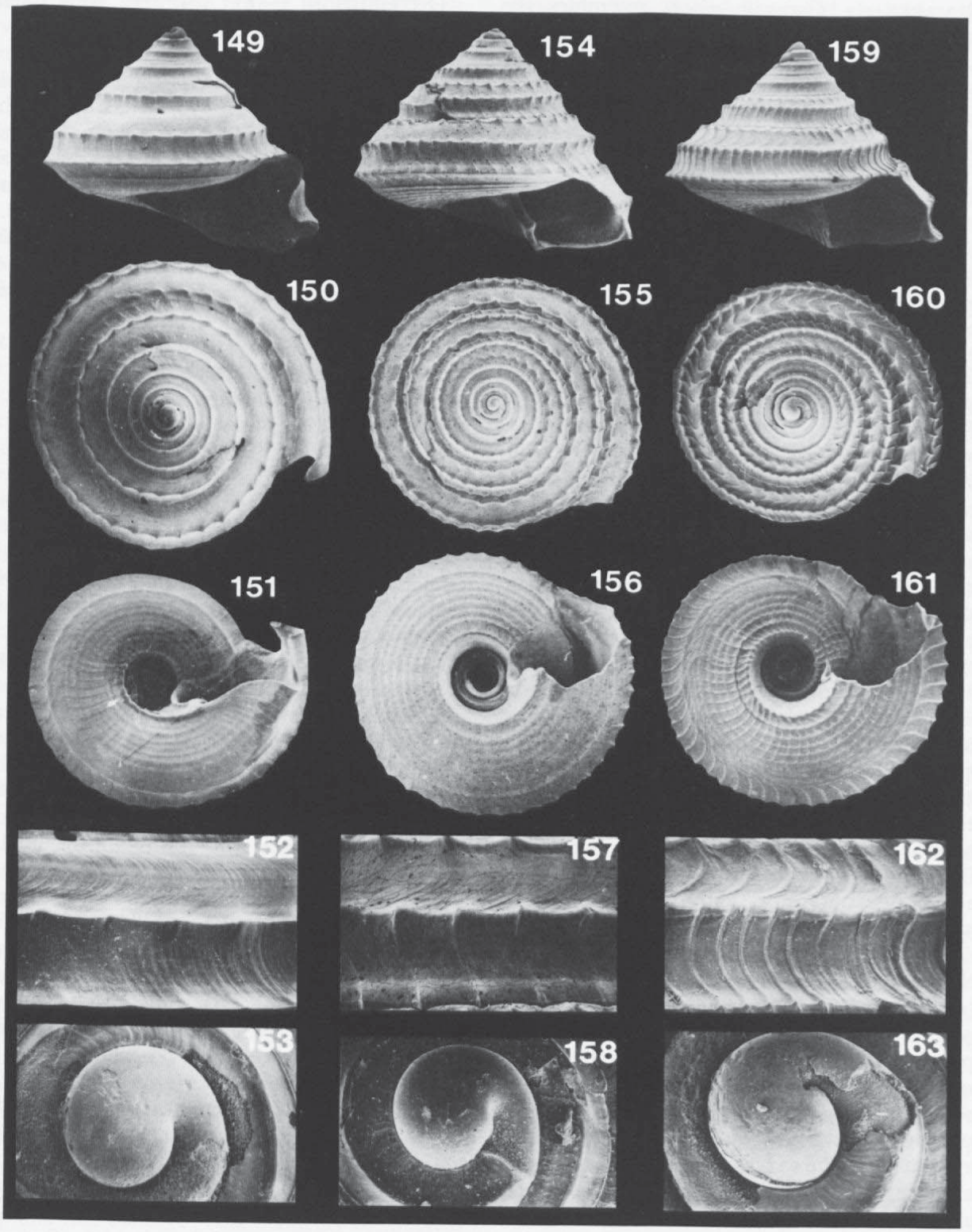
Protoconch 270-300 μm wide, with 6 fine spiral threads that vanish before apertural rim.

Teleoconch of up to 4.9 whorls, shoulder and peripheral angulations smooth ; ramp flat at first, becoming weakly convex ; side shallowly concave throughout or becoming flat ; base suddenly contracted, convex. Shoulder angulation supramedian, sharp, not projecting, becoming obsolete late on last adult whorl. Peripheral keel strong, sharply angulate. Base with weak spiral cord near periphery, obscure spiral lines, and rounded spiral cord at umbilical rim. First whorl finely and sparsely granulate. Fine collabral axial riblets commence late on 1st whorl, crisply defined on ramp, weaker on side, weakening and vanishing on 1st half of 3rd whorl. Subsequent whorls otherwise smooth apart from fine collabral growth lines. Umbilicus deep, diameter 16.7-28.6 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin, simple within ; posterior notch retraction depth 5.11 % and protraction depth at least 15 % of shell diameter (tip of labial projection broken) ; basal notch shallower, peripheral notch weak. Parietal glaze thin. Inner lip curved toward umbilicus, flexed near base to form small rounded tooth.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.50 × 2.60 mm, 4.5 TW) and 2 paratypes MNHN, NMNZ (2.40 × 2.40 mm, 4.6 TW ; 2.20 × 2.62 mm, 4.9 TW) : BIOCAL, stn DW 79. Paratypes (3 MNHN) : BIOCAL, stn CP 57.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, and southern New Caledonia, 1 320-1 620 m (dead).



FIGS 149-163. — Genus *Carenzia* : **149-153,** *Carenzia serrata*, holotype, 2.85 × 3.45 mm, 152 (last TW) × 40, 153 × 100. — **154-157,** *C. acanthodes*, holotype, 3.95 × 5.10 mm, 157 (last TW) × 30. — **158,** *C. acanthodes*, paratype, BIOCAL stn CP 26, × 70. — **159-163,** *C. ornata*, holotype, 2.70 × 3.60 mm, 162 (last TW) × 40, 163 × 80.

REMARKS. — *Carenzia nitens* resembles the New Zealand species *C. fastigiata* Marshall, 1983, and differs in attaining maturity at smaller size, and in having a weaker, unpleated peripheral keel.

ETYMOLOGY. — Shining (Latin).

Carenzia serrata sp. nov.

Figs 149-153

DESCRIPTION. — *Shell* up to 3.45 mm wide, broader than high, rather thin, umbilicate, spire 1.17 × as high as aperture, glossy ; white, nacreous through thin, translucent outer shell layer.

Protoconch 270 μm wide, very finely granulate at extreme tip of apical fold, elsewhere smooth.

Teleoconch of up to 5.75 whorls, shoulder and periphery angulated by sharp keels, ramp shallowly concave at first, becoming weakly convex ; side concave ; base suddenly contracted, weakly convex. Shoulder keel strongly supramedian at first, descending until almost median, peripheral keel more strongly projecting ; both smooth at first, with small, sharp, conical nodules after 3rd whorl. Nodules coinciding with weak axial riblets between shoulder keel and outermost basal spiral, axials strongest on shoulder and peripheral keels, and between peripheral keel and outermost basal spiral, almost obsolete between keels and beside outermost spiral. Spire whorls otherwise smooth apart from fine, sigmoidal, collabral growth lines. Base with 11 spiral cords, the 2 beside outermost spiral ill-defined, inner 9 spirals reticulating with fine collabral axial riblets. Umbilicus deep, diameter 26 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin at rim, modestly thickened within, posterior notch concave, rim flared, retraction depth 8.7 % and protraction depth 11.6 % of adult shell diameter ; basal notch narrower, rim flared ; periphery not retractively notched though adult rim concave and flared. Parietal glaze very thin. Inner lip curved toward umbilicus, flexed near base to form strongly projecting rounded tooth.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.85 × 3.45 mm, 5.75 TW) : BIOCAL, stn CP 26. Paratype (1 MNHN) : BIOCAL, stn CP 57.

DISTRIBUTION. — Off southern New Caledonia, 1 490-1 740 m (dead).

REMARKS. — Compared with *C. trispinosa* (Watson, 1879) (QUINN, 1983a, figs 8-12), which it most closely resembles, *C. serrata* differs in having the shoulder angulation set considerably lower on the whorls, and in having a smaller protoconch (diameter 270 μm, cf. 380 μm). It differs from the New Zealand species *C. fastigiata* Marshall, 1983 in having a lower peripheral keel and prominent nodules on the shoulder angulation.

ETYMOLOGY. — Saw-toothed (Latin).

Carenzia acanthodes sp. nov.

Figs 154-158

DESCRIPTION. — *Shell* up to 5.10 mm wide, markedly broader than high, of moderate thickness, stout, widely umbilicate, spire 1.76 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 330-370 μm wide, tip excert, sparsely and very finely granulate.

Teleoconch of up to 6.10 whorls, shoulder and periphery angulated by projecting, angulate keels, ramp more or less flat, side concave, base suddenly contracted, weakly convex. Spire with 3 spiral keels, shoulder keel strongly supramedian at first, descending until almost median, keels smooth at first, shoulder and peripheral keels with conical nodules on 3rd and subsequent whorls ; subsutural keel gradually resolving from low, rounded swelling, with conical nodules on 4th and subsequent whorls. Nodules coinciding with weak collabral axial riblets that gradually resolve on 2nd whorl, most crisply defined between shoulder keel and outermost basal spiral, almost obsolete on ramp. Spire otherwise smooth apart from obscure spiral lines and fine, sigmoidal, collabral growth lines. Adult base with 8 subequal spiral cords and weaker collabral axial riblets. Umbilicus deep, perspective to protoconch, diameter 32.5-34.0 % of adult shell diameter. Aperture subrhomboidal. Outer lip simple within, intact rim unknown, from growth lines retraction depth 5.88 % and protraction depth 6.52 % of shell diameter ; basal notch shallower, very slightly notched at periphery.

Parietal glaze very thin. Inner lip rather thick, curved toward umbilicus, flexed near base to form small rounded tooth.

Animal unknown.

TYPE DATA. — Holotype MNHN (3.95 × 5.10 mm, 6.10 TW) : BIOCAL, stn CP 26. Paratypes (4 MNHN, 1 NMNZ) : BIOCAL, stn DW 79.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands and southern New Caledonia, 1 320-1 740 m (dead).

REMARKS. — *Carenzia acanthodes* closely resembles *C. melvilli* (Schepman, 1909) (Makassar Strait, Indonesia, 1 301 m) in general facies and the two species are undoubtedly closely related congeners. By direct comparison with the holotype (ZMA), *C. acanthodes* differs in having a lower, more broadly conical spire, and a substantially broader umbilicus (diameter 32.2-34.0 % cf. 27.2 % of shell diameter). Although the two forms are interpreted as distinct species, it must be admitted that there is currently insufficient material to assess the limits of variation in shell morphology. Compared with *C. serrata* sp. nov., with which it occurred at BIOCAL station CP 26, *C. acanthodes* differs in having a larger protoconch, in attaining larger size, and in having a more strongly nodular subsutural spiral.

ETYMOLOGY. — Prickly (Greek).

Carenzia ornata sp. nov.

Figs 159-163

DESCRIPTION. — *Shell* up to 3.60 mm wide (immature ?) markedly broader than high, rather thin, widely umbilicate, spire up to 1.40 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 370-380 μm wide, surface almost entirely etched away but intact surface beside suture apparently smooth.

Teleoconch of up to 5.1 whorls, shoulder and periphery angulated by sharply angulate keels, ramp and side concave ; base suddenly contracted, weakly convex. Shoulder keel strongly supramedian at first, descending until almost median, peripheral keel stronger and more narrowly angulate. Shoulder and peripheral keels smooth at first, small conical nodules on peripheral keel after late 1st whorl and on shoulder keel after 2nd whorl. An angulate subsutural keel with small conical nodules commences late on 3rd whorl. Summits of keels on last 2 adult whorls with fine spiral threads, 2 each on subsutural and peripheral keels, 3 on shoulder keel, additional threads between periphery and outermost basal spiral. Axial riblets fine, crisp, sigmoidal, collabral, commencing late on 1st whorl. Axials at first between shoulder and periphery, extending adapically onto ramp on 1st half of 3rd whorl and progressively extending to suture. From late 3rd whorl axials continuous over spire whorls and base, including outer part of umbilical wall. Base either with 9 spiral cords, the outer 3 weaker, or 8 similar spiral cords. Umbilicus deep, rim sharply angulate, diameter 27.8 % of shell diameter. Aperture subrhomboidal, intact rim unknown. From growth lines retraction depth 2.77 %, and protraction depth 10.19 % of shell diameter. Parietal glaze very thin. Inner lip (immature ?) thin, shallowly sigmoidal, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.70 × 3.60 mm, 5.1 TW) : BIOCAL, stn CP 72. Paratypes (2 MNHN) : BIOCAL, stn DS 59.— Stn DS 98.

DISTRIBUTION. — Off southern New Caledonia, 2 100-2 650 m (dead).

REMARKS. — *Carenzia ornata* most closely resembles *C. melvilli* (Schepman, 1909) and *C. acanthodes* sp. nov., differing from the former in having finer sculpture on the spire and a broader umbilicus, and from the latter in having a larger protoconch, a thinner shell, and closer and stronger axial sculpture. That the present specimens may be immature is suggested by the exceptionally large protoconch and the simple inner lip.

ETYMOLOGY. — Ornate (Latin).

Genus *QUINNIA* Marshall, 1988

Seguenziella Marshall, 1983 : 245. Type species (by original designation) : *Seguenziella patula* Marshall, 1983 ; Recent, New Zealand (not *Seguenziella* Neviani, 1901, not Sacco, 1904).
Quinnia Marshall, 1988 : 242. Replacement name for *Seguenziella* Marshall, 1983 (preoccupied).

Quinnia patula (Marshall, 1983)

Figs 164-168 ; Table 16

Seguenziella patula Marshall, 1983 : 245, figs 4 a-e, 8 j-l.
Quinnia patula - MARSHALL, 1988 : 242.

TYPE DATA. — Holotype. NZOI H. 377 : P 939, 41°20′ S, 166°54.8′ E, E slope of Tasman Basin, off Westport, New Zealand, 1 760-1 799 m, 22 April 1980, R. V. " *Tangaroa* ".

OTHER MATERIAL EXAMINED (3 specimens MNHN). — BIOCAL, stn CP 72 (1). — Stn DS 98 (2).

DISTRIBUTION. — Off southern New Caledonia (dead, 2 100-2 470 m) and off Westport, New Zealand (alive, 1 760-1 799 m).

REMARKS. — I am unable to detect any taxonomically significant differences between New Caledonian and New Zealand specimens. The species is extremely similar to *Q. cazioti* (Dautzenberg, 1925), based on a specimen taken at 2 286 m off Madeira.

TABLE 16. — *Quinnia patula*. Shell measurements (mm) and countings.

H	D	H/D	TW	UD%	
5.65	8.40	0.67	6.10	23.4	Holotype
4.60	7.30	0.63	5.75	31.5	BIOCAL, stn CP 72
3.90	6.10 (est.)	0.64	5.40	30.3	BIOCAL, stn DS 98
2.00	3.40	0.59	4.00	23.5	Paratype
1.30	2.45	0.53	3.20	28.5	BIOCAL, stn DS 98

Quinnia laetifica sp. nov.

Figs 169-173

DESCRIPTION. — *Shell* up to 4.20 mm wide, broader than high, thin, umbilicate, spire about as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 370 µm wide, minutely granulate.

Teleoconch of up to 4.70 weakly convex, shouldered whorls. Shoulder angulation sharp, supramedian at first, descending to submedian position, ramp and side shallowly concave. Peripheral angulation similar to shoulder angulation, base rather gently contracted, convex. Spire whorls with similar, fine, crisp, sigmoidal, collabral axial riblets, and spiral threads, very minutely granulate throughout. Axial riblets evenly developed over spire to outermost basal spiral, weaker on base, evanescent on umbilical wall. Spiral threads multiplying by intercalation, at start of last adult whorl numbering 3 or 7 on ramp and 3 or 4 on side, subsutural spiral surmounting low angulation that commences on 2nd half of 3rd whorl. Base with 2 or 3 fine outer spiral threads below periphery, and 9 stronger cords that enlarge towards umbilicus ; interspaces considerably wider than each spiral, locally with addition of 1 or 2 intercalating spiral threads. Umbilicus deep, rim sharp, diameter 25.6-28.5 % of adult diameter. Aperture subrhomboidal. Outer lip rim damaged, not thickened within ; from growth lines posterior notch well retracted from suture, apex roundly angulate, retraction depth 4.28 % and protraction depth 9.41 % of shell diameter ; basal notch rounded ; no peripheral notch. Inner lip thin, simple.

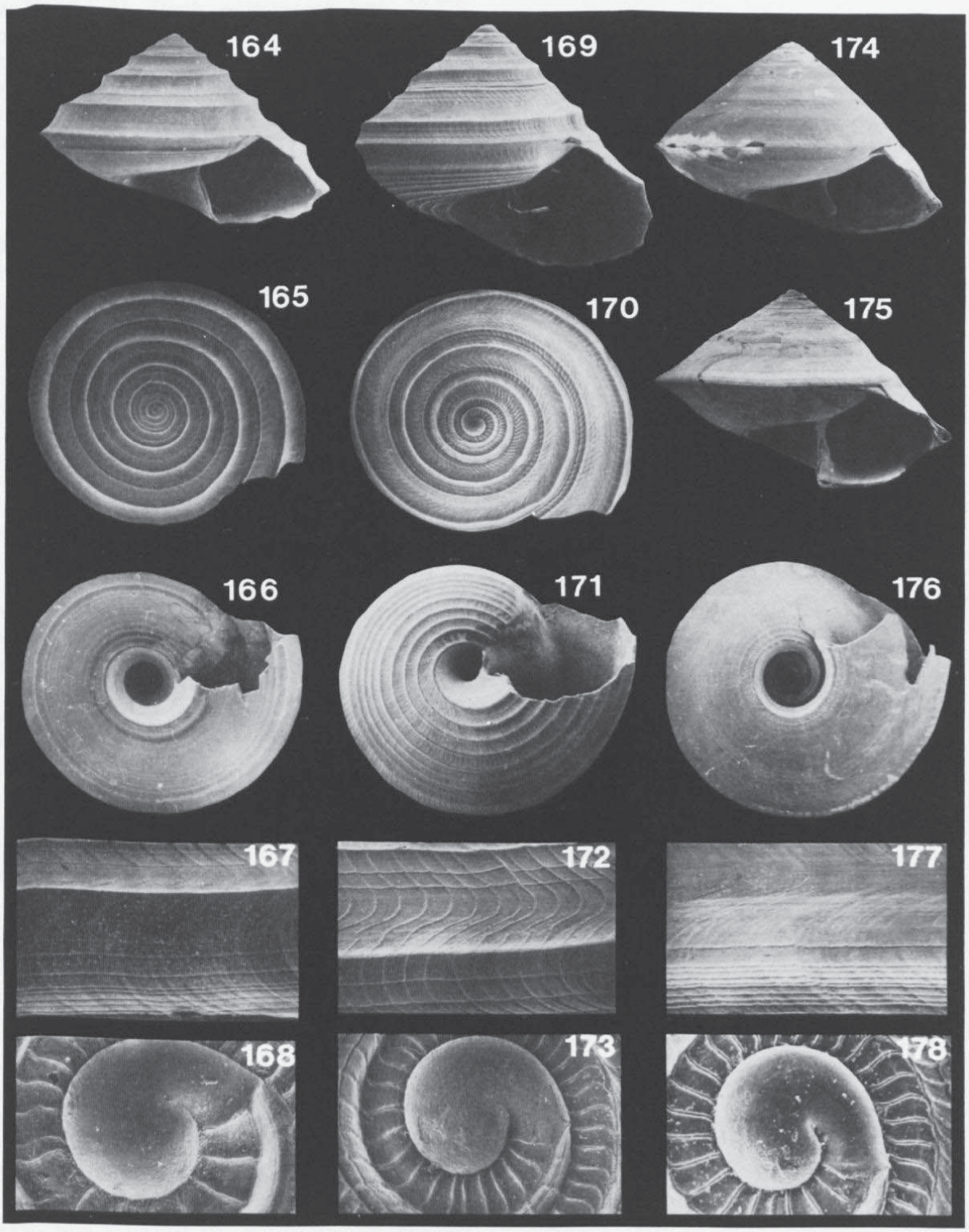
Animal unknown (dried).

TYPE DATA. — Holotype (3.02 × 3.90 mm, 4.40 TW) and paratype (3.58 × 4.20 mm, 4.70 TW) MNHN : BIOCAL, stn CP 23 (alive).

DISTRIBUTION. — Off southern New Caledonia, 2 040 m (alive).

REMARKS. — *Quinnia laetifica* differs from *Q. patula* and *Q. cazioti* in having a submedian instead of supramedian shoulder angulation, a taller spire, stronger spiral sculpture on the base, and a narrower umbilicus.

ETYMOLOGY. — Gladdening (Latin).



FIGS 164-178. — Genus *Quinnia* : **164-167,** *Quinnia patula*, BIOCAL stn CP 72, 4.60 × 7.30 mm, 167 (last TW) × 25. — **168,** *Q. patula*, BIOCAL stn DS 98, × 75. — **169-173,** *Q. laetifica*, 3.02 × 3.90 mm, 172 (last TW) × 40, 173 × 70. — **174,** *Q. limatula*, paratype, BIOCAL stn CP 26, 4.52 × 6.90 mm. — **175-178,** *Q. limatula*, holotype, 3.60 × 5.40 mm, 177 (last TW) × 40, 178 × 80.

Quinnia limatula sp. nov.

Figs 174-178

DESCRIPTION. — *Shell* up to 6.90 mm wide, broader than high, thin, umbilicate, spire 0.71-1.11 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 330 μm wide, tip minutely granulate, last half whorl smooth.

Teleoconch of up to 5.9 whorls ; 1st whorl with strong supramedian shoulder angulation, angulation weakening and vanishing over next half whorl, subsequent whorls very weakly concave or convex, periphery sharply angulate ; base suddenly contracted, convex, flattened below periphery. Axial riblets fine, sigmoidal, collabral, entirely traversing 1st 2 whorls, after which obsolete in supramedian band, crisp on 1st 3.5 whorls, thereafter obsolete. Spiral threads crisp, similar to axials on early whorls, multiplying by intercalation, becoming obsolete over abapical half or two thirds of each whorl on 3rd or 4th whorl, reappearing in subsutural zone on last adult whorl. Base finely lirate over outer third, umbilicus bounded by 3-5 smooth spiral cords, innermost 3 most widely spaced and with axial riblets in interspaces, median third with weakly defined grooves and obscure spiral lines. Umbilicus deep, wall vertical, diameter 27.5-29.6 % of shell diameter. Aperture subtrapezoidal. Outer lip rim damaged, with narrow median tubular cavity in peripheral and basal angulation, from collabral growth lines retraction depth 3.7 % and protraction depth 16.7 % of shell diameter ; basal notch concave ; peripheral notch within peripheral angulation, not retracted. Parietal glaze thin. Inner lip (adult paratype) rather thin, curved towards umbilicus, abapical end broken but probably flexed to form a small tooth.

Animal unknown.

TYPE DATA. — Holotype MNHN (3.60 × 5.40 mm, 5.25 TW) : BIOCAL, stn DW 79. Paratype MNHN (4.52 × 6.90 mm, 5.9. TW) : BIOCAL, stn CP 26.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands and southern New Caledonia, 1 320-1 740 m (dead).

REMARKS. — *Quinnia limatula* differs from all known species of *Quinnia* in lacking a shoulder angulation on all but the earliest teleoconch whorls. Unlike *Q. patula, Q. cazioti* and *Q. laetifica*, this species probably has a tooth on the adult inner lip, a character shared with possible congeners *Seguenzia ionica* Watson, 1879 and *S. rushi* Dall, 1927. Apart from the lack of a shoulder angulation on later whorls, and the probable presence of a tooth on the inner lip, *Q. limatula* is essentially similar to typical *Quinnia* species. The tubular cavities in the outer lip rim at the peripheral and basal angulations are characters hitherto unknown from this family.

ETYMOLOGY. — Somewhat polished (Latin).

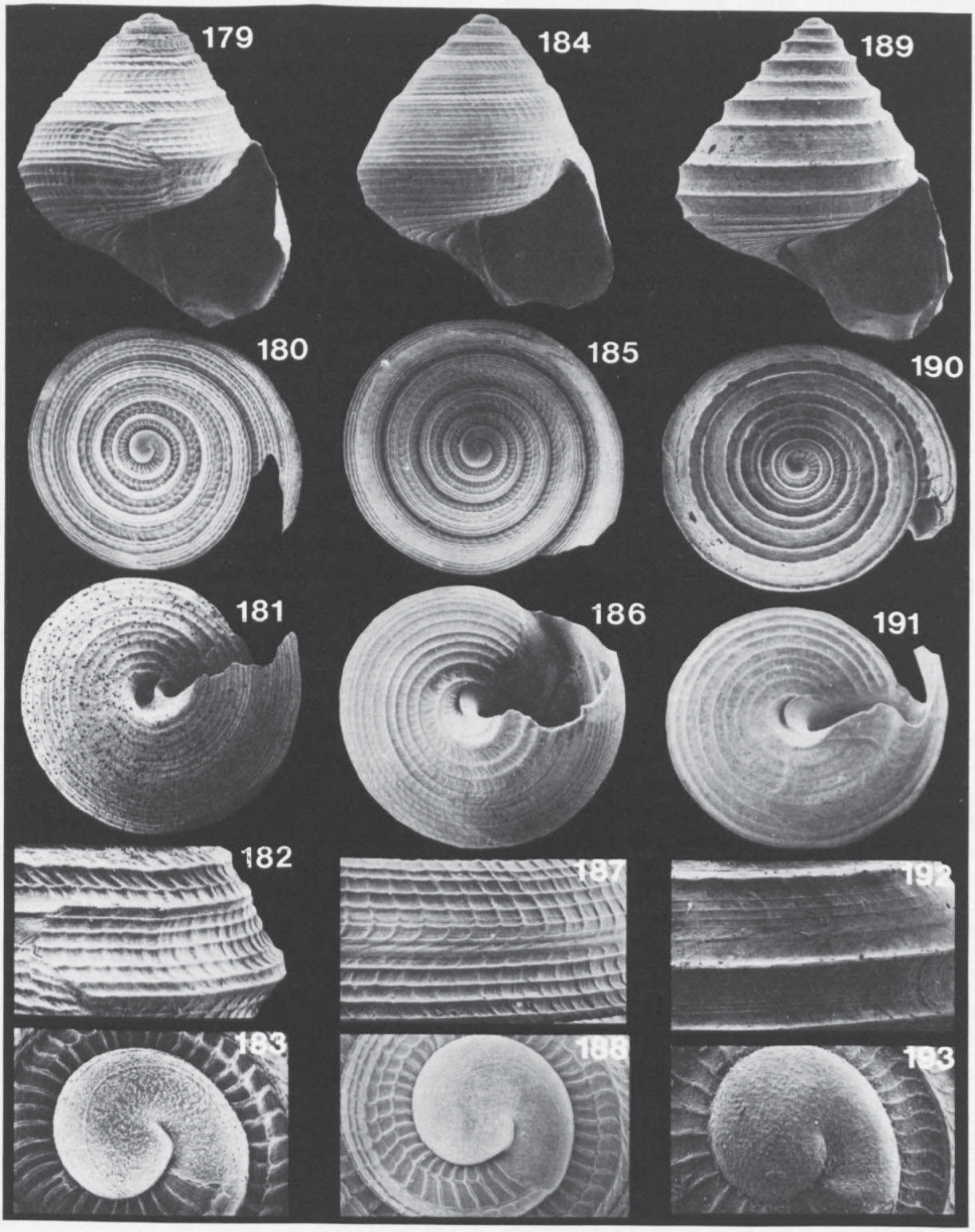
Genus *HALYSTINA* gen. nov.

TYPE SPECIES. — *Halystina caledonica* sp. nov.

ETYMOLOGY. — Diminutive of seguenziid genus *Halystes* Marshall, 1988, which is an anagram of the seguenziid genus *Thelyssa* Bayer.

DIAGNOSIS. — Shell 2.1-4.0 mm high, depressed or narrowly turbiniform, narrowly umbilicate. Protoconch finely granulate, with or without 2 fine spiral threads. Teleoconch whorls becoming almost flat-sided. Sculpture of collabral axial and spiral riblets, axials well-developed throughout or soon becoming obsolete, with or without stronger, angulating spirals on spire. Posterior apertural notch broad, protraction depth 9.7-25.2 % of shell diameter. Columella toothless. External anatomy unknown (animals dried). Radula similar to that in *Halystes* and *Seguenzia*.

REMARKS. — Apart from the three species described below, this genus contains *Seguenzia siberutensis* Thiele, 1925 (off Siberut Island,



FIGS 179-193. — Genus *Halystina* : **179, 180, 182, 183,** *Halystina vaubani*, holotype, 1.80 × 1.70 mm, 182 × 55, 183 × 110. — **181,** *H. vaubani*, paratype, " *Vauban* " stn 40, width 1.80 mm. — **184-188,** *H. caledonica*, holotype, 3.00 × 2.70 mm, 187 × 40, 188 × 85. — **189-193,** *H. carinata*, holotype, 3.40 × 3.18 mm, 192 × 33, 193 × 95.

western Sumatra, 750 m), and *S. simplex* (Barnard, 1963) (off Cape Point, South Africa, 1 280 m). It is thus equivalent to *Seguenzia* Group III of QUINN (1983). Members of the group are extremely similar to the abyssal type species of *Halystes* Marshall, 1988 (*H. chimaera* Marshall, 1988) in gross facies, but differ collectively in attaining smaller maximum size (height 2.1-4.0 mm, cf. 8.6 mm), and in having narrower and deeper posterior notches (maximum depth 9.7-25.2 %, cf. 2.3 % of shell diameter). Although *Halystina* is here interpreted as a discrete monophyletic radiation, *Halystes chimaera* may prove to be an aberrant member of the same group, in which case *Halystina* might be better placed as a subgenus. Until animals of *Halystina* species are available for comparison with that of *H. chimaera*, I prefer to treat *Halystes* and *Halystina* as distinct, closely related genera. The central radular tooth in *H. caledonica* is shorter than in *H. chimaera*. Both groups appear to be closely related to *Rotellenzia* Quinn, 1987 (type species *Basilissa lampra* Watson, 1879).

Halystina caledonica sp. nov.

Figs 184-188, 282, 283 ; Table 17

DESCRIPTION. — *Shell* up to 3.35 mm high, higher than broad, umbilicus mostly invaded by inner lip, thin ; spire weakly cyrtoconoid, 0.77-0.82 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

TABLE 17. — *Halystina caledonica*. Shell measurements (mm) and countings. (BIOCAL, stn DS 04, DS 98).

Character	*n*	Range	Mean	SD
H	6	2.85-3.35	3.07	0.16
D	6	2.40-2.95	2.78	0.20
H/D	6	1.05-1.19	1.11	0.05
TW	6	4.40-4.50	4.45	0.05

Protoconch 330 μm wide, minutely granulate.

Teleoconch of up to 4.5 whorls ; 1st 2 whorls convex, subsequent whorls flat above rounded periphery, base convex. Very minutely granulate throughout. Axial riblets fine, crisp, sigmoidal, collabral, traversing spire and base, evanescent on outer part of umbilical wall. Spiral threads fine, crisp, similar on spire and base, multiplying by intercalation, numbering about 12 at start of last adult whorl and 12-16 on base, an additional thread on outer part of umbilical wall in most adults. Umbilicus reduced to a shallow crescentic depression by invading inner lip. Aperture subtrapezoidal. Outer lip thin ; posterior notch broad, retraction depth 6.9-7.0 % and protraction depth 17.2-18.6 % of shell diameter ; basal notch concave, apical rim slightly flared ; peripheral notch shallow, concave. Parietal glaze thin. Inner lip almost straight, toothless.

Animal unknown (dried).

Radula (Figs 282, 283). Central tooth subovate, longer than broad, thin in section, flexible, cutting area curving forward from shaft, narrowly angulate, terminal cusp large, accessory cusps fine, about 8 on each side, shaft tapered to horizontal basal plate. Lateral teeth broad, thin in section, flexible, cutting area narrowly angulate, terminal cusp large, 4-6 fine, accessory cusps on each side. Marginal teeth slender, terminal cusp of each very long and slender, a few fine accessory cusps on outer edge.

Jaw not found, reduced or absent.

TYPE DATA. — Holotype (3.00 × 2.70 mm, 4.5 TW) and paratype MNHN : BIOCAL, stn DS 04. Paratypes (3 MNHN, 1 NMNZ) : BIOCAL, stn DS 98.

DISTRIBUTION. — Between New Caledonia and Lifou, Loyalty Islands, 2 340-2 470 m, living at 2 340 m.

REMARKS. — Compared with *Halystina siberutensis*, which it much resembles in general facies, *H. caledonica* differs in sculptural details, in attaining maturity at larger size (height 3.40-4.00 mm cf. 2.40 mm) and in having a larger protoconch (width 330 μm cf. 230 μm).

ETYMOLOGY. — (New) Caledonian.

Halystina carinata sp. nov.

Figs 189-193 ; Table 18

DESCRIPTION. — *Shell* up to 4.00 mm high, slightly higher than broad at maturity, thin, umbilicus invaded by inner lip, sometimes with a fine crescentic chink, spire 1.13-1.15 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 300-310 μm wide, minutely granulate.

Teleoconch of up to 5.75 whorls ; shoulder angulated by sharp-edged keel, ramp and side more or less flat ; periphery rounded, with smooth angulate keel, base convex. Shoulder keel strongly supramedian on 1st whorl, descending to submedian position, smooth ; subsutural angulation commencing on about mid 3rd whorl, summit undulant throughout. Axial riblets collabral, fine, crisp on 1st 2 whorls, weakening on 3rd whorl, becoming obsolete on 4th whorl, sometimes reappearing on ramp on last part of last adult whorl. Spiral threads fine, crisp, multiplying by intercalation, commencing on 3rd whorl, covering last adult whorl from suture to periphery and between periphery and outmost basal spiral. Base with 8-10 smooth, subequal spiral cords, interspaces considerably wider than each spiral. Aperture subtrapezoidal. Outer lip thin, slightly thickened within ; posterior notch retraction depth 9.6-10.7 % and protraction depth 21.5-25.2 % of shell diameter ; basal notch concave, gently flared ; peripheral notch small, shallow. Parietal glaze thin. Inner lip rather thick, spreading into and almost or entirely infilling umbilicus, almost straight, toothless.

Animal unknown.

TABLE 18. — *Halystina carinata*. Shell measurements (mm) and countings. (BIOCAL, stn DW 79).

Character	*n*	Range	Mean	SD
H	8	3.35-4.00	3.54	0.20
D	8	3.03-3.38	3.22	0.12
H/D	8	1.05-1.18	1.09	0.04
TW	8	5.20-5.75	5.36	0.19

TYPE DATA. — Holotype MNHN (3.40 × 3.18 mm, 5.4 TW) and 11 paratypes (AMS, BMHN, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 79.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 1 320-1 380 m (dead).

REMARKS. — *Halystina carinata* differs markedly from its congeners in having angulate subsutural, shoulder and peripheral keels. The South African *H. simplex* (Barnard, 1963) resembles it in having a shoulder angulation, but in *H. carinata* the angulation is set lower on later whorls, the spire is more narrowly conical, there are more numerous basal spire cords, while the umbilicus is closed instead of fully open.

ETYMOLOGY. — Keeled (Latin).

Halystina vaubani sp. nov.

Figs 179-183 ; Table 19

DESCRIPTION. — *Shell* up to 2.10 mm high, about as high as broad, thin, narrowly umbilicate, spire 0.75-0.92 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

TABLE 19. — *Halystina vaubani*. Shell measurements (mm) and countings. (" *Vauban* ", stn 40).

Character	*n*	Range	Mean	SD
H	10	1.72-2.10	1.92	0.12
D	10	1.70-1.82	1.78	0.04
H/D	10	0.98-1.15	1.07	0.06
TW	10	3.80-4.40	4.15	0.17

Protoconch 330-400 μm wide, sculptured with minute granules and 2 fine spiral threads.

Teleoconch of up to 5.75 whorls ; 1st spire whorl convex, subsequent whorls almost flat, with low angulate keels at about adapical third and subsuturally ; periphery broadly angulate ; base convex, on last adult whorl becoming shallowly concave from midway between periphery and umbilicus to innermost 2 spiral threads. Last part of last adult whorl becoming steeper-sided. Axial riblets fine, sigmoidal, collabral, crisp on spire, weaker on base where typically absent from a median spiral band. Spiral threads fine, crisp, traversing axials, multiplying by intercalation, numbering 7-9 on spire at start of last whorl, and 10-12 on base. Very minutely granulate throughout. Umbilicus conical, diameter 18.3-23.1 % of adult shell diameter. Aperture subquadrate. Outer lip thin ; posterior notch broad, shallow, rim damaged, from collabral sculpture retraction depth 5.8 % and protraction depth 9.7 % of shell diameter ; basal notch concave, rim gently flared ; peripheral notch shallow, angulate. Parietal glaze thin. Inner lip thin, almost straight, toothless.

Animal unknown.

TYPE DATA. — Holotype MNHN (1.80 × 1.70 mm, 4.0 TW) and 32 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : " *Vauban* ", stn 40.

DISTRIBUTION. — Off southern New Caledonia, 250-350 m (dead).

REMARKS. — Compared with *H. siberutensis* (Figs 136-138) to which it is closely similar, *H. vaubani* differs in having considerably narrower, more crisply defined spiral threads on the last adult whorl, and in having a low angulation at the adapical third on the spire whorls, while the innermost two basal spiral threads are finer, and the inner base is more shallowly concave at the same stage of growth. Moreover, *H. vaubani* appears to attain maturity at smaller size (maximum height 2.10 mm, cf. 2.40 mm), and does not become as distinctly pupoidal in outline at maturity. Of the 14 syntypes of *H. siberutensis* (Zoological Museum, Berlin) the specimens here chosen as lectotype (Figs 136-138) closely matches the original illustration (THIELE, 1925, Pl. 1, figs 13-14) and agrees well with the original given dimensions (2.4 × 1.9 mm).

ETYMOLOGY. — Named after N. O. "*Vauban* ".

Genus ***SEGUENZIA*** Jeffreys, 1876

Seguenzia Jeffreys, 1876 : 200. Type species (by monotypy) : *Seguenzia formosa* Jeffreys, 1876 ; Recent, North Atlantic.

Seguenzia chelina Marshall, 1983

Figs 194-197 ; Table 20

Seguenzia chelina Marshall, 1983 : 240, figs 2 k-o.

TYPE DATA. — Holotype NZOI H. 371 : P 929, 40°42.8′ S, 167°50.0′ E, E slope of Tasman Basin, off Westport, New Zealand, 1 029 m, 18 April 1980, R. V. " *Tangaroa* ".

OTHER MATERIAL EXAMINED. — **New Caledonia** and Loyalty Islands (5 specimens) — BIOCAL stn CP 75 (1 MNHN). — Stn DW 80 (3 MNHN, 1 NMNZ). **New Zealand** (5 specimens) : BS 846 (O 592), 37°04.3′ S, 176°26.6′ E, SE of Aldermen Is, dead, 807-872 m, 23 January 1981, R. V. " *Tangaroa* " (3 NMNZ) ; P 942, 41°00.6′ S, 169°06.0′ E, E slope of Tasman Basin, off Westport, dead, 914 m, 24 April 1980, R. V. "*Tangaroa* " (2 NZOI).

TABLE 20. — *Seguenzia chelina*. Shell measurements (mm) and countings.

H	D	H/D	TW	
2.98	2.45	1.22	5.60	BIOCAL, stn DW 80
3.00	2.45	1.22	5.90	BIOCAL, stn DW 80
3.10	2.61	1.15	6.00	BIOCAL, stn DW 80
3.00	2.60	1.15	6.25	Holotype
3.05	2.50	1.22	6.00	BS 846
3.30	2.95	1.12	6.00	BS 846
3.30	2.80	1.18	6.00	P 942
3.35	2.65	1.26	5.80	BS 846

DISTRIBUTION. — New Caledonia and Loyalty Islands (825-980 m), and New Zealand (807-1 029 m).

REMARKS. — Specimens from off New Caledonia and the Loyalty Islands differ from the holotype and additional material from the Tasman Basin in having the umbilicus only partly invaded by the inner lip and thus more open, but are otherwise indistinguishable. Two of the three New Zealand specimens taken off the Aldermen Islands have the umbilicus intermediate in width between the extremes, so there would seem to be north-south clinal intergradation in umbilicus width. It transpires that the holotype is atypical in lacking spiral cords from a broad zone beside the umbilical chink. All other New Zealand specimens have spiral cords that extend to the umbilical rim (Fig. 197), numbering 7-9 in New Zealand material, and 8 or 9 in specimens from New Caledonia and the Loyalty Islands. See Discussion page 107.

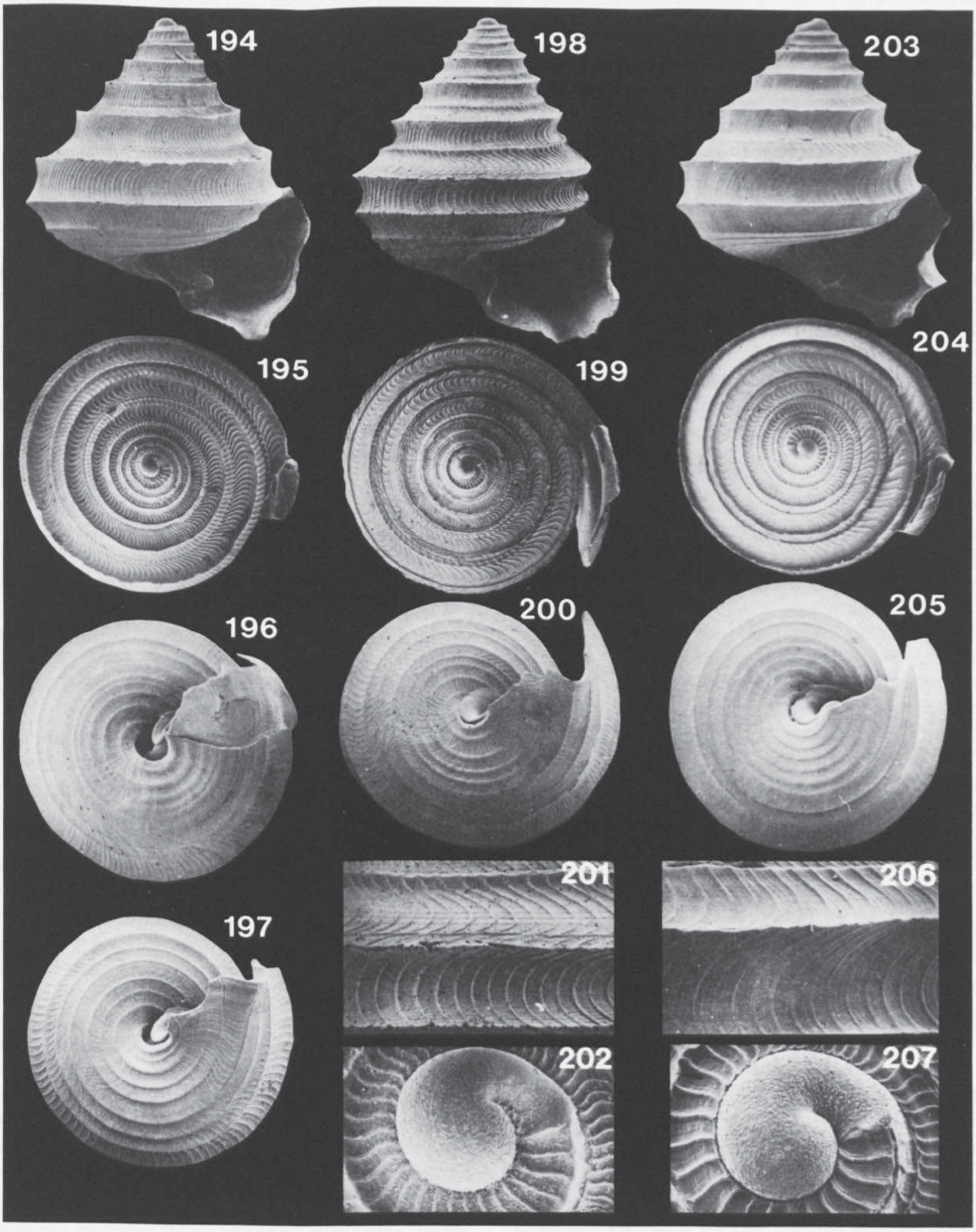
Seguenzia praeceps sp. nov.

Figs 198-202 ; Table 21

DESCRIPTION. — *Shell* up to 4.55 mm high, higher than broad, thin, anomphalous, spire 1.19-1.35 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 300-330 μm wide, minutely granulate.

Teleoconch of up to 6.6 whorls, shoulder and



FIGS 194-207. — Genus *Seguenzia* : **194-196,** *Seguenzia chelina*, BIOCAL stn DW 80, 3.15 × 2.65 mm. — **197,** *S. chelina*, off Aldermen Is, New Zealand, 807-872 m (NMNZ M. 95411), width 2.70 mm. — **198-202,** *S. praeceps*, holotype, 4.15 × 3.25 mm, 201 × 30, 202 × 85. — **203-207,** *S. metivieri*, holotype, 2.88 × 2.52 mm, 206 × 45, 207 × 90.

periphery angulated by sharp-edged keels, ramp shallowly concave, concave between periphery and outermost basal spiral, most deeply concave between shoulder and periphery ; base gently contracted, convex. Very minutely granulate throughout. Shoulder keel at adapical third, its summit on last whorl with distinct bevel bounded by spiral threads ; a finely serrate subsutural angulation commencing late on 4th whorl. Axial riblets fine, sigmoidal, crisp on spire and base to innermost basal spiral, numbering 13-18 per mm between spire keels at end of 5th whorl. spiral threads finer than axials, multiplying by intercalation, covering spire and periphery to outermost basal spiral. Base with 7-9 similar, prominent spiral cords, interspaces considerably broader than each spiral. Aperture subrhomboidal. Outer lip thin, posterior notch deep, retraction depth 14.0-18.4 % and protraction depth 53.2-58.4 % of shell diameter, apical rim flared ; basal notch U-shaped, apical rim flared ; peripheral notch angulate, well retracted. Parietal glaze thin. Inner lip concave, sharply flexed at base to form prominent tooth, broadly channelled below.

Animal unknown.

TABLE 21. — *Seguenzia praeceps*. Shell measurements (mm) and countings. (BIOCAL, stn DW 79).

Character	*n*	Range	Mean	SD
H	9	4.00-4.55	4.22	0.22
D	9	3.15-3.35	3.23	0.08
H/D	9	1.25-1.38	1.30	0.04
TW	9	6.10-6.60	6.41	0.18

TYPE DATA. — Holotype MNHN (4.15 × 3.25 mm, 6.10 TW) and 11 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USNM) : BIOCAL, stn DW 79.

OTHER MATERIAL EXAMINED (3 specimens MNHN). — BIOCAL, stn DS 59 (2). — Stn DS 98 (1).

DISTRIBUTION. — Off Ouvéa, Loyalty Islands and southern New Caledonia, 1 320-2 650 m (dead).

REMARKS. — Among previously described species, *S. praeceps* seems closest to *S. fulgida* Marshall, 1983, based on two specimens taken at 1 760-1 799 m off Westland, New Zealand. The New Caledonian species differs primarily in having more crisply-defined axial riblets on later whorls, including the base, in having closer shoulder and peripheral keels, and in attaining maturity at smaller size, *S. fulgida* attaining 6.10 mm in height. It also closely resembles syntypes (USNM 181650) and NMNZ specimens of *S. formosa* Jeffreys, 1876 (off Portugal, 4 220-4 380 m) and the holotype (NSMT) of *S. mirabilis* Okutani, 1964 (off Japan, 3 150-3 550 m) in general facies, differing from *S. formosa* in having a smaller protoconch (diameter 300-330 μm, cf. 370 μm) and a sharper subsutural angulation, and from *S. mirabilis* in being smaller relative to the number of whorls and in having considerably weaker spiral threads on the spire. The undescribed Philippine species illustrated by QUINN (1983b, fig. 1) is superficially similar, but differs in having a much stronger tooth on the inner lip.

ETYMOLOGY. — Steep (Latin).

Seguenzia metivieri sp. nov.

Figs 203-207

DESCRIPTION. — *Shell* up to 2.88 mm high, slightly higher than broad, thin, anomphalous, or with narrow umbilical chink, spire 1.15 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 280 μm wide, finely granulate.

Teleoconch of up to 5.80 whorls, shoulder and periphery angulated by sharp-edged keels, ramp almost flat, side concave, shallowly concave between periphery and outermost basal spiral, base rather gently contracted, convex. Very minutely granulate throughout. Shoulder angulation at about adapical third, a low angulation bordering suture on last adult whorl. Axial riblets fine, sigmoidal, crisp on spire and on base to outermost basal spiral, obsolete on adapical side of shoulder keel, obsolete elsewhere on base, numbering 17 per mm between keels at end of 5th whorl. No spiral threads. Base with 8 spiral cords, outermost cord angulate in section, most prominent, others considerably lower, interspaces similar, considerably broader than each spiral. Umbilicus narrow, either fully invaded by inner lip, or partially invaded to form an elliptical chink. Aperture subrhomboidal. Outer lip thin, posterior notch deep, retraction depth 10.2 % and protraction depth at least 24 % shell diameter (tip of labial projection broken), apex flared ;

basal notch shallow, concave, apex slightly flared ; peripheral notch smallest, roundly angulate. Parietal glaze thin. Inner lip thick, deeply curved into umbilicus, sharply flexed at base to form strong tooth, channelled below.

Animal unknown.

TYPE DATA. — Holotype (2.88 × 2.52 mm, 5.50 TW) and paratype (2.75 × 2.45 mm, 5.80 TW) MNHN : BIOCAL, stn DW 80.

DISTRIBUTION. — Off Ouvea, Loyalty Islands, 900-980 m (dead).

REMARKS. — *Seguenzia metivieri* bears a close superficial resemblance to the New Zealand species *S. transenna* Marshall, 1973, from which it differs primarily in lacking spiral threads on the teleoconch, and in having the axial riblets weaker between the periphery and outermost basal spiral, and obsolete elsewhere on the base, while the tooth on the inner lip is much stronger. Moreover, the axial riblets on the shoulder are shorter, extending almost to the summit of the keel in *S. transenna*. *S. metivieri* occurred together with *S. chelina* at the type locality.

ETYMOLOGY. — Named after Bernard METIVIER (MNHN) who participated on the BIOCAL campaign.

Seguenzia richeri sp. nov.

Figs 208-212

DESCRIPTION. — *Shell* (holotype) 3.55 mm high, slightly higher than broad, thin, umbilicate, spire as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 370 μm wide, minutely granulate.

Teleoconch of 5.0 whorls ; shoulder and periphery angulated by sharp-edged keels, ramp and side concave, concave between periphery and outermost basal spiral ; base evenly contracted, convex. Very minutely granulate throughout. Shoulder keel at about adapical third, adapical edge distinctly bevelled on last 2 whorls, bevel bounded by crisp spiral thread ; a low, finely serrated subsutural angulation on last whorl. Axial riblets fine, crisp, sigmoidal, traversing spire and base onto outer part of umbilical wall, numbering 13 per mm on spire between keels at end of 5th whorl. Spiral threads crisp, similar to axials, multiplying by intercalation, covering spire and periphery to outermost basal spiral. Base with 6 similar prominent spiral cords ; interspaces similar, considerably broader than each spiral. Umbilicus deep, rim angulate, diameter 19.3 % of shell diameter. Aperture subrhomboidal. Outer lip thin ; posterior notch deep, retraction depth 6.45 % of shell diameter, protraction depth unknown (rim damaged) but at least 34 % of shell diameter ; basal notch well developed, flared ; peripheral notch in angulation, slightly retracted. Parietal glaze very thin. Inner lip rather thin, rolled outwards at rim, deeply curved into umbilicus, sharply flexed at base to form prominent tooth, narrowly channelled below.

Animal unknown.

TYPE DATA. — Holotype MNHN (3.55 × 3.10 mm, 5 TW) : BIOCAL, stn CP 23.

DISTRIBUTION. — Off southern New Caledonia, 2 040 m (dead).

REMARKS. — *Seguenzia richeri* closely resembles *S. metivieri* sp. nov., and the New Zealand species *S. transenna* Marshall, 1973, in shape, differing from both in having a larger protoconch and a wider, open umbilicus. It differs further from *S. metivieri* in lacking the bevelled edge on the shoulder keel, in having strong axial sculpture on the base, and in having fewer (6 cf. 8), more widely spaced cords on the base, while *S. transenna* has finer basal sculpture with 11 or 12 spiral cords, and a much weaker tooth on the inner lip.

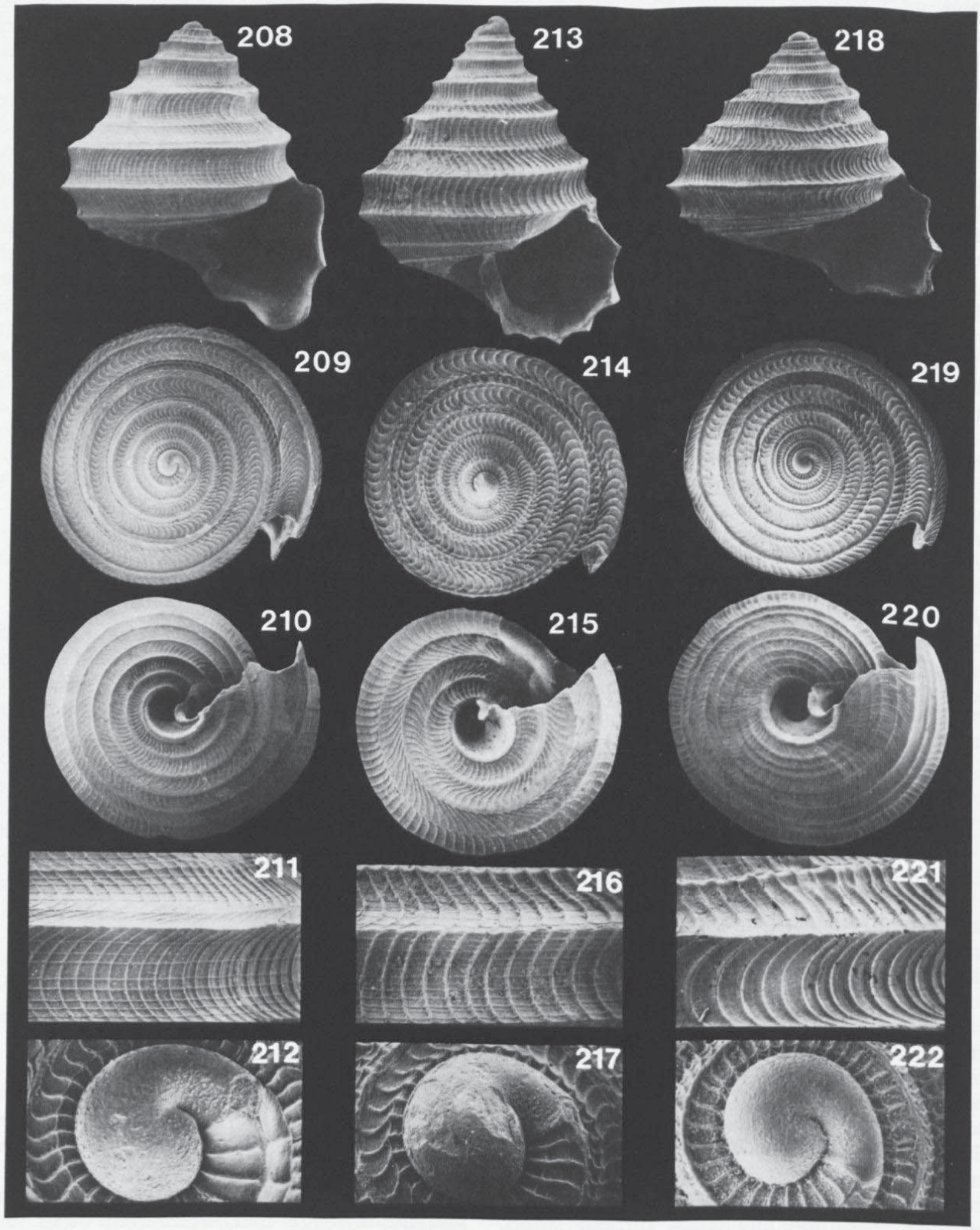
ETYMOLOGY. — Named after Bertrand RICHER DE FORGES, who participated on the BIOCAL campaign.

Seguenzia emmeles sp. nov.

Figs 213-217

DESCRIPTION. — *Shell* (subadult holotype) 3.55 mm high, higher than broad, thin, umbilicate, spire 1.25 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch (holotype and paratype) 330 μm wide, tip bulbous.



FIGS 208-222 — Genus *Seguenzia* : **208-212,** *Seguenzia richeri*, holotype, 3.55 × 3.10 mm, 211 × 35, 212 × 85. — **213-216,** *S. emmeles*, holotype, 3.55 × 2.90 mm, 216 × 30. — **217,** *S. emmeles*, paratype, BIOCAL stn 59, × 70. — **218-222,** *S. eutyches*, holotype, 2.90 × 3.00 mm, 221 × 40, 222 × 80.

Teleoconch (holotype) of 5.6 whorls ; shoulder and periphery angulated by similar, sharp edged keels, ramp and side concave, concave between periphery and outermost basal spiral ; base evenly contracted, convex. Shoulder keel at about adapical third, a low, finely serrate subsutural angulation commencing on 3rd whorl. Axials fine, crisp, sigmoidal, collabral, entirely traversing spire and base, evanescent deep within umbilicus, numbering 12 per mm on spire between keels at end of 5th whorl. Spiral threads crisp, numerous, similar, multiplying by intercalation, covering spire, periphery and base to outermost spiral, a few threads in each interspace of inner basal spirals. Base with 4 strong spiral cords, outermost angulate in section, most prominent, others lower and similar, interspaces much wider than each spiral. Umbilicus deep, diameter 25.3 % of shell diameter. Aperture subtrapezoidal. Outer lip thin, retraction depth of posterior notch 6.9 % of shell diameter, protraction depth unknown (rim damaged) ; basal notch concave ; peripheral notch small, angulate, slightly retracted. Parietal glaze very thin. Inner lip thin, shallowly curved towards umbilicus, weakly flexed at base, toothless.

Animal unknown.

TYPE DATA. — Holotype (3.55 × 2.90 mm, 5.6 TW) and immature paratype MNHN : BIOCAL, stn DS 59.

OTHER MATERIAL EXAMINED (3 immature specimens MNHN). — BIOCAL, stn DS 04 (2). — Stn CP 72 (1).

DISTRIBUTION. — Off southern New Caledonia, 2 100-2 650 m (dead).

REMARKS. — Compared with *S. richeri* to which it has a general resemblance, *S. emmeles* differs in having a more excert protoconch, a more narrowly conical spire, and in lacking the clearly defined bevel on the adapical side of the summit of the shoulder keel. *S. mirabilis* Okutani, 1964 (off Japan, 3 150-3 350 m ; holotype at Geological Institute, University of Tokyo, RM 8811) is even closer in general facies, but differs in sculptural details, in having a narrow umbilical chink, and in having 7 instead of 4 spiral cords on the base.

ETYMOLOGY. — Harmonious (Greek).

Seguenzia eutyches sp. nov.

Figs 218-222

DESCRIPTION. — *Shell* up to 3.40 mm high, slightly broader than high, thin, umbilicate, spire 0.78-1.03 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 300 µm wide, minutely granulate.

Teleoconch of up to 5.2 whorls ; shoulder and periphery angulated by sharp-edged keels, ramp and side concave, concave between periphery and outermost basal spiral ; base gently contracted, weakly convex. Very minutely granulate throughout. Shoulder keel at adapical third, similar to peripheral keel ; low, finely serrate subsutural angulation commencing on 2nd whorl. Axial riblets fine, crisp, sigmoidal, strong over spire to outermost basal spiral, finer on inner base, evanescent on outer part of umbilical wall, numbering 15 per mm at end of 5th whorl. Spiral threads almost obsolete, present on spire and between periphery and outermost basal spiral. Base with 8 crisp spiral cords, outermost angulate in section, most prominent, next spiral finest, inner spirals low and and similar, spiral interspaces considerably wider than each spiral. Umbilicus deep, diameter 21.6-27.7 % of shell diameter. Aperture subrhomboidal. Outer lip thin, rim damaged, basal notch concave, apical rim slightly flared. Parietal glaze thin. Inner lip thick, rim tightly folded towards umbilicus, gently curving towards umbilicus, gently flexed at base to form small rounded tooth, shallowly channelled below.

Animal unknown.

TYPE DATA. — Holotype (2.90 × 3.00 mm, 5.2 TW) and paratype (3.40 × 3.55 mm, 5.1 TW) MNHN : BIOCAL, stn DW 70.

DISTRIBUTION. — Off southern New Caledonia, 965 m (dead).

REMARKS. — *Seguenzia eutyches* most closely resembles *S. richeri* sp. nov. but differs in a number of characters, including the very much weaker spiral threads, the earlier appearance of the subsutural angulation, the more shallowly concave inner lip, and the considerably weaker tooth. It differs further in the lack of a thread-bounded bevel on the shoulder keel, and in the

straighter axial riblets on the ramp on the early teleoconch whorls.

ETYMOLOGY. — Good luck (Greek).

Seguenzia wareni sp. nov.

Figs 223-227 ; Table 22

DESCRIPTION. — *Shell* up to 2.90 mm high, slightly higher than broad, thin, narrowly umbilicate, spire 0.97-1.07 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 270-300 μm (mostly 270 μm) wide, finely granulate.

TABLE 22. — *Seguenzia wareni*. Shell measurements (mm) and countings. (BIOCAL, stn DW 79).

Character	*n*	Range	Mean	SD
H	10	2.55-2.90	2.69	0.11
D	10	2.30-2.55	2.45	0.07
H/D	10	1.04-1.15	1.09	0.04
TW	10	4.80-5.20	4.94	0.12
UD%	10	16.8-20.8	18.9	1.14

Teleoconch of up to 5.2 whorls ; shoulder and periphery angulated by sharp-edged keels, ramp and side concave, concave between periphery and outermost basal spiral ; base evenly contracted, convex. Very minutely granulate throughout. Shoulder keel strongly supramedian at first, descending to adapical third. Axial riblets, fine, crisp, sigmoidal, entirely traversing spire and base to umbilical rim, numbering about 33 per mm between spire keels at end of 5th whorl. Spiral threads similar, similar to axials, multiplying by intercalation, extending from suture to periphery, a few developing on last adult whorl between periphery and outermost basal spiral. Base with 7 similar, prominent spiral cords, interspaces considerably broader than each spiral. Frequently a weaker cord immediately within umbilicus. Umbilicus deep, rim angulate, diameter 16.8-20.8 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin ; posterior notch deep, retraction depth 12.9-17.3 % and protraction depth 54.8-55.4 % of shell diameter, apical rim flared ; peripheral and basal notches similar, U-shaped, flared. Parietal glaze thin. Inner lip strongly curved towards umbilicus, sharply flexed at base to form prominent tooth, channelled below.

Animal unknown.

TYPE DATA. — Holotype MNHN (2.80 × 2.45 mm, 5 TW) and 20 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USM) : BIOCAL, stn DW 79.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 1 320-1 380 m (dead).

REMARKS. — Compared with *S. richeri*, which it much resembles in shape and in having a narrow, open umbilicus, *S. wareni* differs in being smaller with a smaller protoconch, and in having finer and closer reticulate sculpture.

The unusually deep, U-shaped peripheral notch in the mature outer lip is an extremely distinctive character. *S. wareni* occurred together with *S. chariessa* at the type locality.

ETYMOLOGY. — This species is named after Anders WARÉN (Swedish Museum of Natural History, Stockholm), who provided critical comparative material and who designed the excellent rock dredge with which most of the present material was obtained.

Seguenzia matara Marshall, 1988

Figs 228-232

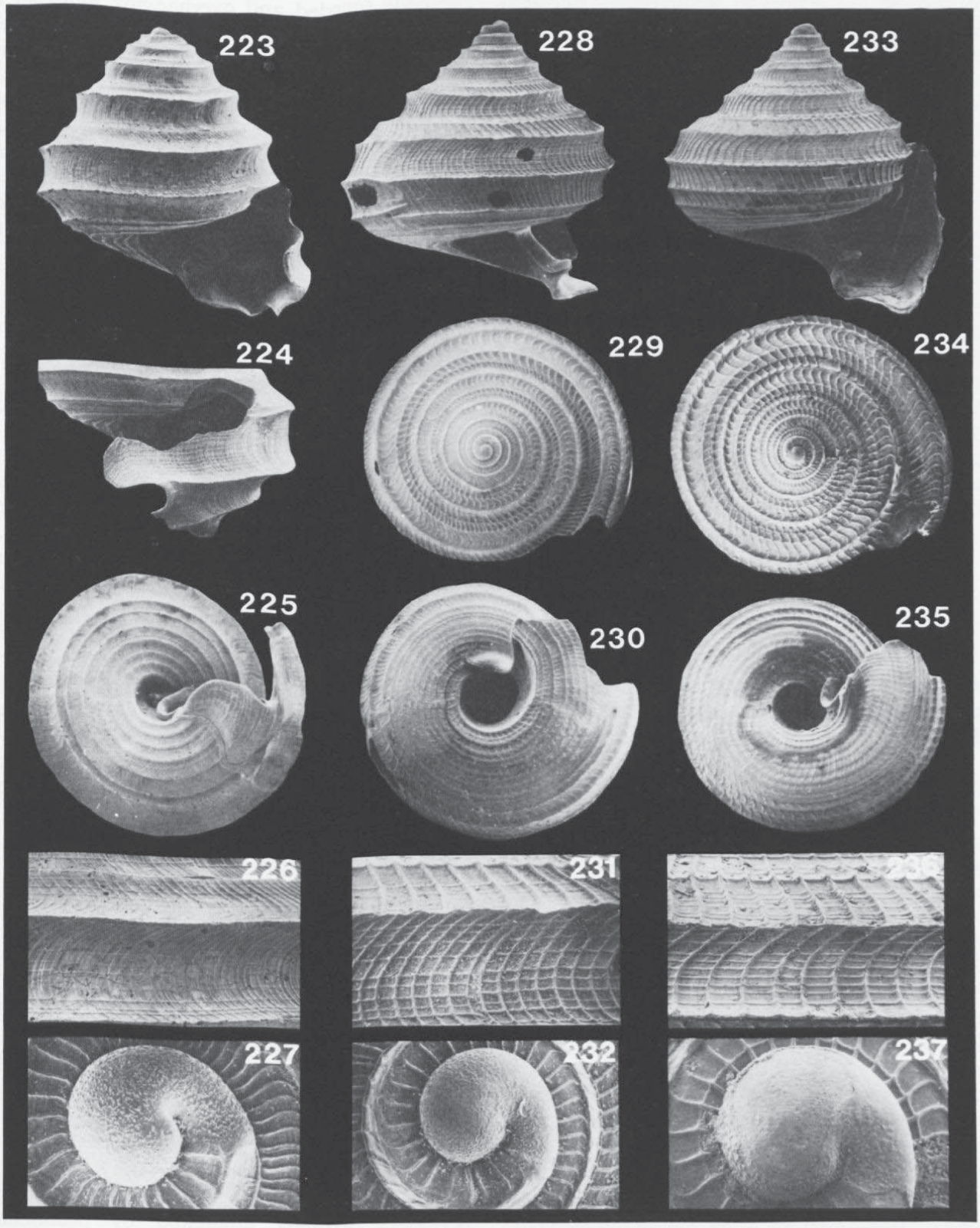
Seguenzia matara Marshall, 1988 : 242, figs 2 k-o, 4 g, 5 a.

TYPE DATA. — Holotype NZOI H. 453 : Q 696, 42°36.1′ S, 169°34.8′ E, off Westland, New Zealand, alive, 935-920 m, 21 February 1982, R. V. " *Tangaroa* ".

OTHER MATERIAL EXAMINED (2 specimens MNHN). — BIOCAL, stn DW 80.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands (dead, 900-980 m), and New Zealand (alive, 750-1 029 m).

REMARKS. — The two New Caledonian specimens fall within the range of variation in shell morphology exhibited by New Zealand type material of *S. matara*, and would thus seem to be



FIGS 223-237. — Genus *Seguenzia* : **223, 225-227,** *Seguenzia wareni*, holotype, 2.80 × 2.45 mm, 226 × 45, 227 × 95. — **224,** *S. wareni*, paratype, BIOCAL stn DW 79, × 20. — **228-232,** *S. matara*, BIOCAL stn DW 80, 3.20 × 3.40 mm, 231 × 45, 232 × 80. — **233-237,** *S. eidalima*, holotype, 3.27 × 3.10 mm, 236 × 45, 237 × 110.

conspecific. *S. matara* is similar to *S. elegans* Jeffreys, 1885 and *S. nipponica* Okutani, 1964 in general facies. It differs from both in that the outermost basal spiral and peripheral keel are set further apart. It differs further from *S. elegans* in attaining maturity of larger size and in having a wider umbilicus, while the last adult whorl is more strongly convex with more prominent shoulder and peripheral keels. When introducting *S. matara* I did not indicate its affinities with *S. nipponica* because New Zealand specimens seemed to differ widely from the original illustration of the holotype (OKUTANI, 1964, pl. 6, fig. 1, cf. MARSHALL, 1988, fig. 2 k). Comparisons of the type material, however, reveal that they are in fact closely related. Of the three species, *S. nipponica* and *S. elegans* are the most similar, *S. nipponica* differing from *S. elegans* in attaining larger size and in having fewer, more widely spaced axial riblets on the spire. A closely related species is described below. See Discussion page 107.

Seguenzia eidalima sp. nov.

Figs 233-237

DESCRIPTION. — *Shell* (holotype) 3.27 mm high, about as broad as high, thin, umbilicate, spire 0.80 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 270 μm wide, surface mostly etched away, remaining surface granulate.

Teleoconch of 5.5 whorls, shoulder and periphery angulated by sharp-edged keels, ramp and side shallowly concave, shallowly concave between peripheral and outermost basal spiral, base evenly contracted, weakly convex. Very minutely granulate throughout. Shoulder keel near adapical third, rather low, peripheral keel stronger ; low, finely serrate subsutural angulation commencing on 2nd whorl. Axial riblets fine, crisp on spire and on outer half of base, weaker on inner half of base, numbering 10 per mm between keels at end of 5th whorl. Spiral threads multiplying by intercalation, crisp, that surmounting subsutural angulation becoming as strong as axials, others finer and similar, covering spire and occupying spaces between periphery and outermost 2 basal spirals. Base with 13 crisp spiral cords, interspaces considerably wider than each spiral, outer 2 spirals angulate in section, most prominent, others considerably lower. Umbilicus deep, rim narrowly rounded and overhanging wall that is sigmoidal in section, diameter 26.7 % of shell diameter. Aperture subrhomboidal. Outer lip thin, posterior notch apex flared, retraction depth 10.7 % of shell diameter, protraction depth unknown (labial projection broken) ; basal notch concave, no peripheral notch. Parietal glaze thin. Inner lip rather thick, tightly rolled outwards at rim, deeply curved towards umbilicus, strongly flexed at base to form very prominent tooth, deeply channelled below.

Animal unknown.

TYPE DATA. — Holotype MNHN (3.27 × 3.10 mm, 5.5 TW) : BIOCAL, stn CP 26.

DISTRIBUTION. — Off southern New Caledonia, 1 618-1 740 m (dead).

REMARKS. — *Seguenzia eidalima* closely resembles type material of the North Atlantic species *S. elegans* Jeffreys, 1885 (syntypes BMNH 885.11.5 2628-30, 2587-88) and the Japanese *S. nipponica* Okutani, 1964 (holotype Department of Geology, University of Tokyo RM 8812 ; paratype NSMT MO 64682). It differs from *S. nipponica* in being smaller relative to the number of whorls (*S. nipponica* paratype 4.20 × 4.05 mm, 4.5 TW), and from *S. elegans* in having a wider umbilicus (diameter 26.7 % of shell diameter, cf. 19.7 %). It differs further from both in that the outer part of the umbilical wall is concave and overhung by the umbilical rim.

ETYMOLOGY. — Shapely (Greek).

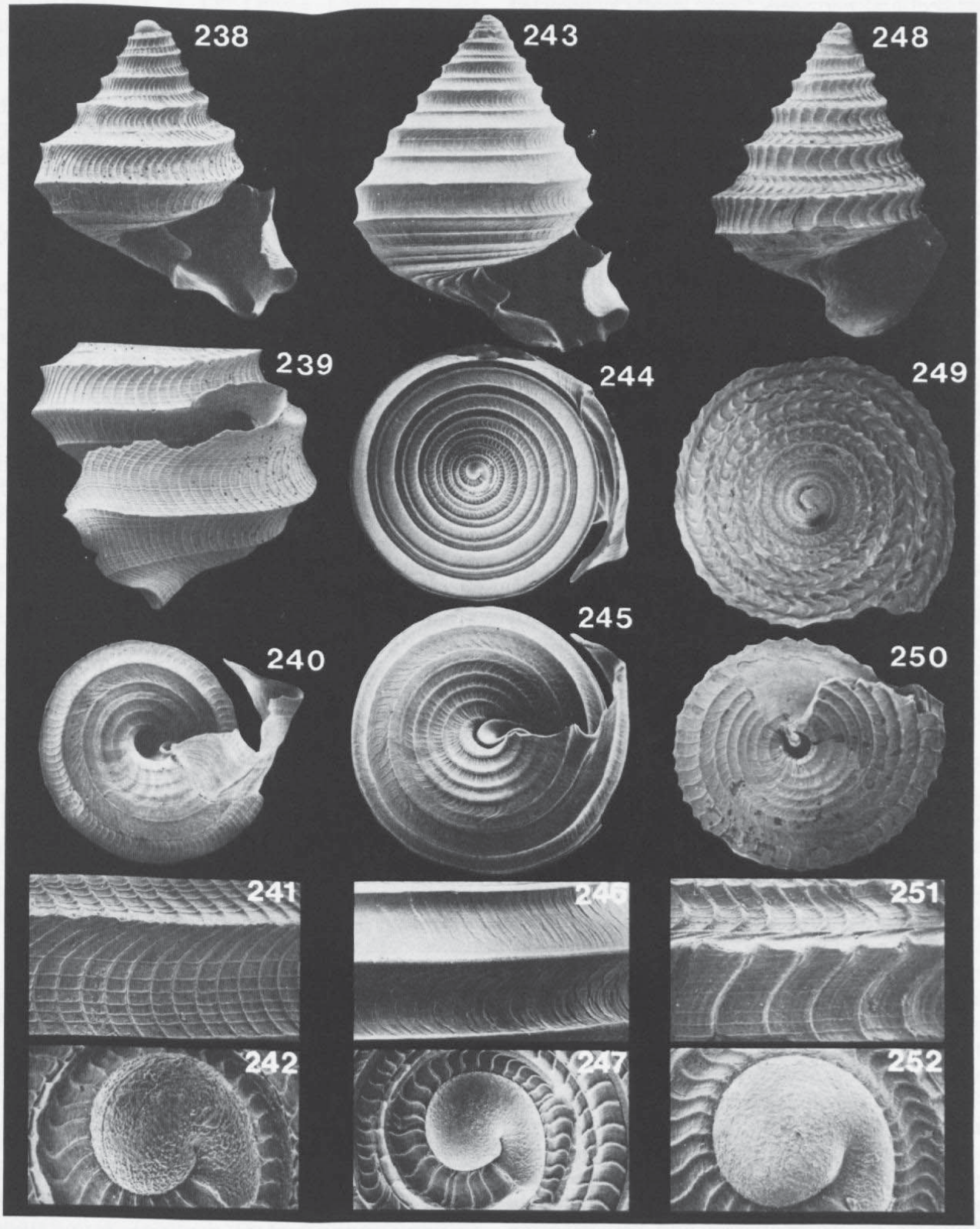
Seguenzia iota sp. nov.

Figs 238-242 ; Table 23

DESCRIPTION. — *Shell* up to 2.60 mm high, slightly higher than broad, thin, narrowly umbilicate, spire 0.95-1.09 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 230-270 μm wide, coarsely granulate throughout and with 2 spiral threads.

Teleoconch of up to 5.75 whorls ; shoulder and periphery strongly angulated by prominent, sharp-edged keels, ramp shallowly concave, shallowly concave between periphery and outermost basal spiral, more deeply concave between shoul-



FIGS 238-252. — Genus *Seguenzia* : **238, 239,** *Seguenzia iota*, paratypes, " *Vauban* " stn 40, 2.30 × 2.10 (238), 2.05 × 1.90 (239). — **240-242,** *S. iota*, holotype, 2.23 × 2.01 mm, 241 × 60, 242 × 110. — **243, 244, 246, 247,** *S. chariessa*, holotype, 5.30 × 4.30 mm, 246 × 25, 247 × 70. — **245,** *S. chariessa*, paratype, BIOCAL stn CP 75, width 3.95 mm. — **248-251,** *S. levii*, holotype, 5.00 × 3.55 mm, 251 × 25. — **252,** *S. levii*, paratype, BIOCAL stn CP 72, × 80.

der keel and periphery ; base gently contracted, convex. Very minutely granulate throughout. Shoulder keel at about adapical third, summit slightly upturned. Axial riblets fine, sigmoidal, crisp on spire and base to outermost basal spiral, developing between outermost 2 basal spirals on last adult whorl, obsolete elsewhere on base, numbering 16-22 per mm between keels at end of 5th whorl. Spiral threads crisp, numerous, multiplying by intercalation, covering spire, developing between periphery and outermost basal spiral on last adult whorl, and later, frequently between outermost 2 basal spirals. Base with 5 or 6 crisp, similar spiral cords, interspaces considerably wider than each spiral. Umbilicus deep, outer part of wall shallowly convex, concave behind inner lip, diameter 12.3-17.7 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin, posterior notch deep, apical rim strongly flared radially and adapically, retraction depth 21.6-27.0 % and protraction depth 65-73 % of shell diameter ; peripheral notch only slightly retracted though strongly radially flared at rim ; basal notch concave, prominently flared. Parietal glaze thin. Inner lip rather thick, rim tightly folded towards umbilicus, deeply curved towards umbilicus, sharply flexed at base to form strong tooth, channelled below.

Animal unknown.

TABLE 23. — *Seguenzia iota*. Shell measurements (mm) and countings. (" *Vauban* ", stn 40).

Character	*n*	Range	Mean	SD
H	11	2.00-2.60	2.31	0.18
D	11	1.88-2.12	1.97	0.07
H/D	11	1.06-1.30	1.17	0.07
TW	11	4.90-5.75	5.31	0.28
UD%	11	12.1-17.7	14.7	2.03

TYPE DATA. — Holotype (2.23 × 2.01 mm, 5 TW) MNHN and 679 paratypes (AMS, BMNH, MNHN, NMNZ, NMP, USM) : " *Vauban* ", stn 40.

DISTRIBUTION. — Off southern New Caledonia, 250-350 m (dead).

REMARKS. — Among previously described species of *Seguenzia, S. iota* is rendered highly distinctive by its small size and very strongly developed apertural features.

ETYMOLOGY. — Very small (Greek).

Seguenzia chariessa sp. nov.

Figs 243-247 ; Table 24

DESCRIPTION. — *Shell* up to 5.75 mm high, narrowly conical, considerably higher than broad, thin, anomphalous, spire 1.32-1.36 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 330-350 μm wide (mostly 330 μm), minutely granulate.

Teleoconch of up to 7.3 whorls ; shoulder and periphery strongly angulated by smooth, sharp-edged keels, ramp, side and basal spiral interspaces shallowly concave ; base evenly contracted, convex. Shoulder keel strongly supramedian at first, descending to almost median position, summit slightly upturned ; subsutural angulation strong, smooth, commencing on 2nd whorl. Axial riblets fine, sigmoidal, crisp on early whorls, less crisply defined on later whorls, extending over spire and base to umbilical rim, numbering 13 per mm between shoulder keel and periphery at end of 5th whorl. Spiral threads absent. Base with 6 or 7 strong, smooth spiral cords, interspaces considerably broader than each spiral. Aperture subrhomboidal. Outer lip thin ; posterior notch deep, retraction depth 12.1-14.6 % and protraction depth up to at least 61 % of shell diameter (tip of labial projection broken), apical rim flared ; basal notch U-shaped, rim flared ; peripheral notch shallow, concave, flared. Parietal glaze thin. Inner lip thick, deeply curved away from aperture, strongly flexed at base to form strong, narrowly angulate tooth, channelled below.

Animal unknown.

TABLE 24. — *Seguenzia chariessa*. Shell measurements (mm) and countings. (BIOCAL, stn CP 75, DW 80).

Character	*n*	Range	Mean	SD
H	7	4.70-5.75	5.30	0.33
D	7	3.65-4.25	3.92	0.20
H/D	7	1.21-1.41	1.35	0.05
TW	7	6.50-7.30	6.90	0.26

TYPE DATA. — Holotype (5.30 × 4.30 mm, 6.75 TW) MNHN, and 81 paratypes (AMS, BMNH, MNHN, NMP, NMNZ, USM) : BIOCAL, stn CP 75. Paratypes (12 MNHN) : BIOCAL , stn DW 79 (2). — Stn DW 80 (10).

DISTRIBUTION. — Off Ouvéa, Loyalty Islands and southern New Caledonia, 825-1 380 m, living at 825-860 m.

REMARKS. — *Seguenzia chariessa* is rendered very distinctive by the combination of large size, tall spire, lack of spiral threads, and rather weak axial riblets.

ETYMOLOGY. — Graceful (Greeck).

Seguenzia levii sp. nov.

Figs 248-252

DESCRIPTION. — *Shell* up to 5.00 mm high, narrowly conical, considerably higher than broad, thin, becoming rather thick, very narrowly umbilicate, spire 1.58 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 350 μm wide, finely granulate.

Teleoconch of up to 7.0 whorls, shoulder and periphery strongly angulated by prominent keels, ramp shallowly concave, shallowly concave between periphery and outermost basal spiral, more deeply concave between shoulder keel and periphery ; base gently contracted, convex. Shoulder keel summit narrowly rounded, strongly serrate, becoming slightly higher than weakly serrate peripheral keel at maturity, at about adapical third ; subsutural angulation commencing on 2nd whorl, gradually enlarging, becoming serrate. Very minutely granulate throughout. Axial riblets sigmoidal, narrow, strongly raised, relatively very strong on spire, weaker on base, weakening towards umbilicus, coalescing to form strong spiral thread on adapical side of shoulder keel, numbering 6 per mm between keels at end of 5th whorl. Spiral threads crisp, considerably finer than axials, multiplying by intercalation, covering spire and base to outermost basal spiral, commencing between outermost 2 basal spirals on last adult whorl. Base with 9 or 10 crisp spiral cords, outer 3 or 4 spirals angulate in section, inwardly decreasing in prominence, innermost spiral weakest, bordering umbilicus, interspaces considerably wider than each spiral. Umbilical diameter 11.3 % of adult shell diameter. Outer lip broken back, from growth lines posterior notch probably very deep ; basal notch concave ; peripheral notch shallow, concave, angulate. Parietal glaze thin. Inner lip rather thick, rim tightly folded towards umbilicus, weakly flexed at base to form small, blunt, solid tooth.

Animal unknown.

TYPE DATA. — *Holotype* (5.00 × 3.55 mm, 7.0 TW) MNHN, and immature paratype MNHN : BIOCAL, stn CP 72. Paratype (MNHN) : BIOCAL, stn DS 59.

DISTRIBUTION. — Off southern New Caledonia, 2 100-2 650 m (dead).

REMARKS. — *Seguenzia levii* is highly distinctive in its tall, narrowly conical spire, very prominent axial riblets and strong, serrate shoulder keel.

ETYMOLOGY. — It is named after Claude LEVI, who was cruise leader of the 1985 BIOCAL campaign.

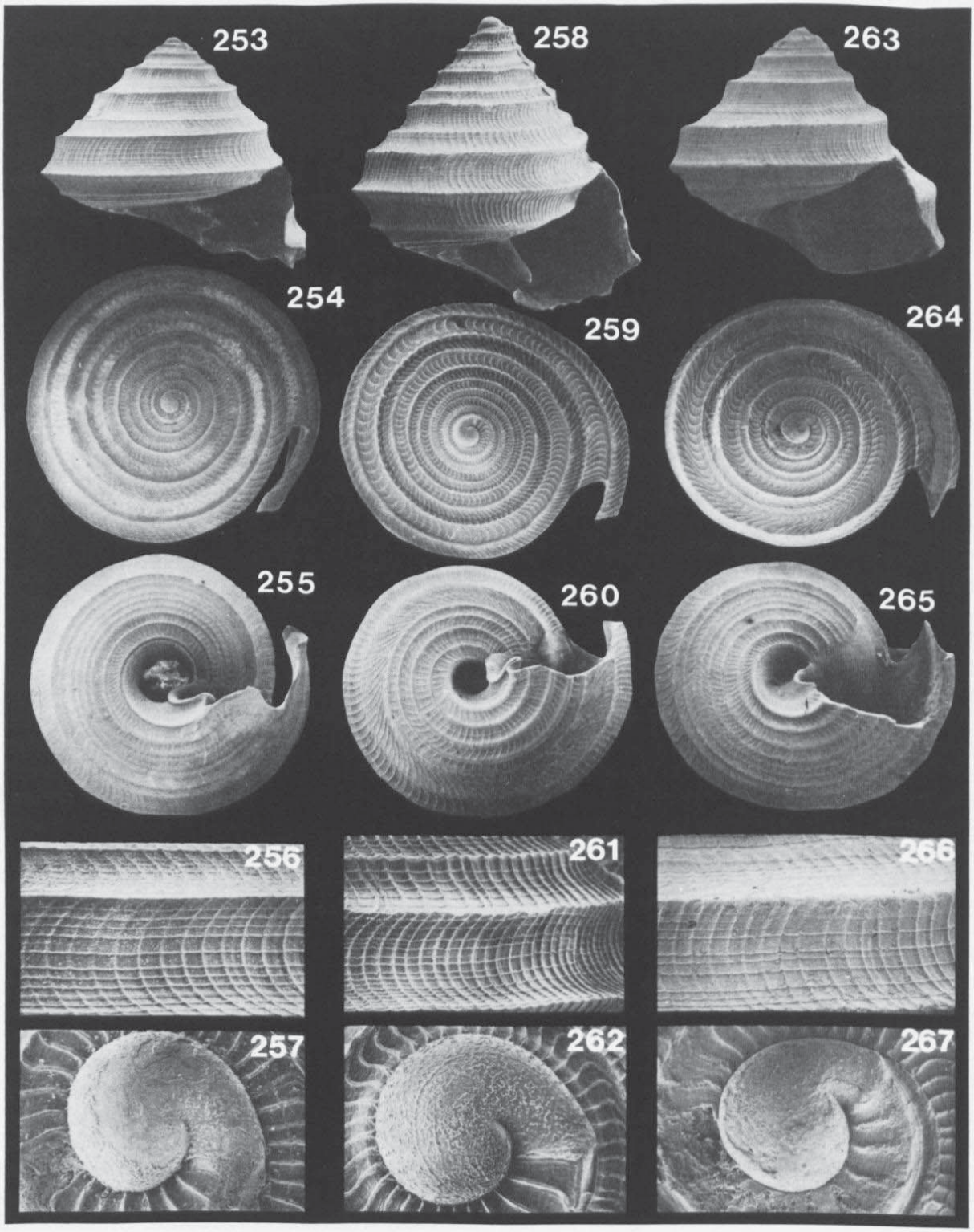
Seguenzia engonia sp. nov.

Figs 253-257

DESCRIPTION. — *Shell* up to 3.25 mm high, broader than high, thin, widely umbilicate, spire 0.76-1.06 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 300-320 μm wide, finely granulate.

Teleoconch of up to 5.10 whorls, shoulder keel at adapical third, peripheral keel very strong, ramp and side shallowly concave, shallowly concave between periphery and outermost basal spiral ; base sharply contracted, weakly convex. A long though distinct, weakly serrate, subsutural angulation commencing on 4th whorl. Axial riblets fine, crisp, sigmoidal, traversing spire, base and outer part of umbilical wall, numbering 12 or 13 per mm between keels at end of 5th whorl. Spiral threads crisp, similar to axials, multiplying by intercalation, covering spire and base to outermost spiral. Base with 7-9 crisply defined spiral cords, outermost angulate in section and most prominent, interspaces considerably wider than each spiral. Umbilicus deep, rim angulate, diameter 28.6-34.1 % of adult shell diameter. Aperture subrhomboidal. Outer lip thin ; posterior notch deep, retraction depth 6.6-7.4 % and protraction depth 34.1 % of shell diameter ; slightly flared at apex ; basal notch U-



FIGS 253-267. — Genus *Seguenzia* : **253-257,** *Seguenzia engonia*, holotype, 3.10 × 3.52 mm, 256 × 35, 257 × 105. — **258-262,** *S. stegastris*, holotype, 2.70 × 2.80 mm, 261 × 45, 262 × 105. — **263-267,** *S. platamodes*, holotype, 2.73 × 3.28 mm, 266 × 45, 267 × 70.

shaped at rim, scarcely retracted behind. Parietal glaze thin. Inner lip rather thick, rim tightly folded towards umbilicus, deeply curved towards umbilicus, strongly flexed at base to form strong, rounded tooth, channelled below.

Animal unknown.

TYPE DATA. — Holotype MNHN (3.10 × 3.52 mm, 5.1 TW) and 3 paratypes (2 MNHN, 1 NMNZ) (3.25 × 3.60 mm, 5.1 TW ; 2.95 × 3.50 mm, 4.75 TW) : BIOCAL, stn DW 79.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 1 320-1 380 m (dead).

REMARKS. — *Seguenzia engonia* is a very distinctive species characterised by low spire, sharply angulate periphery, broad umbilicus, and strong tooth on the inner lip.

ETYMOLOGY. — Angular (Greek).

Seguenzia platamodes sp. nov.

Figs 263-267

DESCRIPTION. — *Shell* (holotype) 2.73 mm high, slightly broader than high, thin, umbilicate, spire 1.10 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 400 μm wide, surface eroded.

Teleoconch of 4.1 whorls, shoulder and periphery angulated by blunt-edged keels, ramp and side shallowly concave, shallowly concave between periphery and outermost basal spiral ; base rather suddenly contracted, weakly convex. Shoulder keel at adapical third, a low serrated subsutural angulation commencing on 4th whorl. Very minutely granulate throughout. Axial riblets fine, crisp, sigmoidal, traversing spire and base, extending onto outer part of umbilical wall, numbering 11 per mm between keels at end of 4th whorl. Spiral threads crisp, finer than axials, multiplying by intercalation, covering spire and outer base to outermost spiral. Base with 8 crisp, similar spiral cords, interspaces considerably wider than each spiral. Umbilicus deep, rim angulate, diameter 24.4 % of shell diameter. Aperture subquadrate. Outer lip thin, retraction depth 4.1 % of shell diameter, protraction depth unknown (rim damaged) ; basal notch concave, peripheral notch very slightly retracted. Parietal glaze thin. Inner lip thick, shallowly curved towards umbilicus, not flexed at base, toothless.

Animal unknown (dried).

TYPE DATA. — Holotype MNHN (2.73 × 3.28 mm, 4.1 TW) : BIOCAL, stn DS 14.

DISTRIBUTION. — Off Lifou, Loyalty Islands, 3 680-3 700 m (alive).

REMARKS. — *Seguenzia platamodes* most closely resembles *S. engonia* sp. nov., from which it differs in being larger relative to the number of whorls, in having a much larger protoconch, in the later appearance of the subsutural angulation, and in having more bluntly angulate summits on the shoulder and peripheral keels. Judging from the simple apertural features and the large protoconch, the holotype may be immature. Accordingly, larger specimens may be expected to develop a tooth at the base of the inner lip.

ETYMOLOGY. — Flattened (Greek).

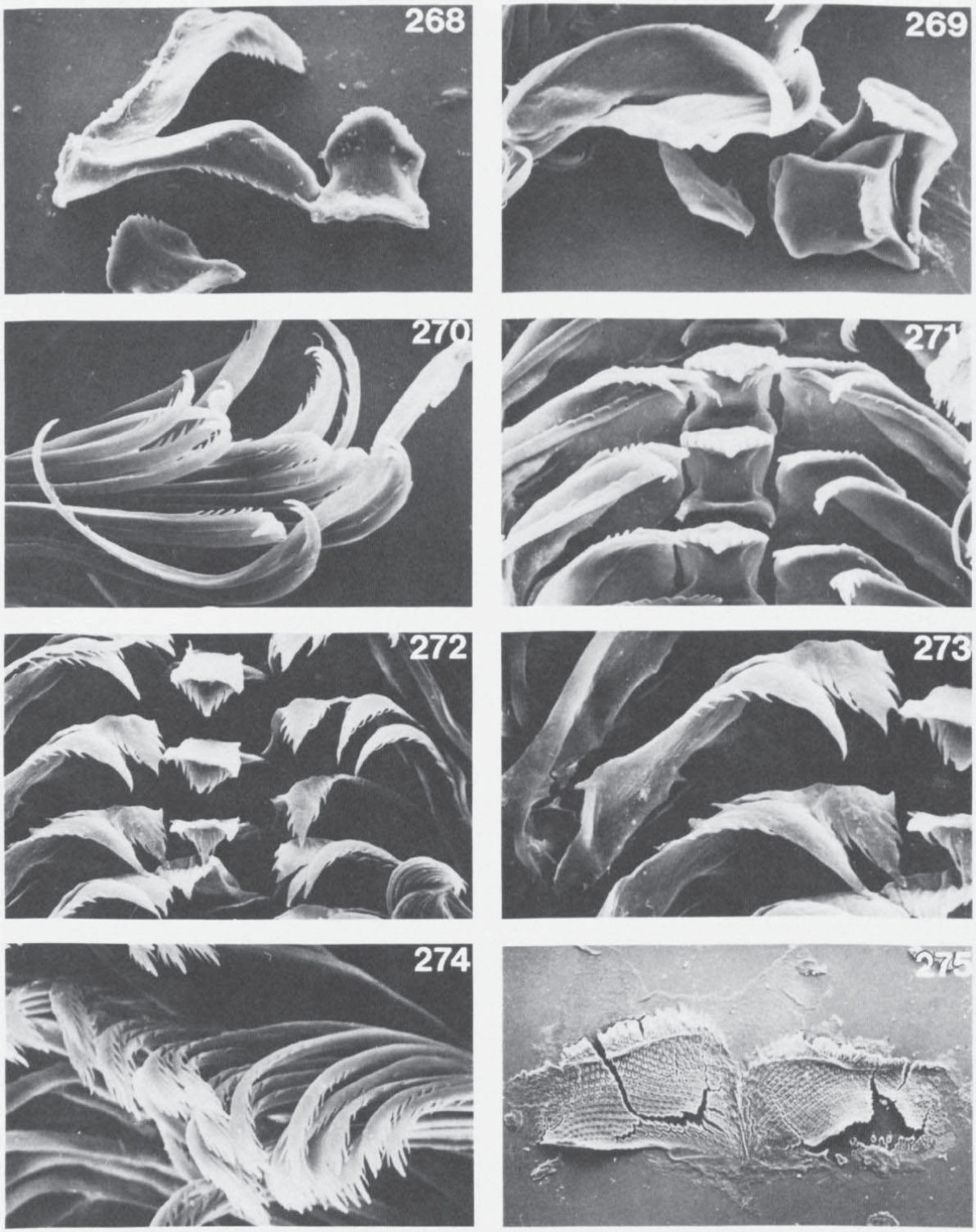
Seguenzia stegastris sp. nov.

Figs 258-262

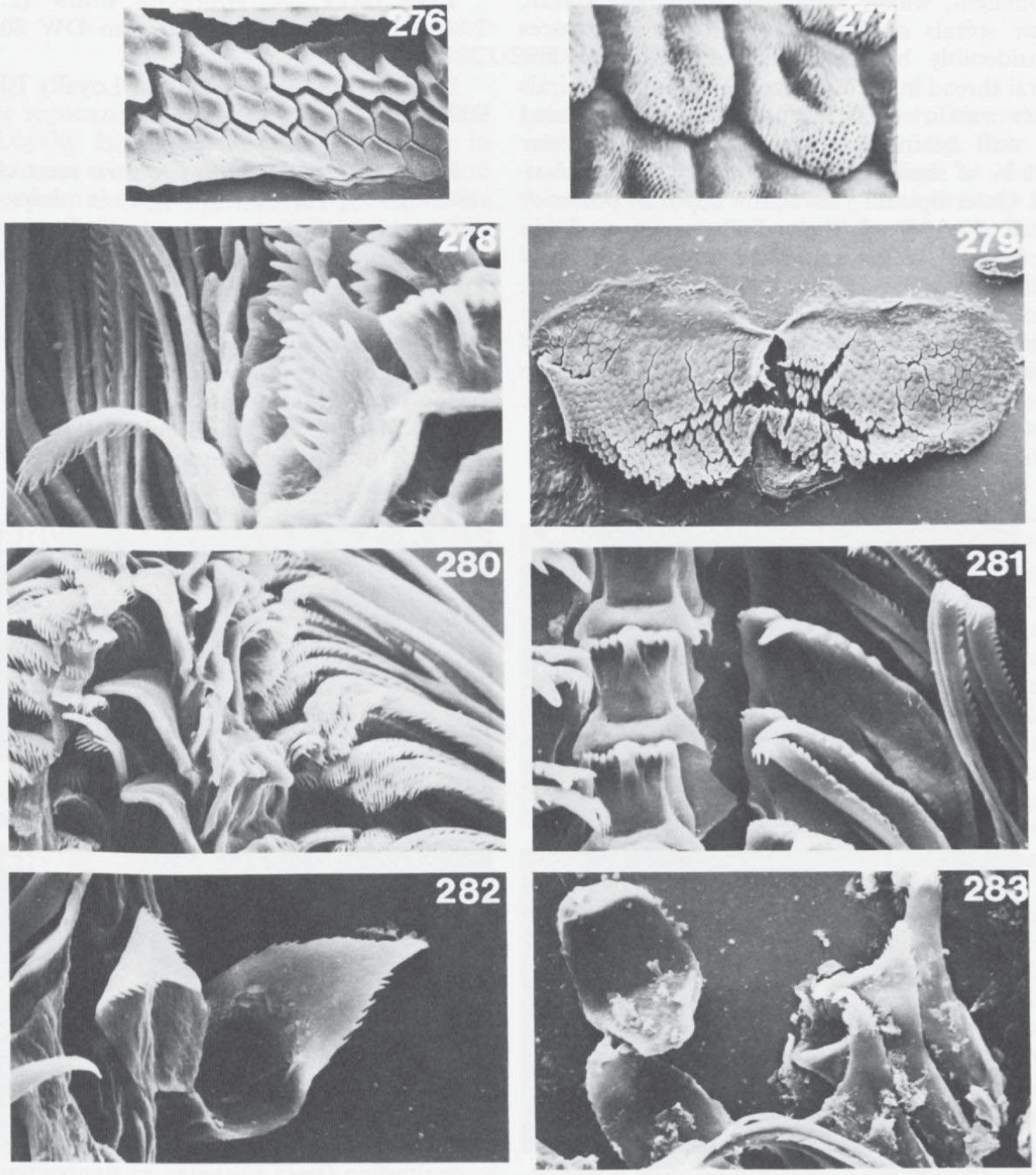
DESCRIPTION. — *Shell* (holotype) 2.70 mm high, about as high as broad, thin, umbilicate, spire 1.07 × as high as aperture ; white, nacreous through thin, translucent outer shell layer.

Protoconch 310 μm wide, minutely granulate, granules coalescing to form single spiral thread at summit.

Teleoconch of 5.25 whorls ; shoulder and periphery angulated by sharp-edged keels of similar size, ramp and side concave, concave between periphery and outermost basal spiral ; base gently contracted, convex. Shoulder keel at about adapical third, summit slightly upturned ; a prominent, finely serrate subsutural angulation commences on 3rd whorl. Axial riblets fine, crisp, sigmoidal, collabral, traversing spire and base to spiral thread within umbilicus, numbering 13 per mm between keels on spire at end of 5th whorl. Spiral threads crisp, similar, numerous, multiplying by intercalation, covering spire and base from periphery to outermost basal spiral, commencing between outer 2 basal spirals on last half of last adult whorl. Base with 6 crisp spiral cords, outermost angulate in section, most



FIGS 268-275. — Radulae and jaws (275) : **268-270,** *Asthelys nitidula*, NE of Sandy Cape, Queensland (AMS C. 154369), 268 × 830, 269 × 1 000, 270 × 1 250. — **271,** *Ancistrobasis scitula*, paratype, BIOCAL stn DW 51, × 1 060. — **272-275,** *Ancistrobasis boucheti*, paratype, BIOCAL stn DW 77, 272 × 950, 273 × 1 380, 274 × 1 210, 275 (jaws) × 150.



FIGS 276-283. — Jaws (276, 277, 279) and radulae : **276, 277,** *Ancistrobasis boucheti*, paratype, BIOCAL stn DW 77 (jaw details), 276 × 700, 277 × 2 830. — **278, 279,** *Calliobasis spectrum*, paratype, BIOCAL stn DW 41, 278 × 1 890, 279 (jaws) × 220. — **280, 281,** *Fluxinella asceta*, paratype, BIOCAL stn DW 33, 280 × 1 140, 281 × 1 140. — **282, 283,** *Halystina caledonica*, paratype, BIOCAL stn DS 04, 282 × 1 420, 283 × 1 960.

prominent, widely separated from next spiral ; inner spirals similar, closer though interspaces considerably broader than each spiral, a fine spiral thread in each interspace of 2nd-4th spirals from umbilicus. Umbilicus deep, a spiral thread on wall behind tooth on inner lip, diameter 22.6 % of shell diameter. Aperture subrhomboidal. Outer lip thin ; retraction depth of posterior notch 12.5 % of shell diameter, protraction depth unknown (labial projection broken) ; basal notch concave ; peripheral notch small, angulate. Parietal glaze thin. Inner lip rather thick, rim tightly folded towards umbilicus, deeply curved towards umbilicus, sharply flexed at base to form strong angulate denticle, channeled below.

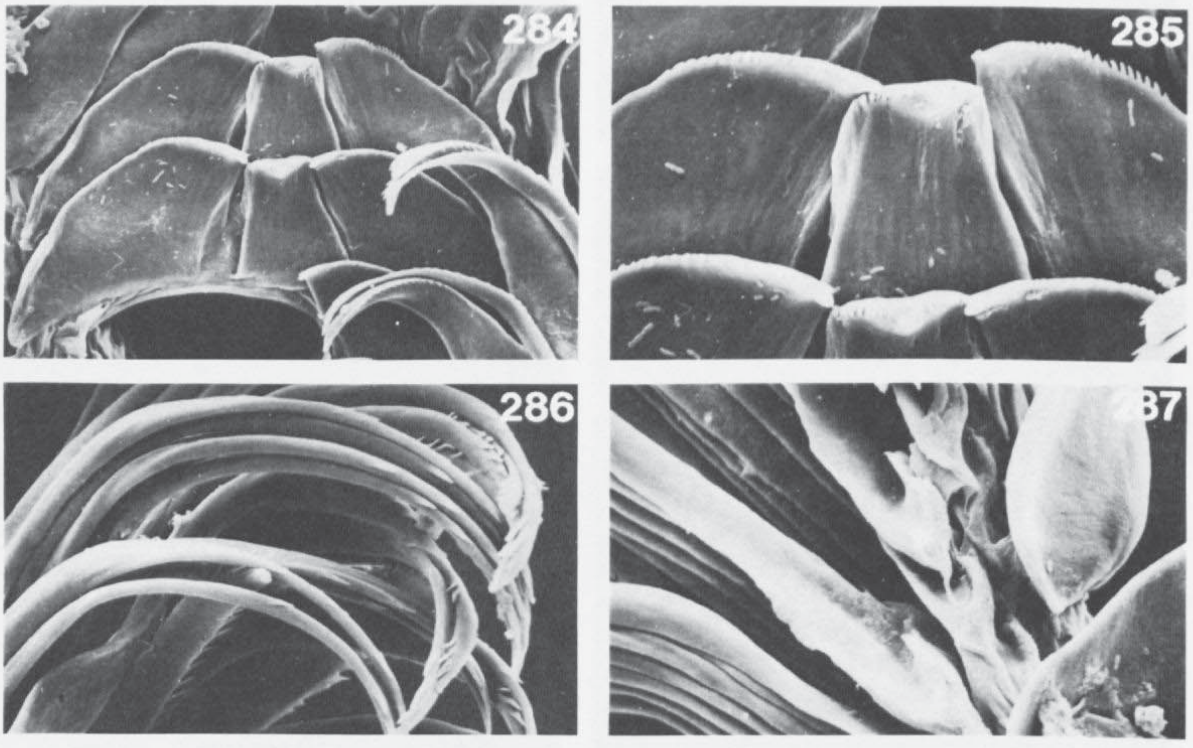
Animal unknown (dried).

TYPE DATA. — Holotype MNHN (2.70 × 2.80 mm, 5.25 TW) : BIOCAL, stn DW 80.

DISTRIBUTION. — Off Ouvéa, Loyalty Islands, 900-980 m (dead).

REMARKS. — *Seguenzia stegastris* most closely resembles *S. eutyches* sp. nov. in shape, and differs primarily in having much stronger spiral threads on the spire, and a considerably stronger tooth on the inner lip.

ETYMOLOGY. — A weaver (Greek).



FIGS 284-287. — Radula, *Basilissa superba*, BIOCAL stn CP 13, 284 × 508, 285 × 1 164, 286 × 1 164, 287 (showing interlocking marginal tooth bases) × 1 164.

DISCUSSION

The seguenziid fauna off New Caledonia and the Loyalty Islands is exceptionally diverse in comparison with the 89 Recent taxa hitherto known from the rest of the world (QUINN, 1983b, Table 1 ; Table 25 herein). Of the 55 species present, 50 (91 %) are unknown from elsewhere, 28 (51 %) are known from single stations, while 12 (22 %) are represented by single specimens, the two latter totals suggesting that additional species remain to be discovered. Judging from personal examination of rich unworked collections from off the Philippine Islands (MNHN, USNM), seguenziid species richness in this area will probably prove to be at least as high.

TABLE 25. — Geographic distributions of Recent Seguenziidae with numbers of nominate taxa. Numbers of species shared with other regions in parenthesis.

New Caledonia and Loyalty Islands — 55 (6)
New Zealand region — 22 (4)
Western Atlantic — 18 (2)
Indonesia, Malaysia, Coral Sea — 12 (2)
Eastern Atlantic — 10 (1)
Northeastern Pacific — 7
Japan — 6
Australia — 5 (2)
Southwestern Indian Ocean and South Africa — 5
Southern Ocean and Antarctica — 3 (1)
Northern Indian Ocean — 2
Central Atlantic — 1
Northern Pacific — 1

The relatively low seguenziid diversities reported from elsewhere in the world — Australia (5 species) and Japan (6) are particularly anomalous — may reflect insufficient sampling with appropriate gear (i.e. fine-meshed epibenthic sledges) at bathyal and abyssal depths. The family is very poorly represented both as taxa and individuals in extensive (AMS) collections of mollusca from depths shallower than 1 000 m off Australia, however, and species richness in this depth range may not in fact be as high. By comparison, 15 species from off New Caledonia and the Loyalty Islands have mean depth occurrences of less than 1 000 m (overall mean 709 m), and four of these taxa are locally abundant.

BIOCAL samples from deep water (> 200 m) off New Caledonia and the Loyalty Islands contain exceptionally rich (largely unworked) mollusc faunas in general, and to judge from the remarkable Pleistocene assemblage at Santo, Vanuatu (LADD, 1976 ; 1982), it seems likely that similarly diverse faunas will be found to occur throughout Melanesia. Since the Melanesian arc is situated at current or former boundaries of the Australian and Pacific lithospheric plates, species richness there is probably due at least partly to progressive accumulation of taxa transported on the plates.

Six taxa recorded from off New Caledonia and the Loyalty Islands occur elsewhere in the western Pacific : *Basilissa superba* (northern Coral Sea and Philippine Sea), *Asthelys nitidula* (Queensland), *Ancistrobasis monodon* (Malaysia), *Quinnia patula* (New Zealand), *Seguenzia chelina* (New Zealand), and *S. matara* (New Zealand). *Basilissa superba* (2 560-3 740 m) probably has a continuous distribution through the Coral Sea to New Caledonia, but is bathymetrically isolated from the Philippine Sea population by island arcs and associated trenches, which probably accounts for the difference in umbilical morphology between the two populations. Known populations of *Asthelys nitidula* (1 320-1 620 m), *Ancistrobasis monodon* (505-680 m), *Seguenzia chelina* (807-1 029 m), and *S. matara* (750-1 029 m) are currently separated by depths considerably greater than the deepest known occurrences of living specimens. *Asthelys nitidula* and *Ancistrobasis monodon* may have essentially continuous distributions via drifting eggs or larvae from populations off the intervening islands, reefs and submarine banks, either through the Melanesian Arc, or between Queensland and New Caledonia. That their distributions may be relicts of formely more continuous distributions, rather than the result of continuous larval dispersal events, is suggested by differences in shell and umbilicus size between the widely separated populations. Known populations of *Quinnia patula* (1 760-2 740 m), *Seguenzia chelina* and *S. matara* are separated by the 1 400 km long Norfolk Ridge, which is virtually continuous between New Caledonia and New Zealand on the 1 500 m contour, with a chain of rises on the 1 000 m contour (" GEBCO ", 1982). Although all

of these species could easily have continuous gene flow along the Norfolk Ridge, northern and southern populations of *S. chelina* and *S. matara* may now be isolated by bathymetry.

Available evidence indicates that New Caledonia and New Zealand had very similar geological histories throughout the Mesozoic and into the Paleocene and Eocene (GRANT-MACKIE, 1985 ; LILLIE & BROTHERS, 1970 ; STEVENS, 1980). Total or partial emergence of the Norfolk Ridge during the Mesozoic and perhaps into the Tertiary could account for some of the observed similarities in the present day terrestrial biotas of New Caledonia and New Zealand (DAWSON, 1963 ; STEVENS, 1980).

Evidence of major Eocene subsidence of the northern part of Norfolk Ridge has been discussed by DANIEL *et al.* (1976) and BITOUN & RECY (1982), who respectively deduced subsidences of about 400 m during the late Miocene or Pliocene and about 1 500 m during the Miocene. If the southern part of the Norfolk Ridge subsided during the same timeframe, this could account for the disjunct distributions of *S. chelina* and *S. matara*.

Potential biogeographical affinities of the New Caledonian Recent marine fauna should be sought in the subtropical mid tertiary faunas of northern New Zealand, such as in the richly fossiliferous lower Miocene beds at Pakaurangi Point, Kaipara Harpara Harbour, and especially Parengarenga Harbour. From a general biogeographical standpoint it is appropriate to indicate that the *differences* between the marine and terrestrial biotas of New Caledonia and New Zealand might reasonably be expected to be almost as great as they are today if there was currently continuous land between them, given the latitudinal range covered.

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