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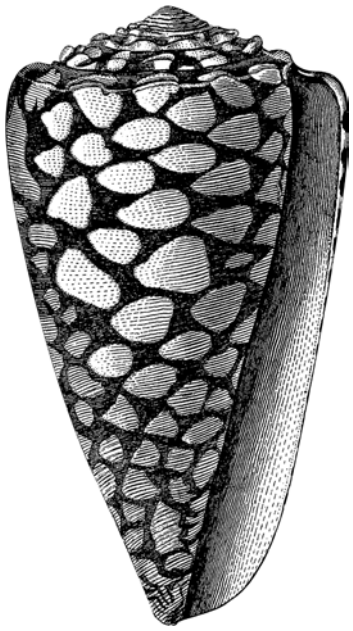

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Some Recent scissurellids from the New Zealand region and remarks on some scissurellid genus group names (Mollusca : Gastropoda : Vetigastropoda)

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Abstract

Taxonomic problems relating to interpretations of type species of *Scissurella* d'Orbigny, 1824, *Schismope* Jeffreys, 1856, *Woodwardia* Crosse & Fischer, 1861 and *Sinezona* Finlay, 1926 are discussed. *Daizona* Bandel, 1998 is interpreted as a synonym of *Sinezona*. *Ariella campbelli* Bandel, 1998 and *Sinezona pacifica* Bandel, 1998 are relegated to synonymy under *Sinezona levigata* (Iredale, 1908) and *Sinezona pacifica* (Oliver, 1915) respectively; *Scissurella stellae* Fleming, 1948 is synonymised with *Scissurella prendrevillei* Powell, 1933; and *Scissurella prendrevillei*, *Scissurella fairchildi* Powell, 1933, and *Scissurella marshalli* Bandel, 1998 are contrasted. A new species of *Sinezona* from north-eastern New Zealand is described and a neotype is designated for *Sinezona pacifica* (Oliver, 1915). *Scissurella mantelli* Woodward, 1859 is shown to have been consistently misidentified and the New Zealand species hitherto so identified is described as a new species of *Thieleella* Bandel, 1998. Three additional recent misidentifications of taxa from the New Zealand region are also indicated.

Additional keywords: *Anatoma*, distribution, new synonyms, new taxa, *Schismope*, *Scissurella*, Scissurellidae, *Sinezona*, *Thieleella*, *Woodwardia*.

Introduction

Among the small marine snails of the family Scissurellidae recently described and illustrated by Bandel (1998) were three new species group taxa and two previously named taxa from the New Zealand region, and a record of *Larochea miranda* Finlay, 1927 from Queensland. The primary objectives of the present contribution are to indicate that two of these three new taxa are junior synonyms, that the others are misidentified, and to discuss taxonomic problems relating to interpretation of *Scissurella* d'Orbigny, 1824, *Schismope* Jeffreys, 1856, *Woodwardia* Crosse & Fischer, 1861 and *Sinezona* Finlay, 1926. The opportunity is taken to indicate that *Scissurella stellae* Fleming, 1948 is a junior synonym of *S. prendrevillei* Powell, 1933 and to provide a replacement name for the New Zealand species currently known as *Anatoma mantelli* (Woodward, 1859), which is based on misinterpreted and mislocalised type material.

The New Zealand scissurellid fauna includes type species of five genus-group taxa and is particularly rich, with 22 named species (all of which are restricted endemics) plus approximately the same number of undescribed species (material NMNZ). This total excludes taxa newly synonymised herein and *Sinezona subantarctica* (Hedley, 1916), an endemic restricted to Macquarie Island (politically Australian), which has been included in the New Zealand fauna (Powell 1979).

Materials and methods

Unless specified, all material is held at the Museum of New Zealand Te Papa Tongarewa (NMNZ; registration numbers are preceded by 'M.').

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Abbreviations and text conventions

AMS Australian Museum, Sydney.
CM Canterbury Museum, Christchurch.
LACM Los Angeles County Museum of Natural History.
NZGS Institute of Geological and Nuclear Sciences, Lower Hutt.
NMNZ Museum of New Zealand Te Papa Tongarewa, Wellington.

Systematics

Superfamily **SCISSURELLOIDEA** Gray, 1847

Family **SCISSURELLIDAE** Gray, 1847

Remarks

Uncertainty has long persisted as to the identity of some European scissurellids, primarily because type material is apparently no longer extant. Key taxa are *Scissurella laevigata* d'Orbigny, 1824, *S. elegans* d'Orbigny, 1824, *S. costata* d'Orbigny, 1824, *S. striatula* Philippi, 1844 and *S. cingulata* O. G. Costa, 1861. Even if type material is indeed lost, at least some of these well-known names could be conserved and stabilised by designation of neotypes (ICZN 1999), ideally illustrated by scanning electron micrographs and with due consideration to the taxonomic problems involved (see below). As a case in point, Burnay and Rolan (1990) interpreted *S. cingulata* as a *nomen dubium* because type material is apparently lost and because the description and original illustration (Costa 1861) are somewhat ambiguous. Fortunately, their opinion has not been widely accepted. A far better course of action would be to conserve the name for the common Mediterranean species to which it is usually applied (e.g. Sabelli *et al.* 1990, 1992; Giannuzzi-Savelli *et al.* 1994), based on a neotype from Sardinia, the type locality.

Subfamily **SCISSURELLINAE** Gray, 1847

Genus ***Scissurella*** d'Orbigny, 1824

Scissurella d'Orbigny, 1824: 343. Type species (by subsequent designation of Gray, 1847: 146): *Scissurella laevigata* d'Orbigny, 1824 (= ? *S. costata* d'Orbigny, 1824); Recent, Mediterranean.
Schismope Jeffreys, 1856*a*: 321. Type species (by monotypy): '*Scissurella striatula* Philippi, 1844' (misidentified).
Woodwardia Crosse & Fischer, 1861*a*: 160. Type species (by monotypy): '*Scissurella elegans* d'Orbigny, 1824' (misidentified).

Remarks

The New Zealand species referred to *Scissurella* below differ from such apparently typical *Scissurella* species as *S. costata* in details of protoconch sculpture, including stronger axial ribs that occupy only the outer half of the exposed part of the protoconch, the lack of an irregular network of threads at the tip of the apical fold and a spiral thread, and in that the terminal varix is not attached to the tip of the apical fold. Evaluation of the significance of these differences is beyond the intention of the present article.

Wenz (1938), followed by Bandel (1998), cited *S. costata* d'Orbigny, 1824, as a type species of *Scissurella*, presumably on the assumption that *S. laevigata* d'Orbigny, 1824 was a synonym of *S. costata*. However, this synonymy remains to be demonstrated convincingly.

Jeffreys (1856*a*) introduced *Schismope* with the following comments:

'The slit in *S. striatula*, Ph., does not commence until the animal is half grown. Its sides or walls are raised above the surface of the shell, and present a prominent ridge ... the foramen in which it terminates is oblong-fusiform ... The foraminal termination of the slit I have only observed in this species ...'

Jeffreys's description is accordant with the Mediterranean species normally identified as *Sinezona cingulata* (O. G. Costa, 1861), which is currently grouped in *Sinezona* (e.g. Sabelli *et al.* 1990; Giannuzzi-Savelli *et al.* 1994). However, judging from Philippi's (1844, pl. 25, fig. 33) illustration, *Scissurella striatula* has an entirely different shell with a tiny spire, a flat sutural ramp, a large umbilicus, a pronounced shoulder angulation surmounted by a long selenizone and an open slit. Thus, *Schismope* is based on a misidentified type species. Note that Anistratenko and Starobogatov (1997) have proposed a neotype for *Scissurella striatula*, which they refer to *Anatoma* Woodward, 1859 (type species *Scissurella crispata* Fleming, 1828) and consider specifically distinct from *Scissurella laevigata* (? = *S. costata* d'Orbigny, 1824), with which it has sometimes been associated (e.g. Sabelli *et al.* 1990).

Crosse and Fischer (1861*a*) introduced *Woodwardia* for *Scissurella elegans* d'Orbigny, 1824 alone, diagnosing the new genus thus: 'Testa juvenis apertura integra, major fissura marginali, adulta formine munita, margine integro'. Their concept of *S. elegans* was based on illustrations of specimens so identified by Woodward (1859), which appear to represent the *Sinezona* species normally identified as *S. cingulata*. Woodward evidently considered that d'Orbigny's (1824) figured specimen of *S. elegans* was subadult because it has a selenizone that terminates in an open slit. Although d'Orbigny depicted a shell with a selenizone much longer than any known species of *Sinezona*, the illustration is certainly inaccurate and misleading because no known scissurellid has a selenizone that commences so early on the teleoconch. Nevertheless, the illustration of *S. elegans* is certainly far more like *Scissurella costata* than *Sinezona cingulata* and, thus, seems more likely to represent a species of *Scissurella* than *Sinezona*. Regrettably, type material of *S. elegans* appears to be no longer extant and, without topotypes (from the Piacentian, Upper Pliocene, of Castell'Arquato, Italy), it is impossible to deduce the affinities of the species with any certainty. Whatever the case, it seems clear that *Woodwardia* is also based on a misidentified type species. Crosse and Fischer (1861*b*) eventually realised that Jeffreys had introduced *Schismope* for the same group and synonymised *Woodwardia* with *Schismope*.

Short of petitioning the International Commission on Zoological Nomenclature, ideally for suppression of *Schismope* and *Woodwardia* (which seems unnecessary), the most obvious and least disruptive course of action is to maintain predominant current usage by interpreting their type species as specifically indeterminable members of the genus *Scissurella*, in which case both fall as synonyms of *Scissurella* (e.g. Keen 1960; Abbott 1974; Herbert 1986; Sabelli *et al.* 1992).

Bandel (1998), evidently unaware of these problems, used *Schismope* (with *Scissurella cingulata* as 'type species') for species here referred to *Sinezona* (see below).

Of historical interest is the extraordinary and acrimonious exchange between Jeffreys and Woodward that followed introduction of *Schismope* (Jeffreys 1856*b*,*c*; Woodward 1856*a*,*b*).

Scissurella fairchildi Powell, 1933

(Figs 1–3)

Scissurella fairchildi Powell, 1933*a*: 34, pl. 6, figs 3, 4; Powell, 1979: 34, pl. 13, figs 16, 17.

Material examined

Holotype. Off Bounty Islands, New Zealand, 311 m; CM M5316.

Other material examined. Proclamation Island, Bounty Islands, 47º42′S, 179º05′E, 39 m (24, M.119755); off Bounty Islands, 91 m (4, M.91946); NW point of Leeward Island, Antipodes Islands, 13 m (1, M.152618); off Antipodes Islands, 49º40.19′S, 178º44.30′E, 113 m (many, M.150149).

Distribution

Antipodes and Bounty islands, New Zealand, 39–311 m (shells only).

Remarks

Scissurella prendrevillei (see below) is a distinct allopatric species that is more widely distributed off southern New Zealand.

Scissurella prendrevillei Powell, 1933

(Figs 4–6)

Scissurella, n. sp. Finlay, 1928: 234.

Scissurella prendrevillei Powell, 1933*b*: 193, pl. 33, fig. 6; Powell, 1979: 34, pl. 13, fig. 14.

Scissurella stellae Fleming, 1948: 84, pl. 6, fig. 3, pl. 8, fig. 4; Powell, 1979: 34. **New synonymy**.

Material examined

Holotype, Scissurella prendrevillei. Off Owenga Beach, Chatham Islands, New Zealand, 18 m, Auckland Institute and Museum No. 70701.

Holotype, Scissurella stellae. Northport, Chalky Sound, Fiordland, New Zealand, 13 m, NZGS TM421.

Other material examined. Fossil: Ohope, shellbeds and blue muddy siltstone below old reservoir in stream foot of Ohope–Whakatane road (W15/644519), Late Pleistocene (Castlecliffian), M.150234 (1); Te Piki road cutting, between Whangaparaoa and Te Araroa (Y14/561904), Holocene (Haweran) (7, M.40192; 1, M.150153). Recent: several thousand specimens (153 lots, NMNZ) from throughout the geographic and bathymetric range.

Distribution

Late Pleistocene to Recent. Three Kings, North, South, Stewart and Chatham Islands, New Zealand, 0–805 m; taken alive at 9–163 m from bryozoan/shell substrata (common).

Remarks

From direct comparison of type material and scanning electron micrographs of topotypes, *Scissurella stellae* Fleming, 1948 is indistinguishable from the prior *S. prendrevillei* Powell, 1933. *Scissurella prendrevillei* differs from *S. fairchildi* in having fewer and stronger axial costae on the teleoconch, in the later appearance of the selenizone and in details of protoconch sculpture. An undescribed species with finer, more numerous axial costae than in *S. fairchildi*, *S. prendrevillei* and *S. marshalli* occurs with the latter two species off the far northern North Island and the Three Kings Islands (e.g. M.148569).

Scissurella marshalli Bandel, 1998

(Figs 7–9)

Scissurella marshalli Bandel, 1998: 12, pl. 2, fig. 4–6.

Material examined

Holotype. Reef between Great Island and Farmer Rocks, Three Kings Islands, New Zealand, 34°09′S, 172°10′E, 33 m, 17 Feb. 1986, scuba, G. S. Hardy, NMNZ M.93992.

Other material examined. Several hundred specimens (21 lots NMNZ).

Distribution

Off Three Kings Islands, New Zealand, 33–805 m, from comminuted bryozoan/shell substrata (shells only).

Remarks

Scissurella marshalli differs from *S. prendrevillei* in attaining a smaller size, in the earlier appearance of the selenizone, in the more strongly produced rim at the start of the selenizone, in that the axial costae on the teleoconch weaken as they approach the suture and in details of protoconch sculpture.

Genus **S*inezona*** Finlay, 1926

Sinezona Finlay, 1926: 341, 346. Type species (by original designation): *Schismope brevis* Hedley, 1904; Recent, New Zealand.

?*Coronadoa* Bartsch, 1946: 281. Type species (by original designation): *Coronadoa simonsae* Bartsch, 1946; Recent, California.

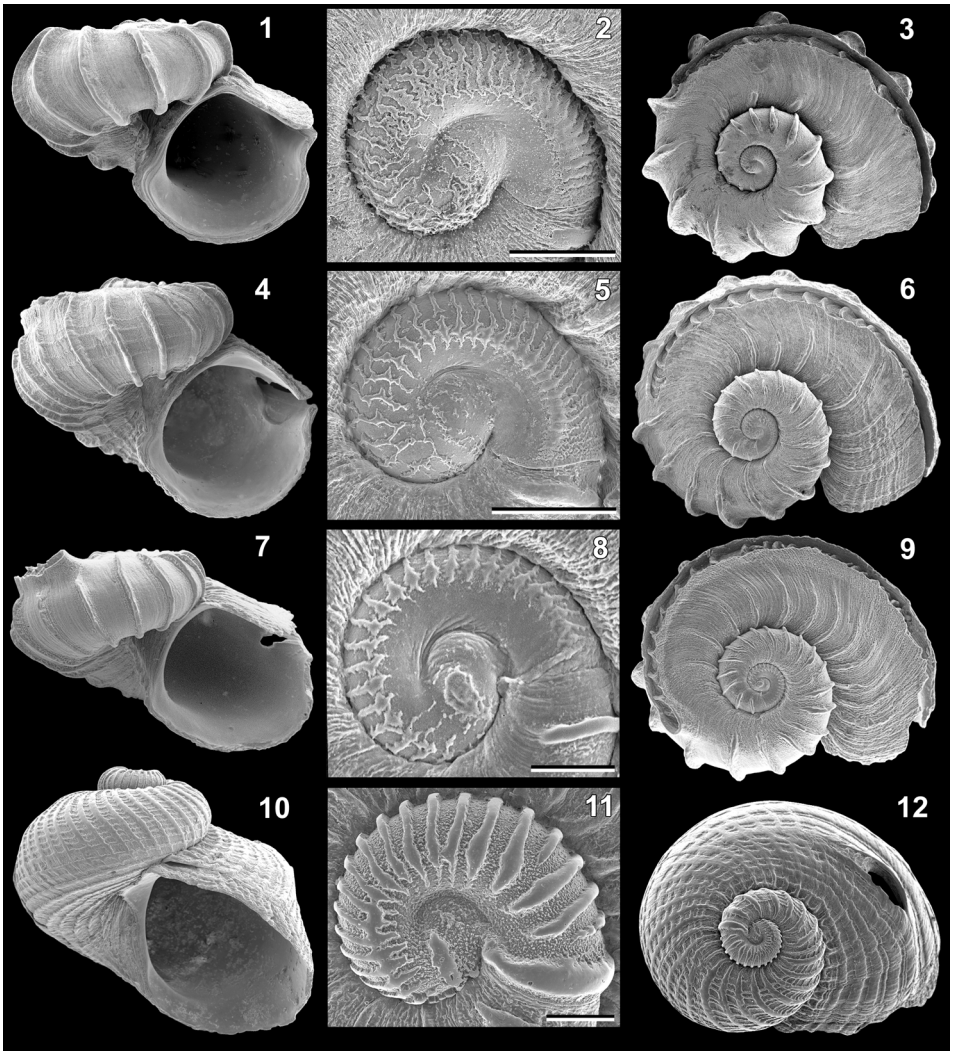
Daizona Bandel 1998: 57. Type species (by original designation): *Sinezona doliolum* Herbert, 1986; Recent, southern Africa. **New synonymy**.

Schismope of author, not Jeffreys, 1856 (based on misidentified type species).

Woodwardia of author, not Crosse & Fischer, 1861 (based on misidentified type species).

Remarks

As here limited, *Sinezona* comprises a group of species in which the protoconch is strongly axially ribbed (no spiral sculpture, no irregularly reticulate sculpture at the tip of the apical fold and terminal varix not connected to the tip of the apical fold) and the anal slit is closed behind the apertural rim to form a foramen at maturity. There is fluid transition in the degree of selenizone development between species in which the selenizone commences at the beginning of the last adult whorl and the terminal foramen either narrows and extends to the apertural rim as a slit (e.g. *S. doliolum* Herbert, 1986; Herbert 1986: fig. 31) or is closed anteriorly well before the outer lip (e.g. *S. pacifica* (Oliver, 1915) and *S. bandeli* new sp., figs 18, 21), through intermediate forms in which the selenizone commences before, at or after the middle of the last adult whorl and the foramen is closed anteriorly (e.g. *S. insignis* (E. A. Smith, 1910), *S. cingulata*, and *S. brevis* (Hedley, 1904: fig. 15)) to those in which the selenizone is very short or entirely absent (foramen only; e.g. *S. levigata* (Iredale, 1908: fig. 12) and *S. pauperata* Powell, 1933: Marshall 1993, fig. 1*A*). Contrary to the opinion of McLean (1967), *Coronadoa simonsae* Bartsch, 1946 is not based on juveniles of *S. rimuloides* (Carpenter, 1865), but appears to be a distinct, although otherwise similar, species of *Sinezona* that attains maturity without ever forming a trace of



Figs 1–12. Shells of *Scissurella* and *Sinezona* species. *1–3*, *Scissurella fairchildi* Powell, 1933, Proclamation Island, Bounty Islands, 39 m, M.119755 (width 1.05 mm). *4–6*, *Scissurella prendrevillei* Powell, 1933, off Bauza Island, Doubtful Sound entrance, 20 m, M.141663 (width 1.03 mm). *7–9*, *Scissurella marshalli* Bandel, 1998, off Three Kings Islands, 91 m, M.33651 (width 0.95 mm). *10–12*, *Sinezona levigata* (Iredale, 1908), off Five Fingers Peninsula, Fiordland, 37 m, M.144348 (width 1.00 mm). Scale bars: 50 μm.

either a selenizone or a foramen (material examined of both taxa collected living off Ben Rock, south of San Martin Island, Baja, California, 16–31 m, LACM 72–112).

Bandel (1998) proposed *Daizona* and *Ariella* (type species *Ariella haliotimorpha* Bandel, 1998; Oligocene, France) as genera for species with a long selenizone and none at all, respectively, and referred species with intermediate degrees of selenizone development to 'S*chismope*' and *Sinezona*. As indicated above, conceptually, *Schismope* and *Woodwardia* are both based on a species (probably *S. cingulata*) with a selenizone of moderate length with an anteriorly closed terminal foramen, although their (misidentified) nominal type species belong in *Scissurella*.

Besides lacking a selenizone, the type species of *Ariella* is characterised by its extremely small size (shell width 0.50 mm). Bandel (1998) referred the New Zealand species *Sinezona pauperata* Powell, 1933 to *Ariella* because it is also very small and lacks a selenizone (it has far more numerous axial riblets on the protoconch than *A. haliotimorpha*). Bandel also referred *Sinezona subantarctica* (Hedley, 1916) and *Ariella campbelli* Bandel, 1998 (= *S. levigata*) to *Ariella*, although there can be little doubt that they belong in *Sinezona s. str.* (see below).

In view of the continuous interspecific gradation in selenizone length, and particularly the absence of supporting anatomical and radular data, it seems impossible to justify *Daizona*, so it is here interpreted as a synonym of *Sinezona*.

In proposing *Sinezona*, Finlay (1926) stated that 'The absence of the fasciole girdle suggests the name chosen for the genus ...', which is unfortunate given that the good original illustration of the type species (Hedley 1904, text fig. 16) clearly shows a selenizone of moderate length. On purely etymological grounds, Herbert (1986) suggested that *Sinezona* may be based on a misidentified type species. However, Finlay (1926: 341, 346) explicitly introduced *Sinezona* '… for the *Schismope brevis* group' (*S. brevis* unequivocally designated as type species by Finlay (1926: 346)), in which he included *S. levigata* and *S. subantarctica* (Hedley, 1916), the former having a very short selenizone and the latter none at all. Finlay's statement that *S. levigata* has a 'generally quite smooth' spire suggests that he wrote from memory, influenced by the inappropriate etymology, a contention supported by the statement (later in the same paragraph) that the finely reticulately sculptured species *S. subantarctica* '… differs from *S. levigata* in being smoother'. Finlay's concept of *S. levigata* was extremely unlikely to be based on specimens of *Incisura lytteltonensis* (E. A. Smith, 1894) or *Scissurona rosea* (Hedley, 1904; the only nominal, more or less smooth Recent scissurellids known from the New Zealand region) because the original illustrations of these common, highly distinctive species clearly show a slit extending to the apertural rim.

I have not explored the possibility that some *Sinezona* species may have a terminal slit that remains wide open to the apertural rim, as in *Scissurella*, but it seems possible that these may exist, given that the foramen extends to the apertural rim as a slit in *Sinezona doliolum* Herbert, 1986. Such species would presumably be distinguishable from *Scissurella* species on protoconch morphology, the latter typically having much finer axial sculpture, a spiral thread, an irregular network of threads at the tip of the apical fold and a terminal varix that is connected to the tip of the apical fold.

Sinezona levigata (Iredale, 1908)

(Figs 10–12)

Schismope brevis levigata Iredale, 1908: 381; Suter, 1913: 91.
Sinezona laevigata [sic]. Finlay, 1926: 341; Powell, 1955: 46.
Sinezona levigata. Powell, 1979: 35.
Sinezona brevis. Bandel, 1998: 61, pl. 21, figs 2–5 (not Hedley, 1904).
Ariella campbelli Bandel, 1998: 64, pl. 22, figs 5–7. **New synonymy**.

Type data

Schismope brevis levigata. Type material probably no longer extant; Sandfly Bay, Otago Peninsula, New Zealand.

Material examined

Holotype, Ariella campbelli. Campbell Island, New Zealand, AMS C.162251.

Other material examined. Several hundred specimens (72 lots NMNZ) from throughout the geographic and bathymetric range.

Distribution

Southern North Island, South, Stewart, Snares, Auckland, Campbell, Antipodes, Bounty and Chatham Islands, New Zealand, 0–113 m; taken alive intertidally to 10 m from algae.

Remarks

Ariella campbelli Bandel, 1998 is based on a Campbell Island specimen of *Sinezona levigata*, specimens of which were described and illustrated in the same publication (Bandel 1998: 61, pl. 21, figs 2–5) as *S. brevis* (M100499). *Sinezona levigata* is common and widely distributed in the southern part of the New Zealand region and occurs sympatrically with *S. brevis* off the southern North Island, the northern South Island and at the Chatham Islands. *Sinezona levigata* may be distinguished from *S. brevis* by shorter selenizone, larger aperture, closed instead of open umbilicus (occluded by spreading inner lip), a slightly more eccentric apex, lower axial riblets on the first half teleoconch whorl and uninterrupted and more crowded axial riblets on the last adult whorl.

There is considerable variation in degree of development of the selenizone, both within and between populations. In most specimens from Campbell Island, the Antipodes Islands and the Bounty Islands, the selenizone is typically extremely short or entirely absent and is up to 200 μm long in a few specimens. In samples from off the Snares Islands, the selenizone ranges from absent to 430 μm in length, whereas in samples from Fiordland the selenizone is typically less than 270 μm long. Whereas there is certainly a higher proportion of specimens without selenizones in populations from the extreme south, there is complete gradation between specimens in which the selenizone is well developed or absent in populations from the Snares Islands, Stewart Island and the southern South Island and there is no obvious north–south cline in selenizone length. Because there does not appear to be any difference associated with selenizone length, it is concluded that all the populations examined are conspecific.

Iredale (1908) stated that the type material of *S. levigata* was ‘to be presented to the Canterbury Museum, Christchurch’, but there is no evidence that it was ever received there (Freeman *et al.* 1997). Moreover, type material was not traced in any other New Zealand national collection (or AMS) and is probably no longer extant.

Sinezona brevis (Hedley, 1904)

(Figs 13–15)

Schismope brevis Hedley, 1904: 90, text fig. 16; Suter, 1913: 91, pl. 6, fig. 14.
Sinezona brevis. Finlay, 1926: 341; Keen, 1960: 221, fig. 136/2; Powell, 1979: 34, pl. 13, figs 10, 11.
Woodwardia (*Sinezona*) *brevis*. Wenz, 1938: 173, fig. 272.
Sinezona iota. Bandel, 1998: 62, pl. 21, figs 6–8 (not Finlay, 1926).
NOT *Sinezona brevis*. – Bandel, 1998: 61, pl. 21, figs 2–5 = *S. levigata* Iredale, 1908.

Material examined

Holotype. Lyall Bay, Wellington, New Zealand, AMS C.13591.

Other material examined. Several hundred specimens (49 lots NMNZ) from throughout the geographic and bathymetric range.

Distribution

Three Kings, North, northern South and Chatham Islands, New Zealand, 0–46 m; taken alive intertidally to 6 m from algae.

Remarks

Bandel (1998) described and illustrated a Chatham Islands specimen of *S. brevis* under the name *Sinezona iota* Finlay, 1926. *Sinezona iota* differs from *S. brevis* in attaining a smaller size, in being taller and narrower, in having a much longer selenizone and a longer slit and in that the axial ribs on the protoconch are absent from a broad inner zone and are strongly thickened and in contact with one another in a narrow zone at the summit. The species described and illustrated by Bandel (1998) as *S. brevis* is, in fact, *S. levigata* (Iredale, 1908; see above).

Sinezona pacifica (Oliver, 1915)

(Figs 16–18)

Schismope pacificus Oliver, 1915: 514, pl. 9, figs 6, 6*a*.
Sinezona pacificus [sic]. Brook & Marshall, 1998: 214.
Daizona pacifica Bandel, 1998: 58, pl. 19, figs 6–8 (in part = *D. bandeli*, n. sp.). **New synonymy**.

Material examined

Neotype, Schismope pacificus Oliver. Here selected to facilitate recognition among other *Sinezona* species at Raoul Island; Raoul Island, Kermadec Islands, New Zealand (depth not recorded); AMS C.162250 (which is also the holotype of *Daizona pacifica* Bandel).

Other material examined. Raoul Island, Kermadec Islands, alive (shallow dredging, depth not recorded; 65, M.212572); SE of Smith Bluff, 29°18.90′S, 177°56.40′W, 82–100 m (4, M.226900); off W side of Meyer Island, 15 m (55, M.153992).

Distribution

Raoul Island, Kermadec Islands, and Norfolk Island, 0–100 m (depth for living specimens not recorded, but certainly as shallow as 15 m).

Remarks

Daizona pacifica Bandel, 1998 is both a synonym and a homonym of *Schismope pacificus* Oliver, 1915. Because type material of *Schismope pacificus* Oliver, 1915 is probably no longer extant (Freeman *et al.* 1997) and in order to obviate confusion with another superficially similar species that occurs at the type locality (e.g. M.226874) and with others from elsewhere in the south-west Pacific, the holotype of *D. pacifica* (Bandel 1998, pl. 19, figs 6–8) is here designated as a neotype of *S. pacificus*.

Bandel's (1998) record of *D. pacifica* from Rangaunu Bay, New Zealand, is based on specimens of a distinct species, which is described below.

Incidentally, *Sinezona* is feminine (*Schismope* masculine), so the specific epithet under *Sinezona* is *pacifica* rather than *pacificus*.

Sinezona bandeli n. sp.

(Figs 19–21, 25, 26)

Daizona pacifica Bandel, 1998: 58 (in part).
Sinezona sp. 5: Spencer *et al.* (in press).

Material examined

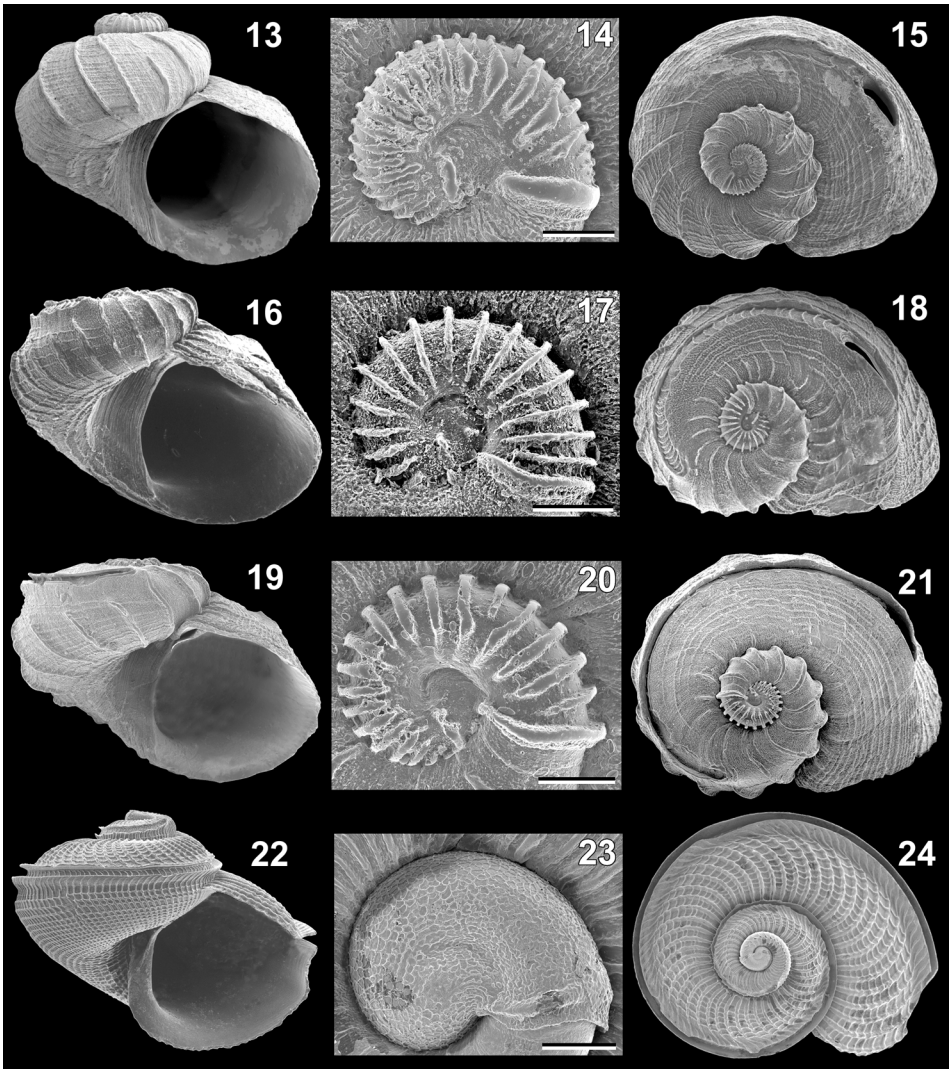
Holotype. Off Rangaunu Bay, New Zealand, 34°48.4′S, 173°19.5′E, alive, 25 m, 27 Jan. 1981, RV Tangaroa, NMNZ M.155919.

Paratypes. Same data as holotype (many, M.150283); off Rangaunu Bay, 34°49.6′S, 173°15.0′E, alive, 23 m (42, M.100505).

Other material examined. Off Three Kings Islands: Middlesex Bank, 33°57.0′S, 171°45.4′E, 98–103 m (3, M.150274); King Bank, 33°57.4′S, 172°19.4′E, 128–123 m (25, M.148572); Three Kings Trough, 34°00′S, 171°55′E, 805 m (11, M.150287); 34°01′S, 172°07′E, 622 m (16, M.150276); 13 km N of Great Island, 34°01.8′S, 172°12.0′E, 508 m (4, M.150288); 11 km NW of Great Island, 34°06.5′S, 172°04.7′E, 310 m (24, M.93865); off North-east Island, 34°08.5′S, 172°11′E, alive, 102 m (15, M.150282); reef between Great Island and Farmer Rocks, 34°09′S, 172°10′E, alive, 33 m (1, M.152626); North-west Bay, Great Island, 34°09.1′S, 172°08.4′E, alive, 23 m, airlifted from low mixed algae (mostly coralline) on boulders (4, M.137035); South-east Bay, Great Island, 34°09.5′S, 172°08.8′E, alive, 13–15 m, airlifted from under boulders (2, M.134905); 34°10′S, 172°12′E, 252 m (1, M.150273); off Princes Rocks, 34°10′S, 172°08′E, 14 m (5, M.150289); off South-west Island, 34°10′S, 172°08′E, 33 m (1, M.54040); Arch Pinnacle, Princes Rocks, 34°10.5′S, 172°03.0′E, 38 m (4, M.150334); Arch Pinnacle, Princes Islands, 34°10.5′S, 172°03.0′E, 44 m (2, M.150325); off N face of Hinemoa Island, 34°10.8′S, 172°02.6′E, 23 m (27, M.150277); 34°11′S, 172°10′E, 91 m (6, M.150281); off West Island, *Elingamite* wreck, 34°11′S, 172°03′E, 37 m (3, M.150317); 34°11.6′S, 172°10.9′E, 92 m (10, M.92071); S of Great Island, 34°14.1′S, 172°09.0′E, 192–202 m (6, M.150285); 39 km SW of Great Island, 34°17.6′S, 171°45.3′E, 427 m (1, M.94322). Off Spirits Bay, 34º22.58′S, 172º49.25′E, 49 m (3, M.152475); 34º23.55′S, 172º51.72′E, alive, 40 m (7, M.152479); 34º23.85′S, 172º47.55′E, alive, 32 m (28, M.152482); 34º23.87′S, 172º45.62′E, alive, 30 m (49, M.152483); 34º24.31′S, 172º49.95′E, 29 m (many, M.152485); 34°25.0′S, 172°46.6′E, 29 m (1, M.150275); 34°25.6′S, 172°48.2′E, 23 m (18, M.150280). N of Kerr Point, Tom Bowling Bay, 34º23.42′S, 172º59.18′E, 30 m (10, M.152477); Great Exhibition Bay, 34°33.4′S, 173°04.8′E, 63 m (1, M.150291); off Waikuku Beach, 47 m (5, M.150327); immediately outside Whangaroa Harbour entrance, 35°00.35′S, 173°45.7′E, alive, 25 m (1, M.152627); Whangaroa Harbour entrance, main channel, 35°02′S, 173°45′E, 20 m (5, M.150279). Bay of Islands: Waewaetorea Passage, 35°12.4′S, 174°13.3′E, 4 m (6, M.49405); 35°12.8′S, 174°15.6′E, 20–32 m (3, M.150315); Oke Bay, 35°13.4′S, 174°16.1′E, 3–5 m (1, M.150326); Paraoa Bay Point, 35°15.8′S, 174°10.4′E, 7 m (2, M.49467). Off Poor Knights Islands, 46 m (30, M.150329); off Poor Knights Islands (2, M.150333); Bartle's Bay, Aorangi Island, Poor Knights Islands, 35º28.5′S, 174º44.3′E, alive, stone washings, low tide (6, M.150323); between Marsden Point and Calliope Bank, Whangarei Harbour entrance, 35°50.2′S, 174°30.5′E, 20–25 m (1, M.150321); North Reef, of NW tip of Goat Island, Leigh, 36°16.2′S, 174°47.7′E, 18 m (2, M.150278); off E side of Ruamahua-nui Island, Aldermen Islands, 36°57.2′S, 176°05.8′E, 38 m (1, M.150292); off E side of Mayor Island, 37°18.9′S, 176°16.2E, 59–74 m (2, M.66513); Ranfurly Bank, East Cape, 37°33.4′S, 178°48.3′E, 106–103 m (1, M.150284); Rungapapa Knoll, WNW of White Island, 37°33.8′S, 176°59.0′E, 188–228 m (6, M.150290).

Description

Shell turbiniform, up to 1.30 mm wide, wider than high, thin; spire low, summit almost horizontal; translucent white. Protoconch 230 μm wide, all but inner one-quarter to one-third of exposed part of whorl section traversed by strong, high, flat-topped axial costae, costa nearest nucleus tangential to and longer than those following; terminal varix strong, rounded. Teleoconch of up to approximately 1.8 rather regularly expanding whorls; ramp weakly convex, almost horizontal on first whorl, thereafter gently sloping; side between selenizone and periphery shallowly concave; periphery and base smoothly continuous, rounded; umbilical rim angulate, wall steep and weakly convex. Selenizone strongly adapical, commencing shortly after start of last quarter of first whorl, rims closing



Figs 13–24. Shells of *Sinezona* and *Thieleella* species. *13–15*, *Sinezona brevis* (Hedley, 1904), Island Bay, Wellington, low tide, M.150342 (width 1.10 mm). *16–18*, *Sinezona pacifica* (Oliver, 1915), Raoul Island, Kermadec Islands, M.212572 (width 1.00 mm). *19–21*, *Sinezona bandeli* n. sp., off Rangaunu Bay, 25 m, paratype, M.150283 (*19*, width 1.20 mm); holotype, M.155919 (*20*, *21*, width 1.13 mm). *22–24*, *Thieleella flemingi* n. sp., Pegasus Canyon, off Banks Peninsula, 512–1006 m, M.52884 (width 2.02 mm). Scale bars: 50 μm.

together to form terminal foramen at shell diameter 0.9–1.00 mm or approximately one-sixth of whorl behind adult apertural rim, selenizone rims strongly elevated, internal septa weak. Sculptured throughout with crisp spiral threads and commarginal axial riblets. Spirals of similar size throughout, commencing shortly after appearance of selenizone, multiplying by intercalation. Axials stronger than spirals throughout, commencing immediately, approximately 14 on first whorl, strong and entirely traversing first 0.75 whorl; following appearance of selenizone weaker and restricted to inner part of ramp, evanescent at approximately middle of ramp, progressively weakening with increasing shell

size; below selenizone absent from concave side, strong and progressively enlarging on periphery and base, evanescent at umbilical rim, 9–12 last whorl in adults, becoming obsolete on last quarter whorl. Entire surface with crisp microsculpture of granules and commarginal growth lines. Aperture subcircular, peristome discontinuous, parietal area narrow, inducture of moderate thickness. Radula (Figs 25, 26) *n* + 4 + 1 + 4 + *n*. Central tooth broad, broad cutting area with seven similar cusps; lateral teeth with broad, outwardly bowed bases and narrow cutting areas, cutting areas of inner three pairs with two or three similar cusps, outermost pair with single cusp. Marginal teeth numerous, innermost pair massive, shaft flanged to interlock with adjacent teeth, cutting area tapered; outer marginals slender, each with five or more sharp slender cusps.

Distribution

Three Kings Islands and north-eastern North Island as far south as East Cape, New Zealand, 0–805 m; taken alive at extreme low tide (stone washings, Poor Knights Islands) to 102 m from clean bryozoan/shell and shell substrata, locally common.

Remarks

Specimens from off Rangaunu Bay (M.15005) were misidentified by Bandel (1998) as *Daizona pacifica* Bandel, 1998, which is both a synonym and a homonym of *Sinezona pacifica* (Oliver, 1915) from the same locality (Raoul Island, Kermadec Islands). Compared with *S. pacifica*, *S. bandeli* differs in a number of details, including larger and more strongly ribbed protoconch (width 230 *v.* 200 μm), stronger and fewer axial costae on the teleoconch, more steeply tapered sides and later closure of the selenizone to form a foramen (shell diameter 0.90–1.00 *v.* 0.70–0.80 mm). *Sinezona bandeli* bears a more superficial resemblance to *S. laqueus* (Finlay, 1926), with which it is sympatric, but differs in numerous details, including a smaller protoconch, smaller maximum size, smaller size relative to the number of whorls, much weaker septa within the selenizone, more shallowly concave sides, weaker axial costae and shorter selenizone.

Etymology

After Klaus Bandel, University of Hamburg.

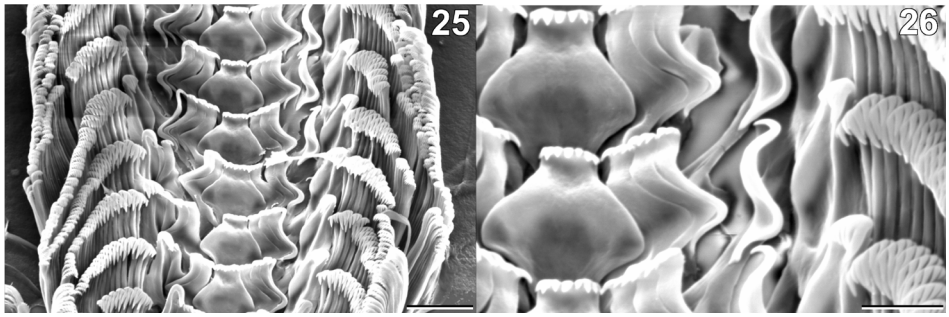
Subfamily **ANATOMINAE** McLean, 1989

Genus ***Thieleella*** Bandel, 1998

Thieleella Bandel, 1998: 35. Type species (by original designation): *Scissurella amoena* Thiele, 1912; Recent, Antarctica.

Remarks

Thieleella was introduced for species closely similar to species of *Anatoma* in teleoconch morphology but with a protoconch sculptured with a network of threads that enclose irregular polygonal spaces, rather than fine granules that are typically grouped into more or less distinct wavy axial lines. The protoconch of the type species of *Hainella* Bandel, 1998 (*Scissurella euglypta* Pelseneer, 1903; Recent, Antarctica) is similar to that in *Anatoma* species, as is the teleoconch, and it is difficult to see how *Hainella* could be separated from *Anatoma* on the basis of shell morphology.



Figs 25, 26. Radula. *Sinezona bandeli* n. sp., off Rangaunu Bay, 25 m, paratype, M.150283. Scale bars: *25*, 100 µm; *26*, 50 µm.

Thieleella protoconch sculpture is strikingly similar to that of the New Zealand species *Schismope lyallensis* Finlay, 1926, which was referred to *Sukashitrochus* Habe & Kosuge, 1964 on the basis of similarity to its type species (*Scissurella carinata* A. Adams, 1862) in teleoconch morphology (Marshall 1993). Other species referred to *Sukashitrochus* by Bandel (1998) on the basis of teleoconch morphology have several types of protoconch sculpture, the significance of which remains to be established (protoconch of *S. carinata* unknown).

Thieleella flemingi n. sp.

(Figs 22–24)

Schizotrochus mantelli. – Fleming, 1948: 84, pl. 8, fig. 3 (not *Scissurella mantelli* Woodward, 1859); Fleming, 1951: 136 (not Woodward).

Anatoma mantelli. – Powell, 1979: 36, pl. 14, fig. 1 (not Woodward).

Material examined

Holotype. The 'neotype' of *S. mantelli sensu* Fleming (1948) not Woodward, 1859; Daggs Sound, inside a rock bar (i.e. moraine), Fiordland, New Zealand, 106 m; NZGS TM426.

Other material examined. S of Kaikoura Peninsula, 42°35′S, 173°41′E, alive, 640 m (1, M.53684); Conway Rise, off Kaikoura, alive, 400 m (2, M.150211); wall of Pegasus Canyon, NE of Banks Peninsula, 43°14′S, 173°39′E, alive, 512–1006 m (2, M.52884). Thompson Basin floor Thompson Sound, 45°13.00′S, 166°57.96′E, 350 m, two stations (2, M.138880; 5, M.138535); 45°13.06′S, 166°58.01′E, 350 m, two stations (13, M.138780; 5, M.138837); 45º14.36′S, 166º58.96′E, 319–324 m (1, M.150711); 45º14.38′S, 166º58.87′E, 340–362 m (18, M.150524). Bradshaw Basin floor, Bradshaw Sound, 45º17.25′S, 167º02.46′E, 417 m (2, M.150652); 45°17.3′S, 167°02.6′E, 415 m (10, M.138409). Doubtful Sound, Utah Basin floor, 45°17.9′S, 166°55.5′E, 400 m (3, M.138624); Kellard Basin floor, 45°21.30′S, 167°03.36′E, 376 m (1, M.138598); Crooked Arm entrance sill (i.e. moraine), 45°21.41′S, 167°01.79′E, 54–60 m (4, M.138985). Long Sound narrows, Preservation Inlet, 35–40 m (probably moraine; 1, NZGS RM2212); head of Karitane Canyon, NE of Taiaroa Head, 45°38.5′S, 171°05.0′E, 585–530 m (3, M.51230); off East Otago, 45°45′S, 171°02′E, 520–600 m (1, M.150337); off Antipodes Islands, 49º40′S, 178º53′E, alive, 450–476 m (1, M.131196).

Description

Shell turbiniform, up to 3.70 mm wide, wider than high, thin, spire 0.43–0.85× height of aperture, translucent white. Protoconch 200 µm wide, sculptured with irregular network of fine, crisp threads; strong, rounded, subterminal varix. Teleoconch of up to 3.4 rather

regularly expanding whorls, ramp broadly and evenly rounded, abapical selenizone rim peripheral; base broadly rounded, evenly curving into narrow, deep umbilicus. Selenizone strongly abapical, commencing at end of first 0.75 whorl, terminating at aperture as open slit, rims strongly elevated; distance between selenizone and succeeding whorl approximately width of selenizone or less on first three whorls, thereafter widening to varying degrees due to descent of last adult whorl. Sculptured throughout with crisp, reticulating spiral threads and commarginal axial riblets, spirals of similar size throughout; axials stronger than spirals on ramp and as strong as spirals on side and base, approximately twice as many on adapical side of selenizone rim, in selenizone and on base and side than on spire. Spiral threads multiplying by intercalation, one commencing immediately and extending to start of selenizone, others commencing at end of first whorl, approximately nine on ramp at end of second whorl, up to 20 on ramp and 40 on base on last whorl of large specimens. Aperture subcircular, peristome discontinuous, parietal area broad, inducture extremely thin, rim of strongly flared abapical part of inner lip intersecting prominent angulation that extends up umbilical wall.

Distribution

Off South Island east coast and Antipodes Islands, New Zealand, living at 400–1006 m (with certainty as deep as 640 m), and Fiordland, 319–417 m (shells only). Shells from the Crooked Arm entrance sill (54–60 m) are from a moraine deposit, occurring together with common shells of other bathyal molluscs and corals that undoubtedly originated from the floor of the deep glaciated basin behind the sill. The holotype (106 m) and the shell from Long Sound narrows (35–40 m) are almost certainly also from moraines.

Remarks

Woodward (1859) introduced *Scissurella mantelli* for a shell reputedly obtained from a sample of 'menaccanite' sand obtained 'in New Zealand' by Walter Mantell. Interpretation of this species has been based consistently on the illustration indicated as representing *S. mantelli* that accompanied the original description (Woodward 1859, pl. 46, fig. 8). On this basis, Fleming (1948) identified similar New Zealand specimens as *S. mantelli* and, subsequently (Fleming 1951), selected one of them as the neotype.

When introducing *S. mantelli*, Woodward (1859: figs 1–7) illustrated three scissurellid species: 'S*cissurella elegans* d'Orbigny, 1824' (misidentified; see above), *S. crispata* Fleming, 1828 (fig. '9'), and *S. mantelli* (fig. '8'). Woodward (1859) described *S. mantelli* by contrasting it with *S. elegans* alone, stating that it was '... larger, more depressed, more strongly ornamented, and has a longer scissural band'. From his illustrations, there can be no doubt that the description is actually based on the specimen depicted at his fig. 9 and that the names *S. mantelli* and *S. crispata* are simply transposed in the legend, so the putative New Zealand species is really the one depicted at fig. 9. No species known from the New Zealand region (named or un-named) matches the original illustration, suggesting that Woodward's specimen was mislocalised. Accordingly, Fleming's (1951) neotype of *S.* '*mantelli*' (not Woodward) represents an unnamed species (of *Thieleella*), for which a substitute name is provided here.

The provenance of Mantell's specimen has long been a mystery to New Zealand workers because the sample of 'menaccanite' sand (i.e. ironsand) from which it reputedly came was almost certainly from a North Island west coast beach (Dawson 1991) and because ironsand

does not occur where *S.* '*mantelli*' = *T. flemingi* has been found, specifically (and uncommonly) off the southern South Island and the Antipodes Islands at 319–1006 m depth (depth records from moraines excluded). Further evidence that the sample was mislocalised is Woodward's (1859) statement that it included a species of *Ringicula* Deshayes, 1838, no member of that genus having been recorded from depths shallower than 165 m off mainland New Zealand, yet faunas from this deep in the area were not sampled until later in the 19th century (*Challenger* Expedition). While it seems impossible to know for sure, it seems likely to me that the original specimen of *S. mantelli* Woodward is actually a subadult of a species of *Reussella* Bandel, 1998, perhaps *R. plicata* (Hedley, 1899) or a similar species, which are not uncommon in sediments from shallow tropical lagoons in the Western Pacific where, indeed, they may occur together with *Ringicula* species. In the absence of type material, or even a type locality, *S. mantelli* Woodward should be dismissed as a *nomen dubium*.

Etymology

After the late Sir Charles Fleming, who fostered my early interest in malacology.

Subfamily **LAROCHEINAE** Finlay, 1927

Genus ***Trogloconcha*** Kase & Kano, 2002

Trogloconcha Kase & Kano, 2002: 26. Type species (by original designation): *Trogloconcha ohashii* Kase & Kano, 2002; Recent, tropical and subtropical Indo-Pacific.

Trogloconcha* sp. cf. *tesselata Kase & Kano, 2002

Larochea miranda. Bandel, 1998: 66, pl. 23, figs 4, 5. Not Finlay, 1927.
Trogloconcha ohashii. Kase & Kano, 2002: 26 (in part).

Distribution

Swain Reef, Queensland.

Remarks

The Australian species identified as *Larochea miranda* by Bandel (1998) differs markedly from the New Zealand endemic species *L. miranda* in having a more central apex, more tightly coiled whorls and much stronger reticulate sculpture. This specimen was identified as *Trogloconcha ohashii* Kase & Kano, 2002, by Kase and Kano (2002), although from the illustrations it seems more likely to be *T. tesselata* Kase & Kano, 2002.

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