

TWO TRICHOTROPID GASTROPODS COLLECTED BY THE
ICEBREAKER SHIRASE FROM BREID BAY, ANTARCTICA,
WITH PROPOSAL OF A NEW SUBGENUS

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Abstract: Among the benthos materials collected by the icebreaker "SHIRASE" from Breid Bay, Antarctica, two species of Antarctic trichotropid gastropods, *Neoconcha insignis* SMITH and *Torellia* (*Schismospira* subgen. n.) *planispira* (SMITH), were discovered. The morphological details of these two species are described and some considerations to their generic position are given.

1. Introduction

The Antarctic mollusks have been studied since the early 1900's by many authorities, such as SMITH (1902, 1907), THIELE (1912), POWELL (1951, 1958), ARNAUD (1972), and EGOROVA (1982) among others. On the contrary, very few papers have been made public on mollusks collected by the Japanese Antarctic Research Expeditions (HORIKOSHI and HOSHIAI, 1977, 1978; HORIKOSHI *et al.*, 1979; OKUTANI, 1986). Therefore, the composition, structure, and ecology of molluscan fauna around Syowa Station have never been fully worked out.

During the course of identification of benthic mollusks collected by the Icebreaker SHIRASE, two species of the gastropod family Trichotropidae were found from Breid Bay, Antarctica. The present paper redescribes morphological details of these two species, *Neoconcha insignis* and *Torellia* (*Schismospira* subgen. n.) *planispira*, and their generic position is discussed.

2. Collecting Stations

Beam-trawl sampling was performed at five stations in Breid Bay and Günnerus Bank during the period from December 1984 to February 1985. The date of sampling, position, and depth of these stations are shown in Table 1 and Fig. 1.

3. Systematics

Family Trichotropidae GRAY, 1850

Genus *Torellia* JEFFREYS, 1867

Type species: *Torellia vestita* JEFFERYS, 1867 (O.D.)

The Trichotropidae have turbinate or globose and thin shell with depressed or high spires, and a thick periostracum. The teleoconch has or has not spiral sculpture.

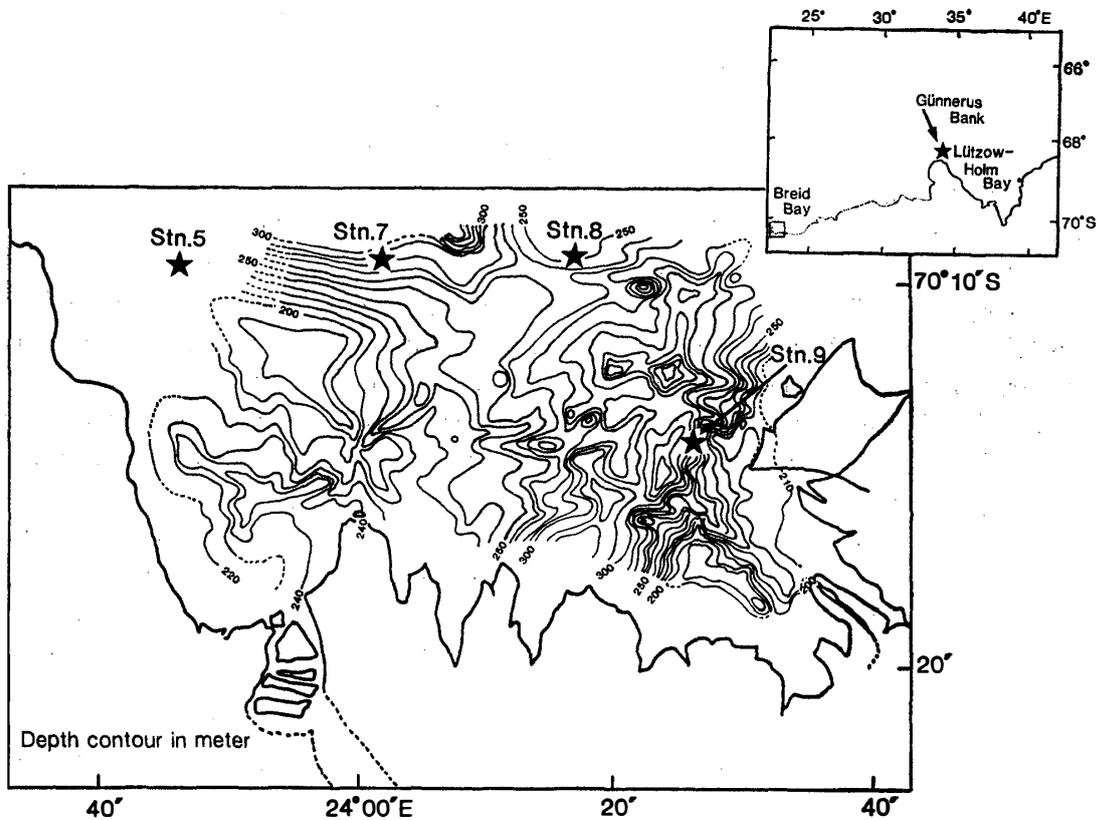


Fig. 1. Trawling sites in Breid Bay and Günnerus Bank by the icebreaker SHIRASE.

Table 1. Collecting stations of beam-trawl by the icebreaker SHIRASE.

Area	Stn.	Date	Lat. S	Long. E	Depth (m)
Breid Bay	7	27 Dec. 1984	70°09.1'	24°01.9'	295-310
	8	29 Dec. 1984	70°08.5'	24°16.8'	270
	5	8 Feb. 1985	70°09.0'	23°46.3'	275-283
	9	10 Feb. 1985	70°13.7'	24°25.7'	276-289
Günnerus Bank	—	25 Feb. 1985	68°23.5'	34°07.5'	281-282

The aperture is round with an only vestigial siphonal canal. The rhachidian tooth is much wider than it is high. The lateral tooth is wide, quadrilateral in outline, with shelf-like wing laterally.

Subgenus *Schismospira*, nov.

Type species: *Trichotropis planispira* SMITH, 1907

The shell is turbanate, thin, fragile, and is broader than it is high, with depressed spires. The teleoconch whorls are separated from each other at suture with a thick and hairy periostracum. The shell has very fine, wavy growth lines, which are emphasized by periostracal hairs, but has no spiral sculpture on ostracum. The umbilicus is widely open. The aperture is round and smooth.

Torellia (Schismospira) planispira (SMITH, 1915)
(Figs. 2A, B; 3B; 5B)

Trichotropis planispira SMITH, 1915, p. 67, pl. 1, fig. 7.

Trichoconcha planispira: POWELL, 1958, p. 188.

Trichoconcha planispira: POWELL, 1960, p. 143 (name only).

Material examined: A single living specimen and 7 empty shells from Stn. 5; 1 living specimen from Stn. 7; 1 living specimen from Stn. 8; 1 living and 1 dead specimen from Stn. 9.

Description: The shell is turbinate, thin, fragile, broader than high, with depressed spires (Fig. 2A, B). The protoconch is about 1.5 in number of turns, about 1.0 mm in diameter, white, naked, mammillate, and has very fine spiral cords. The teleoconch is 3 in number of turns, glossy white in color, with very convex whorls separated at suture, and rapidly increasing in diameter towards the aperture. The helicocone is rounded with no apparent sculpture except weak growth lines. The growth lines are wavy and emphasized by hairy periostracum, which is extraordinarily thick, dirty white in color, rather lamellose axially. The upper whorl is small and depressed. The body whorl is very large, occupying 70–80% of the length, ornamented by regularly spaced, three strong spiral carinae, on which periostracal hair is raised. The space between the suture and the uppermost carina is a flat sutural ramp. The lowest carina is margining an open umbilicus. The umbilicus is so wide that the umbilical walls of upper whorls are visible inside. The aperture is round with a thin and smooth peristome. As the shell is thin and translucent, the superficial periostracal spiral carinae are visible through the shell. The outer lip is smooth, where periostracal spiral carinae terminate. The columellar lip is slightly expanded and reflected over the umbilicus. The basal lip is slightly expanded and reflected, and has a weak corner on the columellar side.

The operculum is horny, slightly small for the aperture (67% of aperture length), and triangular in outline. The nucleus is not preserved in the examined specimens.

The animal is pale brown in color, and has a pair of short and stout cephalic tentacles, with large eyes on basal bulges outside. The penis is small, simple finger-like shaped, and curved backwards. The foot is moderate, quadrilateral in outline, which has a double margin in front. The proboscis is short and wide, with rather large buccal mass.

The redula is taenioglossate, 2:1:1:1:2 with 42 rows of teeth, and translucent brown in color (Fig. 3B). The rhachidian tooth is scalloped in outline, much wider than high (78% of width), and has a strong central cusp that carries finely serrated edge on both sides. The basal line is straight. The lateral tooth is wide, quadrilateral in outline with a sharp tip and shelf-like wing laterally, and has a nodulous projection on lateral inside. The marginals are slender, simple sickle-shaped, and they are similar in size.

Measurements: See Table 2.

Previous distribution records (Fig. 4): Type locality: McMurdo Sound, 222–241 m (SMITH, 1915). Range: Off MacRobertson Land, 219 m (POWELL, 1958).

Remarks: *Torellia (Schismospira) planispira* is similar to *Neoconcha insignis* SMITH, 1915, from East Antarctica, and *Torellia lanata* WARÉN, ARNAUD and CANTERA, 1986, from Kerguelen Islands, in having few strong periostracal keels. However, *T. lanata* is distinguishable from this species by having 10 periostracal keels, the protoconch with

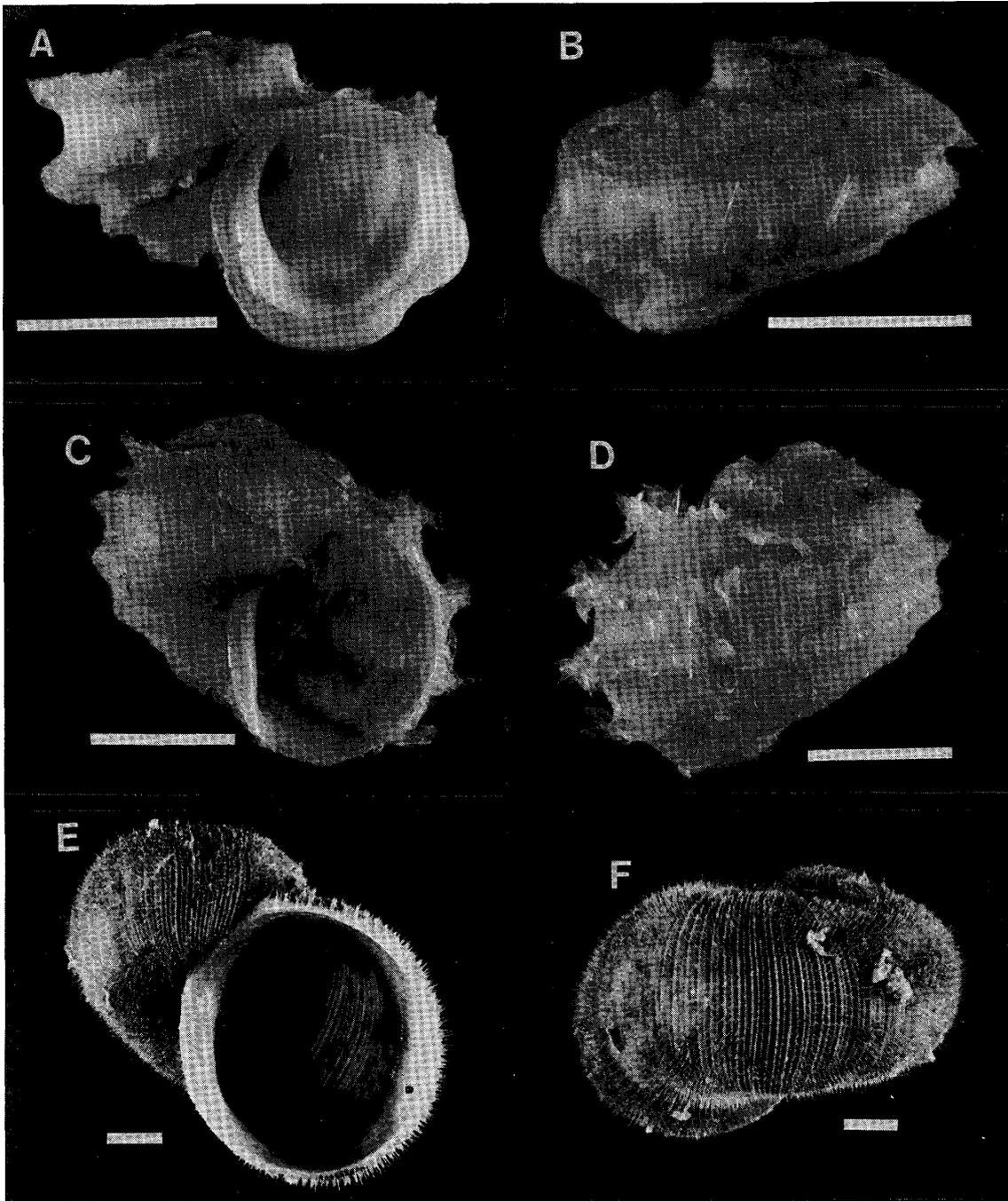


Fig. 2. Three antarctic trichotropid gastropods. A, B: *Torellia* (*Schismospira* subgen. n.) *planispira* (SMITH) from Stn. 9. C, D: *Neoconcha insignis* SMITH from Stn. 5. E, F: *Torellia* (*Trichoconcha*) *mirabilis* (SMITH) from South Shetland Islands. Scale=5 mm.

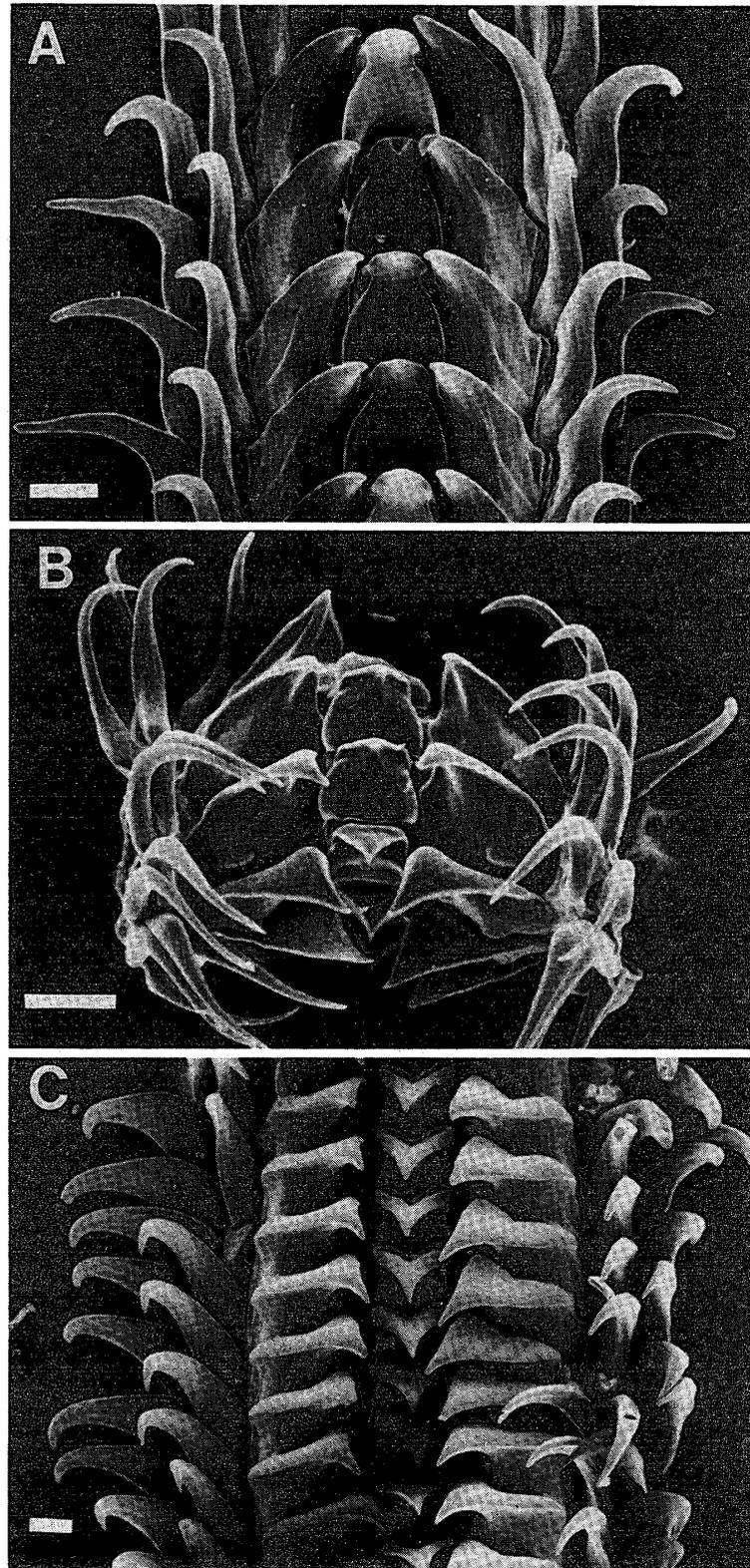


Fig. 3. SEM photographs of radula of three species. A: *Neoconcha insignis* SMITH of Fig. 2C, D. B: *Torellia* (*Schismospira* subgen. n.) *planispira* (SMITH) of Fig. 2A, B. C: *Torellia* (*Trichoconcha*) *mirabilis* (SMITH) of Fig. 2E, F. Scale = 100 μ m.

Table 2. Measurements and condition of *Torellia* (*Schismospira*) *planispira* (SMITH).

No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Stn.		5	5	5	5	5	5	5	5	5	5	5	7	8	9	9
SL. (mm)		5.6	6.1	3.4	2.5	2.4	—	—	—	—	—	—	—	6.5	6.3	7.1
SW. (mm)		8.0	7.6	5.2	3.2	3.2	8.9	8.7	7.3	—	—	—	11.2	9.5	9.5	9.2
SL./SW. (%)		70.0	80.3	65.4	78.0	75.0	—	—	—	—	—	—	—	68.4	66.3	77.2
Condition		F	F	F	F	F	E	E	E	E	E	E	E	F	F	L

SL.: Shell length; SW.: Shell width; L: Specimen taken alive; F: Freshly dead specimen; E: Empty and water-worn specimen.

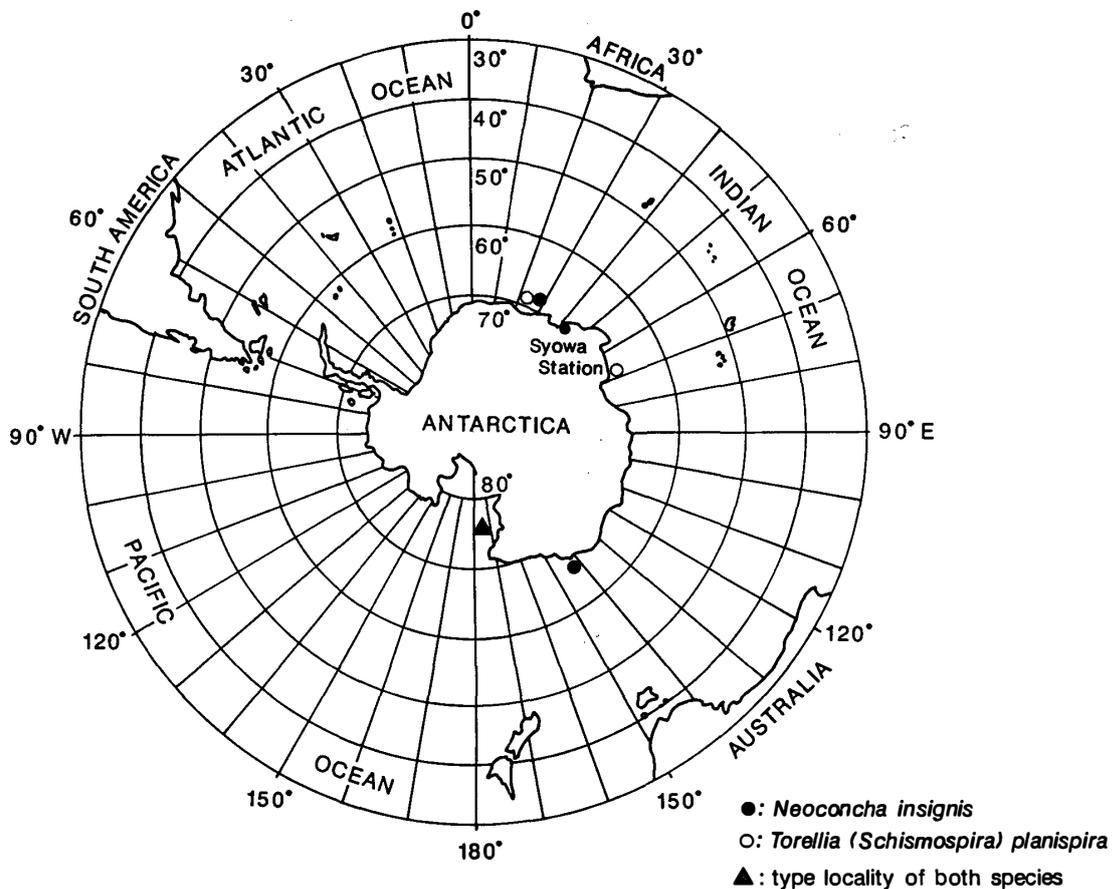


Fig. 4. Distributions of *Neoconcha insignis* SMITH and *Torellia* (*Schismospira* subgen. n.) *planispira* (SMITH).

2.5 in number of turns, and triangular lateral teeth on the radula. *N. insignis* also differs in having no weak corner in the basal lip of the aperture. *Antitrichotropis antarctica* (THIELE, 1912) from East Antarctica is similar to this species in having broader and depressed shell. But, it differs from this species in having strong spiral ridges on spiral whorl. This species is also distinguishable from other related species by having separated teleoconch whorls. This character warrants separating this species from others, at least in the subgeneric level.

Table 3 Historical transfer in generic allocation of three species.

SMITH (1915)	<i>Trichoconcha mirabilis</i>	<i>Trichotropis planispira</i>	<i>Neoconcha insignis</i>
	↓	↓	↓
POWELL (1958)	<i>Trichoconcha mirabilis</i>	<i>Trichoconcha planispira</i>	<i>Neoconcha insignis</i>
	↓	↓	↓
WARÉN <i>et al.</i> (1986)	<i>Torellia (Torellia) mirabilis</i>	<i>Torellia (Torellia) planispira</i>	<i>Torellia (Neoconcha) insignis</i>
	↓	↓	↓
Present study	<i>Torellia (Trichoconcha) mirabilis</i>	<i>Torellia (Schismospira) planispira</i>	<i>Neoconcha insignis</i>

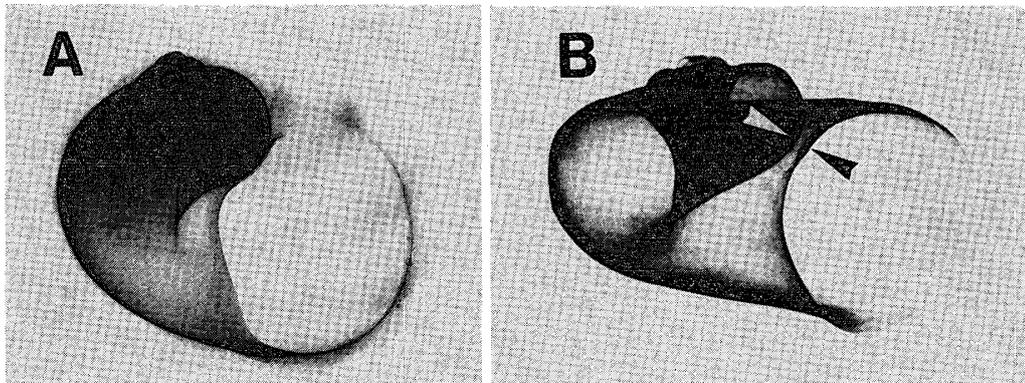


Fig. 5. X-ray photographs of two species. A: *Neoconcha insignis* SMITH (=Fig. 2C, D). B: *Torellia (Schismospira subgen. n.) planispira* (SMITH) (=Fig. 2A, B), showing separated whorls (arrows).

POWELL (1958) moved *Trichotropis planispira* to the genus *Trichoconcha* by depressed shell and widely open umbilicus (Table 3). When *Torellia (Schismospira) planispira* is compared with *Trichoconcha mirabilis* SMITH, 1915 (Figs. 2E, F, 3C), collected from South Shetland Islands by Japan Marine Fishery Resource Research Center, it is true that the configuration of shell of the former species is similar to that of the latter. However, the teleoconch whorls of *T. (S.) planispira* is separated (Fig. 5B), while *T. mirabilis* has adherent whorls. WARÉN *et al.* (1986) stated that *T. (S.) planispira* has a radula intermediate between *Torellia* and *Neoconcha*, while the present study revealed that the radula of this species is similar to *Torellia* rather than to *Neoconcha*. We thus consider that *T. (S.) planispira* is allocated into *Torellia* because of similarity of radula, despite the fact that the shell characters are different from any other species of the genus *Torellia*. Thus, we proposed the new subgenus *Schismospira* for *T. planispira*.

Genus *Neoconcha* SMITH, 1907

Type species: *Neoconcha vestita* SMITH, 1907 (O.D.)

The shell is spherical or globose, thin, fragile, broader than high with depressed spires, and has a thick hairy periostracum. It has growth lines, but has no conspicuous spiral sculpture. The upper whorl is small, while body whorl is very large. The umbilicus is narrowly open. The aperture is round, and has no siphonal canal. The

rhachidian tooth is scalloped in outline, and is much higher than wide. The lateral tooth is stout and rhombic in outline, and has no nodulous projection on lateral inside.

Neoconcha insignis SMITH, 1915

(Figs. 2C, D; 3A; 5A)

Neoconcha insignis SMITH, 1915, p. 68, pl. 1, fig. 8.

Neoconcha insignis: EALES, 1923, p. 13, fig. 11.

Neoconcha insignis: POWELL, 1960, p. 143 (name only).

Neoconcha insignis: ARNAUD, 1972, p. 123.

Torellia (Neoconcha) insignis: WARÉN, *et al.*, 1986, p. 158, fig. 6.

Material examined: A single living specimen from Stn. 5.

Description: The shell is thin, spherical, fragile, and broader than high with depressed spires (Fig. 2C, D). The protoconch is about 1.5 in number of turns, 2.0 mm in diameter, glossy white with very finely spiral cords. The teleoconch is dirty white in color, 4 in number of turns, round, and rapidly increases in diameter towards the aperture. The suture is deep and weakly channeled. The growth lines are emphasized by hairy periostracum, which is very thick, pale olivaceous in color, rather lamellose along those lines and raised into long, divergent hairy processes on the shoulder and on spiral carinae. The upper whorl is small and depressed. The body whorl is very large, occupying 95% of shell length, ornamented by rather regularly spaced, five spiral carinae, on which periostracal hair is raised. The base is roundly inflated. The umbilicus is narrowly open, and it is not margined by the lowest carina. The aperture is round and the peristome is very thin and rather polygonal in outline. As the shell is translucent, the superficial periostracal carinae are visible through the shell. The outer lip is not always smoothly round, elastic and frosted white inside. The inner lip is smooth and glossy white inside. The columellar lip is glossy white in color, slightly expanded and reflected over the umbilicus. The basal lip is elastic and round.

The operculum is horny, small for the aperture, 38% of aperture length, and quadrangular in outline. The nucleus is not preserved in the examined specimen.

The animal is creamy in color, except the brownish mantle edge, while pedal sole is pale red. The animal has a pair of large, short, and stout cephalic tentacles, with large eyes on the outside of basal bulges. The penis is large, simple, finger-like shaped, and curved forward. The foot is small and oblong in outline. The mouth is large, with rather large buccal mass. The ventral lip is shaped like a pseudoproboscis, which is long and tapered to a point.

The radula is taenioglossate, 2:1:1:1:2 with 28 row of teeth, translucent brown in color (Fig. 3A). The rhachidian tooth is scalloped in outline, much higher than wide (60% of height), which has a small central cusp and little rounded basal edge. The lateral tooth is stout and rhombic in outline with sharp tip. The marginals are long, simple sickle-shaped, and they are similar in shape and in size. The rhachidian reduces size towards anterior end of the radular ribbon. In this part, it has a strong central cusp that carries three small denticles on both sides. And the marginals here have two small denticles above, but the laterals are not different from posterior ones.

Measurements: Shell length 11.9 mm, shell width 12.4 mm (operculum 3.8×3.1 mm)

Previous distribution records (Fig. 4): Type locality: McMurdo Sound, 300 fathoms

(SMITH, 1915). Range: Terre Adélie, SE of Curie Island, 110–130 m (ARNAUD, 1972; WARÉN *et al.*, 1986).

Remarks: *Neoconcha insignis* is most closely allied to *Torellia pacifica* OKUTANI, 1980, from the Northwest Pacific, and to *T. lanata* WARÉN, ARNAUD and CANTERA, 1986, from Kerguelen Islands. *T. lanata* is distinguishable from *N. insignis* by having a distinct angle in the lower corner of the aperture. *T. pacifica* differs by having nine strong periostracal carinae on the body whorl. Radulae of these two species also differ from that of *N. insignis* in having broader and lower rhachidian tooth and larger and strongly incurved lateral tooth. *Neoconcha vestita* SMITH, 1907, the type species of *Neoconcha*, is very similar to *N. insignis* in radular character, but they differ from each other in shell form. The shell of *N. vestita* is much higher than wide (87% of the length) and has a large and ovoidal aperture.

Neoconcha was separated from other trichotropid genera by THIELE (1929) because of radular characters. According to WARÉN *et al.* (1986), the radulae of type species of the genus *Torellia*, *T. vestita* JEFFREYS, 1867, from Northern Atlantic, and *Neoconcha vestita* SMITH, 1907, from Antarctica, are different from each other. WARÉN *et al.* (1986) considered that *Neoconcha* is a subgenus of *Torellia*, because of the similarities in shell characters and radular features (Table 3). We compared the radula of *T. (S.) planispira* with that of *N. insignis*. The former species has more-depressed rhachidian tooth (height is 78% of width) and wide and quadrilateral lateral teeth, and is rather similar to that of *Torellia* (Fig. 3C). The shell of *Neoconcha insignis* has spiral carinae superficially; however, according to an X-ray observation, it has no true spiral carinae on the shell (Fig. 5A). *N. vestita* also has no ostracal spiral sculpture. Therefore, we maintain *Neoconcha* at generic level.

Trichoconcha was considered to be a synonym of *Torellia* by WARÉN *et al.* (1986), because of similarity of configuration and color of radula (Table 3). One remarkable feature of *Trichoconcha mirabilis*, type species of the genus *Trichoconcha*, noted by EALES (1923) and WARÉN *et al.* (1986), is that this species has a green radula. The radula of *Torellia vestita* is reportedly also green (WARÉN *et al.*, 1986). Although SMITH (1907) described that the radula of the type specimen of *Trichoconcha mirabilis* was brown in color. The color of radula of *T. mirabilis* under the present examination is translucent brown without any hint of greenish hue. The morphology of radula of *Trichoconcha mirabilis* is similar to that of *Torellia vestita* and of *Torellia (Schismospira) planispira*, except parallelogramatic lateral teeth, and presence of conspicuous shoulder and lack of nodulous projection on lateral side of the base of the lateral teeth (Fig. 3C).

Trichoconcha mirabilis is extremely larger (SL. 29.3 mm; SW. 33.3 mm; South Shetland specimen) than any other known species of *Torellia*, and it has depressed upper whorls, elastic shell, and sparse hairy periostracum (Fig. 2E, F). It is reasonable to treat *Trichoconcha* as a subgenus of the genus *Torellia*.

4. Discussion

According to EALES (1923) and WARÉN *et al.* (1986), the color of the radula of *Torellia (Trichoconcha) mirabilis* was green. However, among three species under the present examination, none of them has green radula. The radulae of all species are

translucent brown in color. The type specimen of *T. (T.) mirabilis* had brownish radula (SMITH, 1915). It is not clear at present if the green radula means a color variation of the radula or is due to a certain artifact such as the method of fixation or the condition of preservation.

Almost all of the species of the genus *Torellia* are distributed in deep water at middle latitudes, such as *T. fimbriata* VERRILL and SMITH in VERRILL, 1882, from North Atlantic, *T. japonica* (OKUTANI, 1964) and *T. pacifica* OKUTANI, 1980 from Northwest Pacific, among others. In contrast to this, in the Antarctic and Arctic areas all members of this genus (s.l.) are distributed in shallow strata, such as species treated here as well as *T. vestita*. It shows that the *Torellia* exhibits a bipolar distribution, with deepening of the water to lower latitudes. The genus *Torellia* is thus considered to be a "deep-water element in the lower latitudes" in the Antarctic shallow water fauna (POWELL, 1960; DELL, 1972).

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(Reference with asterisk denotes that not accessible to the authors.)

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