

Two new species of eelpouts (Teleostei, Zoarcidae) of the genus *Seleniolycus* from the Ross Dependency, Antarctica

PETER R. MØLLER¹ & ANDREW L. STEWART²

¹Zoological Museum, Natural History Museum, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark. E-mail: Pdrmoller@snm.ku.dk

²Museum of New Zealand Te Papa Tongarewa, P.O. Box 467, Wellington, New Zealand

Abstract

Detailed examination of eelpouts (Zoarcidae) in recently collected material from the Ross Dependency, Antarctica, and held by the Museum of New Zealand Te Papa Tongarewa, revealed two undescribed species of *Seleniolycus* Anderson, 1988. They both differ from the type species *Seleniolycus laevifasciatus* (Torno, Tomo & Marschoff, 1977) from the Scotia Sea, Banzarre Bank and Falkland Rise, by having scales on the posterior part of the body (vs. naked), more numerous anal fin rays (69–73 and 64–66 vs. 53–58), total vertebrae (88–97 and 86–89 vs. 74–80), and suborbital head pores (6 and 6–7 vs. 5). *Seleniolycus robertsi* sp. nov. and *S. pectoralis* sp. nov. can readily be separated from each other by pectoral fin length (7.9–9.4 vs. 11.1–11.5% SL) and shape (fin entire vs. lower rays exerted), as well as several meristic and morphometric characters. *Seleniolycus robertsi* inhabits slightly shallower depths than *S. pectoralis* (1455–2290 vs. 1948–2594 m). The new species have several more generalised character states than *Seleniolycus laevifasciatus*, and seem to represent the basal-most branch in the *Seleniolycus*-*Melanostigma* lineage. A key to the known species of *Seleniolycus* is provided.

Key words: *Seleniolycus robertsi* sp. nov., *Seleniolycus pectoralis* sp. nov., Gymnelinae, deep-sea fishes, toothfish fishery

Introduction

The Southern Ocean has a long geological history and a fish fauna dominated by notothenioids (Clarke & Johnston, 1996; Eastman, 2005). With 24 known species, the family Zoarcidae is the fourth most speciose benthic fish family in Antarctic waters, comprising 10.8% of the fish fauna (Eastman, 2005; Eastman & McCune, 2000; Møller *et al.*, 2005). Zoarcids are believed to have originated in the North Pacific, migrating south via isothermic submergence before radiating in the Southern Ocean (see Anderson, 1990;

Briggs, 2006). Unlike other speciose families in the region such as Artedidraconidae and Liparidae, new Antarctic zoarcids have not been described for more than 15 years (Anderson, 1991, 2006; Anderson & Fedorov 2004). While the fish fauna of some parts of the vast Southern Ocean are fairly well known (e.g. the Weddell Sea), other regions remain poorly sampled. This is especially true for the outer Ross, Amundsen and Bellinghausen Seas, where new records and undescribed species are expected.

The Ross Dependency is a region where New Zealand holds special interests and responsibilities, but where the taxonomy of fishes is still poorly known (Eastman & Hubold, 1999). Since 1999 the Museum of New Zealand Te Papa Tongrewa (Te Papa) has received, through the New Zealand Ministry of Fisheries Scientific Observer Programme, important collections of by-catch and stomach contents of fishes taken from exploratory longline fishing for toothfishes (*Dissostichus* spp., Nototheniidae). Collections of fishes were also made in the shallow waters of the western Ross Sea and Balleny Islands, by the New Zealand research vessel *Tangaroa* in 2004 (Mitchell & Clark, 2004). This recent effort has resulted in a significant expansion of the numbers of Antarctic fishes in the National Fish Collection at Te Papa (over 1,000 registered lots) with a corresponding increase in the number of putative new species and new records for the area (Stewart, 1999; Roberts & Stewart, 2001; Stewart & Roberts, 2001; Te Papa unpublished records).

Examination of the zoarcids in this valuable new material (44 lots, 56 specimens) revealed 11 specimens caught on baited longlines assignable to the monotypic Southern Ocean genus *Seleniolycus* Anderson, 1988. However, they belong to two different species, and neither of them matches the description of the type species *Seleniolycus laevifasciatus* (Torno, Tomo & Marschoff, 1977). These two species are herein described as new to science and compared to *S. laevifasciatus*. The latter is known from about 26 specimens collected from the Falkland Rise, Scotia Sea, and Banzar Bank at depths of 700 – 1525 m (Anderson, 1988, 1994, 2006). With the inclusion of two additional species the latest generic diagnosis for *Seleniolycus* (Anderson, 2006) is expanded.

Methods and abbreviations

During the austral summer 2001–2003, fish specimens were acquired as by-catch on exploratory commercial toothfish longlines using baited 6/0 hooks. Specimens were frozen on capture; on return to New Zealand they were thawed and registered into the National Fish Collection at Te Papa. Fish specimens were fixed in 10% formalin and stored in 70% ethanol (jars) or 50% isopropanol (drums and tanks). All specimens were radiographed. The descriptions below give data for the holotype first, followed by the range of all specimens in parentheses where they differ. Measurements were made with dial callipers to the nearest 0.1 mm. Definitions of character states and measurements follow those of Anderson (1982, 1994).

Measurement abbreviations: SL = standard length; HL = head length. Institutional

abbreviations follow Leviton *et al.* (1985), in addition NMNZ = Museum of New Zealand Te Papa Tongrewa; NIWA = National Institute of Water and Atmospheric Research Ltd.

Systematics

Genus *Seleniolycus* Anderson, 1988, p. 68.

Type species. *Oidiphorus laevifasciatus* Torno, Tomo & Marschoff, 1977 (by monotypy) from the South Sandwich Islands, Scotia Sea.

Synonymy. Anderson, 1994, p. 44, description; 2006, p. 12, diagnosis; Anderson & Fedorov, 2004, p. 9, listed; Møller *et al.*, 2005, p. 69, listed.

Diagnosis. Distinguished from all other zoarcids by the following combination of characters: suborbital bones 5–7, forming a circle under eye; postorbital pores 2; preoperculomandibular pores 7–8; flesh gelatinous; lateral line mediolateral; scales absent or present on posterior half of body; pelvic fin absent; pseudobranch, pyloric caeca, vomerine and palatine teeth present; vertebrae 22–27 + 52–71 = 74–97; pectoral fin rays 11–16. See Anderson (1988, 1994) for additional, diagnostic osteological characters of the type species unconfirmed in our material.

Remarks. The two new species described herein are assigned to *Seleniolycus* on the basis of their gelatinous flesh, fragile skin, the circular suborbital pore row, absence of pelvic fins, and by the presence of a mediolateral lateral line, pseudobranch, pyloric caeca, vomerine and palatine teeth (Anderson, 1994, 2006). Detailed osteological studies or molecular data are not included here, but would be relevant for future studies of the interrelationships of *Seleniolycus* species and their relations to other zoarcids, especially their suggested sister group *Melanostigma* Günther, 1881 (Anderson, 1988, 1994; Shinohara & Sakurai, 2006). The degree of squamation is important in the taxonomy of Zoarcidae, although the earlier use of this character as sole argument for establishment of genera (e.g. *Lycodalepis* Bleeker, 1874; *Lycias* Jordan & Evermann, 1898) is now abandoned. Loss of squamation has happened many times in the evolution of Zoarcidae and intrageneric variations are more the rule than the exception. Presence/ absence variation is known from e.g. *Hadropareia* Schmidt, 1904, *Lycodes* Reinhardt, 1831, and *Pachycara* Zugmayer, 1911 (Anderson, 1994; Shinohara *et al.*, 2004; Møller, 2003), and with the present paper also from *Seleniolycus*.

Seleniolycus robertsi sp. nov.

(Figs.1, 3a, 4)

Materials. Holotype: NMNZ P.37815, 393 mm SL, female, Pacific-Antarctic Ridge, outer Ross Dependency, north of Balleny and Scott Islands (63°02.0'S, 172°04.0'E), depth 2290 m, longline, FV *San Aotea II*, Simon Beatson, stn. OBS 1430/242R, 13 May 2001.

Paratypes: (n = 6): BMNH 2006.6.21.1, 348 mm SL, female, Pacific-Antarctic Ridge (65°31.0' to 65°27.0'S, 178°03.0' to 177°57.8'W), depth 1813 m, longline, FV *Avro Chieftain*, Sydney Thickpenny, stn. OBS 1841/005, 5 December 2003; NMNZ P.37819, 357 mm SL, female and ZMUC P766465, 334 mm SL, male, same data as for NMNZ P.37819, Pacific-Antarctic Ridge, north of Balleny and Scott Islands (63°39.0'S, 173°04.0'E), depth 2267 m, longline, FV *San Aotea II*, Simon Beatson, stn. OBS 1430/231R, 9 May 2001; NMNZ P.38574, 316 mm SL, male, Pacific-Antarctic Ridge (65°25.5'S, 178°19.5'E), depth 1455–1555 m, longline, FV *Janas*, Grant Johnson, stn. OBS 1593B/197, 3 May 2002; NMNZ P.38804, 354 mm SL, female, Pacific-Antarctic Ridge (65°35.01'S, 177°44'W), depth 1594–1640 m, longline, FV *Janas*, Stephen Smith, stn. OBS 1728/080, 17 February 2003; NMNZ P.39917, 380 mm SL, female, Pacific-Antarctic Ridge (65°27.3'S, 177°57.8'W), depth 1813–1828 m, longline, FV *Avro Chieftain*, Sydney Thickpenny, stn. OBS 1841/005, 5 December 2003.

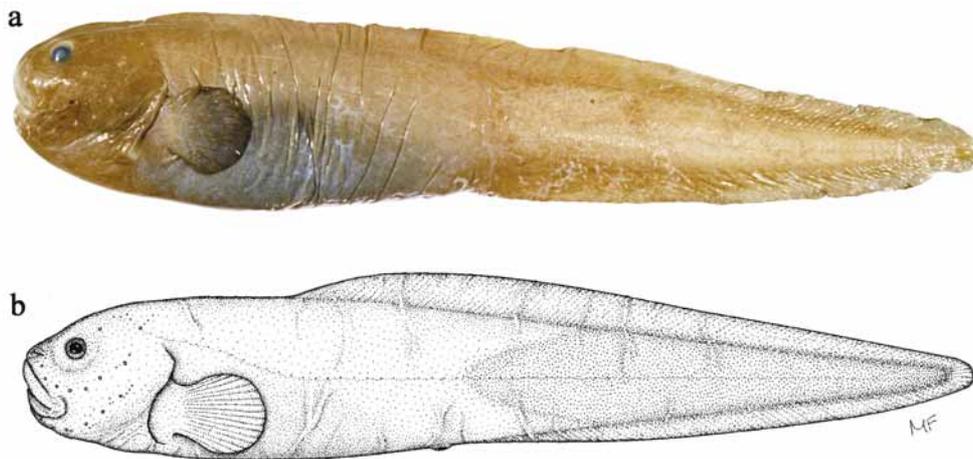


FIGURE 1. *Seleniolytus robertsi*. Holotype, NMNZ P.37815, female, 393 mm SL, Pacific-Antarctic Ridge, outer Ross Dependency, north of Balleny and Scott Islands: a, freshly thawed. Photo: A. Stewart MNZTPT; b, drawing of same specimen; the densely dotted area posteriorly on the body indicates scaled part. Drawing: M. Freeborn.

Diagnosis. Differs from congeners by the presence of scales on posterior half of body, a short pectoral fin 7.9–9.4% SL, dorsal fin rays 84–89, and anal fin rays 69–73. It is further diagnosed by the following combination of characters: suborbital head pores 6, preoperculomandibular pores 8; predorsal length 27.1–36.4% SL; snout length 29.8–51.6% HL, eye diameter 11.0–13.0% HL; pectoral fin rounded, 15–16 rays, none exerted; anterior dorsal fin pterygiophore associated with vertebra 6–8; vertebrae 24–26 + 63–71 = 88–97.

Description. Principal counts and measurements are presented in Table 1. Vertebral centra symmetrical, with prezygapophyses and postzygapophyses of equal horizontal

length. Anal fin pterygiophores 2 (1–2) inserted anterior to haemal spine of first caudal vertebra. Caudal fin with 1 (1–2) epurals, 4 upper and 4 (4–5) lower hypural rays. Epipleural ribs on 4 (3–4) to penultimate precaudal vertebra. Gill rakers on outer surface of first gill arch simple (not furcate) and with spinules. Branchiostegal rays 6. Pectoral fin relatively short; its origin below body midline; lower rays not thickened. Pelvic fin absent.

Body elongate; trunk relatively slender, tail laterally compressed. Head ovoid, robust; snout broadly rounded. Eyes small, slightly ellipsoid, not reaching dorsal profile of head. Mouth terminal; lower lips without lateral lobe; upper lip continuous across snout. Snout blunt, upper jaw not protruding, reaching posteriorly to about mid-eye or before. Nasal tube well developed, but not reaching upper lip. Gill slit moderate, extending ventrally to base (or just below base) of pectoral fin. Opercular lobe at dorsal margin of gill slit, short, rounded.

Jaw, vomer, and palatine teeth small, conical. Premaxilla with 2 rows. Dentary with 4 (3–4) rows of teeth anteriorly, blending into two rows posteriorly. Vomerine teeth in 2 (2–4) rows. Palatine teeth in 3 (2–4) rows.

Head pores moderate in size; no variation in numbers observed. Postorbital pores 2, located at positions 1 and 4 (*sensu* Gosztonyi, 1977); nasal pores 2, one set anteromesial to nasal tube, the other posteromesially; suborbital pores 6; preoperculo-mandibular pores 8, 4 arising from dentary, 1 from anguloarticular and 3 from preopercle; occipital and interorbital pores absent.

Main body lateral line mediolateral, complete to tail tip. Short dorsolateral branch extending from above opercular lobe to near origin of dorsal fin; predorsal branch with widely separated neuromasts extending from above opercular lobe to near caudal fin.

Head and anterior body naked; posterior half covered with up to 40 horizontal rows of small (diameter ca. 0.5 mm), non-overlapping cycloid scales. Dorsal and anal fins naked anteriorly, posterior 1/4 scaled, caudal fin naked. One specimen (BMNH 2006.6.21.1) has a small patch of 33 scales on the otherwise naked abdomen.

Colour. Freshly thawed specimen (Fig. 1a) medium brown, with darker pectoral fin margins. Colour in preserved specimens very similar; peritoneum dark brown, orobranchial chamber and gill rakers pale.

Sexual dimorphism. Measurements of males > females are seen in two males (316–334 mm SL) and five females (348–393 mm SL), with head lengths (18.1–18.8 vs. 16.1–17.6% SL), length of lower jaw (7.1–7.7 vs. 5.4–6.8% SL) and predorsal length (33.5–36.4 vs. 27.1–32.5% SL). Sexual dimorphism in dentition and upper jaw lengths not observed.

Reproduction. The ovary of the only ripening female (BMNH 2006.6.21.1, 348 mm SL) measures 52.3 mm in length. Light orange eggs up to 5.9 mm in diameter.

Etymology. Named in honour of Dr. Clive Roberts, Curator of Fishes, Museum of New Zealand Te Papa Tongarewa, Wellington, in recognition of his valuable contribution to the Biosystematics of Ross Sea fishes project at Te Papa.

Distribution and habitat. Currently known from only seven specimens, all caught on

weighted bottom longlines at depths of 1455–2290 m on the southernmost section of Pacific-Antarctic Ridge, north of the Ross Sea, but south of the Antarctic Convergence (63°02' to 65°35'S, 172°04'E to 177°44'W) (Fig. 4).

Comparison with congeners. *Seleniolychys robertsi* resembles *S. laevifasciatus* in having a rounded pectoral fin without ventrally exerted rays, and in most morphometric characters (Table 1). It differs, however, by the longer predorsal distance (27.1–36.4 vs. 20.0–23.8% SL), a scaled posterior part of the body (vs. naked), and by having more suborbital head pores (6 vs. 5). It resembles *S. pectoralis* sp. nov. (see below) in having a scaled posterior body, (although the distance from the snout to the anterior scales is shorter (48.9–55.4 vs. 58.7–61.8% SL)) and in the number of head pores and most other characters (Table 1). But *S. robertsi* is more slender, has a shorter head (16.1–18.8 vs. 19.8–24.6% SL) and a different pectoral fin shape from *S. pectoralis* (Fig. 3).

***Seleniolychys pectoralis* sp. nov.**

(Figs. 2, 3b, 4).

Materials. Holotype: NMNZ P.40591, 380 mm SL, male, Pacific-Antarctic Ridge, north of Balleny and Scott Islands (64°40.0' to 64°42.3'S, 176°32.0' to 176°44.6'E), depth 1948–2594 m, longline, FV *Avro Chieftain*, Gerald Anderson, stn. OBS 1742/067, 27 March 2003.

Paratypes: (n = 3): NMNZ P.40595 (2 specimens), 315 mm SL, male, and +350 mm SL (tip of tail missing), female, same data as for holotype; NMNZ P.42283, 380 mm SL, female, Pacific-Antarctic Ridge (63°39'S, 173°04'E), depth 2267 m, longline, FV *San Aotea II*, Simon Beatson, stn. OBS 1430/231R, 9 May 2001.

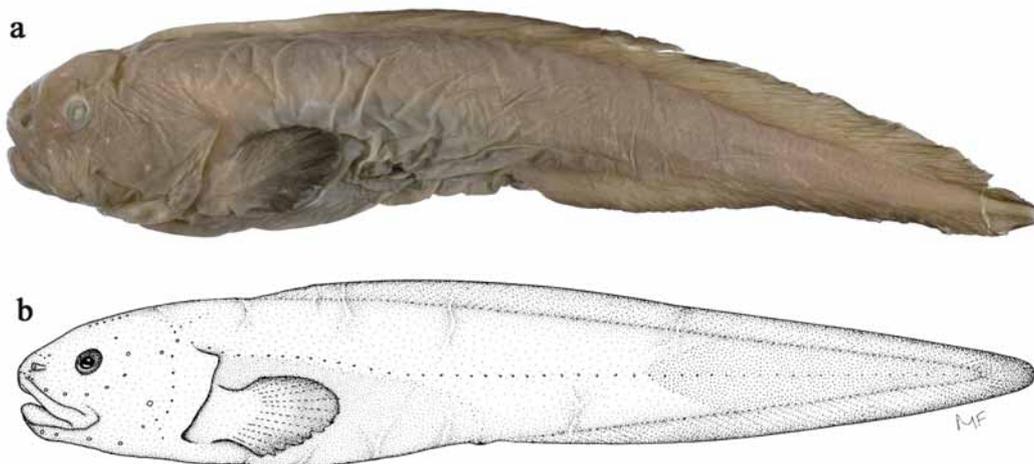


FIGURE 2. *Seleniolychys pectoralis*. Holotype, NMNZ P.40591, male, 380 mm SL, Pacific-Antarctic Ridge, north of Balleny and Scott Islands: a, 36 months after preservation. Photo: C. Struthers MNZTPT; b, drawing of same specimen; the densely dotted area posteriorly on the body indicates scaled part. Drawing: M. Freeborn.

Diagnosis. Differs from congeners by having ventralmost pectoral fin rays exserted, scales present on posterior 2/5 of body, dorsal fin rays 76–80, and anal fin rays 64–66. It is further diagnosed by the following combination of characters: suborbital head pores 6–7, preoperculomandibular pores 8; predorsal length 28.0–30.7% SL; snout length 28.3–36.6% HL, eye diameter 9.4–12.0% HL; pectoral fin rays 14–16; anterior dorsal fin pterygiophore associated with vertebra 6–7; vertebrae 23–27 + 61–63 = 86–89.

Description. Principal counts and measurements are presented in Table 1. Vertebral centra symmetrical, with prezygapophyses and postzygapophyses of equal horizontal length. Anal fin pterygiophores 3 (3–4), inserted anterior to haemal spine of first caudal vertebra. Caudal fin with 1 epural, 4 upper and 5 lower hypural rays. Epipleural ribs on 3 (3–4) to penultimate precaudal vertebra. Gill rakers on outer surface of first gill arch simple (not furcate) and with spinules. Branchiostegal rays 6. Pectoral fin wedge-shaped; its origin below body midline; lower rays thickened, exserted. Pelvic fin absent.

Body elongate; trunk relatively robust, tail laterally compressed. Head ovoid, robust; anterior profile of snout almost vertical. Eyes relatively large, circular, not reaching dorsal profile of head. Mouth subterminal; lower lips without lateral lobe, upper lip continuous across snout. Snout blunt, upper jaw slightly longer than lower jaw, reaching past middle of eye. Nasal tube well developed, but not reaching upper lip. Gill slit large, extending ventrally to level of lower pectoral fin base or just below. Opercular lobe at dorsal margin of gill slit, angular and relatively prominent.

Jaw, vomer and palatine teeth small and conical. Premaxilla with 3 (2–3) rows. Dentary with 4 (3–4) rows of teeth anteriorly, blending into two rows posteriorly. Vomerine teeth in 4 (3–5) rows. Palatine teeth in 3 (3–4) rows.

Head pores moderate in size; minor variation in numbers observed. Postorbital pores 2 (2–3), located at positions 1, 4 and sometimes 3 (*sensu* Gosztonyi, 1977); nasal pores 2, one set anteromesial to nasal tube, the other posteromesially; suborbital pores 7 (6–7); preoperculomandibular pores 8, 4 arising from dentary, 1 from anguloarticular and 3 from preopercle; occipital and interorbital pores absent.

Main body lateral line mediolateral, complete to tail tip. Short dorsolateral branch extending from above opercular lobe to near origin of dorsal fin; predorsal branch with widely separated neuromasts extending from above opercular lobe to near caudal fin.

Head and anterior body naked; posterior ca. 40%, covered with small cycloid scales. Dorsal and anal fins naked anteriorly, posteriorly 1/4 scaled, caudal fin naked.

Colour. Body and head in preserved specimens light to medium brown, with darker dorsal and anal fin margins, pectoral fin and nasal tubes (Fig. 2). Peritoneum dark brown, orobranchial chamber and gill rakers pale.

Sexual dimorphism. The few specimens available are insufficient for analyses of sexual dimorphism.

Reproduction. None of the specimens are ripening.

Etymology. Name refers to the pectoral fin morphology, with ventral rays thickened and exerted, a unique character in the genus.

Distribution and habitat. Currently known from only four specimens, caught at two positions along the Pacific-Antarctic Ridge (64°42.3'S, 176°44.6'E and 63°39'S, 173°04'E), at depths of 1948–2594 m (Fig. 4).

Comparison with congeners. *Seleniolycus pectoralis* is very similar to *S. robertsi* in having scales on the posterior part of the body (vs. absent in *S. laevifasciatus*), a relatively long predorsal distance (28.0–30.7 and 27.1–36.4% SL vs. 20.0–23.8% SL in *S. laevifasciatus*), and in the number of suborbital head pores (6–7 and 6 vs. 5 in *S. laevifasciatus*). *Seleniolycus pectoralis* differs, however, from both *S. robertsi* and *S. laevifasciatus* by the wedge-shaped pectoral fin, with exerted lower rays (vs. with no exerted rays) (Fig. 3), and in the more robust head and body which is expressed in several morphometric characters (Table 1). *Seleniolycus pectoralis* further differs from *S. robertsi* in having a longer pre-scaled distance (58.7–61.8% SL vs. 48.9–55.4% SL) and a larger head (19.8–24.6% SL vs. 16.1–18.8% SL).

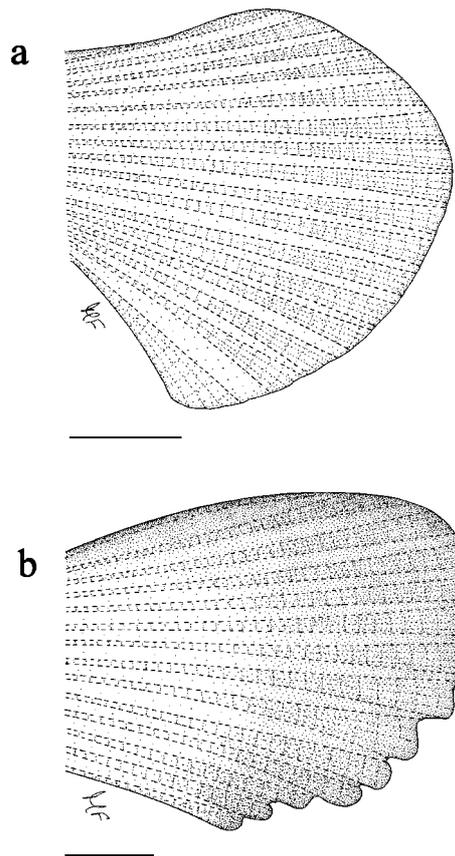


FIGURE 3. Pectoral fins shapes of: a, *Seleniolycus robertsi* NMNZ P.37815 (Holotype) and b, *S. pectoralis* NMNZ P.40591 (Holotype). Scale bars = 10 mm. Drawing: M. Freeborn.

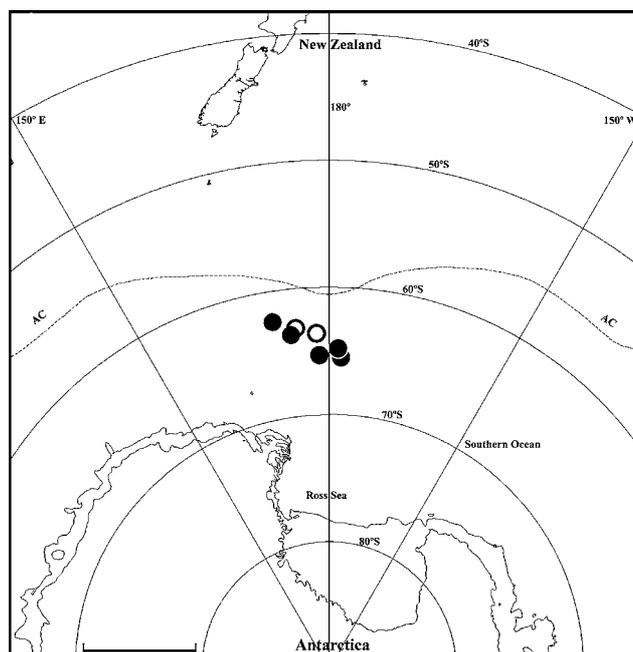


FIGURE 4. Capture sites of *Seleniolyculus robertsi* (solid circles) and *S. pectoralis* (open circles). AC = Antarctic Convergence; Scale bar = 1000 km at 80° south. Image: C. Struthers MNZTPT.

Key to the species of *Seleniolyculus*

- 1a Body entirely naked; predorsal distance 20–23.8% SL; suborbital head pores 5; anal fin rays 53–58..... *Seleniolyculus laevifasciatus*
- 1b Body scaled posteriorly; predorsal distance > 27% SL; suborbital pores 6 or 7; anal fin rays 64–73 2
- 2a Pectoral fin rounded with no exerted rays; distance from snout to anterior scales 48.9–55.4% SL; head length 16.1–18.8% SL; anal fin rays 69–73
.....*Seleniolyculus robertsi*
- 2b Pectoral fin wedge-shaped with the lower fin rays thickened and exerted; distance from snout to anterior scales 58.7–61.8% SL; head length 19.8–24.6% SL; anal fin rays 64–66
.....*Seleniolyculus pectoralis*

Discussion

Seleniolyculus has been proposed as the sister taxon to the widespread mesopelagic genus *Melanostigma* Günther, 1881 (Anderson, 1988, 1994), indicating a southern hemisphere origin of the lineage. Morphology of this clade was supported by seven homoplastic

character states: squamation absent, parasphenoid wing low, frontal-parasphenoid articulation separated by pterosphenoid, interorbital pore absent, palatopterygoid series reduced, upper pharyngeals 2, number of vertebrae 72–105 (see Anderson, 1994). Although it is uncertain if all the osteological characters states of the two new species agree with the states given above, the lack of an interorbital pore, vertebrae number, and upper pharyngeals agree with Anderson's (1994) observations. However, scales present posteriorly in both new species conflict with Anderson's scale character, representing a new character state in this clade. This type of squamation, with scales on the posterior half of the body only, is found in several unrelated zoarcid lineages and is thought to be an intermediate, reduced, apomorphic state. In future studies, polarization of squamation should be treated as multi-state and include the half scaled condition. The presence of posterior squamation supports the interpretation that these two new species are the least reduced, basal-most branches in the *Seleniolycus-Melanostigma* lineage (*sensu* Anderson, 1988, 1994), both having larger gill slits and more head pores than *S. laevifasciatus* and *Melanostigma* species.

As noted above, *Seleniolycus* is endemic to the Southern Ocean. The type species *S. laevifasciatus* is known from approximately 26 specimens collected from the South Shetland Islands (~70° W), the Falkland Rise, Scotia Arc to the Banzare Bank, and south of the Kerguelen Plateau in the eastern Antarctic (~80° E) (Anderson, 1994, 2006). Anderson (1994, p. 45) suggested that *S. laevifasciatus* was probably benthopelagic and circumantarctic in distribution, possibly extending north into the Subantarctic (Anderson, 2006, p. 13). In spite of circumantarctic currents being favourable to the distribution of *S. laevifasciatus* via larval transport into the western Antarctic, none have been taken by toothfish droplines in this sector. Several trawl-based expeditions by research vessels in the Ross Sea and adjacent regions (e.g. Eastman & Hubold, 1999; Mitchell & Clarke, 2004) have also failed so far to capture any specimens of *S. laevifasciatus*. Therefore, available data indicates that *S. laevifasciatus* has a distribution restricted to eastern Antarctic seas.

In spite of the two new species described herein being caught at greater depths than *Seleniolycus laevifasciatus*, the upper depth range of *S. robertsi* (1455 m) overlaps the lower depth range of *S. laevifasciatus* (1500 m). The capture method of *Seleniolycus robertsi* and *S. pectoralis* (bottom longline with baited hooks on traces ~ 1 m long) suggests these new zoarcids are closely associated with the benthos, probably benthic, rather than benthopelagic. In this respect, they differ from their possible sister group *Melanostigma*, which are pelagic, except during benthic spawning (Markle & Wenner, 1979; Silverberg *et al.*, 1987).

TABLE 1. Counts and measurements of the three species of *Selenioleucus*. Mean \pm standard deviation shown in parentheses. F = female, M = male.

	<i>S. robertsi</i>		<i>S. pectoralis</i>		<i>S. laevifasciatus</i>	
	Holotype 393 (F)	Holotype & paratypes 316-393 (355 \pm 26)	Holotype 380 (M)	Holotype & paratypes 315-380(358 \pm 38)	N	N up to 212 mm TL
Moristic characters						
Dorsal fin rays	88	84-89(86.4 \pm 1.7)	80	76-80(78.7 \pm 2.3)	3	69-75
Anal fin rays	73	69-73(71.1 \pm 1.6)	64	64-66(64.7 \pm 1.2)	3	53-58
Caudal fin rays	2+4+4	9-10(9.7 \pm 0.5)	1+4+5	1+4+5	3	7-9
Pectoral fin rays	15	15-16(15.3 \pm 0.5)	14	14-16(15.3 \pm 1.0)	4	11-13
Precaudal vertebrae	26	24-26(25.3 \pm 0.8)	27	23-27(25.5 \pm 1.7)	4	22-24
Caudal vertebrae	71	63-71(68.7 \pm 3.0)	61	61-63(62.3 \pm 1.2)	3	52-57
Total vertebrae	97	88-97(94 \pm 3.1)	88	86-89(87.7 \pm 1.5)	3	74-80
First dorsal fin pterygiophore associated with vertebra	7	6-8(6.7 \pm 0.8)	6	6-7(6.3 \pm 0.5)	4	2-5
Last precaudal vertebra associated with dorsal fin ray	20	19-21(20.1 \pm 0.7)	22	18-22(20.8 \pm 1.9)	4	-
Gill rakers	12+1	12-14(13 \pm 0.7)	-	10-15(13.0 \pm 2.6)	3	11-15
Pseudobranchial filaments	4	2-4(2.8 \pm 1.1)	2	2	4	2-4
Dentition						
Teeth on premaxilla	14+4	18-25(21.6 \pm 2.6)	18+1+10	29-39(34.5 \pm 4.8)	4	10-32
Teeth on vomer	18+29	20-48(28.6 \pm 9.5)	10+8+4+10	32-40(34.7 \pm 4.6)	3	5-20
Teeth on palatines	16+3+10	18-31(24.3 \pm 4.9)	17+3+10	20-43(33.8 \pm 10.9)	4	4-30
Teeth on dentary	27+13+4+3	41-52(46.0 \pm 4.7)	27+18+4+5	54-98(69.3 \pm 24.8)	3	12-33
Squamation						
Snout to anterior scales	50.5	48.9-55.4(51.3 \pm 2.3)	61.8	58.7-61.8(60.1 \pm 1.6)	3	Scales absent
Morphometric characters (% SL)						
Head length	16.1	16.1-18.8(17.4 \pm 0.9)	20.8	19.8-24.6(21.7 \pm 2.6)	3	17.6-20.2
Head width	9.8	9.8-12.3(11.1 \pm 0.8)	12.9	12.5-16.2(13.9 \pm 2.0)	3	9.4-14.5
Head height	14.3	13.0-16.4(14.8 \pm 1.4)	17.6	17.6-19.6(18.5 \pm 1.0)	3	-
Snout length	4.8	4.8-8.9(6.2 \pm 1.3)	7.6	5.6-8.4(7.2 \pm 1.4)	3	-
Nostril tube length	1.0	0.9-1.3(1.1 \pm 0.1)	1.2	1.2-1.6(1.3 \pm 0.2)	3	-
Eye diameter	1.9	1.9-2.3(2.1 \pm 0.9)	2.3	2.3-2.4(2.3 \pm 0.1)	3	-
Pupil diameter	1.3	1.0-1.3(1.2 \pm 0.1)	1.4	1.3-1.4(1.4 \pm 0.02)	3	-

to be continued...

Table 1 continued...

	<i>S. roberzi</i>		<i>S. pectoralis</i>		<i>S. laevifasciatus</i>	
	Holotype	Holotype & paratypes	Holotype	Holotype & paratypes	N	**
Interorbital width (soft)	6.5	6.5-7.7(7.1±0.5)	8.4	6.3-8.4(7.4±1.5)	3	-
Upper jaw length	7.0	7.0-8.6(7.7±0.6)	11.1	11.2-11.6(11.3±0.3)	3	-
Lower jaw length	5.4	5.4-7.7(6.5±0.8)	8.9	8.9-10.5(9.4±0.9)	3	-
Prenal length	44.7	43.5-49.4(46.4±2.3)	51.1	50.5-51.4(51.0±0.5)	3	44.2-48.0
Predorsal length	27.1	27.1-36.4(31.8±2.9)	28.3	28.0-30.7(29.0±1.5)	3	20.0-23.8
Dorsal fin height above anal fin origin	3.1	2.9-5.0(3.7±0.5)	4.7	4.7-6.2(5.6±0.8)	3	-
Body height at anal fin origin	12.0	12.0-15.6(13.9±1.6)	12.7	10.9-12.7(11.7±0.9)	3	9.4-13.6
Body width at anal fin origin	5.3	5.3-7.8(6.6±0.8)	7.0	5.9-7.0(6.3±0.6)	3	-
Pectoral fin length	8.0	7.9-9.4(8.7±0.6)	11.5	11.1-11.5(11.4±0.1)	3	9.8-13.2
Pectoral fin base height	4.3	4.0-4.9(4.4±0.4)	5.7	4.4-6.2(5.4±0.9)	3	-
Pectoral fin base/length ratio	0.5	0.5-0.6(0.5±0.03)	0.5	0.4-0.5(0.5±0.1)	3	0.4-0.5
Caudal fin length	3.3	3.2-4.4(3.9±0.5)	5.8	5.8-6.3(6.1±0.4)	2	-
Gill slit length	6.6	6.6-8.3(7.6±0.7)	10.6	9.5-10.8(10.3±0.7)	3	-
Opercular lobe length	1.5	1.1-2.0(1.5±0.3)	2.7	2.4-2.7(2.5±0.2)	3	-
Isthmus width	8.1	7.8-9.5(8.5±0.7)	-	7.0-9.9(8.5±2.1)	2	-
Morphometric characters (% HL)						
Upper jaw length	43.3	39.6-47.6(44.1±2.8)	53.9	47.2-56.5(52.5±4.8)	3	40.5-49.6
Pectoral fin length	49.8	45.8-54.2(50.0±2.9)	55.1	46.6-56.7(52.8±5.4)	3	48.7-67.0
Snout length	29.9	29.8-51.6(35.6±7.4)	36.6	28.3-36.6(33.0±4.3)	3	19.0-23.4
Eye diameter	12.0	11.0-13.0(11.9±0.7)	11.0	9.4-12.0(10.8±1.3)	3	18.0-29.2
Interorbital width (soft)	40.7	36.5-44.9(41.0±3.4)	40.4	31.8-40.4(36.1±6.1)	3	31.1-38.5***

* Tip of tail missing in one paratype

** Data from Anderson (1988, 2006)

*** Given as interpupul length

Geography and isolation of the Pacific-Antarctic Ridge suggest these two new species of *Seleniolytus* may be endemic to the ridge. This hypothesis is supported by Springer (1982) who showed that the Pacific Plate margins were areas of high endemism. The Pacific-Antarctic Ridge forms the southernmost edge of the Pacific Plate and separates the Pacific and Antarctic plates. It rises up abruptly out of the abyssal plains of the Australian-Antarctic Basin to the west, the Amundsen Abyssal Plain to the south, and the Pacific Basin to the north. It is also a region of high geological activity; an active spreading centre since the Late Cretaceous, currently at ~54–74 mm/yr (Mayers *et al.*, 1990; Géli *et al.*, 1997), and crossed by numerous fracture zones (Marks & Stock, 1994). These complex features have combined to create deep-sea habitats high in morphological diversity (e.g. Ondréas *et al.*, 2001), which probably support high biological diversity.

However, remoteness, prevailing bad sea conditions, substantial depth, and broken bottom topography have all contributed to a paucity of biological sampling and museum specimens from the ridge, and indeed from Antarctic bathyal and bathypelagic depths (1000 to 4000 m) in general (e.g. Eastman, 1993, p. 51; Møller *et al.*, 2005, p. 31). Analyses of Antarctic marine ichthyofauna have focused on the origins, evolution and radiation within the Southern Ocean, or biogeography of the shallow inshore marine fauna (0–1400 m depth) (e.g. Anderson, 1990; Briggs, 2003; Clarke & Johnson, 1996; Eastman & McCune, 2000). Further collecting is required along the Pacific-Antarctic Ridge and adjacent areas to test the endemism hypothesis of this southernmost Pacific Plate boundary feature, and to better determine the extent of distribution of these two new species.

Acknowledgments

Development of the Ross Sea fishes collection was supported in part by Te Papa's Collection Development Programme and New Zealand Ministry of Fisheries. Clive Roberts, Curator of Fishes (Te Papa) is thanked for supporting the senior author's visit to the National Fish Collection at Te Papa, and for constructive comments on the manuscript. Carl Struthers (Te Papa) is thanked for x-rays, technical support, creating Figure 4 (based on SCAR and MapInfo 5.5 digital templates), photographing and scanning Figures 1a and 2a. Michelle Freeborn (Te Papa) drew the original illustrations for Figures 1b, 2b and 3. Thanks also to the Scientific Observers (New Zealand Ministry of Fisheries): Simon Beatson, Grant Johnson, Stephen Smith, Gerald Anderson and Sydney Thickpenny, and the crews of the FV's *San Aotea II* (Sanford Ltd.), *Janas* and *Avro Chieftain* (NZ Longline Ltd.) who collected the type series of these two new species.

References

- Anderson, M.E. (1982) Revision of the fish genera *Gymnelus* Reinhardt and *Gymnelopsis* Soldatov (Zoarcidae), with two new species and comparative osteology of *Gymnelus viridis*. *National Museum of Canada, Publications in Zoology*, 17, 1–76.
- Anderson, M.E. (1988) Studies on the Zoarcidae (Teleostei: Perciformes) of the southern hemisphere I. The Antarctic and Subantarctic regions. *Biology of the Antarctic Seas XIX, Antarctic Research Series*, 47, 59–113.
- Anderson, M.E. (1990) The Origin and Evolution of the Antarctic Ichthyofauna. In: Gon, O. & Heemstra, P.C. (Eds.). *Fishes of the Southern Ocean*. J.L.B. Smith Institute of Ichthyology, Grahamstown, South Africa, pp. 28–33.
- Anderson, M.E. (1991) Studies on the Zoarcidae (Teleostei: Perciformes) of the southern hemisphere. V. Two new species from the Weddell Sea, Antarctica. *Cybium*, 15, 151–158.
- Anderson, M.E. (1994) Systematics and osteology of the Zoarcidae (Teleostei: Perciformes). *J. L. B. Smith Institute of Ichthyology. Ichthyological Bulletin*, 60, 1–120.
- Anderson, M.E. (2006) Studies on the Zoarcidae of the southern hemisphere. X. New records from western Antarctica. *Zootaxa*, 1110, 1–15.
- Anderson, M.E. & Fedorov V.V. (2004) Family Zoarcidae Swainson 1839 — eelpouts. *California Academy of Sciences. Annotated Checklists of Fishes*, 34, 1–58.
- Briggs, J.C. (2003) Marine centres of origin as evolutionary engines. *Journal of Biogeography*, 30, 1–18.
- Briggs, J.C. (2006) Proximate sources of marine biodiversity. *Journal of Biogeography*, 33, 1–10.
- Clarke, A. & Johnston, I.A. (1996) Evolution and adaptive radiation of Antarctic fishes. *Trends in Ecology and Evolution*, 11, 212–218.
- Eastman, J.T. (1993) *Antarctic Fish Biology. Evolution in a Unique Environment*. Academic Press, San Diego California. 322 pp.
- Eastman, J.T. (2005) The nature of the diversity of Antarctic fishes. *Polar Biology*, 28, 93–107.
- Eastman, J.T. & Hubold, G. (1999) The fish fauna of the Ross Sea, Antarctica. *Antarctic Science*, 11, 293–304.
- Eastman, J.T. & McCune, A.R. (2000) Fishes on the Antarctic continental shelf: evolution of a marine species flock? *Journal of Fish Biology, Supplement A*, 84–102.
- Géli, L., Bougult, H., Aslanian, D., Briais, A., Dosso, L., Etoubleau, J., Le Formal, J.-P., Maia, M., Ondréas, H., Olivet, J.-L., Richardson, C., Sayanagi, K., Seama, N., Shah, A., Vlastelic, I. & Yamamoto, M. (1997). Evolution of the Pacific-Antarctic Ridge South of the Udintsev Fracture Zone. *Science*, 278, 1281–1284.
- Gosztonyi, A.E. (1977) Results of the research cruises FRV "Walther Herwig" to South America. XLVIII. Revision of the South American Zoarcidae (Osteichthyes, Blennioidei) with the description of three new genera and five new species. *Archiv für Fischereiwissenschaft*, 27, 191–249.
- Leviton, A.E., Gibbs, Jr. R.H., Heal, E. & Dawson, C.E. (1985) Standards in Herpetology and Ichthyology: Part I. Standard Symbolic Codes for Institutional Resource Collections in Herpetology and Ichthyology. *Copeia*, 1985, 802–832.
- Markle, D.F. & Wenner, C.A. (1979) Evidence of demersal spawning in the mesopelagic zoarcid fish *Melanostigma atlanticum* with comments on demersal spawning in the alepocephalid fish *Xenodermichthys copei*. *Copeia*, 1979, 363–366.
- Marks, K.M. & Stock, J.M. (1994) Variations in ridge morphology and depth-age relationships on the Pacific-Antarctic ridge. *Journal of Geophysical Research*, 99, 531–541.
- Mayes, C.L., Lawyer, L.A. & Sandwell, D.T. (1990) Tectonic history and new isochron chart of the South Pacific. *Journal of Geophysical Research*, 95, 8543–8567.
- Mitchell, J. & Clark, M. (2004). *Voyage Report TAN04-02 Western Ross Sea Voyage 2004. Hydro-*

- graphic and biodiversity survey RV Tangaroa 27 January to 13 March 2004. Cape Adare, Cape Hallett, Possession Islands and Balleny Islands, Antarctica. NIWA Voyage Report TAN04-02, 102 pp.
- Møller, P.R. (2003) Two new species of *Pachycara* Zugmayer (Teleostei: Zoarcidae) from the Indian Ocean, with redescription of *P. shcherbachevi* Anderson. *Copeia*, 2003, 357–365.
- Møller, P.R., Nielsen, J.G. & Anderson, M.E. (2005) Systematics of Polar fishes. In: Steffensen, J. & Farrell, T. (Eds.). *The Physiology of Polar Fishes, Fish Physiology* vol. 22, Elsevier, pp. 25–78.
- Ondréas, H., Aslanian, D., Géli, L., Olivet, J.-L. & Briais, A. (2001) Variations in axial morphology, segmentation, and seafloor roughness along the Pacific-Antarctic Ridge between 56S and 66S. *Journal of Geophysical Research*, 106, 8521–8546.
- Roberts, C.D. & Stewart, A.L. (2001) Ross Sea fishes. A collection-based biodiversity research programme. *Seafood New Zealand*, 9, 79–84.
- Shinohara, G., Nazarkin, M.V. & Chereshev, I.A. (2004). *Magadania skopetsi*, a new genus and species of Zoarcidae (Teleostei: Perciformes) from the Sea of Okhotsk. *Ichthyological Research*, 51, 137–145.
- Shinohara, G. & Sakurai, H. (2006) *Ericandersonia sagamia*, a new genus and species of deep-water eelpouts (Perciformes: Zoarcidae) from Japan. *Ichthyological Research*, 53, 172–178.
- Silverberg, N., Edenborn, H.M., Ouellet, G. & Beland, P. (1987) Direct evidence of a mesopelagic fish, *Melanostigma atlanticum* (Zoarcidae) spawning within bottom sediments. *Environmental Biology of Fishes*, 20, 195–202.
- Springer, V.G. (1982) Pacific Plate Biogeography, with special reference to shorefishes. *Smithsonian Contributions to Zoology*, 367, 1–182.
- Stewart, A.L. (1999) Fishes collected during the 1998/99 exploratory fishing by New Zealand in CCAMLR Subarea 88.1 and registered in the National Fish Collection at the Museum of New Zealand Te Papa Tongarewa. *CCAMLR Research Report*, WG-FSA-99/44, 5 pp.
- Stewart, A.L. & Roberts, C.D. (2001) Fishes collected during the Ross Sea Investigative Fishing Program 2000 and 2001, and registered in the National Fish Collection at the Museum of New Zealand Te Papa Tongarewa. *CCAMLR Research Report*, WG-FSA-01/45, 12 pp.
- Torno, A.E., Tomo, A.P. & Marschoff, E. (1977) Una nueva especie del genero *Oidiphorus* McAlister y Rees (Pisces, Zoarcidae) capturado en las adyacencias de las Islas Sandwich de Sur. *Contribución del Instituto Antártico Argentino*, 223, 1–10.