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## **Snailfishes (Family Liparidae) of the Ross Sea, Antarctica, and Closely Adjacent Waters**

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## Abstract

Snailfishes (Family Liparidae) of the Ross Sea are reviewed, keys are provided to their identification, and the utility of several taxonomic characters, including the pectoral fin and girdle and length and shape of the abdominal cavity, is discussed. New and previously unstudied specimens show that there are more than 34 Ross Sea liparid species in three genera; 18 of them are new to science and are described below. Ross Sea snailfishes include at least six *Careproctus*, 27 *Paraliparis*, and one *Genioliparis* species. The new species are *Paraliparis alius* from off Iselin Seamount at 1225–1332 m, *P. amerismos* from off Hillary Canyon (near Pennell Bank) at 1149–1358 m, *P. camilarus* from the northwest edge of Mawson Bank at 1431–1658 m, *P. ekaporus* from off Mawson Bank at 1431–1658 m, *P. epacrognaethus* from off Mawson Bank at 1431–1658 m, *P. haploporus* from off Mawson Bank at 1954–1990 m, *P. longicaecus* from the NW edge of Mawson Bank at 1431–1658 m, *P. macropterus* from off Iselin and Mawson Banks at 1133–1990 m, *P. magnoculus* from off Iselin and Scott Canyon at 950–1368 m, *P. mentikoilon* from off Mawson Bank at 1954–1990 m, *P. nigrolineatus* from off Mawson Bank at 1954–1990 m, *P. nullansa* from off Mawson Bank at 1954–1990 m, *P. orbitalis* from off Cape Adare at 1110–1210 m, *P. parviradialis* from off Mawson Bank at 1954–1990 m, *P. plicatus* from off Mawson Bank at 1431–1990

m, *P. posteroporus* from off Mawson Bank at 1400–1600 m, *P. tangaroa* from Iselin Seamount at 966–1153 m, and *P. voroninorum* from off Mawson Bank at 1954–1990 m. In addition, one unknown *Paraliparis* is partially described but not named owing to its poor condition. Range extensions for *P. neelovi* and *P. stehmanni* are reported, and two more individuals of *P. andriashevi*, previously known from two specimens, were collected. Other species included are *Careproctus ampliceps*, *C. catherinae*, *C. inflexidens*, *C. polarsterni*, *C. pseudoprofundicola*, *C. vladibeckeri*, *Genioliparis kafanovi*, *Paraliparis antarcticus*, *P. devriesi*, *P. fuscolingua*, *P. macrocephalus*, *P. rossi*, and *P. terraenovae*. History and characteristics of the Ross Sea that probably led to isolation and speciation are described and discussed. The new discoveries increase the number of known Southern Hemisphere snailfish species to about 200.

**Key words:** Pisces, Liparidae, snailfish, Antarctic, Ross Sea, new species

## Introduction

Snailfishes (Family Liparidae) are probably the most speciose family of Antarctic fishes (Eastman 2005), although they are a secondary, not primary, Antarctic family (sensu Andriashev, 1977a; Andriashev & Stein 1998). They did not originate in the region but colonized it after successfully invading the deep sea (Andriashev 1990a, 1991a). Antarctic waters are thus a known center of liparid species diversity (Andriashev & Stein, 1998; Andriashev, 2003) at and below nominally mid-slope depths of 1500 m, but snailfish biomass and numerical abundance is low (Andriashev & Stein, 1998). Andriashev (2003) summarized knowledge of Southern Ocean snailfishes, reviewing 105 species in eight genera, but he did not include recent captures and descriptions of 30 Australian species. Subsequently, more species have been described from the Southern Ocean (Chernova & Duhamel, 2003; Stein, 2005, 2006; Chernova, 2006; Balushkin & Voskoboinikova, 2008). Including known and probably new but as yet undescribed species (Stein, in prep.), the present total of liparid species from the Southern Hemisphere is about 200, and of those, about 150 occur in Subantarctic and Antarctic waters.

It is common for multiple new liparid species to be discovered in a previously unexplored or underexplored region in apparently small populations (Southeast Australia, Stein et al. 2001; northeast Pacific Aleutian Islands, Orr & Busby 2006, Orr & Maslenikov 2007; and others) or as great range extensions for the family (northwest Australia, Stein et al. 2001, Galapagos Islands, Stein & Chernova 2002; Hawaiian Islands, Stein work in progress). In recent decades, the Southern Hemisphere and the Antarctic have been productive regions for the discovery and study of liparids, and have proven to be an important center of diversity for the family. Therefore, the new discoveries reported here are not unusual.

Within the Antarctic, fishes of deeper waters are not very well known (Eastman & Hubold 1999). In the Ross Sea, most previous scientific sampling has been shallower than 1000 m (Eastman & Hubold 1999, Eastman 2005, J. Eastman, pers. comm., 20 Sept. 2010). The New Zealand R/V *Tangaroa* IPY-CAML expedition of 2008 was planned to sample “large scale gradients of depth and latitude” “across the shelf, slope, seamount and abyss environments” of the Ross Sea (Hanchet et al., 2008). From 7 February to 14 March, 2008, as part of the International Polar Year (IPY; 2007–2008), R/V *Tangaroa* sampled the Ross Sea extensively, as well as around the Admiralty and Scott seamounts (Hanchet et al., 2008). The cruise was a joint effort of the New Zealand government, the International Polar Year (IPY) program, and the Census of Antarctic Marine Life (CAML). Ross Sea samples were taken as far south as 76°49.56' S, and as far east as 179°57.6' W, then, as encroaching sea ice forced the vessel north, in a northerly transect to 66°49.15' S. Samples were taken with a wide variety of gear, variously deployed 282 times at depths from 200–3500 m.

Fishes were collected in both midwater and bottom trawls, but all the snailfishes were collected by the latter. A total of 53 bottom collections were made, using beam trawls (13), Brenke sled (5), epibenthic sled (11), and rough bottom trawls (24) at depths ranging from 281–3,490 m. Of these, six tows collected a total of 26 liparids, all *Paraliparis*; all but one from 774 m or deeper, and all but five taken at two stations (IPY-CAML/TAN 144, IPY-CAML/TAN 167). Many of these were photographed while fresh, and those photos are included here. Samples were often from areas and depths that were previously not well known. The *Tangaroa* specimens included 17 species, 13 of them new.

The recent commercial fishery for toothfish (*Dissostichus mawsoni* and *D. eleginoides*) and the New Zealand Ministry of Fisheries (MFish) observer program associated with it resulted in specimens of rare or undescribed liparids from mid- and lower slope depths, often in poor condition owing to their capture by mechanized longline