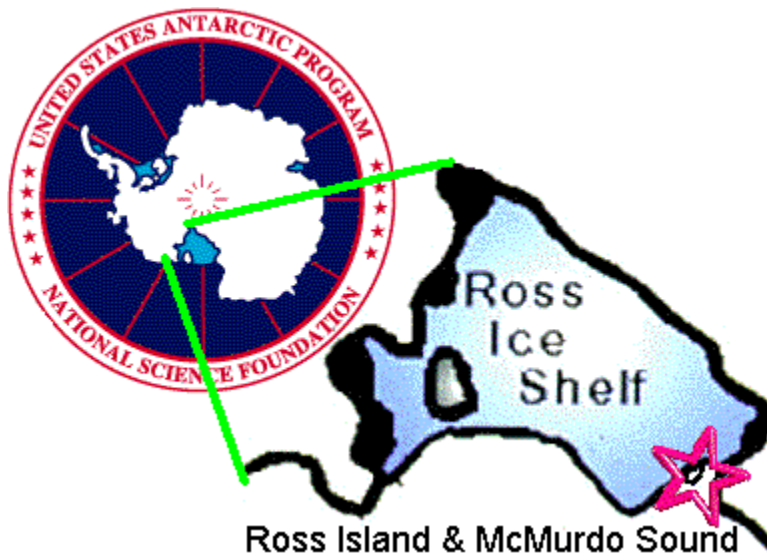


Chordata: fish

UNDERWATER FIELD GUIDE TO ROSS ISLAND & MCMURDO SOUND, ANTARCTICA

Peter Brueggeman

Photographs: Norbert Wu, Steve Alexander, Peter Brueggeman, Paul Cziko, Rob Robbins, & M. Dale Stokes



The National Science Foundation's Office of Polar Programs sponsored Norbert Wu on an Artist's and Writer's Grant project, in which Peter Brueggeman participated. One outcome from Wu's endeavor is this Field Guide. This Field Guide builds upon principal photography by Norbert Wu, with photos from other photographers, who are credited on their photographs and above. This Field Guide is intended to facilitate underwater/topside field identification from visual characters. Organisms were identified from photographs with no specimen collection. Therefore these identifications are to the taxonomic level possible from photographs, and there can be some uncertainty in identifications solely from photographs.

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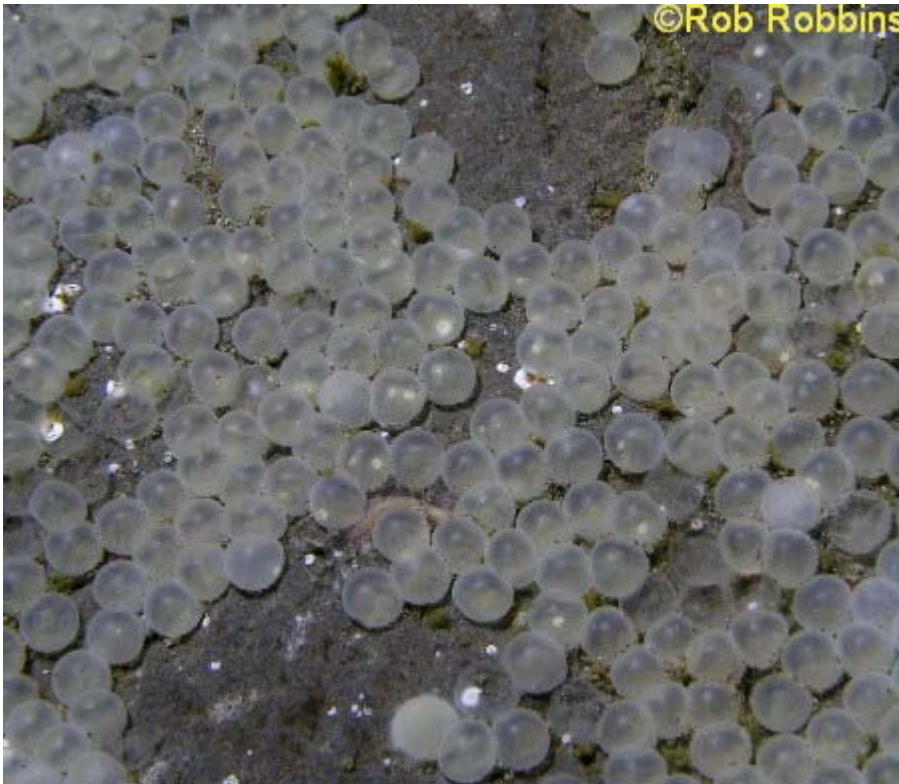
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Naked dragonfish *Gymnodraco acuticeps*

Gymnodraco acuticeps probably occurs throughout Antarctica and is also found at the South Shetland Islands at depths from 0 to 663 meters (usually found in the first 50 meters) ^[1,4].



These are eggs of *Gymnodraco acuticeps*. *G. acuticeps* can grow up to 42 centimeters in length, and spawning occurs in September, with egg hatching in spring ^[1,5].



Dragonfishes are a small, diverse group of Antarctic fishes living at great depths near the Antarctic continent with some species adapted to living under the ice ^[3].

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Gymnodraco acuticeps eats other fish (including *Pleuragramma antarcticum*, *Pagothenia borchgrevinki*, and *Trematomus nicolai*), amphipods, fish eggs, polychaetes, and krill ^[1,2].

References: **1:** Fishes of the Southern Ocean. O Gon & PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990. pp. 372-373; **2:** Polar Biology 4:155-160, 1985; **3:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area). W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **4:** Antarctic Science 11(3):293-304, 1999; **5:** Ross Sea Ecology : Italian Antarctic Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 457-468



eelpout *Lycodichthys dearborni*

Lycodichthys dearborni has been collected in the Ross Sea at depths from 466 to 600 meters [1,3,4,5]. *L. dearborni* has been collected at lengths up to 23 centimeters [1,3,4].



Body color of *Lycodichthys dearborni* is light or yellowish with brown mottling; largest specimens are mostly uniform dark brown with the head and nape darker [3,4]. Body color of *L. dearborni* has also been described as brownish to pale yellowish

brown with a dark back and lighter sides with a small light fleck under each dark scale [1].



Pectoral fins of *L. dearborni* are yellowish with light brown mottling when young, which fades in larger specimens [3,4]. Smaller specimens have a dark brown dorsal surface of head, body, and tail which breaks up into blotches on cheeks, abdomen, and tail [4].

The eelpout family (Zoarcidae) of fishes are usually benthic slope dwellers and are found around the world; benthic forms are usually sexually dimorphic [2]. Benthic eelpouts like *Lycodichthys dearborni* feed on polychaetes, bivalves, and gastropods [3]. The species name *dearborni* honors John Dearborn who collected the first

specimens.

References: **1:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nevada : Foresta Institute for Ocean and Mountain Studies, 1993. pp. 652-653; **2:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area) / W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **3:** Fishes of the Southern Ocean. O Gon and PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990. pp. 268-269; **4:** Biology of the Antarctic Seas 19:59-113, 1988. Antarctic Research Series Volume 47; **5:** Antarctic Science 11(3):293-304, 1999

Pagetopsis macropterus





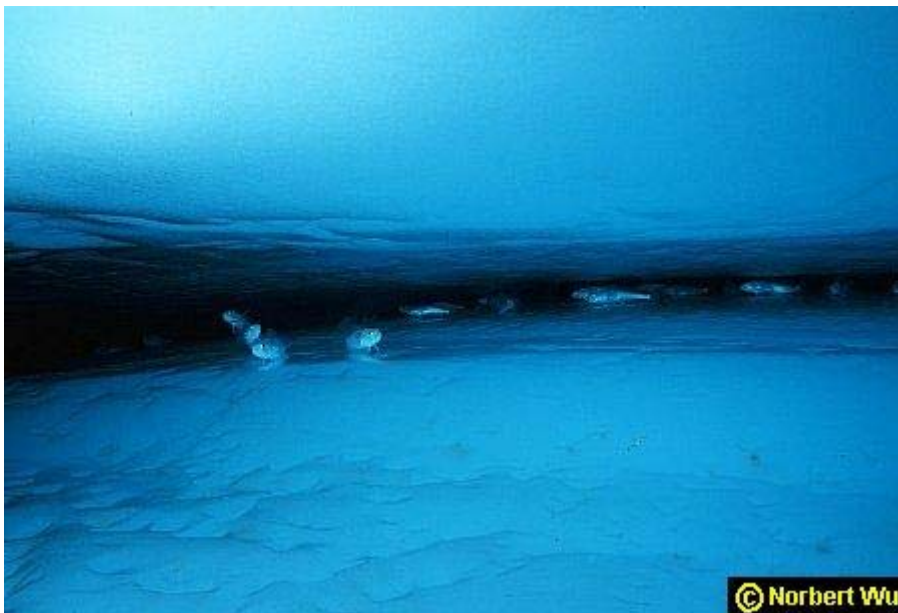
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Bald notothen or bald rockcod *Pagothenia borchgrevinki*

Pagothenia borchgrevinki is found throughout Antarctica and the Antarctic Peninsula, South Orkney Islands, and South Shetland Islands from 0 to 695 meters depth [8,11,13]. *P. borchgrevinki* is a commonly seen fish associated with the sea ice along the Antarctic shore, and has been observed clinging to the underside of thick ice shelves [8,16]. *P. borchgrevinki* can grow up to 28 centimeters in length [8]. *P. borchgrevinki* collected under the sea ice are pale all over in coloration while those collected in association with the bottom are a dark phase with a dark olive-brown spotted pattern above and silver-

white below [9]. Color has also been recorded as yellowish with dark spots or irregular crossbars and dorsal and caudal fins with a series of spots but caudal fin without transverse bands [11].

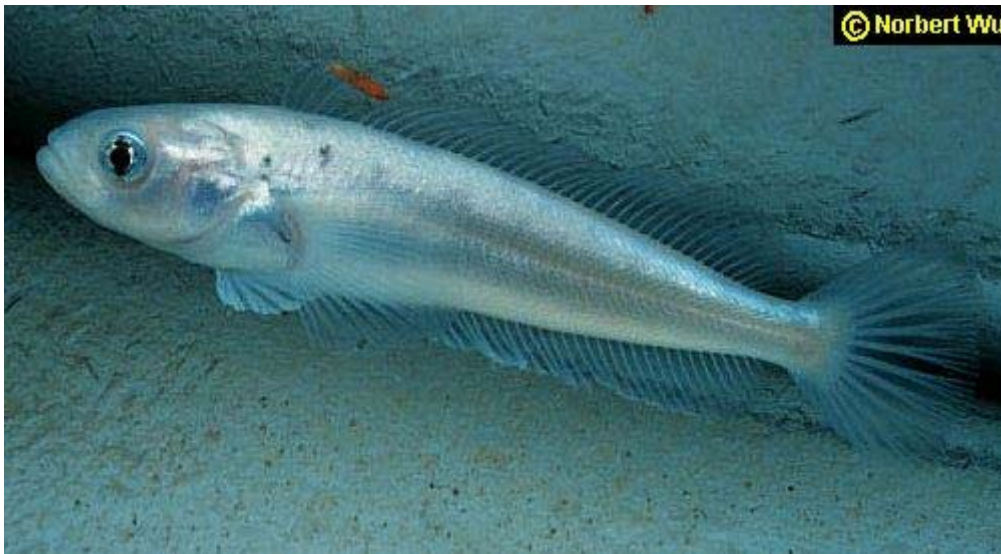


Here *Pagothenia borchgrevinki* is seen in a crack on a grounded iceberg just south of Cape Evans on Ross Island. The undersurface of sea ice is a feeding and refuge site for many organisms with a profusion of amphipods, euphausiids, and fish including *P. borchgrevinki*. *P. borchgrevinki* is well adapted as a hunter; its lateral line sensory system can detect prey by recognizing the low vibration frequencies emitted by swimming crustaceans like *Orchomene plebs*, *Euphausia crystallorophias*, and *Euchaeta antarctica* [17]. *P. borchgrevinki* eats the free-swimming shelled pteropod mollusc *Limacina helicina*, ice krill *Euphausia*

crystallorophias, copepods (including the calanoid copepod *Euchaeta antarctica*), decapod crustacean larvae, chaetognaths, amphipods (including the medusa-hitchhiking hyperiid amphipod *Hyperietta dilatata*, *Orchomene plebs* and *Epimiriella macronyx*), and juvenile fish (including *Pleuragramma antarcticum*, a key species in the food web, being eaten by fish like *Dissostichus mawsoni*, Weddell seals, Adelle penguins and skuas) [2,3,6,10,11,12]. *P. borchgrevinki* is eaten by Emperor penguins and other predators [4].



Termed cryopelagic for its lifestyle preference, *Pagothenia borchgrevinki* is ideally suited for its close association with sea ice. Living in such close association with sea ice crystals is a physiological challenge; you couldn't pick a colder place to live and risk freezing. *P. borchgrevinki*, *Pleuragramma antarcticum* and *P. brachysoma* are among the most southern fish [11]. Antarctic fish like *P. borchgrevinki* are well-adapted to the extremely low and stable temperatures of McMurdo Sound where seawater has a nearly constant mean annual temperature of -1.86 degrees Celsius (28.65 degrees Fahrenheit) and temperature doesn't vary much with depth or season -- 0.2 degrees Celsius (0.36 degrees Fahrenheit) [5]. The flip side is that *P. borchgrevinki* and some other cold-adapted Antarctic fish die of heat at approximately 6 degrees Celsius (42.8 degrees Fahrenheit) which is the lowest known heat death temperature of any animal [8].



Pagothenia borchgrevinki is protected from freezing by glycopeptide antifreeze compounds in its body fluids, that bind to emerging ice crystals and prevent their growth [1,15]. These antifreeze compounds are being commercially marketed for product development [14]. *P. borchgrevinki* lives in the upper six meters of water swimming beneath the sea ice undersurface and entering it to feed and take refuge where it is well-camouflaged by special adaptations

in its body coloration. A silvery protective layer beneath the skin masks dark-colored internal organs (i.e. liver) from appearing on its lightly colored body; the iris and choroid of the eye are similarly masked to avoid their brown or black color [3,6].



Pagothernia borchgrevinki eggs located in a hole in a grounded iceberg south of Cape Evans being protected by a parent fish.

The species name *borchgrevinki* honors CD Borchgrevink, the Norwegian commander of the British Southern Cross Antarctic Expedition of 1898-1900 which established the first wintering-over base on the Antarctic continent and which first collected this fish.

The *Pagothernia* genus differs from the *Notothenia* genus in being more slender and deep bodied with pelagic rather than benthic features [7].

References: **1:** Science 172:1152-1155, 1971; **2:** Antarctic Fish Biology. JT Eastman. San Diego: Academic Press, 1993; **3:** Polar Biology 4:155-160, 1985; **4:** The Penguins, Spheniscidae. TD Williams. Oxford: Oxford University Press, 1995. pp.152- 160; **5:** Antarctic Research Series 5, Biology of the Antarctic Seas II. GA Llano, ed. Washington DC: American Geophysical Union, pp1-37; **6:** Polar Biology 4:45- 52, 1985; **7:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nevada: Foresta Institute for Ocean and Mountain Studies, 1993. pp. 229-235; **8:** Science 156:257-258, 1967; **8:** Fishes of the Southern Ocean. O Gon and PC Heemstra, eds. Grahamstown, South Africa: JLB Smith Institute of Ichthyology, 1990. pp. 308-309; **9:** Hydrobiologia 165:161- 167, 1988; **10:** Polar Biology 8:41-48, 1987; **11:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area). W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **12:** Polar Biology 8(1):49-54, 1987; **13:** Tethys 6(3):631-653, 1974; **14:** www.afprotein.com; **15:** Water and Life : Comparative Analysis of Water Relationships at the Organismic, Cellular, and Molecular Levels. GN Somero, CB Osmond, CL Bolis, eds. New York : Springer-Verlag, 1992. pp. 301-315; **16:** Polar Biology 25(4):320-322, 2002; **17:** Science 235(4785):195-196, 1987



**Emerald notothen or
emerald rockcod**
Trematomus bernacchii

Trematomus bernacchii is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands and Peter I Island from the shore to 695 meters depth [8,13]. *T. bernacchii* is commonly found within the first 200 meters of depth but it can be found down to 700 meters [1]. *T. bernacchii* has been observed taking refuge within volcano sponges with their heads sticking out [2].



Trematomus bernacchii has two morphs, with or without a white blotch spreading out on the nape, behind the eyes, and before the pectoral fins [11,12].

T. bernacchii has black or dark brown blotches over a pale brown or pink-brown body that is darker dorsally; its dorsal and anal fins are uniformly light-brown [8].

The pectoral fins of *T. bernacchii* are dark with numerous light spots and it has three green spots on the upper part of the pectoral fin base [8].



In deeper water, *Trematomus bernacchii* can be less pigmented and more pinkish-brown in coloration as shown here [9].

T. bernacchii females can be up to 35 centimeters long, and males up to 28 centimeters long; females live up to 21 years, and males up to 16 years [1,19].



Trematomus bernacchii lives on the seafloor (benthic) and is primarily a benthic feeder, eating sedentary and moving prey, by ambush or hunt- and-peck feeding [1,2,3,4,7,8,10,14].



Trematomus bernacchii has a varied diet: algae; testate amoeba *Gromia*; crustaceans (including euphausiid krill, mysids, copepods, pycnogonids, tanaids, cumaceans, ostracods, isopods, amphipods, shrimp); nemerteans; sipunculids; priapulids; nematodes; oligochaetes; pterobranchs; polychaetes; hydroids; soft coral (including *Clavularia*); medusae; anemone *Edwardsia meridionalis*; echinoderms (holothurians, brittle stars, sea urchin *Sterechinus neumayeri*); bivalves; gastropods; tunicates; thaliaceans; fish; and fish eggs [1,2,3,4,7,8,10,14,16,17,18,19,23].



Spawning takes place in December-January in McMurdo Sound and in October-November in other reported areas [1]. *Trematomus bernacchii* deposits its eggs on the seafloor (demersal) or within volcano sponges like *Rosella nuda*; parental guarding of the egg mass within volcano sponges has been observed [2]. Hatching may occur towards the end of summer or early autumn [1].



Antarctic fish like *Trematomus bernacchii* are well-adapted to the extremely low and stable temperatures of McMurdo Sound where seawater has a nearly constant mean annual temperature of -1.86 degrees Celsius (28.65 degrees Fahrenheit) and temperature doesn't vary much with depth or season -- 0.2 degrees Celsius (0.36 degrees Fahrenheit) [5].



The flip side is that *Trematomus bernacchii* and some other cold-adapted Antarctic fish die of heat at approximately 6 degrees Celsius (42.8 degrees Fahrenheit) which is the lowest known heat death temperature of any animal [6]. This freezing resistance is accomplished with special antifreeze glycopeptides in its body fluids, that bind to emerging ice crystals and prevent their growth; these antifreeze compounds are being commercially marketed for product development [15,20].



The species name *bernacchii* honors L.O. Bernacchi, an Australian physicist-meteorologist who collected on the Southern Cross Expedition and who also served on Scott's 1901 expedition.

Taxonomic Note: Some use the genus *Pseudotrematomus* [1,21,22]

References: **1:** Fishes of the Southern Ocean. O Gon and PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990. pp. 317-318; **2:** Copeia 1980(1):171-173; **3:** Polar Biology 4:155-160, 1985; **4:** Polar Biology 13(6):429-431, 1993; **5:** Antarctic Research Series 5, Biology of the Antarctic Seas II. GA Llano, ed. Washington DC : American Geophysical Union, pp1-37; **6:** Science 156:257-258, 1967; **7:** Antarctic Science 6(1):61-65, 1994; **8:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area) / W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **9:** Art De Vries, personal communication, 1998; **10:** Bulletin de l'Institut Oceanographique 66(1368), 1966; **11:** Biochemical Systematics and Ecology 20(3):233-241, 1992; **12:** Antarctic Science 9(4):381-385, 1997; **13:** Tethys 6(3):631-653, 1974; **14:** Antarctic Science 12(1):64-68, 2000; **15:** www.afprotein.com; **16:** Ophelia 24(3):155- 175, 1985; **17:** Polar Biology 13:291-296, 1993; **18:** Ross Sea Ecology : Italianartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 551-561; **19:** Ross Sea Ecology : Italianartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 457-468; **20:** Water and Life : Comparative Analysis of Water Relationships at the Organismic, Cellular, and Molecular Levels. GN Somero, CB Osmond, CL Bolis, eds. New York : Springer-Verlag, 1992. pp. 301-315; **21:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nev. : Foresta Institute for Ocean and Mountain Studies, 1993; **22:** Biologiia Shel'fovykh zon Mirovogo Okeana : tezisy dokladov Vtoroi vsesoiuznoi konferentsii po morskoi biologii, Vladivostok, sentiabr' 1982 g. AI Kafanov & TS Veniaminson, eds. Vladivostok : DVNTS AN SSSR, 1982. Volume 2, pp. 9-10; **23:** Polar Biology 27(11):721-728, 2004



Striped notothen / striped rockcod / green rockcod
Trematomus hansonii

Trematomus hansonii is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, and South Georgia Island at depths from 0 to 640 meters [1,3,6,8,12]. *T. hansonii* is colored greenish-grey with large black crossbars; its head is bluish mauve at the lower part [6]. The dorsal and anal fins of *T. hansonii* have greyish-green rays and black membrane and the caudal fin has dark transverse narrow bands with a clear membrane [6]. The pectoral fins of *T. hansonii* have

light and grey bands with a dark membrane between the four last rays; its pelvic fins are punctuated with black spots on the rays [6]. *T. hansonii* can reach 42 centimeters in length [1,6,13].



Trematomus hansonii eats juvenile fish, fish eggs, algae, polychaetes (including *Harmothoe spinosa*, *Haploscoloplos kerguelensis*, *Spiophanes tcherniai*, *Gyptis* sp., *Capitella* sp.), krill, mysids, isopods (including *Austrosignum grande*, *Antarcturus* sp.), amphipods (including *Monoculodes scabriculosus*, *Heterophoxus videns*, *Hyperiella* sp.), tanaid *Nototanaid dimorphus*, shrimp (*Chorismus antarcticus*, *Notocrangon antarcticus*), copepods, nemertean, crinoids, holothurians, anemones (including *Edwardsia meridionalis*), medusae, pycnogonids, pterobranchs, and

gastropods (including *Neobuccinum eatoni*, *Marseniopsis mollis*) [1,3,6,7,10,11,12,13]. *T. hansonii* tends to take more prey from the water column than other primarily benthic feeding fish like *T. pennelli* or *T. bernacchii* [2].

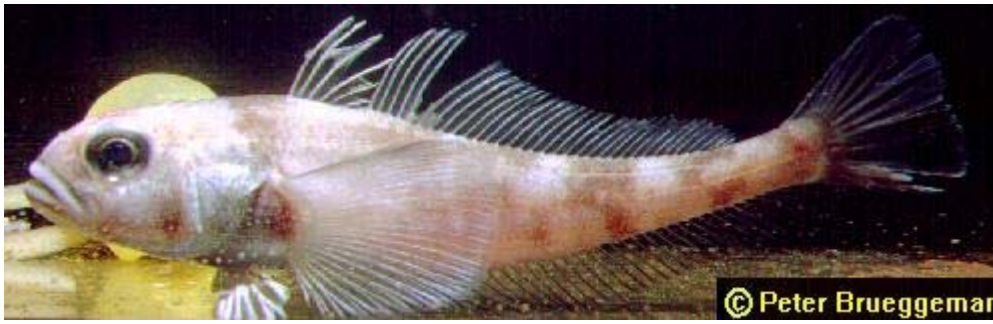
Depending on location, *T. hansonii* becomes sexually mature and spawning in December - February; eggs probably hatch in winter [1,6,12,13]. Antarctic fish like *Trematomus hansonii* are well-adapted to the extremely low and stable temperatures of McMurdo Sound where seawater has a nearly constant mean annual temperature of - 1.86 degrees Celsius (28.65 degrees Fahrenheit) and temperature doesn't vary much with depth or season -- 0.2 degrees Celsius (0.36 degrees Fahrenheit) [5]. The flip side is that *T. hansonii* and some other cold-adapted Antarctic fish die of heat at approximately 6 degrees Celsius (42.8 degrees Fahrenheit) which is the lowest known heat death temperature of

any animal [4]. This freezing resistance is accomplished with special antifreeze glycopeptides in its body fluids, that bind to emerging ice crystals and prevent their growth; these antifreeze compounds are being commercially marketed for product development [9,14].

The species name *hansoni* honors Nicolai Hanson, the biologist of the Southern Cross Expedition.

Taxonomic Note: Sometimes reported with the genus *Pagothenia*. Some use the genus *Pseudotrematomus* [1,15,16]

References: **1:** Fishes of the Southern Ocean. O Gon and PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990. pp. 319-321; **2:** Polar Biology 13(6):429-431, 1993; **3:** Polar Biology 17(1):62-68, 1997; **4:** Science 156:257-258, 1967; **5:** Antarctic Research Series 5, Biology of the Antarctic Seas II. GA Llano, ed. Washington DC : American Geophysical Union, pp.1-37; **6:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area) / W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **7:** Bulletin de l'Institut Oceanographique 66(1368), 1966; **8:** Tethys 6(3):631-653, 1974; **9:** www.afprotein.com; **10:** Ophelia 24(3):155-175, 1985; **11:** Ross Sea Ecology : Italianartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 551-561; **12:** Antarctic Ecosystems : Models for Wider Ecological Understanding. W Davison, C Howard-Williams, P Broady, eds. Christchurch, NZ : New Zealand Natural Sciences, 2000. pp. 96-100; **13:** Ross Sea Ecology : Italianartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 457-468; **14:** Water and Life : Comparative Analysis of Water Relationships at the Organismic, Cellular, and Molecular Levels. GN Somero, CB Osmond, CL Bolis, eds. New York : Springer-Verlag, 1992. pp. 301-315; **15:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nev. : Foresta Institute for Ocean and Mountain Studies, 1993; **16:** Biologiya Shel' fovykh zon Mirovogo Okeana : tezisy dokladov Vtoroi vsesoiuznoi konferentsii po morskoi biologii, Vladivostok, sentiabr' 1982 g. AI Kafanov & TS Veniaminson, eds. Vladivostok : DVNTS AN SSSR, 1982. Volume 2, pp. 9-10



**deepwater notothen or
scaly rockcod**
Trematomus loennbergii

Trematomus loennbergii is found throughout Antarctica and the Antarctic Peninsula at depths from 0 to 1,191 meters [1,2,3,4]. *T.*

loennbergii is light brown or reddish and has four to five irregular crossbands from back to below midside [1,3].



Trematomus loennbergii can be up to 33 centimeters long, and is common up to twenty centimeters [1,3,7].

T. loennbergii often leaves the bottom in order to feed on prey in the water column [1]. *T. loennbergii* feeds on algae, amphipods (including *Orchomene plebs*, *Epimeria* spp., and *Eusirus perdentatus*), isopods, shrimp (*Chorismus antarcticus*, *Notocrangon antarcticus*), polychaetes (including *Barrukia cristata*), fish, and fish eggs [1,5,6,7].

Taxonomic Note: Some use the genus *Pseudotrematomus* [1,8,9]

References: **1:** Fishes of the Southern Ocean. O Gon & PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990. pp. 322-323; **2:** Antarctic Science 11(3):293-304, 1999; **3:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area). W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **4:** Tethys 6(3):631-653, 1974; **5:** Polar Biology 17(1):62-68, 1997; **6:** Ross Sea Ecology : Italianartide Expeditions (1987- 1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 551- 561; **7:** Ross Sea Ecology : Italianartide Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 457-468; **8:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nev. : Foresta Institute for Ocean and Mountain Studies, 1993; **9:** Biologiya Shel' fovykh zon Mirovogo Okeana : tezis dokladov Vtoroi vsesoiuznoi konferentsii po morskoi biologii, Vladivostok, sentiabr' 1982 g. AI Kafanov & TS Veniaminson, eds. Vladivostok : DVNTS AN SSSR, 1982. Volume 2, pp. 9-10

Dusky notothen *Trematomus newnesi*

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Spotted notothen *Trematomus nicolai*





Sharp-spined notothen
Trematomus pennellii

Trematomus pennellii is found throughout Antarctica at depths from the 0 to 732 meters [1].



Trematomus pennellii has distinctive white flecks, and grows up to 25.5 centimeters long [1,3].



Trematomus pennellii lives on the seafloor (benthic) where it is primarily a benthic feeder eating fish eggs, polychaetes (particularly *Amithas membranifera*, *Barrukia cristata*, *Aglaophamus trissophyllus*, and including *Ophelina gymnopige*, *Scoloplos marginatus*), amphipods, pycnogonids/sea spiders, and molluscs [1,2,3].



Trematomus pennellii spawns in summer [1].

The species name *pennellii* honors Harry LL Pennell, Captain of the ship *Terra Nova* of Scott's British Antarctic Expedition of 1910.

Taxonomic Note: *T. centronotus* was synonymized under *T. pennellii* in 1987 with some disagreement; some use the genus *Pseudotrematomus* [1,4,5,6].

References: **1:** Fishes of the Southern Ocean. O Gon and PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990. pp. 326-327; **2:** Polar Biology 13(6):429-431, 1993; **3:** Ross Sea Ecology : Italian Antarctic Expeditions (1987-1995). FM Faranda, L Guglielmo, A Ianora, eds. Berlin : Springer, 2000. pp. 457-468; **4:** Journal of Ichthyology 27(4):56-62 , 1987; **5:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nev. : Foresta Institute for Ocean and Mountain Studies, 1993; **6:** Biologiya Shel'fovykh zon Mirovogo Okeana : tezis dokladov Vtoroi vsesoiuznoi konferentsii po morskoi biologii, Vladivostok, sentyabr' 1982 g. AI Kafanov & TS Veniaminson, eds. Vladivostok : DVNTS AN SSSR, 1982. Volume 2, pp. 9-10

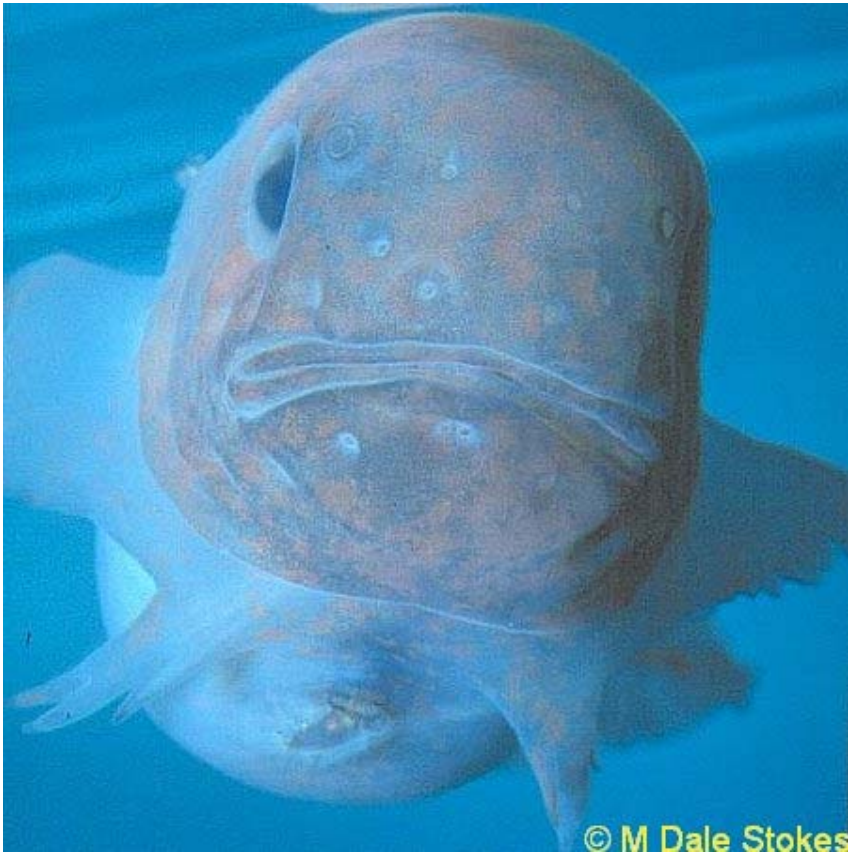


DeVries's Paraliparis *Paraliparis devriesi*

Paraliparis devriesi has been found in McMurdo Sound at 500-700 meters depth, where it lives on the seafloor (epibenthic) [1,2].



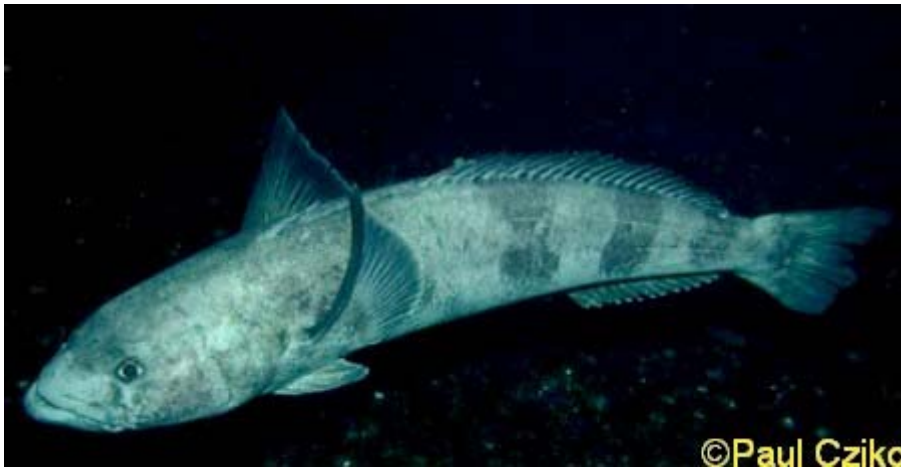
Specimens of *Paraliparis devriesi* have been collected up to nineteen centimeters long [1].



Paraliparis devriesi lacks a swim bladder, and maintains its neutral buoyancy through reduced skeletal ossification and a gelatinous subdermal material [2].



References: **1:** Review of the Snailfish Genus *Paraliparis* (Scorpaeniformes, Liparididae) of the Southern Ocean. AP Andriashev. Koenigstein : Koeltz Scientific Books, 1986; **2:** Journal of Morphology 220:85-101, 1994



Antarctic toothfish *Dissostichus mawsoni*

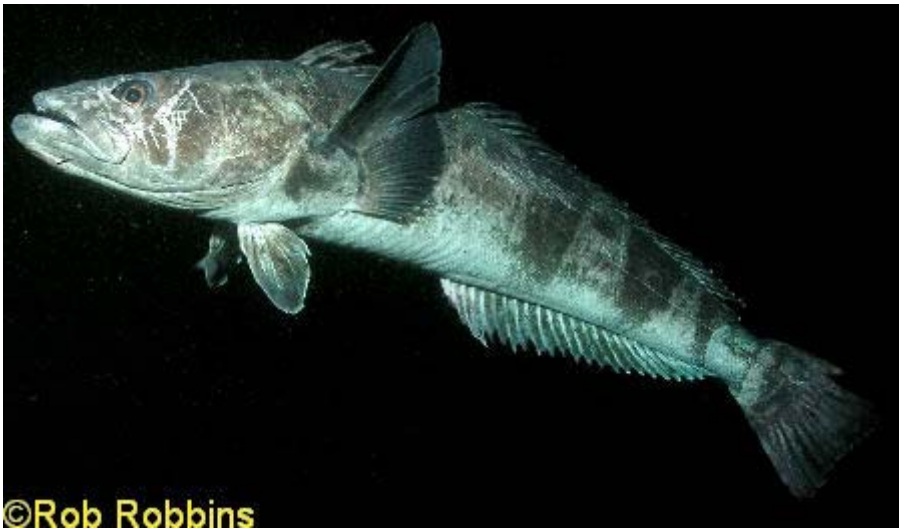
Dissostichus mawsoni is found throughout Antarctica from 20-1,600 meters depth [1,2]. *D. mawsoni* have been collected up to 1.75 meters long, and up to eighty kilograms in weight [1,2]. *D. mawsoni* is usually found near the bottom [2].



Dissostichus mawsoni is an opportunistic feeder, eating zooplankton and other pelagic invertebrates as juveniles, and shifting to various mid- to deep-water fish and squid by their third year [1]. The species of fish and crustaceans found in *D. mawsoni* stomachs in McMurdo Sound indicates that they feed deep and in the open sea, and close under the sea ice [1]. Predators of *D. mawsoni* include Weddell seals, sperm whales, and orcas [1,2,4].



Dissostichus mawsoni has no swim bladder, and relies on reduced calcification of its skeleton, and lipid production in adipose tissue cells, to maintain neutral buoyancy [2].



Dissostichus mawsoni is sexually mature at eight years of age and one meter in length [2]. A well-regulated and enforced commercial fishing for Antarctic toothfish would factor in their slow growth and long lifespan. Such fish cannot be harvested in great quantities, or it will be pushed towards extinction.



Dissostichus mawsoni is related to the Patagonian toothfish, or Chilean sea bass. Large, unreported catches from illegal fishing of Patagonian toothfish, or Chilean sea bass, has made effective fisheries management difficult, and it is being overfished in some areas [3]. Overfishing of long-lived fish pushes them towards extinction. A fate similar to that of the Patagonian toothfish, or Chilean sea bass, may await the Antarctic toothfish. Effective fisheries management in the remote waters of Antarctica is nearly impossible.



Dissostichus mawsoni is named after Douglas Mawson, the leader of early Australian Antarctic exploration.

References: **1:** History and Atlas of the Fishes of the Antarctic Ocean. RG Miller. Carson City, Nev. : Foresta Institute for Ocean and Mountain Studies, 1993; **2:** Fishes of the Southern Ocean. O Gon & PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990; **3:** Fact Sheet, Joint U.S. Department of Commerce/U.S. Department of State. Washington, DC. March 26, 2002; **4:** Norbert Wu, personal communication, 2001



Eaton's skate *Bathyraja eatonii*

Eaton's skate *Bathyraja eatonii* is found in Antarctica and the South Shetland Islands, South Orkney Islands, Kerguelen Island, and Heard Island, at depths from 15 to 800 meters [1,2]. *B. eatonii* can be over one meter in length [1]. *B. eatonii* can be distinguished from *B. maccaini* by the absence of thorns around its eyes [1]. One predator of *B. eatonii* is the sleeper shark *Somniosus cf. microcephalus* [3].

This photo was shot in a Crary Lab tank.

References: **1:** FAO Species Identification Sheets for Fishery Purposes : Southern Ocean (Fishing Areas 48, 58 and 88) (CCAMLR Convention Area) / W Fischer & JC Hureau, eds. Rome : Food and Agriculture Organization of the United Nations, 1985; **2:** Antarctic Science 2(2):129-137, 1990; **3:** Deep Sea Research Part I 51:17-31, 2004



Pleuragramma antarcticum

The unhappy fish in both photos came from the stomach of a freshly caught Antarctic cod *Dissostichus mawsoni*





Antarctic sharks ?

Five species of shark are known from the Southern Ocean, the ocean surrounding the Antarctic continent between 60 degrees south latitude and the Antarctic coast [1,2]. No sharks have been found in Antarctic coastal waters or the Antarctic Peninsula [1]. This is a photo of a great white shark, and they are not found in Antarctica.

The porbeagle *Lamna nasus* has been found around South Georgia and the Kerguelen Islands [1,2].

The lanternshark *Etmopterus cf. granulosus* has been found at the Kerguelen Islands [1,2].

The sleeper shark *Somniosus cf. microcephalus* has been found around the Kerguelen Islands [1,2].

The white-spotted spurdog *Squalus acanthias* and the dogfish *Centroscymnus sp.* have been found at the Kerguelen Islands [2].

References: **1:** Fishes of the Southern Ocean. O Gon & PC Heemstra, eds. Grahamstown, South Africa : JLB Smith Institute of Ichthyology, 1990; **2:** Deep Sea Research Part I 51:17-31, 2004