Arthropoda – Other: copepods, krill, ostracods, mysids, tanaids, barnacles, shrimp, etc.

UNDERWATER FIELD GUIDE TO ROSS ISLAND & MCMURDO SOUND, ANTARCTICA

Peter Brueggeman

Photographs: Norbert Wu, Steve Alexander, Peter Brueggeman, Canadian Museum of Nature (Kathleen Conlan), Paul Cziko, Shawn Harper, Uwe Kils, Adam G Marsh, Rob Robbins, & Steve Rupp/NSF

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, which 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, and there can be some uncertainty in identifications solely from photographs.

© 1998+: Text © Peter Brueggeman; Photographs © Norbert Wu, Steve Alexander, Peter Brueggeman, Canadian Museum of Nature (Kathleen Conlan), Paul Cziko, Shawn Harper, Uwe Kils, Adam G Marsh, Rob Robbins, & Steve Rupp/NSF. Photographs may not be used in any form without the express written permission of the photographers. Norbert Wu does not grant permission for uncompensated use of his photos; see www.norbertwu.com
calanoid copepod
page 5

parasitic copepod, possibly *Eubrachiella antarctica*
page 6

ice krill *Euphausia crystallorophias*
page 9

Antarctic krill *Euphausia superba*
page 10

myodocopid ostracod (order Myodocopida)
page 11
podocopid ostracod (order Podocopida)

page 12

mysid

page 13

tanaid *Nototanais dimorphus*

page 14

acorn barnacle *Bathylasma corolliforme*

page 15
stalked barnacle, possibly *Litoscalpellum aurorae*

page 17

stalked barnacle, probably *Weltnerium bouvieri*

page 21

shrimp *Chorismus antarcticus*

page 22

shrimp *Notocragon antarcticus*

page 24

May 2019: taxonomic names checked in Zoological Record and World Register of Marine Species
This calanoid copepod is carrying eggs.

Copepods are ecologically important in the ocean food chain, feeding on diatoms and other plankton and, as the largest biomass in the oceans, being food for zooplankton, fish, seabirds, and whales. Most copepods species are free-living in the ocean, found from the surface to great depths.

The long, feathered antennae of calanoid copepods facilitate their drifting in the ocean. Copepod fecal pellets contribute to the marine snow, bringing nutrients and minerals from surface waters to the deep sea.
parasitic copepod, possibly *Eubrachiella antarctica*

A common parasitic copepod on Antarctic fish is *Eubrachiella antarctica* [6,7,8]

Parasitic copepods like these on the tail fin of the Antarctic cod *Dissostichus mawsoni* are free-swimming as juveniles [1,2].
Females find a host, attach, and are stationary for life, diverting their energy to reproduction; males move or swim around to find females to reproduce [1,2].

_Eubrachiella antarctica_ pygmy males attach to the female _E. antarctica_ near its genital porus [7] This female parasitic copepod is burrowed into the skin, sucking blood and fluids or grinding away at flesh [1,3]. The female stores the male's sperm and fertilizes its eggs as it expels them into chitinous sausage-like ovisacs [3,4]. The ovisacs gradually lengthen as eggs are expelled [4].
In adapting to their parasitic lifestyle, these copepods have changed substantially from non-parasitic copepods in order to secure a hold on the host and increase their reproductive activity [5]. Parasitic copepods developed various grasping mechanisms like antennae or body outgrowths to hold on or embed themselves into hosts [5].

Parasitic copepods can be relatively benign or life-threatening for a fish, depending on the number of parasites, the organ system affected (fins, skin, gills, internal organs), the age of the fish, environmental conditions, and other factors [3].

**ice krill *Euphausia crystallorophias***

*Euphausia crystallorophias* is found throughout Antarctica and the Antarctic Peninsula from the surface down to usually 300 to 650 meters depth and has been recorded near 4,000 meters depth [1,5]. *E. crystallorophias* reaches a maximum length of 3.4 centimeters, with females slightly larger than males [1,2,5]. *E. crystallorophias* is a swarming species and an important food source for coastal predators, eaten by minke whales, seals, penguins, birds, and fish (particularly *Pleuragramma antarctica*). *E. crystallorophias* replaces *E. superba* in dominance in regions of pack and floating ice and the pelagic shelf community [1,4,5,6]. *E. crystallorophias* may be the major single pelagic consumer of phytoplankton on the Antarctic shelf [4]. *E. crystallorophias* undertakes a vertical diel migration and breeds from the end of December to February under the ice [1]. Coastal polynas are areas of enhanced spawning and grazing for *E. crystallorophias* [4].

*E. crystallorophias* was first described from specimens collected through holes cut in the ice by Scott's Discovery Expedition [3].

Euphausiids are small translucent shrimp-like crustaceans commonly known as krill; seven species belonging to two genera *Euphausia* and *Thysanoessa* occur in the Southern Ocean [1,2]. The genus name *Euphausia* refers to the luminescence produced by large light organs (photophores) [2]. An Antarctic midwater trawling fishery based on *Euphausia superba* catches krill for human and domestic animal consumption [1]. *E. crystallorophias* is similar to *E. superba* but has a longer rostrum, larger eyes, a shorter mandibular palp, and is shorter in overall length [5].

**References:**
Antarctic krill *Euphausia superba*

*Euphausia superba* is found around Antarctica between the continent and the Polar Front within the upper 100 meters of depth [1]. *E. superba* reaches a maximum length of five centimeters [1]. This photo is an adult male in the typical oblique hovering position with its pleopods beating [4]. *E. superba* is a swarming species and an important food source for baleen whales including minke whales, seals, fish (particularly *Notothenia neglecta*, *Electrona antarctica*, *Cygnodraco mawsoni*, *Champsocephalus gunnari*), penguins and birds, and cephalopods [1,6]. *E. crystallorophias* replaces *E. superba* in dominance in regions of pack and floating ice and the pelagic shelf community [1]. *E. superba* spawns during late spring and summer, peaking from early January to mid-February [1]. *E. superba* lives two years with recent research suggesting seven years [1]. *E. superba* feeds preferentially on phytoplankton and is a dominant herbivore in the food web [1]. *E. superba* feeds on planktonic and ice-attached diatoms, dinoflagellates, silicoflagellates, tintinnids, foraminiferans, radiolarians, heliozoans, *Calanus/Calanoides* copepods, invertebrate eggs, siphonophores, its own species, other zooplankton [1,5].

Euphausiids are small translucent shrimp-like crustaceans commonly known as krill; seven species belonging to two genera *Euphausia* and *Thysanoessa* occur in the Southern Ocean [1,2]. The genus name *Euphausia* refers to the luminescence produced by large light organs (photophores) [2]. An Antarctic midwater trawling fishery based on *Euphausia superba* catches krill for human and domestic animal consumption [1]. *E. crystallorophias* is similar to *E. superba* but has a longer rostrum, larger eyes, a shorter mandibular palp, and is shorter in overall length [3].

myodocopid ostracod (order Myodocopida)

The carapace of myodocopid ostracods is less strongly calcified than other ostracods; it consists of two valves hinged dorsally with the body of the ostracod suspended from the dorsal margins of those valves [1]. Benthic myodocopid ostracods are usually found at the sediment surface, within the top centimeter of sediment, or swimming near the bottom [1]. Predators of the myodocopid ostracod Philomedes sp. are the fish Trematomus bernacchii and the phoxocephalid amphipod Heterophoxus videns [1,3].

Ostracods are also called mussel shrimp or seed shrimp. Mussel shrimp differ from most crustaceans in having a very short trunk without external segmentation; nearly all of its body is encased in a hard covering. Most ostracods live on or near the bottom, feeding on microorganisms and organic debris or preying on small invertebrates.

podocopid ostracod (order Podocopida)

Ostracods are also called mussel shrimp or seed shrimp.

Mussel shrimp differ from most crustaceans in having a very short trunk without external segmentation; nearly all of its body is encased in a hard covering.

Most ostracods live on or near the bottom, feeding on microorganisms and organic debris or preying on small invertebrates. Predators of McMurdo podocopid ostracods include the fish *Trematomus bernacchii* [2].

Mysids are small, shrimp-like crustaceans, known as "opossum shrimp" due to a brood pouch in mature females. Most Antarctic mysids are hyperbenthic, living above the bottom.[1] There are 37 mysid species in the Antarctic region, with nineteen being endemic.[1] Depending on the species, mysids may feed on small particles collected by grooming their body surface, capture zooplankton, or scavenge. Mysids may be found in large swarms and are an important part of many fish diets. Antarctic mysid predators include brittle stars (Astrotoma agassizii), fish (dragonfish Cygnodraco mawsoni; mackerel icefish Champsocephalus gunnari; Antarctic cod Dissostichus mawsoni; spiny plunderfishes of the family Harpagiferidae), birds (blackbellied storm petrel Fregetta tropica; Wilson's storm petrel Oceanites oceanicus), and the crabeater seal Lobodon carcinophaga.[2,3,4,5,6,7,8,9].

Nototanais dimorphus is found in Antarctica and the Antarctic Peninsula, Kerguelen Island, Marion and Prince Edward Islands, Macquarie Island, and southern tip of South America, from 2 to 585 meters depth [1,2,4,5,6,7,10]. *N. dimorphus* is a dominant species in the McMurdo jetty soft-bottom macrofaunal community and is a foundation species for the ecological community there, regulating species composition and population size (age) structure by preying on small species and small individuals of large species [8,10]. *Nototanais dimorphus* transforms from female to male, and the genders are differentiated by the shape of their cheliped – the pincer-like claw leg [1]. In this photo, the male is above the female [3,10].

*Nototanais dimorphus* lives in a tube, and is located in or near its tube [8]. Its gut contents include diatoms, bacteria, and amorphous organic material [8,9].

The predators of *Nototanais dimorphus* include the anemone *Edwardsia meridionalis* and the fish *Trematomus bernacchii* and *Trematomus hansonii* [8].

The tanaid's upper body (thorax) has seven pairs of walking legs, the first of which has a large pincer-like claw for clasping and the second specialized for burrowing. The tanaid's abdomen has five pairs of swimming limbs and a pair of posterior appendages. Tanaiids live on or in soft sediments, and feed on organic detritus and plankton. The female carries eggs and developing young in a brood pouch on its underside.

acorn barnacle *Bathylasma corolliforme*

The acorn barnacle *Bathylasma corolliforme* is found throughout Antarctica and the Antarctic Peninsula, South Sandwich Islands, Scotia Bank off South Georgia Island, and Kerguelen Islands from 6 to 1,500 meters depth [1,2,4,5,6].

*Bathylasma corolliforme* is not typically known to live at depths of less than one hundred meters in Antarctica; here it was photographed at Cape Armitage at six meters depth and it has been observed near Cape Evans at 24 meters depth [1,2].

The presence of *Bathylasma corolliforme* may be linked to the presence of currents sufficiently strong to bring food into its grasp and thus ensure survival [1].
In these photos, *Bathylasma corolliforme* doesn't have complemental males on or near its top opercular plates; small-sized male barnacles are found attached to larger hermaphroditic individuals to facilitate reproduction [1,3].

stalked barnacle, possibly *Litoscalpellum aurorae*

Looks like *Litoscalpellum aurorae* illustrated in Rauschert and Arntz’ *Antarctic Macrobenthos* [1].
Barnacles that are possibly *Litocalpellum aurorae*, attached to a pycnogonid sea spider.
Pedunculate barnacles of the family Scalpellidae exhibit all three sexual systems (hermaphroditism, androdioecism, dioecism) [2].
stalked barnacle, probably *Weltnerium bouvieri*

*Weltnerium bouvieri* has been collected from Antarctica and the South Orkney Islands and South Georgia Island, from 18 to 920 meters depth [1,5]. This specimen was collected from Cinder Cones at about 18 meters depth [4]. The capitular plates of *W. bouvieri* are separated by narrow, translucent, chitonous spaces [1]. *W. bouvieri* has been collected up to 15 millimeters total height, and has been found attached to hydroids and bryozoans [1,5].

Stalked or lepadiform barnacle species vastly outnumber stalkless or balaniform barnacle species in Antarctica (32 to 1) [1,2]. The greater number of stalked species in Antarctica may be due to the lack of littoral fauna (in which stalkless barnacles are well represented) and also due to periods of heavy glaciation in geologic history which impacts stalkless barnacles heavily since they tend to live in shallow water [1,2].

After their larval stage, barnacles are sedentary organisms, secreting calcareous plates which they open and close to extend and retract appendages to filter feed.

**Taxonomic Note:** Genus was changed from *Arcoscalpellum* to *Weltnerium* [3]. *Weltnerium weltneri* is a junior synonym of *W. bouvieri* [5].

**References:**
shrimp *Chorismus antarcticus*

*Chorismus antarcticus* is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Georgia Island, Falkland Islands, Chile, and Marion and Prince Edward Islands, from 9 to 1,450 meters depth [3,4,5,8,9,14,15,16].

In the Ross Sea, *Chorismus antarcticus* is found on the continental shelf and upper slopes [13].

*Chorismus antarcticus* can be up to ten centimeters long with the rostrum as long as the carapace [5]. Carapace length of *C. antarcticus* can be over two centimeters (from eyestalk base to central dorsal carapace edge) [1].

*Chorismus antarcticus* reaches a likely age of ten years in the Weddell Sea [1]. *C. antarcticus* is a hermaphrodite and undergoes a sex transition from male to female during its the fourth year of life [1,2,6].

*Chorismus antarcticus* adults are carnivorous and feed on moving prey like amphipods [1].

Predators of *Chorismus antarcticus* include fish (including *Trematomus hansoni, Trematomus bernacchii* and *Trematomus loennbergii*), the Weddell seal, penguins, black bellied storm petrels, and the brittle star *Ophiosparte gigas* [7,10,11,12,16].

Due to slow growth, low mortality rate, and low average abundance, *Chorismus antarcticus* has little potential for commercial fishing; commercial bottom trawling would over-exploit the stock and destroy its sponge community habitat [1].
Shrimp have a semitransparent body flattened from side to side with a flexible abdomen and a fan-shaped tail. Shrimp use their appendages for swimming, swimming backward rapidly by flexing their abdomen and tail. Shrimp usually eat phytoplankton and zooplankton; some feed on dead animals.

shrimp *Notocrangon antarcticus*

*Notocrangon antarcticus* is found throughout Antarctica and the Antarctic Peninsula and South Shetland Islands, South Orkney Islands, and South Georgia Island, at depths down to 2,350 meters [2,3].

In the Ross Sea, *Notocrangon antarcticus* is found on the continental shelf and upper slopes [1].

Predators of *Notocrangon antarcticus* include fish, gentoo penguins, grey-headed albatrosses, white-chinned petrels and Weddell seals [4].