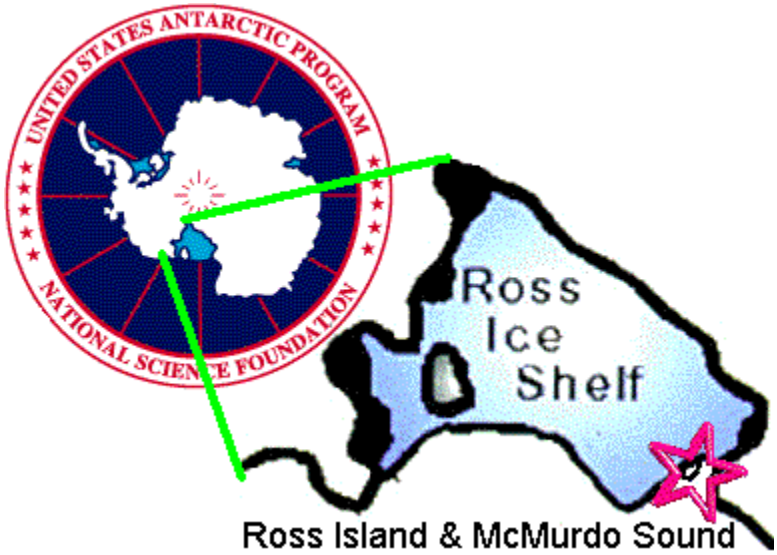
Arthropoda – Isopoda: isopods

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, Jim Mastro, Bruce A. Miller, 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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Arcturid isopod

Antarctic isopods have at least 346 species, with 302 of those are endemic to Antarctica (native or peculiar to Antarctica) [3].

Only one Antarctic isopod is bipolar, being found in the Arctic as well as Antarctic [3].

Arcturid isopods usually have a passive filtration feeding mechanism using the setal combs of their anterior pereopods (front legs) [1].

More primitive genera of Arcturid isopods lack these setal combs on their anterior pereopods (front legs) and eat detritus [1].

Arcturid isopods cling to the bottom with some of their posterior pereopods (rear legs) while holding their anterior segments and pereopods up into the water for passive filter-feeding [1].

The bush sponge *Homaxinella balfourensis* almost always has arcturid isopods perched on it [4].

References: 1: Antarctic Isopoda Valvifera. JW Wagele. Koenigstein ; Champaign, Ill. : Koeltz Scientific Books, 1991; **2:** Antarctic Valviferans (Crustacea, Isopoda, Valvifera) : New Genera, New Species, and Redescriptions. A Brandt. Leiden ; New York : E.J. Brill, 1990; **3:** Berichte zur Polarforschung 98: 201-240, 1991; **4:** Rob Robbins, personal communication, 1999

Arcturid isopods on sea spider

Here are several arcturid isopods perched on a sea spider, going along for the ride.

Why would an isopod joyride on a sea spider?

Arcturid isopods cling to something, like the sea spider leg shown here, using some of their posterior pereopods (rear legs) while holding their anterior segments and pereopods up into the water for passive filter-feeding [1].

Perching on a moving object like a sea spider affords the isopod better access to its prey in the water column as the sea spider walks along the seafloor, covering a wide area. This affords the isopod far better access to food than if the isopod was attached to an immobile object and waiting for its prey to wander by one spot.

The immobile bush sponge *Homaxinella balfourensis* almost always has arcturid isopods perched on it [4].

Arcturid valviferan isopods have a passive filtration feeding mechanism using the setal combs of their anterior pereopods, seen here [1]. More primitive genera of Arcturidae lack these setal combs on their anterior pereopods and are detritivorous [1].

Antarctic isopods have a variety of deepwater and continental shelf ecological niches including parasites of fish and other isopods and free-living predators of amphipods, polychaetes, and other invertebrates [3]. Antarctic isopods have at least 346 species and 302 of those are endemic to Antarctica (native or peculiar to Antarctica) [3]. Some Antarctic isopods occur in both Antarctica and South Africa, Australia, or South America [3]. Only one Antarctic isopod is bipolar (found in the Arctic as well as Antarctic) [3].

References: 1: Antarctic Isopoda Valvifera. JW Wagele. Koenigstein ; Champaign, Ill. : Koeltz Scientific Books, 1991; **2:** Antarctic Valviferans (Crustacea, Isopoda, Valvifera) : New Genera, New Species, and Redescriptions. A Brandt. Leiden ; New York : E.J. Brill, 1990; **3:** Berichte zur Polarforschung 98: 201-240, 1991; **4:** Rob Robbins, personal communication, 1999

giant Antarctic isopod *Glyptonotus antarcticus*

Glyptonotus antarcticus is found throughout Antarctica and the Antarctic Peninsula, South Shetland Islands, South Orkney Islands, South Sandwich Islands, and South Georgia Island from intertidal to 790 meters depth [6,7]. *G. antarcticus* is up to twenty centimeters in length and seventy grams in weight [8]. The color of *G. antarcticus* varies but generally is olive-brown, with its appendages less dark and yellowish; keels, segment margins, and coxal plate margins are lighter with a red-brown tint [6].

Glyptonotus antarcticus is an omnivore and eats what it finds, including brittle seastars, gastropod molluscs, isopods (including small ones of its own species -- cannibalism), sea urchins, pelecypods, carrion, krill, and polychaete worms (including *Flabelligera mundata*); food availability is more important than food type [3,6,7,9]. Its large, powerful mouth parts enable it to dine on hard animals like brittle seastars and sea urchins [3]. As a large benthic predator and scavenger, its ecological role is analogous to that of crabs and lobsters in temperate waters.

Glyptonotus antarcticus is nocturnal with a diurnal activity pattern; during the day, it seeks shelter under stones and algae and, at night, it hunts for food [6]. *G. antarcticus* must be fed at least twice a week to stay healthy [6].

Here *Glyptonotus antarcticus* is poking around in the newly formed anchor ice in shallow water under the McMurdo sea ice with the seastar *Odontaster validus* alongside. The body cuticle of *G. antarcticus* has microstructures discouraging settlement by foraminifera and larval stages of sessile organisms [1]. The armored spiny body of *G. antarcticus* protects it well when it's fully grown; small ones are prey items though. Its predators are notothenid fish (*Notothenia neglecta* [2] and *Trematomus bernacchii* [3]) and the octopus *Pareledone* sp. [4]. *G. antarcticus* lives five to eight years and the interval between moults is 100 - 730 days [6].

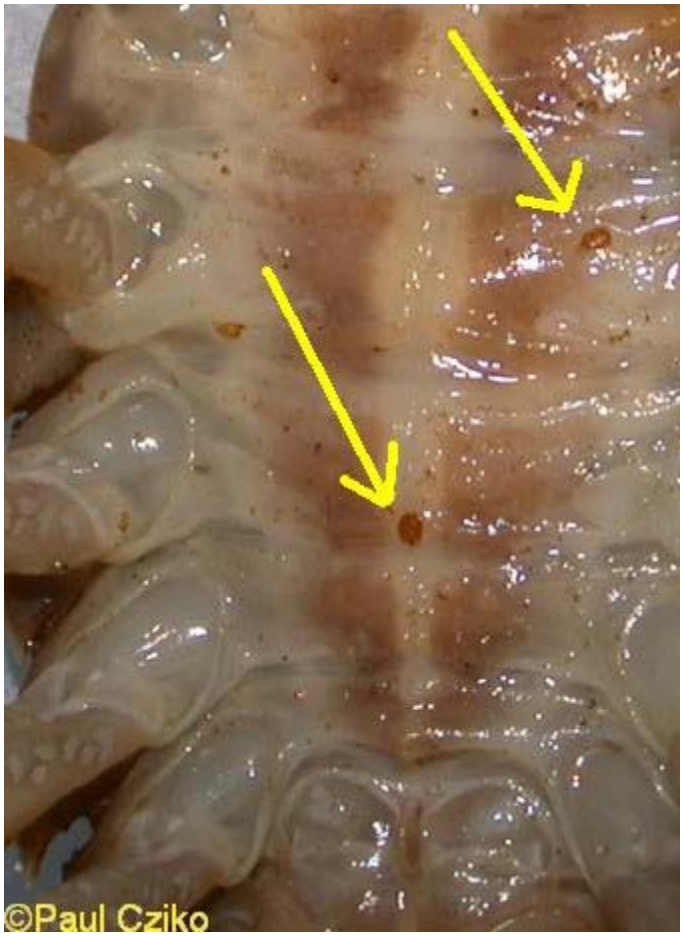
You can see a newly-released juvenile just below the parent's antenna.

Glyptonotus antarcticus has a non-seasonal breeding cycle and young are released throughout the year [6].

Glyptonotus antarcticus incubates and raises its young in a brood pouch (marsupium) as an adaptation to slow development in such cold and adverse conditions [5,6]. Here are pre-emergent young taken from the brood pouch, with their yolk still attached. The developing young ingest non-viable eggs (adelphophagy) and maternal secretions [5].

Here's a closer view of a newly-released juvenile *Glyptonotus antarcticus* on the tubular sponge *Sphaerotylus antarcticus*.

Female *G. antarcticus* usually die after releasing their brood but a few may moult and breed again [6].



The piscicolid leech eggs *Glyptonotobdella antarctica* is known to move between the giant Antarctic isopod *Glyptonotus antarcticus*, *Sterechinus* sea urchins, and some species of the octopus *Pareledone* [10].

As shown here, egg cocoons of this leech can be found on the ventral (under) side of the giant Antarctic isopod *Glyptonotus antarcticus* [10].

A closer view of a leech egg cocoon on *Glyptonotus antarcticus*.

Most likely the leech *Glyptonotobdella antarctica* moves between different hosts and their potential prey [10].

References: 1: Zoomorphologie, 94(2):209-216, 1980; **2:** Antarctic Science 2(3):207-213, 1990; **3:** Royal Society of New Zealand, Transactions, Zoology, 8(15):163-168, 1967; **4:** Polar Biology 13(5):347-354, 1993; **5:** Polar Biology 13(3):145-149, 1993; **6:** Antarctic Isopoda Valvifera. JW Wagele. Koenigstein ; Champaign, Ill. : Koeltz Scientific Books, 1991; **7:** Antarctic Valviferans (Crustacea, Isopoda, Valvifera) : New Genera, New Species, and Redescriptions. A Brandt. Leiden ; New York : EJ Brill, 1990; **8:** Ninth European Marine Biology Symposium. H Barnes, ed. Aberdeen : Aberdeen University Press, 1975. pp 707-724; **9:** Peter Brueggeman, personal communication (observed *G. antarcticus* attacking and eating *Flabelligera mundata* on time-lapsed video), 1999; **10:** Polar Biology 13(5):347-354, 1993

flabelliferan isopod *Natatolana* sp. or *Aega* sp.

From the suborder Flabellifera, this isopod is either *Natatolana* sp. (Family Cirolanidae) or *Aega* sp. (Family Aegidae) [1]. The genus is identified from the isopod's first, second, and third pereopods (thoracic appendages) on its ventral side which aren't visible in this photo [1,4,5]. This isopod was about the size of a sowbug or pillbug -- about one centimeter [2].

Antarctic isopods have at least 346 known species and 302 of those are endemic to Antarctica (native or peculiar to Antarctica) [3]. Some Antarctic isopods occur in both Antarctica and South Africa, Australia, or South America [3]. Only one Antarctic isopod is bipolar (found in the Arctic as well as Antarctic) [3].

Here a flabelliferan isopod *Natatolana* sp. or *Aega* sp. is perched on the lip of the sponge *Haliclona dancoi*. The isopod is probably living in a commensal relationship with the sponge. The isopod benefits from the shelter of the sponge and the sponge is not harmed by the presence of the isopod. Antarctic isopods have a variety of deepwater and continental shelf ecological niches including parasites of fish and other isopods and free-living predators of amphipods, polychaetes, and other invertebrates [3]. *Natatolana* spp. isopods feed on carrion [6].

References: 1: Angelika Brandt, personal communication, 1998; **2:** Norbert Wu, personal communication, 1998; **3:** Berichte zur Polarforschung 98: 201-240, 1991; **4:** A Brandt. Antarctic Serolidae and Cirolanidae (Crustacea, Isopoda) : New Genera, New Species, and Redescriptions. Koenigstein : Koeltz Scientific Books, 1988; **5:** Biological Reports of the Soviet Antarctic Expedition, 1955-1958. Chief editor: EP Pavlovskii. Edited by AP Andriyashev & PV Ushakov. Volume 3. Jerusalem : Program for Scientific Translations, 1966. pp 220-389; **6:** Oceanografia in Antartide, Oceanografia en Antartica. VA Gallardo, O Ferretti, HI Moyano, eds. Concepcion, Chile : Universidad de Concepcion, 1992. pp 417-420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gnathiid isopod *Caecognathia calva*

Caecognathia calva is found throughout Antarctica and the Antarctic Peninsula from intertidal to 661 meters depth [1]. *C. calva* is a fish parasite whose larval stages suck blood or lymph; they can be spotted attached to the heads of benthic fish [1]. Adult *C. calva* do not feed and can be up to six millimeters long [1]. This is a male shown here with its mandibles. Mature *C. calva* males fight for dominance leading to death; the stronger male bites off the legs of the weaker male [1].

An adult *Caecognathia calva*.

Adult *C. calva* can be found on hexactinellid sponges (look for *Rossella* spp. or *Anoxycalyx (Scolymastra) joubini*) with a single male close to the oscular opening, accompanied by a harem of several breeding females and also some juveniles [1]. On *Rossella racovitzae*, *C. calva* can be found in the Budding Type morph and not in the Large Type morph [2].

Here's a juvenile *Caecognathia calva*

Larval *C. calva* are released between February and May and search for a benthic fish [1]. *C. calva* has three larval stages; each stage sucks fish blood once, and then rests in a hidden place for up to two years [1]. Finally the third larval stage of *C. calva* enters a hexactinellid sponge after feeding, where it moults into a mature female or immature male [1].

Taxonomic Note: *Gnathia calva* was assigned to the *Caecognathia* genus in 1994 [3].

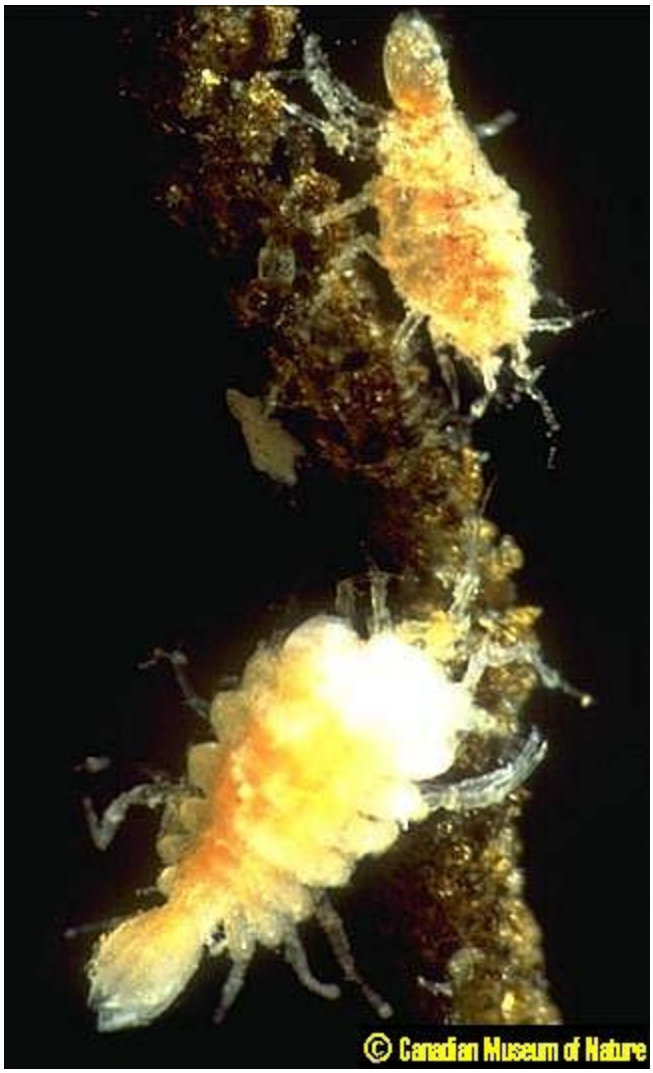
References: 1: Polar Biology 8(4):287-291, 1988; **2:** Verhandlungen Deutsche Zoologische Gesellschaft 85(2):271-276, 1992; **3:** Memoirs of the Museum of Victoria 54(2):271-397, 1994

munnid isopod *Munna* sp.

Munna isopods look like small spiders with long legs that can be 1.5 times longer than the body [1].

Antarctic isopods have a variety of deepwater and continental shelf ecological niches including parasites of fish and other isopods and free-living predators of amphipods, polychaetes, and other invertebrates [2]. Antarctic isopods have at least 346 species and 302 of those are endemic to Antarctica (native or peculiar to Antarctica) [2]. Some Antarctic isopods occur in both Antarctica and South Africa, Australia, or South America [2]. Only one Antarctic isopod is bipolar (found in the Arctic as well as Antarctic) [2].

References: 1: Bulletin du Museum National d'Histoire Naturelle. Section A. Zoologie Biologie et Ecologie Animales 16(1):111-201, 1994; **2:** Berichte zur Polarforschung 98: 201-240, 1991



pleurogoniid isopod *Austrosignum grande*

Austrosignum grande is found in Antarctica, South Shetland Islands, South Georgia Island, and southern Chile at depths from 0 to 385 meters [1,2,3,6,8].

In this photo, the female is above the male. *A. grande* is a dominant species in the McMurdo jetty soft-bottom macrofaunal community [7]. *A. grande* is found on exposed polychaete tubes or plowing through surface sediments [7]. A study examined the gut contents of *A. grande* and found diatoms and amorphous organic material [7]. Its predators include the fish *Trematomus bernacchii* and *Trematomus hansoni* [7].

Pleurogoniid isopods have most of their species in polar or boreal waters with their highest diversity in Antarctica [5]. Deep sea and northern pleurogoniid isopods are derived from genera occurring in Antarctica [5]. This Antarctic center of diversity for pleurogoniid isopods may be due to a narrow range of adaptability to temperature changes [5].

Taxonomic Note: *A. glaciale* was synonymized with *A. grande* [1]. The characters of species assigned to the genera *Austrosignum* and *Paramunna* are confusing; there may be only one genus or the Antarctic species need redescription [4,5].

References: 1: Fauna i Raspredelenie Rakoobraznykh Notalnykh i Antarkticheskikh Vod (Fauna and Distribution of Crustacea from Notal and Antarctic Waters). AI Kafanov, ed. Vladivostok: Akademiya Nauk SSSR, DVNTS, 1982. pp.73-105; **2:** Tethys 5(4):561-600, 1974 (*A. glaciale*); **3:** Systematics and Biology of Bathyal and Abyssal Isopoda Asellota. T Wolff. Galathea Report, Volume 6. Scientific Results of the Danish Deep-Sea Expedition Round the World 1950-52. Copenhagen: Danish Science Press, 1962. p. 255 (*A. grande*) and p. 256 (*A. glaciale*); **4:** Journal of Natural History 14(2):215-236, 1980; **5:** Gunneria 35:1-128, 1980 ; **6:** The Zoogeography, Ecology, and Systematics of the Chilean Marine Isopods. RJ Menzies. Lunds Universitets Arsskrift. Ny Foljd, Avd. 2. Bd 57. Nr 11. Kungliga Fysiografiska Sallskapet Handlingar. Ny Foljd, Bd 72, Nr 11. Reports of the Lund University Chile Expedition 1948-49. Number 42. Lund: CWK Gleerup, 1962; **7:** Ophelia 24(3):155-175, 1985 ; **8:** Polar Biology 28(1):1-14, 2004

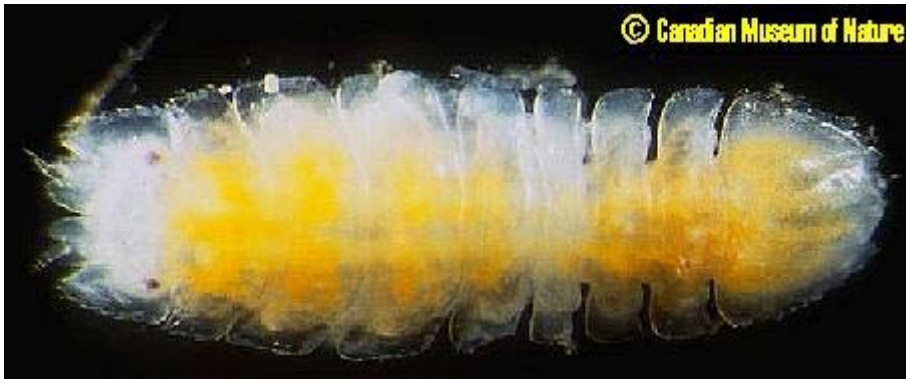
serolid isopod *Ceratoserolis meridionalis*

Ceratoserolis meridionalis is found throughout Antarctica and the Antarctic Peninsula and South Shetland Islands, at depths from 730 to 2,759 meters [2,6,7,8,9]. *C. meridionalis* has been collected at lengths of 6.67 centimeters, plus a caudal spiny tail of 2.67 centimeters length, and a width of 5.18 centimeters [6,7]. Compared to the two other members of its genus, *C. meridionalis* has a characteristic long caudal serrated protrusion (its "tail") [1,6].

Serolid isopods live on sand and mud and are able to burrow into sand [1]. This serolid isopod illustrates how body size can be increased by flattening to occupy more two-dimensional space; flattening helps an organism minimize sinking into a fine-grained soft bottom on which it may live [4]. The eyes of serolid isopods have a large vision field, seeing their surroundings without moving their heads [3]. The second antennae of serolid isopods have brushes used to push sand on the body and to clean the dorsal surface when crawling [3]. Serolid isopods have a concavity under their body which remains sand-free and used to stream water, exiting from a funnel forming at its tail [3]. Serolid isopods are predators and scavengers, feeding on polychaete worms and crustaceans [1,3].

Taxonomic Note: Genus was previously *Serolis* [1,5,6].

References: 1: Antarctic Serolidae and Cirolanidae (Crustacea, Isopoda) : New Genera, New Species, and Redescriptions. A. Brandt. Koenigstein : Koeltz Scientific Books, 1988; **2:** Jim Mastro, personal communication, collected at 730 meters in McMurdo Sound, 1999; **3:** Antarctic Isopoda Valvifera. JW Wagele. Koenigstein ; Champaign, Ill. : Koeltz Scientific Books, 1991; **4:** The Environment of the Deep Sea, Rubey Volume II. WG Ernst & JG Morin, eds. Englewood Cliffs, NJ : Prentice-Hall, 1982. pp. 324-356; **5:** Polar Biology 6:127-137, 1986; **6:** Science Reports of Yokohama National University. Sec. II 38:1-21, 1991; **7** Biological reports of the Soviet Antarctic Expedition, 1955-1958 (Rezultaty biologicheskikh issledovanii Sovetskoi antarkticheskoi ekspeditsii, 1955-1958) EP Pavlovskii, chief ed. Volume 3: AP Andriyashev and PV Ushakov, eds. Jerusalem : IPST Press for Israel Program for Scientific Translations, 1968. on page 243; **8** Berichte zur Polarforschung 98, 1991, 240 pp.; **9:** Polar Biology 28(1):1-14, 2004



stenetriid isopod, family Stenetriidae

Stenetriid isopods are asellotes with a flattened body, short antennulae, and dorsal eyes [1].

This is a female isopod bearing eggs.

References: 1: Records of the Australian Museum 47(1):39-82, 1995