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Short note

Gnathiphimedia mandibularis K.H. Barnard 1930, an Antarctic amphipod (Acanthonotozomatidae, Crustacea) feeding on Bryozoa

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Introduction

The family Acanthonotozomatidae is widely distributed, especially in the Antarctic Ocean. Although many acanthonotozomatids are very conspicuous (they are relatively large and often armoured with teeth on tergites and appendages) very little is known about their biology (Just 1978, Coleman 1989).

Most Antarctic amphipods are thought to be omnivorous or necrophagous (Arnaud 1970, 1977), but very few investigations of the food preference have been carried out. The diversity of mouthpart morphology, especially in the Acanthonotozomatidae, leads to the expectation of very distinct food preferences. In the present study the mandible morphology and fore-gut contents of the Antarctic acanthonotozomatid *Gnathiphimedia mandibularis* has been investigated.

Gnathiphimedia mandibularis is limited to the Antarctic, hitherto reported from McMurdo Sound, Oates Land and South Georgia (Barnard 1932). The material investigated in this note is from the Weddell Sea.

Materials and methods

The material was collected in 1984/85 from the RV 'Polarstern' with an Agassiz trawl, and preserved in 4% formalin solution. The studied specimens were found in the Weddell Sea (72°27.28'S, 17°32.94'W; 73°55.32'S 22°46.43'W; depths 288–473 m).

The drawing has been made using a dissecting microscope (Wild M5) and a camera lucida. Specimens for scanning electron microscopy were dehydrated through an alcohol series, critical point dried and sputter-coated first with carbon and then gold.

Results

Mandible morphology

The mandibles of *Gnathiphimedia mandibularis* K.H. Barnard 1930 are unique in the Amphipoda and are obviously adapted for crushing hard food items: the pars incisiva is flat, rounded distally and without any teeth (see Fig. 1a). The incisors do not overlap (Fig. 1d). Cutting of food is therefore impossible. The lacinia mobilis is developed only at the left mandible (Fig. 1a, d) and is located closely to the pars incisiva.

The pars molaris is a pointed lobe directed dorsally to the opening of the mouth (Fig. 1d). The medial molar surfaces bear small spines (Fig. 1b). The molar surface can certainly not grind food as in other amphipod species, but possibly is advantageous to push large food particles into the oesophagus.

Fore-gut and gut analysis

Eight of the ten specimens examined had remains of Bryozoa in their fore-gut or gut (Fig. 1c). One specimen was in a premolt condition with its fore-gut and gut empty. In the stomach of another specimen ossicles of an ophiurioid were found.

Sand grains, but no detritus, had also been ingested by almost every specimen. The Bryozoa, belonging to the Cyclostomata (the fragment in Fig. 1c possibly belongs to a species of *Hornera*), were crushed to pieces up to 3 mm in length, the parts remaining each consisting of several zooids.

Discussion

During earlier investigations on Antarctic acanthonotozomatid amphipods two food specialists were identified: *Echiniphimedia hodgsoni* (Walker 1906) feeding on sponges and *Maxilliphimedia longipes* (Walker 1906), which ingests cnidarian tissue (Coleman 1989). *Gnathiphimedia mandibularis* is another species of this family utilizing an unusual food source, and is probably the first amphipod species known to use Bryozoa as the principal food source. *Echiniphimedia hodgsoni* and *Maxilliphimedia longipes* both have mandibles with sharp and overlapping incisors which might be used for cutting large bites from their prey. In contrast to these species the mandible morphology of *Gnathiphimedia mandibularis* indicates that food cannot be cut but rather be crushed. The food preference of species

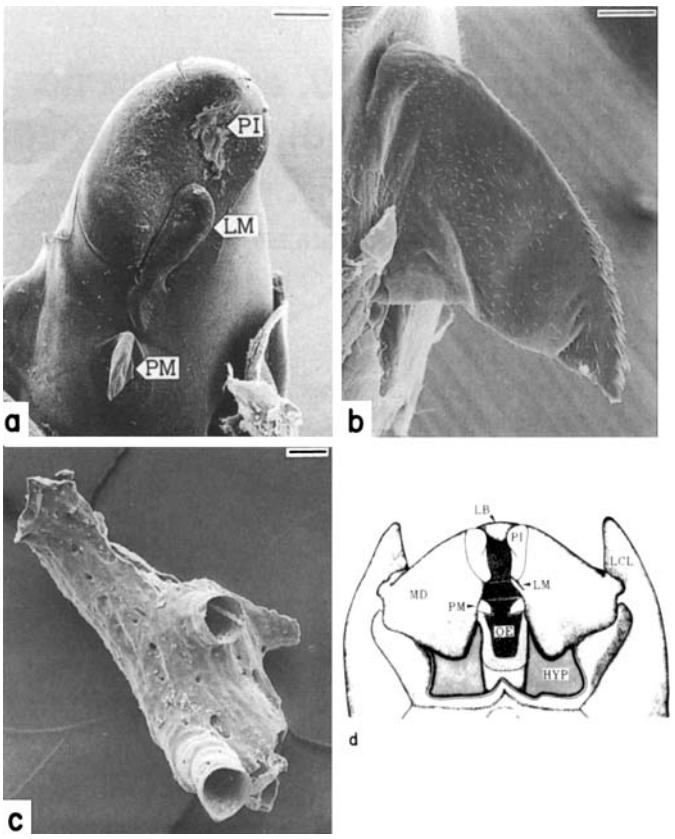

Fig. 1. *Gnathiphimedia mandibularis*. **a.** SEM picture of the left mandible, medial view, scale bar 300 µm. **b.** SEM picture of the pars molaris seen from the anterior, scale bar 50 µm. **c.** Fragment of Bryozoa (cf. *Hornera* sp.) from a fore-gut contents, scale bar 100 µm. **d.** Drawing of the mandibles, seen from posterior, hypopharynx dissected. HYP = place of insertion of hypopharynx, OE = oesophagus, LB = labrum, LCL = lateral cephalic lobe, LM = lacinia mobilis, MD = mandible, PI = pars incisiva, PM = pars molaris.

with other peculiar mandible-shapes in this family (*Labriphimedia* with spoon-like mandibles, or *Parapanoploea* with needle-like mandibles, see in J.L. Barnard 1969) has not yet been investigated.

Several predators of Bryozoa are known: omnivorous species of echinoids, asteroids, chitons as well as fishes (*Blennium pholis*) are known to consume Bryozoa (Ryland 1976). Some animals seem to be highly specialized to ingest bryozoans. The nudibranchs *Adalia proxima* and *Onchidoris muricata* graze on colonies of *Electra pilosa* (Todd & Havenhand 1989) removing the soft tissue but leaving the skeleton undamaged. The sphaeromatid isopod *Paralept-sphaeroma glynni* Buss & Iverson 1981 ingests only the soft parts of anascan bryozoans (Buss & Iverson 1981). Many pygnogonids feed on Bryozoa (King 1974): e.g. *Austrodecus glaciale* is thought to pierce into the frontal wall pores of ascophore bryozoans using its proboscis (Fry 1965). In contrast to these species *Gnathiphimedia mandibularis* crushes whole morsels of a bryozoan colony with its stout mandibles, ingesting fragments, consisting of several zooids, and digesting the bryozoan tissue in the foregut.

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