Description of the Postembryonal Stages of the Antarctic Fish Parasite *Gnathia calva* Vanhoeffen (Crustacea: Isopoda) and Synonymy with *Heterognathia* Amar & Roman

Johann-Wolfgang Wägele

Arbeitsgruppe Zoomorphologie, Fachbereich 7, Universität Oldenburg, Postfach 2503, D-2900 Oldenburg, Federal Republic of Germany

Received 17 April 1986; accepted 17 July 1986

**Summary.** The postembryonal stages of *Gnathia calva* Vanhoeffen 1914 (Crustacea: Isopoda: Gnathiidea) are described. The setation of antennae, pereopods and tail fan does not change much during development from the first praniza to the adult animals, while mouthparts, pleopods and habitus show the typical gnathiid sexual dimorphism. For the first time an immature male is described. It is identical with the stage on which the genus *Heterognathia* Amar and Roman was erected; the latter is therefore considered to be a junior synonym of *Gnathia* Leach. *G. calva* is very frequent in the benthos of the upper 500 m of the Weddell Sea. It had formerly often been overlooked because it lives in sponges.

**Material and Methods**

The Gnathiidea are isopods with an extreme sexual dimorphism of the adult animals (see below), while the juveniles are larvae with a different morphology, adapted to ectoparasitism on fishes (Monod 1926; Stoll 1962; Juchault-Stoll 1964; Davies 1981). From Antarctica 9–10 species of gnathiids are known, but only 6 of them are ‘good species’, well described and not synonymized. *Bathygnathia porca* is only known from Crozet Is. (Kensley 1980), *G. antarctica* from off Patagonia (see Schultz 1978), *G. acuticauda* (Monod 1926) is only known as superficially described larva. The remaining species are *Euneognathia gigas*, *G. calva*, *G. hodgsoni*, *G. tuberculosa*, *G. polaris*, and *Heterognathia adeliensis*, and of these the most frequent is possibly *G. polaris* (Schultz 1978).

During the expeditions of *RV Polarstern* in the seasons 1982/83, 1983/84 and 1984/85 to the Weddell Sea a large number of specimens of *G. calva* was collected from different stations. Until then the species was not known from this area. Based on this collection a description of the postembryonal stages could be prepared for the first time, including the youngest, just hatched larvae. A study of biology and life-cycle of *G. calva* is in preparation.

**Introduction**

The Gnathiidea are isopods with an extreme sexual dimorphism of the adult animals (see below), while the juveniles are larvae with a different morphology, adapted to ectoparasitism on fishes (Monod 1926; Stoll 1962; Juchault-Stoll 1964; Davies 1981). From Antarctica 9–10 species of gnathiids are known, but only 6 of them are ‘good species’, well described and not synonymized. *Bathygnathia porca* is only known from Crozet Is. (Kensley 1980), *G. antarctica* from off Patagonia (see Schultz 1978), *G. acuticauda* (Monod 1926) is only known as superficially described larva. The remaining species are *Euneognathia gigas*, *G. calva*, *G. hodgsoni*, *G. tuberculosa*, *G. polaris*, and *Heterognathia adeliensis*, and of these the most frequent is possibly *G. polaris* (Schultz 1978).

The Gnathiidea are isopods with an extreme sexual dimorphism of the adult animals (see below), while the juveniles are larvae with a different morphology, adapted to ectoparasitism on fishes (Monod 1926; Stoll 1962; Juchault-Stoll 1964; Davies 1981). From Antarctica 9–10 species of gnathiids are known, but only 6 of them are ‘good species’, well described and not synonymized. *Bathygnathia porca* is only known from Crozet Is. (Kensley 1980), *G. antarctica* from off Patagonia (see Schultz 1978), *G. acuticauda* (Monod 1926) is only known as superficially described larva. The remaining species are *Euneognathia gigas*, *G. calva*, *G. hodgsoni*, *G. tuberculosa*, *G. polaris*, and *Heterognathia adeliensis*, and of these the most frequent is possibly *G. polaris* (Schultz 1978).

During the expeditions of *RV Polarstern* in the seasons 1982/83, 1983/84 and 1984/85 to the Weddell Sea a large number of specimens of *G. calva* was collected from different stations. Until then the species was not known from this area. Based on this collection a description of the postembryonal stages could be prepared for the first time, including the youngest, just hatched larvae. A study of biology and life-cycle of *G. calva* is in preparation.

**Material and Methods**

The material was collected during the cruises of *RV Polarstern* in the seasons 1982/83, 1983/84 and 1984/85. *Gnathia calva* was found among the benthonic organisms caught with an Agassiz-trawl. The animals were immediately sorted on deck and kept in aquaria; other specimens were found later in formalin-fixed sub-samples. To obtain the youngest praniza-stages, during the season 1984/85 ovigerous females were kept in aquaria at 0 to −1 °C until the larvae hatched.

Fixed specimens were dissected and mounted on slides, drawings were prepared with the help of a camera lucida. The SEM pictures were obtained with a Cambridge Stereoscan 180. Formalin-fixed specimens were post-fixed in OsO4, dehydrated in alcohol and air-dried, then mounted on stubs and coated with gold.

**Remarks on the Terminology**

The morphology of gnathiids is aberrant in comparison with other isopods, but appendages and somites can easily be homologized with those of other isopods. The terms used in the following descriptions may need some explanations, though they are based on the terminology of Monod (1926). The following postmarsupial stages are distinguished: The “praniza” (Figs. 2 and 3) is the larva, which is able to suck blood and has piercing-sucking mouthparts. No different names are given to pranizas with filled or with empty gut (see below). The mature female (Fig. 7) has a huge marsupium, the mature male can easily be recognized by the large, frontally protruding mandibles (Fig. 12). The immature male has smaller mandibles and a partly swollen thorax (Fig. 10).

Gnathiids have 7 pereonites, as is normal for isopods, but the first pereonite is small and partly fused to the cephalothorax. Dorsally 7
thoracic segments can be counted, with the fifth tergite generally reduced and replaced by a thin membrane. The first pereopod is transformed into short, broad plates, the "pylopods". The pranizas have a claw-like first leg, named by Monod (1926) "gnathopod", but in the following it is also named pylopod to stress the homology and to reduce the number of terms. The following legs are the pereopods 1–5, homologous to the pereopods 2–6 of other isopods. The first, dorsally visible tergite belongs to the segment of the pylopod. It is homologous to the tergite of the first pereonite of other isopods. The fourth tergite therefore belongs to the segment of the third pereopod.

**Distribution**

A large number of specimens was collected from the sampled regions of the Weddell Sea. The immature animals measure 1.5 to 6.5 mm (praniza-stages), mature males and females are 5.5 to 7.0 mm long. From Fig. 1 it can be seen that the species was present in the whole studied area. Single specimens are occasionally present among the epifauna and on sediment, but most animals are hidden and can only be discovered when all small hexactinellid sponges (height: 2–7 cm) are opened. All resting and digesting stages live in these sponges.

Most samples with *Gnathia calva* come from a depth of 200–300 m, a zone generally rich in sponges. The depth at which the species was found in the Weddell Sea ranges from 124 to 661 m, but it can also occur in shallower water (Vanhoffen 1914; Amar and Roman 1973). Sometimes specimens are discovered in vertebrates that eat benthos or fishes, as in the Weddell Seal (personal communication of Dr. J. Pliotz, Alfred Wegener Institute, Bremerhaven) or in the stomach of *Notothenia coriiceps* (Amar and Roman 1973). *G. calva* has previously been reported from Victoria Land, Adélie Land, the Ross Sea, George V-Coast, Wilhelm II-Coast, and off Shackleton glacier (66°8'S 94°17'E). The species has without doubt a circumpolar distribution. It also occurs at the Antarctic Peninsula and in the southern Weddell Sea (Fig. 1) and probably is far more frequent than until now supposed.

**Description of the Postembryonal Stages**

**The Praniza**

The first praniza, as it leaves the maternal marsupium, is shown in Fig. 2B. It is an active stage, the animals can swim and suck blood. Sometimes, in aquaria, an immature earlier stage can be found, which is passive for several days until it matures to the active praniza (Fig. 2A). The morphology of the first praniza corresponds to that of the typical gnathiid larva, called "pullus", "larve primaire" or "larve segmentée" by Monod (1926). The immature stage has a gut swollen with a transparent liquid (Fig. 2A: G) and the intersegmental membrane between the segments of P3 and P5 is stretched. The fifth tergite of these animals is replaced by an elastic membrane, therefore a continuous, elastic intersegmental membrane is present at this area of the thorax. After excretion of the fluid the gut is barely visible (Fig. 2B), the intersegmental membrane shrinks and disappears under the fourth tergite (Fig. 2: T4 = tergite of fourth thoracic somite). The active praniza is therefore shorter than the immature larva. It has a relatively long pleon, its length surpasses that of the pereon. The gut is empty, with the digestive glands extended at its both sides (Fig. 2B: DG). In dorsal view behind the cephalothorax the tergite of the pylopodal segment is visible, then the segments of pereopods 1 and 2 follow; the fourth tergite covers the dorsal area of the segments corresponding to pereopods 3 and 4; the following segment again has a tergite. The eighth thoracic somite, i.e. the seventh pereonite of other isopods, looks like a pleonite, its pleural sides are partly