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Source: *Journal of Crustacean Biology*, Vol. 6, No. 1 (Feb., 1986), pp. 119-124

Published by: [The Crustacean Society](#)

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TWO COROPHIOID AMPHIPODS COMMENSAL ON SPIDER CRABS IN NEWFOUNDLAND

D. H. Steele, R. G. Hooper, and D. Keats

ABSTRACT

The amphipods *Ischyrocerus commensalis* and *Gammaropsis inaequistylis* were found on the spider crab *Chionoecetes opilio* collected in shallow water in Bonne Bay, Newfoundland. The first and second gnathopods have similar morphologies in these two species. *Gammaropsis inaequistylis* was also found on another spider crab, *Hyas araneus*, in Bonne Bay and Conception Bay, Newfoundland.

During April–May 1983 and 1984, large numbers of paired snow crabs, *Chionoecetes opilio* (Fabricius), were found in shallow water (5–30 m) at Bonne Bay on the west coast of Newfoundland. In the course of biological observations in 1983 (Hooper, in press), amphipods were collected from these crabs. In early May 1984 more collections were made from *C. opilio* and from *Hyas araneus* (Linnaeus). Subsequently, amphipods proved to be common on *Hyas araneus* not only in Bonne Bay but also on the east coast of Newfoundland. All these collections form the material for the present report.

MATERIALS AND METHODS

Crabs were collected by SCUBA diving, brought into the laboratory for examination, and the amphipods removed and preserved. During transportation and handling some of the amphipods were dislodged and later found in the bottom of the container, so that the numbers observed on the crabs are less than actually occurred (Table 1). The anatomical locations of amphipod occurrence were recorded only for the 1984 collections (Table 2).

Biological observations were made only on *Gammaropsis inaequistylis*, for which reasonable numbers of specimens were available. The head length of the animals was measured with an eyepiece micrometer. Since the amphipods typically curl up when preserved and can be extended only with difficulty, and not without damage, measurements were converted to total length (anterior margin of the head to the distal end of the telson) from a regression relating the two measurements. Embryos in the brood pouch were classified according to their stage of development (Steele and Steele, 1969), counted, and representatives measured with an eyepiece micrometer. Morphological observations were made on living and preserved specimens.

RESULTS

Occurrence on Crabs

Two species of amphipods, *Gammaropsis inaequistylis* (Shoemaker) and *Ischyrocerus commensalis* Chevreux, were found on *Chionoecetes opilio* in Bonne Bay. According to Hooper (in press) the infestation rate in 1983 was 18%. Both species occurred in early May but only *Gammaropsis inaequistylis* was found in late May (Table 1).

Since the early May collections were not kept separate, it is not known whether the two species occurred on different sites on the crabs. Most specimens of *Gammaropsis inaequistylis* observed in late May on *C. opilio* were found in the marginal groove at the lower edge of the carapace, except for a few below the eye socket and on the large chela (Table 2). Similarly, *G. inaequistylis* on *Hyas araneus* were almost exclusively on the tufts of setae at the base of the carapace just above the origin of the walking legs.

Although both of these species are in genera in which some species are known

Table 1. Collections of amphipods on spider crabs.

Date	Location	Crab species	Number with amphipods	
			<i>Ischyrocerus commensalis</i>	<i>Gammaropsis inaequistylis</i>
12 May 1983	Bonne Bay	<i>C. opilio</i>	3	14
13 May 1984	Bonne Bay	<i>C. opilio</i>	5	4
23–24 May 1984	Bonne Bay	<i>C. opilio</i>	0	38
23–24 May 1984	Bonne Bay	<i>H. araneus</i>	0	3
8 June 1984	Conception Bay	<i>H. araneus</i>	0	16

to construct and live in tubes, neither was found in tubes on the crabs. *Gammaropsis inaequistylis* rests dorsal side up on the setal tuft, and is closely pressed to the surface of the crab. The brownish bands on the body and the red bands on the third segment of the first antennal peduncle, the fourth and fifth segments of the second antennal peduncle, the seventh segment of pereopod 2 (gnathopod 2) and segments five and six of pereopods 3–7 enable it to blend in well with the brownish red colour of the crabs.

Morphology

A comparison of *G. inaequistylis* and *I. commensalis* reveals many similarities in their structure. The genera *Gammaropsis* and *Ischyrocerus* are currently placed in separate families (Isaeidae = Photidae and Ischyroceridae, respectively) of the Superfamily Corophioidea, primarily on the basis of the structure and armament of their third uropods. However, detailed examination of these two species and of others in each genus shows that the similarities in general structure and in mouthparts outweigh the differences and suggests that the two families or parts of them could be united. However, this paper is not the place to make such a realignment.

The genus *Podoceropsis* was synonymized with *Gammaropsis* by Barnard (1973) and this practice is followed here. Conlan (1983), however, on the basis of a study of North Pacific species, retained *Podoceropsis*, while recognizing its close affinity with *Gammaropsis*.

Gammaropsis inaequistylis and *Ischyrocerus commensalis* show striking similarities in the structure of their anterior pereopods (gnathopods) (Fig. 1) that are presumably due to their similar mode of life. Both species are sexually dimorphic, with the second gnathopods much larger in the male than in the female. The anterior gnathopods are small and subchelate in the males and females of both species. The only obvious difference is that the dactyl in the male of *G. inaequistylis*

Table 2. Distribution of *Gammaropsis inaequistylis* on *Chionoecetes opilio* from Bonne Bay (23–24 May 1984) and on *Hyas araneus* from Conception Bay (8 June 1984).

Location	<i>C. opilio</i>	<i>H. araneus</i>
Orbit	6	0
Base of walking leg	14	0
Marginal groove of carapace	18	14
Dorsal surface of carapace	0	2

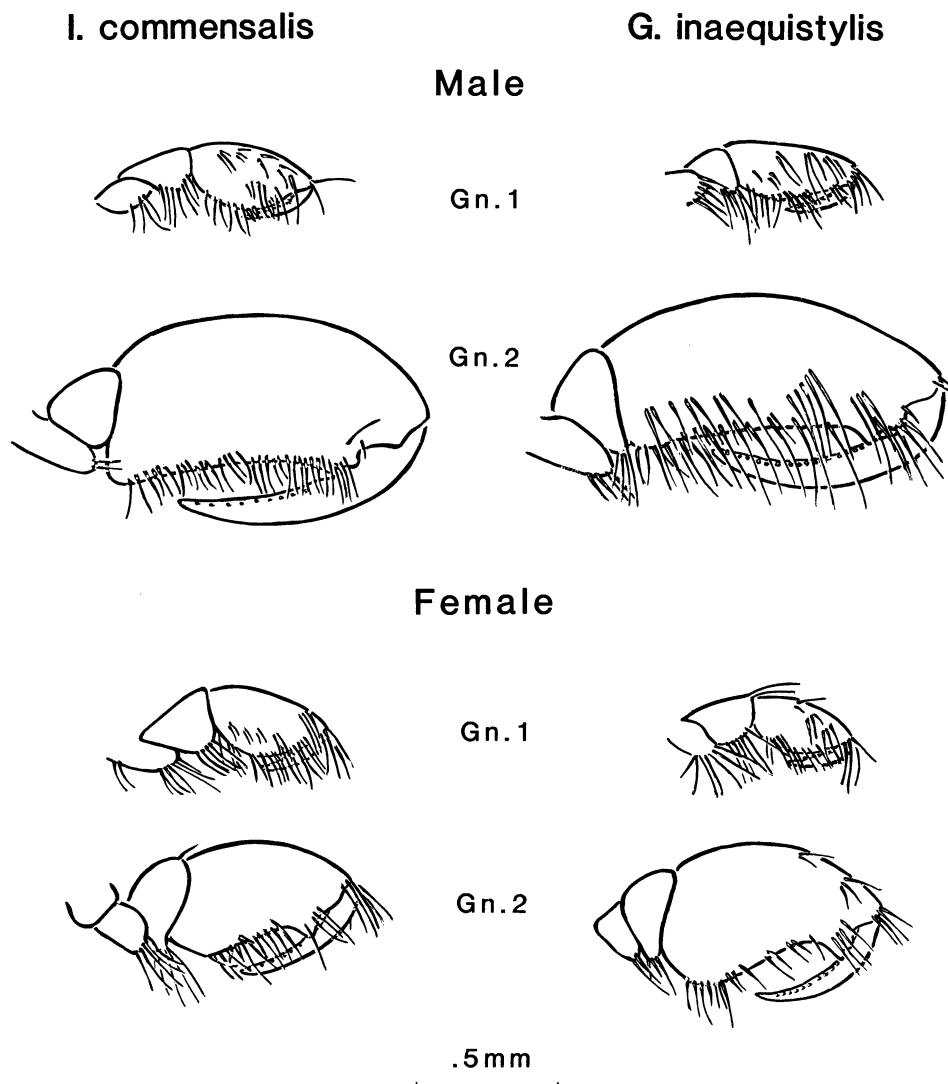


Fig. 1. Gnathopods of male and female *Ischyrocerus commensalis* and *Gammaropsis inaequistylis*.

lacks the row of small teeth found in the females of both species and in the male of *I. commensalis*. The second gnathopods are larger than the first and similar in the two sexes of the two species. In the females, segment 6 is posteriorly concave and has the palm defined by spine-setae. Distally the curved palm terminates in a toothed projection near the dactyl. The large dactyl has sockets but no teeth. The dactyl reaches the spine-setae in *I. commensalis* but not in *Gammaropsis inaequistylis*.

The second gnathopods of the males of both species are also similar to each other. The sixth segments are large, posteriorly concave, and have concave, almost parallel margins. The palm is covered with plumose setae and terminates distally in a projection. The large dactyl has sockets but no teeth in either species.

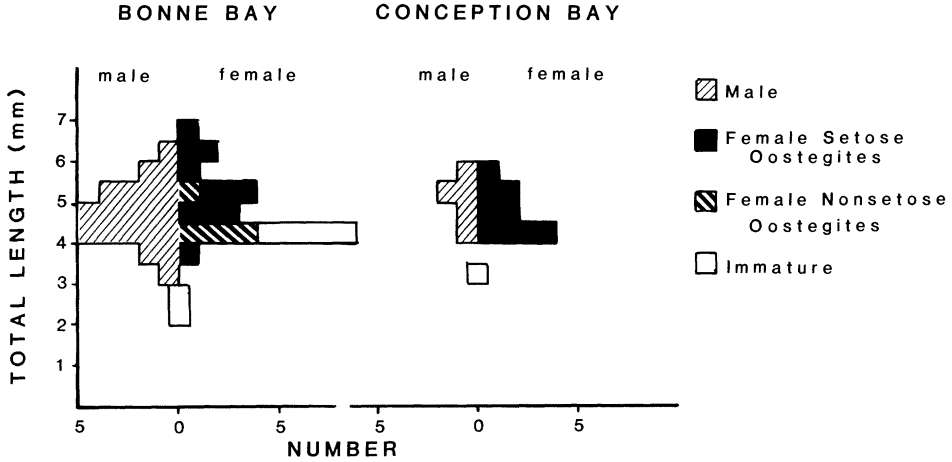


Fig. 2. Size compositions of collections of *Gammaropsis inaequistylis* in Bonne Bay and Conception Bay.

The function of the gnathopods is unknown and it is not clear why those of the males and females differ. Pereiopods 3–7 are not subchelate in either species as they are in the genus *Isaea*, species of which are also commensal on decapods (Vader, 1983). Other species of *Gammaropsis* and *Ischyrocerus* are sexually dimorphic with the anterior gnathopods small and subchelate in both sexes. The sixth segment of the second gnathopod is enlarged and differently shaped in males and females, that of the male of *Gammaropsis sophiae* being apparently similar in shape to that of the females of *G. inaequistylis* and *I. commensalis*.

The regression of total length on head length for *Gammaropsis inaequistylis* is: total length = 8.12 (head length) - 0.14 ($r^2 = 0.92$).

Biology of *Gammaropsis inaequistylis*

The size compositions of *G. inaequistylis* collected on *Chionoecetes opilio* from Bonne Bay and on *Hyas araneus* from Conception Bay are similar (Fig. 2). Ovigerous females ranged from 3.8 to 6.6 mm in calculated total length. Few juveniles were collected on the crabs. The sex ratio of mature animals was 1.05 female to 1.0 male in Bonne Bay and 2.0 females to 1.0 male in Conception Bay.

The average diameter (length + width/2) of stage A eggs was 0.23 mm. Hatched young from the brood pouch were 1.2 mm in total length. The brood pouches contained young in all stages of development from stage A to newly hatched. The number of eggs in the brood pouch increased linearly with the size of the female (Fig. 3).

DISCUSSION

Ischyrocerus commensalis was described by Chevreux (1900) from fifteen specimens collected from an asteroid at a depth of 150 m off Newfoundland (l'Herondelle Station 163). Subsequently, 48 specimens were recorded from three stations in the southern Gulf of St. Lawrence by Shoemaker (1930). Besner (1976) reported that these specimens were attracted to bait in a trap, but this fact was not mentioned by Shoemaker (1930). Besner (1976) has recorded them as associated with hermit crabs and Stephensen (1944) from ascidians. They are collected

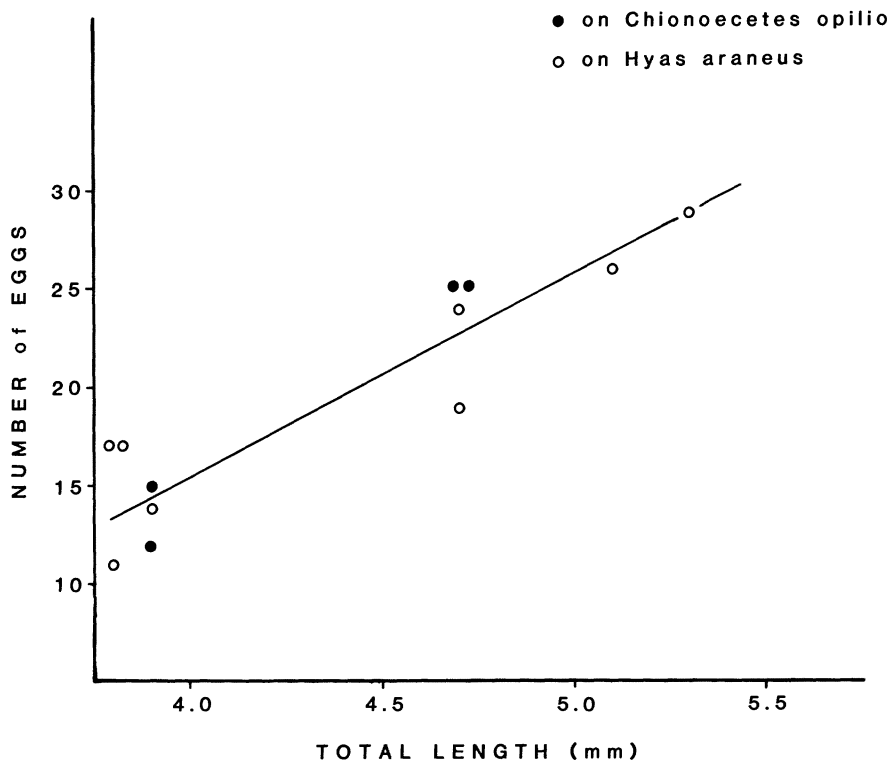


Fig. 3. Fecundity of *Gammaropsis inaequistylis*.

infrequently in dredge and grab samples (personal observation, collections from northern Hudson Bay and Labrador) but the species probably has a circumpolar distribution (Steele, 1961). Considering the diversity of these collections and that they have usually been made only from depths of 100 m or more, the finding of *I. commensalis* as a common commensal of *Chionoecetes opilio* in shallow water was unexpected. That these amphipods regularly occur on the crabs is demonstrated by the early May collections of both 1983 and 1984. Their absence from the late May collections of 1984 suggests that they left the crabs in shallow water. *Gammaropsis inaequistylis*, described and recorded as *Podoceropsis inaequistylis* by Shoemaker (1930) from two specimens collected at a depth of 45 m in the Gulf of St. Lawrence, has been recorded infrequently since then (Steele, 1961; Brunel, 1970). As shown here, it is common on both *Hyas araneus* and *Chionoecetes opilio*. *Hyas coarctatus*, the third spider crab found in Newfoundland waters (Miller and O'Keefe, 1981), has not yet been carefully examined for the presence of amphipods. Since *Hyas araneus* is known from Labrador to Novaya Zemlya and *Chionoecetes opilio* has an amphiboreal distribution, being found in both the North Atlantic and North Pacific Oceans (Squires, 1965; Christiansen, 1969), *Gammaropsis inaequistylis* has a great geographic range in which it might occur. To date it has been reported only from the Northwest Atlantic Ocean.

The similarities in the structures of the gnathopods of *G. inaequistylis* and *I. commensalis* are probably related to their commensal life style on the crabs, but close observations of living animals will be necessary to determine how these gnathopods function.

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RECEIVED: 29 January 1985.

ACCEPTED: 21 May 1985.

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ANNOUNCEMENT

The following opinion has been published by the International Commission on Zoological Nomenclature in the Bulletin of Zoological Nomenclature 42(3): 233.

Calamoecia australica Sars, 1908, and *Calamoecia australis* (Searle, 1911) (Crustacea, Copepoda): proposals to remove the confusion rejected.

The Commission gives six months notice of the possible use of its plenary powers in the following case, published in the Bulletin of Zoological Nomenclature 42(3) on 30 September 1985, and would welcome comments and advice from interested zoologists.

Neodorippe Serène and Romimohtarto, 1969 (Crustacea, Decapoda): proposed designation of type species.

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