

A NOTE ON THE FIRST ZOEAL STAGE LARVA OF
HYMENOCERA PICTA DANA
(CRUSTACEA:DECAPODA:PALAEMONIDAE)

A.J. BRUCE,
Northern Territory Museum of Arts and Sciences
GPO Box 4646, Darwin, NT 0801, Australia.

CRUSTACEA LIBRARY
SMITHSONIAN INST.
RETURN TO W-119

ABSTRACT

The first zoeal larva stage of the palaemonid shrimp, *Hymenocera picta* Dana, is described and illustrated. The morphology of the larva is typical of the family Palaemonidae and confirms the placement of the subfamily Hymenocerinae in that family.

KEYWORDS: Crustacea, Decapoda, Palaemonidae, *Hymenocera picta*, first zoeal larva, morphology.

INTRODUCTION

In a recent paper, describing the first zoeal larval stage of *Gnathophyllum americanum* Guerin, it was noted that the first zoeal larva of *Hymenocera picta* Dana had also been hatched (Bruce 1986). At that time, neither the larvae or the prepared figures were available, but the latter have recently been found and are used as the basis of the present report. The larvae were hatched from an ovigerous female collected from the seaward intertidal reef of Mombasa Island, Kenya, in 1973. The larvae were dissected under a Wild M8 stereo-microscope and the drawing prepared with a Wild M11 with an optical drawing tube, from appendages mounted in ethylene glycol. The larvae described are only the second species of the genera placed in the family Gnathophyllidae Dana by Holthuis (1955), but replaced in the Palaemonidae by Bruce (1986). The description of the larvae of *Hymenocera* further illustrates the uniformity of the larvae in the Palaemonidae, with the exception of those of *Anchistioides*.

dorsal or lateral spines, pleura of first three segments rounded, pleopods absent. Telson broadly triangular, slightly concave posteriorly, with 7 + 7 setae, plumose except for outer pair, subequal, except for submedian pair, about 0.2 of length of fourth pair, and outer pair, about 0.5, posterior margin between fourth spines sparsely armed with minute spinules.

Antennule with subcylindrical unsegmented peduncle with 2 distal flagella; inner flagellum consisting of long plumose seta, equal to about 0.75 of the peduncle length; outer flagellum short, about 0.33 of peduncle length, with 2 aesthetascs only and one preterminal plumose seta distally.

Antenna biramous; protopod robust, about 1.5 times as long as distal width, with small distomedial spine; exopod with 3 distal segmentations and 10 distomedial plumose setae, first and second lateral setae short, rest long, medial margin with proximal tubercle; endopod subcylindrical, slightly tapering, distally acute, with long plumose preterminal lateral seta.

Eyes sessile.

Mandible moderately robust, without palp; molar process distinct, with 2 spines and preterminal seta; incisor process tridentate, lacinia mobilis robust, denticulate along outer margin.

Maxillula with short stout palp, with single simple preterminal spine; upper lacinia with 3 stout setulose spines and 2 simple setae; lower lacinia smaller, with 3 simple distal setae and 1 proximal ventral seta.

SYSTEMATICS

First Zoeal Stage of *Hymenocera picta* Dana

(Figs 1-5)

Description. Carapace with short slender unarmed rostral process reaching to about middle of proximal segment of antennular peduncle, small epigastric tubercle present, carapace otherwise devoid of spines.

Abdomen six-segmented, strongly flexed between third and fourth segments, without

Bruce, A.J. 1988

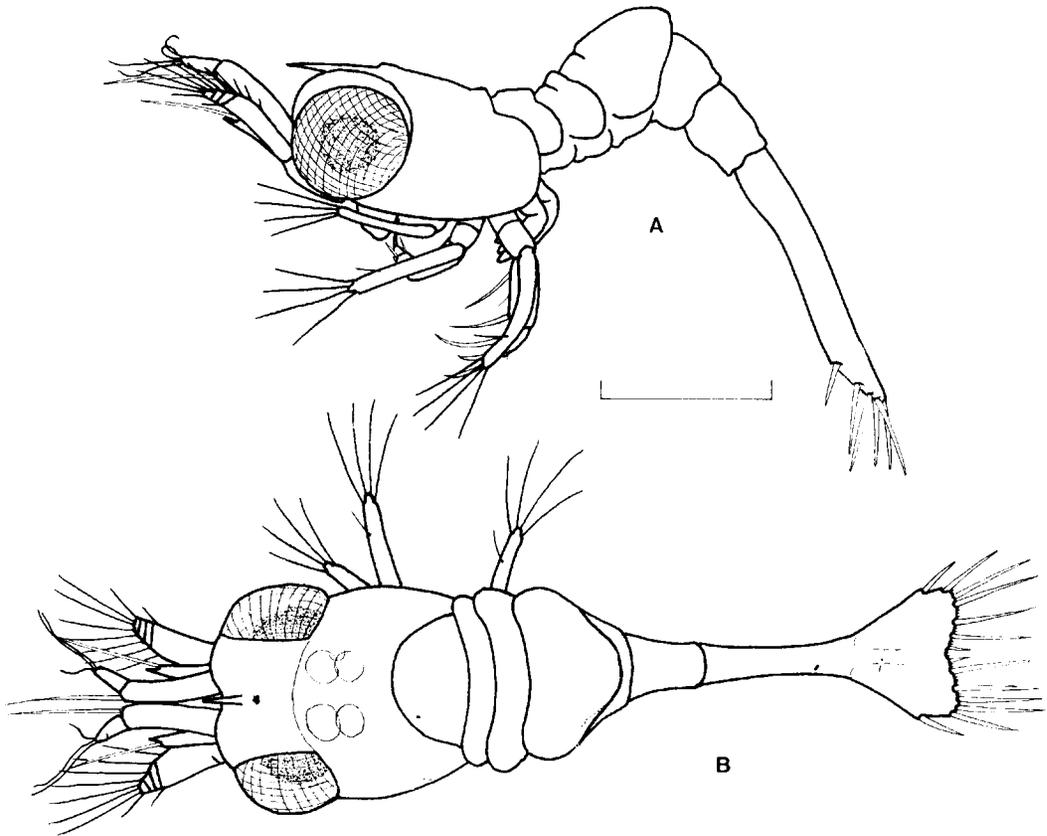


Fig. 1. *Hymenocera picta* first zoeal stage: **A**, lateral; **B**, dorsal. Scale line 0.5 mm.

Maxilla with unsegmented, tapering, proximally expanded palp, margins finely setose, with long simple terminal seta; protopod obscurely subdivided into basal and coxal segments, basal segment distinctly bilobed, each lobe with single simple seta, coxal segment simple, with 2 slender setae distally and stout plumose spiniform seta proximally; exopod with 5 plumose setae.

First maxilliped biramous; endopod sub-cylindrical, tapering, three segmented, with 2 short, 1 long slender distal setae; exopod well developed, with 4 plumose setae distally; protopod feebly produced medially with 2 large, 1 small spiniform setae.

Second maxilliped biramous; endopod 3-segmented, proximal segment largest, unarmed, intermediate segment with disto-lateral spine and distomedial setae; distal segment shortest, about 0.33 of proximal segment length, with very robust, strongly laterally dentate terminal spine, about 2.0 times distal segment length, with 2 short simple preterminal setae; exopod well developed, as

in first maxilliped; protopod with two disto-medial spiniform setae and small proximo-medial tubercle.

Third maxilliped biramous; endopod sub-cylindrical, tapering distally, proximal segment robust, 2.0 times as long as distal width, with 2 long simple spiniform setae medially; intermediate segment about 0.8 of proximal segment length, with 2 long, simple, robust, distoventral spines; distal segment short, about 0.3 of proximal segment length, with 1 long simple terminal spine and 3 short simple pre-terminal setae; exopod well developed, as in first maxilliped, with short simple pre-terminal seta; protopodite with two medial spiniform setae only.

First and second pereopods represented by biramous limb buds only; third to fifth pereopods lacking.

Remarks. The morphology of the first zoea of *Hymenocera picta* shows a very close resemblance to other known palaemonid larvae and suggests that the genera of the Hymenocerinae, *Hymenocera* Latreille, with

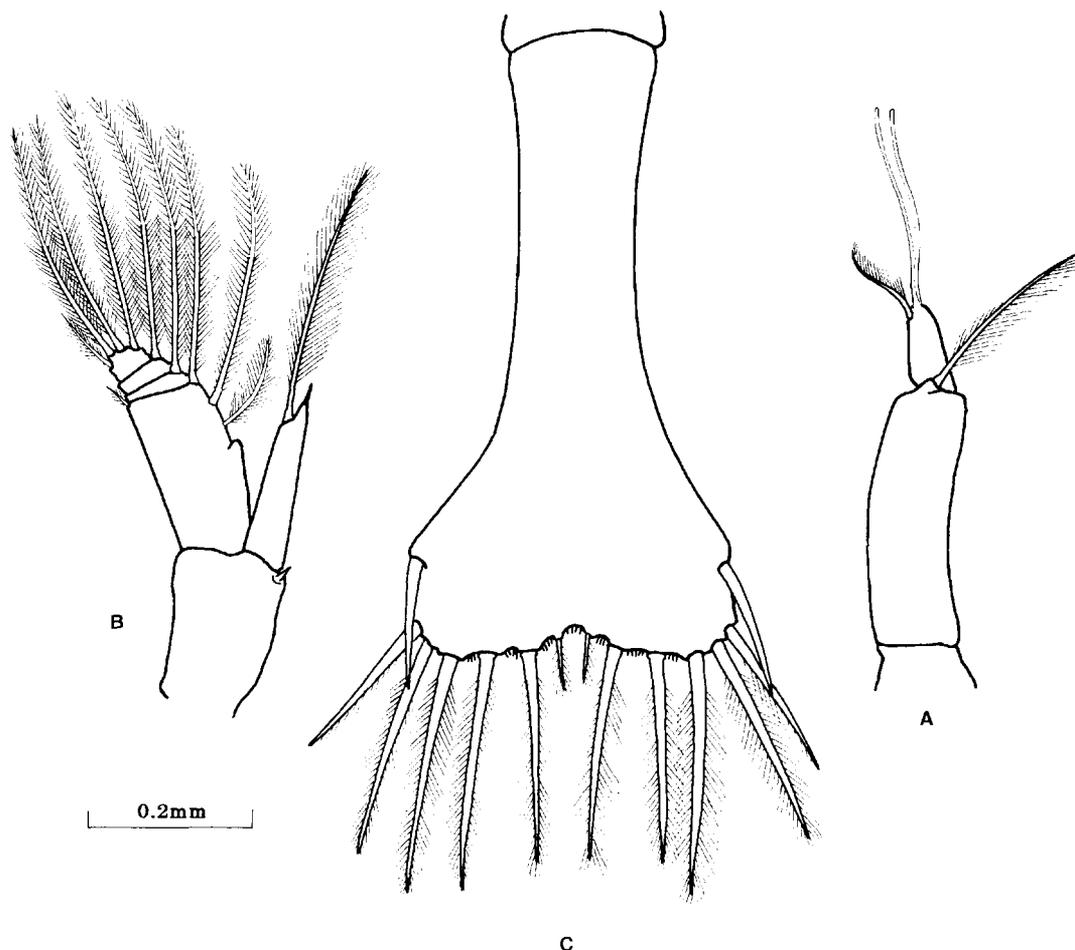


Fig. 2. *Hymenocera picta* first zoeal stage: A, antennule; B, antenna; C, telson.

only one, or possibly two species, and *Phyllognathia* Borradaile, with only two species, *P. ceratophthalma* (Balss) and *P. simplex* Fujino, should be included in the family Palaemonidae. The larvae of *Anchistioides* are so different from the majority of palaemonid larvae that it is difficult to believe that they are as closely related to other palaemonids as their adult morphology suggests. Borradaile (1915, 1917) established the family Anchistioididae for the inclusion of *Anchistioides* but this was abandoned on the basis of the study of Gordon (1935), who placed it in the subfamily Pontoniinae. The apparent morphological resemblance may be largely due to the commensal life-style of the species of *Anchistioides*, living in association with sponges. Even for commensal shrimps, they are unusual in having a lunar planktonic phase, presumably in association with repro-

duction, but ovigerous females may be readily found inside sponges, so the planktonic shrimps must have some way of returning to suitable hosts. In most commensal shrimps, as far as is presently known, the whole of the post-larval life is spent in permanent association with their host animal, without any planktonic phase. Such a phase would appear to present great hazards due to many individuals failing to relocate an appropriate host, with subsequent high mortality due to predation or other factors. Lunar periodicity has only been recorded for *A. antiguensis* in the vicinity of Bermuda (Wheeler and Brown 1936; Wheeler 1937) and has not been reported in the Indo-West Pacific species of the genus.

The Palaemonoida contains only two families, the Campylonotidae Sollaud 1913, and the Palaemonidae Samouelle 1819, if the

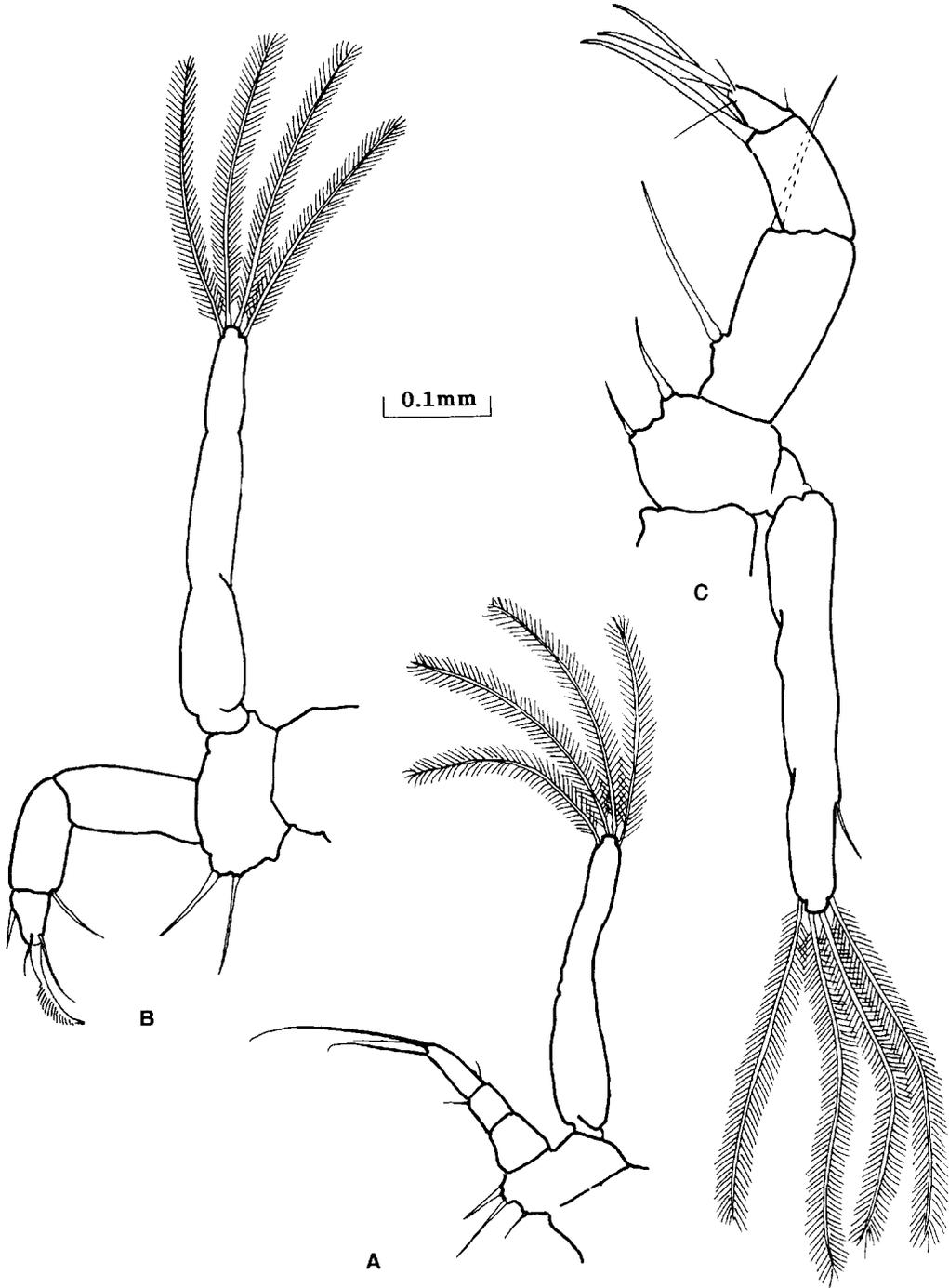


Fig. 3. *Hymenocera picta* first zoeal stage: **A**, mandible; **B**, maxillula; **C**, maxilla.

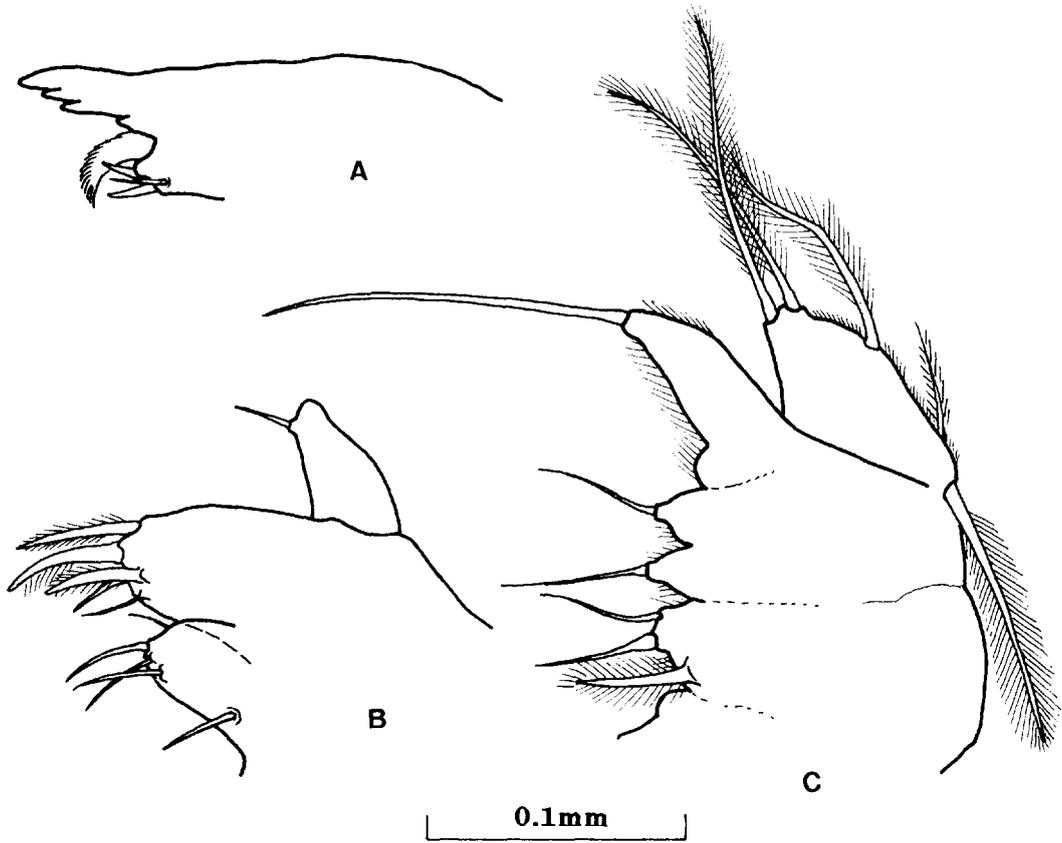


Fig. 4. *Hymenocera picta* first zoeal stage: A, first maxilliped; B, second maxilliped; C, third maxilliped.

family Gnathophyllidae is included in the Palaemonidae as proposed by Bruce (1986). The first zoeal larval stage is known for a number of palaemonid genera, including *Macrobrachium* Bate, *Leander* Desmarest, *Palaemon* Weber, *Palaemonetes* Heller, *Brachycarpus* Bate, *Periclimenes* Costa, *Periclimenaeus* Borradaile, *Philarius* Holthuis, *Harpiliopsis* Borradaile, *Coralliocaris* Stimpson, *Anchistus* Borradaile, *Pontonia* Latreille and *Typton* Costa. They are all very similar in their general morphology. The first zoeal stage of *Campylonotus* Bate has been described by Pike and Williamson (1966), who have suggested that, on the basis of the larval characters, this genus is more closely related to the Pandalidae than to the Palaemonidae. The larvae of *Bathypalaemonella* Balss, the only other genus placed in the Campylonotidae, have not been described, but it seems quite likely that *Bathypalaemonella* is not closely related to *Campylonotus* and, on the basis of the adult

mouthparts, may also not be closely related to the Palaemonidae. This suggests that the Palaemonoida consists of only two families the Palaemonidae and the Anchistoididae.

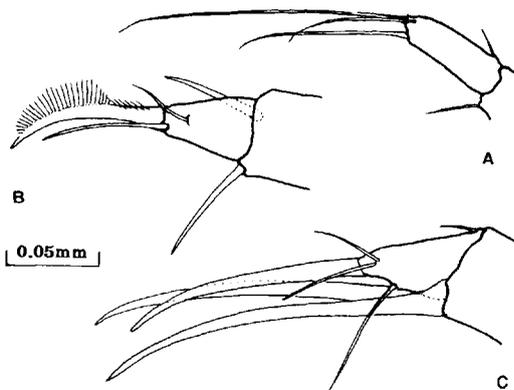


Fig. 5. *Hymenocera picta* first zoeal stage, distal segments of maxillipedal endopods: A, first maxilliped; B, second maxilliped; C, third maxilliped.

REFERENCES

- Borradaile, L.A. 1915. Notes on Carides. *Annals and Magazine of Natural History* (8) **15**: 205-213.
- Borradaile, L.A. 1917. On the Carides of the Western Indian Ocean. The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the leadership of Mr J. Stanley Gardiner. *Transactions of the Linnean Society of London Series 2 Zoology* **17**: 397-412.
- Bruce, A.J. 1986. Observations on the family Gnathophyllidae Dana, 1852 (Crustacea:Decapoda). *Journal of Crustacean Biology* **6** (3): 463-470.
- Gordon, I. 1935. On new or imperfectly known species of Crustacea Macrura. *Journal of the Linnean Society of London Zoology* **39**: 307-351.
- Gurney, R. 1936. Notes on some decapod Crustacea from Bermuda. III-V. *Proceedings of the Zoological Society of London* **1936**: 619-630.
- Holthuis, L.B. 1955. The Recent Genera of the Caridean and Stenopodidean Shrimps (Class Crustacea, Order Decapoda, Supersection Natantia) with keys for their determination. *Zoologische Verhandelingen (Leiden)* **26**: 1-157.
- Pike, R.B., and Williamson, D.I. 1966. The first zoeal stage of *Campylonotus rathbunae* Schmitt and its bearing on the systematic position of the Campylonotidae (Decapoda, Caridea). *Transactions of the Royal Society of New Zealand Zoology* **7** 209-213.
- Wheeler, J.F.G. 1937. Further observations on lunar periodicity. *Journal of the Linnean Society of London Zoology* **40**: 325-345.
- Wheeler, J.F.G., and Brown, F.A. 1936. The periodic swarming of *Anchistioides antiguensis* (Schmitt) (Crustacea Decapoda). *Journal of the Linnean Society of London Zoology* **39**: 413-428.

Accepted 10 August 1988