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**FIRST REPORT OF LARVAL FORMS OF *PARAGNATHIA* SP.
(CRUSTACEA: ISOPODA: GNATHIDAE) FROM
PAKISTANI WATERS (MAKRI CREEK)**

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ABSTRACT: The present report is based on the study of sample collected from Ghora Bari (Makri Creek) on May 29, 2006 for the purpose of non-penaeid shrimps exploitation. The sample, besides having shrimps have fishes belonging to several species and isopod parasites in large numbers. The environmental parameters recorded are: water temperature 31°C, Salinity 42 ppt and pH 8.7. Two larval stages of *Paragnathia* sp. are described, illustrated and compared with the available descriptions of *Paragnathia formica* pranizae larvae given earlier. The specimens are placed only tentatively in *Paragnathia* sp. till the authors find adult specimens nevertheless this is the first report of the genus and the larvae from the area.

KEY WORDS: larval forms, *Paragnathia* sp., Pakistani waters (makri creek).

INTRODUCTION

Paragnathia sp. is a salt-marsh dwelling isopod. Poorly mobile larvae have to attach to comparatively fast swimming hosts (Tinsley and Reilly, 2002). The present gnathiid material is tentatively identified as *Paragnathia* sp. The frequent occurrence of larvae in the sample is because of the gregarious larval settlement. In common with other gnathiid isopods *Paragnathia* larvae are free swimming haematophagous ectoparasites of estuarine fishes in three brief periods in entire life span (Tinsley and Reilly, 2002). They infect fish immediately following parturition and dispersal. The disease they cause is larval paragnathiosis. There are two larval forms: zuphea and praniza. The pranizas are the post-feeding forms and are morphologically distinct from pre-feeding (zuphea) forms (Stoll, 1962). Upton (1987) described these forms using the abbreviation ZI, PI, Z2, P2, Z3, P3, for the moulting phase and feeding status of individual's specimens. The P3 metamorphose into dimorphic adults. The sexual dimorphism in this family is perhaps the most extreme of all isopod taxa (Charmantier, *et al*, 1987).

The present larvae which were picked from the multispecific fish sample are not accompanied by their adults most probably due to the reason that larvae and adult *P. formica* lead different life style as mentioned in the literature. The present larvae are identified as zuphea and praniza stage. The praniza have a distended thorax, almost twice the diameter of the rest of the body, caused by the engorged blood of the host fish. One of the South African gnathiid (*Gnathia africana*) acts as a vector for the blood parasite (Davies and Smit, 2001). This fact underlines the importance of further research into the life cycle and history of gnathiids in general. It is difficult to identify the species when

only larvae are available. The corresponding adult forms could not be determinate. Tentatively it's given at this time as *Paragnathia* sp.

The study deals with morphology of larvae with its comparison with *Paragnathia formica* (Hesse, 1864) has been reported from Morocco to Scotland, France, Wales and northeast Africa (Menezes, 1984 and Charmantier *et al* 1987).

MATERIALS AND METHODS

Material used in this study was collected during field work in May, 2006 at Ghora Bari (Makri creek), at 31°C water temperature, salinity 42 ppt and pH 8.7.

The larvae inspected all were zuphea and praniza stage. The larvae were preserved in 5% formalin, dissected with a tungsten needle under a binocular microscope Kyowa (20 X 2.0 magnification). The illustrations were made with the help of Leitz DM IL (Leica) (magnifications 1.25 X 4, 20 and 40), *camera lucida* attachment. Measurements were obtained with the aid of a micrometer.

The preserved larvae are deposited in the Marine Reference Collection and Resource Centre, University of Karachi under catalogue no. ISOP. 37.

RESULTS AND OBSERVATIONS

Description of the larvae:

Zuphea (Figs. 1A-3D).

The body comprises the cephalon, pereon and pleon. (Figs. 1A - 3O). 26 specimens.

Size.- TL = 1.24mm - 1.27mm.

Cephalon (Fig. 1A).- Short, triangular, lateral margin convex. Sessile compound eyes present.

Antennule (Fig. 1B).- Peduncle 3 articulated, article 3 a little shorter than articles 1 and 2 combined with 2,2 and 1 setae from proximal to distal articles respectively; flagellum composed of 3 articles each bearing a long aesthetasc and terminal article with 3 simple setae.

Antenna (Fig. 1C).- Peduncle 3 articulated with 0, 4 + 2 and 4 + 1 setae from proximal to distal articles respectively; flagellum 8 articulated with 2 + 1, 0, 1 + 1, 0, 1, 1 + 1, 2 and 2 setae respectively.

Mandible (Fig. 1D).- Basis enlarged with a small protrusion on its internal edge, lateral margin with 3 spines; distally 7 backwardly directed teeth present on its inner margin.

Paragnath (Fig. 1E).- Elongated, without teeth, distally pointed.

Maxillule (Fig. 1F).- styliform, enlarged basally, distal inner margin bears 7 teeth. Maxilla . Difficult to locate.

Maxilliped (Fig. 1G).- Palp of 3 articles, article 1 narrow, bears 13 teeth and 1 seta, article 2 of palp longer than first it bears 2 teeth and 3 setae, article 3 shorter and wider than the other 2, terminates with 7 setae.

Gnathopod (Fig. 1H).- Endite short, folded, fringed with numerous short setae, 7 articles each with very few setae, dactylus hook like, small tooth present near its base.

Pereon (Fig. 1A).- Pereonite 1 and 2 fused with cephalon; pereonites 3-8 free, pereonites 3-7 each with 1 pair of pereiopods.

Pereiopods I-V (Figs. 2A-3B).- Pereiopods I-V each with 7 articles more or less similar and terminating with an acute dactylus.

Pleon (Fig. 1A).- Comprises five pleonites, each with one pair of pleopod plus a telson and one pair of uropod, posterolateral angles of pleonites each with a simple seta.

Pleopod I (Fig. 3C).- Pleopod I-V biramous; endopod larger than exopod, endopod with 2 plumose setae and exopod with 9 plumose setae. Sympodite with retinacula.

Pleotelson (Fig. 3D).- Broad, posterior margin tapering with 2 simple setae.

Uropod (Fig. 3D).- Biramous, endopod and exopod with 12 and 11 plumose setae respectively; uropodal basis with 1 long plumose seta.

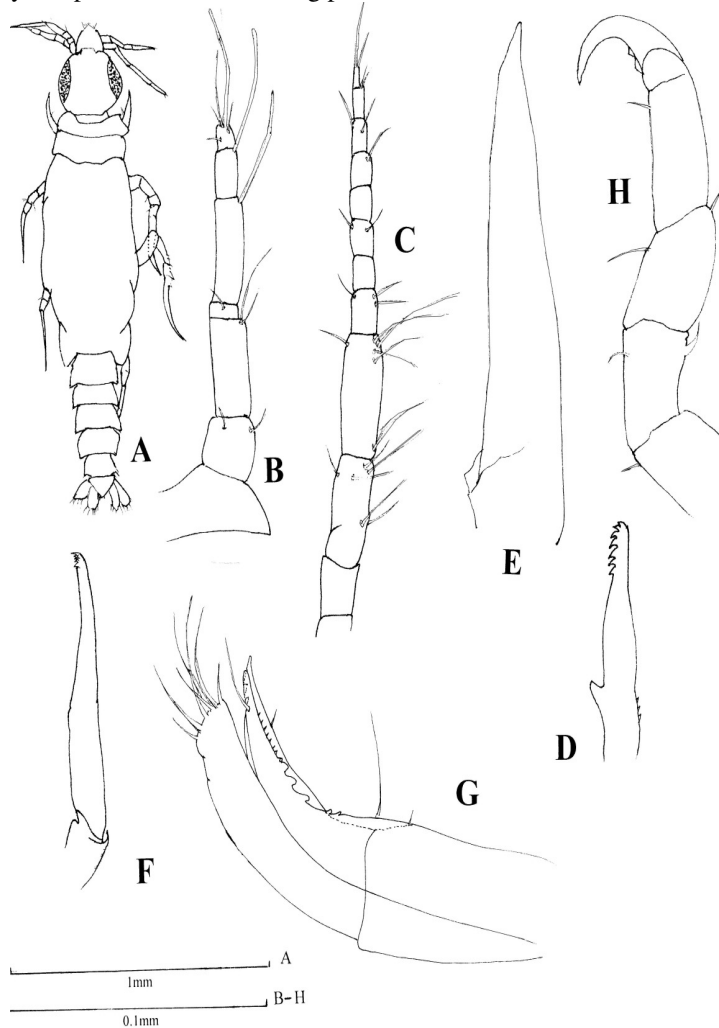


Fig. 1. *Paragnathia* sp. Zuphea larva. A, entire, dorsal view; B, antennule; C, antenna; D, mandible; E, paragnaths; F, maxillule; G, maxillipe; H, gnathopod.

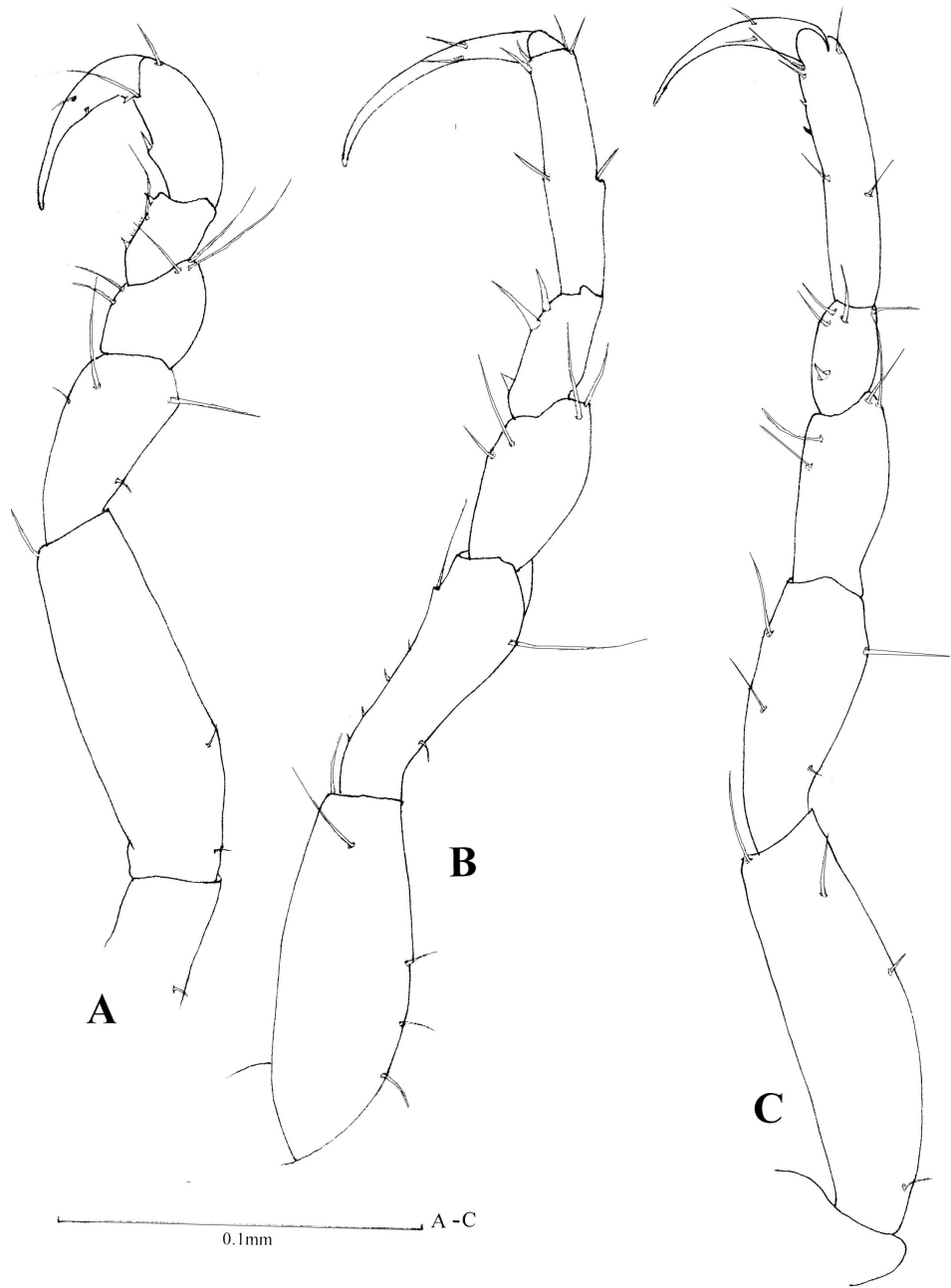


Fig. 2. *Paragnathia* sp. Zuphea larva. A- C, pereopods I – III.

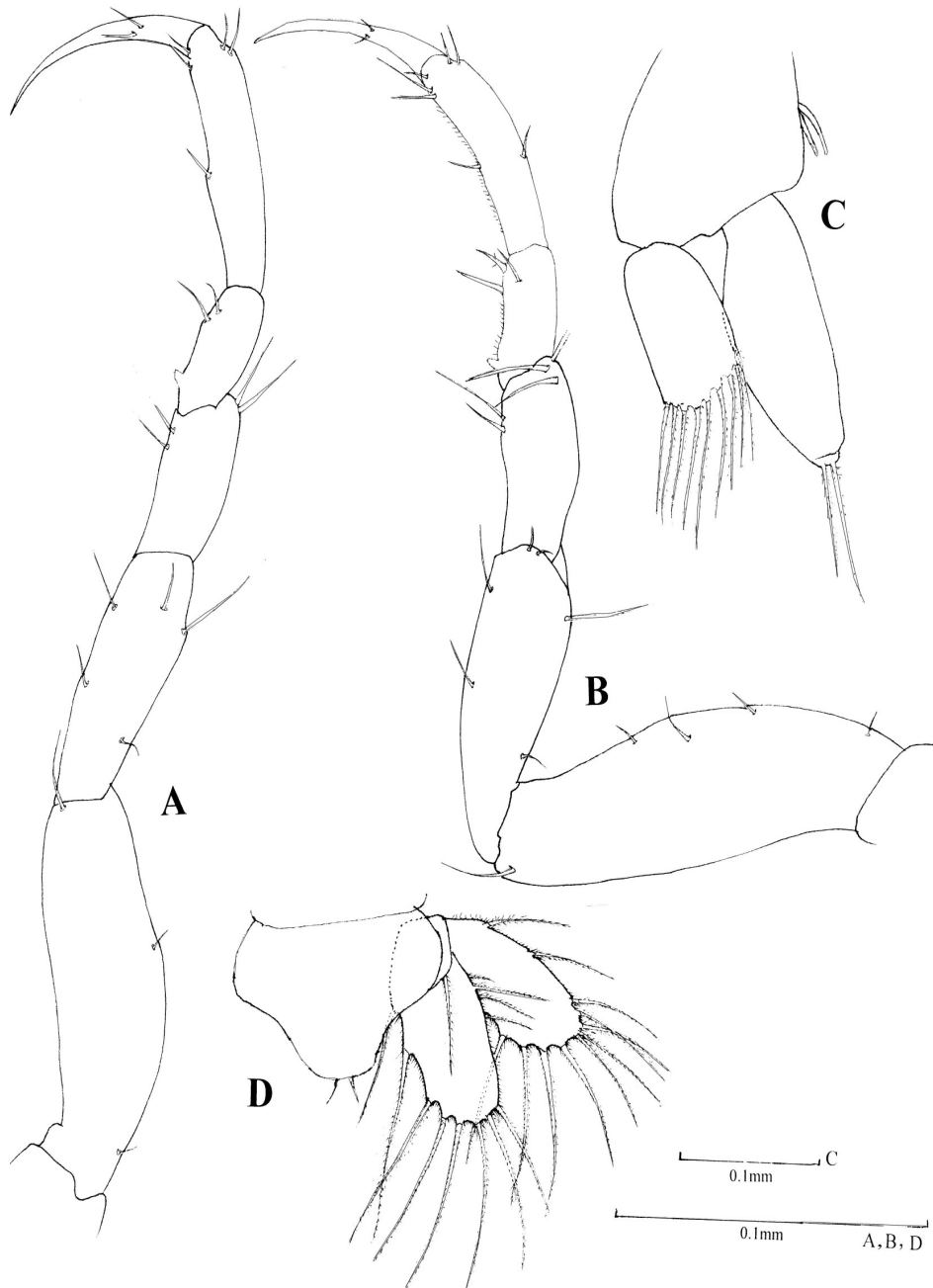


Fig. 3. *Paragnathia* sp. Zuphea larva. A and B, pereopods IV, V; C, pleopod I; D, pleotelson and right uropod.

Praniza (Figs. 4A-3B).

9 specimens.

Size.- TL = 1.48mm - 1.51mm

Cephalon (Fig. 4A).- No change.

Antenna and Antennule (Figs. 4B and 4C).- Unchanged except increase in size and setae.

Mandible (Fig. 4D).- Unchanged.

Paragnath (Fig. 4E).- Elongated, without teeth, distally narrow blunt tip.

Maxillule (Fig. 4F).- Unchanged.

Maxilla . Not visible.

Maxilliped (Fig. 4G).- Palp of 3 articles, article 1 bears 15 teeth and 3 setae, article 2 of palp is longer than the first, bears 2 teeth and 1 seta, article 3 shorter and wider than other 2, terminates with 6 setae.

Gnathopod (Fig. 5A).- Unchanged except small teeth present near the base of dactylus.

Pereon (Fig. 4A).- Pereonite 1 and 2 fused with cephalosome; pereonite 3-7 each with 1 pair of pereopods; pereonite 5-7 consist of elastic membrane fully expanded with blood meal.

Pereopods I-V (Figs. 5B-5F).- Well developed, sparsely setose.

Pleon (Fig. 4A).- Unchanged.

Pleopod I (Fig. 6A).- Unchanged.

Pleotelson (Fig. 6B).- Broad, posterior margin with 2 simple setae.

Uropod (Fig. 6B).- Biramous, endopod and exopod with 7 and 9 plumose setae respectively; uropodal basis with 1 long plumose seta.

Table. Comparison between praniza of *Paragnathia* sp. from Pakistan (present study) and praniza of *Paragnathia formica* (Hesse, 1864) studied by Charmantier *et al.* (1987) from France and Wales.

Characters	<i>Paragnathia</i> sp. Present study	<i>P. formica</i> Charmantier <i>et al.</i> (1987)
Total length:	1.51mm	2.8 - 3.1 mm
Antennule: flagellum	3 articles	4 articles
Antenna: flagellum	8 articles	9 articles
Mandible: distal margin	7 teeth	12 or 13 teeth
Maxilliped: article 1	15 teeth and 3 setae	11 or 12 teeth and 1 seta
article 3	6 setae	6 setae and 1 spine

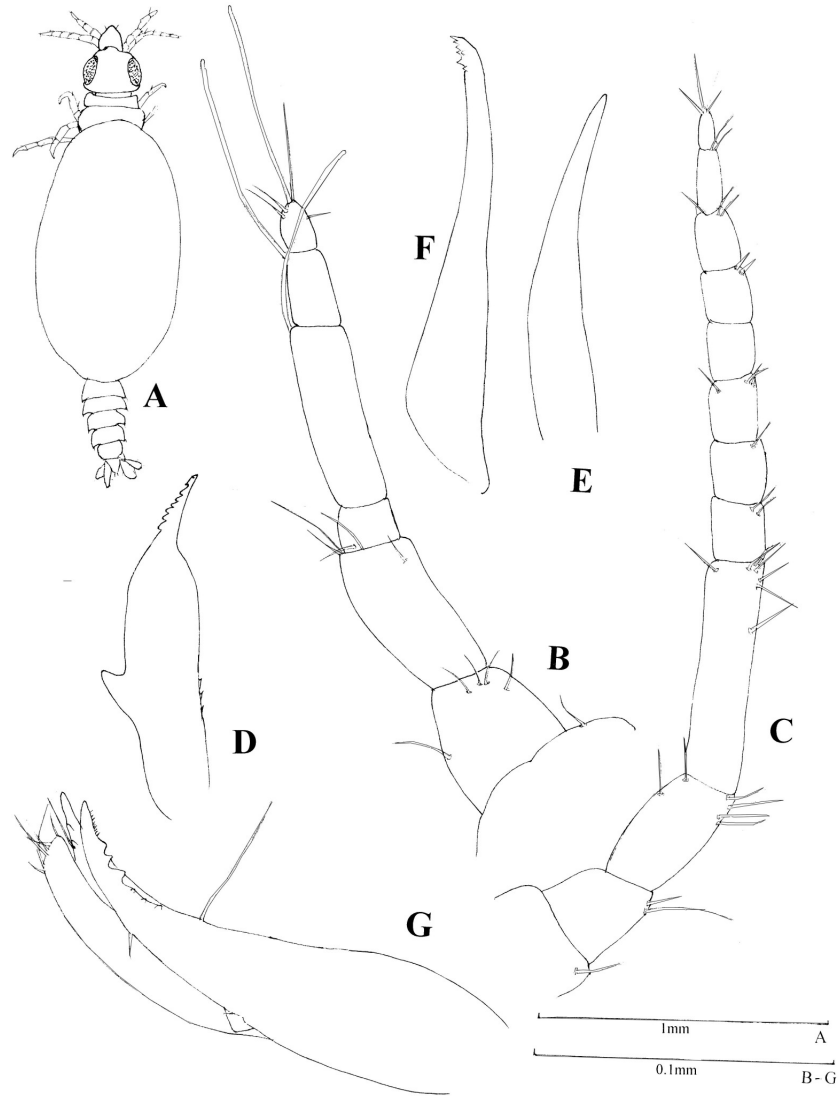


Fig. 4. *Paragnathia* sp. Praniza larva. A, entire, dorsal view; B, antennule; C, antenna; D, mandible; E, paragnath; F, maxillule; G, maxilliped.

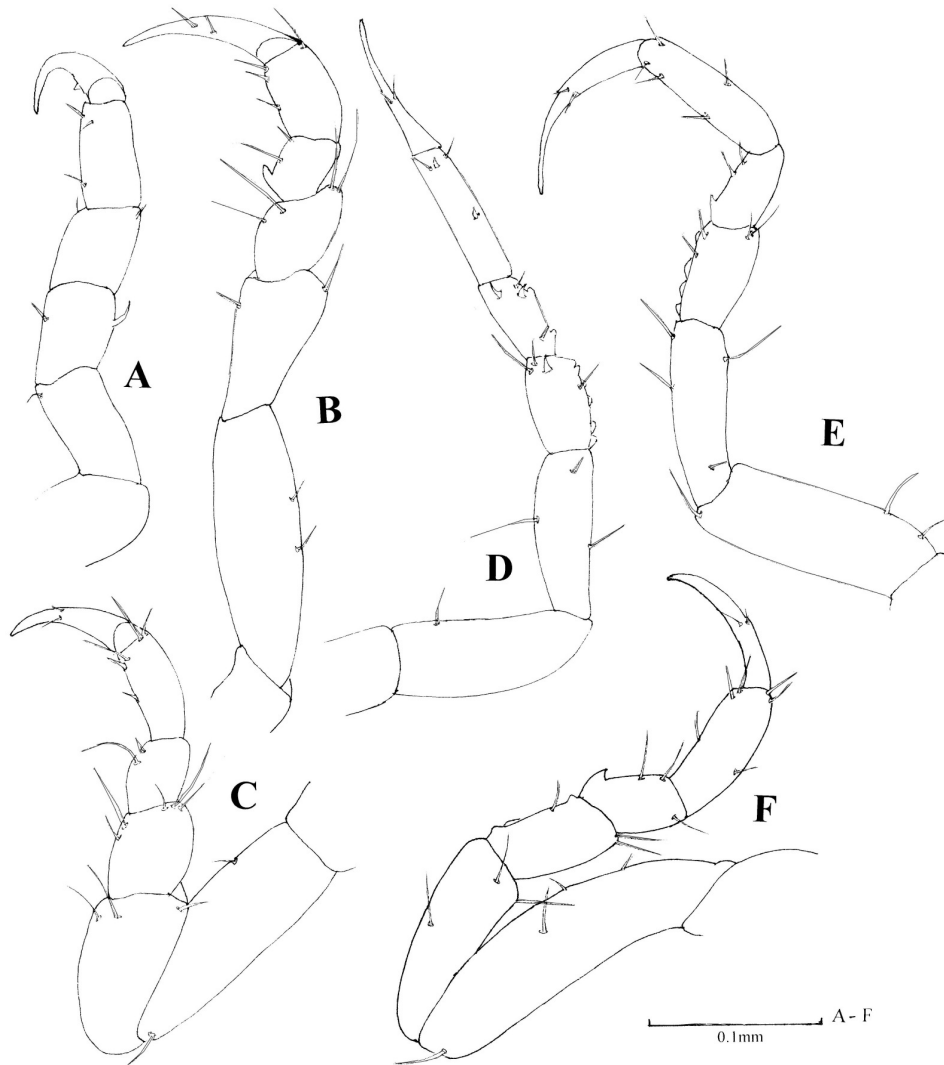


Fig. 5. *Paragnathia* sp. Pranita larva. A, gnathopod; B - E, pereopods I-V.

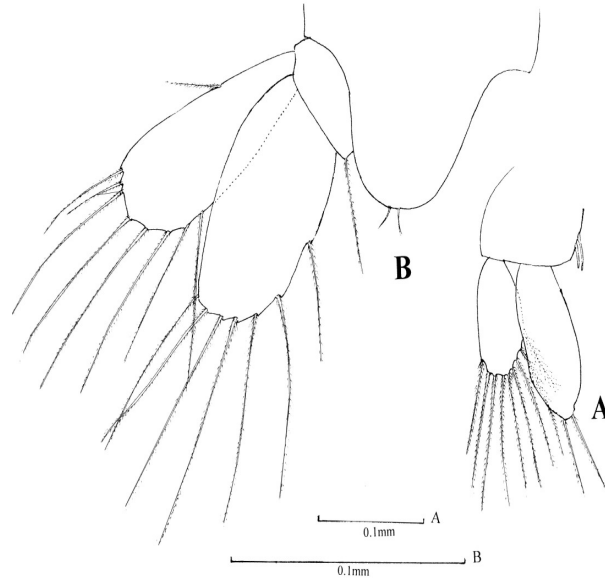


Fig. 6. *Paragnathia* sp. Praniza larva; A, pleopod I; B, pleotelson and left uropod.

DISCUSSION

This is the second gnathiid species to be reported from Pakistan. The first was *Gnathia arabica* by Schotte (1995). Although no adults of *Paragnathia* sp. have been collected from Pakistan but the presence of larvae indicate its presence here.

Paragnathia sp. larvae are compared with *P. cf. formica* described by Charmantier *et al.* (1987) from France and Wales. Zuphea and praniza are known to differ only in size and feeding stage otherwise morphologically similar (Charmantier *et al.* 1987). The Pakistani pranizas differ from that described from Wales and France (see table) and also differ from the Pakistani zuphea stage in details of mouth parts for example the shape of mandible, armature of maxilliped palp, dactyle armature of gnathopod, pereopod II and III. The differences noticed in the morphology of the larvae require further sampling to ascertain the presence of nominal *Paragnathia formica* in the Arabian Sea.

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