

Original papers

Ergasilus boleophthalmi sp. n. (Copepoda: Ergasilidae) parasitic on gobiid fishes from Shatt Al-Basrah Canal, South of Iraq

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ABSTRACT. A new species of *Ergasilus* von Nordmann, 1832 (Copepoda: Ergasilidae) parasitic on the gills of two gobiid fishes *Boleophthalmus dussumieri* Valenciennes and *Bathygobius fuscus* (Rüppell, 1930) from Shatt Al-Basrah Canal, Iraq, is described. The new species differs from all its congeners by a combination of character states including the shape of the body, and the structure and armature of the swimming legs.

Key words: *Ergasilus*, Copepoda, fish parasite, Gobiidae, *Boleophthalmus dussumieri*, *Bathygobius fuscus*, Iraq

Introduction

The mudskipper *Boleophthalmus dussumieri* Valenciennes is a demersal fish that lives on mudflats. It is an amphidromous, amphibious air-breathing fish distributed across the region including Iraq, Iran, Kuwait, Oman, Pakistan, and probably Bangladesh [1]. The dusky frillgoby, *Bathygobius fuscus* (Rüppell), one of a seasonal group of marine diadromous fishes occurs in the restored East Hammar marsh and feeds on shrimps and fish [2]. Locally neither fish has been surveyed from a parasitological viewpoint and there has been only one other such study on another member of the family Gobiidae. Mhaisen and Al-Maliki [3] recorded one species each of protozoan, monogenean and acanthocephalan parasites from *Periophthalmus waltoni* Koumans taken in the Khor Al-Zubair estuary.

Members of the Ergasilidae have adult females that are parasitic mainly on teleost fishes with the exception the genus *Teredophilus* Rancurel, 1954, which occurs on brackish-water bivalve molluscs [4], *Paraergasilus rylovi* Markevich, 1937, which sometimes occurs on freshwater molluscs, and *Ergasilus ogawai* Kabata, 1992 which occurs on an elasmobranch fish [5]. Species of *Ergasilus* are primarily parasites of freshwater hosts but are also common on coastal marine fishes, especially the more euryhaline species such as killifish, needlefish, and grey mullets [6].

To date nine species of *Ergasilus* have been described from or recorded in Iraq [7]. Herzog [8] recorded *E. sieboldi* von Nordmann, 1832 from *Aspius vorax* Heckel, 1843 from the Tigris River. Rahemo [9] described *E. barbi* Rahemo, 1982 and *E. mosulensis* Rahemo, 1982 from *Barbus grypus* (Heckel, 1843) and *Cyprinion macrostomus* Heckel, 1843 respectively, in the Tigris River near the city of Mosul. Abdul-Ameer [10] recorded *E. peregrinus* Heller, 1865 from *Liza abu* (Heckel, 1843) and *A. vorax* in the Tigris River in Salah Al-Dien province. Ho et al. [11] recorded *E. rostralis* Ho, Jaryajan et Radhakrishnan, 1992 from *L. abu* (Heckel) from the Shatt Al-Arab River in the south of Iraq. Amado et al. [12] described three new *Ergasilus* species from Khor Al-Zubair lagoon viz. *E. synanceiensis* Amado, 2001 in Amado et al. [12] from the stonefish *Pseudosynanceia melanostigma* Day [as syn. *Leptosynanceia melanostigma* (Day)],

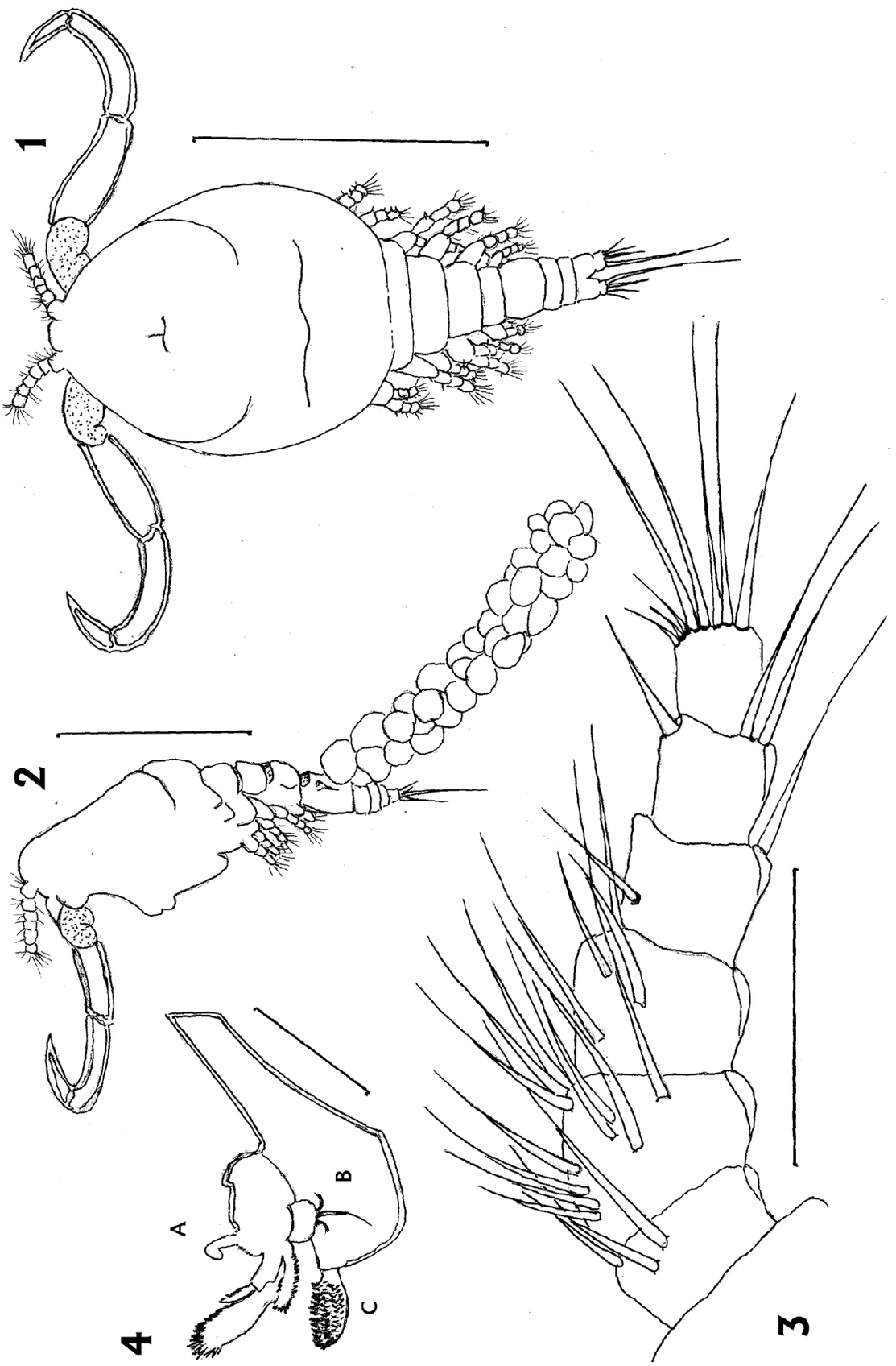

Fig. (1–4). *Ergasilus boleophthalmi* sp. n., female. (1) habitus, dorsal; (2) habitus, lateral; (3) antennule; (4) mouthparts, A: mandible, B: maxillule, C: maxilla. Scale bar: Fig. 1=500µm, Fig. 2=250µm, Fig. (3–4)=45µm

E. iraquensis Amado, 2001 in Amado et al. [12] and *E. pararostralis* Amado, 2001 in Amado et al. [12] both from green back mullet *Liza subviridis* (Valenciennes). Adday et al. [13] recorded *E. ogawai* Kabata, 1992 from four fishes, *Silurus triostegus* Heckel, *Mystus pelusius* (Solander in Russell), *Mastacembelus mastacembelus* (Blanks and Solander in Russell) and *Acanthopagrus latus* (Houttuyn) from the Shatt Al-Arab River near the city of Qarmat Ali.

During a parasitological examination of the fishes of the Shatt Al-Basrah Canal in the south of Iraq, a member of the genus *Ergasilus* was found on the gills of *Boleophthalmus dussumieri* and *Bathygobius fuscus*. It is described as a new species below.

Materials and methods

A total of 31 specimens of *B. dussumieri* and 15 specimens of *B. fuscus* were examined, measuring from 9.3 to 21.1 cm and 6.5 to 14.2 cm in total length and weighing from 5.2 to 36.5 g and 2.8 to 28.4 g, respectively. They were captured by seine net from the Shatt Al-Basrah Canal (30°27' –30°28'N and 47°49'–47°50'E) from September 2008 to June 2009. During that time the water salinity exhibited significant fluctuations from 5.5 to 48.5 ppt; when the parasite described here was collected in May and June 2009, the salinity ranged from 7.2 to 12 ppt. The fish hosts were transported live to the laboratory, where copepod parasites were removed from the gill filaments under a dissecting microscope, and fixed and preserved in 70% ethanol. They were cleared in 90% lactic acid before dissection, using the wooden slide method [14]. Illustrations were made using a camera lucida on a Yaseen compound microscope. The measurements are given in micrometres as the range with the mean in parentheses. The host names according to Froese and Pauly [1].

Results

Ergasilus boleophthalmi sp. n. (Figs. 1–13).

Description: based on 12 females; males unknown. Body (Fig. 1,2) 735 to 837 (800) in total length, cephalothorax 315–511 (452) long and 333–448 (395) in maximum width. Cephalothorax oval with anterior end tapering; cephalothorax completely

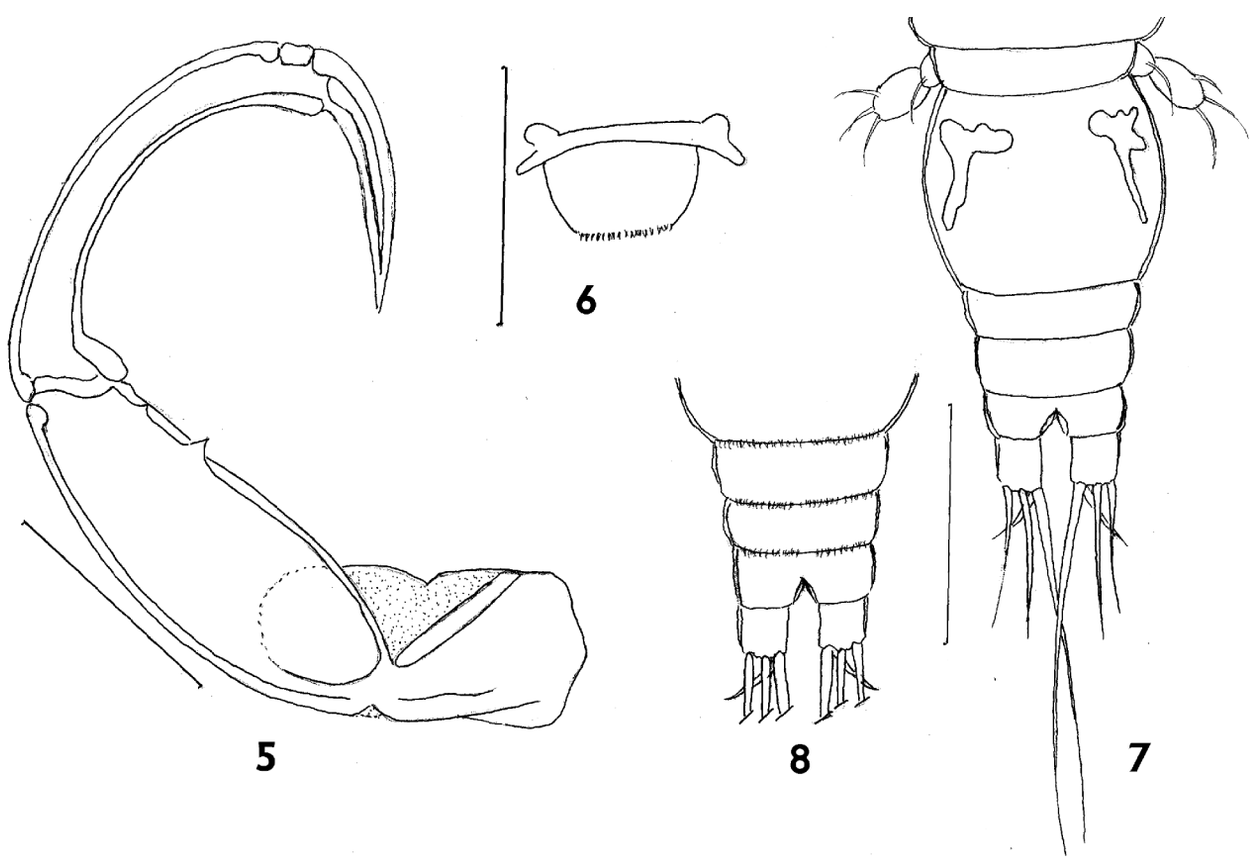

Fig. (5–8). *Ergasilus boleophthalmi* sp. n., female. (5) antenna; (6) first interpodal bar; (7) genital segment and abdomen, dorsal; (8) abdomen and caudal rami, ventral. Scale bar: Fig. 5=110µm, Fig. 6=45µm, Fig. (7–8)=125µm

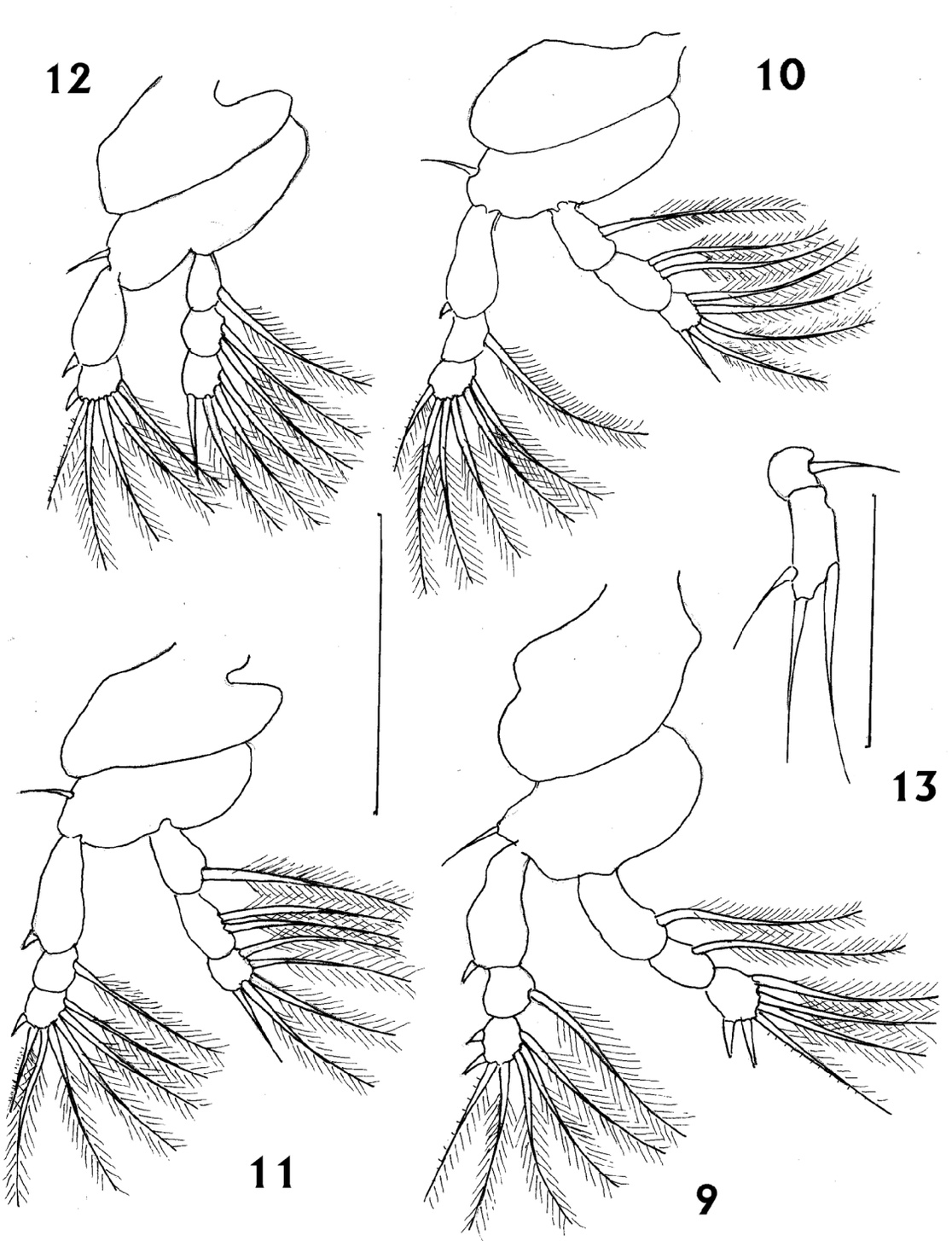

Fig. (9–13). *Ergasilus boleophthalmi* sp. n., female. (9) first leg; (10) second leg; (11) third leg; (12) fourth leg; (13) fifth leg. Scale bar: Fig. (9–12)=125μm, Fig. 13=450μm

incorporating first pedigerous somite, but with fine transverse suture extending partially across posterior half of dorsal surface marking plane of fusion (Fig. 2). Cephalon with inverted T-shaped marking on dorsal surface (Fig. 1); second to fifth pedigerous somites narrowing posteriorly. Genital double-somite (Fig. 8) with rounded lateral margins, just slightly wider 90–108 (99) than long 81–93 (87). Free abdomen 81–126 (95) in length, three-segmented, each somite with single spinule row on ventral surface, near posterior margin. Anal segment with deep posterior incision (Fig. 8).

Caudal ramus slightly longer 18–28 (24) than wide 18–28 (21) (Fig. 7). Egg sac (Fig. 2) shorter than body 500–599 (561).

Antennule 108–126 (118) in length (Fig. 3) six-segmented, setal formula from proximal to distal 3, 11, 3, 2, 2 + aesthetask and 7 + aesthetask. Antenna (Fig. 5) 549–603 (570) long with single setule on basal part of second segment. Second segment longest, third segment (subchela) curved ventrally toward distal claw.

Mandible (Fig. 4A) bearing two blades interiorly and one blade posteriorly. Maxillule (Fig. 4B) a small lobe tipped with three long setae. Maxilla (Fig. 4C) comprising large syncoxa, second segment (basis) spatula-shaped, bearing long, sharp teeth anteriorly.

Maxilliped absent. Interpodal plates (Fig. 6) oval, each ornamented with single row of spinules on posterior margin.

First to fourth swimming legs (Figs. 9–12) biramous with formula of spines (Roman numerals) and setae (Arabic numerals) as follows:

Legs No.	Coxa	Basis	Exopod			Endopod		
			1	2	3	1	2	3
1	0–0	1–0	I–0	0–1	II–5	0–1	0–1	11–4
2	0–0	1–0	I–0	0–1	0–6	0–1	0–2	I–4
3	0–0	1–0	I–0	0–1	I–6	0–1	0–2	I–4
4	0–0	1–0	I–0	I–5	–	0–1	0–2	I–3

Fifth leg (Fig. 13) consisting of two segments: basal segment with single outer seta; distal segment with two long setae at tip and one seta on lateral margin.

Type host: *Boleophthalmus dussumieri* Valenciennes (Pisces, Perciformes, Gobiidae).

Type locality: Shatt Al-Basrah Canal (30°27'–30°28'N, 47°49'–47°50'E); May–June 2009.

Other host: *Bathygobius fuscus* (Rüppell) (Pisces, Perciformes, Gobiidae).

Site of infection: gill filaments.

Prevalence: 32.25% (10 infected out of 31 hosts examined) for *B. dussumieri* and 73.3% (11 infected out of 15 hosts examined) for *B. fuscus*.

Mean of intensity: 3.1 and 3.3 copepod on *B. dussumieri* and *B. fuscus*, respectively.

Material examined: 16 and 4 females collected from gill filaments of the host *B. dussumieri* and host *B. fuscus* respectively in May–June, 2009. The holotype and paratypes have been deposited in the collection of the Natural History Museum, London (holotype: BMNH 2011. 1220; paratypes: BMNH 2011. 1221–1230).

Etymology: The specific name is derived from the generic name of the type host.

Discussion

Walter and Boxshall [15] listed 152 valid species in *Ergasilus*, 9 of those were described or recorded from Iraq. *Ergasilus boleophthalmi* sp.n. shares with the majority of its congeners, the presence of two inner setae on the middle endopod segments of legs 2 and 3. This serves to distinguish the new species from four of the known Iraqi *Ergasilus* species viz. *E. barbi*, *E. mosulensis*, *E. iraquensis* and *E. pararostralis*.

The new species can be distinguished from *E. rostralis* by the number of antennulary segments, which is six in the former compared to five in the latter, by the presence of an outer spine on the distal segment of the exopod of leg 3 and 4, by the arrangement of setae on the distal exopodal segment of legs 1–4.

A the new species can be distinguished from *E. ogawai* by the presence of spine on the distal segment of the exopod of leg 4, the absence of a single spine on the distal segment of the exopod of leg 2, by the arrangement of setae on distal segment of the exopod of legs 1–4 and by the number of setae on the middle and distal segments of the endopod of leg 4 and distal segment of the endopod of legs 2 and 3.

The new species can be distinguished from *E. sieboldi* by the absence of a single outer spine on the middle segment of the exopod of leg 1 and the distal exopodal segment of leg 2, by presence of spine on the distal exopodal segment of leg 4 .

The new species differs from *E. synanceiensis* by the possession of a single spine on the distal exopodal segment of legs 3 and 4, and on the distal endopodal segment of leg 4.

There are just three species which have leg 1–4 setal formula plus 6-segmented antennules very similar to those of the new species *viz. Ergasilus anchoratus* Markevich, 1946, *E. magnicornis* Yin, 1949 and *E. peregrines* Heller, 1868. These species can be distinguished from a new species by presence spine on the distal segment of the exopod of leg 2.

Also, *E. peregrinus* can be distinguished from a new species by absence of spine on distal segment of the exopod of leg 3 and absence of seta on the middle segment of the exopod of leg 1.

E. magnicornis has distinctive striated surface of the antennal claw. Furthermore all these three differ from *E. boleophthalmi* in a different setal formula of atennule.

Acknowledgements

We would like to express our regards and thanks to Prof. Dr. Z. Kabata from Pacific Biological Station, Nanaimo, B.C. Canada, Prof. Dr. Ju-Shey Ho from Department of Biological Sciences, California State University, USA, and Prof. Dr. Geoffrey A. Boxshall from the Department of Zoology, Natural History Museum in London, England for helping us with the identification of this parasite. Our thanks go to Dr. N.R. Khamees from our department for interest advices.

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Received 25 May 2011
Accepted 30 June 2011