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Copepods of the family Ergasilidae (Poecilostomatoida) parasitic on fishes from Khor al-Zubair Lagoon, Iraq

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Abstract

Four species of ergasilid copepods were collected from gill filaments of three species of fishes from Khor al-Zubair Lagoon, Iraq. The mugilid *Liza subviridis* hosted the new species *Ergasilus iraquensis* and *Ergasilus pararostralis*. *Ergasilus synanceiensis* sp. n. was found on the synanceiid *Leptosynanceia melanostigma* (Day). The fourth species, *Dermoergasilus varicoleus* Ho, Jayarajan & Radhakrishnan, 1992 was found parasitizing the mugilid *Liza abu*, and is a new record for Iraq.

Introduction

Khor al-Zubair Lagoon is a northwestern extension of the Arabian Gulf into lower Mesopotamia (Fig. 1). It starts as a small bay north of Bubiyan Island and continues northwards until it ends in a number of small blind creeks just south of Zubair, west of Basrah. Recently, this extension of the Arabian Gulf was connected with the Al-Hammar marsh by a channel called the Shatt Al-Basrah or Basrah Canal. Freshwater discharge from Al-Hammar marsh into Khor al-Zubair (khor, Arabic for marsh) is controlled by a dam, that opens only during low tide.

Khor al-Zubair is about 32 km long, its width ranging from 100 to 800 m and its depth is 10–15 m at high water. The bottom sediments in Khor al-Zubair are muddy sand. Surface temperature varies from a low mean of 12 ° C in January to a high mean of about 32 ° C in August.

The fish fauna of Khor al-Zubair is more or less similar to that of the Arabian Gulf. According to Mhaisen (in litt.), 73 fish species representing 43 families are known in this marsh (Khor, in Arabic). Most of these fishes use Khor al-Zubair as a nursery area or feeding ground.

Some of these species are of great commercial importance for human consumption. One of them (*Liza subviridis*) is a regular resident, and although it is smaller than other commercial fishes species in Iraq, it is an important item in the fish market of Basrah Province.

Copepods parasitizing fishes from Iraq are still not well known; only eight species of ergasilid copepods have been described. Rahemo Zohair (1982) described *Ergasilus barbi* from *Barbus grypus* (Heckel), and *Ergasilus mosulensis* from *Cyprinion macrostomus* (Heckel), both collected from the Tigris River, Mosul (northern Iraq). Piasecki et al. (1991) described *Mugilicola kabatai* from *Liza abu* (Heckel, 1843) collected from Abu-al-Khaseb Creek, one of the western side branches of the Shatt Al-Arab River, about 20 km south of Basrah City, southern Iraq. Ho et

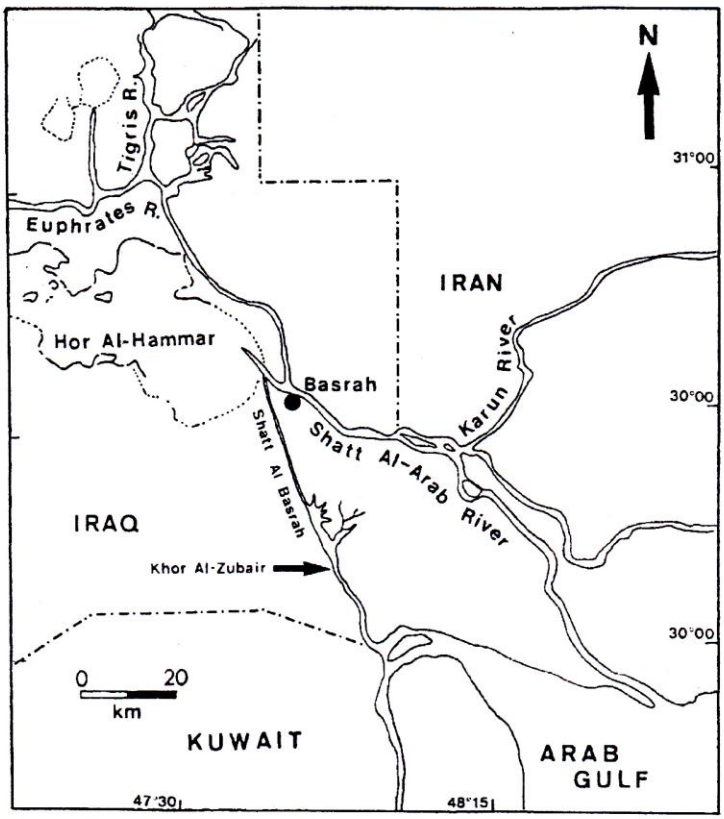


Figure 1. Map showing location of Khor Al-Zubair Lagoon, Iraq.

al. (1996) described *Paraergasilus inflatus* and reported *E. rostralis* Ho, Jayarajan & Radhakrishnan, 1992, and *Dermoergasilus varicoleus* Ho, Jayarajan & Radhakrishnan,1992, all from *Liza abu* in the Shatt Al-Arab. *Ergasilus sieboldi* Nordman, 1832 was first recorded in Irak by Herzog (1969) on *Aspius vorax*. Finally, Mhaisen (in litt.) mentions the occurrence of *E. peregrinus* Heller, 1868 on *A. vorax* and *L. abu*.

In this paper, we add to this list four species of ergasilids, in two genera. Two new species of *Ergasilus* were collected from a mugilid and a third species from synanceiid fish. The fourth species was identified as *D. varicoleus*.

Material and methods

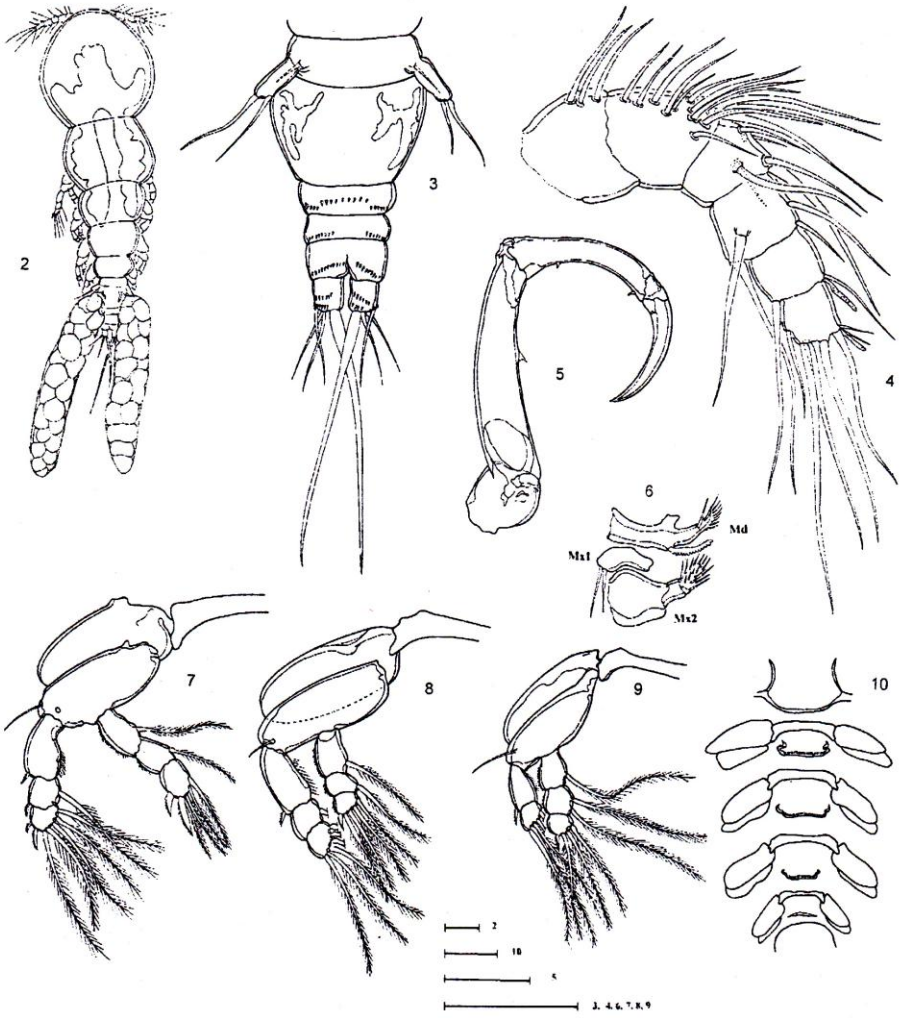
The specimens were collected from fish caught in Khor al-Zubair Lagoon, Iraq. Whole specimens were examined in temporary lactic acid mounts in different positions. Fragments of cover glass were used to support the cover glass of the preparation. After examination, the specimens were preserved in 70% ethanol. All drawings were made with the aid of a camera lucida mounted on a Leitz SM-LUX microscope.

Specimens were deposited in the collections of the Museu de Zoologia, Universidade de São Paulo (MZUSP), Brazil.

Descriptions

Ergasilus iraquensis Amado sp. n.
(Figs 2–10)

Material examined: Female holotype (MZUSP 12181) and 8 female paratypes (MZUSP 12182) from *Liza subviridis* (Valenciennes, 1836) (Perciformes,



Figures 2–10. Ergasilus iraquensis sp. n. Female. 2. habitus, dorsal; 3. urosome, ventral; 4. antennule; 5. antenna; 6. oral appendages (Md=mandible, Mx1=maxillule, Mx2= maxilla); 7. leg 1; 8. leg 2; 9. leg 4; 10. thoracic sternites. Scale bars 50 μm.

Mugilidae), from Khor al-Zubair Lagoon, Iraq, S. A. M. Al-Daraji coll., 1992/1993.

Female holotype. Total length (without caudal setae) 1,077 μm; prosome length 883 μm; urosome length 194 μm; genital double-somite length 72 μm; caudal ramus length 22 μm, egg sac length 722 μm.

Cephalosome rounded (Fig. 2), as long as wide. First pediger free and almost as large as cephalosome. Metasomal somites diminishing gradually in length and width toward urosome. Abdominal somites and caudal rami with spinulation on ventral surface (Fig. 3). Anal somite partially divided by medial longitudinal notch. Caudal ramus (Fig. 3) as long as wide, with 1 long and 3 short setae. Egg sac long and multiserial.

Antennule (Fig. 4) 6-segmented, armed as follows: 3, 13, 6, 4, 2 + aesthetask, 7 + aesthetask.

Antenna (Fig. 5) long, slender, 4-segmented, and with terminal claw. Coxobasis unarmed. First and second endopodal segments bearing 1 and 2 sensilla, respectively. The second endopodal segment is 80% of the length of the first. Third endopodal segment vestigial. Terminal claw long, slightly shorter than second endopodal segment.

Mandible, maxillule, and maxilla as in Fig. 6.

Legs 1–4 (Figs 7–9) biramous. Endopods of all legs with row of spinules on outer margins of first and second segments; terminal endopodal segments of legs 1 and 4 smooth. Proximal exopodal segment of all legs bearing row of setules along inner margin. Spines on exopod and endopod serrate on outer margin. Intercoxal plates of legs 1–4 wide and narrow. Formula of spines (Roman numerals) and setae (Arabic numerals) as follows:

Leg 1	Coxa: 0 - 0	Basis: 1 - 0	Exopod: I – 0; I – 1; II, 5 Endopod: 0 –1; 0 – 1; II, 4
Leg 2 and Leg 3	Coxa: 0 - 0	Basis: 1 - 0	Exopod: I – 0; 0 – 1; 6 Endopod: 0 – 1; 0 – 1; I, 4
Leg 4	Coxa: 0 - 0	Basis: 1 - 0	Exopod: I – 0; 5 Endopod: 0 – 1; 0 – 2; I, 3

Leg 5 (Fig. 3) represented by seta implanted on small protuberance of thoracic somite, and free segment about 2 times longer than broad, with 2 setae at apex.

Thoracic sternites (Fig. 10) of pedigers 1–3 serrate along posterior margin.

Male. Unknown.

Etymology. The specific name refers to the country where the specimens were collected, Iraq.

Remarks. Within the genus *Ergasilus*, the first pediger is nearly always fused with the cephalosome, forming a cephalothorax. However, there are 21 species in which it is separated from the cephalosome, as in the new species. From this group of species, *E. pitalicus* Thatcher, 1984, *E. nodosus* Wilson, 1938, *E. mirabilis* Oldewage & Van As, 1987, and *E. kandti* van Douwe, 1912 have a 5-segmented antennule, while seven other species (*E. leporinidis* Thatcher, 1981, *E. jaraquensis* Thatcher & Robertson, 1981, *E. hydrolicus* Thatcher, Boeger & Robertson, 1981, *E. felichthys* (Pearse, 1947), *E. clupeidarum* Johnson & Roger, 1972, *E. bryconis* Thatcher, 1981, and *E. versicolor* Wilson, 1911) have the endopod of leg 1 2-segmented. The remaining 10 species share with *Ergasilus iraquensis* n. sp. an antennule of 6 segments and a 3-segmented endopod of leg 1. Some of these species differ from the new species in having a pointed cephalosome. On the other hand, *E. amblicephalus* Kuang, 1983, *E. batai* Karamchandani, 1952, *E. inflatipes* Cressey, 1970, *E. philippinensis* Velasquez, 1951, and *E. monodi* Brian, 1927 share a rounded cephalosome, like that of the new species. *Ergasilus iraquensis* n. sp. can be separated from these latter species by the armature of legs 1–4, as shown in Table 1.

Ergasilus iraquensis n. sp. closely resembles *E. monodi*. However the new species has one more spine on the exopod 3 of legs 1 and 2, as well as one more seta on the second endopodal segment of legs 2 and 3 (see Table 1).

Ergasilus pararostralis Amado sp. n.
(Figs 11–19)

Material examined. Female holotype (MZUSP 12183) and 7 female paratypes (MZUSP 12184) from *Liza subviridis* (Perciformes, Mugilidae), from Khor al-Zubair Lagoon, Iraq, S. A. M. Al-Daraji coll., 1992/1993.

Female holotype. Total length (without caudal setae) 705 μm, prosome length 538 μm, urosome length 100 μm, genital double-somite length 55 μm, caudal ramus length 27 μm.

Cephalosome (Fig. 11) clearly separate from first metasomal somite. Rostral area well defined (Fig. 13). Anal somite notched medially. Caudal ramus (Fig. 12)

Table 1. Armature of legs 1 – 4 of *Ergasilus amblicephalus* Kuan, 1983, *E batai* Karanchandani, 1952, *E. inflatipes* Cressey, 1978, *E. philippinensis* Velasquez, 1951, *E. monodi* Brian, 1927 and *E. iraquensis* sp. n. (spine = Roman numerals, seta = Arabic numerals)

Species	Exopod				Endopod			
	Leg 1	Leg 2	Leg 3	Leg 4	Leg 1	Leg 2	Leg 3	Leg 4
E. amblicephalus	I-0, 0-1, II-5	I-0, 0-2, I-4	I-0, 0-1, 0-5	I-0, 0-5	0-1, 0-1, II-4	0-1, 0-2, I-4	0-1, 0-2, I-4	0-1, 0-2, I-3
E. batai	I-0, 1-1, II-4	I-0, 0-1, I-4	I-0, 0-1, I-4	0-0, I-4	0-1, 0-1, II-4	0-1, 0-2, I-4	0-1, 0-2, I-4	0-1, 0-2, I-3
E. inflatipes	I-0, I-1, II-5	I-0, 0-1, 0-5	I-0, 0-1, 0-5	I-0, 0-5	0-1, 0-1, II-4	0-1, 0-2, I-4	0-1, 0-2, I-4	0-0, 0-2, I-4
E. philippinensis	I-0, 0-1, II-5	I-0, 0-1, 0-4	I-0, 0-1, 0-4	0-0, 0-5	0-1, 0-2, I-5	0-1, 0-1, I-4	0-1, 0-1, I-4	0-1, 0-2, I-4
E. monodi	I-0, 0-1, I-5	I-0, 0-1, 0-6	I-0, 0-1, 0-6	I-0, 0-5	0-1, 0-1, II-4	0-1, 0-2, I-4	0-1, 0-2, I-4	0-1, 0-2, I-3
E. iraquensis n. s	I-0, 0-1, II-5	I-0, 0-1, I-6	I-0, 0-1, 0-6	I-0, 0-5	0-1, 0-1, II-4	0-1, 0-1, I-4	0-1, 0-1, I-4	0-1, 0-2, I-3

slightly wider than long, tipped with 1 long and 3 short setae. Innermost seta spinulose. Egg sac shorter than body, multiserial.

Antennule (Fig. 13) 5-segmented, armed as follows: 16, 6, 4 + aesthetask, 2 + aesthetask, 7 + aesthetask. First segment little longer than second and third combined. Aesthetasks very short.

Antenna (Fig. 14) long, slender, 4-segmented, and slightly curved. Coxobasis unarmed. First endopodal segment as longer as second, and bearing 1 sensillum. Third segment vestigial. Second endopodal segment with 2 sensilla. Terminal claw long, about half of length of 2nd endopodal segment.

Mouthparts (Fig. 15) consisting of mandible, maxillule and maxilla; maxilliped absent. Mandible with 2 blades anteriorly and 1 blade posteriorly: larger anterior blade bearing row of curved strong theeth along posterior edge; other 2 blades with row of thin spinules on anterior margin. Maxillule bearing 2 elements ventrally. Maxilla 2-segmented: syncoxa naked; basis ending in blunt spinulose terminal process.

Legs 1–4 (Figs 16–18) biramous. Bases of all legs with distal spinulose areas on anterior surface. Margins of all ramal segments devoid of any ornamentation. Legs armature as follows (spines= Roman numerals; setae= Arabic numerals).

P1 Coxa:	0-0 Basis:	1-0	Exopod: I - 0; 0 - 1; II. 5
			Endopod: 0 - 0; 0 - 1; II. 4
P2 and P3	Coxa: 0-0	Basis: 1-0	Exopod: 0 - 0; 0 - 1; 5
			Endopod: 0 - 1; 0 - 1; 5
P4	Coxa: 0-0	Basis: 1-0	Exopod: 0 - 0; 6
			Endopod: 0 - 1; 0 - 1; 4

Leg 5 (Fig. 12) represented by free segment bearing 2 setae at apex and 1 seta implanted on thoracic somite.

Thoracic sternites (Fig. 19) smooth.

Male. Unknown.

Etymology. The specific name is given for the similarities of the new species with *E. rostralis* Ho, Jayarajan & Radhakrishan, 1992 (of Latin, *para* = 'beside', 'at the side of').

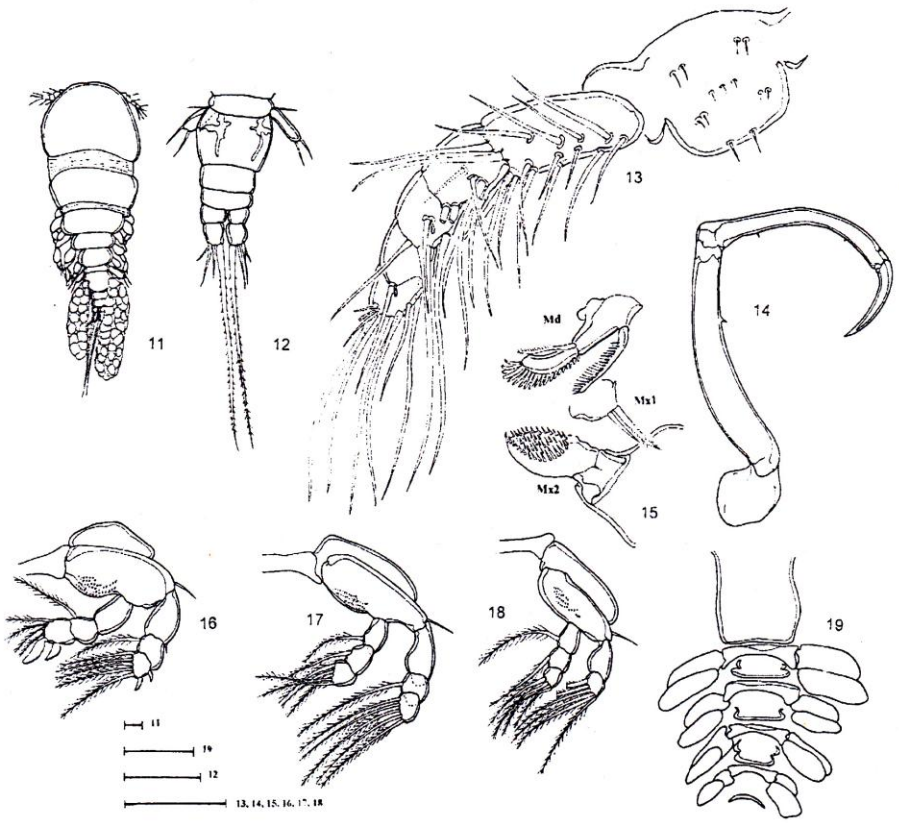
Remarks: According to Ho et al. (1992), there were six species of *Ergasilus* with 5-segmented antennules. The authors added two more species: *E. rostralis* and *E. uniseriatus*. The new species resembles *E. rostralis* in many characters. Both species possess the same shape of body, having a well defined rostral area, and the same number and shapes of caudal setae. Nevertheless, the new species can easily be distinguished from *E. rostralis* by the armature of legs 1–4, as shown in Table 2. In addition, the new species has spinulose areas on the bases of legs 1–4.

Ergasilus synanceiensis Amado sp. n.
(Figs 20–28)

Material examined. Female holotype (MZUSP 12185) and 3 female paratypes (MZUSP 12186) from *Pseudosynanceia melanostigma* (Scorpaeniformes, Synanceiidae), from Khor al-Zubair Lagoon, Iraq, S. A. M. Al-Daraji coll., 1992/1993.

Female. Total length (without caudal setae) 888 μm, prosome length 733 μm, urosome length 138 μm, genital double-somite length 55 μm, caudal rami length 16 μm.

Body (Fig. 20) with inflated cephalothorax. Rostral area (Fig. 22) distinctly marked on anterior extremity of cephalothorax, with 2 anterior and 2 ventral sensilla. Metasomal somites abruptly narrowed from cephalothorax and decreasing gradually in length and



Figures 11–19. Ergasilus pararostralis sp. n. Female. 11. habitus, dorsal; 12. urosome, ventral; 13. antennule and rostral area, ventral; 14. antenna; 15. oral appendages (Md= mandible, Mx1= maxillule, Mx2= maxilla); 16. leg 1, posterior; 17. leg 2, posterior; 18. leg 4, posterior; 19. thoracic sternites. Scale bars 50 μm.

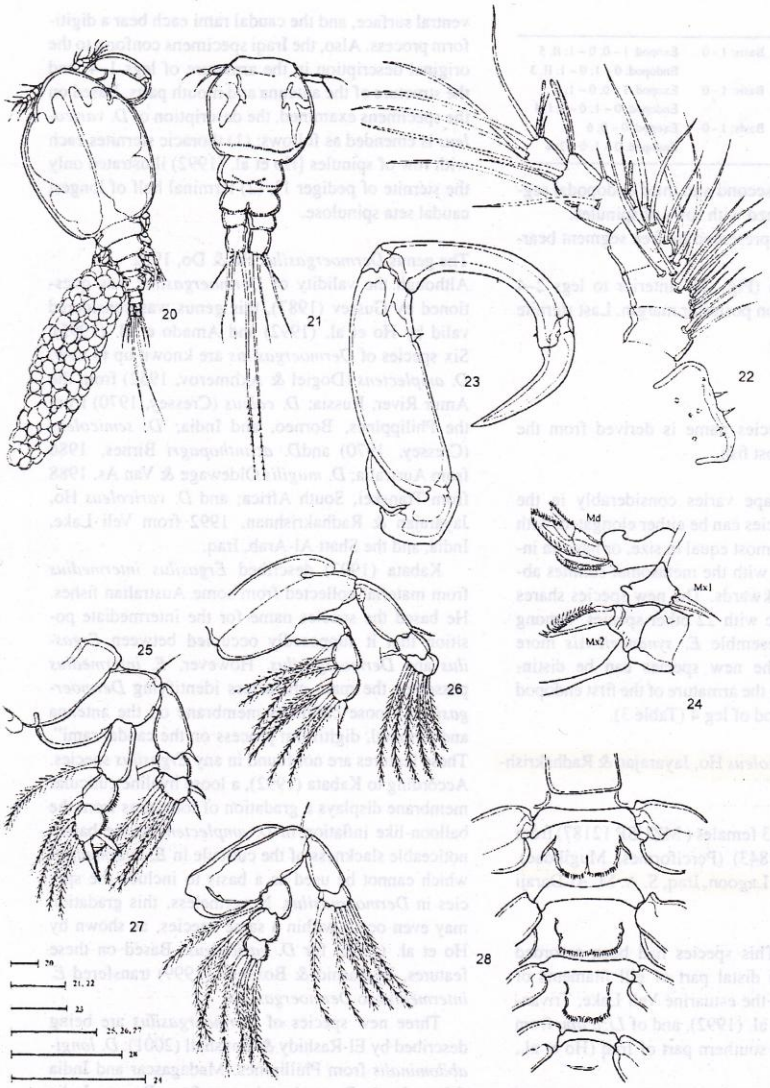
width toward urosome. Genital double-somite slightly wider than long. Spinulation on ventral surface of urosome as shown in Fig. 21. Pre-anal somite partly and anal somite completely notched medially. Caudal ramus (Fig. 21) about 1.2 longer than wide and tipped with 4 setae. Innermost seta spinulose distally. Shortest seta implanted dorsally. Egg sacs elongated, thick, and longer than body.

Antennule (Fig. 22) 6-segmented, armed as follows: 3, 13, 6, 4 + aesthetask, 2 + aesthetask, 7 + aesthetask. Aesthetask on penultimate segment as long as adjacent seta.

Antenna (Fig. 23) strong and curved, with 4 segments and terminal claw. Coxobasis unarmed. First and second endopodal segments similar in length, bearing 1 and 2 sensilla respectively. Third segment vestigial. Claw curved proximally and shorter than endopodal segments.

Mandible, maxillule and maxilla as in Figure 24.

Legs 1–4 (Figs 25–27) biramous, with formula of spines and setae as follows:



Figures 20–28. Ergasilus synanceiensis sp. n. Female. 20. habitus, dorsal; 21. urosome, ventral; 22. antennule and rostral area; 23. antenna; 24. oral appendages (Md=mandible, Mx1= maxillule, Mx2= maxilla); 25. leg 1; 26. leg 2; 27. leg 4; 28. thoracic sternites. Scale bars 50 μm.

P1	Coxa: 0 - 0	Basis: 1 - 0	Exopod: I – 0; 0 – 1; II. 5 Endopod: 0 – 1; 0 – 1; II. 3
P2 and P3	Coxa: 0 - 0	Basis: 1 - 0	Exopod: I – 0; 0 – 1; 6 Endopod: 0 – 1; 0 – 2; I. 4
P4	Coxa: 0 - 0	Basis: 1 - 0	Exopod: 0 – 0; 6 Endopod: 0 – 1; 0 – 2; 4

Outer margins of second and third endopodal segments of legs 1–4 armed with rows of spinules.

Leg 5 (Fig. 21) represented by free segment bearing 2 distal setae.

Thoracic sternites (Fig. 28) anterior to legs 2–4 with row of spinules on posterior margin. Last sternite smooth.

Male. Unknown.

Etymology. The species name is derived from the family name of the host fish.

Remarks: Body shape varies considerably in the genus *Ergasilus*. Species can be either elongated, with metasomal somites almost equal in size, or have an inflated cephalothorax, with the metasomal somites abruptly narrowing backwards. The new species shares this last characteristic with 22 other species. Among these, 12 species resemble *E. synanceiensis* more closely. However, the new species can be distinguished from them by the armature of the first endopod of leg 1 and the exopod of leg 4 (Table 3).

Dermoergasilus varicoleus Ho, Jayarajan & Radhakrishnan, 1992

Material examined. 3 females (MZUSP 12187) from *Liza abu* (Heckel, 1843) (Perciformes, Mugilidae), from Khor Al-Zubair Lagoon, Iraq, S. A. M. Al-Daraji coll., 1992/1993.

Previous records. This species had been recorded twice before, on the distal part of gill filaments of *Liza tade* Forskal, in the estuarine Veli Lake, Trivandum, India, by Ho et al. (1992), and of *Liza abu* from the Shatt Al-Arab in southern part of Iraq (Ho et al., 1996).

Remarks. The specimens from Al-Zubair Lagoon, Iraq were identified as *D. varicoleus*, as they agree with the original description in all relevant features defining the species.The antennule is 6-segmented, the abdominal somites have rows of denticules on the ventral surface, and the caudal rami each bear a digitiform process. Also, the Iraqi specimens conform to the original description in the armature of legs 1–4, and the structure of the antenna and mouth parts. Based on the specimens examined, the description of *D. varicoleus* is emended as follows: (1) thoracic sternites each with row of spinules [Ho et al. (1992) illustrated only the sternite of pediger 1]; (2) terminal half of longest caudal seta spinulose.

The genus *Dermoergasilus* Ho & Do, 1982

Although the validity of *Dermoergasilus* was questioned by Gussev (1987), this genus was considered valid by Ho et al. (1992) and Amado et al. (1995). Six species of *Dermoergasilus* are known up to now: *D. amplectens* (Dogiel & Akhmerov, 1952) from the Amur River, Russia; *D. coleus* (Cressey, 1970) from the Philippines, Borneo, and India; *D. semicoleus* (Cressey, 1970) and*D. acanthopagri* Birnes, 1986 from Australia; *D. mugilis* Oldewage & Van As, 1988 from Transkei, South Africa; and *D. varicoleus* Ho, Jayarajan & Radhakrishnan, 1992 from Veli Lake, India, and the Shatt Al-Arab, Iraq.

Kabata (1992) described *Ergasilus intermedius* from material collected from some Australian fishes. He based the species name for the intermediate position that it supposedly occupied between *Ergasilus* and *Dermoergasilus*. However, *E. intermedius* possesses the main characters identifying *Dermoergasilus*: "loose chitinous membrane on the antenna and terminal, digitiform process on the caudal rami". These features are not found in any *Ergasilus* species. According to Kabata (1992), a loose hyaline cuticular membrane displays a gradation of looseness from the balloon-like inflation in *D. amplectens* to the barely noticeable slackness of the cuticule in *E. intermedius*, which cannot be used as a basis to include the species in *Dermoergasilus*. Nevertheless, this gradation may even occur within a same species, as shown by Ho et al. (1992) for *D. varicoleus*. Based on these features, El-Rashid & Boxshall (1999) transfered *E. intermedius* to *Dermoergasilus*.

Three new species of *Dermoergasilus* are being described by El-Rashidy & Boxshall (2001): *D. longiabdominalis* from Phillipines, Madagascar and India (Mangalore); *D. semiamplectens* from Burma, India (Calcuta) and China; and *D. curtus* from India (Alahabad). A key is given for identification of the ten currently accepted species.

Table 2. Armature of legs 1–4 of *Ergasilus rostralis* Ho, Jayarajan & Radhakrishnan, 1992, and *E. pararostralis* n. sp. (spines = Roman numerals, and setae = Arabic numerals)

Species	Exopod				Endopod			
	Leg 1	Leg 2	Leg 3	Leg 4	Leg 1	Leg 2	Leg 3	Leg 4
E. rostralis	I-0, I-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, 0-6	I-0, 0-5	0-1, 0-1, II-4	0-1, 0-2, I-4	0-1, 0-2, I-4	0-1, 0-2, I-3
E. pararostralis sp. n.	I-0, 0-1,II-5	0-0, 0-1, 0-5	0-0, 0-1, 0-5	0-0, 0-6	0-0, 0-1,II-4	0-1, 0-1,0-5	0-1, 0-1, 0-5	0-1, 0-1, 0-4

Table 3. Armature of legs 1–4 of *Ergasilus centrarchidarum* Wright, 1882, *E. hypomesi* Yamaguti, 1936, *E. luciopercarum* Henderson, 1929, *E. manicatus* Wilson, 1911, *E. nerkae* Roberts 1963, *E. ovatus* Shen, 1957, *E. polynemi* Redkar, Rangnekar & Murtis, 1951, *E. shehyanguensis* Wang, 1961, *E. scotti* Sundara Raj, 1923, *E. turgidus* Fraser, 1920, *E. xinjianguensis* Kuan & Qian, 1985, *E. wareaglei* Johnson, 1971, and *E. synanceiensis* sp. n. (spines = Roman numerals and setae = Arabic numerals)

Species	Exopod				Endopod			
	Leg 1	Leg 2	Leg 3	Leg 4	Leg 1	Leg 2	Leg 3	Leg 4
E. centrarchidarum	I-0, 0-1, II-0	I-0, 0-1, 0-6	I-0, 0-1, 0-6	0-0, 0-5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,0-5	0-1,0-2, 0-6
E. hypomesi	I-0, 0-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, 0-6	I-0, 0 -5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1, 0-2, I-3
E. luciopercarum	I-0, 0-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, 0-6	I-0, 0-5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1, 0-2, I-3
E. manicatus	0-0, 0-1,II-5	0-0, 0-1,0-6	0-0,0-1, 0-6	0-0, 0-5	0-0,0-0,II-4	0-0,0-0,0-5	0-0,0-0,0-5	0-1, 0-2, I-3
E. nerkae	I-0, 0-1, II-5	I-0, 0-2, 0-6	I-0, 0-2, 0-6	0-0, 0-5	0-1, 0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1, 0-2, I-3
E. ovatus	0-0, 0-1,II-5	I-0, 0-1, 0-6	I-0, 0-1, I -6	I-0, I - 5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1, 0-2, I-3
E. polynemi	I-0, I-1, I-5	I-0, 0-1, I-6	I-0, 0-1, I -6	I-0, I - 5	0-1,0-1,I-3	0-1,0-1,II-4	0-1,0-2,0-5	0-0, 0-2, 0-3
E. shehyanguensis	I-0, 0-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, I -6	I-0, I - 5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1,0-2, 0-4
E. scotti	I-0, 0-1, II-5	I-0, I-0, 0-7	I-0, I -0, 0-7	I-0, I - 5	0-1,0-1,II-4	0-,0-2, 0-5	0-0,0-2,0-5	0-1, 0-2, 0-5
E. turgidus	I-0, 0-1, I-5	0-0, 0-1,0-6	0-0, 0-1,0-6	0-0, 0-5	0-1,0-0,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1,0-2, 0-4
E. xinjianguensis	0-0, 0-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, 0-5	I-0, 0-5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1,0-2, I -3
E. wareaglei	I-0, 0-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, 0-6	0-0, I-5	0-1,0-1,II-4	0-1,0-2,I-4	0-1,0-2,I-4	0-1,0-2, 0-4
E. synanceiensis sp. n.	I-0, 0-1, II-5	I-0, 0-1, 0-6	I-0, 0-1, 0-6	0-0, 0-6	0-1,0-1,II-3	0-1,0-2,I-4	0-1,0-2,I-4	0-1,0-2, 0-4

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