

TWO NEW SPECIES OF *ERGASILUS* (COPEPODA :
CYCLOPOIDA) FROM THE GILLS OF TWO IRAQI
FRESHWATER FISHES.

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INTRODUCTION

While surveying the parasites of some Iraqi fishes, many ergasilid specimens were collected from the gills of two cyprinid fishes : *Barbus grypus* Heckel and *Cyprinion macrostomus* Heckel. Specimens were killed and fixed in 70% alcohol, stained either with borax carmine or acetocarmine. Measurements are in microns based on 10 specimens of each and are made by the help of stage micrometer using both low power and high power objectives. Some specimens were examined in glycerine and glycerine jelly for the counting and details of thoracic spines and setae. Drawings were made with the aid of the camera lucida.

Ergasilus barbi Sp. n. (Figs. 1-8)

Description : Female measurements as in Table 1. Cephalothorax lacking pronounced inflation, longer than wide (fig. 1). Head and first thoracic segment fused by a marked distinct groove. Antennal area projecting. Free

Table (1). Measurements of *E. barbi* sp. n. adult females (in microns). Measurements based on 10 specimens.

	Mean	Range
Total length (excluding egg sac and setae)	1180	1020-1650
Cephalothorax length	470	440-490
width	310	284-328
Genital segment length	84	80-92
width	90	72-1000
Egg sac length	621	570-701
Abdomine length	87	71.6-101
Caudal rami length	22	20-24
width	21	20-22
Antennule length	133	110-155
Antenna length	654	590-670

Table (2). Measurements of *E. mosulensis* sp. n. adult female. Measurements base on 10 specimens (in microns).

	Mean	Range
Total length (excluding egg sac and setae)	1520	1450-1620
Cephalothorax length	485	264-320
width	371	340-393
Genital segment length	90	80-100
width	86	84-88
Egg sac length	676	672-680
Abdomine length	21	20-24
Caudal rami length	21	20-24
width	18	16-20
Antennule length	126	100-150
Antenna length	500	450-600

thoracic 4 segments decreasing regularly in size and they are easily distinguished by a relatively shallow grooves. Ratio of widths of the 4 thoracic segments (3 : 2 : 1). Fifth segment compressed and difficult to be seen. Thoracic sternites 1 to 4 contains no spinules. Genital segment rounded, wider than long (fig. 8). Caudal rami cylindrical, longer than wide. Each ramus bears a long and stout seta medially, a relatively short seta laterally and 2 short setae ventrally.

Antennules 6-segmented (fig. 2), weakly tapering distally, with numerous simple long setae, those medially located more longer and stouter. Prehensile antenna (fig. 3), 4-segmented length relation (1 : 2 : 1). Basal segment short and stout, triangular in shape. Second segment subrectangular, with largest length, slightly tapering toward distal end and its maximal width at its proximal third. Third segment with more clear curvature at its distal end. Fourth segment smoothed and its smallest segment, curved to form a hook-like structure with a finely pointed end. Articulation between third and fourth segments bearing a large cuticle thickening and a knob on medial surface.

Leg 1 rami (fig. 4). Coxa rectangular, with distolateral spine. Exopod 3-jointed. First segment with small distolateral spine. Second segment with 1 small spine on distolateral margin and a short seta located at distomedial margin. Third segment with 5 medial seta, most medial three abruptly ended, and 2 distolateral spines, the inner one is longer. Endipod 3-jointed. First segment, its lateral margin without spines but with a seta projecting from the middle of medial margin. Second segment with no spines located on lateral margin but with 1 seta on

medial margin. Third segment with 2 distolateral spine, the most outer is smaller and with 4 short setae on distomedial margin. Spine seta formula :

Exopod, I-0, I-1, II-5.

Endopod, 0-1, 0-1, II-4.

Leg 2 rami (fig. 5). Coxa similar to leg 1. First segment exopod with 1 distolateral spine and without setae on medial margin. Second segment without spine on distolateral margin but with 2 medial setae. Third segment with 1 small spine on distomedial margin and 6 terminal setae, 5 of them abruptly pointed. Endopod 3-segmented. First segment with a row of ciliation on lateral margin and 1 medial seta at midpoint. Second segment without spine but with 1 small seta located medially. Third segment with 2 spines on distolateral margin and 4 long setae subterminally located. Spine seta formula :

Exopod, I-0, 0-2, I-6.

Endopod, 0-1, 0-1, II-4.

Leg 3 rami (fig. 6). Coxa similar to leg 1. Exopod 3-segmented. First segment with 1 distolateral spine, no setae located. Second segment without spine but with 1 seta medially located. Third segment with 6 distomedial setae, the most medial 5 abruptly pointed. Endopod 3-segmented. First segment with a row of cilia on lateral margin and 1 short seta on distomedial margin. Second segment with 1 spine on distomedial margin and 6 terminal setae, 4 of them abruptly pointed. Spine seta formula :

Exopod, I-0, 0-1, 0-6.

Endopod, 0-1, 0-2, I-6.

Leg 4 rami (figt. 7). Exopod 2-segmented. First segment with 1 spine located distolaterally and with no

seta on medial margin. Second segment without spine but with 5 long terminal setae. Endopod 3-segmented. First segment without spine but with 2 setae on medial margin. Third segment with 1 spine and 4 terminal setae the most medial abruptly pointed. Spine seta formula :

Exopod, I-0, 0-5.

Endopod, 0-1, 02, I-4.

Leg 5 rami (fig. 8). It consist of 2 small setae born on a separately small papillae.

Mouth parts : Mandible basal segment subrectangular, unornamented with a terminal spine. Terminal segment plumose, more coarsely beset with bristles as the inner margin. Palp with pectinal inner margin. First maxillam rounded to oval in shape bearing two setae. Second maxilla with a large triangular basal segment. Terminal segment with coarse bristles covering distal end.

Male : Unknown

Host : *Barbus grypus* Heckel

Location : Gills

Locality : River Tigris, Mosul (North Iraq).

Types : Type and paratype are deposited at parasitology section, Department of Biology, College of Science, Mosul, Iraq. Five specimens are deposited at Crustacea Section, British Museum (N. H.), London.

Ergasilus mosulensis sp. n. (fig. 9-16)

Description : Female measurements are given in Table 2. Cephalon lacking inuuation, longer than wide (fig. 9). Head and first thoracic segment fused by marked groove.

Thoracic segments decreased regularly in size. Widths of 4 free thoracic segments ratio (3.5 : 2.1 : 1.5 : 1). Fifth segment compressed, difficult to be seen. Genital segment longer than wide, no decoration present. Three abdominal segments present without spinules. Third segment divided bears a long seta medially, a short seta laterally on the distal edge, and two smaller setae ventrally, spinules absent.

First antenna 6-segmented and weakly tapering, with a tuft of long setae, especially those located distolaterally (fig. 10). Second antenna 4-segmented, length relation 1 : 2 : 1.5 : 1 (fig. 11). Basal segment rectangular. Second segment enlarged, wide ~~at~~ diminishing in size distally. Third segment with a small swelling at its base near its joint with the second segment with clear curvature. Two senssillia existed on its inner margin. Terminal segment unornamented, finely pointed with short curvature to make with the 3rd segment a distinct hook.

Leg 1 rami (fig. 12). Coxa rectangular lacking ornamentation with a distelateral spine. Exopod 3-segmented, no any spinules on both coxa basis. First segment with 1 small spine and without seta medially. Second segment with 1 small spine on distolateral margin and with 1 long seta medially located. Third segment with two long spines on distolateral margin and 5 long setae on medial margin. Endopod 3-segmented. First segment with 1 seta on medial margin. Second segment without spine but with 1 medial seta. Third segment with 2 long spines and 4 setae terminally located. Arrangment of spine seta formula :

Exopod, I-0, I-1, II-5.

Endopod, 0-1, 0-1, II-4.

Leg 2 rami (fig. 13). Coxa similar to leg 1. Exopod 3-segmented. First segment with 1 small spine on distolateral margin, without seta medially. Second segment with 1 small spine on distolateral margin and 1 long seta located medially at the middle of the segment. Third segment without any spine but with 6 long setae located medially. Endopod 3-segmented. First segment without spines but with 1 long seta located on distomedial margin. Second segment without spines but with 2 long setae located at distomedial margin. Third segment with 1 spine and 4 terminal long setae. Spine seta formula :
Exopod, I-0, I-1, 0-6.
Endopod, 0-1, 0-2, I-4.

Leg 3 rami (fig. 14). Coxa and basis similar to leg 1. Exopod 3-segmented. First segment without spine and without seta. Second segment without spines but with 1 long seta located medially on the middle of the segment. Third segment without spines but with 6 long setae located medially. Endopod 3-segmented. First segment without spines but with 1 long seta located medially at the middle of the segment. Second segment without spines but with 2 long setae located on medial margin. Third segment with 1 small spine on distolateral margin. Third segment with 1 small spine on distolateral margin and 4 terminal setae on distomedial margin. Spine seta formula :

Exopod 0-0, 0-1, 0-6.

Endopod, 0-1, 0-2, I-4.

Leg 4 rami (fig. 15). Coxa and basis similar to leg 1. Exopod 2-segmented. First segment with 1 small spine but without setae. Second segment with 5 subterminal long setae. Endopod 3-segmented. First segment without

spine but with 1 long seta located on distomedial margin. Second segment without spines but with 2 long setae on medial margin. Third segment with 1 distal long spine and 4 subterminal setae. Spine seta formula :

Exopod, I-0, 0-5.

Endopod, 0-1, 0-2, I-4.

Leg 5 rami (fig. 16). Represented by 2 small setae at terminal end, each one on a separate small papillae.

Mouthparts, mandible 2-segmented, basal segment subrectally unornamented with terminal spine. Terminal segment plumose, more coarsely beset with bristles on the inner margin. Palp with pectinate inner margin. First maxillae rounded to ovoid bearing basal segment. Terminal segment with coarse bristles on the inner margin. Palp with pectinate inner margin. First maxilla rounded to ovoid bearing basal segment. Terminal segment with coarse bristles covering distal end.

Male : Unknown

Location : Gills

Locality : River Tigris, Mosul (North Iraq).

Types : Type and paratype are deposited at parasitology section, Department of Biology, College of Science, University of Mosul, Iraq. Eight specimens are deposited at Crustacea Section (British Museum, N. H.), London.

Discussion

Ergasilus barbi sp. n.

In total length the present parasite resemble to that of *Ergasilus clupeidarum* Johnson and Rogers, 1972 :

E. flaccidus Fryer, 1965 and *E. latus* Fryer, 1960. The present form has 2-segmented exopod of fourth thoracic leg which resemble that of *E. flaccidus* ; *E. kandti* Van Dauwe (Redescribed by Fryer, 1965) ; *E. rhinose* Burris and Miller, 1972.

Genital segment is wider than long, which is similar to that of *E. tenax* Roberts, 1965 ; *E. inflatipes* Cressey and Collette, 1970 and *E. wareaglei*, 1971.

In this species the cephalon is constricted to an anterior and a posterior portion. Antenna and some other feature of this parasite correspond to that of *E. latus* described by Fryer, 1960 from African freshwater fishes. A similar swelling is seen at the vicinity of the joint of second and third segments. But this swelling is not conspicuous as that of *E. nodulosus* (Wilson, 1911). Nevertheless, the present form differs from *E. latus* in being larger in size, without such broad fifth leg and so much characteristic bend near proximal end of the longest furcal seta. In spine seta formula the following differences are noted.

<i>E. latus</i>					<i>E. barbi</i>		
Leg 1	exo	0-0	I-1	II-5	I-0	I-1	II-5
	endo	0-1	0-1	II-4	0-1	0-1	II-4
Leg 2	exo	0-0	0-1	0-6	I-0	0-2	I-6
	endo	0-1	0-2	I-4	0-1	0-1	II-4
Leg 3	exo	0-0	0-1	0-6	I-0	0-1	0-6
	endo	0-1	0-2	I-4	0-1	0-2	I-6
Leg 4	exo	I-0	0-5	—	I-0	0-5	—
	endo	0-1	0-2	I-3	0-1	0-2	I-4

Note : The Latin numerals indicating the number of spines, while Arabic numerals indicating number of setae.

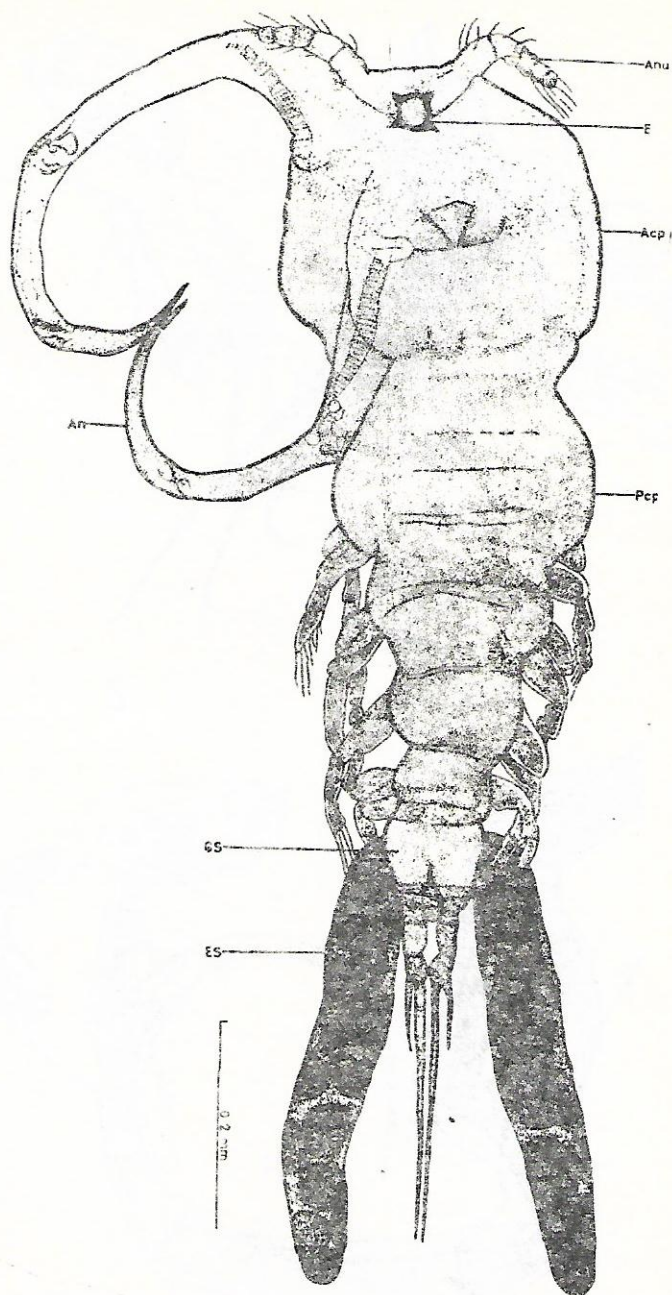
Ergasilus mosulensis sp. n.

The record of Johnson and Rogers (1972) is considered the first one on ergasils from Mugilidae in U. S. A. They synopsised *Ergasilus* of America, reporting ergasilids of 2-jointed endopodal type parasitising *Mugil* species along the gulf of Atlantic coasts. They also considered *E. tizae* Kroyer 1963 as a synonym of *E. versicolor* of Wilson, 1911 and *E. mugilus* Vogt, 1877.

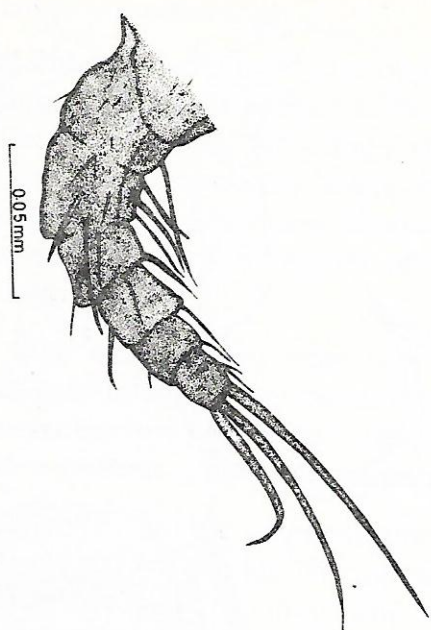
The present type was reported from *Liza abu* Heckel, from Iraq while *E. seiboldi* is the first species reported from Iraq and from neighbouring countries (Herzog, 1969 : Shamsuddin, 1971 ; Beckman, 1962 and Boxshall, 1976).

Ergasilus versicolor in its pigmentation, 2-jointed endopodal segment of 4th swimming leg, absence of knobs from antenna, ratio between terminal and subterminal segment of the antenna (= straight line) less than 2 times. Accordingly many differences exist between the present parasite and that of *E. versicolor*. For instance cephalon constriction into two portions, a distinct deep groove, antennal segment shorter and wider, shorter egg sac string. The comparison between the two species in spine setae formula as in the following :

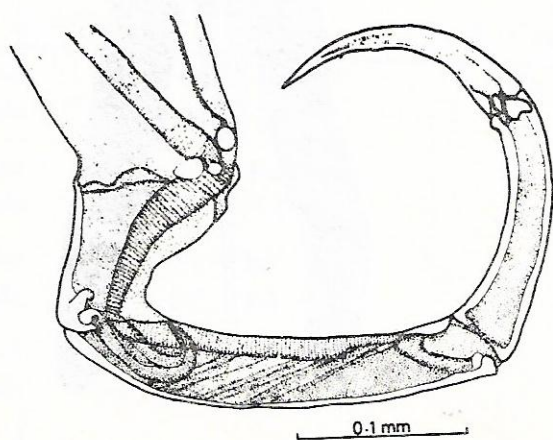
<i>E. versicolor</i>					<i>E. mosulensis</i>		
Leg 1	exo	I-0	0-1	II-4	I-0	I-1	II-5
	endo	0-1	0-2	I-3	0-1	0-1	II-4
Leg 2	exo	I-0	0-1	I-4	I-0	I-1	0-6
	endo	0-1	0-2	II-4	0-1	0-2	I-4
Leg 3	exo	I-0	0-1	I-5	0-0	0-1	0-6
	endo	0-1	0-2	I-4	0-1	0-2	I-4
Leg 4	exo	0-0	I-5	—	I-0	0-5	—
	endo	0-1	0-2	I-3	0-1	0-2	I-4



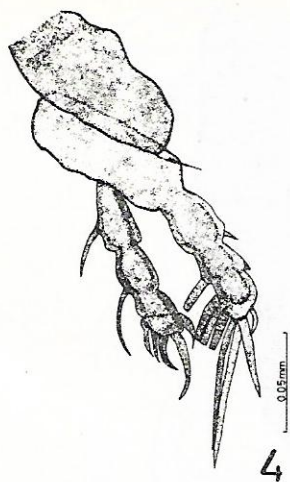
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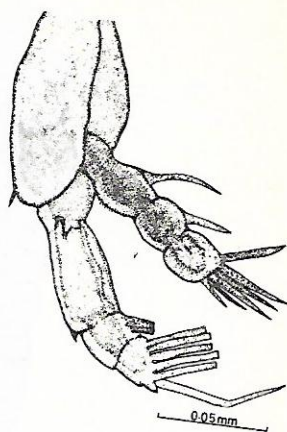
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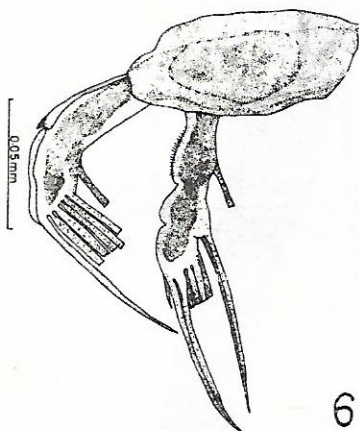
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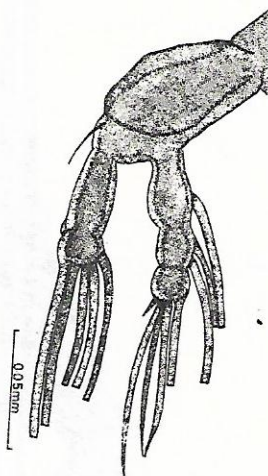
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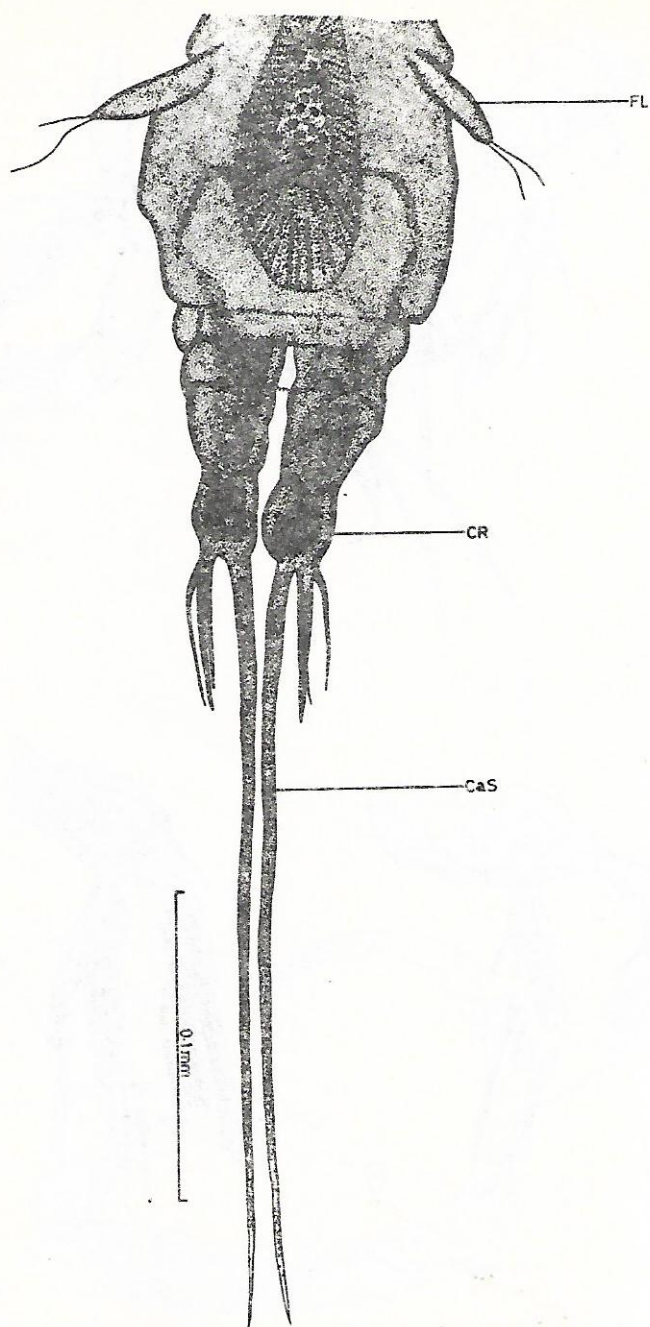
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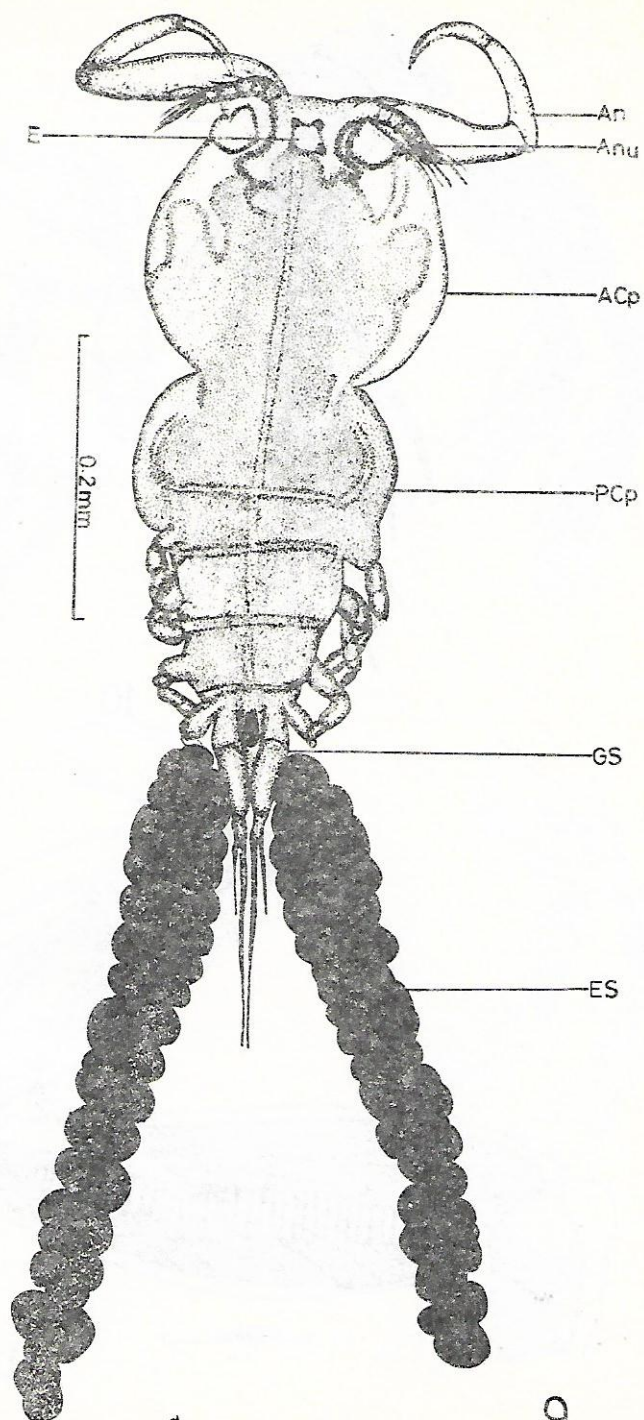


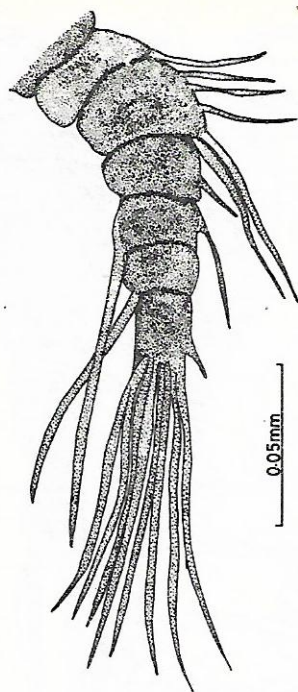
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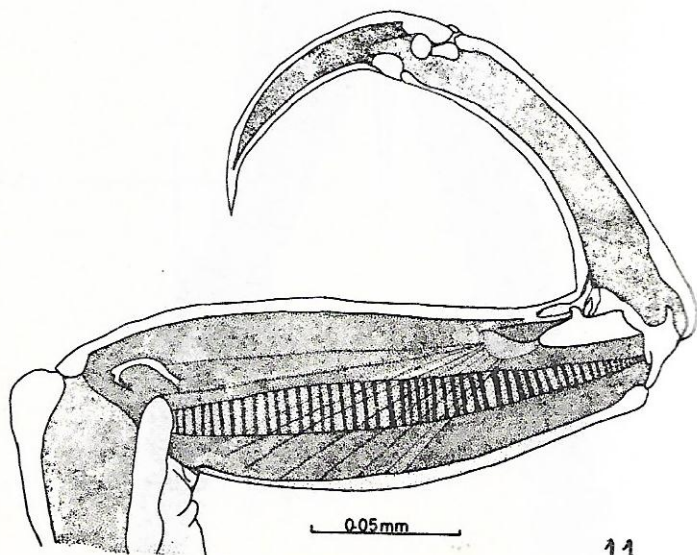
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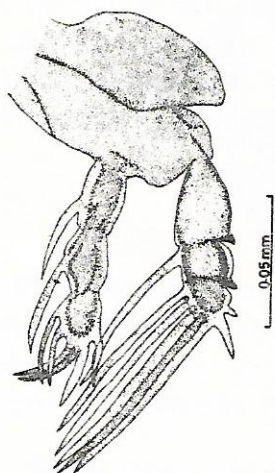




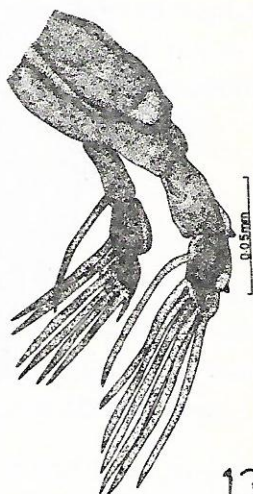
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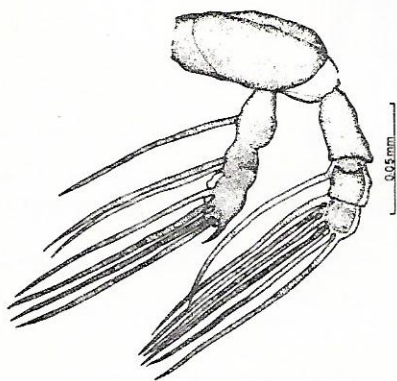
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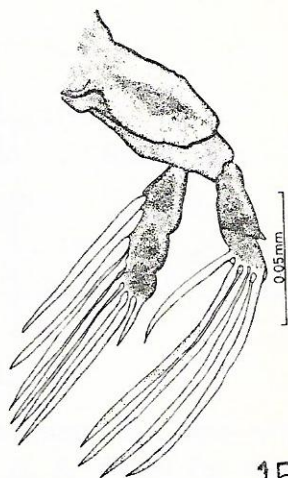
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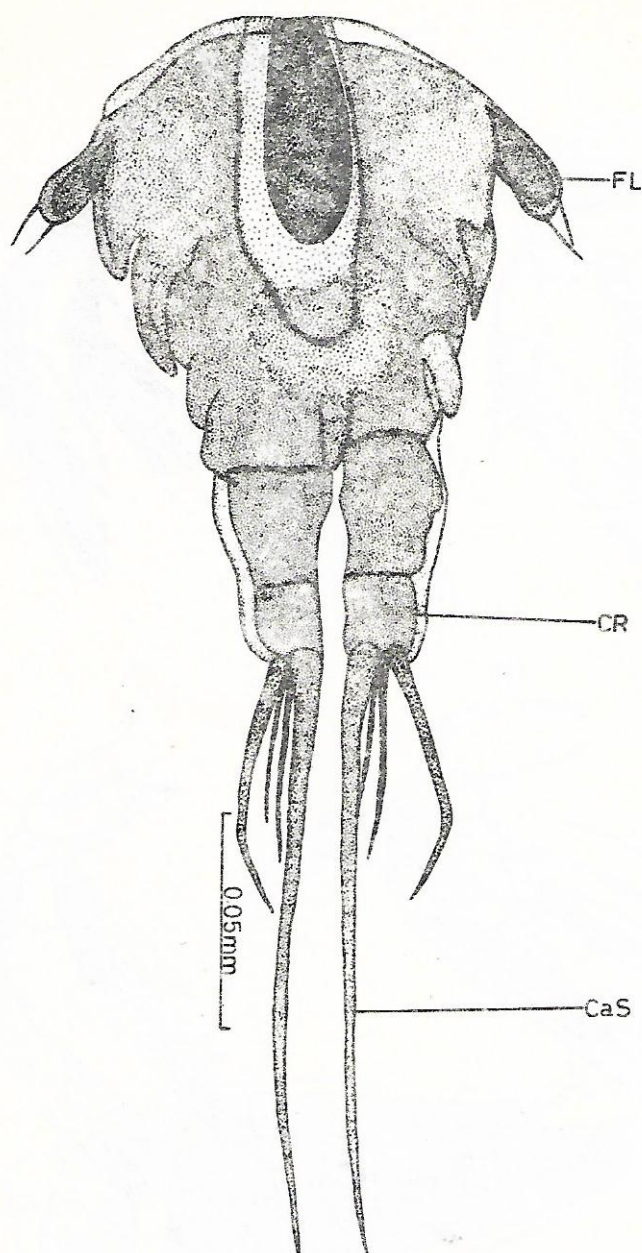
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The present parasite differs also from *E. barbi* in many characters, for instance ; the antenna of *E. barbi* is longer and slender, shape of posterior part of constricted cephalon is subrectangular and in antennal segments relation in their lengths. In cephalon constriction seem possible that they are conspecific (Boxshall, per. comm., 1975).

SUMMARY

Two new species of Copepode *Ergasilus barbi* and *E. mosulensis* have been reported from the gills of two freshwater fishes *Barbus grypus* Heckel and *Cyprinion macrostomus* Heckel from the river Tigris Mosul, Iraq.

Study reveals general description of the body and the appendages like antennae and the legs of these two species.

الغلاصة

يتضمن هذا البحث وصف لنوعين جديدين من القشريات *Ergasilus barbi* و *E. mosulensis* التي وجدت على غلاصم نوعين من الاسماك النهرية (*Cyprinion macrostomus*, *Barbus grypus*) على التوالي (المصطادة من نهر دجلة في محافظة الموصل كذلك تضمن البحث وصف شامل لاجزاء الجسم وبالاخص اللواحق كاللوامس والارجل للنوعين ..

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REFERENCES

- Boxshall, G. A. 1976. A new genus and two new species of copepod parasitic on freshwater fish. Bull. Mus. nat. Hist. (Zool). 30 (6) : 210-215.
- Burris, K. W. and C. C. Miller 1972. *Ergasilus rhinose* sp. n. (Copepoda : cyclopoida) from the nasal fossae of three centrarchid fishes. J. Parasit. 58(3) : 600-604.
- Cressey, R. F. and B. B. Collette. 1970. Copepods and needlefishes : a study in host-parasite relationships. Fishery Bull. 68 : 347-432.
- Fellows, C. R. 1887. A description of *Ergasilus chatauquaensis*, a new species of Copepoda, and a list of other Entomostraca found alake Chautauqua, in August, 1886. Proc. Am. Soc. Microscopists. 9 : 246-249.
- Fryer, C. 1965. Crustacean parasites of African freshwater fishes, mostly collected during the expeditions to lake Tanganyika, and to lakes Kivu, Edward and Albert by the Institute Royal Des Sciences Naturelles de Belgique. XII. 7 : 1-22.
- Herzog, P. H. 1969. Untersuchungen uber die Parasiten der Subwasserfische des Iraq. Arch. Fishereiwiss., 20 (2/3) : 132-147.

Johnson, S. K. 1971. *Ergasilus wareaglei* sp. n. (Copepoda : Cyclopoida) from North American catostomid fishes. J. Alabama Acad. Sci. 42(4) : 243-247.

———, and W. Rogers. 1972. *Ergasilus clupearum* sp. n. (Copepoda : Cyclopoida) from clupeid fishes of the southeastern U. S. with synopsis of the North American *Ergasilus* species with two-jointed first endopod. J. Parasit. 58(2) : 385-392.

Pears, A. S. 1947. Parasitic copepods from Beaufort, North Carolina. J. Elisha Mitchell Sci. Soc. 63 : 1-16.

Roberts, L. S. 1965. *Ergasilus tenax* sp. n. (Copepoda : Cyclopoida) from the white crappie, *Pomoxis annularis* Rafinezque. J. Parasit. 51 : 987-989.

Vogt, C. 1877. Recherches cetieres ; Second memoire, Second section, De la famille des Chondrachanthides. Mem. de. l'Inst. nat. genevois. 13 : 75-100.

Wilson, C. B. 1911. North American parasitic copepods belonging to the family Ergasilidae. Proc. U. S. nat. Mus. 39 : 263-400.

———, 1916. Copepod parasites of Freshwater fishes and their economic relation to mussel glochidia. Bull. U. S. Bur. Fish. 34 : 331-374.