

# A NEW SPECIES OF *ERGASILUS* FROM THE GILLS OF *LABEO BATA* (HAMILTON)\*

By S. J. KARAMCHANDANI, *Central Inland Fisheries Research Station, Barrackpore.*

## INTRODUCTION.

A new species of *Ergasilus*, a parasitic copepod, found infecting the gills of the minor carp, *Labeo bata* (Ham.) is described as *E. batae* sp. nov. in the present paper.

### ***Ergasilus batai* sp. nov.**

Out of 78 specimens of *L. bata* of total lengths ranging from 86 mm. to 342 mm. from various places, (Table I) which were examined, only two fishes (2.56 per cent. infection) were found infected indicating that the parasite has a very limited distribution and is of low incidence. The two infected fish were 165 mm. and 292 mm. in total length and were collected on November 19, 1948 and June 21, 1949, from Serampore and Barrackpore respectively.

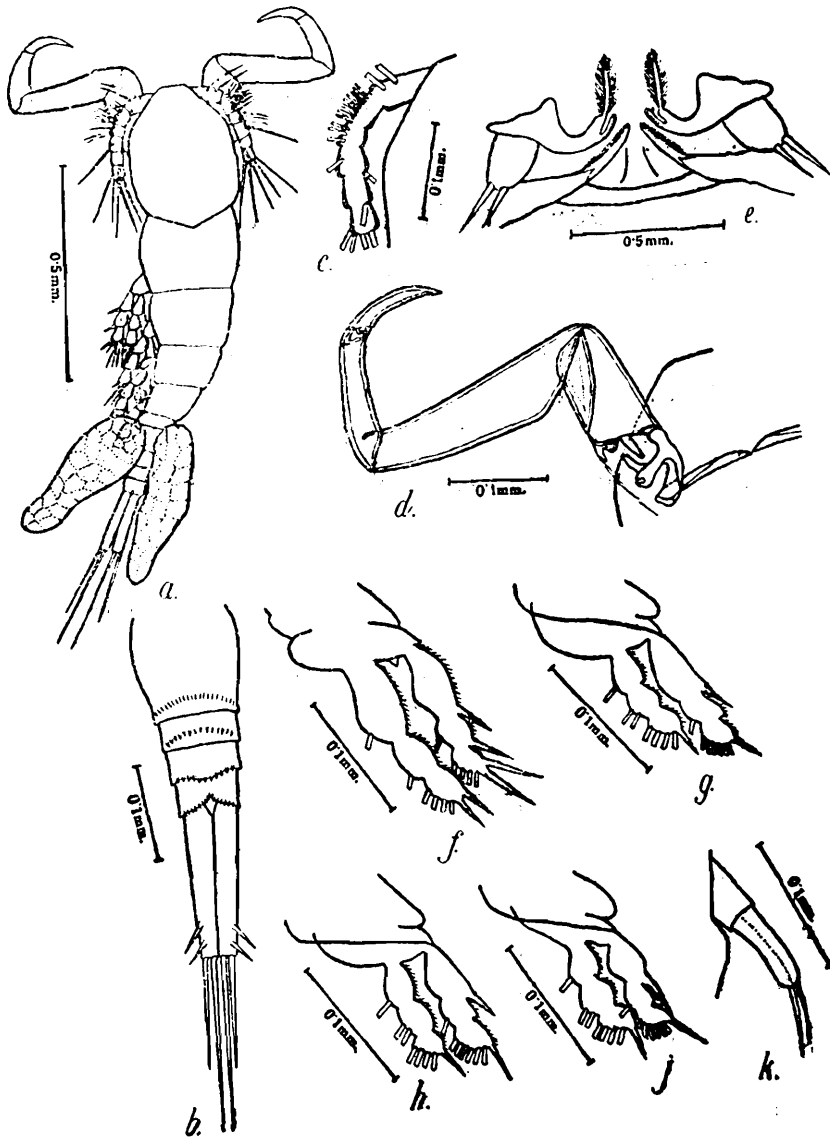
TABLE NO. I.

Place.	No. of host examined.	Total length range of host in mm.	No. of host infected.	No. of parasites present on host.
1. Serampore (Bengal)	4	117—165	1	7
2. Barrackpore (Bengal)	1	292	1	15
3. Belghuria (Bengal)	4	203—210	..	..
4. Bidhyadhari (Bengal)	4	115—166	..	
5. Midnapore (Bengal)	6	86—108		
6. Hirakud (Orissa)	5	265—270		
7. Cuttack (Orissa)	50	111—342		
8. Ramchandrapuram (Madras)	3	124—168		
9. Rajahmundri (Madras)	1	222		..
	78		2	

Most of the species of *Ergasilus* have been found infecting fresh-water fishes in Europe, America and Asia. In India, so far, only six species have been recorded *viz* : (1) *E. bengalensis* Southwell and Prasad 1918.

\* Published with the kind permission of the Chief Research Officer.

and (2) *E. scotti* Sundara Raj 1923, from *Wallago attu* (3) *E. hamiltoni* Southwell and Prasad 1918, from *Anabas testudineus* (4) *E. nanus* Van Beneden, 1870, from *Mystus gulio* and *Pseudapocryptes laceolatus*, (5) *E. gibbus* Nordmann 1832, from *Ophicephalus gachua*, and (6) *E. polynemi* Redkar, Rangnekar and Murti 1951, from *Eleutheronema tetradactylum*. The first three species are from fresh water, the next two from brackish water and the last one is a marine form. *E. batae* sp. nov. is seventh species found to occur on Indian fishes and is the first record from the gills of an Indian carp.



TEXT FIG. 1 *Ergasilus batae* sp. nov. a.—Dorsal view of female. b.—Ventral view of abdomen and anal laminac. c.—First antenna. d.—Second antenna. e.—Mouth parts. f.—First leg. g.—Second leg. h.—Third leg. j.—Fourth leg. k.—Fifth leg.

*Description of the Female.*—The main body of the parasite was dirty blue and the egg strings were creamy in colour. The parasites were attached in numbers in both the instances only over the anterior hemibranch of the second gill. The heads of the parasites were invariably directed towards the gill-arch. This mode of attachment perhaps offers least resistance to the water flowing through the gill chamber and the parasites do not get washed off from the gill surface. Nauhaus (1929) also has reported the same manner of attachment for *E. siebolde* (Nordmann).

The body (fig. 1a) is long and slender, tapering posteriorly and nearly four times as long as its maximum width (maximum width being in the region of the mouth) and about three and half times as long as cephalon. The cephalon is not fused with the first thoracic segment. Its anterior margin is slightly flattened, the lateral sides curved and the posterior margin broadly 'V' shaped. The cephalon is little wider than the first thoracic segment. The five thoracic segments decrease progressively in length and breadth posteriorly. The fifth, the shortest thoracic segment is not easily distinguishable from the genital segment which follows it. The latter is broad anteriorly and tapers gradually towards its posterior end to which are attached two long egg sacs. Each egg sac contains 25—30 eggs. The abdomen (fig. 1b) consists of three segments of nearly equal lengths which progressively diminish in width. Ventrally, the posterior margin of each abdominal segment is beset with small setae. The last segment is slightly forked in the middle along its posterior margin and bears two anal laminae which are about  $1\frac{1}{2}$  times longer than the abdomen. Each lamina is 7 times as long as wide at its base and bears three setae of which two are attached at its distal end and the third set dorsally. The inner of the two distal setae is longer and the third dorsally placed seta is the shortest of all.

A pair of fused eyes (0.032 mm. in diameter) is situated dorsally in the anterior one third of the cephalon. The first pair of antennae (fig. 1c) is six-jointed, the first segment being the longest. The second and third are not clearly demarcated from each other. The rest of the three segments are nearly equal in length. The arrangement of the setae on the segments is as follows: 1st segment—2, 2nd segment—9-10, 3rd segment—3, 4th segment—2, 5th segment—1 and 6th segment—4.

The second pair of antennae (fig. 1d) is nearly half of the body length, and two and half times longer than the first pair. It is well developed for prehension and has five segments each. The first segment is short; the second is wedge-shaped; the third is long and slender, four times as long as wide; the fourth segment is shorter than the third; and the fifth is a strongly chitinised-clawed segment. No spines or papillae are present on any of the segments. The mouth is situated ventrally in the posterior third of the cephalon, 0.253—0.3 mm. from the anterior margin. The mouth parts (Fig. 1e) consist, as usual, of mandibles, two pairs of maxillae and two lips. The mandible is two-jointed. The first joint is broad at its base, which slowly narrows and is curved anteriorly, where the terminal joint is attached. The terminal joint is beset profusely with fine hairlike setae on its inner and outer margins. The mandibular palp whose inner margin is beset with small hair like setae, is attached to the posterior margin of the first segment. The first maxilla is short and stumpy and has two long setae at its free end. The outer seta is a little longer than the inner one. The second maxilla is two-jointed. The basal segment is long and tapering. The terminal joint is beset with small setae along its outer margin. The terminal joints cross each other anteriorly as in *E. myctarothus* (Wilson 1913). The first four pairs of thoracic legs (figs. 1f, g, h and j) are well developed and biramous. All the ramii are three-jointed. The fifth leg (fig. 1k) is rudimentary and has two segments. The terminal segment has two long setae. The number

and the arrangement of the spines (in bold numbers) and setae on the legs are as follows :

First pair of legs	.	.	.	{ Exo. 1-0, 1-1, 2-4 Endo. 0-1, 0-1, 2-4
Second pair of legs	.	.	.	{ Exo. 1-0, 0-1, 1-6 Endo. 0-1, 0-2, 1-4
Third pair of legs	.	.	.	{ Exo. 1-0, 0-1, 1-6 Endo. 0-1, 0-2, 1-4
Fourth pair of legs	.	.	.	{ Exo. 1-0, 0-1, 1-6 Endo. 0-1, 0-2, 1-4

The male is not known.

The measurements (in mm.) of five specimens of *E. batae* sp. nov. are given in the Table II.

TABLE II.

	I	II	III	IV	V
1. Total length	1.248	1.185	1.169	1.153	1.090
2. Length of cephalon +first thoracic seg- ment.	0.521	0.506	0.490	0.474	0.348
3. Breadth of cephalon	0.284	0.269	0.269	0.237	0.237
4. Distance of cephalic notch from ant. margin.	0.348	0.316	0.332	0.316	0.284
5. Length of abdomen	0.146	0.139	0.139	0.139	0.139
6. Length of anal lamina	0.190	0.174	0.174	0.174	0.174
7. Length of <i>outer</i> seta of anal lamina.	0.219	0.219	0.201	0.201	0.201
8. Length of <i>inner</i> seta of anal lamina.	0.183	0.183	0.164	0.164	0.164
9. Length of egg-sac	0.474	0.340	0.411	0.332	0.379
10. Breadth of egg-sac	0.142	0.126	0.095	0.079	0.111
11. Length of first antenna		0.223	0.221	0.219	0.215
12. Length of second antenna.	..	0.553	0.553	0.553	..
13. Length of genital seg- ment.	0.091	..	0.080	0.091	..
14. Breadth of genital segment.	0.128	..	0.091	0.113	..

*Breeding*.—Very little is known about the breeding season of *Ergasilus* in India. In N. America and Central Europe, *Ergasilus* is not known to breed in winter months (Wilson, 1911 and Nauhaus, 1929). According to Wilson (1911), in N. America, there are three peak periods of breeding, namely : April-May, July-August, and October-November. Mature female specimens of *E. batae* sp. nov. were collected by the author in the months of June and November. Southwell and Prasad (1918) collected female specimens of *E. bengalensis* and *E. hamiltoni* with eggs during the months of June and December respectively. Sundara Raj (1923) collected female specimens of *E. scotti* with and without egg-cases in the month of August. The above records indicate that in India *Ergasilus* breeds in summer as well as in winter.

*Pathology*.—The parasite attaches itself to the gills of the host by the help of the strongly clawed second pair of antennae. This produces small punctures in the gill filaments and causes irritation to the host. Instances of fish mortality are known due to presence of *Ergasilus* in large numbers. Nauhaus (1929) has recorded as many as three thousand specimens of *Ergasilus* from a single Tench, 250 mm. in size. As a remedial measure, he has suggested to neat and clean the fish during the winter when the parasite is not breeding. In the present case the host appeared to be healthy and no hypertrophy of the gill tissue was noticed at the seat of infection.

*Remarks*.—The outstanding characters of this species are :—long and slender body, shape of the cephalon, markedly elongated second pair of antennae, presence of rows of small setae on the ventral side of the abdominal segments, strikingly elongated anal laminae and serrated spines of the legs.

*E. batae* sp. nov. differs from six species of *Ergasilus*, so far recorded from India, in various characters as is evident from the artificial key to the species of *Ergasilus*, given below.

*E. batae* sp. nov. resembles *E. chautauquaensis* Wilson 1911 with regard to the size of the body, shape of the cephalon, presence of rows of setae or teeth on the ventral side of abdominal segments, and number and arrangement of spines and setae on the second and third legs. The two species differ in the size of the anal lamina, the length of second antenna compared to first antenna, number of joints of the fourth leg and the size of fifth leg. In *E. batae*, each lamina is seven and a half times as long as wide, while in *E. chautauquaensis*, it is square. The second pair of antennae is two and a half times longer than the first pair in the former case whereas it is shorter in the latter. In *E. batae*, the exopod of the fourth leg is three-jointed but it is two-jointed in *E. chautauquaensis*. The fifth leg of *E. batae* is longer than that of *E. chautauquaensis*.

An artificial key to the species of *Ergasilus* described from Indian Fishes :

- 1(6) Head distinctly separated from first thoracic segment by a groove ; exopod of the fourth leg two or three jointed. .2
- 2(3) Second thoracic segment half the width of the first thoracic segment ; first thoracic segment as wide as head. .

. . . *E. gibbus* Nordmann, 1832.

- 3(2) Second thoracic segment more than half the width of the first thoracic segment; first thoracic segment little wider or narrower than the head . . . . . 4
- 4(5) Anterior margin of the carapace evenly rounded; first thoracic segment little wider and three times longer than head; anal laminae nearly as long as last abdominal segment; exopod of the fourth leg two-jointed; fifth leg rudimentary and reduced to an elongated process only. . . . .  
*E. hamiltoni* Southwell and Prasad, 1918.
- 5(4) Anterior margin of the carapace flattened; first thoracic segment little narrower than and about half as long as head; anal laminae four times as long as last abdominal segment; exopod of the fourth leg three-jointed; fifth leg rudimentary, two-jointed, ternial joint with two setae. . . . .  
*E. batae* sp. nov.
- 6(1) Head completely fused with the first thoracic segment, exopod of the fourth leg two-jointed.
- 7(10) Second thoracic segment narrows to less than half the width of cephalothorax; anal laminae as long as wide, each with three or four setae; egg-strings longer than the entire length of body . . . . . 8
- 8(9) Cephalothorax broad at the anterior end; third and fourth thoracic segments equal in width; second pair of antennae distinctly longer than cephalothorax; anal lamina with three setae; fifth leg much reduced and of papillae form, ending in couple of spines. . . . .  
*E. scotti* Sundara Raj, 1923.
- 9(8) Cephalothorax greatly narrowed at its anterior end; third thoracic segment broader than the fourth thoracic segment; second pair of antennae as long as cephalothorax; anal lamina with four setae; fifth leg two-jointed, proximal joint with a small spine, and distal joint with one long and two small setae. . . . .  
*E. polynemi* Redkar, Rangnekar and Murti, 1951.
- 10(7) Free thoracic segments regularly decrease in width; anal laminae rhomboidal or rectangular, each with two or three setae; egg-strings shorter than the entire length of body. . . . . 11
- 11(12) Cephalothorax more or less elliptical; second pair of antennae distinctly longer than cephalothorax; anal laminae rhomboidal, each with two setae and much longer than the last abdominal joint; fifth leg much reduced, knob like, with single spine. . . . .  
*E. bengalensis* Southwell and Prasad, 1918.

- 12(11) Cephalothorax narrowed posteriorly ; second pair of antennae as long as cephalothorax ; anal laminae rectangular, as long as last abdominal segment, each with three setae ; fifth leg three times longer than broad, armed with three setae.

*E. nanus* Van Beneden, 1870.

#### ACKNOWLEDGEMENTS.

I am indebted to Mr. Y. R. Tripathi for his guidance, kind help and encouragement in this work. My sincere thanks are due to Dr. T. J. Job and Dr. V. G. Jhingran for kindly going through the manuscript critically. My thanks are also due to Messrs. K. H. Alikunhi and H. Chaudhuri for kindly giving me specimens of *Labeo bata* from Ramchandrapuram and Rajahmundry. And finally I am grateful to Mr. G. N. Mitra, Deputy Director of Orissa Fisheries for according facilities for work at Cuttack.

#### REFERENCES.

- Gurney, R. 1933.—British fresh-water copepoda. *Ray Society*, 3, pp. 311-316.
- Nauhaus, E. 1929.—Untersuchungen über die Lebensweise von *Ergasilus sieboldi*, Nordm. *Zeist. f. Fischerei*, 27, pp. 341-398.
- Pearse, A. S. 1932.—Observations on the ecology of certain fishes and crustaceans along the bank of Matla river at Port Canning. *Rec. Ind. Mus.*, 34, pp. 289-298.
- Raj, B. Sundara, 1923.—A new copepod parasite from the gills of *Wallago attu*. *Madr. Fish. Bull.* 17, Report No. 2, Madras, pp. 45-48.
- Redkar, M., Rangnekar, P. G. and Murti, N. N., 1951.—*Ergasilus polynemi* sp. nov. (Copepoda) parasitic on the fish *Polynemus tetradactylus* Shaw. *Jour. Zoo. Soc. Ind.*, 3, pp. 223-227.
- Southwell, T and Prasad, B., 1918.—Notes from Bengal fisheries laboratory. No. 5. Parasites from Indian fishes with a note on the Carcinoma in the climbing perch. *Rec. Ind. Mus.*, 15, pp. 341-355.
- Wilson, C. B. 1911.—North American parasitic copepods belonging to the family Ergasilidae. *Proc. U. S. Nat. Mus.* 39, pp. 263-400.
- 1913.—Crustacean parasites of West Indian fishes and land crabs, with descriptions of new genera and species. *Proc. U. S. Nat. Mus.*, 44, pp. 189-277.
- 1916.—Copepod parasites of fresh-water fishes and their economic relation to Mussel glochidia. *Bull. U. S. Bur. Fish.*, Washington, 34, pp. 331-374.