TWO NEW SPECIES OF *ARGULUS* MULLER (CRUSTACEA: BRANCHIURA) FROM RIVER CAUVERY WITH A KEY TO INDIAN SPECIES

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ABSTRACT

Two new species of *Argulus* Muller viz., *A. fluviatilis* and *A. cauveriensis* collected from River Cauvery at Hoginekal, South India, are described, with a discussion on their affinity to the other Indian species. The paper also provides a key to the Indian species of *Argulus*.

INTRODUCTION

Species of *Argulus* Muller in the collections of the Zoological Survey of India have been described by Ramakrishna (1951). The four species hitherto reported are *Argulus siamensis* Wilson, *Argulus indicus* Weber, *Argulus giganteus* Ramakrishna, *Argulus bengalensis* Ramakrishna, *Argulus siamensis peninsularis* Ramakrihna and *Argulus puthenvelliensis* Ramakrishna.

The present species were collected from river Cauvery at Hoginekal, 33 river miles above Mettur Dam, in spawn-nets during collection of drift invertebrates. Since the specimens were with ripe overies, it is presumed that they might have left the host for the purpose of egg laying and caught free from the river.

The types are deposited in the Reference Collection Museum of the C.M.F.R. Institute, Mandapam Camp.

ARGULUS FLUVIATILIS SP. NOV.

(Fig. 1, A-E)

Material: Holotype, one female 6.714 mm long. Reg. No. C.M.F.R.I. 159.

Locality: Hoginekal, Cauvery river, 33 miles by river above Mettur Dam, collected on 31st May 1964.

Description: Carapace almost as broad as long with deep posterior sinus. Lateral lobes of carapace convex, overlapping all swimming legs. Dorsal paired

ridges of carapace curve outward beyond paired eyes anteriorly and discontinuous posteriorly with posterior straight pieces ending near posterior transverse groove of cephalic region (Fig. 1, A).

Paired lateral eyes conspicuous, round and nearer the anterior end. Median eye well defined.

Paired respiratory areas elongated, lying side by side and longitudinally disposed. Anterior respiratory area longer and more than five times as broad as outer one which does not extend backwards beyond level of anterior area (Fig. 1, B).

Antennule with well-developed lateral hook and less-defined hook on anterior process (Fig. 1, C). Posterior spine straight and pointed, basal spine stout, long, and with acute tip. Second antenna with large basal segment. Postantennal spines large and pointed.

Suckers well developed, placed near midventral line. Rib of suction cup with 7 to 8 imbricate plates besides an elongated basal segment (Fig. 1, E).

Second Maxilla with large triangular basal plate bearing three blunt, backwardly directed teeth of similar size (Fig. 1, D). Tip of maxilla with two minute spines. Maxillary spines stout with pointed tips. Postmaxillary spines stouter than maxillary spines.

First two pairs of swimming legs provided with a flagellum. Fourth pair of legs bear stout, bluntly pointed and posteriorly directed lobes in female.

Abdomen nearly as long as broad with deep anal sinus lodging paired anal papilla. Female genital apertures opening on ventral surface near base of abdomen.

ARGULUS CAUVERIENSIS SP. NOV.

(Fig. 1, M-Q)

Material: Holotype, one female 6.286 mm long. Reg. No. C.M.F.R.I. 160. Paratype, one female 5.640 mm long. Reg. No. C.M.F.R.I. 161.

Locality: Hoginekal, Cauvery river, collected on 3rd-4th July 1964.

Description: Carapace distinctly longer than broad, with deep posterior sinus. Lateral lobes of carapace convex, overlapping only three swimming legs on dorsal side. Paired ridges on dorsal surface of carapace discontinuous posterior to nauplius eye, diverging further back and ending near transverse groove at middle of body (Fig. 1, M).

Paired eyes anterior and well developed. Nauplius-eye well defined.

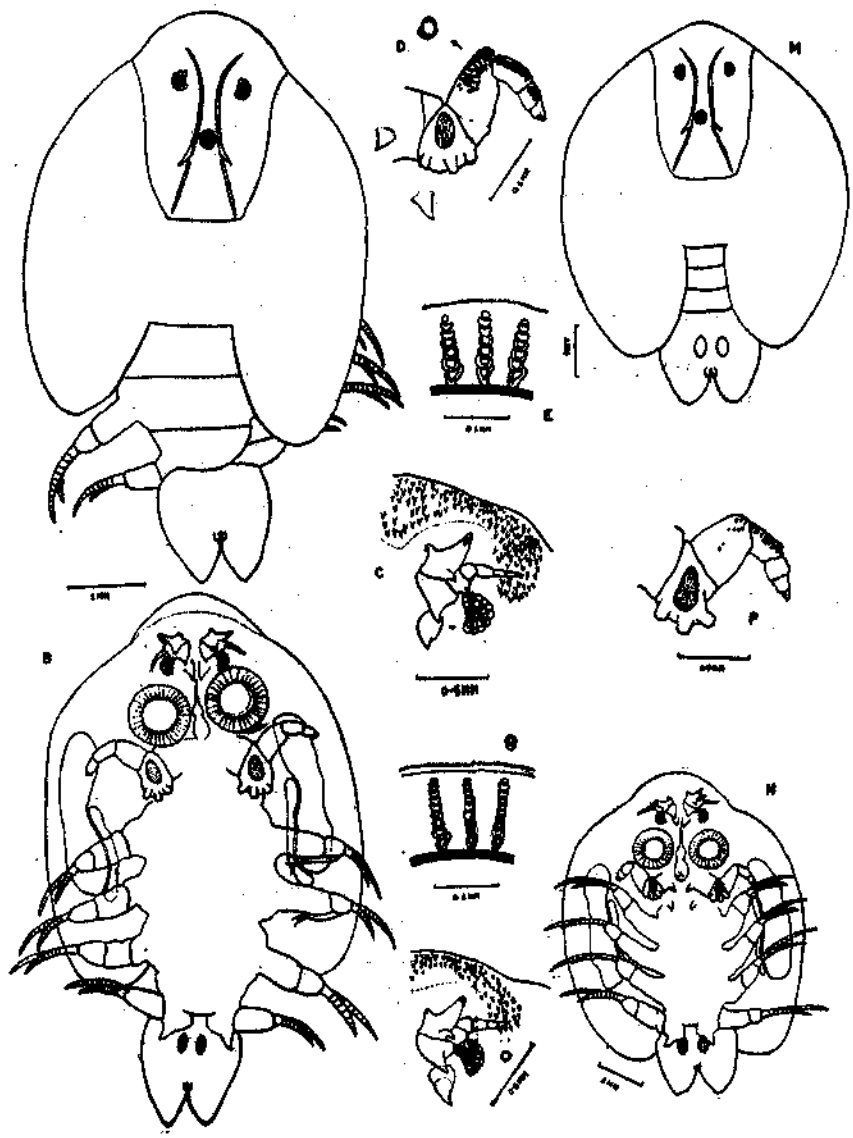

FIG. 1. *Argulus fluviatilis* sp. nov. and *Argulus cauveriensis* sp. nov. A-E *A. fluviatilis*, A: Whole animal, dorsal view; B: Whole animal, ventral view; C: Anterior region showing antennule, second antenna and compound eye; D: Second maxilla; E: Margin of sucker showing supporting ribs. M-Q *A. cauveriensis*, M: Whole animal, dorsal view; N: Whole animal, ventral view; O: Anterior region showing antennule, second antenna and compound eye; P: Second maxilla; Q: Margin of sucker showing supporting ribs.

Paired respiratory areas elongated and lie side by side longitudinally. Outer anterior one 3 or 4 times broader and 1½ times longer than inner posterior area (Fig. 1, N).

Antennule with minute anterior hook, well-developed lateral hook and posterior spine and stout basal spine. Second antenna with large basal segment. Postantennal spine long and pointed (Fig. 1, O).

Suction cups larger and placed nearer to each other. Besides one basal elongated segment, 8 or 9 imbricate plates decreasing in size from base of rib towards outer margin (Fig. 1, P).

Teeth of basal plate of second maxilla blunt (Fig 1, Q). Terminal joint bears two spinules on inner side. Maxillary and postmaxillary spines stout and pointed.

Flagella of first two swimming legs well developed and directed towards body, parallel to appendages. Boot-shaped processes present on basipod of last pair of swimming legs as in females of other species.

Abdomen nearly as long as broad with deep anal sinus less than half the length of abdomen. Posterior margins of abdomen bluntly pointed. Paired female genital apertures in abdomen and paired anal papilla in anal sinus present.

All specimens of *A. cauveriensis* were females with ovaries full of ripe ova ready to be deposited.

Body measurements of both species are given in Table 1.

TABLE 1. *Body measurements of* A. fluviatilis *and* A. cauveriensis (*in mm*).

	A. fluviatilis	*A. cauveriensis*
Total length	6.714	6.286
Maximum breadth	4.857	4.000
Carapace length	5.643	4.643
Abdomen:		
length	1.429	1.286
breadth	1.643	1.214
Diameter of sucker	0.857	0.786

AFFINITIES

In the nature of the respiratory areas which is the chief diagnostic feature in argulids, *A. cauveriensis* resembles *A. puthenvelliensis* Ramakrishna and *A. fluviatilis* resembles *A. siamensis peninsularis* Ramakrishna. The structure of the first antenna, second antenna and second maxilla is almost the same in

A. cauveriensis, *A. fluviatilis* and *A. puthenveliensis*. While the number of imbricate plates besides the elongated basal segment are 7 to 8 and 8 to 9 respectively in the former two spcies, they are only 4 to 5 in the latter. The carapace is longer than broad in *A. cauveriensis* and *A. puthenveliensis* but as long as broad in *A. fluviatilis*. It covers all the swimming legs of *A. fluviatilis* (only one specimen observed) and female *A. puthenveliensis* but overlap only three in *A. cauveriensis* and male *A. puthenveliensis*. The abdomen is long and spindle shaped in *A. puthenveliensis* but nearly as long as broad in both the present species.

Remarks

In round-the-clock collections of drift invertebrates made at Hoginekal in river Cauvery during summer (31-5-64 to 1-6-64), autumn (3 & 4-7-64) and winter (9 & 10-12-64) *Argulus* spp., occurred only in summer and autumn. Diurnal periodicity observed in almost all other invertebrates was not observed in *Argulus* spp., as in summer one specimen each in day and night were represented in the collections. All were gravid females and appeared to have abandoned their hosts in the warmer months for egg deposition.

Key to the Indian Species of *Argulus*

1. Anterior respiratory area prolonged laterally around the posterior respiratory area. 2

   Anterior respiratory area small anterior or in the central mesial notch of posterior respiratory area. 5

2. Anterior respiratory area broader; posterior respiratory area extends posteriorly beyond the posterior margin of the anterior respiratory area. .. 2
   Anterior respiratory area broader; posterior margin of both respiratory areas in same level 4

   Anterior respiratory area narrower as posterior; posterior respiratory area extends beyond posterior margin of anterior respiratory area; rib of suction cup with 4 to 6 plates including the basal segment; teeth in basal plate of second maxilla blunt and short. .. .. *siamensis*

3. Posterior respiratory area extends by 1|3 its length beyond the posterior margin of anterior respiratory area; ribs of suction cups with 5 imbricate plates plus an elongated basal segment; teeth of basal plate of second maxilla rather pointed. .. .. *puthenveliensis*

   Posterior respiratory area extends by 1|12 its length beyond posterior end of anterior area; ribs of suction cup with 8 imbricate plates plus an elongated basal segment; teeth of basal plate of second maxilla blunt.

4. Ribs of suction cup supported by 6 to 7 imbricate plates plus an elongated basal segment; teeth of basal plate of second maxilla blunt. .. .. *fluviatilis*

Ribs of suction cup supported by 4 to 5 plates including the basal segment; teeth of basal plate of second maxilla blunt and short. . .

*siamensis peninsularis**

5. Anterior respiratory area oval, subequal to and far in front of the posterior area between suckers and maxillipeds; ribs of suction cup with 25 to 26 imbricate plates. Inner two teeth of the basal plate longer and broadly pointed, widely separated from the small and blunt third teeth. . . *giganteus*

Anterior respiratory area minute just anterior to the very large and oblong posterior one; ribs of suction cup with 3 rods and not of imbricate plates; second maxilla slender, basal plate with three large teeth. . . *indicus*

Anterior respiratory area minute, in the central mesial notch of the posterior one; ribs of suction cups with 5 to 6 imbricate plates of which the basal one is the longest; basal plate of second maxilla with three strong pointed spines. . . . . *bengalensis*

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* Ramakrishna (1951) described only the respiratory areas in *A. siamensis peninsularis*. The plates in ribs and nature of teeth in basal plate of 2nd max. are presumed to be the same as in *A. siamensis* in this key.