

ISOPOD PARASITES OF FREE-LIVING COPEPODS OF MADRAS

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INTRODUCTION

THOUGH the Bopyrids of the Indo-Pacific region have been studied by many workers and the Indian Bopyrids treated exhaustively by Chopra (1923), the Epicarids parasitic on free-living Copepods of the Indian coast have not received any attention. Nierstrasz and Brandis (1923) have given an excellent account of the Indo-Pacific Epicaridea collected by Siboga expedition, but the Microniscidæ parasitic on Copepods have been given only a brief reference. Tattersall's account (1905) of the Microniscidæ collected from Nordisches Plankton has however proved very helpful to the authors in preparing this brief note on three of the Indian forms, occurring on the Madras coast.

In the course of the studies of Copepods of Madras Plankton, 13 Isopods were found as ecto-parasites on free-living Copepods belonging to the genera *Acartia*, *Acrocalanus* and *Eucalanus*, between 11-9-1947 and 6-10-1947. The data collected as regards the number of parasites, their respective hosts, size and colour are given in the table below.

Type	No. of Specimen	Colour	Length	Breadth	Host	Remarks
A	2	Greenish-White with phosphorescent spots	mm. 1.64	mm. 0.9	<i>Acartia</i>	
B	1	Reddish	1.32 1.00 1.20	0.48 0.28 0.32	<i>Eucalanus</i> <i>Acartia</i> <i>Acrocalanus</i>	
C	7	Greenish-White	1.24 1.32 1.36 1.40 1.24 1.48	0.36 0.48 0.48 0.56 0.32 0.60		This is found parasitic on two hosts

The hosts were free-living Copepods belonging to the genera *Acartia*, *Acrocalanus* and *Eucalanus*. The parasites do not seem to affect the host

at all, as far as its swimming powers, body size or sexual maturity are concerned. Nor were there any pathological developments. The percentage of occurrence of the infected Copepods is very negligible. Though a total number of 6,000 specimens of *Acartia* was examined from 20 samples, the number of infected Copepods was only 7. In the same way, among the 10,000 *Eucalanus* and 8,000 *Acrocalanus* examined, only one of the former and two of the latter were found infected.

The 13 parasites collected fall into three definite types and appear to be restricted to three genera of hosts, *Acartia*, *Acrocalanus* and *Eucalanus*, one of the three types being found on two of these hosts (*Acartia* and *Acrocalanus*). As there were no means of determining whether these were larvæ or adults, male or female, the authors felt that they may be provisionally described as different species of the genus *Microniscus* with the specific names indicating the genera of the hosts, as *Tattersall* has done, until we know more about their life-histories.

All the three parasites were found attached to the cephalothorax of their hosts in the same oblique position, the posterior part of the parasite being on the lateral side of the host with the anterior side extending over the dorsal side. This position is probably due to the small size of the hosts—average length 2.97 mm., breadth 0.72 mm., in proportion to that of the parasites—average length 1.45 mm. and breadth 0.56 mm. It is also probable that the oblique position is the most suited for the parasite to be attached without hampering the movements of the limbs of the hosts. Prehension appears to be with the help of the antennæ, the thoracic legs, the flat form of the body and pointed uropods. The parasites are easily dislodged from the body of their hosts and when detached they crawl on their thoracic legs in the watch-glass. Frequently they fall on their dorsal side and remain inactive. Even when the parasites were crawling about, they appeared to be indifferent in securing a fresh host though several Copepods of their host genera as well as others were placed in their vicinity. After dislodging the parasite, the host was examined carefully for any injury inflicted by the mouth parts of the parasite. As there were no wounds in the few forms examined, it is possible that the parasites had just fastened themselves to their hosts. By the prehensile nature of the limbs and absence of food-capturing organs, the possibility of their being just epizoic can be ruled out. The parasites appear to have no power of swimming, the pleopods which appear to be respiratory never being brought into play. The entire abdomen not being attached to the host, the posterior free part was lifted up and lowered down. Such ventilatory movements were slow, lasting from 8 to 10 seconds and

repeated 5 to 7 times a minute. Observation of the tiny parasites was facilitated by staining them in neutral red. One of them moulted during observation, the ecdysis starting from the cephalic region and extending backwards. But it was found impossible to rear them for a period longer than three days.

TYPE A

Microniscus acartii

Host: *Acartia erythræa* Giesbrecht.

Locality: Madras Coast.

Size of the Host: 2–7 mm. long and 0·72 mm. broad (average).

The two specimens found, measured 1·64 mm. from the anterior tip of the cephalic plate to the posterior tip of the setæ of the uropod and 0·9 mm. across the body between the outer edges of the tergal plates. The body is twisted about the commencement of the abdominal region so that when the abdomen is viewed dorsally the part anterior to it is seen from a lateral aspect.

The segmentation of the body is very clear, especially on the ventral side. As in all isopods, there are seven free thoracic segments in front of which is a large and prominent shield of crescentic shape. This carapace covers the cephalothorax of six segments. The anterior edge of this plate projects freely forwards for a short length. This free, flexible margin is probably of use in getting a closer and firmer contact on the surface of the host's body than an abrupt sharp edge would secure. The dorsal side of the carapace is marked by a pair of conspicuous eyes consisting of 4 elements. The dorsal surface of the body is distinguished by two rows of 10 phosphorescent spots, one row on each side of the median line behind the carapace. Each spot is circular with irregular edges and is of a dirty yellow colour by daylight. The telson is a broad plate with a median emarginate tip (Fig. 1 T).

Appendages.—The first antenna extends ventrally beyond the carapace and is not hidden by it. The protopodite appears to be 3 jointed, cylindrical. The endopodite is short, slender and pointed—dactylose while the exopodite is two jointed, twice as long as the endopodite (Fig. 1 A). The second antenna is far longer, being nearly twice as long as the first. The three joints of the protopodite are cylindrical and the last two are marked by their distal edges being prolonged into a spine each (Fig. 1. B).

The mouth parts are attached medially just behind a rostral or labral plate which however does not form a complete sheath. The mandible, the 1st maxilla and the 2nd maxilla are attached closely together with their

distal tips directed inwards and forwards. The mandible appears to be simple, blunt-tipped, and probably with a sharp posterior edge. The tips of the two mandibles are directed medially. The 1st maxilla is three-jointed, the basal joints are stout while the third is long, slender and pointed. The 2nd maxilla is two-jointed and tapers into a pointed process (Fig. 1 D).

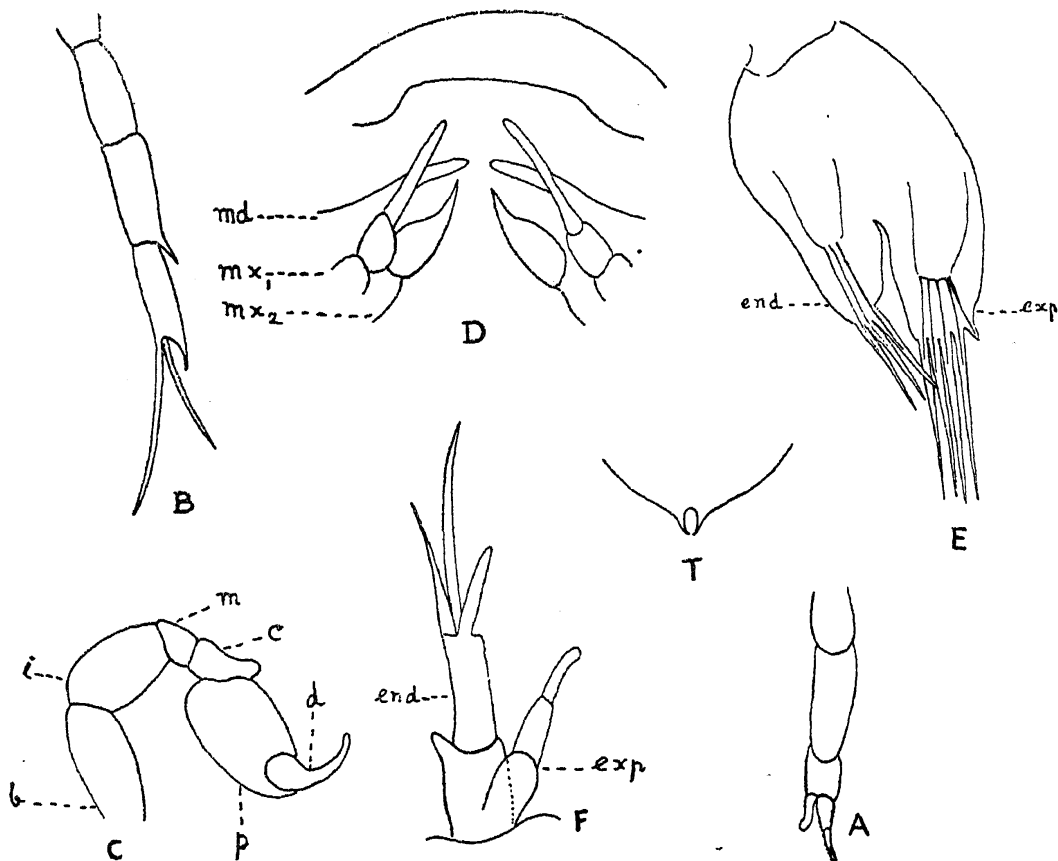


FIG. 1. *M. acartii* (Appendages)

As in all Isopods, there are seven pairs of six articulated thoracic legs. The legs are short and prehensile. The proximal part curves outward, while the distal part, ending in a long, slender claw-like dactylus, is curved inwards (Fig. 1 C). This facilitates a purchase on the host's body. There are five pairs of biramous foliaceous pleopods which are all alike and exhibit no trace of articulation. The exopodite of each bears a short, blunt spine at its outer distal edge and four setæ. The endopodite bears three setæ (Fig. 1 E). The uropod on either side is extended straight behind and is parallel and biramous. The protopodite is single-jointed bearing the endopodite on its inner side a little before its distal edge which is drawn out into a small spine on the outer side and bears the exopodite. The exopodite is long, cylindrical and bears three spines, the middle one being the longest. The endopodite is shorter and more slender. It is single-jointed and bears a spine (Fig. 1 F). The two uropods with their tapering spiny ramii are

pressed close together, to form the pointed, posterior end of the body and serve as a hold on the host.

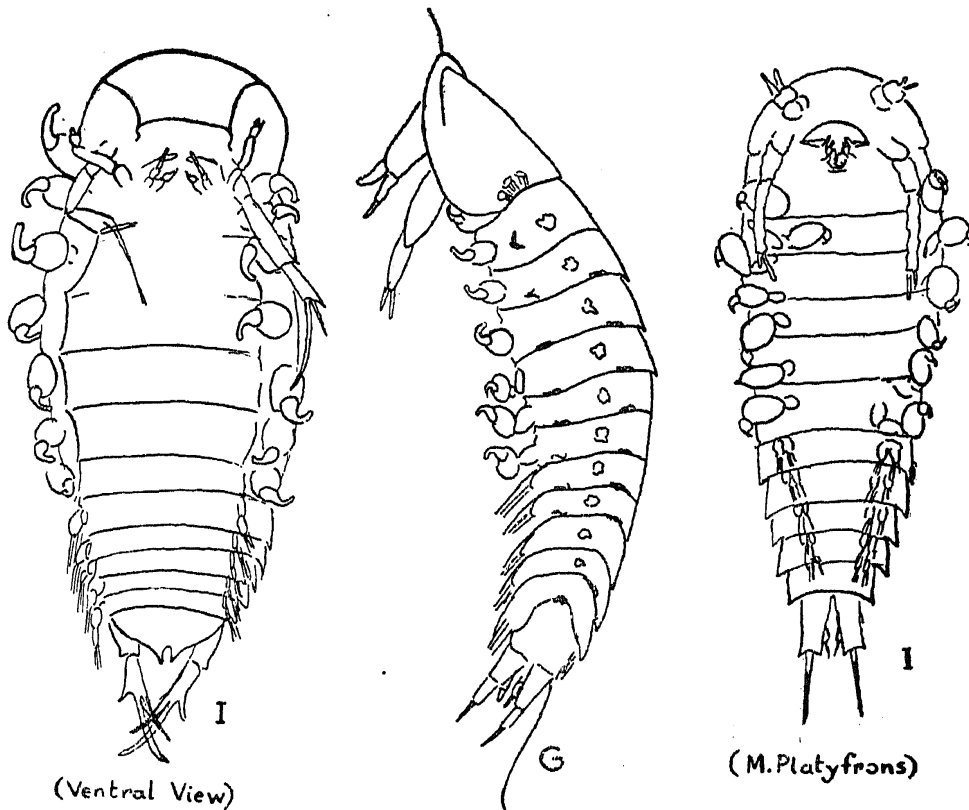


FIG. 2. Ventral and lateral views of *M. acartii* and ventral view of *M. platyfrons*

TYPE B

Microniscus eucalani

Host: *Eucalanus crassus* Griesbrecht.

Locality: Madras Coast.

Size of Host: 4.0 mm.

The parasite measured 1.32 mm. long and 0.48 mm. broad. The whole body is hirsute on the dorsal surface. There is no torsion of the body which is marked by a number of densely scattered red pigment spots giving the parasite a very light reddish colour. The edge of the cephalic plate is toothed and has no free flexible margin.

Appendages.—The 1st antenna is short, 3-jointed and uniramous. The basipodite has 3 spinous processes on its outer side. The 2nd joint is half as broad as the 1st and bears 3 setæ on its inner surface and a tuft of hairs on the outer side. The 3rd joint has 4 terminal bristles (Fig. 3 A). The 2nd (Fig. 3 B) antenna is nearly 5 times longer than the 1st. It is 8-jointed and flagellar. Each joint bears one or two spines on its distal edge while the terminal joint bears three long bristles.

The mouth parts are similar to those of *M. acartii*, excepting for the difference in the lengths of the joints of the 2nd maxilla. In the present form all the mouth parts are directed anteriorly (Fig. 3 D).

The thoracic legs appear better fitted for prehension. The propodus is large and swollen, with the sharp-pointed dactylus folding on it giving the leg a chelate termination (Fig. 3 C).

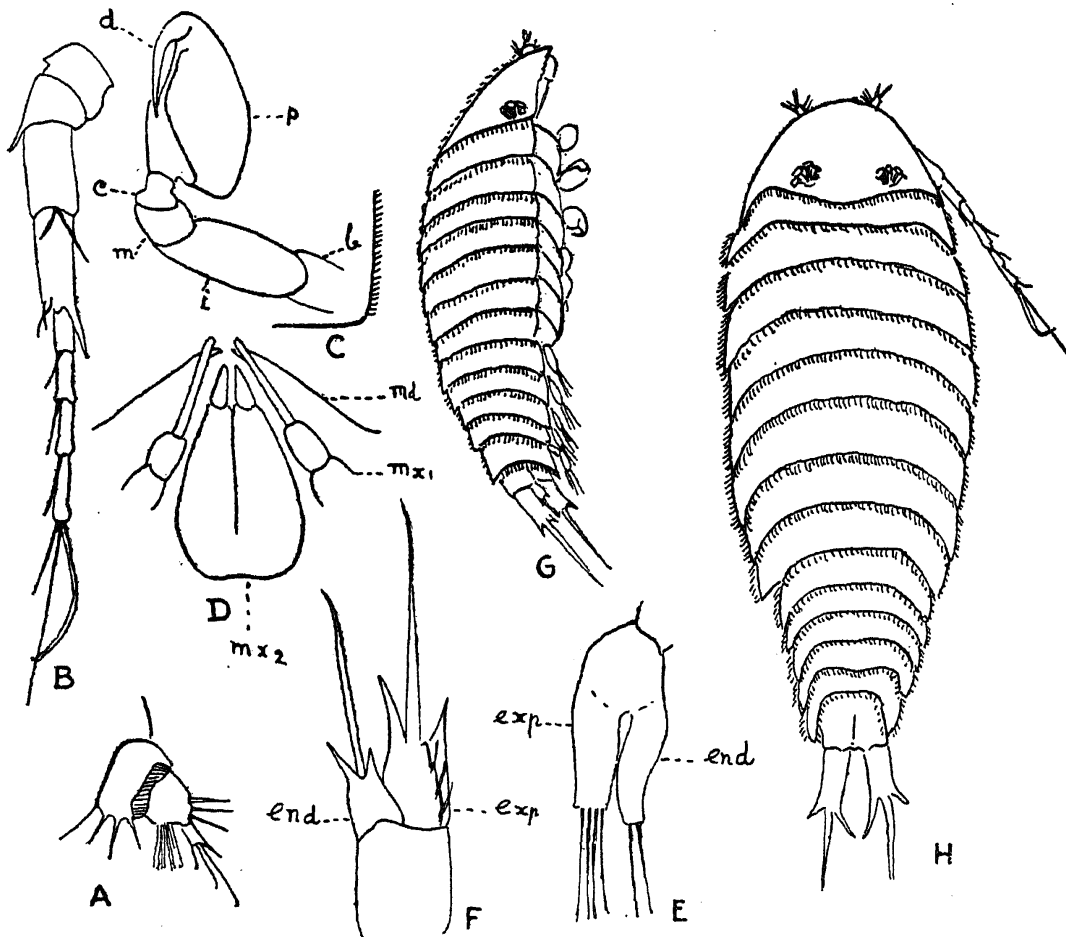


FIG. 3. *M. eucalanii* (Appendages and dorsal and lateral view)

There are five pairs of biramous pleopods. The endopodite bears two long setæ and the exopodite bears four long setæ (Fig. 3 E).

The uropods are biramous. The protopodite is single-jointed, stout, cylindrical. The exopodite has a sharp ridge bearing three slender spines and ends in a long curved spine.

The sides of the joint are produced into two stout, short spines, one on either side. The endopodite is smaller but single jointed. Its distal edge is drawn into two short stout spines, while it terminates in a long stout spine (Fig. 3 E).

Only one specimen of this type was found—though 20 samples each containing roughly 500 forms were examined.

TYPE C

Microniscus lathyfrons

Hosts: *Acartis erythræa* and *Acrocalanus longicornis* Giesbrecht.

Locality: Madras Coast.

Size of Host: *Acrocalanus:* 1.42 mm. long. *Acartia:* 3 mm. long.

Out of the eight specimens collected, 6 were parasitic on *Acartia* and two on *Acrocalanus*. These measured 1.36 mm. long and 0.48 mm. broad. The carapace of this form differs in having the anterior region depressed so that the front edge is flatter.

Appendages.—The 1st antenna (Fig. 4 A) is biramous and short. The protopodite appears to be two-jointed, the proximal joint being very large

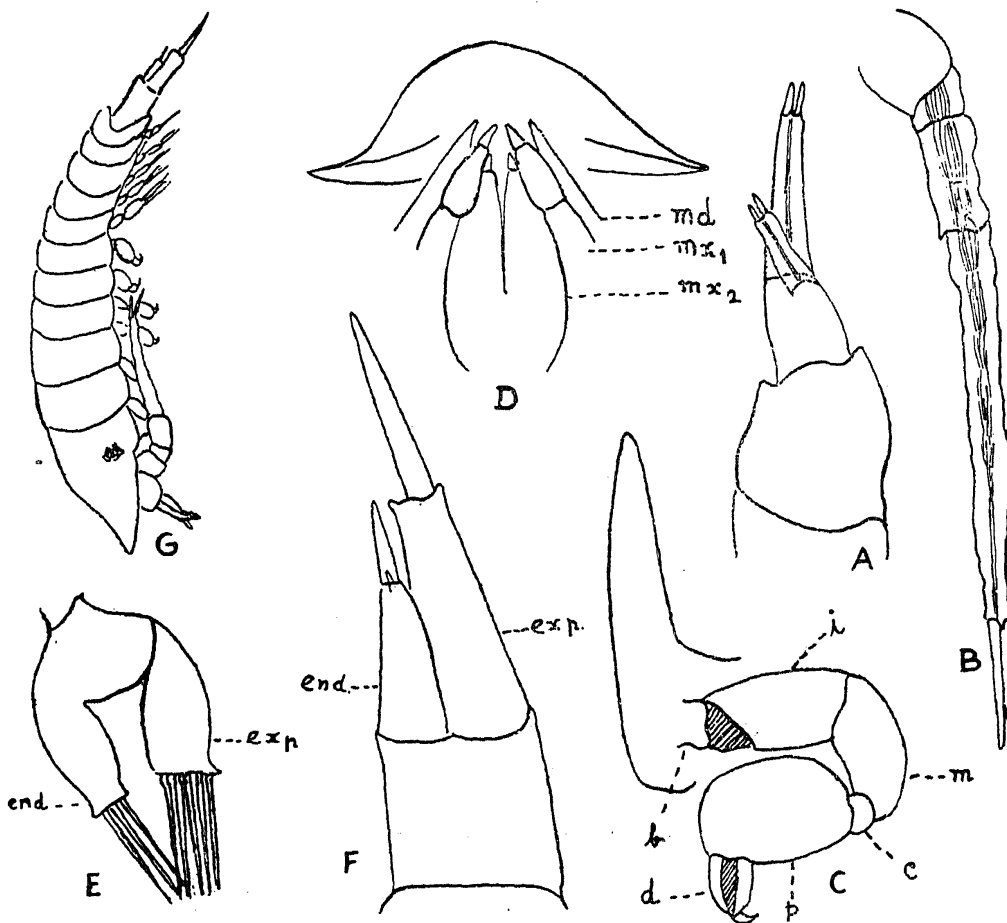


FIG. 4. *M. lathyfrons* (Appendages and lateral view)

and stout. The second joint is about half its size, but longer and three times as stout as the endopodite. The exopodite is single jointed but twice as long as the endopodite. The endopodite is single-jointed, slender and ends in a pair of finger-like processes. The 2nd antenna (Fig. 4 B) is four-articled and three times as long as the 1st, uniformly thin and bears two small pointed processes at its tip.

The mouth parts (Fig. 4 D) are similar to those of the previous forms as regards their arrangement and structure. The difference in the lengths of the joints of the 1st maxilla and 2nd may however be mentioned.

There are seven pairs of six-jointed thoracic legs. The dactylus bears a small, curved pointed, process which helps in clinging. The propodus is large and rounded (Fig. 4 C).

There are five pairs of biramous pleopods. The exopodite has a small spinous process at its outer edge and bears five setæ. The endopodite has three setæ (Fig 4 E).

There is a pair of biramous uropod. The protopodite is two-jointed, cylindrical. The endopodite is single jointed and bears a stout spine half as long as the base. The endopodite is distinguished by a small slender accessory spine. The exopodite also consists of a basal piece and a spine and the basal portion is as long as the entire endopodite and is proportionately stouter. The spine is also more than twice the length of the spine of the endopodite (Fig. 4 F).

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KEY TO LETTERING

A.	1st antenna.	M.	Mandible.
B.	2nd antenna.	Max. 1.	1st Maxilla.
C.	Thoracic leg.	Max. 2.	Maxilla 2.
d.	Dactylus.	E.	Pleopod.
p.	Propodus.	endp.	Endopodite.
c.	Carpus.	F.	Uropod.
m.	Merus.	exop.	Exopodite.
i.	Ischium.	endp.	Endopodite.
b.	Basis.	exop.	Exopodite.
D.	Mouth-parts.	T.	Telson.