A NEW GENUS AND THREE NEW SPECIES OF PARASITIC ISOPOD CRUSTACEANS

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The three species of bopyridian crustaceans herein described were collected by the author during the summer of 1915 while making a study of the decapod crustaceans of the region about Beaufort, North Carolina, for the United States Bureau of Fisheries. For the facilities for obtaining, preserving, and studying the animals I have to thank the Director of the Beaufort Fisheries Biological Station, Mr. S. F. Hildebrand, and the Commissioner of Fisheries, Dr. Hugh M. Smith. It is with the permission of the latter that the paper is published.

PHRYXUS SUBCAUDALIS, new species.

Plate 98, figs. 1 to 6.

Holotypes.—Cat. No. 48367, U.S.N.M., paratypes female and male, Cat. No. 48368, U.S.N.M., from Onslow Bay, North Carolina, about 20 miles off Beaufort Inlet, on *Synalpheus longicarpus* (Herrick); depth, 10 fathoms; station 8293, United States Fisheries Steamer *Fish Hawk;* August, 1915.

Female (Holotype).—Similar in general appearance and structure to *Phryxus abdominalis* Krøyer, but differing markedly in having five well-developed legs on the long side of the body, the second and third legs only being absent. The expanded epimera of the abdominal segments are usually shorter and broader than those of *P. abdominalis* and are inclined to be orbicular or even broader than long. The posterior lobe of the broad plate borne by the first leg is longest in it transverse diameter. The terminal segment of the abdomen tapers to a point and is not notched at the end.

Male (Paratype).—Compared with *P. abdominalis* the thoracic and abdominal segments taper more toward their sides, thus giving the body the appearance of being more loosely articulated, the legs appear

to be longer and more slender, and the abdomen is distinctly notched at the tip and usually shows no indication of its component parts.

A series of over 20 of these crustaceans was obtained from specimens of *Synalpheus longicarpus* (Herrick) picked out of a large sponge dredged by the Bureau of Fisheries Steamer *Fish Hawk* from a depth of about 10 fathoms. About 5 per cent of the shrimps bore this parasite and another 5 per cent had a branchial parasite (*Synsynella deformans*, new species). No case was found in which both kinds were present in the same individual. The parasites attach themselves to the under surface of the abdomen of their host, to whose swimmerets they cling with their prehensile feet. So strong is the hold of the females that unless great care is exercised in removing them their legs are invariably broken off and left behind. The ventral surface of the parasite is uppermost and its head is turned toward the tail of its host. In addition to the attachment by the feet, there appears to be a sort of pedicel extending from the soft interarticular membrane of the shrimp to the mouth of the parasite, but it is so completely hidden that I have not been able to satisfy myself as to its nature. All the females are apparently mature and are swollen with eggs. About half of the specimens are accompanied by males, but the latter are not found on the females as is usual in the parasitic isopods, but are to be found clinging to bases of the swimmerets or the last pair of walking legs of the host, immediately above the position occupied by their mate. In one case a small male was found within the egg pouch of a female; it is much smaller than the free males, its antennae and legs are much reduced in size, its abdomen is longer, turned to one side at its extremity and undulate along the margins, and the eyes and antennules are not discernible. Whether this is merely an immature male or a complemental male somewhat similar to those described by Bonnier in *Grapsicepon edwardsii* I am unable to determine.

The striking difference between this species and *P. abdominalis* is the presence in the adult female of *P. subcaudalis* of five well-developed legs on the long side of the body. It is stated by Sars that the immature female of *P. abdominalis* has four such legs, the last three of which are reduced at maturity to mere vestiges. It may be that the small size of the host of *P. subcaudalis* has made the parasite so stunted that it has retained some of its immature characteristics, but it appears more probable that we are dealing with a more primitive species, which retains its ancestral characteristics.

With the exception of Spence Bates's record for the Philippine Islands, *P. abdominalis* has been reported only from localities much farther north than Beaufort, and it appears to be most common in Arctic waters. The range of *P. subcaudalis* is probably a much more southern one, for its host belongs to a subfamily the members of which are practically all tropical and subtropical in their distribution.

SYNSYNELLA, new genus.

Branchial parasites. Head and first thoracic segment completely fused in both sexes. Eyes present. Uropods wanting.

Female.—Body somewhat asymmetrical. First and second thoracic segments and first four abdominal segments fused in the middle region, but free at the sides; last two abdominal segments completely fused; other segments distinct. Pleopods usually rudimentary but with indications of being biramous.

Males.—Body symmetrical. Abdominal segments five, all distinct. Pleopods wanting.

This genus, which probably stands closest to *Bopyriscus* Richardson, differs from all other genera of the family Bopyridae in the complete fusion in both sexes of the first thoracic segment with the head. This condition, according to Dr. H. Richardson,[1] is paralleled in only a few isopods, namely in the family Tanaidae, the family Dajidae (males only), the family Serolidae, and in the species *Crabyzos longicaudatus* Spence Bate and *Arcturides cornutus* Studer and the genus *Stenasellus* Dollfus. The union of the second thoracic segment with the head mass, as shown in the female of the present species, is a still rarer condition, being known only in the genus *Sphyrapus* Norman and Stebbing.

Type of the genus.—*Synsynella deformans*, new species.

SYNSYNELLA DEFORMANS, new species.

Plate 99, figs. 13 to 18.

Holotype and paratypes.—Female, Cat. No. 48371, U.S.N.M., Cat. No. 48372, U.S.N.M., from Onslow Bay, North Carolina, about 20 miles off Beaufort Inlet, parasitic on *Synalpheus longicarpus* (Herrick); depth, 10 fathoms, station 8293, United States Fisheries Steamer *Fish Hawk*; August, 1915.

Female.—Body nearly symmetrical, slightly longer on one side than on the other, about two-thirds as wide as long. Color entirely white or white with a brown area on the dorsal surface. Eyes red. Head broad, completely consolidated with the first thoracic segment, but a deep notch on each side continued into a shallow groove indicates its margins. Second segment fused with the first in the middle, but free at the sides. The other thoracic segments distinct. Epimeral plates present on the second, third, and fourth segments on both sides of the body, but smaller on the short side. Ovarian bosses entirely lacking. Abdomen composed of six segments fused together along the middle line; the first four have their outer half or two-thirds free, the last two are completely fused; the outer ends of all turn backward and from front to back are increasingly acute. First lamella of the marsupium bilobed, those of the two sides approximately alike in

[1] Proc. U. S. Nat. Mus., vol. 27, 1903, p. 9.

size and shape. Maxillipeds consisting of two broad basal articles obliquely articulated and a minute distal article. Antennae minute, composed of two short articles and completely concealed beneath the margin of the head. Pleopods, four pairs of small, rather broad, bilobed plates, growing smaller posteriorly, the last two or three always rudimentary. Uropods wanting.

Male.—About one-fourth as long as the female, symmetrical, about four times as long as wide. Head consolidated with the first thoracic segment, emarginate in front and with a deep notch on each side in a line with the small, black eyes. Thoracic segments rather loosely articulated, their outer ends rounded. Abdomen consisting of five distinct segments, the first three large, but diminishing in size backward, the fourth very small and completely immersed in the third, the fifth a small rounded lobe. Antennae composed of two articles. Pleopods and uropods wanting. Color white or yellowish, usually with a minute pigment fleck on each side of some of the thoracic segments.

A series of over 20 specimens of this species was secured from the same lot of shrimps as supplied the specimens of *Phryxus subcaudalis*. This parasite lives in the gill chamber, either the right or the left, with its dorsal surface resting against the gills of its host. A male is invariably found attached to the pleopods of the female close behind the marsupial chamber.

Among the specimens examined only one female was found with two pairs of well-developed pleopods. The usual condition was to have the first pair obscurely biramous, the next pair rather deeply notched, and the last two pairs much smaller and subquadrate. One male was found which was considerably broader in proportion to its length than the others, owing to the reduction of its abdomen to only three segments. It was clinging to a perfectly normal female.

PSEUDIONE UPOGEBIAE, new species.

Plate 100, figs. 7 to 12.

Holotype.—Cat. No. 48369, U.S.N.M. (female), and paratype from Beaufort, North Carolina, on *Upogebia affinis* (Say). Collector, W. P. Hay, August 17, 1915.

Female (holotype).—Body somewhat asymmetrical, longer than broad, irregularly ovate. Head small, deeply immersed in the thorax, with a frontal border the anterior margin of which is sinuately curved and indistinctly cleft in the center. Antennules of three and antennae of four articles the last two of which, in each case, project beyond the frontal border. Thorax with all the segments distinct. Ovarian bosses present on the first four segments. Epimera of first four segments reduced to narrow ridges external to the ovarian

bosses, those of the last three segments occupying the entire lateral margins. Abdominal segments distinct and with the epimera produced into broad plates which are expanded at the outer end and, with the exception of the first, have their anterior angle drawn out into a more or less prominent tooth. The pleopods are five pairs of elongate, tapering, leaf-shaped, biramous appendages having the margins produced into a number of thick, finger-like processes, which stand at right angles to the plane of the appendage both above and below, giving it the appearance, when viewed from the edge, of being pinnately branched; there may be eight or nine of these processes on each margin of both endopodite and exopodite, but those of the latter branch are reduced in size. The uropods are uniramous and resemble the endopodite of the pleopods. The incubatory pouch is formed by five broad, foliaceous plates overlapping in the middle line; the last four of these plates are approximately alike but the first is divided into two lobes, an anterior and a posterior, by a broad fold; the posterior lobe helps to cover the eggs, the anterior lobe covers the mouthparts and the fold, the margin of which bears processes similar to those on the pleopods, forms the front boundary of the egg chamber. Maxillipeds broad, roughly quadrangular and divided obliquely into two parts; the anterior inner angle produced into an unsegmented tip; posterior outer angle curved and pointed.

Male (paratype).—Much smaller than the female, symmetrical, about three times as long as broad, with all the segments of the body developed and distinct. There is a pair of very small eyes. The antennules, of three articles, are hidden beneath the margin of the head. The antennae, of four articles, are partly visible from above. The legs are all alike and prehensile. The lateral portions of all the segments of the body are narrowed, the lateral angles tending to be acuminate in the thoracic and rounded in the abdominal regions. The terminal segment of the abdomen is reduced to a knoblike structure, narrow anteriorly and notched horizontally and vertically behind.

Six specimens of this isopod, three males and three females, were obtained from the gill chambers of *Upogebia affinis*. It resembles most closely, perhaps, *P. furcata* Richardson, but differs from it and all other American species of the genus in the structure of the pleopods of the female.

EXPLANATION OF PLATES.

PLATE 98.

FIG. 1, *a*, *b*, two specimens of *Synalpheus longicarpus* with the parasite *Phryxus subcaudalis*, ×4.

2. *Phryxus subcaudalis*, female, view showing the short side of the body, ×10.
3. *Phryxus subcaudalis*, female, ventral view, ×8.
4. *Phryxus subcaudalis*, female, dorsal view, ×8.
5. *Phryxus subcaudalis*, female, view showing the legs of the long side of the body, ×10.
6, *a*, *b*, *c*, *Phryxus subcaudalis*, males, ×20; *a*, *c*, ventral; *b*, dorsal view.

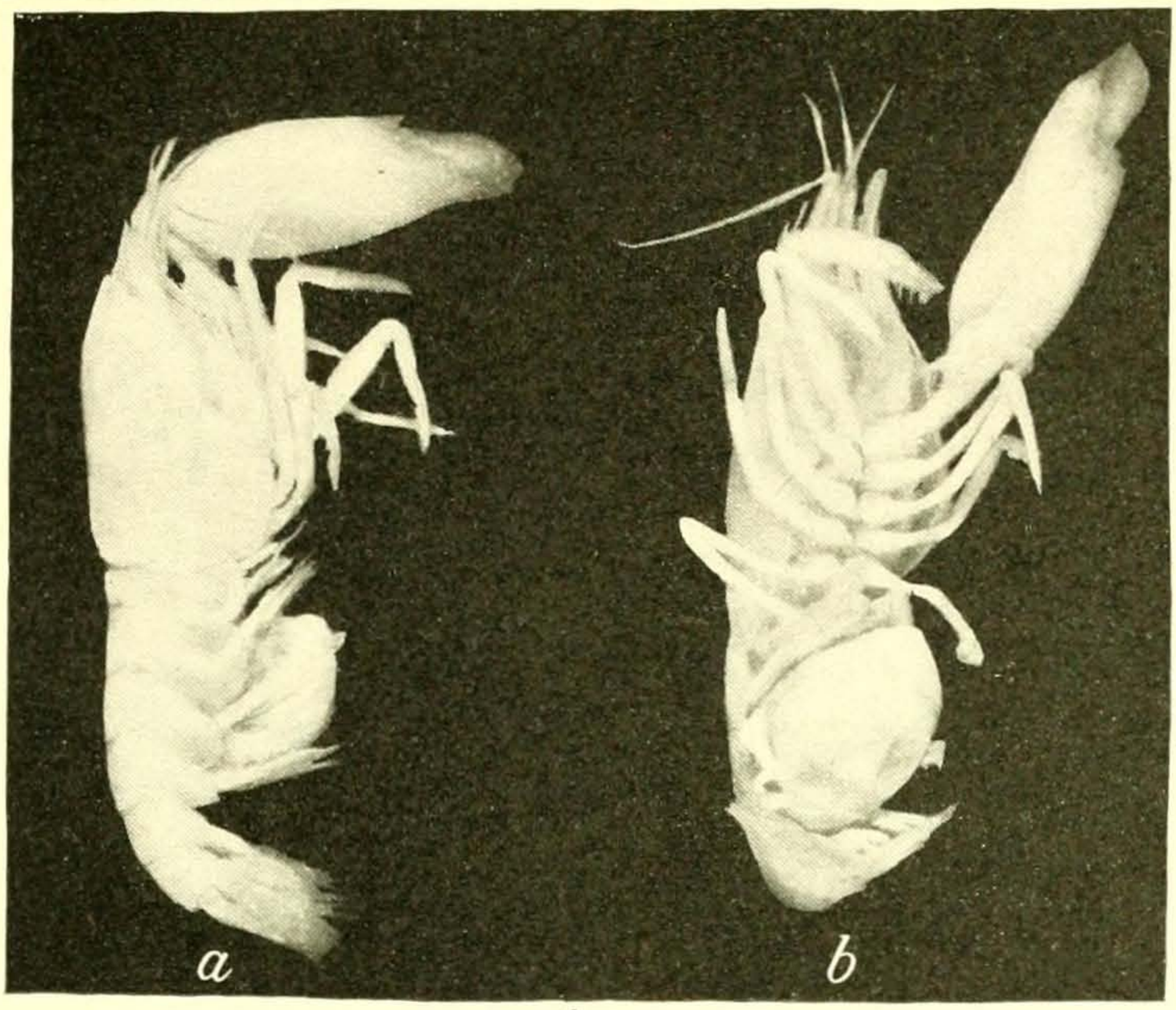
PLATE 99.

13, *a*, *b*, *c*, Three specimens of *Synalpheus longicarpus* with the parasite *Synsynella deformans*, ×4.

14. *Synsynella deformans*, male, ×25, ventral view.
15. *Synsynella deformans*, male, ×25, the one showing the dorsal surface has the abdomen abnormal.
16. *Synsynella deformans*, female, ventral view, ×10.
17. *Synsynella deformans*, female, dorsal view, ×10.
18. *Synsynella deformans*, male and female, ×10.

PLATE 100.

7. *Pseudione upogebiae*, female, dorsal view, ×4.
8. *Pseudione upogebiae*, female, ventral view, ×4.
9. *Upogebia affinis* with the parasite *Pseudione upogebiae*, natural size.
10. *Pseudione upogebiae*, male, dorsal view, ×10.
11. *Pseudione upogebiae*, male, ventral view, ×10.
12. *Pseudione upogebiae*, male and female, ×4.



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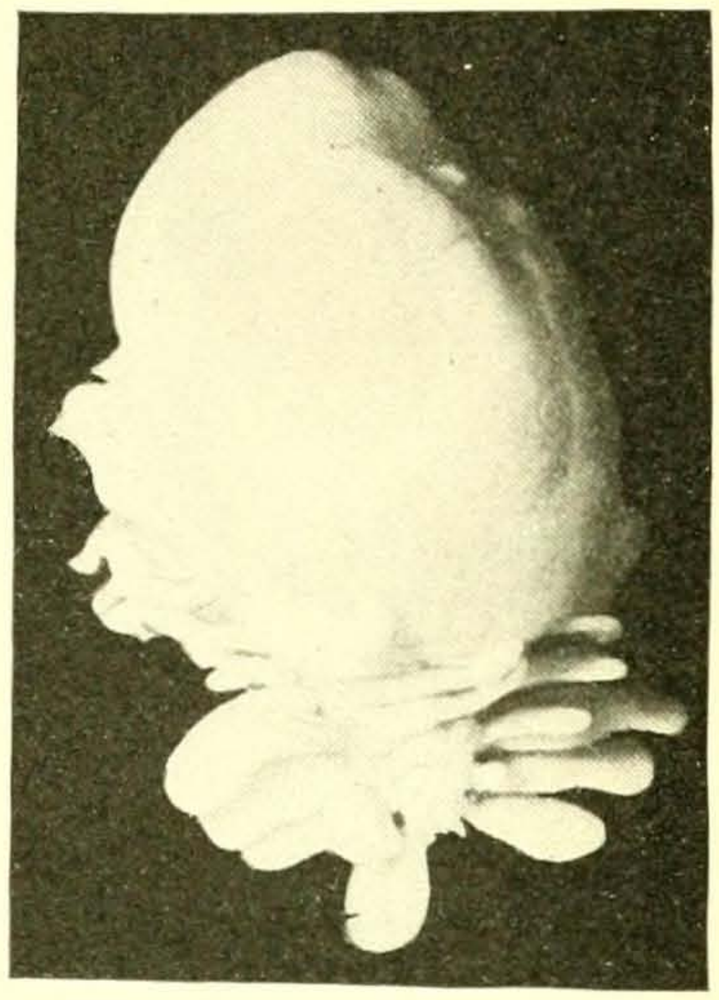

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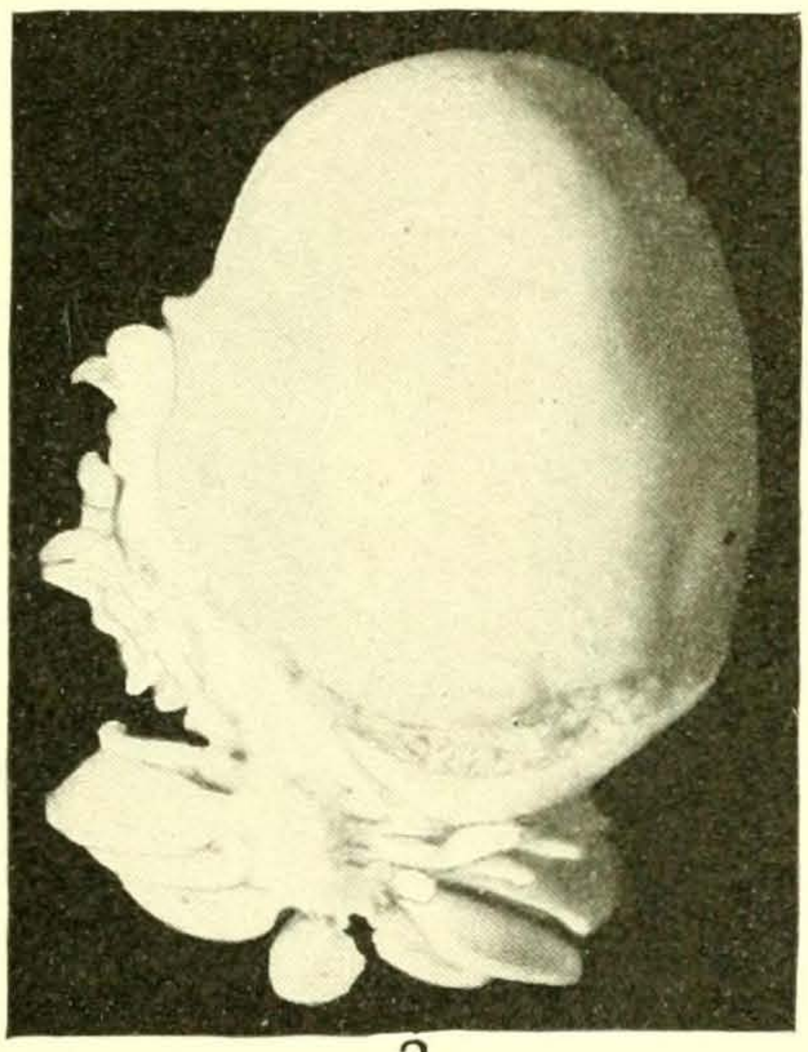

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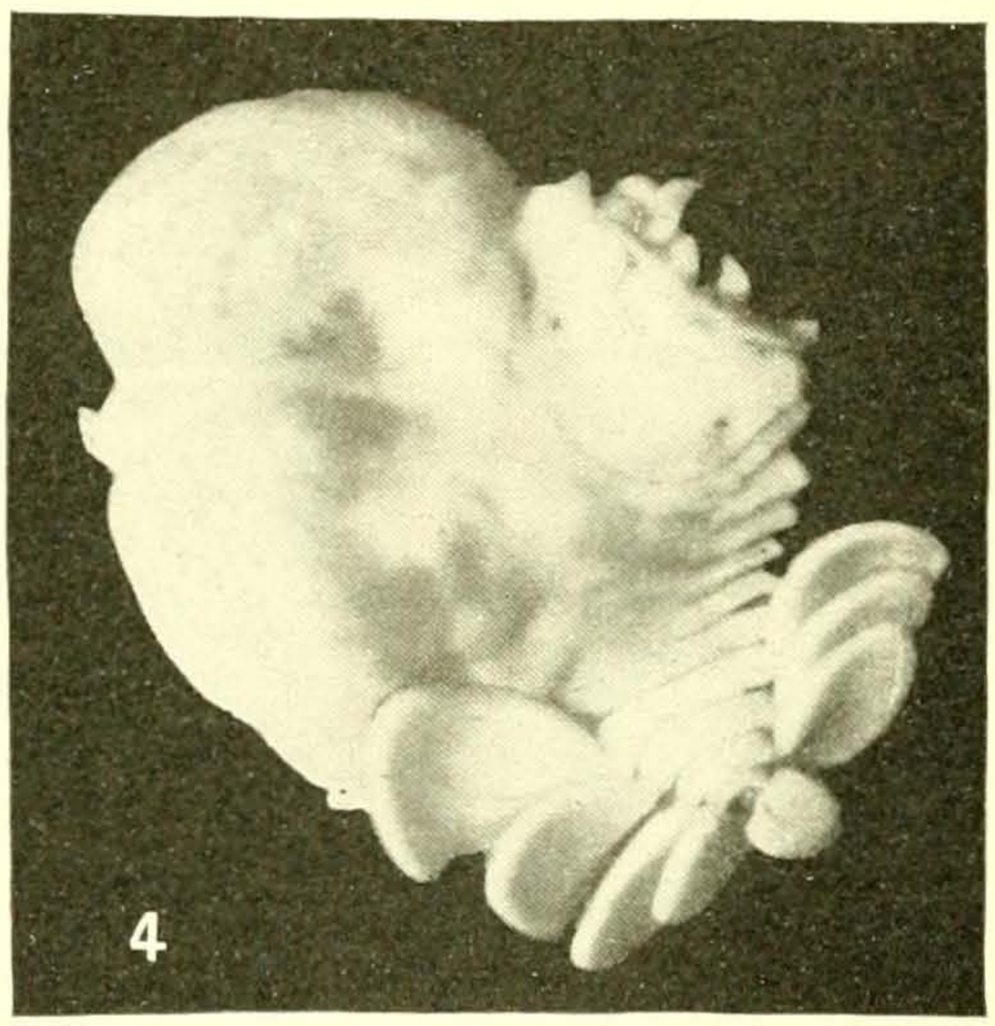

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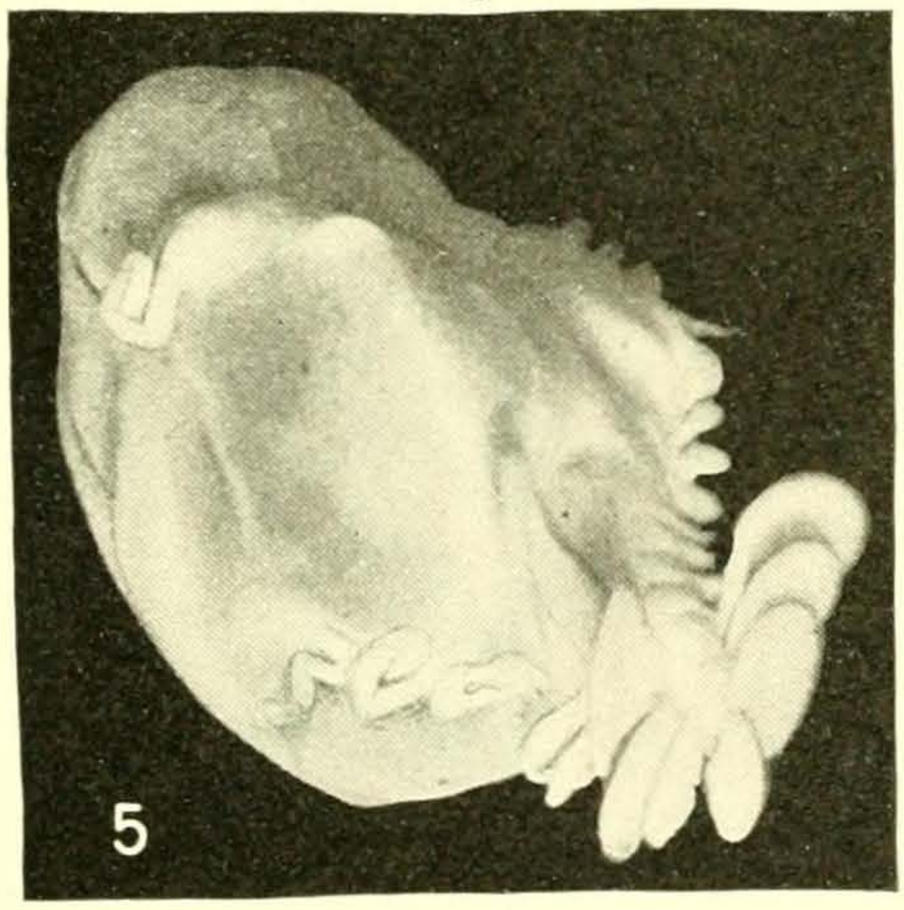

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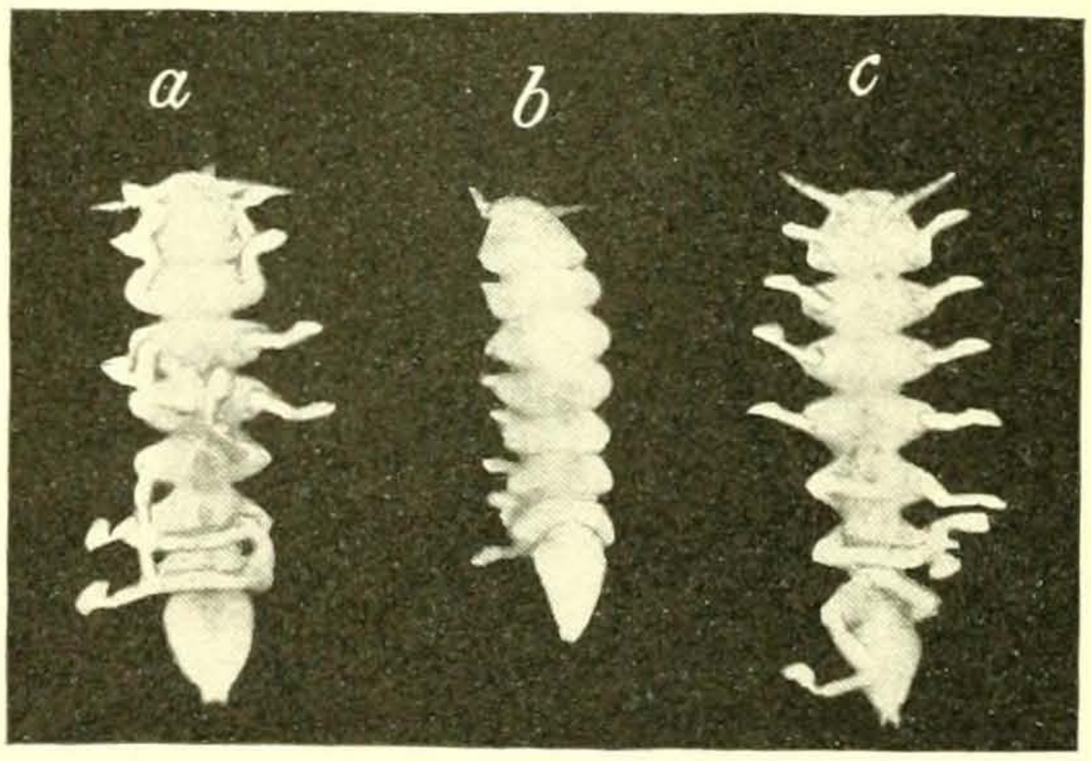

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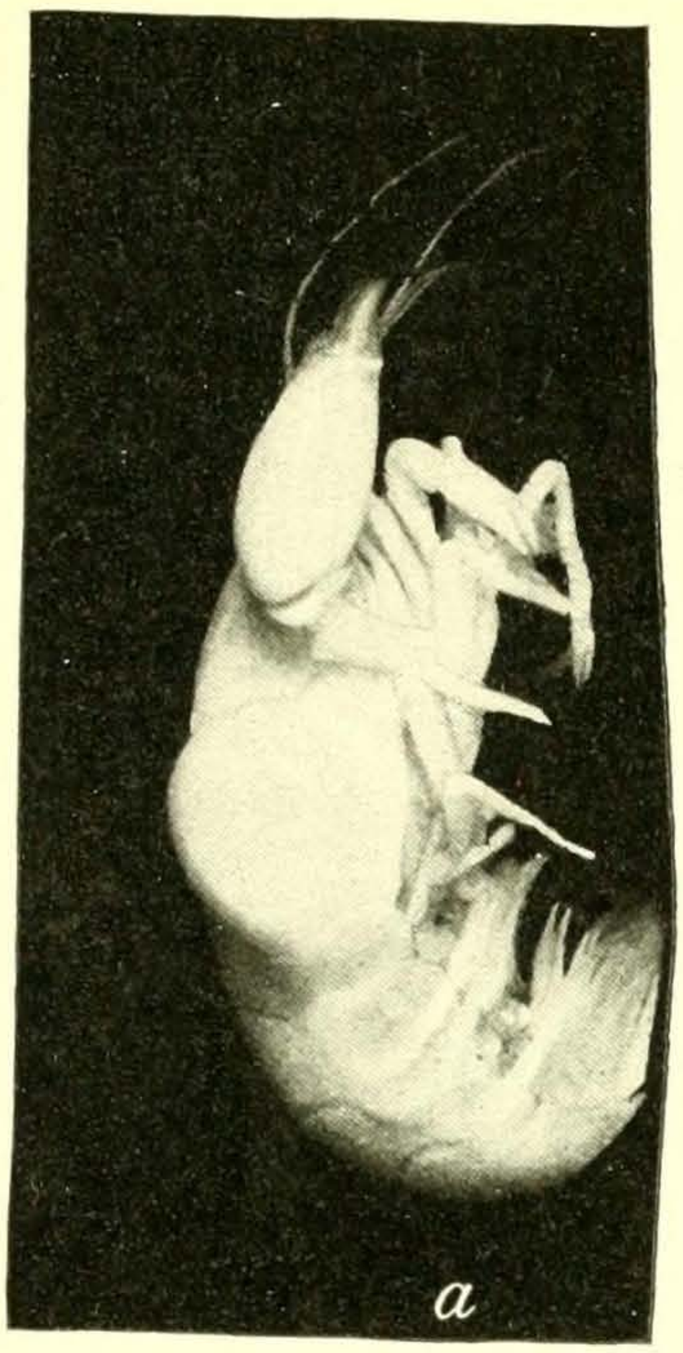
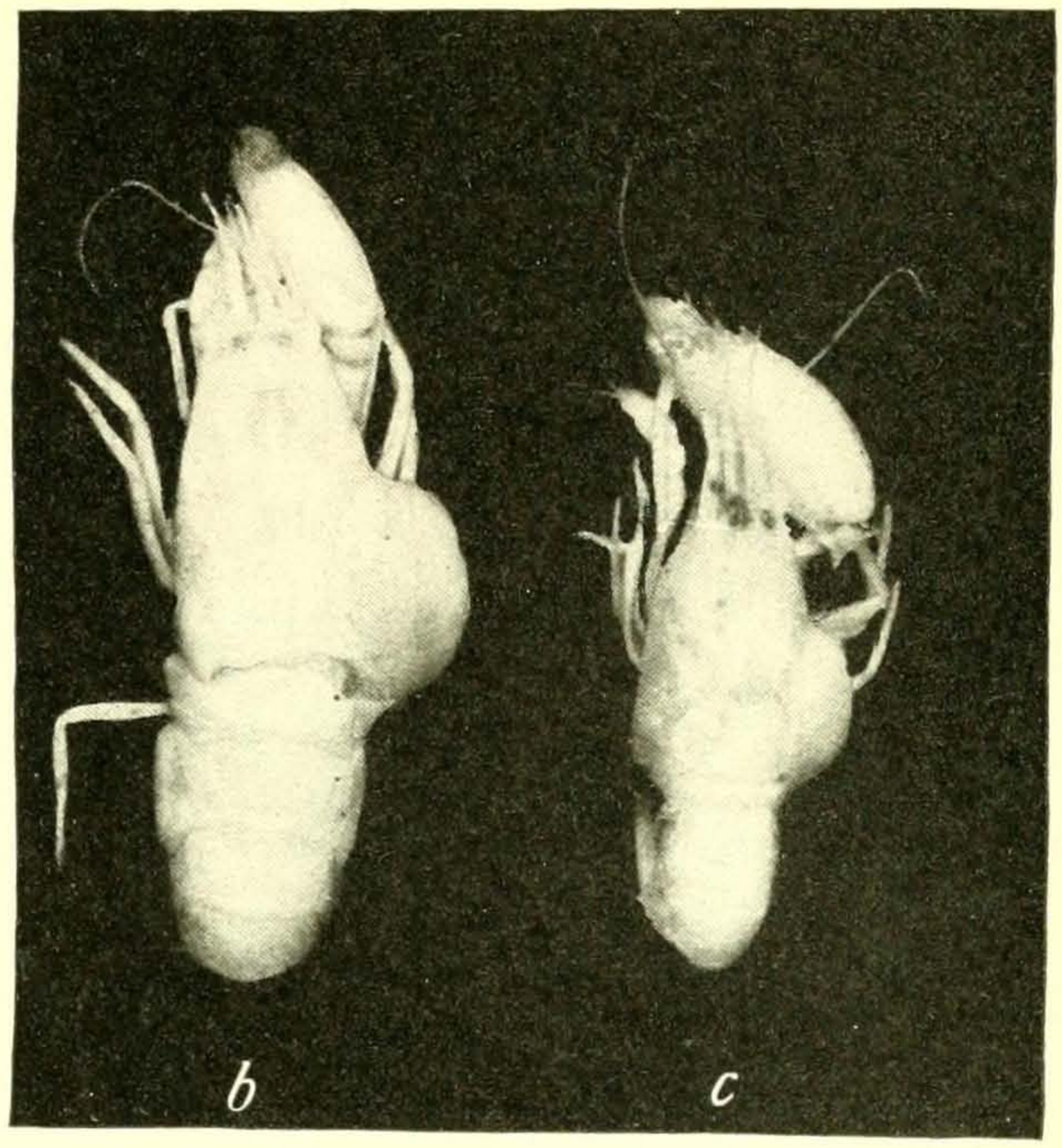
NEW SPECIES OF PARASITIC ISOPOD CRUSTACEANS.

FOR EXPLANATION OF PLATE SEE PAGE 574.





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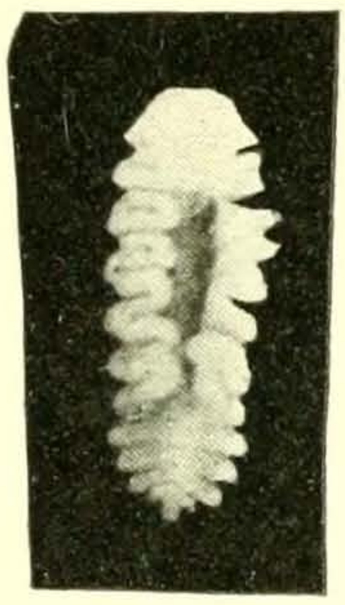

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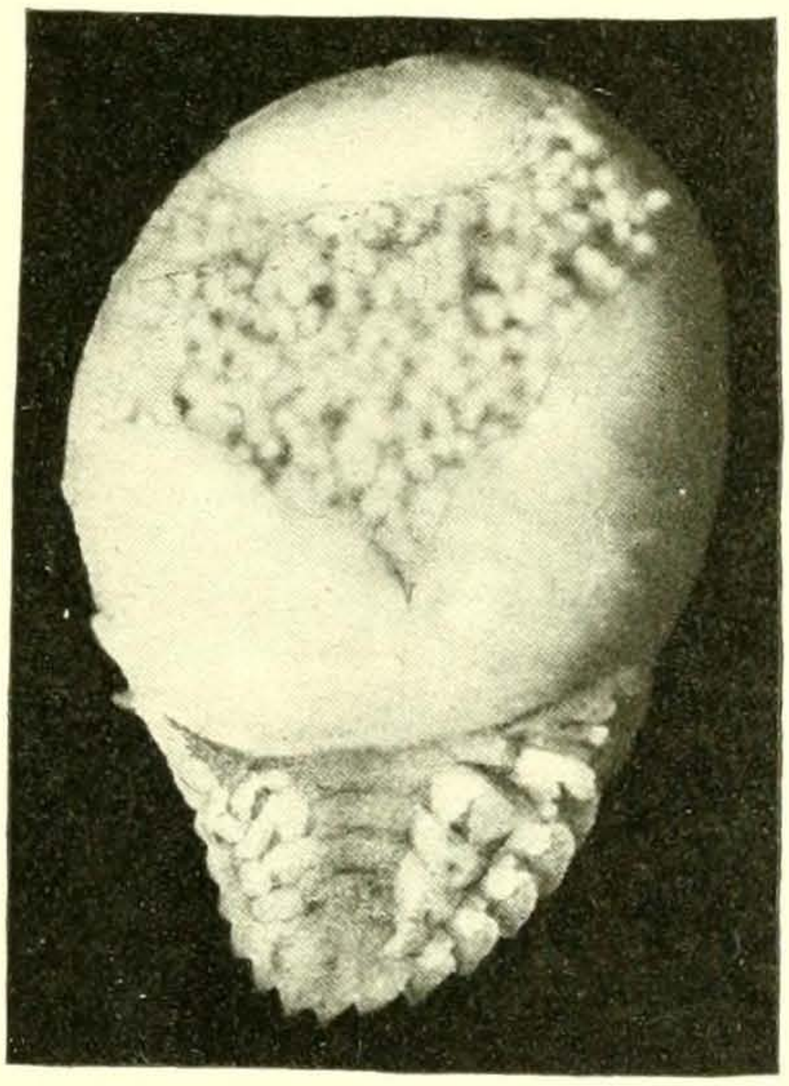

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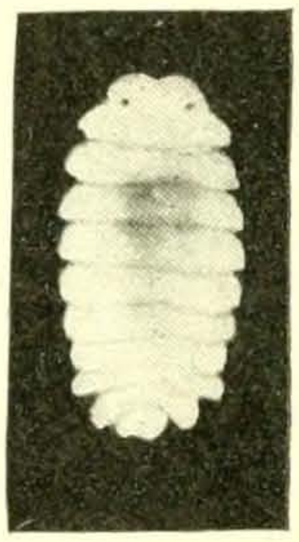

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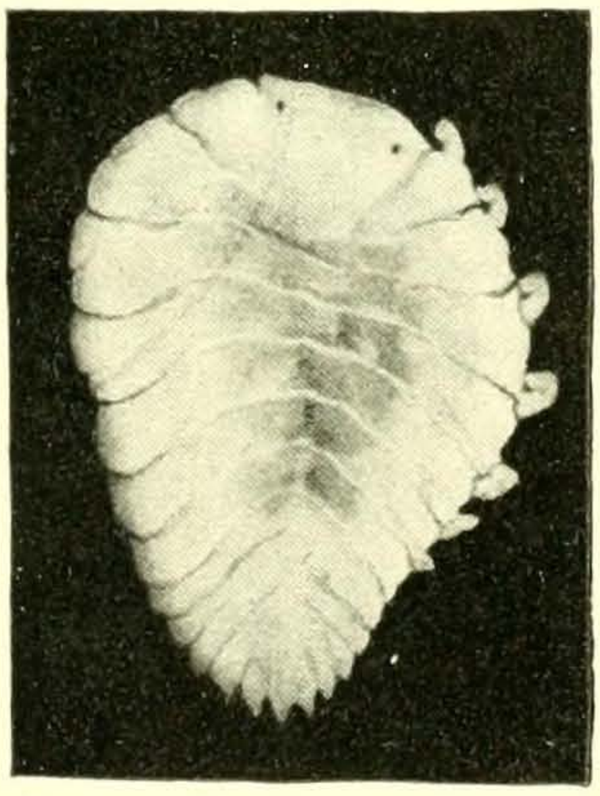

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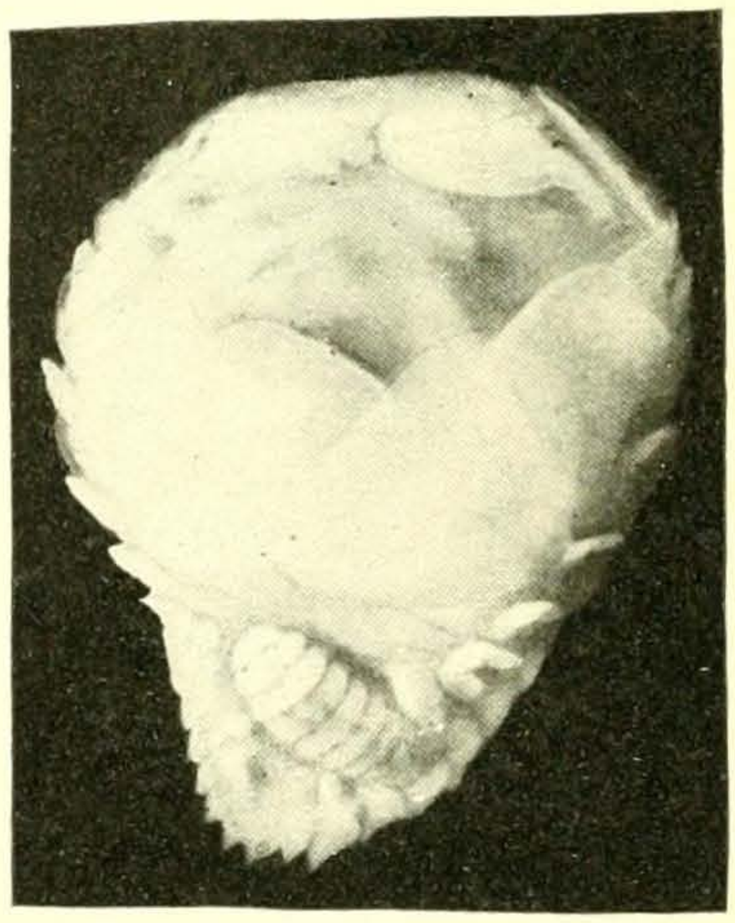

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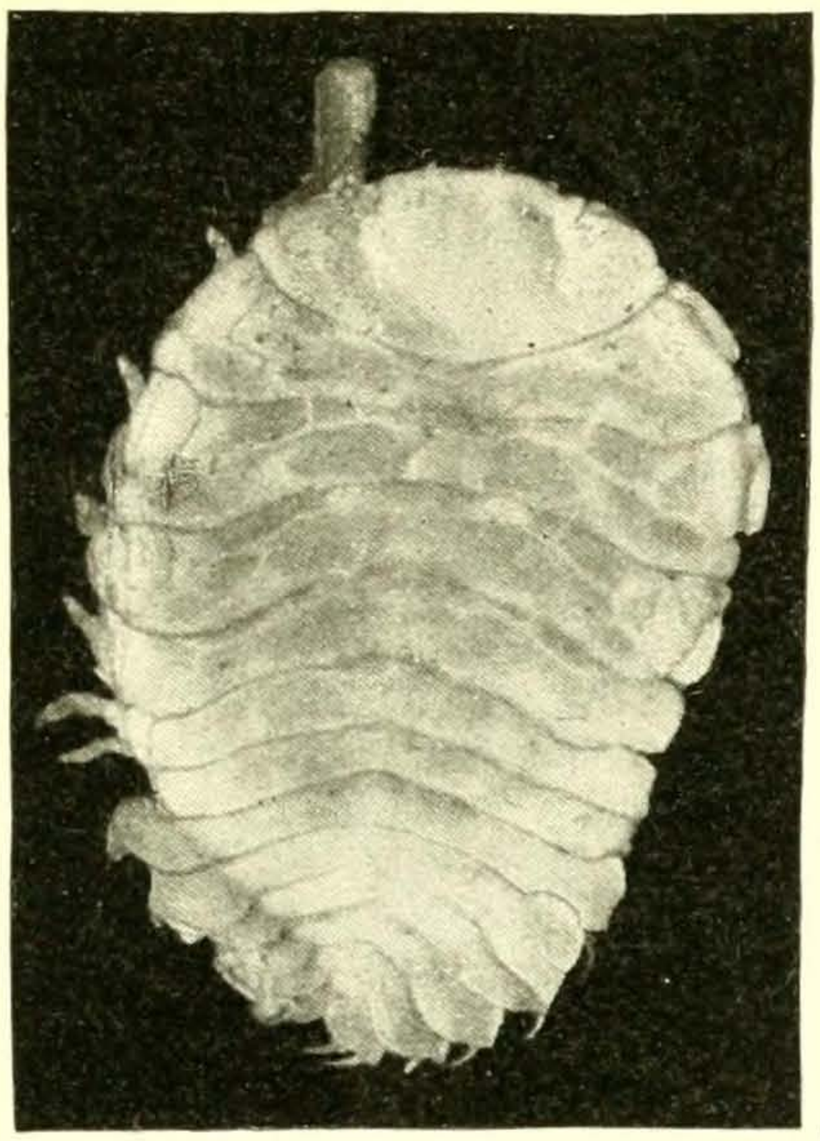
NEW SPECIES OF PARASITIC ISOPOD CRUSTACEANS.

FOR EXPLANATION OF PLATE SEE PAGE 574.



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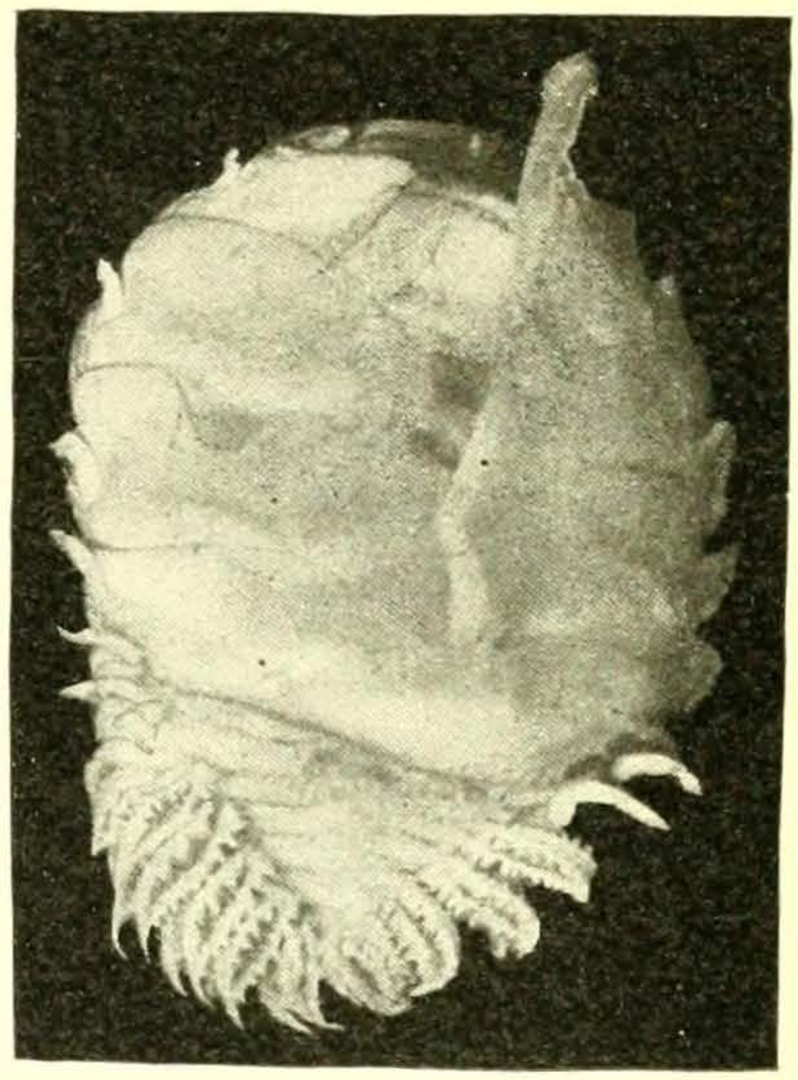

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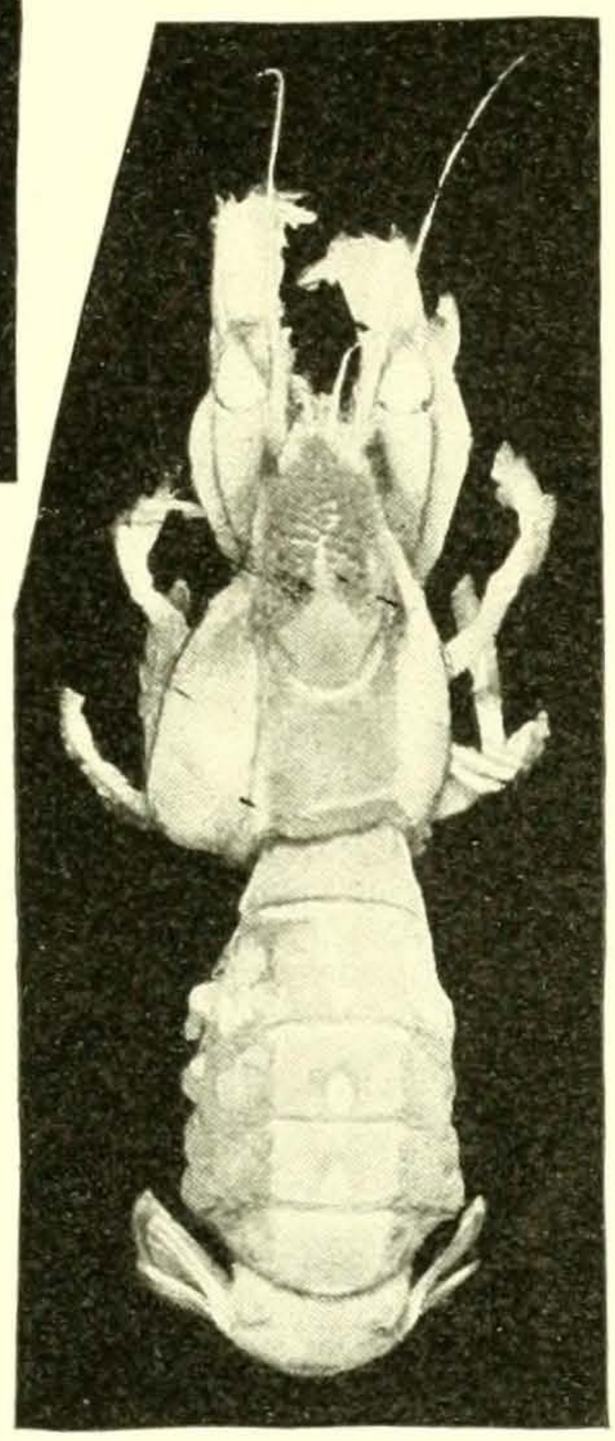

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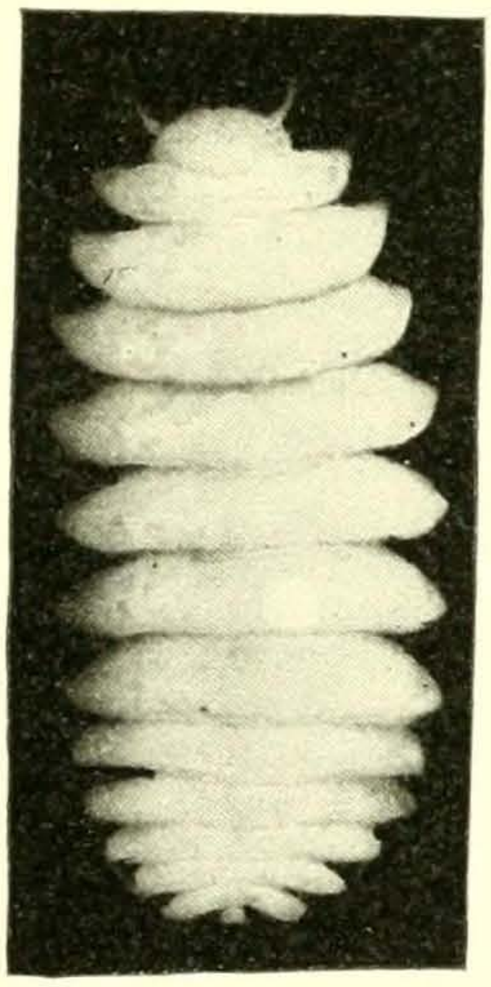

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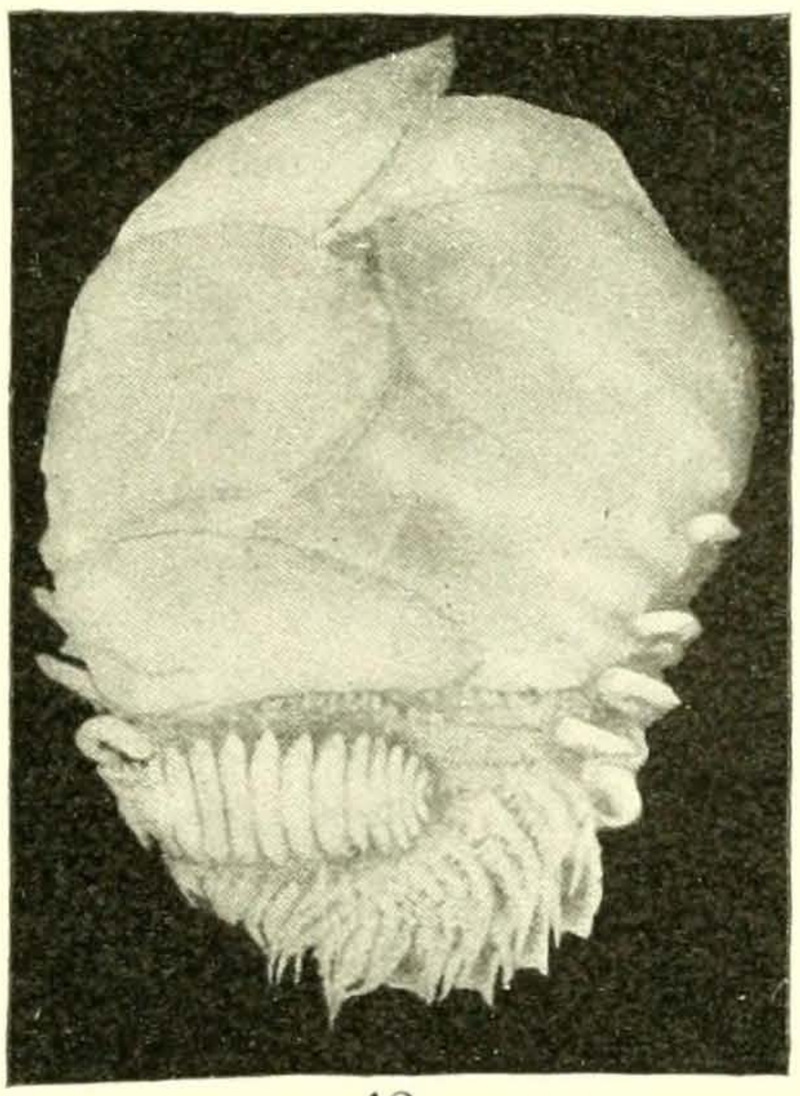

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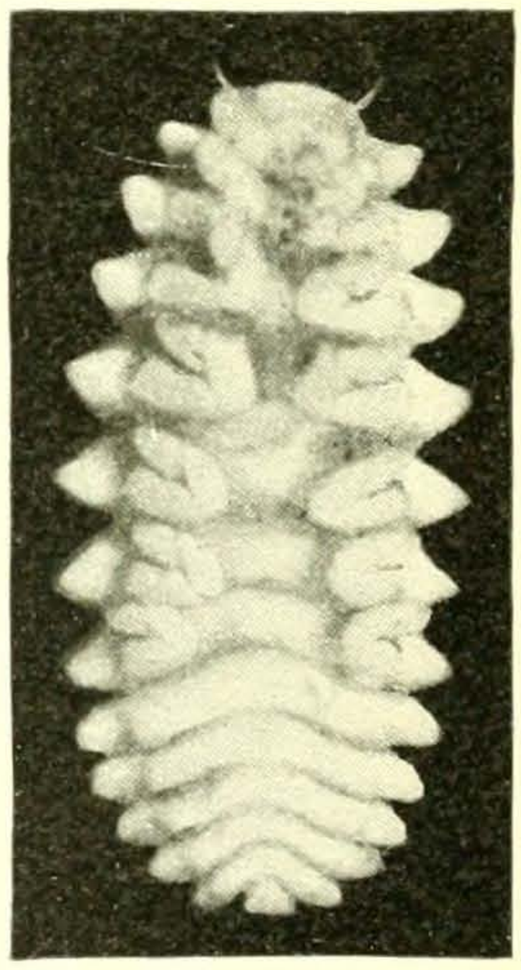

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NEW SPECIES OF PARASITIC ISOPOD CRUSTACEANS.

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