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AT HARVARD COLLEGE.

VOL. LIV. No. 15.

SOME CUBAN CRUSTACEA.

BY MARY J. RATHBUN.

WITH NOTES ON THE ASTACIDAE, BY WALTER FAXON, AND
A LIST OF ISOPODA, BY HARRIET RICHARDSON.

WITH FIVE PLATES.

CAMBRIDGE, MASS., U. S. A.:
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JOHN GERRARD KESTER

BY JOHN G. KESTER

WITH NOTES ON THE LIFE HISTORY BY WALTER KESTER AND
A LIST BY ISOBEL M. BY HENRIET RICHMOND

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No. 15.— *Some Cuban Crustacea.*

By MARY J. RATHBUN.

*With notes on the Astacidae, by WALTER FAXON, and a list of Isopoda,
by HARRIET RICHARDSON.*

DURING a trip to western Cuba last February and March, Dr. Thomas Barbour obtained several species of Crustacea, including two new shrimps living in caves. These are not only very distinct from any previously recorded, but represent two widely different families. One is a Palaemonetes, (Palaemonidae), living in fresh water and blind like the two cave-dwelling species of the genus already known;¹ the other is one of the Hippolytidae, found in slightly brackish water, and having well-developed ocular pigment. No member of this family has heretofore been found in caves, or to my knowledge, in brackish water.

PALAEEMONIDAE.

PALAEEMONETES CALCIS, sp. nov.

Plate 1, figs. 1-5.

Type.— M. C. Z., 7,415. Cuba: Pool in a cave between Madruga and Aguacate. Thomas Barbour.

Body stout; carapace as long as the last 4 segments of the abdomen, high and thick; the median carina begins at the cervical suture, is subacute, and bears a single sharp spine a little behind the line of the orbits; the rostrum is about $\frac{2}{5}$ as long as the remainder of the carapace, inclined slightly downward, upper and lower edges thin, unarmed, gradually converging to an acuminate tip, a few scattered

¹ *Palaemonetes antrorum* Benedict, Proc. U. S. nat. mus., Apr. 14, 1896, 18, p. 615; from artesian well 188 feet deep, San Marcos, Texas.

Palaemonetes eigenmanni Hay, Proc. U. S. nat. mus., Feb. 2, 1903, 26, p. 431, text fig. 2; from cavern at Ashton, Cuba.

hairs on upper margin; a spine on the anterior margin of the carapace above the base of the antenna.

Eyes short, stout, subconical, with the end of the cone rounded, and an acute tubercle on the outer side of the summit; eyes without pigment.

Antennules more than $1\frac{1}{2}$ times as long as the body; peduncle very slightly longer than the rostrum; first segment as broad as long, antero-external spine broad, reaching past the middle of the second segment; second segment broader than long; third segment about as broad as long.

Antennae about $2\frac{1}{4}$ times as long as the body, the peduncle falling short of the end of the first segment of the antennules; the first segment of the antennae bears a sharp spine on its anterior margin just below the outer angle; scale broad, subovate, reaching a little beyond the antennular peduncle, and armed with a small spine near its outer extremity.

The incisor process of the mandible has a bidentate tip, the molar process has the extremity partially dentate (Plate 1, fig. 4).

The outer maxillipeds if extended would reach beyond the antennal scale by the length of the last segment.

First pair of pereopods slender, reaching beyond the scale by the length of the propodus and half the carpus; ischium expanded below except at proximal end; merus and carpus subequal, carpus a little the longer, widening distally; palm slightly dilated, exceeding the carpus in width somewhat; fingers $1\frac{1}{2}$ times as long as palm, tapering only near the tip.

Second pair of pereopods as long as the body; ischium no wider than merus and $\frac{2}{3}$ as long; carpus a little longer than merus and widening from the proximal to the distal end; palm much swollen; fingers slender and of even width to near the tips, $1\frac{1}{2}$ times as long as palm, scarcely longer than carpus, prehensile edges thin, corneous, translucent, unarmed except near the base, where the dactylus bears a shallow lobe followed by a small tooth, both of which fit closely against a complementary tooth on the fixed finger; tips corneous, crossing well past each other.

Third, fourth, and fifth pairs of pereopods subequal, long and slender, the fifth pair reaching beyond the scale by the length of the dactylus and one half the propodus.

Postero-lateral angle of fourth segment of abdomen almost a right angle; of fifth and sixth segments acute; sixth segment slightly longer than broad; telson $1\frac{1}{2}$ times length of preceding segment, dor-

sal surface flattened, forming an angle with the lateral surfaces, two dorsal spines on each side near together, just posterior to the middle, posterior margin broadly rounded, armed with 4 pairs of spines, of which the 3 inner pairs are subequal in length, the first and second pairs very weak, the third pair much the strongest, the outer pair very small; both branches of swimming-fan broad, suboval, the outer exceeding the inner branch, as much as the inner does the telson; tooth of outer branch broadly triangular, tipped with a small spine.

Dimensions.— Type ♀, total length 36.8 mm. (approx.). Length of carapace 14.8 mm., of abdomen 22 mm. (approx.).

Color.— Whitish.

Dr. Barbour says of this species:—

“These shrimps were collected from a pool at the bottom of a deep, steeply sloping, lime tone cave, situated directly beside the calzada which runs from Madruga to Aguacate, just about a kilometer beyond where this calzada branches off from the one from Madruga to Matanzas. They were found in company with the blind isopod, *Cirolana cubensis* Hay. The shrimps were quite abundant and were usually seen swimming slowly about in the water a some distance from the bottom. I caught several individuals on the first trip, but the bottle got broken and I had to return for more. On the second visit I found them much more abundant and obtained the whole lot by wading or swimming about in the water holding a small electric light and dip net. Finally the water became so stirred up that it was impossible to see anything. I saw no blind fish in this cave. I had kindly helping me on this trip Dr. J. L. Bremer and Mr. Elliot C. Bacon.”

This species is very distinct from the other cave-dwelling Palaemonetes. It approaches nearest to *P. eigenmanni* Hay which has similar eyes but a more slender body, much longer rostrum, armed above with a series of teeth, and more slender chelae.

PALAEEMONETES EIGENMANNI Hay.

Palaemonetes eigenmanni Hay, Proc. U. S. nat. mus., Feb. 2, 1903, 26, p. 431-433, fig. 2.

Type locality:— Cave at Ashton, southwest of Alquizar, Province of Habana.

Cave near Güira de Melena, Habana Province; Dr. Pedro Perdigon, collector; presented by Dr. Carlos de la Torre; 4 specimens. M. C. Z., 7,427.

The largest specimen that Mr. Hay described was 23 mm. long.

The largest from this locality is 32 mm. (tip of rostrum broken off). The rostrum reaches either just to the end of the scale or a little beyond it; the superior teeth vary from 6 to 9, 3 of which are on the carapace proper or behind the line of the orbits.

The outer of the two long flagella of the antennules is as long as the flagellum of the antennae, or about twice as long as the body.

The postero-lateral angle of the fifth and sixth segments of the abdomen is subacute.

PALAEEMONETES CUBENSIS Hay.

Palaemonetes cubensis Hay, Proc. U. S. nat. mus., Feb. 2, 1903, **26**, p. 433.

Arroyo de la Cruz, Province of Pinar del Rio. One specimen collected by Dr. Rafael del Pino, May 4, 1912, presented by Dr. Carlos de la Torre. M. C. Z., 7,442.

Laguna Las Cañas, Marti, Province of Matanzas. Two specimens collected by Dr. Rafael Gómez Guardiola, April 25, 1912, presented by Dr. Carlos de la Torre. M. C. Z., 7,447.

MACROBRACHIUM OLFERSII (Wiegmann).

Palaemon olfersii Wiegmann, Arch. f. naturgesch., 1836, **2**, **1**, p. 150.

Near Guaos, Jurisdicion de Cienfuegos. M. C. Z., 7,421. One specimen was infested with an isopod parasite (*Probopyrus panamensis* Richardson) in its left branchial cavity.

HIPPOLYTIDAE.

The genera of this family are usually characterized by the presence or absence of a cutting edge and a palp on the mandible, and the number of segments (varying from 2 to "many") into which the carpus or wrist-joint of the second pair of pereopoda is divided.

The new form described below resembles *Latreutes* Stimpson,¹ *Platybema* Bate,² and *Nauticaris* Bate,³ in lacking a cutting edge on the mandible, while differing from them in the large number of carpal segments of the second foot. In this respect it resembles certain genera established by Bate, viz. *Chorismus*,⁴ *Merhippolyte*,⁵ and *Amphiplectus*,⁶ all of which, however, have a cutting edge on the mandible.

¹ Proc. Acad. nat. sci. Phila., 1860, p. 27 [96].

² Challenger rept. Zool., 1888, **24**, part 52, p. 578.

³ *Op. cit.*, p. 602.

⁴ *Op. cit.*, p. 616.

⁵ *Op. cit.*, p. 618.

⁶ *Op. cit.*, p. 622.

BARBOURIA, gen. nov.

- Body stout; rostrum small, compressed laterally.
Antennulae and antenna very long.
Antennular scale vertically placed.
Mandibles with a 3-jointed palp, and no cutting edge.
First maxilla (or maxillula) with two endites.
Second maxillipeds composed of 6 segments.
Outer maxilliped provided with an exopod and epipod; first, second, third and fourth pereopods with epipods.
Carpus of second pereopods many-jointed.
Type species, *Barbouria poeyi*, sp. nov.

BARBOURIA POEYI, sp. nov.

Plates 2-5, figs. 6-22.

Type.—M. C. Z., 7,418. Cave near seashore, between Morro Castle and Cojimar; March 10, 1912. Thomas Barbour.

Thorax stouter than abdomen; carapace strongly arched both in side and front views; median carina prominent except posteriorly where it fades out gradually toward the posterior margin; the downward slope of the anterior half is continued by the upper margin of the rostrum, although the latter may be a little more horizontal; a row of from 4 to 6 spines begins at the anterior third of the carina and is continued on the rostrum; usually 3, sometimes 2, of these spines are on the carapace proper; rostrum short, reaching to middle, or nearly to middle, of second segment of antennules, acutely pointed, armed below with from 2 to 4 small spines. Two slender spines near anterior margin of carapace, one on the suborbital lobe, the other behind the antenna.

Eyestalks short and stout, subconical, terminating in large, dark blue corneae.

Antennular peduncle stout, less than half as long as carapace, excluding rostrum; first segment twice as long as wide, its external scale turned almost vertically; scale suboval, shorter than the segment itself, base thickened, outer surface concave, having a broad longitudinal furrow, upper margin armed near its extremity with a small spine; second segment shorter than first; third $\frac{2}{3}$ as long as second; flagella about $1\frac{1}{4}$ times as long as body.

Antennal peduncle reaching to the end of first segment of antennular peduncle; scale extending considerably beyond antennular peduncle,

narrowing toward tip, two longitudinal grooves above, a small tooth at end of outer margin which overreaches blade of scale; flagellum more than twice as long as body.

Mandible with a stout molar process and a 3-jointed palp; the corneous extremity of the molar process has a crenulated edge on one side; the first and second segments of palp are of subequal length, the third segment is about twice as long as the second, and has a fringe of long bristles attached at and near the tip.

The outer maxillipeds are stoutish and surpass the antennal scale by $\frac{1}{3}$ the length of the terminal segment; this segment is subsquamose, being covered with deep pits from which arise fine setae.

The first pair of pereopods are shorter than the maxillipeds and reach beyond their penultimate segment only by the length of the fingers; the carpus widens considerably from the proximal to the distal end; propodus nearly as long as carpus; palm swollen; fingers $\frac{2}{3}$ as long as palm, meeting throughout, tips corneous.

Second pair of pereopods filiform, very long, reaching beyond the antennal scale by the length of the propodus and carpus and nearly half the length of the merus; the carpal segments vary from 26 to 32; the merus also is faintly subdivided into segments varying from 12 to 17.

Third, fourth, and fifth pairs of feet filiform, similar, the merus of the third pair reaching a little past the middle of the scale, of the fifth pair to the base of the scale; the third and fourth pairs are similar in length, the propodus of the fifth pair is greatly elongated, being $1\frac{1}{2}$ times as long as that of the fourth pair; dactyli short and stout, tipped with a corneous spine which is nearly half as long as the remainder of the segment; 2 more slender corneous spines on the lower margin.

The abdomen in its highest part is only about $\frac{2}{3}$ the height of the carapace; postero-lateral angles of third and fourth segments rounded, of fifth and sixth segments armed with a short spine; length of telson $1\frac{1}{8}$ times the sixth segment; the distance between the 2 pairs of dorsal spinules is equal to the distance between the posterior pair and the extremity; the terminal spines consist of a pair situated at the outer angles, and longer than the posterior width of the segment, a pair of short ones originating above and overlapping the long pair, and a submedian pair of intermediate length originating at a lower level than the others. The inner branch of the swimming fan is narrow-oval, and reaches just to the end of the telson, exclusive of spines; the outer branch is much larger, reaches nearly to the end of the

longest spines on the telson; it bears a slender, movable spine near the end of its outer margin.

Dimensions.—Type ♀, total length of body 42 mm., length of carapace 14.5 mm., of abdomen 26 mm. (approx.)

Dr. Barbour's notes on this species are quoted in full:—

"This is how we came to get the new red shrimps. Sitting with Dr. Carlos de la Torre at his house one afternoon looking over some manuscript notes of Poey's, which he is editing, we came across a bare statement on a sheet of paper in Poey's portfolio that in a cave between Morro Castle and Cojimar there were shrimps which the country people said were already cooked, they looked so red. We became quite interested over this note and Torre suggested at once that we get a boat and go over to Morro Castle where Poey's old fisherman-collector lived. It was quite dark and we had some difficulty finding a boat along the waterfront, but finally secured one, rowed over and found the man, who said that he remembered distinctly where the cave was, and that he himself had told Poey of the existence of these shrimps. He promised to go with us the next morning. Bright and early the following day Dr. J. L. Bremer, Dr. de la Torre, and myself all returned to the Morro where we met our fisherman friend with a motley following. A long, hot walk through the scrub brought us to two sink holes, some distance apart, evidently places where the roof of two low caves had partly fallen in, permitting one to look down a great depth into a very deep cavern, almost full of clear, slightly brackish water, which we were told, fluctuated slightly with each tide. In both of these caves the red shrimps were very abundant and in one of them a blind fish, probably *Stygicola*, was also seen. In life they were a beautiful, translucent, crimson color, while the long antennae and the first pair of chelate appendages were pure white, contrasting strongly with the color of the body of the animal and the other legs. We brought a number of these back to Havana alive as well as a supply of water from the cave. We had hoped that it might be possible to bring some north with us alive, but in this we were entirely unsuccessful."

POTAMONIDAE.

EPILOBOCERA CUBENSIS Stimpson.

Epilobocera cubensis Stimp., Ann. Lyc. nat. hist. N. Y., 1860, 7, p. 234.

San Diego de los Baños. M. C. Z., 7,413.

EPILOBOCERA ARMATA Smith.

Epilobocera armata Smith, Trans. Conn. acad. arts & sci., 1870, **2**, p. 151, pl. 5, fig. 2.

Near Guaos, Jurisdicion de Cienfuegos; young specimens. M. C. Z., 7,414.

Not previously recorded from western Cuba.

ASTACIDAE.

By WALTER FAXON.

CAMBARUS CUBENSIS Erichson.

Astacus (*Cambarus*) *cubensis* Erichs., Arch. f. naturgesch., 1846, **12**, 1, p. 100.

Eight specimens (3 ♂, 5 ♀), M. C. Z., 7,407, were collected by Dr. Barbour in the Botanic Garden of the Institute, Principe, Habana.

CAMBARUS CUBENSIS CONSOBRINUS (Saussure).

Cambarus consobrinus Sauss., Rev. et mag. de zool., 1857, ser. 2, **9**, p. 101. Mem. Soc. phys. hist. nat. Genève, 1858, **14**, p. 457, pl. 3, fig. 21.

Nine specimens (5 ♂, 4 ♀), M. C. Z., 7,343, were secured by Dr. Barbour at San Antonio de los Baños, in the interior of the Province of Habana. They were got from boys who were using them for fish-bait. These specimens differ from the true *C. cubensis* Erichs. in the following regards:— the rostrum is narrower, more deeply concave above; its margins more elevated and less convergent between the base and the pair of lateral spines near the distal end; these lateral spines, moreover, are much better developed than they are in *C. cubensis*, and the rostral acumen is longer; the post-orbital ridge is more prominent, distinctly grooved along its outer face, and terminates anteriorly in an acute spine much more strongly emphasized than in the typical *C. cubensis*; there is, too, an evident lateral spine on each side of the carapace, on the hind border of the cervical groove,— a spine which is not present in typical specimens of *C. cubensis*. The external sexual organs are alike in the typical form and the form *consobrinus*.

Cotypes of Saussure's *Cambarus consobrinus* are now dispersed in the Museums of Geneva, Paris, Berlin, and Washington. Belike Saussure's material embraced some of the typical form of *C. cubensis*, though his description and figures were based on the form with long rostral acumen, and distinct rostral and lateral thoracic spines; the type locality of *consobrinus*, moreover, is the *central part* of the island.

In the cotype in the U. S. national museum (No. 20,684), a male dried and transfixed with a pin, the rostrum is abnormal, the right margin being pared away toward the tip, carrying with it the right marginal spine. This deformity was evidently present in the living specimen. On the left side the marginal rostral tooth or spine is well developed, as are also the thorns at the front end of the post-ocular ridges. The lateral thoracic spines are also fairly well marked.

CAMBARUS CUBENSIS RIVALIS, subsp. nov.

This form is a denizen of the mountain streams of western Cuba. The extent of its distribution remains to be determined by further exploration of the island. The type specimens (M. C. Z., 7,406), two males of the second form and three females, were captured by Dr. Barbour in a mountain stream near San Diego de los Baños, in the Province of Pinar del Rio. There are also specimens in the U. S. national museum from the same place (28,626, 28,627) and from a mountain brook north of the town of Pinar del Rio (23,656, 23,657).

It differs from the typical form of *C. cubensis* (which lives in the low country on the coast of Cuba) in having a much shorter and broader areola, a shorter, broader, and more heavily granulated chela; the sides of the rostrum, too, are more nearly parallel and bear a pair of distinct lateral spines at the base of the acumen. In so far as the rostrum is concerned it resembles *C. c. consobrinus*, but it differs from that form by its short and wide areola and absence of lateral thoracic spines.

The sexual parts are like those of *C. cubensis*.

Length of an ovigerous female, 44 mm., length of carapace, 21 mm., length of areola, 6 mm., breadth of areola, 2 mm.

ISOPODA.

Determined by Harriet Richardson.

CIROLANIDAE.

CIROLANA CUBENSIS Hay.

Cirolana cubensis Hay, Proc. U. S. nat. mus., Feb. 2, 1903, **26**, p. 430.

Two specimens (M. C. Z., 7,423) from a cave between Madruga and Aguacate, Province of Habana (Dr. Barbour).

BOPYRIDIDAE.

PROBOPYRUS PANAMENSIS Richardson.

Probopyrus panamensis Rich., Proc. U. S. nat. mus., Aug. 29, 1912, **42**, p. 523.

One specimen (M. C. Z., 7,424) from near Guaos, Province of Santa Clara, on *Macrobrachium olfersii* (Dr. Barbour).

ARMADILLIDIDAE.

CUBARIS MURINA Brandt.

Cubaris murina Brandt, Bull. Soc. imp. Moscou, 1838, **6**, p. 28.

Two specimens (M. C. Z., 7,422) from near Guaos (Dr. Barbour).

Portrait of John Calvin Coolidge

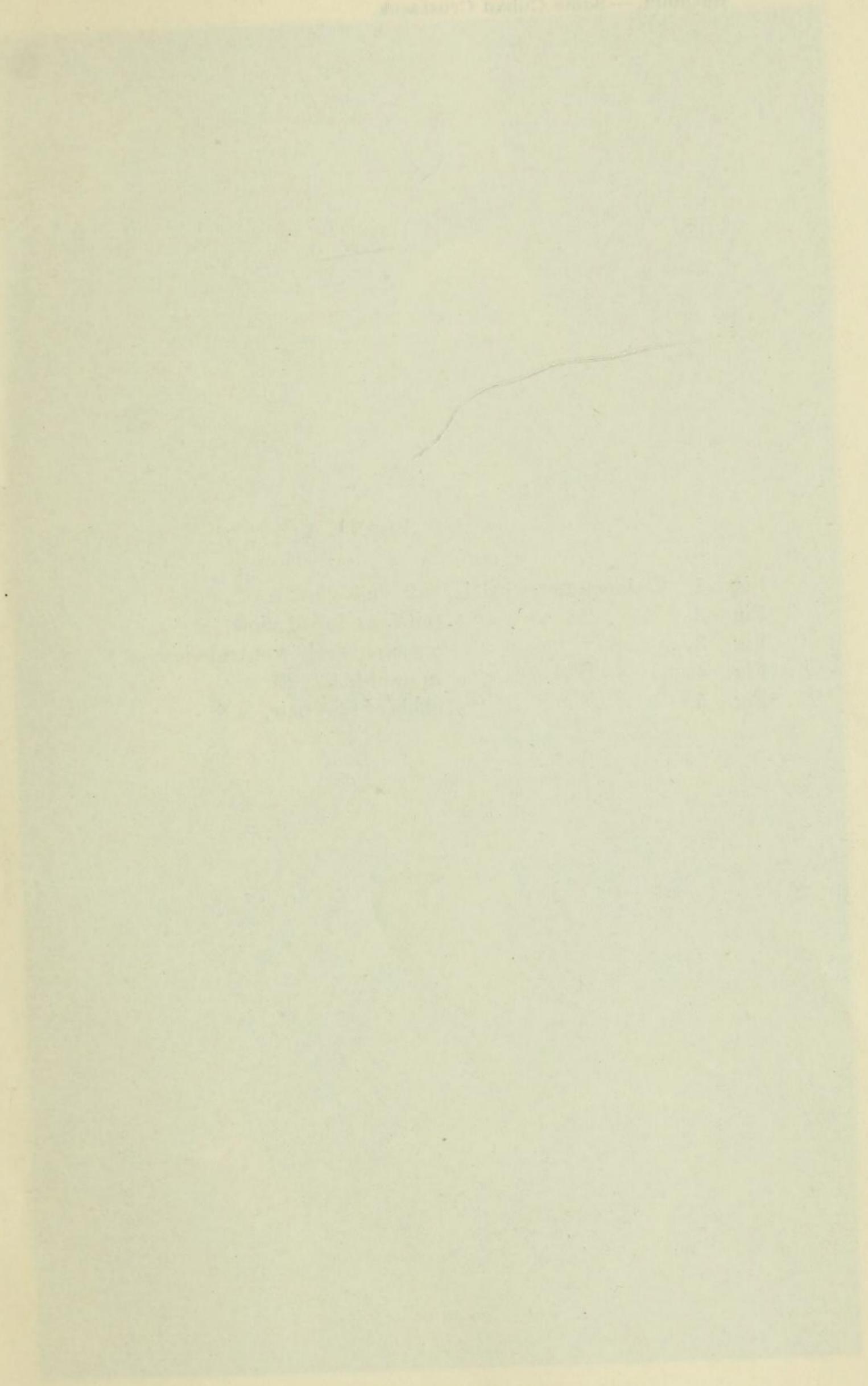
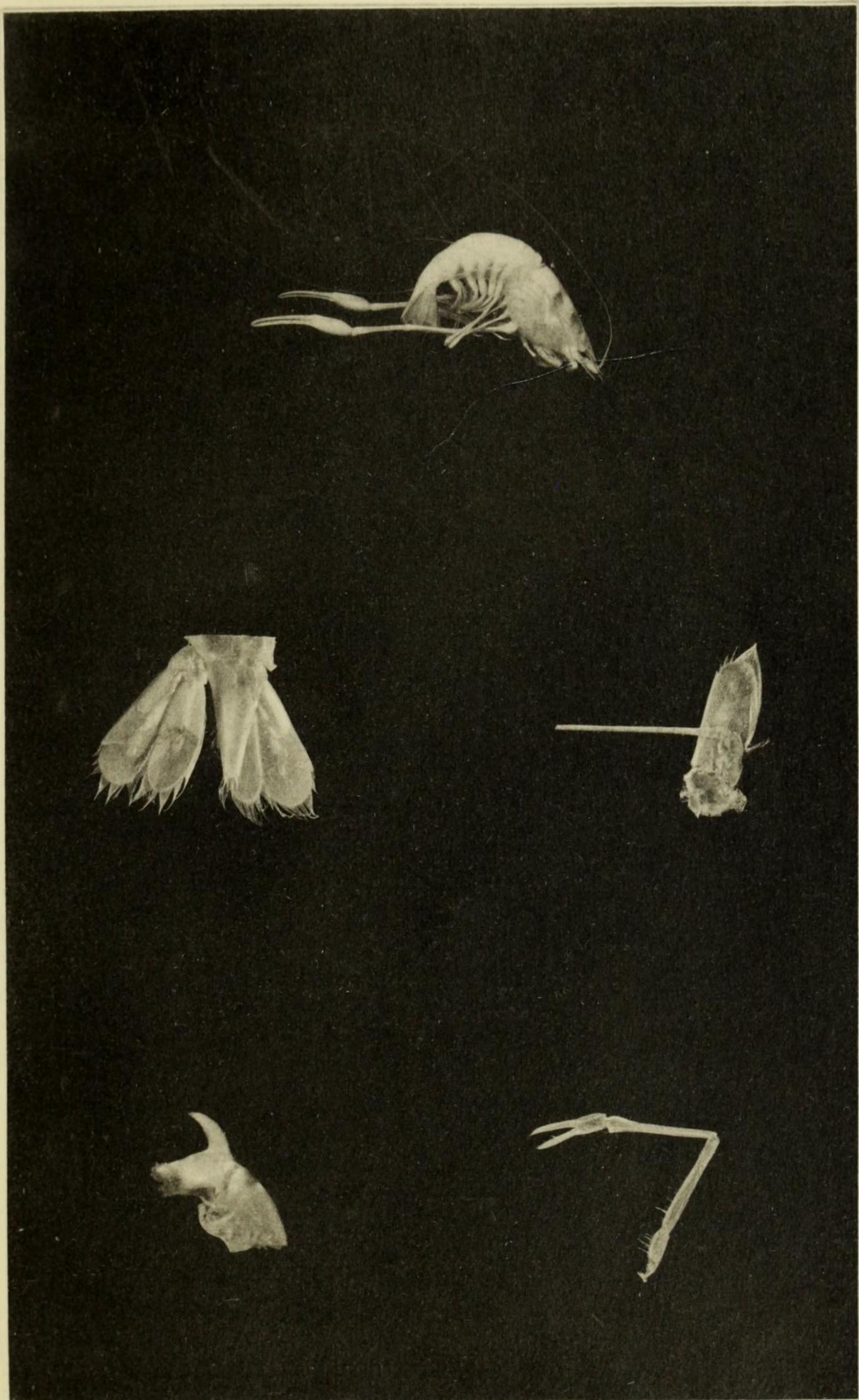


PLATE 1.

- Fig. 1. *Palaemonetes calcis*, side view, $\times 2$.
Fig. 2. " " tail-fan, dorsal view, $\times 8$.
Fig. 3. " " antennal scale, ventral view, $\times 8$
Fig. 4. " " mandible, $\times 20$.
Fig. 5. " " chela of first pair, $\times 8$.

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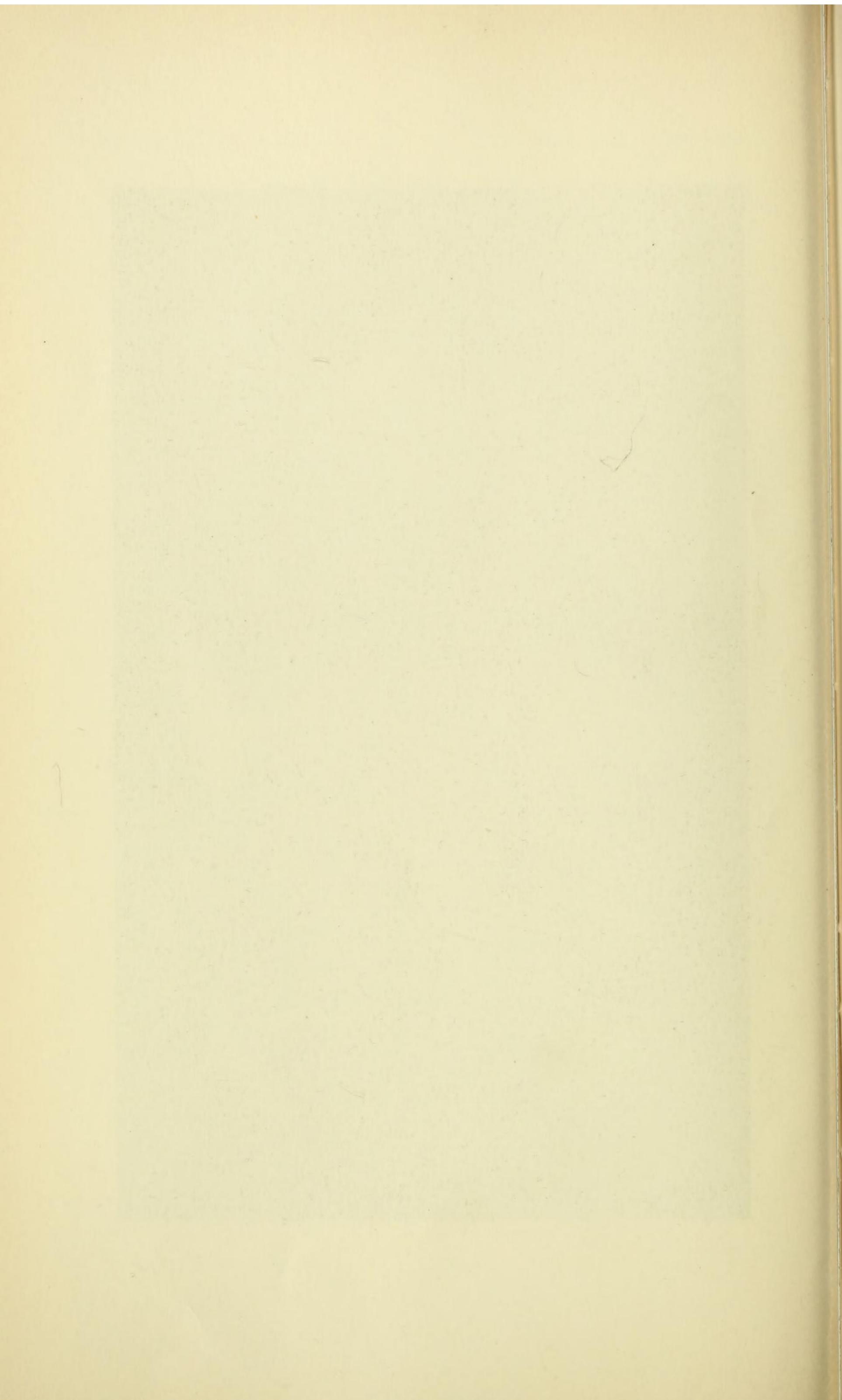
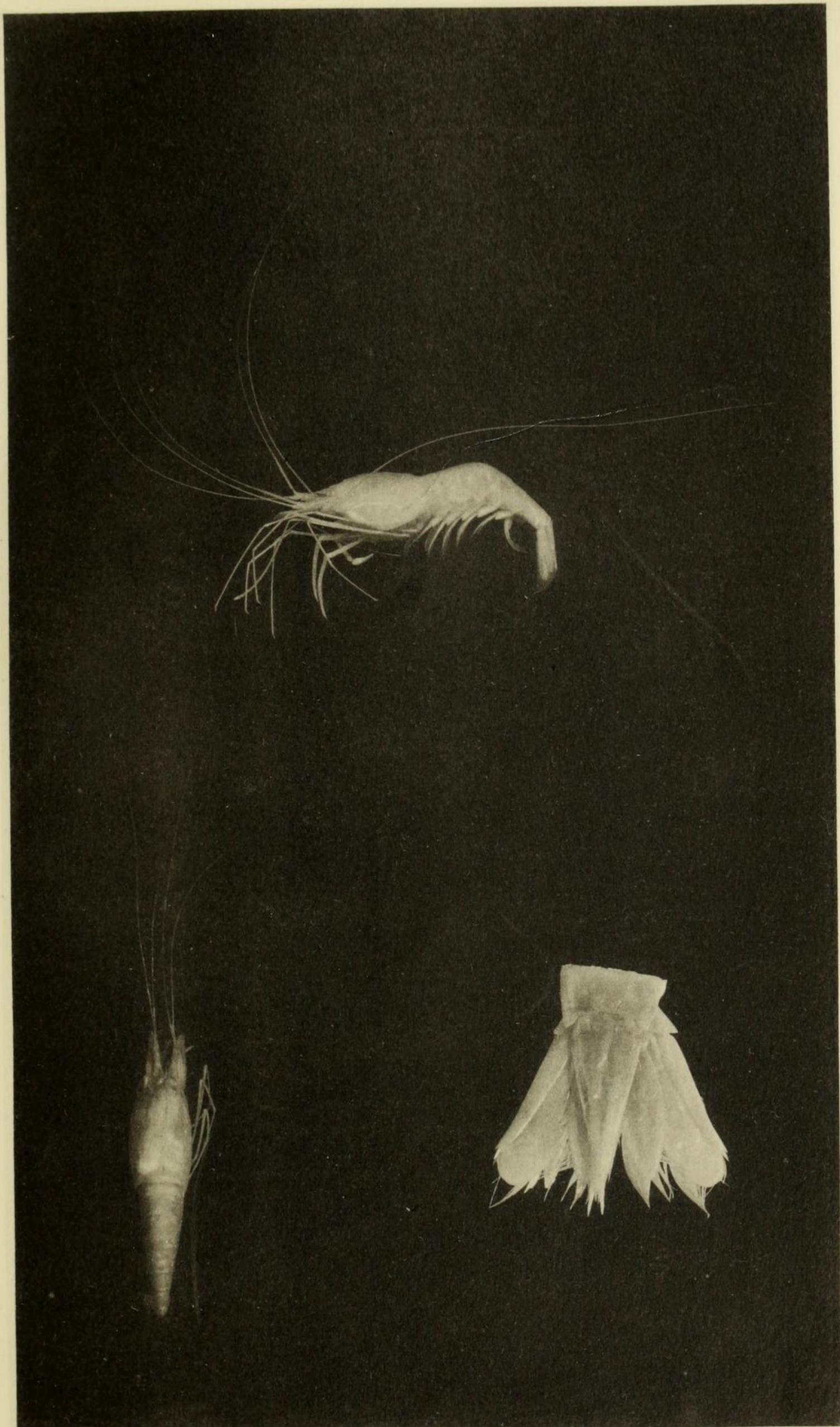


PLATE 2.

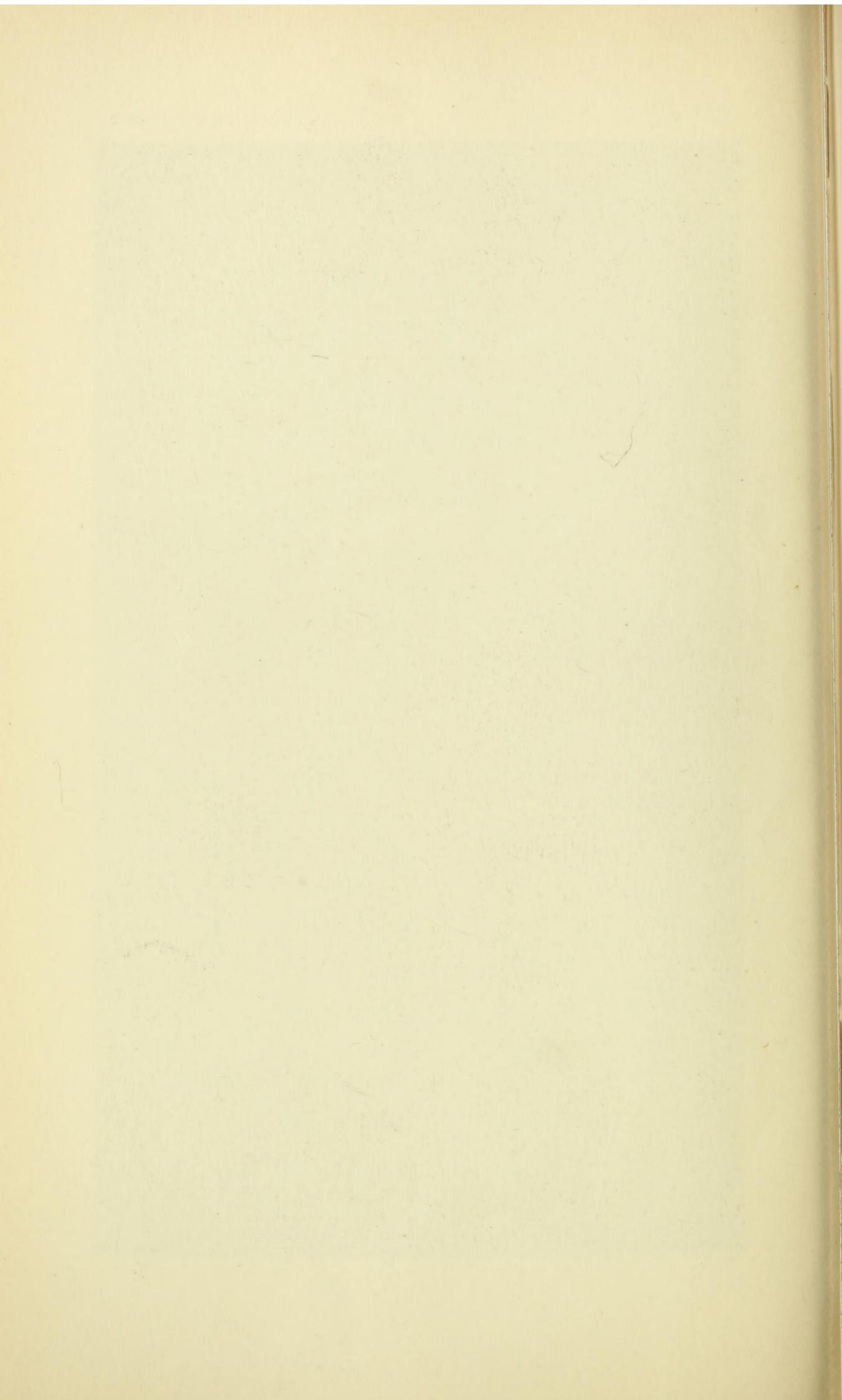
- Fig. 6. *Barbouria poeyi*, side view, $\times 2$.
Fig. 7. " " dorsal view, $\times 2$.
Fig. 8. " " tail-fan, dorsal view, $\times 8$.



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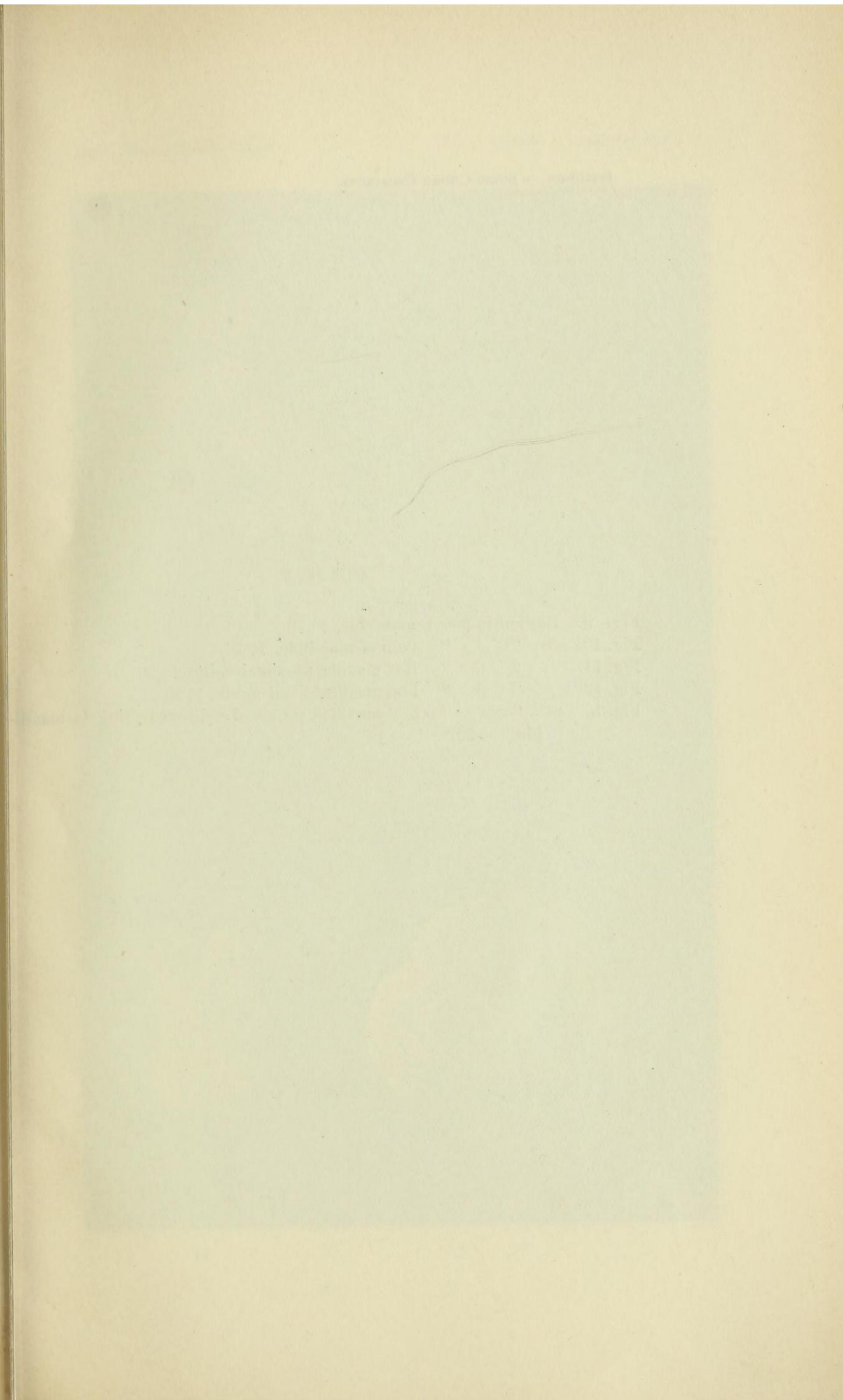
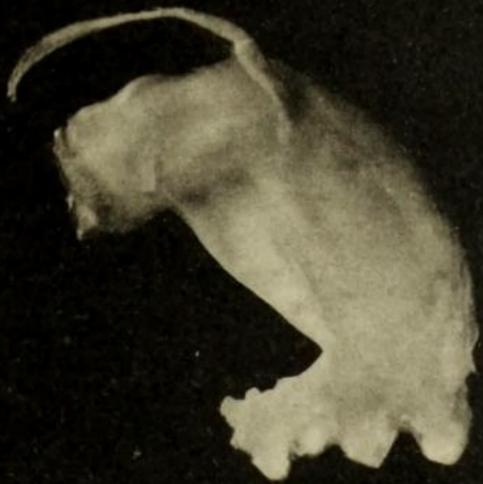


PLATE 3.

- Fig. 9. *Barbouria poeyi*, mandible, $\times 20$.
Fig. 10. " " palp of mandible, $\times 26$.
Fig. 11. " " first maxilla, proximal endite, $\times 20$.
Fig. 12. " " first maxilla, distal endite, $\times 20$.
Fig. 13. " " first maxillae, proximal endites covering the mandibles, $\times 20$.

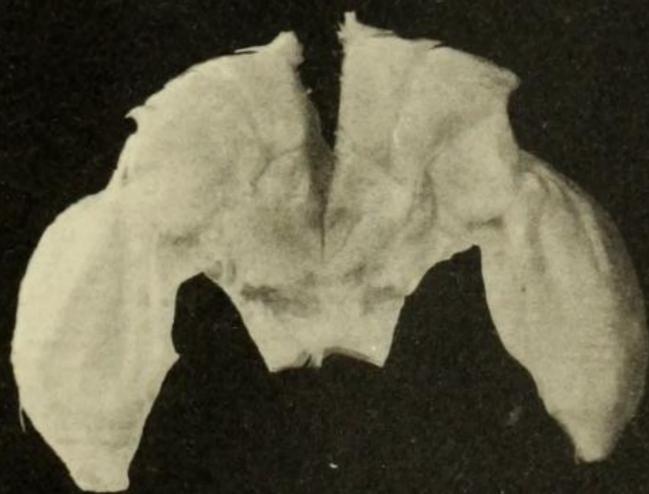
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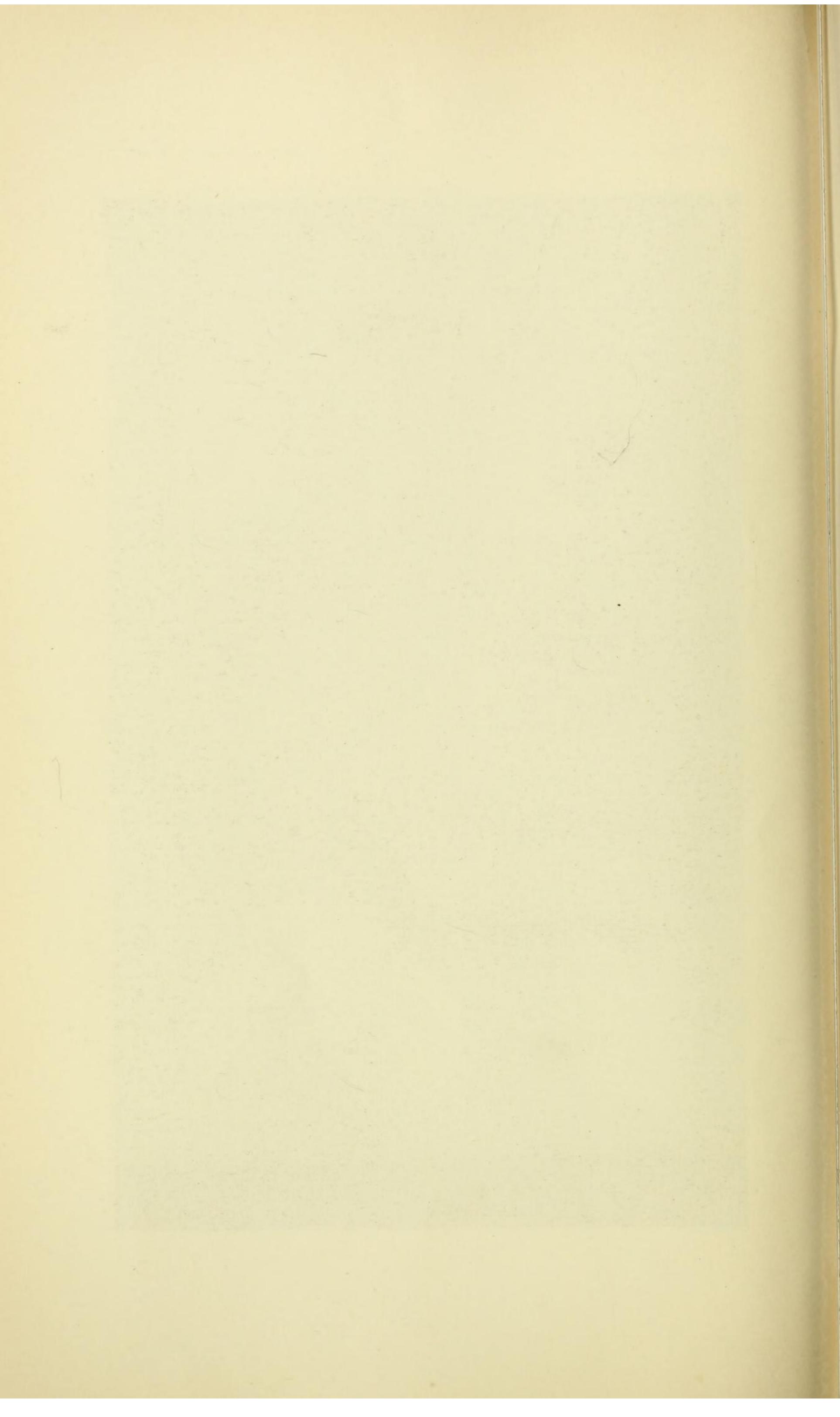
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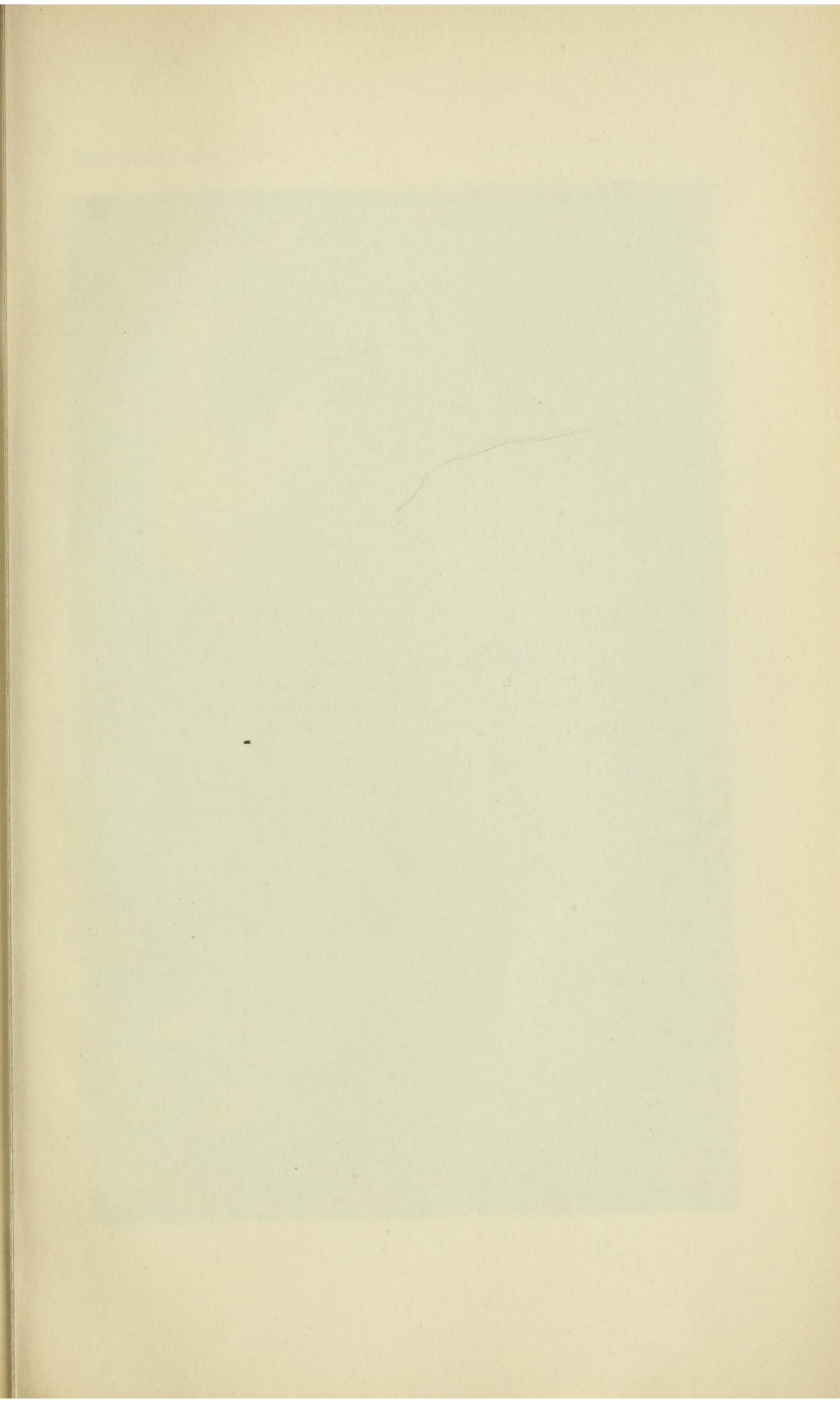


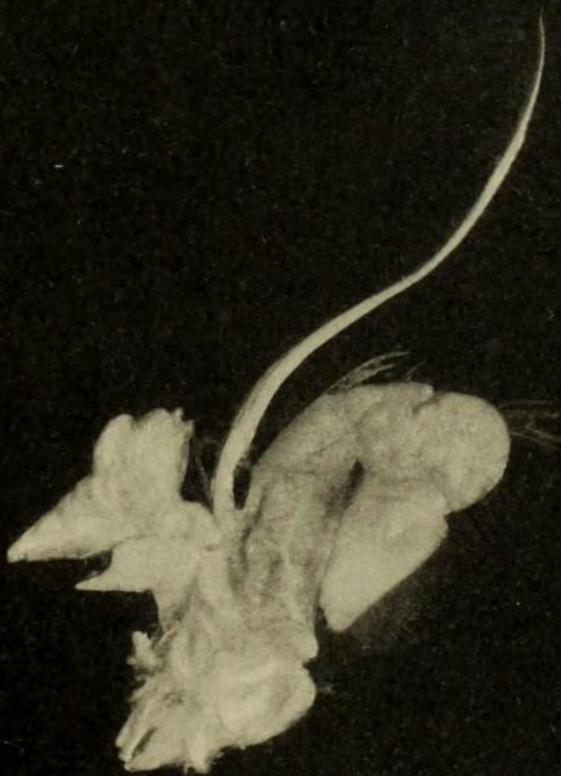
PLATE 4.

- Fig. 14. *Barbouria poeyi*, second maxilla, $\times 20$.
Fig. 15. " " first maxilliped, $\times 20$.
Fig. 16. " " second maxilliped, $\times 20$.
Fig. 17. " " third maxilliped, $\times 8$.

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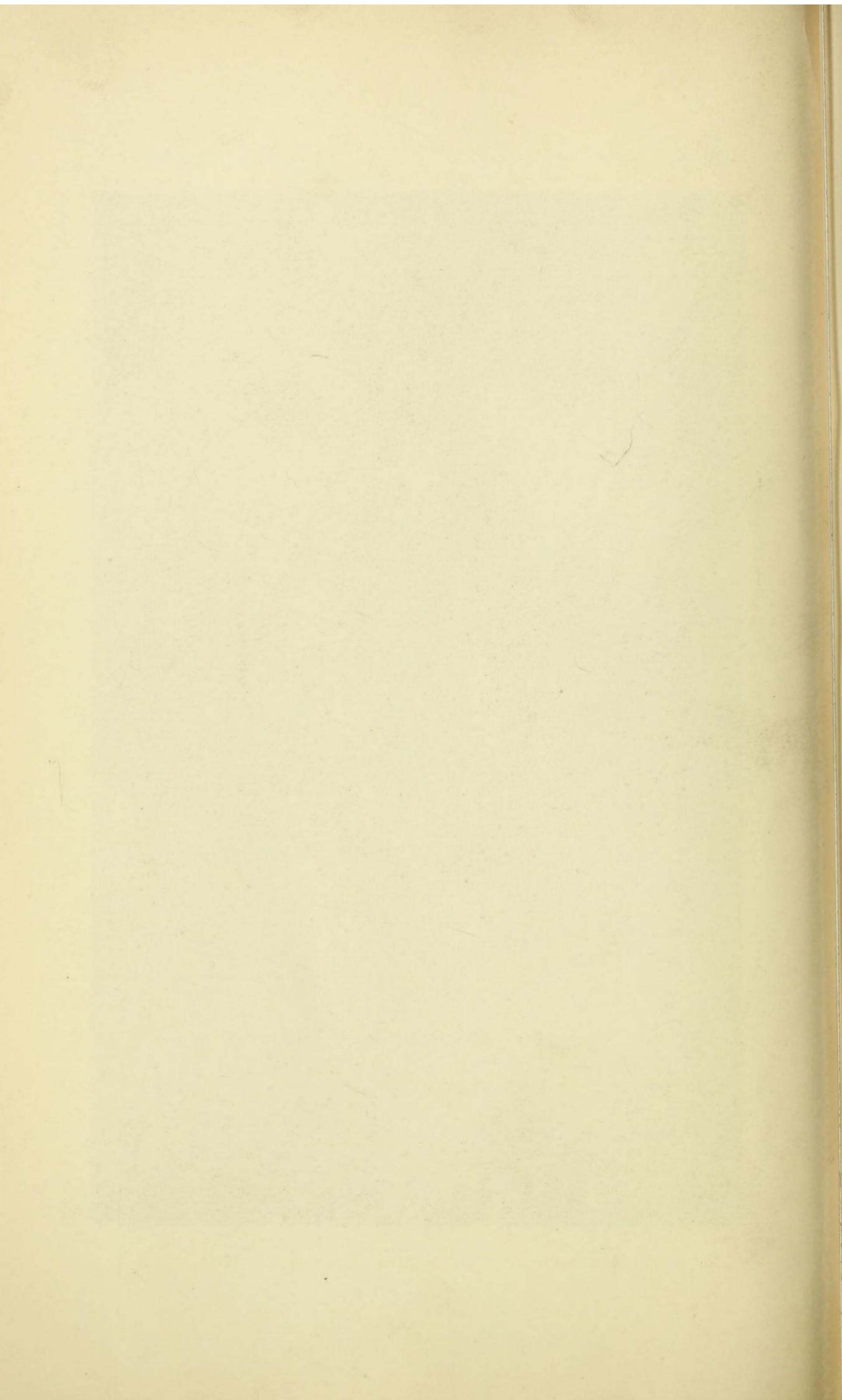


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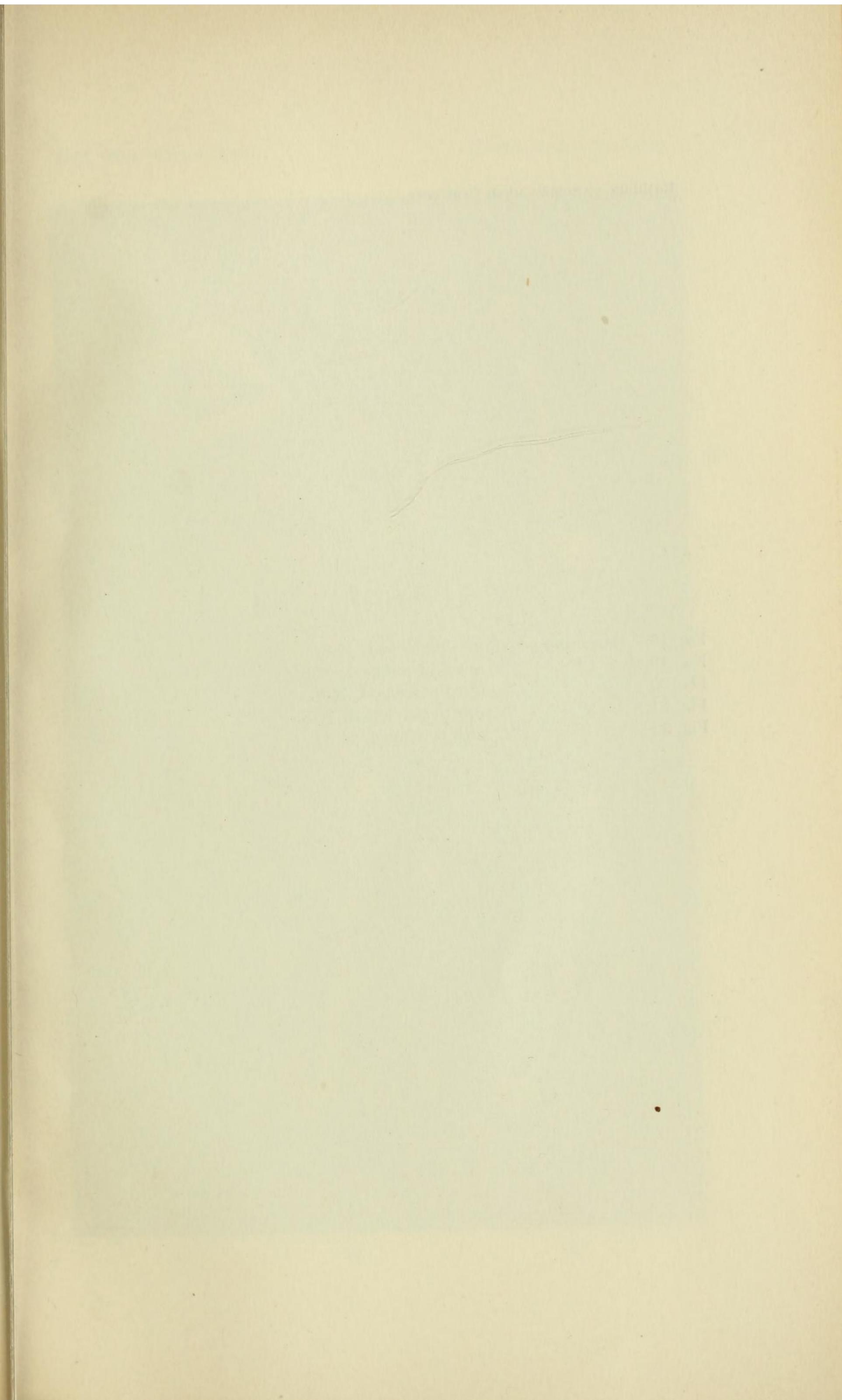
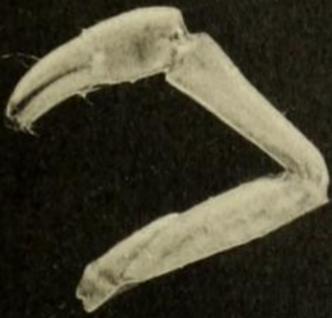


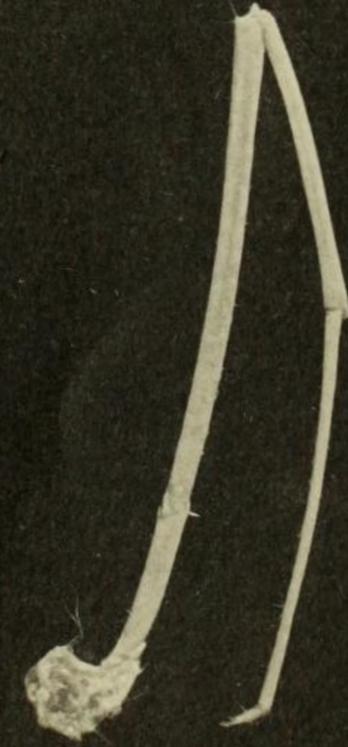
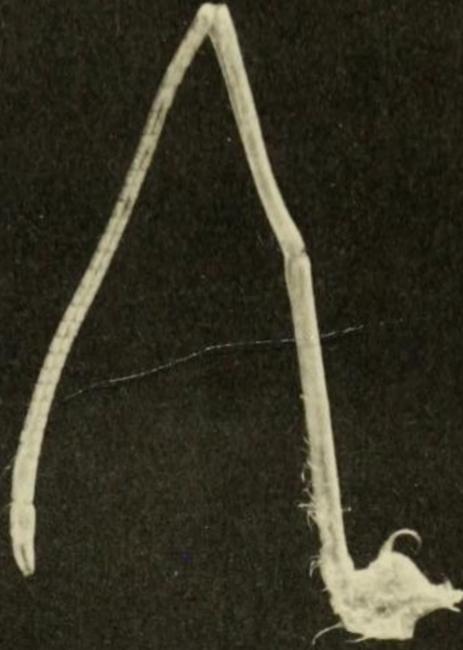
PLATE 5.

- Fig. 18. *Barbouria poeyi*, first pereopod, $\times 8$.
Fig. 19. " " second pereopod, $\times 8$.
Fig. 20. " " third pereopod, $\times 8$.
Fig. 21. " " fourth pereopod, $\times 8$.
Fig. 22. " " fifth pereopod, $\times 8$.

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