ZOOLOGY.—Austrobdella anoculata, a new species of fish leech from Greenland.\(^1\) J. Percy Moore, University of Pennsylvania. (Communicated by Waldo L. Schmitt.)

In the course of his many expeditions to the Arctic, Capt. Robert A. Bartlett has brought back extensive collections of animal and plant life from that region. Among the material collected on opposite sides of Greenland, seven years apart, he obtained two contracted examples of a small marine leech, of which the host is unknown, one from northwest Greenland between Capes Alexander and Chalon, and the other from northeast Greenland.

I have been unable to harmonize them with the description of any species hitherto reported from our northern seas. Except for minor differences, they agree with the type of Badham's genus *Austrobdella*. Of the two, the paratype is somewhat less contracted and distorted and for that reason was sectioned for study of the internal anatomy. The drawings and description are based upon both specimens.

*Austrobdella anoculata*, new species

*Diagnosis.*—Similar to *A. translucens* Badham,\(^2\) but distinguished by absence of eyes, abdomen less abruptly shouldered in adult, somites typically tri- (sex-) annulate; gonopores separated by two annuli, ovisacs short, without prolonged posterior lobes; last pair of gastric caeca with about one-fifth of their caudal ends disunited.

*Description.*—Body divided into two regions, "neck" and "abdomen," the former short and subcylindrical, the latter about three times as long, abruptly wider and moderately depressed. Measurements in millimeters of type: Length 4.6, to \(\varphi\) pore 1.0; widths, cephalic sucker (contracted) about 0.4, at \(\varphi\) pore 0.65, maximum (XIX–XX) 1.8, anus 0.7; caudal sucker 0.9; depths not measured but in neck slightly less than widths, in abdomen about three-fourths widths. Paratype at same points 6.8, 1, 4.7, 0.8, 2.1, 0.75, 1.0; maximum depth about 1.4. Cephalic sucker small, about one-half diameter of caudal sucker, normally cup-shaped, but so contracted in both specimens that ventrally it appears as a thickened annular rim surrounding a deep central depression; in dorsal aspect hemispherical, not definitely wider than the first nuchal somites, without obvious markings, only a few very faint traces of annuli on caudal part and a few scattered, very minute, sensory papillae. Eyes absent, in sections a few pigment granules near middle of head, but no pigment cups or visual cells. Mouth seen only in sections as a minute pore on the cephalic slope of a slight papilla at the center of the ventral face of the sucker. Neck sharply differentiated from abdomen (most so in paratype), subcylindrical, slightly depressed, short, about one-sixth or one-seventh length of abdomen, its maximum width about one-seventh that of the widest part of the abdomen, increasing slightly in width cephalo-caudal but again slightly contracted at the elitellum; preelitellar annuli about 13, but irregular, some of them double; intermetameric furrows, including the nuchal groove,

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\(^1\) Received August 6, 1940.

Figs. 1–3.—Australobdella anoculata. X ca. 28.

1. Annulation in dorsal aspect as worked out from a comparison of the two specimens. In most respects they agree. Where they differ the one appearing most normal or clearest is usually represented, or in other cases the paratype is represented on the left, the type on the right side. Somites are numbered in Roman on left side. a, Anus.

2. Ventral aspect of first 13 segments showing the position of the gonopores.

3. Semidiagrammatic representation of the chief features of the digestive and reproductive organs. The gastric caeca are shown complete on the right side, the male organs on the left side only. a, Anus; at, atrium; de, ductus ejaculatorius; gc 1–7, gastric caeca; ic, caecate intestine; ic, saccate intestine; m, mouth; o, esophagus; p, pharynx; r, rectum; s, stomach or crop; t 1–5, testes of left side; td, vas deferens; ♂, male gonopore; ♀, female gonopore.
generally deeper than the interannular furrows and the only visible external metamerie character; most somites 3-annulate. Clitellum ill-defined, somite X not modified, XI and XII somewhat narrower, about as wide as the first uchial annulus, XII embraced at its caudal end by the anterior fold of the wider first abdominal annulus, into which it is slightly recessed; somites XI and XII triannulate dorsally, biamnulate ventrally, the second annulus of XI enlarged in the medial ventral field to encroach upon the first annulus of XII, and bearing the $\delta$ gonopore; on venter all elitellar annuli longer than those of the preceding somites; gonopores (Fig. 2) separated by two annuli, the $\delta$ on the caudal margin of XI $a_3$, the $\varphi$ at XII $a_2/a_3$, both small and obscure, especially the female, which on the type is concealed beneath the edge of projecting rim of somite XIII but on the paratype is exposed. Abdomen much wider than neck throughout, outline elliptical, the greatest width near middle at somites XVIII–XX (relatively much wider in the type) moderately depressed; cephalic end truncate but not expanded shoulder-like, embracing the last elitellar annulus, but prepubal fold only slightly developed; caudal end tapered to the sucker, for which it forms a definite peduncle; no lateral pulsatile vesicles and no other external metameric structures (nephropores, sensillae) discernible, except that intersegmental furrows are usually deeper than the others. Abdominal somites typically 3(6)-annulate but some of them definitely 6-annulate with the primary triannulation obscure, furrows often irregular or incomplete. Anus a well marked pore on the caudal peduncle followed by two incomplete annuli. Caudal sucker about twice size of cephalic in all dimensions, deeply cupped, regular, directed caudad, with about 48 minute marginal crenulations; dorsal face areolated and divided by faint furrows into three or four obscure concentric rings, each of which bears a circle of very minute papillae which are most distinct on the smooth ventral face. No natural color remains, but the type is stained a uniform green, which may be due to preservation in a copper tank.

Annulation (Fig. 1).—Often irregular and in places, especially at clitellum and caudal end of abdomen, difficult to interpret. On most somites primary and secondary furrows are distinguishable by their relative depth but in places this distinction is lost. I–V, cephalic sucker (head), no annuli distinguishable except some faint traces of one or two at caudal end. VI 2-annulate, first annulus ($a_1/a_2$) larger and very distinct, separated from sucker by a deep nuchal furrow, the second ($a_3$) very small and not separated ventrally. VII 2 or 3-annulate, $a_1$ separated as a very short annulus on paratype, not distinct on type; furrows irregular and incomplete on both. VIII 3-annulate, similarly irregular, with split and spiral primary annuli. IX and X 3-annulate both dorsally and ventrally, $a_3$ largest on X with a faint secondary furrow. Normally X is first elitellar, but on these specimens apparently not closely united with XI externally. XI 2- or 3-annulate, definitely elitellar, ($a_1/a_2$) > $a_3$ with a faint $a_1/a_2$ furrow on the dorsum, which disappears on the venter where $a_3$ is enlarged medially and produced caudal into XII as a small lobe bearing the $\delta$ gonopore on its caudal margin. XII 2- or 3-annulate, 3rd elitellar, similar to XI but shorter, more crowded, and partly concealed by XIII, $a_1$ less developed than on XI and $a_3$ possibly slightly subdivided, $\varphi$ gonopore very minute at $a_2/a_3$, beneath prepubal fold on type. XIII 3-annulate, sharply defined by deep furrows from both XII and XIV and abruptly larger than former, with a moderately developed prepubal fold, which partly encloses it. XIV and XV 3-annulate, with $b_3$ and $b_6$ indicated on both paratype and type by a slightly developed $b_5/b_6$ furrow and $b_1$ and $b_3$ on the former; owing to contraction the annuli of both crowded together and piled.
up, making the region very opaque. XVI–XXII normally 3(6)-annulate. The normal condition is that the three primary annuli are approximately equal and each divided by shallower furrows into two secondary annuli, but because of different degrees of contraction of the two specimens and of greater or less engagement of different gastric caeca of the same specimen there is much irregularity. On the type specimen the triannulate condition dominates but the secondary furrows are usually present, especially on the more contracted side, where annuli stand out more prominently, but $a3$ is rarely and $a2$ more frequently undivided. On the paratype XVI to XIX are much distended by the large blood-filled caeca, which stretch the integument so that it is thin and transparent and the distinction between primary and secondary furrows is nearly lost (Fig. 1). This shows best on XVI and XVII. XVIII–XXII more typical, all annuli may be equal or $a2$ smaller and $a3$ larger. XXIII–XXV 3-annulate, but progressively reduced in size and the annulation very irregular, especially on the type. XXVI and XXVII 2-annulate, but irregular, the latter much smaller and bearing the anus on the anterior margin of the first annulus.

Fig. 4.—*Austrobedella anoculata*: Dorsal and ventral photographic views of type. $\times 3\frac{1}{2}$.

**Anatomy** (Fig. 3).—Some of the internal organs can be seen through the integuments sufficiently to determine their position and roughly their form, but the details were worked out from sections of the paratype in which some of the structures were obscured by the engorged gastric caeca. Anatomy closely patterned after that of the genotype, *A. translucens*. Ventral nerve ganglia of complete somites in annuli $a2$, chiefly in $b4$. Pharynx with medial ventral and paired dorsolateral muscular ridges; salivary glands diffuse, of very large single cells in somites VII–X. Gastric caeca seven pairs in XIII to XIX, the first six reaching nearly to the lateral body walls and lobed at the ends, the last pair coalescing completely except at the caudal end, where the two caeca remain distinct for a longer distance than in *A. translucens*; intestine with two or three pairs of small simple caeca at the anterior end, following which it expands into a wide, simple sac reaching nearly to the end of the united gastric caeca and giving rise from its dorsal face a short distance anterior to its caudal end to a narrow, tubular rectum which ends at the anus. Reproductive organs similar to those of *A. translucens* except that the median chamber of the atrium is relatively smaller and the duct shorter; cornu large and sperm ducts with several loose coils at the atrial end; testes five pairs at XIV/XV to XVIII/X IX, alternating with gastric caeca. Vagina a simple vertical duct with only a slight enlargement and not expanded into a sac or bulb but encased in a mass of glands; it divides beneath the nerve cord into the paired ovarian sacs lacking the narrow duct and anterior lobe shown by Badham, both ovisacs very short, the one reaching to XIII only, the other to the middle of XIV, both containing developing ova in early stages.
Material examined.—Two specimens, one of which, the holotype, U.S.N.M. no. 20573, was obtained in 25 to 40 fathoms between Capes Alexander and Chalon, northwest Greenland, by Capt. Robert A. Bartlett, August 2, 1937 (station 27, seine haul). The other specimen, the paratype, comes from northeast Greenland, where it was collected by Captain Bartlett in 1930 (No. 14).

Remarks.—Owing to the limited material and its indifferent preservation, it has not been possible to arrive at such unequivocal conclusions and to prepare as satisfactory a description as could be wished. Many nominal species of fish leeches have been described from Arctic and sub-Arctic waters. Some of the early descriptions are so brief and ambiguous that the species to which they refer have never been certainly determined. Synonyms are still confused. It is possible that the species here described may belong to one of these, but none were found to agree. Concerning the generic reference there is little doubt. On a preliminary study it was thought that these leeches might belong to Abranchus or Ottonia, but externally the form and annulation differ from those genera and internally the coalescence of the last pair of gastric caeca is sharply differential.

On the other hand, the resemblance to Austrobdella, both externally and internally is very close. So far as it could be worked out, the annulation agrees closely with that of A. translucens Badham. The external form and proportions of parts are very similar. Neither of the two specimens is so strongly shouldered at the junction of the neck and abdomen as in Badham’s most mature individuals. The anatomy of the alimentary canal and reproductive organs, so far as worked out, is very close in the two species, the principal differences being that in the type species the last pair of gastric caeca are more completely united at the caudal end than in A. anoculata, and that the ovisacs of the latter are not prolonged caudally and have the vaginal duct short and simple. These ovarian differences may be due to immaturity. Owing to the state of the material, a study of the distribution of the sinuses was not attempted.

ICHTHYOLOGY.—Hadropterus palmaris, a new darter from the Alabama River System.REEVE M. BAILEY. (Communicated by LEONARD P. SCHULTZ.)

In a collection of fishes from the Etowah River in northern Georgia, six specimens of a hitherto undescribed species of Hadropterus were taken. Twenty-seven additional specimens from two localities in Alabama have been placed at my disposal through the generosity of Dr. Carl L. Hubbs. This handsomely colored species is herein described under the name Hadropterus palmaris.¹

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² I am indebted to Dr. Hubbs for helpful suggestions in preparing this paper.
³ Palmaris = a prize.

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