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## XV.—The male of *Apus cancriformis*

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the modern Australian molluscan fauna. A search among the more persistent of living types may produce some torn pages of its history. One such is recognized by the writer in *Lucopinella*, whose occurrence in Australian waters is noted\*. But palæontology must be chiefly called on to relate the story of the decline and fall of the Antarctic marine fauna.

XV.—*The Male of Apus cancriformis*. By W. BLAXLAND BENHAM, D.Sc. (Lond.), Hon. M.A. (Oxon.), Aldrichian Demonstrator in Comparative Anatomy, Oxford.

IN view of the rarity of the male individuals of this interesting Phyllopodan Crustacean, it may be worth putting on record the occurrence of one amongst the specimens of *Apus* used for examination in the ordinary course of our work in the Zoological Laboratory here in Oxford. The specimens were obtained through Fric, of Prague, from Poděbrady, a town on the Elbe.

*Apus* is one of the stock examples of parthenogenesis, the bulk of the individuals being females; that males do occur occasionally we know from the observations of Kozubowski, von Siebold, and others; but locality and season appear to have considerable influence on their occurrence. Thus, in 1858, out of 549 specimens of *Apus* collected at Krakau, as many as 154 were males, whereas in 1866 out of 999 collected at Breslau there were only 7 males. Von Siebold's repeated endeavours during several successive years to obtain males are matters of history.

The credit of first describing the male is due to Prof. Kozubowski, who, in 1857, gave an account of the testis, sperm-duct, and spermatozoa (Arch. f. Nat. xxiii.), and laid the foundation for the view which has since then been nearly universally adopted, viz. that *Apus* is parthenogenetic. Up to that period it had been considered hermaphrodite.

It will not be amiss to note that the only external point of difference between the two sexes is the absence in the male of that modification of the sixteenth appendage which results in the female in the formation of an egg-pouch ("oostegopod"); in fact, the sixteenth appendage of the male is precisely like its neighbours, and at its base the sperm-duct opens.

I looked carefully for any appendages which might be

\* Proc. Roy. Soc. Vict. 1894, p. 197.

modified for holding the female, such as occur in its ally *Branchipus*; but none exist.

It is usually stated, on Kozubowski's authority, that the male is about one third shorter than the female, with a distinctly narrower abdomen and flatter carapace. These statements can scarcely be said to be true in the present instance. The male did not differ noticeably in size from the rest of the specimens, some of which were slightly larger, others smaller. I measured one female, taken at random, and found the trunk (excluding the head, that is) to be 36 millim. long; the trunk of the male is 33 millim.; the diameter of the female abdomen, close to the last appendage, is 5 millim., that of the male 4 millim.

Sir John Lubbock has recorded (1863) that the males of another species, *Lepidurus productus*, are larger than the female. We cannot, then, make any general statement as to proportionate size of the two sexes.

On referring to Mr. Bernard's little book, 'The Apodidæ,' I was rather surprised to find that no mention of the anatomy of the male *Apus* occurs in the body of the book; but in the appendix he quotes his letter to 'Nature,' vol. xliii. p. 843, in which he gave a brief history of the observations on the male. The name of Kozubowski does not appear in his list of references, nor that of von Siebold. Seeing that Bernard's book is the only recent English account of the anatomy of *Apus*, it is regrettable that space was not found for a reference to the sexual difference. But no doubt a description of the mere anatomy of the animal was not so much his aim as a comparison of *Apus* with an Annelid. Moreover, he wished to emphasize the hermaphrodite nature of *Apus*.

Now it is more than four years since Mr. Bernard announced, in a brief note published in the 'Jena. Zeitsch.,' the discovery of the existence of testes, or, at any rate, of "sperm-producing centres," in the female *Lepidurus*; but beyond stating that he has observed the same state of things in some other species, and has seen spermatozoa in the lower part of the duct, he has not materially added to this bare statement either in his book or elsewhere. I think it is not an exaggeration to say that zoologists have been impatiently waiting for a detailed and *illustrated* account of this phenomenon. *Apus* has for so many years been regarded as parthenogenetic, that naturalists hesitate to accept the bald statement that it is "hermaphrodite and self-fertilizing."

On p. 309 of his book Mr. Bernard writes:—"The sperm-producing centres were found scattered here and there among the rich branches of the segmental diverticula of the genital

tubes. They occur either at the tips of such branches where the eggs ordinarily develop, or as slight lateral bulgings of the same." I have recently had occasion in the course of my work to examine a series of longitudinal sections through *Apus cancriformis*, and I have failed to identify any such "sperm-producing centres."

On p. 144 he gives a figure representing a portion of the ovary, and at one point the epithelium of the duct is interrupted by a group of small round granules, which is labelled "testis, as occasionally found (*e. g.* in *Apus cancriformis*)."

This "testis" is neither a terminal nor a lateral bulging; this figure, too, which is the only illustration of the point in question, is so crude that we ought to have further details of these "sperm-producing centres."

I will not presume to deny the possibility of hermaphroditism in the Apodidæ, however improbable it may be; I merely repeat, we wait for further evidence.

With regard to Bernard's figure of the ovary I would say one more word. Von Siebold, in a paper accompanied by beautiful figures, showed that each terminal swelling of the ovary is formed of four cells, of which the *distal* cell becomes the egg-cell, the other three being yolk-forming cells. That this is true for *Apus* a glance at a section is sufficient to demonstrate; but Bernard, in the figure referred to (illustrating presumably *Lepidurus*), represents the *proximal* cell of the four as the egg-cell. If this is really the case, we have an extremely interesting difference between the two genera.

Oxford,  
December 16, 1895.

XVI.—*Descriptions of Two new Species of Eugaster* (Hetrodidæ) *from East Africa*. By W. F. KIRBY, F.L.S., F.E.S., &c., Assistant in Zoological Department, British Museum.

*Eugaster suakimensis.*

Long. corp. 37–40 millim.

Head brown, strongly punctured above, the lower mouth-parts, the palpi, and the base of the antennæ more or less varied with testaceous; a short conical testaceous spine between the antennæ; pronotum reddish brown or blackish, varied with testaceous in front and along the median line, and with reddish behind. It is strongly rugose, with two irre-