usually to settle down to a definite form, and this would support such a suggestion.

Note.—Spiral forms of discharge in ordinary vacuum tubes using direct currents appear among the many observed by de la Rue and Muller so early as 1877 (*Phil. Trans.*). They also noted the prominence of the mercury lines in such a discharge. Gassiot (*Phil. Trans.*, 1858) also makes mention of a spiral discharge.

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Mode of Feeding of the Bopyridæ.

IN connexion with a study which I am about to publish on the effects of one of the Bopyrid isopods, *Gyge branchialis*, on its host, *Upogebia littoralis*, I have become interested in certain questions concerned with the mode of feeding of the Bopyridæ which seem to have been neglected by students of these animals and to which I wish to direct attention.

It may be recalled that the Bopyridæ are parasitic in the branchial cavity of decapod crustaceans, and that they normally occur in pairs, a large female individual and a minute and less highly modified male, which leads a sedentary existence on the body of the female. The latter, at any rate, obviously feeds by sucking the juices of the host by means of its piercing and suctorial mouth-parts, but from what part it sucks them appears, if one looks critically into the literature, to be by no means clear. The animals are often spoken of as though they suck the juices directly from the thorax of the host. Such an eminent authority as Bonnier, in his monograph on the Bopyrids (*Travaux de la Station Zoologique de Wimereux*, tome 8; 1900), seems clearly to imply this, for he speaks definitely (p. 50) of the animal sucking "les liquides viscéraux", and again (p. 104), "les liquides de la cavité viscérale de l'hôte". Yet when one reflects that the ventral surface of the parasite, on which the mouth-parts open, is turned towards the branchiostegite of the host and away from the latter's body, these statements appear difficult to accept literally. It would seem that the only way in which the animal could suck "the liquids of the visceral cavity of the host" would be for it to protrude its mouth-parts for a relatively great distance, and at the same time to twist them round to an extraordinary extent, so as to drive them into the host's body, from which they are normally turned *away*. The conformation of the mouth-parts does not suggest that such a proceeding is possible.

The only alternative seems to be to suppose that the animal sucks the juices from the inner membrane of the branchiostegite. So far as I know, however, this is nowhere definitely suggested in the literature, though Dr. Calman, to whom I have appealed, tells me that he has always supposed that this is what happens. The membrane is certainly often quite well vascularised, though sometimes, as in the *Upogebia* upon which I have been working, it is so thin that one would not suppose it to be a very satisfactory source of nourishment for a suctorial parasite. It appears to me that, unless I have overlooked some important contribution to the subject, no one has really demonstrated clearly and definitely from what part of the host the parasite does extract its food, a curious omission in a group of animals which have received a very fair amount of attention.

This is not all: there are difficulties also in connexion with the male. The larval form which first invades the branchial cavity of the host develops into the large female form. Afterwards another arrives, settles down on the body of the first and becomes a male. There are two, probably related, questions concerning this second arrival to which I can find no clear answers, namely: How does it feed? What causes it to become a male? Apparently the larvæ are equipotential with regard to sex. If No. 2 did not feed at all, the difference in its subsequent development as compared with No. 1 would be accounted for. But the mouth-parts are perfectly well developed like those of the other sex, and some of Bonnier's remarks certainly seem to imply that it does feed. But neither Bonnier nor anyone else, so far as I know, explains how a minute animal leading a sedentary existence on the female's ventral surface, which is turned towards the branchiostegite of the host, contrives to reach the host's body with its mouth-parts. Hypothetical acrobatics by which it might manage to do so might be suggested, but I will not waste space on these. The point is that if it really does so, it is worth while taking the trouble to find out how.

If the male does not suck the host's juices directly, and yet does feed, the only alternative is to suppose that it sucks the juices from its own female. Should this prove to be the case it would be surprising that so interesting and remarkable a state of things should not have been noted before, but personally I do not think it is very likely. On the whole, it rather looks as though the male does not feed, but if it can be shown that it does not, other questions are raised. Is it possible that it can exist entirely without food for so long as the female, which feeds vigorously and the life span of which is apparently coincident with that of the host? Or is there a succession of males during the lifetime of one female? (I may say that I have examined many *Gyge* and never found an adult female without a male). If the male does not feed, why are its mouth-parts and gut so well-developed? Is it, speaking teleologically, so that it can start feeding and develop into a female if the original female dies? I could add other questions.

What I have said will have been sufficient to suggest that present knowledge of the biology of the Bopyrids is scarcely commensurate with the knowledge of their structure. The points I have raised ought not to be beyond the ingenuity of someone having access to living material to settle. I hope I may have an opportunity of doing something in this direction myself at some future time. But my immediate object is to inquire whether there is no zoologist who can now from experience already obtained throw some light on these questions, which seem so obvious and yet seem to be carefully avoided or slurred over in all the literature with which I am acquainted.

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Behaviour of the Mercury Line 1849·57 ($1^1S_0 - 2^1P_1$).

UTILISING an arrangement which permits working in an atmosphere of nitrogen and a Hilger quartz spectrograph model E/37 with Schumann plates (see details in *Contrib. Estd. Ciencias Fis. Mat. Serie matemáticofisica*, **4**, 102; 1927, La Plata) we have investigated the persistence of the mercury line 1849·57. In the spark spectrum, using Gramont's fulgurator with solutions of mercury salts, $Hg(CN)_2$ or $Hg(NO_3)_2$, it is only possible to register photographically the mercury line 1849·57 when working in an atmosphere of nitrogen (Fig. 1). In the arc spectrum, using McLennan's vacuum arc lamp and operating in a normal atmosphere, and in a nitrogen