XIV LITTORAL OLIGOCHAETA FROM THE CHILKA LAKE ON THE EAST COAST OF INDIA.

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On the occasion of a recent visit to Calcutta, Dr. Annandale handed over to me for examination three specimens of a worm, which had recently been taken at the Chilka Lake during a preliminary survey of that area. I subsequently received in Lahore four more captures of Oligochaete worms, taken during the more detailed investigation of the lake. Three of these were specifically identical with the specimens I had examined in Calcutta, and represent a species of *Pontodrilus* which I identify with *P. ephippiger*, Rosa. Since, however, the specimens show a considerable amount of variation among themselves, as well as some minor differences from the form with which I identify them, I give a fairly complete description below

The remaining batch of specimens, which I identify with *Criodrilus lacuum*, Hoffmstr., consisted of a very large number of individuals; but unfortunately I failed to find any which showed the least external mark of sexual maturity. However I dissected two of the best-grown specimens, and fortunately found the genital organs in an early stage of development. But as under these conditions there must be at least a slight element of doubt in the specific, if not generic, diagnosis, I have given here also a number of descriptive details, in order that the result may be amenable to criticism if necessary.

General Remarks.

The occurrence of *Criodrilus tacuum* is interesting, since the family (Glossoscolecidae) to which it belongs is represented in India, so far as hitherto known, by only two or three species. The nearest locality to India from which this species has previously been reported is, I think, the Lake of Tiberias in Palestine (Stephenson, 10 from specimens collected by Annandale); and along with this may be mentioned several places in Syria (Rosa, 8). This is of interest in view of Annandale's recent remarks (1) concerning the relationship between the faunas of India and of the Jordan Valley. *Criodrilus lacuum*, as its name implies, has a limnic habitat; I am not aware whether it has previously been recorded from any locality which could be described as 'littoral,' though the Lake of Tiberias of course contains a high percentage of salt. For the rest, it occurs principally in Central Europe.

The genus *Pontodrilus* has been recorded twice previously from the Indian region. The references are to *P. bermudensis*,

Bedd., from Ceylon (cf. Michaelsen, 7), the distribution of which is circummundane in the tropics; and to Beddard's species *laccadivensis*, which occurs in both the Laccadive and Maldive Islands (3).

Criodrilus lacuum, Hoffmstr.

Shore at Satpara, Puri district, Orissa, from fisherman; 14-iii-1914. Very numerous specimens, none showing external marks of maturity.

Length average 80, maximum 100 mm.; breadth 2 mm. Colour an equable grey. Segments *ca.* 240. Prostomium zygolobous. No dorsal pores.

The body from about segment ix onwards is somewhat four-cornered; in the posterior fourth of the body, the dorsal surface is concave, thus presenting a shallow longitudinal groove. The posterior end is sharply pointed. The anus is dorsal, and forms a longitudinal slit with whitish margins, the posterior end of which does not reach the pointed posterior end of the body. The number of segments over which the anus extends is difficult to count, as they are small, and, at the end, not completely differentiated; but about 6 or 7 can be recognized and counted, as well as a small undifferentiated zone posteriorly. The segments after the first three are triannulate, soon becoming four- and five-ringed by the subdivision of one or more of the primary rings; posteriorly the segments are again three-ringed.

The setal intervals vary somewhat; the relations may roughly be expressed thus:—$aa = 2\text{–}2\frac{1}{4}ab = bc = 2\text{–}2\frac{1}{4}cd = \frac{2}{3}\text{–}\frac{3}{4}ad$. In the anterior part of the body $aa = 1\frac{2}{3}ab$. The setae are ornamented towards the tip, but much less markedly than is shown by Vejdovsky in his figure (11).

The first septum is $\frac{4}{5}$; thereafter the septa gradually increase in thickness, being moderately thick at $\frac{8}{9}$, and so continuing to $\frac{12}{13}$. Behind this the thickness rapidly decreases again, and $\frac{16}{17}$ and those behind are of the usual attenuated type.

A rudimentary gizzard was present in segments xiii–xiv in one specimen dissected; in the other it was questionable whether there was anything which could be called a gizzard.

The last heart is in segment xi. Nephridia begin in xii (xi one side of one specimen).

The testes are situated in x and xi; one funnel was seen in x. The four pairs of seminal vesicles depend, two anteriorly (i.e. forwards from the posterior wall of the segment) into ix and x, and two posteriorly into xi and xii. Ovaries and ovarian funnels were seen in xiii, and small ovisacs depending backwards into xiv.

Pontodrilus ephippiger, Rosa.

In damp mud under stones at edge of Chilka Lake at Gantasila, Ganjam district; 27-xii-1913; three specimens, two being fully mature.

Chilka	survey	28	Z.E.V	$\frac{6\,2\,2\,6}{7}$; a number of specimens.
,,	,,	75	Z.E.V.	$\frac{6\,2\,2\,7}{7}$; two specimens.
,,	,,	82	Z.E.V	$\frac{6\,2\,2\,8}{7}$; three specimens.

Length variable in the different captures, 32–65 mm.; diameter maximum 2–2½ mm. Colour in general light grey throughout; the first batch of specimens however were olive-green, the anteclitellar region paler, and clitellum with a reddish tinge.

Prostomium slightly epilobous. Segments 106–108. No dorsal pores.

The lateral setae are not paired. In front of the clitellum the setal intervals may be represented by the formula $ab = \frac{3}{5}aa = \frac{3}{5}bc = \frac{3}{5}cd$, *aa*, *bc* and *cd* being thus equal to each other; or *cd* may even be slightly greater than *bc*. Behind the clitellum the relations are $ab = \frac{1}{2}aa$, and *aa* = or slightly > *bc* = *cd*. Throughout the body $dd = 2cd$. No ornamentation can be seen on the setae even under the oil-immersion lens.

The clitellum is absent ventrally, the ventral surface in this region forming a broad groove. The clitellum extends from ½xiii–xvii = 4½ (once xiii–xvii = 5).

The male apertures are situated on small papillae in segment xviii in the line of setae *b*. At the margins of the ventral surface in xviii, and extending on to the adjacent parts of xvii and xix, are a pair of very prominent longitudinal ridges, white and rounded. Internal to the ridge of each side is a deep depression, also, like the ridge, narrow, longitudinal, and well-defined, i.e. an antero posterior groove of the same length as the ridge, which latter bounds the groove on its outer side. Between the grooves of the two sides the ventral surface may be slightly hollowed. The situation of the male apertures is on the inner, rather more gently sloping, wall of the longitudinal grooves above described.

The female apertures appear as two white points anteriorly in xiv, nearer the groove $\frac{1}{1}\frac{3}{4}$ than the line of the setae; they are one on each side of the nerve cord, which can be seen shining through, and internal to the line of setae *a*.

The spermathecal apertures are two pairs, on small white papillae, in furrows $\frac{7}{8}$ and $\frac{8}{9}$ in the line of setae *b*. In one specimen, while three of the four apertures were in the lines of *b*, one (left anterior) was exactly in line with the setae *a*.

The genital markings are variable. (i) Most constant is one in $\frac{1}{2}\frac{9}{0}$, of an oval shape with long axis transverse; its extent varies, between setae *a* and *a*, or between *b* and *b*; the form it takes also varies:—(*a*) It may be a depression, with a well-marked lip-like margin, and thus somewhat sucker-like; (*b*) or a broad white low papilla with a flat surface; (*c*) or a whitish well-defined area, but not raised above the general surface; or (*d*) it may be very inconspicuous, though never, so far as I observed, entirely absent.

The next commonest genital mark is (ii) a similar oval area in furrow $\frac{12}{13}$, of whitish colour, stretching from between lines *a* and *b* on one side to a corresponding point on the other. This has the form of a low flat papilla; it was present, though not always equally well-marked, in about half the specimens examined. (iii) In one case there was a slight whitish ill-defined elevation in the situation of groove $\frac{13}{14}$.

Septum $\frac{5}{6}$ is thin or only slightly thickened; the septa increase in thickness from $\frac{6}{7}$ to $\frac{9}{10}$, and then continue thick to $\frac{11}{12}$; $\frac{12}{13}$ is thinner again, and thence onwards all are thin.

There is no gizzard; the intestine begins to swell out in xv. The last heart is in xiii.

The nephridia are absent from the first twelve segments; they are present in segment xv, and onwards, but (in the specimens dissected) absent in xiv, though either one or a pair were found in xiii.

Small testes were seen in segment x; they were not identified in xi, but funnels were present in both segments (x and xi). Testes and funnels were free in the body-cavity.

The vesiculae seminales are two pairs, in xi and xii, each grapelike, being cut up deeply into small lobes.

The prostates are of moderate size, tubular and slightly coiled, especially at the free end, which is posterior; they run forwards and inwards, from the eighteenth to the seventeenth segment, and at their anterior end, where the duct commences, they lie alongside or under cover of the intestine (in the dissected animal). The duct runs backwards and outwards, roughly parallel to and on the inner side of the glandular portion; it is strong, stout and intensely glistening, only slightly curved, and of approximately the same diameter throughout (or perhaps slightly narrower at its outer end); it is rather shorter than the gland.

Ovaries and ovarian funnels were seen in xiii.

The spermathecae are two pairs, lying in segments viii and ix. The ampulla varies in shape from roughly spherical to elongated ovoid; the duct is of moderate or relatively considerable width, and is nearly as long as (subspherical ampulla), or more than half as long as (elongated ampulla), the ampulla itself. The diverticulum is tubular, not swollen or very slightly swollen at its internal end; its length also appears to vary,—it may either fall considerably short of or extend considerably beyond the end of the ampulla, according as this latter is or is not elongated in form. The name diverticulum is in strictness hardly applicable, as the structure to which it is applied is here implanted on the inner surface of the body-wall separately from though close to the end of the duct. No penial setae were discovered.

The present species has been described by Rosa (9) from Christmas Island; the chief differences between that author's specimens and mine are the absence of the genital papillae on $\frac{12}{13}$ and $\frac{13}{14}$, and the "deep slit-like" character of the marking on $\frac{19}{20}$

in Rosa's examples; though he and I describe the area surrounding the male pores in different ways, there appears to be an essential similarity between the two accounts.

I have also compared Beddard's account of *P. laccadivensis* (3). This latter is a larger worm, and the spermathecal apertures are situated, in some but not all individuals, near the extremities of long dumbbell-shaped cutaneous thickenings in $\frac{7}{8}$ and $\frac{8}{9}$; but the male area (illustrated not in the original paper, but in 4) resembles very much that of *P. ephippiger.* Since *P. ephippiger* is a variable species (compare the data as to size, papillae, first nephridia, characters and length of spermatheca and diverticulum given above, from a limited number of specimens), and *P. laccadivensis* is so also, at least in the matter of cutaneous thickenings or papillae, I believe that the two species should be united.

Michaelsen has recently united *P. insularis* (Rosa) with his own species *P. arenae* and Beddard's *P. bermudensis* (compare 5, and the lists of Indian species in 6 and 7). I can see no essential difference between the descriptions of *P. ephippiger* and *P. arenae*, except that the setae are ornamented in *P. arenae*, not in *P. ephippiger*; and when the revision of the genus is next undertaken it will be necessary, I believe, to consider whether this is sufficient to distinguish them; since Beddard, even when looking for it, at first failed to find the ornamentation (2). This would reduce *P. bermudensis, arenae, insularis, ephippiger,* and *laccadivensis* to a single species. Some consideration should also be given to *P. matsushimensis*, which possesses the same characteristic male genital area; though the absence of a distinct muscular prostatic duct is perhaps a sufficient ground for separation.

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