NOTE ON AN ABNORMAL SPECIMEN OF *PHERETIMA POSTHUMA* (L. VAILL.).

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Pheretima posthuma has not been previously recorded from Rangoon, but is common in the city nearly all the year round. Some months ago while examining a collection of nearly a thousand worms of this species, procured in this city, one worm which seemed quite abnormal in a number of details was found and put aside for further study. For several reasons it has seemed advisable to use the Arabic numerals in designating the segments of this worm instead of the usual Roman numerals. This prevents confusion in the discussion where the reasons for the use will be more obvious.

DESCRIPTION.

External characteristics.

Length 114 mm. Diameter 5 mm. Number of segments 106. Colour dark slaty grey. Prostomium and setae as usual in this species.

On segments 2 to 10 as well as on all segments posterior to the clitellum there are two secondary furrows per segment, one anterior to, and the other posterior to, the setal circle.

The first functional dorsal pore is in 9/10, and the next pore is in 13/14. There are what at first sight appear to be dorsal pores in 7/8 and 8/9 but no fluid could be squeezed out in this region and they probably merely represent weak places in the body-wall.

The clitellum begins at intersegmental furrow 9/10 on the right side, ending dorsally on segment 10 as a rather jagged line in the region of the mid-dorsal line, and ending ventrally in an abrupt line at about the mid-ventral region. On the left side the clitellum begins with 10/11. The colour is reddish grey. Posteriorly the clitellum ends with 12/13 on the right side, and 13/14 on the left side, while the dorsal and ventral boundary of the clitellum on segment 13 is a nearly straight line in the mid-dorsal and in the mid-ventral region. Setae are present on all segments.

The male pore of the left side is in the usual position in the setal circle but on segment 15, while the male pore of the right side, also in the usual place, as far as position on the segment is concerned, is on segment 14.

There is a rather conspicuous median ventral pore probably female on segment 12 posterior to the setal circle but closer to 12/13 than to the setae.

The spermathecal pores are in 3/4, 4/5, 5/6, and 6/7, more than one-third of the circumference apart. The usual indication of these pores, a minute round papilla on the posterior part of the segment close to the intersegmental furrow, is very much smaller than usual.

Copulatory papillae occur on the left side of 14, the right side of 15, the right and left sides of 16, and the right and left sides of 17, six instead of the usual four. Between the male papilla and the copulatory

papilla of 14 there are 19 setae, of 15—14 setae, and between the copulatory papillae of 16—18 setae, and the papillae of 17—19 setae.

The appearance externally of the male and copulatory papillae is exactly the same as in normal worms of this species.

Internal anatomy.

The first septum present is 2/3 which is very thin ; 3/4 is slightly thickened ; 4/5, 5/6 and 6/7 are very thick ; 7/8 is lacking ; 8/9 and 9/10 are slightly thickened ; the remainder are thin. Septum 6/7 is pushed backwards by the gizzard into contact with 8/9 to which it is fused in the region of the alimentary canal, so that no part of the oesophagus appears in 7 or 8.

The gizzard is in segment 6, the posterior end enlarged, and the anterior end conical. The intestine begins in 12. A pair of characteristic caecae extend forward from 24 into 21.

The supra-pharyngeal ganglia are in segment 2.

In segments 3 and 4 there are on each side of the alimentary canal large nephridial masses attached to the anterior faces of septa 3/4 and 4/5, while loose in each of these two segments are large, red, paired masses of blood glands.

There is a very large lateral commissure on the left side in segment 11 but none on the right side, a pair of large commissures in segment 10, a very large commissure on the right side of 9 but none on the left side. In the anterior part of the combined segments (7 and 8) the dorsal blood vessel gives off a conspicuous pair of commissures which are however not as large as those of 10, 11 and 12. Behind this pair there is a much smaller lateral commissure on the right side only, on the anterior face of 8/9 which must be the commissure of segment eight. There are paired commissures in segments 6, 5, 4, 3 and 2.

Paired testes sacs in 8 lie close under 8/9, and there is only a single testis sac on the left side in 9. There is a large characteristic seminal vesicle on the left side of 10 but none on the right side. In segment 9 there is a pair of large lobed seminal vesicles, that of the right side somewhat smaller than the other.

The prostatic duct of the left side is in segment 15, that of the right side is in segment 14. The right prostate lies in segments 13-15 (3), the left prostate in segments 14-17 (4). The prostatic duct lies on the floor of its segment bent into the form of a U with the limbs pressed into contact with each other, the open end of the U posteriorly. The larger ectal limb is nearer the nerve cord, the smaller ental end bends outward slightly just as it passess into the gland. There is a single sperm duct on the right side which passes into the prostatic duct at the edge of the gland. On the left side the two sperm ducts are in contact but do not unite until just before passing into the prostatic duct.

An ovary of usual size and appearance is flattened against the posterior face of 10/11 on the left side, but no trace of a right ovary can be found in this or any other segment. On the anterior face of 11/12 there is a large oviduct funnel opposite the ovary. The oviduct is long and passes through 12 and into septum 12/13 in which it penetrates into the ventral parietes. The anterior pair of spermathecae is in 4 and is very small, although the picture presented by the whole spermathecal apparatus

is the same as that of norm l worms of the species. The second pair of spermathecae is in 5. The spermatheca on the left side is double, or more correctly, the ducts of two spermathecae join as they pass into the body wall. The diverticulum of the outer spermatheca on this side is split into two longitudinally, beginning at the free ental end and proceeding nearly to the place where the diverticulum narrows suddenly to form the stalk by which it is attached to the duct. The spermathecae of this segment are slightly larger than those of the preceding segment. There are two pairs of spermathecae in segment 6, the posterior pair passing into the body-wall close to 6/7, and the anterior pair close to 5 6. The spermathecae of this segment are slightly larger than those of the preceding segment but only about half the size of the spermathecae of normal specimens of this species. The last spermatheca on the left side also has a diverticulum split in two nearly to the stalk.

DISCUSSION.

The most striking abnormality of the worm is the unusual position of the organs. The gizzard for instance is in segment 6 instead of VIII. Possibly two segments have been elided or have failed to develop. If it is imagined that two segments are intercalated between (what are in this abnormal worm according to the external segmentation) segments 2 and 3, a description of the internal anatomy will then read as follows.

Septa 4/5 present, 5/6 slightly thickened, 6/7, 7/8, 8/9 much thickened, 9/10 absent, 10/11 and 11/12 slightly thickened. Nephridial masses and blood glands in 5 and 6, last heart in 13, testes sacs in 10 and 11, seminal vesicles in 11 and 12, ovary in 13, and spermathecae four pairs, one pair each in 6 and 7 and two pairs in 8, and paired caecae in 26. This is practically the same as a description of similar organs in the normal *posthuma* of Rangoon for in the local forms 8/9 is always present, and 9/10 is always absent ; seminal vesicles are always two pairs in XI and XII ; and the spermathecae are four pairs, one pair each in VI and VII, and two pairs in VIII. (However in the normal *P. posthuma* 5/6 is usually as thick as 6/7 and 8/9 is usually thinner than 7/8, but this is relatively unimportant.) An additional similarity is furnished by the lateral commissures. In the Rangoon form there are large paired commissures in XI, XII, and XIII, the pair belonging to X are very small, located on the anterior face of 10/11 and frequently one of the pair is lacking. There are larger commissures in the anterior part of the combined segment, belonging to IX. This is also just the condition of the commissures in the segments noted in the abnormal worm allowing for the difference of the two segments and the asymmetrical development of the vessels in 9 and 11.

Most of the organs seem to be two segments anterior to their normal position. It is difficult to conceive of all these structures " jumping forward" two segments. It is perhaps easier to think that two segments have been omitted somewhere. Evidence for this and for the place of omission is furnished by the condition of the alimentary canal in the first two segments. The canal in 3 and 4 is narrow and pigmented on the outer surface, which is just the appearance of this organ in a normal *posthuma* in segments V and VI. Between this region (3 and 4) and

the buccal cavity which is confined to segment 1 the canal is only slightly larger than in 3, and the large thickening of the dorsal wall always present on the pharynx in III and IV is lacking.

No evidence as to how the two segments were elided is furnished by the worm exteriorly, for the prostomium is normal in shape and attachment, the intersegmental grooves are sharp and clear, deeper than the secondary furrows. There is no possibility of confusion of the segments due to the intersegmental furrows running into each other as sometimes happens, and the setae are present normally in all segments from 2 on. The absence of a typical pharynx with dorsal thickening seems to indicate that it is segments III and IV which have been elided to produce the abnormal condition. If this is so the brain may have been pushed forward into 2 before the elision or it may have developed there.

But adding two to the numbers of the segments in the abnormal worm does not solve quite all the difficulties, for when this has been done the prostatic ducts and their apertures are still only in 16 on the right side, and 17 on the left side. It does not seem probable that a segment has been lost in this region for the addition of the previous two segments raises the number of the caecal segments of the abnormal worm from 24 to 26 which is the segment in which these organs are normally found in this species. Clearly something else has happened in the region of the prostatic apparatus. In this connection it is interesting to note that Stephenson has found accessory prostates with ducts in segment XVII alongside of the usual prostates with ducts in XVIII.

Another abnormality in this worm is the asymmetrical development of the organs, including the clitellum. On the right side the posterior testis together with its sperm duct and funnel, the seminal vesicle of the posterior pair, and the ovary are absent, or at least not sufficiently developed to be visible when studied with the binocular dissecting microscope. The left prostate is larger than the right, the left caecum than the right, while the right anterior vesicle is larger than the left.

A third abnormality is the tendency for the doubling of the diverticulum or even of the spermatheca, here confined to the left side, but which has been noted in other Rangoon worms of this species on either side or both sides.