

ON DOCHMIUS DUODENALIS (SCLEROSTOMA VEL ANCHYLOSTOMA DUODENALE) AS A HUMAN PARASITE IN INDIA.

By J. F. P. McCONNELL, M.B.,

PROFESSOR OF PATHOLOGY AND CURATOR OF THE PATHOLOGICAL MUSEUM, MEDICAL COLLEGE, CALCUTTA.

IN Professor Cobbold's recently published treatise on the "Entozoa of Man and Animals," pp. 212-16, a very interesting account is given of the observations made by Griesinger and Wücherer with respect to the geographical distribution and pathological importance of this small nematoid worm. It has been found "by Bilharz and Griesinger in Egypt; by Wücherer, Dr. Moura, Dr. Tourinho, and other physicians in Brazil; by Monestier and Grenet in the Comoros; and by Rion Kérangel in Cayenne." In commenting on "the wide separation of these several localities," Wücherer ventures to predict that "anchylostomes, if duly sought for, will be found in many other countries." This has already been verified in some parts of Europe, as, for example, the numerous instances reported of the infection by anchylostomes

of workmen engaged in the St. Gotthard tunnel; and as regards India, the present paper will prove that these parasites are far from being uncommon amongst natives—at least, amongst the natives of Lower Bengal. The description of the anatomical structure of the dochmius given by Cobbold¹ renders its identification easy:—"The males measure $\frac{3}{8}$ ", or rather more, whilst the females extend to very nearly $\frac{1}{2}$ " (12 mm.). The head is pointed and tapering, and bent forward, having the mouth directed towards the ventral aspect. The oral opening is armed with four asymmetrically disposed, unequal-sized, horny, conical, converging teeth. The neck is continuous with the cylindrical body, which is $\frac{1}{16}$ " in thickness. The body terminates in a straight cone-shaped, or rather sharply pointed, tail in the female, the caudal extremity of the male ending in a partially inflexed blunt point. In the male there is a cup-shaped, bilobed bursa, the membranes of which are supported by eleven chitinous rays, ten being simple, whilst the median, or odd one, is bifurcated at the summit. The mode of reproduction is viviparous. Adult males and females occur in the proportion of one of the former to three of the latter."

This description may be supplemented by certain particulars, the results of careful examination of numerous specimens in my possession, from which, also, the drawings in the accompanying woodcut have been made.

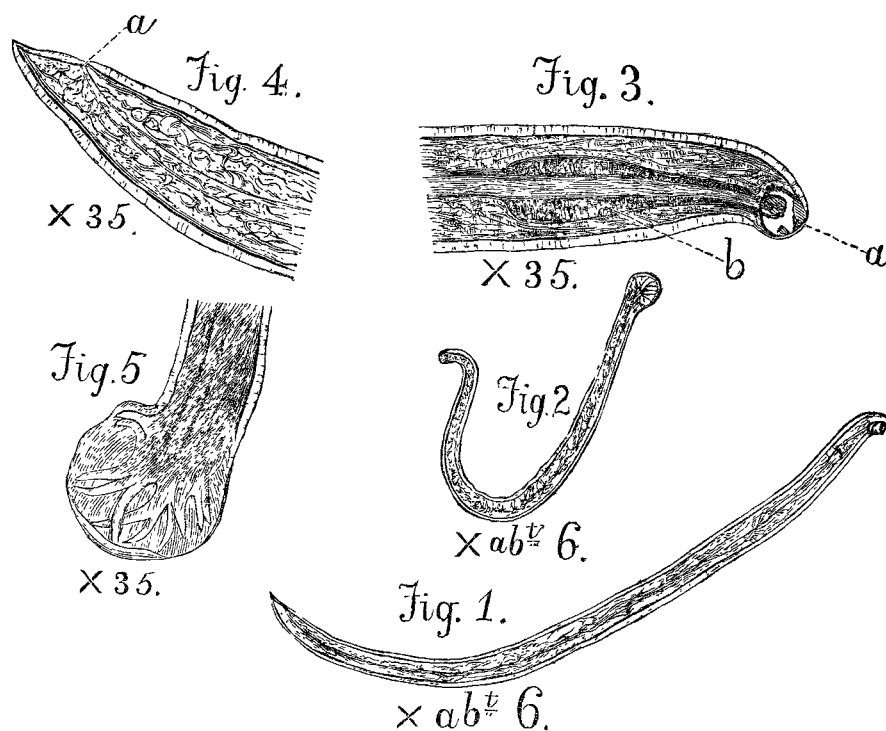


Fig. 1.—Female dochmius, \times abt. 6. Fig. 2.—Male dochmius, \times abt. 6. Fig. 3.—Anterior portion of female worm, \times 35; showing the mouth (a) and the oesophagus (b). Fig. 4.—Posterior portion, or tail, of female, \times 35, with termination of intestinal canal at a. Fig. 5.—Caudal bursa of male, \times 35, with pronged chitinous rays, &c.

The average length of the female sclerostomata in my possession is $\frac{9}{16}$ " (14 mm.), and of the males $\frac{7}{8}$ " (11 mm.). The breadth of the former, at the thickest part (about the middle of the body) is about $\frac{1}{16}$ "; of the latter, about $\frac{1}{8}$ ". The head is not strictly "pointed and tapering," but rounded or somewhat square-shaped, and abruptly truncated. The mouth (Fig. 3, a) is provided with three or four irregular, hard, horny teeth; it measures in the female $\frac{1}{32}$ ", in the male $\frac{1}{16}$ ". The oral orifice leads into a pharynx and bulbous oesophagus (Fig. 3, b), very distinct in both males and females, and measuring in the latter $\frac{1}{32}$ " in length by $\frac{1}{17}$ " in greatest width. The muscular structure of this portion of the alimentary canal is particularly well marked, and probably forms a powerful suction-apparatus. To the oesophagus succeeds a simple intestine, which terminates in an anal aperture a short distance ($\frac{1}{32}$ ") from the tail in the female (Fig. 4, a), and on the under surface of the caudal bursal expansion in the male. The rest of the body of the worm is occupied by the reproductive tubules and glands, the former of which, especially in the female, have a highly convoluted outline, and very dark granular contents. The caudal bursa in the male dochmius measures about $\frac{1}{8}$ " (Fig. 5). The chitinous rays which it supports vary in number from ten to twelve; the majority are double, like the prongs of a fork; one or two may be simple or solitary. This evidently constitutes a prehensile organ, and is the chief distinguish-

ing peculiarity (apart from the difference in size) between the male and female sclerostome. Lastly, the body of the worm has a distinct double contour—a transparent interval of from $\frac{1}{32}$ " to $\frac{1}{16}$ " existing between the peripheral outline and the dark central structure of the parasite. This transparent portion is composed of muscular fibres arranged in very distinct transverse bundles.

The first specimens of this nematoid observed by me in this country were found on January 6th, 1879, adhering to the mucous membrane of the jejunum of a native (Hindu) male, aged twenty-five, who had died in the Medical College Hospital from chronic dysentery. I mistook them for thread worms, though puzzled to account for their presence so high up in the intestine. On placing some of them, however, under the microscope, the distinctive peculiarities which separate them from the oxyuris vermicularis were readily recognised. Since this period I have met with sclerostomata in nineteen other bodies examined in the dead-house. In some only four or five worms, in others more than fifty were found in the bowel or its contents.

With respect to the pathological significance of this entozoon, Griesinger has described a form of "anæmic chlorosis" in Egyptians, and Wücherer a similar condition (under the designation of "hypoæmia") in Brazilian sub-

¹ Loc cit., p. 211.

jects, which both these observers attribute directly to the presence of these worms, and their action as "veritable blood suckers." More recently a similar rôle has been assigned to these parasites in connexion with the epidemic disease which proved so fatal to some of the workmen employed in the construction of the St. Gothard tunnel, and was referred to in an annotation in THE LANCET on April 3rd, 1880, p 535, headed "Anchylostomosis." There is still, however, some difference of opinion with respect to this interesting question, and, for this reason, I have taken great care to record carefully the causes of death, and the presence or absence of anæmia in all the cases that have come under my own observation. These details, with others, are exhibited in the accompanying table.

TABLE OF CASES OF DOCHMIUS DUODENALIS IN THE HUMAN BODY, WITH NATURE OF DISEASE, PRESENCE OR ABSENCE OF ANÆMIA, ETC.

No.	Race &c.	Sex.	Age.	Disease.	Where found.	Anæmia present.	Remarks.
1	Native (Hindu)	Male	25	Chronic dysentery	Jejunum	Yes	Worms found adherent.
2	Native (Mahomedan)	"	18	Acute dysentery	"	No	Distoma conjunctum in bile-ducts of liver.
3	Native (Hindu)	"	—	Erysipelas	Duodenum and upper part of jejunum	No	One whipworm (trichocephalus) and one threadworm (oxy. vermicularis) found in large intestine.
4	"	"	12	Malarial anæmia and exhaustion	"	Yes	No bowel lesion.
5	"	"	40	Chronic bronchitis	"	No	"
6	"	"	30	Remittent fever	"	No	"
7	"	"	32	Malarial anæmia and dysentery	Free in contents of small intestine	Yes	"
8	"	"	28	Acute cerebro-spinal meningitis	Jejunum	No	No bowel lesion.
9	"	"	40	Dysentery	Jejunum and upper part of ileum	Yes	—
10	"	"	25	Pneumonia	"	No	No bowel lesion.
11	"	"	26	Traumatic tetanus	"	No	"
12	"	"	26	Cirrhosis of liver &c.	"	Yes	Small puncta where worms adhered.
13	"	"	26	Morbus cordis	Duodenum and upper part of jejunum	No	Worms found adherent.
14	"	"	35	Acute dysentery	Free in contents of small intestine	No	—
15	"	"	30	Pyæmia after compound fracture of the foot	"	No	No bowel lesion.
16	"	"	30	Cirrhosis of liver	Duodenum	No	"
17	"	"	18	Dysentery and cirrhosis of liver	Jejunum	Yes	"
18	"	"	30	Acute dysentery	Duodenum and upper part of jejunum	No	Worms found adherent.
19	"	"	20	Chronic dysentery	Jejunum and upper part of ileum	Yes	Worms found adherent, and when detached and placed in water, exhibited lively movements.
20	"	Fem.	25	Chronic dysentery and splenic anæmia	Jejunum	Yes	Worms found adherent.

While anæmia was a prevailing element in nearly half (8 out of 20) of the cases in which sclerostomata were found, yet it seemed to me that this condition was, in these cases, more directly attributable to dysentery and malarial complications than to the presence of a varying number of these parasites; and, on the other hand, in more than half the number (12 out of 20) not only was there no anæmia, but a positive hyperæmic condition of almost all parts and tissues of the body, as is the rule in acute or sthenic diseases, such as pneumonia, erysipelas, cerebro-spinal meningitis, remittent fever, &c. Not only, therefore, was there no anæmic condition of parts discovered after death in the majority of these cases, but the very nature of the fatal diseases precluded the existence of this condition during life. Hence, while it may readily be conceded that in a certain proportion of the cases now reported the anæmia might partially be attributable to the depletion resulting from the presence of sclerostomata, in the majority their existence was not associated with this state; and, certainly, no facts in this connexion have hitherto tended to show that anything like a specific hypoaemia or chlorosis occurs in the natives of this country, which can be traced even indirectly to this cause.

In no instance has blood in any quantity been found in the small intestine, and, except in dysenteric cases (and then usually with mucus and other inflammatory products), the same may be said with regard to the colon. A point or minute puncture is observed when an adhering dochmius is detached from the mucous surface of the bowel, and occasionally small red puncta in the duodenum or jejunum have indicated the site of attachment of these parasites, but more frequently the lining membrane of the intestine has been found quite healthy and free from all pathological changes. I have, hitherto, failed to find these worms in the evacuations during life, nor do I know of any specific symptoms by which their existence is to be diagnosed. My opinion is that their presence is to be regarded

in the majority of cases as purely accidental, and their relation to any special disease a coincidence. The lower classes of natives in this country are by no means clean feeders or careful as to the quality of the water they drink, and hence are very frequently infected with intestinal worms, particularly the round worm. The presence of sclerostomata may be attributed to the same causes, and I am inclined to believe that the prevalence of these worms is not very much less common than that of the lumbricus in this class of individuals. It may here be mentioned that up to the present time all the cases in which I found these parasites have been natives, and, with one exception, males. This circumstance may perhaps be due to the fact that comparatively few bodies of native females are brought to the post-mortem room at the Medical College Hospital. In not a single instance has the worm been discovered in a European, Eurasian, &c. The first two of my cases (see table) show that the occurrence of sclerostomata is not incompatible with the existence of other entozoa in the same "host."

In conclusion, I would direct attention to the fact that in the majority of the cases these worms were met with in the jejunum, or even lower down the intestinal canal. In some instances this might have been due to the contents of the bowel being squeezed downwards before the latter was laid open; but in the majority this was not the case, the parasites being found adherent. This circumstance seems of some importance, since one of the specific names of the dochmius, or sclerostoma, is derived from a particular portion of the intestinal canal supposed to be its usual habitat.

THE Royal Commission on Metropolitan Sewage Discharge met on Tuesday at 20, Great George-street. There were present—Lord Bramwell, F.R.S. (in the chair), Sir John Coode, Professor A. W. Williamson, F.R.S., Dr. De Chaumont, F.R.S., Dr. Stevenson, Mr. James Abernethy, F.R.S.E., and Dr. W. Pole, F.R.S. (secretary).