

The Occurrence of *Ankylostoma Ceylanicum* in West African Dogs

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To cite this article: Warrington Yorke & B. Blacklock (1917) The Occurrence of *Ankylostoma Ceylanicum* in West African Dogs, *Annals of Tropical Medicine & Parasitology*, 11:1, 69-74, DOI: [10.1080/00034983.1917.11684125](https://doi.org/10.1080/00034983.1917.11684125)

To link to this article: <http://dx.doi.org/10.1080/00034983.1917.11684125>



Published online: 24 Mar 2016.



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THE OCCURRENCE OF
ANKYLOSTOMA CEYLANICUM
 IN WEST AFRICAN DOGS

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(Received for publication 25 April, 1917)

In a paper (1915) entitled 'Ankylostomiasis in Dogs in Sierra Leone,' we drew attention to the existence of two species of ankylostoma (*A. caninum* and *A. ceylanicum*) in all of seven native dogs examined by us in Freetown. The following is an extract from this paper:—

'These species are readily distinguished one from the other by the characteristic arrangement of their teeth. The mouth of *Ankylostoma caninum* is armed with three pairs of prominent ventral teeth, whereas in *Ankylostoma ceylanicum* there is one pair of large ventral teeth, and one very small pair near the base of the former, but on a slightly deeper plane. These characters are illustrated in figs. 1 and 2.

'The bursa of the males is very similar in the two species. It consists of two large lateral and a small dorsal lobe. The arrangement of the rays is as follows:— In each lateral lobe there is an anterior ray which is cleft, an antero-external ray, a median ray which is doubled, and a postero-external ray which arises from a common trunk with the single posterior ray. In the dorsal lobe is the posterior ray, which exhibits slight differences in the two species. In both it is bifurcated in its terminal third, and each of the branches is at its extremity tridigitate. It is in the character of these terminal digitations that the slight difference is found (see figs. 3 and 4). In both species the two inner digitations are small, being separated by a mere notch. In *Ankylostoma caninum* the cleft separating the two inner from the outer digits is shallow, but in *Ankylostoma ceylanicum* the cleft is deep, being about half the length of the branch of the posterior ray.'

Leiper (1915) in criticism of this paper makes the following observations:—

‘The details given in this paper lead me to doubt the accuracy of the diagnosis of *A. ceylanicum*. The authors compare their presumed *A. ceylanicum* with *A. caninum* and illustrate the main points of contrast with figures reproduced here.

‘I append a drawing (fig. 7) from an Indian specimen of *A. ceylanicum*; it will be seen that the dorsal ray has a pair of digitations only on each of its two branches. As this division is of specific importance and occurs in all specimens, it seems unlikely that the West African dog ankylostome is the same species as that recorded above. The drawings of the mouth capsule given by Yorke and Blacklock certainly show a single pair of large chitinous teeth as in *A. ceylanicum*, but the outline is scarcely correct. One is inclined to think that these authors have been dealing with *Uncinaria stenocephala* Railliet, a similar ankylostome often found in association with *A. caninum*.

‘As regards synonymy a recent article by Gomes de Faria contributes further anatomical details which tend to show that *A. braziliense* and *A. ceylanicum* are distinct species.

‘Some attention has already been devoted to ankylostomiasis in Sierra Leone. Major F. Smith in a paper in the Journal of the Royal Army Medical Corps for 1905 says: “*I have not yet found in Sierra Leone a dog free from ankylostomes,*” but he does not indicate that man and the dog in those regions have a species in common.’

We propose here to discuss the various points which are raised.

I.—‘*The drawings of the mouth capsule given by Yorke and Blacklock certainly show a single pair of large chitinous teeth, as in A. ceylanicum, but the outline is scarcely correct. One is inclined to think that the authors have been dealing with Uncinaria stenocephala (Railliet), a similar ankylostome often found in association with A. caninum.*’

In reply to this we may state at once that the mouth capsule of the ankylostome which we found in dogs in Sierra Leone bears no resemblance to that of *Uncinaria stenocephala*. As shown in the figure given in our paper, the Sierra Leone ankylostome has ‘one pair of large ventral teeth, and one very small pair near the base of the former, but on a slightly deeper plane.’ So different is the appearance of the mouth capsule of *Uncinaria stenocephala*, which has a pair of large cutting plates in no way resembling the ventral teeth of the ankylostome in question, that it did not occur to us that any confusion with this species could arise. We do not

know upon what evidence Leiper made the assertion that the outline is scarcely correct, as he has not seen the specimens from which the diagram was made and our description framed.

II.—‘*I append a drawing from an Indian specimen of A. ceylanicum. It will be seen that the dorsal ray has a pair of digitations only on each of its two branches. As this division is of specific importance and occurs in all specimens, it seems unlikely that the West African dog ankylostome is the same species as that recorded above.*’

With regard to the termination of the dorsal ray, we might point out that it is commonly held that in the genus *Ankylostoma* each of the primary branches into which the dorsal ray divides is at its extremity tridigitate. Raillet and Henry (1909) define in the following manner the group *Ankylostomeae*:—‘*Bourse caudale à côtes antérieures fendues, moyennes dédoublées, postérieures et postérieures externes naissant d’un tronc commun, postérieures tridigitées.*’ Clayton Lane (1916), writing of the genus *Ankylostoma*, states: ‘The dorsal ray bifurcates, each branch further bifurcating, while the inner of these sub-branches again ends in two points.’

In the plate which illustrates his paper, Lane gives two figures of the termination of the dorsal ray of *A. ceylanicum*. This is shown to be bifurcated and each of the branches is at its extremity tridigitate: the two inner digits are small, being separated by a notch. These figures, which were published by Lane nearly a year after our paper appeared, resemble that given by us very closely.

Looss (1911), in his original description of *A. ceylanicum*, gives no detailed account of the termination of the posterior ray of the bursa. In a letter published by de Faria,* Looss writes: ‘The relative thickness of the bursal rays in similar species of *ankylostoma* is a definite differential character, but this point is emphasised by no recent writer. On the other hand one finds full descriptions of the arrangement of the rays, which is the same for all *ankylostoma*, and complete details of the terminal divisions of the dorsal ray, which vary in nearly every individual.’

* Quoted by Clayton Lane, loc. cit.

It is very instructive to compare two drawings by Leiper of the dorsal ray of *A. ceylanicum*, the first in the *Journ. of Trop. Med. and Hyg.*, 1913, Vol. XVI, p. 335, and the second in the *Journ. R.A.M.C.*, 1915, Vol. XXIV, p. 572. When Leiper wishes to prove that Lane's *A. ceylanicum* of India is the same as de Faria's *A. braziliense*, he figures a notched inner sub-branch, whereas when he desires to show that the ankylostome from Sierra Leone described by us as *A. ceylanicum* is not identical with the Indian *A. ceylanicum* he omits the notch.

As will be seen from the extract quoted above, we did not in our paper attach the same diagnostic significance to the character of the posterior ray as does Leiper. Looss gave no illustration of the termination of the posterior ray in his original description of *A. ceylanicum*, and consequently we were compelled, in identifying the West African worm, to rely mainly on the characteristic arrangement of the ventral teeth. Recently, as already mentioned, Lane has furnished drawings of the dorsal ray of the Indian *A. ceylanicum*, and we have had an opportunity of examining a specimen of this worm. On comparing the Indian specimen with those from West Africa slight differences in the posterior ray are observable—the ray in the West African worm is a little thicker and the notch in the sub-branch is a trifle deeper. Whether these slight differences are constant, or what importance should be attributed to them we do not know. In this connection we might recall the following statement by Looss in his original description of *A. ceylanicum*: 'All the rays are remarkably thick and plump.'

III.—Major F. Smith, in a paper in the *Journal of the Royal Army Medical Corps* for 1905, says: 'I have not yet found in Sierra Leone a dog free from *Ankylostomes*'; but he does not indicate that man and the dog in these regions have a species in common.

This appears to be used by Leiper as an argument against our suggestion that the parasite found by us in dogs may also occur in man. As Major Smith does not give any details by which the parasites he found in dogs can be recognised, reference to his work seems hardly relevant. However, it is interesting to note that Major Smith, a few lines below that quoted by Leiper, writes: 'The experimental results suggest intercommunicability among animals;

inferentially we may suspect that man can contract ankylostomiasis from the lower animals.'

For purpose of comparison we give here camera lucida drawings of the outline of the mouth parts and dorsal ray of the bursa of *A. ceylanicum* from West African dogs, *A. ceylanicum* from India (sent by Dr. Clayton Lane), and *Uncinaria criniformis* (*stenocephala*) (from Looss). These drawings were made by Mr. Forster Cooper, to whom we are much indebted.

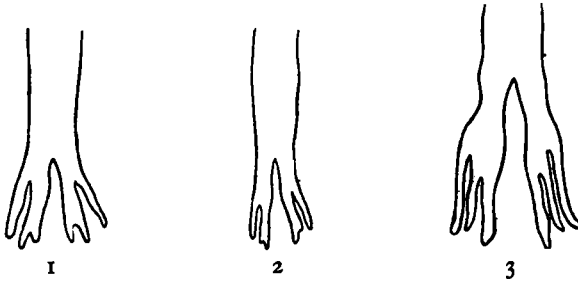


FIG. 1. Dorsal ray of *A. ceylanicum* (West African dog).
 FIG. 2. Dorsal ray of *A. ceylanicum* (India).
 FIG. 3. Dorsal ray of *U. criniformis*.

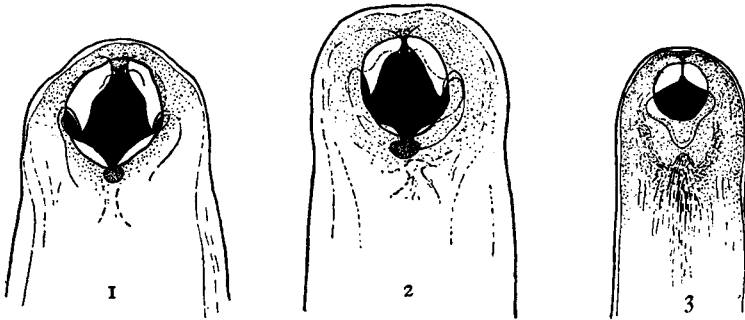


FIG. 1. Mouth capsule of *A. ceylanicum* (West African dog).
 FIG. 2. Mouth capsule of *A. ceylanicum* (India).
 FIG. 3. Mouth capsule of *U. criniformis*.

Dr. Macfie informs us that he has found *A. ceylanicum* in four of ten dogs examined by him in Accra, and that he has recorded the observation in his Annual Report to the Colonial Office (1916) now in the press.

Leiper (1913) wrote: 'I have re-examined my collections of ankylostoma from cats and dogs, mainly from Africa, but this species [*A. ceylanicum*] is not represented.' Possibly it was this fact which called forth the unwarrantable criticism of our paper.

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