A NOTE ON THE NEW SPECIES OF *EIMERIA* FOUND IN MAN BY DR E. P. SNIJDERS.

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IN the foregoing paper Dr E. P. Snijders has described the oöcysts of a species of *Eimeria* which he found in the stools of a patient under his care in Medan (Sumatra). The manuscript of this paper, together with a preparation containing the cysts in question, was kindly sent to me by the author¹ with the request that I would "be so kind as to add my opinion, and give to the species its right name." I shall do my best to comply with both these requests in the present note.

Dr Snijders has so fully described the cysts which he found, and has discussed their nature so ably, that there is little for me to add to his account. Careful examination of the specimen which he has sent me has suggested, however, a few points which appear worthy of note.

The specimen was a wet smear preparation of faeces, stained with iron haematoxylin and eosin and mounted in balsam. Dr Snijders describes it as "a bad one," but says he "could get no better." Nobody who has ever tried to make satisfactory permanent preparations of coccidial oöcysts and spores will be disposed to find fault with him on this score. It is frequently impossible to cause either fixatives or stains to penetrate these very resistant structures, and at present they can, in many cases, be studied properly in the fresh state only. I have never been able to obtain satisfactory stained preparations of any of the other coccidia of man.

On examining the preparation in question I was unable to recognize any oöcysts in it with certainty. I found, here and there, a few structures which appeared to be degenerate sporozoites, stained pink with eosin; but I was unable to make out the sporocysts or oöcysts enclosing them. I knew from experience, however, that the cysts of such organisms are often invisible when mounted in balsam—the cyst-walls and the balsam having approximately the same refractive index. I therefore removed the balsam with xylol, detached the cover-glass, and after passing the preparation through the various grades of alcohol, remounted the film in water. On re-examining it with a good lens, and suitably adjusted illumination, I was gratified to find a number of easily recognizable oöcysts—many of them, unfortunately, collapsed—containing

¹ I received the communication through the Editor of *Parasitology*: and I have therefore to thank Professor Nuttall not only for his good offices in this connexion but also for enabling me to publish this note simultaneously with Dr Snijders' paper.

spores whose walls (sporocysts) were quite intact. The pink-stained sporozoites within them appeared very degenerate, but were still recognizable. I made a number of careful measurements of the oöcysts and spores as they appeared in water. I then attempted to restrain the preparation—with little success—and have remounted it permanently in euparal. In this medium, which has a lower refractive index than balsam, the cyst walls are barely visible.

I have had little difficulty in confirming Dr Snijders' statement that the cysts are those of a species of *Eimeria*. Every oöcyst contains the typical four spores, each of which—in all specimens sufficiently well preserved for study—encloses two sporozoites. Dr Snijders states that the diameter of the oöcysts is 40–48 μ . Most of those which I have seen are now too shrivelled for it to be possible to measure them accurately; but the few measurements which I have been able to make, and my estimates of the probable dimensions of the collapsed cysts, agree with his observations.

As regards the spores—which, as already noted, were still intact in many instances—I would note the following points. Dr Snijders states that they are whetstone-shaped, and measure 17–20 μ in length, with a breadth of 7–8 μ . They are shown best, I think, in his Fig. B: the more irregular outlines of Figs. C and D being due, apparently, to the fact that the spores in these were not all lying flat, but were seen more or less obliquely inclined to the axis of the microscope. It seems to me probable that Dr Snijders has not made sufficient allowance for this obliquity of many of the spores in making his measurements. At all events all my own measurements—made with great care from spores lying at right angles to the optical axis of the microscope, or estimated from those lying inclined to it at various angles—show that the length of the spores is slightly greater than he states. All my measurements lie between 20 μ and 25 μ , most of the spores measuring 22–24 μ . I find the width at the middle is—as stated by Dr Snijders—approximately 7–8 μ . (This dimension is not, of course, subject to the same error in its determination as the length.) All the spores appear to be fusiform, with their two ends equally pointed. Traces of an epispore ("mucous outer layer" of Dr Snijders) are visible on some; and the remains of sporocystic and oöcystic residual bodies can be made out in the majority of the cysts. It was impossible, however, to make out any details in the sporozoites.

It seems to me probable that the unsegmented oöcysts referred to by Dr Snijders, and shown in his Fig. A, are abnormal specimens. The protoplasmic inclusion appears far too small for a normal form in an early stage of development; but such abnormal stages are often seen in other species, and represent, I believe, dead oöcysts which have failed to get fertilized.

The oöcysts of this species are of unusually large size, and are certainly the largest described from man; but they are not the largest known in the Coccidia. Those of *Aggregata*, for example, attain much greater dimensions.

Although I was struck, at first, by the resemblance of these oöcysts to

those of *Eimeria oxyspora*, it seems clear, from their dimensions and those of their spores, that they belong to a distinct species. The dimensions of the spores in the Coccidia are very constant; and I do not know of any accurately described species which shows so great a range of variation in the form and size of its spores as that between *E. oxyspora* and the present organism. The relatively short spindle-shaped spores of the latter are quite distinct from the long whetstone-shaped spores of the former.

In my "Revision of the Coccidia parasitic in Man" (1919) I have discussed all the species of this group previously described: and Dr Snijders has pointed out that his *Eimeria* does not appear to belong to either of the intestinal species of this genus therein recognized—*E. wenyoni* and *E. oxyspora*. In this I fully agree; and I think Dr Snijders is to be congratulated, therefore, upon having demonstrated the existence of a hitherto undiscovered coccidium in man. There is a possibility, as he rightly points out, that the oöcysts may be those of an *Eimeria* belonging to some other host; but there is, I believe, no evidence at present in favour of such a supposition. It seems probable that the parasite is one which belongs to man himself. It is, however, somewhat remarkable that all the species of *Eimeria* hitherto found in human stools are not only very rare, but apparently cause infections which are peculiarly transitory. Their cysts have suddenly appeared in the stools and then promptly vanished—never to return.

Since I wrote my revision of the Coccidia of man, two papers purporting to describe new human cases of intestinal coccidiosis have appeared. The first, by Huetter (1919), records the finding of "coccidia" in sections of a rectal tumour from a woman: but even from the incomplete description of this case, it seems obvious that it was not really one of coccidiosis. Of the other case of "coccidiosis (?)" recorded by Lockhart-Mummery and Gabriel (1919) I can speak with more confidence. I have seen a preparation of the structures interpreted as coccidia, and have no hesitation in saying that they are neither coccidia nor protozoa of any sort.

Brumpt (1918) has recently stated that the French Armies were infected to the extent of 0.2 to 0.33 per cent. with "*Eimeria (Coccidium)*": but—so far as I am aware—he has not described this organism. Chatton (1918, p. 218) states that he has found three cases of *Eimeria* infection in Southern Tunis, but does not name or describe the species. According to Mesnil (1919) it was probably *E. wenyoni*.

So far as I am aware, therefore, Dr Snijders' *Eimeria* belongs to a species which has not hitherto been described or named. I propose to call it *E. snijdersi*, in honour of its discoverer, and give the following diagnosis. For reasons already stated I have ventured to change the dimensions of the spores, as given by Dr Snijders, to those which I believe, from my own measurements of some of his specimens, to be correct.

Eimeria snijdersi nov. spec.

Oöcyst colourless, spherical, 40–48 μ in diameter. Spores fusiform, equally

pointed at both ends; length 20–25 μ , width in middle 7–8 μ . Oöcystic residue small, granular. Sporocystic residues in the form of one or two small refractile spheres. No “crystalline bodies”—like those of *E. oxyspora*—visible at the posterior ends of the sporozoites.

Habitat: intestine (?) of man.

As yet found in one case only, at Medan (Sumatra).

The structural characters given above serve to distinguish this species readily from the two other species of *Eimeria* previously described from human stools—*E. wenyoni* and *E. oxyspora*¹.

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REFERENCES.

- BRUMPT, E. (1918). Protozoaires et Helminthes des selles aux Armées. *C. R. Soc. Biol.* LXXXI. 1044.
- CHATTON, E. (1918). Le Laboratoire militaire de Bactériologie du Sud-Tunisien (à Gabès), etc. I. Flore et faune intestinales. *Arch. Inst. Pasteur, Tunis*, x. 205.
- DOBELL, C. (1919). A Revision of the Coccidia parasitic in Man. *Parasitol.* XI. 147.
- HUETTER (1919). Menschliche Darmcoccidiose. *München. med. Wchnschr.* LXVI. 730.
- LOCKHART-MUMMERY, P., and GABRIEL, W. B. (1919). Case of intestinal coccidiosis (?). *Proc. Roy. Soc. Med.* XIII. (Sect. Surg., Subsect. Proctol.), 14.
- MESNIL, F. (1919). [Review of Dobell (1919).] *Bull. Inst. Pasteur*, xvii. 376.

¹ I may note that M. Mesnil (1919) has, by an unfortunate misprint, inadvertently renamed this species “*E. oxyphila*.”