

MILD UNCINARIA INFECTIONS

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Hookworm disease exists in a very large area of the civilized world, varying greatly in the extent of the infection in different localities. The Porto Rico Anemia Commission estimates that 90 per cent. of the population of Porto Rico are infected and that 30 per cent. of the deaths are due directly to this disease. No estimate can be placed on the number resulting from it indirectly. C. W. Stiles, who has especially directed attention to this disease in the southern states, has collected reports of many thousand cases all over the south. He is convinced that the death rate due directly thereto is very high, while that due indirectly to this disease is enormous. It is unnecessary to mention the importance of the economic side of the subject. The intensity of the infection varies greatly in different individuals.

It is intended to discuss in this paper briefly mild uncinaria infections (1) from the hygienic standpoint, (2) from the clinical side, and (3) to refer somewhat at length to certain manipulations in technic by which these cases can be more certainly recognized than by the ordinary examination of the feces.

HYGIENIC CONSIDERATIONS

For every well-marked case of uncinariasis in the infected section of the southern states there are several patients having from one parasite up to a number sufficient to cause the ordinarily recognized symptoms. The proportion of mild to severe cases varies with the extent of the infection in a given locality, but it is perfectly consistent that there should be very few medium to severe cases in a given locality while yet a large percentage of the entire population may be infected to some extent. This is particularly likely to be true where there are many negroes. Negroes do not, as a rule, show marked symptoms, even when infected with many parasites. Those who have many eggs in the feces usually show only slight or no anemia if the blood is examined.

Many of the mild cases are those of persons who wear shoes and in whom there is no history or little probability of skin infection. Adults are likely to fall in this class. This argues the probability of mouth infection in this class of cases.

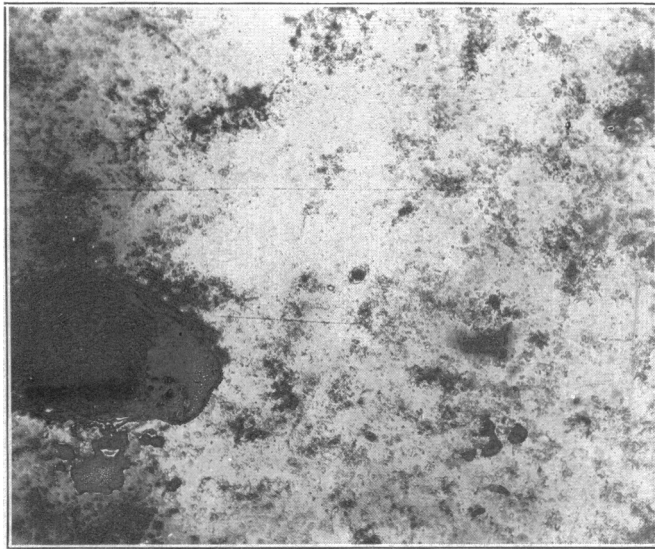


Fig. 1.—Photomicrographic view of feces containing uncinaria eggs. Only one egg is shown.

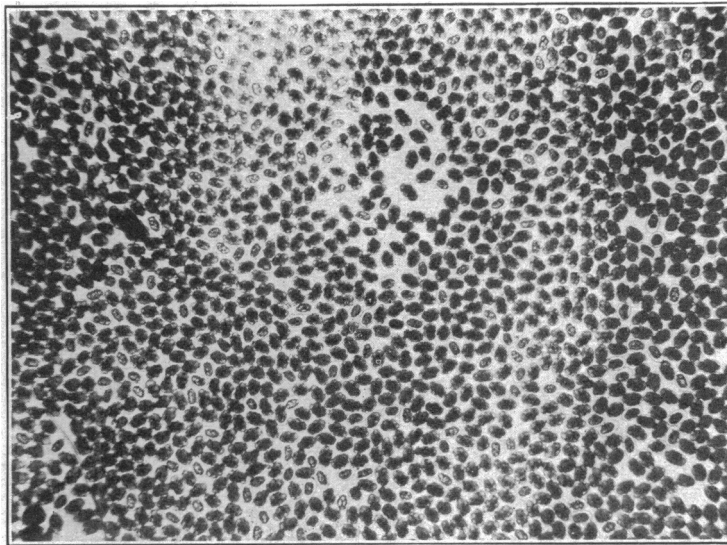


Fig. 2.—Eggs, practically free from fecal matter, obtained from specimen shown in Figure 1.

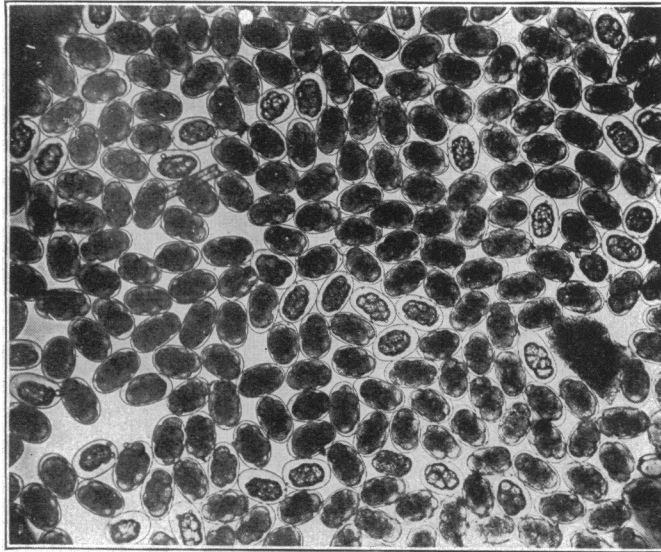


Fig. 3.—Higher-power view of eggs shown in Figure 2.

Mildly infected cases should be treated and warned against soil pollution, just as severer ones, for they may be a source of infection to others and give rise to severe cases. Just here the southern negro demands special consideration. His habits and bad hygiene include soil pollution, which, as shown by Stiles and others, is the great source of hookworm disease. The infected negro is a source of infection to others, while he himself enjoys considerable immunity from the effects of the parasite. He here plays the same rôle as he does in the spread of yellow fever, which he has in a mild and usually unrecognized form. His immunity from the effects of yellow-fever infection is illustrated by the experience at Tallulah, La., in 1905. The number of cases was: whites 80, with 18 deaths; colored about 950, deaths 5. Though there may not be the same difference in susceptibility to the effects of uncinaria infection, I am sure it is very considerable. Mildly infected patients and infected negroes compare well with the typhoid or diphtheria bacillus-carriers or the chronic malaria patients.

CLINICAL CONSIDERATIONS

The symptoms of uncinariasis are not always in proportion to the number of worms present. This no doubt is influenced largely by individual susceptibility and individual capacity of blood regeneration. It frequently happens that a patient with many worms has few or no symptoms, whereas another patient with few worms may have severe anemia or other symptoms. I am convinced, however, that those who have mild infections generally do not have recognizable symptoms.

Out of 152 cases of infection seen in which the symptoms were not sufficiently marked to attract special attention—cases which were, therefore, properly classed as mild—in only 26 per cent. was there more than 4 per cent. of eosinophiles, and in only 6 per cent. of the cases was there more than 6 per cent. of eosinophiles. Complete blood examination was made in 62 of these cases. The average percentage of hemoglobin was 90. The average number of red corpuscles was 5,125,000.

Of the 152 cases, 32 per cent. gave a history of more or less indigestion; 34 per cent. gave a history of pains and tenderness on pressure in the right side of the abdomen.

It is through the courtesy of Dr. J. B. Elliott, Sr., former professor of medicine in Tulane University, who was one of the first in our section to recognize the rôle of uncinariasis in producing a variety of vague digestive and abdominal symptoms, that I have seen several of these cases. The following cases are illustrative:

CASE 1.—J. B., aged 39, male, white, merchant, was well developed and looked fairly well; had never had ground itch; lived in town. He had had vague pains in the right side of abdomen as long as he could remember; said he was nervous and had "indigestion." Pains were not related to the time of eating. Physical examination failed to reveal anything abnormal. There were a few eggs in the stools; fourteen worms were recovered. The patient recovered entirely and gained nine pounds in nine weeks.

CASE 2.—L., aged 61, white, farmer's wife, had had no ground itch. The negroes on the plantation had it. The patient had had pains in the right side and uneasiness in the abdomen for the past six years, not related to meals; tenderness was not present. Physical examination showed nothing abnormal. There were a few eggs in the stools; no anemia. The patient recovered on treatment with thymol. Eight months later she was still well.

CASE 3.—Paul H., aged 42, male, white, lawyer, complained of indigestion and frequent headaches. He had tenderness in the right side of the abdomen. There were a few eggs in the stools. The patient was relieved of indigestion and headaches after the first course of thymol.

It would be impracticable to relate here enough cases to prove that the vague and indefinite symptoms referred to are frequently due to hookworms and that their occurrence in uncinariasis is not a coincidence. One who has met a large number of such cases and seen the prompt relief following treatment becomes convinced, I believe, that a very few worms may give rise to such symptoms without the production of anemia.

All who have had much experience with the disease have, however, seen cases with few worms and severe anemia. Hypersusceptibility to the toxin or possibly anaphylaxis may explain this. These cases form a striking contrast to what is seen in the negro with his many worms and no symptoms. Such instances should be regarded as cases of uncinariasis of medium or marked severity. They are often unrecognized through insufficient examination of feces. Many of the patients have had severer infection which has been reduced, but they have been unable to recover from the effects of the toxin. It is possible that old parasites may cease to ovulate long before they die. This hypothesis would explain cases in which there are few eggs and severe symptoms.

RECOGNITION OF THE OVA

The recognition of infections in which there are only a few parasites, or the determination of the moment when all parasites have disappeared under treatment, is not always easy. When many eggs are present, a positive report is easy to make; but when very few eggs are present it may require a long search over many slides before any can be found. To make a conscientious and reliable negative report, one must look over many slides if the ordinary technic is followed. I want to call attention to certain modifications of technic which make the examina-

tion far more reliable and save much time and labor. Following this technic one should find eggs if only one laying worm is present. This method of procedure is based on recognition of the specific gravity and shape of the eggs in relation to that of other material of the feces. Feces consist largely of bacteria, undigested food particles and crystals, insoluble grit, etc. The specific gravity of these different elements varies considerably. The specific gravity of fresh uncinaria eggs is between 1050 and 1100. When they grow old this is increased in many specimens.

A quantity of feces is well diluted with water, one in ten, and strained through gauze to get rid of coarse particles. This is centrifugalized, the fluid poured off, the centrifuge tube refilled and centrifugalized again until all the diluted feces have been used. The precipitate is rewashed several times with water as long as anything can be washed out. To know just how long to continue the centrifugalization is the secret of success. One must learn just what is the proper time for his centrifuge. It should be carried out at high speed and just long enough to throw the eggs to the bottom. Too long centrifugalization defeats the purpose. With a centrifuge running 3,500 revolutions per minute, ten seconds at first, when there is much matter, and then four to five seconds is usually the proper time. The centrifuge must be steady. This gets rid of most very small things, those having flat rough surfaces and those having a specific gravity about that of water. Now the precipitate should be washed as before, using calcium chlorid solution of a specific gravity up to 1050. (Calcium chlorid is preferable to other salts because of its hygroscopic property. This was suggested by Professor A. L. Metz.) This disposes of everything having a specific gravity below 1050, and the precipitate may now be examined. There frequently remains a considerable amount of material, much of which is considerably heavier than the eggs and of such a character that it interferes much with their recognition. This material may be removed by centrifugalizing with a solution sufficiently heavier than the eggs. A solution with a specific gravity of 1250 is very satisfactory. In such a solution the eggs go to the top and other material below. With an appropriate pipette one may remove a few drops from the surface and examine, or, what is still better, pour off some of the top fluid containing eggs, dilute with water sufficiently to bring the specific gravity below 1050 and centrifuge again. The precipitate will now contain most of the eggs contained in the original amount of feces and may all be put on one slide and examined. One such slide contains as many eggs as could be found in several hundred ordinary slide preparations of feces.

With this technic I was able to recover 96 per cent. of 1,000 eggs put in one ounce of feces, 94 per cent. of 100 eggs in the same quantity, and 60 per cent. of 10 eggs in one ounce. From specimens containing many eggs they may be obtained practically free from anything else. The accompanying illustrations show the results obtainable. I am indebted to Professor Beyer for making the photomicrographs from which the cuts were made.

The procedure may be of service when it is desired to obtain quantities of eggs free from feces for experimental purposes. It should be used before making a negative report or pronouncing a patient under treatment to be positively free from parasites. Good results can be obtained only with fresh specimens, and preferably those taken following a dose of epsom salts. In old specimens the specific gravity of the eggs may go even above 1250.

Before making use of this technic on questionable specimens the investigator should familiarize himself with just what is accomplished by the different steps, using specimens containing many eggs. Unless he does this and also tests his centrifuge he will be disappointed. Solutions of calcium chlorid of several different strengths should be used when it is desired to get eggs absolutely free from other material, but for ordinary diagnostic work two solutions, one of a specific gravity of 1050 and one of 1250, are sufficient. Washing with water alone is of much service.

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