

In this experiment the earth contained no added organic matter; in the two following old cultures were used which had been made with earth and emulsified fæces.

5. A culture of *Ancylostoma duodenale*, made a month previously, the larvæ in which had never been numerous, was allowed to dry on a sheet of paper. It took seven days to become thoroughly dry throughout and was left for a further three days, when a sample of it lost 1.1% of its weight at 105° C. It was then wetted and twenty-four living larvæ obtained. The mean dry and wet bulb readings at 3 p.m. during this and the preceding experiment were about 25° and 20.5° C. (77° and 69° F.).

6. Part of a ten-day-old culture which had yielded numerous larvæ of *Ancylostoma duodenale* and *Necator americanus* in the ratio of seven to one, was exposed to the air and appeared thoroughly dry throughout after four days. Twenty-four hours later a part of it, on being wetted, yielded thousands of larvæ; two hundred on examination proved all to be ancylostomes. Five days after it had become dry a further portion after wetting yielded five ancylostome larvæ. The remainder, twelve days after drying, yielded no larvæ. The weather was rainless throughout and the mean dry and wet bulb readings at 3 p.m. were 28.5° and 23° C. (83.3° and 73.4° F.).

Two of these observations suggest that *Ancylostoma braziliense* probably does not differ much from the human hookworms as regards the powers of the larvæ to withstand light and drying. No observations have been made on the larvæ of the other common hookworm of cats and dogs *Ancylostoma caninum*. The larvæ of these species are of interest both on account of the difficulties they may cause in the examination of soil and because one of them is now suspected by American investigators to be the cause of a form of creeping disease in Florida. The photographs and description of the condition leave little doubt that it is the same as a creeping affection of the feet common in Townsville and other parts of North Queensland and popularly known as "sand worm." The writer has made attempts to produce the condition experimentally with larvæ of *Ancylostoma braziliense*, but so far without success. However, *Ancylostoma caninum* seems the more likely of the two to be responsible since *Ancylostoma braziliense* can parasitize man in a normal manner.

Earlier in this paper mention was made of the use of a warm needle to stimulate infective hookworm larvæ. Special apparatus has been devised by Fulleborn and others for the purpose of employing the thermotropism of hookworm and *Strongyloides* larvæ to separate them from free living larvæ of the earth. The warm needle is a very simple instrument by means of which the presence of a few hookworm larvæ among a number of free living larvæ may be detected without recourse to morphological characters or the higher powers of microscope. A needle with a metal handle is used since it does not need such frequent reheating

in the flame and loss of warmth is at once noticed. The larvæ are examined under a dissecting microscope at the same time that the point of the needle is dipped into the water containing them and passed near to all parts of the collection. Hookworm larvæ which respond to the approach of the needle by a violent increase in activity, are at once detected and can if necessary be pipetted on to a slide for further examination; the free living larvæ make little response.

An observation has just been completed on the effect of discontinuous illumination on hookworm larvæ. Some larvæ of *Ancylostoma duodenale*, ten days old, were exposed in a watch glass resting on white paper to strong sunlight for six minutes each day. The temperature was kept below 31° C. At all other times they were kept in the dark. Examined just before the fifth exposure, only a few living larvæ were found and these were feeble. Twenty-four hours after the fifth exposure all but one were quite dead and that was nearly dead. The total exposure which killed, was thus half an hour, certainly not a longer time than would have been required if it had been given continuously.

#### Summary and Conclusion.

It has been shown that, contrary to the accepted view, the light of day rapidly injures and kills infective hookworm larvæ of both the human species; the practical implications are discussed.

Infective hookworm larvæ do not die at once in earth which has been dried in the atmosphere of Townsville; some of them survive for several days; the larvæ of *Ancylostoma duodenale* survive longer than those of necator.

#### References.

- <sup>(1)</sup> A. Looss: "The Anatomy and Life History of *Ancylostoma duodenale* Dubini, Part II," *Records of the School of Medicine, Cairo*, Volume IV, 1911.
- <sup>(2)</sup> G. M. Heydon: "The Differences Between the Infective Larvæ of the Hookworms of Man," *THE MEDICAL JOURNAL OF AUSTRALIA*, April 9, 1927, page 531.
- <sup>(3)</sup> G. Baermann: "Über Ankylostomiasis, deren Ausbreitungsbedingungen durch die Bodeninfektion und deren Bekämpfung," *Geneeskundig Tijdschrift voor Nederlandsch-Indië*, 1917, Volume LVII.
- <sup>(4)</sup> W. Nicoll: "Observations on the Influence of Salt and Other Agents in Modifying the Larval Development of the Hookworms," *Parasitology*, 1917, Volume IX, Number 2.
- <sup>(5)</sup> D. L. Augustine: "Investigations on the Control of Hookworm Disease. IX: On the Position of the Infective Hookworm Larvæ in the Soil. X: Experiments on the Length of Life of Infective Hookworm Larvæ in Soils," *American Journal of Hygiene*, 1922, Volume II, Number 2.

#### Reports of Cases.

LARVA MIGRANS (MYIASIS LINEARIS) OCCURRING IN THE TERRITORY OF NEW GUINEA.

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LARVA MIGRANS or *myiasis linearis* is the generic name given to a condition first described by Lee in 1874 and

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produced by certain burrowing parasites or even, it is said, by inanimate bodies, such as a hair. It is characterized by a very slightly raised red line, from 1.5 to eighteen millimetres (one-sixteenth to three-quarters of an inch) broad, which creeps forward as much as 2.5 centimetres (an inch) a day in a sinuous pattern, the earlier portions fading as it proceeds and the line consequently remaining about a constant length. Its progress is associated with intense itching and secondary infection often occurs from scratching. It is said that if the "larva" be not captured and destroyed, it may exist and travel for months or years. Occasionally the "larva" may be detected as a brownish spot slightly beyond the advancing end of the line and identified specimens have proved to be larvæ of *Hypodermia bovis*, *Gastrophilus hamorrhoidalis*, *Gastrophilus veterinus* et cetera. Looss incriminates also the larvæ of *Ancylostoma*.

The case under review occurred in Rabaul (4° south, 152° east approximately) in a female European child, aged two and a half years and infection possibly occurred on the east coast of the island of New Ireland close by some month or so previously. In this latter locality cases are reputed to exist among the natives. The condition first appeared as a small itching spot on the dorsum of the left foot immediately distal to the metatarso-phalangeal joint of the big toe. This spot was secondarily infected and became pustular, the infection travelling slowly along the course shown in the diagram as I—Ia.



Figure showing Track of Infection.

Upon its reaching the latter point on June 9, 1927, the case was referred to the writer in consultation and diagnosed as *myiasis linearis*. On June 10, 1927, the child was anaesthetized and the whole track to the point Ia opened up and thoroughly scrubbed with solution of biniodide of mercury. The skin of the neighbourhood was explored in every direction, but no "larva" or other parasite was seen. Immediate examination of the contained matter microscopically, however, revealed what appeared to be portions of a mite. These were too much damaged to be recognizable.

It was considered that this treatment would be sufficient to cure the condition, but two days later, June 12, 1927, an extension of the line appeared over the area marked II—IIa.

A second anaesthetic was administered, the former treatment instituted and further a circular piece of skin and tissue eighteen millimetres (three-quarters of an inch) in diameter was excised around the travelling end.

Cure followed, the wound healing in a few days uneventfully.

The excised skin and the morbid matter from the track were submitted to microscopical examination and the bacteriologist of the Commonwealth Health Laboratory, Rabaul, Dr. T. C. Backhouse, reported the presence of another damaged mite and what appeared to be eggs. These specimens were examined by Dr. Backhouse and the writer and the mite though unidentified showed characters resembling a sturdy *Rhizoglyphus*.

In the opinion of the writer the causative agents of the "creeping eruption" in this case were two mites (? male and female) resembling, as stated, the *Rhizoglyphus* type.

The specimens (which may be identifiable by other observers) will be submitted to further examination as opportunity offers.

## TWO CASES OF POLYCYSTIC DISEASE OF THE EPIDIDYMIS.

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### Clinical Histories.

CASE I.—H. K., aged three, was admitted to the Sydney Hospital on February 27, 1922, with a history of a swelling in the scrotum on the right side ever since birth. It had shown no evidence of increase in size and had never seemed to cause pain or discomfort.

Examination showed a rounded, soft, fluctuating swelling in the right side of the scrotum. It was not tender, exhibited no impulse on coughing and was not reducible into the inguinal canal or the abdomen. The testicle could be felt towards the posterior and medial aspect. No other abnormalities were apparent and the patient seemed in good health.

On March 3 he was operated on, when the tumour was seen to consist of a closely packed mass of small cysts with thin, delicate walls, and filled with clear colourless fluid. The cystic mass was apparently in close association with the epididymis.

The operative treatment consisted in cutting away the cystic mass as completely as possible, having regard to the integrity of the normal organs.

CASE II.—G.G., aged forty-one years, was admitted to the Sydney Hospital, May 1, 1922. He gave a history of "swollen testicles," with a duration of from fifteen to twenty years. In the last twelve months the enlargement had increased to a considerable extent.

Examination showed a translucent pyriform enlargement of both sides of the scrotum. The testes could be felt at the postero-inferior aspect. In all other respects, he appeared to be physically normal and in good health.

At the operation, May 3, 1922, the condition was found to be due to a bilateral polycystic development in connexion with both testicles, and apparently chiefly developed from the region of the epididymis. The cysts were thin-walled and filled with clear hyaline fluid, not yellow-tinted as in ordinary hydrocele. The individual cysts varied in size from, say, a capacity of two cubic centimetres down to a size no bigger than fine shot, and constituted a closely bunched mass. There was a small quantity of fluid in the *tunica vaginalis*, about two cubic centimetres, and its pale straw colour was seen to contrast with the hyaline fluid of the cysts.

The cysts were excised as completely as possible on both sides.

The pathological report by Dr. P. E. Walton Smith was as follows: "The condition is apparently a cystic formation arising from the *vasa efferentia* and from embryonic remains. Spermatozoa present in fluid."

### Comment.

The distinctive feature in these two cases is the enormous multitude of cysts. I have seen nothing similar, nor have I been able to find any similar cases recorded, though I admit that it has been impossible to go through all the literature systematically. No doubt, these cases could properly be classified clinically as cases of encysted hydrocele of the epididymis, but the examples of encysted hydrocele of the epididymis usually met with consist of single cysts, or at most a few. The single cysts are usually known as spermatoceles. I think I am justified in describing the cases I have recorded by the new name of polycystic disease of the epididymis.