

Infestation of man by the Cestode Inermicapsifer madagascariensis in Lusaka, Zambia

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SUMMARY

The infestation of a child with the cestode Inermicapsifer madagascariensis is reported for the first time in Zambia. The criteria used in arriving at the species diagnosis are discussed. As the probable rodent reservoir hosts are widely distributed in the country, the infection in man is likely to be more common than hitherto recognized. Review of the case six months after treatment with Niclosamide (Yomesan) indicated that the chemotherapy was successful.

INTRODUCTION

Cestodes of the genus Inermicapsifer are primarily parasites of rodents and are found widely in Africa. However, in countries such as Cuba, Madagascar and Mauritius I. madagascariensis has adapted itself for interhuman transmission (Baer, 1956, Nelson et al., 1965). Reports from Kenya (Bayliss, 1949) and Rwanda and Burundi (Fain, 1950) show that this parasite has also been found occasionally in man. Mettrick (1961) in a study of cestodes of

vertebrates in Rhodesia, remarked on the conspicuous lack of reports of human infections with Inermicapsifer sp. in Central Africa. Since then the parasite has been recorded in man in South Africa (Ortlepp, 1961), Rhodesia and Malawi (Goldsmid, 1964, 1968, 1972).

This communication reports the infection of a child with I. madagascariensis in Zambia for the first time, discusses the species diagnosis, considers the possible animal reservoir hosts in the country and also the appropriate chemotherapy in human infestation.

CASE REPORT

A Zambian female child of one year was brought to the Children's Filter Clinic of the University Teaching Hospital by the mother. She explained that the child was "losing weight, refused to eat and cried frequently". The next day her stool, which was hard in consistency and brown in colour, was sent to the Parasitology Laboratory in a waxed

capped container. Direct smears and faecal concentration techniques revealed no ova. Closer examination of the container revealed eight white macroscopic organisms resembling "rice grains" (figure 1). Consultations with the parents revealed that the whole stool passed that morning at home was put in the container, capped and brought directly to the laboratory; there was no possible chance of contamination.

The segments, on being pressed between two microscope slides, burst releasing minute, white particles which eventually were identified as egg capsules (figure 2). From the nature of the segments and the presence of the egg capsules, a provisional diagnosis of cestodiasis was made. The probable genus involved was either *Inermicapsifer* sp. or *Raillietina* sp.

The child was put on a course of Niclosamide (Yomesan). The parents agreed to bring the whole stool for the next six days. Mature and gravid proglottids were found in the stool first day after treatment; three scolices with segments were recovered the next day and the rest of the specimens were negative.

Six months post-treatment, the child seems to have been cured as the symptoms have long subsided and she has not passed any segments thus far.

LABORATORY INVESTIGATIONS

After the preliminary diagnosis, measurements of egg capsules showed that they ranged from between 0.4 mm. to 0.6 mm. and are shown in figure 3. Each egg capsule contained between 6 to 8 ova.

Figure 1 shows gravid proglottids as seen in the stool specimen. Such segments attached to the strobila were longer than broad, measuring (after staining and mounting) between 2.9 mm. to 3.2 mm. in length by 2.3 mm to 2.7 mm. in breadth. In these, the egg capsules ranged from 136 to 152 per segment. Though the genital pore was not visible in most segments, mature proglottids showed the opening was unilateral and opened at the middle of the lateral border of each margin.

DISCUSSION

Cestodes of the genus *Inermicapsifer* sp. and *Raillietina* sp. are best separated from each other on the basis of the structure of the scolex (Baer, 1956). *Inermicapsifer* sp. have a rounded, unarmed scolex with four spinous suckers whereas *Raillietina* sp. have a cushion-shaped rostellum armed with a double row of eighty or more small hammer-shaped hooks and four suckers usually equipped with minute hooklets. All three scolices recovered showed the typical rounded scolex of *I. madagascariensis* with four unarmed suckers each.

Subsidiary criteria also enable one to distinguish the species accurately. The chief character is the opening of the genital pore. In *Inermicapsifer* sp. the unilateral, marginal genital pores are situated in the middle of the lateral margin of the segments (Figure 2). In contrast, in *Raillietina* sp. the irregularly alternating unilateral, marginal genital pores are situated in the anterior third of the lateral margin of the proglottid. (Wardle and Mcleod, 1952; Yamaguti, 1959; Faust and Russel, 1964).

Until recently, there was much confusion as to the identity of the rodent cestode infecting man in Africa. Baer (1956) examining original material has done much to clarify the situation and has concluded that the two valid *Raillietina* sp. infecting man are *R. celebensis* reported from Japan, Formosa, Thailand, Indonesia and Australia, and *R. demarensis* from Central and South America (Baer and Sanders, 1956).

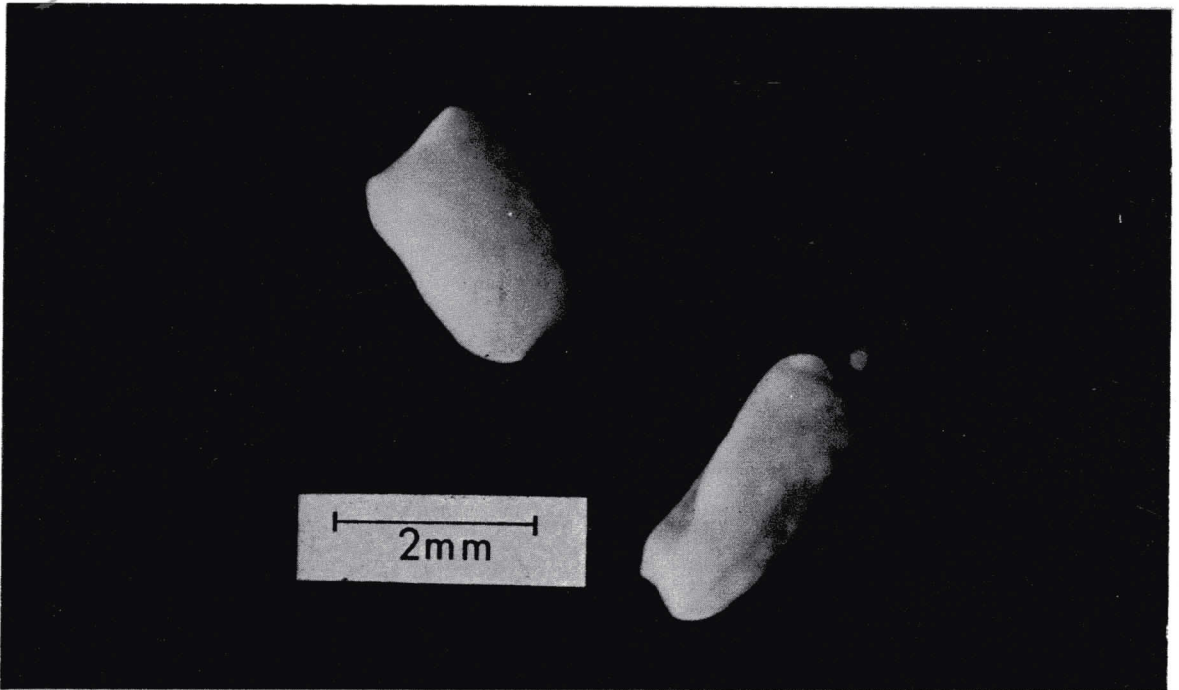
Thus on the basis of the scolex, the position of the opening of the genital pore, the size of the gravid proglottids, the polyhedral arrangement and number of egg capsules within a proglottid, the size of the egg capsules with the number of ova within them and the geographical distribution of such cestodes, it was concluded that the parasite harboured by the child was *Inermicapsifer madagascariensis* of the order Cyclophyllidae and family Linstowiidae.

The life cycle of the parasite is indirect with rodents and man as the definitive hosts. The intermediate host/s are still unknown though insects (Nelson *et al.*, 1965) and Oribatid mites (Watson, 1960) have been implicated. Up to 1965, there were only 6 recorded cases from the African mainland reported from Kenya, Rwanda and Burundi, South Africa and Rhodesia (Nelson *et al.*, 1965). Since then Nelson *et al.* (1965) have recorded further cases from Kenya and Tanzania while Goldsmid (1964, 1968, 1972) has recorded the parasite in man again in Rhodesia and in Malawi.

Undoubtedly, in Africa, man is an incidental host. However, the paucity of such reports could be further due to the parasite being frequently overlooked or misidentified as the proglottids in the stool do resemble "rice grains". Besides, if they are brought to the attention of laboratories (where they exist) they could be misidentified as "Taenia" or merely referred to as "tape-worms" as an awareness of the existence of such infections in man is an important factor in the identification.

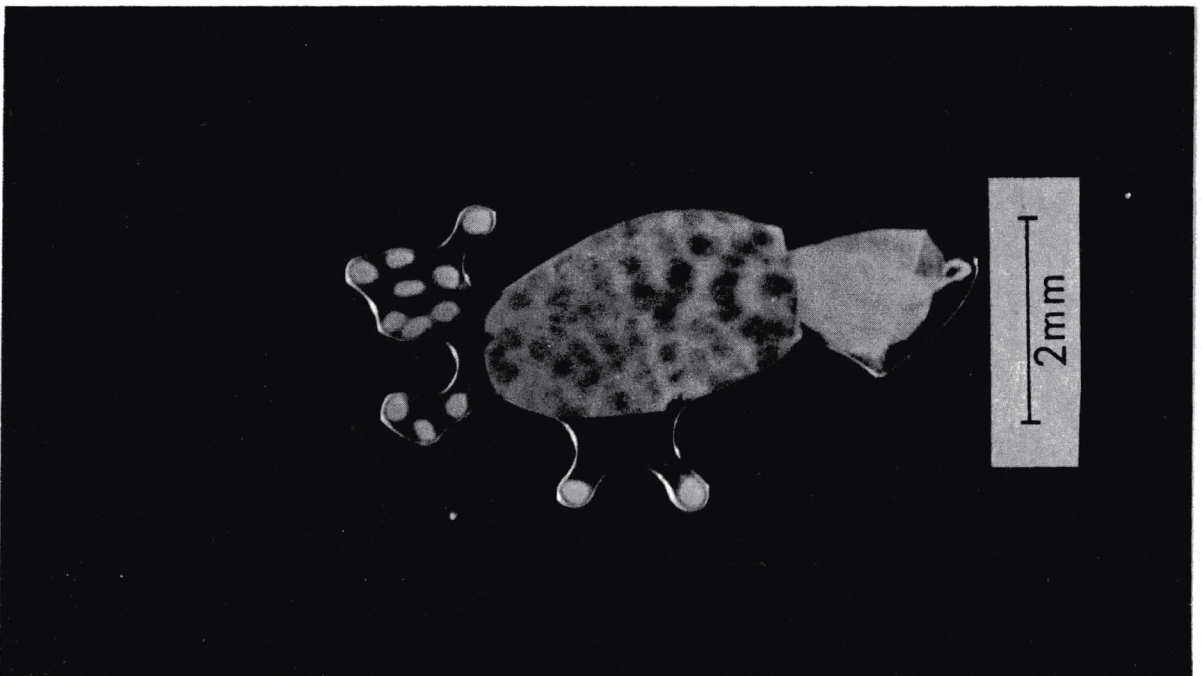
The mode of infection is still undetermined but accidental ingestion of vectors, as happens in other anoplocephalids, is possible. That the parasite is maintained by inter-rodent transmission in Africa is shown by the huge reservoir of infection in rodents of the genera *Mastomys*, *Lophuromys*, *Arvicanthis* and *Otomys* in East Africa (Nelson *et al.*,

Figure 1:



Gravid proglottids of *Inermicapsifer madagascariensis* as they appeared in the stool specimen.

Figure 2:



Gravid proglottid of *I. madagascariensis* pressed between two microscope slides releasing egg parenchymatous capsules. Note the opening of the genital pore in middle of the left lateral margin of the segment.

1965) while in nearby Rhodesia, 9 of 16 *Mastomys natalensis* harboured the parasite in Salisbury (Goldsmid, 1972). This latter species is commonly found throughout Zambia and is usually known as the rural house rat. However, even in cities like Ndola and Lusaka, the species has not been displaced by *Rattus rattus*, the common urban house rat. Thus an ideal reservoir for human infection clearly exists even in urban areas in Zambia where the present case emanated from. Apart from the report by Fain (1950) though, the species has not been reported from the common house rats *R. rattus* and *R. norvegicus*.

Clinical symptoms, while clearly indicated in the present case, appear to be slight or even absent in most published reports (Nelson et al, 1965). However, Goldsmid (1972) records patients with loss of appetite, weight loss and irritability while Belding (1965), though affirming that "symptoms are negligible", states that "anemia, asthenia, bronchitis and functional cardiac symptoms have been observed in a child".

The earlier treatment with the extract of male fern recommended by Bayliss et al (1949) was undoubtedly effective. The indications of the effectiveness of the readily available Niclosamide are favourable, as Goldsmid (1972) reports complete recovery after treatment with the drug while a review after six months in the present case established a complete cure.

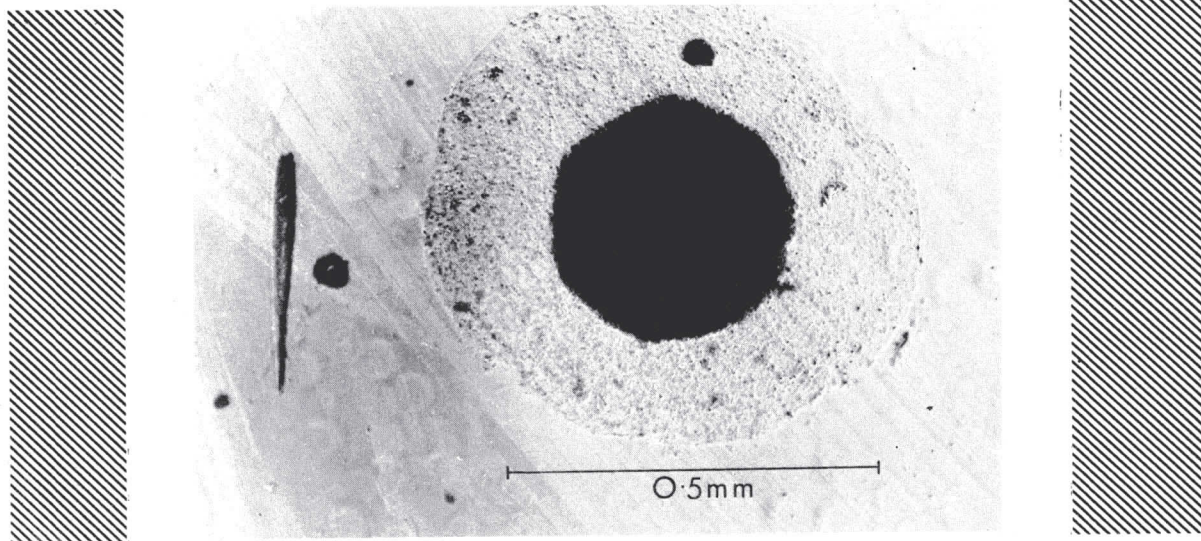
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Figure 3:



Photomicrograph showing an egg capsule of *I. madagascariensis*.