DIAGNOSIS OF LIVER TAPEWORM, *STILESIA HEPATICA*, INFECTION IN SHEEP

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ABSTRACT

A practical method of diagnosing *Stilesia hepatica* in live sheep is described. Intestinal contents and faeces were sieved through a sieve with apertures of 1,0 mm onto a sieve with apertures of 100 µm to reduce volume and turbidity. The residue on the fine sieve was examined microscopically. Gravid proglottids passed through the intestine without being digested. Intact proglottids were recovered from the intestine and faeces of infected sheep. Used purely on faeces, the technique is simple and reliable as a diagnostic method. Its application could facilitate basic research into the biology and epidemiology of the parasite.

Key words: Diagnosis, oncosphere, paruterine organ, sheep, *Stilesia hepatica.*

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The liver tapeworm, *Stilesia hepatica,* inhabits the bile ducts of sheep, cattle and wild ruminants in Africa and is widespread in South Africa[2,4]. The infection causes considerable economic losses because infected livers are condemned at abattoirs[3] for aesthetic reasons[4]. Little is known about the life cycle of the parasite[1]. Investigations regarding the identity of the intermediate host and other aspects of the life cycle, have been largely unsuccessful because of the difficulty of diagnosing *S. hepatica* infection in the live host. The only successful analytical technique to demonstrate the presence of the parasite in a live host, was carried out on a single sheep by Van Amelsfoort & Schröder[3]. They used a flotation technique to recover oncospheres from a faecal sample.

This paper reports on a simple technique which can be used to demonstrate the presence of *S. hepatica* in live sheep without the need of specialised equipment. The method can be applied in the field requiring only sieves and a field stereo microscope. This technique could facilitate research into the biology and epidemiology of the parasite.

Fresh intestines of 12 sheep heavily infected with *S. hepatica* were collected at the Bloemfontein abattoir over a period of 3 to 4 months. The contents of each intestine, from duodenum to rectum, was examined microscopically for the presence of any identifiable parts of the tapeworm. Following this, the intestinal contents was washed through a sieve with apertures of 1,0 mm onto a sieve with apertures of 100 µm. The residue on the second sieve was washed off and suspended in 100 to 150 ml of water. This was then transferred in 2 or 3 50 ml aliquots to a petri dish and examined under a stereo microscope. Faecal samples, usually about 40 to 50 g, were also collected at the abattoir from live sheep in which the presence of *Stilesia* was determined post mortem. Faecal samples were gently crushed and diluted in water before sieving and examining the residue as described above.

During the initial microscopical examination of intestinal contents, some gravid proglottids were recovered. However, the volume of material involved, together with its turbidity, made the finding of proglottids largely a matter of chance and precluded microscopic examination of untreated intestinal contents as a routine method to determine the presence of proglottids.

The sieving of intestinal contents and faecal samples considerably reduced the volume of material which had to be examined. Much of the very fine material which caused turbidity was also washed out through the sieve with apertures of 100 µm. Gravid proglottids, roughly 0,9 mm wide and 0,6 mm long, were easily recovered from the residue on the sieve with apertures of 100 µm. Two rounded paruterine organs (Fig. 1), characteristic of *S. hepatica,* were conspicious, even under low magnification. Proglottids mostly occurred singly and were recovered from all regions of the intestine, posterior to the opening of the bile duct into the duodenum. Those found in the posterior regions of the intestine were often stained yellow to brown, but were still easily detected due to their characteristic shape. In faecal samples we seldom found more than 2 or 3 proglottids, even in heavily infected animals.

Oncospheres appeared to be intact in all gravid proglottids recovered from the intestine and faeces (Fig. 2). Movement of hexacanth embrios was often observed during microscopic examination. Oncospheres had a characteristic oval shape (Fig. 3). A thick capsule surrounded each embryo, but the oncosphere nevertheless appeared to be a delicate structure (Fig. 2). Each paruterine organ of gravid proglottids contained from 20 to 25 oncospheres. Only when pressure was exerted on the paruterine organ, did its contents extrude as a gelatinous mass containing the oncospheres. Paruterine organs probably function to protect the delicate oncosphere against adverse conditions outside the host.

The most significant finding of this study was that mature proglottids shed by adult worms pass through the intestine without being digested. Oncospheres will therefore not normally be present in the intestinal contents and faeces. Flotation techniques, such as those used by Van Amelsfoort & Schröder[3], would give positive results

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ig. 1: **Photomicrograph of a gravid proglottid of *S. hepatica*, recovered from the intestine of a sheep. The pair of rounded paruterine organs are characteristic. Scale bar 200 μm**

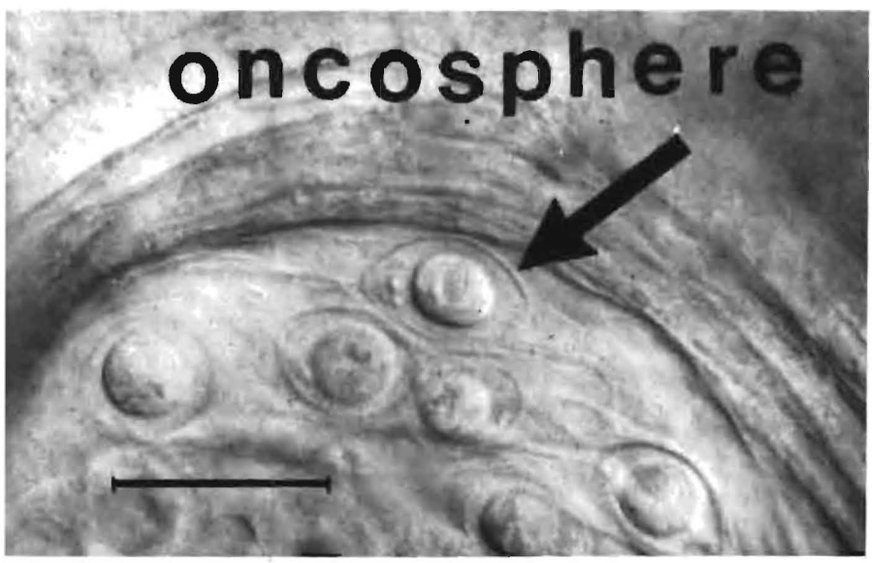

Fig. 2: **Photomicrograph of oncospheres inside the paruterine organ of a gravid proglottid of *S. hepatica*, recovered from the intestine of a sheep. Scale bar 50 μm**

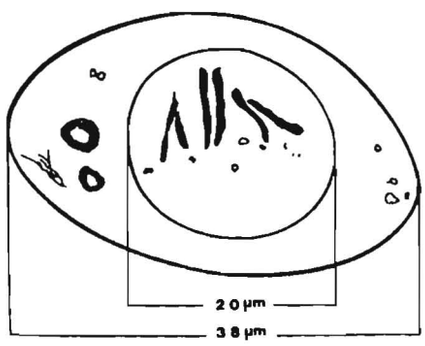

Fig. 3: **Drawing of an oncosphere of *S. hepatica*, indicating its approximate size and characteristic shape**

only in those cases where paruterine organs are damaged mechanically during the handling of samples, resulting in the extrusion of oncospheres. Even then the delicate oncospheres may be affected by osmotic stress, which would make it more difficult to identify them as those of *S. hepatica*. The sieving method described here, evidently overcame most of these problems, is easy to use and during application constantly gave reliable positive diagnoses.

In heavy infections with *Stilesia*, large numbers of worms crowded the bile ducts and it is difficult to explain why we never found large numbers of proglottids in any region of the intestines of infected hosts. This may be related to seasonality or the rate of maturation of proglottids, aspects on which no information is available. Most studies relating to the biology and epidemiology of *S. hepatica* are dependent upon the diagnosis of infection in the live host. The application of the technique described, should facilitate basic research into the biology of the parasite.

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