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RESEARCH NOTE

FIRST REPORT OF *FASCIOLOIDES MAGNA* (BASSI, 1875) IN SOUTH AFRICA

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ABSTRACT

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Fascioloides magna from a Brahman heifer recently imported from the USA is recorded for the first time in South Africa. The pathological findings are briefly described. The possibility of this parasite becoming established in this country is also discussed.

Résumé

COMMUNICATION DE RECHERCHE: PREMIER RAPPORT SUR FASCIOLOIDES MAGNA *(BASSI,* 1875) *EN AFRIQUE DU SUD*

Les auteurs rapportent la première découverte de Fascioloides magna *chez une génisse de race Brahmane récemment importée des Etats Unis. Les lésions en anatomo-pathologie sont brièvement décrites. La possibilité que ce parasite puisse persister dans ce pays est discutée.*

INTRODUCTION

Fascioloides magna (Bassi, 1875) is a digenetic trematode often encountered in the liver of deer in Europe (Soulsby, 1969; Erhardová-Kotrlá, 1971), in the USA (Olsen, 1949; Dutson, Shaw & Knapp, 1967; Glazenen & Knowlton, 1967; Soulsby, 1969) and Canada. Domestic cattle become infested when they graze on pastures also used by deer.

Up until now, this parasite had not been recorded in the Republic of South Africa.

HISTORY

During February 1975, a 15-month-old Brahman heifer was presented for necropsy. She was one of a group of animals which had been imported from the USA in December 1974 and, after a month of quarantine, were brought to a farm in the central Transvaal. Four weeks later the heifer showed nervous symptoms resembling those of heartwater. The animal was treated, but subsequently died.

PATHOLOGICAL FINDINGS

Heartwater was diagnosed as the cause of death. Pathological findings included mild lung oedema, mild tumor splenis, mild nephrosis, oedema of the abomasal folds and caecum wall, and a marked generalized lymphadenopathy with oedema, congestion and petechiation of the lymph node cortices. Brain smears, stained with Giemsa and examined microscopically, revealed numerous colonies of *Cowdria ruminantium*.

Pathological findings pertaining to *F. magna* only are described below.

Gross pathology

Necropsy revealed numerous sinuous black migratory tracts varying from 2–10 mm in width on the omentum, mesentery, ventral peritoneum and liver surface. The tracts themselves appeared sunken.

When the liver was sectioned, a cyst about 8 cm diameter encircling a bile duct was opened. The cyst wall was thick and fibrous, with a smooth inner surface and an irregular outer capsule. The cyst contained one fully grown *F. magna* surrounded by a black viscid fluid. Microscopic examination of the fluid inside the cyst revealed many eggs, black pigment granules and cell debris. Four mature *Fasciola hepatica* were also found in thickened bile ducts elsewhere in the liver.

Migratory tracts of varying sizes were distributed throughout the liver, the larger ones being black in appearance and the smaller tracts mostly haemorrhagic.

The periportal lymph nodes were enlarged, oedematous, and black in appearance.

The mature parasites (both *F. magna* and *F. hepatica*) were still alive when collected. After fixation between 2 glass slides in 10% buffered formalin, the *F. magna* measured about 7 cm long and 2 cm wide. The anatomical details were clearly visible in the unstained specimen, and agree with those given by Stiles, 1894 (as cited by Swales, 1935). The parasites are illustrated to the same scale in Fig. 1.

Histopathology

Tissue blocks were taken for histological examination and fixed in 10% buffered formalin. Paraffin blocks were prepared, sections were cut 3 microns thick, and stained routinely with haematoxylin-eosin.

The migratory tracts in the liver were roughly classed as: large and pigmented; intermediate and either pigmented or not; and small and non-pigmented. Upon further examination the black pigment proved to be hematin, which is an iron-negative, anisotropic pigment, produced by the parasite. The small, non-pigmented tracts were completely filled with dense fibrous tissue. Bile ducts opening into the small and intermediate tracts appeared normal and patent. The intermediate tracts showed the same changes as the small tracts except that haematin granules were embedded in the fibrous tissue of some of them.

The large tracts were filled with dense fibrous tissue in which groups of eggs and hematin granules were embedded. Larger bile ducts opening into the tracts were occluded, and only a few small bile ducts with a diameter less than the diameter of the parasite eggs remained patent.

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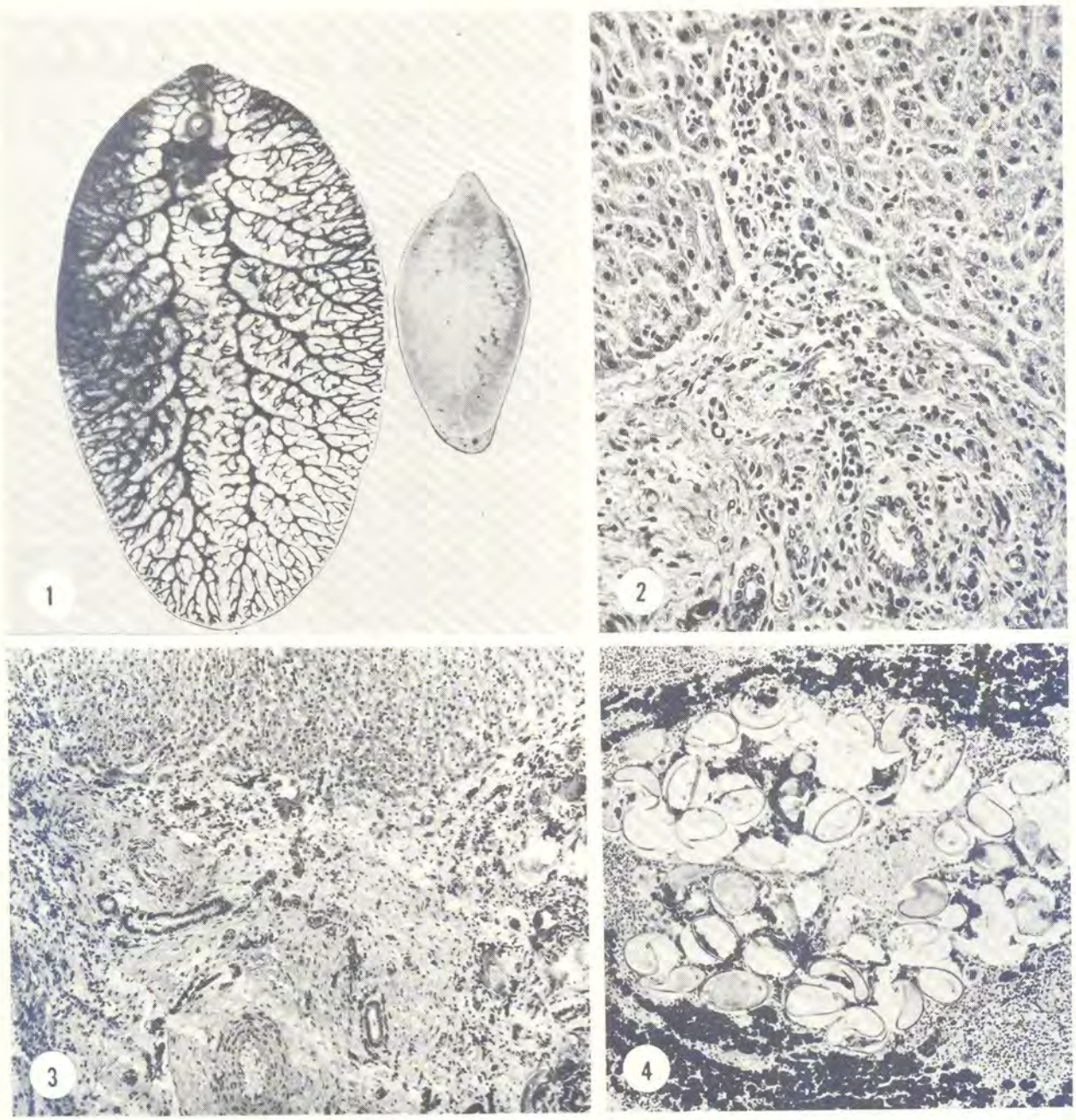

FIG. 1 *Fascioloides magna* (left) and *Fasciola hepatica* × 1,5.
FIG. 2 Part of a migratory tract, showing pressure necrosis of hepatocytes, fibrosis of tract and bile duct proliferation. HE, × 200
FIG. 3 Part of cyst wall showing pressure necrosis of hepatocytes, haematin granules, patent small bile ducts and blood vessels surrounded by a thick layer of fibrous tissue. HE, × 100
FIG. 4 Eggs in periportal lymph node. Note accumulation of haematin pigment. HE, × 75

Blood vessels in all the migratory tracts were surrounded by a thick layer of fibrous tissue. Hepatocytes bordering the tracts showed mild pressure necrosis and some intermingling with connective tissue. No tissue reaction as a result of the pressure necrosis was apparent (Fig. 2).

The parasitic cyst consisted of a thick fibrous capsule in which groups of eggs and hematin granules were embedded. The inner surface was smooth, and the outer capsule formed irregular evaginations into the surrounding parenchyma. Bile ducts opening into the cyst were mostly occluded, but a few small bile ducts appeared to be normal (Fig. 3). The cyst as such appeared to be a sub-acute lesion as active fibrosis was still evident in some parts. Both the veins and arteries surrounding the cyst appeared dilated and were surrounded by a thick connective tissue layer. Lymphatic vessels could not be seen in the cyst wall, but the portal lymphatic vessels in the surrounding parenchyma appeared to be normal. As was the case with the migratory tracts, hepatocytes bordering the fibrotic area showed mild pressure necrosis. No cellular reaction as a result of the necrosis was apparent. Some cholangitis as a result of fascioliasis was evident.

The periportal lymph nodes contained groups of eggs as well as much hematin. The eggs were surrounded by a thin fibrous layer, mild necrosis of lymphoid cells and a mild round cell infiltration (Fig. 4).

Discussion

Swales (1935) gives an excellent account of the life cycle and pathology of *F. magna* in deer as well as in cattle. He states that, in deer, the cyst is an open one, surrounded by a thin fibrous capsule and communicating with one or more patent bile ducts. In cattle the cyst is closed, and there is no communication with bile ducts. As a result of the occlusion of the bile ducts, the livers of cattle are more heavily pigmented than those of deer. Since all the eggs, hematin and cell debris remain in the closed cyst in cattle, whereas in deer it is excreted via the bile ducts, cattle seldom, if ever, spread the infection. Blazek, Erhardová-Kotrlá & Kotrlý (1972) found eggs in the faeces of cattle only in the initial stages of the infection when the mature parasite is not yet fully encapsulated. Similar findings are reported by Lankester (1974) in moose in Canada.

Blazek (1973), describing the pathology of *F. magna* in naturally and experimentally infected cattle, sheep and deer, reported that the portal lymphatic vessels and those surrounding the parasitic cyst were markedly dilated in cattle. This may account for the presence of eggs in the periportal lymph nodes of the case under discussion, although no dilated lymphatics were seen in the sections examined.

Swales (1935) lists some of the intermediate snail hosts, of which only the genus *Lymnaea* occurs in South Africa. *L. truncatula* and *L. columella* act as intermediate hosts for *F. hepatica,* and *L. natalensis* for *F. gigantica* (Soulsby, 1969). Erhardová-Kotrlá (1971) lists *L. truncatula,* and Dutson, Shaw & Knapp, (1967) *L. columella* as experimental intermediate hosts for *F. magna*. As *L. truncatula* is limited to the colder regions of South Africa and does not occur in the warm central Transvaal, it is not likely to become a natural intermediate host for *F. magna*. *L. columella,* however, has a more widespread distribution and may become a natural intermediate host should accidental infection with *F. magna* occur.

It has been established that cattle seldom, if ever spread the infection (Blazek *et al.,* 1972). The limited distribution of *L. truncatula* and the lack of evidence that *L. columella* acts as a natural intermediate host make it unlikely that *F. magna* will establish itself in this country.

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References

BLAZEK, K., ERHARDOVÁ-KOTRLÁ, B. & KOTRLÝ, A., 1972. Ovulation of the trematode *Fascioloides magna* in relation to the duration of parasitation. *Folia Parasitologica,* 19, 335–339.

BLAZEK, K., 1973. Pathology of the vascular changes in facioloidiasis. *In Helminthological Abstracts, Series A.,* 42, 734.

DUTSON, V. J., SHAW, J. N. & KNAPP, S. E., 1967. Epizootiologic factors of *Fascioloides magna* (Trematoda) in Oregon and Southern Washington. *American Journal of Veterinary Research,* 28, 853–860.

ERHARDOVÁ-KOTRLÁ, B., 1971. Occurrence of *Fascioloides magna* (Bassi, 1875) in Czeschoslovakia. Academia, Czech Academy of Sciences, Prague, pp. 155.

GLAZENER, W. C. & KNOWLTON, F. F., 1967. Some endoparasites found in Welder Refuge deer. *Journal of Wildlife Management,* 31, 595–597.

OLSEN, O. W., 1949. White tailed deer as a reservoir of the large American liver fluke. *Veterinary Medicine,* 44, 26–30.

LANKESTER, M. W., 1974. *Parelaphostrongylus tenuis* (Nematoda) and *Fascioloides magna* (Trematoda) in moose of South-western Manitoba. *Canadian Journal of Zoology,* 52, 235–239.

SOULSBY, E. J. L., 1969. Helminths, Arthropods and Protozoa of domesticated animals (Mönnig). Baillière, Tindall & Cassel, London.

SWALES, W. E., 1935. The life cycle of *Fascioloides magna* (Bassi, 1875), the large liver fluke of ruminants in Canada, with observations on the bionomics of the larval stages and the intermediate hosts, pathology of *Fascioloides magna* and control measures. *Canadian Journal of Research,* 12, 177–215.