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A Natural Infection of *Fascioloides magna* in a Llama (*Lama glama*)

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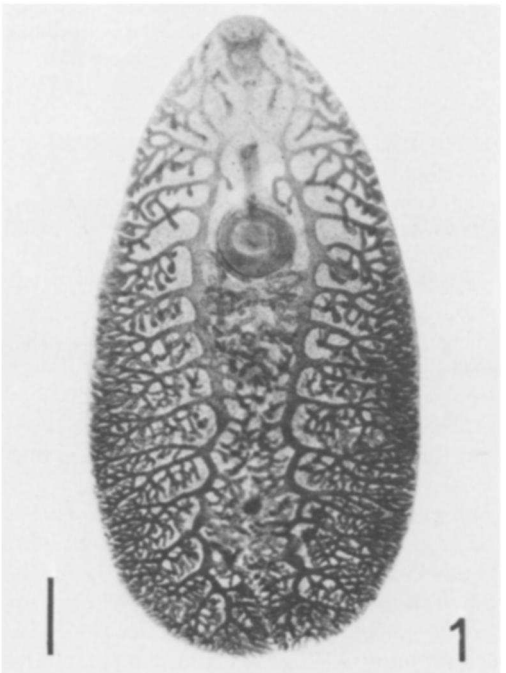
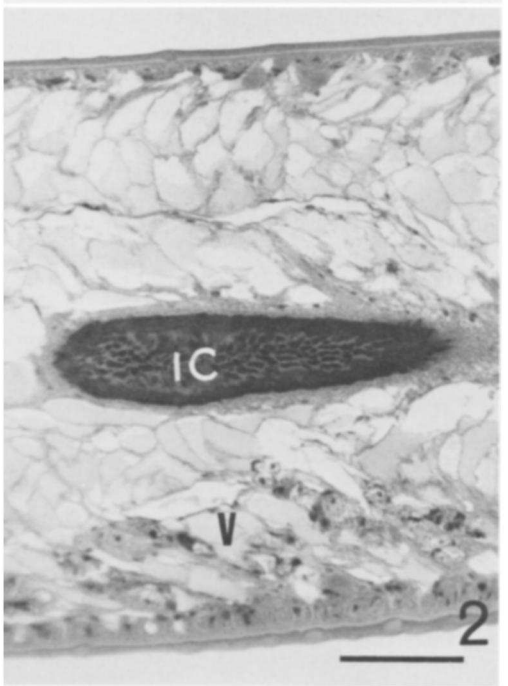
ABSTRACT: A young, female llama (*Lama glama*) was euthanized following the onset of hindleg paresis and paralysis. Live trematodes, identified as *Fascioloides magna,* were identified from the liver of this animal. This represents the first report of *F. magna* in a llama.

A 1½-yr-old, female llama (*Lama glama*) was examined at the University of Minnesota Veterinary Teaching Hospital, because of hindleg paresis. The paresis later progressed to paralysis and the llama was euthanized. During necropsy, lesions unrelated to the central nervous system disease were seen in the liver. The liver parenchyma contained multiple necrotic tracts, each surrounded by a thin capsule of gray–white connective tissue. Microscopically the tracts consisted of a central area of necrosis and hemorrhage, with neutrophils, macrophages, lymphocytes, and plasma cells present. Some of the tracts contained live trematodes. Five flukes ranging in length from 8 to 20 mm ($\bar{x}$ = 13.6 mm, SD = 5.5 mm) were recovered from the liver.

The flukes were fixed in 10% buffered formalin and the 4 smallest flukes were stained in Semichon's acetic carmine. The largest fluke was cut in cross section, embedded in paraffin, and a 5-μm section was mounted on a slide and stained with hematoxylin and eosin. The anterior end of the flukes was rounded in shape and the intestinal ceca were highly branched (Fig. 1). Genital primordia consisting of a cirrus, uterus, ootype, a branched ovary, and 2 branched testes were visible in the whole-mounted flukes. The uterus and the ovary were located anterior to the ootype. The testes were posterior to the ootype. There were no ova present in any of the flukes. In the cross section, the vitelline glands were located almost entirely ventral to the intestinal ceca (Fig. 2). The anatomy of the flukes appeared identical to that as described for *Fascioloides magna* (Bassi, 1875), the large American liver fluke (Stiles, 1894, Journal of Comparative Medicine and Veterinary Archives **15:** 161–178, 225–243, 299–313, 407–417, 457–462; Swales, 1935, Canadian Journal of Research **12:** 177–215). The flukes were similar in size, and identical in morphology to immature *F. magna* recovered in this laboratory from experimentally infected sheep and guinea pigs 3–4 mo postinfection.

Fascioloides magna infection in llamas has not been reported previously. This llama was born and raised on a hobby farm located in the northern half of the state of Minnesota. The area has a large population of white-tailed deer (*Odocoileus virginianus*). White-tailed deer are a natural definitive host of *F. magna.* Adult flukes reside in cysts in the liver parenchyma, which open to the biliary system. Flukes mature to patency at about 7 mo postinfection, the ova passing through the bile ducts into the small intestine and out in the feces. Various lymnaeid snails serve as intermediate hosts. The deer are infected by eating metacercaria encysted on vegetation. *Fascioloides magna* does not seem to be very pathogenic to white-tailed deer (Foreyt and Todd, 1976, Journal of Parasitology **62:** 26–32). Sheep, cattle, horses (Swales, 1935, loc. cit.), goats (Foreyt and Leathers, 1980, American Journal of Veterinary Research **41:** 883–884), pigs (Migaki et al., 1971, American Journal of Veterinary Research **32:** 1417–1421), and various other animals (Swales, 1935, loc. cit.) can serve as aberrant hosts. In cattle *F. magna* is totally encapsulated in cysts in the liver which do not open to the biliary system (Swales, 1935, loc. cit.). Rarely, flukes are also found in the lungs of infected cattle (Foreyt and Todd, 1976, loc. cit.). Death loss in cattle due to *F. magna* infection has been thought to be rare. Most infected cattle, as with white-tailed deer, show little or no clinical sign of infection. In sheep, however, infection with *F. magna* is usually fatal; the animals die within 6 mo of infection. Infection with relatively few flukes has been found to kill a sheep. Flukes migrate freely through the liver, lungs, and other tissues (Foreyt and Todd, 1976, loc. cit.; Stromberg et al., 1985,





FIGURES 1, 2. *Fascioloides magna.* **1.** A photograph of a stained, immature *Fascioloides magna,* 1 of 5 recovered from the liver of a llama. Bar = 1 mm. **2.** A photomicrograph of one of the flukes in cross section. The vitelline follicles (V) were located entirely ventral to the intestinal ceca (IC). Bar = 100 μm.

American Journal of Veterinary Research **46:** 1637–1641). Sheep seem unable to encapsulate migrating flukes. Because of the capsule formation seen in the liver of this llama in response to fluke infection, it is likely that *F. magna* infection in llamas is similar to that in cattle. It is probable that *F. magna* is not a serious pathogen in llamas imported into endemic areas.