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## EMACIATION AND ENTERITIS OF COTTONTAIL RABBITS INFECTED WITH *Hasstilesia tricolor* AND OBSERVATIONS ON A FLUKE TO FLUKE ATTACHMENT PHENOMENON

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**Abstract:** Emaciation and enteritis of the small intestine were observed in three cottontail rabbits, *Sylvilagus floridanus*, which had died shortly after their capture from the wild and introduction into outdoor enclosures. These symptoms were associated with very heavy infection of intestinal flukes, *Hasstilesia tricolor*. Histological sections collected from the intestine of one rabbit revealed extensive villi destruction attributed to the parasite. Attachment of flukes to one another by ventral suckers was also observed. The high prevalence of infection of this parasite in Montgomery County, Virginia, indicates that it may be of local importance as a pathogen causing fatal consequences in its host.

### INTRODUCTION

Rowan<sup>11</sup> described the life cycle of the rabbit intestinal fluke *Hasstilesia tricolor*. Several authors<sup>2,10,12</sup> have reported infection of cottontail rabbits by this parasite, although only Morgan and Waller<sup>10</sup> have reported pathological effects. They found this parasite to be associated with severe catarrhal enteritis in eight cottontail rabbits. Andrews<sup>2</sup> reported the possibility that this fluke might have deleterious effects on its host and that symptoms might include bloody feces and general emaciation.

### CASE HISTORIES

Three cottontail rabbits, *Sylvilagus floridanus*, which died of unknown causes during an experiment on reducing parasitism were collected and examined shortly after death. The three rabbits were recovered 3, 4, and 6 days after their release into 1 decaire rabbit enclosures. Two had received treatment with the antihelminth drug, 1-tetramisole hydrochloride (Tramisol, American Cy-

anamid), and all had been treated with insecticide-generating collars containing 2,2 dichlorovinyl dimethyl phosphate (Sergeant's Sentry Dog Collar). These three rabbits, along with 44 others, had been trapped from the wild in September and October 1972. To reduce nematode parasitism, 24 of the rabbits were treated with Tramisol and to reduce ectoparasite burdens, 12 of the Tramisol treated and 12 of the untreated were fitted with insecticide generating collars. Eleven rabbits were left as controls. The exact experimental design, techniques used, and the results of this experiment have been summarized elsewhere.<sup>7,8</sup>

### MATERIALS AND METHODS

Body weights were taken and necropsies performed on the three rabbits which died. Sections were taken from the small intestine of one rabbit and preserved in 10% formalin solution. These sections were later embedded in paraffin and histological sections made. To establish prevalence of infection of *Hasstilesia tricolor* parasitism, 41 rabbits

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from Montgomery County, Virginia were sacrificed in December 1972. Thirty-one were from the experiment described above and 10 were collected from wild populations.

#### RESULTS

The rabbits which had died 3, 4, and 6 days after release into enclosures were

found to have dropped in weight from 1161, 731, and 923 grams to 916, 668, and 625 grams respectively. Necropsy revealed severe enteritis of the small intestine with heavy fluke infection. Histological sections revealed extensive destruction of the villi adjacent to the worms (Figure 1).

In addition to villi destruction, an apparently unusual attachment pheno-



FIGURE 1. Villi destruction by *Hasstilesia tricolor* in the small intestine of a cottontail rabbit and fluke to fluke attachment. A. Host mucosal in the oral sucker of a fluke. B. Fluke to fluke attachment via the ventral sucker.

menon was observed. Some of the flukes were attached to one another by means of the ventral suckers as shown in Figure 1.

All rabbits examined (44) for *H. tricolor* were found to be infected. With one exception, fluke burdens were not quantified for individual rabbits. One of the 41 rabbits collected in December was also noted to have a very heavy infection, numbering over 14,000 flukes.

#### DISCUSSION

It is doubtful that the pesticide treatments which rabbits received were connected to the mortalities observed. The antihelminth drug, Tramisol, has been shown safe for use even under stressful conditions. If toxic signs appeared, they usually become apparent within 15 minutes, and metabolic breakdown products were less toxic than the original compound.<sup>1</sup> Likewise, studies we conducted with insecticide-generating collars showed them to have no adverse effects on rabbits, even after 90 days of treatment.<sup>7</sup>

The exact cause of tissue necrosis by the flukes is only conjectural but several factors should be considered. As evidenced in Figure 1, worms were observed with plugs of mucosa drawn into the oral suckers and their ceca were filled with host epithelium. Crowding of the worms may have caused mechanical pressure on the mucosa with resulting loss of neurovascular integrity and subsequent sloughing. Release of metabolites or other chemicals by the worm

could contribute to or complicate the mucosal destruction.

The attachment of flukes to one another may have occurred in response to crowding. However, Fried and Lang<sup>4</sup> reported fluke to fluke attachment in a low worm density situation. In a later work by Fried and Roberts,<sup>5</sup> chemoattraction was reported and the suggestion was made that reproductive processes were involved in worm pairing. Since worms observed in the present study were in the ventral to dorsal attachment position and their genital pores were not in apposition, we assume that the attraction for this phenomenon was not entirely reproductive but may have been a chemoattraction.

The lack of other identifiable factors associated with the death of the three rabbits strongly suggests *H. tricolor* parasitism may have contributed to their mortality. The combined findings of Rowan<sup>11</sup> and Andrews<sup>2</sup> that *H. tricolor* appeared to obtain its greatest prevalence in fall and winter months and the findings reported in the present study suggest that mortality due to this parasite is most likely to appear during periods of the year when the host is most subjected to environmental stressors and therefore less equipped to deal with parasite challenge. The high prevalence of infection found in this area of Virginia (other authors have reported prevalences ranging from 1%<sup>3</sup> to 41%<sup>6</sup>) further indicates this parasite may be of local importance as a mortality factor to cottontail rabbit populations.

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