Association of Microorganisms with the Epithelium in the Alimentary Tract of *Aspicularis tetraptera*

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Parasitic nematode worms (*Aspicularis tetraptera*) were observed microscopically in histological sections of the colons of C57BL/6StCrl female mice. These nematodes have gram-positive bacteria intimately associated with the mucosal epithelium in their alimentary tract.

During investigations into the indigenous microbial flora of the gastrointestinal tract of various mouse strains, we observed that female mice of the inbred C57BL/6StCrl strain (Charles River Breeding Laboratories, Wilmington, Mass.) have nematode worms in their colons. On the basis of egg morphology within gravid females, these nematodes were identified as *Aspicularis tetraptera* (4).

The parasites could be seen in histological sections prepared in the following manner. The mice, approximately five weeks old, were killed by chloroform. Portions of the colon were removed from each mouse at autopsy and frozen with contents intact in 2% methyl cellulose in saline. The tissues were sectioned at four μm on a microtome cryostat and fixed onto slides in absolute methanol. The sections were then stained by a tissue Gram stain.

By examining these histological sections microscopically, we observed many nematode worms, which were cut in various planes, exposing areas of their alimentary tracts. Cells of the size and morphology of bacteria could be seen intimately associated with the mucosal epithelium of the nematode tracts. Gram-positive cocci predominated in the nematode flora. By contrast, gram-negative fusiform-shaped bacteria predominated in the colonic lumen surrounding the worms (Fig. 1) (3). It seems unlikely to us that the nematodes selectively ingest only gram-positive cocci, for the most abundant microbial types in the mouse colon are fusiform-shaped bacteria. Therefore, we believe that the cocci associated with the nematode epithelium are not merely passive components of the ingesta passing through the alimentary tract. Apparently, the environment on the mucosal epithelium within the nematode alimentary tract selects for a gram-positive coccal flora.

Microbes associate intimately with the mucosal epithelium in various areas of the gastrointestinal tracts of animals of several species. Such associations are best characterized for mice and rats (3) but have also been described for man (2), chickens (1), and swine (6). We believe that the phenomenon has not been reported previously for nematode worms.

Although we are not suggesting that the association between microbes and nematodes necessarily is harmful to the latter, we feel that Jonathan Swift's comments (5) are somewhat appropriate.

“So, naturalists observe, a flea
Hath smaller fleas that on him prey;
And these have smaller fleas to bite 'em,
And so proceed ad infinitum.”

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**LITERATURE CITED**

Fig. 1. (a) Nematode (N) in lumen of mouse colon adjacent to host tissues (M). ×300. (b) Nematode alimentary tract flora (NF). Bacterial flora of mouse colon can be seen at top of figure. ×750. (c) Gram-positive flora of nematode alimentary tract. Some fusiform-shaped bacteria are present. ×3,000. (d) Fusiform-shaped bacteria predominating in mouse colon. Nematode at bottom left. ×3,000. Gram stain.