and the roots of intact seedlings (19-20) among the treatments from the water agar plates. Percentages did increase substantially, however, on N-free White's medium where percentages of nodulation were approximately two times higher for intact roots (59-61) when compared with excised roots (28-30). Nodules formed on roots in each experiment were tested for nitrogen fixation using the method of Koch and Evans (4). Reduction of acetylene to ethylene by nodules taken from all treatments confirmed nitrogen-fixing capabilities.

*R. japonicum* or its metabolic by-products supported enormous populations of *P. lheritieri* in laboratory cultures. A superabundance of a bacterial food source may account for passage of bacteria. Nematodes also can transport bacteria which adhere to their external body surface (3) as well as by ingestion and defecation (1). Since our data were not obtained from treatments beginning with equal concns of *R. japonicum*, we are unable to compare the efficiency of nematode dissemination with a suspension inoculation. However, an association of *P. lheritieri* and *R. japonicum* can result in nodulation of soybean roots. Thus, saprozoic nematodes can disseminate beneficial bacteria.

**LITERATURE CITED**


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**Comparative Stereoscan Electron Micrographs of Nematode Heads**

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At a time when the application of stereoscan techniques to nematology is increasing, we felt it suitable to present a selection of pictures of a wide biological and systematic spectrum of nematodes.

The smaller species, *Tetradonema plicans* (Cobb) and *Prionchulus* sp. ( Wu and Hoepli) were fixed in TAF and dehydrated in glycerol. *Enoplus* sp. was fixed in Gordon’s fixative and dehydrated in glycerol. *Mermis nigrescens* (Dujardin), *Ascaris lumbricoides* (Linne) and *Ascaris suum* (Goeze), *Dictyocaulus viviparus* (Block) and the hookworms *Ancylostoma caninum* (Ercolani), *A. ceylanicum* (Looss) and *A. tubaeforme* (Zeder) were fixed in formalin and slowly dehydrated in alcohol; all worms were mounted on aluminum studs using double-sided adhesive tape or silver DAG, and coated with gold/palladium (3). The specimens were viewed on a Cambridge Stereoscan microscope at 10-20 kV.

Figs. 1-3 show the arrangement of the teeth of three species of hookworms. *A. caninum* (dog, Fig. 1) and *A. tubaeforme* (cat, Fig. 2), although often treated as one species, are separate (2). *A. ceylanicum* (dog and man, Fig. 3) has cutting plates instead of teeth.

A thickened ring occurs just inside the oral opening of *Dictyocaulus viviparus* (Fig. 4). It has been suggested that *Ascaris lumbricoides* (man, Fig. 5) and *A. suum* (pig, Fig. 6) may best be separated on the characters of the head (1, 11). Figs. 5 and 6 show some differences. The four papillae and small amphidal apertures (6) are shown in Fig. 6.

In *Enoplus* sp. (seaweed) the six setae are
FIG. 1-4. Stereoscan electron micrographs 1. Adult, Ancylostoma caninum (× 385); 2. Adult, Ancylostoma tubaeforme (× 323); 3. Adult, Ancylostoma ceylanicum (× 562); 4. Adult, Dictyocaulus viviparus (× 1,192); a = amphidial aperture.

composed of two fused elements (Fig. 7). Weiser (12) concluded on general anatomical grounds that Enoplus would be predatory, but we suggest the stoma is likely to be that of a browser.

Prionchulus sp. (soil) has a rounded, six-sided stomatal aperture (Fig. 8), apparently associated with the development of a shearing force during the powerful sucking action of the muscular pharynx.

FIG. 5-10. 5. Adult, Ascaris lumbricoides (× 120); 6. Adult, Ascaris suum (× 100); 7. Adult, Enoplus sp. (× 729); 8. Adult, Prionchulus sp. (× 1,828); 9. Adult female, Tetradonema plicans (× 1,825); 10. Gravid adult female, Mermis nigrescens (× 281). Legend: a = amphidial aperture, p = papilla.
Two adult female parasites, *Tetradonema plicans* (*Bradysia*) and *Mermis nigrescens* (grasshopper), show no indication of a distinct stoma (Figs. 9, 10). Our photograph of *T. plicans* supports the latest observations of Hudson (4, 5). The absence or extensive modification of functional stomata in entomophilic species from the haemocoel may be a widespread phenomenon (7, 9, 10).

The position of the amphids varies in these species. In *Ascaris* and *Ancylostoma* the amphidial apertures are directed forwards, and it is conceivable that these organs are intimately associated with sensitivity in feeding or digestion (8). By contrast, the amphidial apertures of *Enoplus* sp. and *Prionchulus* sp. open behind the stoma and are less likely to be associated with feeding.

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