RESEARCH NOTES

An Adhesive Plug Associated with the Feeding of *Hemicycliophora similis* on Cranberry

M. KISIEL, J. CASTILLO AND B. M. ZUCKERMAN[1]

McElroy and Van Gundy (1) made detailed observations on the feeding process of *Hemicycliophora arenaria* Raski on tomato (*Lycopersicum esculentum* Mill. 'Rutgers'), including the description of an adhesive plug that formed between the stylet and root epidermal cell during feeding. This was the first report of such a structure associated with nematode parasitism of plants. When that paper appeared our similar study of *H. similis* Thorne on cranberry (*Vaccinium macrocarpon* Ait.) had progressed to where histochemical tests were being run on paraffin sections of nematodes feeding on roots. Observations on the formation of a similar adhesive plug and depth of stylet penetration are reported herein.

Feeding nematodes were obtained by germinating cranberry seeds in nematode-infested soil and collecting 3 to 5-day-old seedlings as described by Zuckerman (2). Roots with feeding nematodes were excised, fixed with FAA or 6% formalin, dehydrated in a tertiary butyl alcohol series, embedded in paraffin and sectioned at 15 μ with a rotary microtome. The periodic acid Schiff reaction (PAS) for carbohydrates and safranin-fast green stain for lignified cell walls were applied to root sections from 60 cranberry seedlings.

Feeding *H. similis* were attached to cranberry roots by an adhesive plug circling the stylet (Fig. 1 and 2) similar to that associated with *H. arenaria* feeding on tomato roots (1). The plug gave a strong PAS reaction and therefore probably is of polysaccharide composition similar to that associated with the stylet of *H. arenaria* during feeding. Sufficient sections were not available to prove this point by running analyses for acid mucopolysaccharide, mucin and mucoprotein reactions.

The stylet was usually inserted up to 70 μ deep, 60–70% of its total length. Most feeding was at the root tip with the stylet penetrating to the meristematic zone. However, a few nematodes fed further back from the tip and, where tissue differentiation had occurred, the stylet penetrated the xylem (Fig. 3) which were differentiated by the safranin staining of the lignified cell walls.

McElroy and Van Gundy (1) proposed that feeding processes, nematode morphology, and a developmental trend in parasitic specialization are related and give evidence that *H. arenaria* represents an extreme in ectoparasitic evolution. Zuckerman (3) presented a similar hypothesis relative to physiological and morphological specializa-

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[1] University of Massachusetts, Laboratory of Experimental Biology, East Wareham, Massachusetts 02538.

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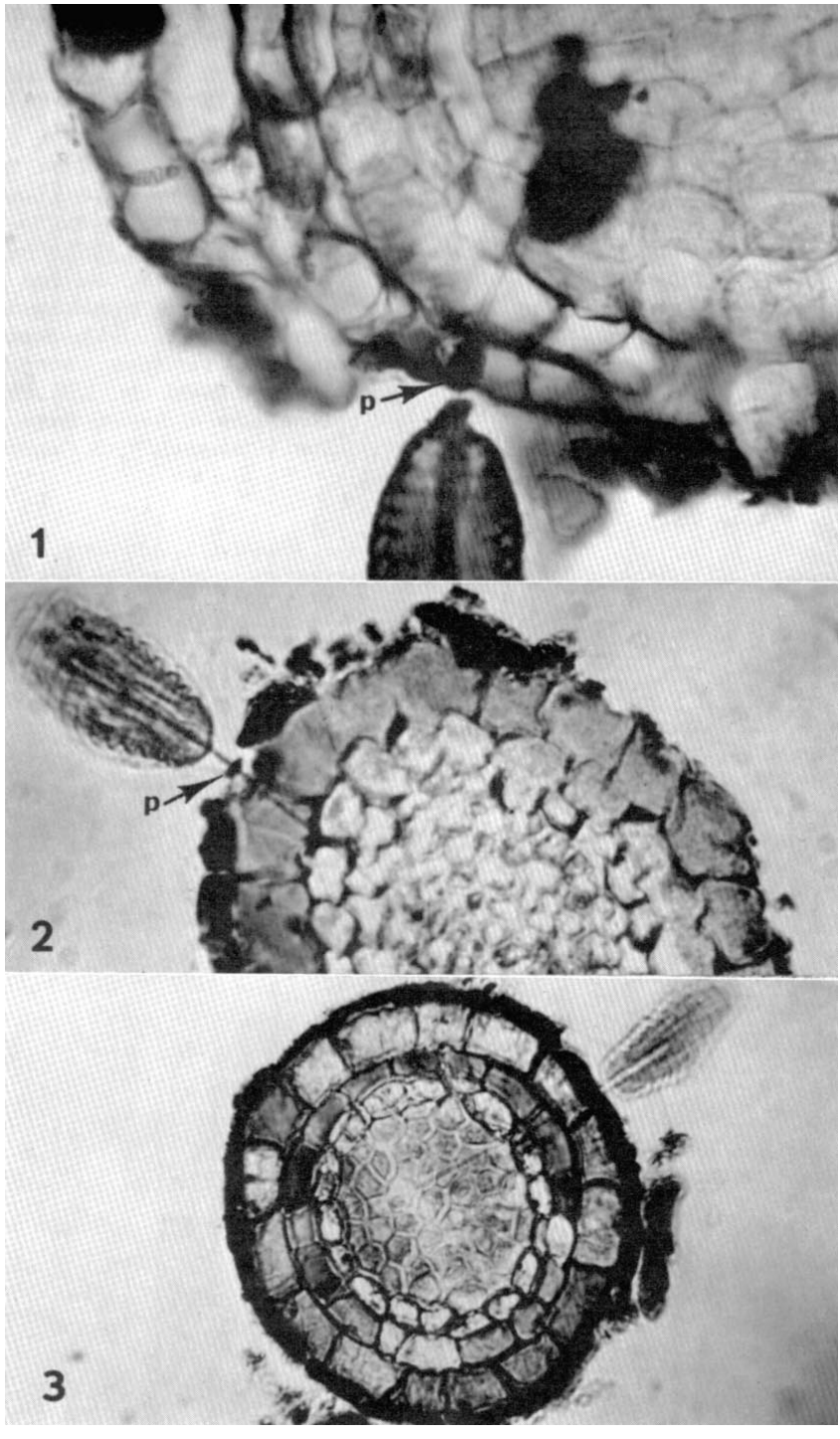
FIG. 1–3. *Hemicycliophora similis* feeding on cranberry roots. **1.** Longitudinal section of a root and nematode showing feeding in parenchyma immediately posterior to the root tip. The plug (p) surrounds the stylet between the lips and the surface of the epidermal cell. **2.** Cross-section through a root and nematode feeding about 500 μ behind the tip showing the location of the plug (p). **3.** Cross-section about 1 mm behind the root tip showing the stylet tip penetrating an xylem cell.


p
1
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tion among ectoparasitic nematodes. The formation of adhesive plugs by closely related nematode species on two widely dissimilar plant hosts suggests that plug formation is initiated by the nematode and not the plant. Whether formed by the plant or the nematode, plugs are a positive adaptation, favoring nematode survival by helping to maintain the feeding position for long time periods. It would be of interest to know whether plugs are formed during feeding of other nematodes which appear to have evolved to an advanced stage of ectoparasitism, such as species of Criconematinae, Paratylenchinae, Dolichodorinae and Belonolaiminae.

Literature Cited

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