

HOWARDULA APTINI (SHARGA 1932) PARASITIC IN  
BLUEBERRY THRIPS IN NEW BRUNSWICK<sup>1</sup>

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## Abstract

A parasitic nematode, *Howardula aptini* (Sharga 1932) Wachek, 1955, is reported for the first time in North America, and is a parasite of two serious blueberry thrips. Parasitized thrips probably do not produce eggs as the ovarian tissue is greatly reduced by the nematode and dissections failed to reveal eggs in infected individuals. Parasitism varied and was 71% in one sample. Introduction of the nematode into unparasitized populations is feasible. Previously unknown details of the morphology and life history of the nematode are described and illustrated.

A few studies on nematode parasites of thrips were made in Europe and this parasitic relationship was noted briefly in the American literature; however, as far as the authors can determine, this is the first record of *Howardula aptini* (Sharga 1932) Wachek, 1955 in North America. Uzel (1895) reported an unnamed nematode in the body cavity of *Thrips physapus* L. and that the ovaries of the thrips were destroyed by the nematodes, which numbered over 200 in one specimen. Russell (1912) reported that P. R. Jones found a parasitic nematode in the mature larvae of the bean thrips, *Heliothrips fasciatus* Pergande, at Lindsay, California, in 1910. Sharga (1932) described a nematode parasite from *Aptinothrips rufus* Gmelin as *Tylenchus aptini*. Lysaght (1936) proposed the taxon *Anguillulina aptini* (Sharga 1932) for this nematode and noted that two flexures of the ovary may exist in the adult parasitic female stage. Lysaght clarified the life cycle of this parasite and in 1937 made an ecological study of it. Wachek (1955) transferred Sharga's species to the genus *Howardula*.

*Frankliniella vaccinii* Morgan and *Taeniothrips vacciniophilus* Hood significantly affect production of lowbush blueberry in the Maritime Provinces (Wood 1956, 1960). Both species often occur together and cause similar injury to the blueberry plants. The populations of the two thrips increased during the past few years, and these thrips rank among the more important pests of blueberries in the Maritimes. Thrips that were parasitized by nematodes were first found in a few samples from western Charlotte County, New Brunswick, in 1959, were common in 1960, virtually disappeared in 1961, but became common again in 1962.

Injured foliage from each field was collected in one-half-pint containers; the thrips were removed and identified; and the number of parasitized specimens was recorded. Percentage parasitism in samples from eight localities

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A11/90  
B1/2  
LABORATORIUM VOOR  
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in New Brunswick was (number of adults dissected in each sample followed by the percentage parasitism in parentheses), respectively, 61(71); 20(25); 38(61); 146(33); 64(50); 14(64); 24(8); and 33(27). All samples included some parasitized hosts. No significant difference exists between the percentage parasitism of the two species of thrips. Parasitized nymphs were noted but not recorded.

The thrips feed on the unfolding leaves and cause a leaf gall to form. The eggs are laid in this gall and the next generation of thrips mature before leaving the gall to overwinter in the soil and complete their life cycles. Galls often contain both adult and immature stages of the thrips at the same time.

Though numerous nematode eggs and larvae in all stages of development are found in the haemocoel, normally only one or two parasitic females (Fig. 1B) are found in the body cavity of a parasitized thrip. The nematodes mature in the host and leave it as fully developed, free-living forms. The free-living males and females probably mate within the confines of the gall and the fertilized female nematode must then enter the thrips larvae or pupae that are in the leaf gall. The high humidity of the gall would favor parasite transfer. It is of interest that another allantonematoid nematode, *Fergusobia tumifaciens* (Currie 1937), which parasitizes both the adult and immature stages of agromyzid flies, *Fergusonia* spp., also has its free-living stages in galls formed by its host. In this case the galls are on the flowers of eucalyptus (Currie 1935, 1937). This association was reported as a mutualistic symbiosis; however, it is more probably a true parasitic relationship.

The ovaries of the parasitized thrips were greatly reduced and dissections showed that no eggs were present. The introduction of this nematode into populations of thrips without the parasite could reduce thrip fecundity and population level.

### Description of Nematode

*Howardula aptini* (SHARGA 1932) WACHEK, 1955

Syn. *Tylenchus aptini* Sharga, 1932

*Anguillulina aptini* (Sharga 1932) Lysaght, 1936

*Adult parasitic female* (6).— $L = .210$  mm (.180–.254 mm)\*;  $W = .056$  mm (.040–.086 mm); stylet 11–12  $\mu$ ;  $a = 3.8$  (3.0–4.8);  $V = 85\%$ ; eggs =  $35 \times 18 \mu$ .

*Free-living stages*.—Female (10):  $L = .253$  mm (.240–.272 mm);  $W = 8 \mu$  (7.5–10.0  $\mu$ ); stylet 11–12  $\mu$ ;  $a = 32$  (27–34);  $b = 6$  (5–7);  $c = 13$ ;  $V = 84\%$ ; tail length = 20  $\mu$ . Male (10):  $L = .248$  mm (.220–.268 mm);  $W = 9 \mu$  (8–10  $\mu$ ); stylet absent;  $a = 28$  (27–29);  $c = 8$  (7–9); tail length = 30  $\mu$ ; spicule = 10  $\mu$ ; gubernaculum = 5  $\mu$ .

Adult parasitic female (Fig. 1B) spindle-shaped to bean-shaped. Shorter than free-living female. Body surface mostly smooth. Anterior end conoid; stylet not retracted into inner body, more or less distinctly set off from rest of body; tail end narrows quickly, resembling free-living female tail. Esophagus and intestine degenerate. Anus not seen. Oviparous; gonad fills body cavity and usually has two flexures; ovary with numerous hexagonal oogonia arranged about a central rachis; each oogonium contains a large

\*Average with range.

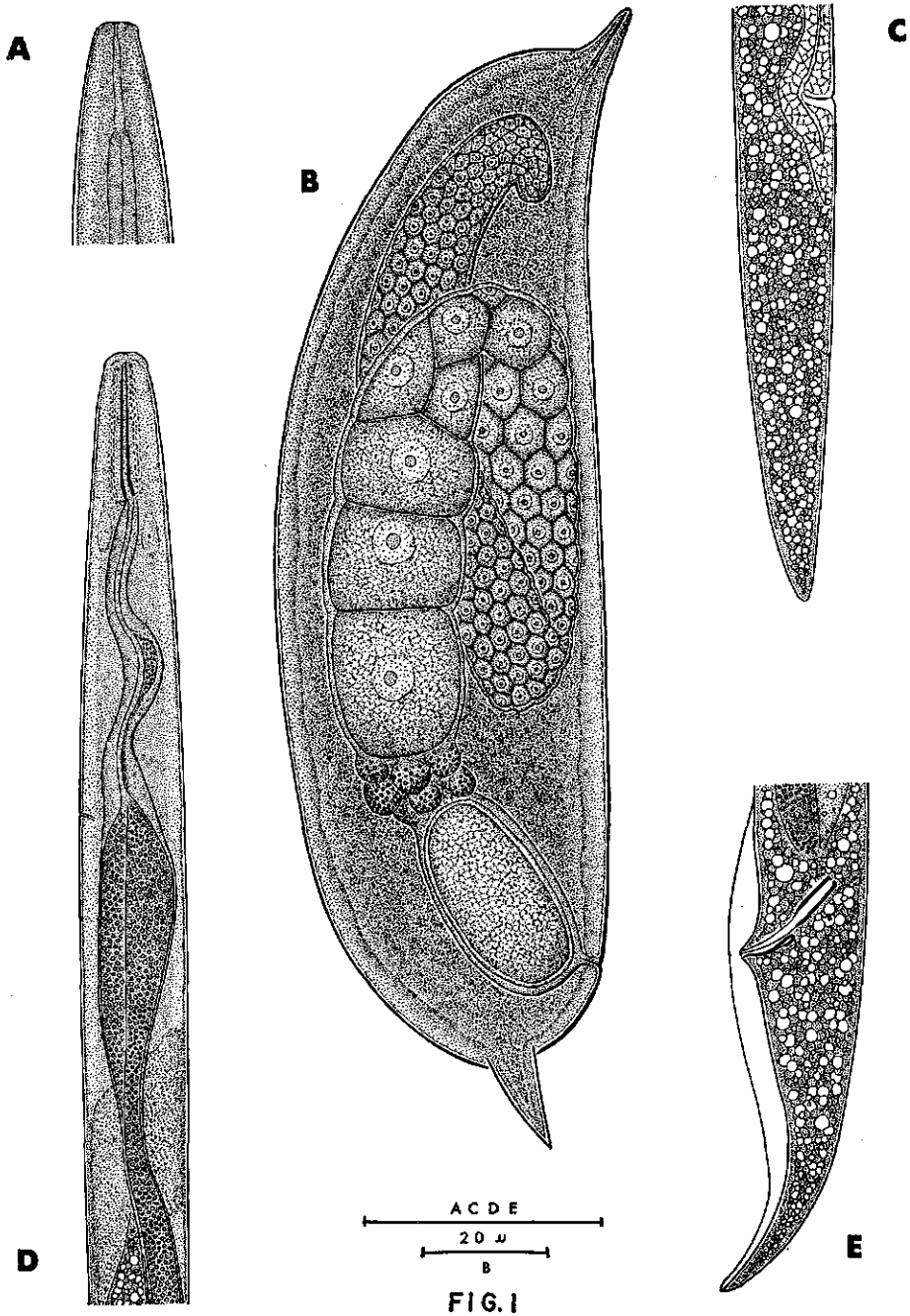


FIG. 1

FIG. 1. *Howardula aptini*. A. Male anterior end. B. Adult parasitic female. C. Free-living female, posterior end. D. Free-living female, anterior end. E. Male, posterior end. All lateral views.

nucleus; mature oogonia do not collect in oviduct; spermatheca highly specialized, in pouch-like structure in wall of oviduct that contains individual sperm received from male during free-living stage. Vulval lips slightly protruded.

Free-living female (Figs. 1C, 1D) with body only slightly curved when relaxed by heat. Excretory pore at level of subventral esophageal gland openings, anterior to nerve ring. Stylet robust; sulphuretylenchoid, 11–12  $\mu$  long, lumen large, basal flanges well developed. Esophagus allantonematoid, strongly swollen at level of subventral gland orifices, glands extend far posteriorly, filled with coarse globules, dorsal gland not as well developed as subventrals. Intestine difficult to see because of reserve food globules in body cavity. Gonad single, prodelphic; ovary few-celled; no eggs produced in this stage; small postuterine sac-like area present; vulva small, round; vulval lips not protruded. Anus difficult to see. Tail wedge-shaped, rounded at the end.

Free-living male (Figs. 1A, 1E) smaller than female. Stylet absent, stoma weakly cuticularized. Esophagus weakly developed. Gonad outstretched, reaching into esophageal region; vas deferens containing individual sperms. Tail rounded at tip, enveloped by narrow, peloderan caudal alae. Spicules slightly curved, distally acuminated, tylenchoid. Gubernaculum appearing as a shepherd's crook in lateral view.

Canadian specimens are smaller than the European specimens that were available for examination, and may eventually prove to represent a separate species. At least five different genera of thrips are known hosts of nematodes of the genus *Howardula*. Little information is available on these nematodes and specific morphological characters are not yet evident. The sulphuretylenchoid stylet that usually occurs in the more pathogenic allantonematids and the shepherd's crook gubernaculum are diagnostic for the Canadian forms.

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