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IDENTIFICATION OF APHELENCHIDS

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INTRODUCTION

Aphelenchid nematodes inhabit all terrestrial habitats and show a wide range of ecological relationships: plant parasitism, fungus feeding, insect phoretic association, insect parasitism, and predation (Nickle, 1970; Siddiqi, 1980). They are frequently found in samples observed by the nematologists.

At low magnification, these nematodes are easy to characterize by: (*i*) body length generally small to medium; (*ii*) body shape thin without distinct annuli; (*iii*) translucent appearance; (*iv*) generally slow movements in water; (*v*) non offset anterior end; (*vi*) stylet thin with basal knobs small or absent; (*vii*) large and clearly marked median bulb; (*viii*) lack of differentiation between oesophagus and intestine; (*ix*) vulva always posteriorly located at more than 60% of the body length; and (*x*) males often present. We propose here to recognize only one promorph, P-aphelenchid, for all these nematodes.

If general identification of aphelenchids is easy, identification at both generic and specific levels is more difficult because of the low number of discriminating characters.

Several published descriptions are of a poor quality, and the oldest published descriptions lack many morphological details. The absence of preserved type specimens for numerous genera and species makes it impossible to supplement the incomplete descriptions.

Currently, twenty-nine valid genera are recognized in this group: *Acugutturus, Anomyctus, Aphelenchoides, Aphelenchus, Aprutides, Berntsenus, Bursaphelenchus, Cryptaphelenchus, Entaphelenchus, Ektaphelenchoides, Ektaphelenchus, Laimaphelenchus, Megadorus, Noctuidonema* Remillet & Silvain, 1988, *Omemeea, Papuaphelenchus, Paraphelenchus, Paraseinura, Parasitaphelenchus, Peraphelenchus, Praecocilenchus, Rhadinaphelenchus, Roveaphelenchus, Ruehmaphelenchus, Schistonchus, Seinura, Sheraphelenchus, Teragramia*, and *Tylaphelenchus* (*see* Fortuner, 1984 for the authority of the genus names).

Fourteen of these taxa are monotypic, ten have between two and ten species and only five have more than ten species.

GROUP HOMOGENEITY AND DISCRIMINATING CHARACTERS

The review of aphelenchids published by Nickle (1970), and particularly his figures 1, 2 (general morphology) and 3 (anterior end morphology), shows the great homogeneity of this group. Recent studies under scanning electron microscopy (Hooper & Clark, 1980; Nickle *et al.*, 1981; Raski & Valenzuela, 1988) on the morphology of the anterior end reinforce this observation.

The best identification criteria at generic and/or specific levels are (*i*) stylet length, (*ii*) position of the valve in the median bulb, (*iii*) oesophageal gland morphology, (*iv*) vulva position, (*v*) vulva morphology, (*vi*) post-uterine sac presence and length, (*vii*) bursa presence and morphology, (*viii*) spicules and gubernaculum presence and morphology, (*ix*) anal aperture presence or absence in females. Other biological criteria such as obligate insect parasitism, nematode localization on or in insects, presence or absence of adult parasitic forms or dauer larvae, are seldom or not used.

Recent use of scanning electron microscopy has offered new data for taxa characterization as, for example, the head morphology in the genus *Tylaphelenchus* (Hooper & Clark, 1980; Raski & Valenzuela, 1988).

DIFFICULTIES ENCOUNTERED IN IDENTIFICATION PROCESS

After the observation of nematode specimens with light or electron microscopy, the nematologist must study bibliographic data to determine their taxonomic status.

Bibliographic data published before 1970 frequently lacks some of the characters essential for generic or specific identification. Type specimens for numerous species and genera of the aphelenchid group were not originally preserved, or later disappeared, which often precludes the solution of many taxonomic problems. A good example of this situation is the problem of the relationships between the species *Bursaphelenchus lignicolus - B. xylophilus* that will not be solved without the rediscovery of type specimens (Nickle *et al.*, 1981).

These difficulties hinder the proposal of new classifications of the group. They also make more difficult the identification process. To help with identification, eight nests of species (as defined by Fortuner, 1989) are proposed below for the species in the promorph P-aphelenchid.

PROPOSAL OF EIGHT NESTS OF SPECIES

The nests of species will use the following eight primary identification criteria:

1) presence of two *vs* three adult forms
2) stylet length more or less than 30 µm
3) position of vulva at more or less than 80% of the body
4) bursa present or absent
5) gubernaculum present and "V" shaped or absent
6) spicules fused or non fused
7) anus present or absent
8) tail with or without appendage

The eight proposed nests are:

1) Three adult forms present; stylet length less than 30 µm; V more or less

than 80%; bursa and gubernaculum absent; spicules not fused; anus present; tail without appendage;
Genera: *Entaphelenchus, Peraphelenchus, Praecocilenchus, Roveaphelenchus.*

2) Two adult forms; stylet length more than 30 µm; V more or less than 80%; bursa present or absent; gubernaculum absent; spicules not fused; anus present; tail without appendage;
Genera: *Anomyctus, Acugutturus, Noctuïdonema.*

3) Two adult forms present; stylet length less than 30 µm; V more than 80%; bursa present or absent; gubernaculum absent; spicules fused; anus present; tail without appendage;
Genera: *Parasitaphelenchus, Sheraphelenchus.*

4) Two adult forms present; stylet length less than 30 µm; V less than 80%; bursa present; gubernaculum absent; spicules not fused; anus present; tail without appendage;
Genera *Bursaphelenchus, Omemeea, Rhadinaphelenchus, Teragramia.*

5) Two adult forms present; stylet length less than 30 µm; V less than 80%; bursa and gubernaculum absent; spicules not fused; anus absent; tail without appendage;
Genera: *Cryptaphelenchus, Ektaphelenchoides, Ektaphelenchus.*

6) Two adult forms present; stylet length less than 30 µm; V less than 80%; bursa and gubernaculum absent; spicules not fused; anus present; tail with appendage;
Genera: *Laimaphelenchus, Tylaphelenchus pro parte.*

7) Two adult forms present; stylet length less than 30 µm; V less than 80%; bursa present or absent; gubernaculum present, "V" shaped; spicules not fused; anus present; tail without appendage;
General *Aphelenchus, Paraphelenchus.*

8) Two adult forms present; stylet length less than 30 µm; V less than 80%; bursa and gubernaculum absent; spicules not fused; anus present; tail without appendage;
Genera: *Aphelenchoides, Aprutides, Berntsenus, Megadorus, Papuaphelenchus, Paraseinura, Ruehmaphelenchus, Schistonchus, Seinura, Tylaphelenchus pro parte.*

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DISCUSSION

Fortuner: You said that the aphelenchids are slow in water, but this group includes the only good swimmers among tylenchids: *Aphelenchoides besseyi* or *Aphelenchoides fragariae* can actually take off from the bottom of the counting dish.

Baujard: Yes, but nematodes extracted from soil include other forms than just tylenchids. There are also dorylaims, rhabditids and other nematodes. If you use swimming for identification you must consider the type of movement in reference to all groups of nematodes, not only to tylenchids.

Fortuner: I do not think any nematode can swim better than *Aphelenchoides besseyi*.