

## SOME IMPORTANT KEYS TO SPECIES OF SELECTED GENERA OF PLANT-PARASITIC NEMATODES

Submitted to NNL by:

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This list of keys and references for identifying species of selected genera of plant-parasitic nematodes was compiled to assist students and professionals in the discipline of nematology. It is not comprehensive but was compiled as a current source of information and initial perspective for those interested in species identification of selected plant-parasitic nematode genera. Nomenclature and systematics follow that of Ebsary, 1991, and genera selected are primarily those in Mai, W. F., and P. G. Mullin, with H. H. Lyon and K. Loeffler. 1996. *Plant-parasitic nematodes: A pictorial key to genera*. Ithaca, NY: Cornell University Press. We added older references where most appropriate and included some references that are not keys, where keys are unavailable or if particularly useful as supplemental references. For information on older references and on genera not included herein, see E. C. Bernard and S. M. Baird. 1983. *Bibliography of keys for the identification of plant-parasitic and free-living terrestrial nematodes*. *Nematology Newsletter* 29(4):9-18. Detailed study should encompass original species descriptions. We recommend the following references for studies of the principles of taxonomy behind many

of the keys and for general review:

Golden, A. M. 1971. Classification of the genera and higher categories of the order Tylenchida (Nematoda). Pp. 191-232 in B. M. Zuckerman, W. F. Mai, and R. A. Rohde, eds. *Plant Parasitic Nematodes. Vol. 1. Morphology, Anatomy, Taxonomy and Ecology*. New York: Academic Press.

The landmark collection of manuscripts entitled: *A Reappraisal of Tylenchina (Nemata)* published in *Revue de Nématologie*, 1987-88, by contributors R. Fortuner, E. Geraert, M. Luc, A. R. Maggenti, and D. J. Raski.

Siddiqi, M. R. 1985. *Tylenchida parasites of plants and insects*. Slough, UK: Commonwealth Agricultural Bureau on behalf of Commonwealth Institute of Parasitology. 645p.

Ebsary, B. A., 1991. *Catalog of the Order Tylenchida (Nematoda)*. Publication 1869/B. Ottawa, Canada: Canada Communication Group-Publishing. 196 p.

Nickle, W. R., ed. 1991. *Manual of agricultural nematology*. New York, NY: Marcel Dekker. 1035 p. (A valuable reference that has many species keys.)

Tylenchida Thorne, 1949

Tylenchoidea Örley, 1880

Tylenchidae Örley, 1880 (See key to genera in *Manual of Agricultural Nematology*)

Tylenchinae Örley, 1880

\*\*Tylenchus Bastian, 1865 and related forms

Andrássy, I. 1954. Revision der gattung *Tylenchus Bastian, 1865* (Tylenchidae, Nematoda). *Acta Zoologica Academiae Scientiarum Hungaricae* 1:5-42. (Foundation manuscript for studying Tylenchidae.)

Bello, A. 1973. Étude taxonomique du genre *Tylenchus* Bastian 1865 (Nematoda: Tylenchinae). *Nematologia Mediterranea* 1:1-7.

Andrássy, I. 1979. The genera and species of the family Tylenchidae Oerley, 1880 (Nematoda). The genus *Tylenchus* Bastian, 1865. *Acta Zoologica Academiae Scientiarum Hungaricae* 25:1-33.

Siddiqi, M. R. 1979. Seven new species in a new nematode subfamily, Duosulciinae n. subfam., is proposed to accommodate species with only two incisures (or a single ridge) in the lateral field. *Nematologica* 25:215-236. (Key to the six genera)

Brzeski, M. W., and M. R. Sauer. 1982. Scanning electron microscopy of some Tylenchidae and Boleodoridae and reappraisal of the Boleodoridae. *Nematologica* 28:437-446.

Sumenkova, N. I. 1984. Survey of generic and suprageneric categories of nematodes in the family Tylenchidae Orley, 1880. *Taksonomiya I biologiya fitogel'mintov*. 1984. 132-144. Moscow: Nauka. (A key to genera, in Russian)

\*\**Ottolenchus* Husain & Khan, 1967 (Wu, 1970) Golden, 1971 synonymized this subgenus with *Aglenchus*, Andrassy, 1954

Brzeski, M. W. 1982. Taxonomy of *Ottolenchus* Husain & Khan, and a description of *Còslenchus polonicus* sp. n. (Nematoda: Tylenchidae). *Revue de Nématologie* 5:71-77.

Maqbool, M. A., and F. Shahina. 1985. Two new species of the genus *Ottolenchus* Husain & Khan, 1967 (Nematoda: Tylenchidae) with a key to the species and observation on *O. facultativus* (Szczygiel, 1969)

Brzeski, 1982 from Pakistan. *Revue de Nématologie* 8:329-333.

Sumenkova, N. I. 1987. Taxonomy of phytonematodes of the genus *Ottolenchus* (Nematoda: Tylenchidae) and a description of two new species of the genus. *Zoologicheskii Zhurnal* 66:1805-1811.

\*\**Filenchus* Andrassy, 1954

Raski, D. J., and E. Geraert. 1986. Review of the genus *Filenchus* Andrassy, 1954 and descriptions of six new species (Nemata: Tylenchidae). *Nematologica* 32:265-311. (Synonymy of *Ottolenchus*, *Dactylotylenchus*, *Lambertia*, *Duosulcius*, *Zanenchus* and *Discotylenchus* with *Filenchus*)

\*\**Malenchus* Andrassy, 1968

Andrássy, I. 1981. The genera and species of the family Tylenchidae Oerley, 1880 (Nematoda). The genus *Malenchus* Andrassy, 1968. *Acta Zoologica Academiae Scientiarum Hungaricae* 27:1-47.

Geraert, E., and D. J. Raski. 1986. Unusual *Malenchus* species (Nemata: Tylenchidae). *Nematologica* 32:27-55.

*Boleodorinae* Khan, 1964

\*\**Basiria* Siddiqi, 1959

Karegar, A., and E. Geraert. 1997. The genus *Basiria* Siddiqi, 1959 (Nematoda: Tylenchida). II. Species with four lateral lines and anterior median bulb. *Nematologica* 43:383-406.

Karegar, A., and E. Geraert. 1998. The genus *Basiria* Siddiqi, 1959 (Nemata: Tylenchida) IV. General discussion, genus diagnosis and key to the species. *Nematologica* 44:1-13.

\*\**Boleodorus* Throne, 1941

Khan, E. 1963. *Boleodorus mirus* n. sp. (Tylenchida: Boleodorinae N. SubFam.) from Kufri, Simla (H. P.) India, with a key

to the species of the genus *Boleodorus* Thorne, 1941. *Zool. Anz.* 173:336-341.

Geraert, E. 1971. Observations on the genera *Boleodorus* and *Boleodoroides* (Nematoda: Tylenchidae). *Nematologica* 17:263-276.

Brzeski, M. W., and M. R. Sauer. 1982. Scanning electron micrography of some Tylenchidae and Boleodoridae and reappraisal of the Boleodoridae. *Nematologica* 28:437-446.

(The classification for this group is presently very confused.)

\*\**Psilenchus* de Man, 1921.

Kheiri, A. 1970. Two new species in the family Tylenchidae (Nematoda) from Iran, with a key to *Psilenchus* De Man, 1921. *Nematologica* 16:359-368.

Brzeski, M. W. 1989. Notes on the genus *Psilenchus* de Man, 1921, with description of *P. klingleri* sp. n. (Nematoda: Tylenchidae). *Annales Zoologici* 43:51-69.

\*\**Neopsilenchus* Throne and Malek, 1968

Khan, F. A., and A. M. Khan. 1975. Three new species of *Neopsilenchus* Thorne & Malek, 1968 (Nematoda: Psilenchinae). *Indian Journal of Nematology* 5:15-21.

Sultan, M. S., I. Singh, P K. Sakhuja. 1987. Plant parasitic nematodes of the Punjab, II. *Neopsilenchus longicaudatus* n. sp. (Nematoda: Tylenchidae). *Indian Journal of Nematology* 17:330-332.

Shahina, F., and Maqbool, M. A. 1990. Studies on the genus *Neopsilenchus* (Nematoda: Tylenchidae) with description of *Acusilenchus* n. subgen and three new species. *Pakistan Journal of Nematology*. 8:49-63.

Atylenchinae Skarbilovich, 1959

\*\**Aglenchus* Andrassy, 1954

Andrassy, I. 1980. The genera and species of the family Tylenchidae Oerley, 1880 (Nematoda). *Acta Zoologica Academiae Scientiarum Hungaricae* 26:1-20.

\*\**Coslenchus* Siddiqi, 1978

Brzeski, M. W. 1978. Taxonomic notes on *Coslenchus* Siddiqi, 1978 (Nematoda: Tylenchidae). *Annales Zoologici* 28:417-436.

Siddiqi, M. R. 1980. Six new species of *Coslenchus* Siddiqi, 1978 (Nematoda: Tylenchidae). *Nematologica* 26:432-447.

Andrassy, I. 1982. The genera and species of the family Tylenchidae Orley, 1880 (Nematoda). The genus *Coslenchus* Siddiqi, 1978. *Acta Zoologica Academiae Scientiarum Hungaricae* 28:193-232.

Geraert, E., and D. J. Raski. 1988. Study of some *Aglenchus* and *Coslenchus* species (Nematoda: Tylenchida). *Nematologica* 34:6-46.

Tylodorinae Paramonov, 1967

\*\**Cephalenchus* (J. B. Goodey, 1962) Golden, 1971

Sultan, M. S., and M. S. Jairajpuri. 1981. Two new species of the genus *Cephalenchus* (Goodey, 1962) Golden, 1971 with a key to species. *Indian Journal of Nematology* 11:165-171.

Mizukubo, T., and N. Minagawa. 1985. Taxonomic study of the genus *Cephalenchus* (Nematoda: Tylenchida) from Japan. Descriptions of three new species and records of *C. planus* Siddiqui & Khan with a key to species. *Japanese Journal of Nematology* 15:26-40.

Raski, D. J., and E. Geraert. 1986. Descrip-

tions of two new species and other observations on the genus *Cephalenchus* Goodey, 1962 (Nematoda: Tylenchida). *Nematologica* 32:56-78.

\*\*Eutylenchus Cobb, 1913

Brzeski, M. W. 1996. On the genus *Eutylenchus* Cobb, 1913 (Nematoda: Tylenchidae). *Nematologica* 42:1-8.

Anguinidae Nicoll, 1935 (1926)

\*\*Anguina Scopoli, 1777 (after Chizhov and Subbotin, 1990) and related genera

Note: Classification and identification of species of this genus are difficult and controversial.

Chizhov, V. N., and S. A. Subbotin. 1990. Phytoparasitic nematodes of subfamily Anguininae (Nematoda, Tylenchida). Morphology, trophic specialization, taxa. *Zoologicheskii Zhurnal* 69:15-26. (In Russian).

\*\*Ditylenchus Filip'ev, 1936

Brzeski, M. W. 1991. Review of the genus *Ditylenchus* Filipjev, 1936 (Nematoda: Anguinidae). *Revue de Nématologie* 14:9-59.

Dolichodoridae Chitwood, 1950

\*\*Dolichodorus Cobb, 1914

Loof, P. A. A., and R. D. Sharma. 1975. *Dolichodorus minor* n. sp. (Nematoda: Dolichodoridae) with a key to the genus *Dolichodorus*. *Revista Theobroma (Brazil)* 5:35-41.

Lewis, S. A., and A. M. Golden. 1981. Description and SEM observation of *Dolichodorus marylandicus* n. sp. with a key to species of *Dolichodorus*. *Journal of Nematology* 13:128-134.

Smart, G. C., Jr., N. B. Khuong. 1985. *Dolichodorus miradvulvus* n. sp. (Nematoda: Tylenchida) with a key to species. *Journal of Nematology* 17:29-37.

Belonolaimidae Whitehead, 1960

Belonolaiminae Whitehead, 1960

\*\*Belonolaimus Steiner, 1949

Rau, G. J. 1963. Three new species of *Belonolaimus* (Nematoda: Tylenchida) with additional data on *B. longicaudatus* and *B. gracilis*. *Proceedings of the Helminthological Society of Washington* 30:119-128.

\*\*Geocenamus Thorne & Malek, 1968

Brzeski, M. W. 1991. Taxonomy of *Geocenamus* Thorne & Malek, 1968 (Nematoda: Belonolaimidae). *Nematologica* 37:125-173.

Brzeski, M. W. 1992. Species omitted in *Geocenamus* review. *Nematologica* 38:255 (Short communication).

Telotylenchinae Siddiqi, 1960

\*\*Amplimerlinius Siddiqi, 1976

Brzeski, M. W. 1985. Contribution to the knowledge of Polish plant parasitic nematodes (Nematoda). 7. Ten species new for Polish fauna. *Fragmenta Faunistica* 29:275-288.

Shaw, S. P., and E. Khan. 1992. Tylenchorhynchidae Golden, 1971 (Nematoda: Tylenchida) in India: 1. *Amplimerlinius sikkimensis* sp. n. from Sikkim with key to *Amplimerlinius* species and *Tylenchorhynchus shivanandi* sp. n. from Nagaland. *Bulletin of Entomology, New Delhi* 33:7-13.

*Paratrophurus* Arias, 1970 (*Histotylenchus* Siddiqi, 1971 and *Telotylenchoides* Siddiqi, 1971 are synonymous with *Paratrophurus*, according to Ebsary, 1991.)

\*\*Trophurus Loof, 1956

Kleynhans, K. P., and P. Cadet. 1994. *Trophurus deboeri* n. sp. from sugarcane soil in

Barbados and key to the species of the genus *Trophurus* Loof, 1956 (Nematoda: Belonolaimidae). *Fundamental and Applied Nematology* 17:225-230.

*Telotylenchus* Siddiqi, 1960

\*\**Tylenchorhynchus* Cobb, 1913  
and related forms

Tarjan, A. C. 1973. A synopsis of the genera and species in the Tylenchorhynchinae (Tylenchoidea, Nematoda). *Proceedings of the Helminthological Society of Washington* 40:123-144.

Jairajpuri, M. S., and D. J. Hunt. 1984. The taxonomy of Tylenchorhynchinae (Nematoda: Tylenchida) with longitudinal lines and ridges. *Systematic Parasitology* 6:261-268. (Keys to *Dolichorhynchus*, *Neodolichorhynchus*, *Tessellus*, and to genera of subfamily)

Fortuner, R., and M. Luc. 1987. A reappraisal of Tylenchina (Nemata). 6. The family Belonolaimidae Whitehead, 1960. *Revue de Nématologie* 10:183-202. (Five genera synonymized with *Tylenchorhynchus*)

Brzeski, M. W., and C. M. Dolinski. 1998. Compendium of the genus *Tylenchorhynchus* Cobb, 1913 sensu lato (Nematoda: Belonolaimidae). *Russian Journal of Nematology* 6:189-199. (Synonymy of six genera with *Tylenchorhynchus*)

(There is no key for identification of species after rearrangement of *Tylenchorhynchus* and related genera by Fortuner and Maggenti, 1987, and many species have been described after Tarjan, 1973. A tabular key [Brzeski and Dolinski, 1998] may be more practical for identification. Also, see Software.)

\*\**Bitylenchus* Filip'ev, 1934

Jairajpuri, M. S. 1982. Some studies on Tylenchorhynchinae: The subgenus *Bitylenchus* Filipjev, 1934, with description of *Tylenchorhynchus* (*Bitylenchus*) *depressus* n. sp. and a key to species of *Bitylenchus*. *Mededlingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 47:765-770.

Golden, A. M., M. A. Maqbool, and Z. A. Handoo. 1987. Descriptions of two new species of *Tylenchorhynchus* Cobb, 1913 (Nematoda: Tylenchida), with details on morphology and variation in *T. claytoni*. *Journal of Nematology* 19:58-68. (In this manuscript *Bitylenchus* is synonymized with *Tylenchorhynchus*.)

Gomez-Barcina, A., M. R. Siddiqi, and P. Castillo. 1992. The genus *Bitylenchus* Filip'ev, 1934 (Nematoda: Tylenchidae) with descriptions of two new species from Spain. *Journal of the Helminthological Society of Washington* 59:96-110. (*Bitylenchus* is revived.)

\*\**Merlinius* Siddiqi, 1970

Sultan, M. S., I. Singh, and P. K. Sakhuja. 1988. Plant parasitic nematodes of Punjab, India V. *Merlinius communica* n. sp. with key to species of the genus and *Telotylenchus elongatus* n. sp. *Indian Journal of Nematology* 18:44-48.

Sultan, M. S., I. Singh, and P. K. Sakhuja. 1988. Addendum to the paper "Plant parasitic nematodes of Punjab, India." V. *Merlinius communica* n. sp. with a key to the species of the genus and *Telotylenchus elongatus* n. sp. *Indian Journal of Nematology* 18:44-48.

\*\**Nagelus* Malek & Thorne, 1968

Powers, T. O., J. G. Baldwin, and A. H. Bell. 1983. Taxonomic limits of the genus *Nagelus* (Thorne and Malek, 1968) Siddiqi,

1979 with a description of *Nagelus borealis* n. sp. from Alaska. *Journal of Nematology* 15:582-593. (Tabular information)

\*\*Quinisulcius Siddiqi, 1971

Maqbool, M. A. 1992. Description of *Quinisulcius solani* n. sp. (Nematoda: Tylenchorhynchidae) with a key to the species and data on *Scutylenchus koreanus* from Pakistan. *Journal of Nematology* 14:221-225.

Hoplolaimidae Filip'ev, 1934

Hoplolaiminae Filip'ev, 1934

\*\*Aorolaimus Sher, 1963

Baujard, P., P. Castillo, M. E. Doucet, B. Martiny, and D. Mounport. 1994. Taxonomic studies on the genus *Aorolaimus* Sher, 1963 (Nematoda: Hoplolaimidae) I. Bibliographic analysis and tentative key to species. *Fundamental and Applied Nematology* 17:103-115.

\*\*Helicotylenchus Steiner, 1945

Sher, S. A. 1966. Revision of the Hoplolaiminae (Nematoda). VI. *Helicotylenchus* (Steiner, 1945). *Nematologica* 12:1-56.

Anderson, R. V. 1979. A supplemental key to species of *Helicotylenchus* Steiner, 1945 (Nematoda: Hoplolaimidae) described since 1972 and a description of *H. oscephalus* n. sp. *Canadian Journal of Zoology* 57:337-342.

Anderson, R. V., and E. S. Eveleigh. 1982. Description of *Helicotylenchus amplius* n. sp. and a key to the Canadian species of the genus (Nematoda: Hoplolaimidae). *Canadian Journal of Zoology* 60:318-321.

Boag, B., and M. S. Jairajpuri. 1985. *Helicotylenchus scoticus* n. sp. and a conspectus of the genus *Helicotylenchus* Steiner, 1945 (Tylenchida: Nematoda). *Systematic Parasitology* 7:47-58. (Compendium of 154 species)

Fotedar, D. N. and V. Kaul. 1985. A revised key to the species of the genus *Helicotylenchus* Steiner, 1945 (Nematoda: Rotylenchoidinae). *Indian Journal of Nematology* 15:138-147. (Approximately 125 species in this key)

Firoza, K., and M. A. Maqbool. 1994. A diagnostic compendium of the genus *Helicotylenchus* Steiner, 1945 (Nematoda: Hoplolaimidae). *Pakistan Journal of Nematology* 12:11-50.

\*\*Rotylenchus Filip'ev, 1936

Sher, S. A. 1965. Revision of the Hoplolaiminae (Nematoda) V. *Rotylenchus* Filip'ev, 1936. *Nematologica* 11:173-198.

Boag, B., and D. J. Hooper. 1981. *Rotylenchus ouensensis* n. sp. (Nematoda: Hoplolaimidae) from the British Isles. *Systematic Parasitology* 3:119-125.

Geraert, E., and S. Barooti. 1996. Four *Rotylenchus* from Iran, with a key to the species. *Nematologica* 42:503-520.

Castillo, P., N. Vovlas, A. Gomez-Barcina and F. Lamberti. 1993. The plant parasitic nematode *Rotylenchus*, (a monograph). Supplement to *Nematologia Mediterranea* 21. 200 p.

\*\*Hoplolaimus Daday, 1905

Sher, S. A. 1963. Revision of the Hoplolaiminae (Nematoda). II. *Hoplolaimus* Daday, 1905 and *Aorolaimus* n. gen. *Nematologica* 9:267-295.

Jairajpuri, M. S., and Q. H. Baqri. 1973. Nematodes of high altitudes in India. I. four new species of Tylenchida. *Nematologica* 19:19-30.

Anderson, R. V. 1983. Morphological characteristics of *Hoplolaimus indicus* Sher, 1963 in Canada, a parasite of wild rice.

Journal of Nematology 15:366-369.

Handoo, Z. A., and A. M. Golden. 1992. A key and diagnostic compendium to the species of the genus *Hoplolaimus* Daday, 1905 (Nematoda: Hoplolaimidae). Journal of Nematology 15:45-53.

\*\*Scutellonema Andrassy, 1958

Sher, S. A. 1963. Revision of the Hoplolaiminae (Nematoda) III. *Scutellonema* Andrassy, 1958. Nematologica 9:421-443.

Van Den Berg, E., and J. Heyns. 1973. South African Hoplolaiminae 2. The genus *Scutellonema* Andrassy, 1958. Phytomycolactica 5:23-40.

Germani, G., J. G. Baldwin, A. H. Bell, X. Y. Wu. 1986. Revision of the genus *Scutellonema* Andrassy, 1958 (Nematoda: Tylenchida). Revue de Nématologie 8:289-320.

\*\*Peltamigratus Sher, 1964

Mulk, M. M., and M. R. Siddiqi. 1982. Three new species of Hoplolaimid nematodes from South America. Indian Journal of Nematology 12:124-131.

Bitencourt, C., and C. S. Huang. 1986. Brazilian *Peltamigratus* Sher, 1964 (Nematoda: Hoplolaimidae), with description of six new species. Revue de Nématologie 9:3-24.

Rashid, F. E. Geraert, and R. D. Sharma. 1987. The genus *Peltamigratus* Sher, 1964 with description of two new species (Nematoda: Hoplolaimidae). Revue de Nématologie 10:3-21.

Fortuner, R. 1987. A reappraisal of Tylenchina (Nemata). 8. The family Hoplolaimidae Filip'ev, 1934. Revue de Nématologie 10:219-232. (*Peltamigratus* was

placed in synonymy with *Aorolaimus*.)

\*\*Paratylenchus Baldwin and Bell, 1981

Baldwin and Bell, A. H. 1981. *Paratylenchus* n. gen. (*Paratylenchinae* n. subfam.: Hoplolaimidae) with six new species and two new combinations. Journal of Nematology 13:111-128.

Rotylenchulinae Husain & Khan, 1967

\*\*Rotylenchulus Linford & Olivera, 1940

Robinson, A. F., R. N. Inserra, E. P. Caswell-Chen, N. Vovlas, and A. Troccoli. 1997. *Rotylenchulus* species: identification, distribution, host ranges, and resistance. Nematropica 27:128-180. (Useful descriptions – not a key. See Nickle, Manual of Agricultural Nematology.)

Pratylenchidae Thorne, 1949

Pratylenchinae Thorne, 1949

\*\*Pratylenchus Filip'ev, 1936

Thorne, G. 1961. Principles of Nematology. New York: McGraw-Hill. (Still a good reference for becoming acquainted with the primary identifying features)

Loof, P. A. A., 1978. The genus *Pratylenchus* Filipjev, 1936 (Nematoda: Pratylenchidae): a review of its anatomy, morphology, distribution, systematics and identification. Vaxtskyddsrapporter 5:1-50. (Outstanding key)

Ryss, A. Yu. 1988. Kornevye paraziticheskie nematody semeistva Pratylenchidae (Tylenchida) mirovoi fauny. Leningrad, Nauka. (Russian text). (See software)

Frederick, J. J., and A. C. Tarjan. 1989. A compendium of the genus *Pratylenchus* Filipjev, 1936 (Nemata: Pratylenchidae). Revue de Nématologie 12:243-256.

Handoo, Z. A., and A. M. Golden. 1989. A

key and diagnostic compendium to the genus *Pratylenchus* Filipjev, 1936 (lesion nematodes). *Journal of Nematology* 21:202-218.

Café Filho, A. C., and C. S. Huang. 1989. Description of *Pratylenchus pseudofallax* n. sp. with a key to the species of the genus *Pratylenchus* Filipjev, 1936 (Nematoda: Pratylenchidae). *Revue de Nématologie* 12:7-15.

\*\*Radopholus Thorne, 1949

Sher, S. A. 1968. Revision of the genus *Radopholus* Thorne, 1949 (Nematoda: Tylenchidae). *Proceedings of the Helminthological Society of Washington* 35:219-237.

\*\*Hoplitylus s'Jacob, 1960

Bernard, E. C., and T. L. Niblack. 1982. Review of *Hoplitylus* s'Jacob (Nematoda: Pratylenchidae). *Nematologica* 28:101-109.

\*\*Hirschmaniella Luc and Goodey, 1964

Ebsary, B. A., and R. V. Anderson. 1982. Two new species of *Hirschmaniella* Luc and Goody, 1963 (Nematoda: Pratylenchidae) with a key to the nominal species. *Canadian Journal of Zoology* 60:530-534.

Sivakumar, C. V., and E. Khan. 1982. Description of *Hirschmaniella kaverni* sp. n. (Radopholidae: Nematoda) with a key for identification of *Hirschmaniella* spp. *Indian Journal of Nematology* 12:86-90.

\*\*Pratylenchoides Winslow, 1958

Ryss, A. Y. 1980. *Pratylenchoides ivanovae* sp. n. (Nematoda: Pratylenchidae) and key to species of the genus *Pratylenchoides*. *Parazitologiya* 14:516-520.  
Baldwin, J. G., et al. 1983. Contribution to the study of the genus *Pratylenchoides* Winslow (Nematoda: Tylenchidae). *Revue de Nématologie* 6:111-125.

Nacobbinae Chitwood, 1950

\*\*Nacobbus Thorne and Allen, 1944

Sher, S. A. 1970. Revision of the genus *Nacobbus* Thorne and Allen, 1944 (Nematoda: Tylenchoidea). *Journal of Nematology* 2:228-235.

Heteroderidae Filip'ev & Schuurmans Stekhoven, 1941. Mulvey, R. H., and A. M. Golden. 1983. An illustrated key to the cyst-forming genera and species of Heteroderidae in the western hemisphere with species morphometrics and distribution. *Journal of Nematology* 15(1):1-59.

Wouts, W. M. 1985. Phylogenetic classification of the family Heteroderidae (Nematoda: Tylenchida). *Systematic Parasitology* 7:295-328.

Luc, M., A. Maggenti, and R. Fortuner. 1988. A reappraisal of Tylenchina (Nematoda). 9. The family Heteroderidae Filip'ev & Schuurmans Stekhoven, 1941. *Revue de Nématologie* 11:159-176.

Heteroderinae Filip'ev & Schuurmans Stekhoven, 1941 Baldwin, J. G., and L. P. Schouest, Jr. 1990. Comparative detailed morphology of the Heteroderinae Filip'ev & Schuurmans Stekhoven, 1941, sensu Luc et al. (1988): Phylogenetic systematics and revised classification. *Systematic Parasitology* 15:81-106.

(Also, see key to genera of Heteroderinae by Baldwin and Mundo-Ocampo on Pp. 345-346 of *Manual of Agricultural Nematology*)

\*\*Cryphodera Colbran, 1966

Karssen, G., and A. Van Aelst. 1999. Description of *Cryphodera brinkmani* n. sp. (Nematoda: Heteroderidae), a parasite of *Pinus thunbergii* Parlatores from Japan, including a key to the species of Cryphodera



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Longidoridae Thorne, 1935

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Aphelenchina Geraert, 1966  
Aphelenchoidea Skarbilovich, 1947  
(Siddiqi, 1980)  
Aphelenchoididae Skarbilovich, 1947  
(Paramonov, 1953)  
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### **Software – Computerized Keys:**

*Ditylenchus*

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*Tylenchorhynchus* sensu lato and *Geocenaemus* species

Dr. Michael W. Brzeski E-mail: mbrzeski@linux.inwarz.skierniewice.pl.

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Fortuner, R., and Y. Wong. 1984. Review of the genus *Helicotylenchus* Steiner, 1945. 1. A computer program for identification of the species. *Revue de Nématologie* 7:385-392.

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*Pratylenchus* and *Radopholus*

Digital pictorial keys – Dr. Alexander Ryss, Zoological Institute, Russian Academy of Sciences, Universitetskaya, Emb., 1, St. Petersburg 199034, Russia. E-mail: alexryss@AR4280.spb.edu Also, vermes@zin.ru.

Ryss, A. 1997. Computerized identification of species of the genus *Radopholus* (Tylenchida: Pratylenchidae). *Russian Journal of Nematology* 5:137-142.

*Longidorus*

Dr. R. T. Robbins, University of Arkansas, Nematology Laboratory, Fayetteville, Arkansas 72701.

Rey, J. M., M-Fe Andres, and M. Arias. 1988. A computer method for identifying nematode species. 1. Genus *Longidorus* (Nematoda: Longidoridae). *Revue de Nématologie* 11:129-135.

*Xiphinema*

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*Trichodorus* and *Paratrichodorus*

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