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Nematology

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A phylogenetic tree of nematodes based on about 1200 full-length small subunit ribosomal DNA sequences

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Summary – As a result of the scarcity of informative morphological and anatomical characters, nematode systematics have always been volatile. Differences in the appreciation of these characters have resulted in numerous classifications and this greatly confuses scientific communication. An advantage of the use of molecular data is that it allows for an enormous expansion of the number of characters. Here we present a phylogenetic tree based on 1215 small subunit ribosomal DNA sequences (*ca* 1700 bp each) covering a wide range of nematode taxa. Of the 19 nematode orders mentioned by De Ley *et al.* (2006) 15 are represented here. Compared with Holterman *et al.* (2006) the number of taxa analysed has been tripled. This did not result in major changes in the clade subdivision of the phylum, although a decrease in the number of well supported nodes was observed. Especially at the family level and below we observed a considerable congruence between morphology and ribosomal DNA-based nematode systematics and, in case of discrepancies, morphological or anatomical support could be found for the alternative grouping in most instances. The extensiveness of convergent evolution is one of the most striking phenomena observed in the phylogenetic tree presented here – it is hard to find a morphological, ecological or biological characteristic that has not arisen at least twice during nematode evolution. Convergent evolution appears to be an important additional explanation for the seemingly persistent volatility of nematode systematics.

Keywords – convergent evolution, DNA barcoding, molecular, nematode evolution, phylogeny.

As in many other major invertebrate clades, the early members of the phylum Nematoda are thought to have arisen in marine habitats during the so-called Cambrian Explosion (600-550 million years ago). However, fossil records from nematodes are extremely rare and no hard evidence is available for this statement. So far, the oldest nematode fossil is *Palaeonema phyticum* that was found in association with *Aglaophyton major*, a free-sporing land plant of the early Devonian (416-396 million years ago; Poinar *et al.*, 2008). More, and older, fossil records are available from water bears or tardigrades, a group of animals relatively closely related to nematodes (*e.g.*, Dunn *et al.*, 2008). Fossils from marine tardigrades show that the earliest members of the Tardigrada arose in the mid-Cambrian (for review, see Labandeira, 2005). This observation could be considered as indirect support for the marine origin of the phylum Nematoda during the Cambrian.

Compared with related phyla, such as the Priapulida, the Kinorhyncha, and its closest relative, the Nematomorpha (horsehair worms; *ca* 320 described species), the phylum Nematoda can be seen as a success story. Nematodes are speciose and are present in huge numbers in virtually all marine, freshwater and terrestrial environments. Analysis of large EST data sets recently reconfirmed the placement of the phylum Nematoda within the superphylum Ecdysozoa (Dunn *et al.*, 2008), a major animal clade proposed by Aguinaldo *et al.* (1997) that unites all moult-

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ing animals.

Being relatively small and colourless, most nematodes are inconspicuous organisms. They are best known to the general public as the causal agents of a number of human, animal and plant diseases. For instance, the pinworm, *Enterobius vermicularis*, is a ubiquitous parasite of man (particularly children), and the number of people infected is estimated at about 400 million (Lukeš *et al.*, 2005). *Ascaris lumbricoides* is a major intestinal parasite with more than a billion people estimated to be infected by this worm (with the highest incidence in areas with poor sanitation; Lukeš *et al.*, 2005). Other high impact nematode parasites of humans include *Necator americanus* and *Ancylostoma duodenale* (hookworms), *Wucheria bancrofti* and *Brugia malayi* (the causal agents of filariasis). Animal parasitism by nematodes is widespread and affects livestock such as sheep (*Haemonchus contortus*), pigs (*Ascaris suum*) and chickens (*Ascaridia galli*). Plant-parasitic nematodes are also ubiquitous with cyst (members of the genera *Heterodera* and *Globodera*), root-knot (representatives of the genus *Meloidogyne*) and lesion nematodes (*Pratylenchus* spp.) seriously affecting economically important crops such as soybean, potato and tomato. Plant-parasitic nematodes cause worldwide losses of about $80 billion annually (Agrios, 2005). It should be noted that parasites mostly constitute a (small) minority within nematode assemblages, the majority being non-parasitic organisms that play essential roles in terrestrial and sediment food webs.

For decades people have tried to design a phylogenetic framework for the members of this old and highly diverse phylum. Micoletzky (1922) supposed that differences in the morphology of the stoma (‘mouth’) could be used to determine relationships between major groups. However, the subdivision of the phylum into five stoma-based families appeared to be unstable. The bipartite system proposed by Chitwood and Chitwood (1933) has been very influential. They proposed a subdivision of the phylum into the Aphasmidia and the Phasmidia. In 1958, Chitwood decided to change the names into Adenophorea (‘gland bearers’) and Secernentea (‘secretors’), respectively, and for decades nearly all nematologists have adhered to this deep subdivision. Lorenzen (1981) was the first to propose a phylogenetic scheme for nematodes based on cladistic principles. He also indicated that the establishment of a more definitive cladogram was severely hindered by the scarcity of informative characters. Over the last two decades this impediment has been bypassed by the availability of a virtually unlimited number of DNA characters for any taxon. Blaxter *et al.* (1998) (53 taxa) and Aleshin *et al.* (1998) (19 taxa) were among the first to exploit the potential of ribosomal DNA sequence data to resolve phylogenetic relationships among nematodes. Holterman *et al.* (2006) presented a subdivision of the phylum Nematoda into 12 clades based on a series of mostly well supported bifurcations in the backbone of the tree (339 taxa).

Over the last few years, an impressive number of molecular data-based papers have been published that focused on specific taxonomic groups. In the basal part of the nematode tree, the resolution among Dorylaimida, remarkably poor with SSU rDNA data, was substantially improved by using the 5′ region of the LSU rDNA (Holterman *et al.*, 2008a). The under-representation of marine nematodes in the phylogenetic overview presented so far was, to some extent, lifted by SSU rDNA-based papers from Meldal *et al.* (2007) and Holterman *et al.* (2008a). Nadler *et al.* (2007) greatly increased our insight into the relationships among animal-parasitic nematodes by analysing 113 SSU rDNA sequences. Bert *et al.* (2008) investigated relationships within the suborder Tylenchina (covering four infraorders, namely Panagrolaimorpha, Cephalobomorpha, Drilonematomorpha and Tylenchomorpha) by combining SSU rDNA data and morphological information on the female gonoduct. Holterman *et al.* (2009) concentrated on the Tylenchomorpha (mainly insect and plant parasites) and revealed phylogenetic relationships among some of the major plant parasites based on 116 SSU rDNA sequences.

In the current overview paper we made a selection of *ca* 1200 (nearly) full-length SSU rDNA sequences from representatives throughout the phylum Nematoda. Although, to the best of our knowledge, it is the most species rich and diverse nematode tree based on molecular data published so far, it is biased towards terrestrial nematodes living in moderate climate zones. It is, even at the ordinal level, still incomplete (no representatives from Muspiceida, Marimermithida, Benthimermithida and Rhaptothyreida), and it is based on only a single gene. Nevertheless, it provides numerous insights into the evolutionary relationships within the Nematoda in all its trophic and ecological diversity. Apart from this scientific merit, this framework can be used to (quantitatively) detect single targets in highly complex DNA backgrounds, such as specific plant parasites in a soil community. Currently, we are field testing SSU rDNA-based nematode community analysis in soil at family level and preliminary results will be published in the near future.

Materials and methods

SPECIMEN COLLECTION

Nematodes were collected from various habitats throughout The Netherlands, and extracted from the soil using standard techniques. Prior to DNA extraction, individual nematodes were identified using a light microscope (Zeiss Axioscope) equipped with DIC optics. A CCD camera (CoolSnap, RS Photometrics) was used to take a series of digital images from each nematode. For the nomenclature of taxonomic groups we essentially conformed to the systematics proposed by De Ley *et al.* (2006), except for the order Tylenchida for which we adhered to the systematics proposed by Siddiqi (2000).

DNA EXTRACTION, AMPLIFICATION AND SEQUENCING

DNA extraction, amplification and sequencing were performed as detailed in Holterman *et al.* (2006). Newly generated SSU rDNA sequences (n = 109) were deposited at GenBank under the accession numbers FJ040398-FJ040506.

SEQUENCE ALIGNMENT

Newly generated nematode SSU rDNA sequences were supplemented with publicly available sequences (for a full list, see Supplementary Table S1 in the online edition of this journal, which can be accessed *via* http://www.brill.nl/nemy). The outgroup consisted of other Ecdysozoa (n = 10). The SSU rDNA sequences were aligned using the ClustalW algorithm as implemented in BioEdit 5.0.9 (Hall, 1999) and manually improved using secondary structure information from *Loricea foveata* (http://bioinformatics.psb.ugent.be/webtools/rRNA/secmodel/Lfov_SSU.html), in accordance with Ben Ali *et al.* (1999). Thirteen length variable regions (LVRs) were present within the alignment (length and positioning are given in Figure S1, parts 1, 2, that can be found in the online edition of this journal, which can be accessed *via* http://www.brill.nl/nemy). The software package mfold (Washington University, St. Louis, MO, USA; http://mfold.bioinfo.rpi.edu/cgi-bin/dna-form1.cgi) was used to predict the most likely secondary structure, and this information was used to align sequences with one or more LVRs. The final alignment consisted of 1225 SSU rDNA sequences and contained 2967 aligned positions (including gaps). In a second analysis, the 13 LVRs as defined in Supplementary Figure S1 were removed to the study the effect on the phylogenetic analysis.

PHYLOGENETIC ANALYSIS

The program Modeltest v.3.06 (Posada & Crandall, 1998) selected the GTR + I + Γ model as the best fitting model using both the likelihood ratio test and Akaike Information Criterion. The phylogenetic tree was constructed with a fast maximum likelihood method. The SSU rDNA alignment was analysed at a distant server (http://phylobench.vital-it.ch/raxml-bb/index.php) running the program RAxML-VI-HPC v.4.0.0 (Randomized Axelerated Maximum Likelihood for High Performance Computing (Stamatakis, 2006). A GTR model with invariable sites and gamma distribution was used and the dataset was divided in a stem and loop partition. The tree presented is the result of two independent runs. The values of the shape parameter α for the stem partition were estimated by RAxML at 0.626539 and 0.624500 for run 1 and 2, respectively. For the loop partition, α was 0.638105 and 0.638054. The proportion of invariable sites was 0.037952 and 0.037696 (stem), and 0.041264 and 0.041248 (loop) for run 1 and 2, respectively. Two hundred bootstraps were performed.

In addition, the alignment without LVRs was analysed using RAxML and the tree with the best likelihood is presented in Figure S1 in the online edition of this journal, which can be accessed *via* http://www.brill.nl/nemy. The values of the shape parameter α for the stem partition were estimated by RAxML at 0.635468 and 0.642951 for run 1 and 2, respectively. For the loop partition α was 0.657278 and 0.658856. The proportion of invariable sites was 0.032238 and 0.032557 (stem), and 0.032853 and 0.032846 (loop) for run 1 and 2, respectively. Two hundred bootstraps were performed.

Results and discussion

BACKBONE

Previously, Holterman *et al.* (2006) proposed a subdivision of the phylum Nematoda into 12 clades on the basis of *ca* 360 SSU rDNA sequences that gave rise to a series of mostly well supported bifurcations in the backbone of the phylogenetic tree. The increase in the number of sequences analysed to 1215, the use of a fast maximum likelihood method (instead of a more time consum-

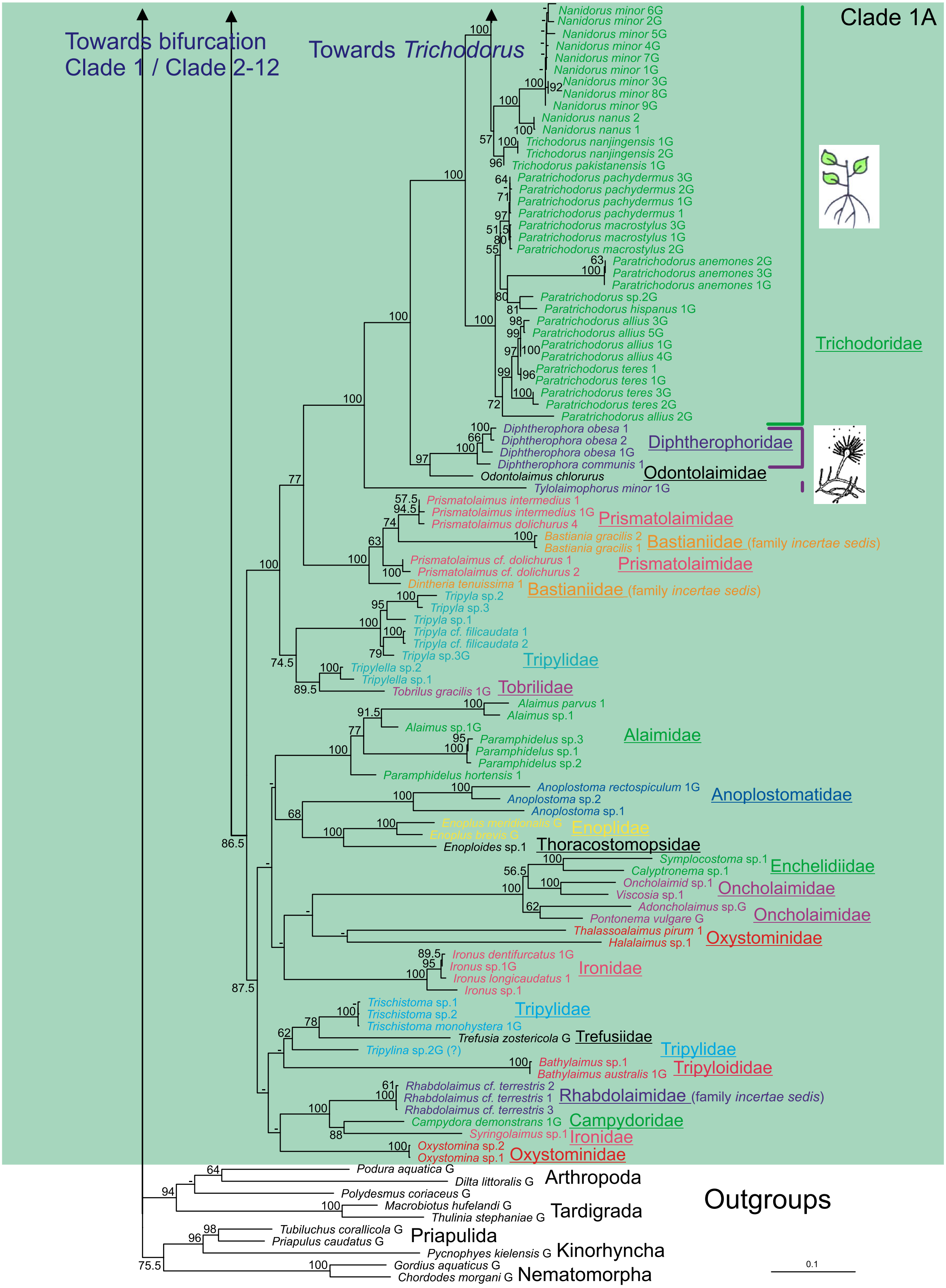
Table 1. *Support values for deep phylogenetic relationships among nematode clades based on (nearly) full length SSU rDNA sequences.*

	Bifurcation between	Bootstrap value (%) (this paper) (>65% is robust)	Posterior probability (Holterman *et al.*, 2006) (>0.95 is robust)
Clade 1	Clade 2-12	100	1.00
Clade 2	Clade 3-12	63	0.81
Monoposthiidae	Haliplectidae and Desmodoridae, and Clade 3-12	100	– (no Monoposthiidae included)
Haliplectidae and Desmodoridae	Clade 3-12	–	– (no Haliplectidae included)
Clade 3	Clade 4-12	–	1.00
Clade 4	Desmoscolecidae and Clade 5ABC-12	64	1.00
Desmoscolecidae	Clade 5ABC-12	68.5	– (no Desmoscolecidae included)
Clade 5ABC	Clade 6-12	–	0.71
Clade 6	Clade 7-12	100	1.00
Clade 7	Clade 8-12	97	1.00
Clade 8	Clade 9-12	97	1.00
Clade 9	Clade 10-12	–	0.64
Clade 10	Clade 11-12		1.00
Clade 11	Clade 12 (and Clade 10A)	70	0.95 (Clade 10A not included)
Clade 12	Clade 10A	–	

ing Bayesian analysis) and the inclusion of the gamma parameter in this analysis resulted in a phylogenetic tree with an overall topology that resembles the previous one. However, the support values for the backbone tend to be lower (Table 1). This can be explained, at least partially, by the inclusion of families that had not been considered previously or taxa that previously were not taken into consideration because of their strong destabilising effect on the tree ('rogue taxa', such as *Prodesmodora circulata* and *Desmoscolex* sp. in Holterman *et al.*, 2008b). Monoposthiidae (one representative), Desmoscololecidae (one representative) and a cluster with Haliplectidae (one representative) and Desmodoridae (subfamily Prodesmodorinae only) appeared as new, distinct, groups but their positioning in the overall tree remains unclear. The splitting of Clade 10 into two parts could be seen as a main difference between Holterman *et al.* (2006) and the current analysis but as there is no support for this alternative topology, it will not be discussed further. The use of subclades in this paper (*e.g.*, 8A, 8B) is merely for the aid of discussion and no phylogenetic meaning is attached to them (indeed some are not even monophyletic).

In the second analysis, we removed 13 LVRs as defined in Figure S1 (part 1) in the online edition of this journal, which can be accessed *via* http://www.brill.nl/nemy. The positioning of the LVRs in a SSU rRNA secondary structure model is given in Figure S1 (part 2) in the online edition of this journal, which can be accessed *via* http://www.brill.nl/nemy. Maximum likelihood analysis resulted in a phylogenetic tree with a topology similar to that presented in Figure S1 (part 3) in the online edition of this journal, which can be accessed *via* http://www.brill.nl/nemy, although the support values for the major bifurcations tended to be lower. It is noted that some families with a poorly supported position in the original tree, such as Panagrolaimidae and Aphelenchidae, were repositioned in the analysis without LVRs. However, the alternative positioning received no significant bootstrap support.

Fig. 1. *Best likelihood phylogenetic tree recovered by RAxML on the basis of SSU rDNA sequences. Alternating pale yellow and green backgrounds define clades. White backgrounds indicate an uncertain clade position. For the nomenclature of taxonomic groups we essentially conformed to De Ley* et al. *(2006); deviations from this system are indicated in the tree. Family names are underlined, and family members have identical colours. Only bootstrap values >50% are given next to the nodes. A 'G' behind a nematode name indicates that the sequence was acquired from GenBank.*


Towards bifurcation Clade 1 / Clade 2-12
Towards *Trichodorus*
Clade 1A
Nanidorus minor 6G
Nanidorus minor 2G
Nanidorus minor 5G
Nanidorus minor 4G
Nanidorus minor 7G
Nanidorus minor 1G
Nanidorus minor 3G
Nanidorus minor 8G
Nanidorus minor 9G
Nanidorus nanus 2
Nanidorus nanus 1
Trichodorus nanjingensis 1G
Trichodorus nanjingensis 2G
Trichodorus pakistanensis 1G
Paratrichodorus pachydermus 3G
Paratrichodorus pachydermus 2G
Paratrichodorus pachydermus 1G
Paratrichodorus pachydermus 1
Paratrichodorus macrostylus 3G
Paratrichodorus macrostylus 1G
Paratrichodorus macrostylus 2G
Paratrichodorus anemones 2G
Paratrichodorus anemones 3G
Paratrichodorus anemones 1G
Paratrichodorus sp.2G
Paratrichodorus hispanus 1G
Paratrichodorus allius 3G
Paratrichodorus allius 5G
Paratrichodorus allius 1G
Paratrichodorus allius 4G
Paratrichodorus teres 1
Paratrichodorus teres 1G
Paratrichodorus teres 3G
Paratrichodorus teres 2G
Paratrichodorus allius 2G
Trichodoridae
Diphtherophora obesa 1
Diphtherophora obesa 2
Diphtherophora obesa 1G
Diphtherophora communis 1
Odontolaimus chlorurus
Diphtherophoridae
Odontolaimidae
Tylolaimophorus minor 1G
Prismatolaimus intermedius 1
Prismatolaimus intermedius 1G
Prismatolaimus dolichurus 4
Prismatolaimidae
Bastiania gracilis 2
Bastiania gracilis 1
Bastianiidae (family *incertae sedis*)
Prismatolaimus cf. dolichurus 1
Prismatolaimus cf. dolichurus 2
Prismatolaimidae
Dintheria tenuissima 1
Bastianiidae (family *incertae sedis*)
Tripyla sp.2
Tripyla sp.3
Tripyla sp.1
Tripyla cf. filicaudata 1
Tripyla cf. filicaudata 2
Tripyla sp.3G
Tripylidae
Tripylella sp.2
Tripylella sp.1
Tobrilus gracilis 1G
Tobrilidae
Alaimus parvus 1
Alaimus sp.1
Alaimus sp.1G
Paramphidelus sp.3
Paramphidelus sp.1
Paramphidelus sp.2
Paramphidelus hortensis 1
Alaimidae
Anoplostoma rectospiculum 1G
Anoplostoma sp.2
Anoplostoma sp.1
Anoplostomatidae
Enoplus meridionalis G
Enoplus brevis G
Enoplidae
Enoploides sp.1
Thoracostomopsidae
Symplocostoma sp.1
Calyptronema sp.1
Enchelidiidae
Oncholaimid sp.1
Viscosia sp.1
Oncholaimidae
Adoncholaimus sp.G
Pontonema vulgare G
Oncholaimidae
Thalassoalaimus pirum 1
Halalaimus sp.1
Oxystominidae
Ironus dentifurcatus 1G
Ironus sp.1G
Ironus longicaudatus 1
Ironus sp.1
Ironidae
Trischistoma sp.1
Trischistoma sp.2
Trischistoma monohystera 1G
Tripylidae
Trefusia zostericola G
Trefusiidae
Tripylina sp.2G (?)
Tripylidae
Bathylaimus sp.1
Bathylaimus australis 1G
Tripyloididae
Rhabdolaimus cf. terrestris 2
Rhabdolaimus cf. terrestris 1
Rhabdolaimus cf. terrestris 3
Rhabdolaimidae (family *incertae sedis*)
Campydora demonstrans 1G
Campydoridae
Syringolaimus sp.1
Ironidae
Oxystomina sp.2
Oxystomina sp.1
Oxystominidae
Podura aquatica G
Dilta littoralis G
Arthropoda
Polydesmus coriaceus G
Macrobiotus hufelandi G
Thulinia stephaniae G
Tardigrada
Outgroups
Tubiluchus corallicola G
Priapulus caudatus G
Priapulida
Pycnophyes kielensis G
Kinorhyncha
Gordius aquaticus G
Chordodes morgani G
Nematomorpha
0.1
100
100
100
92
100
100
57
100
96
64
71
97
51
80
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100
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57.5
94.5
74
63
100
100
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95
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79
74.5
100
89.5
100
91.5
77
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95
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100
100
68
100
100
86.5
100
56.5
100
100
62
89.5
95
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87.5
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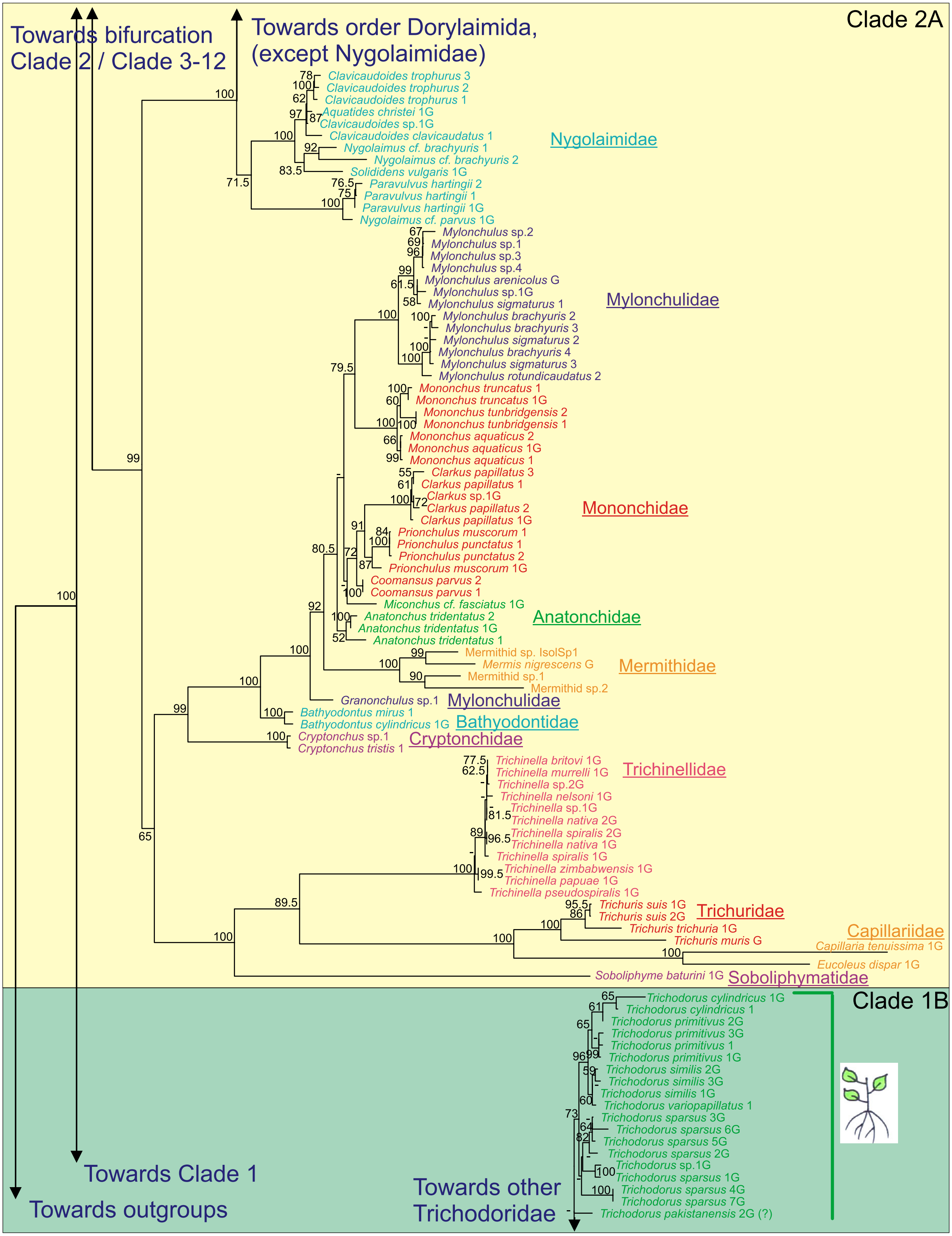
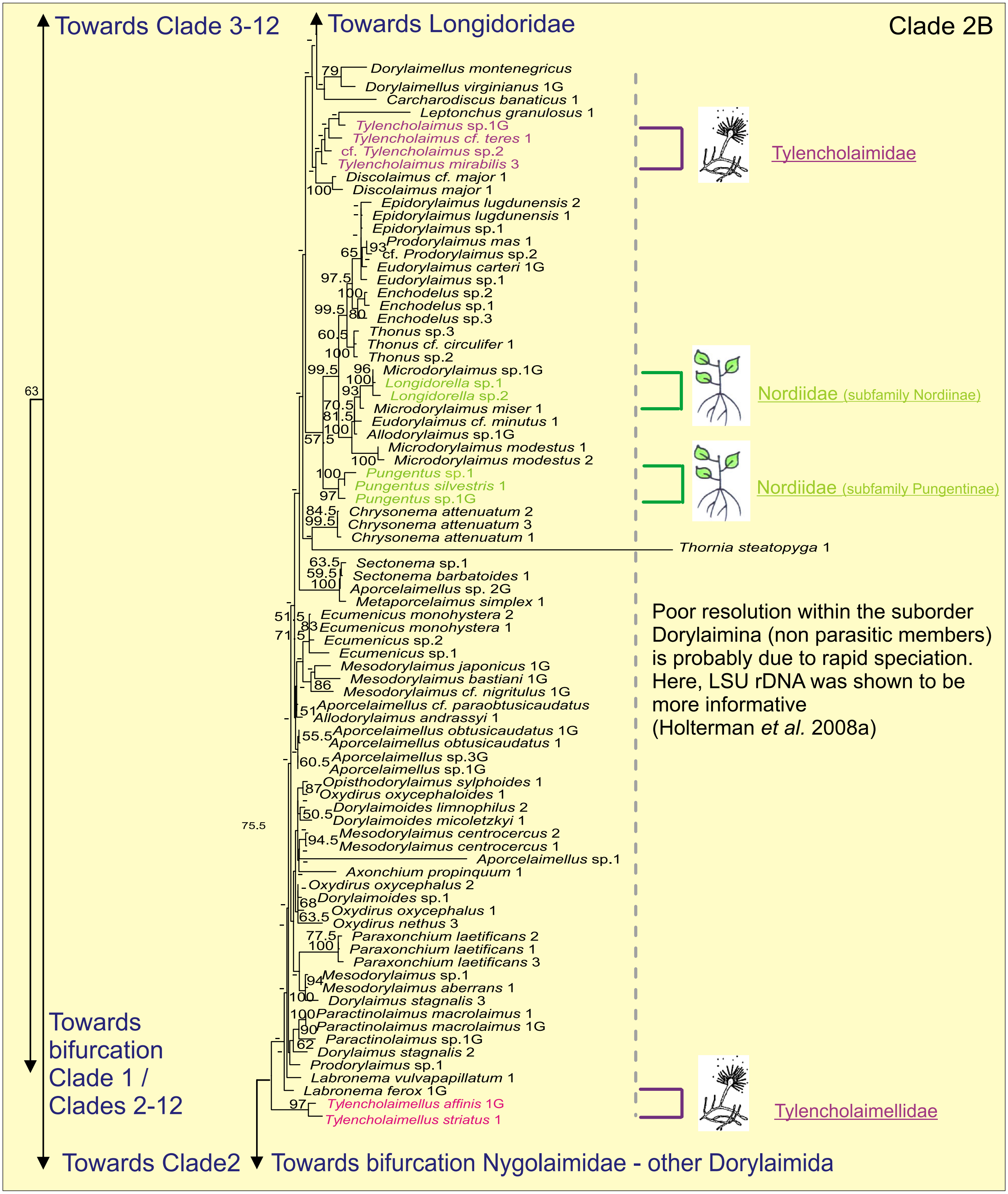
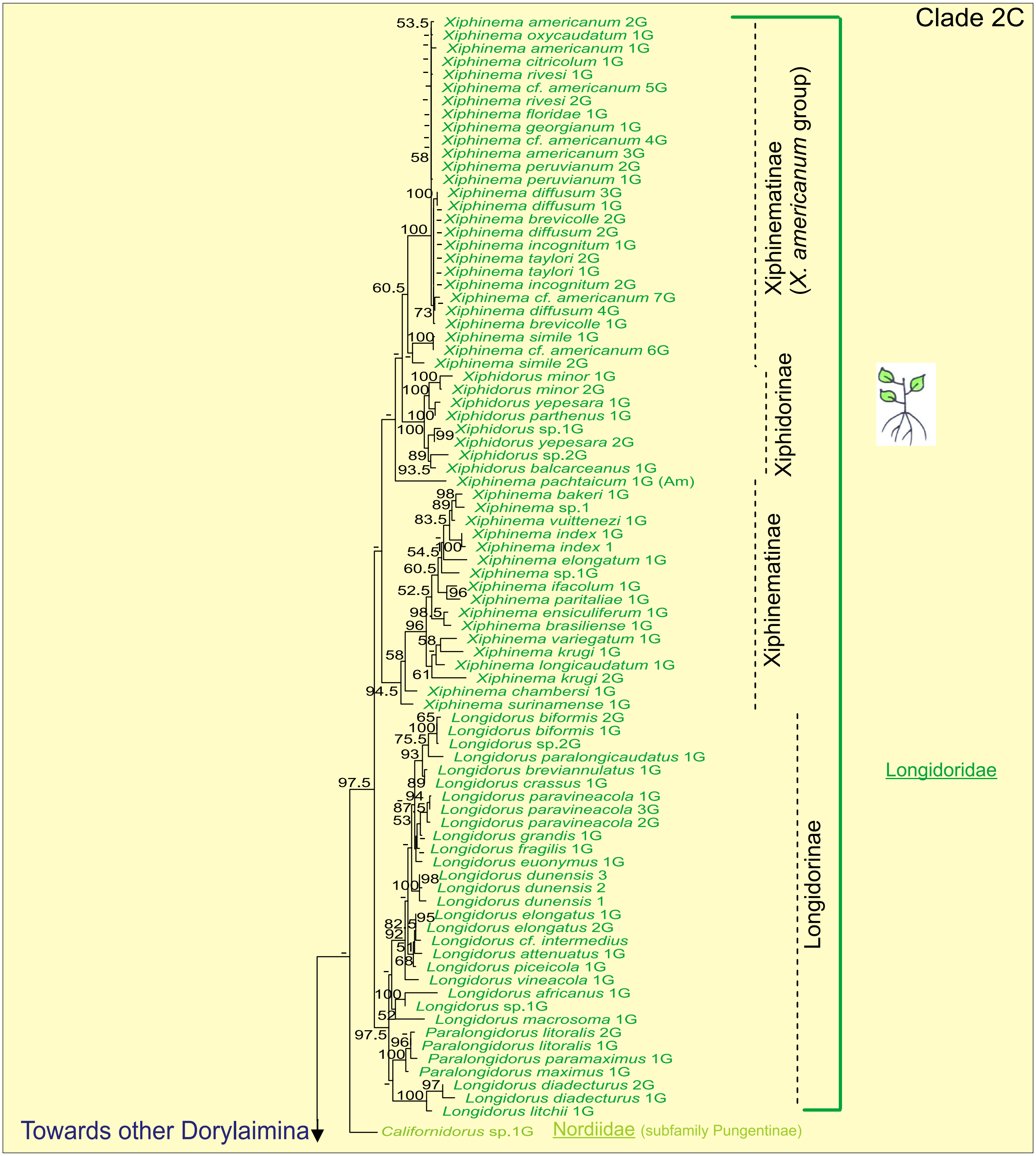
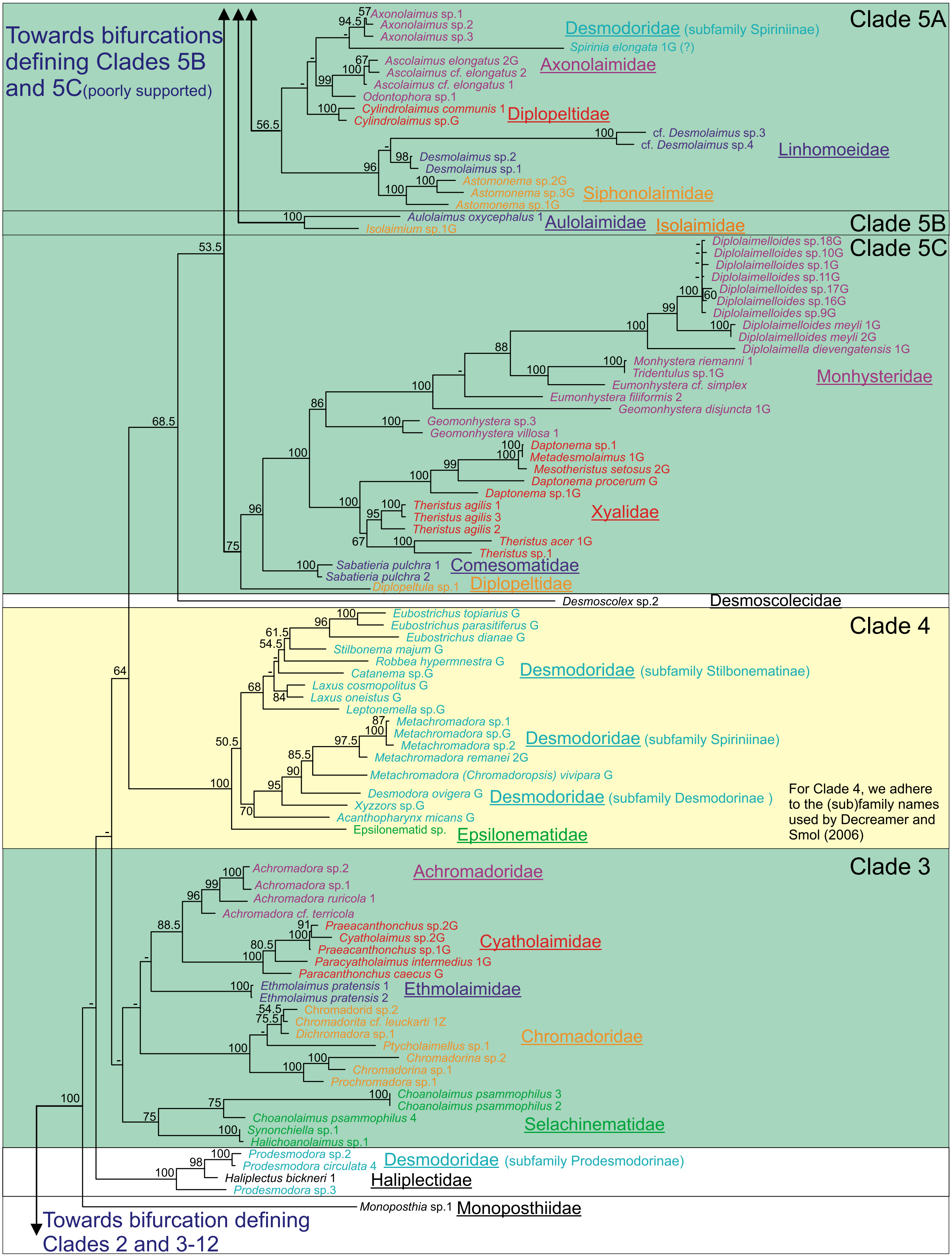
78
62
100
61
100
100
88
100
64
94
100
98
96
75.5
100

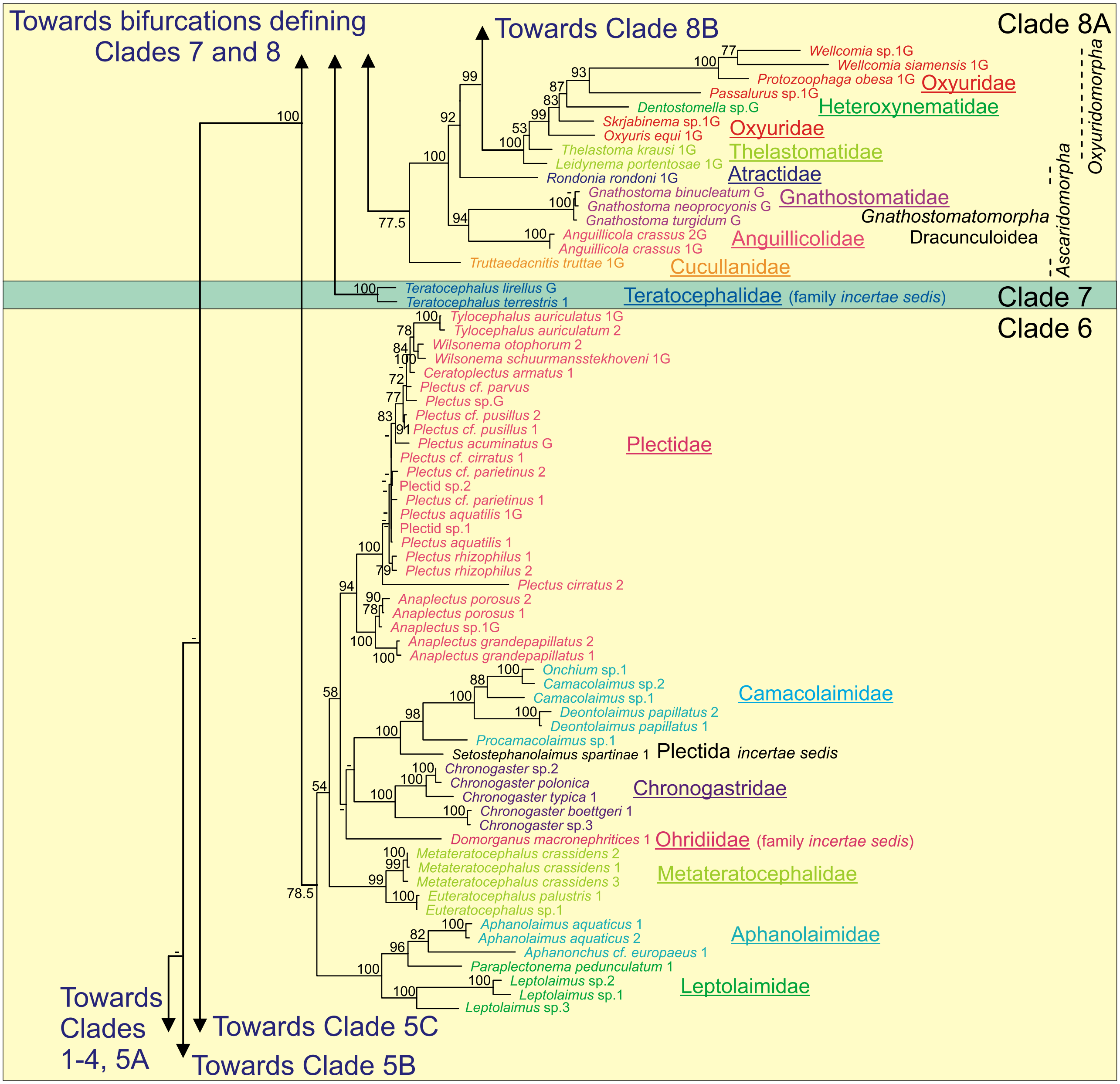

Clade 2A
Towards bifurcation Clade 2 / Clade 3-12
Towards order Dorylaimida, (except Nygolaimidae)
78 Clavicaudoides trophurus 3
100 Clavicaudoides trophurus 2
62 Clavicaudoides trophurus 1
97 87 Aquatides christei 1G
Clavicaudoides sp.1G
100 Clavicaudoides clavicaudatus 1
92 Nygolaimus cf. brachyuris 1
Nygolaimus cf. brachyuris 2
83.5 Solididens vulgaris 1G
76.5 Paravulvus hartingii 2
75 Paravulvus hartingii 1
100 Paravulvus hartingii 1G
Nygolaimus cf. parvus 1G
Nygolaimidae
100
71.5
67 Mylonchulus sp.2
69 Mylonchulus sp.1
96 Mylonchulus sp.3
Mylonchulus sp.4
99 Mylonchulus arenicolus G
61.5 Mylonchulus sp.1G
58 Mylonchulus sigmaturus 1
100 Mylonchulus brachyuris 2
Mylonchulus brachyuris 3
Mylonchulus sigmaturus 2
100 Mylonchulus brachyuris 4
100 Mylonchulus sigmaturus 3
Mylonchulus rotundicaudatus 2
Mylonchulidae
100
79.5
100 Mononchus truncatus 1
60 Mononchus truncatus 1G
Mononchus tunbridgensis 2
100 100 Mononchus tunbridgensis 1
66 Mononchus aquaticus 2
Mononchus aquaticus 1G
99 Mononchus aquaticus 1
55 Clarkus papillatus 3
61 Clarkus papillatus 1
100 72 Clarkus sp.1G
Clarkus papillatus 2
Clarkus papillatus 1G
Mononchidae
91
84 Prionchulus muscorum 1
100 Prionchulus punctatus 1
72 Prionchulus punctatus 2
87 Prionchulus muscorum 1G
80.5
Coomansus parvus 2
100 Coomansus parvus 1
Miconchus cf. fasciatus 1G
92
100 Anatonchus tridentatus 2
Anatonchus tridentatus 1G
52 Anatonchus tridentatus 1
Anatonchidae
100
99 Mermithid sp. IsolSp1
100 Mermis nigrescens G
90 Mermithid sp.1
Mermithid sp.2
Mermithidae
100
Granonchulus sp.1 Mylonchulidae
100 Bathyodontus mirus 1
Bathyodontus cylindricus 1G Bathyodontidae
99
100 Cryptonchus sp.1
Cryptonchus tristis 1 Cryptonchidae
99
100
77.5 Trichinella britovi 1G
62.5 Trichinella murrelli 1G
Trichinellidae
Trichinella sp.2G
Trichinella nelsoni 1G
Trichinella sp.1G
81.5 Trichinella nativa 2G
89 Trichinella spiralis 2G
96.5 Trichinella nativa 1G
Trichinella spiralis 1G
100 99.5 Trichinella zimbabwensis 1G
Trichinella papuae 1G
Trichinella pseudospiralis 1G
89.5
95.5 Trichuris suis 1G
86 Trichuris suis 2G
Trichuridae
100 Trichuris trichuria 1G
100 Trichuris muris G
Capillariidae
Capillaria tenuissima 1G
100 Eucoleus dispar 1G
65
100
Soboliphyme baturini 1G Soboliphymatidae
Clade 1B
65 Trichodorus cylindricus 1G
61 Trichodorus cylindricus 1
65 Trichodorus primitivus 2G
Trichodorus primitivus 3G
Trichodorus primitivus 1
96 99 Trichodorus primitivus 1G
59 Trichodorus similis 2G
Trichodorus similis 3G
Trichodorus similis 1G
60 Trichodorus variopapillatus 1
73 Trichodorus sparsus 3G
64 Trichodorus sparsus 6G
82 Trichodorus sparsus 5G
Trichodorus sparsus 2G
100 Trichodorus sp.1G
Trichodorus sparsus 1G
100 Trichodorus sparsus 4G
Trichodorus sparsus 7G
Trichodorus pakistanensis 2G (?)
Towards Clade 1
Towards outgroups
Towards other Trichodoridae

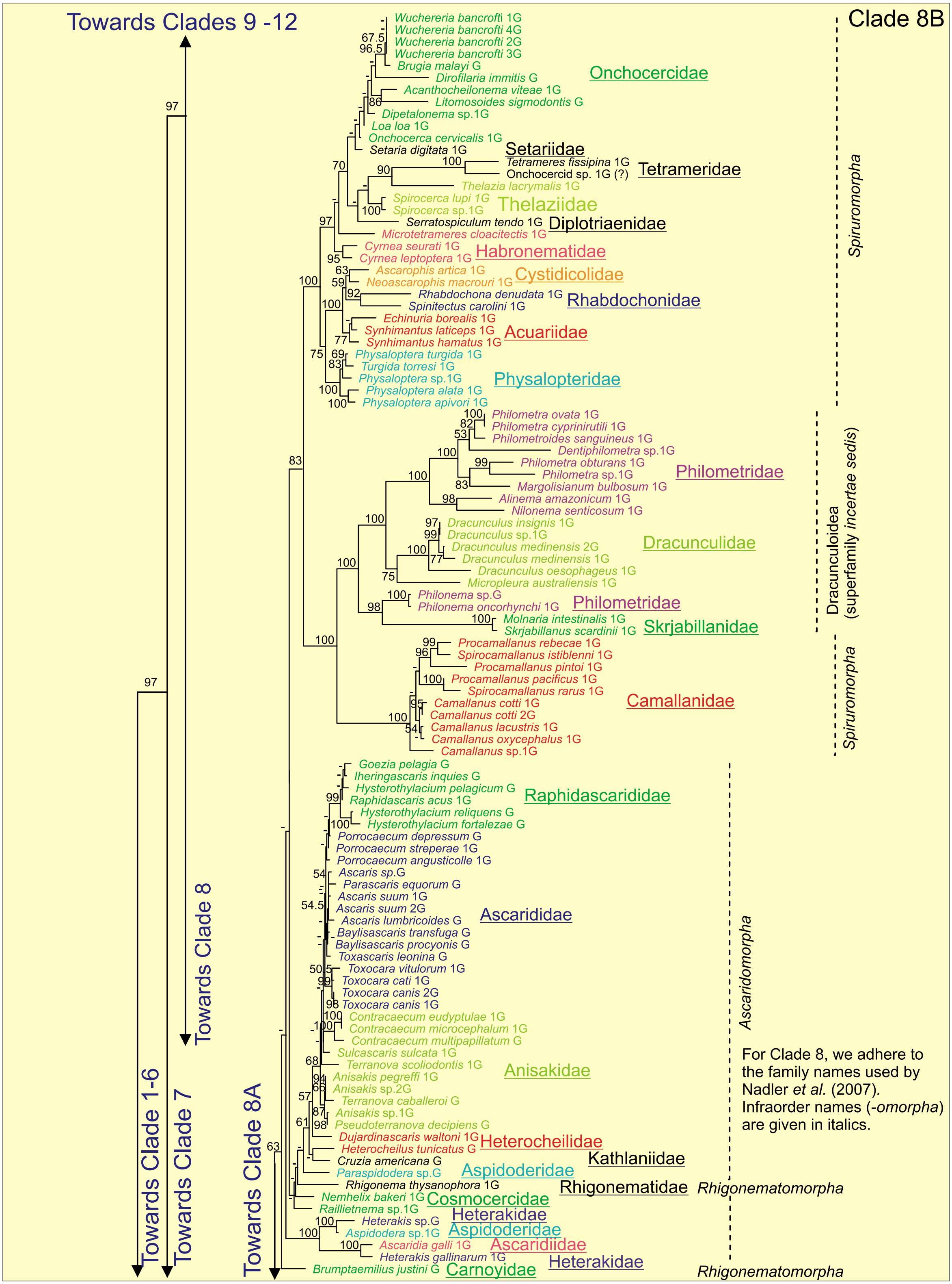


Poor resolution within the suborder Dorylaimina (non parasitic members) is probably due to rapid speciation. Here, LSU rDNA was shown to be more informative (Holterman *et al.* 2008a)

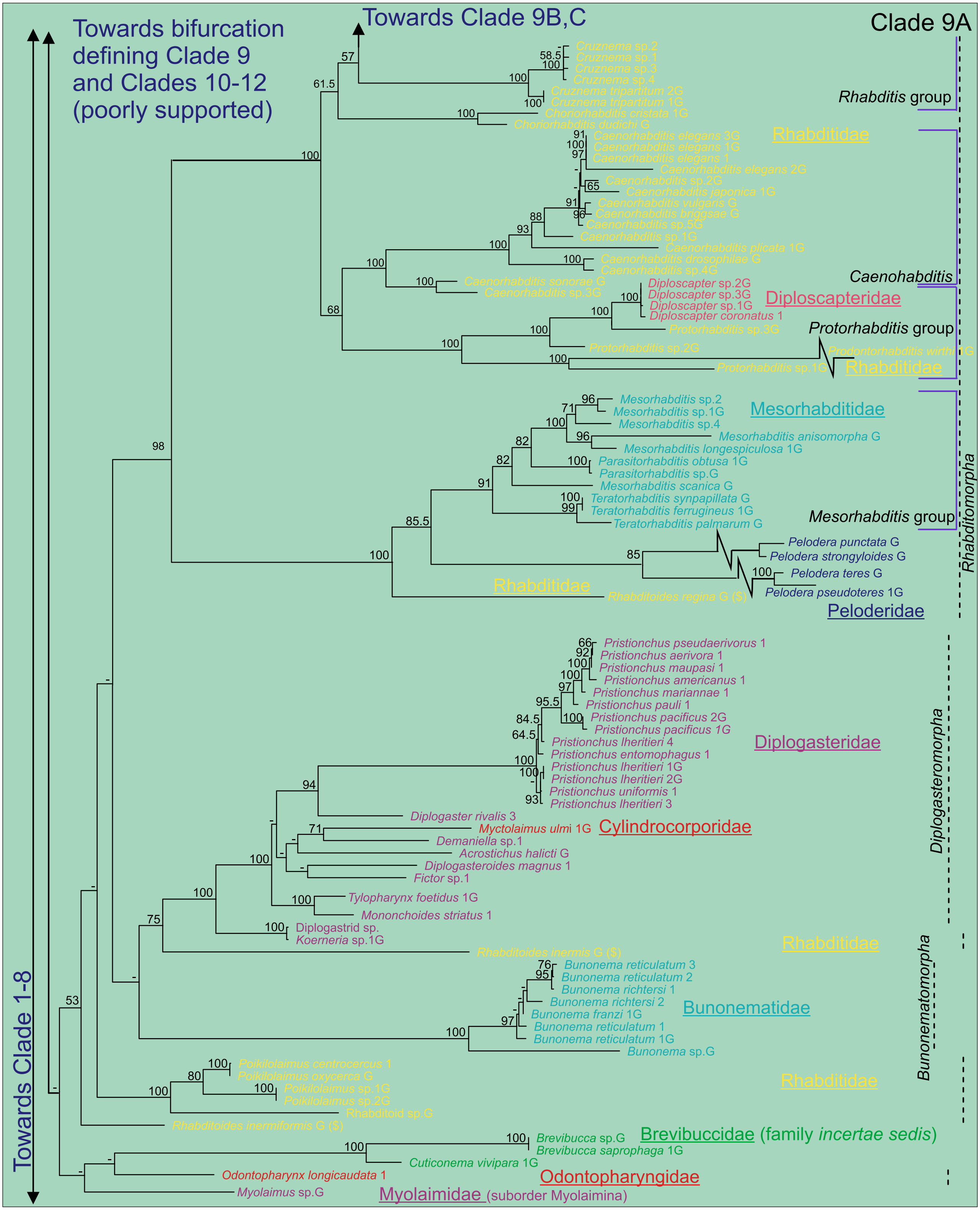

Clade 2C
Xiphinema americanum 2G
Xiphinema oxycaudatum 1G
Xiphinema americanum 1G
Xiphinema citricolum 1G
Xiphinema rivesi 1G
Xiphinema cf. americanum 5G
Xiphinema rivesi 2G
Xiphinema floridae 1G
Xiphinema georgianum 1G
Xiphinema cf. americanum 4G
Xiphinema americanum 3G
Xiphinema peruvianum 2G
Xiphinema peruvianum 1G
Xiphinema diffusum 3G
Xiphinema diffusum 1G
Xiphinema brevicolle 2G
Xiphinema diffusum 2G
Xiphinema incognitum 1G
Xiphinema taylori 2G
Xiphinema taylori 1G
Xiphinema incognitum 2G
Xiphinema cf. americanum 7G
Xiphinema diffusum 4G
Xiphinema brevicolle 1G
Xiphinema simile 1G
Xiphinema cf. americanum 6G
Xiphinema simile 2G
Xiphidorus minor 1G
Xiphidorus minor 2G
Xiphidorus yepesara 1G
Xiphidorus parthenus 1G
Xiphidorus sp.1G
Xiphidorus yepesara 2G
Xiphidorus sp.2G
Xiphidorus balcarceanus 1G
Xiphinema pachtaicum 1G (Am)
Xiphinema bakeri 1G
Xiphinema sp.1
Xiphinema vuittenezi 1G
Xiphinema index 1G
Xiphinema index 1
Xiphinema elongatum 1G
Xiphinema sp.1G
Xiphinema ifacolum 1G
Xiphinema paritaliae 1G
Xiphinema ensiculiferum 1G
Xiphinema brasiliense 1G
Xiphinema variegatum 1G
Xiphinema krugi 1G
Xiphinema longicaudatum 1G
Xiphinema krugi 2G
Xiphinema chambersi 1G
Xiphinema surinamense 1G
Longidorus biformis 2G
Longidorus biformis 1G
Longidorus sp.2G
Longidorus paralongicaudatus 1G
Longidorus breviannulatus 1G
Longidorus crassus 1G
Longidorus paravineacola 1G
Longidorus paravineacola 3G
Longidorus paravineacola 2G
Longidorus grandis 1G
Longidorus fragilis 1G
Longidorus euonymus 1G
Longidorus dunensis 3
Longidorus dunensis 2
Longidorus dunensis 1
Longidorus elongatus 1G
Longidorus elongatus 2G
Longidorus cf. intermedius
Longidorus attenuatus 1G
Longidorus piceicola 1G
Longidorus vineacola 1G
Longidorus africanus 1G
Longidorus sp.1G
Longidorus macrosoma 1G
Paralongidorus litoralis 2G
Paralongidorus litoralis 1G
Paralongidorus paramaximus 1G
Paralongidorus maximus 1G
Longidorus diadecturus 2G
Longidorus diadecturus 1G
Longidorus litchii 1G
Californidorus sp.1G
Nordiidae (subfamily Pungentinae)
Xiphinematinae (X. americanum group)
Xiphidorinae
Xiphinematinae
Longidorinae
Longidoridae
Towards other Dorylaimina

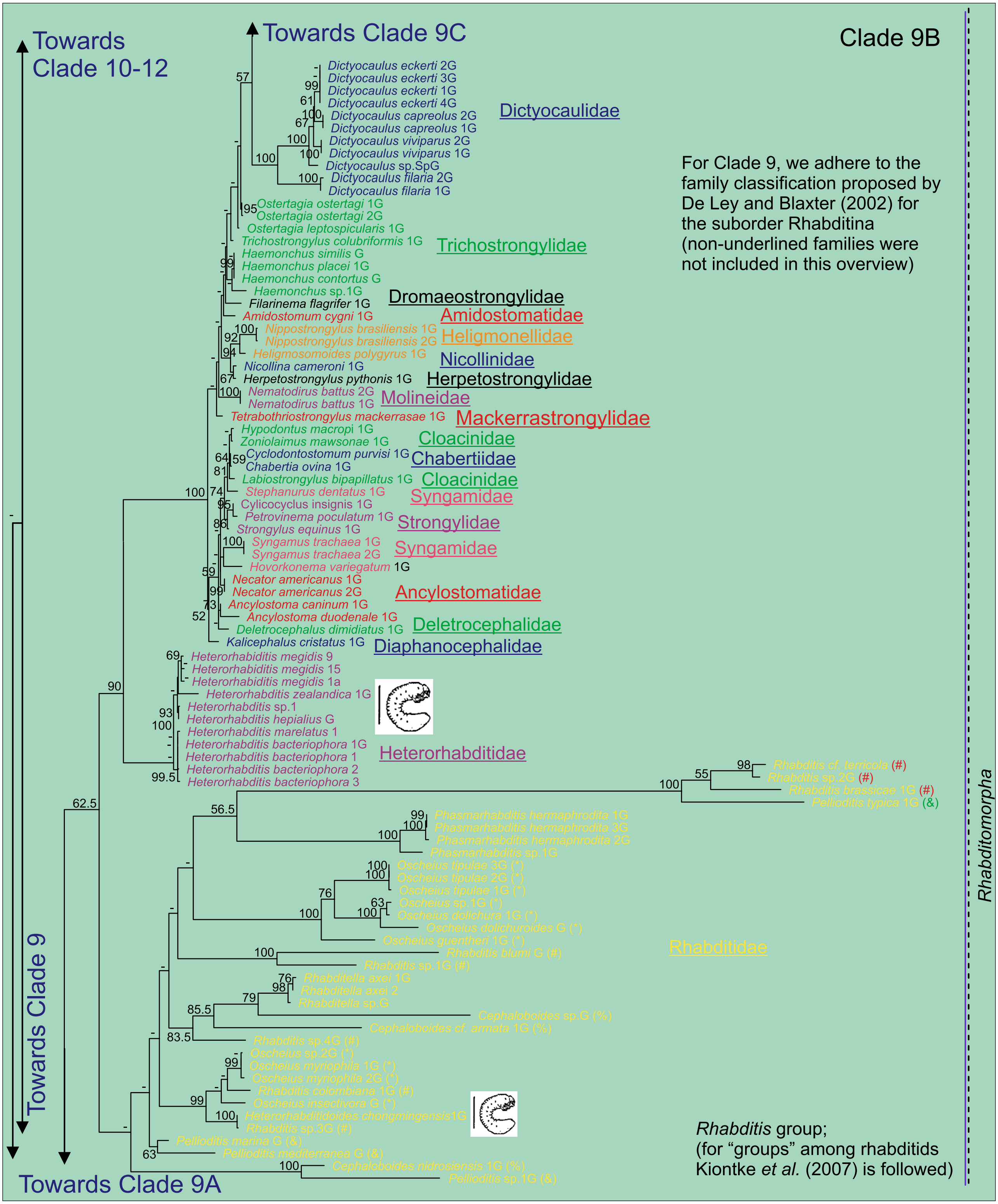

Towards bifurcations defining Clades 5B and 5C(poorly supported)
Clade 5A
57 Axonolaimus sp.1
94.5 Axonolaimus sp.2
- Axonolaimus sp.3
Desmodoridae (subfamily Spiriniinae)
Spirinia elongata 1G (?)
- 67 Ascolaimus elongatus 2G
100 Ascolaimus cf. elongatus 2
99 Ascolaimus cf. elongatus 1
- Odontophora sp.1
Axonolaimidae
100 Cylindrolaimus communis 1
Cylindrolaimus sp.G
Diplopeltidae
56.5
100 cf. Desmolaimus sp.3
cf. Desmolaimus sp.4
Linhomoeidae
- 98 Desmolaimus sp.2
Desmolaimus sp.1
96
100 Astomonema sp.2G
100 Astomonema sp.3G
Astomonema sp.1G
Siphonolaimidae
100 Aulolaimus oxycephalus 1
Isolaimium sp.1G
Aulolaimidae
Isolaimidae
Clade 5B
Clade 5C
53.5
- Diplolaimelloides sp.18G
- Diplolaimelloides sp.10G
- Diplolaimelloides sp.1G
- Diplolaimelloides sp.11G
100 60 Diplolaimelloides sp.17G
Diplolaimelloides sp.16G
99 Diplolaimelloides sp.9G
100 100 Diplolaimelloides meyli 1G
Diplolaimelloides meyli 2G
Diplolaimella dievengatensis 1G
88
- 100 Monhystera riemanni 1
100 Tridentulus sp.1G
Eumonhystera cf. simplex
100 Eumonhystera filiformis 2
Geomonhystera disjuncta 1G
Monhysteridae
86
100 Geomonhystera sp.3
Geomonhystera villosa 1
68.5
100
100 Daptonema sp.1
100 Metadesmolaimus 1G
99 Mesotheristus setosus 2G
100 Daptonema procerum G
Daptonema sp.1G
100
100 Theristus agilis 1
95 Theristus agilis 3
Theristus agilis 2
Xyalidae
67 100 Theristus acer 1G
Theristus sp.1
96
75
100 Sabatieria pulchra 1
Sabatieria pulchra 2
Comesomatidae
Diplopeltula sp.1
Diplopeltidae
Desmoscolex sp.2
Desmoscolecidae
Clade 4
100 Eubostrichus topiarius G
96 Eubostrichus parasitiferus G
61.5 Eubostrichus dianae G
54.5 Stilbonema majum G
- Robbea hypermnestra G
- Catanema sp.G
Laxus cosmopolitus G
84 Laxus oneistus G
68 Leptonemella sp.G
Desmodoridae (subfamily Stilbonematinae)
64
87 Metachromadora sp.1
100 Metachromadora sp.G
97.5 Metachromadora sp.2
85.5 Metachromadora remanei 2G
Desmodoridae (subfamily Spiriniinae)
50.5
90 Metachromadora (Chromadoropsis) vivipara G
95 Desmodora ovigera G
Xyzzors sp.G
Desmodoridae (subfamily Desmodorinae)
100
70 Acanthopharynx micans G
Epsilonematid sp.
Epsilonematidae
For Clade 4, we adhere to the (sub)family names used by Decreamer and Smol (2006)
-
Clade 3
100 Achromadora sp.2
99 Achromadora sp.1
96 Achromadora ruricola 1
Achromadora cf. terricola
Achromadoridae
88.5
91 Praeacanthonchus sp.2G
100 Cyatholaimus sp.2G
80.5 Praeacanthonchus sp.1G
100 Paracyatholaimus intermedius 1G
Paracanthonchus caecus G
Cyatholaimidae
-
100 Ethmolaimus pratensis 1
Ethmolaimus pratensis 2
Ethmolaimidae
-
54.5 Chromadorid sp.2
75.5 Chromadorita cf. leuckarti 1Z
- Dichromadora sp.1
100 Ptycholaimellus sp.1
100 Chromadorina sp.2
100 Chromadorina sp.1
Prochromadora sp.1
Chromadoridae
-
-
100 Choanolaimus psammophilus 3
75 Choanolaimus psammophilus 2
Choanolaimus psammophilus 4
75
100 Synonchiella sp.1
Halichoanolaimus sp.1
Selachinematidae
100
100 Prodesmodora sp.2
98 Prodesmodora circulata 4
100 Haliplectus bickneri 1
Prodesmodora sp.3
Desmodoridae (subfamily Prodesmodorinae)
Haliplectidae
Monoposthia sp.1
Monoposthiidae
Towards bifurcation defining Clades 2 and 3-12


Towards bifurcations defining Clades 7 and 8
Towards Clade 8B
Clade 8A
Wellcomia sp.1G
Wellcomia siamensis 1G
Protozoophaga obesa 1G
Oxyuridae
Passalurus sp.1G
Dentostomella sp.G
Heteroxynematidae
Skrjabinema sp.1G
Oxyuris equi 1G
Oxyuridae
Thelastoma krausi 1G
Leidynema portentosae 1G
Thelastomatidae
Rondonia rondoni 1G
Atractidae
Gnathostoma binucleatum G
Gnathostoma neoprocyonis G
Gnathostoma turgidum G
Gnathostomatidae
Gnathostomatomorpha
Anguillicola crassus 2G
Anguillicola crassus 1G
Anguillicolidae
Dracunculoidea
Truttaedacnitis truttae 1G
Cucullanidae
Oxyuridomorpha
Ascaridomorpha
Teratocephalus lirellus G
Teratocephalus terrestris 1
Teratocephalidae (family incertae sedis)
Clade 7
Clade 6
Tylocephalus auriculatus 1G
Tylocephalus auriculatum 2
Wilsonema otophorum 2
Wilsonema schuurmansstekhoveni 1G
Ceratoplectus armatus 1
Plectus cf. parvus
Plectus sp.G
Plectus cf. pusillus 2
Plectus cf. pusillus 1
Plectus acuminatus G
Plectus cf. cirratus 1
Plectus cf. parietinus 2
Plectid sp.2
Plectus cf. parietinus 1
Plectus aquatilis 1G
Plectid sp.1
Plectus aquatilis 1
Plectus rhizophilus 1
Plectus rhizophilus 2
Plectus cirratus 2
Plectidae
Anaplectus porosus 2
Anaplectus porosus 1
Anaplectus sp.1G
Anaplectus grandepapillatus 2
Anaplectus grandepapillatus 1
Onchium sp.1
Camacolaimus sp.2
Camacolaimus sp.1
Camacolaimidae
Deontolaimus papillatus 2
Deontolaimus papillatus 1
Procamacolaimus sp.1
Setostephanolaimus spartinae 1
Plectida incertae sedis
Chronogaster sp.2
Chronogaster polonica
Chronogaster typica 1
Chronogastridae
Chronogaster boettgeri 1
Chronogaster sp.3
Domorganus macronephritices 1
Ohridiidae (family incertae sedis)
Metateratocephalus crassidens 2
Metateratocephalus crassidens 1
Metateratocephalus crassidens 3
Metateratocephalidae
Euteratocephalus palustris 1
Euteratocephalus sp.1
Aphanolaimus aquaticus 1
Aphanolaimus aquaticus 2
Aphanolaimidae
Aphanonchus cf. europaeus 1
Paraplectonema pedunculatum 1
Leptolaimus sp.2
Leptolaimus sp.1
Leptolaimidae
Leptolaimus sp.3
Towards Clades 1-4, 5A
Towards Clade 5C
Towards Clade 5B
100
77
100
93
99
87
83
99
53
100
92
100
77.5
100
94
100
100
100
78
84
100
72
77
83
91
100
79
94
90
78
100
100
100
88
100
100
98
100
58
100
100
100
100
54
100
99
99
100
78.5
100
82
96
100
100
100
-



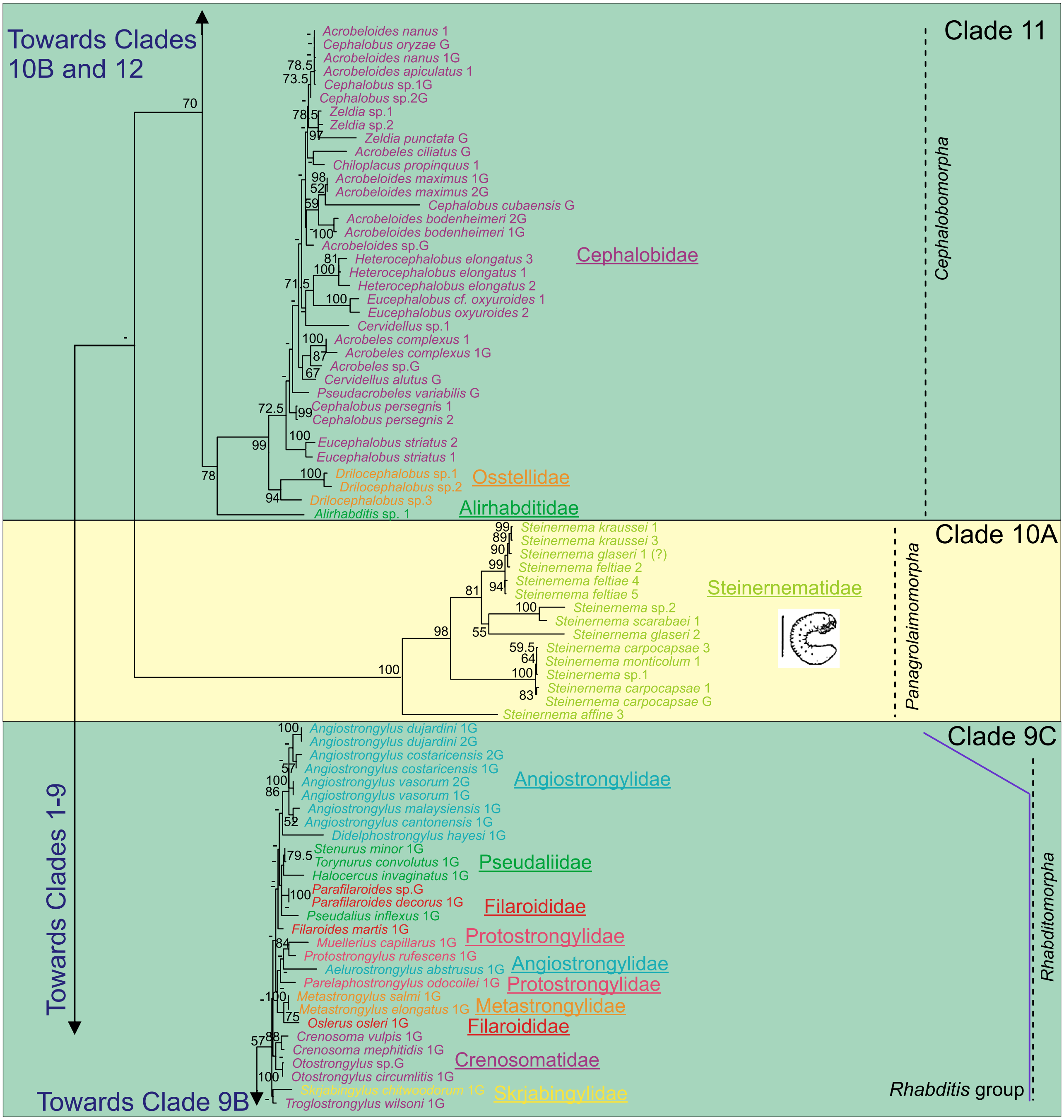
For Clade 8, we adhere to the family names used by Nadler *et al.* (2007). Infraorder names (-*omorpha*) are given in italics.

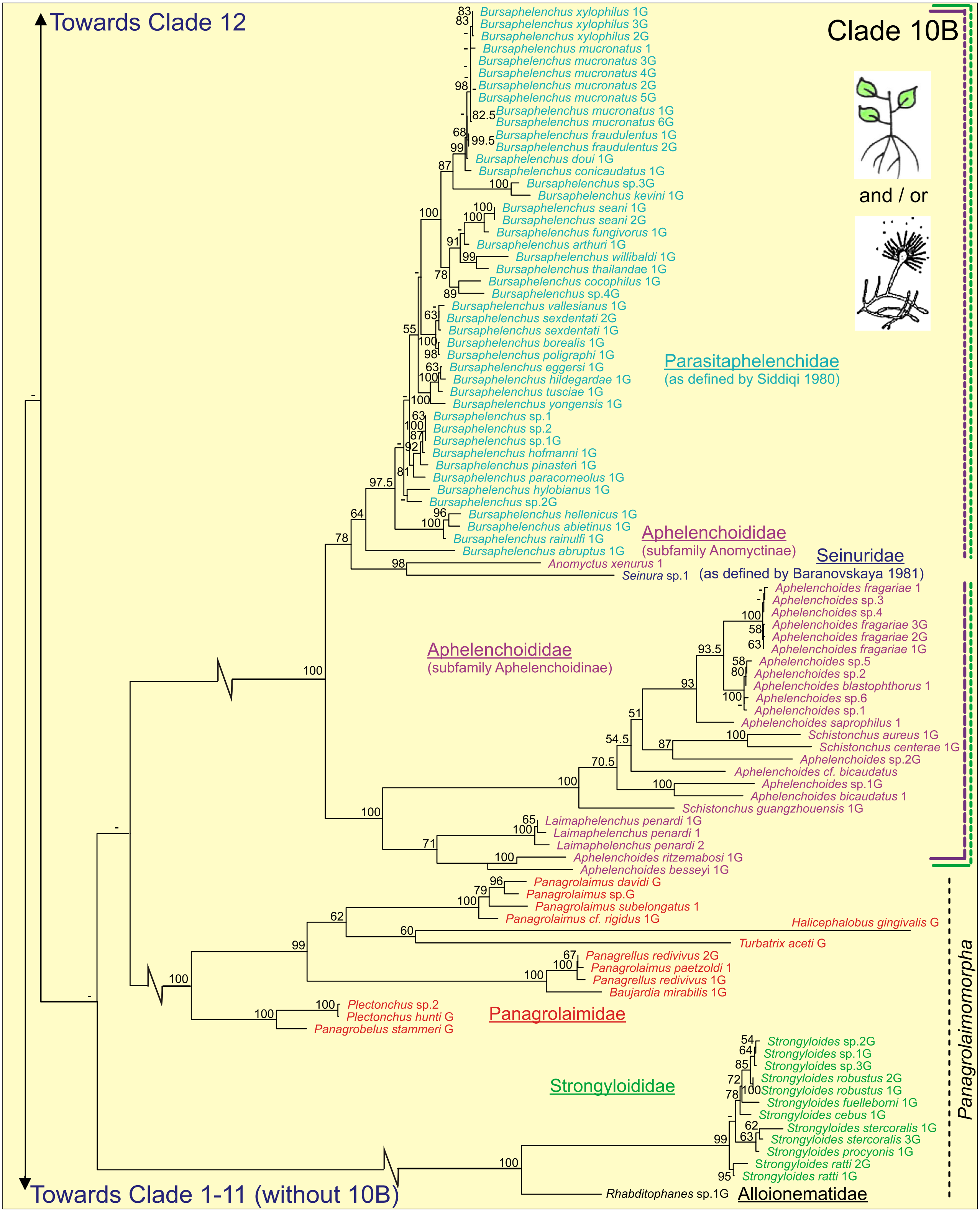

Towards bifurcation defining Clade 9 and Clades 10-12 (poorly supported)
Towards Clade 9B,C
Clade 9A
Cruznema sp.2
Cruznema sp.1
Cruznema sp.3
Cruznema sp.4
Cruznema tripartitum 2G
Cruznema tripartitum 1G
Choriorhabditis cristata 1G
Choriorhabditis dudichi G
Rhabditis group
Rhabditidae
Caenorhabditis elegans 3G
Caenorhabditis elegans 1G
Caenorhabditis elegans 1
Caenorhabditis elegans 2G
Caenorhabditis sp.2G
Caenorhabditis japonica 1G
Caenorhabditis vulgaris G
Caenorhabditis briggsae G
Caenorhabditis sp.5G
Caenorhabditis sp.1G
Caenorhabditis plicata 1G
Caenorhabditis drosophilae G
Caenorhabditis sp.4G
Caenorhabditis sonorae G
Caenorhabditis sp.3G
Caenohabditis
Diploscapter sp.2G
Diploscapter sp.3G
Diploscapter sp.1G
Diploscapter coronatus 1
Diploscapteridae
Protorhabditis sp.3G
Protorhabditis group
Protorhabditis sp.2G
Prodontorhabditis wirthi 1G
Protorhabditis sp.1G
Rhabditidae
Mesorhabditis sp.2
Mesorhabditis sp.1G
Mesorhabditis sp.4
Mesorhabditidae
Mesorhabditis anisomorpha G
Mesorhabditis longespiculosa 1G
Parasitorhabditis obtusa 1G
Parasitorhabditis sp.G
Mesorhabditis scanica G
Teratorhabditis synpapillata G
Teratorhabditis ferrugineus 1G
Teratorhabditis palmarum G
Mesorhabditis group
Rhabditomorpha
Pelodera punctata G
Pelodera strongyloides G
Pelodera teres G
Pelodera pseudoteres 1G
Rhabditidae
Rhabditoides regina G ($)
Peloderidae
Pristionchus pseudaerivorus 1
Pristionchus aerivora 1
Pristionchus maupasi 1
Pristionchus americanus 1
Pristionchus mariannae 1
Pristionchus pauli 1
Pristionchus pacificus 2G
Pristionchus pacificus 1G
Pristionchus lheritieri 4
Pristionchus entomophagus 1
Pristionchus lheritieri 1G
Pristionchus lheritieri 2G
Pristionchus uniformis 1
Pristionchus lheritieri 3
Diplogasteridae
Diplogasteromorpha
Diplogaster rivalis 3
Myctolaimus ulmi 1G
Cylindrocorporidae
Demaniella sp.1
Acrostichus halicti G
Diplogasteroides magnus 1
Fictor sp.1
Tylopharynx foetidus 1G
Mononchoides striatus 1
Diplogastrid sp.
Koerneria sp.1G
Rhabditoides inermis G ($)
Rhabditidae
Bunonema reticulatum 3
Bunonema reticulatum 2
Bunonema richtersi 1
Bunonema richtersi 2
Bunonema franzi 1G
Bunonema reticulatum 1
Bunonema reticulatum 1G
Bunonema sp.G
Bunonematidae
Bunonematomorpha
Poikilolaimus centrocercus 1
Poikilolaimus oxycerca G
Poikilolaimus sp.1G
Poikilolaimus sp.2G
Rhabditoid sp.G
Rhabditidae
Rhabditoides inermiformis G ($)
Brevibucca sp.G
Brevibucca saprophaga 1G
Brevibuccidae (family incertae sedis)
Cuticonema vivipara 1G
Odontopharynx longicaudata 1
Odontopharyngidae
Myolaimus sp.G
Myolaimidae (suborder Myolaimina)
Towards Clade 1-8

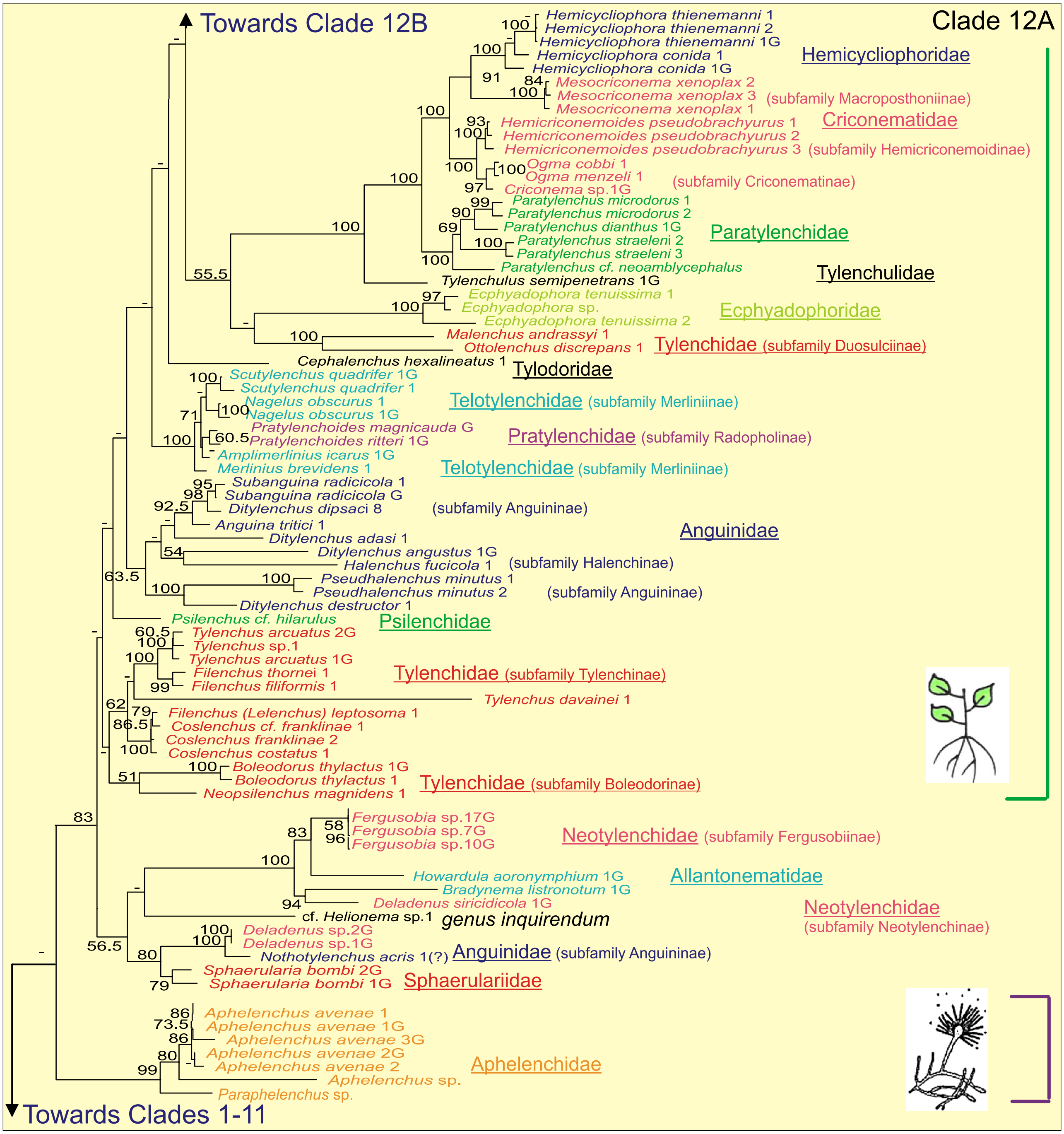


For Clade 9, we adhere to the family classification proposed by De Ley and Blaxter (2002) for the suborder Rhabditina (non-underlined families were not included in this overview)

Rhabditis group; (for “groups” among rhabditids Kiontke *et al.* (2007) is followed)


Towards Clades 10B and 12
Clade 11
Acrobeloides nanus 1
Cephalobus oryzae G
Acrobeloides nanus 1G
78.5
73.5
Acrobeloides apiculatus 1
Cephalobus sp.1G
70
Cephalobus sp.2G
78.5
Zeldia sp.1
Zeldia sp.2
97
Zeldia punctata G
Acrobeles ciliatus G
Chiloplacus propinquus 1
98
Acrobeloides maximus 1G
52
Acrobeloides maximus 2G
59
Cephalobus cubaensis G
Acrobeloides bodenheimeri 2G
100
Acrobeloides bodenheimeri 1G
Acrobeloides sp.G
Cephalobidae
81
Heterocephalobus elongatus 3
100
Heterocephalobus elongatus 1
71.5
Heterocephalobus elongatus 2
100
Eucephalobus cf. oxyuroides 1
Eucephalobus oxyuroides 2
Cervidellus sp.1
100
Acrobeles complexus 1
87
Acrobeles complexus 1G
Acrobeles sp.G
67
Cervidellus alutus G
Pseudacrobeles variabilis G
72.5
99
Cephalobus persegnis 1
Cephalobus persegnis 2
100
99
Eucephalobus striatus 2
Eucephalobus striatus 1
78
100
Drilocephalobus sp.1
Drilocephalobus sp.2
Osstellidae
94
Drilocephalobus sp.3
Alirhabditis sp. 1
Alirhabditidae
Cephalobomorpha
Clade 10A
99
Steinernema kraussei 1
89
Steinernema kraussei 3
90
Steinernema glaseri 1 (?)
99
Steinernema feltiae 2
81
94
Steinernema feltiae 4
Steinernema feltiae 5
Steinernematidae
100
Steinernema sp.2
Steinernema scarabaei 1
98
55
Steinernema glaseri 2
59.5
Steinernema carpocapsae 3
64
Steinernema monticolum 1
100
100
Steinernema sp.1
83
Steinernema carpocapsae 1
Steinernema carpocapsae G
Steinernema affine 3
Panagrolaimomorpha
Clade 9C
100
Angiostrongylus dujardini 1G
Angiostrongylus dujardini 2G
Angiostrongylus costaricensis 2G
57
Angiostrongylus costaricensis 1G
Angiostrongylidae
100
Angiostrongylus vasorum 2G
86
Angiostrongylus vasorum 1G
Angiostrongylus malaysiensis 1G
52
Angiostrongylus cantonensis 1G
Didelphostrongylus hayesi 1G
Towards Clades 1-9
Stenurus minor 1G
79.5
Torynurus convolutus 1G
Pseudaliidae
Halocercus invaginatus 1G
100
Parafilaroides sp.G
Parafilaroides decorus 1G
Filaroididae
Pseudalius inflexus 1G
Filaroides martis 1G
84
Muellerius capillarus 1G
Protostrongylidae
Protostrongylus rufescens 1G
Aelurostrongylus abstrusus 1G
Angiostrongylidae
Parelaphostrongylus odocoilei 1G
Protostrongylidae
100
Metastrongylus salmi 1G
75
Metastrongylus elongatus 1G
Metastrongylidae
Oslerus osleri 1G
Filaroididae
57
88
Crenosoma vulpis 1G
Crenosoma mephitidis 1G
Otostrongylus sp.G
Crenosomatidae
100
Otostrongylus circumlitis 1G
Skrjabingylus chitwoodorum 1G
Skrjabingylidae
Towards Clade 9B
Troglostrongylus wilsoni 1G
Rhabditomorpha
Rhabditis group


Towards Clade 12
Clade 10B
and / or
Bursaphelenchus xylophilus 1G
Bursaphelenchus xylophilus 3G
Bursaphelenchus xylophilus 2G
Bursaphelenchus mucronatus 1
Bursaphelenchus mucronatus 3G
Bursaphelenchus mucronatus 4G
Bursaphelenchus mucronatus 2G
Bursaphelenchus mucronatus 5G
Bursaphelenchus mucronatus 1G
Bursaphelenchus mucronatus 6G
Bursaphelenchus fraudulentus 1G
Bursaphelenchus fraudulentus 2G
Bursaphelenchus doui 1G
Bursaphelenchus conicaudatus 1G
Bursaphelenchus sp.3G
Bursaphelenchus kevini 1G
Bursaphelenchus seani 1G
Bursaphelenchus seani 2G
Bursaphelenchus fungivorus 1G
Bursaphelenchus arthuri 1G
Bursaphelenchus willibaldi 1G
Bursaphelenchus thailandae 1G
Bursaphelenchus cocophilus 1G
Bursaphelenchus sp.4G
Bursaphelenchus vallesianus 1G
Bursaphelenchus sexdentati 2G
Bursaphelenchus sexdentati 1G
Bursaphelenchus borealis 1G
Bursaphelenchus poligraphi 1G
Bursaphelenchus eggersi 1G
Bursaphelenchus hildegardae 1G
Bursaphelenchus tusciae 1G
Bursaphelenchus yongensis 1G
Bursaphelenchus sp.1
Bursaphelenchus sp.2
Bursaphelenchus sp.1G
Bursaphelenchus hofmanni 1G
Bursaphelenchus pinasteri 1G
Bursaphelenchus paracorneolus 1G
Bursaphelenchus hylobianus 1G
Bursaphelenchus sp.2G
Bursaphelenchus hellenicus 1G
Bursaphelenchus abietinus 1G
Bursaphelenchus rainulfi 1G
Bursaphelenchus abruptus 1G
Parasitaphelenchidae
(as defined by Siddiqi 1980)
Aphelenchoididae
(subfamily Anomyctinae)
Anomyctus xenurus 1
Seinura sp.1
Seinuridae
(as defined by Baranovskaya 1981)
Aphelenchoides fragariae 1
Aphelenchoides sp.3
Aphelenchoides sp.4
Aphelenchoides fragariae 3G
Aphelenchoides fragariae 2G
Aphelenchoides fragariae 1G
Aphelenchoides sp.5
Aphelenchoides sp.2
Aphelenchoides blastophthorus 1
Aphelenchoides sp.6
Aphelenchoides sp.1
Aphelenchoides saprophilus 1
Schistonchus aureus 1G
Schistonchus centerae 1G
Aphelenchoides sp.2G
Aphelenchoides cf. bicaudatus
Aphelenchoides sp.1G
Aphelenchoides bicaudatus 1
Schistonchus guangzhouensis 1G
Aphelenchoididae
(subfamily Aphelenchoidinae)
Laimaphelenchus penardi 1G
Laimaphelenchus penardi 1
Laimaphelenchus penardi 2
Aphelenchoides ritzemabosi 1G
Aphelenchoides besseyi 1G
Panagrolaimus davidi G
Panagrolaimus sp.G
Panagrolaimus subelongatus 1
Panagrolaimus cf. rigidus 1G
Halicephalobus gingivalis G
Turbatrix aceti G
Panagrellus redivivus 2G
Panagrolaimus paetzoldi 1
Panagrellus redivivus 1G
Baujardia mirabilis 1G
Plectonchus sp.2
Plectonchus hunti G
Panagrobelus stammeri G
Panagrolaimidae
Panagrolaimomorpha
Strongyloididae
Strongyloides sp.2G
Strongyloides sp.1G
Strongyloides sp.3G
Strongyloides robustus 2G
Strongyloides robustus 1G
Strongyloides fuelleborni 1G
Strongyloides cebus 1G
Strongyloides stercoralis 1G
Strongyloides stercoralis 3G
Strongyloides procyonis 1G
Strongyloides ratti 2G
Strongyloides ratti 1G
Rhabditophanes sp.1G
Alloionematidae
Towards Clade 1-11 (without 10B)


Towards Clade 12B
Clade 12A
Hemicycliophora thienemanni 1
Hemicycliophora thienemanni 2
Hemicycliophora thienemanni 1G
Hemicycliophora conida 1
Hemicycliophora conida 1G
Hemicycliophoridae
Mesocriconema xenoplax 2
Mesocriconema xenoplax 3
Mesocriconema xenoplax 1
(subfamily Macroposthoniinae)
Hemicriconemoides pseudobrachyurus 1
Hemicriconemoides pseudobrachyurus 2
Hemicriconemoides pseudobrachyurus 3
Criconematidae
(subfamily Hemicriconemoidinae)
Ogma cobbi 1
Ogma menzeli 1
Criconema sp.1G
(subfamily Criconematinae)
Paratylenchus microdorus 1
Paratylenchus microdorus 2
Paratylenchus dianthus 1G
Paratylenchus straeleni 2
Paratylenchus straeleni 3
Paratylenchus cf. neoamblycephalus
Paratylenchidae
Tylenchulus semipenetrans 1G
Tylenchulidae
Ecphyadophora tenuissima 1
Ecphyadophora sp.
Ecphyadophora tenuissima 2
Ecphyadophoridae
Malenchus andrassyi 1
Ottolenchus discrepans 1
Tylenchidae (subfamily Duosulciinae)
Cephalenchus hexalineatus 1
Tylodoridae
Scutylenchus quadrifer 1G
Scutylenchus quadrifer 1
Nagelus obscurus 1
Nagelus obscurus 1G
Telotylenchidae (subfamily Merliniinae)
Pratylenchoides magnicauda G
Pratylenchoides ritteri 1G
Pratylenchidae (subfamily Radopholinae)
Amplimerlinius icarus 1G
Merlinius brevidens 1
Telotylenchidae (subfamily Merliniinae)
Subanguina radicicola 1
Subanguina radicicola G
Ditylenchus dipsaci 8
(subfamily Anguininae)
Anguina tritici 1
Ditylenchus adasi 1
Anguinidae
Ditylenchus angustus 1G
Halenchus fucicola 1
(subfamily Halenchinae)
Pseudhalenchus minutus 1
Pseudhalenchus minutus 2
(subfamily Anguininae)
Ditylenchus destructor 1
Psilenchus cf. hilarulus
Psilenchidae
Tylenchus arcuatus 2G
Tylenchus sp.1
Tylenchus arcuatus 1G
Filenchus thornei 1
Filenchus filiformis 1
Tylenchidae (subfamily Tylenchinae)
Tylenchus davainei 1
Filenchus (Lelenchus) leptosoma 1
Coslenchus cf. franklinae 1
Coslenchus franklinae 2
Coslenchus costatus 1
Boleodorus thylactus 1G
Boleodorus thylactus 1
Neopsilenchus magnidens 1
Tylenchidae (subfamily Boleodorinae)
Fergusobia sp.17G
Fergusobia sp.7G
Fergusobia sp.10G
Neotylenchidae (subfamily Fergusobiinae)
Howardula aoronymphium 1G
Allantonematidae
Bradynema listronotum 1G
Deladenus siricidicola 1G
Neotylenchidae
(subfamily Neotylenchinae)
cf. Helionema sp.1
genus inquirendum
Deladenus sp.2G
Deladenus sp.1G
Nothotylenchus acris 1(?)
Anguinidae (subfamily Anguininae)
Sphaerularia bombi 2G
Sphaerularia bombi 1G
Sphaerulariidae
Aphelenchus avenae 1
Aphelenchus avenae 1G
Aphelenchus avenae 3G
Aphelenchus avenae 2G
Aphelenchus avenae 2
Aphelenchus sp.
Paraphelenchus sp.
Aphelenchidae
Towards Clades 1-11
100
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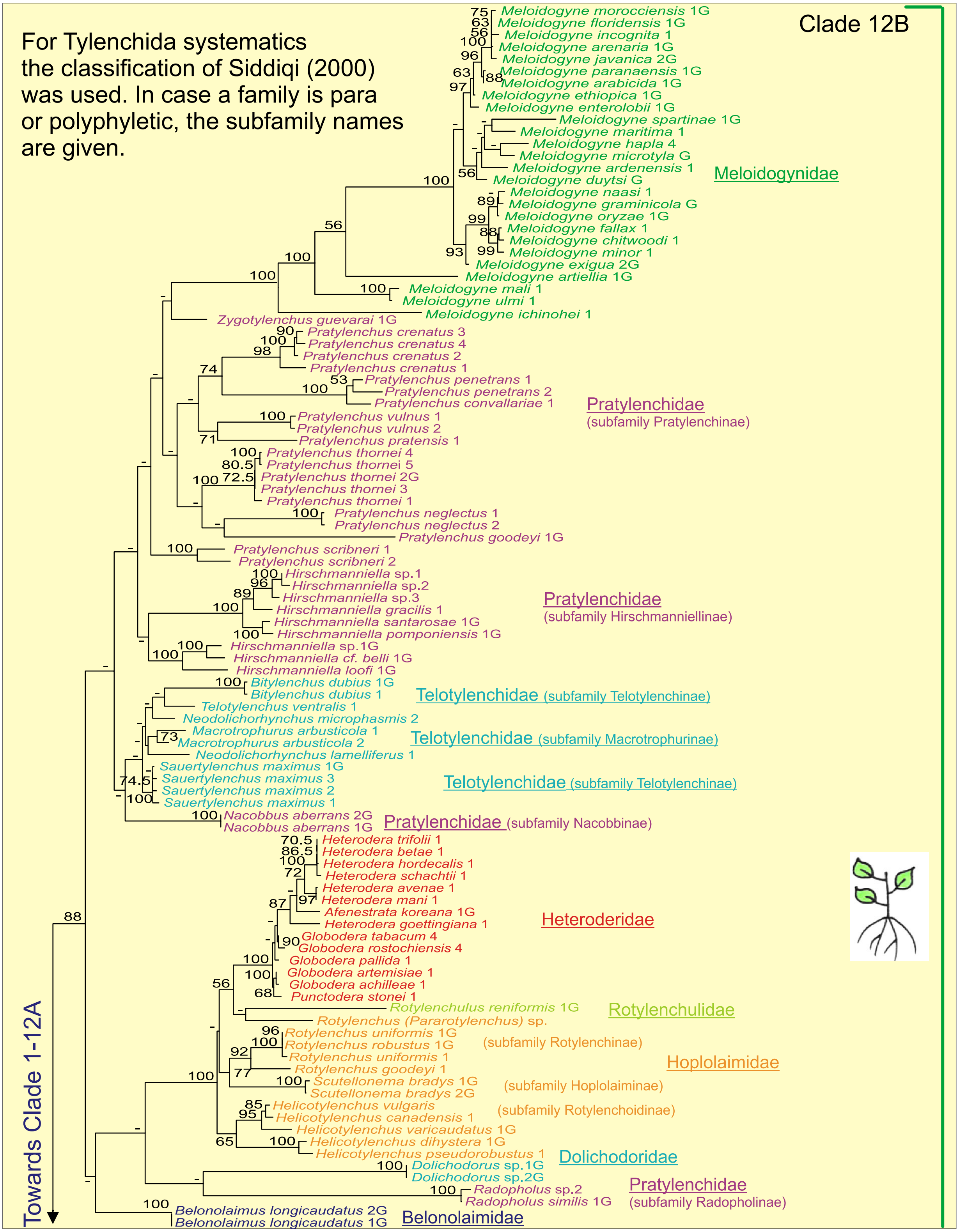

For Tylenchida systematics the classification of Siddiqi (2000) was used. In case a family is para or polyphyletic, the subfamily names are given.

CLADE 1 – ENOPLIDA AND TRIPLONCHIDA

Since the bootstrap support for the second major node between Clade 2 (subclass Dorylaimia) and Clades 3-12 (63%) is just below the threshold value (65%), we cannot further confirm the basal positioning of Clade 1 as proposed by Holterman *et al.* (2006) on the basis of SSU rDNA sequences and embryological and morphological arguments. Within this clade there is a well-supported split between the Enoplida and the Triplonchida. In a single case, representatives of the family Tripylidae (usually placed within the order Triplonchida) are found in both orders. *Trischistoma* and *Tripylina* reside among the Enoplida, whereas *Tripyla* and *Tripylella* members are positioned among the Triplonchida. Similarities in the morphology of the labial region, the amphids, the digestive system and the male copulatory apparatus support the sister relationship between *Trischistoma* and *Trefusia*. For similar reasons Brzeski and Winiszewska-Ślipińska (1993) proposed the removal of the genus *Trischistoma* (but not *Tripylella*) from the Tripylidae.

Within the suborder Diphtherophorina, members of the Diphtherophoridae are positioned at the base of the Trichodoridae. The subdivision of the Trichodoridae (most sequences were generated by Dr Konstantina Boutsika in the framework of her Ph.D. thesis: see Boutsika, 2002) is remarkably similar to the grouping of (*Para*)*Trichodorus* on the basis of the cuticle fine structure as presented by Karanastasi *et al.* (2001); Type 1, represented by *T. cylindricus*, *T. primitivus* and *T. similis* (here supplemented with *T. variopapillatus*), constitutes a single cluster (see Clade 1B). This also holds for Type 2, represented here by *Nanidorus* (*Paratrichodorus*) *minor*, *N. nanus*, *T. nanjingensis* and *T. pakistanensis*. The SSU rDNA based analyses suggests a sister relationship between Type 1 and Type 2 (*Para*)*Trichodorus* groups. A third group (Type 3), defined on the basis of the cuticle structure, which included *Paratrichodorus pachydermus*, *P. anemones*, *P. hispanus*, and *P. teres*, was confirmed by molecular data. The current analysis suggests that *P. macrostylus* and *P. allius* also belong to this group and points at a sister relationship between Types 1 and 2 on the one hand, and Type 3 on the other.

The close relationship between the Bastianiidae (family *incertae sedis*) and the Prismatolaimidae (order Triplonchida, suborder Tobrilina) confirms earlier results from Coomans and Raski (1988) who pointed out a remarkable number of similarities between *Prismatolaimus* and *Bastiania* in the structure of sensilla, amphid, cardia, supplements, spicules and gubernaculum. The genera *Prismatolaimus*, *Bastiania* and *Dintheria*, which constitute a well supported subclade sister to the Diphtherophorina, share several characteristics of the male copulatory apparatus, including spicule and gubernaculum shape, arrangement of spicule protractors and supplement shape (Holovachov, 2006).

Within the order Enoplida, a well-supported cluster was formed by members of the genera *Rhabdolaimus* (Rhabdolaimidae, family *incertae sedis*), *Campydora* (Campydoridae) and *Syringolaimus* (Ironidae). Previously, Chitwood (1951) united the genera *Rhabdolaimus* and *Syringolaimus* in the subfamily Rhabdolaiminae, having three minute, outwardly directed, teeth as a common characteristic. *Campydora* species have only one, elongated, dorsal tooth (Andrássy, 2007). The three genera are united by a strongly sclerotised lumen in the swollen, bulb-like, posterior end of the pharynx (Chitwood, 1951; Andrássy, 2007).

CLADE 2 – SUBCLASS DORYLAIMIA

Most of the orders residing within the subclass Dorylaimia (*i.e.*, Dorylaimida, Mononchida, Isolaimida, Dioctophymatida, Muspiceida, Marimermithida, Mermithida and Trichinellida) are represented in Clade 2. Muspiceida and Marimermithida (marine nematodes) are missing as no ribosomal DNA data are available. Isolaimida, here represented by a single SSU rDNA sequence from *Isolaimium* sp., was placed in Clade 5B. This is an elaboration on the results presented by Mullin *et al.* (2005) proposing an exclusion of the Isolaimida from the Dorylaimia. The positioning of *Isolaimium* and *Aulolaimus* in Clade 5B is discussed in detail in Holterman *et al.* (2008b).

As compared with Holterman *et al.* (2008a), one family is added, namely the Capillariidae. A sister relationship was observed between the two members of the Capillariidae, *Capillaria tenuissima* and *Eucoleus dispar* (both isolated from the digestive system of the common buzzard (Honisch & Krone, 2008)) and representatives of the Trichuridae. This is a confirmation of morphology-based taxonomy which places both families within the superfamily Trichinelloidea.

Within the Longidoridae, three subfamilies are indicated in Figure 1 (Clade 2C), *viz.*, Xiphinematinae, Xiphidorinae and Longidorinae (see Hunt, 1993). For the *Xiphinema americanum*-group we used the species list from Lamberti *et al.* (2000). Most of the Longidoridae data shown here were generated by and discussed in Neilson *et al.* (2004), and the data set was supplemented by unpublished GenBank sequences from Dr S.S. Lazarova and co-workers. For the status and the positioning of the genus *Xiphidorus* we refer to Oliveira *et al.* (2004). Originally, the atypical genus *Californidorus* was placed in a separate subfamily (Californidorinae) under the Longidoridae. Mainly based on the number of pharyngeal glands (five instead of three in the longidorids), Jairajpuri (1982) decided to place this genus under the Nordiidae. For further discussion on the Dorylaimida we refer to Holterman *et al.* (2008a).

CLADES 3 TO 7 – BASAL CHROMADORIA

As compared with Holterman *et al.* (2008b), the inclusion of SSU rDNA sequences from additional taxa resulted in a re-positioning of the Selachinematidae. This family is usually placed within the suborder Chromadorina and, in the current analysis, it is indeed placed within Clade 3, although without bootstrap support.

Most remarkable is the highly polyphyletic nature of the Desmodoridae. Within this family, six subfamilies are distinguished, *viz*., Desmodorinae (predominantly marine), Spiriniinae (marine), Prodesmodorinae (limnoterrrestrial), Stilbonematinae (marine), Pseudonchinae (marine) and Molgolaiminae (marine). Only the first four are represented in the current SSU rDNA-based tree. Within Clade 4, the Stilbonematinae appear as a single monophyletic group, whereas the Desmodorinae and most of the Spiriniinae (exception: *Spirinia elongata* among Axonolaimidae) also form a single cluster. The positioning of the genus *Prodesmodora* together with *Haliplectus bickneri* sister to Clades 3-12 (no support) questions whether this single-genus subfamily should indeed reside in the family Desmodoridae.

The clustering of representatives of the Linhomoeidae and Siphonolaimidae fits well in current nematode systematics as both reside within the superfamily Siphonolaimoidea. For further discussion of subclades 5A, B and C and the polyphyletic nature of the Monhysterida and Araeolaimida see Holterman *et al.* (2008b).

Domorganus macronephritices (Ohridiidae – family *incertae sedis*) was placed amidst the Plectida families in Clade 6, but the relationship with other Plectida families remains unclear.

CLADE 8 – BASAL RHABDITIDA

Clade 8 comprises the Rhabditida ('Secernentea') superfamily Dracunculoidea, and the infraorders Spiruromorpha, Ascaridomorpha, Oxyuridomorpha, Gnathostomatomorpha and Rhigonematomorpha. Because the use of infraorders for zooparasitic nematodes is relatively new, their representation is indicated in Figure 1 (Clade 8A, B). The superfamily Dracunculoidea (except *Anguillicola crassus*) is robustly placed within the Spiruromorpha. Within Spiruromorpha *sensu lato* a subdivision is observed between the Dracunculoidea and the Camallanidae on the one hand, and the other Spiruromorpha on the other. The Rhigonematomorpha are represented by two species only, belonging to different families. Both rhigonematid rDNA sequences were associated with Ascaridomorpha representatives (but without bootstrap support). Two families, Atractidae and Cucullanidae, were placed outside the Ascaridomorpha but, as they are each represented by one species only, there is no basis for firm conclusions with regard to their systematic position. Most SSU rDNA sequences in Clade 8 were presented in Nadler *et al.* (2007). There is no essential difference between the topology presented here and the trees included in this paper and for an excellent further discussion we refer to Nadler *et al.* (2007).

CLADE 9 – RHABDITIDAE AND RELATED FAMILIES

The species-rich Clade 9 includes the infraorders Bunonematomorpha, Diplogasteromorpha and Rhabditomorpha. Most deep relationships within Clade 9 are unresolved, except for a major bifurcation in the Rhabditomorpha between the superfamily Mesorhabditoidea (= Mesorhabditidae and Peloderidae) on the one hand and the Rhabditoidea (= Rhabditidae and Diploscapteridae) and the Strongyloidea (Heterorhabditidae and animal parasite families) on the other. Apart from animal-parasitic and insect-parasitic nematodes, more loose associations with arthropods and gastropods are found within the superfamilies Rhabditoidea and Mesorhabditoidea. These associations involve either the facilitation of transport (phoresy) or necromeny. Necromeny implies that dauer juveniles only start feeding and develop into adults after the death of its host (apparently without promoting this) upon the colonisation of the insect cadaver by saprophytic bacteria.

Within the *Rhabditis* group, as defined by Kiontke *et al.* (2007), and apart from the family Heterorhabditidae, another member of the group of entomopathogenic nematodes (EPN) was found in Eastern China, namely *Heterorhabditidoides chongmingensis* (Zhang *et al.*, 2008). It is noteworthy that *Rhabditis* sp. 3, with a SSU rDNA sequence almost identical to that of *H. chongmingensis*, was also collected from China. Two close relatives of this novel EPN, *Rhabditis* (*Oscheius*) *colombiana* and *Oscheius tipulae*, are associated with the subterranean burrower bug (*Cyrtomenus bergi*; Stock *et al.*, 2005) and with leatherjackets (*Tipula paludosa*; Sudhaus, 1993). Members of the genus *Caenorhabditis* are not normal soil inhabitants, being found only in nutrient rich environments such as compost heaps or in association with arthropods or gastropods (for overview see Kiontke & Sudhaus, 2006). A similar phenomenon was described for a member of the Mesorhabditidae: originally *Teratorhabditis synpapillata* was found in cow dung from Bali (Indonesia), but was recently described in association with the red palm weevil (*Rhynchophorus ferrugineus*; see Kanzaki *et al.*, 2008). A related species, *Parasitorhabditis platidontus*, was described as a parasite of *Cyclocephala signaticollis* (Reboredo & Camino, 2000). Occasionally, true parasitic interactions occur among Rhabditoidea and Mesorhabditoidea (*e.g.*, *Phasmarhabditis hermaphrodita* on slugs and *H. chongmingensis* on insects). Hence, loose associations between members of the Rhabditomorpha and arthropods and gastropods are widespread and not confined to one or two groups.

Rhabditidae genera within the *Rhabditis*-group are often poly- and/or paraphyletic (*e.g.*, *Rhabditis*, *Pellioditis*, *Cephaloboides* and *Oscheius* – each indicated with a distinct symbol in Figure 1). In part this can be explained by the unstable state of Rhabditidae systematics. For instance, *Pellioditis marina* is occasionally placed within the genus *Rhabditis* (Derycke *et al.*, 2008), *Oscheius tipulae* is sometimes placed within the genus *Rhabditis* (Sudhaus, 1993), whereas *Rhabditis colombiana* is also known as *Oscheius colombiana* (Stock *et al.*, 2005). Apart from this, molecular and morphological data indicate that the actual diversity among Rhabditidae could be substantially larger than that suggested by classical taxonomists. This can be illustrated by *P. marina* that was recently shown to be an 'umbrella taxon' for a huge species complex (Derycke *et al.*, 2008).

It is noted that the Brevibuccidae, a family *incertae sedis* according to De Ley *et al.* (2006), was formerly placed in Clade 10 (Holterman *et al.*, 2006). This new positioning will not be discussed here because in both instances it received insufficient support.

CLADE 10 – APHELENCHOIDEA PART I (PARASITAPHELENCHIDAE, APHELENCHOIDIDAE AND SEINURIDAE) AND THE PANAGROLAIMOMORPHA

In a previous analysis by Holterman *et al.* (2006), a sister relationship between the Steinernematidae and Strongyloididae/Alloionematidae was observed. The inclusion of more taxa and the use of a new, faster, maximum likelihood program resulted in Clade 10 splitting into part A and B. One of the reasons underlying the instability of Clade 10 could be the elevated AT-contents of *Bursaphelenchus* spp. (De Ley & Blaxter, 2002), and the Panagrolaimomorpha (AT-content *ca* 57%; Holterman *et al.*, 2006). Hence, the current composition of Clade 10 is probably biased by long-branch attraction (LBA) artefacts although, as there is as yet no properly supported alternative, there is little point proposing an alternative.

At the base of the Aphelenchoididae, there is a bifurcation between *Laimaphelenchus*, and two *Aphelenchoides* species, *viz.*, *A. besseyi* (the causal agent of 'white tip' in rice) and *A. ritzemabosi* (chrysanthemum leaf nematode) on the one hand, and the remaining *Aphelenchoides* species and the representatives of the genus *Schistonchus* on the other. Although it is realised that only a subset of the described species is included here, it is remarkable to see that this split coincides with the tail tip morphology, both *A. besseyi* and *A. ritzemabosi* having a mucro with two to four pointed processes, whereas *Laimaphelenchus* species are usually characterised by fringed tubercles on the tail tip (Hunt, 1993). *Aphelenchoides fragariae*, *A. blastophthorus* and *A. saprophilus* possess a single, poorly to well developed mucro devoid of any processes. *Schistonchus* species have a tail with a mucronate tip (Hunt, 1993) and in *A. bicaudatus* the tail is terminally bifurcate. Hence, the presence or absence of processes on the tail tip seems to support the split within the Aphelenchoididae as revealed by ribosomal DNA data. Based on these results it may be worthwhile investigating in more detail whether *Schistonchus* should be maintained as a separate genus.

Another remarkable feature of Clade 10 is the positioning of *Anomyctus* and *Seinura* at the base of the Parasitaphelenchidae. A characteristic that coincides with this split is the morphology of the cephalic region. Contrary to the Aphelenchoidinae, Anomyctinae have a high cephalic region which is strongly offset by a constriction. This high and offset cephalic region is also typical for *Seinura* and *Bursaphelenchus* species.

CLADE 11 – CEPHALOBOMORPHA

The infraorder Cephalobomorpha includes five families: Cephalobidae, Osstellidae, Alirhabditidae, Elaphonematidae and Bicirronematidae. The first three families are represented here. It is noted that the non-represented families comprise only a small number of genera (Elaphonematidae: *Acromoldavicus*, *Kirjanovia* and *Elaphonema* (Baldwin *et al.*, 2001) and Bicirronematidae: *Trualaimus*, *Tricirronema* and *Bicirronema* (Holovachov *et al.*, 2003). Except for *Acromoldavicus*, for which some partial LSU rDNA sequences are available, no molecular data have been generated from these families. In accordance with a previous study based on partial LSU rDNA data (Nadler *et al.*, 2006), SSU rDNA sequences confirm the monophyly of the taxa presenting the superfamily Cephaloboidea, the only superfamily within the Cephalobomorpha. Compared with most other nematode families, SSU rDNA variation between representatives of the Cephalobidae is very limited. Moreover, most genera do not appear as monophyletic groups (see for instance *Cephalobus* or *Acrobeloides*). Attempts to resolve Cephalobidae relationships on the basis of LSU rDNA D1-D3 domains failed; D1 and D3 were too conserved, whereas the high variability of the D2 domains among outgroup species hampered proper alignment (O. Holovachov, unpubl.). The para- or polyphyly of genera can further be explained by the fact that, in the past, Cephalobidae systematics was mainly based on labial morphology (probolae). Phenotypic plasticity of probolae morphology and homoplasy – parallel and convergent evolution of lip morphology among Cephalobidae members – make lip morphology a poor choice as a basis for cephalobid systematics. The current data set does not allow us to say whether complex probolae are an ancestral (Nadler *et al.*, 2006) or a derived (De Ley *et al.*, 1993) character.

CLADE 12 – APHELENCHOIDEA PART II (APHELENCHIDAE) AND THE TYLENCHIDA

Out of the two families of the superfamily Aphelenchoidea, the Aphelenchidae and Aphelenchoididae, only the first family is found at the base of Clade 12. The Aphelenchidae genera *Aphelenchus* and *Paraphelenchus* are predominantly mycetophagous. Additional molecular data are needed to confirm their position as an immediate sistergroup of the Tylenchida. It is noted that the other family of the Aphelenchoidea, the Aphelenchoididae, was placed in Clade 10 in a sister relationship with (mainly) the Parasitaphelenchidae. Interestingly, the cellulases from Clade 12 members investigated so far, including *Aphelenchus avenae* (Dr Taisei Kikuchi, Tsukuba, Japan, pers. comm.), all belong to glycoside hydrolase family (GHF) 5, whereas cellulases from the Parasitaphelenchidae (Clade 11, close to the Aphelenchoididae) belong to GHF 45 (Kikuchi *et al.*, 2004).

Close to the base, there is a major split between the insect-associated and the plant-parasitic Tylenchida. Among the more basal Tylenchida families the resolution is poor; in fact we observe a large polytomy closely resembling the one presented by Holterman *et al.* (2009). Worthwhile mentioning is the positioning of *Halenchus fucicola*, a parasite of marine plants. Together with *Hirschmanniella* spp., such as *H. zostericola*, *H. mexicana*, and *H. marina* (species from which no rDNA data are available yet) (Sher, 1968), *H. fucicola* constitutes one of the rare examples in the Tylenchida that made the transition from terrestrial to marine habitats.

Recently, only two tylenchid groups were reported to be monophyletic, namely the Criconematoidea and the Hoplolaimidae (including the cyst and cystoid nematodes) (Bert *et al.*, 2008). Concerning the superfamily Criconematoidea, it should be noted that Bert *et al.* (2008) followed the Criconematoidea definition given by De Ley *et al.* (2006), including the families Criconematidae, Hemicycliophoridae and Tylenchulidae. We adhered to the Tylenchida systematics of Siddiqi (2000) in which the same superfamily name comprises the Criconematidae only. The suborder Criconematina *sensu* Siddiqi (2000) corresponds to the superfamily Criconematoidea *sensu* De Ley *et al.* (2006) and this cluster within Clade 12 indeed appears to be monophyletic.

In a more distal part of the tree (Clade 12B), a major split is observed between (mainly) the Heteroderidae and Hoplolaimidae, and most Pratylenchidae and Meloidogynidae. In Bert *et al.* (2008) the Hoplolaimidae include cyst and cystoid nematodes and the reniform nematode *Rotylenchulus reniformis*. Here, the inclusion of more taxa (from 11 to 27) resulted in a confirmation of the monophyletic nature of the Hoplolaimidae *sensu lato* (Hoplolaimidae, Heteroderidae and Rotylenchulidae).

According to Siddiqi (2000), "Meloidogynidae and Heteroderidae most probably originated from ancestors similar to the contemporary, migratory Pratylenchidae and Hoplolaimidae, respectively" (p. 372). SSU rDNA data presented here and in a recent paper on Tylenchida evolution (Holterman *et al.*, 2009) tentatively support the first hypothesis. We hypothesise that members of the genera *Belonolaimus*, *Radopholus* or *Dolichodorus* could be relatively closely related to the common ancestor of the Hoplolaimidae and the Heteroderidae.

Concluding remarks

From the 19 nematode orders included in the classification framework presented by De Ley *et al.* (2006), 15 are represented in this paper. As compared with Holterman *et al.* (2006), the number of SSU rDNA sequences was more than tripled and, instead of Bayesian inference, a fast maximum likelihood method was used (including the gamma parameter). The resulting phylogenetic tree is presumably the largest published so far and the subdivision of the phylum Nematoda into 12 clades as proposed by Holterman *et al.* (2006) still seems to hold. However, the deep subdivision of the phylum Nematoda should be regarded as ‘work in progress’, and a multi loci approach will be required for a more definitive framework.

The SSU rDNA-based molecular framework of the phylum Nematoda shows the extensiveness of parallel evolution among nematodes. Irrespective of whether ecological (*e.g.*, trophic ecology), biological (*e.g.*, mode of reproduction), or morphological (*e.g.*, tail shape) characteristics are taken into consideration, in the vast majority of cases similar characteristics are found on independent branches within Figure 1. Hence, similar ecological challenges independently gave rise to common adaptive phenotypes. Of course, this phenomenon greatly complicates the deduction of phylogenetic relationships and this co-explains the volatility of nematode systematics. Extensive convergent evolution has occurred in many organismal groups and comparison of DNA sequences from truly orthologous genes can be very helpful to elucidate evolutionary relationships. This point can be illustrated with an example from the plant kingdom, the family Brassicaceae. This is a large plant family (338 genera and 3700 species) and convergent evolution in nearly every morphological character lead to major problems in taxa description. The use of neutral molecular data – in this case internal transcribed spacer (ITS) sequences – substantially contributed to a more stable phylogeny (Bailey *et al.*, 2006). In another example, two major ascomycete classes Dothideomycetes and Sordariomycetes, the morphological characteristics used for the classification underwent major parallel evolution and, hence such characteristics appeared to be of little use for phylogenetics. In this case, the combined use LSU rDNA and a RNA polymerase II subunit (RPB2) resulted in a more stable systematic framework (Shenoy *et al.*, 2006).

We are currently using the framework described in this paper for DNA barcode-based nematode detection and community analysis. With regard to detection we have focused so far on plant-parasitic nematodes, often a small minority with a nematode community. On the basis of the framework presented here, it is (in most cases) possible to define species-specific sequence signatures and to design simple and cheap PCR primers that allow real-time PCR-based detection and quantification of pathogenic nematodes in complex DNA backgrounds. At the same time, the SSU rDNA alignment was used to design dozens of family-specific PCR primers (see for example Holterman *et al.* (2008a) and we are currently testing quantitative, DNA barcode-based nematode community analyses under field conditions.

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Supplementary material

Positioning and lengths of Length Variable Regions (LVRs)

LVR 1:	14-51	(length 38 nt)
LVR 2:	104-132	(length 29 nt)
LVR 3:	186-234	(length 349 nt)
LVR 4:	269-447	(length 179 nt)
LVR 5:	698-711	(length 14 nt)
LVR 6:	991-1257	(length 267 nt)
LVR 7:	1304-1321	(length 18 nt)
LVR 8:	1750-1770	(length 21 nt)
LVR 9:	2151-2284	(length 134 nt)
LVR 10:	2293-2306	(length 14 nt)
LVR 11:	2337-2352	(length 16 nt)
LVR 12:	2456-2473	(length 17 nt)
LVR 13:	2756-2904	(length 149 nt)

In total 945 positions have been removed
Including LVRs: 2967 aligned positions
Excluding LVRs: 2022 aligned positions

Fig. S1. Part 1. *Effect of the removal of SSU rDNA length variable regions (LVRs) on the overall topology of a SSU rDNA-based ML tree. Positioning and length of the LVRs are given in part 1; the positioning of the LVR within the SSU rRNA is given in part 2. The best likelihood phylogenetic tree recovered by RAxML on the basis of SSU rDNA sequences after removal of LVRs is presented in part 3. Only bootstrap values >50% are given next to the nodes. Branch lengths are given in parentheses.*

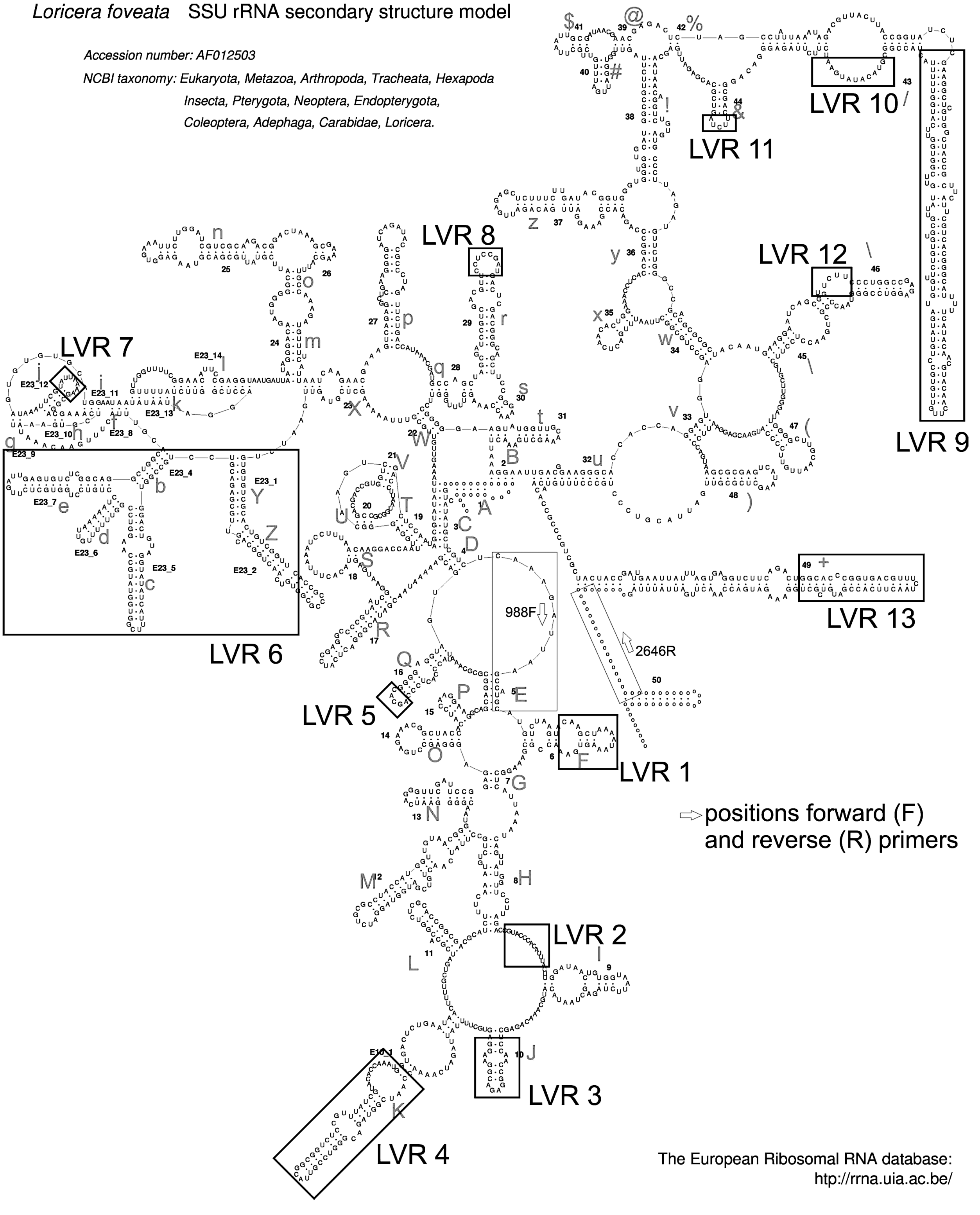
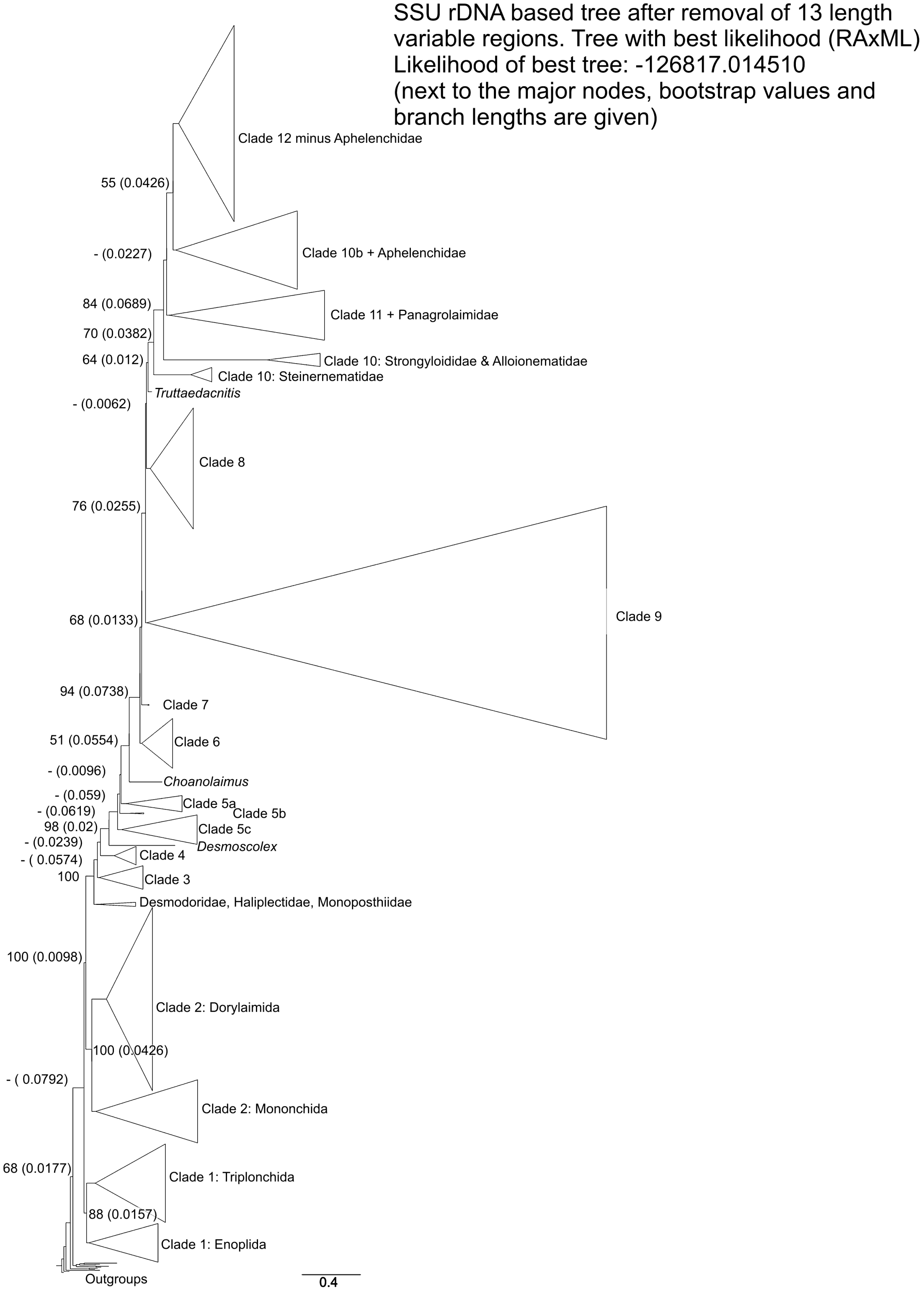

Loricera foveata SSU rRNA secondary structure model
Accession number: AF012503
NCBI taxonomy: Eukaryota, Metazoa, Arthropoda, Tracheata, Hexapoda
Insecta, Pterygota, Neoptera, Endopterygota,
Coleoptera, Adephaga, Carabidae, Loricera.
LVR 1
LVR 2
LVR 3
LVR 4
LVR 5
LVR 6
LVR 7
LVR 8
LVR 9
LVR 10
LVR 11
LVR 12
LVR 13
988F
2646R
⇨ positions forward (F) and reverse (R) primers
The European Ribosomal RNA database:
http://rrna.uia.ac.be/

Fig. S1. Part 2.



SSU rDNA based tree after removal of 13 length variable regions. Tree with best likelihood (RAxML) Likelihood of best tree: -126817.014510 (next to the major nodes, bootstrap values and branch lengths are given)

Fig. S1. Part 3.

Table S1. *List of all SSU rDNA sequences used in this paper (scientific names, specimen identifiers, and corresponding GenBank accession numbers). A 'G' behind a nematode name indicates that the sequence was acquired from GenBank. The outgroup members are in the shaded lines.*

Genus	Species	ID	GenBank No.
Acanthocheilonema	*viteae*	ACheVit1G	DQ094171
Acanthopharynx	*micans*	AcanMicG	Y16911
Achromadora	cf. *terricola*	AchrTerZ	AY593940
Achromadora	*ruricola* 1	AchrRur1	AY593941
Achromadora	sp.	AchrSp2	AY284718
Achromodora	sp.	AchrSp1	AY284717
Acrobeles	*ciliatus*	AcroCilG	AF202148
Acrobeles	*complexus*	AcroCom1G	U81577
Acrobeles	*complexus* 1	AcroCom1	AY284671
Acrobeles	sp.	AcroSpG	U81576
Acrobeloides	*apiculatus* 1	AcLoApi1	AY284673
Acrobeloides	*bodenheimeri*	AcLoBod1G	AF202159
Acrobeloides	*bodenheimeri*	AcLoBod2G	AF202162
Acrobeloides	*maximus*	AcLoMax1G	EU196016
Acrobeloides	*maximus*	AcLoMax2G	EU306344
Acrobeloides	*nanus*	AcLoNan1G	DQ102707
Acrobeloides	*nanus* 1	AcLoNan1	AY284672
Acrobeloides	sp.	AcLoSpG	AF034391
Acrostichus	*halicti*	AcStHalG	U61759
Adoncholaimus	sp.	AdonSpG	AF036642
Aelurostrongylus	*abstrusus*	AeluAbs1G	AJ920366
Afenestrata	*koreana*	AfenKor1G	EU306357
Alaimus	*parvus* 1	AlaiPar1	AY284738
Alaimus	sp.	AlaiSp1G	AJ966514
Alaimus	sp. 1	AlaiSp1	FJ040489
Alinema	*amazonicum*	AlinAma1G	DQ442672
Allodorylaimus	*andrassyi*	AlloAnd1	AY284801
Allodorylaimus	sp.	AlloSp1G	AJ966472
Amidostomum	*cygni*	AmidCyg1G	AJ920353
Amplimerlinius	*icarus*	AmplIca1G	EU306351
Anaplectus	*grandepapillatus*	AnapGra1	AY284697
Anaplectus	*grandepapillatus*	AnapGra2	AY284698
Anaplectus	*porosus*	AnapPor1	AY284696
Anaplectus	*porosus*	AnapPor2	FJ040453
Anaplectus	sp.	AnapSp1G	AJ966473
Anatonchus	*tridentatus*	AnatTri1	AY284768
Anatonchus	*tridentatus*	AnatTri2	AY284769
Anatonchus	*tridentatus*	AnatTri1G	AJ966474
Ancylostoma	*caninum*	AncyCan1G	AJ920347
Ancylostoma	*duodenale*	AncyDuo1G	EU344798
Angiostrongylus	*cantonensis*	AngiCan1G	AY295804
Angiostrongylus	*costaricensis*	AngiCos1G	DQ116748
Angiostrongylus	*costaricensis*	AngiCos2G	EF514913
Angiostrongylus	*dujardini*	AngiDuj1G	AY542282
Angiostrongylus	*dujardini*	AngiDuj2G	EF514915
Angiostrongylus	*malaysiensis*	AngiMal1G	EF514914
Angiostrongylus	*vasorum*	AngiVas1G	AJ920365
Angiostrongylus	*vasorum*	AngiVas2G	EF514916

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Anguillicola	*crassus*	AngCCra1G	DQ118535
Anguillicola	*crassus*	AngCCra2G	DQ490223
Anguina	*tritici* 1	AnguTri1	AY593913
Anisakis	*pegreffi*	AnisPeg1G	EF180082
Anisakis	sp.	AnisSp1G	U81575
Anisakis	sp.	AnisSp2G	U94365
Anomyctus	*xenurus*	AnomXen1	FJ040413
Anoplostoma	*rectospiculum*	AnopRec1G	AY590149
Anoplostoma	sp. 1	AnopSp1	FJ040491
Anoplostoma	sp. 2	AnopSp2	FJ040492
Aphanolaimus	*aquaticus*	AphaAqu2	AY593933
Aphanolaimus	*aquaticus* 1	AphaAqu1	AY593932
Aphanonchus	cf. *europaeus*	AphNEurZ1	EF591319
Aphelenchoides	1	AChoSp1	AY284646
Aphelenchoides	2	AChoSp2	AY284647
Aphelenchoides	*besseyi*	AChoBes1G	AY508035
Aphelenchoides	*bicaudatus* 1	AChoBic1	AY284643
Aphelenchoides	*blastophtorus* 1	AChoBla1	AY284644
Aphelenchoides	cf. *bicaudatus*	AcHoBicZ	FJ040407
Aphelenchoides	*fragariae*	AChoFra1G	AB067755
Aphelenchoides	*fragariae*	AChoFra2G	AJ966475
Aphelenchoides	*fragariae*	AChoFra3G	DQ901551
Aphelenchoides	*fragariae* 1	AChoFra1	AY284645
Aphelenchoides	*ritzemabosi*	AChoRit1G	DQ901554
Aphelenchoides	*saprophilus*	AChoSap1	FJ040408
Aphelenchoides	sp.	AChoSp1G	DQ901550
Aphelenchoides	sp.	AChoSp2G	DQ901552
Aphelenchoides	sp. 3	AChoSp3	FJ040409
Aphelenchoides	sp. 4	AChoSp4	FJ040410
Aphelenchoides	sp. 5	AChoSp5	FJ040411
Aphelenchoides	sp. 6	AChoSp6	FJ040412
Aphelenchus	*avenae*	ApheAve1	AY284639
Aphelenchus	*avenae*	ApheAve2	AY284640
Aphelenchus	*avenae*	ApheAve1G	AF036586
Aphelenchus	*avenae*	ApheAve2G	AB368918
Aphelenchus	*avenae*	ApheAve3G	EU306347
Aphelenchus	sp.	ApheSp	AY284641
Aporcelaimellus	cf. *paraobtusicaudatus*	ApoEParZ	AY284812
Aporcelaimellus	*obtusicaudatus*	ApoEObt1	AY284811
Aporcelaimellus	*obtusicaudatus*	ApoEObt1G	DQ141212
Aporcelaimellus	sp.	ApoESp1G	AJ875154
Aporcelaimellus	sp.	ApoESp2G	AJ875153
Aporcelaimellus	sp.	ApoESp3G	AJ875155
Aporcelaimellus	sp. 1	ApoESp1	AY284813
Aquatides	*christei*	AquaCri1G	AY552963
Ascaridia	*galli*	AsDiGal1G	EF180058
Ascaris	*lumbricoides*	AscaLumG	U94366
Ascaris	sp.	AscaSpG	M58348
Ascaris	*suum*	AscaSuu1G	U94367
Ascaris	*suum*	AscaSuu2G	AF036587

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Ascarophis	*arctica*	AscPArc1G	DQ094172
Ascolaimus	cf. *elongatus*	AscoElo1Z	FJ040460
Ascolaimus	cf. *elongatus*	AscoElo2Z	EF591330
Ascolaimus	*elongatus*	AscoElo2G	AM234617
Aspidodera	sp.	AspiSp1G	EF180070
Astomonema	sp.	AstoSp1G	DQ408759
Astomonema	sp.	AstoSp2G	DQ408760
Astomonema	sp.	AstoSp3G	DQ408761
Aulolaimus	*oxycephalus*	AuloOxy1	AY284724
Axonchium	*propinquum*	AxonPro1	AY284820
Axonolaimus	sp. 1	AxLaSp1	FJ040461
Axonolaimus	sp. 2	AxLaSp2	EF591331
Axonolaimus	sp. 3	AxLaSp3	FJ040462
Bastiania	*gracilis*	BastGra1	AY284725
Bastiania	*gracilis*	BastGra2	AY284726
Bathylaimus	*australis*	BaLaAus1G	AJ966476
Bathylaimus	sp. 1	BaLaSp1	FJ040504
Bathyodontus	*cylindricus*	BathCyl1G	AY552964
Bathyodontus	*mirus*	BathMir1	AY284744
Baujardia	*mirabilis*	BaujMir1G	AF547385
Baylisascaris	*procyonis*	BaylproG	U94368
Baylisascaris	*transfuga*	BayltraG	U94369
Belonolaimus	*longicaudatus*	BeloLon1G	AY633449
Belonolaimus	*longicaudatus*	BeloLon2G	DQ912919
Bitylenchus	*dubius*	BityDub1G	EU306352
Bitylenchus	*dubius* 1	BityDub1	AY284601
Boleodorus	*thylactus*	BoleThy1	AY593915
Boleodorus	*thylactus*	BoleThy1G	AY993976
Bradynema	*listronotum*	BradLis1G	DQ915805
Brevibucca	*saprophaga*	BrevSap1G	EU196018
Brevibucca	sp.	BrevSpG	AF202163
Brugia	*malayi*	BrugMalG	AF036588
Brumptaemilius	*justini*	BrumJusG	AF036589
Bunonema	*franzi*	BunoFra1G	AJ966477
Bunonema	*reticulatum*	BunoRet2	AY593925
Bunonema	*reticulatum*	BunoRet3	FJ040450
Bunonema	*reticulatum*	BunoRet1G	EU196017
Bunonema	*reticulatum* 1	BunoRet1	AY284661
Bunonema	*richtersi*	BunoRic1	FJ040451
Bunonema	*richtersi*	BunoRic2	FJ040452
Bunonema	sp.	BunoSpG	U81582
Bursaphelenchus	1	BursSp1	AY284649
Bursaphelenchus	2	BursSp2	AY284650
Bursaphelenchus	*abietinus*	BursAbi1G	AY508011
Bursaphelenchus	*abruptus*	BursAbr1G	AY508010
Bursaphelenchus	*arthuri*	BursArt1G	AM397010
Bursaphelenchus	*borealis*	BursBor1G	AY508012
Bursaphelenchus	*cocophilus*	BursCoc1G	AY509153
Bursaphelenchus	*conicaudatus*	BursCon1G	AM397011
Bursaphelenchus	*doui*	BursDou1G	AM397012

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Bursaphelenchus	*eggersi*	BursEgg1G	AY508013
Bursaphelenchus	*fraudulentus*	BursFra1G	AY508014
Bursaphelenchus	*fraudulentus*	BursFra2G	AY508015
Bursaphelenchus	*fungivorus*	BursFun1G	AY508016
Bursaphelenchus	*hellenicus*	BursHel1G	AY508017
Bursaphelenchus	*hildegardae*	BursHil1G	AM397013
Bursaphelenchus	*hofmanni*	BursHof1G	AY508018
Bursaphelenchus	*hylobianus*	BursHyl1G	AY508019
Bursaphelenchus	*kevini*	BursKev1G	AY753531
Bursaphelenchus	*mucronatus*	BursMuc1G	AB067759
Bursaphelenchus	*mucronatus*	BursMuc2G	AY508020
Bursaphelenchus	*mucronatus*	BursMuc3G	AY508021
Bursaphelenchus	*mucronatus*	BursMuc4G	AY508022
Bursaphelenchus	*mucronatus*	BursMuc5G	AY508023
Bursaphelenchus	*mucronatus*	BursMuc6G	AM397015
Bursaphelenchus	*mucronatus* 1	BursMuc1	AY284648
Bursaphelenchus	*paracorneolus*	BursPar1G	AY508027
Bursaphelenchus	*pinasteri*	BursPin1G	AM397016
Bursaphelenchus	*poligraphi*	BursPol1G	AY508028
Bursaphelenchus	*rainulfi*	BursRai1G	AM397017
Bursaphelenchus	*seani*	BursSea1G	AY508029
Bursaphelenchus	*seani*	BursSea2G	AY508030
Bursaphelenchus	*sexdentati*	BursSex1G	AY508031
Bursaphelenchus	*sexdentati*	BursSex2G	AY508032
Bursaphelenchus	sp.	BursSp1G	AF037369
Bursaphelenchus	sp.	BursSp2G	AY508024
Bursaphelenchus	sp.	BursSp3G	AY508025
Bursaphelenchus	sp.	BursSp4G	AY508026
Bursaphelenchus	*thailandae*	BursTha1G	AM397019
Bursaphelenchus	*tusciae*	BursTus1G	AY508033
Bursaphelenchus	*vallesianus*	BursVal1G	AM397020
Bursaphelenchus	*willibaldi*	BursWil1G	AM397021
Bursaphelenchus	*xylophilus*	BursXyl1G	AB067760
Bursaphelenchus	*xylophilus*	BursXyl2G	AY508034
Bursaphelenchus	*xylophilus*	BursXyl3G	AM397022
Bursaphelenchus	*yongensis*	BursYon1G	AM397023
Caenorhabditis	*briggsae*	CaenBriG	U13929
Caenorhabditis	*drosophilae*	CaenDroG	AF083025
Caenorhabditis	*elegans*	CaenEle1G	X03680
Caenorhabditis	*elegans*	CaenEle2G	AY268117
Caenorhabditis	*elegans*	CaenEle3G	EU196001
Caenorhabditis	*elegans* 1	CaenEle1	AY284652
Caenorhabditis	*japonica*	CaenJap1G	AY602182
Caenorhabditis	*plicata*	CaenPli1G	AY602178
Caenorhabditis	*sonorae*	CaenSonG	AF083026
Caenorhabditis	sp.	CaenSp2G	U13930
Caenorhabditis	sp.	CaenSp1G	AF083006
Caenorhabditis	sp.	CaenSp3G	AY602180
Caenorhabditis	sp.	CaenSp4G	AY602181
Caenorhabditis	sp.	CaenSp5G	EU196000

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Caenorhabditis	*vulgaris*	CaenVulG	U13931
Californidorus	sp.	CaliSp1G	AY283155
Calyptronema	sp. 1	CalySp1	FJ040503
Camacolaimus	sp. 1	CamaSp1	EF591325
Camacolaimus	sp. 2	CamaSp2	EF591327
Camallanus	*cotti*	CaLaCot1G	DQ442662
Camallanus	*cotti*	CaLaCot2G	EF180071
Camallanus	*lacustris*	CaLaLac1G	DQ442663
Camallanus	*oxycephalus*	CaLaOxy1G	DQ503463
Camallanus	sp.	CaLaSp1G	DQ442664
Campydora	*demonstrans*	CampDem1G	AY552965
Capillaria	*tenuissima*	CapiTen1G	EU004822
Carcharodiscus	*banaticus*	CarcBan1	AY284827
Catanema	sp.	CataSpG	Y16912
Cephalenchus	*hexalineatus* 1	CeLeHex1	AY284594
Cephalobidae		Cephfamil	FJ040406
Cephaloboides	cf. *armata*	CeBoArm1ZG	EU196005
Cephaloboides	*nidrosiensis*	CeBoNid1G	EU196020
Cephaloboides	sp.	CeBoSpG	AF083027
Cephalobus	*cubaensis*	CephCubG	AF202161
Cephalobus	*oryzae*	CephOryG	AF034390
Cephalobus	*persegnis*	CephPer1	AY284662
Cephalobus	*persegnis*	CephPer2	AY284663
Cephalobus	sp.	CephSp1G	AF202158
Cephalobus	sp.	CephSp2G	AF202160
Ceratoplectus	*armatus*	CeraArm1	AY284706
Cervidellus	*alutus*	CervAluG	AF202152
Cervidellus	sp. 1	CervSp1	AY284674
Chabertia	*ovina*	ChabOvi1G	AJ920341
Chiloplacus	*propinquus* 1	ChilPro1	AY284677
Choanolaimus	*psammophilus*	ChoaPsa4	FJ040467
Choanolaimus	*psammophilus* 2	ChoaPsa2	AY284715
Choanolaimus	*psammophilus* 3	ChoaPsa3	AY284716
Chordodes	*morgani*	ChDoMorG	AF036639
Choriorhabditis	*cristata*	ChorCri1G	EU196013
Choriorhabditis	*dudichi*	ChorDudG	AF083012
Chromadoridae	1	ChMafamil1	AY284713
Chromadoridae	sp. 2	ChMafamil2	FJ040474
Chromadorina	sp. 1	ChInSp1	FJ040470
Chromadorina	sp. 2	ChInSp2	FJ040471
Chromadorita	*leuckarti*	ChItleu1Z	FJ040473
Chromadoropsis (= *Atrochromadora*)	*vivipara*	ChOpVivG	AF047891
Chronogaster	3	ChGaSp3	FJ040455
Chronogaster	*boettgeri* 1	ChGaBoe1	AY593931
Chronogaster	*polonica*	ChGaSp1	AY284708
Chronogaster	sp. 2	ChGaSp2	AY284709
Chronogaster	*typica* 1	ChGaTyp1	FJ040456
Chrysonema	*attenuatum*	ChryAtt1	AY593945
Chrysonema	*attenuatum*	ChryAtt2	AY284779

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Chrysonema	*attenuatum*	ChryAtt3	EF207245
Clarkus	*papillatus*	ClarPap1	AY284748
Clarkus	*papillatus*	ClarPap3	AY284749
Clarkus	*papillatus*	ClarPap2	AY284750
Clarkus	*papillatus*	ClarPap1G	AY552966
Clarkus	sp.	ClarSp1G	AJ966479
Clavicaudoides	*clavicaudatus*	ClavCla1	AY593944
Clavicaudoides	sp.	ClavSp1G	AY552967
Clavicaudoides	*trophurus*	ClavTro1	AY284772
Clavicaudoides	*trophurus*	ClavTro2	AY284773
Clavicaudoides	*trophurus*	ClavTro3	AY593943
Contracaecum	*eudyptulae*	ContEud1G	EF180072
Contracaecum	*microcephalum*	ContMic1G	AY702702
Contracaecum	*multipapillatum*	ContMulG	U94370
Coomansus	*parvus*	CoomPar1	AY284766
Coomansus	*parvus*	CoomPar2	AY284767
Coslenchus	cf. *franklinae*	CoslFra1Z	AY284582
Coslenchus	*costatus* 1	CoslCos1	AY284581
Coslenchus	*franklinae*	CoslFra2	AY284583
Crenosoma	*mephitidis*	CrenMep1G	AY295805
Crenosoma	*vulpis*	CrenVul1G	AJ920367
Criconema	sp. 1	CricSp1G	AJ966480
Cruzia	*americana*	CrZiAmeG	U94371
Cruznema	1	CruzSp1	AY284655
Cruznema	2	CruzSp2	AY284656
Cruznema	3	CruzSp3	AY284657
Cruznema	4	CruzSp4	AY284658
Cruznema	*tripartita*	CruzTri1G	U73449
Cruznema	*tripartitum*	CruzTri2G	EU196012
Cryptonchus	sp. 1	CrypSp1	FJ040479
Cryptonchus	*tristis* 1	CrypTri1	EF207244
Cuticonema	*vivipara*	CuCoViv1G	EU196019
Cyatholaimus	sp.	CyatSp2G	AM234618
Cyclodontostomum	*purvisi*	CyclPur1G	AJ920340
Cylicocyclus	*insignis*	CyCyIns1G	AJ920342
Cylindrolaimus	*communis* 1	CyliCom1	AY593939
Cylindrolaimus	sp.	CyliSpG	AF202149
Cyrnea	*leptoptera*	CyrnLep1G	EU004815
Cyrnea	*seurati*	CyrnSeu1G	EU004816
Daptonema	*procerum*	DaptProG	AF047889
Daptonema	sp.	DaptSp1G	EF436228
Daptonema	sp. 1	DaptSp1	FJ040463
Deladenus	*siricidicola*	DeDeSir1G	AY633447
Deladenus	sp.	DeDeSp1G	AJ966481
Deladenus	sp.	DeDeSp2G	EU306345
Deletrocephalus	*dimidiatus*	DeleDim1G	AJ920346
Demaniella	sp. 1	DemaSp1	FJ040438
Dentiphilometra	sp.	DPhiSp1G	DQ442673
Dentostomella	sp.	DentSpG	AF036590
Deontolaimus	*papillatus*	DeonPap1	EF591322

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Deontolaimus	*papillatus*	DeonPap2	FJ040457
Desmodora	*ovigera*	DeRaOviG	Y16913
Desmolaimus	sp. 1	DeLaSp1	EF591332
Desmolaimus	sp. 2	DeLaSp2	EF591333
cf. *Desmolaimus*		DeLaSp3Z	EF591336
cf. *Desmolaimus*		DeLaSp4Z	EF591337
Desmoscolex	sp. 2	DeCoSp2	EF591342
Dichromadora	sp. 1	DichSp1	FJ040506
Dictyocaulus	*capreolus*	DictCap1G	AY168862
Dictyocaulus	*capreolus*	DictCap2G	AY168859
Dictyocaulus	*eckerti*	DictEck1G	AY168857
Dictyocaulus	*eckerti*	DictEck2G	AY168858
Dictyocaulus	*eckerti*	DictEck3G	AY168863
Dictyocaulus	*eckerti*	DictEck4G	AY168864
Dictyocaulus	*filaria*	DictFil1G	AY168861
Dictyocaulus	*filaria*	DictFil2G	AJ920362
Dictyocaulus	sp.	DictSpG	AY168860
Dictyocaulus	*viviparus*	DictViv1G	AY168856
Dictyocaulus	*viviparus*	DictViv2G	AJ920361
Didelphostrongylus	*hayesi*	DideHay1G	AY295806
Dilta	*littoralis*	DiltLitG	AF005457
Dintheria	*tenuissima*	DintTen1	FJ040487
Dipetalonema	sp.	DiTaSp1G	DQ531723
Diphtherophora	*communis*	DiphCom1	AY593955
Diphtherophora	*obesa*	DiphObe1	AY284838
Diphtherophora	*obesa*	DiphObe2	AY284839
Diphtherophora	*obesus*	DiphObe1G	AY552968
Diplogaster	*rivalis* 1	DiGaRiv3	AY284688
Diplogastridae		DiGafamil	AY284689
Diplogasteroides	*magnus*	DiGOMag1	FJ040448
Diplolaimella	*dievengatensis*	DiplDie1G	AJ966482
Diplolaimelloides	*meyli*	DiLaMey1G	AF036644
Diplolaimelloides	*meyli*	DiLaMey2G	AF036611
Diplolaimelloides	sp.	DiLaSp1G	EF659926
Diplolaimelloides	sp.	DiLaSp9G	EF659927
Diplolaimelloides	sp.	DiLaSp10G	EF659925
Diplolaimelloides	sp.	DiLaSp11G	EF659924
Diplolaimelloides	sp.	DiLaSp16G	EF659919
Diplolaimelloides	sp.	DiLaSp17G	EF659918
Diplolaimelloides	sp.	DiLaSp18G	EF659917
Diplopeltula	sp. 1	DiPeSp1	EF591329
Diploscapter	*coronatus* 1	DiScCor1	AY593921
Diploscapter	sp.	DiScSp1G	U81586
Diploscapter	sp.	DiScSp2G	AF083009
Diploscapter	sp.	DiScSp3G	EU196003
Dirofilaria	*immitis*	DiroImmG	AF036638
Discolaimus	cf. *major*	DisLMaj1Z	EF207252
Discolaimus	*major*	DisLMaj1	AY284828
Ditylenchus	*adasi*	DityAda1	EU669909
Ditylenchus	*angustus*	DityAng1G	AJ966483

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Ditylenchus	*destructor*	DityDes1	AY593912
Ditylenchus	*dipsaci*	DityDip8	EU669931
Dolichodorus	sp.	DoRuSp1G	DQ912918
Dolichodorus	sp.	DoRuSp2G	EF025336
Domorganus	*macronephritices*	DoGaMac1	FJ040454
Dorylaimellus	*montenegricus*	DoMeMon	AY284821
Dorylaimellus	*virginianus*	DoMeVir1G	AY552969
Dorylaimoides	*limnophilus*	DoMoLim2	AY593950
Dorylaimoides	*micoletskyi*	DoMoMic1	AY284830
Dorylaimoides	sp. 1	DoMoSp1	AY593951
Dorylaimus	*stagnalis*	DomuSta2	AY284776
Dorylaimus	*stagnalis*	DoMuSta3	AY284777
Dracunculus	*insignis*	DracIns1G	AY947719
Dracunculus	*medinensis*	DracMed1G	AY852268
Dracunculus	*medinensis*	DracMed2G	AY947720
Dracunculus	*oesophageus*	DracOes1G	AY852269
Dracunculus	sp.	DracSp1G	DQ503457
Drilocephalobus	1	DrilSp1	AY284678
Drilocephalobus	2	DrilSp2	AY284679
Drilocephalobus	3	DrilSp3	AY284680
Dujardinascaris	*waltoni*	DujaWal1G	EF180081
Echinuria	*borealis*	EchiBor1G	EF180064
Ecphyadophora	sp.	EcphSp	AY593917
Ecphyadophora	*tenuissima*	EcphTen1	EU669910
Ecphyadophora	*tenuissima*	EcphTen2	EU669911
Ecumenicus	1	EcumSp1	AY284781
Ecumenicus	2	EcumSp2	AY284782
Ecumenicus	*monohystera*	EcumMon1	AY284783
Ecumenicus	*monohystera*	EcumMon2	AY284784
Enchodelus	sp.	EnchSp3	EF207247
Enchodelus	sp. 1	EnchSp1	AY284792
Enchodelus	sp. 2	EnchSp2	AY284793
Enoploides	sp. 1	EPloSp1	FJ040490
Enoplus	*brevis*	EnopBreG	U88336
Enoplus	*meridionalis*	EnopMerG	Y16914
Epidorylaimus	*lugdunensis*	EpidLug1	AY284802
Epidorylaimus	*lugdunensis*	EpidLug2	AY284803
Epidorylaimus	sp. 1	EpidSp1	FJ040478
Epsilonematidae	sp. 1	Epsifamil1	EF591340
Ethmolaimus	*pratensis*	EthmPra2	FJ040475
Ethmolaimus	*pratensis* 1	EthmPra1	AY593942
Eubostrichus	*dianae*	EuboDiaG	Y16915
Eubostrichus	*parasitiferus*	EuboParG	Y16916
Eubostrichus	*topiarius*	EuboTopG	Y16917
Eucephalobus	cf. *oxyuroides*	EuceOxy1Z	AY284664
Eucephalobus	*oxyuroides*	EuceOxy2	AY284665
Eucephalobus	*striatus*	EuceStr1	AY284666
Eucephalobus	*striatus*	EuceStr2	AY284667
Eucoleus	*dispar*	EucoDis1G	EU004821
Eudorylaimus	1	EudoSp1	AY284800

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Eudorylaimus	*carteri*	EudoCar1G	AJ966484
Eudorylaimus	cf. *minutus*	EudoMin1Z	AY284794
Eumonhystera	cf. *simplex*	EumoSimZ	AY284692
Eumonhystera	*filiformis*	EumoFil2	AY593937
Euteratocephalus	*palustris*	EutePal1	AY284684
Euteratocephalus	sp.	EuteSp1	AY284685
Fergusobia	sp.	FergSp7G	AY589299
Fergusobia	sp.	FergSp10G	AY589302
Fergusobia	sp.	FergSp17G	EF011668
Fictor	sp. 1	FictSp1	FJ040437
Filarinema	*flagrifer*	FiNeFla1G	AJ920354
Filaroides	*martis*	FilaMar1G	AY295807
Filenchus	*filiformis* 1	FileFil1	AY284592
Filenchus	*thornei* 1	FileTho1	AY284591
Geomonhystera	*disjuncta*	GeomDis1G	AJ966485
Geomonhystera	sp. 3	GeomSp3	FJ040465
Geomonhystera	*villosa* 1	GeomVil1	EF591334
Globodera	*achilleae*	GlobAch1	FJ040399
Globodera	*artemisiae*	GlobArt1	FJ040400
Globodera	*pallida*	GlobPal1	AY284618
Globodera	*rostochiensis*	GlobRos4	AY593880
Globodera	*tabacum*	GlobTab4	FJ040401
Gnathostoma	*binucleatum*	GnatBinG	Z96946
Gnathostoma	*neoprocyonis*	GnatNeoG	Z96947
Gnathostoma	*turgidum*	GnatTurG	Z96948
Goezia	*pelagia*	GoezPelG	U94372
Gordius	*aquaticus*	GordAquG	X80233
Granonchulus	sp. 1	GranSp1	AY593953
Haemonchus	*contortus*	HaemConG	L04153
Haemonchus	*placei*	HaemPla1G	L04154
Haemonchus	*similis*	HaemSimG	L04152
Haemonchus	sp.	HaemSp1G	DQ503465
Halalaimus	sp. 1	HalaSp1	FJ040501
Halenchus	*fucicola*	HaleFuc1	EU669912
Halicephalobus	*gingivalis*	HaliGinG	AF202156
Halichoanolaimus	sp. 1	HaChSp1	EF591338
Haliplectus	*bickneri*	HaPlSp1	AY593935
Halocercus	*invaginatus*	HaloInv1G	AY295808
Helicotylenchus	*canadensis*	HeliCan1	AY284605
Helicotylenchus	*dihystera*	HeliDih1G	AJ966486
Helicotylenchus	*pseudorobustus*	HeliPse1	AY284606
Helicotylenchus	*varicaudatus*	HeliVar1G	EU306354
Helicotylenchus	*vulgaris*	HeliVul	AY284607
Heligmosomoides	*polygyrus*	HeSoPol1G	AJ920355
cf. *Helionema*	sp. 1	HelOSp1	EU669913
Hemicriconemoides	*pseudobrachyurus*	HCriPse1	AY284622
Hemicriconemoides	*pseudobrachyurus*	HCriPse2	AY284623
Hemicriconemoides	*pseudobrachyurus*	HCriPse3	AY284624
Hemicycliophora	*conida*	HemiCon1	EU669914
Hemicycliophora	*conida*	HemiCon1G	AJ966471

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Hemicycliophora	*thienemanni*	HemiThi1	AY284628
Hemicycliophora	*thienemanni*	HemiThi2	AY284629
Hemicycliophora	*thienemanni*	HemiThi1G	EU306341
Herpetostrongylus	*pythonis*	HerpPyt1G	AJ920358
Heterakis	*gallinarum*	HeRaGal1G	DQ503462
Heterakis	sp.	HeRaSpG	AF083003
Heterocephalobus	*elongatus*	HCepElo1	AY284668
Heterocephalobus	*elongatus*	HCepElo2	AY284669
Heterocephalobus	*elongatus*	HCepElo3	AY284670
Heterocheilus	*tunicatus*	HeChTunG	U94373
Heterodera	*avenae* 1	HeDeAve1	FJ040403
Heterodera	*betae*	HeDeBet1	FJ040404
Heterodera	*goettingiana*	HeDeGoe1	EU669915
Heterodera	*hordecalis*	HeDeHor1	FJ040405
Heterodera	*mani*	HeDeMan1	EU669916
Heterodera	*schachtii*	HeDeSch1	AY284617
Heterodera	*trifolii* 1	HeDeTri1	FJ040402
Heterorhabditis	*bacteriophora*	HeRhBac1G	AF036593
Heterorhabditis	*bacteriophora*	HeRhBac1	FJ040428
Heterorhabditis	*bacteriophora*	HeRhBac2	FJ040429
Heterorhabditis	*bacteriophora*	HeRhBac3	FJ040430
Heterorhabditis	*hepialius*	HeRhHepG	AF083004
Heterorhabditis	*marelatus*	HeRhMar1	FJ040431
Heterorhabditis	*megidis*	HeRhMeg1	FJ040432
Heterorhabditis	*megidis*	HeRhMeg9	FJ040433
Heterorhabditis	*megidis*	HeRhMeg15	FJ040434
Heterorhabditis	sp.	HeRhSp1	FJ040435
Heterorhabditis	*zealandica*	HeRhZea1G	AJ920368
Heterorhabditidoides	*chongmingensis*	HRToCho1G	EF503692
Hirschmanniella	cf. *belli*	HirsBel1GZ	EF029856
Hirschmanniella	*gracilis*	HirsGra1	EU669959
Hirschmanniella	*loofi*	HirsLoo1G	EU306353
Hirschmanniella	*pomponiensis*	HirsPom1G	EF029854
Hirschmanniella	*santarosae*	HirsSan1G	EF029855
Hirschmanniella	sp.	HirsSp1G	EF029857
Hirschmanniella	sp. 1	HirsSp1	AY284614
Hirschmanniella	sp. 2	HirsSp2	AY284615
Hirschmanniella	sp. 3	HirsSp3	AY284616
Hovorkonema	*variegatum*	HovoVar1G	AY702705
Howardula	*aoronymphium*	HowaAor1G	AY589304
Hypodontus	*macropi*	HypoMac1G	AJ920339
Hysterothylacium	*fortalezae*	HystForG	U94374
Hysterothylacium	*pelagicum*	HystPelG	U94375
Hysterothylacium	*reliquens*	HystRelG	U94376
Iheringascaris	*inquies*	IhAsInqG	U94377
Ironus	*dentifurcatus*	IronDen1G	AJ966487
Ironus	*longicaudatus*	IronLon1	FJ040495
Ironus	sp.	IronSp1G	AY552970
Ironus	sp. 1	IronSp1	FJ040496
Isolaimium	sp.	IsolSp1G	AY552971
Isolaimium	sp. 1	IsolSp1	AY552971

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Kalicephalus	*cristatus*	KaliCri1G	AJ920349
Koerneria	sp.	KoerSp1G	EU196025
Labiostrongylus	*bipapillosus*	LabiBip1G	AJ920337
Labronema	*ferox*	LabrFer1G	AY552972
Labronema	*vulvapapillatum*	LabrVul1	AY284807
Laimaphelenchus	*penardi*	LaimPen2	AY593919
Laimaphelenchus	*penardi*	LaimPen1G	EU306346
Laimaphelenchus	*penardi* 1	LaimPen1	AY593918
Laxus	*cosmopolitus*	LaxuCosG	Y16918
Laxus	*oneistus*	LaxuOneG	Y16919
Leidynema	*portentosae*	LeidPor1G	EF180073
Lelenchus	*leptosoma*	LeleLep1	AY284584
Leptolaimus	sp. 1	LeLaSp1	EF591323
Leptolaimus	sp. 2	LeLaSp2	EF591324
Leptolaimus	sp. 3	LeLaSp3	FJ040458
Leptonchus	*granulosus*	LeOnGra1	AY284831
Leptonemella	sp.	LeptSpG	Y16920
Litomosoides	*sigmodontis*	LitoSigG	AF227233
Loa	*loa*	LoaLoa1G	DQ094173
Longidorella	sp. 1	LoReSp1	AY284789
Longidorella	sp. 2	LoReSp2	AY284790
Longidorus	*africanus*	LoRuAfr1G	AY283164
Longidorus	*attenuatus*	LoRuAtt1G	AY687994
Longidorus	*biformis*	LoRuBif1G	AY283162
Longidorus	*biformis*	LoRuBif2G	AY283171
Longidorus	*breviannulatus*	LoRuBre1G	AY283161
Longidorus	cf. *intermedius*	LoRuIntZ	AY284816
Longidorus	*crassus*	LoRuCra1G	AY283158
Longidorus	*diadecturus*	LoRuDia1G	AY283166
Longidorus	*diadecturus*	LoRuDia2G	AY283167
Longidorus	*dunensis*	LoRuDun1	AY284817
Longidorus	*dunensis*	LoRuDun2	AY284818
Longidorus	*dunensis*	LoRuDun3	AY284819
Longidorus	*elongatus*	LoRuElo1G	AF036594
Longidorus	*elongatus*	LoRuElo2G	AY687992
Longidorus	*euonymus*	LoRuEuo1G	AY687995
Longidorus	*fragilis*	LoRuFra1G	AY283172
Longidorus	*grandis*	LoRuGra1G	AY283165
Longidorus	*litchii*	LoRuLit1G	AY687996
Longidorus	*macrosoma*	LoRuMac1G	AY580055
Longidorus	*paralongicaudatus*	LoRuPar1G	AY283160
Longidorus	*paravineacola*	LoRuPaV1G	AY283156
Longidorus	*paravineacola*	LoRuPaV2G	AY283157
Longidorus	*paravineacola*	LoRuPaV3G	AY283159
Longidorus	*piceicola*	LoRuPic1G	AY687993
Longidorus	sp.	LoRuSp1G	AY283163
Longidorus	sp.	LoRuSp2G	AY283168
Longidorus	*vineacola*	LoRuVin1G	AY283169
Macrobiotus	*hufelandi*	MaBiHufG	X81442
Macrotrophurus	*arbusticola*	MaTrArb2	AY284596

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Macrotrophurus	*arbusticola* 1	MaTrArb1	AY284595
Malenchus	*andrassyi* 1	MaleAnd1	AY284587
Margolisianum	*bulbosum*	MargBul1G	AB185161
Meloidogyne	*arabicida*	MeloAra1G	AY942625
Meloidogyne	*ardenensis*	MeloArd1	AY593894
Meloidogyne	*arenaria*	MeloAre1G	U42342
Meloidogyne	*artiellia*	MeloArt1G	AF248477
Meloidogyne	*chitwoodi*	MeloChi1	AY593883
Meloidogyne	*duytsi*	MeloDuyG	AF442197
Meloidogyne	*ethiopica*	MeloEth1G	AY942630
Meloidogyne	*exigua*	MeloExi2G	AY942627
Meloidogyne	*fallax*	MeloFal1	AY593895
Meloidogyne	*floridensis*	MeloFlo1G	AY942621
Meloidogyne	*graminicola*	MeloGraG	AF442196
Meloidogyne	*hapla*	MeloHap4	AY593892
Meloidogyne	*ichinohei*	MeloIch1	EU669953
Meloidogyne	*incognita*	MeloInc1	AY284621
Meloidogyne	*javanica*	MeloJav2G	AY268121
Meloidogyne	*mali*	MeloMal1	EU669948
Meloidogyne	*maritima*	MeloMar1	EU669944
Meloidogyne	*mayaguensis*	MeloMay1G	AY942629
Meloidogyne	*microtyla*	MeloMicG	AF442198
Meloidogyne	*minor*	MeloMin1	AY593899
Meloidogyne	*morocciensis*	MeloMor1G	AY942632
Meloidogyne	*naasi*	MeloNaa1	AY593900
Meloidogyne	*oryzae*	MeloOry1G	AY942631
Meloidogyne	*paranaensis*	MeloPar1G	AY942622
Meloidogyne	*spartinae*	MeloSpa1G	EF189177
Meloidogyne	*ulmi*	MeloUlm1	EU669947
Merlinius	*brevidens*	MerlBre1	AY284597
Mermis	*nigrescens*	MermNigG	AF036641
Mermitide	sp. 2	Mermfamil2	FJ040480
Mermitide		Mermfamil	AY284743
Mesocriconema	*xenoplax*	MCriXen1	AY284625
Mesocriconema	*xenoplax*	MCriXen2	AY284626
Mesocriconema	*xenoplax*	MCriXen3	AY284627
Mesodorylaimus	*aberrans*	MesDAbe1	AY593947
Mesodorylaimus	*bastiani*	MesDBas1G	AJ966488
Mesodorylaimus	*centrocercus*	MesDCen1	AY284799
Mesodorylaimus	*centrocercus*	MesDCen2	EF207248
Mesodorylaimus	cf. *nigritulus*	MesDNig1ZG	AJ966490
Mesodorylaimus	*japonicus*	MesDJap1G	AJ966489
Mesodorylaimus	sp. 1	MesDSp1	AY284780
Mesorhabditis	2	MRhaSp2	AY284660
Mesorhabditis	*anisomorpha*	MRhaAniG	AF083013
Mesorhabditis	*longespiculosa*	MRhaLon1G	EU196014
Mesorhabditis	*n*	MRhaSp4	AY593922
Mesorhabditis	*scanica*	MRhaScaG	AF083014
Mesorhabditis	sp.	MRhaSp1G	U73452
Mesotheristus	*setosus*	MTheSet2G	AM234045

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Metachromadora	*remanei*	MAchRem2G	AM234620
Metachromadora	sp.	MAchSpG	AF036595
Metachromadora	sp. 1	MAchSp1	EF591339
Metachromadora	sp. 2	MAchSp2	FJ040469
Metadesmolaimus	sp.	MDesSp1G	AJ966491
Metaporcelaimus	*simplex*	MApoSim1	AY593948
Metastrongylus	*elongatus*	MStrElo1G	AJ920363
Metastrongylus	*salmi*	MStrSal1G	AY295809
Metateratocephalus	*crassidens*	MTCeCra1	AY284686
Metateratocephalus	*crassidens*	MTCeCra2	AY284687
Metateratocephalus	*crassidens*	MTCeCra3	AY593934
Miconchus	cf. *fasciatus*	MicoFas1ZG	AY552973
Microdorylaimus	*miser*	MicDMis1	AY284804
Microdorylaimus	*modestus*	MicDMod1	AY284805
Microdorylaimus	*modestus*	MicDMod2	AY284806
Microdorylaimus	sp.	MicDSp1G	AJ966492
Micropleura	*australiensis*	MicPAus1G	DQ442678
Microtetrameres	*cloacitectus*	MicTClo1G	EU004814
Molnaria	*intestinalis*	MolnInt1G	DQ442668
Monhystera	*riemanni*	MonhRie1	AY593938
Mononchoides	*striatus* 1	MonEStr1	AY593924
Mononchus	*aquaticus*	MonCAqu1	AY284764
Mononchus	*aquaticus*	MonCAqu2	AY284765
Mononchus	*aquaticus*	MonCAqu1G	AY297821
Mononchus	*truncatus*	MonCTru1	AY284762
Mononchus	*truncatus*	MonCTru1G	AJ966493
Mononchus	*tunbridgensis*	MonCTun1	AY284763
Mononchus	*tunbridgensis*	MonCTun2	AY593954
Monoposthia	sp. 1	MonPSp1	FJ040505
Muellerius	*capillaris*	MuelCap1G	AY295810
Myctolaimus	*ulmi*	MyctUlm1G	EU196024
Mylonchulus	1	MyloSp1	AY284758
Mylonchulus	2	MyloSp2	AY284759
Mylonchulus	3	MyloSp3	AY284760
Mylonchulus	4	MyloSp4	AY284761
Mylonchulus	*arenicolus*	MyloAreG	AF036596
Mylonchulus	*brachyuris*	MyloBra2	AY284752
Mylonchulus	*brachyuris*	MyloBra3	AY284753
Mylonchulus	*brachyuris*	MyloBra4	AY284754
Mylonchulus	*rotundicaudatus*	MyloRot2	AY284751
Mylonchulus	*sigmaturus*	MyloSig1	AY284755
Mylonchulus	*sigmaturus*	MyloSig2	AY284756
Mylonchulus	*sigmaturus*	MyloSig3	AY284757
Mylonchulus	sp.	MyloSp1G	AJ875156
Myolaimus	sp.	MyolSpG	U81585
Nacobbus	*aberrans*	NacoAbe1G	AF442190
Nacobbus	*aberrans*	NacoAbe2G	AJ966494
Nagelus	*obscurus*	NageObs1G	EU306350
Nagelus	*obscurus* 1	NageObs1	AY593904
Nanidorus	*minor*	NaniMin1G	AJ438052

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Nanidorus	*minor*	NaniMin2G	AJ438053
Nanidorus	*minor*	NaniMin3G	AJ438054
Nanidorus	*minor*	NaniMin4G	AJ438055
Nanidorus	*minor*	NaniMin5G	AJ438056
Nanidorus	*minor*	NaniMin6G	AJ438057
Nanidorus	*minor*	NaniMin7G	AJ438058
Nanidorus	*minor*	NaniMin8G	AJ439571
Nanidorus	*minor*	NaniMin9G	AM269897
Nanidorus	*nanus*	NaniNan1	FJ040485
Nanidorus	*nanus*	NaniNan2	FJ040486
Necator	*americanus*	NecaAme1G	AY295811
Necator	*americanus*	NecaAme2G	AJ920348
Nematodirus	*battus*	NemaBat1G	U01230
Nematodirus	*battus*	NemaBat2G	AJ920360
Nemhelix	*bakeri*	NemhBak1G	DQ118537
Neoascarophis	*macrouri*	NeoaMac1G	DQ442660
Neodolichorhynchus	*lamelliferus* 1	NeodLam1	AY284598
Neodolichorhynchus	*microphasmis*	NeodMic2	EU669917
Neopsilenchus	*magnidens* 1	Neopmag1	AY284585
Nicollina	*cameroni*	NicoCam1G	AJ920357
Nilonema	*senticosum*	NiloSen1G	DQ442671
Nippostrongylus	*brasiliensis*	NippBra1G	AF036597
Nippostrongylus	*brasiliensis*	NippBra2G	AJ920356
Nothotylenchus	*acris* 1	NothAcr1	AY593914
Nygolaimus	cf. *brachyuris*	NygoBra1Z	AY284770
Nygolaimus	cf. *brachyuris*	NygoBra2Z	AY284771
Nygolaimus	cf. *parvus*	NygoPar1ZG	AY552974
Odontolaimus	*chlorurus*	OdLaChl	AY284723
Odontopharynx	*longicaudata*	OdPhLon1	FJ040449
Odontophora	sp. 1	OdonSp1	FJ040459
Ogma	*cobbi*	OgmaCob1	EU669918
Ogma	*menzeli*	OgmaMen1	EU669919
Onchium	sp. 1	OChiSp1	EF59138
Onchocerca	*cervicalis*	OnCeCer1G	DQ094174
Onchocercidae	sp.	OnCefamil1G	DQ103704
Oncholaimidae	sp. 1	Onchfamil1	FJ040493
Opisthodorylaimus	*sylphoides*	OpiDSyl1	AY284785
Oscheius	*dolichurus*	OschDoA1G	EU196010
Oscheius	*dolichuroides*	OschDolG	AF082998
Oscheius	*guentheri*	OschGue1G	EU196022
Oscheius	*insectivorus*	OschInsG	AF083019
Oscheius	*myriophila*	OschMyr1G	U81588
Oscheius	*myriophila*	OschMyr2G	U13936
Oscheius	sp.	OschSp1G	AF082995
Oscheius	sp.	OschSp2G	AF082994
Oscheius	*tipulae*	OschTip1G	U81587
Oscheius	*tipulae*	OschTip2G	AF036591
Oscheius	*tipulae*	OschTip3G	EU196009
Oslerus	*osleri*	OsleOsl1G	AY295812
Ostertagia	*leptospicularis*	OsteLep1G	AJ920351

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Ostertagia	*ostertagi*	OsteOst1G	AF036598
Ostertagia	*ostertagi*	OsteOst2G	AJ920352
Otostrongylus	*circumlitus*	OtosCir1G	AY295813
Otostrongylus	sp.	OtosSpG	U81589
Ottolenchus	*discrepans* 1	OttoDis1	AY284590
Oxydirus	*nethus*	OxydNet3	EF207251
Oxydirus	*oxycephaloides*	OxydOCO1	AY284823
Oxydirus	*oxycephalus*	OxydOxy1	AY284824
Oxydirus	*oxycephalus*	OxydOxy2	AY284825
Oxystomina	sp. 1	OxysSp1	FJ040498
Oxystomina	sp. 2	OxysSp2	FJ040499
Oxyuris	*equi*	OxyuEqu1G	EF180062
Panagrellus	*redivivus*	PGreRed1G	AF036599
Panagrellus	*redivivus*	PGreRed2G	AF083007
Panagrobelus	*stammeri*	PGBeStaG	AF202153
Panagrolaimoid		RhPhSp2GZ	U81580
Panagrolaimus	cf. *rigidus*	PGLaRig1GZ	DQ285636
Panagrolaimus	*davidi*	PGLaDavG	AJ567385
Panagrolaimus	*paetzoldi*	PGLaPae1	FJ040414
Panagrolaimus	sp.	PGLaSpG	U81579
Panagrolaimus	*subelongatus* 1	PGLaSub1	AY284681
Paracanthonchus	*caecus*	PCanCaeG	AF047888
Paractinolaimus	*macrolaimus*	PActMac1	AY284826
Paractinolaimus	*macrolaimus*	PActMac1G	AY993978
Paractinolaimus	sp.	PActSp1G	AY552975
Paracyatholaimus	*intermedius*	PCyaInt1G	AJ966495
Parafilaroides	*decorus*	PFilDec1G	AY295814
Parafilaroides	sp.	PFilSpG	U81590
Paralongidorus	*litoralis*	PLonLit1G	EU026158
Paralongidorus	*litoralis*	PLonLit2G	EU026159
Paralongidorus	*maximus*	PLonMax1G	AJ875152
Paralongidorus	*paramaximus*	PLonPar1G	EU026157
Paramphidelus	1	PAmpSp1	AY284740
Paramphidelus	2	PAmpSp2	AY284741
Paramphidelus	3	PAmpSp3	AY284742
Paramphidelus	*hortensis*	PAmpHor1	AY284739
Paraphelenchus	sp.	PAphSp	AY284642
Paraplectonema	*pedunculatum*	PaPlPed1	EF591320
Parascaris	*equorum*	PAscEquG	U94378
Parasitorhabditis	*obtusa*	PaRhObt1G	EU003189
Parasitorhabditis	sp.	PaRhSpG	AF083028
Paraspidodera	sp.	PSpiSpG	AF083005
Paratrichodorus	*allius*	PTrCAll1G	AJ439572
Paratrichodorus	*allius*	PTrCAll2G	AJ439623
Paratrichodorus	*allius*	PTrCAll3G	AM067124
Paratrichodorus	*allius*	PTrCAll4G	AJ439569
Paratrichodorus	*allius*	PTrCAll5G	AM269895
Paratrichodorus	*anemones*	PTrCAne1G	AF036600
Paratrichodorus	*anemones*	PTrCAne2G	AJ439573
Paratrichodorus	*anemones*	PTrCAne3G	AJ439570

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Paratrichodorus	*hispanus*	PTrCHis1G	AJ439577
Paratrichodorus	*macrostylus*	PTrCMac1G	AJ439507
Paratrichodorus	*macrostylus*	PTrCMac2G	AJ439621
Paratrichodorus	*macrostylus*	PTrCMac3G	AJ439622
Paratrichodorus	*pachydermus*	PTrCPac1	FJ040483
Paratrichodorus	*pachydermus*	PTrCPac1G	AF036601
Paratrichodorus	*pachydermus*	PTrCPac2G	AJ439512
Paratrichodorus	*pachydermus*	PTrCPac3G	AJ439574
Paratrichodorus	sp.	PTrCSp2G	AJ439576
Paratrichodorus	*teres*	PTrCTer1	FJ040484
Paratrichodorus	*teres*	PTrCTer1G	AJ439575
Paratrichodorus	*teres*	PTrCTer2G	AM087125
Paratrichodorus	*teres*	PTrCTer3G	AM269896
Paratylenchus	cf. *neoamblycephalus*	PTylNeoZ	AY284634
Paratylenchus	*dianthus*	PTylDia1G	AJ966496
Paratylenchus	*microdorus*	PTylMic1	AY284632
Paratylenchus	*microdorus*	PTylMic2	AY284633
Paratylenchus	*straeleni*	PTylStr2	AY284630
Paratylenchus	*straeleni*	PTylStr3	AY284631
Paravulvus	*hartingii*	PVulHar1	AY284774
Paravulvus	*hartingii*	PVulHar2	AY284775
Paravulvus	*hartingii*	PVulHar1G	AY552976
Paraxonchium	*laetificans*	PAxoLae1	AY284808
Paraxonchium	*laetificans*	PAxoLae2	AY284809
Paraxonchium	*laetificans*	PAxoLae3	AY284810
Parelaphostrongylus	*odocoilei*	PElaOdo1G	AY295815
Passalurus	sp.	PassSp1G	EF180061
Pellioditis	*marina*	PellMarG	AF083021
Pellioditis	*mediterranea*	PellMedG	AF083020
Pellioditis	sp.	PellSp1G	EU196011
Pellioditis	*typica*	PellTyp1G	U13933
Pelodera	*cylindrica*	PeloCyl1G	EU196021
Pelodera	*pseudoteres*	PeloPse1G	EU196023
Pelodera	*punctata*	PeloPunG	AF083018
Pelodera	*strongyloides*	PeloStrG	U13932
Pelodera	*teres*	PeloTerG	AF083002
Petrovinema	*poculatum*	PetrPoc1G	AJ920343
Phasmarhabditis	*hermaphrodita*	PhasHer1G	DQ639980
Phasmarhabditis	*hermaphrodita*	PhasHer2G	DQ639981
Phasmarhabditis	*hermaphrodita*	PhasHer3G	DQ639980
Phasmarhabditis	sp.	PhasSp1G	EU196008
Philometra	*cyprinirutili*	PhiMCyp1G	DQ442675
Philometra	*obturans*	PhiMObt1G	AY852267
Philometra	*ovata*	PhiMOva1G	DQ442677
Philometra	sp.	PhiMSp1G	DQ442674
Philometroides	*sanguineus*	PhMOSan1G	DQ442676
Philonema	*oncorhynchi*	PhilOnc1G	DQ442670
Philonema	sp.	PhilSpG	U81574
Physaloptera	*alata*	PhysAla1G	AY702703
Physaloptera	*apivori*	PhysApi1G	EU004817

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Physaloptera	sp.	PhysSp1G	EF180065
Physaloptera	*turgida*	PhysTur1G	DQ503459
Plectid		Plecfamil2G	AJ966508
Plectidae	sp.	Plecfamil1G	AJ966478
Plectonchus	*hunti*	PlChHunG	AF202154
Plectonchus	sp. 1	PlChSp2	AY593920
Plectus	*acuminatus*	PlecAcuG	AF037628
Plectus	*aquatilis*	PlecAqu1G	AF036602
Plectus	*aquatilis* 1	PlecAqu1	AY284700
Plectus	cf. *cirratus*	PlecCir1Z	AY284701
Plectus	cf. *parietinus*	PlecPRi1Z	AY284702
Plectus	cf. *parietinus*	PlecPRi2Z	AY284703
Plectus	cf. *parvus*	PlecParZ	AY284699
Plectus	cf. *pusillus*	PlecPus1Z	AY284704
Plectus	cf. *pusillus*	PlecPus2Z	AY284705
Plectus	*cirratus* 1	PlecCir2	AY593930
Plectus	*rhizophilus*	PlecRhi1	AY593928
Plectus	*rhizophilus*	PlecRhi2	AY593929
Plectus	sp.	PlecSpG	U61761
Podura	*aquatica*	PoduAquG	AF005452
Poikilolaimus	*centrocercus* 1	PoikCen1	FJ040436
Poikilolaimus	*oxycerca*	PoikOxyG	AF083023
Poikilolaimus	sp.	PoikSp1G	U81583
Poikilolaimus	sp.	PoikSp2G	DQ385848
Polydesmus	*coriaceus*	PolyCorG	AF005449
Pontonema	*vulgare*	PontVulG	AF047890
Porrocaecum	*angusticolle*	PorrAng1G	EU004820
Porrocaecum	*depressum*	PorrDepG	U94379
Porrocaecum	*streperae*	PorrStr1G	EF180074
Praeacanthonchus	sp.	PraeSp1G	AF036612
Praeacanthonchus	sp.	PraeSp2G	AM234046
Pratylenchoides	*magnicauda*	PrChMagG	AF202157
Pratylenchoides	*ritteri*	PrChRit1G	AJ966497
Pratylenchus	*convallariae*	PratCon1	EU669957
Pratylenchus	*crenatus*	PratCre1	AY284610
Pratylenchus	*crenatus*	PratCre2	EU669920
Pratylenchus	*crenatus*	PratCre3	EU669921
Pratylenchus	*crenatus*	PratCre4	EU669922
Pratylenchus	*goodeyi*	PratGoo1G	AJ966498
Pratylenchus	*neglectus*	PratNeg1	EU669923
Pratylenchus	*neglectus*	PratNeg2	EU669924
Pratylenchus	*penetrans*	PratPen1	EU669925
Pratylenchus	*penetrans*	PratPen2	EU669926
Pratylenchus	*pratensis*	PratPra1	AY284611
Pratylenchus	*scribneri*	PratScr1	EU669927
Pratylenchus	*scribneri*	PratScr2	EU669958
Pratylenchus	*thornei*	PratTho2G	AJ966499
Pratylenchus	*thornei*	PratTho1	AY284612
Pratylenchus	*thornei*	PratTho3	EU669928
Pratylenchus	*thornei*	PratTho4	AJ966499

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Pratylenchus	*thornei*	PratTho5	EU669930
Pratylenchus	*vulnus*	PratVul1	EU669955
Pratylenchus	*vulnus*	PratVul2	EU669956
Priapulus	*caudatus*	PriaCauG	Z38009
Prionchulus	*muscorum*	PrioMus1	AY284745
Prionchulus	*muscorum*	PrioMus1G	AJ966500
Prionchulus	*punctatus*	PrioPun1	AY284746
Prionchulus	*punctatus*	PrioPun2	AY284747
Prismatolaimus	cf. *dolichurus*	PriMDol1Z	AY284727
Prismatolaimus	cf. *dolichurus*	PriMDol2Z	AY284728
Prismatolaimus	*dolichurus*	PriMDol4	AY593957
Prismatolaimus	*intermedius*	PriMInt1	AY284729
Prismatolaimus	*intermedius*	PriMInt1G	AF036603
Pristionchus	*aerivora*	PriTAer1	FJ040440
Pristionchus	*americanus*	PriTAme1	FJ040445
Pristionchus	*entomophagus*	PriTEnt1	FJ040441
Pristionchus	*lherithieri*	PriTLhe2G	AF036643
Pristionchus	*lheritieri*	PriTLhe1G	AF036640
Pristionchus	*lheritieri*	PriTLhe4	FJ040439
Pristionchus	*lheritieri* 1	PriTLhe1	AY284690
Pristionchus	*lheritieri* 2	PriTLhe3	AY593923
Pristionchus	*marianneae*	PriTMar1	FJ040442
Pristionchus	*maupasi*	PriTMau1	FJ040443
Pristionchus	*pacificus*	PriTPac1G	U81584
Pristionchus	*pacificus*	PriTPac2G	AF083010
Pristionchus	*pauli*	PriTPau1	FJ040446
Pristionchus	*pseudaerivorus*	PriTPse1	FJ040447
Pristionchus	*uniformis*	PriTUni1	FJ040444
Procamacolaimus	sp. 1	PrCoSp1	EF591326
Procamallanus	*pacificus*	PrCaPac1G	DQ442665
Procamallanus	*pintoi*	PrCaPin1G	DQ442666
Procamallanus	*rebecae*	PrCaReb1G	DQ442667
Prodesmodora	*circulata* 4	PrDeCir4	AY284722
Prodesmodora	sp. 2	PrDeSp2	FJ040476
Prodesmodora	sp. 3	PrDeSp3	FJ040477
Prodontorhabditis	*wirthi*	PDRhWir1G	AY602179
Prodorylaimus	*mas*	PrDoMas1	AY593946
Prodorylaimus	sp.	PrDoSp1	EF207246
cf. *Prodorylaimus*		PrDoSp2Z	AY284778
Protorhabditis	sp.	PRhaSp2G	AF083024
Protorhabditis	sp.	PRhaSp1G	AF083001
Protorhabditis	sp.	PRhaSp3G	EU196002
Protostrongylus	*rufescens*	PrStRuf1G	AJ920364
Protozoophaga	*obesa*	PrZoObe1G	EF180075
Pseudacrobeles	*variabilis*	PseAVarG	AF202150
Pseudalius	*inflexus*	PsAlInf1G	AY295816
Pseudhalenchus	*minutus*	PseHMin2	AY593916
Pseudhalenchus	*minutus* 1	PseHMin1	AY284638
Pseudoterranova	*decipiens*	PseTDecG	U94380
Psilenchus	cf. *hilarulus*	PsilHilZ	AY284593

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Ptycholaimellus	sp. 1	PtycSp1	FJ040472
Punctodera	*stonei*	PuncSto1	EU682391
Pungentus	*silvestris*	PungSil1	AY284788
Pungentus	sp.	PungSp1	AY284791
Pungentus	sp.	PungSp1G	AJ966501
Pycnophyes	*kielensis*	PycnKieG	U67997
Radopholus	*similis*	RadoSim1G	AJ966502
Radopholus	sp. 2	RadoSp2	FJ040398
Raillietnema	sp.	RailSp1G	DQ503461
Raphidascaris	*acus*	RaphAcu1G	DQ503460
Rhabditella	*axei*	RhTeAxe2	AY284654
Rhabditella	*axei*	RhTeAxe1G	U13934
Rhabditella	sp.	RhTeSpG	AF083000
Rhabditis	*blumi*	RhabBluG	U13935
Rhabditis	*brassicae*	RhabBra1G	EU196006
Rhabditis	cf. *terricola*	RhabTerZ	AY284653
Rhabditis	*colombiana*	RhabCol1G	AY751546
Rhabditis	sp.	RhabSp1G	AF083008
Rhabditis	sp.	RhabSp2G	EU196007
Rhabditis	sp.	RhabSp3G	EU273597
Rhabditis	sp.	RhabSp4G	EU196004
Rhabditoid	sp.	Rhabditida1G	EU196015
Rhabditoides	*inermiformis*	RhToInFG	AF083017
Rhabditoides	*inermis*	RhToIneG	AF082996
Rhabditoides	*regina*	RhToRegG	AF082997
Rhabditophanes	sp.	RhPhSp1G	AF202151
Rhabdochona	*denudata*	RhChDen1G	DQ442659
Rhabdolaimus	cf. *terrestris*	RhDoTer1Z	AY284710
Rhabdolaimus	cf. *terrestris*	RhDoTer2Z	AY284711
Rhabdolaimus	cf. *terrestris*	RhDoTer3Z	AY284712
Rhigonema	*thysanophora*	RhigThy1G	EF180067
Robbea	*hypermnestra*	RobbHypG	Y16921
Rondonia	*rondoni*	RondRon1G	DQ442679
Rotylenchulus	*reniformis*	RoChRen1G	EU306342
Rotylenchus	*goodeyi*	RotyGoo1	AY284609
Rotylenchus	*robustus*	RotyRob1G	AJ966503
Rotylenchus	sp. 1	RotySp	AY284608
Rotylenchus	*uniformis*	RotyUni1	AY593882
Rotylenchus	*uniformis*	RotyUni1G	EU306356
Sabatieria	*pulchra*	SabaPul1	EF591335
Sabatieria	*pulchra*	SabaPul2	FJ040466
Sauertylenchus	*maximus*	SaueMax2	AY284603
Sauertylenchus	*maximus*	SaueMax3	AY284604
Sauertylenchus	*maximus*	SaueMax1G	AY993979
Sauertylenchus	*maximus* 1	SaueMax1	AY284602
Schistonchus	*aureus*	SchiAur1G	DQ912922
Schistonchus	*centerae*	SchiCen1G	DQ912923
Schistonchus	*guangzhouensis*	SchiGua1G	DQ912924
Scutellonema	*bradys*	ScNeBra1G	AY271723
Scutellonema	*bradys*	ScNeBra2G	AJ966504

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Scutylenchus	*quadrifer*	ScutQua1	AY284599
Scutylenchus	*quadrifer*	ScutQua1G	AY993977
Sectonema	*barbatoides*	SectBar1	AY284814
Sectonema	sp. 1	SectSp1	AY284815
Seinura	sp. 1	SeinSp1	AY284651
Serratospiculum	*tendo*	SerrTen1G	AY702704
Setaria	*digitata*	SetaDig1G	DQ094175
SetoStephanolaimus	*spartinae*	SeStSpa1	EF591321
Skrjabillanus	*scardinii*	SkLaSca1G	DQ442669
Skrjabinema	sp.	SkNeSp1G	EF180060
Skrjabingylus	*chitwoodorum*	SkrjChi1G	AY295819
Soboliphyme	*baturini*	SoboBat1G	AY277895
Solididens	*vulgaris*	SoliVul1G	AY552977
Sphaerularia	*bombi*	SpRuBom1G	AB250212
Sphaerularia	*bombi*	SpRuBom2G	AB250213
Spinitectus	*carolini*	SpinCar1G	DQ503464
Spirinia	*elongata*	SpirElo1G	EF527426
Spirocamallanus	*istiblenni*	SpCaIst1G	EF180076
Spirocamallanus	*rarus*	SpCaRar1G	DQ494195
Spirocerca	*lupi*	SpCeLup1G	AY751497
Spirocerca	sp.	SpCeSp1G	AY751498
Steinernema	*affine*	SteiAff3-27	FJ040425
Steinernema	*carpocapsae*	SteiCarG	AF036604
Steinernema	*carpocapsae*	SteiCar1	FJ040415
Steinernema	*carpocapsae*	SteiCar3	FJ040416
Steinernema	*feltiae*	SteiFel2	FJ040417
Steinernema	*feltiae*	SteiFel4	FJ040418
Steinernema	*feltiae*	SteiFel5	FJ040419
Steinernema	*glaseri*	SteiGla2	FJ040422
Steinernema	*glaseri* 1	SteiGla1	AY284682
Steinernema	*kraussei*	SteiKra1	FJ040420
Steinernema	*kraussei*	SteiKra3	FJ040421
Steinernema	*monticolum*	SteiMon1	FJ040423
Steinernema	*scarabaei*	SteiSca1	FJ040424
Steinernema	sp. 1	SteiSp1	FJ040426
Steinernema	sp. 2	SteiSp2	FJ040427
Stenurus	*minor*	StenMin1G	AY295817
Stephanurus	*dentatus*	StepDen1G	AJ920345
Stilbonema	*majum*	StilMajG	Y16922
Strongyloides	*cebus*	StroCeb1G	AB272236
Strongyloides	*fuelleborni*	StroFue1G	AB272235
Strongyloides	*procyonis*	StroPro1G	AB272234
Strongyloides	*ratti*	StroRat1G	U81581
Strongyloides	*ratti*	StroRat2G	AF036605
Strongyloides	*robustus*	StroRob1G	AB272232
Strongyloides	*robustus*	StroRob2G	AB272233
Strongyloides	sp.	StroSp1G	AB272229
Strongyloides	sp.	StroSp2G	AB272230
Strongyloides	sp.	StroSp3G	AB272231
Strongyloides	*stercoralis*	StroSte1G	M84229

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Strongyloides	*stercoralis*	StroSte3G	AF279916
Strongylus	*equinus*	StGyEqu1G	DQ094176
Subanguina	*radicicola*	SubaRadG	AF202164
Subanguina	*radicicola*	SubaRad1	EU682392
Sulcascaris	*sulcata*	SulcSul1G	EF180080
Symplocostoma	sp. 1	SympSp1	FJ040502
Syngamus	*trachea*	SyngTra1G	AF036606
Syngamus	*trachea*	SyngTra2G	AJ920344
Synhimantus	*hamatus*	SynhHam1G	EU004819
Synhimantus	*laticeps*	SynhLat1G	EU004818
Synonchiella	sp. 1	SynoSp1	FJ040468
Syringolaimus	sp. 1	SyriSp1	FJ040497
Telotylenchus	*ventralis* 1	TeloVen1	AY593905
Teratocephalus	*lirellus*	TCepLirG	AF036607
Teratocephalus	*terrestris*	TCepTer1	AY284683
Teratorhabditis	*ferrugineus*	TRhaFer1G	AB269816
Teratorhabditis	*palmarum*	TRhaPalG	U13937
Teratorhabditis	*synpapillata*	TRhaSynG	AF083015
Terranova	*caballeroi*	TerrCabG	U94381
Terranova	*scoliodontis*	TerrSco1G	DQ442661
Tetrabothriostrongylus	*mackerrasae*	TetrMac1G	AJ920359
Tetrameres	*fissipina*	TetMFis1G	EF180077
Thalassoalaimus	*pirum*	ThalPir1	FJ040500
Thelastoma	*krausi*	ThSoKra1G	EF180068
Thelazia	*lacrymalis*	ThelLac1G	DQ503458
Theristus	*acer*	TherAce1G	AJ966505
Theristus	*agilis*	TherAgi1	AY284693
Theristus	*agilis*	TherAgi3	AY284695
Theristus	*agilis*	TherAgi2	AY284694
Theristus	sp. 1	TherSp1	FJ040464
Thonus	2	ThonSp2	AY284797
Thonus	cf. *circulifer*	ThonCir1Z	AY284795
Thonus	sp.	ThonSp3	AY284798
Thornia	*steatopyga* 1	ThorSte1	AY284787
Thulinia	*stephaniae*	ThulSteG	AF056023
Tobrilus	*gracilis*	TobrGra1G	AJ966506
Torynurus	*convolutus*	ToryCon1G	AY295818
Toxascaris	*leonina*	TAscLeoG	U94383
Toxocara	*canis*	ToxoCan1G	U94382
Toxocara	*canis*	ToxoCan2G	AF036608
Toxocara	*cati*	ToxoCat1G	EF180059
Toxocara	*vitulorum*	ToxoVit1G	EF180078
Trefusia	*zostericola*	TrefZosG	AF329937
Trichidorus	*primitivus*	TricPri1	FJ040481
Trichinella	*britovi*	TriNBri1G	AY851257
Trichinella	*murrelli*	TriNMur1G	AY851259
Trichinella	*nativa*	TriNNat1G	AY487254
Trichinella	*nativa*	TriNNat2G	AY851256
Trichinella	*nelsoni*	TriNNel1G	AY851261
Trichinella	*papuae*	TriNPap1G	AY851263

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Trichinella	*pseudospiralis*	TriNPse1G	AY851258
Trichinella	sp.	TriNSp1G	AY851260
Trichinella	sp.	TriNSp2G	AY851262
Trichinella	*spiralis*	TriNSpi1G	U60231
Trichinella	*spiralis*	TriNSpi2G	AY497012
Trichinella	*zimbabwensis*	TriNZim1G	AY851264
Trichodorus	*cylindricus*	TricCyl1	FJ040482
Trichodorus	*cylindricus*	TricCyl1G	AJ439578
Trichodorus	*nanjingensis*	TricNan1G	AJ439579
Trichodorus	*nanjingensis*	TricNan2G	AJ439580
Trichodorus	*pakistanensis*	TricPak1G	AJ439581
Trichodorus	*pakistanensis*	TricPak2G	AJ439582
Trichodorus	*primitivus*	TricPri1G	AF036609
Trichodorus	*primitivus*	TricPri2G	AJ439517
Trichodorus	*primitivus*	TricPri3G	AJ439583
Trichodorus	*similis*	TricSim1G	AJ439522
Trichodorus	*similis*	TricSim2G	AJ439584
Trichodorus	*similis*	TricSim3G	AJ439585
Trichodorus	sp.	TricSp1G	AJ439588
Trichodorus	*sparsus*	TricSpa1G	AJ439586
Trichodorus	*sparsus*	TricSpa2G	AJ439587
Trichodorus	*sparsus*	TricSpa3G	AJ439589
Trichodorus	*sparsus*	TricSpa4G	AJ439590
Trichodorus	*sparsus*	TricSpa5G	AJ439624
Trichodorus	*sparsus*	TricSpa6G	AJ439625
Trichodorus	*sparsus*	TricSpa7G	AJ439591
Trichodorus	*variopapillatus*	TricVar1	AY284841
Trichostrongylus	*colubriformis*	TrStCol1G	AJ920350
Trichuris	*muris*	TriUMurG	AF036637
Trichuris	*suis*	TriUSui1G	AY851265
Trichuris	*suis*	TriUSui2G	AY856093
Trichuris	*trichiura*	TriUTri1G	DQ118536
Tridentulus	sp.	TridSp1G	AJ966507
Tripyla	cf. *filicaudata*	TripFil1Z	AY284730
Tripyla	cf. *filicaudata*	TripFil2Z	AY284731
Tripyla	sp.	TripSp3G	EF197734
Tripyla	sp. 1	TripSp1	AY284732
Tripylella	sp.	TrLeSp1	AY284737
Tripylella	sp.	TrLeSp2	FJ040488
Tripylina	sp.	TrLiSp2G	EF197728
Trischistoma	1	TrisSp1	AY284735
Trischistoma	2	TrisSp2	AY284736
Trischistoma	*monohystera*	TrisMon1G	AJ966509
Troglostrongylus	*wilsoni*	TrogWil1G	AY295820
Truttaedacnitis	*truttae*	TrutTru1G	EF180063
Trypila	sp. 2	TripSp2	AY284733
Trypila	sp. 4	TripSp3	AY284734
Tubiluchus	*corallicola*	TubiCorG	AF119086
Turbatrix	*aceti*	TurbAceG	AF202165
Turgida	*torresi*	TurgTor1G	EF180069

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Tylencholaimellus	*affinis*	TyMeAff1G	AY552978
Tylencholaimellus	*striatus*	TyMeStr1	AY284837
Tylencholaimus	cf. *teres*	TyLaTer1Z	EF207254
Tylencholaimus	sp. 2	TyLaSp2Z	AY284833
Tylencholaimus	*mirabilis*	TyLaMir2	AY284836
Tylencholaimus	*mirabilis*	TyLaMir3	EF207253
Tylencholaimus	sp.	TyLaSp1G	AJ966510
Tylenchulus	*semipenetrans*	TyChSem1G	AJ966511
Tylenchus	*arcuatus*	TyleArc1G	EU306348
Tylenchus	*arcuatus*	TyleArc2G	EU306349
Tylenchus	*davainei* 1	TyleDav1	AY284588
Tylenchus	sp.	TyleSp1	AY284589
Tylocephalus	*auriculatus*	TyCeAur2	AY284707
Tylocephalus	*auriculatus*	TyCeAur1G	AF202155
Tylolaimophorus	*minor*	TyloMin1G	AJ966512
Tylopharynx	*foetida*	TyPhFoe1G	EU306343
Viscosia	sp. 1	ViscSp1	FJ040494
Wellcomia	*siamensis*	WellSia1G	EF180079
Wellcomia	sp.	WellSp1G	EF180066
Wilsonema	*otophorum*	WilsOto2	AY593927
Wilsonema	*schuurmansstekhoveni*	WilsSch1G	AJ966513
Wuchereria	*bancrofti*	WuchBan1G	AF227234
Wuchereria	*bancrofti*	WuchBan2G	AY843436
Wuchereria	*bancrofti*	WuchBan3G	AY843437
Wuchereria	*bancrofti*	WuchBan4G	AY843438
Xiphidorus	*balcarceanus*	XiDoBal1G	AY297839
Xiphidorus	*minor*	XiDoMin1G	AY297830
Xiphidorus	*minor*	XiDoMin2G	AY604181
Xiphidorus	*parthenus*	XiDoPar1G	AY604182
Xiphidorus	sp.	XiDoSp1G	AY604183
Xiphidorus	sp.	XiDoSp2G	AY297841
Xiphidorus	*yepesara*	XiDoYep1G	AY297837
Xiphidorus	*yepesara*	XiDoYep2G	AY297838
Xiphinema	*americanum*	XiphAme1G	AY283170
Xiphinema	*americanum*	XiphAme2G	AY580056
Xiphinema	*americanum*	XiphAme3G	AM086684
Xiphinema	*bakeri*	XiphBak1G	AY283173
Xiphinema	*brasiliense*	XiphBra1G	AY297836
Xiphinema	*brevicolle*	XiphBre1G	AY297822
Xiphinema	*brevicolle*	XiphBre2G	AY580057
Xiphinema	cf. *americanum*	XiphAme4GZ	AM086671
Xiphinema	cf. *americanum*	XiphAme5GZ	AM086672
Xiphinema	cf. *americanum*	XiphAme6GZ	AM086679
Xiphinema	cf. *americanum*	XiphAme7GZ	AM086683
Xiphinema	*chambersi*	XiphCha1G	AY283174
Xiphinema	*citricolum*	XiphCit1G	AM086686
Xiphinema	*diffusum*	XiphDif1G	AY297823
Xiphinema	*diffusum*	XiphDif2G	AM086669
Xiphinema	*diffusum*	XiphDif3G	AM086677
Xiphinema	*diffusum*	XiphDif4G	AM086685

Table S1. *(Continued).*

Genus	Species	ID	GenBank No.
Xiphinema	*elongatum*	XiphElo1G	AY297824
Xiphinema	*ensiculiferum*	XiphEns1G	AY297825
Xiphinema	*floridae*	XiphFlo1G	AM086687
Xiphinema	*georgianum*	XiphGeo1G	AM086688
Xiphinema	*ifacolum*	XiphIfa1G	AY297826
Xiphinema	*incognitum*	XiphInc1G	AM086670
Xiphinema	*incognitum*	XiphInc2G	AM086678
Xiphinema	*index*	XiphInd1	EF207249
Xiphinema	*index*	XiphInd1G	AY687997
Xiphinema	*krugi*	XiphKru1G	AY297827
Xiphinema	*krugi*	XiphKru2G	AY297828
Xiphinema	*longicaudatum*	XiphLon1G	AY297829
Xiphinema	*oxycaudatum*	XiphOxy1G	AY297835
Xiphinema	*pachtaicum*	XiphPac1G	AM086682
Xiphinema	*paritaliae*	XiphPar1G	AY297831
Xiphinema	*peruvianum*	XiphPer1G	AY297832
Xiphinema	*peruvianum*	XiphPer2G	AM086674
Xiphinema	*rivesi*	XiphRiv1G	AF036610
Xiphinema	*rivesi*	XiphRiv2G	AM086673
Xiphinema	*simile*	XiphSim1G	AM086680
Xiphinema	*simile*	XiphSim2G	AM086681
Xiphinema	sp.	XiphSp1G	AY297840
Xiphinema	sp. 1	XiphSp1	EF207250
Xiphinema	*surinamense*	XiphSur1G	AY297833
Xiphinema	*taylori*	XiphTay1G	AM086675
Xiphinema	*taylori*	XiphTay2G	AM086676
Xiphinema	*variegatum*	XiphVar1G	AY297834
Xiphinema	*vuittenezi*	XiphVui1G	AY552979
Xyzzors	sp.	XyzzSpG	Y16923
Zeldia	*punctata*	ZeldPunG	U61760
Zeldia	sp. 1	ZeldSp1	AY284675
Zeldia	sp. 2	ZeldSp2	AY284676
Zoniolaimus	*mawsonae*	ZoniMaw1G	AJ920338
Zygotylenchus	*guevarai*	ZygoGue1G	AF442189