

Acknowledgments

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References

CHITWOOD, B. G. & CHITWOOD, M. B. (1974). *An Introduction*

to *Nematology*. Monumental Printing Press, Baltimore, 241 p.

RASKI, D. J. & COOMANS, A. V. (1990). Five new species of *Aphanolaimus* (Nemata : Araeolaimida) with a key to species. *Nematologica*, 26 : 22-54.

A SHORT CENSUS OF FREE-LIVING NEMATODES

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As far as I know the exact number of Nematoda species has not been counted for a semi-century, only some, more or less rough, calculations were published in a few cases. Let us see some examples : Tarjan (1960) : about 9000 species; Meyl (1961) : 5000 free-living species; Kaestner (1965) : 10 000 species, but in the validity at least 100 000 species; Hope and Murphy (1972) : 438 marine genera and 5000 marine species; Ayoub (1980) : 50 % of the known species marine, 35 % free-living (continental) and 15 % parasitic; Maggenti (1981) : about 15 000 nominal species, and 250-300 families; Platt and Warwick (1983) : 20 000 nominal species, of them 4000 species marine; Poinar (1983) : about 15 000 described species but at least 500 000 actually living species; Siddiqi (1986) : 216 genera and 2200 species in the order Tylenchida — and we could continue the enumeration. According to these calculations, 10 000 to 20 000 species — free-living and parasitic together — are supposed as having been described to the present.

Unfortunately I cannot give exact data about parasitic nematodes, about free-living ones *, however, I dare outline some picture. During forty years having worked on these animals I currently registered all the taxa ever described. Well, how many genera and species of Nematoda have been registered to science?

Genera

The total number of nominal genera and subgenera of free-living nematodes established to the end of the year

1989 is not far from two thousand : 1793. The actual number of valid genera, however, cannot be given so definitely. The reason is well known : the valuation of genera, i.e. what someone looks upon as “good” genus, is more subjective. One would regard every small group of species as a separate genus, the other prefers to unite even quite evident genera. In having been somewhere in the mean, I calculate with good reason that 1380 genera may be considered as valid (Table 1). That means, 77 % of the nominal generic taxa are good and 23 % (413 genera) synonyms or *incertae*.

Table 1. Free-living genera.

Subclasses	Valid genera	Of them	
		marine	continental
Torquentia	472 (34 %)	435	37
Secernentia	406 (30 %)	1	405
Penetrantia	502 (36 %)	167	335
Together	1 380	603	777

Of the sum 1380, 603 genera (44 %) are marine and 777 (56 %) continental *. As for the subclasses, 472 genera (34 %) belong to the Torquentia, 406 (30 %) to the Secernentia and 502 (36 %) to the Penetrantia. These nearly equal numbers do serve a good argue again that

* Under “free-living” nematodes I mean all the marine, limnic and terrestrial forms including those associated on or in plants. The “true” parasites are those forms which live in animals and in the man.

* Although there are some — few — genera which occur in both spheras, on the basis of majority of species, however, they may be regarded as marine or terrestrial, respectively.

all the three subclasses are approximately of the same taxonomic "gravity". But this balance dissolves if we look at the marine and the continental forms separately. In marine habitats the Torquentia are on the top (435 genera, 72%), the Penetrantia much fewer (167 genera, 28%) and the Secernentia represented by a sole genus (*Halenchus*, < 1%). In continental relation the Secernentia are predominant (405 genera, 52%), they are followed by the Penetrantia (335 genera, 43%), while the Torquentia are the poorest (37 genera, 5%). In other words, the genera of Torquentia are in 92% marine and only in 8% continental, those of Secernentia hardly in 1% marine, thus practically in 100% continental, and those of Penetrantia in 33% marine and in 67% continental.

It is worthy to mention that 21% of the nominal generic taxa — or 26% of the valid genera — were described in the last twelve years. Of the valid marine genera 13%, of the limnic and terrestrial ones 37% (!) were established in the last dozen of years.

Species

The number of valid species of free-living Nematoda having been described hitherto is 11 050. Of them, 5450 are marine and 5600 continental (Table 2), that means that both the main spheras — sea and land — have been populated, according to our present-day knowledge, by the same number of nematode species!

Table 2. Free-living species.

Subclasses	Valid species	Of them	
		marine	continental
Torquentia	3 650 (33 %)	3 380	270
Secernentia	3 120 (28 %)	*	3 120
Penetrantia	4 280 (39 %)	2 070	2 210
Together	11 050	5 450	5 600

* Only two (or three) species, thus practically none.

A close balance of species number we can see in the subclasses as well: 3650 species (33%) belong to the Torquentia, 3120 species (28%) to the Secernentia and 4280 species (39%) to the Penetrantia. If we look, however, at the two brief regions of the Earth, we can find strong differences in the subclasses. Of marine nematodes 3380 species (62%) belong to the Torquentia, 2070 species (38%) to the Penetrantia and only 2 (or 3) species (< 1%) to the Secernentia. Of the continental Nematoda, the number of species is the richest in the Secernentia (3120 species, 56%), fairly rich in the Penetrantia (2210 species, 39%) but poor in the Torquentia (270 species, 5%).

From an other point of view, the valid species of Torquentia are in 93% marine and in 7% continental, of Secernentia in less than 1% marine, i.e. practically in 100% continental, and of Penetrantia in 48% marine and in 52% continental.

But let us see also some examples on the relation between nominal (all hitherto described) and valid species of continental — terrestrial and limnic — Nematoda. The total number of nominal species is 6810, of them 5600 (82%) may be accepted as good and 1210 (18%) synonyms or *incertae*. That means that every 5th or 6th of species is invalid taxonomically. In Torquentia: nominal 411, valid 270 (66%), synonyms etc. 141 (34%); in Secernentia: nominal 3731, valid 3120 (84%), synonyms etc. 611 (16%); in Penetrantia: nominal 2673, valid 2210 (83%), synonyms, etc. 463 (17%).

In free-living continental nematodes the richest orders are the Tylenchida (2240 species, 40%), the Dorylaimida (1880 species, 34%) and the Rhabditida (870 species, 16%). The Enoplida are represented by hardly 6%, and all the Torquentia by less than 5% of species.

The above sums reflect the presently known status of genus and species number. We may not forget that the actual number of nematode species must be much far greater. Cautious and unanimous opinions of experts presume that at least 100 000 nematodes species do exist in all the world!

References

- AYOUB, S. M. (1980). *Plant nematology. An agricultural training aid*. Sacramento, USA, CDFR, 195 p.
- HOPE, W. D. & MURPHY, D. G. (1972). *A taxonomic hierarchy and checklist of the genera and higher taxa of marine nematodes*. Washington, Smithsonian Contributions to Zoology, No. 137, 101 p.
- KAESTNER, A. (1965). *Lehrbuch der Speziellen Zoologie. Band I. Wirbellose. I. Teil. Protozoa, Mesozoa, Parazoa, Coelenterata, Protostomia*. Jena, 845 p.
- MAGGENTI, A. (1981). *General nematology*. New York, Heidelberg & Berlin, Springer Verlag, 372 p.
- MEYL, A. H. (1961). Die freilebenden Erd- und Süßwasser-nematoden (Fadenwürmer). In: *Die Tierwelt Mitteleuropas*, 1 (5a) Leipzig, 164 p.
- PLATT, H. M. & WARWICK, R. M. (1983). *Free-living marine nematodes. Part I. British enoplids*. Cambridge University Press, 307 p.
- POINAR, G. O. Jr. (1983). *The natural history of nematodes*. Englewood Cliffs, USA, Prentice-Hall, 323 p.
- SIDDIQI, M. R. (1986). *Tylenchida parasites of plants and insects*. Farnham Royal, UK, CABI, 645 p.
- TARJAN, A. C. (1960). *Check-list of plant and soil nematodes. A nomenclatorial compilation*. Gainesville, USA, Society of Nematologists, 200 p.