

Small subunit rRNA sequences were obtained from 38 representatives mainly of the nematode orders Spirurida (Camallanidae, Cystidicolidae, Daniconematidae, Philometridae, Physalopteridae, Rhabdochonidae, Skrjabillanidae) and, in part, Ascaridida (Anisakidae, Cucullanidae, Quimperidae). The examined nematodes are predominantly parasites of fishes. Their analyses provided well-supported trees allowing the study of phylogenetic relationships among some spirurine nematodes. The present results support the placement of Cucullanidae at the base of the suborder Spirurina and, based on the position of the genus *Philonema* (subfamily Philoneminae) forming a sister group to Skrjabillanidae (thus Philoneminae should be elevated to Philonemidae), the paraphyly of the Philometridae. Comparison of a large number of sequences of representatives of the latter family supports the paraphyly of the genera *Philometra*, *Philometroides* and *Dentiphilometra*. The validity of the newly included genera *Afrophilometra* and *Caranginema* is supported. These results indicate geographical isolation has not been the cause of speciation in this parasite group and no coevolution with fish hosts is apparent. On the contrary, the group of South-American species of *Alinema*, *Nilonema* and *Rumai* is placed in an independent branch, thus markedly separated from other family members. Molecular data indicate that the skrjabillanid subfamily Esocineminae (represented by *Esocinema bohemicum*) should be either elevated to the rank of an independent family or Daniconematidae (*Mexiconema africanum*) should be decreased to Daniconematinae and transferred to the family Skrjabillanidae. Camallanid genera *Camallanus* and *Procamallanus*, as well as the subgenera *Procamallanus* and *Spirocamallanus* are confirmed to be paraphyletic. Paraphyly has also been found within Filarioidea, Habronematoidea and Thelazioidea and in Cystidicolidae, Physalopteridae and Thelaziidae. The results of the analyses also show that *Neoscarophis*, *Spinitectus* and *Rhabdochona* are monophyletic, in contrast to the paraphyletic genus *Ascarophis*. They further confirm the independence of two subgenera, *Rhabdochona* and *Globochona*, in the genus *Rhabdochona*. The necessity of further studies of fish-parasitizing representatives of additional nematode families not yet studied by molecular methods, such as Guyanemidae, Lucionematidae or Tetanonematidae, is underscored.