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Ecological flexibility of Nematoda

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Because of their ecological flexibility Nematoda became one of the most successfull groups of invertebrates. That underlines their value for the assessment of environment conditions in theoretical and applied ecology.

Nemathelminthes are among the most numerous groups in the animal world. Their exact number is not determined, but COBB (according to PARAMONOV 1970) suggests their number on Earth is superior to five hundred thousands species. Nematoda are an example of such a state in the evolution of a given taxonomic unit, which is designed by SEVERTSOV (according to PARAMONOV 1970) with the term biological progress. It is described by the following characteristics:

- Increase in the density of the species populations
- Enlargement of the area
- Extensive ecological flexibility and occupation of new ecological niches.

Compared to other groups of worms, Nematoda have adapted to different living conditions due to their solid cuticle, which makes them less sensitive to the oxygen content and to influence of other ecological factors. Owing to this characteristic, they inhabit both maritime and freshwater basins, as well as the ground. A large group of Nematoda are ecto- and endoparasites on plants and animals. Due to their small dimensions and uncomplicated composition, Nematoda have occupied almost the whole biosphere and inhabit all possible substrata (NOVIKOVA 1971, STOYKOV 1980, GAGARIN 1981) including underground habitats (ALTHERR & DEBOUTTEVILLE 1972, DOLE 1983, DOLE & CHESSEL 1986, JIBERT 1986, PANDOURSKI 1994, BERON 1994). They are found in oceans and in seas, down to the Antarctic basins (ALLGEN 1959), in places with little depth near the littoral (STOYKOV 1980), as well as in habitats located deeper than 2000 m below the sea-level (SERGHEEVA 1974).

The freshwater Nematoda fauna is ecologically diverse. Its composition includes typical inhabitants of freshwater, species migrating in salted pre-estuary river areas, maritime species, organisms inhabiting moss, and others occasionally fallen in the water due to outwashing of littoral rocks.

The most numerous in species is the free-living Nematoda fauna. Phylogenetically, the most ancient among them are orders Enoplida and Araeolaimida

(GAGARIN 1981). After having occupied the whole maritime environment, they began progressively and slowly to penetrate fresh waters. Probably, different groups of sea nematodes have occupied freshwater during different stages of their evolution and had a different mode of adaptation to this environment.

After coming across continental waters, ancient Araeolaimida started to adapt progressively to a higher level of saprobity (GAGARIN 1981). Having occupied fresh waters, representatives of Araeolaimida continued their expansion towards the ground (order Rhabditida) and through their consecutive evolution they originated the first phyto- and zoohelminths (orders Rhabditida and Strongylida).

The evolution of the other aquatic Nematoda orders is not connected to putrefactive processes.

The ancient Enoplida, adapted to fresh water, have probably originated the order Dorylaimida, which penetrated the ground and, at the end, originated ectoparasitic Phyto-Nematoda.

The evolution of Mohysterida, Chromadorida and Desmoscolecida has occurred exclusively in a water environment (GAGARIN 1981).

The subsequent passage of fresh water Nematoda to a life in a maritime environment has probably occurred in fresh water basins located near the seacoast, in which it is possible for fresh water Nematoda to penetrate the interstitial to a considerable distance from the basin (STOICHEV 1998, PANDOURSKI & STOICHEV 2000). Probably, the lack of food in such isolated water bodies, or pollution in other cases, have provoked some eurybionthic species to penetrate the interstitial. If they encounter a favorable environment, they continue their evolution under the new circumstances and, gradually adapting to the higher salinity of the interstitial separating the fresh water basin from the sea, they successively return back in the sea water. Nematoda have achieved their current biological advancement, occupying all biotopes and habitats known to science, exactly due to their high ecological flexibility and adaptability. The free-living benthic nematodes *Dorylaimus stagnalis* DUJARDIN 1848, *Dorylaimus paradoxus* ELIAVA 1967, *Laimidorus agilis* (DE MAN 1880) SIDDIQI 1969, *Aporcelaimellus obtusicaudatus* (BASTIAN 1865) ALDER 1968, *Eudorilaimus carteri* (BASTIAN 1865) ANDRASSY 1959, *Eudorylaimus centrocercus* (DE MAN 1880) ANDRASSY 1959, *Thornia steatopyga* (THORNE & SCHWANGER 1936) MELL 1954, *Monhystera stagnalis* BASTIAN 1865, *Monhystera similis* BUETSCHLI 1873, *Diplogaster rivalis* (LEYDIG 1854) BUETSCHLI 1873, *Rhabditis filiformis* BUETSCHLI 1873 and *Panagrolaimus hydrophilus* BASSEN 1940 occur in hyporheic waters (STOICHEV in press) probably because of the continuous exchange of matter and energy between surface and ground ecosystems through the ecotone. Principally, this exchange is created by the surface water flow (JIBERT 1986). The individual behaviourly oriented movements of the animals themselves are probably also involved. These two factors, and probably some others, determine the basic characterization of the ecotone: its semi-permeability. They probably explain the periodic migrations of some species from the surface to the hyporheic waters, and these migrations are connected with the changes that occur in the environment.

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