

THE ECOPHYSIOLOGY OF MARINE NEMATODES

by

W. WIESER

Institut für Zoophysiologie der Universität Innsbruck, Austria

SUMMARY

The ecophysiology of any group of animals is best approached by analysing the responses of organisms to individual environmental factors as well as to combinations of factors. Very little has been done along these lines in marine nematodes and very few findings of a more general nature have emerged. The following topics of recent interest should be mentioned, however :

1) *Temperature*

Resistance studies revealed relationships between upper lethal temperature and the patterns of distribution in various species. A closer analysis of this relationship may prove fruitful in shedding light on niche specialization and related problems. *Metabolism : temperature curves* represent another means of interpreting habitat organism relationships since usually there is some connection between Q_{10} -values and the ranges of optimum temperature experienced by species in nature. One case of *seasonal acclimatization* of oxygen consumption has been reported. Optimum *developmental temperature* appears to be a characteristic of all the species living in a particular habitat — which is not true for the upper lethal temperatures of these species. A very striking phenomenon is the ability of some inhabitants of temperate beaches to carry on with developmental processes at subzero temperatures and even in a frozen condition.

2) pO_2

In the few species analyzed oxygen consumption conforms to pO_2 in the case of *Enoplus brevis*, assisted by the presence of haemoglobin in the muscles, down to very low values. Acclimatization of metabolism to low pO_2 is possible. No sign of an oxygen debt was detected. Close to anoxic conditions most species become immobile, but at least one species, *Paramonhystera wieseri*, turned out to be a true anaerobe, being equipped with very peculiar mitochondria.

3) pH

Resistance studies revealed close correspondence between lethal alkaline pH and maximum pH experienced by various species in their habitat. This indicates that there is very little « Excess » alkaline resistance, at least in the inhabitants of a subtropical beach.

4) *Salinity*

In littoral species resistance to salinity appears to be closely correlated with the extremes of concentration and dilution in that zone in which the species is maximally abundant. The rate of development is also adjusted to this ecological factor, being fastest at the average habitat salinity.

5) *Food*

The attraction of nematodes by specific food sources (aspects of « sensory ecophysiology ») has been studied, and the possible involvement of the amphids has been suggested. The classification of « feeding types » based on buccal structure has proven to be an ecological tool of some values, particularly in connection with the determination of oxygen consumption, since a fairly clearcut relationship could be established between feeding type and level of metabolism.

In summary it may be said that this field of nematology is wide open. Most studies have resulted in rather conventional findings but an analysis of the adaptations of nematodes to low pO_2 may prove to have implications of wider biological significance.