

# **“Cytogenetics and biology of selected representatives of the family Sphaeriidae”**

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Abstract of a PhD. thesis

The thesis has a form of four separate articles, the full texts of which are included. Two of them were published, one was accepted and one was under revision before submission of the PhD thesis. The articles deal with cytogenetics, breeding and nutrition of selected representatives of the hermaphroditic, viviparous, primarily freshwater bivalves of the family Sphaeriidae (Mollusca: Bivalvia: Veneroidea).

Although various aspects of the biology of Sphaeriidae have been intensely studied for more than 100 years, many questions still remained unresolved. This thesis brings data on chromosome numbers of 11 species (10 of which have not been studied cytogenetically before) and information on the course of meiosis in two of these species (Chapter 1). Although the chromosome numbers are high (from ca. 140 to more than 240), the behaviour of chromosomes at meiosis rather corresponds to that of diploid organisms. Also the DNA contents in five selected species with high chromosome numbers (as measured by flow-cytometry) do not differ significantly from those in sphaeriids with a diploid chromosome number of 30. Such results contradict an origin of the high chromosome numbers by a recent polyploidization. Alternative hypotheses suggest an ancient polyploidization or multiple chromosome fissions, in both cases followed by substantial chromosome rearrangements.

The thesis further provides a more in-depth analysis of karyotype diversity and meiosis in two *Sphaerium* species (*Sphaerium corneum* and its sibling *S. nucleus*, the relationship between the two species having been examined in the diploma thesis of the author). Although the former species has previously been studied cytogenetically, the study included in this thesis (Chapter 2) presents and interprets some details that were neglected by other authors (C-banding pattern and distribution of nucleolar organiser regions- NORs, diffuse stage and achiasmatic meiosis in both male and female germ line, meiotic behaviour of B chromosomes).

Data on the timing of meiosis and aspects of breeding strategies and life-histories, i.e. on growth, gametogenesis, fecundity and overlap of generations of one *Sphaerium corneum* population, are included in Chapter 3. As shown here, male and female gametogenesis proceeds simultaneously in each individual, breeding is to a large extent synchronised within the population and concentrated into two peaks (in spring and autumn). However, some young clams are born also in other periods of the year, namely thanks to the phenomena like precocious maturation (gametogenesis beginning in the larval stage), retardation of larval growth and other aspects that make the structure of population more heterogeneous.

Chapter 4 contains data on intestine contents of six sphaeriid species from different habitats. It has shown that sphaeriids ingest particles of a suitable size from the surrounding water and sediments, but a large proportion of the incoming material is indigestible and passes through the alimentary tract unchanged. Digested are probably only some bacteria and green algae.

The combination of several above mentioned methodological approaches used in the thesis has yielded quite a complex view of the focal family of bivalves, especially of its Central European representatives.