

Knowledge about spermatogenesis in medicinal leeches from genus *Hirudo* is based on a few research only and is usually focused on spermiogenesis. The aim of this research was to analyse and compare the course of spermatogenesis with the special focusing on the organisation and functioning of the germ-line cysts at the consecutive stages of spermatogenesis in selected species of medicinal leeches from genus *Hirudo*. A number of different techniques as molecular analysis, transmission electron microscopy, light and fluorescence microscopy were used for the research. To prepare the three-dimensional reconstructions of germ cells at the level of their ultrastructure, the serial block face scanning electron microscopy (SBEM) technique was used.

The obtained results show, that inside the testis of medicinal leeches all germ cells are united into syncytial cysts. Within the given testis, cysts are in different developmental stages, however all germ cells in a given cyst develop in a full synchrony (i.e. they are at the same stage of spermatogenesis). Thus, separated cysts with spermatogonia, spermatocytes (primary and secondary), spermatids (isodiametric early spermatids and late elongated spermatids) were observed. The germ cells in a given cyst were attached to a central anucleate cytoplasmic mass, the cytophore. Such a pattern of cyst architecture corresponds to the spatial organization of the germ cells already known in other Clitellata. Each germ cell was connected to the cytophore by a single intercellular bridge. The bridges were elongated and had a cylinder-like shape. The shape of intercellular bridges changes during the consecutive stages of spermatogenesis, their length elongates whereas their diameter decreases. The techniques used also allowed to analyse the activity and conformation of mitochondria during successive stages of spermatogenesis. These results allowed to observe that mitochondria form a network from the spermatogonium stage and their activity hesitates during consecutive stages of spermatogenesis. These results are the first ones, which show the full spatial organization of mitochondria in germ cells during spermatogenesis in an invertebrate animal.

In this study, no significant differences in the course of the spermatogenesis were found between selected species of medicinal as well as between the available literature data devoted to leech spermatogenesis. The only difference found is the number of cells in cysts with isodiametric spermatids. In the case of the studied species, it was calculated that there are 512 cells in such a cyst, while in the available literature data it was found that there are 1024 in cysts with isodiametric spermatids in *H. troctina*. The results obtained in this study allowed to supplement and verify the data on the spermatogenesis process in invertebrate animals.