Polyploidization and hybridization are the main microevolutionary processes, which take place within pteridophytes and dominantly participate in their variability and further speciation. Reproductive strategies are also related with above mentioned processes, especially various type of apomictic reproduction, which play an important role within ferns (compared to Angiosperms).

Polyploidization and hybridization take part in *Cystopteris fragilis* (L.) Bernh. (common fragile fern) and both are also recently participating in origin of new cytotype (mirrored by enormous proportion of mixed populations consisting off tetraploids to octoploids). The main goal of this diploma thesis is cytotype structure of particular stages within the life cycle of common fragile fern with evaluation of sporogenesis (viability, exospore length and number of spores), together with testing reproductive strategies of individual cytotype using flow cytometry. Moreover, an experimental hybridization is supplementing above mentioned aims of the diploma thesis.

The main sources of variability seem to be restricted to tetraploids and pentaploids, whereas hexaploids produce only uniform progeny. Tetraploids form both diploid reduced and tetraploid unreduced spores (but only 1,97 % of total amount of spores). Pentaploids have variable sporogenesis with high number of aborted spores. They tend to produce spores of all lower ploidy levels, but it differs between populations. The first group of pentaploids consist of recent hybrids, which are almost sterile, but still produce some viable spores (reproduce sexually), whereas the second group is formed by stable hybrids, which reproduce asexually via obligate apomixis. These findings confirm apomixis for the first time in Cystopteridaceae family.

Heteroploidy hybridization is very rare (only 0,58 % experimental crosses), because sexual reproduction is realized through intragametophytic selfing (autogamy within one gametophyte).

Cystopteris fragilis variability is generated predominantly in mixed ploidy populations via specific microevolutionary processes (i.e. heterogenous sporogenesis, unreduced spores, apomictic reproduction or exceptional heteroploid hybridization).

Key words: Apomixis, *Cystopteris fragilis*, experimental hybridization, intragametophytic selfing, polyploidization, flow cytometry