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Species delimitation in taxonomically difficult fungi: the case of *Hymenogaster*

Since its first description by Vittadini in 1831, inappropriate species concepts in the false truffle genus *Hymenogaster* have led to continued confusion, caused by a large variety of prevailing taxonomical opinions. Here we reconsider the species delimitations in *Hymenogaster* based on a comprehensive collection of Central European taxa comprising more than 140 fruiting bodies from 20 years of field work. The ITS rDNA sequence dataset was subjected to phylogenetic analysis as well as clustering optimization using the OPTSIL software. Among distinct species concepts from literature used to create reference partitions for clustering optimization, the broadest concept resulted in the highest agreement with the ITS data. Our results indicate a highly variable morphology of several *Hymenogaster* species, most likely linked to stage of maturity, habitat, soil type and growing season. In particular, taxa described in the 19th century frequently appear as conspecific, for instance *H. vulgaris*, *H. muticus*, *H. populetorum*, *H. griseus* and *H. lycoperdineus*. However, neglected and cryptic species were also uncovered. A revised taxonomy for one of the most difficult to determine genera of Basidiomycetes is proposed. The (semi-)automated selection among species concepts used here is of importance for the revision of taxonomically problematic fungal groups in general.