Abstract

The genus *Arthroderma* contains predominantly geophilic dermatophytes (naturally occuring in soil). Some species, especially those from *Trichophyton terrestre* complex, cause human and animal dermatomycosis. In the past, the species boundaries were determined mainly on the basis of biological species concept using *in vitro* mating experiments. But these nearly 70-years-old findings have not been tested by means of modern taxonomic methods.

In total 194 species of the genus *Arthroderma* (including all available ex-type strains) originating predominantly in USA, Canada and Europe were studied in this thesis. They were mostly isolated from soil (n = 77), animals (n = 50), human clinical material (n = 41) and cave sediment (n = 9). The main goal of the thesis was to elucidate the species boundaries between species *A. insingulare*, *A. lenticulare* and *A. quadrifidum*, that were classified into the *T. terrestre* complex because of their seemingly identical asexual stage. Further, this work aimed to resolve the relationship between *Arthroderma* species using the multigene phylogeny and clarify which species are clinically relevant.

A multigene phylogeny of the genus *Arthroderma* was based on the sequences of the ITS rDNA region, β-tubulin (*TUB2*) and translation elongation factor 1α (*TEF1α*) genes. The genus *Arthroderma* was divided into 8 statistically well-supported clades encompassing 24 known species and 15 lineages probably representing undescribed species. Phylogenetic analysis clearly supported the recognition of species *A. insingulare*, *A. lenticulare* and *A. quadrifidum*, which however did not form a monophyletic species complex. *Trichophyton terrestre* is a separate species phylogenetically distantly related to the three above mentioned species. The typification of this species is required along with its transfer to the genus *Arthroderma*, similarly to *Chrysosporium magnasporum* and *Ch. oceanitesii*, that also belong to the genus *Arthroderma* based on the phylogeny.

The mating experiments on 4 media and at 3 cultivation temperatures were conducted to induce the sexual stage in *T. terrestre* complex species and the characters on both sexual and asexual stages were studied. The mating experiments revealed different requirements of particular species for the sexual reproduction *in vitro*. It was found that the both asexual and sexual stages show characters usable for species discrimination in *T. terrestre* complex species. The taxonomic position of *A. redellii* (bat pathogen) is controversial. This species was phylogenetically located in the lineage of *A. quadrifidum* and was able to mate with the *A. quadrifidum* strain UAMH 2941, but the „hybrid“ progeny showed very low level of germination compared to crosses between *A. quadrifidum* isolates. Additionally, *A. redellii* differed from *A. quadrifidum* in many morphological and physiological characters; the reason why mutual taxonomic position of these two species will be subjected to further analyses. A taxonomic revision of 41 strains from human clinical material showed that *A. quadrifidum*, *A. onychocola*, *A. insingulare, A crocatum*, *A. eboreum* a *T. terrestre* are potential human pathogens. Similarly, 12 known and 9 undescribed species were identified as potentially pathogenic for animals,

especially for bats (*A. redellii, A. insingulare*, *A. quadrifidum A. vespertilii* and undescribed species *Arthroderma* sp. 8, 11, 12, 14, 15) and snakes (*A. quarifidum, A. insingulare, A. curreyi*, *A. onychocola* and undescribed species *Arthroderma* sp. 2, 3, 6, 8, 10).

Key words: *Arthroderma*, dermatophytosis, geophilic dermatophytes, hybridization, phylogenetic analysis, mating experiments, mating type genes, polyphasic taxonomy, *Trichophyton terrestre* complex, scanning electron microscopy, viability of ascospores