

Morphology as the basis for Fungal classification

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Many different aspects can be used in fungal taxonomy, inducing criteria such as morphology, or life cycle/reproductive cycle, or more recent molecular phylogeny such as genetics. Morphology superficially appears as an excellent classification criteria as certainly there is a wide range or diversity, from the enormous carion flowers of *Amorphophallus titanum* (Jurgens, 2015), to the fuzzy black mold of *Aspergillus acidus*. Furthermore morphology provides general characteristic distinctions, such as the distinction between filamentous fungi and yeasts, which can be readily identify without the need for complex laboratory analysis.

For theses reasons perhaps, the oldest recorded Fungal classification, designed by the Greek scholar Theophrastus over 2000 years ago, was morphologically based (Ramsbottom, 1992). This calcification, although reasonable primitive already served to highlight the disadvantages of a purely morphological approach, as Theophrastus firmly believed Fungi to be a class of rootless, plants due to there lack of motility despite there closer evolutionary relationship to animals. While fungi do indeed share some important characteristics with plants because of their sessile nature, such as the development of specialized spore dispersal mechanisms, they still have radically different metabolic, activities, such as a notable lack of photosynthetic ability and occupy different environmental niches, decomposers or consumers as a pose to produces.

Another Serious problem with morphollogy based classification systems is first recognised in th 17th centuray by the botanist Casper Bauhin, (Bauhin C., 1623), is that fungal morphology can change over there lifecycle, leading to different species names for the same organism. A prime example is in *Candida* species which can switch there morphology from filamentous to yeast when the infect a animal host (Thompson, 2011). This issue can be overcome to an extent on focusing of the sexual structures for classification, as for example in Bessy's three class system (Bessey, 1950). However this route has two significant drawbacks. Firstly all fungi for in which sexaul reproduction has not yet been observed are lumped together into the fungi imperfetic clade regardless of seriousl differnces in their appreance, metabolisims, evolution, habitat etc. Secondly some fungi may share similar sexual strcutres due to pressures of their environemnt despite having diverged so far as to consitutue entirely new clades. For example the zoospores of Neocallimastigomycota, Blastocladiomycota, and Chytridiomycota, driven by their aquaous environemnt, lead to the orginal calssification of Basidiomycetes and Neocallimastigomycetes as chytrids, desptie underlying differences in their internal structure, genetic composition and ecological niche.

In Conclusion, while morphology, superficially appears as a good criterion for classification, it is often as misleading as it is helpful. More in deptyh analysis including molecular phylogeny are required to vewrifty the relationships suggested by morphology, and indeed may provide a more accurate, reliable and objective system approach overall.

References

- Bauhin C. ,Pinax theatri botanici, 1623, University of Kyoto Online.
- Bessey E. A. ,1950, Morphology and taxonomy of fungi. Philadelphia, Blakiston.
- Jurgens, A., 2015, Shuttleworth, Carrion Ecology, Evolution, and Their Applications. *CRC Press*. pp. 361–386.
- Ramsbottom J.,1912, Some notes on the history of the classification of the Discomycetes, Transactions of the British Mycological Society, *Science Direct*, 4, 382-404
- Thompson, Delma S. and Carlisle, Patricia L. and Kadosh, David, Co-evolution of Morphology and Virulence in *Candida* Species, 2011, ,American Society for Microbiology Journals, *Eukaryotic Cell*, 3: 55-63
- Van de Peer, Y.1997, De Wachter, R., 1997, Evolutionary Relationships Among the Eukaryotic Crown Taxa Taking into Account Site-to-Site Rate Variation in 18S rRNA, *Journal of Molecular Evolution* , 45: 619