

Focus

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Concepts of species in trypanosomatids

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Abstract

This paper is a commentary on "Species concepts for trypanosomes: from morphological to molecular definitions!" by Wendy Gibson published in this journal [1]. Taxonomy has been traditionally based on expert opinion which is influenced among other factors by the philosophical and educational background of the expert concerned. This has resulted in widely different criteria for species among the trypanosomatids when compared to the actual genetic diversity involved. Gibson's paper presents an example of this within the trypanosome sub-genera. Although attempts have been made to put taxonomy on a more objective basis expert opinion still appears to dominate in the actual classifications in use.

Taxonomists have been traditionally divided between "lumpers" and "splitters". The former tend to reduce species to the minimum number necessary and are extremely wary of creating new divisions. The latter attach great importance to variations between organisms and prefer to name each variant discovered in the belief that otherwise it may be lost. Although all taxonomists do not hold such extreme views most will tend in one direction or the other.

As Gibson has pointed out in her paper [1] the biological species concept provides no clear guidance on defining species in groups such as the trypanosomatids, whose predominant mode of reproduction is asexual. It is therefore left to the expert knowledge of taxonomists to make judgements regarding which groups deserve species status. Other subjective factors however effect this judgement besides the tendency to splitting and lumping mentioned above. Taxonomists may be "idealists", such as some phylogeneticists who want their classification to reflect the "true" evolutionary history of the organisms and therefore their species to be phylogenetically monophyletic; Or they may be "pragmatists", more concerned about the utility of their classification and whether organisms assign

to given species provide information about those species which usefully differentiates them as compared to other species assignments.

The medical or conversely zoological interest of the taxonomist may also affect their judgement in creating species. Clinicians often favour more conserved taxonomies, specially where the prognosis and treatment of the disease caused by the differing aetiological agents is the same. Zoologists frequently wish to create differing species to correlate with ecological and host differences of the parasites. Parasites of medical and veterinary interest naturally receive the most attention from taxonomists and are most liable to splitting while less attention is paid to free living and other parasitic trypanosomatids which may be lumped into larger species groupings by neglect. It is therefore not surprising that inconsistencies in the assigning of species among different subgenera such as reported by Gibson occur. Similar examples can be found among other genera of trypanosomatids. For example the genus *Leishmania* with dozens of named species has a similar genetic diversity to that of the single species *T. cruzi*.

Do these inconsistencies matter? Again there is no agreement. It can be argued using the previous example that the absence of separate species or subspecies within *T. cruzi* when there is clear genetic divergence within the group has hampered research in elucidating the causes of the different clinical and ecological manifestations of the infection caused by that organism. On the other hand the plethora of species in *Leishmania* have been criticized by some as confusing to clinicians and complicating the teaching of the subject to students.

Although there have been many attempts to make the discipline of taxonomy more objective, such as those by pheneticists and cladists in the previous century, at least for the trypanosomatids expert opinion still seems to hold the dominant position. It remains to be seen whether the hope expressed by Gibson that molecular taxonomy holds the key will be realized and a more evidenced based systematics of trypanosomatids arise.

References

1. Gibson W: **Species concepts for trypanosomes: from morphological to molecular definitions.** *Kinetoplastid Biol Dis* 2003, **2(10)**.

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