

READERS' OPINION AND DISCUSSION

OPINION

Further thoughts on the use of the name *Leishmania (Leishmania) infantum chagasi* for the aetiological agent of American visceral leishmaniasis

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Dear Editor,

I read with great interest the recent discussion (Dantas-Torres 2006, Lainson & Rangel 2006) on the name used for the parasite that causes human and canine visceral leishmaniasis in the Americas. Independently I had used (Shaw 2002) the name *Leishmania (Leishmania) infantum chagasi* for the aetiological agent of American visceral leishmaniasis (AVL) and because of this I wish to add my own comments to this apparent taxonomic dilemma. I whole heartedly agree with Dantas-Torres, Lainson and Rangel that the laws a nomenclature must under all circumstances be obeyed. However, according to the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature 1999) the name *Leishmania (Leishmanina) infantum chagasi* is absolutely correct. The question is should the name *chagasi* be synonymized with *infantum*? The weight of the published evidence suggests today that at the species level *chagasi* should be synonymized with *infantum*. But are we correct in saying that the two parasites are identical? Lainson and Rangel (2006) gave reasons for considering that they are in fact not identical. Molecular biology has shown over and over again that species are composed of genetically distinct groups which are given a status that may or may not fall within the code. *Leishmania* species are composed of clonal populations whose structure varies according to the characterization method. The challenge that we are facing today is when do we give a name to one of these groups? Clearly if we do then it is advisable to use existing names before creating new ones.

Recent studies on the Old World visceral parasites using the internal transcribed spacer (ITS) (Kuhls et al. 2005) and fluorogenic assays (Quispe-Tintaya et al. 2005) showed consistent genetic diversity and strongly suggest the need for a revision of the group. A logical taxo-

nomic solution is to create subspecies within the *infantum* and *donovani* lineages. But they also emphasized that more than one taxon of visceral parasites occurs in the same geographical area. This is a potential point of considerable confusion since by chance different research groups may or may not examine the same parasites and thus come to conflicting conclusions. Originally there was a tendency to name parasites according to their geographical origin, a practice that in part led to the name *L. chagasi*. Like this latter species the validity of *L. archibaldi* has been similarly questioned on numerous occasions (Oskam et al. 1998, Jamjoom et al. 2004) but studies using fluorogenic assays (Quispe-Tintaya et al. 2005) have shown that in fact parasites of both *L. (L.) infantum* and *L. (L.) donovani* occur in the Sudan and that name *L. archibaldi* could be used for Sudanese parasites of the *donovani* group. What is perhaps initially confusing is that strains labeled as *archibaldi* occur in both groups but the name was used because of their geographical origin and not specific characters.

It is conceivable that different lineages of *infantum* may exist in the Americas some being indigenous and others imported. One of the pitfalls of evaluating the validity of a parasite's name is to examine a small number of strains. Only when a larger numbers of isolates from East Africa were examined did it become clear that more than one parasite was present in the region. It is not always easy to plot the geographical expansion of parasites whose reservoirs are man or domestic animals, especially when they do not cause an insidious disease. The *Leishmania* responsible for visceral leishmaniasis fall within this group and it is probable that present day distributions are the result of both man's migratory movements and enzootics in autochthonous natural reservoirs. In such situations it is essential that adequately large samples are examined from different hosts and environments.

The formulation of names and creating an acceptable classification for any group is an arduous process that may take many years and does not necessarily apply to all the taxa of the group. The general classification that is presently used today for the genus *Leishmania* (Lainson & Shaw 1987) was elaborated over a period of approximately 20 years. Previous classifications (Lainson & Shaw 1979, Lainson 1982, Shaw 1982) used subspecies but it became clear that there were significant differences between the subspecies and so they were abandoned by raising them to the species (Saf'janova 1982, Lainson & Shaw 1987). This gave room to a system that could cope with the greater levels of diversity indicated by the burgeoning characterization methods. As more data becomes available it appears that in some cases raising subspecies to the species level was correct while in others it is debatable if it was. For instance it is now apparent that *L. (L.) amazonensis* should not be considered as a subspecies of *L. (L.) mexicana* (Uliana et al. 2000) This brings me to question comments made by Dantas-Torres that in the "current classification of the genus *Leishmania* there is no subspecies" and that in his view, "*L. infantum* and *L. chagasi* must be regarded as synonyms, until a new classification of the genus *Leishmania* is proposed". The

decision to divide a species into sub-species or raise sub-species to the specific level does not depend on a revision of the genus but on the availability of sufficient data to justify the action. However, it is a matter of opinion as to what differences should be considered as worthy of distinguishing taxa and we must remember that a name should communicate useful and important information. During an on-line discussion on the validity of *L. chagasi* on Leish-L (present address: Leish-L@lineu.icb.usp.br) some contributors said that it should be maintained because they immediately knew that the paper dealt with AVL. Taxonomically this opinion is not acceptable but emphasizes that an important function of taxonomy is to transmit information. In relation to this problem Dantas-Torres (2006) suggest the use of *L. infantum* (= *L. chagasi*) for "didactic purpose" for AVL parasites. I personally find this confusing and prefer *L.(L.)i. chagasi* for the Latin American parasites for the reasons that I have given.

In the United States there are well documented cases both imported (Bravo et al. 1993) and autochthonous (Rosypal et al. 2003) canine visceral leishmaniasis but the transmission method of the latter has yet to be determined. In the case of the imported cases and the autochthonous cases it is probably more correct to consider them as being *L.(L.)i. infantum* and not *L.(L.)i. chagasi*. But how does this relate to canine AVL in Latin America? Given the extension of the problem and the differences in epidemiology it reinforces the argument that we are most probably dealing with imported and autochthonous parasites and that until more strains are examined we should not synonymize the name *chagasi* at all taxonomic levels.

I conclude that because there are still so many unanswered questions surrounding the origin, identity, and epidemiology of the AVL parasites that it is more prudent to continue to use the name *L. (L.) infantum chagasi*. There is also a strong academic argument against completely synonymizing the name *chagasi*. If this is done there is a real danger that many potential lines of research will be killed before they are born. One of the last century's most outstanding parasitologists, Professor PCC Garnham, always maintained that it was better to give a name and keep it alive otherwise the parasite in question could be lost for ever. Lainson and Rangel (2006) cited the differences that have been found between a small number of Old World and American visceral *Leishmania* isolates. There are no constraints on individuals or groups giving names as long as they are based on tangible valid characters that can be used to differentiate them from other members of the same group. It is then up to the scientific community to judge this decision. In the end one of the most significant guides as to the acceptance of a name is if it is consistently used.

In my opinion we are at present witnessing speciation due to natural selection in the vector of the visceral parasites. Differences in sand fly gut wall galectins are responsible for specific parasite adhesion (Kamhawi et al. 2000, 2004) and consequently successful transmission. Adaptation to new vectors will depend on the compatibility of parasite surface glycolipids with gut wall galectins. It will be interesting to see the level of similarity between the galectins of the principal American vector (*Lutzomyia*

longipalpis) and those of the Old World (*Phlebotomus perniciosus*, *P. ariasi*, *P. neglectus*, and *P. perfiliewi*).

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