LETTER TO THE EDITOR

NEW CLASSIFICATION FOR *Toxoplasma gondii*

Claudio Bruno Silva de Oliveira

Dear Editor,

I have been following the latest publications in the field of parasitology and have noticed that, despite the changes in the group that host the parasite *Toxoplasma gondii* that have been suggested since 2012 (Adl et al. 2012), many articles in several journals have not been updated (Liempi et al. 2014; Ning et al. 2015; Lorenzi et al. 2016). This can be explained by a certain protectionism regarding the form that has been used for several years. However, it is important to consider that this can also be due to some unfamiliarity with the current classification of eukaryotes and protozoa.

Classically this protozoan is classified within the Protista kingdom, Apicomplexa phylum, Sporozoasida class, Eucoccidiorida order, Sarcocystidae family, and *Toxoplasma genus* (Current et al. 1990). This classification has been used for many decades, and it is well accepted by research groups in the area. Recently, however, Adl et al. (2012) seeking to standardize and organize different groups of eukaryotes, mainly protists, suggested a new classification based on phylogenetic and ultra-structural similarity. Now *Toxoplasma gondii* appears within a super group called SAR comprising: Stramenopiles, Alveolata, and Rhizaria. More precisely, it appears inside the Alveolata group (first group); among Alveolata it is classified as Apicomplexa (second group); among the Apicomplexa it is classified as Conoidasida (third group); among these it is classified as Coccidia (fourth group); and finally among the Coccidia it is part of Eimeriorina group (fifth group), along with other associated parasites such as *Cyclospora* and *Neospora*. These authors argue that a large number of new molecular tools have produced data that require a new and more robust model to suit the new information. In this sense, the new classification will accommodate the recent changes with more stability in the future (Adl et al. 2012).

Laboratório de Biologia da Malária e Toxoplasmose. Departamento de Microbiologia e Parasitologia. Centro de Biociências. Universidade Federal do Rio Grande do Norte, Natal, Rio Grande do Norte, Brasil.

Corresponding author: Prof. Dr. Claudio Bruno Silva de Oliveira. Laboratório de Biologia da Malária e Toxoplasmose, Departamento de Microbiologia e Parasitologia, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Av. Salgado Filho, s/n, Lagoa Nova, 59000-000, Natal/RN, Brasil; Phone: +55 84 3342-2335, extension 308; Fax: +55 84 3211-9210; Mobile: +55 84 99969-1353; e-mail: bruno_biomedico@yahoo.com.br.

Received for publication: 6/7/2016. Accepted: 14/9/2016.

It is quite understandable that after so long, such a significant change in a well-established classification, should take time to be accepted by the expert community in the area. Thus, articles dealing with this update are fundamental to spread this new classification. Therefore, I hope to have helped the readers of this journal to be better informed and thus standardize how they refer to this important parasite.

REFERENCES

1. Adl SM, Simpson AGB, Lane CE, Lukes J, Bass D, Bowser SS, Brown MW, Burki F, Dunthorn M, Hampl V, Heiss A, Hoppenrath M, Lara E, Le Gall L, Lynn DH, McManus H, Mitchell EAD, Mozley-Stanridge SE, Parfrey LW, Pawlowski J, Rueckert S, Shadwick L, Schoch CL, Smirnov A, Spiegel FW. The Revised Classification of Eukaryotes. *J Eukaryot Microbiol 59*: 429-493, 2012.
2. Current WL, Upton SJ, Long PL. *Taxonomy and Life Cilcle*. In: PL Long. Coccidiosis of man and domestic animals. CRC Press: Boston, 1990. p.7-8.
3. Liempi A, Droguett D, Castillo C, Sandoval A, Figueroa P, Galanti N., Maya JD, Kemmerling, U. Congenital infection of protozoa: Histopathological and histochemical analysis of human chorionic villi explants infected ex vivo with *Trypanosoma cruzi* and *Toxoplasma gondii*. *Placenta 35*: A61-A62, 2014.
4. Ning HR, Huang SY, Wang JL, Xu QM, Zhu XQ. Genetic Diversity of *Toxoplasma gondii* Strains from Different Hosts and Geographical Regions by Sequence Analysis of GRA20 Gene. *Korean J Parasitol 53*: 345-348, 2015.
5. Lorenzi H, Khan A, Behnke MS, Namasivayam S, Swapna LS, Hadjithomas M, Karamycheva S, Pinney D, Brunk BP, Ajioka JW, Ajzenberg D, Boothroyd JC, Boyle JP, Darde ML, Diaz-Miranda MA, Dubey JP, Fritz HM, Gennari SM, Gregory BD, Kim K, Saeij JPI, Su C, White MW, Zhu XQ, Howe DK, Rosenthal BM, Grigg ME, Parkinson J, Liu L, Kissinger JC, Roos DS, Sibley LD. Local admixture of amplified and diversified secreted pathogenesis determinants shapes mosaic *Toxoplasma gondii* genomes. *Nat commun 7*: 1-13, 2016.