THE ENDOSYMBIONT OF TRYPANOSOMATID PROTOZOA UNDERGOES COORDINATED DIVISION WITH THE HOST CELL NUCLEUS

Brum da Silveira, F.L.[1]; Cavalcanti, D.P.[2]; De Souza, W.[1,2]; Schenkman, S.[3]; Elias, M.C.[4]; Motta, M.C.M.[1,*]

[1]Laboratório de Ultraestrutura Celular Hertha Meyer - Instituto de Biofísica Carlos Chagas Filho - UFRJ - brum@biof.ufrj.br, wsouza@biof.ufrj.br, motta@biof.ufrj.br
[2]Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (INMETRO) – RJ - danic@biof.ufrj.br
[3]Departamento de Microbiologia, Imunologia e Parasitologia – UNIFESP – sschenckman@unifesp.br
[4]Laboratório de Parasitologia - Instituto Butantã - SP - carol@butantan.gov.br

Trypanosomatids present typical structures, many of them are single-copy ones, as the nucleus, the flagellum and the mitochondrion, this last comprising the kinetoplast that is constituted by a network of circular DNA molecules. Some monoxenic trypanosomatids present a single endosymbiotic bacterium in the cytoplasm. This endosymbiont co-evolves through a mutualistic relationship with the host protozoan, constituting a valuable model to understand the origin of organelles, such as the mitochondrion [1]. The cell cycle of trypanosomatids involves a co-ordinated replication and segregation of the nucleus, the kinetoplast and the flagellum [2-4]. In trypanosomatids that harbor an endosymbiotic bacterium, such as *Blastocrithidia culicis* and *Crithidia deanei*, this process is more complex, since the symbiont divides synchronically with the host protozoa [1]. In this study, we used light and electron microscopy approaches in order to describe the morphological events that occur during endosymbiont-bearing trypanosomatids cell cycle, in particular the chronological division of the symbiotic bacterium, regarding other protozoan host structures, as the nucleus, the kinetoplast and the flagellum. Results showed that the endosymbiont divides independently of the appearance of the new flagellum, always before the kinetoplast and the nucleus segregation. In addition, the endosymbiont was found associated with the host cell nucleus, presenting various shapes during the host cell cycle. At the end of cytokinesis, each daughter cell harbors a single symbiotic bacterium, indicating that the prokaryote division is linked to the host protozoan cell cycle. Insights about the coordinated division between the endosymbiont and the host trypanosomatid structures might help us to understand the establishment of organelles in eukaryotic cells. Supported by FAPESP and FAPERJ

References:

[1] W. De Souza and M.C.M. Motta, FEMS Microbiol. Lett. 173 (1999) 1-8.
[2] W.B. Cosgrove and M.J. Skeen, J. Protozool. 17 (1970) 172-177.
[3] P.G. McKean Curr. Opin. Microbiol. 6 (2003) 600-607.
[4] M.C. Elias, J.P. Da Cunha, F.P. Faria, R.A. Mortara, E. Freymuller and S. Schenkman, Protist. 158 (2007) 147-157.

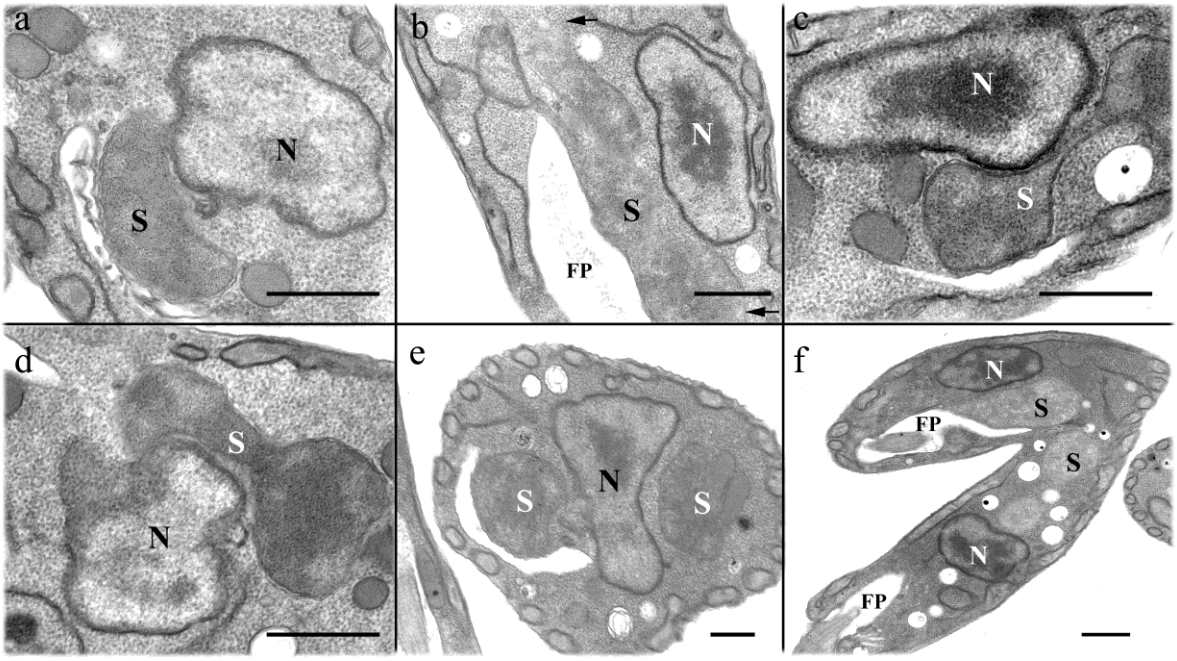

Figure 1 - Ultrastructural analysis by transmission electron microscopy showed a close association between the endosymbiont and the host protozoan nucleus (Figs. a-f). The symbiotic bacterium was observed as a rounded (Fig. a), elongated (Fig. b) or constricted (Fig. c) structure, which lies down over the nucleus in order to divide (Fig. d). Note the symmetrical distribution of the symbionts in relation to the nucleus (Fig. e) in order to guarantee the equal number of bacteria per protozoan during the cytokinesis (Fig. f). FP – flagellar pocket, N – nucleus, S – symbiont. Bars are equal to 0.5 μm.