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***Paramecium/Holospora Endobiotic System as a Model for Studying Host-Pathogen Cross-Talk***

E.V. Sabaneyeva\*<sup>1</sup>, K.A. Benken<sup>1</sup>, M.E. Derkacheva<sup>1,2</sup>, S.I. Fokin<sup>1</sup>, I.N. Skovorodkin<sup>2,3</sup>  
<sup>1</sup>*Saint Petersburg State University, Russian Federation*, <sup>2</sup>*Institute of Cytology, Russian Academy of Sciences, St. Petersburg, Russian Federation*, <sup>3</sup>*Biocenter Oulu, Finland*

Bacteria of the genus *Holospora* (Rickettsiales), which are the closest known relatives of mitochondria, invade the nuclei of the ciliate *Paramecium caudatum*, providing a unique model system for studying intranuclear parasitism. The infectious form of *Holospora* is ingested by the ciliate by phagocytosis, but soon the bacterium escapes from the host cell phagosome and can be soon revealed in the host nucleus. In the nucleus the bacterium forms constrictions and differentiates into reproductive forms. Though morphological aspects of the infection have been thoroughly studied in the recent years, some key steps of the infection process still remain obscure.

Our studies demonstrate that both host cytoskeleton systems, microtubules and microfilaments, are involved in transportation of the infectious form in the host cytoplasm. On the basis of immunocytochemistry using antibodies against *P. aurelia* actin 1-1 combined with in situ hybridization with the *Holospora*-specific probe we show that the host actin tail is formed around the bacterium protruding from the host phagosome. Experimental infection of the ciliates transfected with the GFP-conjugated actin1-1 demonstrated that this actin tail is rather dynamic and is responsible for pulling *Holospora* out of the host phagosome. However, the tails trailing after bacteria in the host cytoplasm do not contain actin1-1, but are positive for antibodies against Arp 3. Microtubules seem to be crucial for nuclear invasion, as this step of infection is completely abolished under nocodazole treatment, with bacteria surrounding the nuclei, but never getting inside. In general, the language of the *Holospora/Paramecium* cross-talk seems to resemble that of many human pathogens.

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