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Dynamics of an 89-kDa protein localizing at a specialized tip of the endonuclear symbiotic bacterium *Holospora* in infection

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The symbiotic bacterium *Holospora obtusa* infects the macronucleus of the ciliate *Paramecium caudatum*. After ingestion by its host, an infectious form of *Holospora* with an electron-translucent tip passes through the host digestive vacuole, and penetrates the macronuclear envelope with this tip. To investigate the underlying molecular mechanism of this process, we raised a monoclonal antibody against a tip-specific 89-kDa protein, partially sequenced this protein and identified the corresponding complete gene. The deduced protein sequence carries two actin-binding motifs. Indirect immunofluorescence microscopy shows that during escape from the host digestive vacuole, the 89-kDa protein translocates from the inside to the outside of the tip. When the bacterium invades the macronucleus, the 89-kDa protein is left behind at the entry point on the nuclear envelope. Transmission electron microscopy shows the formation of fine fibrous structures that co-localize with the antibody-labeled regions of the bacterium. Our findings suggest that the 89-kDa protein plays a role in *Holospora*'s escape from the host digestive vacuole, migration through the host cytoplasm, and invasion into the macronucleus.