Interaction between the macronucleus-specific bacterium *Holospora obtusa* and the macronuclear histones of the host *Paramecium caudatum*

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SUMMARY

The Gram-negative bacterium *Holospora obtusa* is a macronucleus-specific symbiont of the ciliate *Paramecium caudatum*. In the host macronucleus, *H. obtusa* interacts with the macronuclear chromatin. Gel-overlay blotting with a monoclonal antibody specific for the outer membrane of *H. obtusa* demonstrated that macronuclear proteins, including histone H4, adhered to the outer membrane. Immunoblot with a monoclonal antibody specific for histone H4 of *P. caudatum* showed that the H4 molecules were present not only on the outside of the bacteria but also inside *H. obtusa*. Furthermore, the amount of the intrinsic H4 proteins per cell was almost the same in all stages of the bacterial life cycle. Indirect immunofluorescence microscopy showed that histone H4 is localized inside the outer membrane or periplasm of the bacterium. In contrast, histone H2B-YFP was not present inside the bacteria. These results indicate that *H. obtusa* imports histone H4, but not histone H2B, selectively from the host nucleus and that an unknown function of the imported H4 may be responsible for the macronucleus-specific habitat of this bacterium.