FASSBERG SEMINAR SERIES

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Intracellular symbionts in marine invertebrates – new faces, new places, new roles

Intracellular symbiosis is a key source for evolutionary innovation and, with the mitochondria and plastids, stands at the basis of all macroscopic life. In this talk I present striking innovations that intracellular bacteria deliver to marine animal hosts. I focus on two symbiont groups that come from the most divergent physiological backgrounds – one is an autotroph fully catering its host, the other one a heterotroph largely catered by the host. Both symbionts occur in a large number of host species and both provide crucial services to their hosts from an intracellular position. Based on an interdisciplinary approach I show that a rickettsial endosymbiont in the endoplasmic reticulum of the placozoan *Trichoplax* does not use its energy parasitic capabilities. Instead, it thrives on abundant intermediates of the host metabolism and expresses an enzymatic toolkit unavailable to animals. Even more deeply integrated into their hosts physiology is the intracellular symbiont in the gutless flatworm *Paracatenula*. Most animals typically store their primary energy reserves in specialized cells, but in *Paracatenula*, the intracellular chemosynthetic symbiont performs this function. The symbiont occupies half of the biomass in the symbiosis and has a highly reduced genome, but efficiently stocks up carbon and energy, particularly sugars. The host rarely digests the symbiont cells to access these stocks. Instead, the symbionts transfer the bulk nutrition by secreting outer-membrane vesicles. This transfer mode is in contrast to all other chemosynthetic symbioses, where the hosts digest full cells of a small and ideally growing symbiont population that cannot deliver a long-term buffering capacity during nutrient limitation.

Host: Jochen Rink

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