The power of cryo-EM to elucidate biological mechanisms

The insect-pathogenic bacterium Photorhabdus luminescens contains a large number of toxic proteins, including Tc toxins, with which it can kill host cells within a very short period of time. Tc toxins form a special protein complex that stores a "killer enzyme" in a cocoon and injects it into the cell only after contact with the host via a novel, syringe-like mechanism. There, the killer enzyme unfolds its toxic effect and leads to the aggregation of the cytoskeleton and ultimately to cell death. This mechanism is of fundamental importance for the general understanding of the transport of active substances through membranes and could even be used for specific medical applications. In this talk, I will present our recent electron cryo microscopy work that we have combined with biochemical studies and molecular dynamics simulations, revealing important molecular details of the mechanism of action of Tc toxins.

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