

## DOMAIN 4 SYNTHESIS AND PROCESSING OF MACROMOLECULES

# The Type VI Secretion System in *Escherichia coli* and Related Species

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**ABSTRACT** The type VI secretion system (T6SS) is a multiprotein complex widespread in *Proteobacteria* and dedicated to the delivery of toxins into both prokaryotic and eukaryotic cells. It thus participates in interbacterial competition as well as pathogenesis. The T6SS is a contractile weapon, related to the injection apparatus of contractile tailed bacteriophages. Basically, it assembles an inner tube wrapped by a sheath-like structure and anchored to the cell envelope via a membrane complex. The energy released by the contraction of the sheath propels the inner tube through the membrane channel and toward the target cell. Although the assembly and the mechanism of action are conserved across species, the repertoire of secreted toxins and the diversity of the regulatory mechanisms and of target cells make the T6SS a highly versatile secretion system. The T6SS is particularly represented in *Escherichia coli* pathotypes and *Salmonella* serotypes. In this review we summarize the current knowledge regarding the prevalence, the assembly, the regulation, and the roles of the T6SS in *E. coli*, *Salmonella*, and related species.

## INTRODUCTION

The adaptation of bacterial species in their ecological niche relies not only on specific regulatory circuits to adapt the metabolism and the growth to the extracellular conditions, but also on the release of molecules – siderophores, exopolysaccharides, and/or protein toxins – in the milieu. To facilitate their transport through the physical barriers that the membranes represent, protein toxins are specifically selected and secreted by dedicated machineries named “secretion systems.” Depending on the nature of the machine itself and on the mechanism of transport of the toxins, these secretory pathways are numbered I to IX. Most of these pathways, including type I (T1SS), type II (T2SS), type III (T3SS), type IV (T4SS or conjugation), type V (auto-transporters, intimin/invasin, and two-partner pathways including contact-dependent growth inhibition systems), and curli/fimbriae/chaperone-usher pathways, are assembled and active in *Escherichia coli* and related species such as *Salmonella*, *Shigella*, *Enterobacter*, and *Citrobacter*, and therefore details regarding their architecture, assembly, mechanism of transport, as well as the effectors they deliver are described in the corresponding chapters in *EcoSalPlus*. We will describe here one of the most recently identified secretion pathways, the type VI secretion system (T6SS).

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