

Assembly of the *Yersinia* Ysc Injectisome

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The type III secretion injectisome is a nanosyringe that injects bacterial effector proteins into the cytosol of eukaryotic cells. It is related to the flagellum, with which it shares structural and functional similarities. It consists of a basal body made of several rings spanning the bacterial membranes, connected by a central tube. On top of the basal body, comes a short stiff needle. The basal body contains the export apparatus, which serves first for the export of the needle subunits and later for effectors. This structure is sufficient for exporting effector proteins across the two bacterial membranes but not to inject them into the cytosol of target cells. In *Yersinia*, this translocation step requires three more proteins, LcrV, YopB and YopD, in the case of *Yersinia*. LcrV forms a structure at the tip of the needle and this structure is believed to act as a scaffold for the insertion of a pore made of YopB and YopD into the target cell membrane. LcrV is known since the mid nineteen fifties to be a protective antigen against plague. The length of the needle is controlled by a mechanism involving a protein thought to act both as a molecular ruler and a substrate specificity switch (YscP in *Yersinia*). When assembly of the needle is complete, the molecular ruler changes the substrate specificity of the export apparatus, which becomes ready to export pore formers and the effectors. One protein from the export apparatus (YscU in *Yersinia*) seems to specifically recognize the various classes of export substrates. Export of the latter will only occur upon contact with a target cell.