



## Weaving of Bacterial Cellulose by the Bcs Secretion Systems

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Cellulose is the most abundant biopolymer on Earth and while it is the predominant constituent of plants, it is also a key extracellular matrix component in many bacterial species. While bacterial cellulose (BC) was first described in the 19th century, it was not until this last decade that insights were provided into how the cellulose synthase BcsA, assisted by its inner-membrane partner BcsB, senses c-di-GMP to simultaneously polymerize its substrate and extrude the nascent polysaccharide across the inner bacterial membrane. It is now established that BC can be produced by several distinct types of cellulose secretion systems and that in addition to BcsAB, they can feature multiple accessory subunits, often indispensable for polysaccharide production. Importantly, in the last years we have made significant progress in elucidating not only cellulose polymerization *per se* but also the bigger picture of bacterial signaling, secretion system assembly, and bacterial biofilm formation. In *Escherichia coli*, the BcsAB tandem assembles into a stable megadalton-sized macrocomplex with four accessory subunits, which are either essential for (BcsR and BcsQ) or enhance (BcsE and BcsF) the secretion of a phosphoethanolamine(pEtN)-modified biomatrix polymer. In the crystalline cellulose superproducer *Gluconacetobacter hansenii*, cellulose crystallinity is determined by the linear arrangement of the Bcs terminal complexes, itself driven by two accessory subunits, BcsH and BcsD. I will present recent structural and functional data providing in-depth mechanistic insights into the Bcs secretion systems of these two important model organisms.

### References:

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