Bacterial cells are surrounded by an exoskeleton made of the heteropolymer peptidoglycan (PG). The shape of this wall structure determines cell morphology, and its biogenesis is the target of many of our most effective antibiotics. Studies of PG assembly therefore provide fundamental insight into cell morphogenesis and practical information to aid in the development of new antibacterial therapies. Recent work from my lab focused on the identification of new PG polymerases and their regulation within the morphogenic machinery of bacteria will be presented.