Anatomical Society PhD Project Summary

Teeth, like other ectodermal organs, form from placodes – epithelial thickenings that invaginate into the underlying mesenchyme to form buds. The Green lab at King's College London uncovered unusual cell movements and forces that drive this initial invagination: cells at the edges of the placode migrate towards the placode centre and intercalate, making a contractile canopy and towing their basally-anchored sister cells over the thickening placode middle. The next project, the subject of an Anatomical Society PhD Studentship, is to examine the next stages of this developing anatomy in which the bud deforms itself to create the so-called "cap" and "bell" stages, consisting of a dental papilla inside an epithelial socket surrounded by a mesenchymal condensation. The project consists of tracking cell shapes, staining for and perturbing cytoskeletal activity and mapping physical forces that deform cells, their nuclei and ultimately the epithelium. This will link the anatomical phenotype to cellular activities and ultimately molecular processes.

Figure: F-actin (phalloidin) and myosin (NMyIIB antibody) staining of bud and late cap/early bell-stage tooth germs (different scales) showing epithelial bending and formation of the dental papilla (bottom centre shape in right-hand panel).

