

Department of Developmental Biology

The principal research activities of the Department of Developmental Biology are focused on attaining a mechanistic understanding of animal development, encompassing the earliest cell fate specification and movement processes that shape the early embryo, organogenesis, stem cell biology and engineering, tissue homeostasis and repair, and aging. Students and postdoctoral fellows work closely with faculty and staff on research projects and participate in weekly journal clubs and seminars at which recent literature and ongoing research are discussed.

The developmental biology faculty employ a variety of model organisms and cell-based systems to answer key outstanding questions about the fundamental mechanisms of development and to apply this knowledge to pathogenic mechanisms that lead to human birth defects and disease; they also use this knowledge to create improved future therapies. The department takes a broad view of developmental biology, with research groups studying diverse developmental processes (e.g., early embryogenesis, organogenesis, aging) and applying multidisciplinary approaches that include forward and reverse genetics, epigenetics, molecular and chemical methods, and computational methods. Embryogenesis is a fascinating process during which a fertilized egg undergoes divisions to form a mass of pluripotent cells that signal to one another to establish embryonic polarity, diverse cell types, and organs and that also undergo massive cell migrations and rearrangements to sculpt the embryonic body.

Research is also carried out on the processes involved in tissue degeneration, repair and regeneration, the biology of embryonic and adult stem cells, and cellular reprogramming. It is a particularly opportune time for developmental biology research, as recent technological breakthroughs in both animal model systems and genomics afford insights into developmental processes at the epigenetic, genetic and molecular levels and also enable the monitoring of cell behaviors in vivo. We are discovering the genes that are responsible for birth defects and defining connections between many adult human diseases and their origins during embryogenesis. The studies of stem cells, cellular reprogramming and regeneration are bringing us closer to curing human diseases, repairing damaged organs, and extending the boundaries of aging.

Website: <http://devbio.wustl.edu>