



As an organism develops, grows, and ages, neurons in its nervous system proliferate and make connections with each other so that they can talk to each other, send information from cell to cell, and store memories. Kolodkin investigates how these connections form and are maintained in both insect and mammal models. He has long sought to understand the identity and function of the critical guidance cues that control neural circuit establishment and to understand the underlying intracellular signaling cascades that are regulated by these cues. As a postdoc, he discovered the first member of the large semaphorin family of proteins, which includes membrane and secreted proteins that guide axon growth. Due to Kolodkin's work investigating the functions of these proteins, semaphorins are now recognized as one of the most important families of axon guidance cues and they are known to play critical roles in adult nervous system function and plasticity, neural regeneration, cancer cell proliferation and metastasis, immune system responses, and a range of other functions. More recently, Kolodkin addressed the longstanding mystery of how synaptic laminae, a key architectural feature of many neural systems, are specified during development. In elegant and rigorous mouse experiments, he showed that repulsive guidance plays a critical role in directing retinal lamination and in orchestrating connectivity between retinal ganglion cells and their targets in the brain. Such discoveries have transformed our understanding of how developing neural circuits assemble.