Abstract:
Although neurons generally form only one axon, each neuron establishes synaptic connections with a multitude of target neurons often in disparate parts of the nervous system. The ability of a single axon to accomplish this complex level of connectivity is to the formation of collateral branches from the main axon shaft. This presentation will cover insights we have obtained into the cytoskeletal and signaling mechanisms underlying the formation of collateral branches from the axons of embryonic sensory neurons, with emphasis on the mechanism of NGF-induced branching. The mechanism of branching involves the concerted regulation of the actin filament and microtubule cytoskeleton, the former requiring NGF-induced intra-axonal protein synthesis. Recent results regarding the role of axonal mitochondria in branching will be emphasized.