Evolution and development of the central nervous system in mollusks.

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The goal of this project entitled “Evolution and development of the central nervous system in mollusks” is to provide a first assessment of key neurogenetic processes in three molluscan species that belong to different class-level taxa and exhibit different degrees of nervous system centralization. Polyplacophorans lack major neural condensations, while bivalves possess several pairs of interconnected ganglia. The highest level of nervous system centralization within mollusks can be observed in cephalopods, where most ganglia are fused to form highly complex brains. For most bilaterian animals, it has been shown that Soxb genes and Notch signaling are involved in regulating the specification, proliferation, local maintenance, and maturation of neural progenitors. To understand how the distinct neural architectures of mollusks are formed, we thus plan to compare the spatiotemporal distribution of Soxb expressing neural progenitors and Notch signaling pathway components, during development of the polyplacophoran *Acanthochitona crinita*, the zebra mussel *Dreissena polymorpha*, and the pygmy squid *Idiosepius notoides*. Furthermore, we will determine the proliferative properties of Soxb-expressing neural progenitors in *D. polymorpha* and assess how pharmacological inhibition of Notch signaling influences their specification, proliferation and differentiation. These data will allow us to shed light onto nervous system development and evolution within the diverse molluscan sublineages and should also provide insights into the driving forces behind nervous system centralization within the Mollusca.