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EMBRYONIC BRAIN DEVELOPMENT OF LOLIGINIDS: AXONAL SCAFFOLD AND NEUROPIL FORMATION RELATED TO EARLY LIFE STYLES

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ABSTRACT: To understand the neural basis for a variety of early life modes in cephalopods, we examined morphological processes of the brain development in *Loliolus japonica*, *Sepioteuthis lessoniana*, and Loligo edulis by immunostaining with a neuron specific marker, anti-acetylated á-tubulin antibody. In the early embryonic brain of *Loliolus japonica*, a simple axonal "scaffold" appeared prior to neuropil formation. A ladder-like axonal scaffold, consisting of longitudinal connectives and commissural tracts, was formed first in the subesophageal mass, and the neuropils differentiated on the basis of the pre-existing axonal scaffold. The development of brain lobes began with the subesophageal and periesophageal masses; the basal lobes then appeared in the supraesophageal mass, and finally the vertical lobe system and the subpedunculate lobe appeared in the dorsal region of the supraesophageal mass. The developmental sequences were basically very similar in the three loliginids, but the vertical lobe system in the hatchling brain of *S. lessoniana* was more highly developed than those in the other two species. The subvertical lobe in the hatchlings of *S. lessoniana* showed an especially complicated domain structure, which may reflect the active predatory life of the hatchlings of these species.