

ABSTRACT

Early neurogenesis in flatworms

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We have initiated a series of studies of embryonic neural development in flatworms representing several different taxa, including acoels, macrostomids, polyclads, typhloplanoids, dalyelliids and temnocephalids. In our presentation we surveyed three pertinent studies: 1. We introduce a series of stages defined by easily recognizable morphological criteria that are applicable to all taxa. This staging system will serve us as a framework for our molecular and descriptive analysis of two "laboratory" species, *Macrostomum* and *Neochildia* that produce a sizeable number of eggs for developmental analysis year round. 2. Early neurogenesis: Neural progenitors are formed at an early stage when the flatworm embryo constitutes a multilayered mesenchymal mass of cells. A neurectoderm as in vertebrates or arthropods is absent. Only after neurons in the deep layers of the embryo have started differentiating do superficial cells reorganize into an epithelium that will give rise to the epidermis. Neurons are clustered in two anterior, bilaterally symmetric brain hemispheres. This implies that neurons later found in the trunk migrate out from the brain or are added on by neoblasts. After neural differentiation has set in, an antibody against acetylated beta-tubulin (anti-acTub) that binds neurotubules labels a pattern of pioneer neurons in the brain of midstage embryos of all species investigated. Pioneer neurons are grouped in several small clusters at characteristic positions. They pioneer several commissural tracts of the brain and two pairs of ventral and dorsal connectives, respectively. 3. We have cloned the POU genes *brn-1* and *brn-3*, as well as the homeobox gene *vnd* out of the macrostomid *Macrostomum* and the acoel *Neochildia*. In situ hybridisation carried out with 400bp fragments of these genes labels distinct populations of nerve cells in the brain of juvenile specimens. In situ hybridization on embryos at different stages is ongoing.

Results can be found in

YOUNOSSI-HARTENSTEIN, A., U. EHLERS & V. HARTENSTEIN (2000). Embryonic development of the nervous system of the rhabdocoel flatworm *Mesostoma lingua* (Abildgaard, 1789). *J. Comp. Neur.*, 416: 461-476.

HARTENSTEIN, V. & K. DWINE (2000). A new freshwater dalyellid flatworm, *Gieysztoria superba* sp. nov. (Dalyellidae: Rhabdocoela) from Southeast Queensland, Australia. *Memoirs of the Queensland Museum*, 45: 381-383.

YOUNOSSI-HARTENSTEIN, A. & V. HARTENSTEIN (2000a). The embryonic development of the dalyellid flatworm *Gieysztoria superba*. *Int. J. Dev. Biol.*, 44: 499-506.

YOUNOSSI-HARTENSTEIN, A. & V. HARTENSTEIN (2000b). The embryonic development of the polyclad flatworm *Imgogine mcgrathi*. *Dev. Genes Evol.*, 210: 383-398.

HARTENSTEIN, V. & U. EHLERS (2000). The embryonic development of the rhabdocoel flatworm *Mesostoma lingua*. *Dev. Genes Evol.*, 210: 399-415.