

Publication

A tripartite organization of the urbilaterian brain : Developmental genetic evidence from *Drosophila*

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Author(s) Reichert, Heinrich

Author(s) at UniBasel [Reichert, Heinrich](#) ;

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Developmental genetic studies suggest that the embryonic vertebrate brain has a tripartite ground plan consisting of a forebrain/midbrain, a hindbrain, and an intervening midbrain/hindbrain boundary region, which are characterized by the specific expression of the Otx, Hox and Pax-2/5/8 genes. Recent studies in *Drosophila* reveal similarities in the expression and function of these genes in patterning the embryonic brains of flies and vertebrates. Thus, in *Drosophila*, as in vertebrates, a Pax2/5/8 domain is located between an anterior otd/Otx2 region and a posterior Hox region of the embryonic brain. Moreover, in *Drosophila*, as in vertebrates, this Pax2/5/8 domain is located at the interface of the otd/Otx2 domain and a posterior unplugged/Gbx2 domain. Furthermore, in *Drosophila*, as in vertebrates, inactivation of otd/Otx2 or of unplugged/Gbx2 results in a comparable mispositioning or loss of orthologous gene expression domains in the embryonic brain. These developmental genetic similarities suggest that the tripartite ground plan, which characterizes the developing vertebrate brain, is also at the basis of the developing insect brain. This, in turn, implies that a tripartite organization of the embryonic brain may characterize all extant bilaterians, and thus may already have been established in the last common urbilaterian ancestor of all bilaterians. (c) 2005 Elsevier Inc. All rights reserved.

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