

**Mario F. Wullimann
Barbara Rupp and
Heinrich Reichert**

Neuroanatomy of the Zebrafish Brain

A Topological Atlas

**Birkhäuser Verlag
Basel · Boston · Berlin**

Contents

1 Introduction: neuroanatomy for a neurogenetic model system	1
Differentiation of first neurons and their associated tracts and commissures in the embryonic zebrafish brain	1
Neuromeres and expression of regulatory genes in the embryonic zebrafish	3
Generation of zebrafish mutants via saturation mutagenesis	5
2 Taxonomic background	5
3 Technical details	6
Histology	6
Preparation of figures	6
4 The brain of the zebrafish <i>Danio rerio</i>: an overview	7
Telencephalon	7
<i>Olfactory bulbs</i>	7
<i>Area ventralis telencephali</i>	8
<i>Area dorsalis telencephali</i>	8
<i>Telencephalic tracts and commissures</i>	9
Diencephalon (including synencephalon and pretectum)	9
<i>Area praeoptica</i>	9
<i>Epithalamus</i>	9
<i>Dorsal thalamus</i>	9
<i>Ventral thalamus</i>	9
<i>Posterior tuberculum</i>	10
<i>Hypothalamus</i>	10
<i>Synencephalon</i>	10
<i>Pretectum</i>	11
<i>Diencephalic tracts and commissures</i>	11
Mesencephalon	12
<i>Tectum opticum</i>	12
<i>Torus semicircularis</i>	12
<i>Tegmentum</i>	12
Rhombencephalon (metencephalon and myelencephalon)	13
<i>Cerebellum</i>	13
<i>Medulla oblongata</i>	13
Primary sensory and motor nuclei	13
Reticular formation	15
Additional medullary nuclei	15
Medulla spinalis	15
Brain stem/spinal tracts and commissures	16

5 The brain of the zebrafish <i>Danio rerio</i>: a neuroanatomical atlas	19
External view	19
Cross sections	21
Sagittal sections	63
Horizontal sections	79
6 Functional anatomy of the zebrafish brain: a comparative evaluation	89
Sensory Systems in the teleostean CNS	89
<i>Olfaction</i>	89
<i>Vision</i>	89
<i>Mechanoreception</i>	91
<i>Audition</i>	92
<i>Vestibular sense</i>	94
<i>Gustation</i>	94
<i>General visceral sense</i>	96
<i>Somatosensory system</i>	96
Motor and premotor systems in the teleostean CNS	97
<i>Motor nuclei of cranial nerves</i>	97
<i>Descending spinal projections</i>	98
<i>Reticular formation</i>	99
Integrative centers in the teleostean CNS	99
<i>Cerebellum</i>	99
<i>Tectum opticum</i>	100
<i>Telencephalon</i>	100
7 Index of Latin terms	103
8 Index of English terms	115
9 Index of abbreviations	127
10 References	139