Fortgeschrittenenpraktikum Entwicklungsbioologie im WS

| Modul A: Experimentelle Embryologie / Entwicklungsgenetik – Zebrafische | 1 Woche |
| Modul B: Hühnchen, Drosophila und Maus Embryologie | 1 Woche |

This is a highly intense course with regard to contents as well as with regards to techniques. For that reason students benefit most from the course when they have acquired a deeper understanding of developmental biology before beginning of their practical work. A group-wise exam helps to check the individual level of preparation. The exam will be held three weeks before the course starts.

For preparation we suggest the Vorlesung Entwicklungsbioologie and the S.F. Gilbert: Developmental Biology (7. oder 8. Auflage 2003 bzw. 2006)

Kapitel:
1 Grundlagen
2 Lebenszyklen S. 25-30
3 Experimentelle Embryologie
4 Genetik
5 Differentielle Genexpression
6 Zellkommunikation
9 Drosophila
10 Amphibienentwicklung
11 Wirbeltierfrühenwicklung
12 Ektoderm / ZNS
14 Mesoderm
15 Mesoderm und Entoderm
16 Extremitätenentwicklung

Programm

Dozenten Modul A: Prof. Dr. Wolfgang Driever, PD Dr. Marcus Frank, Dr. Jochen Holzschuh, Dr. Björn Wendik, Dr. Daria Onichtchouk

<table>
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<th>#</th>
<th>Experiments and teaching goals</th>
<th>Picts from students from course 2009</th>
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<td>1</td>
<td><strong>Early zebrafish development, live observation</strong>&lt;br&gt;cell cleavage, cell movement (Epiboly, Gastrulation) and axis determination in wild type embryos  &lt;br&gt;<strong>Methods:</strong> - mounting techniques for microscopy  - introduction into microscopy  - taking picture</td>
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|   | **Pattern formation in early embryonic development:**  
|   | zebrafish breeding, genetics, screens, mutations  
| Methods: | - Recognizing zebrafish mutations affecting pattern formation  
|   | - Recognizing zebrafish mutations affecting organogenesis  
| 2 | **Molecular characterization of patterning defects in wild-type and mutant zebrafish embryos:**  
| Methods: | - analysis of gene expression using *in situ* hybridization technique (ISH)  
|   | - Introduction in high throughput ISH (Roboter)  
|   | - Documentation and evaluation  
| 3 | **Signaling pathway characterization:**  
|   | Analysis of the Wnt-Signaling pathway in axis determination and early patterning formation  
| Methods: | - Pharmaceutical activation of the Wnt-pathway by GSK-3-inhibitor  
| 4 | **Experimental embryology:**  
|   | Analysis of the Nodal-Signaling pathway  
| Methods: | - Generation of mosaic zebrafish embryos by cell transplantation of cells at blastoderm stage  
|   | - Analysis using fluorescence and confocal microscopy  
| 5 | **Molecular embryology:**  
|   | Manipulating axis formation and early patterning by gene overexpression, cell lineage tracing  
| Methods: | - Microinjection of mRNA and DNA into one-cell stage embryos  
|   | - Analysis of distribution of fluorescent GFP  
|   | - Analysis of phenotypes induced by overexpression of patterning genes  
| 6 | **Genetic tricks in zebrafish**  
| Methods: | - in vitro fertilization  
|   | - induction of haploid development  
|   | - induction of gynogenetic diploid development  
| 7 | **Imaging**  
| Methods: | - fluorescent microscopy  
|   | - confocal microscopy  
|   | - time-lapse analysis  
|   | - image acquisition and analysis software  
| 8 |