

M4 - Neuroethology: The neural basis of adaptive behavior

Module Organiser – Berthold Hedwig

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Aims:

- To foster a broad approach to neuroethology that integrates different levels of analysis.
- To understand how adaptive behaviour requires many levels of neuronal organisation, drawing examples from a wide range of animals.
- To illustrate the mechanisms by which nervous systems operate.
- To identify critical questions, gaps in current knowledge, and controversial issues.

Course structure

The course considers a central problem in animal biology: How does the nervous system gather information about the environment, integrate it and then generate appropriate behavioural responses? Emphasis is placed on the behavioural context of neural mechanisms and relating neural organisation, function and circuit design to specific behaviours, i.e. the classical approach of “Neuroethology”. The lectures will cover the following topics:

- The organisation and evolution of brains
- Analysing and understanding neural circuits
- Neural mechanisms of acoustic communication
- Performance at extreme behaviours
- Colour vision
- Drosophila courtship behaviour
- Circuits and learning in Drosophila
- Neuromodulation and variability

We will use examples from invertebrates and vertebrate to identify and analyse neural circuits that process sensory signals and generate motor activity underlying simple and complex behaviour.

Learning outcomes

- An understanding of the principles of neural network function and organisation at a systems and cellular level within the context of adaptive behaviour.
- An appreciation of common organisational principles operating over a wide range of animals.
- The ability to evaluate different experimental approaches to a single problem and an appreciation of the need for a cross-disciplinary approach.
- Knowledge of the fundamental limitations and gaps in our understanding of major issues, and an understanding of the approaches that might resolve these problems.
- The development of a reasoned critical approach to the interpretation of published data, methodology and hypotheses that can be transferred to any discipline.

Module M4
Mon, Weds, Fri, 3pm

1-3	Corina Logan	Brains	7, 10, 12, Oct
4-5	Dieter Lukas	Ecology and evolution of brains	14, 17, Oct
6-8	David Parker	Neural Circuits	19, 21, 24, Oct
9-11	Berthold Hedwig	Acoustic communication	26, 28, 31, Oct
12-14	Paloma Gonzalez Bellido	Performance at extremes	2, 4, 7, Nov
15-17	Trevor Wardill	Colour vision	9, 11, 14, Nov
18-19	Caroline Fabre	Drosophila courtship	16, 18 Nov
20-22	Marta Zlatic	Circuits and learning in Drosophila	21, 23, 25, Nov
23-24	Timothy O'Leary	Neuromodulation and variability	28, 30, Nov