

**Invitation to a guest lecture
at the joint colloquium of the Institute of Biology and Environmental Sciences and the
Department of Neuroscience**

Module bio890: Current topics in biology

Prof. Dr. Jörg Albert

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Peeping Through the Keyholes of Neuroecology: the (mechano)sensational worlds of fruit flies and mosquitoes

A starting definition of our brain is that it - *somehow* - orchestrates the opening and closing (with a single and beautiful, yet near untranslatable, English word: the *gating*) of ion channels! And there truly are many ion channels in the brain. A safe first, but sufficiently cautious, estimate is that is about the same number as stars in the universe (somewhere between 10^{22} and 10^{24}). *Will we ever get our head around the brain?* But beneath all that mind-boggling numerical complexity lies a plain and simple truth: the gating of each of these ion channels is a mechanical act. With whatever form of energy the journey may start, the energy of a photon in the eye or the binding energies of a specific odorant complex in the nose, in the end it has to be transduced to a mechanical force that 'moves the gate'. Some sensory systems couple their *transducer channels* directly (i.e. mechanically) to the external world around. These are the mechanosensory systems, such as e.g. ears. Their simple design has many advantages (and also, one might have suspected, disadvantages). For once, it is fast. Freed from time-consuming energy conversions, mechanotransducers respond with latencies of $<1\text{ms}$, often in the tens of microseconds range. Direct mechanotransducers are also advantageous from a researcher's perspective as they allow to observe an ion channel's function - and its properties - by studying the external structure it is coupled to. These structures are usually much larger, and much more easily accessible; ear drums, for example ...or an insect antenna. We have been studying the antennae of fruit flies (*Drosophila*) and disease transmitting mosquitoes (e.g. the malaria mosquito *Anopheles*) extensively in the past and we have used them as keyholes, through which we caught a glimpse of not only their molecular modes of operation but their contributions to the sensory ecologies of the animals more widely. In this seminar I will show a few examples on how the very construction of their ears, and the way they hear, has far reaching implications for the lives they live and the behaviours they display. In the end I hope to also address the question: *What's it got to do with us?*

14.06.2022, 4:15 pm, W04 1-162

Host: Prof. Dr. Jutta Kretzberg (Computational Neuroscience / Sinnesphysiologieochlea), DfN

Members of all institutes are cordially invited to join the lecture.