

Introductory Remarks to Symposium 17

Moving the body: communication, coordination and control in neuromechanical systems

Jan M. Ache and Corinna Gebehart, Wuerzburg and Lisbon (Portugal)

Taking a walk in the park is much more challenging than personal experience might suggest: moving through the world is demanding on multiple levels, and how nervous systems control adaptive locomotion is an area of intense research efforts. Many unanswered questions in motor control are found at systems interfaces, for example between the body and the environment, or between regions of the nervous system. Which sensory cues are needed for adaptive locomotion, and how are they integrated? Motor networks in the spinal or ventral nerve cord can maintain locomotor rhythms independent of the brain, but how is their activity modulated by descending commands to achieve adaptive locomotion? And how does the brain, in turn, integrate ascending feedback about body posture and internal states? The international NeuroNex consortium 'Communication, Coordination and Control in Neuromechanical Systems' (C³NS) aims to tackle these questions by comparing motor control strategies across species.

Our symposium features five speakers, four of whom are associated with 'C³NS'. Starting in the sensory periphery, Gesa F. Dinges will address how force feedback from leg mechanoreceptors is fed into the nervous system of *Drosophila*. Another key interface that has received little attention in the context of motor control and action-selection is that between neurons and glia, which will be discussed by Amber A. Krebs. Finally, three talks will cover interactions between the brain and motor networks. First, Jan M. Ache will discuss how sensory cues and internal states are integrated by descending neurons to drive adaptive locomotion in *Drosophila*. Second, Nicholas S. Szczecinski will discuss how motor circuits integrate descending commands and local mechanosensory feedback to control movements in synthetic nervous systems. Finally, Marie-Claude Perreault will speak about influences of descending systems on sensory processing in the mouse spinal cord.

Symposium 17

Thursday, March 23, 2023
16:15 - 18:15, Lecture Hall 9

Chairs: Jan M. Ache and Corinna Gebehart,
Wuerzburg and Lisbon (Portugal)

- 16:15 **Opening Remarks**
- 16:20 Gesa F. Dinges, Cologne
DROSOPHILA STRAIN SENSORS: FROM MORPHOLOGY AND BIOMECHANICS TO FUNCTION (S17-1)
- 16:45 Amber A. Krebs, Münster
CONTRIBUTION OF GLIAL CELLS DURING ACTION SELECTION IN *DROSOPHILA* LARVAE (S17-2)
- 17:00 Jan M. Ache, Wuerzburg
NEURONAL MECHANISMS FOR SENSORIMOTOR FLEXIBILITY IN *DROSOPHILA* (S17-3)
- 17:25 Nicholas S. Szczecinski, Morgantown, USA
BIOMIMETIC ROBOTS AS TOOLS FOR UNDERSTANDING HOW THE NERVOUS SYSTEM MOVES THE BODY (S17-4)
- 17:50 Marie-Claude Perreault, Atlanta, USA
INTEGRATION OF DESCENDING AND PERIPHERAL SENSORY SIGNALS BY SPINAL CORD INTERNEURONS (S17-5)