Introductory Remarks to Symposium 36

Novel local mechanisms of motor control

Joachim Schmidt and Abdel El Manira, Köln and Stockholm (Sweden)

It is textbook knowledge that the output from neural networks in the spinal cord of vertebrates and in the ventral nerve cord of arthropods controls rhythmic movements of the locomotor organs. The output pattern of these local networks depends on the connectivity of the component neurons and their specific membrane properties. Descending input from the brain triggers locally generated activity and modulates it. In addition, input from sense organs is integrated. Decades of research on the local control of movement may lead to the assumption that actual work on this topic merely refines a knowledge we already have. This assumption, however, is not true. In this symposium we will present novel findings on the mechanisms of local motor control in vertebrates and invertebrates that have so far not been on the radar of most neuroscientists in the field.
Traditionally, motor neurons in the vertebrates CNS have been viewed as mere output elements of the nervous system, conveying to the muscles the motor program generated by upstream interneuron circuits. Abdel El Manira will introduce a so far unforeseen role of motor neurons in controlling locomotor circuit function via gap junctions in zebrafish.
The functional core of a neural network that controls the generation of rhythmic motor output is a network of neurons called central pattern generator (CPG). Two CPGs in a given abdominal ganglion in crayfish control the beating of paired swimmerets (abdominal legs). Carmen Smarandache-Wellmann will show two pathways that control in-phase activity of the two CPGs. One of which involves gap junctions between left and right motor neurons that in turn are electrically coupled to CPG neurons.
Stereotypic behaviors as escape responses in fish or crayfish but also walking in arthropods can be triggered by command neurons descending from the brain. A focus of Eva Berg's talk will be on the function of a segmental or local command neuron that she recently found to reside in each thoracic hemi-ganglion of the stick insect. This command neuron triggers stereotypic rhythmic searching movements of a stepping leg that lost ground contact.
When we think of membrane properties of neurons in oscillatory networks we usually think of ion channel conductances. In contrast, Keith Sillar will report on how activity of the Na^+/K^+ ATPase affects spinal locomotor network output in *Xenopus* frog tadpoles.

Symposium 36

Saturday, March 25, 2017
8:30 -10:30, Lecture Hall 101

Chairs: *Joachim Schmidt and Abdel El Manira, Köln and Stockholm (Sweden)*

08:30 **Opening Remarks**

08:40 Abdel El Manira, Stockhom, Sweden
MODULAR MICROCIRCUITS UNDERLYING GEAR CHANGES DURING LOCOMOTION (S36-1)

09:00 Carmen Smarandache-Wellmann, Cologne
TWO DISCRETE PATHWAYS RESPONSIBLE FOR THE INTRASEGMENTAL COORDINATION OF LIMB MOVEMENTS IN THE ABDOMINAL GANGLIA OF CRAYFISH (S36-2)

09:20 Angela O'Sullivan, Aarhus, Denmark
MOTOR CONTROL OF DROSOPHILA COURTSHIP SONG AND FLIGHT (S36-3)

09:30 Eva Berg, Stockhom, Sweden
A LOCAL COMMAND NEURON AND THE CONTROL OF LEG SEARCHING MOVEMENTS IN THE STICK INSECT (S36-4)

09:50 Keith Thomas Sillar, St. Andrews, UK
REGULATION OF LOCOMOTOR NETWORK PERFORMANCE BY THE SODIUM PUMP IN XENOPUS FROG TADPOLES (S36-5)

10:10 Thomas Stolz, Cologne
DESCENDING MODULATION OF THORACIC MOTOR ACTIVITY IN THE STICK INSECT (S36-6)

10:20 **Concluding Remarks**