

DANDRITE Topical Seminar

Tuesday 8 November 2016
at 13.15 – 14.00

Building 1170, library
Ole Worms Allé, 8000 Aarhus C

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Seminar on Speed-dependent interaction of sensory signals and local, pattern-generating activity during walking in *Drosophila*

The rhythmic and coordinated motor output required for terrestrial legged locomotion is a result of interactions between sensory signals from the legs and the activity of local pattern-generating networks. In that notion, local pattern-generating networks provide basic rhythmic output that is modulated on a cycle-by-cycle basis by sensory input mediating the current state of the motor system. How this interaction changes speed-dependently and thereby gives rise to the different coordination patterns observed at different speeds is understood insufficiently. Amputation of individual legs removes load signals and mechanical coupling between legs. Therefore, intact flies and single-leg amputees were observed during walking on an air-suspended ball, walking speed was monitored and oscillation periods, phases, and absolute inter-segmental intervals of movements in the intact legs and single leg stumps were quantified. While the oscillatory frequency in intact legs was dependent on walking speed, stumps showed a high and relatively constant oscillation frequency at all walking speeds. As a consequence, strict cycle to cycle coupling between stumps and intact legs was absent at low walking speeds. Nevertheless, preferred absolute time intervals were found between intact leg liftoff and subsequent levation or depression onset in the stump. At high walking speeds stump oscillations were strongly coupled to the movement of intact legs on a 1-to-1 basis. The *nan[36a]* mutant, which has defective chordotonal organs, was used to investigate the influence of sensory feedback from chordotonal organs in the intact legs on movements of the stump. In contrast to wild type flies stump oscillations in the mutant flies failed to entrain to the stepping behavior of the intact legs at high walking speeds. A largely constant stump period over the whole speed range indicates that descending signals controlling walking speed do not access the basic pattern-generating circuits directly. Furthermore, in WT flies inter-leg coordination strength seems to be speed-dependent and greater coordination is evident at higher walking speeds.

Host: Group Leader Anne von Philipsborn, DANDRITE, Dept. of Molecular Biology and Genetics, Aarhus University