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Curricula: Neuroscienze e neurotecnologie

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Proprioception in motion EPIN004101 e EPIN004199

Title: Proprioception in motion

Abstract:

The octopus, with its eight long and flexible arms, is an example of highly efficient motor behavior reached in an animal lacking any rigid structure. The octopus uses unique motor control strategies to cope with the complexity arising from its hyper-redundant body. We know that these strategies are present at all levels—from the neuromuscular system to higher motor control centers and are achieved through a special embodied organization of its flexible body, unusual morphology, and a unique central and peripheral distribution of its extremely large nervous system.

In the project we aim at addressing one aspect of this animal behaviors which is still under-investigated: the role of proprioception in motor control.

We will employ techniques of electrophysiology, muscle biomechanics, 2-photon microscopy and imaging to assess the presence, type, information pathway and functional role of muscle proprioceptive receptors in single arms. In particular, we will uncover their involvement in the arm stretch-induced withdrawal response, sucker reflex and in bend propagation. In addition, we will provide information on how stretch is coded into proprioceptive responses and if this information is used to build or refine motoneuronal commands.