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DISTINGUISHED SEMINAR

The vertebrate Forebrain over 500 million years

Lecturer: **Sten Grillner** M.D., Ph.D.

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Date: Thursday, 17 July 2025

Time: 17:00 - 18:00

Venue: Conference Room
B1F, Faculty of Medicine Bldg. B

Eligibility: Academic Researchers and Students

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An important question is to what an extent the bauplan of the vertebrate forebrain evolved early in vertebrate evolution or rather gradually during the vertebrate evolution to mammals with cortical/pallial motor and sensory areas, the basal ganglia and the modulatory systems. The lamprey belonging to the oldest group of now living vertebrates became separate from the evolutionary line leading to mammals already some 500 million years ago. We show that the lamprey forebrain has the basal ganglia, organized in a similar way to the mammalian version with the same intrinsic nuclei (striatum, GPi, SNr, STN), same types of connectivity, types of neurons, transmitters, receptors and input from cortex/pallium and thalamus. The dopamine system has also a similar efferent and afferent connectivity. Thalamus conveys signals to a retinotopically organized visual area in the dorsal pallium/cortex, where there is also a somatopically organized area, and a motor area with separate projections to thalamus, the midbrain, brainstem and even the spinal cord. There is in addition the intratelencephalic neurons that connect both hemispheres but also project to striatum. We interpret these data to suggest that these basic features of the forebrain had evolved early in vertebrate evolution and been maintained through the amphibians, the reptile group (cynodonts) that evolves into mammals. The lamprey thus has a similar basic organization of the forebrain as mammals while the number of neurons in each part is very much reduced.

Hosted by Institute for the Advanced Study of Human Biology (WPI-ASHBi)

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