グローバル COE 特別セミナー

生物化学専攻セミナー

日時：平成 21 年 11 月 21 日（土） 13:00〜14:00
場所：理学部 3 号館 3 階 327 号室
講師：Mario de Bono
MRC Laboratory of Molecular Biology（Cambridge , England ）

演題：Aggregating in rotten places: oxygen and carbon dioxid sensing in C. elegans.

要旨：Behaviour arises from the interplay between the environment, experience and dynamic networks of genes, neurons and neural circuits. We are studying how such networks encode and modulate behaviour, using C. elegans as a model. In this animal we can dissect neural networks into individual identified neurons since the C. elegans nervous system has exactly 302 neurons, all recognizable, and these have reproducible functions and synaptic connections. Using powerful genetics we can also elucidate the molecular pathways underpinning neural function.

Foraging in C. elegans involves integration of multiple sensory cues, including signals from bacterial food, other animals, gases and internal nutritional state. Two important regulators of foraging are ambient oxygen and carbon dioxide. C. elegans uses distributed neural circuits to sense and respond to each of these gases. Two types of O2 sensing molecules are soluble guanylate cyclases and globins. These sensors act together to shape the O2 response of C. elegans into a sharp sigmoidal curve tuned close to 21% - the concentration of O2 at earth ' s surface. O2 responses serve both to help worms escape the surface and to find food. CO2 sensors help prevent animals getting trapped in high CO2 environments. Both O2 and CO2 sensing neurons continue signaling as long as their cognate stimulus is present. Chronic signaling by these neurons appears to set the animal into different behavioural states, analogous to moods.

O2, CO2, food and other animals regulate a higher-order behaviour of C. elegans, aggregation. I will describe the behavioural responses that allow animals to aggregate together and the neural circuits underlying them. One mechanism involves use head and tail sensors that allow animals to detect if they are moving forwards or backwards out of a group.

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