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MPI-NAT SEMINAR SERIES

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Germline Formation and Regeneration in the Annelid Platynereis dumerilii

Germ cells (reproductive cells and their progenitors) give rise to the next generation in sexually reproducing organisms. The loss or removal of germ cells often lead to sterility in established research organisms such as the fruit fly, nematodes, frog, and mouse. The failure to regenerate germ cells in these organisms reinforced the dogma of germline-soma barrier in which germ cells are set-aside during embryogenesis and cannot be replaced by somatic cells. However, in stark contrast, many animals including segmented worms, hydra, planaria, sea stars, sea urchins, and tunicates can regenerate germ cells. Although germ cell regeneration is widespread, cellular sources that participate in germ cell regeneration and molecular mechanisms underlying this ability remain poorly understood. We study germ cell regeneration in a highly regenerative group of animals called segmented worms (annelids). Adult annelids regenerate germ cells while regenerating their body axis, and after ablation of germ cell progenitors in the embryos. We particularly focus on the marine annelid Platynereis dumerilii. Platynereis is highly regenerative and germ cell regeneration can be induced; stable transgenic tools are available, therefore genetic cell lineage tracing is feasible; worms can be cultured for the full life cycle at the lab with feasible maturation times, allowing observations of germ cell regeneration and fertility in experimentally reasonable timeframes. For studying germ cell development and regeneration in vivo, we established live imaging techniques for embryos and post-embryonic stages when germ cells are observed. We tested the effect of developmental stage on germ cell regeneration, and investigated gene expression patterns during germ cell regeneration. This talk will focus on the germ cell regeneration question in the context of the cellular sources of annelid regeneration and post-embryonic growth, based on our recent scRNAseq and transgenesis studies. If soma regenerates germ cells, hereditary material may move from soma to germ in these organisms. Therefore, a better understanding of this phenomenon will be a major conceptual advance in our view of the germline.

Thursday, 23.05.2024, 13:00

Host: Jochen Rink

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