
Stem cells in an evolutionary perspective

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Abstract

Session: Asking the Hidden Questions Raised by Stem Cells: History, Philosophy, and Biology (Jane Maienschein, Melinda Fagan, Lucie Laplane, Michel Vervoort) Most discussions about stem cells are usually fuelled by data that come from a few model systems, in particular mammals, and focus on a few stem cell types such as those found in adult tissues (multipotent tissue-specific stem cells) and embryonic stem cells (ES cells). In my talk, I will present experimental evidence of the widespread existence of pluripotent adult somatic stem cells in many non vertebrate lineages, including cnidarians, ctenophores, flatworm, and annelids. I will discuss the importance of these adult stem cells for key biological features of these organisms, such as continuous growth, asexual reproduction, high phenotypic plasticity, and extensive regenerative capabilities. These stem cells found in distantly-related species, show striking similarities in their molecular signatures, opening the possibility to define a conserved ‘stemness’ or ‘pluripotency’ repertoire in animals. In addition, these somatic pluripotent stem cells share many molecules with primordial germ cells, suggesting an evolutionary link between these two cell types. I will discuss these similarities in the light of recently proposed models about stem and germ cell evolution. Finally, I will point out the interest of these evolutionary data for our general understanding of the stem cell concept.

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