ZOO6927-9122(28407) - Special Topics

MILESTONE PAPERS IN DEVELOPMENT AND REGENERATION

This course will meet weekly to present, read and discuss the most important papers in developmental biology and regeneration over the last century. The papers we will consider have established new disciplines, new model organisms and new techniques to generate major advances the fields of development and regeneration. We will begin with R.G. Harrison's 1921 paper on the limb field and end up with genome sequencing and single cell RNAseq to ask how the work came about, its significance both scientifically and sociologically and its value to scientific discovery. We will also see how the scientific method has dramatically changed over this time course.

Each member of the class will present one of these papers as a powerpoint presentation.

Date	Time	Paper to discuss	Comments
3rd Sept	10.40-11.30	Introduction, what we are going to do, what did these papers discover, how do they relate to today's research and understanding, how has research changed?	
10th Sept	10.40-11.30	Harrison "On relations of symmetry in transplanted limbs". J. Exp. Zool. 32, 1-136, 1921	First analysis of tissue interactions in development limb bud. 136 figures, individual cases reported!
17th Sept	10.40-11.30	Spemann & Mangold "Uber induction von embryonalanlagen durch implantation artfremder organisatoren". 1924	Discovery of 'the organiser'. Nobel prize work.
24th Sept	10.40-11.30	Singer "Influence of the nerve in regeneration of the amphibian extremity". Quart Rev Biol. 27, 169-200, 1952	Elaboration of the neurotrophic control of limb regeneration.
1st Oct	10.40-11.30	Wolpert "Positional information and the spatial pattern of cellular differentiation. J. Theor. Biol. 25, 1-47 (1969).	Theoretical description of how patterning works in embryos which laid the groundwork for developmental biology.
8th Oct	10.40-11.30	Tickle, Summerbell & Wolpert "Positional signalling and specification of digits in chick limb bud morphogenesis". Nature 254, 199-202, 1975.	Discovery of an organizer in the limb bud and how it works
15th Oct	10.40-11.30	Lewis "A gene complex controlling segmentation in Drosophila". Nature 276, 565-570, 1978.	The classical genetic analysis of Hox genes. Nobel prize work.

22nd Oct	10.40-11.30	Nusslein-Volhard & Weischaus "Mutations affecting segment number and polarity in Drosophila" Nature 287, 795-801, 1980	Mutation screening reveals how spatial organization and segmentation works genetically
29th Oct	10.40-11.30	Maden, M. Nature 295, 672-675, 1982 Studer et al. Science 265, 1728-1732, 1994	RA as a concentration dependent morphogen and how it acts via Hox genes.
5th Nov	10.40-11.30	O. Chisaka & M.R. Capecchi "Regionally restricted developmental defects resulting from targeted disruption of the mouse homeobox gene hox-1.5". Nature 350, 473-479, 1991.	Early mouse gene ko showing hox gene function in the mouse embryo. Nobel prize work.
12th Nov	10.40-11.30	D.Y.R. Stainier et al. "Mutations affecting the formation and function of the cardiovascular system in the zebrafish embryo". Development 123, 285-292, 1996.	Example of the power of zebrafish to discover gene function and the cause of human abnormalities
19th Nov	10.40-11.30	Nowoshilow et al. "The axolotl genome and the evolution of key tissue formation regulators". Nature 554, 50-55, 2018.	Not just a 32-Gb genome sequence (10x bigger than human), but also why some animals can regenerate and others cannot
26th Nov		THANKSGIVING	
3rd Dec	10.40-11.30	Y. Wang et al. Single-cell analysis of murine fibroblasts identifies neonatal to adult switching that regulates cardiomyocyte maturation. Nature Comm. 11:2585 | https://doi.org/10.1038/s41467-020-16204-w (2020)	Single cell RNA seq analysis of why we can't regenerate our heart.