Department of Biochemistry

2014 Axelrod Distinguished Lectures

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Tuesday, April 22
3:30 - Deans Auditorium (PFEN 241)
Splitting up is hard to do: regulating the end of the cell cycle

Wednesday, April 23
4:00 - Deans Auditorium (PFEN 241)
At the breaking point: molecular control of cytokinesis

Splitting up is hard to do: regulating the end of the cell cycle

Cytokinesis is the physical division of one cell into two daughter cells. Observed since the first microscopes focused on cells, the process of cell division continues to fascinate and inspire cell biologists with its intricacy and precision. Furthermore, although the failure of this process is most often lethal to cells, mounting evidence indicates that cytokinetic failure in some cell types contributes to tumorigenesis through formation of tetraploid intermediates that escape cell death. Yet, a thorough understanding of cytokinesis has not yet been achieved in any organism. Over the last two decades we, and others, have championed the fission yeast *Schizosaccharomyces pombe* as a powerful model organism for learning how cell division can be achieved and how it can be coordinated so precisely with chromosome segregation. *S. pombe* cells divide much like a conventional animal cell – symmetrically - through the formation and constriction of an actomyosin-based contractile ring. Forward genetic screens enabled the first and most extensive 'parts list' of cytokinesis proteins to be assembled for any organism. Indeed, it is now appreciated that ~150 proteins underlie the complexity and robustness of cell division even in this 'simple' eukaryote. Subsequent chemical-genetic, proteomic, and RNAi screens in fly tissue culture cells, worm embryos, and mammalian cells revealed overlapping sets of cytokinetic proteins. This seminar will present emergent themes in the mechanism and regulation of cytokinesis.

At the breaking point: molecular control of cytokinesis

With a parts list of the cytokinetic machinery in hand, we now focus on learning how these pieces are assembled into a functional constriction apparatus and to discover how the assembly process is regulated with respect to other events of mitosis. In this seminar, our mechanistic work revealing phospho-regulated oligomeric switches key to contractile ring assembly will be described. Our current understanding of a checkpoint pathway that fine-tunes the timing of actomyosin ring assembly to safeguard genomic integrity will also be presented.

About the Axelrod Lectures:

Dr. Bernard Axelrod served as Head of the Department of Biochemistry. His efforts were instrumental in founding the biochemistry program at Purdue University. On the occasion of his 70th birthday, colleagues and friends established this lectureship in honor of Dr. Axelrod's many contributions to the field of biochemistry and its community of scientists. Dr. Axelrod passed away in 2011 at the age of 97.