
Seminars in Genetics and Molecular Cell Biology

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Peroxioredoxins are conserved markers of circadian rhythms

Cellular life emerged 3.7 billion years ago. With scant exception, terrestrial organisms have evolved under predictable daily cycles owing to the Earth's rotation. The advantage conferred on organisms that anticipate such environmental cycles has driven the evolution of endogenous circadian rhythms that tune internal physiology to external conditions. The molecular phylogeny of mechanisms driving these rhythms has been difficult to dissect because identified clock genes and proteins are not conserved across the domains of life: Bacteria, Archaea and Eukaryota. Here we show that oxidation–reduction cycles of peroxiredoxin proteins constitute a universal marker for circadian rhythms in all domains of life, by characterizing their oscillations in a variety of model organisms. Furthermore, we explore the interconnectivity between these metabolic cycles and transcription–translation feedback loops of the clockwork in each system. Our results suggest an intimate co-evolution of cellular timekeeping with redox homeostatic mechanisms after the Great Oxidation Event 2.5 billion years ago.

Tuesday, December 11, 2012 at 5.00 p. m.

Institute for Genetics,
Zùlpicher Str. 47 a, Lecture hall, 4th floor

Host: Gerrit Praefcke, Institute for Genetics,
University of Cologne