THE RNA WORLD

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Overview

Numerous scenarios have been envisioned for the origin of life with the common theme that, based on modern day biological systems, replication and information storage were needed for survival of any self-sustaining system. In extant biology, these functions are the realm of nucleic acids - DNA and RNA. However, because of its rather inert (non-reactive) nature, DNA is thought to have appeared more recently and, in early evolution, played a secondary role to that of RNA. The now well-established capacity for catalysis thus puts RNA at the front and center of arguments about the origin of life, a realization that dates back to the 1960s and subsequently embodied in the term "The RNA world". This RNA world harkens to a time when the main transaction maker in biology was RNA, with its ability to self-replicate with high fidelity through its role as both template and catalyst. Such attributes ensured the storage of critical genetic information even while enabling replication of sequence variants that provided enough diversity for evolutionary forces to shape biology. Despite the ability of RNAs to catalyze diverse reactions, the pressures of natural selection coupled with the advent of proteins led to the slow but inevitable transition to an RNA-protein world and current biological systems. The explosion of interest in the biological functions of RNA and its role in the origin of life have also been driven by remarkable advances in technologies for studying RNA structure, function and regulation. This course will explore the biology and biochemistry of RNA, with emphasis on structure-function relationships of "non-coding" RNAs as well as the introduction of techniques important for studying RNA biology. The course will focus on the functions that "non-coding" RNAs play at the cellular level and how our knowledge of RNA metabolism has changed our view of the origin of life.

Through lectures and paper discussions, course participants will familiarize themselves with the arguments and findings that support the idea of an RNA world, as well as gain the knowledge to apply wide-ranging, cutting-edge techniques to advance their own goals in RNA biology research.

Dates	**December 15 - December 23, 2016** **Number of participants - 50 (Maximum)**
You Should Attend If…	▪ You have completed course work on the structure, synthesis and biochemistry of nucleic acids, and are generally interested in recent advances in RNA biology ▪ Your current research involves some aspects of RNA biology and you are interested in newer *in vitro* and *in vivo* methods to study RNA structure and function ▪ Your current teaching covers RNA biology and its futuristic development
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $200** **Industry/ Research Organizations: 10,000** **Academic Institutions: 5000** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility.

The Faculty

Dr. Juan Alfonzo is a Professor of Microbiology at The Ohio State University (OSU). He received his Ph.D. at Indiana University from the laboratory of Dr. Milton Taylor and did his postdoctoral training at UCLA with Dr. Larry Simpson. He is interested in RNA processing events that are unique to trypanosomes and that could be exploited as targets for the design of therapies against protozoan diseases. His team focuses on three facets of RNA processing: RNA editing and RNA modification in trypanosomes and tRNA import into mitochondria in various systems, with special focus on tRNA transport in human mitochondria, which was discovered in the Alfonzo laboratory. Research in the Alfonzo laboratory aims to provide useful knowledge of basic cellular processes with the added incentive of great overall implications in terms of medical applications.

Dr. Jane Jackman is an Associate Professor of Chemistry & Biochemistry at OSU. She has been working in the field of RNA editing, modification and processing for over 15 years, after obtaining her Ph.D. in Biochemistry working as an enzymologist with Drs. Carol Fierke and Chris Raetz at Duke University. Along with Dr. Eric Phizicky, she discovered the first known family of RNA 3'-5' polymerases and an unusual tRNA methyltransferase, both of which are currently under active study in her laboratory. Her studies focus on elucidating both the molecular mechanisms and biological functions of these fascinating and unusual enzymes that participate in non-coding RNA metabolism.

Dr. Venkat Gopalan is a Professor of Chemistry & Biochemistry at OSU. He obtained his Ph.D. (Biochemistry) from the University of New Mexico (Mentor: Prof. Robert H. Glew). He was then a post-doctoral fellow in the group of Prof. Sidney Altman, Yale University. During his post-doctoral tenure, he was also a visiting scholar at the MRC Laboratory of Molecular Biology, Cambridge, UK (Mentor: Aaron Klug). His research focuses on RNase P, a ribonucleoprotein that catalyzes tRNAmatu-ration and is a fine model to understand protein-aided RNA catalysis.

Dr. Krishnan Sankaran is a Professor at Centre for Biotechnology, Anna University, Chennai. A biochemist and molecular enzymologist by training, his research contributions over 3 decades include unraveling of bacterial lipid modification pathway, its application as first post-translational protein engineering for various biotech applications (including adjuvant-free vaccines), molecular pathogenesis of infectious bacteria and next-generation diagnostic instrumentation, commercialization of indigenous healthcare devices through national hubs and biotech entrepreneurship development. His current interest in the vast RNA World is extracellular RNAs, their role in pathogenesis and diagnostics.

Course Coordinator

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