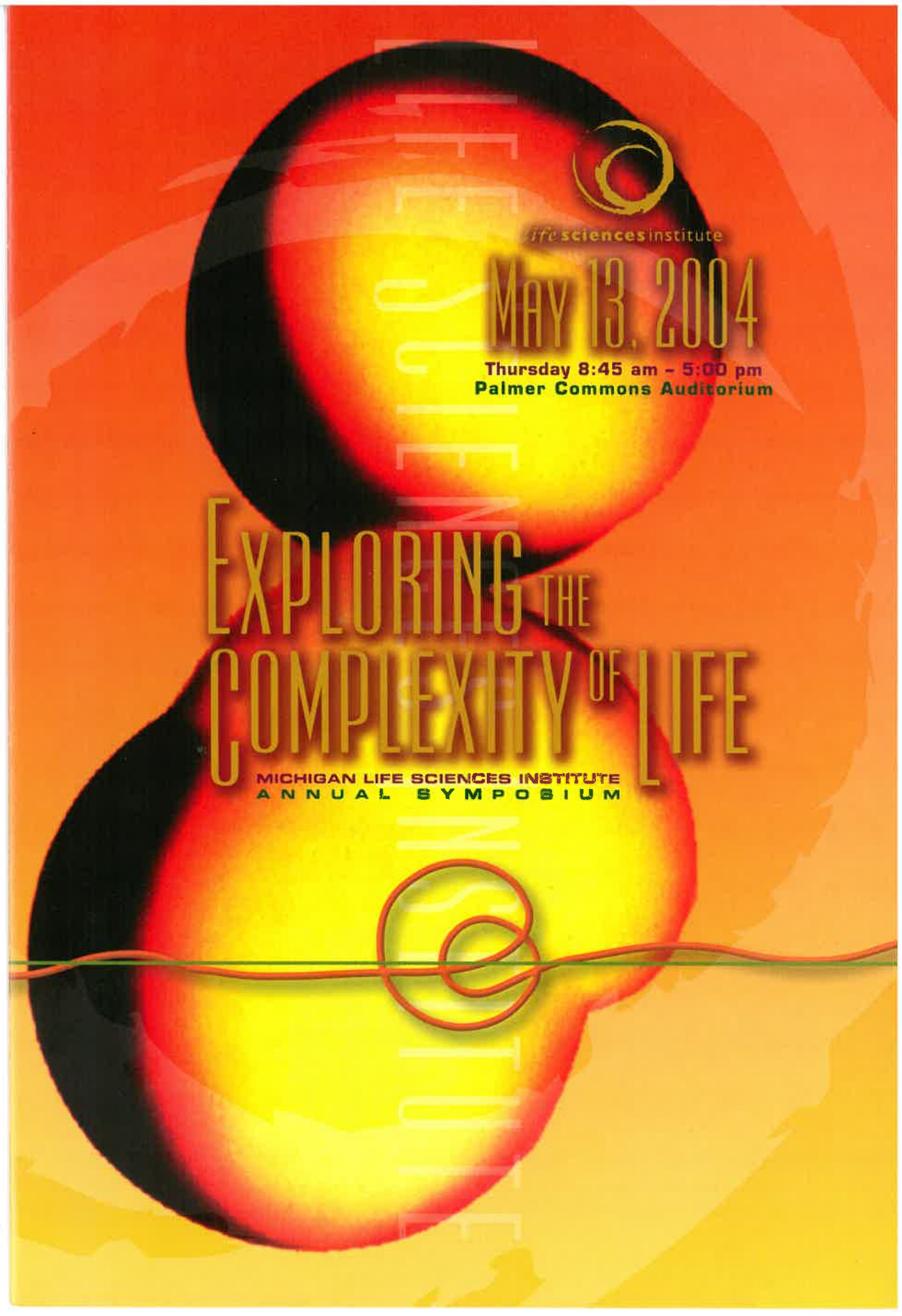
life sciences institute
MAY 13, 2004
Thursday 8:45 am - 5:00 pm
Palmer Commons Auditorium
EXPLORING THE COMPLEXITY OF LIFE
MICHIGAN LIFE SCIENCES INSTITUTE
ANNUAL SYMPOSIUM

Dixon's research has focused on a group of proteins that govern a chemical reaction called "phosphorylation," the addition or removal of phosphate molecules from proteins. This biochemical reaction serves as a major signaling mechanism in cells, including growth factors, neuronal firing, or even the presence of an invading pathogen. Dixon's work has gained insights into the plague, Down Syndrome and cancer. Jack Dixon is also on the external advisory board of the U-M Life Sciences Institute.

Schlessinger studies the mechanism of activation of receptor tyrosine kinases (RTKs) and how RTKs are maintained in an inactive state prior to growth factor stimulation. Growth factor stimulation activates recruitment and control of cellular signaling pathways. He is also interested in new approaches for the discovery of drugs to treat diseases caused by aberrant activation of RTKs or dysfunction in their signaling pathways, including cancer.

Jack E. Dixon, PhD
Dean of Scientific Affairs
Professor of Pharmacology, Cellular & Molecular Medicine, and Chemistry & Biochemistry
University of California – San Diego

Joseph Schlessinger, PhD
William H. Prusoff Professor & Chairman of Pharmacology
Yale University School of Medicine

8:45 am
Welcome
Alan Saltiel
Director of the Life Sciences Institute

9:00 am
The Intersection Between Bacterial Pathogens and Eukaryotic Signal Transduction Systems

9:50 am
Cell Signaling by Tyrosine Phosphorylation: From the Bench to the Bedside

10:40 – 11:00 am Break

Agre studies proteins on the cellular membrane, and has discovered those comprising the aquaporin water channel - a critical feature that allows water to move in and out of cells in a quick and controlled fashion. Several research laboratories around the world have subsequently defined more than 200 different aquaporins in tissues from mammals, invertebrates, microorganisms, and plants. Agre's laboratory is currently devoted to the structural and functional characterization of aquaporins from humans, bacteria, and yeast.

Doudna's research concerns the structure and function of RNA molecules, including ribozymes and viral RNAs. She is comparing catalytic strategies used by RNA to those of protein enzymes, focusing on self-splicing introns and the self-cleaving RNA from hepatitis delta virus (HDV), a human pathogen. Doudna is also investigating RNA-mediated initiation of protein synthesis in hepatitis C virus, and RNA-protein complexes involved in targeting proteins for export out of cells. Professor Doudna is also on the external advisory board of the U-M Life Sciences Institute.

Peter Agre, MD
2003 Nobel Laureate in Chemistry
Professor of Biological Chemistry & Medicine
Johns Hopkins University School of Medicine

Jennifer A. Doudna, PhD
Investigator
Howard Hughes Medical Institute
Professor, Molecular & Cell Biology
University of California – Berkeley

11:00 am
Mary Sue and Kenneth Coleman Life Sciences Lecture:
Aquaporin Water Channels — From Atomic Structures to Clinical Medicine
Introduction by
President Mary Sue Coleman

1:00 pm
Of Motions and Metals: Diverse Catalytic Strategies of Natural Ribozymes

Noon – 1:00 pm Break

Horwich studies a cellular machine called chaperonin that assists proteins in folding to their native, functional, form inside the cell. This machine uses the energy of ATP in alternating and repeating cycles of conformational change. Related work investigates a chaperone system that uses ATP to unfold proteins. His group also has been analyzing the structure of an amyloid, a protein aggregate that builds up in a variety of neurodegenerative diseases, including Alzheimer's.

Hopkins has identified mutations in roughly 25% of the genes essential for the development of a 5-day-old zebrafish larva. Almost every one of these genes has a homologue in humans and 20% of them encode proteins whose biochemical function is unknown. Her work has identified pathways of development and disease for kidney, cartilage, jaw, liver, and hearing. Collaborations with 25 external labs are helping to identify the genes involved in formation of many other embryonic vertebrate organs and cell types. Hopkins and her collaborators have also found a novel class of tumor suppressors in the collection.

Schekman is interested in protein trafficking between intracellular membranes and the cell surface, using yeast as a model organism. His genetic and biochemical approach to the study of eukaryotic membrane traffic has shown that protein transport in yeast appears to be mediated by the same organelles and proteins that operate in mammalian cells. Professor Schekman is also on the external advisory board of the U-M Life Sciences Institute.

Arthur L. Horwich, MD
Investigator
Howard Hughes Medical Institute
Professor of Genetics & Pediatrics
Yale University School of Medicine

1:50 pm
The Chaperonin Folding Machine

Nancy Hopkins, PhD
Amgen, Inc. Professor of Biology
Massachusetts Institute of Technology

3:00 pm
The Genes Essential for Early Zebrafish Development

Randy Schekman, PhD
Investigator
Howard Hughes Medical Institute
Professor of Molecular & Cell Biology
University of California – Berkeley

3:50 pm
Mechanism and Regulation of Vesicle Biogenesis in the Secretory Pathway

2:40 – 3:00 pm Break

The Life Sciences Institute at the University of Michigan is the core of a campus-wide effort to expand teaching and learning in the life sciences. A multidisciplinary team of LSI scientists collaborate and share ideas in an open lab setting. The 230,000 square foot institute building opened in September 2003.

LSI researchers are exploring the complexity of life at the level of molecules and cells using the tools of genetics, genomics and proteomics, structural, chemical and computational biology, molecular and cellular biology and chemical genomics.

The annual LSI symposium highlights recent scientific developments and provides an opportunity for Michigan's students and scientists to interact with and learn from prominent scientific leaders.

lsi.umich.edu

lsi.umich.edu