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Whitehead Faculty and Fellows

Ask a visiting scientist to describe Whitehead Institute and two themes emerge immediately: the exceptional quality of the scientific staff and the collaborative spirit—the ethos that encourages researchers at every level to share new ideas and benefit from the insights and experience of their colleagues.

The key to this combination of excellence and accessibility is, of course, the faculty. "From the beginning, we sought researchers who had terrific scientific instincts, but we were also looking for people who would feel comfortable in our open environment," says Founding Member Gerald Fink. "The exchange of energy and new ideas never stops, from the formal research retreat, to the faculty lunches, to the countless informal conversations in hallways and lounges."

Whitehead faculty, known as Members, are selected through a joint appointment process with the MIT Biology Department. Whitehead Institute is solely responsible for their salary and research support.

"Whitehead faculty are extraordinarily ambitious. They want to change the world—open new frontiers, invent new technologies, and establish new paradigms. Permeating everything we do is the belief that the collaborative, collegial spirit that has characterized Whitehead from the beginning, fuels this engine," says Member Susan Lindquist. "The whole is even greater than the sum of its spectacular parts. It is, quite simply, the most exciting environment for science I could imagine."

"As an independent institution, we offer the faculty greater flexibility than they might find elsewhere," says Vice President Martin Mullins. "A large portion of our research support comes from competitive federal grants, but we also have significant support from foundations, corporations and individuals, as well as the endowment begun by Whitehead Founder Jack [Edwin C.] Whitehead. These private funds provide the seed money to explore new territories—to do the initial experiments that will later reach fruition."

Whitehead Fellows are young researchers who skip the postdoctoral stage of their training and are given the space and resources necessary to run their own labs and pursue independent research agendas.

The synergy of creative people and a supportive environment has produced extraordinary results. Senior faculty have made vital contributions to human health and younger scientists have extended the frontiers of biology in ways no one could have predicted.

MEMBERS

David Bartel investigate microRNAs, small molecules that play an active role in regulating the genomes of both plants and mammals by interrupting a gene's ability to produce protein. His lab has found that microRNAs affect most human proteincoding genes, either by regulating them or by shaping their evolution.

Iain Cheeseman does research on the kinetochore, a key structure that helps to divvy up DNA molecules shortly before cells divide.

Gerald R. Fink analyzes baker's yeast to explore critical pathways in cell growth and metabolism. Applications include cancer research and the creation of anti-fungal drugs.

Rudolf Jaenisch, one of the founders of transgenic science, has made important contributions to cloning technology and to studies of embryonic stem cells. Jaenisch's lab studies how gene expression is regulated by epigenetic mechanisms, which affect how cell structures are produced without altering genes in the process.

Susan L. Lindquist conducts groundbreaking research on how such diverse processes as stress tolerance, neurodegenerative disease, and heredity can be governed by changes in protein conformation. Her research on prion proteins has provided the definitive evidence for a new form of genetics, based upon the inheritance of proteins with new, self-perpetuating shapes rather than new DNA sequences.

Harvey F. Lodish, a Founding Member and leader in the field of membrane biology, has isolated and cloned numerous proteins that reside on the surface of cells and play a role in cell growth, glucose transport and fatty acid transport. His results have important implications for the treatment of cancer, diabetes, heart disease and obesity. Additionally, the Lodish lab studies the isolation and growth of hematopoietic stem cells, which generate all blood and immune cells.

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Terry L. Orr-Weaver deciphers critical events in cell growth and cell division. Two proteins she discovered help ensure proper partitioning of chromosomes (improper partitioning of chromosomes is a major cause of human birth defects). Studies of DNA replication in the lab also are revealing new players in the molecular pathways leading to cancer.

Whitehead Director *David C. Page* studies the Y chromosome—the chromosome that distinguishes males from females. In 1992, his laboratory mapped and cloned the entire Y chromosome. Today, he uses the map and other tools to trace the genetic causes of male infertility, the history of the Y chromosome and human populations, and the origins of common genetic diseases.

Hidde Ploegh investigates the molecular mechanisms by which the immune system responds to antigens such as viruses or bacteria. His work now focuses on flu and herpes viruses and the processes by which they evade the immune system.

Peter W. Reddien works to understand regeneration of tissues and organs by studying the planarian *Schmidtea mediterranea*, a flatworm that has long captured the imagination of biologists. Reddien led the first large-scale study of gene function during regeneration in planarians.

David Sabatini studies the basic mechanisms that regulate growth, the process whereby cells accumulate mass to increase in size. His work is focused in part on a cellular system called the TOR pathway, a critical regulator of growth in many species. To decipher the molecular pathways that regulate cell growth, Sabatini has developed new technologies to study the functions of large sets of genes in mammalian cells.

Robert A. Weinberg, a pioneer in cancer research, discovered the first human oncogene and the first tumor suppressor gene. Today, much of his research focuses on new models of breast cancer development.

Richard A. Young is a leader in gene transcription, the process by which cells read and interpret the genetic instructions embedded in DNA. The Young lab creates and uses state-of-the-art genomic tools to map the genome-wide circuitry of living cells. Achievements include identifying the locations of key gene regulators in human embryonic stem cells.

FELLOWS

Thijn Brummelkamp exploits a process called RNA interference, which can selectively turn off specific genes, to study genes implicated in cancer.

Andreas Hochwagen employs yeast to study how cells repair genetic damage.

Paul Wiggins works on creating models of biophysical phenomena, exploring the geometry of DNA and membranes.

Defne Yarar, a Special Fellow of the Whitehead Institute, studies the role of actin in endocytosis, the primary mechanism by which cells ingest nutrients and other macromolecules.

AFFILIATE MEMBER

David Gifford, a professor of computer science and engineering at MIT, develops novel computational methods to analyze data from high throughput molecular biology experiments.

Award-Winning Leaders in Biomedical Science

Recipient of the 1997 National Medal of Science
7 Members of the National Academy of Sciences (NAS)
5 Members of the Institute of Medicine (IOM)
6 Fellows of the American Academy of Arts and Sciences
Winner of the MacArthur Foundation Prize Fellowship
Winner of the City of Medicine Award
1997 and 1998 winners of the Robert J. and Claire Pasarow Foundation Award for Cancer Research
Winner of the NAS Award in Molecular Biology
Chiron Corporation Biotechnology Award
Gairdner Foundation International Award
Leukemia Society Fellow
Phi Beta Kappa Associates Award
Searle Scholar Award