



## Whitehead Faculty and Fellows

Ask a visiting scientist to describe Whitehead Institute and three themes emerge immediately: the exceptional quality of the scientific staff, the collaborative spirit, and 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 Institute faculty, known as Members, are selected through a joint appointment process with the Massachusetts Institute of Technology (MIT) Department of Biology. Whitehead Institute is solely responsible for their salary and research. Whitehead Fellows are 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.

“Our 21 Institute Members and Fellows, and the 300 world-class scientists working with them, conduct not just cutting-edge science, but ‘courageous’ science, carving new paths into realms few would consider entering,” says Director David C. Page.

“As an independent institution, we offer the Faculty greater flexibility than they might find elsewhere,” says Vice President of Administration 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 Edwin C. “Jack” Whitehead. These private funds provide the seed money to explore new territories — to do the initial experiments that will later reach fruition.”

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

## Members

**David Bartel** studies microRNAs and other small RNAs that specify the destruction and/or translational repression of mRNAs. He also studies mRNAs, focusing on their untranslated regions and poly(A) tails, and how these regions recruit and mediate regulatory processes. His lab found that microRNAs affect most human protein-coding genes, either by regulating them or by shaping their evolution.

**Iain Cheeseman** investigates the process of chromosome segregation and cell division. In particular, he uses proteomics, biochemistry, cell biology, and functional approaches to examine the composition, structure, organization and function of the kinetochore — the group of proteins that assemble at the centromere and are required for chromosome segregation and cell division.

**Gerald R. Fink**, a Founding Member of the Institute, developed baker's yeast as a model for studying fundamental biological mechanisms. Fink has also studied how the pathogenic yeast *Candida albicans* avoids detection by the immune system.

**Mary Gehring** studies epigenetic reprogramming in the model plant *Arabidopsis*. She is particularly interested in determining how epigenetic information is transmitted between generations.

**Rudolf Jaenisch**, a Founding Member and 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.

**Ankur Jain** studies RNA aggregation and its role in health and disease.

**Pulin Li** investigates how genes in individual cells can interact together to enable tissue formation.

## Members (continued)

**Harvey F. Lodish**, a Founding Member of the Institute 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.

**Sebastian Lourido** studies the molecular events that enable apicomplexan parasites to remain widespread and deadly infectious agents. He studies the important human pathogens, *Toxoplasma gondii*, to model features conserved throughout its phylum and seek to expand our understanding of eukaryotic diversity and identify specific features that can be targeted to treat apicomplexan parasite infections, such as malaria.

Whitehead Institute Director **David C. Page** studies germ cell origins and development, the genomics of sex chromosomes, and the differential impact of XX and XY chromosomes on cellular function throughout the body. One of his core goals is to elucidate the sex-biased mechanisms underpinning health and disease.

**Peter W. Reddien** is researching the regeneration of tissues and organs by studying the planarian *Schmidtea mediterranea*, a flatworm whose ability to regenerate almost any tissue has long fascinated 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 on a cellular system called the mTOR pathway that couples growth to nutrient availability in many species. To decipher the molecular pathways that regulate cell growth, Sabatini has developed new tools and technologies to study the function of large sets of genes in mammalian cells.

**Hazel Sive** studies development of the vertebrate embryo. She has made unique contributions to the fundamental questions of how the face forms and how the brain develops its normal structure. Her research emphasizes neurodevelopmental and craniofacial disorders and uses frog and zebrafish models, as well as human cells.

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

Using model plants that represent several major lineages, **Jing-Ke Weng** studies how complex metabolic traits evolve in a Darwinian fashion. Weng is interested in how such step-wise processes produced in plants elaborate metabolic pathways and tightly paired hormones and receptors.

**Richard Young** is a leader in the study of gene transcription, the process that cells use to read and interpret the genetic instructions encoded 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

**Olivia Corradin** investigates the role of noncoding DNA variants in defining human disease pathogenesis and susceptibility.

**Kristin Knouse** uses mouse cells to investigate reversible cell cycle states and reveal novel approaches for regenerative medicine.

**Silvia Rouskin** seeks to understand the principles of RNA folding in vivo, how RNA structure regulates gene expression, and what goes awry in the onset of diseases.

## 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.

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## Award-Winning Leaders in Biomedical Science

- 2 Recipients of the National Medal of Science
- 8 Members of the National Academy of Sciences
- 4 Members of the National Academy of Medicine
- 5 Fellows of the American Academy of Arts and Sciences
- Winner of the MacArthur Foundation Fellowship
- Winner of the Wolf Prize in Medicine