

The Whitehead Institute for Biomedical Research

Gerald R. Fink, Ph.D., Director

The Whitehead Institute for Biomedical Research is one of the youngest independent research and teaching institutions in the United States, with innovative programs in cancer and AIDS research, developmental biology, structural biology, and genetics. Located in Cambridge, Massachusetts, the Institute was the brainchild of the late philanthropist, Edwin C. "Jack" Whitehead, who sought to create a fertile environment for basic research. He envisioned a research institution that would exist outside the boundaries of a traditional academic institution and yet, through a teaching affiliation, offer all of the intellectual, collegial, and scientific benefits of a leading research university.

Mr. Whitehead planned the institution with Nobel laureate Dr. David Baltimore, the Institute's first director, and a handful of scientists who were attracted to this idea. The Whitehead Institute became a reality in 1981, and a year later it established a formal affiliation with Massachusetts Institute of Technology (MIT). The Institute's marriage with MIT and the quality of its research have earned it a place among the leading biomedical research institutions in the world. Today, it has a faculty of 13 members who have joint appointments in the MIT Biology Department and participate fully in the department's activities but carry out their research programs at the Whitehead Institute, which is solely responsible for their support. The Institute also houses the Whitehead/MIT Center for Genome Research, the largest component of the U.S. government's Human Genome Project. The Whitehead Institute is guided by a board of directors, chaired by former Senator Paul E. Tsongas, and a board of advisory scientists.

In addition to its unusual organizational structure, the Whitehead Institute has other novelties that account for its prominence. One of the most notable is the Whitehead Fellows Program. This program allows talented young scien-

tists to pursue independent research programs as an alternative to traditional postdoctoral positions. Ph.D. and M.D. graduates with proven independence in research are provided the space, time, and resources necessary to function as principal investigators. The Fellows, unencumbered by financial constraints or teaching responsibilities, are able to concentrate on their research and establish their own scientific programs.

Currently the Institute has five fellows who represent an added tier of new P.I.'s at the Whitehead Institute. The remainder of the Whitehead scientific staff consists of approximately 96 postdoctoral fellows, 35 visiting scientists from universities and research institutions around the world, 56 MIT and 9 other graduate students, 35 MIT and 17 other undergraduates, 63 research technicians, and 26 other research staff. The Institute has a total staff of approximately 500.

Another unique feature of the Whitehead Institute stems from its founding principle: the importance of seeding innovative ideas not supported by conventional funding sources. By providing seed money, the Institute guarantees that creative new ideas will not be lost for lack of resources. These ideas often grow into successful research projects and are then able to compete for federal grants and grants from foundations, corporations, and individuals. Many of the Institute's major research programs have blossomed from this approach.

One notable example is the Genome Center. This bustling research center with 85 staff members and two novel robots began as a proposal from a young mathematician from Harvard Business School who wanted to apply mathematics and computer technology to genetics. The Whitehead Institute provided him the resources to realize his ideas through the Whitehead Fellows Program. Today, this investigator, Eric



FIG. 1. Whitehead Institute for Biomedical Research and a view of its new wing

The photograph is courtesy of Abbott-Boyle, Inc.

Lander, directs the Genome Center, is a member of the Whitehead Institute, and a professor of biology at MIT. Under his direction, the Genome Center has become the largest federally funded center for genome mapping and sequencing and recently completed a comprehensive physical map spanning 95% of the human genome. Genome Center scientists are now forging ahead to the final and most exciting phase of the Genome Project, large-scale sequencing.

This seeding of new ideas has fueled research in all of the Whitehead laboratories, as has the collaboration with MIT and other institutions and the close internal interactions among faculty members (engendered by the small size of the Institute). Today, our research program reflects a rich tapestry of efforts in diverse disciplines: molecular genetics using a variety of model systems including yeast, plants, fruitflies, frogs, zebrafish, and mice; cancer genetics; transgenics; structural biology; cell biology; developmental biology; gene transcription; infectious diseases and vaccine technology; biomedical engineering; and automation and robotics. We have also hired two new faculty members who bring added expertise in olfaction and RNA research. These diverse research interests converge on a single unifying theme: to understand the molecular basis of disease by comparing normal with mutant forms.

Faculty and Fellows at the Whitehead Institute for Biomedical Research

Faculty:

Dr. Gerald R. Fink, Director
 Dr. David P. Bartel
 Dr. Andrew Chess
 Dr. Rudolf Jaenisch
 Dr. Peter S. Kim

Dr. Eric S. Lander
 Dr. Harvey F. Lodish
 Dr. Paul T. Matsudaira
 Dr. Terry L. Orr-Weaver
 Dr. David C. Page
 Dr. Hazel L. Sive
 Dr. Robert A. Weinberg
 Dr. Richard A. Young

Whitehead Fellows:

Dr. Angelika Amon
 Dr. James Berger
 Dr. George Q. Daley
 Dr. Michael P. Lisanti
 Dr. Julie Theriot

The Whitehead Institute contributes to technology transfer by licensing development rights on patents awarded for Whitehead discoveries. The Institute has more than 50 licensing agreements on products ranging from AIDS vaccine candidates to new robotics technologies with biotechnology and pharmaceutical companies throughout the United States.

Another unique feature of the Whitehead Institute is the facility itself. When the building was completed in July 1984, it represented the state-of-the-art in science infrastructure. This 160,000-gross sq ft, seven-story building was specially designed to encourage collaboration and provide a supportive research environment. The first two floors include administrative space, cafeteria, auditorium, workshops, library, computing center, and animal facility. The third through sixth floors house 59 laboratories and faculty offices, with shared resources and common spaces designed to encourage collaborations. The seventh floor contains a classroom, a greenhouse to study plant genetics, a faculty lounge, and mechanical spaces. The Institute recently added a new research wing (Fig. 1), a 76,000-sq ft addition that doubles the size of the mouse facility, houses an X-ray crystallography suite, and provides space for new faculty and Fellows.

The Whitehead Institute also has a strong commitment to science education. The annual Whitehead Institute Symposium, a 3-day event on a topic selected for its timeliness and broad scientific appeal, attracts 1400 scientists and students from around the world. The Whitehead Institute also has developed a series of programs to help its students and others explore ethical dilemmas in biomedical research. This includes

the Whitehead Task Force on Genetic Testing, Privacy, and Public Policy. In addition, the Whitehead Public Lecture Series, "Biology and the Future," provided an opportunity for some 300 scientists and nonscientists to explore together the social, ethical, and environmental consequences of the revolution in molecular biology.

The Institute has also forged strong ties with local schools. The 5-year-old Partnership for Science Education provides regular opportunities for high school teachers and students in the Boston/Cambridge area to share learning experiences with young working scientists. Participating teachers have said that it has revitalized their teaching. During winter vacation, the Whitehead offers a high school student program designed to

stretch the imagination with topics such as "The Truth Behind Jurassic Park" and "Biotechnology: From Bench to Bedside."

The evolution of science at the Whitehead Institute and the rapidly changing technologies have transformed the research environment, creating needs for new and expanded facilities and equipment. To meet these needs, in 1993 the Whitehead Board of Directors adopted a strategic plan to reflect the achievements and goals of the Whitehead faculty. The plan consists of major initiatives in three key research areas: transgenic science, structural biology, and infectious disease. The new wing and our recently completed capital campaign will ensure that our researchers continue to have the resources they need to move forward in the decades ahead.