2024 Annual Report

Whitehead Institute

Contents

Renewal and resilience

This past July marked four years since I returned to Whitehead Institute to serve as director. Recently, the Institute's board of directors appointed me to a second five-year term beginning in 2025, which has prompted me to reflect on the past four years and to ponder what the future may hold.

When I began, in the summer of 2020, the world was in the throes of the COVID-19 pandemic. The disease's physical toll, coupled with economic dislocation and political turmoil marked the period. Our institute pulled together as a community, and together we forged a path to safely keep our science moving and spirit intact.

Today, looking forward, I could not be more excited. Our now 42-year path of discovery — broadly defined by Jack Whitehead and David Baltimore as uncovering fundamental principles in developmental biology — has brought us organically to our new scientific vision, *Renewal and Resilience*. Guided by this vision, we strive to understand how organisms perform the fundamental tasks of life. We're asking questions such as: How do organisms replenish their cells and tissues? How do they reproduce? How do they respond to challenges like disease and climate change?

Renewal and Resilience encompasses the breadth of research conducted by our principal investigators. Their work ranges from exploring how our germ cells renew and replenish our genetic material to tracing the effects of hibernation and torpor on aging; from learning how certain species regenerate organs and functions to understanding the genomics underlying sex differences in health and disease; and from spurring immune cells to fight cancer to developing more productive and resilient food crop plants.

Whitehead Institute scientists are extraordinarily well-positioned to address these important challenges because we are guided by an ethos of science without limits: a commitment to multidisciplinary, foundational biology fueled by curiosity, creativity, and the courage to take on intellectual risk in pursuit of discovery.

Not bound to a particular research area or disease focus, our researchers are nimble, free to pursue the big questions. They let their interests evolve and draw from any area of biology that can advance their investigations. Indeed, embracing science without limits in an institutional sense, we leverage our affiliation with the world-class expertise of our colleagues at Massachusetts Institute of Technology, and we pursue collaborations with researchers around the world.

Whitehead's strong basic science approach drives a mechanistic understanding of biological processes that is crucial to understanding health and disease at its most elemental levels — and that is essential for reconstituting the complexity with which organisms function. We believe that understanding this complexity is critical for identifying the causes of disease and developing evidence-based therapies.

I am proud of all that Whitehead Institute has accomplished thus far. And I'm enthusiastic about the limitless science our investigators will pursue in the years to come.

Sincerely,

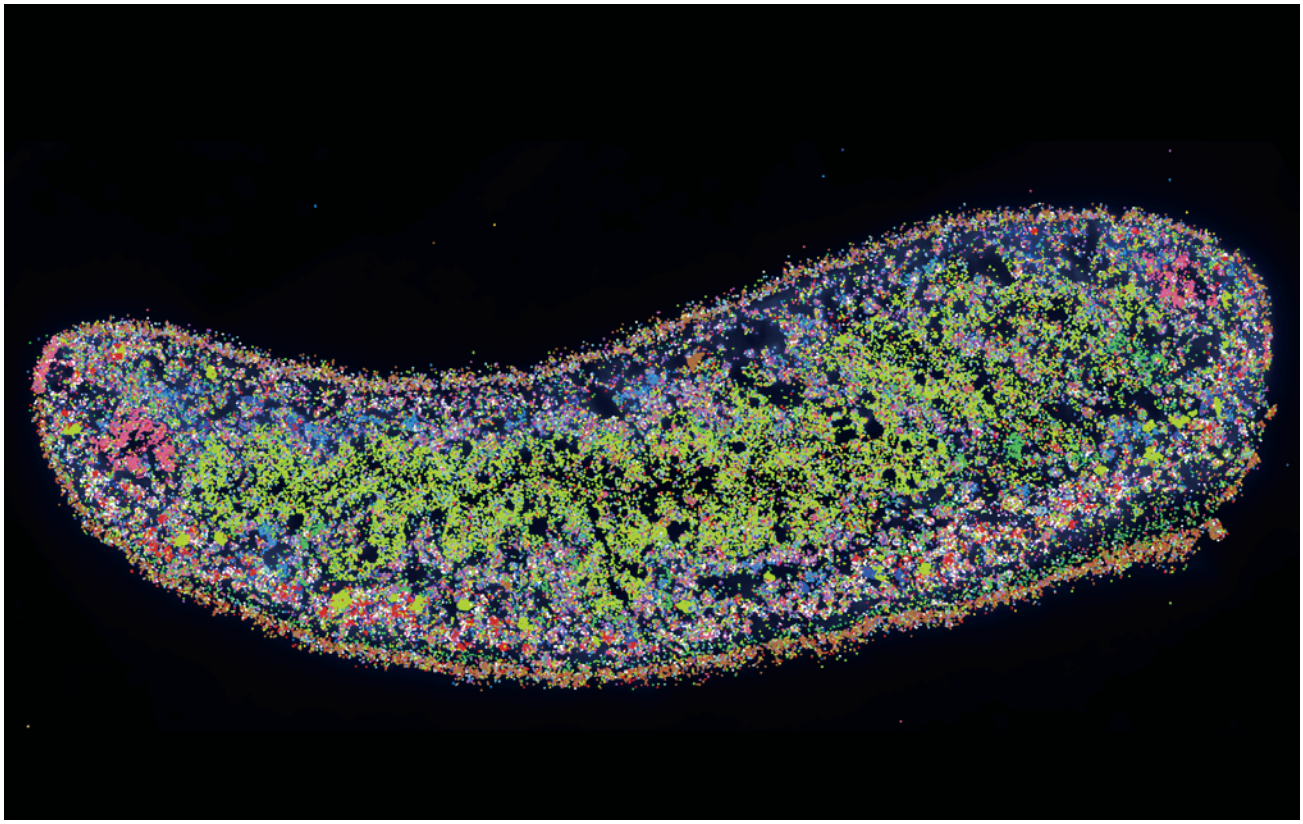
Ruth Lehmann
President and Director

Our science without limits approach emerges from the diversity of the research at Whitehead Institute that fosters multi-disciplinary thought.

An embryonic mouse lung
Credit Miram Meziane/Whitehead Institute

Our Science

Whitehead Institute scientists are making paradigm-shifting insights into the fundamental principles of life, as they strive to address challenges of global scope from chronic and infectious diseases to climate change. Listen to our “sound garden” updates on their accomplishments, and peruse a variety of news stories and multimedia features spanning Whitehead Institute science in 2024.



A regenerating fragment of a planarian. Each spot represents the detection of a single mRNA molecule, and each color represents the expression of a different gene. Credit: Chan Park/Whitehead Institute

A scientific vision that unites our research

Over more than 40 years of groundbreaking work, Whitehead Institute scientists have solved some of the most fundamental questions in developmental biology such as: How do we coax stem cells to become particular cell types? Which genes help make cells stop dividing and can cause cancer when they go awry?

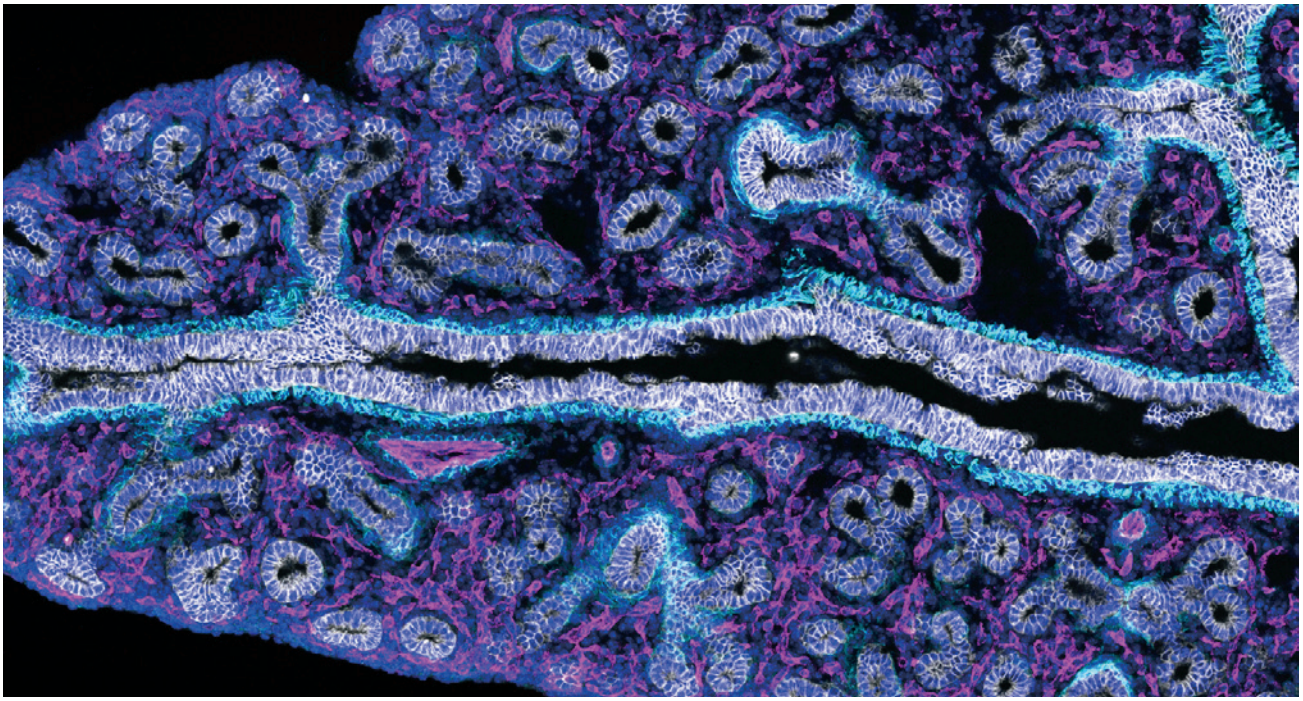
Building on these discoveries and many others, Whitehead Institute scientists are now addressing what is next—understanding the processes and players that drive renewal and resilience in living things.

A snapshot of this work includes:

- Siniša Hrvatin, studying how animals may increase resilience by entering states of torpor and hibernation
- Mary Gehring, investigating how to make crops such as the pigeon pea plant more resilient to climate change
- Yukiko Yamashita, researching how the germline remains effectively immortal, transmitting genetic information to the next generation
- Peter Reddien, studying how certain stem cells can create a positional map, so they know what type of cell to create during regeneration
- Olivia Corradin, investigating the genetic factors that may help an individual be resilient to opioid addiction

We are focused on these questions, and others like them, not only to better understand our own biology and world but to provide critical insights into complex, chronic diseases and the pressing global challenges we face. Both within our building and through our affiliation with Massachusetts Institute of Technology (MIT) and beyond, our scientists work closely with researchers across disciplines and can integrate thinking and approaches from them to tackle difficult questions impenetrable by a single discipline. These integrated approaches are needed to understand previously intractable problems in the science of renewal and resilience that will inform our understanding of health and disease. Explore the Our Science section of the annual report to learn more about the compelling questions our scientists are investigating.

Picturing science



An embryonic mouse lung Credit: Miram Meziane/Whitehead Institute

Sounds of science

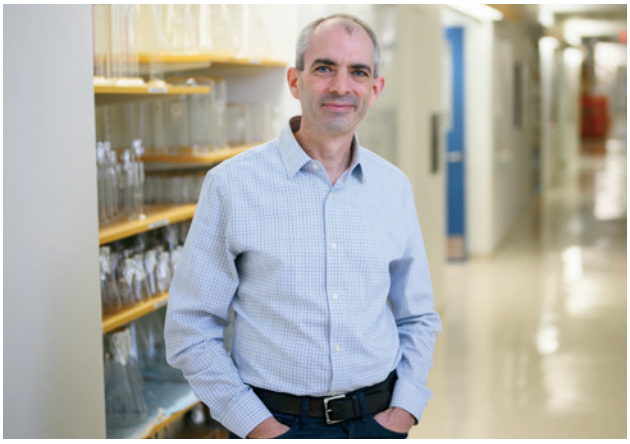
Take a walk through the following "sound garden," in which our investigators describe some of their notable accomplishments in 2024. In order to learn more, visit the collection of audio clips in the digital version of this report in which the researchers describe the highlights of their year.

Lindsey Backman, Valhalla Fellow

Our lab has started focusing on bacterial organelles. Bacteria were thought to be very simple — DNA clumped together in the nucleolus, without much cellular organization. But now we're starting to look at them under new conditions. We're studying protein-based shells that encapsulate oxygen-sensitive metabolic pathways. In some ways, this is a renewal in our understanding of these very canonically-studied species.

David Bartel, Member

One of the advances to come from our lab this year has been the increased understanding of RNA interference (RNAi), a gene silencing pathway in which messenger RNA is sliced into two pieces and thereby destroyed. These insights explain why natural slicing sites are configured the way they are, and they provide insights into using RNAi for research tools, or perhaps new therapies.



Iain Cheeseman, Member

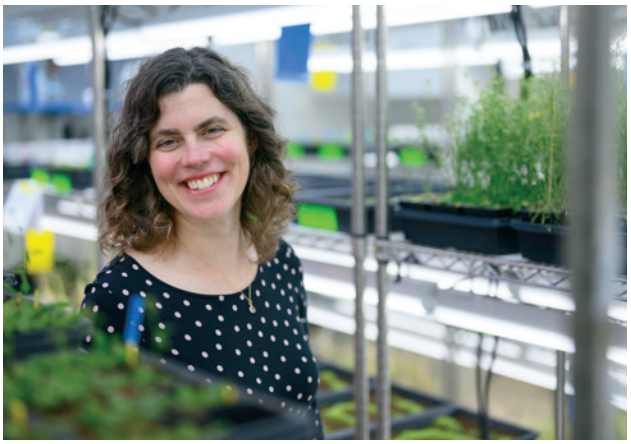
We've been interested in how cells change the core processes of chromosome segregation to make haploid gametes during meiosis, instead of identical diploid cells during mitosis. Recently, Jimmy Ly in my lab came across a germline-specific version of a kinetochore protein, a protein that I've worked on for more than 20 years, and was able to show that the version made in the germline is quite different from the one in mitotic cells.

Olivia Corradin, Member

Opioid addiction is a difficult and complex human behavioral-related trait. We looked at postmortem brain tissue of those who died of an opioid overdose, and looked for changes in the pattern of how genes are controlled in these types of samples versus individuals who died from accidental causes. That has been a really effective strategy — we found a number of new, exciting gene targets.

Gerald Fink, Member

I'm writing a book entitled *Creation of the Whitehead Institute: A Radical experiment*. This year I've been working on the second chapter of that book, on when I became director of Whitehead Institute in 1990. During this time, we wanted to alert the public to the consequences of having access to the human genome. We ran two large symposia, where more than 1,500 people attended.



Mary Gehring, Member

We're starting to work on underutilized crops. One limitation of some species is that there's limited genetic diversity. We're developing methods to increase genetic diversity through simple, non-transgenic approaches, namely inducing large structural variation in genomes. Increasing genetic diversity will allow us to look for important traits associated with crop resiliency.

Allison Hamilos, Valhalla Fellow

Dopamine is a neurotransmitter involved in learning, but it's involved in other things, like movement initiation. Last year we've explored the link between these two roles. We trained mice to play a game in which they make choices with limited information. This experiment allowed us to examine what dopamine neurons are doing as animals adjust their decision-making process in response to feedback from the environment.

Siniša Hrvatin, Member

It's long been known that hibernators live longer than closely related non-hibernators. But the mechanisms behind this phenomenon weren't well understood. After triggering a hibernation-like state in mice, we found that certain tissues, like blood, slow features of aging. At a higher level, we're beginning to address the question of how animals entering states of torpor and hibernation can extend features of their aging.

Rudolf Jaenisch, Member

The gene responsible for Rett syndrome, MECP2, was discovered in the 90's and was thought to be a repressor of gene expression. That was the prevailing model. Now, results from my lab show that MECP2 represses only a few genes, but activates thousands of genes. It's just the opposite of what was thought. This finding calls for new therapeutic approaches.

Ankur Jain, Member

Polyamines are very small metabolites found in all living cells. They're associated with various human diseases. For instance, dividing cells have high polyamines, and there's a lot of interest in down-regulating polyamines for anti-cancer therapeutics. But at a molecular level, what these metabolites are doing is not clear. We have developed a new biosensor allowing us to read out polyamine levels in living cells in near real time.

Ruth Lehmann
Member, President and Director

We know a lot about the master regulators of different cells in our body. But for germ cells, we know less about their transcriptional program. We sorted germ cells from fly embryos into different developmental stages and looked at their transcripts. We expected to see no transcription during early stages of development, but instead found transcripts. We're interested in understanding whether these genes are playing an important role, or if they're a memory of the soma.

Pulin Li, Member

We're excited to apply artificial intelligence to understanding cell-cell communication that occurs across different types of tissues, organisms, developmental stages and disease. In a petri dish, we can stimulate cells with known signaling pathways and learn about the response features of diverse cell types. Using neural networks, we can apply gene expression signatures at different developmental stages to infer how cells get from A to B, and to learn what signaling pathways are activated or inactivated along this process.

Harvey Lodish, Member

I'm continuing to teach both an undergraduate course in biotechnology, and my graduate class, the Science and Business of Biotechnology. The graduate course has been successful in bringing together excellent students from biology, chemistry, engineering and business. I'm also teaching a similar course to 60 students in 12 African countries. I'm beginning to see the rewards in that there is a slowly emerging biotech group in Africa.

Sebastian Lourido, Member

Understanding how parasites functions, and in particular how they function in the context of infection, is one of our greatest passions. To do that, you really have to put them in the context in which they would be found in nature, which is inside of living organisms. We're excited to overcome some technical challenges in mouse models to allow ourselves to measure how parasites proliferate inside a living vertebrate organism.

Tobiloba Oni, Valhalla Fellow

We're interested in studying how cancer cells interact with their environment and how these interactions decide whether a tumor grows or is destroyed by the immune system. We focused on understanding how pancreas cancer cells interact with their environment to prevent immune attack, and how they impede the efficacy of immunotherapies. Our research shows that a complex set of sugars called glycans, which coat the surface of cancer cells, help cancer cells evade the immune system.

David Page, Member

The so-called inactive X chromosome in human cells is very active and, in some sense, is the female counterpart to the male Y chromosome. Discoveries being made in our lab and in others point to the inactive X as a culprit for females' increased risk for autoimmune disorders. We're also very interested in disorders that occur more commonly in males, like autism. Why is it that females are less likely to be diagnosed with autism? The inactive X may be a source of resilience.

Aditya Raguram, Fellow

Our goal is to develop new therapeutic approaches for delivering macromolecules into cells in the body, so those molecules can actually be used to treat diseases. We're most interested in cell-derived bioparticles, which broadly encompass viruses and extracellular vesicles. We're interested in high-throughput approaches to investigate millions of different variants of bioparticles using large scale functional and genomics approaches.

Peter Reddien, Member

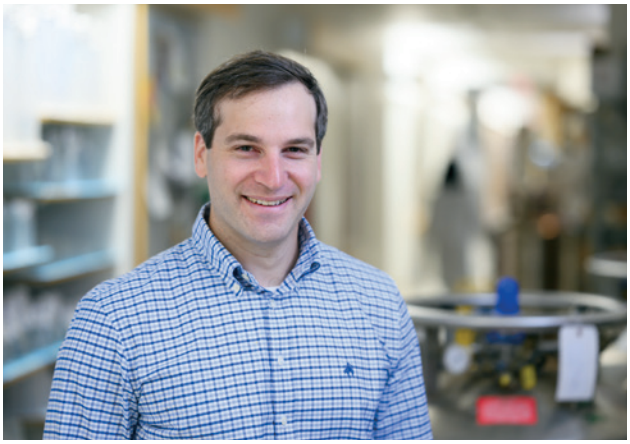
We use planarians to understand principles by which adult progenitors and stem cells can make choices in the context of regeneration. Stem cells choose between over 100 possible paths. How do they do it, and how do they tailor those choices to the identity of missing tissues? We've found that the spatial pattern of fate choice involves a salt and pepper distribution, where cells that are immediate neighbors might make drastically different choices.

Na Sun, Member

I'm joining Whitehead as an AI Fellow to apply deep learning technologies to solving biological questions. During my PhD training at MIT, my major focus was studying mechanisms of Alzheimer's disease. The complexity of Alzheimer's disease is partially due to the heterogeneity of its patients. It's very useful to integrate genetic and molecular data using deep learning models in order to solve fundamental questions.

Robert Weinberg, Member

My lab has been studying what happens to cancer cells after they spread from a primary tumor to distant tissues. The vast majority of disseminated cells become dormant. The question is, what happens when, after some delay, some of these cells suddenly wake up and begin proliferating vigorously to create a life-threatening metastatic tumor? We've found that in at least one experimental model, inflamed tissue induces cancer cells to shift their state to once again proliferate.

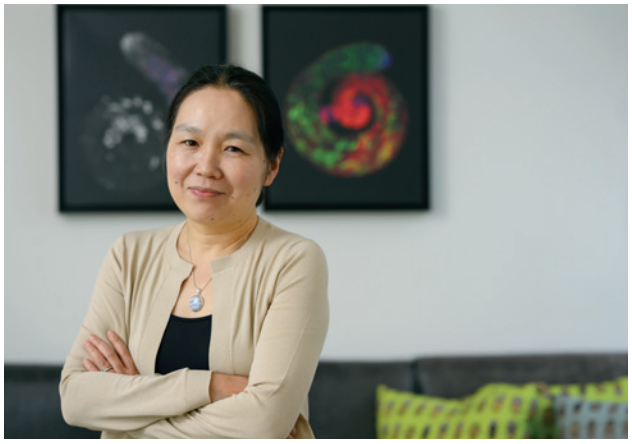


Kipp Weiskopf, Valhalla Fellow

One of the biggest studies we've completed over the past year combines targeted therapies or specific molecular inhibitors of certain genetic mutations in cancer with therapies that act on macrophages to boost the ability of macrophages to recognize and eliminate cancer cells. We found that these two therapies synergize, stressing cancer cells in a way that makes them more vulnerable to being engulfed by macrophages.

Jonathan Weissman, Member

Prion diseases are caused by prion protein (PrP) misfolding. All we need to do to stop the disease is to prevent this protein from being expressed in the brain. We developed a new tool called CHARM that's effective at silencing PrP. This is part of a broader effort to develop genetic medicines that in a very targeted, precise way, go after a disease.



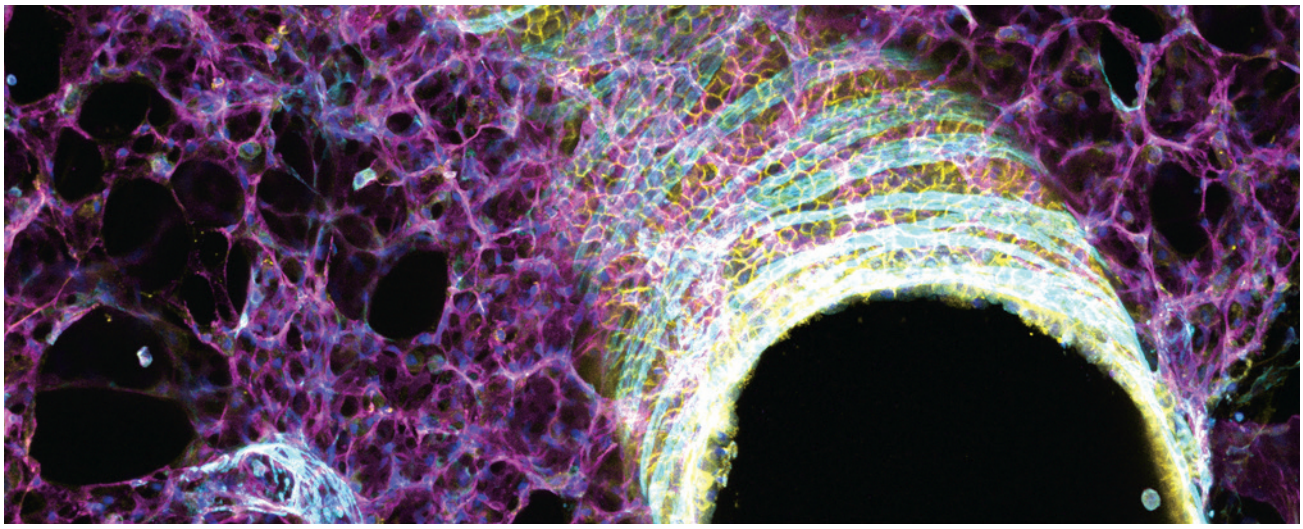
Yukiko Yamashita, Member

Stem cells must maintain their own population, while continuing to make differentiated cells. When stem cells are sporadically lost, a partially differentiated daughter cell can revert back to being a stem cell. But how does the cell maintain this split identity? We're tackling this question. We're figuring out that multiple signaling pathways can actually encode for many different cell states.

Richard Young, Member

Typically, a protein needs to get together with lots of other proteins to perform a number of cellular functions. The question is whether these proteins find each other just by bumping into one another, or do proteins gather in a particular place to get their job done? We discovered an embedded code within the amino acid sequence of a protein, similar to a zip code, that sends a protein to a particular spot in the cell.

Picturing science



Adult mouse lung, with epithelial cells in yellow, smooth muscle in cyan, and endothelial cells in magenta.
Credit: Diep Hoang Ngoc Nguyen/Whitehead Institute

Stories of science in every shape and size

Whitehead Institute researchers investigate a diverse array of questions. In the first collection of multimedia stories below, learn about research that spans the scales of size, time, and process to build a deeper understanding of biology. In the second collection, read, watch, and listen to stories that highlight different aspects of Whitehead Institute research. Learn about how researchers make use of tools from the natural world in their work, and how foundational biological research can lay the groundwork for medical advances.

Understanding biology across scales

From investigating genome-wide associations in health and disease to probing individual molecular mechanisms, Whitehead Institute researchers span the continuum of scales across size, time, and process to reshape our understanding of biology.

Illustrations: Devin Powell

Scale of size:

No gear is an island — just as a machine relies on the precise operation of its mechanical components, an organism depends on the coordinated function of its building blocks. Molecules, the basic building blocks of life, come together to form organelles, which are specialized structures within cells. Groups of cells then unite to form tissues that collaborate on a specific task. These tissues are interconnected by networks of genes that synchronize the life processes of an organism.

Through the study of life at every scale, researchers at Whitehead Institute are able to piece together how each "component" of a living organism acts as part of a vital machine—and how these parts may go awry in the case of disease.

Scale of time:

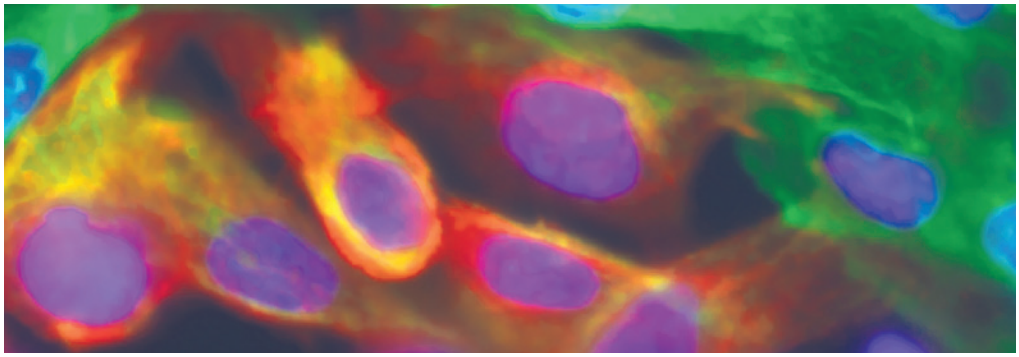
Take a deep dive into the journey of life. It starts with a single fertilized egg cell dividing to form two new cells. These cells then continuously divide to produce thousands of cells, driving processes like growth, aging, and disease throughout an organism's lifetime. Over millions of years, as genetic instructions within these cells accumulate epigenetic changes or mutations, species evolve. But through all this, life persists as organisms survive and reproduce.

By studying life through its various stages — from a single cell division to the lifespan of an organism and evolutionary changes in a species — researchers at the Whitehead Institute gain a comprehensive understanding of how disruptions at any stage impact the health and survival of individual organisms and entire species.

Scale of process:

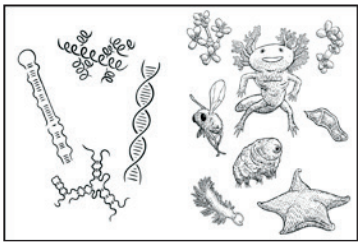
Genes, like instruments in an orchestra, produce proteins that keep the symphony of life running smoothly. Researchers at the Whitehead Institute are exploring the scale of this symphony, from the function of individual genes to how they work together in a complex system, by leveraging advanced genomic techniques and computer modeling. Their work offers a reimagined view of the intricate workings of cells and what life looks like from the micro to the macro level.

Dive into this multimedia collection to learn more.



Video: A tour of our cells through time

From chemical reactions occurring in a splinter of a second to evolution shaping species over billions of years, the processes that make up our biology occur in time frames both short and long. In this video, Whitehead Institute scientists describe how their thinking about different time scales informs scientific discovery.



From molecule to organism: Science at every size

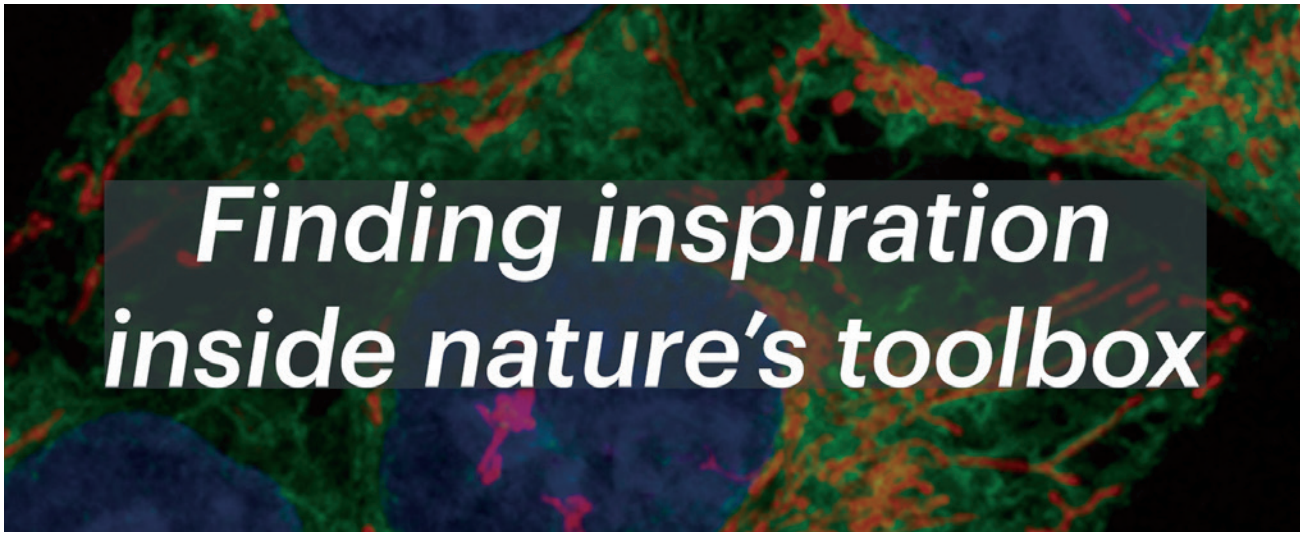
In order for researchers to understand the biology of living organisms, they must consider what is happening across the size scale. Interactions between molecules drive interactions between cells that affect traits and behaviors. Experiences and decisions made by the organism can lead to changes at the cellular and molecular level. To understand the full picture, Whitehead Institute researchers study everything from molecules to cells to whole organisms.

A reimagined glimpse of cellular symphony

Researchers at Whitehead Institute are employing cutting-edge techniques that combine layers of data — from the function of individual genes to the interactions of all molecules within a living organism — to investigate biological phenomena with unprecedented depth and breadth. Their efforts are yielding a richer understanding of the mechanisms involved in health and disease.

Multimedia special features

Explore Whitehead Institute research in video, audio, and other multimedia form. Learn what the microbiome is and how research could improve pro- and antibiotics, how researchers use an endangered salamander to understand the biology of limb regeneration, how existing biological processes can be used in research tools, and how Whitehead Institute researchers drive breakthroughs in disease treatment.

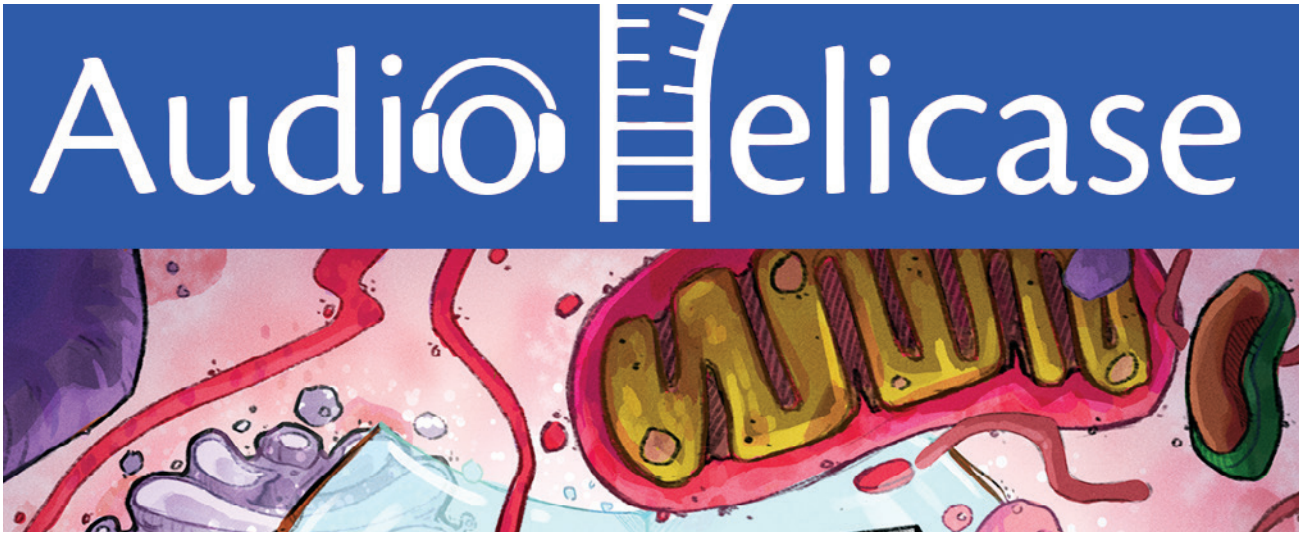


Video: Finding inspiration inside nature's toolbox

From how genes are regulated to how cells transport important cargo — there are many biological processes that work similarly across organisms and are versatile in their function. Learn how Whitehead Institute researchers are finding ways to tailor existing biological processes, expanding the potential to address complex problems.

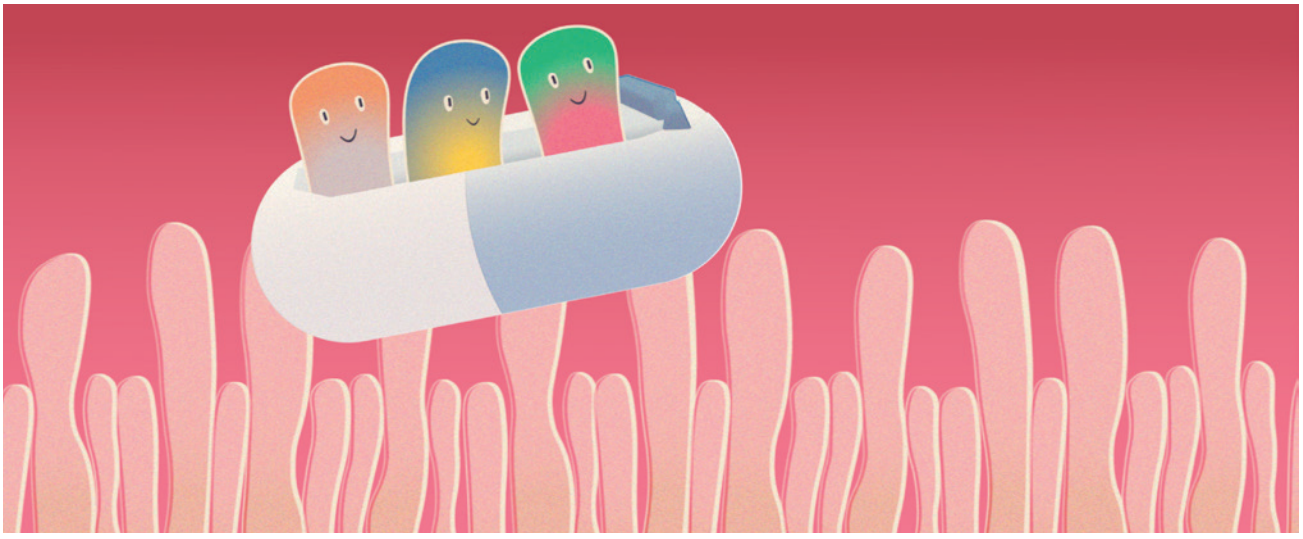
Unusual Labmates: Nature's Peter Pans

Axolotls *(Ambystoma mexicanum)* are a critically endangered species of salamander. They are also highly regenerative. The latest story in our *Unusual Labmates* series explores these fascinating creatures, what Whitehead Institute researchers are hoping to discover by studying them, and why they are worth preserving in the wild.



AudioHelicase special: How foundational research takes medicines from lab to shelf

In this episode of *AudioHelicase*, we sit down with three Whitehead Institute researchers driving breakthroughs in disease treatment. Join us as we explore some of the toughest challenges they're overcoming to move transformative therapies from the lab bench to your medicine cabinet.



Video: What is the microbiome?

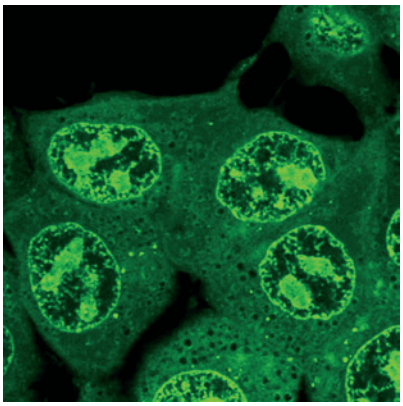
Valhalla Fellow Lindsey Backman explains what the microbiome is and the roles that different members of our microbiomes play in health and disease. She also discusses how her lab studies adaptations that some microbes have evolved to tolerate oxygen-containing environments, and how researchers may be able to use what she learns to create better antibiotics and probiotics.

Selected science news

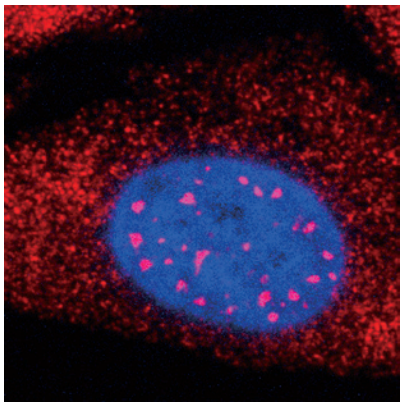
Browse through the following articles highlighting some of the research our investigators pursued during the past year. The work ranges from redefining sex chromosome function to developing gene editing tools that could become potent therapeutics to deepening our understanding of the mechanisms underlying developmental and neurodegenerative disorders.

New findings activate a better understanding of Rett syndrome's causes

A CHARMed collaboration created a potent therapy candidate for fatal prion diseases

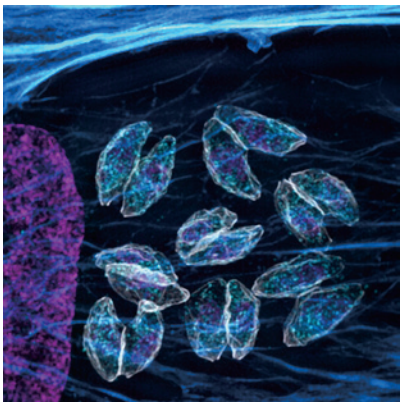


Machine learning helps predict drugs' favorite subcellular haunts

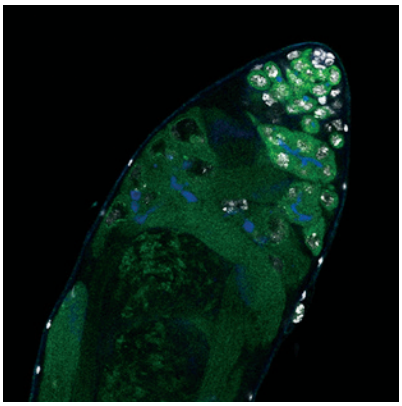


Protein production glitches in Huntington's disease revealed

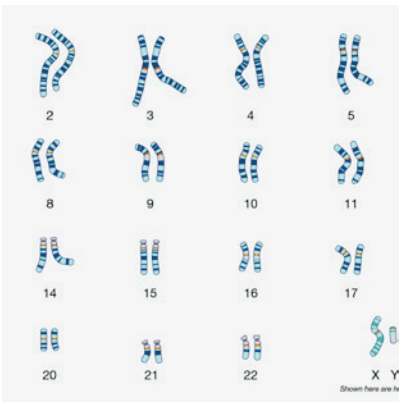
"Vaults" within germ cells offer more than safekeeping



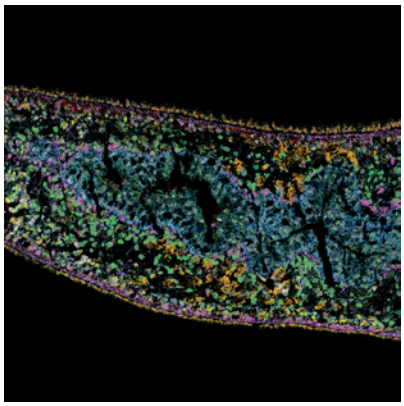
A genome-wide screen in live hosts reveals new secrets of parasite infection



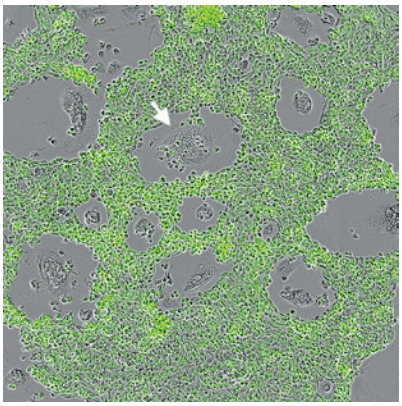
Maintaining fertility requires uneven division of DNA



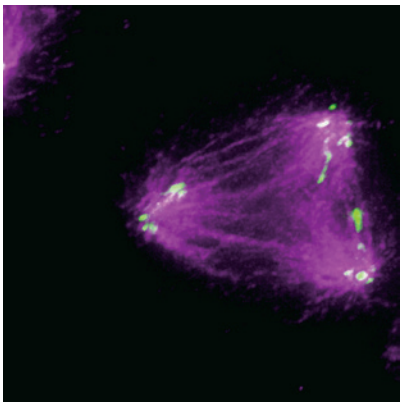
Sex chromosomes responsible for much more than determining sex



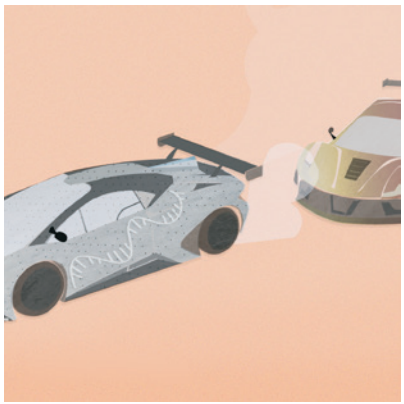
Cell fate choice during adult regeneration is highly disorganized, new study finds



Targeted therapies outperform hundreds of other drugs in "priming" lung cancer cells for destruction



How cells accurately assemble complex machinery



Gene silencing tool has a need for speed

Whitehead Institute Member Olivia Corradin and lab members discuss data. Credit: Gretchen Ertl/ Whitehead Institute

The Whitehead Innovation Initiative advances AI use in biomedical research

In April 2024, philanthropists Michael and Victoria Chambers announced a $10 million gift to establish the Whitehead Innovation Initiative, which will catalyze novel research at the intersection of biology and artificial intelligence (AI). The Initiative will also empower Whitehead Institute scientists to explore the power of AI tools to advance discoveries underpinning new ways of preventing, diagnosing, and treating disease.

"The Whitehead Innovation Initiative will enable our researchers to be even more agile, creative, and pioneering in the questions they ask and the approaches they use," says Whitehead Institute President and Director Ruth Lehmann, who is also professor of biology at Massachusetts Institute of Technology (MIT). " It will also fuel innovative new collaborations among Institute labs and with outside partners."

"There's no setting more suited than the Whitehead Institute, under the expert guidance of Dr. Lehmann, to pioneer the melding of AI and biology," explains Michael Chambers, who is a member of the Institute's board of directors. "We embrace this venture with great enthusiasm and support, foreseeing a future rich with scientific advancement."

Hitting the ground running

The Initiative got off to a very fast start.

An advisory committee was immediately appointed to provide strategic advice on advancing AI-based research, education, and community-building efforts. Chaired by Richard Young, Whitehead Institute Member and a professor of biology at MIT, its members include: Regina Barzilay, the School of Engineering Distinguished Professor for AI and Health at MIT; Allison Hamilos, Valhalla Fellow in the Whitehead Fellows Program; and Vanessa Almendro, Vice President of Science and Technology and Head of Innovation at Danaher Corporation.

With the advisory committee's input, five new studies received seed funding from the Whitehead Innovation Initiative. "These are one-year grants that are enabling the scientists to use AI-based methods to begin testing their hypotheses and developing proof-of-concept data," Young explains. "Our hope is that the results of these initial studies will support successful applications for external grants to fund underwrite next-stage investigations." (For more information on these studies, see the accompanying article "Using AI to Drive Discovery.")

Valhalla Fellow Allison Hamilos kicks off a Whitehead Institute community seminar on artificial intelligence in biological research.
Credit: Madeleine Turner/Whitehead Institute

Using AI to drive discovery

Five exciting new research projects have received the Whitehead Innovation Initiative's first set of seed grants:

- The **Cheeseman lab** is using AI-driven analysis of its growing cell image repository to build knowledge about each gene's contribution to biological function. The group anticipates that the resulting data would underpin systematic approaches for eliminating specific genes and uncover biologically meaningful patterns underlying critical features and functions of the cell.
- The **Corradin lab** is using machine learning methods to leverage more than 5,000 distinct genome-wide association studies and exome sequencing-based studies reflecting myriad human diseases. In using these rich datasets, the group will attempt to infer the function of previously uncharacterized genes and the role they may play in disease. The group has a particular interest in opioid use disorder, and their work could also yield key insights into the epigenetic variations found to be prevalent in opioid use disorder.
- Leveraging existing machine learning expertise and deep knowledge about the planarian regeneration model, the **Reddien lab** seeks to develop new AI-based methods to help explain how stem cells are differentiated into specific cell types and how cells are able to organize into complex structures and tissues.
- The **Weissman lab** is using machine learning to study the inner workings and intercellular communication of cells to understand how collections of cells self-organize to create tissues and organs. This effort has the potential to broadly inform our understanding of distinct organ functions and the underlying causes of disease.
- In a collaboration with the Barzilay lab at MIT, the **Young lab** is using AI to learn how proteins gather into functional compartments in cells, providing potentially revolutionary insights into how diseases develop and which ultimately may suggest specific types of therapeutics that would be optimal for patients.

> "The Whitehead Innovation Initiative will enable our researchers to be even more agile, creative, and pioneering in the questions they ask and the approaches they use." — Ruth Lehmann

While those five studies got under way, a new, AI-focused principal investigator role was created and the first incumbent recruited. In September 2024, Na Sun, a recent PhD graduate of MIT, became the inaugural AI Fellow within the Whitehead Fellows Program. "Her appointment is significant in many ways," observes Whitehead Institute Director and President Ruth Lehmann. "Not only is she pursuing novel studies in her own lab, she offers new kinds of knowledge and technical skills from which our principal investigators and staff scientists can draw inspiration."

Sun welcomes opportunities to collaborate with scientists across Whitehead Institute to employ AI and other deep learning techniques to advance studies on a broad range of questions. "It's the fact that the Whitehead Institute culture supports interactions among many kinds of scientific expertise and perspectives that makes this new role particularly exciting for me," she says. (For background on Na Sun, see the accompanying article "Computational Biologist Becomes the First AI Fellow.")

Sidebar: Computational neurobiologist becomes the first AI Fellow

For the past 15 years, Na Sun has been fascinated by the challenges and opportunities to be found at the intersection of biology and data science. Having earned an SB in life science at Linyi University in 2009, she completed an SM in bioinformatics and developmental biology at the University of the Chinese Academy of Sciences in 2013. She conducted her master's research in the lab of Jing-Dong Han and continued as a research associate in the Han lab until 2016. There, she developed a model for better understanding the effects of gene expression patterns on neuronal differentiation and identified networks of transcription factors regulating gene expression in the human brain.

In 2017, Sun became a bioinformatics specialist at the Ragon Institute of Mass General, MIT and Harvard. In that work, she integrated an array of experimental data types to create methods for investigating epigenetic regulation to explore immune cell lineage specification and differentiation. In 2020, Sun embarked on graduate studies in computational biology at MIT and earned a PhD in computer science earlier this year.

Her doctoral research used advanced computational techniques to investigate the cellular heterogeneity of brain vasculature and immune cells and cell-cell communications, with a focus on the molecular mechanisms underlying Alzheimer's disease. In particular, she looked at cell-cell communications between neurons, vascular cells, and microglia — which are immune cells operating in the brain — and their dysregulation during Alzheimer's progression.

"That research generated massive data sets, to which I've applied my knowledge and skills in bioinformatics and computational biology to understand what the data tells us," Sun explains. "Initially, my Whitehead Institute laboratory will continue to apply and develop new computational methods to systematically decipher the complexity of cell-cell communication in the brain and their biological implications in cellular states, tissue organization, and disease genetics. Over time, I plan to develop, adapt, and apply novel deep learning methods to explore broader neuroimmune crosstalk between the central nervous and peripheral immune systems, as well as to study disease mechanisms by multilayered integration from genotype to phenotype."

A community comfortable with computation

Attendees at the kickoff meeting for the Whitehead Innovation Initiative discuss the Initiative during the reception.
Credit: Madeleine Turner/Whitehead Institute

"Michael and Victoria Chambers recognized that important scientific discoveries will occur at the intersection of biology and AI, and we are dedicated to seeing that realized at Whitehead," says Richard Young. "My confidence in this comes from the powerful innovations that are occurring in each of the fields of biology and AI, the remarkable community of talented researchers we have at Whitehead and at MIT, and our history of innovation in multidisciplinary research."

Young believes that to realize the tremendous opportunity for discovery, Whitehead Institute needs to be very intentional about preparing its scientists to use AI tools and about fostering partnerships between biomedical and computational researchers. "In particular," he suggests, "we need to help researchers recognize the value in moving beyond their comfort zones."

Toward that end, Allison Hamilos stepped up to help create a multifaceted program of AI-focused education, mentoring, and community building. "We launched our activities soon after the Whitehead Innovation Initiative was established," Hamilos explains, "and we've had fantastic engagement across Whitehead, from principal investigators and staff scientists to postdocs to students."

"Our goal is twofold: to help them be familiar with the growing array of tools available; and to connect them with the expertise and technical capacities they need to employ the right tools given their scientific objectives," she notes. "But through our programming, we also are striving to nurture a robust culture of learning about — and intellectual risk-taking in — the application of AI tools to biological discovery."

"Through our programming, we also are striving to nurture a robust culture of learning about — and intellectual risk-taking in — the application of AI tools to biological discovery."
— Allison Hamilos

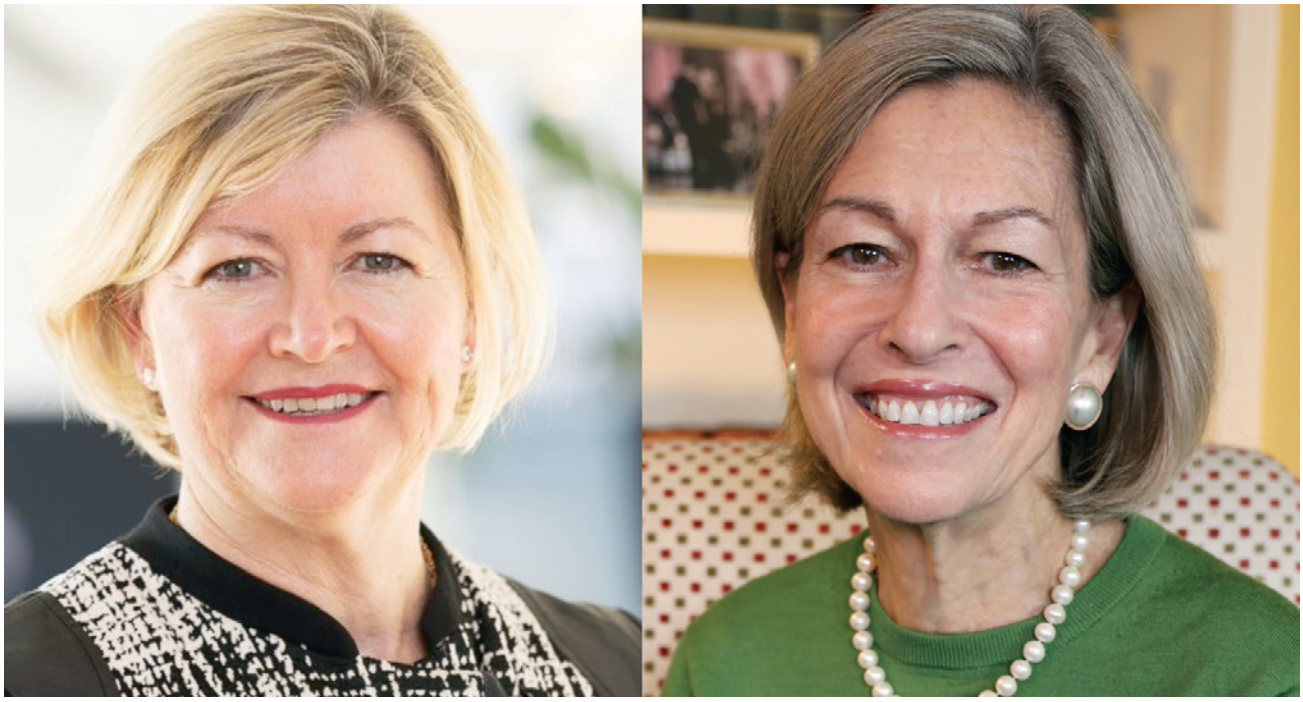
To those ends, the advisory committee is sponsoring an ongoing series of seminars and talks about specific AI-based methods and other computational biology tools. It has also held periodic social events that create informal opportunities for traditional bench scientists to surmount the typical institutional or disciplinary hurdles that can separate them from computation-oriented researchers.

In the coming year, several other efforts will be launched, including a journal club focusing on how biology researchers can pitch their ideas for collaborative work with AI-focused scientists; presentations by the labs pursuing Initiative-funded research projects; and AI Dinners for Eight, designed to spur focused conversations and brainstorming on specific questions.

Stepping back to offer a long-term view of an initiative still in its infancy, Ruth Lehmann observes, "Many of science's biggest advances have come from giving people opportunities to advance their science in ways that cross disciplines. We believe that the Whitehead Innovation Initiative will spur incredible advances."

Our People

Whitehead Institute's scientists, trainees, and technical experts are renowned for their knowledge, skills, creativity, and commitment to driving biological research forward. Read on to learn about some of the stellar members of our community — from the Whitehead Fellows and postdoctoral researchers who are key drivers of scientific discovery to the globally recognized leaders who serve on our board of directors.



Left: Deborah Dunsire. Right: Micho Spring Credit: Courtesy of Deborah Dunsire and Micho Spring

Two globally respected executives join Whitehead Institute Board of Directors

The Whitehead Institute Board of Directors has elected two experienced leaders to its ranks: biotechnology and pharmaceutical industry executive Dr. Deborah Dunsire; and Micho Spring, a strategic communications expert who led a major global consulting practice. Both have been elected to six-year terms that began July 1, 2024.

"We are very pleased to have these two accomplished and dynamic individuals join our organization," says Board Chair Sarah Keohane Williamson. "Deborah and Micho each possesses a long, distinguished record of guiding growing organizations and each brings a depth of knowledge and expertise that will meaningfully enhance Whitehead Institute's ability to pursue its mission: forging new frontiers in science, uncovering insights today that unlock the potential of tomorrow."

Deborah Dunsire has, in the four decades since earning a medical degree at the University of the Witwatersrand in Johannesburg, built a series of highly successful teams in biotech and pharma companies including Novartis, Millennium Pharmaceuticals (now Takeda Oncology), and Lundbeck Pharmaceuticals — the Copenhagen-based company that has developed and commercialized some of the world's most widely prescribed therapies for brain diseases.

"My passion has been the discovery and development of medicines that transform outcomes for patients," Dunsire says. "That is why I am excited by this opportunity to contribute to Whitehead Institute's continuing success in making discoveries that become catalysts for new treatments and, indeed, for whole new ways of understanding human biology and health."

In the course of her career, Dunsire has led companies in developing therapeutics used in more than 100 countries, addressing neurological conditions, inflammatory diseases, and cancer. In those roles, she guided the launch of 11 blockbuster medicines, while also directing the turnaround of commercial operations, transforming R&D organizations, and shepherding multiple successful mergers and acquisitions. She currently chairs the board of directors of Neurvati Neurosciences, and serves on the boards of McKesson, Ultragenyx, Syros Pharmaceuticals, and Vima Therapeutics. Previously, she was a board member for Takeda Pharmaceuticals in Japan, Allergan, and Alexion.

Outside of her industry work, Dunsire is a longstanding member of the boards of trustees of Northeastern University, the Museum of Science (Boston), and the International Institute of New England.

Micho Spring, now a senior advisor at Weber Shandwick, formerly led its global corporate practice and served as its chief reputation officer. During her 31-year career there, she counseled clients on challenges ranging from CEO succession and cultural transformation to litigation and environmental and social issues.

Before joining Weber, Spring was CEO of Boston Telecommunications Company, chief of staff and deputy mayor under Boston Mayor Kevin H. White, and a member of New York Mayor John Lindsay's administration. She earned a master of public administration degree from Harvard University's Kennedy School of Government, having previously attended Georgetown and Columbia Universities.

Spring's understanding of the challenges facing complex organizations also draws from her service on the boards of directors of the National Bank Holdings Corporation and the National Association of Corporate Directors New England; as past chair of the Greater Boston Chamber of Commerce; and as treasurer of the Massachusetts Conference for Women, which offers education and networking on topics both career and personal development and advancement.

At the same time, Spring says, "I have a strong commitment to improving healthcare quality and public well-being." Pursuing that commitment, she serves as a member of the corporation of Mass General Brigham, having previously served on the boards of Partners Healthcare and Brigham and Women's Hospital. She is also founding chair and a director of Friends of Caritas Cubana, a humanitarian and social services agency serving Cuba's most vulnerable populations.

"Whitehead Institute has a legacy of tremendous impact, both in creating new knowledge and in training some of the world's most innovative biomedical leaders," Spring observes. "To me, joining its board offers a unique opportunity to help extend and expand that legacy — and in that way to enable people across the world to have healthier, more fulfilling lives."

Talking with astronaut, scientist, surgeon Robert Satcher

Robert (Bobby) Satcher, professor of orthopaedic oncology at the University of Texas MD Anderson Cancer Center and former NASA astronaut, joined the board of Whitehead Institute in 2020. He brought to that role deep expertise in clinical care and translational research, wide-ranging experience as an educator, and a passion for helping expand global access to high-quality medical care.

After earning bachelor's and PhD degrees in chemical engineering from Massachusetts Institute of Technology and an MD from the Harvard Medical School Health Sciences and Technology program, Satcher completed fellowships at University of California, Berkeley and University of Florida; he then served on the faculties of Northwestern University's Feinberg School of Medicine and the University's biomedical engineering department. From 2004 to 2011, he was a NASA Mission Specialist Astronaut; during that time, he participated in an 11-day mission to the International Space Station, served as that crew's medical doctor, and took two spacewalks.

In this interview, he explains why he chose to engage so deeply with Whitehead Institute and how he hopes to help guide its path forward.

Whitehead Institute: Given the range of biomedical organizations that would welcome you to their boards, why have you decided to devote your time and energy to Whitehead Institute?

Robert Satcher: I was an undergraduate at MIT in the mid-1980s when the Institute was just getting off the ground, and I was able to take courses with some of the Whitehead faculty. Over the years, I've paid attention to the research coming out from its labs and have been very impressed by the impact it was having in a variety of biomedical fields. And when the opportunity arose to be engaged directly in advancing its work, there was no question in my mind that I'd do it. It was like the germination of a seed planted 35 years earlier, and it's been exciting to help guide its growth and future direction.

WI: Was there a specific set of Whitehead Institute's accomplishments over the years that helped keep it present in your mind?

RS: Certainly the Institute's work on the human genome was one of those major accomplishments. It's been fundamental to so many of the pathbreaking discoveries and biomedical applications that have steadily emerged over the past two decades — and that will only increase in number and impact in coming years. Then, as an orthopedic oncologist, I'm very aware of the many game-changing discoveries in cancer biology that continue to come out of Whitehead labs — and of the therapeutic strategies that continue being developed thanks to those discoveries. I also have to admit that, personally, I love having the opportunity to go into Institute labs, talk to the researchers, and learn about how they are able to continuously make spectacular advances. I could go on, because oncology and genomics are just two examples of Whitehead Institute's huge footprints in biomedical science.

WI: You've worn many hats in your career and bring an array of skills and experiences to bear as a board member. Which have you found are especially useful in that role?

RS: I was asked to be a member of the board's Leadership Advisory Committee. It works with Ruth Lehmann and her administrative team to help set strategic goals, manage difficult issues and challenges, and make critical decisions efficiently and effectively — all while keeping the big picture and long-term vision in mind. So, my experience in universities and academic medical centers has given me lots of knowledge directly relevant to Whitehead's raison d'être of conducting impactful research and training the next generation of scientific leaders.

But more important, I think, has been my NASA experience. It equipped me with a perspective that is, if not unique, certainly different from that of most clinician-scientists and biomedical educators. People at NASA are used to making difficult decisions in trying circumstances — and in the glare of public attention. They know it's essential to be decisive and then to do what's necessary to bring about success. There are very few academic and nonprofit leadership and governance teams — which mostly comprise people who are, appropriately, deliberative in nature — that possess those capacities. So, to the extent that it's needed and useful, I try to bring my NASA experience to bear in helping identify, rigorously analyze, decisively address big questions and thorny challenges.

However, I must say, I have been very impressed by the Institute's ability to navigate in choppy waters. The biggest example: responding to the pandemic. I joined the board in mid-2020 and you really learn a lot about an organization — about its culture and resilience, and about its leaders' capacities — when you see it operating under enormous, unprecedented stress. Those were challenging days, weeks, and months, no doubt about it. But Whitehead came through the pandemic well — in some ways, even stronger than before. And it's very well-positioned to continue building on its long legacy of discovery and impact.

Trainee snapshots

Whitehead Institute's trainees — its postdoctoral researchers and graduate students — are central to its highly productive and collaborative environment. These emerging scientific leaders are multitalented individuals whose collective backgrounds, interests, and perspectives help fuel the Institute's vibrant culture. Here are snapshots of five of them; you can also view extended profiles of these individuals by clicking on their names.

Luiza de Oliveira Saad (Reddien lab)

Luiza, a postdoc in Whitehead Institute Member Peter Reddien's lab, is developing a regenerating slug as a model species to investigate the molecular mechanisms involved in regeneration and ultimately help to understand why some animals can regenerate while others cannot. Saad, who is also a Pew Latin American Fellow, grew up in the coastal city of Santos, Brazil, and was always fascinated by marine life. "We'd go to the beach every day after school," she explains. "I've always been curious about the shells and tiny creatures making bubbles in the sand. Observing these things fueled my curiosity and desire to understand what I see, which has heavily influenced me."

Mark Greenwood (Li lab)

Mark, a postdoc in Whitehead Institute Member Pulin Li's lab, studies hormone signaling. "Right now I'm working to understand the impact of oscillating hormone concentrations in the blood — which is a prevalent but little understood phenomenon," he says. "Current hormone therapies typically ignore this complexity. I'm exploring what effect this has on physiology." Growing up in the UK, he loved sport and wanted to be a professional athlete, but realized he lacked the requisite talent. "Still, these days, I regularly play soccer with a group of MIT postdocs. It's been a good way to create a community and meet new people."

Asaf Maoz (Weiskopf lab)

Asaf, a postdoc in Whitehead Institute Valhalla Fellow Kipp Weiskopf's lab, is studying new immunotherapy strategies to treat cancer. He's also a medical oncologist in the Gastrointestinal Cancer Center and Division of Genetics and Prevention at Dana-Farber Cancer Institute. His research focuses on using cytokines, which are signaling proteins that can regulate immune responses, for macrophage-based cancer immunotherapy. "Being a clinician-scientist leaves me little free time," he explains, "but I really like playing basketball and I love learning languages." At present, he is fluent in English, Hebrew, German, and Spanish — in which he's a certified bilingual provider. "I can also get by fine in French, Portuguese, and Catalan. And I can have a simple conversation in Arabic and Russian."

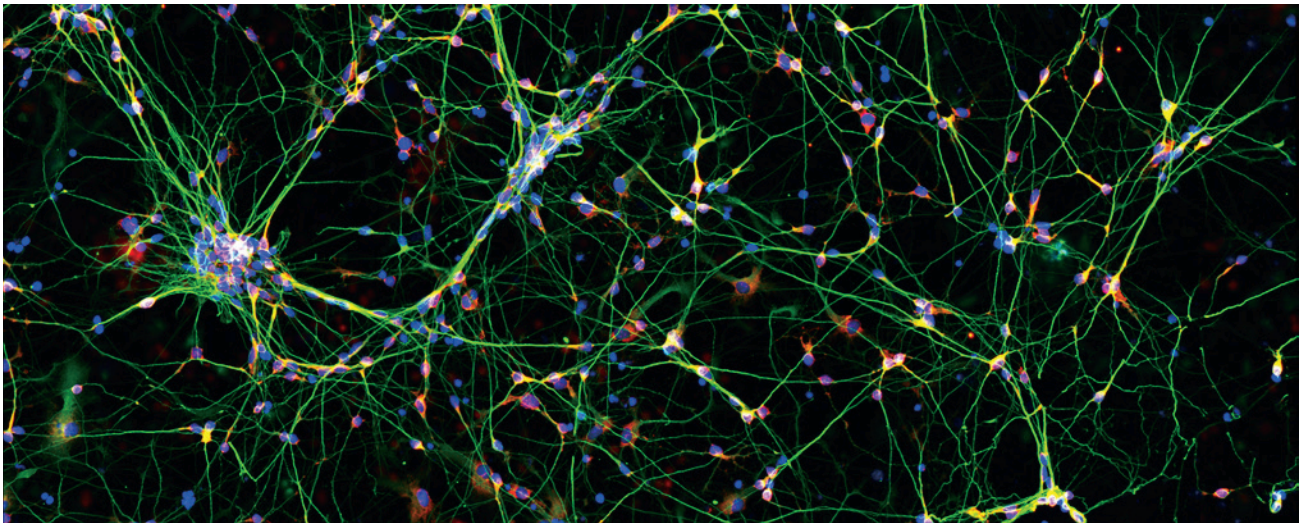
Pavana Rotti (Corradin lab)

Pavana, a postdoc in Whitehead Institute Member Olivia Corradin's lab, is studying the neurobiology of opioid use disorder. "Lots of studies indicate that genomic changes are associated with opioid use disorder. But nobody yet knows how the affected genes contribute to opioid use disorder and what the cellular mechanisms are involved," she says. Growing up in Bangalore, India, Rotti studied the Indian classical dance form called Bharatanatyam for many years and it's still a hobby. "In particular, I enjoy the combination of rhythmic movement and facial expressions that portray certain emotions without talking. But, these days, dance — and reading and hiking — all take a back seat to being a mother to a year-old daughter."

Carly Martin (Gehring lab)

Carly, a doctoral student conducting research on plant reproduction in the lab of Whitehead Institute Member Mary Gehring, is developing a detailed map of genes that are turned on or off during seed development. Prior to graduate school, she had focused on neuroscience. But she shifted her doctoral studies to a challenge that had been on her mind for years: "I want to know how we can protect plant biodiversity in the face of climate change," she says. "My ultimate goal is to help solve the global food insecurity crisis that climate change is exacerbating. And along the way, I want to inspire budding scientists to pursue questions that ignite *their* curiosity."

Picturing science



This image visualizes neurons, a cell type that makes up the largest region of the human brain, called the forebrain. The forebrain is integral to information processing activities such as cognition (thinking, memory, language) and voluntary motor activities (conscious movements).
Credit: Zia Barnard/Whitehead Institute

The Whitehead Fellows Program: 40 years young and thriving

Valhalla Fellow Lindsey Backman (left) discusses an experiment with members of her lab. Credit: Gretchen Ertl/Whitehead Institute

Since 1984, the Whitehead Fellows Program has given extraordinarily talented recent PhDs and MDs the opportunity to launch their own labs. Fellows receive dedicated lab space; funds for equipment, lab operations, salary, and core staffing; plus access to Whitehead's shared technical facilities.

"The bar for being selected as a Fellow is high," explains Program co-director Yukiko Yamashita, who is an Institute Member, professor of biology at MIT, Howard Hughes Medical Institute (HHMI) Investigator, and first incumbent of the Susan Lindquist Chair for Women in Science. "Each of these young scientists are highly accomplished scientifically, and demonstrate the ability to independently pursue solutions to major research problems."

"The Program's objective is to enable Fellows to create bold, independent research programs and pursue their scientific visions as creatively as they dare," says Program co-director David Bartel, who is an Institute Member, a professor of biology at MIT, HHMI Investigator, and a former Fellow himself. "In practice, Fellows also bring knowledge and skills that enhance the Institute's overall capacities."

The Program was one of the first of its kind, and for 40 years its alumni have continued to be pacesetters: becoming pioneering scientists, lauded teachers, and heads of major academic and commercial research centers. Their ranks include a White House science advisor, a NASA astronaut, a dean of Harvard Medical School, senior executives of major biomedical companies, and six current or former Members of Whitehead Institute.

Fellows' research discoveries have had a profound impact on a broad array of crucial topics — from the essential roles RNAs play, to the genetic factors contributing to drug addiction, to harnessing the immune system to fight cancer. And with each passing year, more of the Program alumni's basic-science discoveries are being translated into strategies for preventing or treating disease.

"Whitehead Institute is committed to nurturing young scientists who are passionate about — and effective in — defining and pursuing their visions." — Sebastian Lourido

The Fellows Program was created by Founding Director David Baltimore as one way to continuously refresh the range of expertise, ideas, and perspectives that create Whitehead Institute's robust culture — and to help fuel a steady flow of research innovation and discovery.

"David Baltimore's vision for the Whitehead Fellowships blossomed very quickly, and in my opinion, the Program has become one of the Institute's central pillars," says Institute Member and Former Director David Page. He is in a perfect position to know: He was the first Whitehead Fellow, arriving at the Institute even before its new building was fully completed. Today, among the many notable experiences Page had as a Fellow, one is indelibly marked in his memory. "Since the Institute's founding, Members have had a monthly faculty lunch to share updates on our research projects, discuss technical problems we're wrestling with, and consider opportunities and challenges facing the Institute as a whole. Fellows participate in those conversations, and while I don't remember exactly what we discussed in my first faculty lunch, I do recall the epiphany I had afterward: 'These MIT scientists, who were hand-picked to launch this Institute, are talking to me — a guy with three-plus years of lab experience — like I was one of them.' And that dynamic, of Fellows and Members talking and working together as colleagues, continues to this day."

Although each of the Program's alumni have had a unique set of experiences and opportunities, many share a perspective on the most beneficial and most challenging aspects of being a Fellow. "My experience as a Whitehead Fellow was a positive inflection point in my scientific career," observes Olivia Corradin, who, at the end of her Fellowship in 2021, was named a Whitehead Institute Member and an assistant professor of biology at MIT. "By not restricting me to studying a specific scientific question and by encouraging me to take more intellectual risks, the Program freed me to think in a more interdisciplinary way and to make a major shift in the direction of my research program. And that new direction has proven quite fruitful."

Sebastian Lourido — a Program alum who became a Whitehead Institute Member in 2016, is an associate professor of biology at MIT, and holds the Institute's Landon T. Clay Career Development Chair — also cherished the flexibility to adapt his laboratory's initial focus as his scientific vision evolved. "At the same time," he says, "the Program demands that a new PhD dive right into the responsibilities of creating and running a lab. It's a dramatic change in how you relate to the people around you. Suddenly, they are looking to you to set the direction, make the important choices, and solve the problems that arise."

Lourido believes that the balance of opportunity and challenge reflects a fundamental principle of Whitehead Institute. "The Program is investing in the investigator, not in any individual project," he observes. "And Whitehead Institute is committed to nurturing young scientists who are passionate about — and effective in — defining and pursuing their visions."

Sidebar: Empowering a scientific quest

Tobiloba (Tobi) Oni is a current Valhalla Fellow in the Whitehead Fellows Program. "It is a remarkable experience in many ways," he says. "Most fundamental: It's enabled me to undertake the intellectually risky science involved in pursuing my goal of developing highly effective immune-based strategies for treating pancreatic cancer. Many experienced investigators told me that the scientific questions on which our lab is working are too complex — and that we should pursue another research path. But our work holds such enormous potential for real impact on people's lives. And I'm very grateful that the Fellows Program exists to provide the time and resources we need to pursue our scientific quest."

Award-winning leaders in biomedical sciences

Current and past Whitehead Fellows have had enormous impact on biomedical research.

7 Howard Hughes Medical Institute Investigators

7 NIH Early Investigator Award and Pioneer Awards

14 National Academy of Sciences, National Academy of Medicine, or the American Academy of Arts & Sciences elected

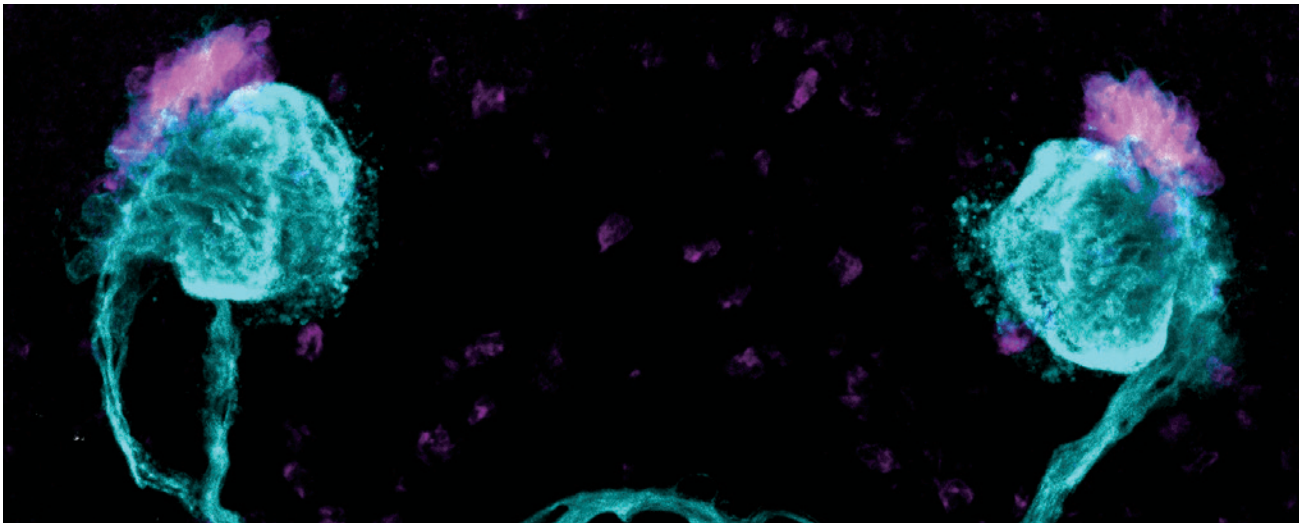
4 Packard, Pew and Searle Scholars

2 Breakthrough Prize in Life Sciences awardees

2 MacArthur Fellowship recipients

4 NAS Award in Molecular Biology recipients

Picturing science



The central nervous system in a regenerative planarian flatworm. This animal has ectopic brain branches coming out of its ventral nerve cords, posterior to where brain branches are usually located.
Credit: Bryanna Canales/Whitehead Institute

Our Culture

Ingenuity. Learning. Belonging. Courage. These are the values undergirding Whitehead Institute's culture of excellence, innovation, and collaboration. This culture fosters an environment where some of the world's brightest trainees are guided to do their best work. And it reflects our commitment to fostering a multifaceted community where each person can thrive. Read on to learn more.

Diversity, equity, and inclusion at Whitehead Institute

Cultivating a diverse, equitable, and inclusive community is fundamental to Whitehead Institute's mission to forge new frontiers in science. We continue to develop and clarify our Strategic Plan for Diversity, Equity, and Inclusion (DE&I), which is built on four core commitments.

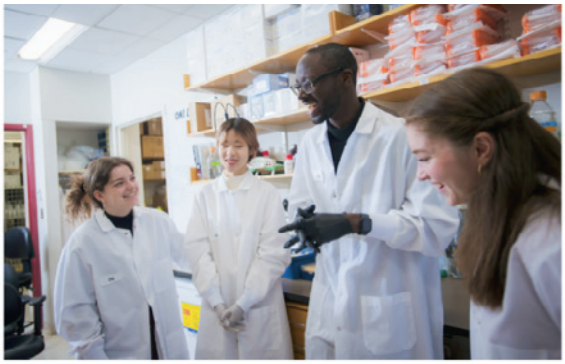
- Improving the hiring, retaining and promoting of diverse talent
- Creating and maintaining an inclusive culture that promotes physical and mental well-being and respect for all Whitehead Institute community members
- Developing partnerships to increase engagement and outreach with local communities to improve accessibility, particularly for individuals from groups underrepresented in biomedical sciences
- Encouraging open dialogue and facilitating learning opportunities to address DE&I topics and making them available to the entire Whitehead Institute community

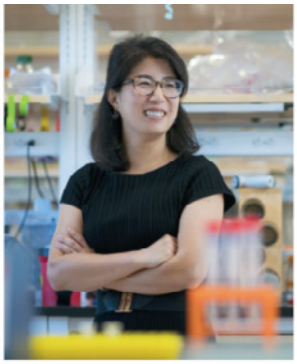
"It's no coincidence that the Institute remains at the cutting edge of biological science, while prioritizing diversity, equity, and inclusion. These two aims are intimately intertwined," says Dilly Wilson, Whitehead Institute's Director of Human Resources and Diversity, Equity & Inclusion Officer.

This year, DE&I efforts flourished both at the lab bench and on a community-wide level. The DE&I Council, which is composed of faculty, trainees, and staff, continues to promote diversity, equity and inclusion through new initiatives. The Council is currently designing a professional development program for Whitehead Institute technicians applying to graduate school. The Council has also continued to organize the Science for the Non-Scientist Seminar Series: jargon-free talks given by trainees, sharing both their research and passion for science.

"Cultivating a diverse, equitable and inclusive community is fundamental to Whitehead Institute's mission to forge new frontiers in science."

Whitehead Institute is also home to nine Inclusion Networks: Accessible Whitehead Alliance, Asian American and Pacific Islanders, Black and African Diaspora, DEI Allies, First Generation College Graduates, LGBTQIA+, Parents, Whitehead UNIDOS and Women@WIBR. These groups provide Whitehead Institute trainees and staff an opportunity to foster connections over shared interests and identities. At "An Exploration of Indigenous Cuisine," an event hosted by DEI Allies and Women@WIBR, chef Sherry Pocknett shared her knowledge of Indigenous food, history, and culture. In February, AAPI hosted a Lunar New Year celebration. This spring, members of our community received the chance to learn the basics of salsa, bachata, merengue, and cha-cha at a Whitehead UNIDOS dance party. Roots Alley Collective, upon invitation from the Black and African Diaspora Inclusion Network, performed live music and shared the history and culture of reggae music during a Q&A session. Also, this summer, the Parents Inclusion Network hosted a children's clothing, book, and toy swap. These are just a sampling of the events and activities hosted by Whitehead Institute's Inclusion Networks.





The Inclusion Networks also supported Whitehead Institute's DEI Seminar Series, which hosted speakers from a wide range of disciplines in both the sciences and humanities. The series explores not only exciting ideas in science but also how personal identities and experiences interface with the broader culture and institutions of science.

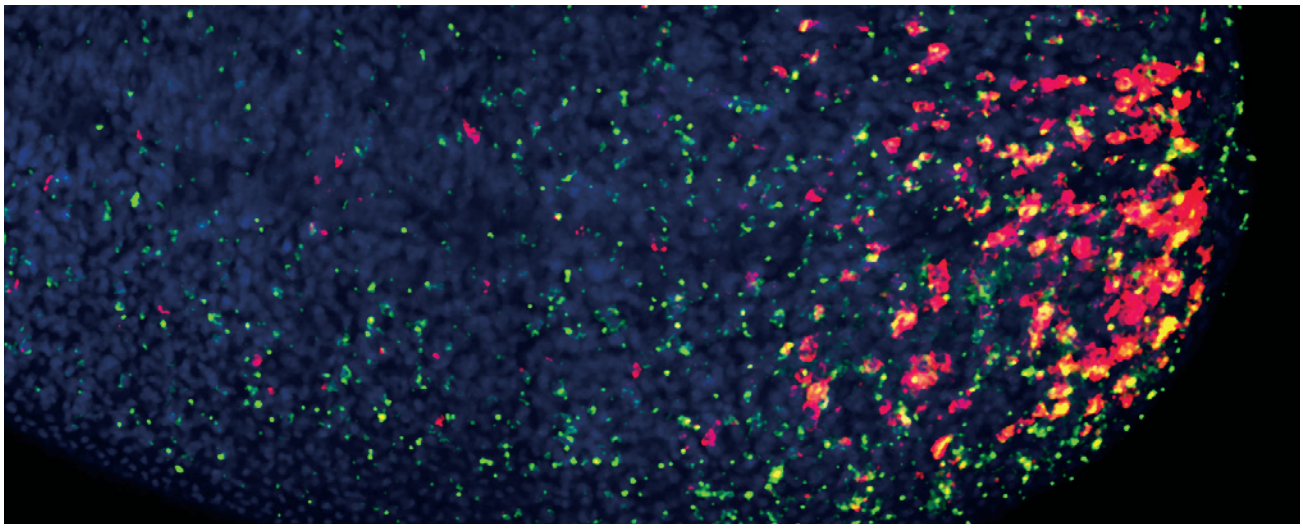
- Dis/ability Inclusion: Improving Climate and Addressing Access with Dr. Autumn Wilke
- The Intersection of Disability and Poverty with Dr. Esther Kamau
- Immunology of Long COVID with Dr. Akiko Iwasaki
- The Field, the Curriculum, the Scientists: Where Do We Get to Exist? with Dr. Alyssa Hillary Zisk
- Mechanosensitive Channels, Sensory Physiology and Neurological Disorders with Dr. Yuh-Nung Jan
- The Multitasking TMEM16 Family with Dr. Lily Jan
- Understanding the Regulation of Gene Expression by Acetyl-methyllysine through the Cell Cycle with Charlie Brown, PhD candidate

The High School Internship Program, which debuted last year, provides an opportunity for students from historically underrepresented backgrounds to gain hands-on research experience. This year the Hamilos lab and Functional Genomics Platform hosted two interns who completed research projects over the summer.

Discovery Lab @ Whitehead Institute provides another opportunity for high school students to gain exposure to science. Through the program, students from local communities tour our labs and talk to Whitehead Institute researchers about science and career paths. In the inaugural program, Whitehead Fellow Aditya Raguram hosted AP Biology students from the Community Charter School of Cambridge.

As we look to the future, we reaffirm our commitment to fostering a diverse, equitable, and inclusive environment, one that empowers bold, cutting-edge science.

Picturing science



A planarian tail regenerating 18 hours after wounding. Genes with wound-induced expression are in magenta, and longitudinal muscle genes in green. Credit: Yoki Miliard/Whitehead Institute

Learning by engaging

For more than 30 years, Whitehead Institute's public programs have been helping our broader community learn about cutting-edge biological research. The dual goal: preparing future citizens who are comfortable engaging with science and technology in their lives and workplace; and building the pipeline of future leaders in biomedical research and translation.

"For more than 30 years, Whitehead Institute's public programs have been helping our broader community in learning about cutting edge biological research."

While we participate in community-led events such as the Cambridge Science Festival, our core efforts focus on middle and high school students (and their teachers): We offer hands-on and online programs that develop critical thinking skills and inspire participants to pursue their interests in science, technology, engineering, and math (STEM).

Those programs continue to grow and evolve. In particular, we have adapted and enhanced individual programs in ways that provide access to STEM knowledge to people — and especially students — who have had little opportunity to engage directly with researchers and experience science first-hand. And we have seen an important result: an increasing proportion of program alumni are considering — or actually pursuing — a STEM major in college.

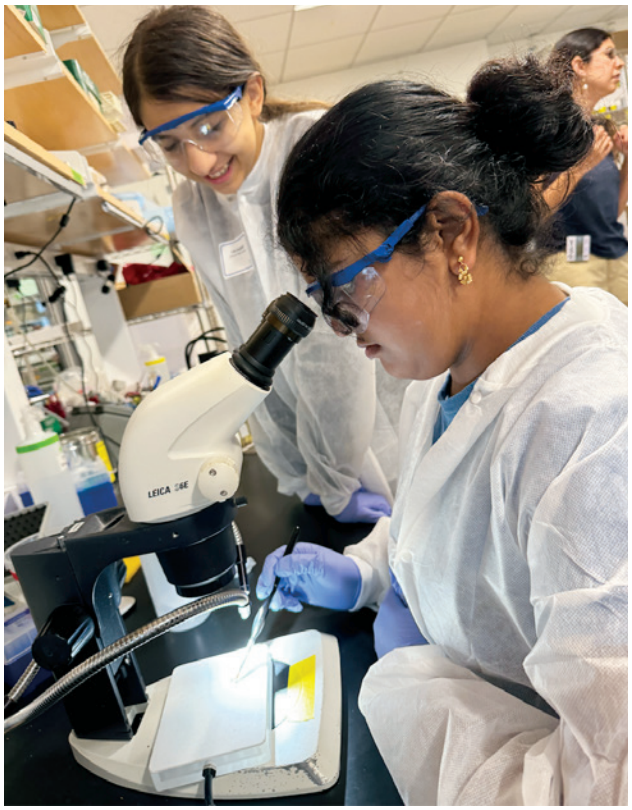
"Leveraging an expanded network of education partners — and thanks to philanthropic support from Sanofi and from individual donors — we have also been able to increase the overall number of participants in our hands-on science programs," notes Public Programs Manager Amy Tremblay. "The financial support also enabled us to both reduce the price of our summer programs and give more scholarships."

Below are updates on inspiring core programs we offered in 2024, plus links to additional information on each.

Spring Lecture Series for High School Students

The Spring Lecture Series for High School Students encourages participants to explore the facts behind the science headlines and experience cutting-edge biomedical research. The three-day program, held over spring break, features lectures from leading scientific experts, hands-on laboratory sessions, visits to local biotech organizations, and opportunities to meet with pioneering Whitehead scientists. Since its launch in 1992, more than 2,700 students have participated in the series.

In this photo, Whitehead Fellow Aditya Raguram talks to students about rewriting our DNA using precision genome editing during the 2024 Spring Lecture Series for High School Students, Regenerative Biology and its Role in Improving Human Health and Disease.



Expedition: Bio

A two-week summer exploration of the extraordinary variety of life around us, Expedition: Bio gives rising seventh and eighth grade students a fun, hands-on scientific immersion. Guided by expert instructors with more than 30 years of public school teaching and curriculum-building experience, and with the assistance of Whitehead Institute undergraduate, graduate, and postdoctoral scientists, the middle schoolers learn first-hand how researchers are answering some of biology's most challenging questions — and they have an awful lot of fun doing it! More than 475 budding scientists have participated since the program was launched in 2013 (as "CampBio").

In this photo, students examine fruit flies under a microscope during a hands-on laboratory session with Amelie Raz, postdoctoral fellow in the Yamashita lab. Students learned how these tiny organisms are an incredible system in which to study cells and genes.

Seminar Series for High School Teachers

The Seminar Series for High School Teachers offers educators the opportunity to explore topics at the forefront of biomedical research. Built around monthly science seminars that explore important challenges and introduce new tools and research findings, the program pairs each teacher with a Whitehead scientist who serves as a resource during the school year — answering questions, discussing their fields of expertise, and visiting with students. Averaging more than 50 participants each year, more than 2,200 teachers have engaged in the series over the past 30 years.

In this photo, Alessandra Dall'Agnese, postdoctoral associate in the Young lab, sits down to meet with her teacher partner during a seminar's working dinner portion of the program.

BioNook

BioNook is Whitehead Institute's online resource for K-12 science education. Launched during the height of the COVID-19 pandemic to offer students — and parents — a virtual and engaging way to learn about science, it continues to blossom. BioNook delivers a wealth of free materials on biology and research: videos, podcasts, stories on Whitehead Institute science, and ideas for nature-based activities — plus virtual workshops offered through the BioNook After School Science Club. The newest BioNook feature is Ask-a-Scientist: Students in grades 5 through 12 submit questions, which are answered on video by a Whitehead Institute scientist. Those videos are archived online through BioNook and are often highlighted on Whitehead Institute's social media channels.

To view an Ask-a-Scientist video in which Brittania Moodie, technical associate in the Cheeseman lab, explains what cell division is and why it is important for scientists to understand how it works, click here.

Sidebar: Expedition: Bio really fueled my passion for science

From student to teacher to college science major

Gabe Lopes (pictured above) first attended Expedition: Bio in 2019 as a middle schooler. He loved the experience so much that he attended again the next year. In 2022, as a high schooler, he returned once more, this time as a teaching assistant.

At that time, Gabe described himself as someone who has always been curious and loved learning. He found Expedition: Bio to be a perfect opportunity to explore that curiosity and recalls having fun doing hands-on science and interacting with professional scientists and hearing about how they got into their careers. "Expedition: Bio really fueled my passion for science," he says, "and in being a teaching assistant I'm hoping to spread my love for science to other kids."

Today, Gabe is taking the next step in what he hopes will be a long, fulfilling career in science: He's applying to colleges and plans to study biology. "Whitehead Institute has given me the perfect experience for seeing where my interests lie and making clear what I want to do next," he says.

Sharing insights, building connections

Whitehead Institute hosts an array of events designed to spur a flow of information and insight on biomedical research and the translation of scientific discovery into ways of advancing human health. Those events also build connections between the Institute and the communities, organizations, and individuals inspired by the work we do. Below, click through to see a few highlights of this past year's events, including the Director's Dialogues series and the Scientific Webinar series:

Whitehead Institute Director Ruth Lehmann in conversation with Uli Stilz, vice president of Novo Nordisk and leader of the company's Bio Innovation Hub during a recent Director's Dialogues, a series of discussions with visionary leaders of science, education, and industry. Credit: Gretchen Ertl/Whitehead Institute

In his webinar, *Delivering Therapeutic Proteins into Cells Using Biological Nanoparticles*, Whitehead Fellow Aditya Raguram explained how his lab develops biological nanoparticles that can safely and efficiently deliver therapeutic proteins into cells within the body — potentially enabling new treatments for genetic disorders, cancer, and other diseases.

Whitehead Fellow and systems neuroscientist Allison Hamilos led a webinar discussion of the neural circuit mechanisms of spontaneity. She described the novel methods her lab is using to understand the processes underlying spontaneous behaviors and the ways those processes go awry in conditions like Parkinson's.

Our Impact

Whitehead Institute's accomplishments reflect both the exceptional talent it attracts and its *science without limits* ethos. Our Members, Fellows, postdocs, and graduate students are creating new knowledge, research tools, and methods — and spurring translation of their discoveries into new treatments and diagnostics. Read on to learn more.

Today's discoveries, tomorrow's revolutionary treatments

My role at Whitehead Institute enables me to interact directly with our innovative faculty, Fellows and trainees, learning about their work and its potential to change the world of biomedicine. For that reason, when a donor asks why it is important to fund basic science research instead of studies on specific diseases, I'm ready to explain a key fact about how new treatments are developed: It simply won't happen without the kind of fundamental scientific knowledge our investigators have excelled at uncovering.

With very few exceptions, novel treatments of specific diseases are possible only because of an important discovery resulting from patient, continuous investigations of basic biology. For more than 40 years, Whitehead Institute researchers have been rewarded by seeing the practical impact of the basic science discoveries they created through diligent and intellectually courageous work.

Simply put, our scientists are creating new knowledge that will ultimately enhance the health and resilience of this and future generations, and their studies on the fundamental mechanisms of life cover a broad array of subjects. Those studies range from unraveling the cellular processes associated with drug addiction to pioneering ways to deliver treatments to the specific cellular compartments that can best employ them to counter disease. And they extend from developing methods to increase food crop seed production to creating gene editing tools that turn off particular disease-causing genes — and thereby stop the disease from developing.

In other words, I tell donors: Whitehead Institute science is changing the world.

And I invite forward-looking philanthropists to join us in pursuing science without limits.

Sharon J. Stanczak
Vice President for External Affairs

In conversation with: Whitehead alumna Nancy Andrews

Nancy Andrews conducted doctoral research in the lab of Whitehead Institute Founding Director David Baltimore, and earned her PhD in biology from Massachusetts Institute of Technology in 1985.

Today, she serves as executive vice president and chief scientific officer of Boston Children's Hospital and professor in residence of pediatrics at Harvard Medical School and is widely respected for her four decades' work as a physician-scientist, teacher, and academic leader. A former investigator of the Howard Hughes Medical Institute, her pioneering research elucidated fundamental aspects of mammalian iron utilization and uncovered the molecular causes of several iron-based diseases. She served as Harvard Medical School's dean for basic sciences and graduate studies and as director of the Harvard/MIT M.D.-Ph.D. program. And, for 10 years, she was the dean of the school of medicine and vice chancellor for academic affairs at Duke University.

Andrews has been elected to the National Academy of Sciences (NAS), the National Academy of Medicine, and the American Academy of Arts and Sciences. Having previously chaired the boards of directors of the Burroughs Wellcome Fund and the American Academy of Arts and Sciences, she is currently home secretary of the NAS and a member of the MIT Corporation, the Institute's board of trustees.

She also serves on the boards of directors of Novartis, Charles River Laboratories, and Maze Therapeutics.

Whitehead Institute: What stands out from your experience as a PhD student in the Baltimore lab?

Nancy Andrews: My first interest in the Baltimore lab was immunology, and my initial project was based on an unexpected result from prior work done in the lab. However, several months in, we realized that the result had been incorrect and

there was no reason to continue working on it. So, David asked me to build on work he'd started on poliovirus replication. I did, and my research resulted in useful, incremental progress. It did not have a major impact scientifically, but it was valuable for me: I learned how to take advantage of an array of research tools and methods — such as how to purify proteins — preparing me to do more significant work later, as a postdoc, on gene expression in red blood cells. In turn, that led to a focus on iron biology once I'd launched my own lab.

Today, many students feel immense pressure for their doctoral research to produce major findings. But it's probably more important for them to use their graduate school experience to develop as scientists. Coping with setbacks and mastering both fundamental and emerging methods are essential experiences for young researchers.

WI: Were there other practical lessons you took away from your time in the Baltimore lab?

NA: Many, but one of the most memorable resulted from an experiment that I originally wasn't going to do. The investigations that became my dissertation grew out of a control experiment that had a very different result than I'd expected, tipping me off that something else was going on. Initially, as a naïve graduate student, I'd thought, "Oh I don't really need to do that— I already know what it will show." Yet, clearly, I didn't know, and not doing the control would have been a big mistake.

I've told that story to my own graduate students many times, as a concrete piece of advice. But I have also used that lesson to remind myself and colleagues: Take time to make sure that what's "obvious" is also demonstrably accurate. It's possible that a single set of information can lead to multiple conclusions, and we don't want to blind ourselves to those alternatives.

WI: How would you compare your experience as a woman pursuing a career in scientific research in the 1980s and '90s with the experience that young female scientists are having today?

NA: I see the early 1970s as an inflection point where a series of societal events created a surge of opportunities for women as professionals, including in science and medicine. For a while after, there was notable progress, but it decelerated in the 1990s. As I got further into my career and rose up the ranks, I saw that the professional path for women scientists got narrower, that resources were often distributed inequitably between male and female faculty, and that fewer leadership opportunities were made available to women than to men. My experience was strikingly similar to what was described in the 1999 MIT report on women in the School of Science, which was instigated by Nancy Hopkins, Ruth Lehmann, and 14 other courageous women scientists who simply wanted to have the same advantages as their male colleagues. Recognizing the parallels between the MIT report and my experiences was a landmark event in my career.

In 2007 — more than 30 years after the "women's liberation movement" — I was appointed dean of Duke's medical school. I was the first woman to hold that role and the first to lead a top-10 medical school in the United States. That received much more publicity than I would have imagined. Fortunately, things have improved since then.

Yet, while circumstances are better for young female scientists today, inequities remain and the playing field is still not level. As described in the MIT report, relatively smaller inequities that younger women scientists face accumulate, growing as these women move through their careers. And the effects are still insidious, even if they are less pronounced overall.

Expanding the ranks of women in leadership roles will help solve this problem. We're definitely seeing progress, as evidenced by the appointments of Whitehead Institute Director Ruth Lehmann and MIT president Sally Kornbluth.

But there is still much work to do. This has been and continues to be a very important, personal issue for me. I've come to feel that mentoring and sponsoring the leadership of women and people of color is the biggest piece of "unfinished business" in my career.

Challenge, growth, and resilience

Selecting an organization's leader is one of a board's most important decisions. We hit a home run in 2019 when, guided by a search committee led by MIT president emerita Susan Hockfield, we selected Ruth Lehmann. We recently affirmed our decision by asking Ruth to serve a second five-year term as director and president, beginning July 2025.

Of course, in 2019, we did not know that when she assumed her role in July 2020, she would have to grapple with the question, "How do you run a pioneering research organization in the midst of a pandemic — simultaneously protecting and maintaining the productivity of a community of scientists who thrive on interaction and collaboration?" But Ruth's capacity to lead our scientific community through challenging times — while simultaneously guiding it to become stronger, nimbler, and more multifaceted today — is a major reason we are so pleased that she agreed to continue through 2030.

The board is also energized by Ruth's scientific vision for Whitehead Institute, *Renewal and Resilience*. That vision reflects a powerful common denominator among our investigator's diverse research programs: exploring how organisms perform the essential tasks of life, how they renew and replenish cells and tissues and reproduce, and how they respond to stresses such as drought and heat. It is also evidenced in two major scientific programs that have been launched under Ruth's leadership — the Whitehead Innovation Initiative, which leverages artificial intelligence to drive pioneering investigations, and the Initiative on Biology and Health of Climate Change.

The board is committed to *Renewal and Resilience*, both as a purposeful scientific vision and as a way of defining its own core objective: ensuring that, for decades to come, Whitehead Institute has the resources and capacities to pursue its mission of *forging new frontiers in science, uncovering insights today that unlock the potential of tomorrow*.

I encourage you to learn more about the pioneering work being done at Whitehead Institute and about the extraordinary researchers who are pushing past today's scientific boundaries.

We welcome your engagement in our collective effort to help shape the future of biomedical science.

Sarah Keohane Williamson
Chair, Board of Directors

Whitehead Institute in Kendall Square.

The importance of looking beyond the horizon

An interview with Michael and Victoria Chambers

Having long been biomedical industry entrepreneurs and business leaders, Michael and Victoria Chambers are increasingly focused on using philanthropy and community leadership to have meaningful impact. They met at North Dakota State University where Michael earned degrees in chemistry, microbiology, and biotechnology, and Victoria earned degrees in mass communication and political science. In 1998, they and colleagues launched Aldevron, a company that specializes in nucleic acid, protein, and enzyme production and has developed novel quality systems and technologies to accelerate the genetic medicine sector. During the following two-plus decades, Michael served as Aldevron's CEO and chairman and Victoria served in major roles including marketing director and chief operating officer.

Since the 2021 acquisition of Aldevron by Danaher for $9.6 billion, Michael has provided counsel on opportunities in fields such as automating and miniaturizing biomanufacturing; he leads an investment group seeking to make genomic therapies, AI, and other transformative technologies broadly accessible; and he serves on the boards of Sarepta Therapeutics, Lykan Biosciences, Agathos, and Calviri. Victoria is active in North Dakota's nonprofit community, serves on the Theodore Roosevelt Presidential Library board of trustees, and works on education projects such as a new children's science museum. Together, they are the trustees of the Centurion Foundation, which they founded in 2021.

In 2022, Michael was elected to the Whitehead Institute board of directors, and this past year he and Victoria made a $10 million gift to establish the Whitehead Innovation Initiative. Following is the text of a joint, written interview with them.

Whitehead Institute: Michael, what motivated you to join the Whitehead Institute board?

Michael Chambers: The Whitehead Institute's impact on advancing basic fundamental research and the entire life-science field is unparalleled, a fact I recognized when I was a student at North Dakota State University. The importance of the Institute's research is well-known to anyone in molecular biology or related fields. Aldevron works with thousands of researchers from around the world. Many of these scientists have ties to Whitehead. I was honored to be invited to serve on the board and to be part of this remarkable team.

WI: What kind of satisfaction do you get from engaging with Whitehead researchers?

Michael & Victoria Chambers: The groundbreaking efforts at Whitehead have significantly broadened our grasp of biomedical science, pushing the envelope of what we believe is achievable. What captivates us most is that this zeal for discovery permeates throughout the organization — from the faculty, postdocs, and students down to every individual contributor. There's a shared dedication to innovation that stands out.

Particularly rewarding is Whitehead's commitment to sharing knowledge and training upcoming scientific pioneers. They've fostered an environment that's not only open but thrives on interdisciplinary collaboration. Curiosity is celebrated. Every idea, whether orthodox or outlandish, finds a welcoming space, often leading to unforeseen innovations and authentic scientific advancements. This persistent curiosity, embodying the notion that the quest for knowledge is perpetual, truly defines Whitehead's ethos.

WI: What observations have you made about the way Whitehead's scientists interact?

Michael & Victoria Chambers: Seeing the dynamic interactions between principal investigators, postdocs, and students has been amazing. There's this powerful blend of hunger and humility. Everyone, no matter their experience level, is focused on learning and advancing the field. Ego doesn't seem to have a place here — there's a genuine sense that all energy is directed toward a shared mission of expanding knowledge. This creates an atmosphere where ideas flow freely, collaboration happens naturally, and people are deeply motivated to contribute to something bigger than themselves.

WI: What role do you feel that basic biological research can play in the overall biomedical enterprise in the decades ahead?

Michael & Victoria Chambers: Fundamental research is central to biomedical progress. We're at a pivotal moment where technology meets biology in an unprecedented way. With computational power, we can now predict how proteins will behave before we even synthesize them. And with big data, we're analyzing everything from single-cell behavior to outcomes from thousands of patient records.

> "For the future, the role of basic biology can't be overstated. It's about ensuring we're equipped to solve current medical challenges and anticipate and address those on the horizon."
> — Michael & Victoria Chambers

This creates a virtuous cycle where each discovery fuels more discoveries. Basic research doesn't just support this cycle; it drives it. It's where we understand the mechanisms behind life, which is essential for translating these findings into real-world applications. For the future, the role of basic biology can't be overstated. It's about ensuring we're equipped to solve current medical challenges and anticipate and address those on the horizon.

WI: What drove your decision to underwrite creation of an AI-focused Innovation Initiative at Whitehead Institute?

Michael & Victoria Chambers: We have always believed in the transformative work happening at the Whitehead Institute. By contributing to this AI initiative, we're excited to enhance the Institute's capabilities. We aim to support its researchers in their pioneering efforts and to facilitate a broader sharing of knowledge and technology, ensuring the entire scientific community can advance with these powerful tools.

WI: In more general terms, what do you feel are the most significant opportunities for enhancing biological research through AI?

Michael & Victoria Chambers: AI holds the promise to significantly boost biological research through several direct applications —

Data handling and insight generation: AI excels at navigating through large-scale data, spotting trends or discrepancies that might elude human eyes. This capacity is especially beneficial in fields like genomics or proteomics, where data sets are enormous.

Optimizing research strategies: With AI, experimental design can be enhanced by forecasting results based on findings from past experiments, streamlining procedures for maximum effectiveness, or proposing new methods through computational simulations.

Virtual protein structuring: Thanks to initiatives like AlphaFold, AI demonstrates its potential in modeling protein structures, offering groundbreaking insights for drug discovery and exploring protein roles without traditional lab experiments.

Tailoring medical treatments: Through AI, we can now customize medical treatments according to a person's unique genetic makeup, forecasting their reaction to drugs or therapeutic approaches.

Speeding literature synthesis: AI can keep researchers abreast of the latest scientific literature by distilling key points, spotlighting significant advancements, or forecasting future research.

WI: What scientific impact are you hoping the Whitehead Innovation Initiative will have had ten years from now?

Michael & Victoria Chambers: In a decade, we envision the Whitehead Innovation Initiative having led to —

Advanced computational tools: The initiative will have developed tools that make complex data analysis routine, enabling discoveries in areas like cellular processes or disease mechanisms at an unprecedented pace.

Leadership in interdisciplinary collaboration: By fostering a culture where computational scientists and biologists work hand-in-hand, the Initiative will have led to breakthroughs in fields like cancer research, where AI helps in understanding metastasis or resistance mechanisms.

Real-world medical applications: The Initiative's work will have contributed to the development of new diagnostic tools, therapeutic methods, and personalized medicine approaches, directly impacting patient care.

Tool development for unresolved questions: New AI methodologies will have been created or refined to tackle questions that were once out of reach, like predicting the spatial dynamics of cell populations or simulating entire biological systems for drug testing.

Global leadership in Bio-AI: Whitehead will be recognized as a global leader in the integration of AI with biology, influencing how research is conducted not just within its own walls but across the scientific community worldwide.

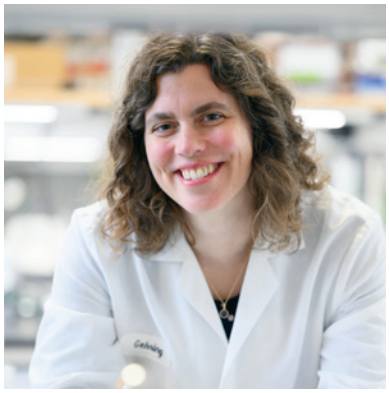
WI: Any thoughts that we haven't touched on?

Michael & Victoria Chambers: We would like to highlight the importance of looking beyond the immediate horizon. Science doesn't just move in a straight line; it spirals upward through the collective efforts of many. We hope that Whitehead Institute continues to foster environments where risk is appreciated as much as success, where curiosity leads to discovery, and where the pursuit of knowledge is valued above all else.

Moreover, we want to express our deep appreciation for Whitehead's leadership and community. Your commitment to excellence, to ethical research practices, and to sharing knowledge freely is what drew us to support your endeavors. It's this kind of integrity and vision that will ensure the Institute remains at the forefront of scientific discovery. Keep pushing the boundaries, and thank you for allowing us to be part of this extraordinary journey in advancing human knowledge.

Awards and recognitions

Here is a sampling of the honors and major grants received by Whitehead Institute researchers this past year.



Mary Gehring was appointed an Investigator of Howard Hughes Medical Institute

Considered one of the most prestigious appointments in biomedical research, HHMI Investigators receive substantial direct support over a renewable seven-year term. With that support, Gehring will expand her lab's studies on plant epigenetics, growth, and development. That work aims to provide the scientific foundations for engineering alternative modes of seed development and improving plant resiliency — enabling scientists to develop food crop plants better able to withstand changing conditions resulting from climate change.

Siniša Hrvatin received a 2024 McKnight Scholar Award

The awards, from the McKnight Endowment Fund for Neuroscience, are given to exceptional young scientists who demonstrate the potential for having important impact through their basic science studies of the brain and their discoveries' translation to clinical practice. One of just ten early career scientists to receive a 2024 McKnight Scholar Award, Hrvatin's research seeks to address fundamental biological questions about the capacity of certain species to survive harsh environmental conditions by decreasing body temperature and entering torpor or hibernation.

Rudolf Jaenisch was awarded the ISTT Prize by the International Society for Transgenic Technologies

The prize recognizes his exceptional contribution to the field of animal transgenesis over the past five decades. Jaenisch is globally renowned for his groundbreaking body of work in the development of transgenic animals and the generation and use of induced pluripotent stem cells. In announcing the award, the organization stated that Jaenisch's scientific achievements have "revolutionized the understanding of embryonic development, cloning, epigenic regulation, cancer and disease, [and] transformed the work of the transgenic community and the scope of our activities."

Ruth Lehmann was named a Foreign Member of the Royal Society

The Royal Society is the United Kingdom's national academy of sciences and the world's oldest national scientific organization. Lehmann's election recognizes her pioneering studies of the mechanisms underlying the embryonic development and reproduction of the fruit fly Drosophila. In particular, the Royal Society noted her work establishing the role of messenger RNA localization in specifying the antero-posterior body axis and germ line development; and her discoveries on the role of lipid-based signaling pathways in the migration of germ cells to the developing gonads.

Aditya Raguram has received a 2024 NIH Director's Early Independence Award

The award supports his work to develop cell-derived bioparticles into safe and efficient vehicles for delivering therapeutic proteins into cells. The award program supports promising, newly graduated scientists with the intellect, creativity, and maturity to bypass a traditional postdoctoral training period and instead launch an independent research career. Toward his ultimate goal of using bioparticles loaded with therapeutic proteins or RNAs to treat specific diseases, Raguram's project seeks to understand factors that regulate bioparticle formation and to develop strategies for highly efficient bioparticle production. His previous work toward that goal earned Raguram recognition from the MIT Technology Review as one of its 2024 *Innovators Under 35* — which recognized him for developing groundbreaking tools to make CRISPR genetic engineering more practical for treating a wide range of genetic disorders.

The American Society of Tropical Medicine and Hygiene selected Sebastian Lourido to receive its 2024 William Trager Award

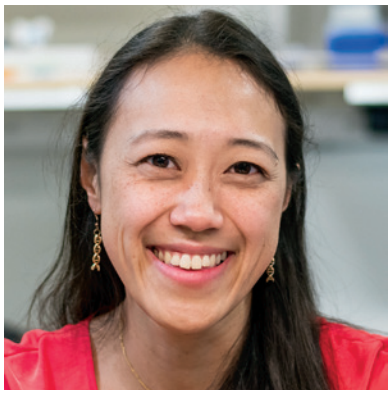
The Award recognizes scientists who have made substantial contributions to the study of basic parasitology through breakthroughs that have unlocked completely new areas of work. ASTMH selected Lourido in recognition of his groundbreaking discoveries on the molecular biology of toxoplasma. In particular, he was lauded for his use of cutting-edge CRISPR tools to study the fundamental biology of *Toxoplasma gondii*, a single-celled parasite that infects about 25 percent of humans.

The 2024 Regeneron Prize for Creative Innovation has been separately awarded to PhD students Christopher Giuliano and Julian Roessler

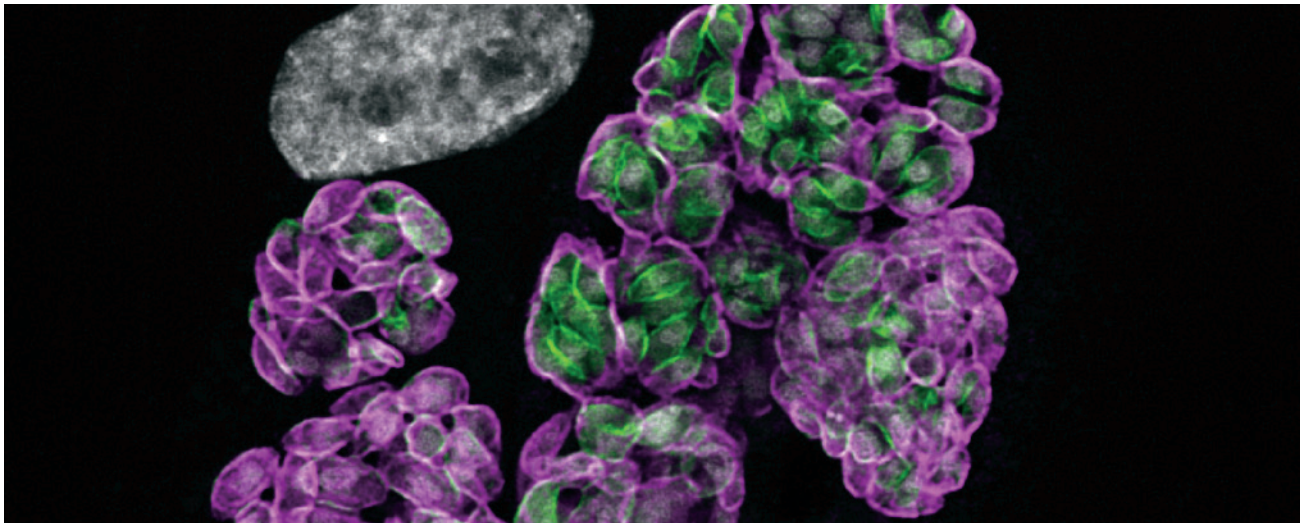
Giuliano and Roessler are conducting their doctoral research in the labs of Whitehead Institute Members Sebastian Lourido and Siniša Hrvatin, respectively. A competitive award designed to recognize exceptional talent and originality in biomedical research, the Prize is awarded to trainees who display great scientific clarity, elegance, precision, and creativity. In addition, Chen Weng, a researcher in the lab of Whitehead Institute Member Jonathan Weissman, was named a finalist in the Prize's postdoctoral fellows competition.

The Howard Hughes Medical Institute selected postdoctoral researcher Maiko Kitaoka as a Hanna H. Gray Fellow

As one of 25 scientists selected for the prestigious appointment in 2023, Kitaoka will receive funding that supports her postdoctoral research in the lab of Whitehead Institute Member Yukiko Yamashita and that may continue into her early career as independent faculty. Kitaoka studies how sperm genomes are safeguarded and filtered to ensure sperm quality and fertility; in that work, she explores intersections between DNA damage responses, genome architecture, and sperm developmental dynamics.



Picturing science

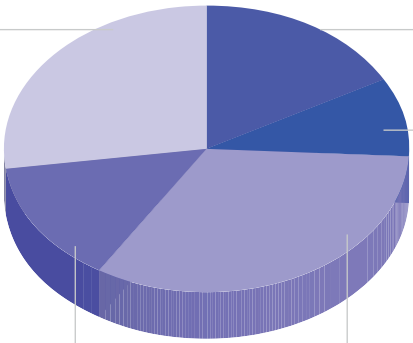


The parasite *Toxoplasma gondii* typically divides by a process called endodyogeny where two daughter cells are formed within a mother cell that is eventually consumed by the daughters. However, this image shows parasites with an atypical trait in which more than two daughters emerge within a single mother cell, ultimately leading to the formation of large plasma membrane spheres containing a multitude of daughters.
Credit: Dominic Schwarz/Whitehead Institute

Financial Summary

Revenues & Support

2024 TOTAL **$112.9 M**



27%
INVESTMENT SUPPORT
30.9 M

17%
CORPORATE & FOUNDATION SUPPORT
19.1 M

9%
GIFTS & OTHER REVENUE
10.5 M

14%
FEDERAL GRANTS
14.7 M

33%
NET INTELLECTUAL PROPERTY REVENUE
37.7 M

2023

Investment Support
31.5 M [32%]

Corporate & Foundation Support
20.2 M [20%]

Gifts & Other Revenue
9.7 M [10%]

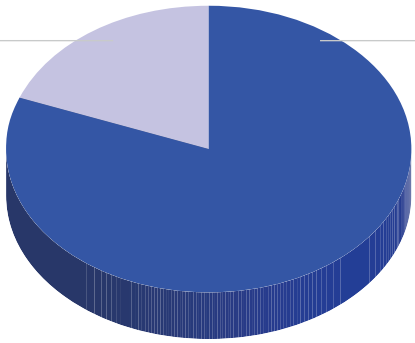
Net Intellectual Property Revenue
23.9 M [24%]

Federal Grants
13.3 M [14%]

TOTAL
$98.6 M [100%]

Operating Expenses

2024 TOTAL **$104.9 M**



19%
GENERAL & ADMINISTRATIVE
19.8 M

81%
RESEARCH
85.1 M

2023

Research
81.1 M [83%]

General & Administrative
16.6 M [17%]

TOTAL
$97.7 M [100%]

Whitehead leadership

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Rudolf Jaenisch
Harvey F. Lodish
Robert A. Weinberg

Members
David Bartel
Iain Cheeseman
Olivia Corradin
Mary Gehring
Siniša Hrvatin
Ankur Jain
Pulin Li
Sebastian Lourido
David C. Page
Peter Reddien
Jonathan Weissman
Yukiko Yamashita
Richard A. Young

Whitehead Fellows
Lindsey Backman
Allison Hamilos
Tobiloba Oni
Aditya Raguram
Na Sun
Kipp Weiskopf

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The Whitehead Fellows program allows exceptionally talented young scientists to establish independent research programs without undertaking the full range of normal faculty duties.

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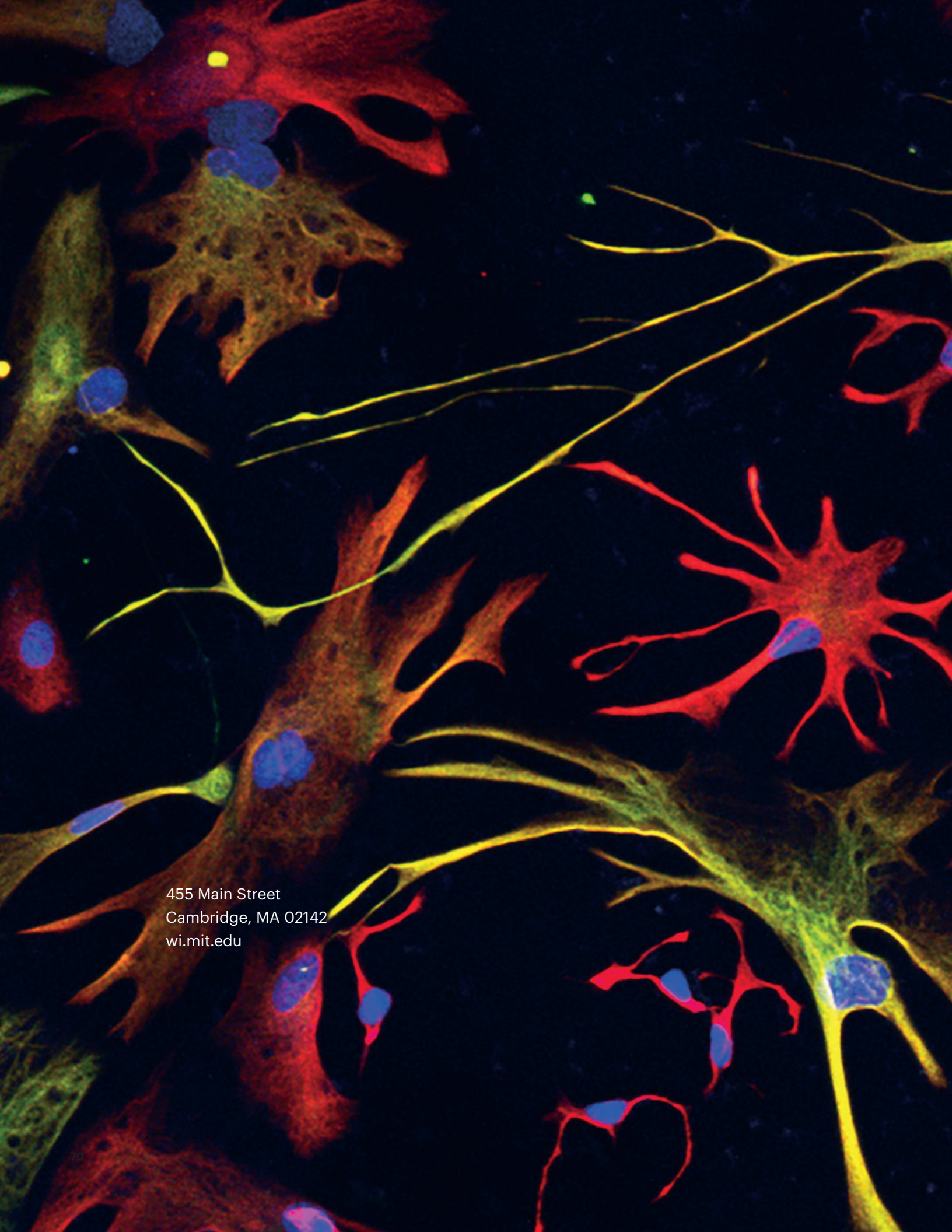

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