

# HHMI: Catalyst for Discovery

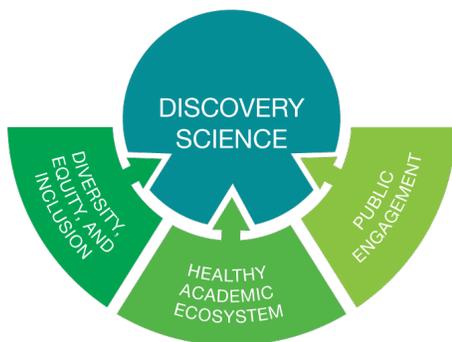
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**hhmi** | Howard Hughes  
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# HHMI: Catalyst for Discovery

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For 60 years, HHMI has been moving science forward. We're an independent, ever-evolving philanthropy that supports basic biomedical scientists and educators with the potential for transformative impact. We make long-term investments in people, not just projects, because we believe in the power of individuals to make breakthroughs over time. HHMI scientists have radically advanced the understanding of cells, the brain, the immune system, the development of organs, and how to treat many diseases.

Our HHMI community cultivates an ethos of excellence. We think in generations—and we want the next generation of science to be more vibrant and inclusive than today. We see potential for significant changes in academic culture, from science education to the research environment. We're committed to experimenting with new approaches to achieve progress and sharing what we learn along the way.

To ensure that we use HHMI's resources for maximum impact, we've established core priorities to guide our decisions over the next five to ten years. During this time, we will focus on: reaffirming our commitment to discovery science; increasing diversity and inclusion in the scientific workforce; engaging the public; and fostering a healthy academic ecosystem.

Significant new knowledge cannot be supplied on demand—it unfolds over time, through exploration, experimentation, and rigorous debate.

## REAFFIRMING OUR COMMITMENT TO DISCOVERY SCIENCE

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Significant new knowledge cannot be supplied on demand—it unfolds over time, through exploration, experimentation, and rigorous debate. HHMI catalyzes discovery in basic biomedical research, generating knowledge about the structure and function of living systems at the level of molecules, cells, behaviors, and interactions, with potential to benefit humanity. We place big bets on curious and ambitious researchers, supporting them with generous and flexible funding for significant periods of time, subject to rigorous periodic scientific review. As one measure of success, to date, 28 current or former HHMI scientists have been awarded a Nobel Prize. We take our responsibility as a major supporter of discovery science seriously and look to make maximum impact, particularly at a time in which many funders are shifting toward more applied research.

**Goal:** HHMI will ensure that our investigators are fully able to explore new scientific territory, taking the intellectual and career risks necessary to advance our basic understanding of biology.

- ▶ **Rationale:** The HHMI Investigator program is HHMI's longest-running effort to sustain innovation in science. With our support, investigators build a research team and environment well suited to tackle profound science questions, with the assurance that they have adequate time, funding, equipment, peer community, mentoring, and lab and support staff.
- ▶ **Approach:** We will continuously work to evaluate the HHMI Investigator program and adjust the resources we offer investigators, including factors such as the terms of eligibility to become an investigator, the length of an investigator's term, the level and nature of support provided to investigators, and the frequency and nature of investigator competitions.

**Goal:** HHMI will continually catalyze new research fields at our Janelia Research Campus, through tool development, discovery science, and training.

- ▶ **Rationale:** HHMI scientists at Janelia have transformed how researchers worldwide study and understand the brain by developing and applying critical new tools, including microscopes, fluorescent sensors, and imaging dyes. Looking ahead, we believe that Janelia can break open other high-impact, challenging research areas with similarly collaborative efforts. To achieve this scientific impact, we plan to periodically change research focus as current areas mature and to actively recruit the next generation of independent scientists to help develop new areas.
- ▶ **Approach:** We are now operating on 15-year research cycles at Janelia. We will develop a given research area for roughly 15 years to gain traction and attract outside interest, at which point we'll cycle to a new area of focus. This approach enables Janelia to stay at the frontier of science, advancing 1-3 research areas at any point in time. HHMI will hold open competitions to determine Janelia's future research areas. In addition, we will emphasize recruitment of highly creative scientists who are ready to pursue an independent research career soon after graduate school.

**Goal:** HHMI will actively develop strategic partnerships with philanthropies and donors to invest in promising scientists and discovery science.

- ▶ **Rationale:** There are many more deserving scientists than HHMI can fund through our programs. By partnering with other philanthropies, we can extend our successful programs and share our knowledge with individuals and organizations interested in supporting discovery science.
- ▶ **Approach:** HHMI's rigorous and multi-phased review process relies on an administrative infrastructure and expert reviewer network that are difficult for small or new foundations to build. We will offer select philanthropies and donors the opportunity to join us in funding select scientists or projects. We will also seek appropriate opportunities to share HHMI's funding philosophy and approach with others.

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## INCREASING DIVERSITY, EQUITY, AND INCLUSION IN THE SCIENTIFIC WORKFORCE

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HHMI's research labs, like many others, do not reflect the demographic diversity of the U.S. population. As a result, we miss talent that we otherwise might have in science. That's a problem—not only socially, but also scientifically. We want to find the best solutions to difficult problems. To do that, we need the varying perspectives of people who come from different races, ethnicities, genders, training backgrounds, and more.

**Goal:** HHMI will actively use our resources—funding, community, and influence—to increase diversity, equity, and inclusion in our scientific community and beyond.

- ▶ **Rationale:** At large U.S. research universities, only a quarter of full professors in the life sciences are women. The number of underrepresented minorities is vanishingly small. Because HHMI trains many scientists in top academic labs, we have a unique opportunity to address this important problem by actively identifying and nurturing talent from all backgrounds.
- ▶ **Approach:** We work to foster the scientific careers of highly talented researchers from underrepresented groups in science. Through our Gilliam Fellows program, we hold open competitions to select and support underrepresented PhD students. Similarly, our Hanna H. Gray Fellows program selects postdoctoral fellows, who are funded all the way into the first few years of an independent academic appointment. In addition to these program efforts, HHMI is placing new emphasis on developing inclusive environments in our own labs and operations.

**Goal:** HHMI will partner with universities and colleges to build their capacity to develop scientific talent in ALL students and to overcome barriers such as socioeconomic status, gender, or ethnic and racial background.

- ▶ **Rationale:** Every year in the U.S., about 40% of freshmen (more than 1.5 million students) enter college planning to study science, technology, engineering, or math (STEM). Before the end of their sophomore year, many switch to non-STEM majors. This attrition is greatest among underrepresented groups, where up to 80% leave STEM. Why does this happen—and what can schools do about it?
- ▶ **Approach:** We support the development and sharing of innovative approaches that colleges and universities can take to enable students from all backgrounds to experience science and to pursue further study of science. Our Inclusive Excellence initiative challenges schools to make foundational and lasting changes, from improving the structure of science coursework and teaching to adjusting school policies, better training faculty, and improving campus culture so that all students have positive exposure to science. We are working to identify the key ingredients of the most successfully inclusive school environments, so that other schools can adopt what works. For example, we seek to replicate the success of programs such as the Meyerhoff Scholars program at the University of Maryland, Baltimore County.

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## ENGAGING THE PUBLIC

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The sustained excellence of our nation's science, and its proper role in society, depends upon a public that understands the importance of science—its process, as well as its payoffs. To value science, the public needs good and compelling information. HHMI has established a leading position in public engagement as an organization with both a deep understanding of biological science and education and professional media production capabilities. HHMI has the potential for significant positive impact on a national scale. Two elements essential to making that impact are powerful partners and powerful content.

**Goal:** HHMI will enable established journalism organizations to provide greater and deeper coverage of science and medicine.

- ▶ **Rationale:** Today's news organizations lack resources for in-depth reporting and storytelling, which has led to decreases in both the amount and depth of science coverage across the country. The current rise in anti-scientific attitudes makes this a particularly important time to bring science to broad audiences.
- ▶ **Approach:** We will work with organizations such as the Associated Press, the largest provider of news content in the world, to promote greater and deeper coverage of important scientific topics. We will increase awareness and knowledge about contemporary science among people of different ages and backgrounds.

**Goal:** HHMI will create powerful science content that inspires and engages a broad spectrum of audiences.

- ▶ **Rationale:** Good information is necessary yet insufficient to convey the role of scientists in shaping our world. To fully value science, the public also needs to be inspired. That inspiration often comes from a glimpse into the hearts and lives of scientists—their passions, aspirations, struggles, setbacks, and the price many pay for the reward of discovery.

- ▶ **Approach:** To bring powerful stories about the lives and work of scientists to the public, HHMI Tangled Bank Studios will continue to seek out and collaborate with exceptional filmmakers who work in the most immersive formats. These films will be the cornerstones of larger media projects that employ a combination of strategies and partners to increase our reach and to inspire greater appreciation for and interest in science among diverse audiences.

We believe HHMI has an opportunity to collaborate with other scientific leaders to address these issues in concrete ways.

## PROMOTING A HEALTHY ACADEMIC ECOSYSTEM

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Federal and state funding for higher education has tightened considerably in recent years, creating a hyper-competitive academic research environment. Researchers confront pressure to constantly pursue multiple grant opportunities, demonstrate research impact by publishing in a handful of highly selective journals, and protect their data, rather than share information for the betterment of science. At the same time, they are not rewarded for taking time to teach, mentor, and serve the scientific community. These trends contribute to a systemically unhealthy academic environment, impeding the exploratory nature of discovery science and threatening the quality of U.S. biomedical research. We believe HHMI has an opportunity to collaborate with other scientific leaders to address these issues in concrete ways.

**Goal:** HHMI will promote and model a scientific publishing system that puts the interest of science above the interest of publishers, through open dissemination and transparent evaluation of scientific work.

- ▶ **Rationale:** If we value scientists who share their research results openly and rapidly, we need to devise better incentives to promote a culture of open science. Currently, academic incentives are pegged to a publishing system that was designed in a pre-digital world, with journals as gatekeepers of quality control and publishing. As a result, scientific publishing serves the interests of publishers over those of the scientific community. Many academic institutions effectively buy into this model by making decisions about their faculty based largely on journal metrics and quantity of output.
- ▶ **Approach:** In partnership with other funders and scientific organizations, we will consider and support new publishing models, such as author-driven dissemination and a transparent evaluation process that treats peer reviews as scholarly work. We will also leverage HHMI's support for, and lessons from, the journal *eLife*, which has already established a transparent and consultative peer review process.

**Goal:** HHMI will promote consideration of models for faculty evaluation that emphasize the long-term impact of their research and include an evaluation of teaching, mentoring, and service.

- ▶ **Rationale:** If we value scientists who execute original, creative, and bold research programs, while contributing to the greater scientific community, we need to evaluate them based on these characteristics. HHMI applies these standards to evaluation of our HHMI investigators. While the exact methods that work for HHMI will not work everywhere, we believe that scientific leaders can together pioneer effective principles of evaluation—ultimately changing science for the better.
- ▶ **Approach:** In partnership with leaders of academic institutions and funders, we will explore how to better evaluate research performance, teaching, mentoring, and service. We plan to do this by convening leaders, sharing our experience, and continuing to refine our own methods of evaluation.

## CONCLUSION

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There is no more important time to invest in discovery science. Scientists are capturing an increasingly sophisticated molecular view of the behavior of cells and organisms. Studies of human cells, genes, and genomes also can illuminate many of the underpinnings of human health and disease that previously could only be inferred from the study of model organisms. In a variety of biomedical fields, HHMI scientists continue to challenge our very understanding of how life works. The new knowledge they create has great potential to benefit humanity.

But it's not enough to simply do and support science. If we want the resulting discoveries to be effectively translated into benefits for society, we also need to address the challenges and opportunities that today's research environment presents. As a recognized leader in research and education, HHMI has unique opportunity to respond meaningfully to these challenges—in the scientific community, in classrooms, and in the public arena. We are committed to driving science forward.

[www.hhmi.org](http://www.hhmi.org)

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