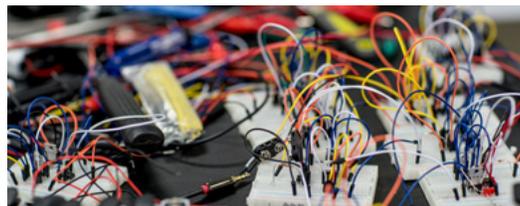
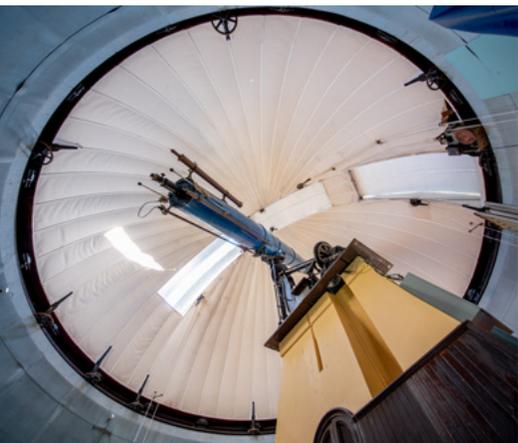
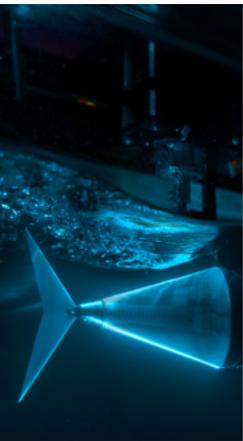
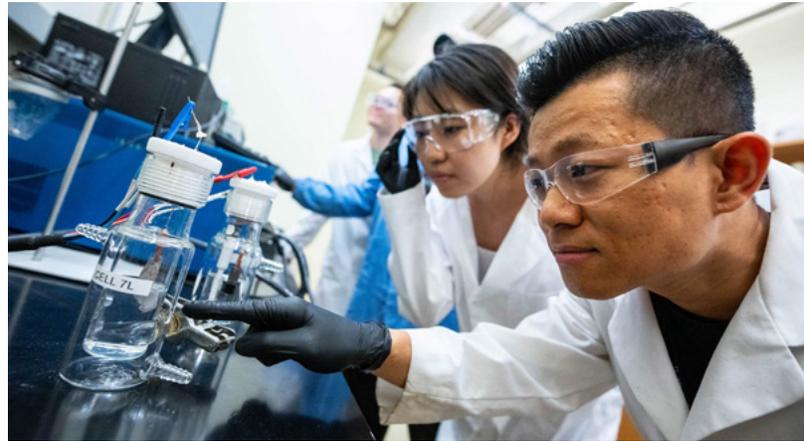


2023 ANNUAL RESEARCH REPORT



LETTER FROM THE VICE PRESIDENT FOR RESEARCH

Dear colleagues,

I am delighted to present the annual report for the Office of the Vice President for Research (VPR) at the University of Virginia. As we reflect on the accomplishments and progress of fiscal year 2022-2023, I am filled with immense pride and gratitude for the tireless efforts of our dedicated researchers, scholars, and staff.

At the heart of our mission lies a commitment to advancing knowledge and serving society on a local, national, and global scale through research, scholarship, creative arts, and innovation. We are driven by the pursuit of discoveries that enrich and improve lives, and this year has been no exception.

I am thrilled to announce that our research enterprise has experienced remarkable growth, reporting a record \$532 Million in sponsored awards during the fiscal year, representing a phenomenal increase of over 22% compared to the previous year. This success is a testament to the dedication, creativity, and collaborative spirit of the UVA research community.

We remain steadfast in our commitment to support and invest in our researchers and infrastructure. Our five research themes—Democracy, Environmental Resiliency and Sustainability, Brain & Neuroscience, Precision Medicine/Health, and Digital Technology and Society—continue to thrive as we nurture their development and explore new frontiers.

Last year, we made strategic investments of \$50M in each of the first three themes, and I am pleased to share that this year we expanded our efforts by making further investments of similar magnitude in the last two strategic areas. These investments will not only bolster our research capabilities but also attract top talent, enabling us to make even greater strides in these critical fields.

In line with our dedication to fostering innovation, I am delighted to announce that we launched the Paul and Diane Manning Institute of Biotechnology. This exciting initiative will focus on pioneering cellular, gene, and immunotherapies, while also serving as a hub for new business ventures. Moreover, we are excitedly anticipating the construction of a state-of-the-art lab building at Fontaine Research Park, scheduled to begin in 2024, which will further enhance our research capabilities.

As we move forward, we are determined to maintain our upward trajectory, nurturing a thriving research ecosystem that enables our faculty and staff to push boundaries and make transformative discoveries. I extend my heartfelt gratitude to all those who have contributed to this remarkable success, and I invite you to explore the achievements and breakthroughs detailed in this annual report. It is an exciting time to be a part of the research endeavors at UVA, and together we are making a lasting impact, not only within our institution but also across the Commonwealth of Virginia, the nation, and the world.



Sincerely,

Melur "Ram" Ramasubramanian

TABLE OF CONTENTS

RESEARCH BY THE NUMBERS **03**

THE OFFICE OF THE VICE PRESIDENT FOR RESEARCH **04**

COLLABORATION AND INNOVATION **06**

SIGNIFICANT DISCOVERIES **08**

STRATEGIC INVESTMENTS **12**

FACULTY RECOGNITION **15**

RESEARCH BY THE NUMBERS



\$2.43B
Research
Proposals



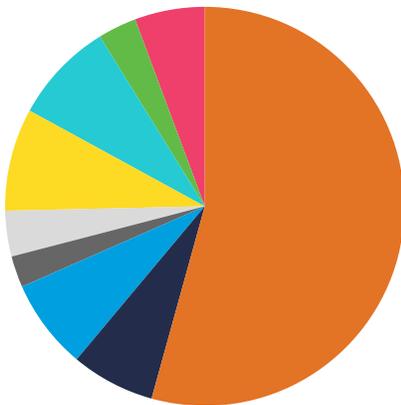
\$662.7M
Total R&D
Expenditures FY22



63%
Sponsored Funding increase
FY16 - FY23



\$532M
Sponsored Funding
for FY22 - FY23

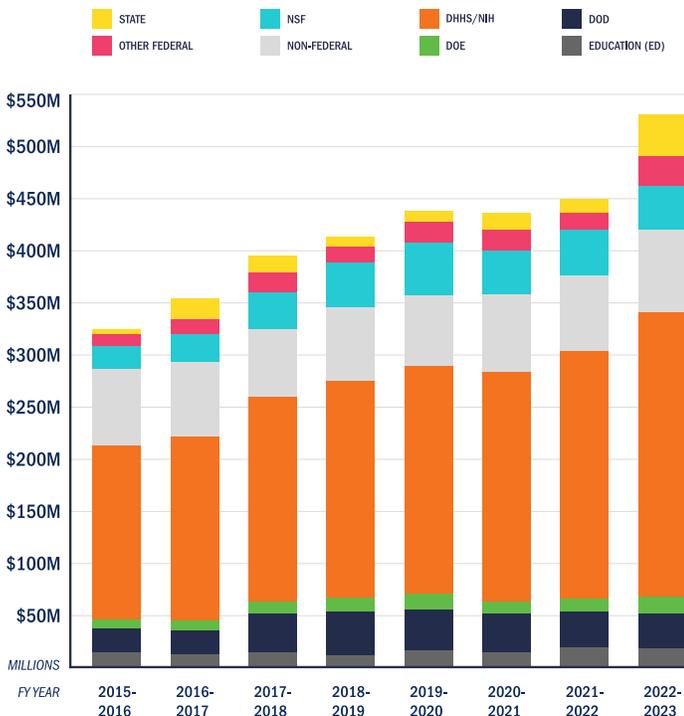


TOTAL AWARDS BY SOURCE FY22 - FY23: \$532,430,000*

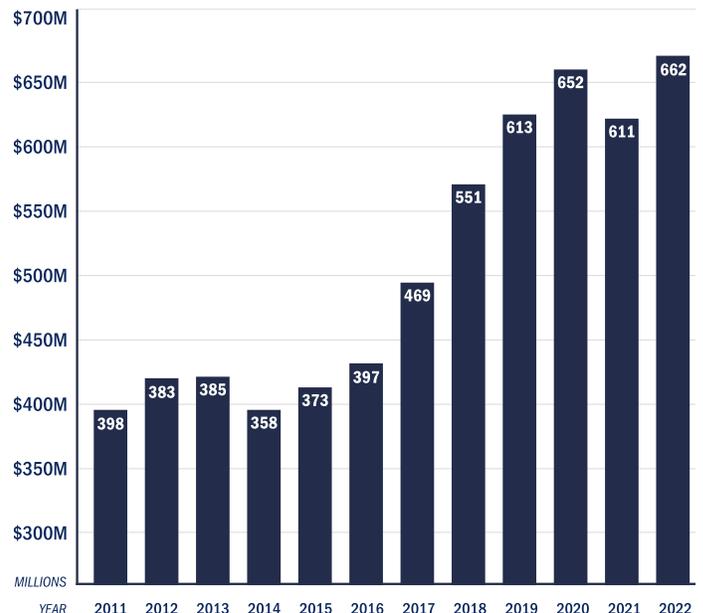
■ HEALTH & HUMAN SERVICES (DHHS/NIH) \$277,450,000	■ FOREIGN GOVERNMENTS \$13,380,000	■ DEPARTMENT OF DEFENSE (DOD) \$34,720,000
■ NATIONAL SCIENCE FOUNDATION (NSF) \$42,270,000	■ INDUSTRY & SUBCONTRACTS \$19,460,000	■ DEPARTMENT OF ENERGY (DOE) \$15,960,000
■ STATE & LOCAL \$40,630,000	■ FOUNDATIONS \$41,260,000	■ OTHER FEDERAL \$29,730,000

* As of 8/21/23

SPONSORED RESEARCH AWARDS: FY15 - FY23



UNIVERSITY R&D EXPENDITURES: 2011 - 2022



THE OFFICE OF THE VICE PRESIDENT FOR RESEARCH (VPR)

WHAT DOES THE VPR OFFICE DO FOR UVA RESEARCHERS?

The VPR office is an important resource and helps to advance UVA research through every step in the process—everything from finding funding, applying for grants, doing human subject or animal research, making sure labs are safe and in compliance with both ethics and policies to launching new ventures, patents for inventions and communicating their research to the world.

Photo courtesy UVA Communications



SEED FUNDING

- 3Cavaliers
- P2PE STEM
- Grand Challenges
- Pan-U Institutes
- SIF Projects
- School & Central Seed Funds
- Venture Fund
- Licensing & Ventures Seed Fund



OPERATIONAL EXCELLENCE

- Human Subject Protection Program
- Center for Comparative Medicine
- Animal Care & Use
- Environmental Health & Safety
- Radiation Safety
- Export Controls
- Sponsored Programs
- Data Security
- Foreign Influence
- Licensing & Ventures



GROW RESEARCH

- Creation of Large & Complex Proposals
- Award Nominations
- Coordinate with State & Federal Agencies
- Limited Submissions
- Data Analytics



IMPACT & COMMUNICATE

- Sponsored Research
- Philanthropic Support
- Quantity & Quality of Publications
- Faculty Recognition
- National Academy Members
- Translation of Discovery & Knowledge
- Research-enabled Student outcomes
- Peer recognition (Ranking)



FUNDING INNOVATIVE NEW RESEARCH

The Office of Sponsored Programs supports faculty members, assisting them with their grant proposals, budgets, processing, and review. Our growing Research Development team is here to help researchers prepare large scale grant proposals. Seed funding initiatives like 3Cavaliers, P2PE, and more help faculty get new research projects off the ground and provide the data they need to apply for larger grants.

“ Our office works with faculty and staff to improve UVA’s overall effectiveness and expertise in research administration. As an alum who feels a great passion for UVA, I can think of no better place and time to be in research administration. ”

- Stewart Craig, *Executive Director, Office of Sponsored Programs*



KEEPING UVA SAFE AND COMPLIANT WITH ALL REGULATORY REQUIREMENTS

Environmental Health and Safety helps keep UVA labs safe and compliant. The Human Research Protection Program, Office of Animal Welfare, Animal Care & Use Committee, and Center for Comparative Medicine all make sure that research at UVA is done ethically, protects participants, monitors animal care, follows policies, and is compliant with all regulations.

“ Our daughter Violet is the beneficiary of translational research and alive today because of clinical trials. This is more than a job. It’s a lifelong passion. ”

- Raphael “Ralph” Malbrue *Executive Director & Attending Veterinarian, Center for Comparative Medicine*



ENCOURAGING INNOVATION

Licensing & Ventures Group takes the best faculty ideas and helps to turn them into companies, patents and more.

“ The entire LVG Team derives its energy and enthusiasm from working with UVA faculty, students, entrepreneurs and investors. ”

- Richard W. Chylla, *Executive Director, Licensing & Ventures Group*

COLLABORATION & INNOVATION



UVA HAS A COLLABORATIVE SPIRIT.

With an engineering school and medical school close by, many innovative and collaborative centers and institutes have sprung up around Grounds. UVA currently has more than **150** externally funded projects that include an investigator in more than one school, bringing new perspectives and fresh approaches to solving problems.



Photo courtesy UVAToday

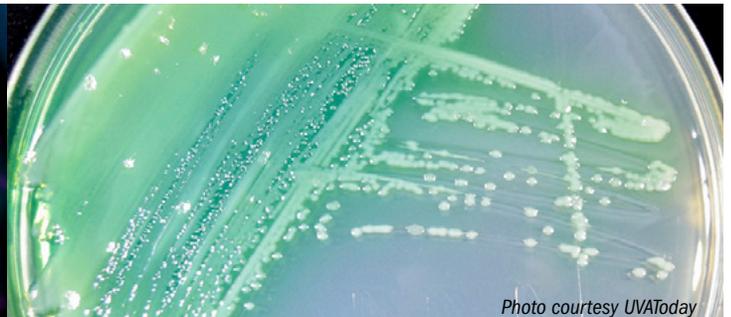


Photo courtesy UVAToday

ENGINEERING + MEDICINE

NEW CENTER FOCUSES ON THE SMALLEST COMPONENTS OF CANCER CELLS

16 faculty across two schools awarded a \$12M grant from NIH to form SASCO, the Systems Analysis of Stress-adapted Cancer Organelles Center at UVA to study interactions of organelles as a network instead of focusing on specific genes or proteins.

ARTS & SCIENCES + MEDICINE

DISCOVERY WILL AID GUT-MICROBIOME RESEARCH EFFORTS

New discovery led by Chemistry, and partnering with microbiology, that could provide a window into the complex relationship between our bodies and the community of microbes known as our microbiome and lead to new treatments for a variety of diseases.

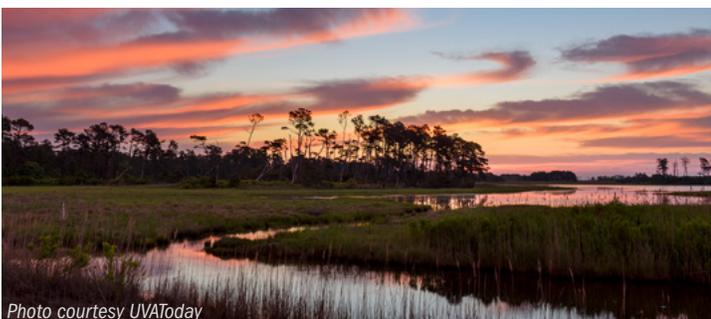


Photo courtesy UVAToday



Photo courtesy UVAToday

ARCHITECTURE + ARTS & SCIENCES + ENGINEERING

ENGAGING COASTAL COMMUNITIES TO COMBAT CLIMATE CHANGE

A joint project to find methods to build collaboration between researchers and coastal area residents and help urban and suburban communities facing climate change challenges to achieve a more resilient future.

COMMERCE + NURSING + ARTS & SCIENCES

STUDY ON SUSCEPTIBILITY TO COVID-19 MISINFORMATION

A joint project combining psychology and data science to investigate if and how psychological traits and political identity can be used to predict susceptibility to COVID-19 misinformation.

Collaboration off Grounds connects UVA research to the nation and the globe.



Photo courtesy UVA Today



Photo courtesy Civelek Lab



Photo courtesy UVA Today

UVA & CHILE:

PARTNERSHIP WITH CHILE TO BUILD LEADING-EDGE INSTRUMENTS

UVA astronomers are working with Chileans to build a new, state-of-the-art infrared spectrograph called APOGEE-2 to survey southern half of Milky Way.

UVA & NETHERLANDS:

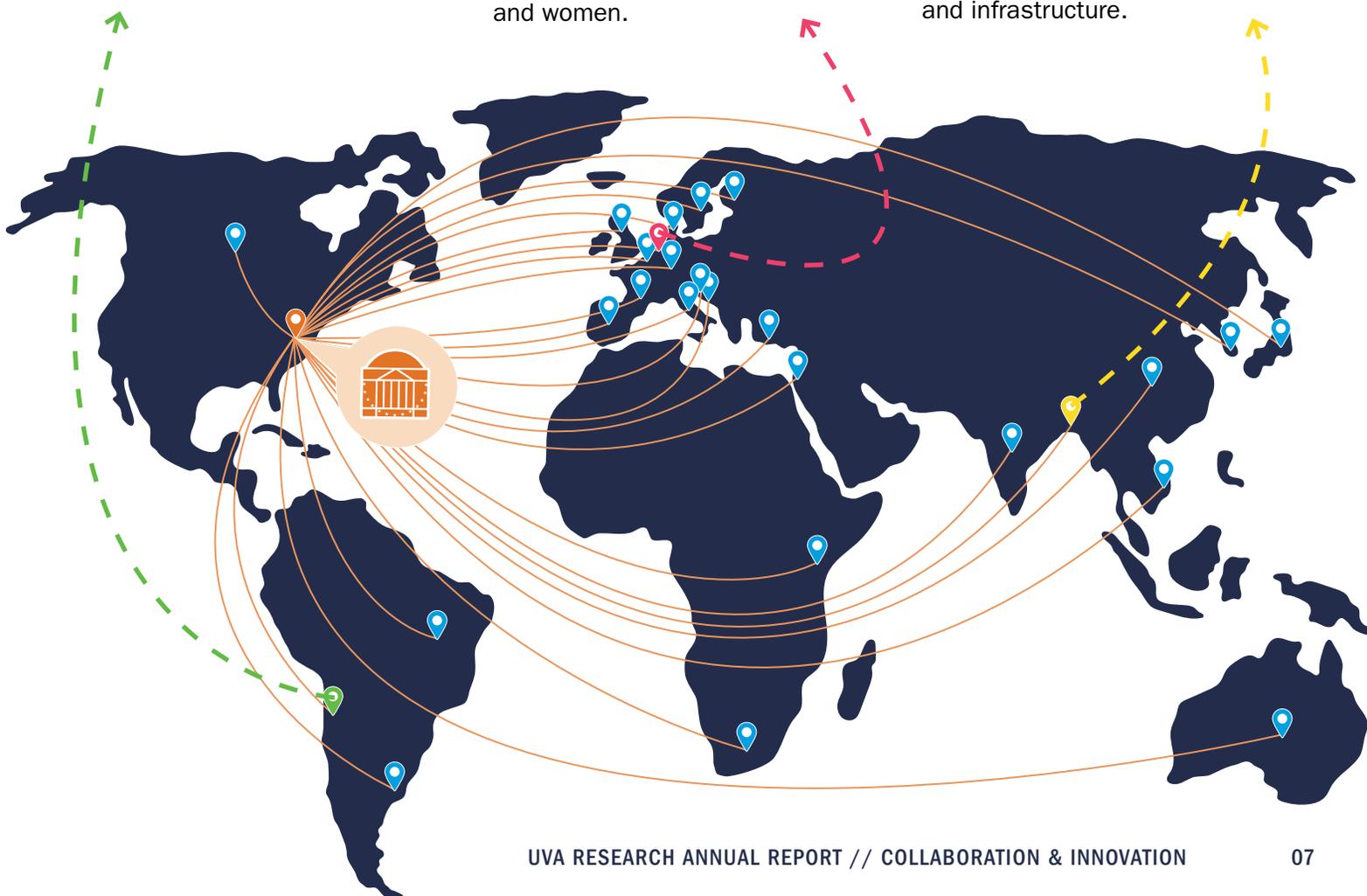
GENE DATA IDENTIFIES CANDIDATE GENES FOR NEW GENOME-WIDE ASSOCIATION STUDIES (GWAS)

A UVA Engineer is leading an international team in using big data analytics to explore the variations in disease susceptibility between men and women.

UVA & BANGLADESH:

GLOBAL NETWORK FOR WOMEN'S AND CHILDREN'S HEALTH NETWORK

UVA researchers are conducting clinical trials by pairing foreign and U.S. investigators to improve maternal and child health while simultaneously building local research capacity and infrastructure.



SIGNIFICANT DISCOVERIES

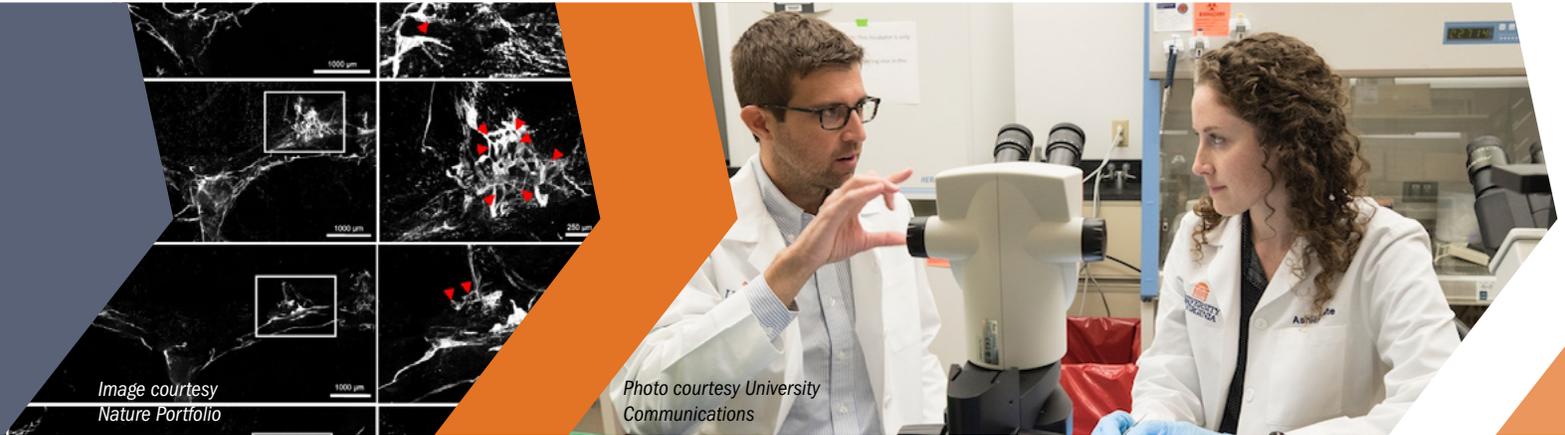


Image courtesy
Nature Portfolio

Photo courtesy University
Communications



NEWLY DISCOVERED MOLECULE ORCHESTRATES IMMUNE SYSTEM

Neuroscience researchers led by John Lukens discovered that a molecule in the brain is responsible for orchestrating the immune system's responses to Alzheimer's disease and multiple sclerosis, potentially allowing doctors to supercharge the body's ability to fight devastating neurological diseases. The molecule directs immune cells called microglia to remove plaque buildup associated with Alzheimer's and prevent the debris buildup that causes MS.

- Josh Barney



Photo courtesy UVA
Environmental News

Digital map courtesy CIRES



SATELLITES REVEAL WIDESPREAD DECLINE IN GLOBAL LAKE WATER STORAGE

More than 50 percent of the largest lakes in the world are losing water, according to a new assessment published in *Science* by a group led by Fangfang Yao, and the key culprits are a warming climate and unsustainable human consumption. By tracking lake water storage trends and the reasons behind them with satellites, scientists can give water managers and communities insight into how to better protect critical sources of water and important regional ecosystems.



Photo courtesy Making of Medicine UVAHealth



Photo courtesy UVAToday



NEW TOOL TO IMPROVE CANCER TREATMENT

An algorithm developed by cancer center researchers led by Kristen Naegle offers a new and better way to pinpoint patients who will benefit from powerful cancer drugs called kinase inhibitors, an important step forward in precision medicine tailored to the individual. The algorithm, described in an article for Nature, performs better than existing approaches, and is more applicable to understanding a patient's cancer.

- Josh Barney



Photo courtesy UVA Communications



Photo courtesy UVA Communications



HYDROGEN COULD BE MAJOR COMPONENT OF CLEAN ENERGY

Researchers led by Sen Zhang are using electrolysis, using a plentiful renewable energy source such as solar energy, to create hydrogen at an industrial scale. This process is a potential answer to two of the world's most vexing problems: high energy demand and climate change, and is part of the current administration's "Earthshot" challenge to move the nation to net-zero carbon emissions by 2050.

- Eric Williamson

SIGNIFICANT DISCOVERIES



Photo courtesy Making of Medicine UVAHealth



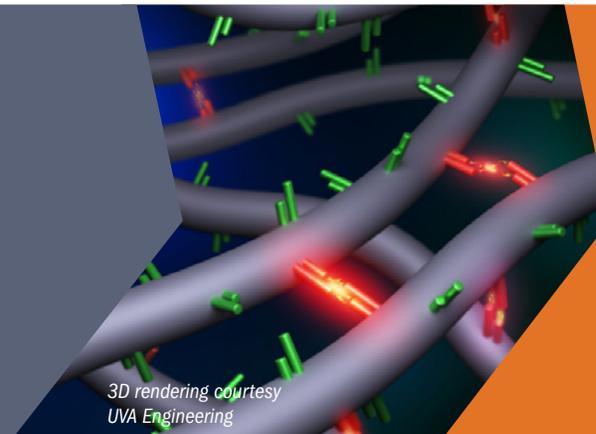
Photo courtesy National Cancer Institute



HISTORIC GENOME ANALYSIS CAN LEAD TO BETTER TREATMENTS FOR MINORITIES

Trans-Omics for Precision Medicine (the TOPMed program) led by Stephen Rich, has analyzed the entire genetic makeup of more than 53,000 people of diverse backgrounds on different continents. Most of the people are from minority groups, which have been historically underrepresented in genetic studies. The increased representation should translate into a better understanding of how heart, lung, blood and sleep disorders affect minorities and help reduce longstanding health disparities.

- Josh Barney



3D rendering courtesy UVA Engineering



Photo courtesy Brookhaven National Laboratory



DISCOVERY CHALLENGES 30-YEAR-OLD DOGMA IN ASSOCIATIVE POLYMERS RESEARCH

A team led by Liheng Cai has published a study about a class of materials called associative polymers that challenges a long-held understanding of how the materials, which have unique self-healing and flow properties, function at the molecular level. The finding has implications on how these materials are used for creating everything from recyclable plastics to human tissue engineering.

- Josh Barney



Photo courtesy
GBS19 News

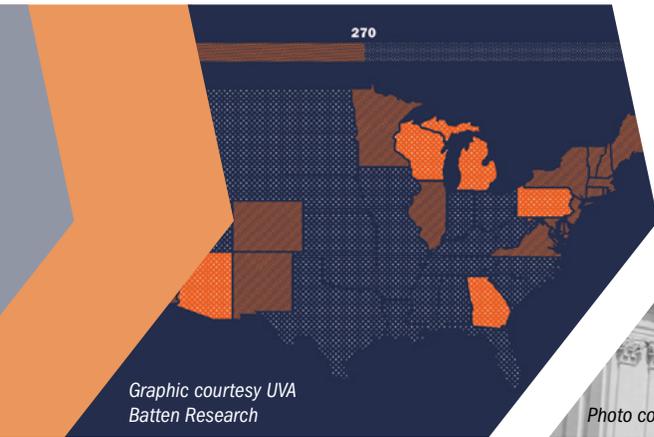
Photo courtesy UVA Communications



NEWLY IDENTIFIED PROCESSES COULD SUPPRESS THE RISK OF DEVELOPING MULTIPLE SCLEROSIS

Researchers led by Mariano Garcia-Blanco have identified a series of processes in cells that suppress the risk of developing multiple sclerosis. They found a gene that acts as a master controller for many other genes important in our susceptibility to MS and the proper functioning of our immune systems, and this discovery could lead to better prevention and treatment therapies.

- Josh Barney



Graphic courtesy UVA
Batten Research

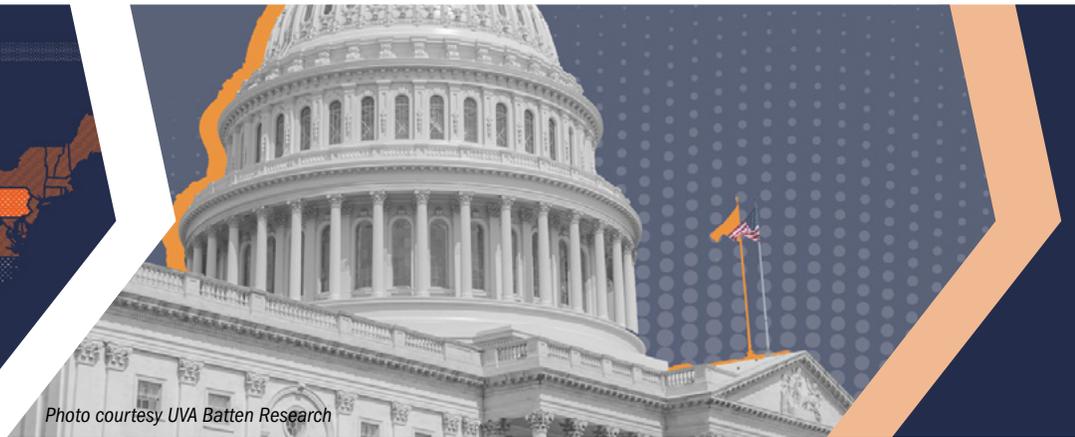


Photo courtesy UVA Batten Research



PRIMARY PATH FOR TURNING LEGISLATIVE EFFECTIVENESS INTO SUCCESS

Craig Volden headed a study on whether effective lawmakers in the US Congress receive electoral payoffs of their efforts. Are effective lawmakers better at warding off challengers in the next election? Do they win at a greater rate? To answer these questions, they drew on original data on congressional primary elections from 1980 to 2016, focusing on elections that lack partisan cues and where voters tend to be highly knowledgeable about politics.

- Craig Volden

STRATEGIC INVESTMENTS

THE 2030 PLAN

One of the goals of the strategic plan for the university is for UVA to become the best public university by 2030. One of the key pillars of the plan is enabling “discoveries that enrich and improve lives.” The five strategic research areas outlined in the plan are **Democracy**, **Environmental Resiliency and**

Sustainability, **Brain & Neuroscience**, **Precision Medicine/Health**, and **Digital Technology and Society**.

Within these areas, the VPR is focused on moving the university from prominence to preeminence through seed funding, strategic hires, investments in infrastructure, and more.



Photo courtesy UVA Communications



GRAND CHALLENGES

Grand Challenges are large strategic research investments identified in the 2030 plan intended to have a significant impact on the five research priority areas. In 2022 and 2023, \$50M in seed funding was given to each of the areas to expand research.



STRATEGIC RESEARCH INFRASTRUCTURE INITIATIVE (SRII)

SRII is developing a prioritized list of infrastructure investments to strengthen UVA's research enterprise. A steering committee and 9 working groups comprised of faculty and staff examined every aspect of UVA's current infrastructure, identifying places that need to expand and develop in order to promote growth for research.



3CAVALIERS

3Cavaliers is a program that awards seed funding to collaborative research projects with 3 faculty members from different schools and departments. 3Cavaliers 2.0, 57 projects with 171 faculty from across Grounds, successfully completed a second round of projects in May 2023.



PROMINENCE-TO-PREMINENCE (P2PE)

We invested \$19M in the Prominence-to-Preeminence (P2PE) STEM Targeted Initiatives Fund. The goal is to contribute knowledge to address major societal challenges and opportunities and move University efforts from prominence to preeminence in the five research focus areas.

PAN-UNIVERSITY INSTITUTES

Pan-University Institutes develop innovative and comprehensive approaches to solving major global challenges, bringing faculty, researchers, and staff together from across schools and disciplines for cross-disciplinary or trans-disciplinary research.



BIOCOMPLEXITY INSTITUTE

A research institute whose trans-disciplinary teams and novel structure reflects the interwoven systems they study.



KARSH INSTITUTE OF DEMOCRACY

Dedicated to the study and strengthening of Democracy.



BRAIN INSTITUTE

The UVA Brain Institute builds and sustains interdisciplinary neuroscience research teams across Grounds to address major societal challenges.



ENVIRONMENTAL INSTITUTE

Supports interdisciplinary research and training that is both great and good at the intersection of climate change and human well-being.



PAUL & DIANE MANNING INSTITUTE OF BIOTECHNOLOGY

Promotes collaborative science and establishes a state-of-the-art campus centered on research, development, commercialization, manufacturing, and patient care of new, innovative cellular, gene, and immuno-therapies.

FACULTY RECOGNITION

Our faculty at UVA are some of the best in the world. Every year, they win top prizes, teaching awards, and bring in hundreds of millions of dollars in sponsored funding.

13

NSF CAREER AWARDS IN 2022



AMERICAN ACADEMY OF ARTS & SCIENCES

Danielle Citron
Law



MOORE INVENTOR FELLOW

Rebecca Pompano
Arts & Sciences



COTTRELL SCHOLAR

Ilse Cleeves
Arts & Sciences



NATIONAL ACADEMY OF SCIENCE

Ed Egelman
Medicine



HOWARD HUGHES MEDICAL INSTITUTE

Jochen Zimmer
Medicine



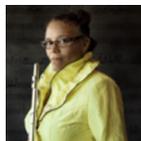
ROME PRIZE

Michael Lee
Architecture

GUGGENHEIM FELLOWSHIPS



Mamdou Dia
Arts & Sciences

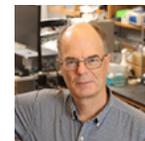


Nicole Mitchell
Arts & Sciences

NATIONAL ACADEMY OF INVENTORS



Mool C. Gupta
Engineering



John A. Hossack
Engineering



Photo courtesy VPR Office

UVA RESEARCH ACHIEVEMENT AWARDS

The Research Achievement Awards are held every January to celebrate our top researchers. Awards are presented to faculty who are making an impact in their field and are acknowledged as leaders in their field.



Photo courtesy UVA Communications



Office of the Vice President
for Research