

FUSING DISCOVERY, IMAGINATION and APPLICATION

GATEWAY 2020, Tobi Kahn
Aluminum sculpture
Thomas Jefferson University
East Falls Campus



THOMAS JEFFERSON UNIVERSITY IS A UNIQUE INSTITUTION,

marked by dualities: simultaneously new and deeply experienced; steeped in tradition and heedless of traditional boundaries; professionally focused and committed to knowledge-creation.

We conduct research both for itself and as an essential part of the educational process. In doing so, we fuse discovery, imagination and application—weaving together the pursuit of basic knowledge with its innovative translation and creative application. We strive to redefine the term “humanly possible” in disciplines ranging from immunology and vaccine development to design and creation of functional fabrics.

New to the ranks of Carnegie Research 2 Doctoral Universities, Jefferson was born of two 19th century academic institutions long respected for education and research. We are committed to a full spectrum of research; and we have created a robust culture where impassioned faculty, students, clinicians and technical staff collaborate across the traditional divides between basic, translational, clinical and applied. We honor both sides of Abraham Flexner’s assertion of the “usefulness of useless knowledge” by pursuing knowledge for its own sake and strategically mining practical impact (and human benefit) from what we learn.

From 1824 to Today

Thomas Jefferson University traces its roots to the 1824 founding of Jefferson Medical College. A pioneer in medical education, it was the first school where medical students learned by observing experienced doctors treating patients and, then, by participating in supervised, hands-on care. Since then, Jefferson researchers have had a record of discovery and research leadership in biomedical science and clinical care; and the University’s research enterprise now includes a health system with nearly four million in- and out-patient visits a year.

In 2017, Jefferson joined with Philadelphia University to form a globally engaged professional university. Philadelphia University, founded in 1884, excelled at training professionals for careers in textile and material sciences, industrial design, architecture and health professions. A leader in hands-on professional education—exemplified by its pioneering “Nexus Learning™” model—it employed applied research to connect students and faculty with public and private organizations seeking solutions for practical, real-world challenges. Today, companies, nonprofits and government agencies—from Johnson & Johnson and Federal-Mogul to NASA and Oak Ridge National Laboratories—seek out the creativity and expertise embodied in the research and education programs that are Philadelphia University’s legacy.

On that substantial cornerstone, we are building an even more robust research enterprise. We have, for example, established a new seed-funding mechanism (the Deans’ Transformational Science Awards) and





a bridge-funding program to address unanticipated gaps in external grant support. We added staff to reduce investigators' administrative burden and facilitate collaboration across research groups and disciplines. And we launched new research and development platforms such as the Jefferson Institute for Bioprocessing (described on page 20).

Driving Forward, Strategically

If we are aggressive in building our research capacities and platforms, we are highly disciplined in our overall research strategy: identifying areas of strength and meaningful opportunity, and building programs that emphasize collaborative, transdisciplinary and cross-professional approaches. This strategy is most evident in our Programmatic Research initiatives, which aim to make rapid and meaningful advances in understanding complex diseases and major societal challenges. Programmatic initiatives comprise teams of researchers with distinct, complementary expertise, who pursue a cohesive set of projects that often extends from basic research to translational, clinical and applied. In this report, we feature several of those Programs—ranging from RNA Biology (page 38) and Fibrotic Diseases (page 46) to the creation of 21st century smart cities (page 32).

The best current example of Programmatic research's ability to drive rapid and meaningful advances is highlighted on page 18: our Vaccine Center's development of a COVID-19 vaccine candidate (CORAVAX™), which went into animal trials in March 2020.

At the same time, Jefferson is dedicated to supporting fundamental research on the most basic questions of science, engineering and society—studies driven not by institutional strategy but by investigators' passions to explore very specific questions and follow the answers wherever they lead. This report illustrates the array of basic research studies we are pursuing—on topics ranging from mitochondrial function (page 56) to the epigenetics of lung disease (page 48) and the molecular basis of uveal melanoma (page 11)—and it highlights how integral they are to both the pursuit of new knowledge and the discovery of solutions to specific challenges.

This report illustrates, too, the many ways that Jefferson investigators are pioneering in the application of new knowledge. From our clinical research on reducing surgical infections (page 54) and treating liver disease (page 42) to our applied research and development projects—in fields such as functional fabrics (page 50); medical and industrial

A NOTE ABOUT OUR RESEARCH CENTERS and INSTITUTES

One way we accomplish our distinctive programmatic approach to research is by organizing as multidisciplinary centers and institutes around specific challenges. Led by visionaries and staffed by experts, these entities enable us to more quickly move discovery to translation and application; and they are excellent environments for training colleagues and students to address the practical challenges the world presents. Many of the faculty members highlighted in this publication are affiliated with one or more of these research engines—powerhouses of discovery such as:

- The NCI-designated **Sidney Kimmel Cancer Center at Thomas Jefferson University**—

which has been an international leader in oncology research, patient treatment and patient education for more than 25 years. The Center's research program includes cancer cell biology and signaling, molecular biology and genetics—focusing on a broad range of malignancies, including prostate cancer, gastrointestinal cancer and brain tumors.

- **Vickie and Jack Farber Institute for Neuroscience**—where globally recognized researchers and physicians from neurosurgery, neurology, psychiatry and neuroscience collaborate on advancements in treating neurological injury and neurodegenerative disorders, including

conditions such as Parkinson's disease, epilepsy, ALS, MS, stroke, and spinal cord and traumatic brain injury.

- **Jane & Leonard Korman Respiratory Institute—Jefferson Health and National Jewish Health**—where world-class researchers pursue bold new avenues of study on lung development and respiratory diseases; focusing, for example, on genetic determinants of airway disease, pulmonary fibrosis, pulmonary hypertension, lung inflammation and tobacco-related disorders. ■

THE EPISTEMOLOGY of JEFFERSON RESEARCH

Research at Jefferson falls into three not-mutually-exclusive categories:

- ▲ **Basic/Discovery Research**, which uncovers fundamental new knowledge in the sciences, engineering, social sciences and humanities.
- ▲ **Clinical/Translational Research**, which tests whether and how fundamental new knowledge can be translated for use—for example, in the clinical trial of a new drug.
- ▲ **Applied Research**, which subjects existing knowledge to new processes and technologies, and uses it to address specific needs for individuals, communities or organizations. It is the reduction-to-practice of prior research.

This way of organizing knowledge follows the conceptual model of scholarship presented in the 1990 Carnegie Foundation report *Scholarship Reconsidered*. The model comprises three interacting types of scholarship that, together, define a flexible approach that can apply to any discipline or professional field: Scholarship of Discovery, the commitment to knowledge for its own sake; Scholarship of Integration, which places special knowledge in a larger context; and Scholarship of Application, where knowledge is employed to address consequential human issues and often engages external clients.

Virtually all of research at Jefferson—from Basic/Discovery to Clinical/Translational to Applied—is grounded in or influenced by all three Scholarship lenses. This works because of the nature and range of professional and scholarly disciplines the University encompasses, and because of its determination to build transdisciplinary connections across the research spectrum. As you read this report, you will note that each article includes the appropriate category or categories to identify where the subject falls in the epistemology. ■

use of hemp (page 14); and the design of lighting for population health (page 28)—we are putting new knowledge to use, expeditiously, efficiently and productively to address real-world problems.

Overall, this document offers just a sample of the exciting work we have undertaken in pursuit of Jefferson's research mission:

Advancing and applying knowledge to **improve lives.**

These pages reflect the tremendous level of commitment, energy and momentum embodied in the Jefferson research enterprise. And they convey how proud—and ready—we are to join our Carnegie Research 2 Doctoral University peers in helping to define the future. ■



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