THE ROCKEFELLER UNIVERSITY

FALL 2017

COMMUNITY CONNECTION

New investments in technology are driving Rockefeller science

Geneticists, structural biologists, and neuroscientists benefit from a new generation of cutting-edge instruments.

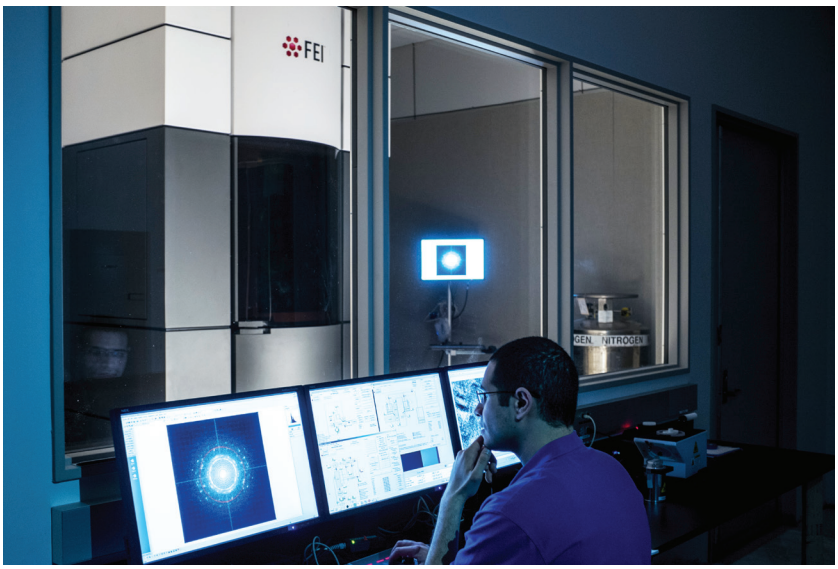

Photo: Mario Morgado

Tomorrow's discoveries aren't likely to be made with yesterday's machines. Rockefeller's recent investments in several breakthrough technologies, worth tens of millions of dollars, have given its scientists powerful new tools that are helping them advance the frontiers of biology.

Among these are a trio of sophisticated new cryo-electron microscopes that leverage extreme cold to visualize otherwise unobservable molecular structures and events. The cryo-EMs, as they are known, have expanded the range of questions Rockefeller's structural biologists, including Nobel Prize winner Roderick MacKinnon, are able to investigate.

The technology is allowing researchers to solve molecular mysteries that were once believed unsolvable, and is helping them better understand cystic fibrosis, neurological disease, and other disorders. In structural biology, the ability to focus on objects just a few millionths of a millimeter in size—far too small to be captured by existing imaging tools—is key. Cryo-EMs use extraordinarily cold temperatures to immobilize specimens, and advanced cameras and software to visualize their intrinsic architecture. The results are insights into how minute molecular complexes, such as those that allow chemical signals to enter and exit cells, work.

Meanwhile, members of Rockefeller's Information Technology team have been developing a high-performance computing cluster capable of bringing enormous processing power to bear on huge data sets, including those generated by the cryo-EMs and genetic sequencing tools.

The new cluster is a major expansion of Rockefeller's scientific computing infrastructure. Its initial configuration incorporates more than 1,600 processors capable of some 57 trillion calculations per second. Capable of identifying patterns and probing for insights from enormous troves of data, the high-performance computing cluster makes it possible for scientists to analyze in minutes what would have previously taken days—enabling projects that would otherwise be too complex to pursue.

Finally, one of the most recent technological additions to Rockefeller's arsenal itself reflects the never-ending need for new tools to drive discovery: an eight-ton, five-axis computer-controlled milling machine to be used for manufacturing delicate instrument parts to within a tolerance of eight one-thousandths of a millimeter. With the assistance of an engineer, scientists can use the mill to create, for example, precision optics for microscopes.

It took two crews to install the massive new machine: a rigging crew to carefully lower it in pieces through an elevator shaft and a team of engineers to assemble it into place. The machine is the centerpiece of the Rockefeller's new Instrument Design and Fabrication Facility which also includes modern tools such as 3-D printers and a precision laser cutter.

"Bringing engineering capabilities to biological problems can have a transformative impact on science," says Alipasha Vaziri, associate professor. "Scientists will be able to work with engineers, incorporating mechanical, optical, and electronic methods, to develop solutions for technical obstacles."

East Side institutions launch drug discovery company

Often, discoveries made at Rockefeller have the potential to lead to new medicines. But once they leave our labs, new advances face an uncertain future. The vast majority of drug-related discoveries made in this country never even get a chance.

In collaboration with Memorial Sloan Kettering Cancer Center and Weill Cornell Medicine, The Rockefeller University has established a new drug discovery company, Bridge Medicines, that will provide an efficient path from concept to experimental medicine, specifically for candidate drugs born at one of the three institutions.

The unique initiative, launched in partnership with Takeda Pharmaceutical Company Ltd. and healthcare investment firms Bay City Capital and Deerfield Management, provides both funding and expertise designed to yield new, innovative treatments for human diseases.

Still in its first year, Bridge Medicines builds upon the work of the independent, non-profit Tri-Institutional Therapeutics Discovery Institute, which works to test and refine experimental medicines. TDI has worked on 50 early-stage drug-discovery projects—spanning therapeutic areas including infectious disease, oncology, neuropsychiatry, and rare diseases—since 2013.

Research projects that have been successful at TDI will now be able to "graduate" to Bridge Medicines, where they receive financial, operational, and managerial

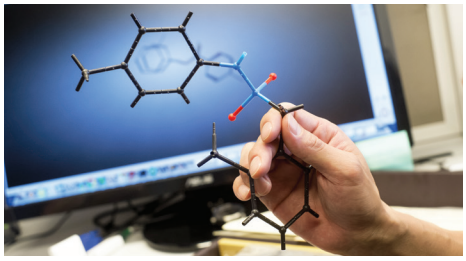

Photo: Mario Morgado

support to move from proof-of-concept studies to clinical trials in real patients.

"This unique academic-industry partnership further extends the ability of basic scientists such as those at our three institutions to explore the full potential of their discoveries for the benefit of patients," said Richard P. Lifton, president of The Rockefeller University. "We are thrilled to be a part of this initiative."

SCIENCE FOR THE BENEFIT OF HUMANITY

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The Rockefeller University is the world's leading biomedical research university, devoted to making transformative discoveries in bioscience and improving medicine for the benefit of humanity.

www.rockefeller.edu

COMMUNITY CONNECTION

Clinical Trials

The Rockefeller University Hospital, a unique facility devoted exclusively to clinical research, is recruiting volunteers to participate in several innovative trials.

Morning stiffness and rheumatoid arthritis

Do you have morning stiffness due to rheumatoid arthritis? A study is exploring why individuals are stiff in the mornings.

More at go.rockefeller.edu/rastiffness.

Secukinumab to treat mild psoriasis

Do you have mild psoriasis? Rockefeller is conducting a study to evaluate the effectiveness of a new drug, Secukinumab.

More at go.rockefeller.edu/psoriasis.

More than 100 other clinical studies are currently underway at Rockefeller. Explore them at www.rucares.org or call 1-800-RUCARES.

Upcoming Event

OCTOBER 14 10 A.M. TO 4 P.M.

Open House New York: Tours of The Rockefeller University campus

Get a free guided tour inside the world's leading biomedical research university, and visit several buildings including the historic library. No tickets or reservations required.

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