

UC San Diego's Mark Herzik Named 2020 Searle Scholar

Assistant professor of chemistry and biochemistry is one of 15 scientists to receive \$300,000 for high-risk, high-reward research

The Searle Scholars Program makes grants to selected universities and research centers to support the independent research of exceptional young faculty members conducting ground-breaking work in chemistry and the biomedical sciences. Mark Herzik from the University of California San Diego is one of the program's picks for 2020.

The program's advisory board of eminent scientists chooses Searle Scholars based on rigorous standards aimed at finding the most creative talent interested in pursuing an academic research career. Herzik, recognized for his work toward an atomistic understanding of mitochondrial protein biogenesis—the synthesis of new living things—was chosen from a field of 199 applicants across 139 universities and research institutions.

"I am very excited that Mark Herzik was selected for this highly competitive award. His cutting-edge research in structural biology, biophysics and biochemistry brings together advanced instrumentation, data science and biology in unique ways," said Vicki Grassian chair and distinguished professor in the [Department of Chemistry and Biochemistry](#) at UC San Diego. "The Searle Scholars Program provides an important funding mechanism for him and other early career faculty to work on high-risk, high-reward projects."



Mark Herzik

As the principal investigator of UC San Diego's [Herzik Lab](#), the university's new Searle Scholar leads research that focuses on elucidating the molecular underpinnings that govern macromolecular transport within eukaryotic cells. In particular, the lab employs innovative biophysical and structural methodologies, including electron cryomicroscopy (cryo-EM), to provide an atomic-level understanding of the structure and dynamics that govern these complex biological processes.

"There are so many critical protein complexes for which we do not know how their atoms are arranged in three dimensions," explained Herzik. "In my mind, there is nothing more rewarding than seeing for the very first time in history, how these atoms are arranged and how their movements are necessary for protein function."

Herzik joined the University of California San Diego as an assistant professor of chemistry and biochemistry in 2019 and continues to develop innovative cryo-EM methodologies to elucidate the mechanisms of macromolecular transport within humans. He brought with him to UC San Diego his long-standing interest in using complementary biochemical and structural methodologies to obtain mechanistic insights into signal transduction pathways contributing to a variety of disorders, ranging from cardiovascular disease to neurodegeneration and chronic pain.

Herzik was the first in his family to attend a higher-educational institution and graduated from the University of Houston in 2007 with university honors in biochemical and biophysical sciences. He performed his graduate research at UC Berkeley in the lab of Michael Marletta, in close collaboration with John Kuriyan, utilizing various biochemical and biophysical techniques to determine the mechanisms by which organisms sense and respond to nitric oxide.

After receiving his Ph.D. in molecular and cellular biology in 2014, Herzik joined the laboratory of Gabriel Lander at the Scripps Research Institute as a Helen Hay Whitney Foundation postdoctoral fellow. Herzik employed high-resolution cryo-EM to elucidate the structures of various macromolecular complexes implicated in the progression of neurodegenerative diseases or chronic pain to reveal new potential targets for therapeutics and avenues for structure-aided drug design. In addition, Herzik pioneered the development of novel strategies for collecting and processing high-resolution cryo-EM data, with particular emphasis toward imaging small (<200 kDa) macromolecules, as well as developing novel methodologies for validating atomic models generated against these data.

Herzik and each of his fellow Searle Scholars will receive the \$300,000 in flexible funding to support his or her ground-breaking research in the biomedical sciences and chemistry over the next three years.

"These fifteen young chemists and biomedical scientists, who were selected by our Scientific Advisory Board in a highly competitive process, will pursue bold programs that will change the directions of their respective fields," remarked Milan Mrksich, scientific director for the Searle Scholars Program.

Topics the new scholars are pursuing—research programs expected to yield exciting fundamental insights with potential to improve health—include:

- How the brain shifts its functional properties to maintain sleep, wake, attentional and affective states, and how can this knowledge lead to treatments for psychiatric disorders;
- How memory T cell differentiation and function in the barrier mucosae works, leading to better vaccines and therapies;
- How archaea produces and consumes the greenhouse gas methane, and how they can be engineered to address environmental and biotechnological challenges; and
- How the design of protein sensors for specific analytes can be used in biomedical imaging and diagnostics.

“At a time when our world is facing an unprecedented challenge with the COVID pandemic, we are humbled by the trust that the public and government has placed in science to develop the diagnostics, therapeutics and vaccines that will return our lives to normal. Indeed, we are proud of the many ways our past and present scholars are leading this effort and are serving society in profound ways,” Mrksich added.

Herzik said that it is an incredible honor to be named a Searle Scholar.

“As a first-generation college student, I never imagined that I would be part of such a special group of scientists dedicated toward pursuing top-tier research in new and innovative directions,” he said. “The funding provided by the Searle Scholars award will allow my group to develop new technologies directed toward imaging very dynamic protein complexes at the atomic scale. We are very grateful for this opportunity.”

About the Searle Scholars Program

The [Searle Scholars Program](#) is funded through the Searle Funds at The Chicago Community Trust and administered by Kinship Foundation, the private operating foundation that manages the institutional philanthropy of the Searle Family. Since 1981, more than 630 scientists have been named Searle Scholars and, as of this year, the program has awarded more than \$143 million. Eighty-five Searle Scholars have been inducted into the National Academy of Sciences, 19 have been recognized with a MacArthur Fellowship, known as the “genius grant,” and a Searle Scholar has been awarded the Nobel Prize for Chemistry.

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