Transforming the treatment of autoimmune disorders, cancer and more

by Jonny Hart

PHOTO: JOSEPH V. LABOLITO

Mark Feitelson and Alla Arzumanyan are developing drugs that use molecules harvested from the human body to safely and effectively treat a long list of diseases.

"If someone is diagnosed with diabetes, what do you do? You give them insulin," said Arzumanyan, associate professor of research. "The idea behind our company is these patients can't make these metabolites, so what can we do? Give it to them in the form of a drug."

Arzumanyan co-founded SFA Therapeutics Inc. in 2017 alongside Mark Feitelson, professor of biology, and Ira Spector, an experienced drug developer.

Metabolites are small molecules produced during metabolism that play crucial roles in maintaining the body's normal functions.

The researchers are developing a set of metabolites that, when given to patients in drug form, can treat many diseases that do not presently have safe and effective drugs, including more than 40 autoimmune disorders, certain types of cancers and other illnesses.

In 2013, Feitelson and Arzumanyan saw a scientific article that discussed using gut metabolites as a treatment in mice for colitis, a disease affecting the colon.

"I thought, well that's really interesting that these gut metabolites work in the colon," said Feitelson, who had been studying chronic liver disease for 30 years. "Can you extend this concept of using gut metabolites to regulate the immune system in other parts of the body?"

He applied the concept to a study of liver disease and found that the gut metabolites successfully treated inflammation in the liver, and they also slowed down the progression from liver disease to liver cancer.

In addition, many drugs for autoimmune disorders cause unwanted side effects because they use compounds not found in the body. "We're using molecules that have evolved with humans. We don't have to optimize them; evolution already has," Feitelson said.

Another breakthrough came when the researchers found that patients taking their treatment for long enough periods could sometimes regain the ability to make these metabolites themselves.

"We have come such a long way since Mark and I read that article more than 10 years ago," Arzumanyan said. "Since then, we've solved problem after problem, and we are continuing to solve more."

GENOMICS SOFTWARE ARTICLE AMONG MOST-CITED SCIENTIFIC WORKS IN HISTORY

by Sarah Chung

The scientific journal *Nature* has named a software developed at Temple among the top-100 most-cited scientific works in history.

Sudhir Kumar's 2016 article describing Molecular Evolutionary Genetics Analysis version 7 (MEGA7) is recognized alongside seminal works in biochemistry and quantum physics. Since its release, MEGA7 has earned more than 45,000 citations, making it one of the youngest and fastest-climbing articles ever to break into *Nature's* top-100 list.

"This achievement is a testament to the foundational role evolutionary analysis plays in understanding everything from species origins to biodiversity and diseases," said Kumar, Laura H. Carnell Professor of Biology and director of the Institute for Genomics and Evolutionary Medicine, where his team developed MEGA7 to meet the demands of analyzing large-scale genomic data.

Downloaded over three million times, MEGA provides tools for constructing evolutionary trees and performing statistical analyses of molecular data. The seventh version delivers performance optimizations enabling large-scale evolutionary analyses in an era of big data, making it an indispensable tool for biologists worldwide.

BIOLOGY WELCOMES TWO NEW RESEARCHERS

The Department of Biology welcomes two tenure track faculty members, Samira Abdulai-Saiku and Yu-Chieh David Chen.

Abdulai-Saiku, a neuroscientist with an interest in sex differences and behavior, earned her doctorate in biological sciences at Nanyang Technological University in Singapore. Before joining Temple, she was a postdoctoral scholar in the Neurology Department at the University of California, San Francisco.

"I employ skills in molecular biology, behavior and neurobiology to understand how the X chromosome regulates different phenotypes in male and female brains with the aim of identifying putative therapeutic targets to improve cognitive performance in aging individuals," said Abdulai-Saiku.

Chen earned his PhD in neuroscience at the University of California, Riverside and his bachelor's and master's degrees at National Taiwan University. Before coming to CST, Chen was a postdoctoral researcher at New York University. At NYU, his research, which was published in *PNAS* and *STAR Protocols*, leveraged single-cell genomics to create genetic tools that target specific cell types during development. This work laid the groundwork for his lab at Temple to investigate the molecular regulators governing neuronal circuit assembly.

Sudhir Kumar

PHOTO: JOSEPH V. LABOLITO

Samira Abdulai-Saiku

PHOTO: CONNOR McVAIL

BRENT SEWALL APPOINTED DIRECTOR OF FIELD STATION

by James Duffy

Brent Sewall, whose research focuses on understanding critical and emerging threats to biodiversity and developing effective strategies for its conservation, is the new director of the Temple Ambler Field Station.

"The position offers me the chance to work with our extraordinary Field Station staff to provide exceptional training opportunities for our wonderful student research interns," said Sewall, an associate professor.

"One of the things that the Field Station has done a great job with," Sewall said, "is the development of resources that support research, allowing researchers to undertake larger, more integrated and more detailed investigations than would be possible by any one researcher or research group alone."

Sewall credits his predecessor Amy Freestone and Mariana Bonfim, who continues as Field Station managing director, for a strong research foundation. "New researchers at Temple Ambler are not starting from scratch but building on an existing foundation of data and resources. It is fertile ground for new questions dreamed up by undergraduate students, graduate students, postdoctoral researchers and faculty and we're here to support them in their research initiatives."