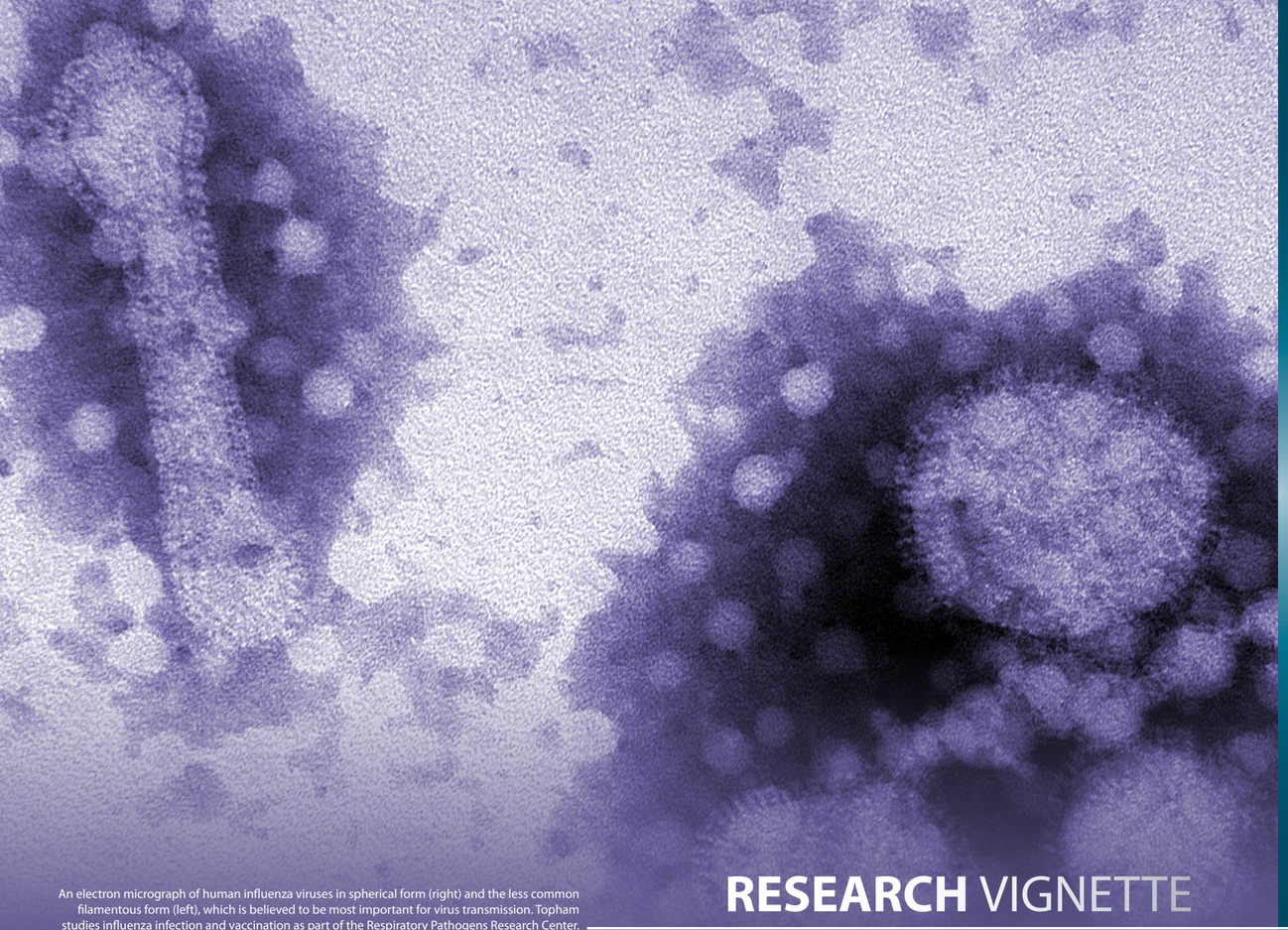

An electron micrograph of human influenza viruses in spherical form (right) and the less common filamentous form (left), which is believed to be most important for virus transmission. Topham studies influenza infection and vaccination as part of the Respiratory Pathogens Research Center.

RESEARCH VIGNETTE

Photo: Karen Bentley / URMC Electron Microscopy Research Core

Building an Edge

David Topham, Ph.D., credits serendipity for bringing him to the University of Rochester in 1999, yet he says the interdisciplinary and computational research he has been able to conduct here is anything but happenstance.

As Executive Director of the Health Sciences Center for Computational Innovation (HSCCI), Topham facilitates access to high-performance computing for biomedical research and fosters collaborations among University researchers, computational scientists, government agencies, and corporate partners. Established in 2009, HSCCI is a multimillion-dollar partnership between the University, IBM, and New York State whose goal is to use supercomputing to solve health care's most complex problems.

In 2008-09, IBM gifted the University its first supercomputer and CIRC was founded to provide the necessary computational expertise. "CIRC is what makes it all work," Topham said. "You can have a great idea, but if you can't reduce it to practice to actually make it go, then it's not worth anything. CIRC reduces the projects to practice."

Topham's own immunology research forayed into computational biology as government interest in biodefense research increased in the wake of September 11, 2001. He joined Hulin Wu, Ph.D., Professor of Biostatistics and Computational Biology, and Martin S. Zand, Ph.D., Professor of Nephrology, in applying for funding from the National Institutes of Health (NIH) to create mathematical models of the biology of bioweapons. This set the stage to compete for one of two Respiratory Pathogens Research Centers. NIH ultimately granted Rochester both available centers because "we had the edge in information technology, and NIH knew the type of studies we were going to be doing were going to require substantial infrastructure," Topham explained.

Even more interdisciplinary research has emerged since the construction of the VISTA Collaboratory — a lab custom-built for collaboration and data visualization across fields. Following an impromptu discussion at the VISTA, Topham and Jannick Rolland, Ph.D., Professor of Optics, are combining their distinct expertise to improve tissue-imaging techniques. They have since co-authored a publication in a top optics journal.

"It seems like serendipity again, but it's not. We brought people together for a reason," Topham said. "We had this idea that people from disparate domains would find ways to work together to develop new technologies and novel approaches. And they have."

Topham sees team science and big data as the future of research. Now, with the creation of the University's Institute for Data Science, that vision is being codified with the development of new curricula and degree programs where interactions between data science and research domains are the norm, not the exception.

"We have the edge," Topham said. "And I think we're going to continue to build that edge and stand out from our competitors on a national if not international level, especially in the application of data science-driven approaches to our research."

"It's all about doing good research in the end," Topham concluded. "We can do really cool stuff and work on important questions that have major impact on society that I don't think we would have ever had the opportunity to do if we hadn't taken that risk to invest in research computing."

David Topham, Ph.D.

Executive Director of
Health Sciences Center for Computational Innovation

Professor of Microbiology & Immunology

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