

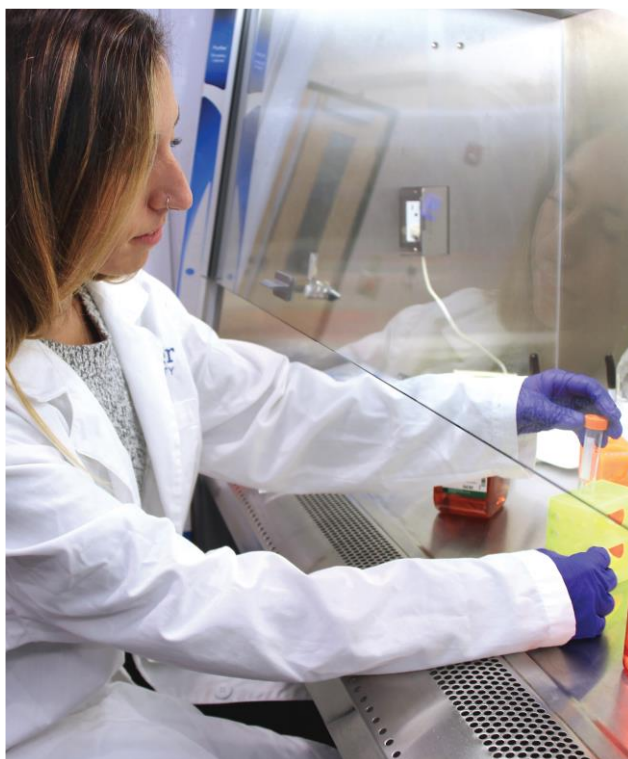
SCIENTIFIC ADVANCES

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Rivier joins a prestigious biomedical research collaboration and enhances faculty-mentored research.

“Rivier’s vision to more deeply engage students in STEM research and innovation is coming to fruition.”

– Dr. Brian Ernsting, Vice President for Academic Affairs



Rivier’s commitment to innovation in the sciences has expanded opportunities for the University and for original faculty-student research. Rivier became the newest member of the state’s IDeA Network of Biomedical Research Excellence (NH-INBRE) this year.

NH-BRE is comprised of 11 partner institutions and supports faculty-student original scientific research through grant funding and shared resources among network institutions. NH-INBRE research grants are funded by the National Institutes of Health, the nation’s medical research agency.

The Network is led by the Geisel School of Medicine at Dartmouth College and the University of New Hampshire and is designed to develop a coordinated network of biomedical research and training. More than 200 student-researchers at New Hampshire colleges and universities benefit from NH-INBRE-supported projects annually. NH-INBRE research is “intended to enhance the caliber of scientific faculty at research institutions and undergraduate schools ...” and “to augment the science and technology knowledge of the state’s workforce.”

“Ingenuity, support, and space came together to advance scientific research on campus,” shares **Dr. Brian Ernsting**, Vice President for Academic Affairs. “Our faculty’s expertise supported by NH-

INBRE's resources made possible the research in Rivier's new Science and Innovation Center. Rivier's vision to more deeply engage students in STEM research and innovation is coming to fruition."

In spring 2021, three grants were awarded to Rivier professors, who had submitted original research proposals. In addition to technology and supplies, the grants funded paid positions for Rivier student-researchers. With the support of their faculty-mentors, Biology majors **Allison Alton '22**, **Aaron LePoer '24**, and **Maegan Sheehy '22** worked full-time in the University's Science and Innovation Center labs this past summer.

"The primary goal of our research is to provide undergraduate Biology students the opportunity to conduct clinically relevant biomedical research working alongside full-time faculty members," Assistant Professor of Biology **Dr. Tatiana Jones** shared when the grants were awarded. "Being actively involved in these research projects will allow students to develop experimental and analytical skills to advance their academic progress and to expand their career opportunities."

The research projects required the student-researchers to think critically about not only the scientific process of conducting the experiments and developing proper experimental protocol skills, but also interpreting and presenting their results to others. Alton and LePoer attended the Network's Annual Meeting held in late summer where all NH-INBRE students presented their research and findings.

"The Annual Meeting was nerve-racking, but a great experience," shared LePoer, who worked with Assistant Professor of Biology **Dr. William Schmidt**. "In addition to presenting our work and seeing all the other research projects, we were able to network with present and past NH-INBRE students and to meet representatives from industry research facilities and businesses." Alton added, "Working with Dr. Jones helped me develop my skills and gave me greater confidence in my abilities. I plan to pursue a research career, and the entire experience really opened my eyes to the opportunities available to me."

Participation in NH-INBRE expands Rivier's faculty experience, as well. "My biggest take-away from the songbird project is experiencing the collaborative nature of research. For the scope of this project, several disciplines overlapped requiring biologists and chemists to work together," says Assistant Professor of Chemistry **Dr. Brian Patenaude**. "In addition, there was collaboration between two different facilities, Rivier University and Dartmouth College, to collect and analyze the required data."

Rivier's focus on innovation in the sciences and NH-INBRE membership will continue to create opportunities for faculty and students to pursue original scientific research, to collaborate within the University setting and with other regional research institutions, and to provide leadership and career-preparation experiences.

The New Hampshire IDeA Network of Biomedical Research Excellence (NH-INBRE) grants were received through an Institutional Development Award (IDeA), P20GM103506, from the National Institute of General Medical Sciences of the NIH.

NH-INBRE Faculty-Student Research

Rivier University professors and students conducted authentic scientific research projects in the University's Science and Innovation Center labs during the summer of 2021.

Project Title: Extracellular RNA can Change the Proinflammatory Profile of Cultured Monocyte-Derived Cells



NH-INBRE Researchers: Dr. Tatiana Jones (*left*), Dr. Brian Patenaude, and Allison Alton '22 (*right*)

Investigation: The research project explored how extracellular ribonucleic acid (RNA) can influence the activities of macrophages, the white blood cells responsible for primary immune defenses. The goal was to discover how these cells are involved in the responses of the immune system to different pathogens, including viruses.

Outcomes: Stimulation of macrophages with self exRNA in these experiments resulted in lower expression by macrophages of one of the most important antigen-presenting molecules along with altered expression of inflammatory signals. Alton is continuing this research as her Senior Research Project to understand how self exRNA can influence the responses of innate immune cells to the different pathogens and the mechanisms of complications related to cells damaged by bacteria or viruses.

Project Title: Lysine Acetylation of Tropomyosin Impairs Binding to Filamentous Actin



NH-INBRE Researchers: Dr. William Schmidt (*right*) and Aaron LePoer '24 (*left*)

Investigation: The project investigated the targeted modification of muscle proteins to identify potential biological mechanisms that could be modulated to alleviate or prevent disease. The goal was to determine if modification of a key muscle protein influences specific molecular interactions that determine muscle function, thus identifying the protein as a potential target for consideration in future drug discovery and design studies.

Outcomes: Modification of muscle proteins had a noticeable effect on the ways proteins act, especially related to muscle binding and function. The experiments' promising results encourage more research to replicate and expand on initial findings.

Project Title: The Influence of Elements Associated with Urbanization on Stress and Immune Responses of Song Sparrows



NH-INBRE Researchers: Dr. Michelle Beck, Dr. Brian Patenaude (*left*), and Maegan Sheehy '22 (*right*)

Investigation: This study examined the concentrations of several essential and non-essential elements along an urbanization gradient (a range of landscapes from urban to rural) and to document any physiological effects associated with element contamination in song sparrows. The project sought to quantify concentrations of essential and non-essential elements in feathers, blood, and soil samples, and then determine if concentrations of these elements are associated with measures of the innate immune response or stress hormone concentrations.

Outcomes: Stress and immune responses did not differ between urban and rural habitats. Work continues on the analysis of the element concentrations and their potential effect on birds' immune responses. Results suggest that corticosterone, a hormone secreted by the adrenal cortex that functions in stress and adaptation, modulates immune response, and this relationship should be addressed further. ■