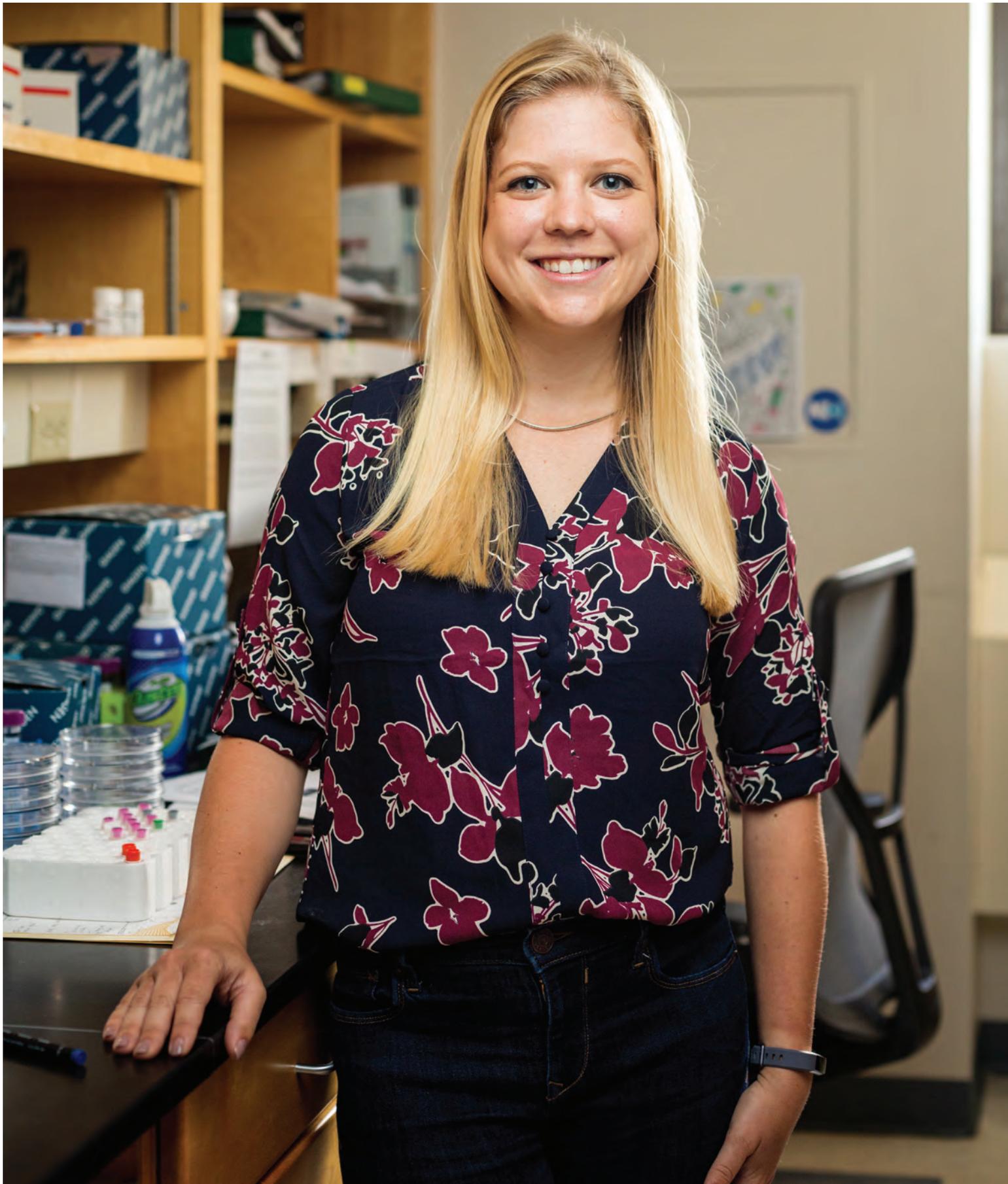


Rob Strong



# BLENDING DISCIPLINES TO TARGET DISEASE

**WHEN IT CAME TIME FOR JENNIFER FRANKS TO SELECT A GRADUATE PROGRAM, SHE WAS TORN.** An undergraduate double major in applied statistics and genetics, Franks faced a dilemma: pursue a doctorate in bioinformatics or in biostatistics. She had just begun to explore her options when she discovered the Geisel School of Medicine Graduate Program in Quantitative Biomedical Sciences (QBS) and realized her problem was solved. “Dartmouth’s program was the first major one I saw, and it offered everything I was interested in: bioinformatics, biostatistics, and epidemiology. With a doctorate in QBS, I’ll be perfectly positioned at the intersection of several disciplines, with a foundation of knowledge that will allow me to address problems that are relevant in a clinical setting or in a laboratory.”

Franks’ interests are broad, spanning human and bacterial genetics, computational immunology, statistics for big data, and machine learning. She’s currently working with Michael Whitfield, PhD, interim chair and professor of biomedical data science, to study the systemic autoimmune disease scleroderma. “We are looking at how the disease starts and then develops by analyzing blood, skin, and internal organ biopsies from a nationwide cohort of patients, examining the DNA, RNA, and molecular processes taking place and exploring how they change over time in the presence or absence of treatment.”

Franks’ particular interest is in the molecular subtypes of scleroderma. “In breast cancer, there are different subtypes of the disease, and identifying these has aided researchers in diagnostics and treatments. The study of molecular subtypes is more common in cancer, but the work we’re doing in our lab represents the first time that such molecular subtypes have been identified in an autoimmune disease.”

If scientists can identify the molecular signatures present in certain scleroderma patients, Franks explains, they can begin to create different groups of patients and ascertain how they respond to various therapies. “If we can figure out how a given molecular process responds, it will help us to explain why some patients react positively to a given therapy while others do not, and then hopefully, we can eventually shut down the disease.”

The volume of biomedical data that scientists must examine in their quest to make new discoveries is quite large, says Frank, and comprised of many variables. “We’re looking at tens of thousands of genes, and when you throw a longitudinal study into the mix, the numbers get really big.” But by employing computational algorithms, she explains, scientists can begin to tease out patterns. “Instead of investigating one gene over time, we’re able to look at thousands, as well as explore interactions between genes.”

The dance between genes is complicated and much work remains to be done, but Franks is excited about the potential for making significant inroads into scleroderma as well as many other diseases. She is also intrigued by the additional questions this research may address. “There are many diseases that present similarly,” she observes, “which begs the question, ‘Are they in fact different diseases or just different stages of the same disease?’ By analyzing large data sets using machine learning and other tools, we may be able to answer these questions.”

Franks does not, however, spend all her time in front of a computer keyboard or at a lab bench. A dedicated wine connoisseur, she enjoys exploring new offerings and admits that conference trips to California and Bordeaux have been significantly enriched by introductions to local vineyards. She also hosts the occasional wine-tasting seminar for members of West House where she

serves as the resident fellow.

Franks is also an avid hiker and competitive ballroom dancer and makes a point to get out and get moving whenever possible. “I don’t really have a good answer as to why I took up ballroom dancing in the first place,” she concedes with a laugh. “I first tried ballroom as an undergrad at Purdue University and discovered that I really enjoyed it. Collegiate competition was very popular there.” When it comes to dance floors, however, Franks admits that the Upper Valley is a little quieter, so for the time being she has swapped out her dancing shoes for hiking boots. “Ballroom dance and hiking are lifelong activities that one can enjoy indefinitely,” she notes, “so I anticipate continuing with both.”

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LORI FERGUSON

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