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Beth Potier
UNH Media Relations

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DURHAM, N.H. – Soil-dwelling bacteria of the genus *Frankia* have the potential to produce a multitude of natural products, including antibiotics, herbicides, pigments, anticancer agents, and other useful products, according to an article in the June 2011 issue of the journal “Applied and Environmental Microbiology.” University of New Hampshire professor of microbiology and genetics Louis Tisa, a *Frankia* expert, contributed the genomic analysis to this study.

“We were able to use cutting-edge techniques to identify unexpected compounds in this organism, *Frankia,*” Tisa says.

The researchers, led by Bradley Moore of the Scripps Oceanographic Institute, found genetic structures in *Frankia* that resemble those of various valuable natural product categories that produce the majority of the natural antibiotics used as drugs.

*Frankia* are nitrogen-fixing bacteria that live in symbiosis with actinorhizal plants (whose ranks include beech and cherry trees); they have not previously been exploited partly because these bacteria are difficult to grow in the lab. But new genetic methods make it easier to transplant genes for promising natural products from *Frankia* into more user-friendly host bacteria for production.

“We found something unique that nobody thought to look for in these bacteria,” says Tisa, who worked with his former graduate student and current lab technician Nicholas Beauchemin, on the project.

Tisa’s lab provided insight on the biology that contributed to the genome mining, a recent technique that involves searching for genetic sequences, that was critical to the results and “complementary to the far more laborious traditional natural product drug discovery that has gone unchanged for decades,” Moore says.

The project grew out of a graduate class that Moore and co-author Daniel Udvari (then his post-doc, now at the University of Rhode Island) taught on “Microbial Genome Mining.” The students—who are the majority of coauthors on the paper—annotated their genes and based on biosynthetic principles, and predicted pathways leading to putative natural products. They then worked with the laboratories of Pieter Dorrestein at the University of California, San Diego, and Tisa to conduct preliminary proteomic and metabolomic analyses to probe whether the predicted pathways were operative, and whether small molecule chemistry was evident.

The paper is called “Significant Natural Product Biosynthetic Potential of Actinorhizal Symbionts of the Genus Frankia, as Revealed by Comparative Genomic and Proteomic Analyses.”

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state’s flagship public institution, enrolling 12,200 undergraduate and 2,300 graduate students.

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Reporters and editors: Louis Tisa is available at 603-862-2442 or louis.tisa@unh.edu. For a copy of the article, contact him or Beth Potier.