Science, symmetry and a magazine cover

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Proteins represent the fastest-growing category of new drug approvals for human therapeutic application. Currently, such proteins are of the naturally produced variety. Looking ahead, an important question is whether natural protein forms can be engineered to have enhanced properties.

To College of Medicine Professor Michael Blaber, the answer is unequivocally affirmative.

Synthetic protein architecture is more than just fascinating to him. It serves as a steering mechanism, helping to guide the research taking place in Blaber's laboratory in the Department of Biomedical Sciences.

"Nature utilizes a relatively limited number of fundamental protein architectures, and the majority of these exhibit some form of structural symmetry," Blaber said. "Symmetry within protein architecture is of particular interest since it offers a means to simplify the design."

And that's exactly what Blaber's team has been working on.

By developing a greater understanding of imperfections in the symmetry of natural proteins, the Blaber Lab has succeeded in creating a perfectly symmetric synthetic protein with greater stability against temperature extremes. The synthetic, or mutant, proteins have potential applications in treatments for such chronic health problems as multiple sclerosis and certain types of heart disease.

In April, the Journal of Molecular Biology put one of Blaber's proteins on display, choosing a Blaber Lab report as its cover story. The article, "A polypeptide building block for the ß-trefoil fold identified by top-down symmetric deconstruction," appeared in the April 15 issue.

On the cover is a figure based upon the crystal structure of a synthetic protein designed in Blaber's lab.

"One feature of this synthetic protein is that it is purely symmetric, with implications for gene duplication and fusion in the evolution of protein structure," Blaber said.

"It is overlaid with a Middle Ages symbol known as a 'trefoil' that is found in some European architecture," he said. "The comparison between the atomic details of a synthetic protein and the geometry utilized in ancient architecture is striking."

Another of Blaber's articles about the evolution of symmetric protein architecture recently was selected for inclusion in the Faculty of 1000 library. That distinction means it is among the top 2 percent of published articles in biology and medicine.