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Brookhaven Lab Biophysicist F. William Studier Wins R&D 100 Award for A New Method that Simplifies Protein Production

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Upton, NY - F. William Studier, a biophysicist at the U.S. Department of Energy's Brookhaven National Laboratory, has won a 2004 R&D 100 award for developing a new process that simplifies the production of proteins in the widely used T7 gene expression system. The T7 expression system, developed and patented at Brookhaven Lab in the 1980s and 1990s, is used worldwide by academia and industry to produce specific proteins within bacterial cells.

R&D 100 Awards are given annually by R&D Magazine to the top 100 technological achievements of the year. Typically, these are innovations that transform basic science into useful products. The awards will be presented in Chicago on October 14.

Studier's new method simplifies the production of many proteins in parallel. Proteins do most of the work in biological systems. They digest food for energy; build biological structures, such as muscles and neurons; and regulate biological functioning, for example, by hormones. The Human Genome Project and other genome sequencing projects are revealing the full complement of human proteins and the proteins of many other organisms. Expression systems such as the T7 system allow biologists and medical scientists to obtain useful amounts of individual proteins for analyzing their structures and functions.

Commercially available through EMD Biosciences, Novagen brand, as the Overnight Express™ Autoinduction System, the new method relies on mechanisms by which bacteria sense the presence of nutrients in their surroundings and select which ones to use. An appropriate mixture of nutrients allows the bacteria to grow vigorously and then, at the appropriate stage of growth, switch automatically to producing the target protein without any intervention by the experimenter. The new method will be useful for biomedical research or for industrial production of proteins to use as enzymes, diagnostics, vaccines, therapeutics and targets for developing pharmaceuticals.

"The new autoinduction system is very convenient," Studier said. "Instead of spending much of the day monitoring the growth of many different cultures to get optimum conditions for producing proteins, we simply inoculate cultures late in the day, let autoinduction do the work for us, and collect our proteins the next morning. An added bonus is that we usually get much more protein."

Studier started his research on T7 - a common bacteria-eating virus - when he first joined Brookhaven Lab in 1964. "The T7 expression system came out of basic research," Studier said, "and the autoinduction system is also an application of basic knowledge. As so often happens, basic research led to useful applications in unexpected ways."

Studier's research is funded by the U.S. Department of Energy's Office of Biological and Environmental Research within the Office of Science, and by the Protein Structure Initiative of the National Institute of General Medical Sciences of the National Institutes of Health as part of the New York Structural Genomics Research Consortium.

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- Department of Energy Office of Biological and Environmental Research
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