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SUPARNA REVEALS the secrets of RIBOSOMES

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Suparna reveals the secrets of ribosomes

“It starts with basic science, we want to learn new things,” says Suparna Sanyal. “But we should also think: Can this be of interest to others, are there practical applications?”

Suparna is an associate professor

at Uppsala University’s Department of Cell and Molecular Biology (ICM). Her research is dedicated to ribosomes, one of the key players in the synthesis of proteins in cells.

Suparna earned her PhD in India, at the University of Calcutta, where she graduated in 2001. Her thesis was concerned with the role of ribosomes in protein folding, and ribosomes have remained the center of her interest. She came to Sweden for a postdoc in Lund, studying the structure of ribosomes by means of x-ray crystallography under professor Anders Liljas, whom she calls her “scientific godfather”.

In 2002 Suparna obtained a position as assistant professor at ICM. She considers Uppsala to be a particularly strong and stimulating scientific environment.

“There is a real passion for science in Uppsala,” she says. “There are so many competent people here, and everybody is eager to participate in multidisciplinary work if the project is good.”

Strong center for RNA research

Uppsala has built an especially strong position in the RNA field. The Uppsala RNA Research Centre brings together competences found at Uppsala University

and the Swedish University of Agricultural Sciences (SLU). The goal of the center is to strengthen the state of RNA knowledge and develop basic research as well as practical applications. Suparna and her research group is one of the participating units.

Ribosomes are complexes of RNA and proteins found in all cells. They are active in the synthesis of proteins in the translation process, binding messenger RNA and using it as a template to join together the correct sequence of amino acids into polypeptide chains.

The next step in the process is protein folding, where the polypeptide chain folds into its characteristic and functional three-dimensional protein structure. Whereas the role of ribosomes in protein synthesis is well established, their role in protein folding is a recent discovery.

Protein synthesis and folding

Suparna and her research team are dealing with both these aspects of ribosomes.

“In protein synthesis my main objective is to understand the structure, function and dynamics of the ribosomal ‘stalk’, a part of the ribosome that I believe has a role in the recruitment of translation factors,” she says.

The mechanism of ribosome assisted protein folding Suparna is studying with special attention to its role in prion diseases.

“Prions are infectious proteins that cause severe neurodegenerative diseases like Creutzfeldt-Jacob’s disease and BSE, Suparna explains. “These diseases are believed to be the result of a folding problem of the prion proteins. So hopefully our basic research will yield knowledge that eventually can lead to practical clinical use.”



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Practical application spin-off

Keeping an open mind to the possible practical uses of research ideas has already paid off for Suparna. Already during her studies in India she learned that there are practical difficulties facing the scientist interested in ribosomes.

“You cannot buy ribosomes; you have to purify them yourself. In order to do this you need special equipment, large ultracentrifuges that are usually not available in the average research lab. Also, the purification and preparation spans many days. So getting ribosomes for research can be a problem for many scientists.”

Together with her co-workers Santanu Dasgupta, Josefina Ederth and Chandra S Mandava, Suparna has now come up with a solution. They have devised a simple and cheap method to purify ribosomes for research purposes, which should be of great use for scientists in smaller labs. They have fused a histidine tag with a ribosomal protein in its chromosomal site in wild-type E. coli. Using this tag, the new method makes it possible to “fish out” active ribosomes from E. coli cells in a few hours.

In cooperation with UUAB, Suparna has filed a first patent application for this method and also negotiated a license agreement with GE Health Care, giving GE the right to use the method in certain applications.

India and Sweden

As a very committed scientist, Suparna finds little time for leisure activities. Most of her time outside the lab she spends with her family, her husband Biplab, who is an associate professor in materials science at Uppsala University, and their 10-year old son Ruku.

Although India and Sweden are very different societies, Suparna still thinks that being a scientist in India and Sweden is not all that different.

“Life in the lab is pretty much the same,” she says. “Scientists are alike all over the world. We love science, that’s why we do it. The happiness of seeing an experiment working is what makes us tick.” ●

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