



BIG QUESTIONS, SMALL ANIMALS: Being awarded the ERC Consolidator Grant means that Andreas H. Hejnal and his team at the Sars International Centre for Marine Molecular Biology

Reconstructing the origin of species

Evolutionary development biologist Andreas Hejnal of the Sars Centre in Bergen has been given a grant of 2 million Euros from the European Research Council (ERC) to reconstruct parts of the evolutionary history of the Earth's species. **TEXT • KIM E. ANDREASSEN**

In February 2015, Andreas H. Hejnal became the second University of Bergen (UiB) researcher to receive the ERC Consolidator Grant.

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“I am delighted that my research received the ERC stamp of approval for high quality and that the questions I try to answer will receive further public interest,” says Hejnal, who has conducted research on evolution at the Sars International Centre for Marine Molecular Biology for more than 5 years.

Understanding animal evolution

Hejnal heads the research group *Comparative Developmental Biology of Animals* at the Sars Centre.

“The goal of the project is to understand animal evolution much better,” he says before adding the central

question of the project: What is the nature of the molecular and genomic changes that gave rise to the animal diversity we have on this planet?

“The proposal aims to reconstruct the evolutionary history of specific embryonic cells of animals, or the *mesoderm*. These embryonic stem cells are present in most animal embryos, including humans, and are located between the *endodermal cells* that form the digestive tract and the *ectodermal cells* that form the skin and nervous system,” Hejnal explains. “The *mesoderm*, or middle layer, leads to the development of all other organ systems such as musculature, blood vascular system and excretory systems such as, for example, the human kidney.”

The ERC Consolidator Grant enables Hejnal to take a closer look at how these organ systems originated.

He and his team will do this using embryos of ribbon worms, rotifers and other animals.

These tiny life forms are all made up of basic cells, making it possible for the researchers to discover ancient genes that may provide answers to the evolution of species in the world's seas.

“I will reconstruct the ancient evolutionary origin of these cells and identify the changes in the molecular and cellular mechanisms that gave rise to the diversity of these organs in animals,” says Hejnal.

Making use of new technology

According to Hejnal, the project's ambitions are of a scale that would make it difficult to conduct without the funding provided by the ERC, particularly as several technologies have advanced rapidly in recent years.



can continue their efforts to unravel the secrets of the origin of species.

“We aim to use the newest technology in microscopy, computational biology, and comparative genomics to study animals that have never been investigated regarding these questions before,” says Hejnal.

This new technology provides Hejnal with unique opportunities to conduct cutting-edge research.

“Only recent advances in these methods have made such projects possible. The comparison of the novel data will ultimately elucidate the evolutionary changes that gave rise to the huge diversity of mesodermal organs in animals, including humans,” he says.

“A lot of pioneering work will need to be done and skilled staff are needed to conduct a project such as this. The grant will mainly be used to attract world-class researchers.”

Pioneering approach in Bergen

Hejnal believes his pioneering approach benefits UiB and the Bergen research community as a whole.

“My project is addressing fundamental questions regarding animal body plan evolution using marine animals and thus broadens the diversity of research conducted at UiB,” he says.

Since 1 January 2015, the Sars Centre has been part of UiB and Hejnal believes this is a unique opportunity

to strengthen biological research and education, since the university already hosts other research groups that are addressing similar questions.

“It also gives the opportunity to establish cutting-edge methodology – such as single plane illumination microscopy – into the range of methods used by researchers at UiB,” says the evolutionary development biologist.

Internationally-orientated research team

During the course of his five year ERC grant period, Hejnal plans to exchange research discoveries with Chris Lowe at Stanford University's Hopkins Marine Station and with Uli Technau at the University of Vienna, both of whom conduct research on species other than those being researched by Hejnal.

In addition to the tiny sea animals that Hejnal and Staff Engineer Aina Børve find at home in Bergen, the UiB/Sars Centre researcher plans to visit marine research centres worldwide to find other animals needed to conduct his experiments. These centres include the University of Washington's Friday Harbor Laboratories and the University of Gothenburg's Sven Lovén Centre for Marine Sciences. ●

ERC grants at UiB

Grants from the European Research Council (ERC) are awarded to researchers working on projects that are highly ambitious, pioneering, and unconventional. In addition to the researchers presented on pages 4–9, this is a list of the current ERC grant holders at the University of Bergen (UiB).

Solving Diabetes

What roles do diets and genetics play in the development of obesity and diabetes? This is one of the questions Professor Pål Rasmus Njølstad at the KG Jebsen Centre for Diabetes Research is working on. It is for his studies of diet and genetics among mothers and children in Norway that Njølstad has been awarded an ERC Advanced Grant.

Space is the place

One of the main tasks for Professor Nikolai Østgaard and his colleagues at the Birkeland Centre for Space Science is to look at how earth connects electrically to space. They also study so-called gamma ray bursts (GRBs) that occur during thunderstorms, and are believed to affect the climate. Østgaard holds an Advanced Grant from the ERC.

Advanced algorithms

Using an Internet search engine to find the hottest restaurant in town? Letting your car's GPS tell you where to turn left to reach the parking house? Worrying if your money is safe when you use online banking? Looking for the love of your life on an Internet dating site? Then most certainly, an algorithm has helped you. Professor and ERC Advanced Grant holder Fedor Fomin and the Bergen Algorithms Research Group develop new mathematical theories to provide better algorithms.

Algorithms and graph theory

Professor Saket Saurabh at the Department of Informatics was awarded an ERC Starting Grant in June 2012. His research interests lie mainly in algorithms and graph theory. He is also a member of the Bergen Algorithms Research Group, underlining the strong algorithms research environment in Bergen.

Equality in crisis

Professor Bruce Kapferer at the Department of Social Anthropology was awarded ERC Advanced Grant status in August 2013. How does greater inequality create divisions in society? This is one of the central issues of his research project *Egalitarianism: Forms, Processes, Comparisons*. His project aims to study egalitarian structures and processes and the underlying values that inform them.