Scientists at the University of Bayreuth and the Czech Academy of Sciences working together on bioadhesives

The EU is funding cross-border research at the University of Bayreuth and the Biological Centre of the Czech Academy of Sciences (AVČR) with around € 670,000. The Biomaterials research group at the University of Bayreuth and the Biological Centre are beneficiaries of the INTERREG programme. The object of the project is to research bioadhesive proteins produced by insect larvae in water bodies, in order to explore the possibilities of industrial production of such bioadhesives.

The demand for biocompatible, biodegradable, and environmentally friendly adhesives has increased greatly in recent years, but no industrial use of these substances is currently in sight. The caddisfly larva is now moving into the centre of interest. It excretes various high-quality, sticky secretions that can bond different materials underwater, and remain insoluble in water after excretion. These differ in their duration of action as well as in the materials they bind, and function as single- or multi-component adhesives. Researchers from Upper Franconia and Southern Bohemia are now investigating.

The Bavarian-Czech border region is one of the regions that is home primarily to traditional industries. But these are undergoing massive structural change. The introduction of modern industries such as biotechnology is therefore important for the future of the region. The EU is supporting this strategy with its ERDF European Regional Development Fund in interregional programmes called INTERREG. In Upper Franconia and South Bohemia, it can build on excellent research institutions: Experts in polymer and material sciences conduct research at the University of Bayreuth, while researchers at the AVČR Biological Centre in České Budějovice specialise in the life sciences.

Both groups will now work closely in researching bioadhesive proteins produced by insect larvae in water bodies. “After suitable protein candidates have been identified by the Czech working group, they will be produced and further processed in Bayreuth biotechnologically, i.e. without caddis flies, in scalable fermentation processes using bacteria, which will provide a basis for later industrial use,” says Prof. Dr. Thomas Scheibel, Chair of Biomaterials at the University of Bayreuth. Prof. Zurovec from the scientific department in Cesky Budejovice adds: “We wish to show that there is a huge range of natural adhesives with a number of unique properties. The project will include the release of results to the broad public, and a photo exhibition at both workplaces.”

Two joint teams will be formed as part of the project. The first - led by the AVČR Biological Centre - is to be responsible for providing and processing natural materials, including samples taken near České Budějovice and Bayreuth (Fichtelgebirge). The second team - led by the Biomaterials research group in Bayreuth - will focus on biotechnological production.

The EU is funding the project to the tune of € 676,200.

About the AVČR Biological Centre
The Biologické centrum (BC), with its six hundred employees, is the largest institution of the Czech Academy of Sciences outside Prague. It specialises mainly in research in biotechnological and biological-ecological disciplines, namely parasitology, entomology, hydrobiology, the molecular biology of plants, and soil biology, including related disciplines.
such as biomedicine, nanotechnologies, and electron microscopy. Researchers gather knowledge about free-living and parasitic organisms, their interrelationships, their impact on ecosystems and other organisms, including humans, at the molecular, cellular, organismal, and ecosystem levels. BC also prepares expert opinions, statements, and recommendations in its fields of activity, organises scientific meetings, and, through its own department, facilitates the transfer of technologies into the practical application of the results of scientific research.

About Biomaterials at the University of Bayreuth
Biomaterials is concerned with the characterisation, functionalisation, and biotechnological production of structural proteins, as well as the development of processing methods for technical and medical applications. An interdisciplinary team contributes its expertise in protein analysis, protein design, recombinant protein production ("white biotechnology"), functionalisation and modification of proteins, process technology (spinning, casting, coating processes, microfluidics, etc.), and cell biology. As a link between industry and (university) research, novel high-performance materials are developed by the research group, opening up new technical and medical applications. The range of applications includes filter materials for fine dust filtration, special textiles, cosmetic products, wound care, implant coatings, and drug delivery systems.

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Larvae of the spider moth, Yponomeuta cagnagella, produce strongly adhesive fibres.