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LOEWE Centre for Insect Biotechnology in Giessen

Successful cooperation between Justus Liebig University Giessen, the Technische Hochschule Mittelhessen and the Fraunhofer Institute for Molecular Biology and Applied Ecology, Aachen (IME) – a decisive step towards a permanent Fraunhofer Institute in Giessen

"Learning from insects means learning to win." – The development of new active agents, products and services on the basis of knowledge acquired from insects is considered internationally to be an innovative field of research with enormous growth prospects. At Justus Liebig University (JLU), this was spotted early on and the first operational unit in Germany and indeed Europe – a LOEWE research cluster on insect biotechnology – was set up with a view to developing innovative key technologies in the field of "yellow biotechnology". The outstanding research success of the teams of scientists working in this field is now being acknowledged once more. The federal state of Hesse will be providing resources amounting to EUR 17.7 million over an initial three-year research period from 2014 to 2016 for the scientific research programme at the new LOEWE Centre for Insect Biotechnology at JLU; plans are for this to be followed by a second funding period with a comparable volume of resources. Furthermore, the federal state of Hesse and the German Federation are providing a total of EUR 30 million for the construction of a new research building. Alongside JLU (lead-manager), the Technische Hochschule Mittelhessen (THM) and the Fraunhofer Institute for Molecular Biology and Applied Ecology, Aachen (IME) also have a stake in the LOEWE Centre for Insect Biotechnology. The general management of the LOEWE Centre has been placed in the hands of the Giessen-based entomologist, Prof. Dr. Andreas Vilcinskas (JLU), who also heads the Fraunhofer Bioresources Project Group. Coordination is shared with Prof. Dr. Peter Czermak (THM/JLU) and Prof. Dr. Holger Zorn (JLU), while the Fraunhofer share of the responsibility is represented by Prof. Dr. Rainer Fischer (IME).

The pioneering decision from Wiesbaden already makes one thing certain: a new scientific "lighthouse" for insect biotechnology is being established in Giessen. The stated aim of all establishments with a stake in the LOEWE Centre is to build a permanent Fraunhofer bioresource institution in central Hesse on this foundation; it will be the first non-university research institution located in Giessen.

The development of the emerging field of insect biotechnology in Giessen is based on an overall strategy drawn up in 2008 in discussions between the Hesse State Ministry of Higher Education, Research and the Arts (HMWK), the Fraunhofer Institute for Molecular Biology and Applied Ecology IME and JLU.

In the view of JLU President Prof. Dr. Joybrato Mukherjee, the establishment of the LOEWE

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Centre for Insect Biotechnology with a total sum invested of just under EUR 48 million is as important for JLU as the double success in the German Excellence Initiative. “In a network with strong partners,” he observed, “we will develop a new, practically oriented field of scholarship. Once again, this shows that our long-term strategy of establishing unique features within our priority area of life sciences, including the LOEWE programme and strengthening excellence, is paying off. I would like to congratulate all participating scientists and to thank the federal state of Hesse and our partner institutions for their excellent cooperation and support.”

Prof. Dr. Günther Grabatin, President of the Technische Hochschule Mittelhessen (THM), emphasized the importance of Giessen as the chosen location: “The establishment of a new LOEWE Centre will boost both the scientific excellence of JLU and THM and the innovative economic strength of the central Hesse region. Our Institute for Bioprocess Engineering and Pharmaceutical Technology is further evidence that top quality research has been firmly established at THM.”

Prof. Dr. Rainer Fischer, Senior Executive Director of the Fraunhofer Institute for Molecular Biology and Applied Ecology (IME), Aachen, sees the developments in Giessen as being well on the way to systematically tapping the potential of insect biotechnology and to developing and economically exploiting new active agents for use in medicine, plant protection or industrial biotechnology: “The Fraunhofer IME sees the new LOEWE Centre as perfectly complementing its research and development activities at the interface between molecular biology and applied ecology. We are expecting this expansion to yield a large number of innovative solutions and platform technologies in a variety of different areas of modern life sciences at a global level.”

Development and expansion of previous research clusters

With the establishment of the LOEWE Centre for Insect Biotechnology in Giessen, the Fraunhofer Bioresources Project Group, which has so far successfully formed part of the LOEWE research cluster, is to be expanded into an autonomous, permanent Fraunhofer Bioresources Institute that works closely with JLU and THM. Its range of research and services in the field of insect biotechnology and beyond will be extended so that a new sustainable facility can be founded in addition to existing Fraunhofer Institutes. For this reason, business areas have been created within the LOEWE Centre that are closely related to the field of insect biotechnology, including the fields of natural products and biodiversity.

At the same time, the LOEWE Centre will create jobs for highly qualified specialists and generate incentives for biotechnological enterprises to establish a presence in Giessen and the surrounding area. Long-term structure formation and profiling, cooperation between universities and non-university players, networking between scholarship and business in association with the LOEWE programme, all these strategic objectives for the region are being implemented in a forward-looking perspective with the LOEWE Centre for Insect Biotechnology.

According to the current planning schedule, work will begin in 2015 on a new research building in Leihgesterner Weg to house the LOEWE Centre for Insect Biotechnology and the new Fraunhofer facility; completion is scheduled for 2017.

Scientific research at the LOEWE Centre for Insect Biotechnology

“Using insects to provide new resources for products that can be used in the fields of medicine, plant protection and industrial biotechnology is the central focus of scientific research at the new LOEWE Centre,” explained the Scientific Coordinator and Head of the new LOEWE Centre, Prof. Dr. Andreas Vilcinskas. He is convinced: “Insects are considered the most successful group of animals or organisms on earth. This biodiversity at the species level is also reflected at the molecular level. That means that insects are a huge store of active agents and what we have to do is deliberately set out to find new active agents in that store and make them beneficial for human beings.”

Insect biotechnology is still a young discipline, with key scientific impulses being sent out from Giessen. Core publications in this specialist field are the work of Giessen-based scientists, in particular Prof. Dr. Vilcinskas and his team. These latest developments have contributed to making Giessen known worldwide, which not only makes it easier to recruit additional experts in this specialised area but also attracts next generation groups to the JLU, with funding coming from the German Research Foundation (DFG) via the Emmy Noether Programme, the VW Foundation and the Fraunhofer Attract Programme.

Insect biotechnology is concerned with the development of interface technologies and the use of new active agents from insects for therapeutic or diagnostic purposes, for instance. As this potential remained systematically untapped and unexploited until recent years, the cooperative venture between the Fraunhofer IME, JLU and THM will provide substantial development and profiling opportunities for all parties. In addition to the possibilities in the field of human and animal medicine, considerable potential in the agricultural and nutrition sector is anticipated.

For example, new enzymes and aromatic substances from insects are to be rendered suitable for use in the food industry. In Giessen new environmental-friendly ways are being developed to combat insect species that cause major economic damage in agriculture or transmit diseases such as malaria. Because of the enormous innovative and economic potential, the LOEWE Centre is also attracting industrial partners which will contribute financially to the research and will thus help to create high quality jobs in Giessen.

Although rapid progress in instrumental analytics as well as proteome and genome research have led to the establishment of important technical requirements, insect biotechnology is still based on the sound knowledge of the systematics, evolutionary biology and ecology of insects. Following the knowledge-based selection of insect species, whose lifestyle should mean that they have the sought-for target molecules (such as antimicrobial agents), application-relevant molecules can be identified by means of highly sensitive mass spectrometric procedures or modern sequencing technologies. By cultivating insect cells in fermenters, insect enzymes, for example, can be produced on a large scale and used by industry.

For more information
www.insekten-biotechnologie.de

Photo

“Learning from insect means learning to win” - laboratory work with bees.
Photos: Jan Michael Hosan / Hessen schafft Wissen

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Founded in 1607, Justus Liebig University Giessen (JLU) is a research university with a long-standing tradition which attracts some 26,000 students. Apart from the wide range of subjects on offer extending from classical natural sciences, law and economics, social and educational sciences to linguistics and cultural studies it offers a selection of life science subjects that is unique not only in Hesse: human and veterinary medicine, agricultural, environmental and nutritional sciences and food chemistry. The leading personae who carried out research and taught at JLU include a number of Nobel prizewinners, such as Wilhelm Conrad Röntgen (Nobel Prize for Physics in 1901) and Wangari Maathai (Nobel Peace Prize in 2004). Since 2006 JLU has been receiving financial support under both the first and the second Excellence Initiative promotional schemes (Excellence Cluster Cardio-Pulmonary System – ECCPS; International Graduate Centre for the Study of Culture – GCSC).