

A research profile – Food Systems Biology at the Leibniz Institute in Freising

From food production to physiology: the researchers for food systems biology at the Leibniz Institute in Freising are investigating bioactive ingredients and their effects on the human body. This is also the focus of the work of Prof. Dr. Veronika Somoza, who has been heading the institute as its new director since November last year.



A focus on healthy and tasty nutrition: In the analytical laboratory based in Freising, chemists, biologists, technologists and bioinformaticians are joining interdisciplinary forces.
(Photo: C. Schraner/Leibniz-LSB@TUM)

At the cutting edge of chemistry, biology and bioinformatics

The institute has been developing solutions for the food supply of the population since its inception in 1918. After 99 years of successful work as the "German Research Institute for Food Chemistry", the institute has been operating under the name Leibniz Institute of Food Systems Biology at the Technical University of Munich, Leibniz-LSB@TUM for short, since September 2017. The new strategic orientation of the institute is dedicated to establishing the interface between chemistry, biology and bioinformatics in order to decipher the complex ingredient profiles of raw materials and food and to elucidate their effects on humans. "As such it has grown far beyond the former core discipline of classical food chemistry," says director Veronika Somoza.

In the early years, research had the primary task of improving nutrition among the population in times of war-related food shortages. Today, the institute is very well networked both nationally and internationally. Chemists, biologists, technologists and bioinformaticians have joined their interdisciplinary forces in order to develop a scientific basis for the resource-saving production of organoleptically appealing food products that promote healthy nutrition. "For this

purpose, they combine methods of biomolecular basic research with analytical methods of bioinformatics and analytical high-performance technologies," said Somoza.

The goal: Setting the course for personalised nutrition

With their research, the scientists at Leibniz want to address the great challenges of our time: The constant growth of the population, the increasing prevalence of food allergies and intolerances and the changing eating habits of consumers make it necessary to develop novel, target group-specific food products. The Bavarian Ministry of Economic Affairs has provided nearly 17 million euros for this purpose. "Products developed on the basis of the research conducted by the scientists in Freising are to contribute to ensuring that the population continues to be supplied with a sustainable and sufficient supply of health-promoting and tasty food in the future," says Minister of State Hubert Aiwanger. In addition, the newly gained knowledge will be used to develop personalised nutritional concepts - such as for people with food allergies and food intolerances.



Andreas Dunkel (Leibniz-LSB@TUM) and Christoph Hofstetter (TUM) in the laboratory: The two researchers are investigating a new methodological approach to food profiling using apple juice as an example.

(Photo 1: Leibniz-LSB@TUM; Photo 2: Andreas Dunkel/Leibniz-LSB@TUM)

Focus on new methods for food profilers

With its work, the institute is also making a significant contribution to the quality assurance of food and its safety to health and is helping to develop new types of detection systems for monitoring food quality and safety. One example of this is a new methodology developed by

Leibniz and TUM scientists for the simultaneous analysis of odours and flavours, which is based on ultra-high performance liquid chromatography-mass spectrometry. In the future, it should be possible for food manufacturers to use this method to quickly and easily monitor the taste of food along the entire value-added chain and to optimise it where necessary. "The method can also be used to put a stop to food counterfeiters," explains Andreas Dunkel. This is because the identified ingredient samples can be used to "easily check indications of origin and quality and to detect counterfeits," says the senior scientist.

Establishing food systems biology on an even firmer footing

Prof. Dr. Veronika Somoza has been head of the Leibniz Institute since 1 November 2019. She unites the fields of nutrition, food and health research and wants to "establish the future field of food systems biology even more firmly on the Weihenstephan campus," says Prof. Dr. Thomas Hofmann about his successor. Before taking up her position, the native of Braunschweig was active at the University of Vienna, where she was Vice Dean of the Faculty of Chemistry and Head of the Institute of Physiological Chemistry. Her research focuses on the isolation, characterisation, bioactivity and bioavailability of food ingredients and their effects on the human biosystem.

Close cooperation with industry and other partners

Leibniz-LSB@TUM is a member of the Leibniz Association, which incorporates 96 independent research institutions. The association's focus ranges from the natural, engineering and environmental sciences to economics, spatial and social sciences and the humanities. Leibniz institutions maintain close cooperation with universities – among others in the form of the Science Campi, with industry and other partners in Germany and abroad. The institutes employ a total of some 20,000 members of staff, including 10,000 scientists.

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