World-leading research into algae

02.07.2019

Saxony-Anhalt has developed into a centre for algae biotechnology. From the fundamental research, to the construction of reactors, all the way through to the development of active agents for the fields of nutrition, medicine and cosmetics, microalgae have a great future as a renewable raw material.

When Carola Griehl is out and about, her eyes often go on a tour of discovery for algae. She has a keen eye for the green micro plants which have a tendency to form wherever the environment is humid – whether in water, on rocks and house walls, or even in the snow. On her last holiday, she says with a smile, she discovered some microalgae in a pond, which isn't yet in her collection. That means something.

Anhalt University of Applied Sciences in Köthen owns some 300 strains of algae. It is here that Carola Griehl is Professor for Biochemistry, and where she leads the working group for "Algae Biotechnology". Carola is one of the leading experts for algae in Germany. Those who join her in the laboratory are quick to notice that her urge to explore is combined with huge enthusiasm. It is therefore for good reason the scientist is also called an "Algae Ambassador". Her message in a nutshell: "Green, blue and red micro-organisms are genuinely multi-talented. They can help us to deal with the major global problems," emphasises Carola Griehl, before making mention of climate change, the growing world population accompanied by declining food supplies as well as the finite nature of fossil fuels.

A source of health-promoting ingredients

The algae researcher is in her element; and she is enthusiastic about highlighting the attractiveness of algae. The algae that she found on holiday actually proved to be a special alga with a high content of omega-3 fatty acids. The professor talks about the development of new species of algae as a source of health-promoting ingredients – such as unsaturated fatty acids, vitamins, proteins, blue dyes, carotenoids and other active agents. "These can reduce the risk of dietary-related diseases in the ageing population," highlights the expert, stressing that certain active substances are also a focus for medical applications, including ones that address brain development, the treatment of chronic intestinal inflammation and neuro-degenerative diseases.

The importance of algae is also set to increase in the agricultural sector – in the animal feed sector, for example, or as an additive to fertilizers, as well as in the cosmetics industry and as a producer of raw materials in the energy and chemical industries.

From the fundamental research though to the industrial use

"Saxony-Anhalt has developed into a centre for algae technology," explains the university professor, before referring to the ever-increasing potential in the federal state: In the year 2000, the first industrial photo-bioreactor plant in the world for the production of algae in glass tubes with a length of 500 kilometres was constructed in Klötze in the Altmark region. At the same time, the application-oriented research into algae began at Anhalt University of Applied Sciences. Carola Griehl tells us that some 40,000 species of algae have been classified in the world of science. "We still know far too little about their usable ingredients, however. At present, only 15 microalgae are used at the industrial level. That's why we're creating our own collection of algae strains. We are investigating the use of the microalgae which is found in nature all over the world."

As the next link in the value added chain, the Fraunhofer Centre for Chemical-Biotechnological Processes CBP opened in Leuna in 2012. It is here that the laboratory processes are transferred to the industrial scale. In 2013, Anhalt University of Applied Sciences opened a biosolar centre in Köthen in cooperation with GICON-GmbH. Here, the results from the fundamental research are further developed through to the level of industrial application. Since 2018, the Fraunhofer Institute for Cell Therapy and Immunology IZI in Halle and Anhalt University of Applied Sciences in Köthen have been developing the "Natural Product-Based Therapeutics" joint research laboratory into a national centre for algae-based drug research.

The alternative to coal and oil

With these partners and others from the worlds of science and industry, Anhalt University of Applied Sciences is developing a network which will provide for a technical advantage, worldwide. Professor Griehl proudly refers to the cooperative doctorate programmes, to the international interest in the student exchanges, to the visiting scientists and lecturers, as well as to the international projects in the field of algae research. She recently signed a contract with a Japanese partner which has the objective of conducting research into an algae that secretes petroleum-like hydrocarbons from the cell; key raw materials for the cosmetics and chemical industries which can also be used to generate energy.

"I am particularly pleased about the application-oriented research here and the tangible transfer of knowledge," says Carola Griehl with a twinkle in her eyes; she is also determined to show off her "algae filling station". This species of algae, which excretes oil similar to petroleum, is cultivated in the bubble columns that have been converted into "milking apparatuses". The algae researchers from Köthen have succeeded in siphoning off the oil during the production of biomass. The scientist tells us that algae oil can be produced profitably on an industrial scale, before presenting yet another invention: the pilot plant is equipped with photo bioreactors developed by GICON GmbH – pine trees made from silicone tubes which can be tempered. This allows the algae culture to be cooled on hot days to prevent it from heating up to more than 35 degrees, which would cause the contents to die.

Raising a toast – with blue algae beer

"It goes without saying that we want to use our pioneering technological role to bring algae into play as an alternative in the development of an energy economy free from oil and coal," explains professor Griehl. She refers to a recent initiative from visionaries who want to establish a Central German Centre for Algae. The objective is to develop, certify and launch new algae-based products in the interests of strengthening the economic clout of the region.

In this respect, nothing could be more appropriate than raising a toast to the blue algae beer from Jean Titze, the beer-brewing professor for food technology. "It doesn't just taste great. The blue colour of the algae also has an anti-inflammatory and anti-carcinogenic effect," enthuses the Algae Ambassador.

Author: Kathrain Graubaum

02.07.2019

previous article

next article

Add page

THIS COULD ALSO BE OF INTEREST FOR YOU:

International breakthrough: Biotechnologists from Saxony-Anhalt revolutionise the production of the sugar polymer Levan for cosmetics

07/02/19

The students and scientists, who specialise in making natural biological processes usable for industrial production, succeeded in finding micro-organisms that produce Levan.

Green chemistry in the fight against malaria

07/02/19

Researchers from Saxony-Anhalt discover the efficient production of medicine to fight the tropical disease

Green innovation: where wood is used to make structural foam

07/02/19

Researchers in Leuna are using tall oil in the production of bioplastics

Green fuels from Saxony-Anhalt: maximum sustainability in the production of biofuel

07/02/19

Technology leader Verbio AG promotes the bio-economy in Germany and worldwide