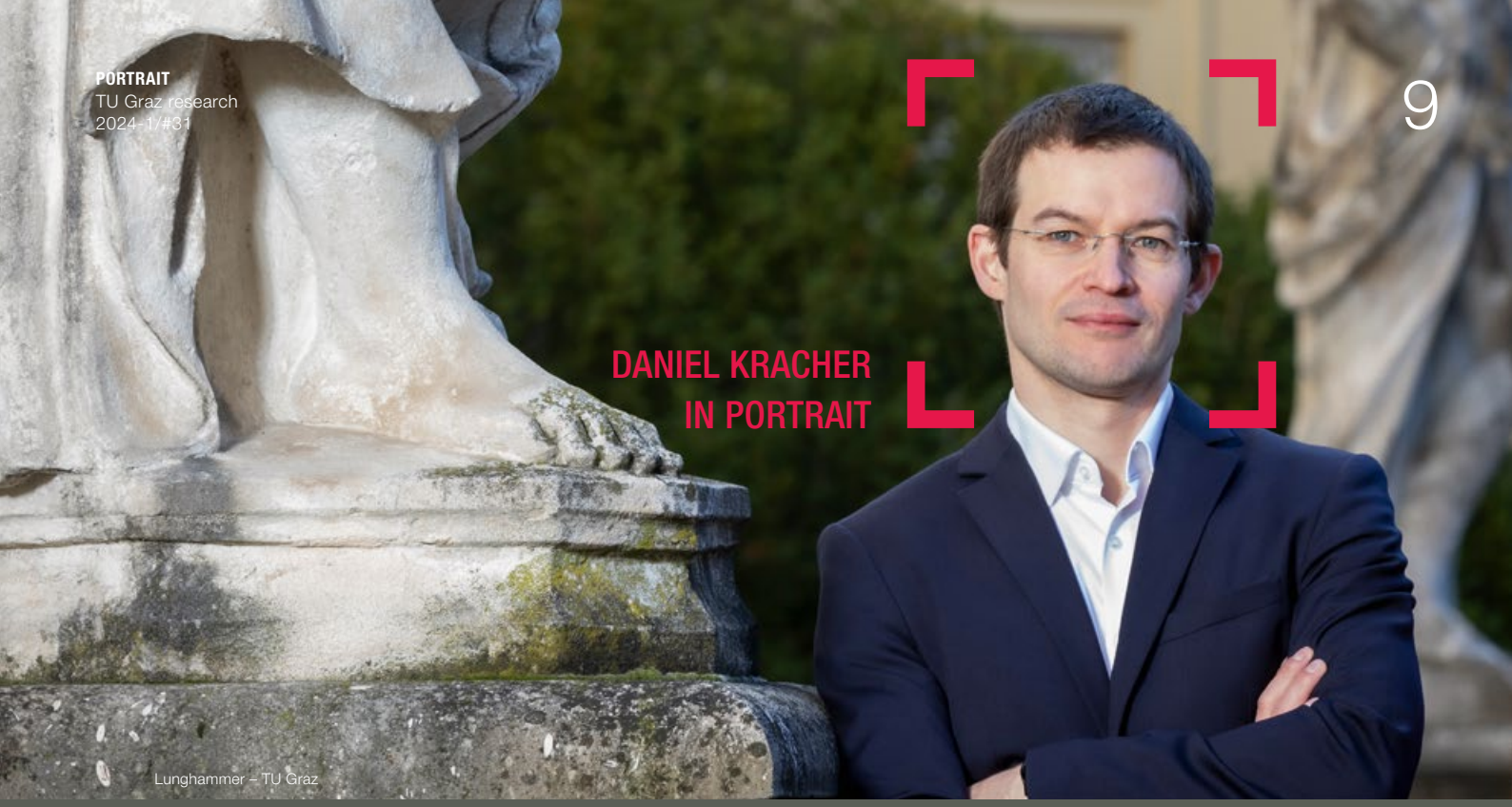

Lunghammer – TU Graz

Between Cholera and Artificial Intelligence

Daniel Kracher is one of 17 scientists and ten doctoral students who will be working on improved methods for the efficient production of new enzymes in the latest TU Graz lead project DigiBioTech.

Birgit Baustädter

"Because it's terribly exciting!" says Daniel Kracher succinctly and memorably, explaining why he chose biochemistry as his field of research. Even at secondary school, the native of Fürstenfeld's rough path towards the natural sciences was discernible. During his studies at Vienna, where he opted for food and biotechnology, his interest in biochemistry eventually crystallised. "That's certainly due to all the lab work," he says laughing, as he looks back. "At the time, I was working with enzymes that are important for the decomposition of biomass in nature. And although they are also important for the controlled degradation of biomass in biorefineries, not much was known about them at the time. I really had to sink my teeth into this topic, and it fired my enthusiasm."

NORWAY AND MANCHESTER

After a period in Norway, where the young researcher was able to familiarise himself with interesting analytics, a Schrödinger Fellowship took him to the Manchester Institute of Biotechnology in the UK for 14 months. "That was certainly one of the most fruitful phases of my career to date because I was relatively free to follow my own research inclinations. In Manchester, there is a very specialised methodology with which I was able to look at reaction processes at a very high temporal resolution."

BIOTECHMED-GRAZ YOUNG RESEARCHER GROUP

In recent years, Kracher has been conducting research, funded by the BioTechMed-Graz inter-university cooperation programme, in a young researcher group at TU Graz which he heads. At the centre of the research work are proteins that are used by pathogenic organisms to hide from the host's immune system and which can thus cause great damage. Vibrio cholerae, the causative agent of cholera, serves as a model organism. "We are investigating whether there is a way to inactivate key proteins in this process. This would allow the pathogen to be recognised at a very early stage of the disease and combated by the immune system." This research is particularly relevant because similar mechanisms also play an important role in many hospital germs. "We are conducting very important basic research here, which can then be built on clinically."

DIGIBIOTECH

Since 2024, he has also been involved in the new TU Graz lead project. As part of the research team, he wants to use artificial intelligence to make biotechnology more efficient. His research focuses on the optimisation of enzymes using AI with the aim of eliminating so-called forever chemicals. These are substances that contain extremely stable carbon-fluorine bonds and are used in numerous consumer materials such as non-stick coatings, water-repellent textiles or food packaging due to their special properties. However, they are also extremely stable and difficult to break down in nature. Kracher now wants to render these substances harmless. Although enzymes are currently unable to do this, or can only do so very slowly, research is to be carried out into new ways of significantly increasing these degradation processes in a targeted manner in collaboration with colleagues from the Institute of Theoretical Computer Science at TU Graz using AI-supported enzyme engineering. ■