

PRESS RELEASE

Hessian Minister for Digital Strategy and Development visits BRAIN AG

Zwingenberg, Germany
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- **Minister informs herself about digitalization in biotechnology**
- **Digitalized metagenome analyses open up new possibilities for special enzyme development**

As part of her "Hessentour - Benefits of Digitalization", Hessian Minister for Digital Strategy and Development Professor Kristina Sinemus visited BRAIN AG in Zwingenberg. The Minister informed herself about the importance and application fields of digitalization in industrial biotechnology.

Scientists from BRAIN AG explained to the Minister the role of digitally-supported analysis of initially unmanageable amounts of data in the field of metagenome analysis – and the identification and characterization of enzymes that can later be used in industrial processes.

Identifying microorganisms and their biomolecules digitally

Scientists at BRAIN described the metagenome as the entire genetic information of all genomes, e.g. in a soil sample, and the microbial diversity it contains. According to the scientists, the acquisition of digital data on microbial diversity (metagenome sequencing), followed by the digital classification of the sequence data (metagenome annotation) and their digital evaluation (comparative analysis) is the only way to process such biodiversity. As an example, they cited the fact that digitalized

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metagenomics could be used to identify and characterize up to 10^{10} microorganisms from a single gram of a soil sample. These in turn would provide an enormous variety of new biomolecules, such as proteins and enzymes, for biotechnological application.

Optimization between laboratory bench and database

Once a biomolecule has been digitally identified, it is advisable to create a "digital variant library" (with more than 10^5 biomolecules in some cases) and optimize it using bioinformatics. This so-called "protein engineering" is then checked in analogue laboratory tests, making it possible to optimize an enzyme step by step and under predefined conditions for cyclical applications on an industrial scale.

According to the scientists who held the presentation, this digital optimization process would sometimes involve the use of structural models that predict a digital 3D model from the one-dimensional linear amino acid sequence of an enzyme. These 3D models allowed predictions to be made about "set screws" with which an enzyme could be improved: for example, the enzyme's temperature or pH optimum could be adapted to industrial processes in this way.

The Minister, herself a qualified biologist, followed the explanations with great interest. In the ensuing dialogue, she wanted to know what benefits this digitalization application would have for people themselves. The scientists at BRAIN explained that the current digital possibilities – particularly in combination with the often cited artificial intelligence – might enable hitherto unknown processes, such as the correct folding of digitally identified enzymes, which could make such efficient predictions based on the wealth of metagenome data that it would be possible to save repeated cycles between laboratory and database. Apart from this practical benefit for the daily work of scientists, society as a whole also benefits from the new digital possibilities, because optimized enzymes can, for example, reduce the energy required in an industrial process or the amount of chemicals needed, thus leading to greater sustainability.

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About BRAIN

B.R.A.I.N. Biotechnology Research and Information Network AG (BRAIN AG; ISIN DE0005203947 / WKN 520394) is one of Europe's leading technology companies in the field of industrial biotechnology, the core discipline of the bioeconomy. As such, BRAIN identifies previously untapped efficient enzymes, microbial producer organisms or natural substances from complex biological systems that can be put to industrial use. The innovative solutions and products developed by means of our proprietary "Nature's Toolbox" are successfully applied in the chemicals, cosmetics and food industries. BRAIN's business model is based on two pillars. The BioScience segment mainly comprises research and development activities with industrial partners ("Tailor-Made Solutions" cooperation business), and the company's own research and development. The BioIndustrial segment consists mainly of business with industrially scalable products. Further information is available at www.brain-biotech.com.

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