Making sustainable biotechnology a reality: Joined forces aim to improve biocatalysts

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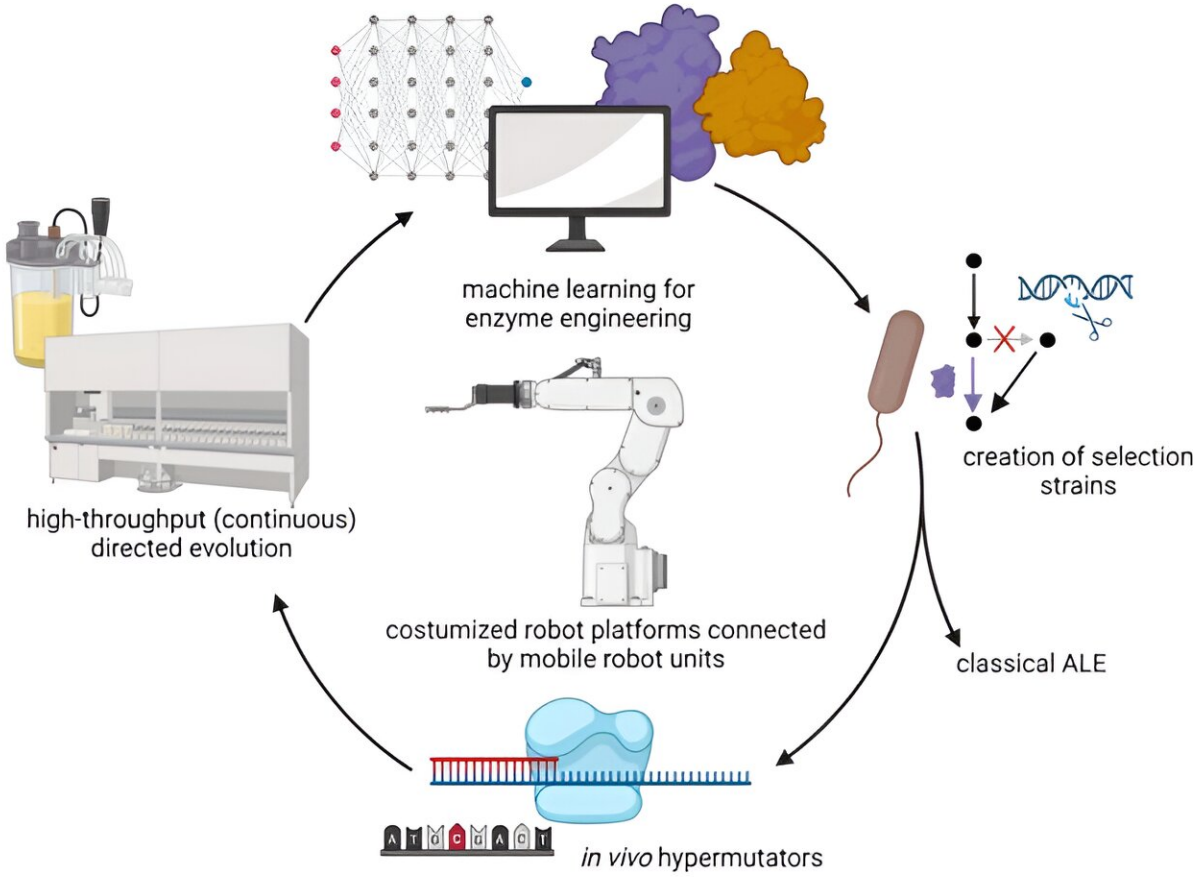

Credit: Lennart Schada van Borzyskowksi

Everything biobased: plastic, medicine, and fuel. It seems like a

futuristic utopia. But for how long? A collaboration of researchers now proposes an idea to accelerate the development process. By combining machine learning and laboratory automation, this biobased ideal may become a reality sooner rather than later.

Biobased products could be as cheap as products made from fossil fuels. However, there is still a way to go. The development of cost-effective biobased processes requires the creation of stable and improved enzymes: biocatalysts that accelerate the production of desired compounds. For bioproducts, enzymes are produced in bacteria, in which DNA is changed to optimize the catalytic function of the enzymes.

Unfortunately, it is a slow and labor-intensive process to modify and test improved enzymes using traditional methods. It requires introducing changes in the DNA of the bacteria and then screening which effect this has on enzyme properties. Nowadays, computational tools, especially machine learning, help to expand the possibilities for enzyme engineering.

This can be combined with advances in laboratory automation and genetic engineering, which help to develop efficient screening methods for engineered enzymes. By relying on this combined approach, enzymes can be engineered faster and more reliably than before.

An article on the researchers was recently published in *Nature Communications*. Researcher Lennart Schada von Borzyskowski (Institute of Biology Leiden), a co-author of the study, says, "We wrote this paper as a team with specialists from different areas of research, and we think that enzyme engineering will also be teamwork in the future."

"One researcher cannot be an expert in biochemistry, genetic engineering, and machine learning at the same time. Improving enzymes

for sustainable biotechnology is a challenging task, and only collaboration makes it possible to succeed."

More information: Enrico Orsi et al, Automated in vivo enzyme engineering accelerates biocatalyst optimization, *Nature Communications* (2024). DOI: 10.1038/s41467-024-46574-4

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