

Algae could feed and fuel planet with aid of new high-tech tool

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Glaucocestis sp. Image: Wikipedia.

Vast quantities of medicines and renewable fuels could be produced by algae using a new gene-editing technique, a study suggests.

Scientists have devised a method that could lead to cheap, environmentally friendly ways of making products for use in the cosmetics, plastics and [food industries](#).

Algae are highly prized for their ability to make useful products, but a lack of engineering tools has hindered basic research and growth of the industry for decades, researchers say.

Scientists at the University of Edinburgh sought to improve the

efficiency of gene-editing to increase yields of products currently made using algae, including some food supplements. The advance could also enable algae to make new products, such as medicines.

The technique uses molecules that act like scissors to cut DNA - called CRISPR molecules - which allow researchers to add new genes or modify existing ones. Until now, scientists have struggled to develop a technique that works efficiently in algae.

To overcome this, the team added CRISPR molecular scissors and short pieces of DNA directly to algae cells to make precise modifications to the genetic code.

Their new method is more specific and increases efficiency 500-fold compared to previous techniques. The discovery could unleash the potential of the global algae industry, projected to be worth \$1.1 billion by 2024.

The team developed its technique to work in a widely used species of algae - called *Chlamydomonas reinhardtii*. The method could potentially also be used to engineer crops to increase yields, improve disease resistance or enable plants to thrive in harsh climates.

The study, published in the journal *Proceedings of the National Academy of Sciences*, was funded by the Biotechnology and Biological Sciences Research Council and Scottish Bioenergy.

Dr Attila Molnar, of the University of Edinburgh's School of Biological Sciences, who led the study, said: "Our findings mark a key advance in large-scale algal genome engineering. Our technique is applicable to a wide range of species, and could pave the way for the development of designer [algae](#), which has many biotechnology applications."

More information: Efficient targeted DNA editing and replacement in *Chlamydomonas reinhardtii* using Cpf1 ribonucleoproteins and single-stranded DNA, *Proceedings of the National Academy of Sciences* (2017). www.pnas.org/cgi/doi/10.1073/pnas.1710597114

Provided by University of Edinburgh

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