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# Identification and Optimization of a Metagenomic Esterase with Hydrolytic Activity towards Polylactic Acid

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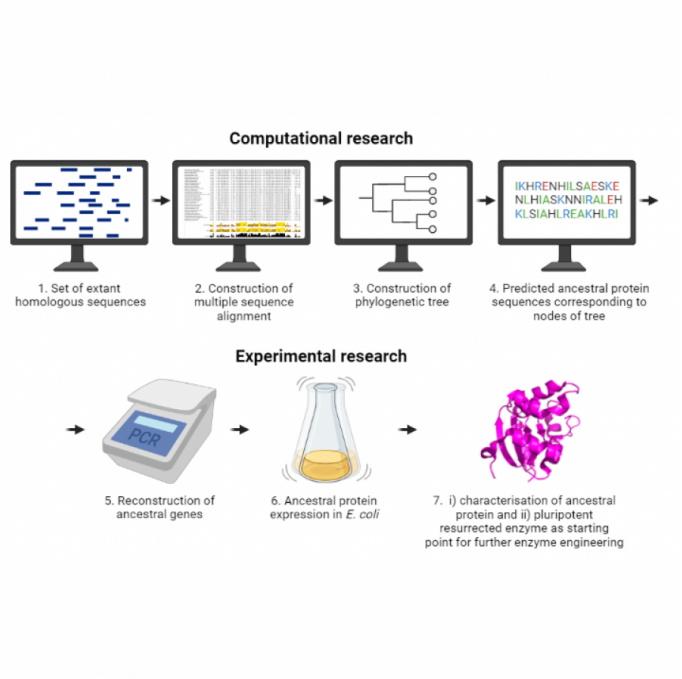
## PURPOSE OF THE ABSTRACT

Polylactic acid (PLA) is a biodegradable polyester with high potential for applications in many fields.[1] The low biodegradability of PLA in natural environments limits its use as a sustainable alternative to conventional plastics. However, microbial enzymes offer a promising strategy to enhance the biodegradation of PLA. Accordingly, we applied a metagenomic approach to identify a novel esterase enzyme, capable of cleaving PLA. A search of metagenomic sequence databases identified an esterase, and its activity towards PLA was demonstrated using emulsified PLA in an agarose test.[2] Subsequent crystallographic studies to obtain the enzyme's structure for further optimization resulted in multiple crystal hits. The structure determination process is ongoing, with initial results indicating the enzyme belongs to the α/β-hydrolase family. To optimize the enzyme's stability, ancestral sequence reconstruction was applied to obtain more robust variants stable at higher temperatures. These variants will be ordered as synthetic genes, expressed, and tested for improved thermostability and activity. (Figure 1).

## FIGURES




## FIGURE 1

Figure 1

A complete scheme of the conducted research.

## FIGURE 2


## KEYWORDS

polylactic acid (PLA) | bioplastics | biodegradation | circular economy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