Industrials biofuel production from resurrected ancestral enzymes

Technology #cu12303

The need for industrial enzymes, specifically cellulases, is rapidly growing due to their importance in the biofuel sector for the production of ethanol from non-edible plant sources. However, industrial enzyme use is limited by the instability of enzymes at high temperatures and extreme pH levels. Unfortunately, modification of an enzyme’s robustness can limit catalytic activity. This technology describes the development of industrial enzymes through the identification and genetic resurrection of suitable ancestral strains. These reconstructed enzyme strains can operate efficiently at high temperatures and in acidic environments because they were adapted to the harsher conditions that existed on primordial earth. These traits enable these enzymes to remain stable in the extreme conditions that industrial processes require. Thus, this technology may offer a quick and effective tool to identify industrial enzymes for applications including food processing, textiles, detergents, and pharmaceuticals.

Timely and efficient development method yields robust and efficient industrial enzymes

Typically enzyme development involves randomly inserting mutations in existing enzymes and screening for variants that exhibit the desired characteristics. However, due to the enormous combinatorial possibilities, this often becomes prohibitively costly and inefficient. The enzyme development methodology described in this technology establishes a fast and economically efficient system to predictably alter and optimize enzymes for certain industrial conditions. Previous work further demonstrated that the resurrected ancestral enzymes were more thermally stable, pH resistant, and active than their modern relatives, making them desirable candidates to be used in the harsh conditions of industrial production.

Lead Inventor:

Julio Fernandez, Ph.D.

Applications:

- Development of industrial enzymes for biofuel production, specifically cellulosic ethanol
- Reconstruction of enzymes for applications in industries such as detergents, textiles, and pharmaceuticals
Efficient reconstruction method for the screening of enzymes

**Advantages:**

- Fast and efficient reconstruction method
- Reconstructed ancestral enzymes are more resilient and efficient at industrial conditions than modern enzymes

**Patent Information:**


Tech Ventures Reference: IR CU12303

**Related Publications:**


**Inventors**

Julio M. Fernandez