



BLUE ENZYMES

DISCOVERING NEW ENZYMES TO ADD VALUE TO BIOMASS

Brown, red and green seaweeds play a dominant role in the primary production of coastal ecosystems, and are a major source of biomass which mainly comprises polysaccharides. These varied, complex algal polymers differ from polysaccharides of terrestrial plant origin, in particular because they are rich in uronic and sulfated polysaccharides. These sulfated polysaccharides are not present in terrestrial plants and are reminiscent of the polymers (sulfated glycosaminoglycans) in animals' extracellular matrix.

Some algal polysaccharides are already used in industry as gelling and texturing agents. Others have specific biological properties including immunostimulant, antiviral and anticoagulant properties. Yet despite these properties which highlight their varied potential applications, seaweed (macroalgae) biomass remains underexploited; high-added-value products based on algal polysaccharides and oligosaccharides are few and far between. One of the brakes on developing a biological economy based on seaweed is the availability of enzymes capable of specifically cleaving polysaccharides and/or modifying their structure, which would help to fine-tune their biological properties (the relationship between structure and function). One of the most relevant sources of specific enzymes is marine bacteria. These biodegrade the seaweed and thus naturally 'refine' the algal biomass. Among these microorganisms, marine flavobacteria have been identified as the key players in recycling seaweed.

Against the backdrop of emerging 'blue' biotechnologies in France, the BLUE ENZYMES research project aims to discover new marine flavobacteria enzymes involved in the bioconversion of algal polysaccharides.

The most promising enzyme candidates will be overexpressed in *Escherichia coli*. After an activity-screening step using algal polysaccharides and oligosaccharides, the new active enzymes will be biochemically and structurally characterised.

Partners

Research centers

Station Biologique de Roscoff, Laboratoire de Biologie Intégrative des Modèles Marins, UMR 8227, Roscoff [\[Project Developer\]](#)
Commissariat à l'Energie Atomique/Direction des sciences du vivants/Institut Génomique/Génoscope (LABGeM), Évry
INRA, Virologie et Immunologie Moléculaires UR 892, Jouy en Josas

Funder

- Agence Nationale de la Recherche

Labelisation

26/09/2014

Overall budget

2 515 K€