

Production of PHB by the marine bacterium *Limimarincola soesokkakensis*

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Limimarincola soesokkakensis is a marine, motile, aerobic alpha-proteobacterium with a rod-shaped morphology, belonging to the family Roseobacteraceae. Several species within the genus *Limimarincola* have been reported as producers of intracellular poly- β -hydroxybutyrate (PHB) granules, a natural polymer derived from β -hydroxybutyric acid, which bacteria synthesize as a carbon and energy reserve under nutritional stress conditions, such as excess carbon and nitrogen limitation (Rai et al., 2021; Lee et al., 2022).

PHB is a biodegradable material with physicochemical properties that make it a viable alternative to petroleum-based plastics (Khosravi et al., 2022). Despite its limitations, such as high crystallinity and rigidity, PHB offers significant advantages for industrial applications, especially in food packaging, due to its biocompatibility, optical properties, and good barrier capacity (Jeon et al., 2023).

In this study, a bacterial strain capable of producing PHB was isolated from the Mexican coasts. The 16S rRNA gene sequence of the isolate revealed that it belongs to the genus *Limimarincola*. Under the microscope, the cells appeared as motile short rods with several birefringent bodies located within the cytoplasm. Whole-genome sequencing confirmed its identification as *Limimarincola soesokkakensis*. In silico analysis allowed us to detect the canonical genes involved in PHB biosynthesis.

Cells cultured in marine medium supplemented with various carbon sources and low nitrogen concentrations were stained with Nile Blue to evaluate PHB accumulation. Subsequently, PHB content was quantified using the crotonic acid method, which showed a 10-fold increase in PHB per cell when grown in media supplemented with carbon. Additionally, proteins associated with the isolated granules were analyzed, and current efforts are focused on characterizing the major components.

References

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