New Record for the Most Effective Microalgae on the Removal of Phosphorus and Nitrogen for Wastewater Treatment

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All around the world wastewater is treated using industrial methods that are based on chemical additives. These approaches show high efficiency in treating wastewater, but are harmful to the environment and humans because of the substances used. Environmentally friendly biological approaches have been attempted, such as anaerobic membrane bioreactor (AnMBR), but these bacteria cannot remove the detrimental Phosphorus (P) and Nitrogen (N). This research aims to improve AnMBR by finding the most efficient microalgae in removing the P and N. To test this, the effluent with high amounts of P and N from the AnMBR was treated by three Red Sea microalgae: Chlorella vulgaris and Haematococcus pluvialis were chosen for their previously known efficiency in removing P and N. Additionally, a group of original wild strains collected from the Pascal's reactor was chosen. Biogas made of Methane, Nitrogen, Carbon Dioxide, and Hydrogen was collected from the AnMBR and added to the effluent, after using gas chromatography. The P and N, the Optical Density (OD), and the pH were measured. Pascal's group removed 100% of the P and 75% of the N. The Chlorella removed 80% of the P and 58% of the N. The Haematococcus removed 70% of the P and 58% of the N. DNA sequencing was done using PCR on the Pascal's group and the applicable strain was identified as Parachlorella kessleri. Using this in the AnMBR may ultimately allow for a more efficient process than current industrial methods and provide a “green” solution for global wastewater treatment.

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