



Biochemical and molecular characterization of *Klebsiella* sp. isolated from environment polluted with perfluoroalkyl substances



Aleksandra Žerađanin^{1*}, Kristina Joksimović², Jelena Avdalović¹, Nikoleta Lugonja¹, Takeshi Nakano³, Hideyuki Inui⁴, Vladimir Beškoski⁵

¹Institute of Chemistry, Technology and Metallurgy, University of Belgrade, ²Innovation Center of the Faculty of Chemistry, University of Belgrade, ³Research Center for Environmental Preservation, Osaka University, Japan, ⁴Biosignal Research Center, Kobe University, Japan, ⁵Faculty of Chemistry, University of Belgrade

*adjuric@chem.bg.ac.rs

Aim

The aim of this paper was to conduct physiological, biochemical and molecular characterization of microorganism isolated from Ajifu Waterway, Osaka, Japan, which can reduce concentration of PFASs based on preliminary laboratory tests.

Introduction

The development of chemical industry in the last century has contributed to an increase in food production, more effective disease control and improved living standards. Nevertheless, it left huge quantities of toxic substances in the environment. Persistent organic pollutants are chemicals that persist, accumulate throughout the food chain and have harmful effects on human health and the environment. Perfluoroalkyl substances such as perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, are on the list of persistent organic pollutants. Several recent publications have shown that microorganisms isolated from environments polluted by perfluoroalkyl substances can reduce the level of these compounds. In this paper, bacterial strain isolated from such an environment, which demonstrated capability to reduce perfluoroalkyl substances in a preliminary study, was physiologically, biochemically and molecularly characterized.

Experimental part

- Selection of PFASs degrading microorganism AW-03
- The growth of bacterial populations
- Gram-staining, catalase and oxidase tests
- Analytical Profile Index (API)
- Fatty acid methyl ester profile (FAME)
- Molecular characterization

Results and discussion

Isolated strain is a Gram-negative, aerobic, catalase positive and oxidase negative bacterium;

Generation time : 51 minutes;

API: Isolated strain AW-03 produced a wide range of different enzymes;

FAME: The FAME profile (Fig. 3) consists of normal, cyclo, hydroxy fatty acids methyl esters, and iso methyl-branched fatty acids.

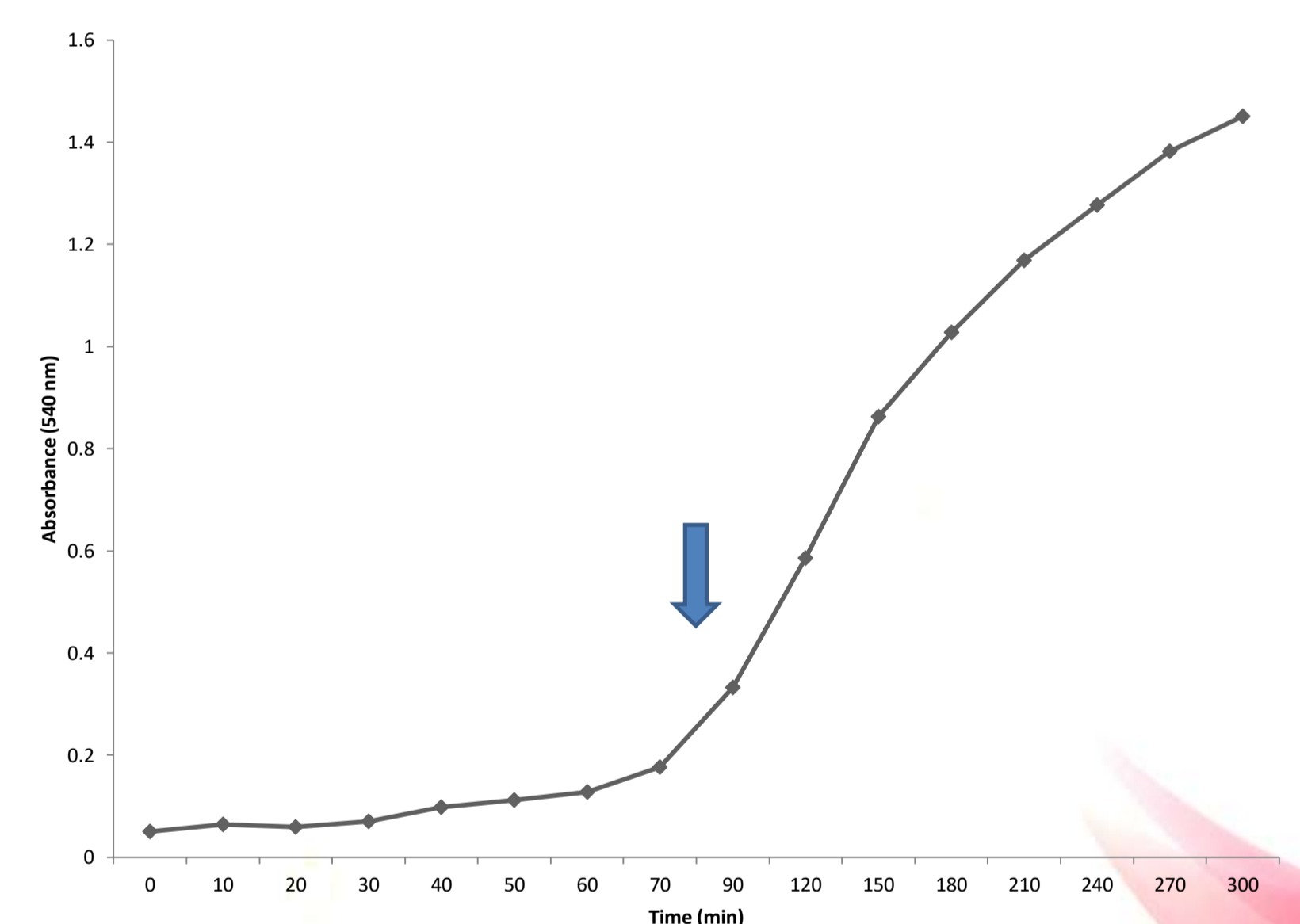


Fig 1. Growth curve of isolated strain.

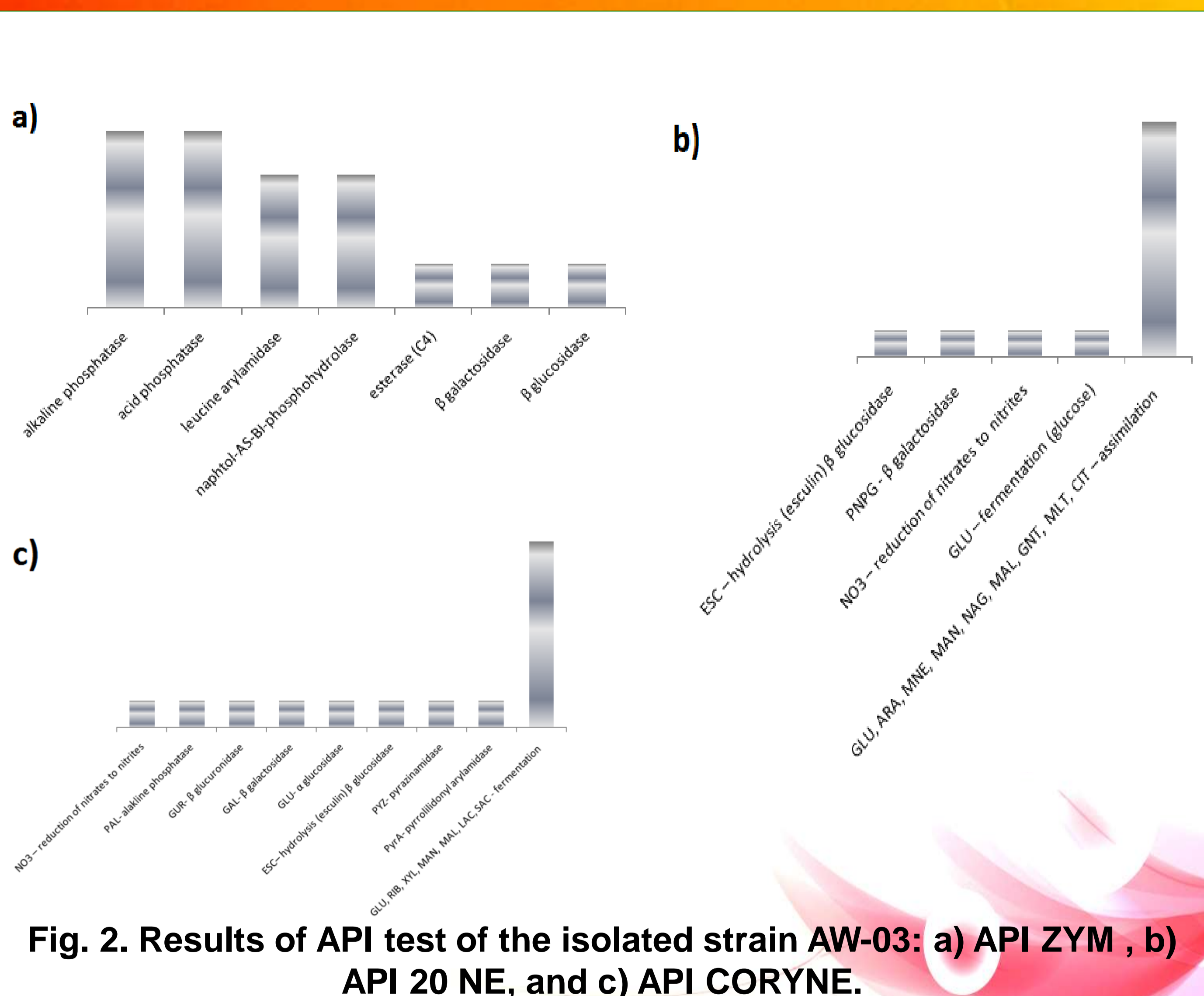


Fig. 2. Results of API test of the isolated strain AW-03: a) API ZYM , b) API 20 NE, and c) API CORYNE.

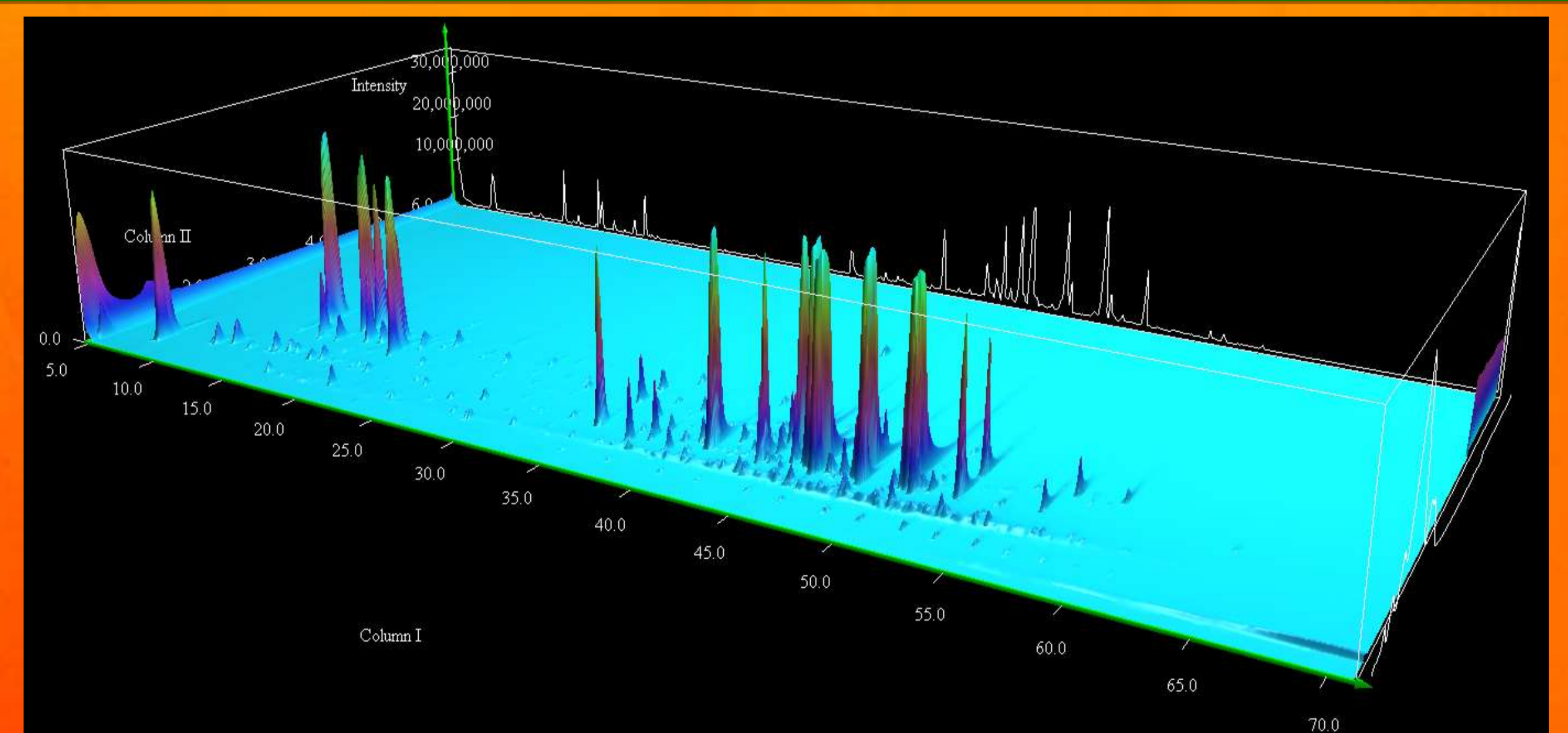


Fig. 3. 2D GCxGC-MS spectrum: the fatty acid methyl ester profile of the isolated AW-03 strain.

Conclusion

The microorganism AW-03 isolated from PFASs-polluted environment was successfully characterized by biochemical and molecular methods. A detailed physiological and biochemical characterization confirmed that isolated bacterial strain AW-03 belongs to the genus *Klebsiella*. Molecular characterization confirmed that this bacterium has the highest homology with *Klebsiella variicola*. Characterized microorganism will be further used for testing of reduction of PFASs concentration.

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