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Microalgae as a Potential New Generation of Material for Various Innovative Products

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Nowadays, great interest has been developed in the isolation of novel bioactive compounds from the marine world which represents the half of the global biodiversity and an untapped reservoir of natural ingredients. Among these ingredients microalgae can play a key role [1,2]. They can biosynthesize many valuable substances with potential applications in the food, feed, pharmaceutical, cosmetic and chemical industry. But the impact of microalgae on the human society is not limited only to their useful products, because of their crucial role on the biosphere through photosynthesis.

Microalgae are primitive, aquatic and photosynthetic microorganisms which appeared on earth about 3.5 billion years ago. They have unicellular or simple multicellular structure and size between 0.2 to 2 nm. Moreover, they have some advantages over terrestrial plants such as higher productivity due to their reproducing by simple division one or two times per day, limited seasonal variation and no lack of raw material. It is estimated that more than 30,000 species of microalgae exist, but only a few are safe and are cultivated in industrial quantities [3,4].

Microalgae that are already commercialized and are used in biotechnology belong to the green algae (e.g. the species *Chlorella, Dunaliela, Haematococcus, Tetraselmis, Isochrysis*) and cyanobacteria – the intermediate blue-green colored species between plants and bacteria (e.g. *Spirulina* (*Arthrospira*), *Aphanizomenon flosaquae*) [3,5,6].

Microalgae can survive under harsh conditions and environmental stressors such as high or low temperature, anaerobiosis, high salinity, photo-oxidation, high osmotic pressure and ultra-violet radiation, so they can greatly modify their chemical composition [2,7]. As a result of the rapid adaptation of algae to the new environmental conditions, they synthesize and produce a great variety of secondary metabolites having structure that cannot be found in other organisms [8]. As a results marine microalgae, due to their abundant availability in the marine ecosystem are an excellent source of valuable compounds such as polyunsaturated fatty acids, proteins, tocopherols and sterols, vitamins and minerals, antioxidants and pigments [7,9].

Consequently, nowadays there are several different applications for microalgae [2,3,10-12]. They could be used in:

A. ***Foods*** as a high-quality protein supplement especially to fortify diets for malnourished people or as functional ingredients

B. ***Feeds*** as protein/vitamin supplements in diets for poultry, pigs, ruminants, rabbits or aquaculture.

C. ***Therapeutics*** to enhance immunity against various infection diseases and to ameliorate/prevent some chronic disorders or to produce metabolites with antibiotic activity or enzymatic hydrolyzates to promote skin metabolism or isotropic compounds in medical research

D. ***Pigments*** β-carotene as food color and provitamin A or xanthophylls in poultry and fish feed or phycobilins as food color in diagnostics, cosmetics and analytical reagents.

E. ***Antioxidants*** as functional ingredients in functional foods and especially in beverages, in pharmaceuticals and in cosmetics.

F. ***Chemicals*** or their precursors e.g. glycerol used in foods, cosmetics, pharmaceuticals, or fatty acids, lipids, waxes, sterols, hydrocarbons, amino acids, enzymes, vitamins E. and C or polysaccharides as gums, viscosifiers and ion exchangers.

G. ***Fuel*** as long-chain hydrocarbons and esterified lipids as combustible oil or biogas or for the production of hydrogen.

H. ***Environmental indicators*** for water pollution for the retention of nitrogen in agriculture or for the retention of excess atmospheric CO_2.

I. ***Hormones*** as auxins, gibberellins and cytokines.

J. ***Miscellaneous*** as biofertilizers, soil conditioners, for waste treatment, or antifreeze proteins.

Although marine microalgae are known for many centuries, nowadays they can be a potential new generation of material, due to the strong demand of the consumers for natural, safe, eco-friendly and renewable products.

References

1. Harlin MM, Darley WM (1988) The algae: an overview. Algae and Human Affairs, Cambridge University Press, Cambridge, UK.
2. Christaki E, Bonos E, Giannenas I, Florou-Paneri P (2013) Functional properties of carotenoids originating from algae. J Sci Food Agri 93: 5-11.
3. Christaki E, Florou-Paneri P, Bonos E (2011) Microalgae: a novel ingredient in nutrition. Int J Food Sci Nutr 62: 794-799.
4. Guedes AC, Amaro HM, Malcata FX (2011) Microalgae as sources of carotenoids. Mar Drugs 9: 625-644.
5. Gouveia L, Batista AP, Sousa I, Raymundo A, Bandarra NM (2008) Microalgae in novel food products. Food Chemistry Research Developments, Nova Science Publishers Inc, USA.
6. Christaki E, Karatzia M, Florou-Paneri P (2010) The use of algae in animal nutrition. Journal of Hellenic Veterinary Medicine Society 61: 267-276.
7. Skjanes K, Rebours C, Lindblad P (2013) Potential for green microalgae to produce hydrogen, pharmaceuticals and other high value product in a combined process. Crit Rev Biotechnol 33: 172-215.

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8. Batista AP, Gouveia L, Bandarra NM, Franco JM, Raymundo A (2013) Comparison of microalgal biomass profiles as novel functional ingredients for food products. Algal Research 2: 162-173.

9. Markou G, Nerantzis E (2013) Microalgae for high-value compounds and biofuels production: A review with focus on cultivation under stress condition. Biotechnol Adv 31: 1532-1542.

10. Becker EW (1994) Microalgae: Biotechnology and Microbiology. Cambridge University Press, Cambridge, UK.

11. Lordan S, Paul Ross R, Stanton C (2011) Marine bioactives as functional food ingredients: Potential to reduce the incidence of chronic diseases. Mar Drugs 9: 1056-1100.

12. Christaki E, Karatzia M, Bonos E, Florou-Paneri P, Karatzias C (2012) Effect of dietary *Spirulina platensis* on milk fatty acid profile of dairy cows. Asian Journal of Animal and Veterinary Advances 7: 597-604.