

1. Record Nr.	UNINA9910261144103321
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Titolo	Advances in Microalgae Biology and Sustainable Applications
Pubbl/distr/stampa	Frontiers Media SA, 2016
Descrizione fisica	1 electronic resource (152 p.)
Collana	Frontiers Research Topics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	<p>It has become more evident that many microalgae respond very differently than land plants to diverse stimuli. Therefore, we cannot reduce microalgae biology to what we have learned from land plants biology. However, we are still at the beginning of a comprehensive understanding of microalgae biology. Microalgae have been posited several times as prime candidates for the development of sustainable energy platforms, making thus the in-depth understanding of their biological features an important objective. Thus, the knowledge related to the basics of microalgae biology must be acquired and shared rapidly, fostering the development of potential applications. Microalgae biology has been studied for more than forty years now and more intensely since the 1970's, when genetics and molecular biology approaches were integrated into the research programs. Recently, studies on the molecular physiology of microalgae have provided evidences on the particularities of these organisms, mainly in model species, such as <i>Chlamydomonas reinhardtii</i>. Of note, cellular responses in microalgae produce very interesting phenotypes, such as high lipid content in nitrogen deprived cells, increased protein content in cells under high CO₂ concentrations, the modification of flagella structure and motility in basal body mutant strains, the different ancient proteins that microalgae uses to dissipate the harmful excess of light energy, the hydrogen production in cells under sulfur deprivation, to mention just a few. Moreover, several research groups</p>

are using high-throughput and data-driven technologies, including “omics” approaches to investigate microalgae cellular responses at a system-wide level, revealing new features of microalgae biology, highlighting differences between microalgae and land plants. It has been amazing to observe the efforts towards the development and optimization of new technologies required for the proper study of microalgae, including methods that opened new paths to the investigation of important processes such as regulatory mechanisms, signaling crosstalk, chemotactic mechanisms, light responses, chloroplast controlled mechanisms, among others. This is an exciting moment in microalgae research when novel data are being produced and applied by research groups from different areas, such as bioprocesses and biotechnology. Moreover, there has been an increased amount of research groups focused in the study of microalgae as a sustainable source for bioremediation, synthesis of bioproducts and development of bioenergy. Innovative strategies are combining the knowledge of basic sciences on microalgae into their applied processes, resulting in the progression of many applications that hopefully, will achieve the necessary degree of optimization for economically feasible large-scale applications. Advances on the areas of basic microalgae biology and novelties on the essential cellular processes were revealed. Progress in the applied science showed the use of the basic science knowledge into fostering translational research, proposing novel strategies for a sustainable world scenario. In this present e-book, articles presented by research groups from different scientific areas showed, successfully, the increased development of the microalgae research. Herewith, you will find articles ranging from bioprospecting regional microalgae species, through advances in microalgae molecular physiology to the development of techniques for characterization of biomass and the use of biomass into agriculture and bioenergy production. This e-book is an excellent source of knowledge for those working with microalgae basic and applied sciences, and a great opportunity for researchers from both areas to have an overview of the amazing possibilities we have for building an environmentally sustainable future once the knowledge is translated into novel applications.
