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# Introductory Chapter: Biotechnology and Bioengineering

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## 1. A general overview on biotechnology and bioengineering

Biotechnology and bioengineering can be defined as “the integration of natural sciences and engineering sciences in order to achieve the application of organisms, cells, parts thereof and molecular analogues for products and services” [1]. Although these areas overlap, depending upon the use of techniques and their applications, both have peculiar characteristics. While the focus of bioengineering is the implementation of engineering principles and design concepts in biology, biotechnology is more focused on the natural sciences [2].

These fields, today considered priority, are the fruit of strategies from various areas that aim to benefit humanity and its environment. Biotechnology and bioengineering, however, despite growing attention in recent decades, are not a new science. Humans have been developing them since the earliest beginnings, mainly in food production. Some ancestral examples include the preparation of fermented beverages from cereals in Babylon and Egypt (8000 to 6000 years BC); the production of bread, using ferment in Egypt (4000 years BC); and wine production in Greece (2000 years BC). Historically, the use of these traditional techniques in this period of history is called discoveries, and not development, once the underlying scientific principles were not understood [3, 4].

Indeed today, the biotechnology and bioengineering based on scientific progress find applications in several areas, including agriculture, livestock, human health, preservation of the environment, and manufacturing industry [5]. This wide applicability was only possible due to the combination of several fields of knowledge that include biochemistry, physiology, genetics, microbiology, virology, botany, zoology, ecology, computer science, and chemical engineering.

Therefore, this is a field of work typically multidisciplinary, which makes the effective collaboration and integration of professionals from different areas of knowledge absolutely indispensable so that all potential of biotechnology and bioengineering can be exploited. The interface between these fields is now understood not only as a “science” to learn about nature but also as a “technology” of susceptible alteration. The intersection between biotechnology and bioengineering and its kindred disciplines proved their economic importance, being capable to expand and promote the manufacture of products and services, besides modifying processes in favor of human benefit [6–8].

The current scenario points for biotechnology and bioengineering as being the main technology of the twenty-first century should be absorbed by the general public. Undoubtedly, knowledge of the principles of vital processes already achieved will proportionate changes significant in the society. Therefore, it is important to

ensure a broad awareness of what these two fields of knowledge involve and what the consequences of accepting or rejecting the innovations [9].

Thus, the chapters presented in this book are intended to help provide a deeper understanding about the recent progresses on biotechnology and bioengineering contributing substantially to the consolidation of bio-based processes and products.

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