



Career Development in Bioengineering and Biotechnology. Guruprasad Madhavan, Barbara Oakley and Luis Kun (eds). Springer Science + Business Media, LLC, 233 Spring Street, New York 10013-1578, USA. 485 pp. Price not mentioned.

Career planning and development requires the knowledge of relevant future options, the capabilities required for each of the options, and the ways to attain those abilities. Understanding the career options involves an awareness of the type of activities (job responsibilities) at various stages of different careers, and the geographic distribution of job availabilities. To grow up to an employable status and then through a career path, it is also essential to identify the prerequisite credentials. Such requirements fall under following categories: theoretical knowledge and practical skills related to specific domain(s), and general personality.

In my opinion, the domains, the extent of depth of knowledge and skills, as well as the suitability of personality-types to different careers, should be presented to students at various stages of education. However, an introduction to career planning and an overview of options has been one of the most important aspect missing in early college education, particularly in India. A study of career options, which keep changing with time and geography, is also essential for the professionals involved in the preparation of syllabi, curricula and policies related to the higher education system. In this context, a book like this can be highly beneficial to many individuals.

The book, with 70 chapters divided into 5 parts, is a good compilation of multiple career options in the biotechnology and biomedical areas, with inputs

from about 85 specialists. Even though it seems to be highly biased towards engineering subjects and careers, the book can be useful for any life sciences graduate/postgraduate students and those involved in teaching or syllabus-preparation for such students. In fact, the last two parts discuss the career development aspects in general, and the relations and impact of certain professions on the society. Hence, the book can also be useful to a wide range of readers related to life/health sciences.

However, the major portion of the book (about 300 pages) is dedicated to the description of traditional as well as newer career options in biomedical and biotech-related engineering. The traditional-careers part covers academic teaching and research, industrial research, research-related activities in the industry as well as the public sectors (including regulatory aspects), healthcare, intellectual property rights, and entrepreneurship in select areas. Another section elaborates on several non-traditional fields such as finance and investments, sales and marketing, book writing, public relations, consulting, legislation, forensic psychology, clinical research and sports engineering.

Even though there is diversity in the writing styles and the contents across the chapters, there has been an effort to maintain uniformity of the content in each of the chapters on career options. The contents of most of the chapters include, notes on personal experiences by the author, particularly the way he/she had begun his/her career, an insight into the daily life of a specific profession, and the necessary knowledge and qualifications. Surprisingly, an indication of comparative pay scales, one of the crucial aspects of career planning, is missing in most of the chapters. The geographic diversities in the scope and work culture have been addressed in some cases, but are far from being sufficient in depth as well as coverage across chapters. In some, such as the chapter on industrial research and management, there is no reference to the scenario in important developing countries, where biotechnology has begun to grow and several service providers cater to outsourcing activities in the Western part of the globe. It should be noted that a very large number of biotechnology and biomedical engineers are likely to emerge from such developing countries in the years to come. In some

other chapters, there is only partial reference to situations in such countries. For example, despite two chapters discussing the teaching in academic organizations, the undergraduate teaching and positions available for non-doctorate candidates in countries like India have not been mentioned, while teaching posts that come with research in higher education centres have been discussed in depth. Differences in the capacities of education and/or training institutions across the world or within USA have also not been dealt with.

Similarly, information regarding various other parameters, including the initial designations and growth-associated hierarchies, size of companies, influence of type of organization on the learning/growth curve, the training options for the domain knowledge/skills, selection processes, etc. have not been given the importance they deserve, in many chapters.

Another lacuna in the book is the absence of information on the type and/or examples of organizations that could provide different career options. A list of companies and institutes along with brief information about the history, employment capacity, hiring rate at various levels, major activities, geographic location and website addresses would be desirable in the context of career planning. Similarly, a schematic or tabular summary of mutual influence of the career options, expertise required at various stages, job responsibilities, organizations and career growth could have been useful for many readers.

Keeping aside the wish list of ideal information needed for career planning, we have to admire the editors and the authors for providing a vast amount of useful information that was much needed. One has to agree with Bruce M. Alberts when he says about various chapters in the book, 'The many heartfelt contributions have been written in different styles, but underlying them all is a deep concern for young people and for the well-being of humanity'. As the editors hope, the book can serve as a stimulus for further progress in bioengineering and related sectors.

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