aspects of blue-green algal biology that are of general interest, or are currently the subject of particularly marked activity." It does not purport to give a general description of the structure and functioning of a blue-green cell and is thus not an appropriate book for introducing students to this unique group of organisms.

Carr and Whitton have assembled contributions from over 20 authorities, all of whom have done an excellent job. The discussions of photosynthesis, nitrogen fixation, photoassimilation, fine structure, chemical composition, and general metabolism, all dealt with at length and very well referenced, are particularly valuable. One matter that is discussed in many chapters is the nature of obligate photoautotrophy and the limited heterotrophic potential of blue-green algae. All these chapters are well written in authoritative fashion.

In spite of the individual merit of the 25 chapters and four short appendices, I am a bit disappointed in the overall impact of this book. The contributions are mostly conventional in delineation of subject material, with emphasis on summarizing present data. Relatively little effort is expended to point out deficiencies in our understanding or to discuss challenging questions concerning organization and function of blue-green cells. The book does not, for instance, deal substantially with the localization and compartmentalization of enzyme units in an oxygen-evolving prokaryotic cell, with developmental phenomena in regard to cell differentiation, or with attempts to relate the structure and functioning of blue-green cells either to their exceptional abilities to survive high and low temperatures as well as desiccation or to their requirement for alkaline growth conditions. One exception to this is the chapter by Lazaroff, in which he nicely documents photomorphogenetic phenomena and also relates and interprets the data in regard to ecological significance.

In view of the fact that the editors have included six chapters dealing primarily with ecological considerations, it is surprising to find some important ecological subjects neglected. The whole topic of photorespiration, for instance, is mentioned only once, and that is in the chapter on nitrogen fixation in regard to competition for reducing power. Perhaps a more serious omission is that of mineral-element interactions, a subject which the editors have chosen to omit but which is nevertheless touched upon by several contributors. There is no mention of uptake mechanisms or uptake kinetics of nutrients, a subject that is of great interest in regard to the distribution and activity of blue-green cells in nature. Another point of concern involves the manner in which light intensities are reported. Most of the contributors (there are a few notable exceptions) use photometric units in discussing effects of light on algal metabolism, in spite of the fact that many photochemical processes are dependent upon the energy as well as the wavelength of the incident light. For such studies it is far more desirable to use radiometric units, as has been elegantly pointed out by J. E. Tyler (*Limnol. Oceanogr.* **16** (5), 841 [1971]).

The omissions will not detract from the value of this text for research workers. The book is amply illustrated. It is also well indexed in regard to subjects and organisms and will be particularly useful because of the cumulative author index of 115 pages. As a general reference source for authoritative information on blue-green algae, it will be of great service for many years.

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Growth Regulator

Ethylene in Plant Biology. FREDERICK B. ABELES. Academic Press, New York, 1973. xii, 302 pp., illus. $18.50.

When, in 1901, Neljubov discovered that ethylene in the air influenced the growth of pea seedlings, he had no idea that he had discovered one of the most important growth regulators of plants, which now is slowly being accepted as the only gaseous hormone yet encountered. Ethylene-regulated phenomena include: breaking of dormancy, regulation of cell elongation, epinasty, induction of roots and root hairs, hypertrophy, exudation, flower induction, fruit ripening, senescence, and abscission. Ethylene also induces enzymes, changes pigmentation, and regulates respiration, nucleic acid and protein metabolism, and other, less important processes.

Ethylene, as far as we know, is produced to some extent in every cell of higher plants, and its production is regulated by the level of other plant hormones such as auxin, gibberellins, cytokinins, abscisic acid, and a whole range of growth retardants. The production of ethylene increases in plants under stress, regardless of the cause of the stress. A variety of organisms produce ethylene at different rates, and the production is under the influence of the environment surrounding the plant. Biochemical pathways from which ethylene evolves may also differ, depending on the type of organism. Several ethylene analogs have been used to elucidate the mechanisms of action of this gaseous hormone, the threshold levels for the action of which are not uniform.

All these matters are discussed in detail in *Ethylene in Plant Biology*. The only place I felt more detail was needed was in the discussion of the biosynthesis of ethylene. Even our incomplete knowledge of this subject is more than that included in the text.

The real value of this book is in collecting the information about ethylene and classifying its effects. The author has done a skillful job of including and illustrating all the important information. After reading the book the uninitiated person, whether he is a student, a teacher, or a researcher not directly engaged in ethylene research, will unquestionably know the role of ethylene in plant biology, just as the title indicates. The author may have intended to write the book as a general reference and to stop at that. However, he leaves the appetite of scientific connoisseurs unsatisfied in that in most controversial cases he merely presents the facts without any attempt to interpret them. This may not be a fault, but Abeles is one of the few persons who is in the position to interpret the available data, and interpretation would add much to the usefulness of the book.

In the past, plant growth has been manipulated by the application of substances that affect the amount of ethylene generated by the plant. Defoliation is the best-known example of this. With the development of new chemicals such as ethephon that are directly converted to ethylene by the plant, the use of ethylene in growth regulation will greatly increase. For this reason, the appearance of this book is timely, and the book is recommended for those who are interested in the subject or want to have a reference book on the work done on ethylene before 1972.

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