where economic new deposits of metals might be discovered utilizes the vast amount of information recovered during the extraction of known ore deposits. The author is fully aware that this is so and has systematically documented the characteristics and debates concerning genesis of the many important rock associations that have yielded ore deposits throughout the world.

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Plant Processes

Photosynthesis, Photorespiration, and Plant Productivity. ISRAEL ZELITCH. Academic Press, New York, 1971. xiv, 348 pp., illus. $15.

Photosynthesis and Photorespiration. A conference, Canberra, Australia, Nov. 1970. M. D. HATCH, C. B. OSMOND, and R. O. SLATYER, Eds. Wiley-Interscience, New York, 1971. x, 566 pp., illus. $19.

These books deal with a subject of great current interest to plant scientists. The discovery of C_4 plants (those in which the early products of carbon dioxide fixation are four carbon dicarboxylic or amino acids instead of phosphoglyceric acid) and the realization that this biochemical difference was associated with altered habitat, anatomy, and physiology have provided a meeting ground for various botanical disciplines. Differences between C_4 and C_3 plants are of more than academic interest; the field productivity of C_4 plants is generally considerably greater than that of the classical C_3 plant. The reader may be interested to learn that crabgrass is a C_4 plant.

Surprisingly, the lesser productivity of C_3 plants is thought to be due to their respiring away, during illumination, a considerable portion of newly fixed carbon. This phenomenon, called photorespiration, is a major subject of both books, but the reader will look in vain for a rationale.

The book by Zelitch brings together most aspects of plant productivity. A section on chloroplast biochemistry, genetics, and photochemistry is followed by sections on photorespiration and productivity in single leaves and in stands. The book is a fine introduction to these subjects and will doubtless be valuable to students and research workers, for it combines topics which are related but are usually treated separately. Photorespiration and the C_4 pathway occupy a large portion of the text, which is of course not surprising, this being one of the author's research interests. The physical and morphological parameters of leaves which affect productivity are discussed, along with the nature of the stand. Metabolism of carbon compounds involved in carbon dioxide fixation and in respiration is given good coverage. The book covers a larger subject matter than do most books of its size, and therefore some areas are treated very briefly. In certain cases this is all to the good. For example, Zelitch seems to believe the triplet state is an obligatory intermediate in the photochemistry of photosynthesis; certainly nothing profitable could be achieved by a lengthy discussion of that matter. The book suffers from the author's adoption of the role of advocate rather than judge. Particularly on the somewhat controversial subject of photorespiration, evidence contrary to his viewpoint is often ignored or treated very lightly. In short, the book is a good introduction to several subjects but does not reflect the disparate opinion that actually exists about them.

Photosynthesis and Respiration is the proceedings of a conference. It is, in the main, devoted to C_4 plants and includes sections on adaptation, evolution, carbon dioxide assimilation, chloroplast structure, photorespiration, and the role of microbodies. It is an excellent publication, extremely easy to read for books of its type. Each section is prefaced by review papers and ends with assessments. Some excellent micrographs aid in understanding the complexities of C_4 plants. The book starts with fine reviews by Downton and Björkman which point out the anatomical and physiological differences between C_4 and C_3 plants. Björkman suggests that the C_4 pathway represents an adaptation to conditions of high temperatures and light intensity combined with limited water supply. Plants having this pathway photosynthesize more rapidly than do C_3 plants under atmospheric partial pressures of carbon dioxide and oxygen. C_3 plants can approach the C_4 rate if the partial pressure of CO_2 is increased or that of oxygen lowered, presumably because of suppression of photorespiration. The roles of glycolic acid and microbodies in photorespiration are discussed by several contributors. The section on carbon dioxide fixation is bracketed by Hatch, who introduces, and Slack, who assesses. The consensus is that C_4 plants fix carbon dioxide into dicarboxylic acids in the mesophyll cells and that these acids are transported into the bundle sheath cells, where they are decarboxylated and the liberated carbon dioxide is refixed via the Calvin cycle. As I read this volume shades of Warburg appeared to my mind; it seemed as if the late master were running things by some kind of remote control. The volume ends with a final assessment in doggerel.

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Nonmammals

Physiology and Biochemistry of the Domestic Fowl. D. J. BELL and B. M. FREEMAN, Eds. Academic Press, New York, 1971. In three volumes. Vol. 1, xxii pp. + pp. 1–602, illus., + index. $29.50. Vol. 2, xxii pp. + pp. 603–1152, illus., + index. $29.50. Vol. 3, xiv pp. + pp. 1153–1488, illus., + index. $23.50.

This set of volumes is unique because it is the first reference work on the anatomy, physiology, and biochemistry of the domestic fowl. There has long been a need for the authoritative coverage provided here. Those who as students or as seasoned investigators venture forth into avian physiology have, up to now, faced the time-consuming and frustrating task of locating pertinent articles hidden within a mountain of mammal-oriented literature.

The 53 contributors dedicated themselves to the task of assembling through 1970 these difficult-to-find publications, but they have done much more. They evaluate the publications of others in the light of their own extensive first-hand experience and supplement their own competency by drawing generously from the unpublished data and ideas of colleagues. Such cooperation was possible because almost all were based on the "tight little island," 35 in England, 14 in Scotland, and 2 in Northern Ireland; one contributor was located in New York City.

The group under the planning of the editors has produced a well-integrated and coordinated sequence of topics: digestive system, presented anatomically, physiologically, and biochemically; the same sequence for respiratory systems; chapters on energy, gaseous, carbohydrate, lipoid, acetate, and protein metabolism; and then chapters on the roles of the vitamins and trace