Ocular Chemistry

Biochemistry of the Eye. ELAINE R. BERMAN. Plenum, New York, 1991. xvi, 476 pp., illus. $85. Perspectives in Vision Research.

The 1980s saw a large influx of scientists into the field of eye research and a concomitant surge in information about the biochemistry of this organ. Elaine Berman, who pioneered the study of ocular macromolecules 30 years ago, has undertaken the task of integrating this new knowledge (including that obtained by molecular-biological techniques) with enduring older studies. The result is a much-needed, thoughtful snapshot of this rapidly expanding field as it existed in mid-1989.

The tissues that compose the vertebrate eye have a unique function: they must maintain their transparency while focusing light on the retina. The retina has the additional job of converting incident light into electrical signals that the brain can interpret as visual patterns. In many ways these functions are reflected in specialized biochemical pathways, such as the visual cycle, in which vitamin A is processed into an isomeric form found nowhere else in the body and required for interaction of the retina with light. On the other hand, much of the activity in the eye is a set of variations on standard biochemical themes. And to make matters even more interesting, the eye sometimes subverts ordinary cellular components and mechanisms for its own use, as in the recruitment of some common enzymes like lactate dehydrogenase into service as structural proteins (the crystallins of the lens). This book succeeds in differentiating among these cases by including several introductory chapters on selected aspects of general biochemistry, such as G proteins, extracellular matrix components, and defenses against oxidative damage. Then, when these topics are later discussed in connection with the various ocular tissues, it is clear how each process is modified to meet the requirements of the eye.

Berman's text is remarkably compact and yet relays in-depth information about the components, metabolism, and specialized reactions of the various tissues of the eye, from the tear film to the retinal pigment epithelium. This concision is achieved, in part, by the skillful utilization of schematic diagrams. The sections of the book that link clinical disorders (such as cataracts and retinal degenerations) to biochemical mechanisms gone awry make particularly interesting reading. Perhaps the most important achievement of this book is its exhaustive lists of references to the original literature, making it a valuable resource for researchers in the field.

The two other most recent books on the subject, both also entitled *Biochemistry of the Eye* (C. N. Graymore, Ed., 1970 and R. E. Anderson, Ed., 1983), were multi-authored. The single authorship of the present volume reduces redundancy and ensures a consistent style and viewpoint. The book is not without some weaknesses: A more detailed index with cross-referencing would facilitate the location of individual components and processes in the text. The labels on figures sometimes do not coincide with terms in the text, as is the case with the introductory diagram of the eyeball. Finally, some topics are discussed without appropriate mention of active controversies among investigators; an example is the collagen composition of the corneal basement membrane. This is not too serious a defect, however, since the reader is always told where to find details in the primary sources.

The 1990s have inevitably brought exciting discoveries, such as the correlation between retinitis pigmentosa and rhodopsin mutations, that could not have been included in this book. A sequel will be necessary in a few years. Until then, Berman's book makes accessible a wealth of well-organized information and references and should be a very useful resource for researchers, students, and ophthalmologists who need a manageable summary of the biochemical functioning of the eye in health and disease.

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