BIOMICROSCOPY OF THE EYE

Slit Lamp Microscopy of the Living Eye

By

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VOLUME I

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VOLUME I

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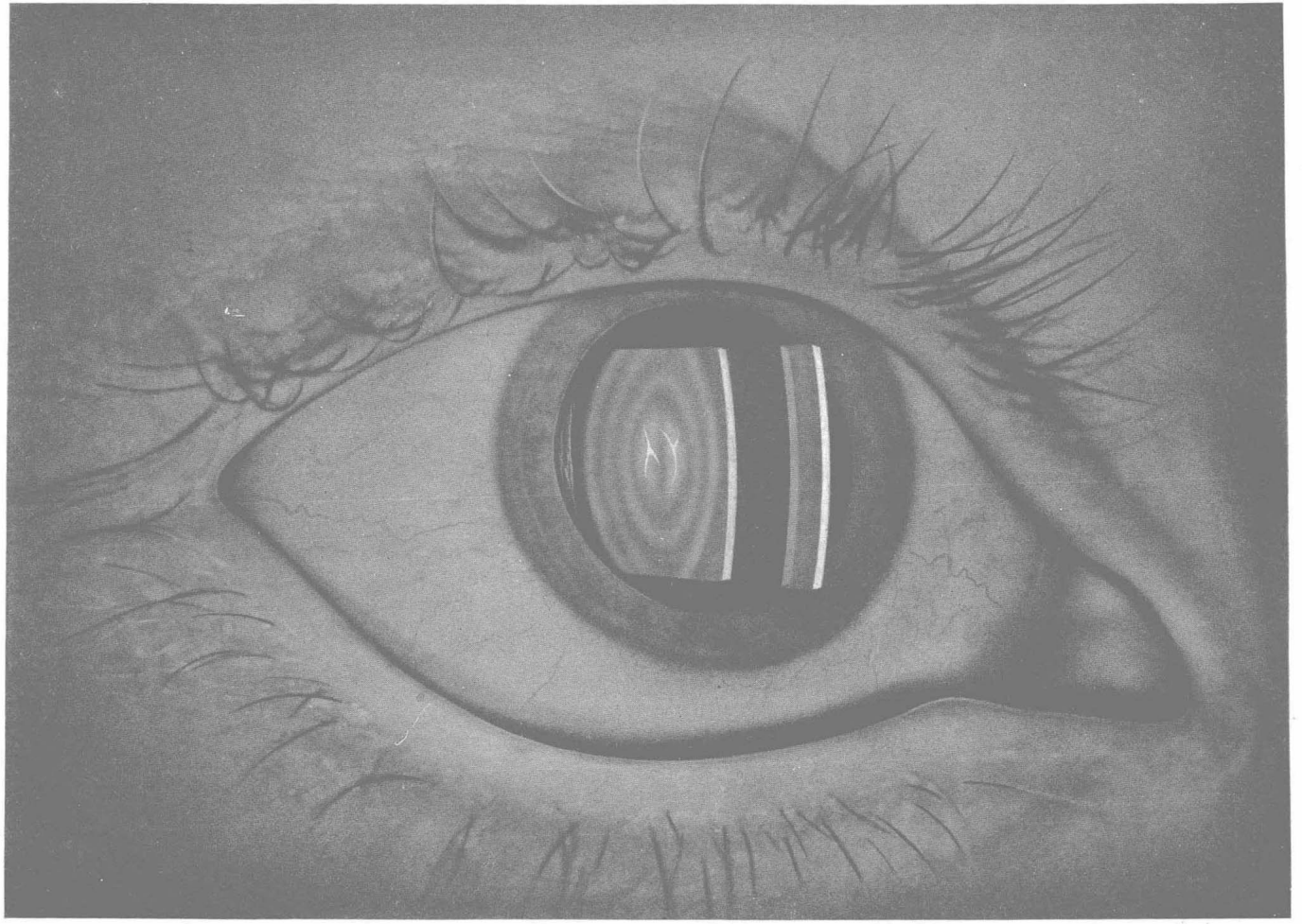

FRONTISPIECE. Composite view, showing passage of slit beam through the transparent media of the eye. From left to right, corneal parallelepiped, dark interval representing depth of anterior chamber, lens block, and a small portion of the vitreous.

To

MY WIFE

PREFACE

DURING the last two decades the biomicroscope has ceased to be simply a research instrument. It now has an indispensable place in the armamentarium of the clinical ophthalmologist comparable with that of the ophthalmoscope. This importance has been recognized, not only by its established position in all postgraduate courses, but also by the fact that knowledge of its use is now required from all those taking the examinations of the American Board of Ophthalmology.

Before the development of biomicroscopy, understanding of the morphology of normal and pathologic changes in the transparent ocular media of the living eye depended chiefly on observation with ordinary oblique illumination or with the ophthalmoscope. I shall not dwell on the inadequacies of these methods, but I am sure that no one at this time will dispute the superiority of the combined use of the focal beam (as devised by Gullstrand) and the binocular microscope (biomicroscope) for examination of the living eye. With biomicroscopy not only can the normal living structure of the conjunctiva, cornea, lens, and vitreous be studied to a degree formerly impossible but finest alterations in them can be seen.

Daily observation of pathologic changes from inception to complete development is feasible with biomicroscopy, and this has afforded valuable insight in the diagnosis, prognosis, and treatment of many conditions. However, the accuracy of many interpretations of phenomena seen biomicroscopically must wait further critical analysis. Advances in biomicroscopy will depend not only on improvement in the instrument and in the technique of using it, but also on correlation of these improvements with new data obtained from physiochemical and histologic research.

From experience in teaching the technique of biomicroscopy to students for over fifteen years, I have found that there is a genuine need for a practical treatise on this subject. Such a textbook should describe the actual handling of the necessary apparatus and interpret the observations in the light of modern histopathologic knowledge. I realize the danger in overemphasizing one particular method of ophthalmologic examination, and that in doing so one must of necessity present only part of the whole. In these volumes, for the purposes of orientation and review I have given short definitions and condensed descriptions of various clinical entities occurring in the conjunctiva, eyelids, cornea, and anterior chambers; and have purposely avoided controversial matters of theoretic interest and some of the involved and highly technical explanations of physico-optic phenomena. In this reprint of the first volume Dr. Sugar has revised and enlarged his excellent chapter on Gonioscopy, and I have added two illustrations, of an aqueous vein and of pupillary membranes.

Volume II contains a similar discussion of the iris, vitreous, and lens, and a description of special methods of illumination and of methods for the examination of the deeper vitreous and fundus.

Lately there has been a great revival of interest in biomicroscopy of the deeper vitreous and fundus. Although the principles employed in the technique of observing these parts by means of optic section is not new, certain improvements have been developed. For example, the mirror used for narrowing the angle between illumination and observation has been supplanted by a prism (Goldmann), and Dr. Priestley and I have been experimenting with different types of prism for this use. Also the new forms of contact lens have been experimented with. Recently the lens (-50.00 diopters) originally suggested by Lemoine and Valois and modified by Hruby, which is placed before the eye in a frame, has obviated the more troublesome contact lens. The ability to obtain optical sections of the deeper vitreous and fundus may open up new fields in the diagnosis and understanding of conditions found in these parts.

One cannot examine the literature on the subject without becoming aware of the pathfinding and magnificent achievements of Al-

fred Vogt. His name is synonymous with almost every major advance made in biomicroscopy.

The appearance of the second volume of this work has been delayed by the war and its aftermath, and I have taken the opportunity to revise and bring up to date the material in it.

Since it is impossible to obtain adequate photographs, I have prepared drawings and colored illustrations of typical cases. In order to make this volume on biomicroscopy complete, frequent reference has been made to the outstanding works of Vogt, Koeppe, Koby, Graves, Meesmann, Goldmann, Harrison Butler, López-Lacarrère, and Duke-Elder. Specific citations are made in the text. I am indebted to the many colleagues and to the officials of the optical companies, whose permission to reproduce illustrations previously published is acknowledged more specifically in the text.

I wish to thank especially Mr. J. Mcguinness Myers for the long and tedious hours spent in making the illustrations; and Dr. H. Saul Sugar for his valuable chapter on gonioscopy.

I also wish to express appreciation to Dr. Bruno Priestley, Dr. Lester Stein, Dr. Morton Biskind, and Miss Helen F. Roberts, and Miss Margaret G. Fiske for their assistance in preparing the manuscript.

The color plates of these two volumes have been made by the Offset Printing Plate Company of New York, Inc., and the black and white illustrations by the Lotz Photoengraving Company of Philadelphia, to both of whom go my sincere thanks.

M. L. BERLINER

New York, N. Y.

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Chapter One

DEVELOPMENT OF BIOMICROSCOPY

ON August 3, 1911, Alvar Gullstrand presented his first rudimentary model of the slit lamp before the "Versammlung der deutschen ophthalmologischen Gesellschaft" in Heidelberg, and explained its optics and applications. His discovery of a method of producing a truly focused beam of light marked the climax of a period, lasting 150 years, in which ophthalmologists had struggled to find a satisfactory clinical method of illumination for examining the anterior parts of the living eye.

During the Middle Ages, owing to the poor light available from candles or oil lamps, it was necessary to use daylight for examination or surgery of the eye. At the beginning of the nineteenth century, Himly (1772–1837) reported that oblique or condensed focal illumination of the eye made more accurate observation possible. In 1806 Himly and William MacKenzie of Glasgow also emphasized the value of this form of lighting. Later, in 1823, Purkinje employed a lens to magnify the details of the iris under strong oblique illumination.

The full significance of oblique illumination of the eye was not stressed until almost fifty years later, when Helmholtz described its theoretical use in an essay, "On Accommodation of the Eye" (1854): "The subject sits on a bench, his chin firmly resting on a support. The observer places a lamp laterally from the observed eye, in such a way so as to illuminate the cornea and the iris. The collarette projects a shadow which is easy to follow."

Helmholtz was interested only in the processes of accommodation as they affected form, size, location of light, images and shadows.