

A System of
**OPHTHALMIC
ILLUSTRATION**

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and Westminster Medical School
University of London

Although primarily directed at the specialized subject of ophthalmology, many of the underlying arguments are applicable to medical photography in general. Workers in all allied sciences will find many useful suggestions applicable to their work.

Written not only for practitioners in illustration, but also for those interested in organizing services within the framework of a hospital or medical school.

American Lecture Series®



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OPHTHALMIC ILLUSTRATION

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ACKNOWLEDGMENTS

IT IS A PITY that the acknowledgment pages of any book are not more seriously read, for they frequently mean more than the observance of a convention. In this particular case the contributions by others have been appreciable in two respects. First, in the interests of economy and in order to be able to increase the number of illustrations so vital to an exposition of this kind, many existing engravings have been made available to the author. Secondly, it has been impossible to formulate a system of ophthalmic illustration without depending in some measure on the work and ideas which have gone before; other contributions to the subject are recognised in the form of references at the end of each chapter or section, thereby also increasing the scope of this work.

Much is due to Sir Stewart Duke-Elder, Director of Research at the Institute of Ophthalmology, London, for his encouragement and forbearance while the methods now in use were being evolved. The bulk of the work has, however, been borne by a handful of people amongst whom I am pleased to name Mr. N. Jeffreys, F.I.B.P., senior photographer, and Mr. T. R. Tarrant, M.M.A.A., ophthalmic artist, both of the above Institute. Miss B. Bate has had the tedious and thankless task of preparing the final manuscript, which she has done with accustomed fervour. The staff of the Illustration Department, Westminster Medical School, London, has also contributed in a number of different ways over the years. A debt of gratitude is also due to my colleague Dr. Robert Ollerenshaw who has so patiently read manuscript and proof in addition to preparing the radiological anatomy illustrations (Fig. 8).

Amongst the more formal, although no less important acknowledgements, I am indebted to the following for their several contributions. Medical colleagues on the staff of Moorfields Westminster and Central Eye Hospital, London, and elsewhere, have been kind enough to allow me to use records originally made for

them; these are represented by Figures 3, 25, 28, 29, 35, 36, 40, 47, 54, 71, 72, 73 and 74, the latter being reproduced from Duke-Elder's *Textbook of Ophthalmology*, Vol. VI, Injuries.

Mr. Edgar Fincham has been helpful in many ways, not least in allowing me to reproduce Figures 58 and 59 from his original work published in the *British Journal of Ophthalmology*.

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Mr. Lou Gibson of the Eastman Kodak Company has been of invaluable help in making certain illustrations available from *Medical Radiography & Photography*. Figures 4, 5, 7 and 23 are from his own articles; Figure 13 is from the parent company; Figure 9 is from an article by Dr. C. H. Killian; Figure 24 is by Dr. E. Rosenthal; Figure 69 is from an article by Dr. Milton Bohrod. My thanks are also due to the authors for their consent.

Dr. D. D. Donaldson of the Massachusetts Eye and Ear Infirmary has kindly provided the engraving of Figure 48 and I am grateful for his ready co-operation in specially preparing Figure 64 from his collection of superb colour transparencies.

Mr. Eric Freeborn made Figure 52 during a brief visit. Figure 51 is taken from an article by Prof. H. M. Dekking of Holland who has also been good enough to provide me with certain references to other work. Figures 56 and 57 are taken from publications by Prof. Hans Goldmann of Switzerland. Mr. Lee Allen of Iowa City has kindly produced Figure 60 to illustrate the method which he devised.

Figure 33 is reproduced from "Photography of the Eye with the Aid of Electronic Flash-Tubes" by J. E. Winkelman and N. Warmoltz, in *Philips Technical Review*.

Individual manufacturers must be thanked for their contributions as follows: Photo-Science Ltd., London (Fig. 15); Mole-Richardson (England) Ltd., London (Fig. 16); Engineering Developments (England) Ltd.,

London (Fig. 18); Allied Instrument Manufacturers Ltd., London (Figures 21 and 22); Zeiss-Opton, Germany (Figures 32 a and b); E. N. Mason & Sons, London (Figures 38 a and b); Bausch & Lomb Optical Co., U.S.A. (Fig. 66).

There must inevitably be people whose names have been overlooked and others who have lent their support in a less definable sense; they will surely recognise and excuse any omission on this score.

P. H.

FOREWORD

ANY ATTEMPT to formulate a code of practice is beset with difficulties; at best it is based on collective ideas and at worst it represents one view narrowed by circumstance. In the case of ophthalmic illustration a mean course must result, for there are few enough departments devoted exclusively to this work and inevitably the mainstay is practical experience. The subject is indeed specialized and restricted in application to but a small part of medicine: to consider it to be difficult is a *non sequitur*.

For the purpose of discussion some baseline has had to be established and throughout a full-time service—however small, involving perhaps only one man and one room—has been assumed. The depiction of external eye conditions forms part of the work of every general illustration department and it is, furthermore, not beyond the scope of consulting room practice. For this reason some space is devoted to this aspect in the hope that methods may be selected and tailored to suit local requirements. The scope of illustration services in ophthalmology can be as ambitious as accommodation, finance and demand permit, but at the other end of the scale much useful work can be done with the humble fixed-focus camera; so that although the work of a department is considered, the needs of a “doctor-photographer” are by no means to be despised or discouraged.

This monograph must necessarily be concerned with photography in the main, but the camera cannot stand alone: in eye work there are too many features demanding illustration which cannot conveniently be photographed. As progress removes these technical barriers, however, many such records remain unsatisfactory. A photograph taken in an instant of time cannot convey the three-dimensional synthesis of human comprehension. It is in these realms that the artist reigns supreme; in techniques such as biomicroscopy of the eye the observer sees a constantly moving image, he scans an

area and thus builds up a concept of the whole—only the artist can convey this impression in his finished drawing. It is true that a photograph may be used to supplement the artist's work for the sake of scientific accuracy, or that the artist may work from photographs on occasion, but essentially the two remain distinct.

If an approach to the subject can be found between the lines of technical description which follow, a dual purpose will have been served: if only a few photographs or sketches are produced where none existed before, the principal aim of this book will have been achieved.

Elstead

P. H.

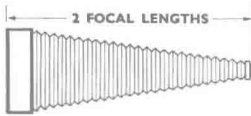
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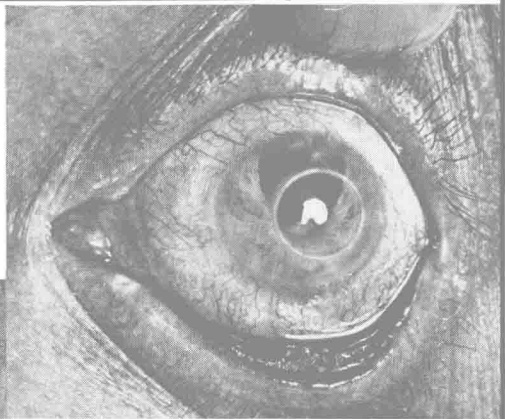
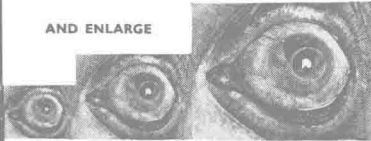
A SYSTEM OF
OPHTHALMIC ILLUSTRATION

OPHTHALMIC PHOTOGRAPHY

OPHTHALMIC PHOTOGRAPHS DIFFER FROM GENERAL MEDICAL PHOTOGRAPHS ONLY IN TERMS OF SCALE. THE PROBLEMS ARISING FROM THIS ARE ILLUSTRATED BELOW:

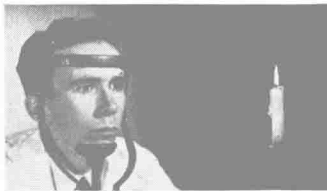


AND ENLARGE

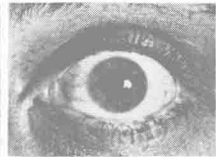


FIX THE HEAD

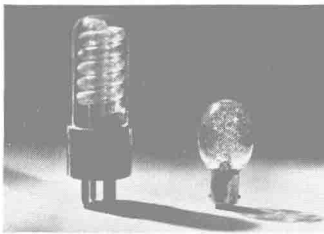
FIX THE EYE



1. CONTROL OF MOVEMENT.

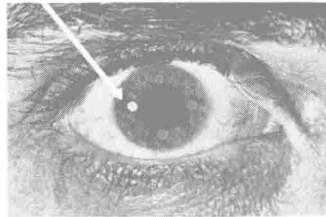


2. DEPTH OF FIELD.



3. SHORT, INTENSE EXPOSURE.

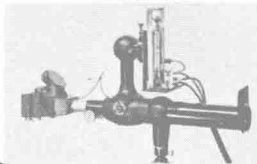
ONE LIGHT
IN OPTIMUM
POSITION



4. CONTROL OF REFLECTIONS.

TWO TECHNIQUES DEMANDING SPECIAL EQUIPMENT:

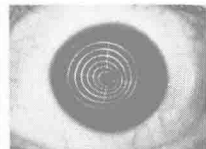
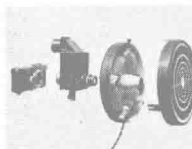
RETINOGRAPHY



+ ARTIST



KERATOGRAPHY



MEDICAL ILLUSTRATION DEPARTMENT
UNIVERSITY OF CALIFORNIA
SCHOOL OF MEDICINE

The Fundamentals of Ophthalmic Photography.

THE PATIENT

General Considerations



IT HAS BECOME platitudinous to say that every consideration must be shown to the patient, but observance of this maxim varies in stature throughout the medical profession and its auxiliary services. As, however, all who are called upon to illustrate eye conditions are not necessarily medically qualified, a few notes of guidance may perhaps be excused.

In general, diseases of the eye are not completely incapacitating and it is therefore common to encounter patients with eye conditions who are at least ambulant if not also of normal appearance. The morale of such patients is usually much higher than in those suffering other afflictions such as deafness; indeed many will go to great lengths to cover up a minor or even major ocular disorder. It is this appearance of normality in the face of pain, photophobia, or disturbance of vision which may lead the illustrator into unintentionally thoughtless ways when dealing with his charges.

As will be gathered from the pages which follow, it is vitally important that the patient should be comfortable, yet fixed in posture and gaze, for most illustrative procedures. Equally the record must be as faithful as can be produced without subjecting the patient to unnecessary discomfort due to intense light or heat.

Children, as in other forms of photography and recording, offer certain peculiar problems. Most frequently they cooperate well, and react more favourably to electronic flash than to other methods of illumination. In view of success in other spheres, it is perhaps surprising that preliminary therapeutic sedation of a fractious child is not more widely practised when it is particularly important that a record should be obtained. Preparation of the patient beforehand, both child and adult, by such means and through the medium of explanation can do much to contribute to the success of any graphic or photographic session. Despite these measures, the photographer would be wise not to guarantee success when special procedures such as keratography and retinography are to be carried out on children under the age of five years. These examinations, as will be

discussed later, demand intelligent cooperation and great patience for a good result.

Fixation

Fixation of gaze may be considered at this juncture, for a person with defective vision will tax the tolerance of the photographer to the full in this respect. For those with normal or even moderately impaired vision, a fixation point is best provided in the form of a *small* bright light. It should

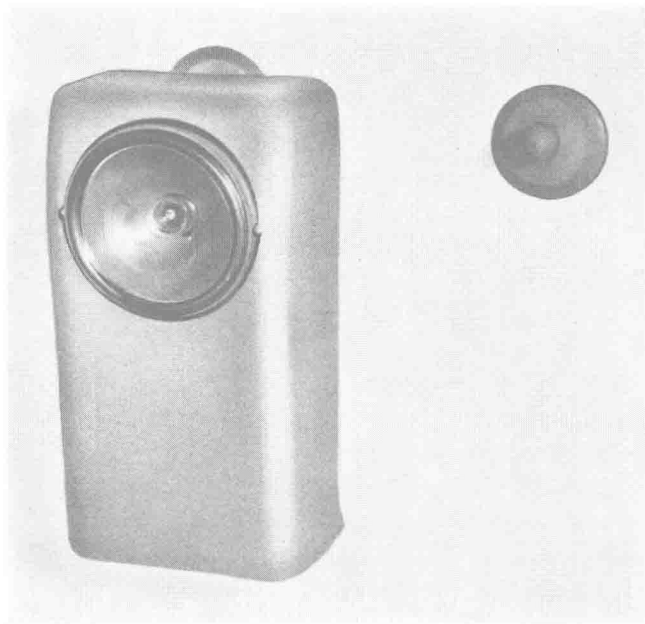


FIGURE 1. Fixation light attached to wall by means of a rubber suction cup.

be realised that in many of the techniques to be described, one or both eyes of the patient under examination may be more or less flooded with an intense directional light for focusing or photographic purposes; it follows that any small, distant source used as a fixation point must compete in brilliance if the patient is to remain aware of it. Elaborate calibration of studio walls in terms of distance and angles has been advocated and indeed there is much to be said for such careful planning if absolute standardisation of fixation points is the aim. A small battery-operated torch which may be affixed to the wall by means of a rubber suction cup will be found to be a flexible and efficient device. In any event, a large circle marked off in eighths, representing the secondary and tertiary eye positions, is of value in eye movement studies.

Other tactics must be employed for the blind or near-blind. If hearing

is acute, a small buzzer or other sound source may be sufficient to attract attention and hence achieve the desired head position and direction of "gaze." Perhaps a better known and less cumbersome practice is the "finger-fixation method." In this the patient offers the more convenient hand to the operator or assistant, who holds and positions the index finger in the required direction of gaze. If the finger is intermittently squeezed, thus providing a sensory stimulus, most blind patients will be found capable of "looking" in the appropriate direction.

Instruments and Clinical Procedures

Of the problems which arise in connection with the representation of external diseases of the eye, that of lid retraction is probably the first to

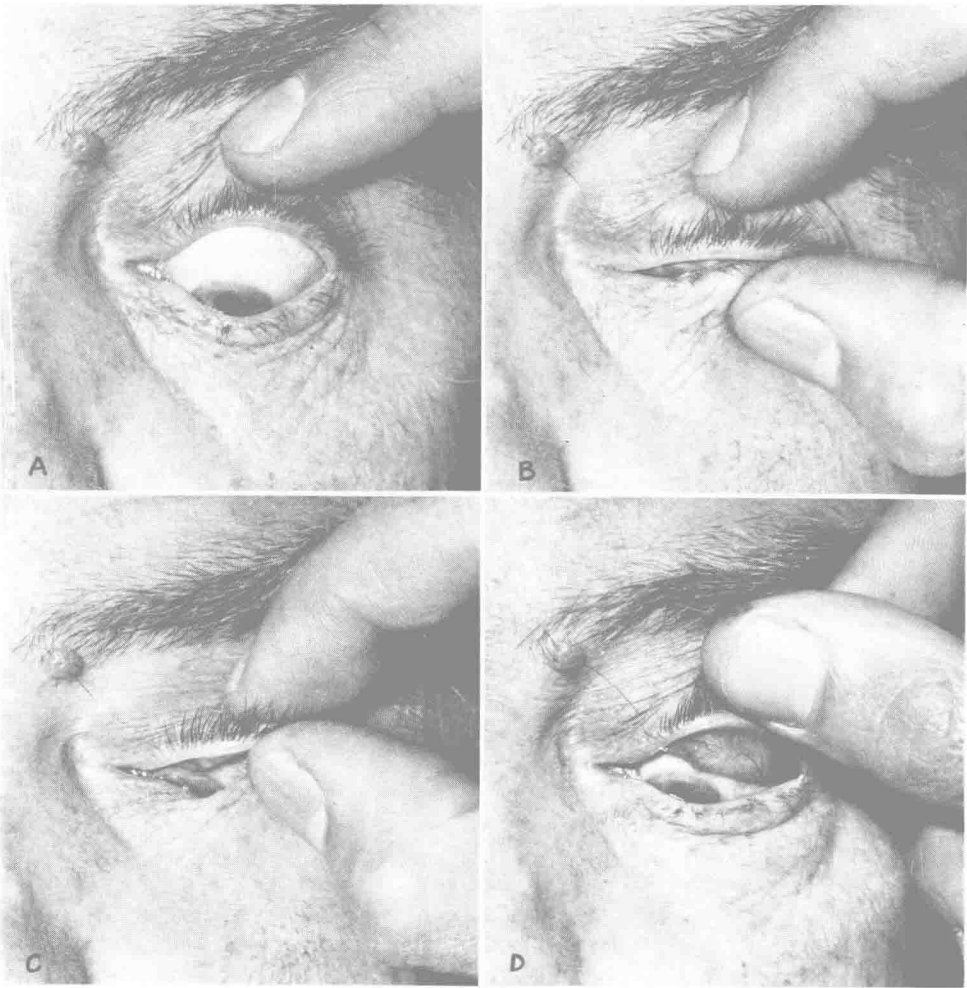


FIGURE 2. Four stages in the single-handed method of everting the upper eyelid.

be met. In practice it will be found that instrumental retraction is hardly ever necessary save in the case of operative procedures when the patient is under the direct control of the surgeon. Lid retractors, gonioscopes and contact glasses (unless regularly worn) should never be inserted without the instillation of anaesthetic drops on the instruction of a member of the medical staff.

For normal photographic work it is usually sufficient for an assistant to retract the upper and lower lids firmly with the fingertips. As the finished picture will probably be viewed at some magnification, particular attention should be paid to finger-nail hygiene. Some prefer surgical gloves to be worn, partly for this reason but mainly to achieve a uniform and tidy appearance; often a better grip may result.

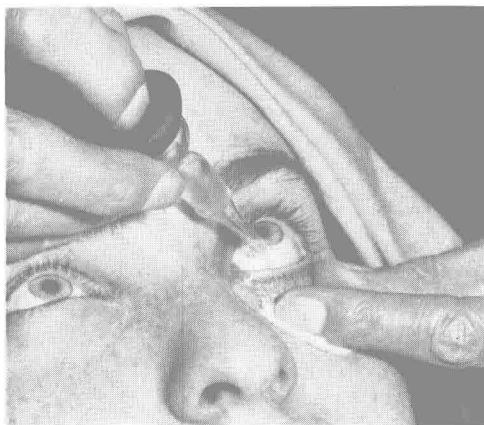


FIGURE 3. Method of instilling eye drops for diagnostic purposes.

Certain diseases involving the lids require that the upper eyelid should be everted for a complete demonstration of the condition. Both artists and photographers engaged in ophthalmic work should, by constant practice, make themselves adept at this simple man-

oeuvre. There are many methods involving either one hand or two, with or without the use of a small glass rod or other support: the last may be found the easiest to master at first for the singlehanded method requires more skill.

The ophthalmoscope and the biomicroscope with slit-lamp illumination are the chief diagnostic tools in eye work, and it is therefore important that the illustrator should not only know how they work, but also be able to use them proficiently. The ophthalmologist uses them almost unconsciously and when referring a patient for illustration, it may be difficult for him to realise or remember the possible deficiencies of the photographer or artist in the use of these instruments—nor indeed should this be the case. The photographer must use an ophthalmoscope for a preliminary survey prior to retinography and the artist must be able to represent biomicroscopical appearances, in which field his work is unsurpassed.

Drugs

There are occasions on which the action of the iris of the eye must be controlled, either to reveal lesions of the iris itself, or to facilitate examination and photography of the posterior segment. In addition it may be