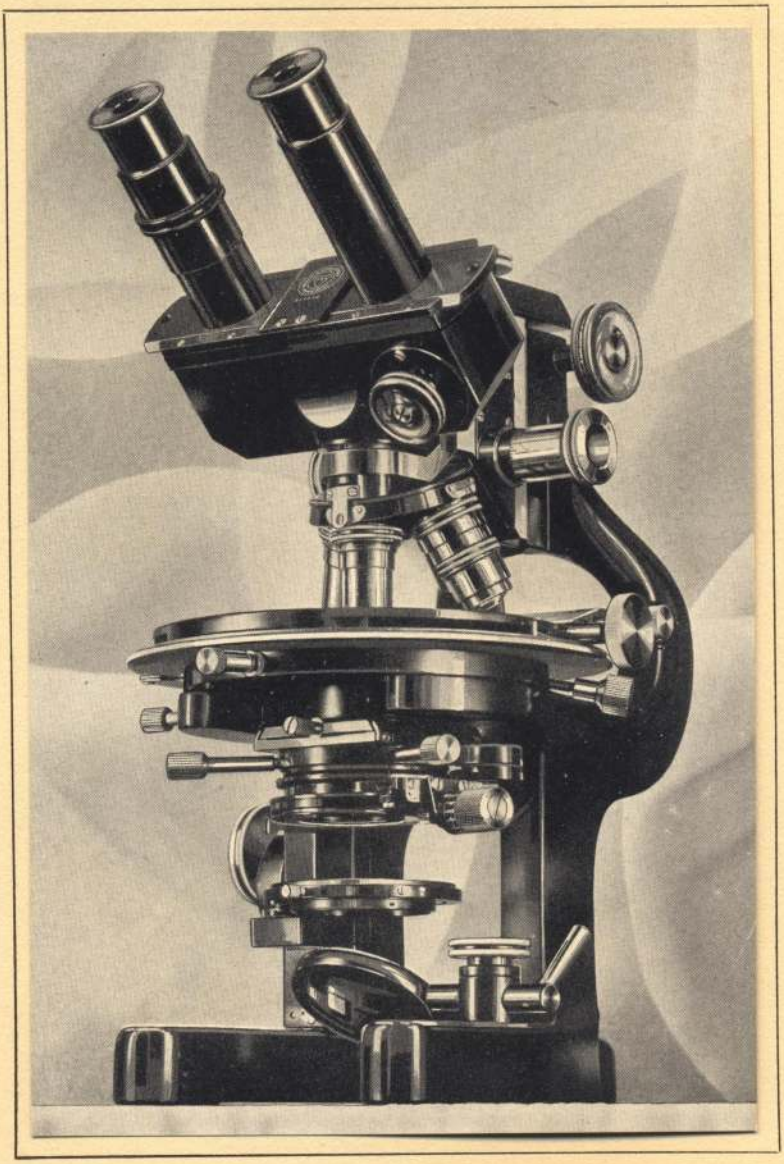
To explore the UNKNOWN

BAUSCH & LOMB OPTICAL COMPANY

To Greater Vision
through Optical Science



A New Research Microscope

A NEW RESEARCH MICROSCOPE, THE DDE

Bausch & Lomb Optical Co.
Rochester, N. Y.

Foreword

THE research worker will find described in this book a distinctly and radically new research microscope. This microscope, designed and built by the Bausch and Lomb Optical Company, is particularly adapted for use by the research scientist. The stand represents an innovation in microscope design, an instrument with the stage directly in front of the operator. This "turned about" position made necessary the redesigning of several indispensable parts of the instrument. Thus, all these essentials have been designed to afford the convenience, accuracy and comfort in keeping with the new idea.

Research Facilities

The Bausch & Lomb Scientific and Technical Bureaus, composed of a group of men who are among the well known in their field, are ever at work to produce better equipment and to create new. Intensive and exhaustive research, day in and day out, is indicative of the persistent endeavor of these men to produce finer and better equipment for the scientists of today.

A Progressive Step ~~~

in microscope design

MORE than a year ago one of Bausch & Lomb's representatives, in the course of his work at Ithaca, N. Y., called upon a well known cytologist * in Cornell University. The conversation turned to research microscopes and their design with especial reference to convenience and comfort for continued observation over protracted periods. The discussion centered on the idea of a "turned about" position with its convenience of manipulation of objects on the stage and of the substage parts. It was thought that by placing the stage directly in front of the observer with the arm on the opposite side from him that an improvement would result to the great benefit of the research worker.

This idea, brought forth in the conversation, was placed before the members of the Engineering Staff of the Bausch & Lomb Optical Company. The result is a microscope, perfected especially for the research worker, to enable him to delve with greater satisfaction into that "unknown" phase of his science.

It marks a definite progressive step in microscope design.

---

* Dr. Lester W. Sharp.

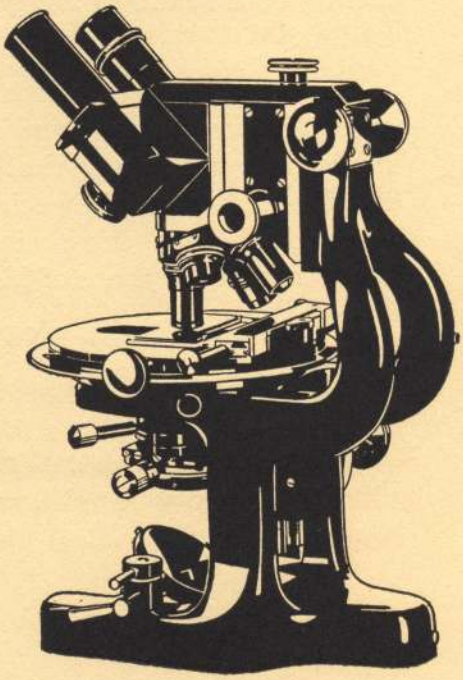
Later Dr. L. F. Randolph of the U. S. Dept. of Agriculture and Cornell University, was invited to criticize the new design.

Finer Equipment ~~~

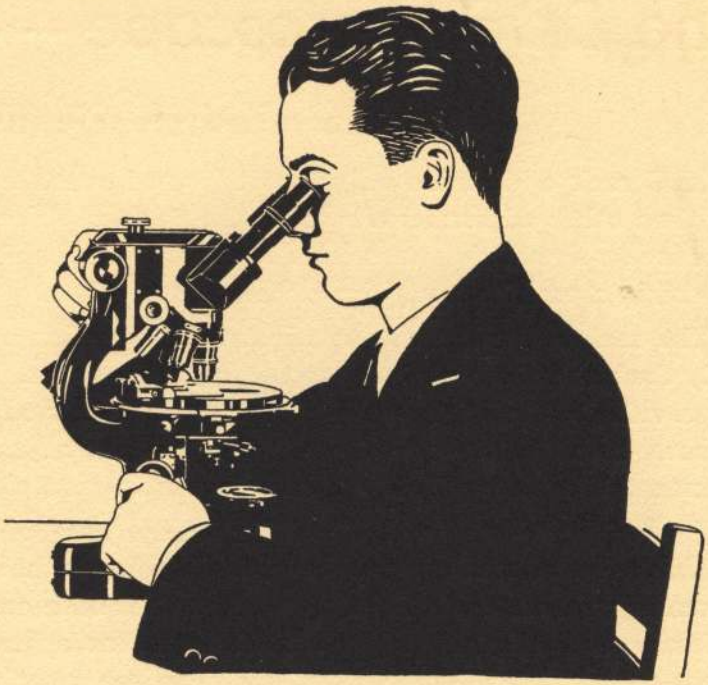
for the research scientist

THAT this research and photomicrographic microscope — the DDE — is a radical departure from any existing type of microscope can be seen from the illustrations. The design of this Bausch & Lomb instrument is such that free access to the object, the stage, the objectives, the substage and the mirror is afforded. To assure extreme rigidity, the usual inclination joint has been eliminated and the double arm and pillars have been made in one piece. The stage is thus always horizontal except when the instrument is used photomicrographically. In this case the entire microscope is placed in a horizontal position, resting upon three points of support provided on the two arms and base, thus leaving each part intact and the stage vertical.

To sit at the microscope in a natural upright position is extraordinary *comfort*. To change instantly from binocular to monocular vision and back again is *convenience*. To focus the condenser for highest power and leave it in position when going to low power by swinging in an auxiliary condenser for suitable illumination is *efficiency*.



As viewed from the right side.



Note the natural position of the neck, shoulders and back.

To put the mirror at the proper angle and clamp it in position is *time saved.*

Because the fine adjustment carries only the weight of the objectives, you obtain the highly controlled action necessary when working at high magnifications. The ability to manipulate the substage adjustment and the slide or object upon the stage immediately in view of the worker is the outstanding convenience of this instrument.

These features, combined with the characteristic Bausch & Lomb quality of material and precision workmanship, make the new DDE one of the most desirable microscopes to possess — it approaches very closely to the theoretical ideal.

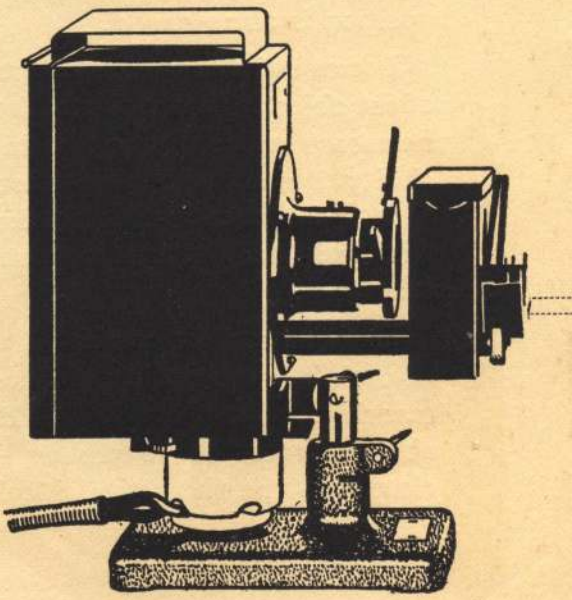
The DDE Microscope ~~~

its Specifications

THE rack and pinion adjustment is used much less than other adjustments because the parfocal objectives are on a revolving nosepiece. Accordingly, it can be placed in a position away from the operator's face.

The rack and pinion in this instrument carries not only the binocular body but also the fine adjustment. It is provided with wide bearings and the weight carried is counter-balanced by a hidden spring. The fine adjustment mechanism is of our well-known construction, side lever type, but carries only the nosepiece and objectives.

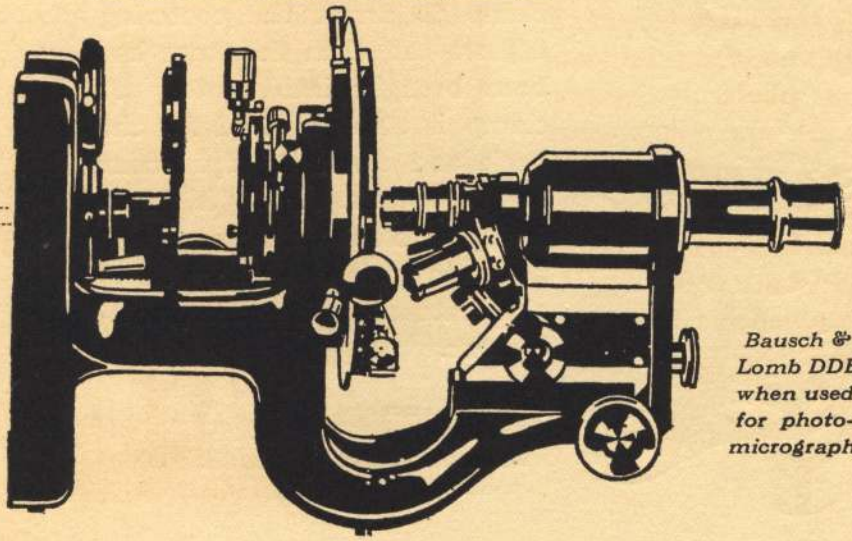
Since the advent of the binocular body, with its necessary prisms and mechanisms, there has been considerable weight placed upon this delicate fine adjustment mechanism. This weight has been too great to secure the responsive action necessary when working at high magnifications. This new arrangement relieves the adjustment of this extra weight. It will be of special value in photomicrographic work where it is necessary to make long exposures. The operating heads of the fine adjustment are extra long for convenience in operating.



The Body Tubes

The instrument may be equipped with different types of body tubes: (A) the regular single objective binocular type for visual use and also for drawing with the camera lucida, and (B) the single tube for photomicrographic work. Due to the construction of the stand, i.e., the focusing adjustments on the opposite side of the optical axis from that usually employed, it becomes possible to incline the binocular tube to a comfortable position, while the surface of the stage remains in a horizontal plane. This is accomplished in such a manner that no unusual height of eyepiece is required and the standard objectives of 160 millimeter tube length may be used with standard eyepieces at standard magnifications, no correction lens being required.

By means of an operating knob conveniently located on the binocular body near the operator, it is possible to direct all light into the right eyepiece instantly. This adjustment, in addition to increasing the illumination, makes possible the use of a camera lucida. As the camera lucida does not add any weight or leverage upon the fine adjustment, it may be left attached to the body so as to be ready for instant use.



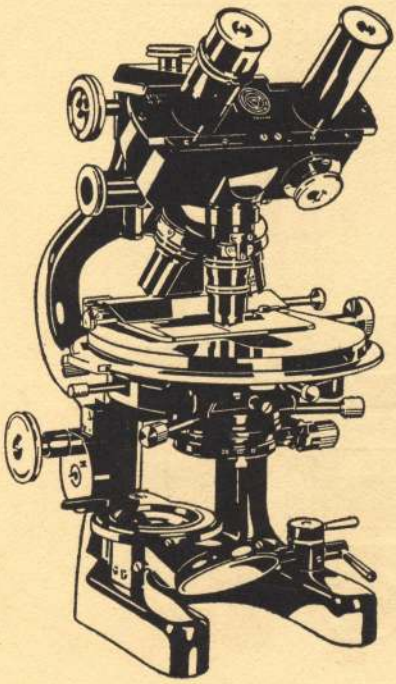
Bausch & Lomb DDE when used for photo-micrography

Nosepiece, Objectives and Eyepieces

The quadruple or triple nosepieces may be used upon the instrument and the construction of the parts is such that the nosepiece and objectives are under the arm out of the way. The specimen and stage are in constant sight with nothing intervening. Standard objectives and eyepieces can be used without alteration.

The Mechanical Stage

The mechanical stage has forward and back adjustment by rack and pinion and transverse adjustment by multiple screw. These adjustments are so placed that they may both be operated from the right-hand side of the stage, and the stage may be completely rotated with the objective in focus without interference. Scales are provided for all movements, including a graduated circumference for degrees of rotation. The transverse adjustment may be quickly removed if desired, to provide a large flat stage for dishes, plates, etc. The stage may be centered by means of the usual centering screws and spring, a new feature being a clamp to arrest the centering adjustment when the stage has been brought into center. A clamp is also provided for the back and forward adjustment and the rotating ring. It is, therefore, possible to fix the specimen firmly in position—a very desirable feature in photomicrographic work.



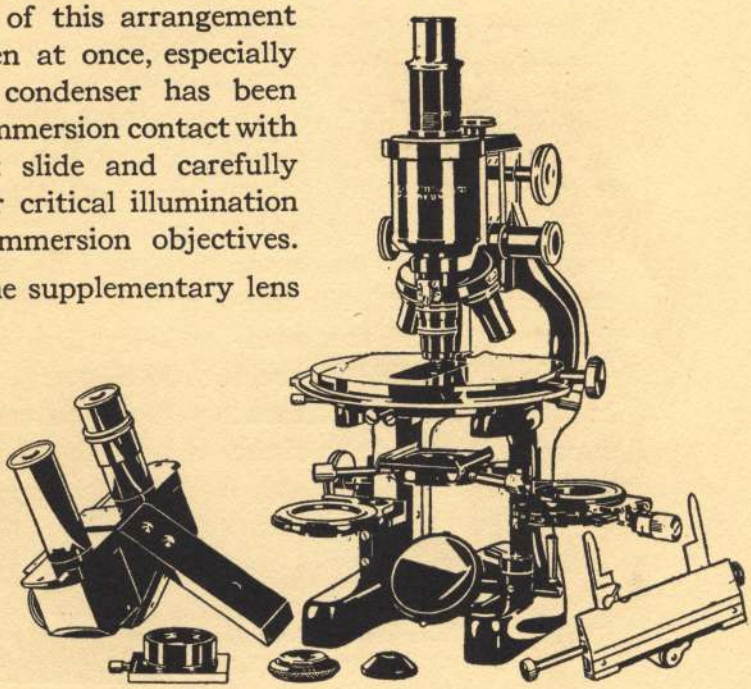
Bausch & Lomb Microscope as viewed from the front.

The Substage

The substage is of the usual form, but is moved up and down by means of a geared rack and pinion adjustment, giving a slow motion for fine focusing of the condensers. The usual quick-changing slide is provided for attaching condensers, dark ground illuminator, etc. This slide is centerable by means of two screws with extended shanks. A graduated iris diaphragm, which is rotatable and decenterable, is provided so that oblique illumination of any degree and position may be obtained. The diaphragm can also be swung out of the optical axis to attach a polarizer.

A novel feature of the substage is a supplementary condenser on swing arm. The focus of this condenser is so selected that the field of a 16 or 32 millimeter objective may be entirely filled with light without moving the substage or any of its elements from the usual position for high power objectives. The advantage of this arrangement will be seen at once, especially when the condenser has been placed in immersion contact with the object slide and carefully focused for critical illumination with oil immersion objectives.

When the supplementary lens



Disassembled. Note the monocular body tube in place.

is placed in the optical axis below the condenser, the field may be searched with a low power and when the object desired is found, the lens can be swung aside. Both low and high powers will function properly without readjustment of the substage condenser.

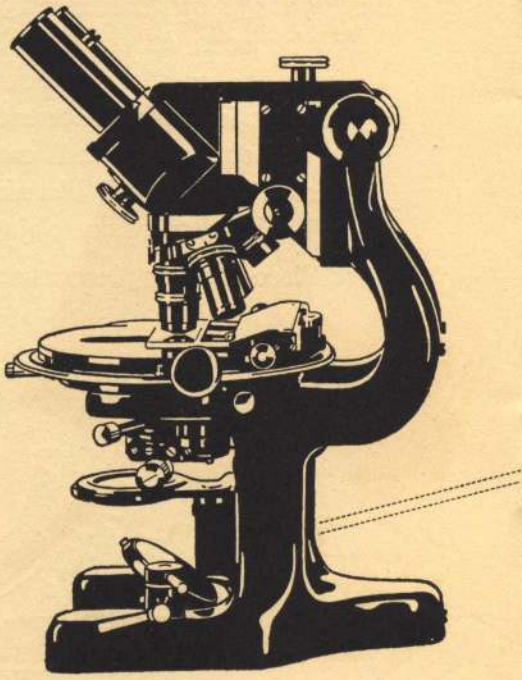
Only one mirror, the plano, is required, and this also is provided with clamping arrangement so that once adjusted it is not easily disturbed.

A suitable lamp should always be used, especially in research work, in order that correct and uniform illumination is obtained. We have designed a special lamp to be used with this microscope with full control of the illumination. This lamp is described on the next page.

The Case

The case is of solid mahogany with a beautiful hand-rubbed piano finish. The lock and fittings are nickel plated and the drawer for the accessories is plush lined. A leather strap for carrying is furnished in place of the usual metal handle.

The real test of this Research Microscope comes from using it, as only in this way can one appreciate the *convenience of the adjustments* and the *comfort* in being able to use a horizontal stage without cramping the muscles of the neck and shoulders.

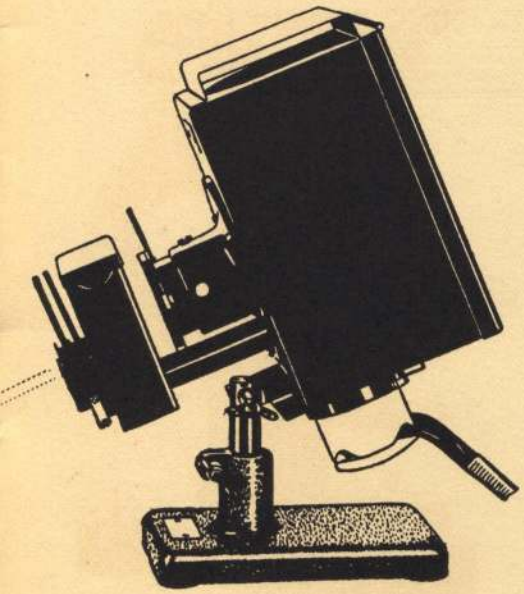


New Bausch & Lomb Lamp in position for use.

A New Lamp ~~~

for the New Research Microscope

THIS new Bausch & Lomb lamp meets two requirements which few designs satisfy: the one of utilizing the full aperture of the microscope condenser (up to N.A. 1.40) and the other of transmitting sufficient light to make possible critical illumination of the specimen under observation. A specially corrected lamp condenser yields this result and an iris diaphragm placed in front of it provides means for setting to the size of aperture desired. A conveniently placed handle operates the iris and the special condenser is focusable with reference to the lamp filament by a second handle. On the front of the lamp there is a water-cell holder which in turn carries a filter rack with three pockets. To moderate intensity of illumination four neutral tint filters, graded to reduce the intensity by 10%, 20%, 40% and 80%, are supplied. Also there is included, for white light effect, a Daylite Glass polished on both sides for maximum transmission. The water-cell holder is easily removed when it is desired to clean the condenser lens surfaces. The water-cell is necessary when using Wratten "M" filters for contrast or photography. The Wratten filters or the water-cell are not included unless ordered.



The Mazda lamp used is a 6 volt 108 watt bulb with a tungsten ribbon filament which provides a light source, small in area, of plane surface and even intensity. It is recommended for use on alternating current when available, as it can be used in conjunction with a transformer and connection made to the regular lighting socket. If used on direct current, provision must be made for wiring and a connecting socket of 18 ampere capacity and the lamp used with a resistance.

Code Word	Cat. No.	Objectives		Paired Eye-pieces	Circ. Nose-pieces	Con-den-ser	Price
		Dry	Oil Immersion				
		Achromatic		*Huy'n*		*Apl.*	
Adurk	DDE 8	10(16mm) 45 (4mm)	97 (1.9mm) (1.25)	5 10	Triple	1.40	$537.00
		Achromatic and Fluorite					
Adusl	DDE 10	10(16mm) 45 (4mm)	100*(1.8mm) (1.30)	5 10	Triple	1.40	560.00
Adutm	DDE 12	10(16mm) 43*(4mm)	100*(1.8mm) (1.30)	5 10	Triple	1.40	575.00
		Apochromatic		*Comp.*			
Aduvn	DDE 18	10(16mm) 45 (4mm)	90 (2mm) (1.30)	(7.5) (12.5)	Triple	1.40	682.50
Aduxr	DDE 20	10(16mm) 20 (8.3mm) 45 (4mm)	90 (2mm) (1.30)	(7.5) (10.0) (12.5) (25.)	Quad-ruple	1.40	774.50
Aduys	92	Monocular Body Tube, Extra					[redacted] 10.00
Afawn	1815	Research Microscope Lamp with corrected condenser for full-aperture, critical illumination, 6 volt, 108 watt ribbon filament Mazda bulb and transformer 110 volts. Four neutral tint filters and one Daylite Glass 50 x 50mm					67.50
Afaxp	1817	Water Cell only					10.00
Aczih	1824	6 volt, 108 watt ribbon filament Mazda bulb,					net 6.00
		Wratten "M" Filters, price on request.					

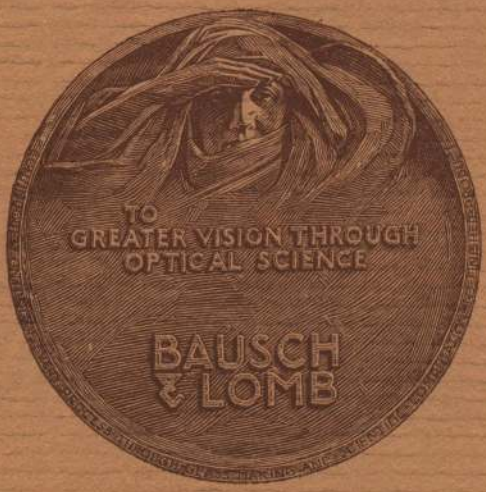
*Objective is Fluorite System.

Optical Glass

OBVIOUSLY, no product can be better than the materials of which it is composed. To insure the utmost precision and the highest quality in lenses for the various parts of the microscope, Bausch & Lomb maintains its own Glass Plant. Here is produced the glass used in the manufacture of B & L products. The glass manufactured is thereby subject to rigid control which control assures the finest glass possible for the most important essential of the optical instrument.

D-164

Printed in U. S. A.
F.-S. P.


TO
GREATER VISION THROUGH
OPTICAL SCIENCE
BAUSCH
& LOMB