OLYMPUS®

LB OBJECTIVES

LB Objective Series for Biological Use

The History of the Microscope in Japan Is the History of Olympus

The history of Olympus Optical Co., Ltd. spans over 65 years. Olympus began in 1919 by designing and producing the first microscope in Japan. It is no exaggeration to state that the development of the microscope in Japan is intimately associated with the history of Olympus.

Our long experience and accumulated technical expertise in the design of opto-electronic instruments have been acclaimed by leading experts and scientists as well as non-professional users. As a result, Olympus products enjoy an outstanding reputation around the world.

Our OM Camera System, for example, incorporates original Olympus design and technology breakthroughs which revolutionized the single lens reflex camera. Pioneering Olympus work in the development of flexible fiberscopes has proven indispensable in the early diagnosis of cancer.

Olympus reaffirms its commitment to technological innovation in the new LB (Long Barrel) Series objectives. These advanced microscope objectives were developed using an original design approach that achieves greater image clarity and higher resolution. Superb quality and manufacturing precision give Olympus LB Series objectives superior accuracy, functionality, economy and handling ease. Ultramodern research and production techniques enable Olympus to achieve an edge in total performance.

LB Series Objectives Combine Important Advantages

1 Excellent resolution

Resolving power is the reciprocal of resolution and refers to the minimum distance at which two minute dots in a specimen can be clearly distinguished. This is expressed in the following formula:

$$\text{Resolution } \delta = 0.61 \times \frac{\lambda}{\text{N.A.}}$$

in which λ is the wavelength and N.A. is the numerical aperture of the objective. The formula was first suggested by Lord Rayleigh.

As shown in the formula, it is necessary to increase the N.A. in order to increase the resolving power. Olympus enlarged the numerical aperture of LB Series objectives to increase resolving power, as shown in the table below.

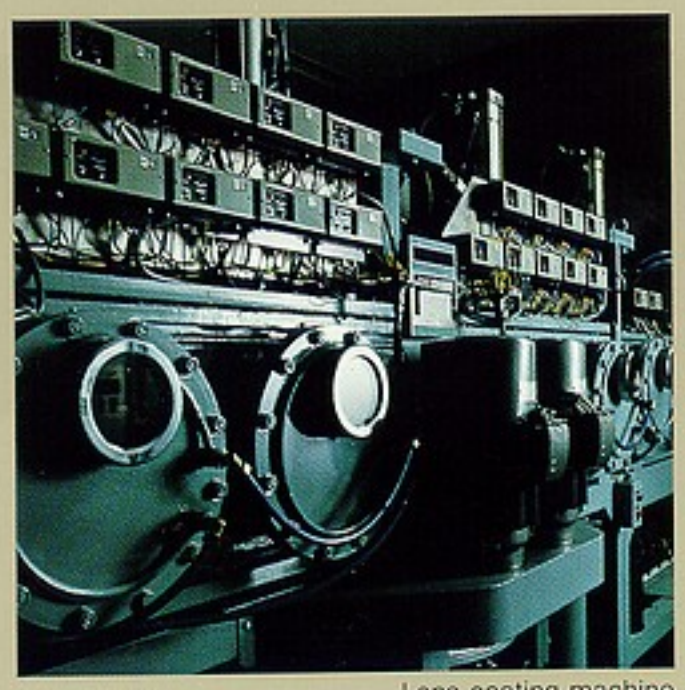
		Numerical aperture	
		LB objectives	Conventional objective
S Plan FL	1X	0.04	—
S Plan FL	2X	0.08	—
S Plan	4X	0.13	0.10
S Plan	10X	0.30	0.25
S Plan	20X	0.46	0.40
S Plan	40X	0.70	0.65
S Plan	100X	1.25	1.25
S Plan Apo	4X	0.16	0.16
S Plan Apo	10X	0.40	0.32
S Plan Apo	20X	0.70	0.65
S Plan Apo	40X	0.95	0.95
S Plan Apo	60X	1.40	—
S Plan Apo	100X	1.35	1.30

2 Improved contrast

Even when resolution is good, definition will be poor if image contrast is insufficient. Factors which exert an adverse influence on the image, such as flare, must be eliminated.

Olympus removes these detrimental factors one by one—during objective design, lens curvature ratio setting, optical glass selection and lens construction. Computers are used extensively to calculate the various possibilities and determine the best combination.

During objective manufacture, a special lens coating machine is used. Ultramodern multilayer coatings are applied to minimize lens surface reflections. These are just a few ways Olympus achieves higher image contrast in the LB Series.



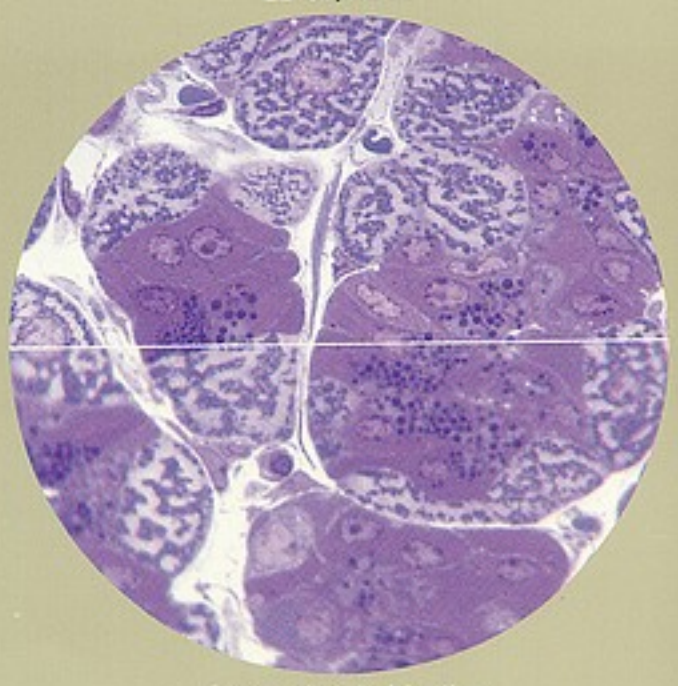
Lens coating machine

3 Outstanding field flatness

The demand for more efficient photomicrography is growing at a rapid pace. This necessitates being able to obtain sharp image clarity throughout the visual field.

Field curvature, one of the typical aberrations which exert a detrimental influence on image quality, is thoroughly compensated for in the LB Series. Olympus has introduced the new photocompensation-type NFK Photo Eyepiece Series to project clear, flat photomicrographic images on the film.

LB objective



Conventional objective

4 Increased working distance

Increasing the objective working distance provides many advantages. Among them, oil in an oil-immersion system does not easily adhere to a non-immersion objective and the ability to mark specimen details is enhanced. These are only two of the many important functional advantages.

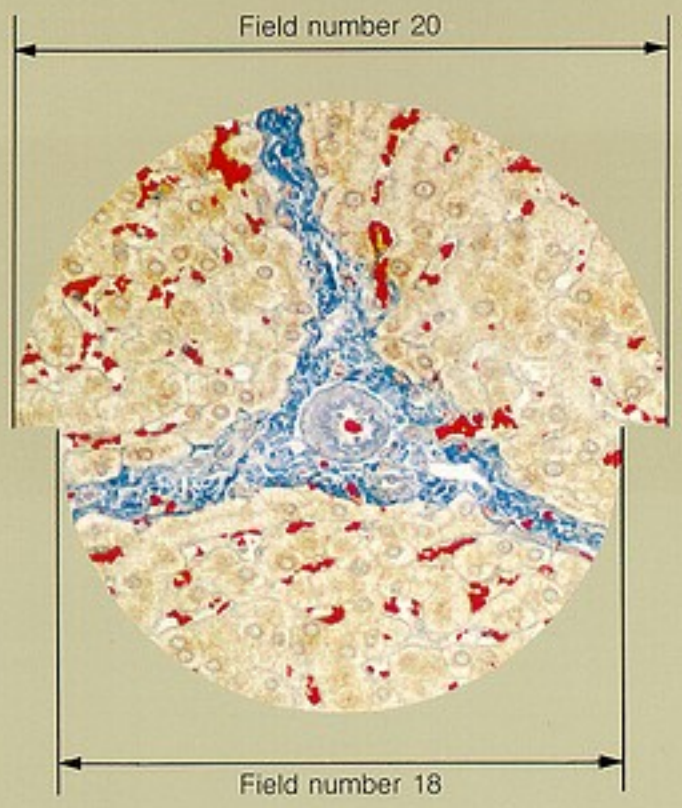
The increased objective working distances of the LB Series are shown in the following table.

		Working distance	
		LB objectives	Conventional objective
S Plan FL	1X	2.20mm	—
S Plan FL	2X	5.50	—
S Plan	4X	15.50	5.50
S Plan	10X	7.50	5.50
S Plan	20X	1.50	0.70
S Plan	40X	0.50	0.22
S Plan	100X	0.17	0.08
S Plan Apo	4X	9.83	4.40
S Plan Apo	10X	2.03	0.20
S Plan Apo	20X	0.55	0.14
S Plan Apo	40X	0.13	0.10
S Plan Apo	60X	0.12	—
S Plan Apo	100X	0.15	0.08

5 23% increase in visual field

(using WHK10X or WK10X eyepiece)

Ease of operation has been greatly improved by the use of the standard WHK10X or WK10X eyepieces, which feature a field number of 20 that yields a visual field 23% larger than the one obtained by conventional systems. The super widefield SWHK Series eyepiece and super widefield BH2-SWTR trinocular observation tube are also available. Their field number of 26.5 is much wider than that of the standard eyepiece.



6 Parfocal distance of an extremely low power objective

Conventional low magnification lenses (e.g. 1X, 2X) have a drawback. Because of their extremely long working distance, they cannot be made parfocal with higher magnification objectives.

In resposne to user needs, this problem has been solved by the new optical system used in the LB Series. The object distance of LB objectives was increased to 45mm (compared to the conventional 36.65mm object distance).

Olympus Confirms the Advantages of the Compensation Type

Compensation system VS. **compensating lateral chromatic aberration by the objective alone**

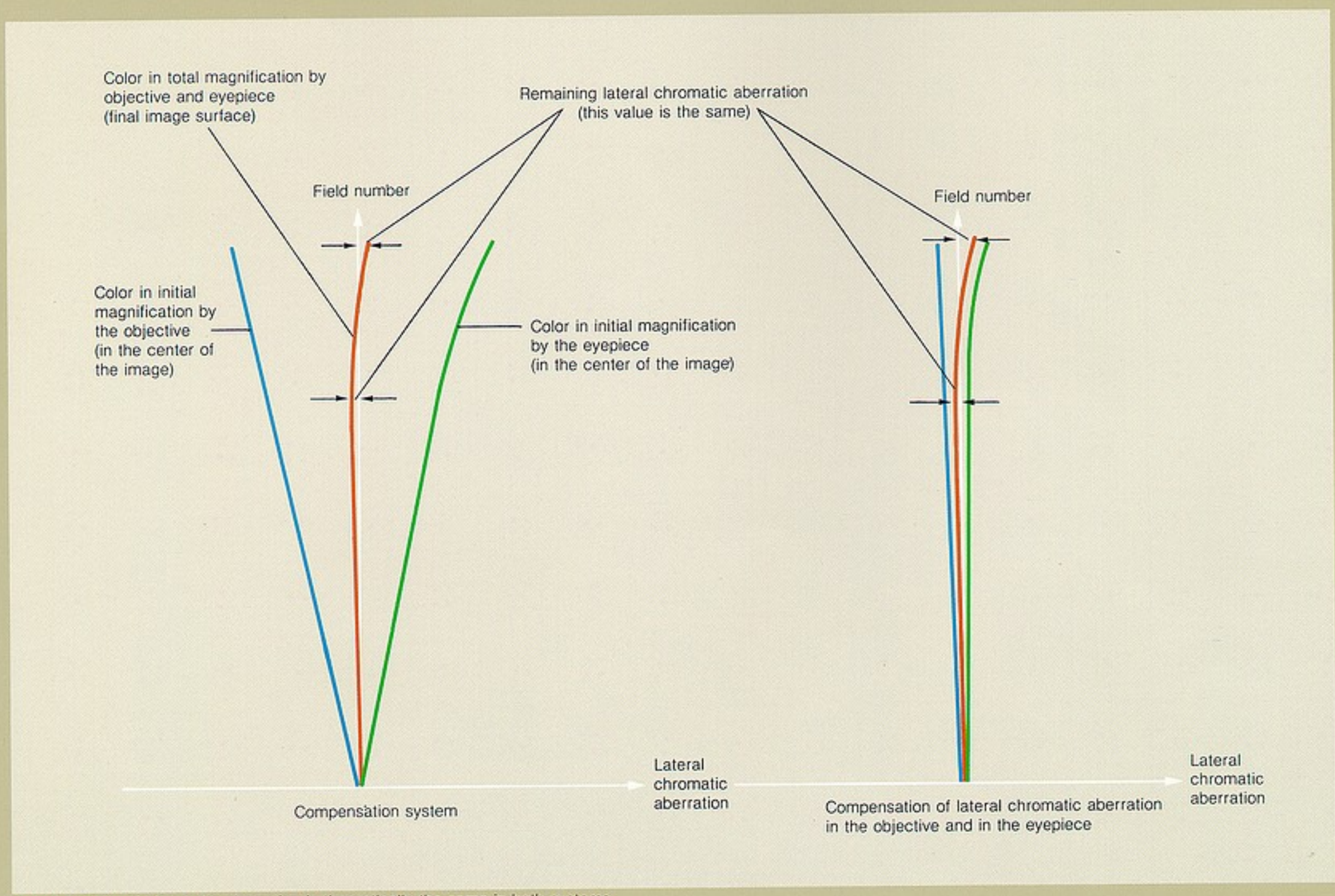
How to best compensate for lateral chromatic aberration has long been discussed. After intensive research, the advantages of the compensation system have been confirmed by Olympus in the LB Series.

As opposed to the camera objective, the theory that the image magnified by a compound microscope objective is again magnified by the eyepiece has remained unchanged since the 16th century.

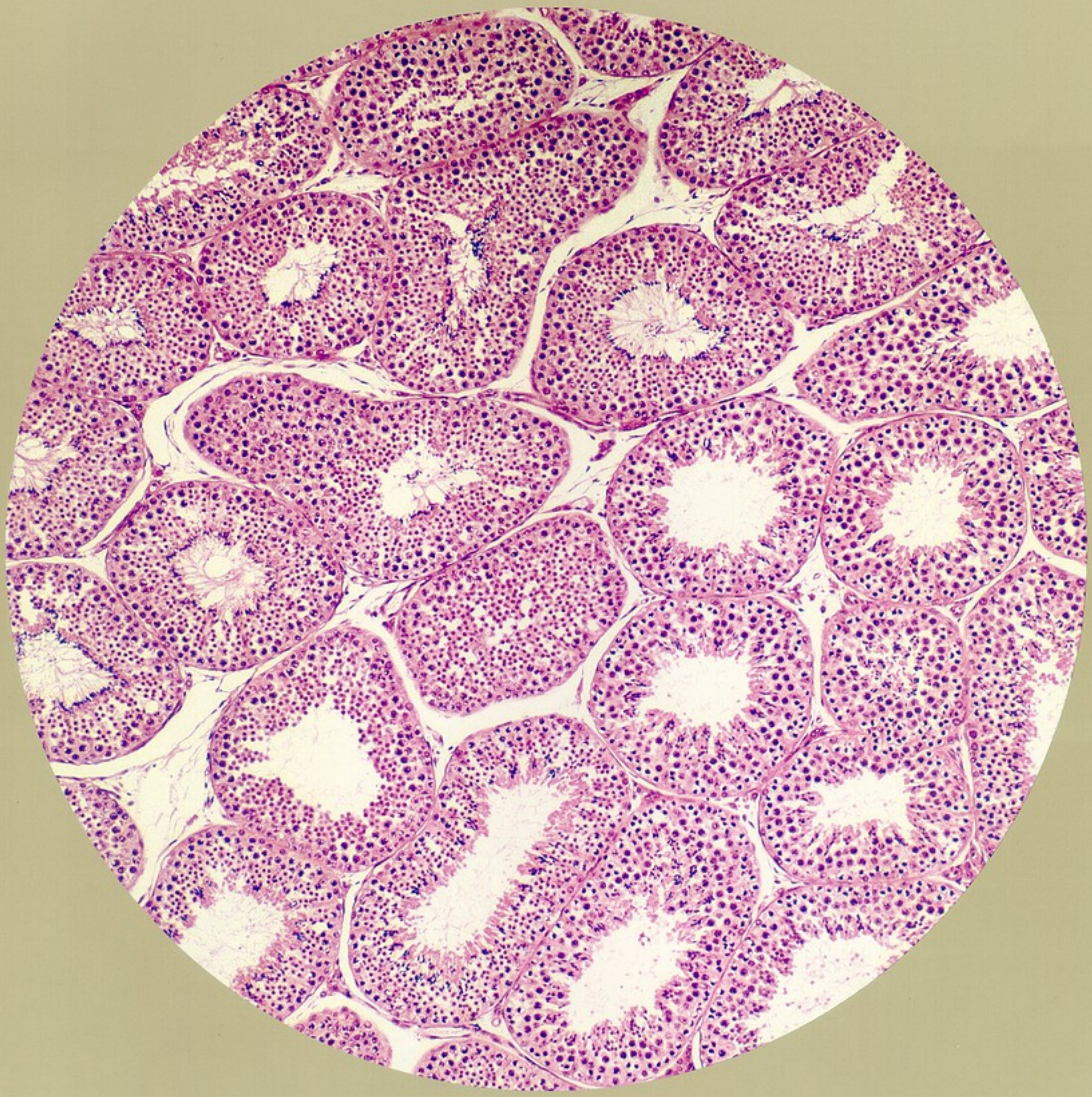
Compensating lateral chromatic aberration in the objective alone has already been applied in some microscopes made in the United States. As shown in the illustration below, the remaining lateral chromatic aberration is theoretically the same as when the compensation system is applied. Only one difference is pointed out—the field diaphragm of the eyepiece looks like a circle around the visual field and a little color fringe appears on the periphery of the field diaphragm.

However, there are curvature of field, astigmatism and other aberrations which exert an influence on the image around the visual field periphery. Since the objective focal distance is short, its construction tends to cause lateral chromatic aberration. Compensation of other important aberrations becomes difficult if only the objective is compensated and the other factors are ignored.

This is a very important point for microscopists. In Olympus LB objectives it has been confirmed that the compensation system, which combines the objective and eyepiece to compensate for lateral chromatic aberration, is far superior and presents no restrictions on the compensation of other aberrations. Please note the color photograph on the right covering the entire field of view of the microscopic image.



Remaining lateral chromatic aberration is theoretically the same in both systems



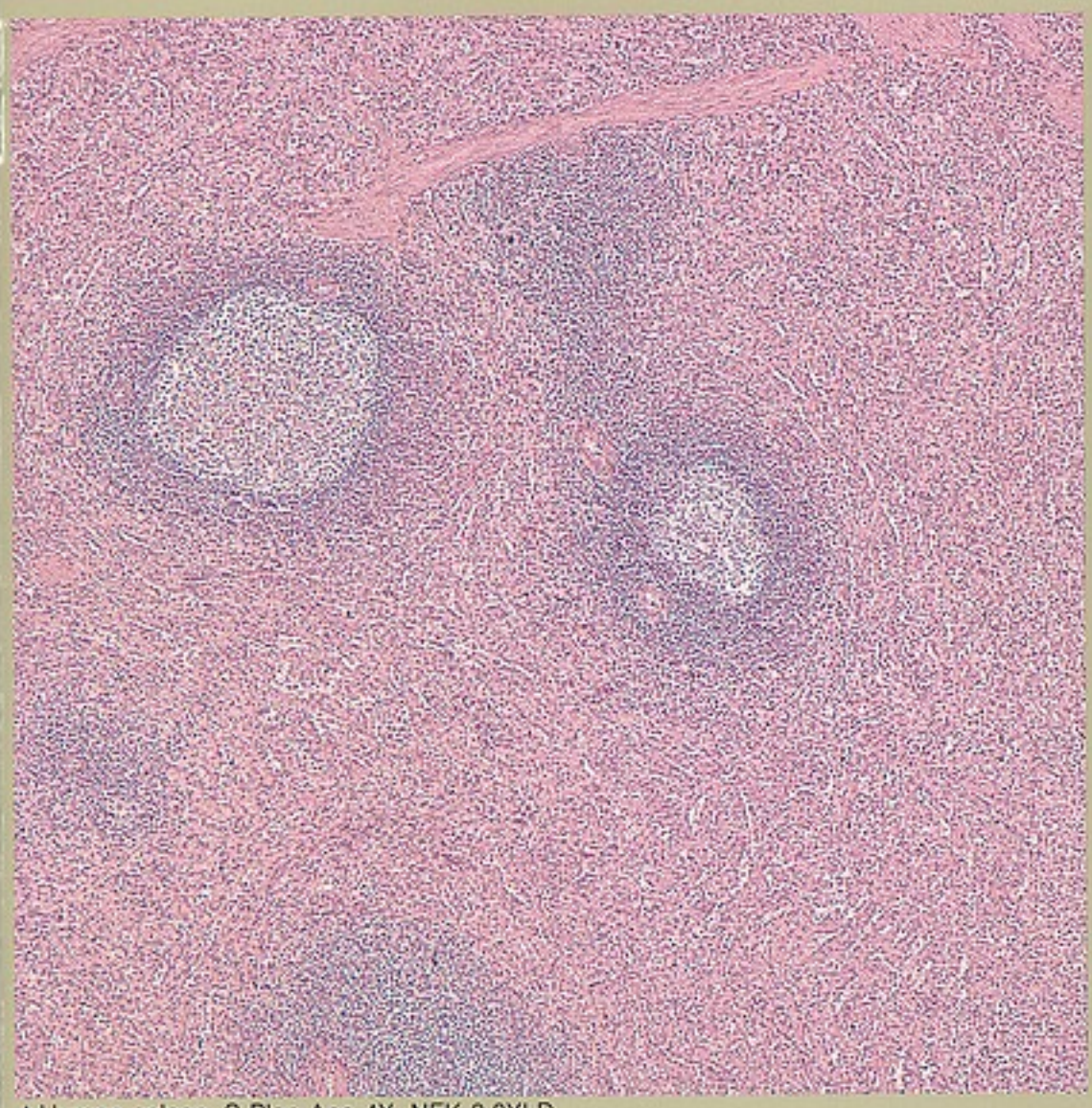
Sharpness at the center of the image is best when resolving power, contrast and chromatic aberration compensation are obtained through a truly superior design. In addition to these factors, the effects of curvature of field, coma, astigmatism and other aberrations must be taken into consideration so the compensation system can assure image sharpness from the center to the periphery of the visual field. This can be observed in the above photomicrograph.

S Plan Apochromatic Objectives

S Plan Apo
These objectives compensate for three wavelength of chromatic aberration throughout the visible wavelength range. Thus superior resolution and image sharpness from the center to the periphery of the visual field are obtained. The high numerical aperture provides outstanding resolution. S Plan apochromats are especially suited for photomicrography. These superior quality objectives incorporate the best of advanced Olympus design and production technology and are backed by fine optical microscope making tradition.

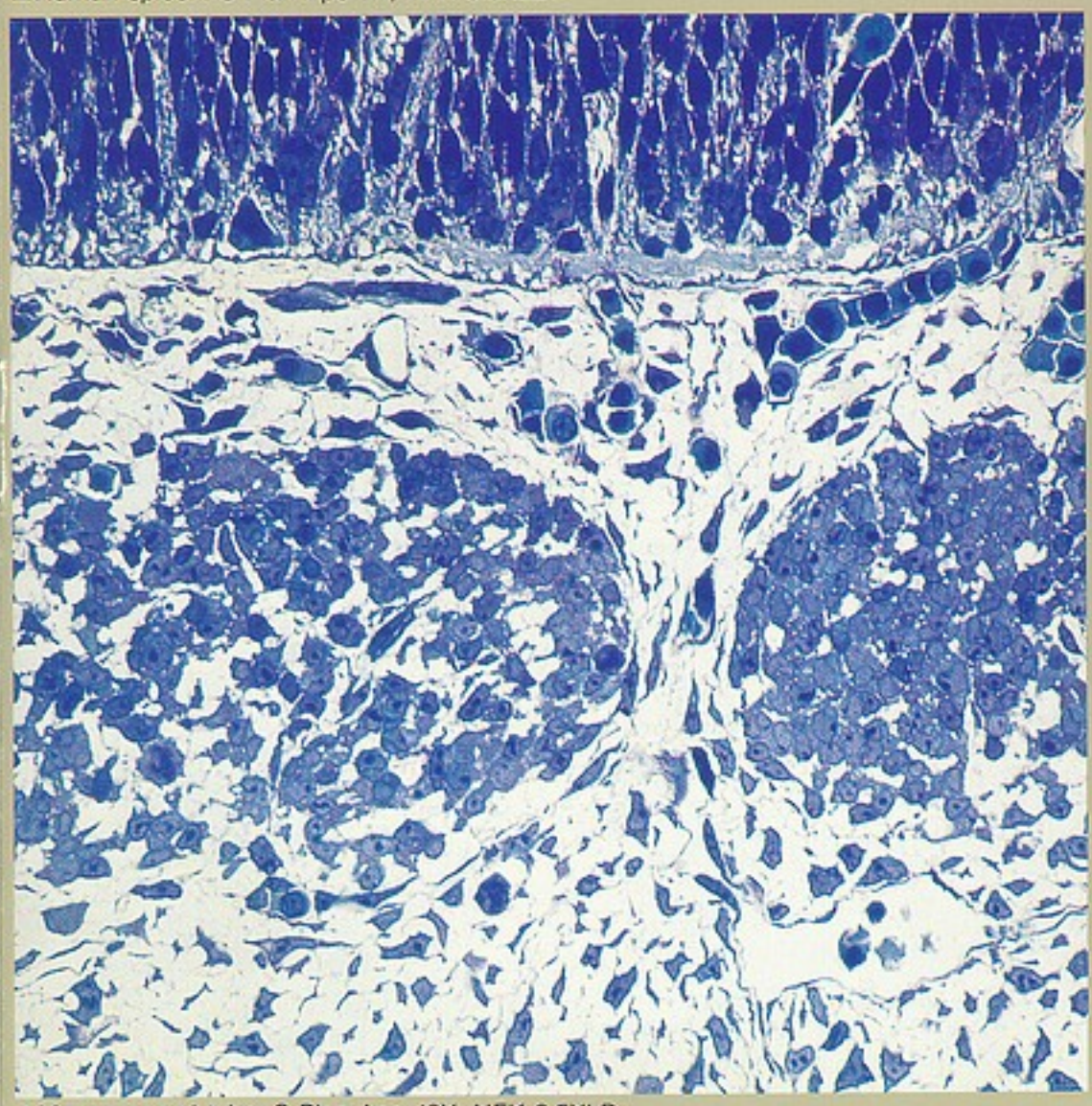
S Plan Apo

▲Section of human scalp. S Plan Apo 20X, NFK 3.3XLD.

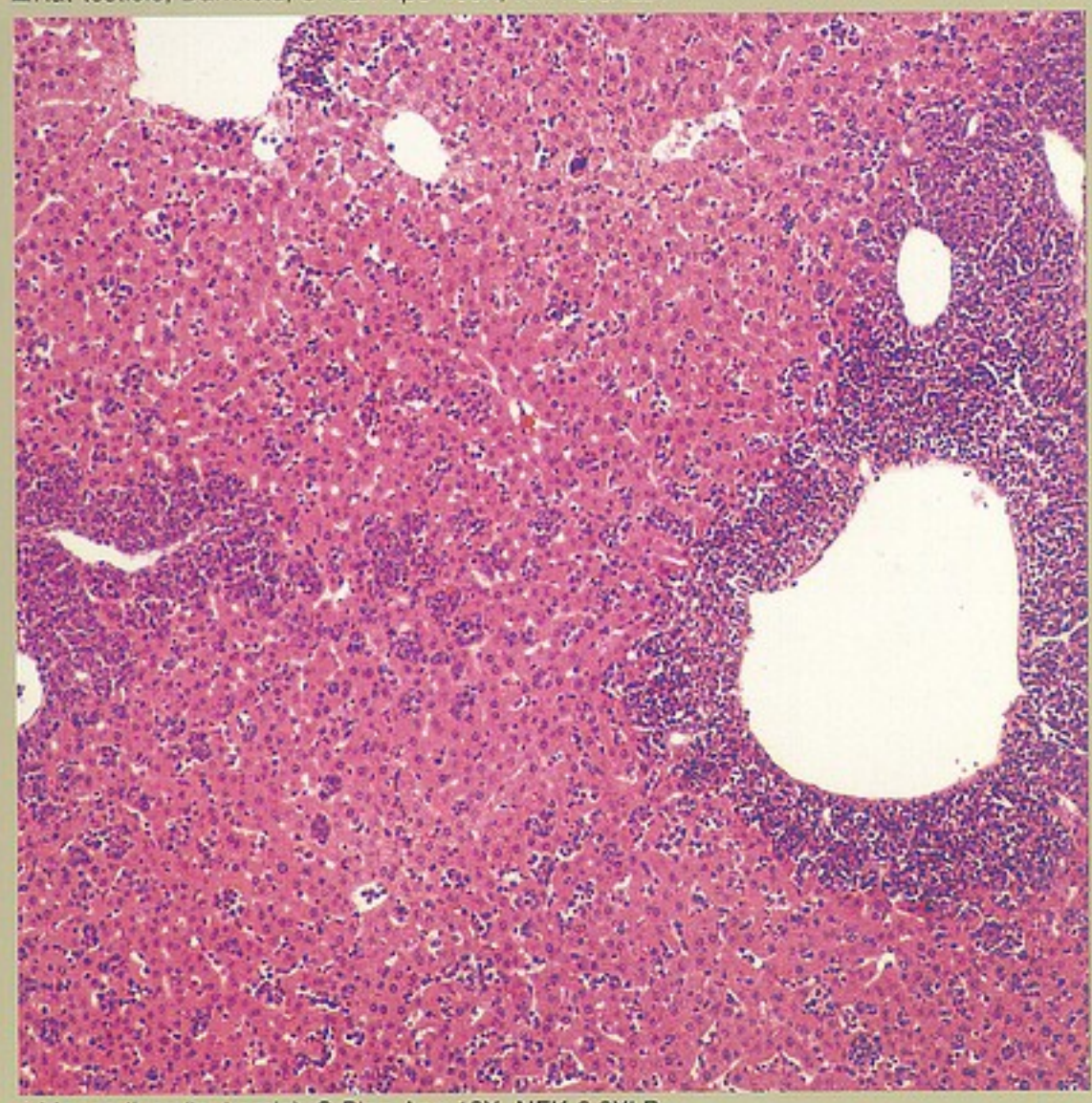


▲Human spleen. S Plan Apo 4X, NFK 3.3XLD.

▲Rat testicle, Darkfield, S Plan Apo 100X, NFK 3.3XLD.



▲Mouse neural tube. S Plan Apo 40X, NFK 2.5XLD.



▲Mouse liver (leukemia). S Plan Apo 10X, NFK 3.3XLD.

S Plan Achromatic and S Plan Fluorite Objectives

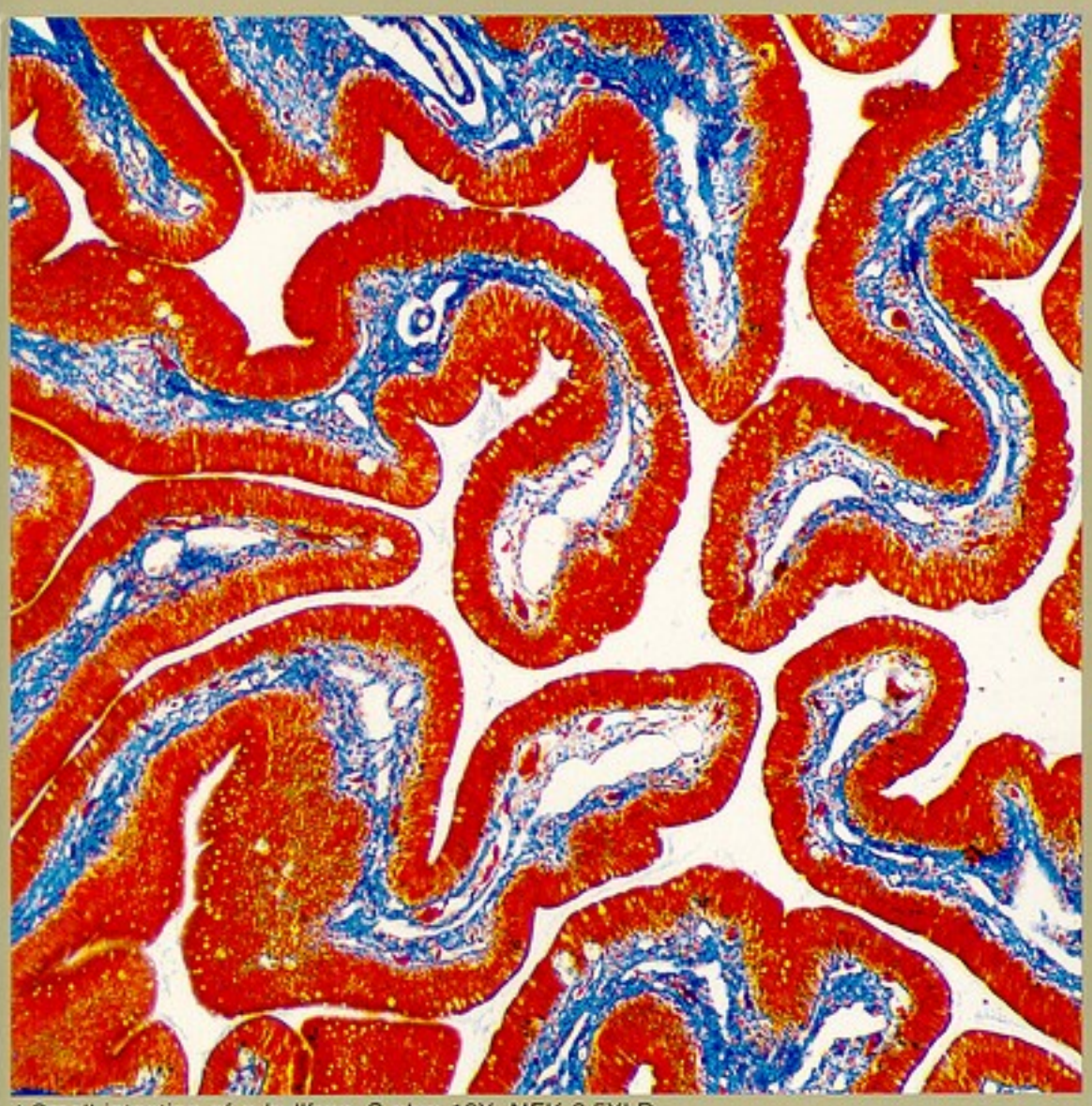
S Plan
These achromatic objectives are mainly used in high quality microscopes for biological applications. Our development activities emphasized improvements to set new standards in microscope performance and our success in achieving this goal has meet with great acceptance. Excellent optical correction across the entire lens surface makes S Plan Achromats ideal for use in differential interference contrast microscopy and for super widefield observation.
S Plan Achromats open up many new possibilities with larger numerical apertures and longer working distances.

S Plan FL
These fluorite objectives (plan semi-apochromats) yield superior image flatness and excellent chromatic aberration compensation. The ultra low magnifications (1X, 2X) of these objectives make them ideal for examination of large specimen areas. They are fully parfocal with other LB objectives. The S Plan FL2X is suitable for super-wide field observations.

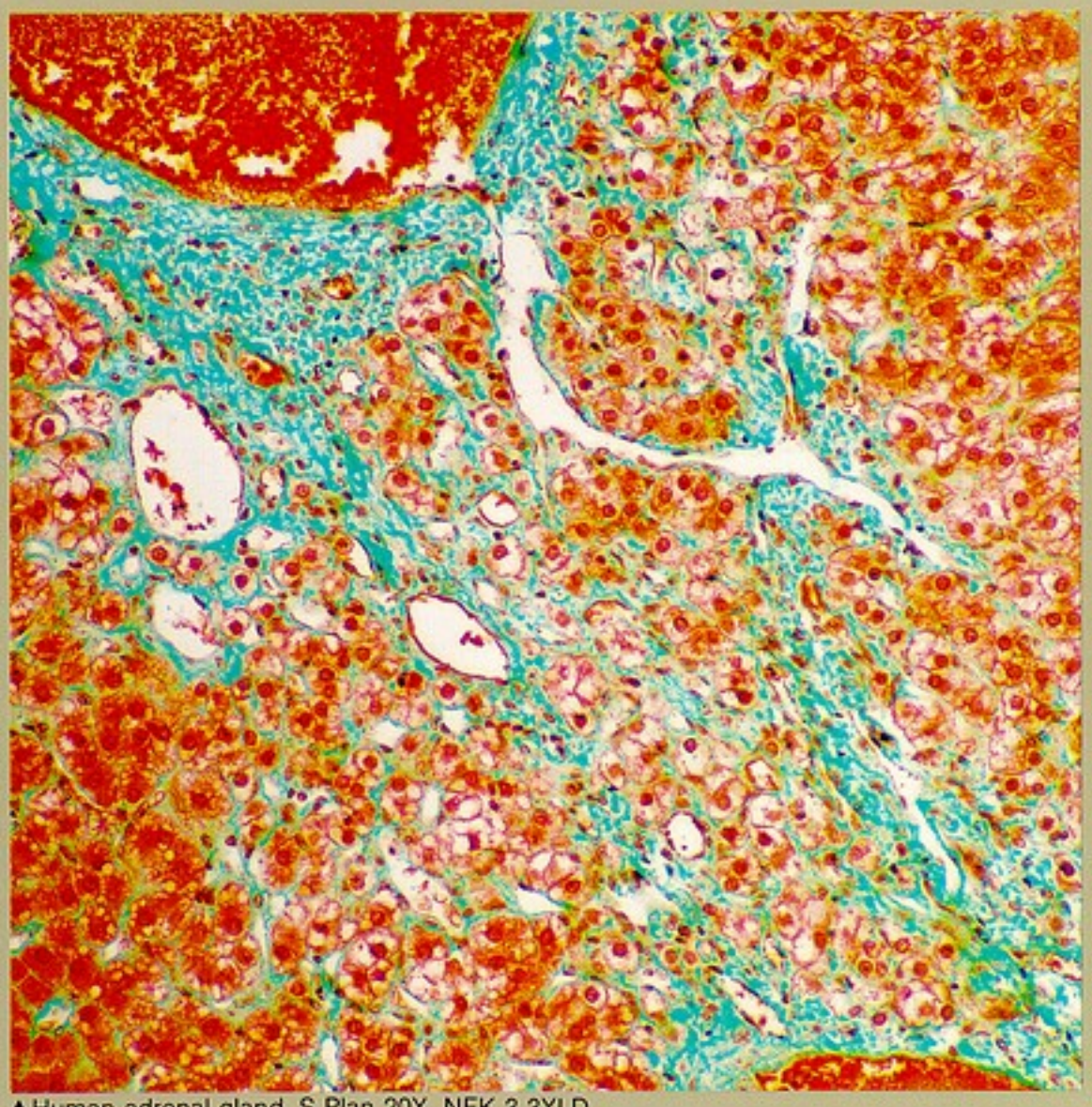
Note: These objectives perform best with the BH2-ULC ultra-low condenser.

S Plan

S Plan FL

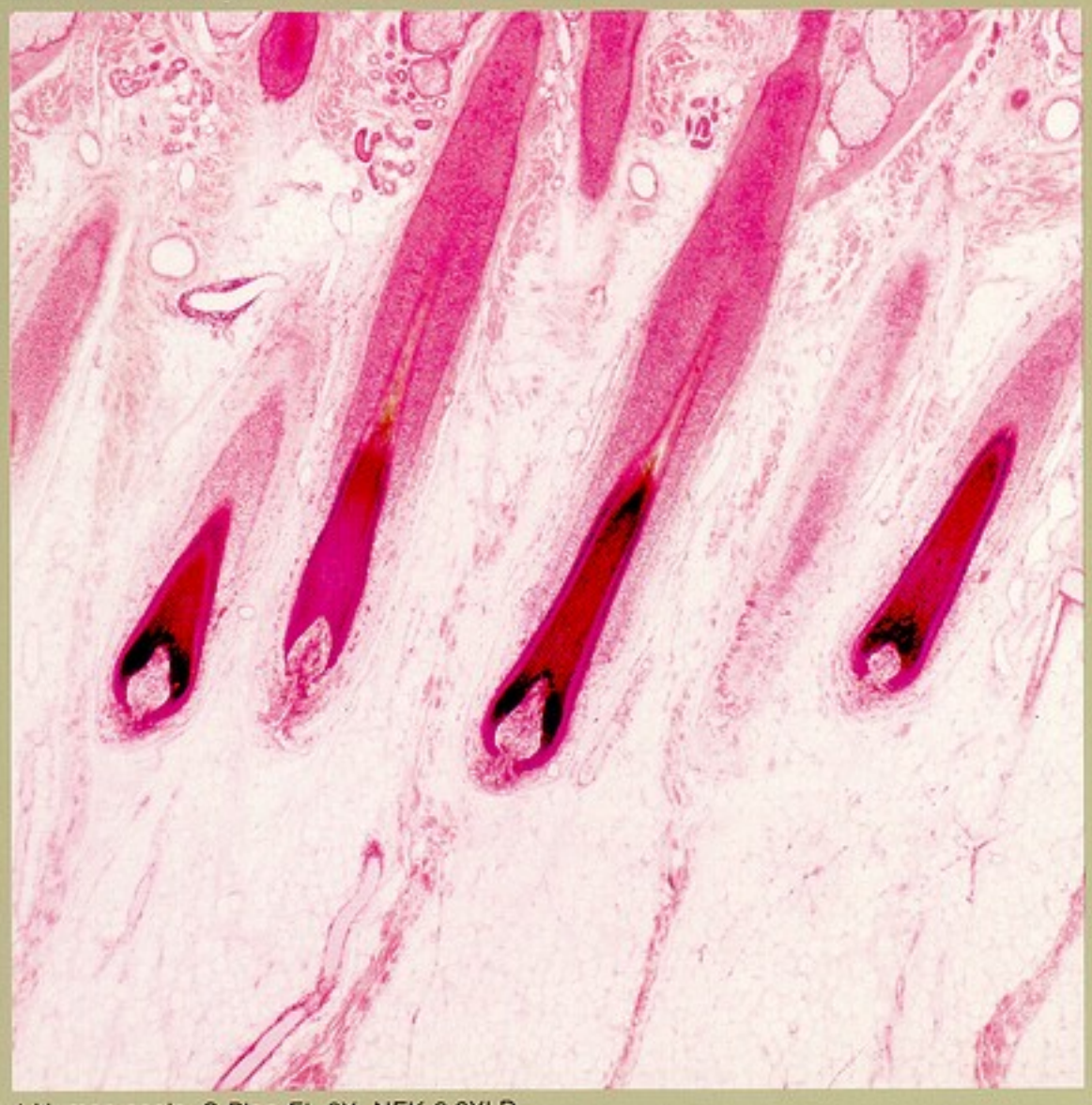


▲Small intestine of a bullfrog. S plan 10X, NFK 2.5XLD.



▲Human adrenal gland. S Plan 20X, NFK 3.3XLD.

▲Human jejunum. S Plan FL1X, NFK 3.3XLD.



▲Human scalp. S Plan FL 2X, NFK 3.3XLD.

D Plan Apochromatic, D Plan Achromatic Objectives and D/ED Achromatic Objectives

D Plan Apo
The D Plan Apo 60X objective has the same superior image flatness as the D Plan achromatic objective. In addition, it is a high quality lens with complete chromatic aberration compensation. A correction collar optically compensates for cover glass thickness discrepancies. This assures crisp images from the center to the periphery of the field of view.

D Plan
D Plan achromatic objectives assure field flatness up to F.N. 20. These achromatic objectives are ideal for photomicrography and are widely used in research, educational and routine work applications.

D Ach
These are economically priced objectives. Resolution and flatness in the field of view center are excellent. They are especially suitable for routine work, as well as for educational and training purposes.

ED Ach
These LB Series objectives combine high performance with maximum economy. ED Ach objectives were specially developed for routine work and education use. Excellent cost-efficiency makes them ideal for student use.

D Plan Apo

D Plan

D Ach

ED Ach

LWD CD Plan, ULWD CD Plan and PC LWD CD Plan, PC ULWD CD Plan Achromatic Objectives for Inverted Microscopes

LWD CD Plan

ULWD CD Plan

PC LWD CD Plan

PC ULWD CD Plan

LWD CD Plan and ULWD CD Plan
These long working distance and ultra long working distance objectives provide adjustment for thick culture vessel bottoms, from 0 to 2mm thickness, and feature excellent optical correction across the entire lens surface. They are ideal for bright field and differential interference contrast microscopy. Observation of specimens through the bottom of petri dishes and tissue culture flasks is outstanding.

PC LWD CD Plan and PC ULWD CD Plan
These positive-low (PL) phase contrast objectives are available in long or ultra long working distance types. Advanced optics provide superb image resolution and flatness—even through thick petri dish and tissue culture vessels.

▲Mouse embryo at pronuclear stage, 5hrs. after fertilization. Nomarski DIC, LWD CD Plan 20X, NFK 5XLD.

Phase Contrast Objectives

PC S Plan PL/NH and
PC D Ach PL/PLL/NH/NM

The PC S Plan Series incorporates S Plan achromatic objective characteristics in addition to those inherent to phase contrast objectives for phase contrast observation within an extra wide visual field. These objectives are available in positive-low (PL) and negative-high (NH) contrasts.
The PC D Ach Series of phase contrast achormatic objectives are available in PL, positive low-low (PLL), NH and negative medium (NM) contrasts.

PC S Plan PL

PC S Plan NH

PC D Ach PL

PC D Ach PLL

PC D Ach NH

PC D Ach NM

▲Fibroblast (Human embryo). PC D 20XPL, NFK 2.5XLD.

▲PC D 20XPLL, NFK 2.5XLD.

▲PC D 20XNH, NFK 2.5XLD.

▲PC D 20XNM, NFK 2.5XLD.

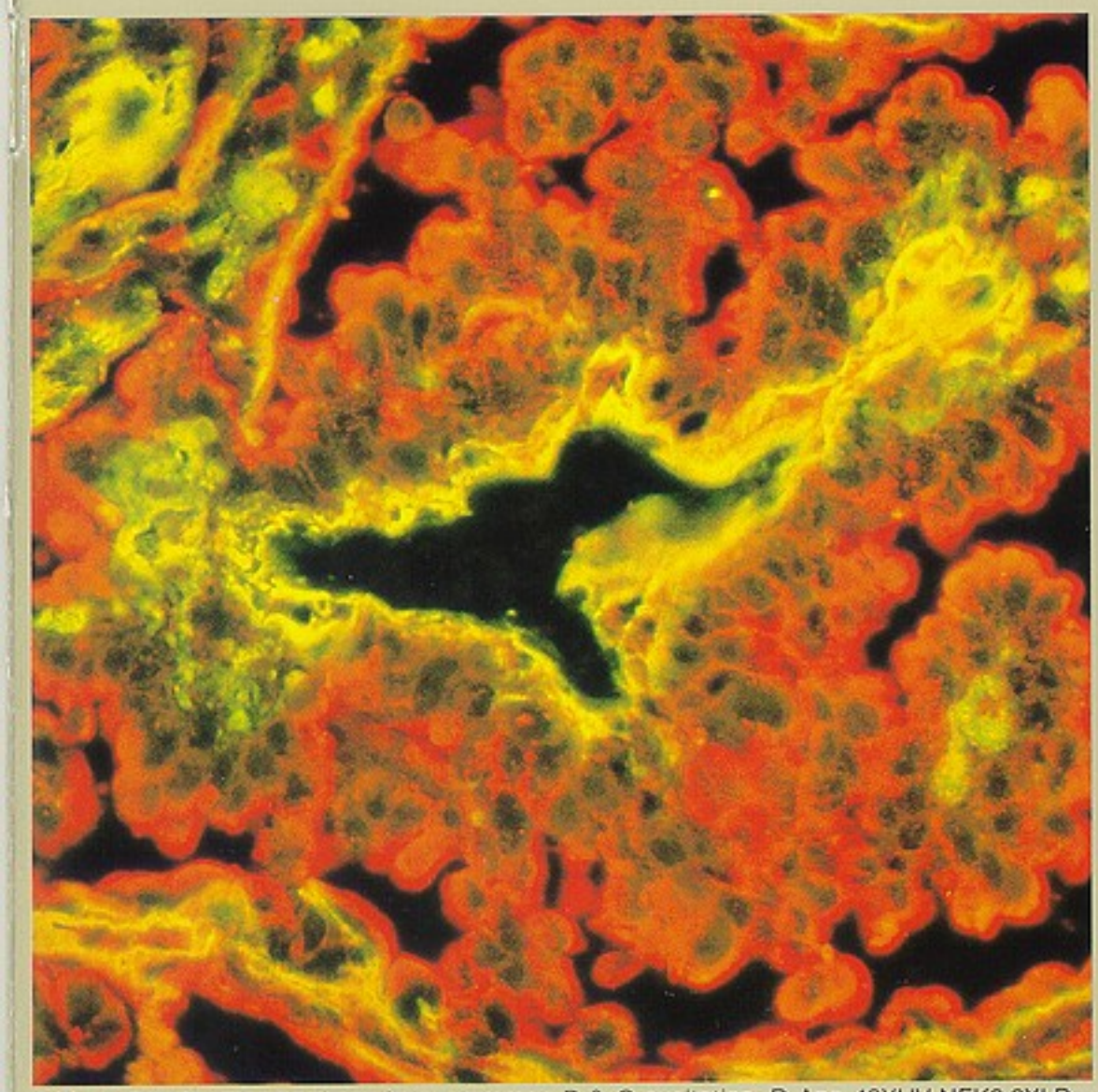
Fluorescence-Free and Fluorescence-Free Phase Contrast Objectives

D Plan Apo UV and D Apo UV
These objectives feature an apochromatic design to correct chromatic aberrations over a wide wavelength range. The design guarantees a sharp image and bright illumination in any excitation wavelength. The new, fluorescence-free immersion oil is also suitable for other oil immersion objectives used for general observation.

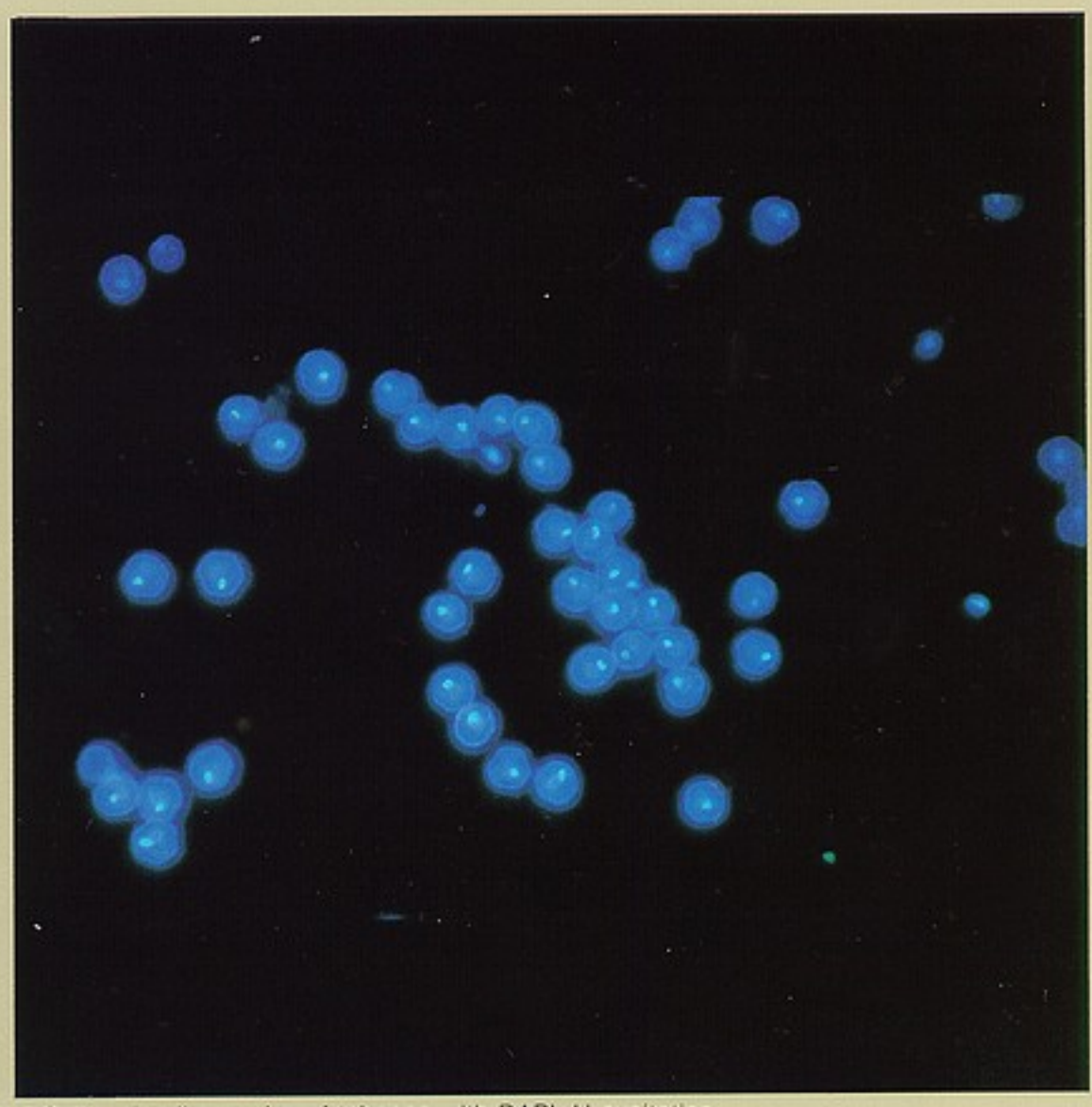
D Plan Apo UVPL and D Apo UVPL
Olympus offers four fluorescent phase contrast objective types. When a fluorescent specimen is being scanned, specimen quenching can be prevented by switching to phase contrast observation. When reflected light fluorescence and transmitted light phase contrast observation are performed simultaneously, a total specimen image—including the non-fluorescent details—can be obtained.

D Plan Apo UV and D Apo UV

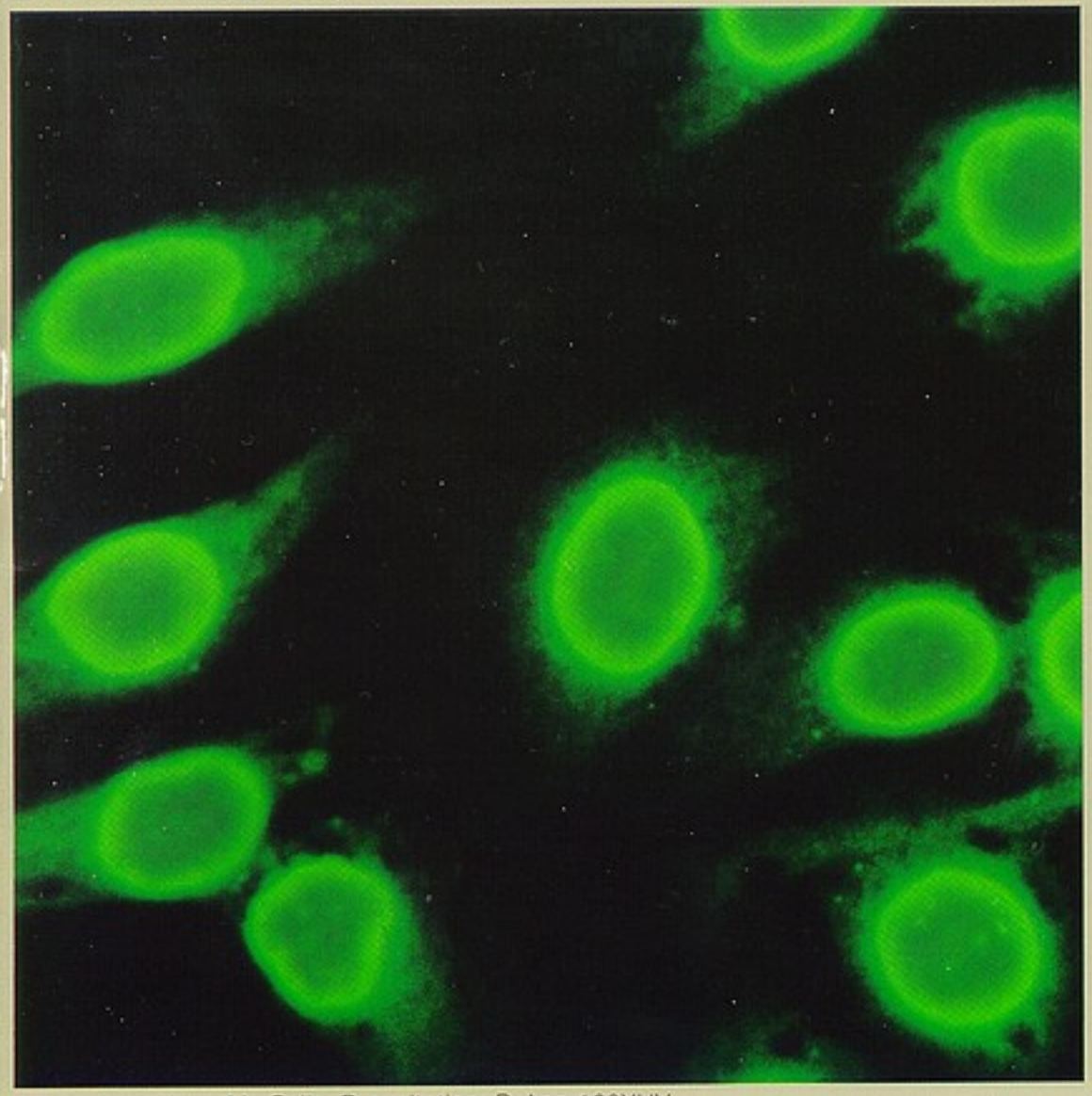
D Plan Apo UVPL and D Apo UVPL



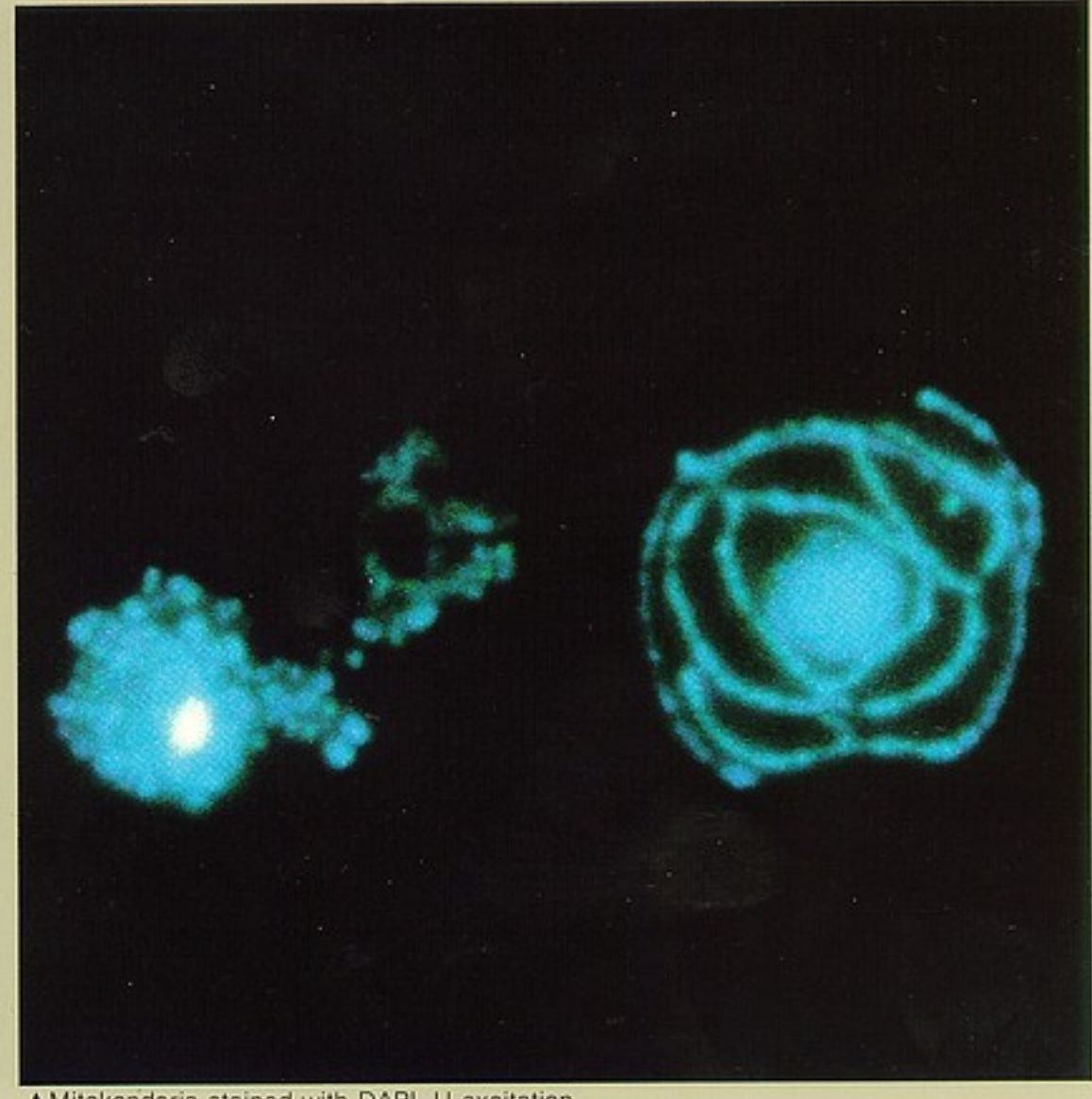
▲Monoclonal antibodies in york sac tummor. B & G excitation, D Apo 40XUV, NFK3.3XLD.



▲Cultured pollen grains of tobacco with DAPI. U excitation.



▲Infectious Hepatitis Cells. B excitation, D Apo 100XUV.



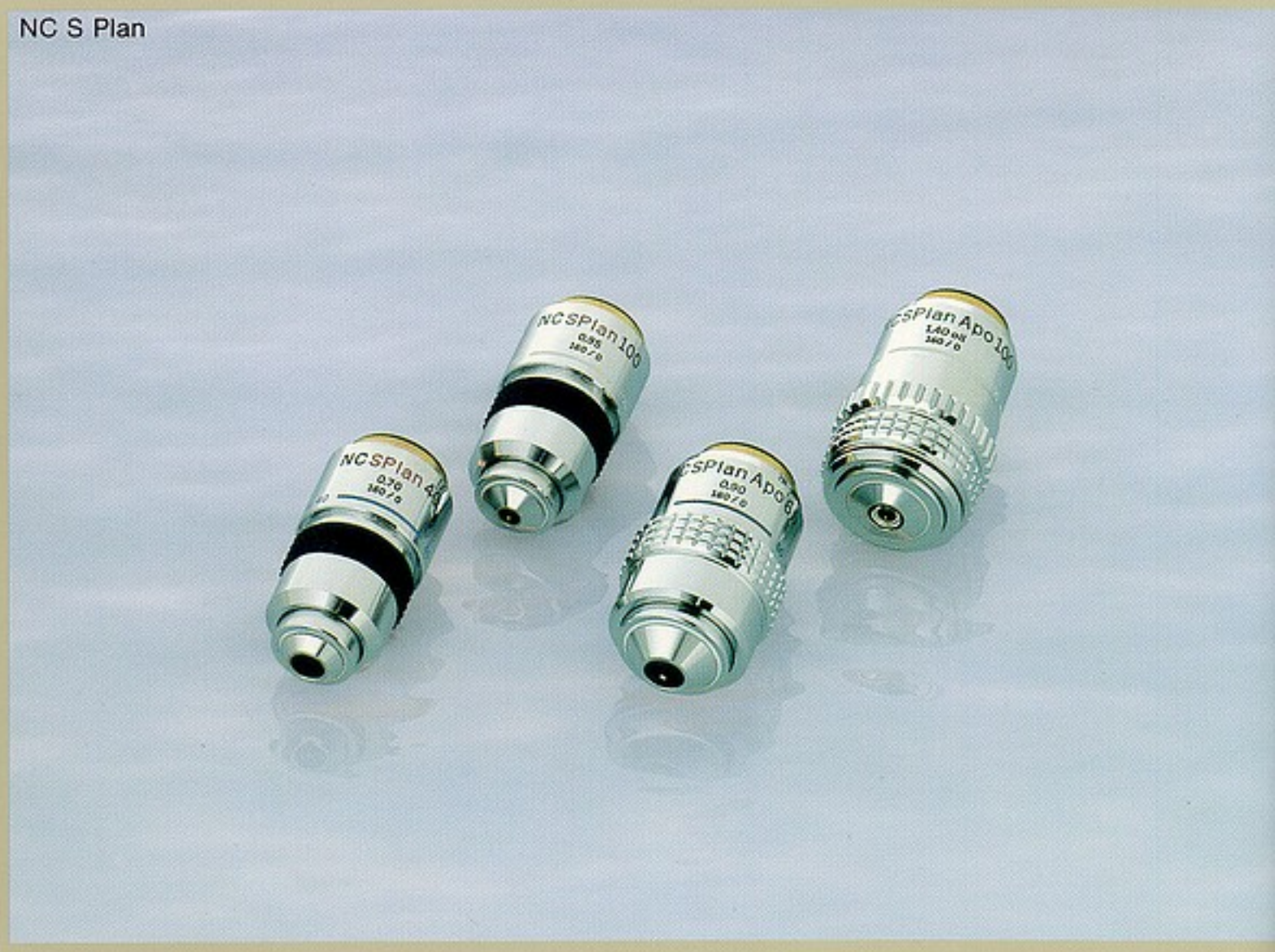
▲Mitokondoria stained with DAPI. U excitation.

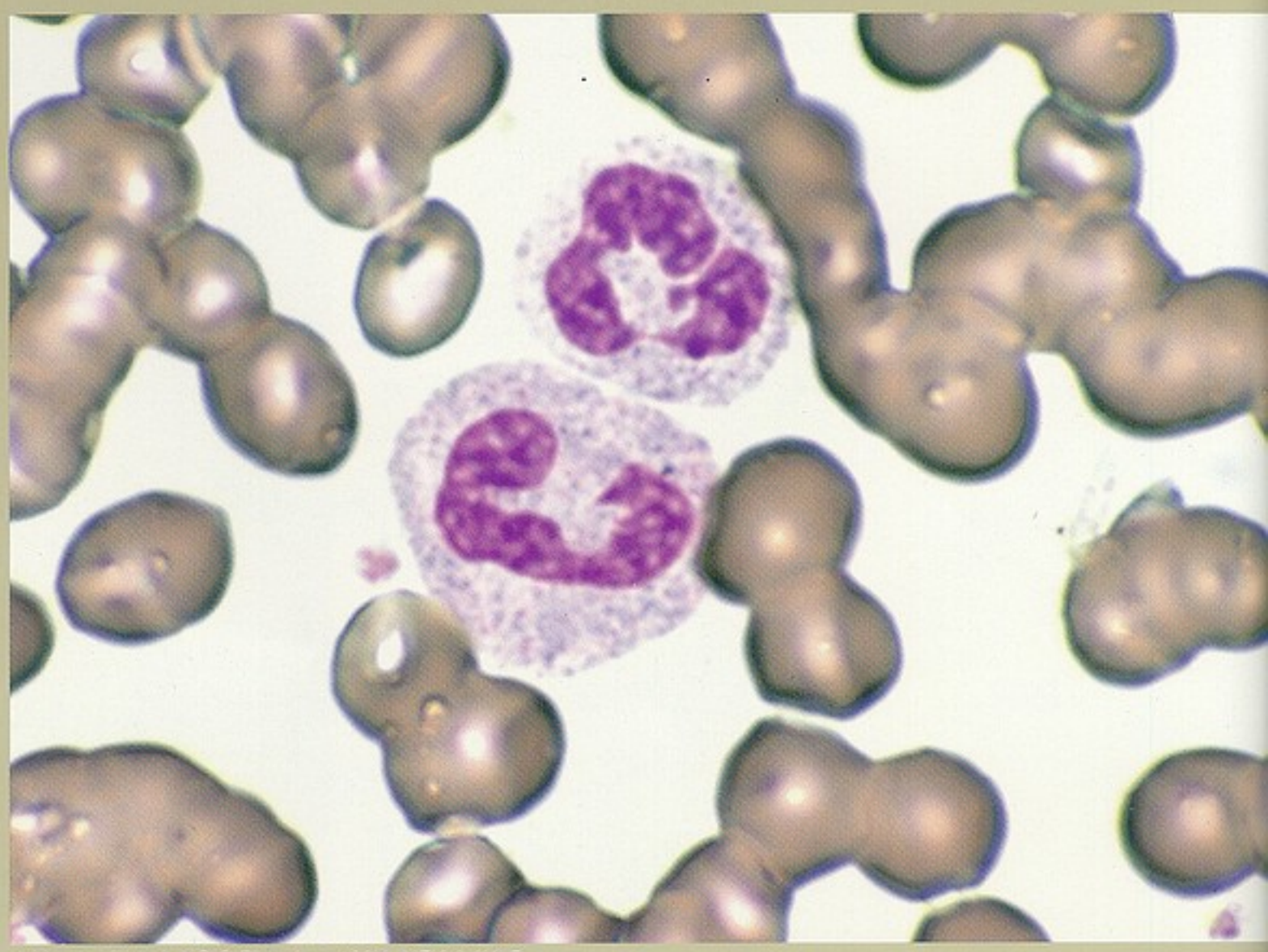
No-Cover Objectives

NC S Plan and NC S Plan Apo

Some specimens and most smears are observed on slides without a cover glass. No-cover objectives are required for these applications. Most objectives are designed to compensate for refraction, not only of the object slide, but also of the 0.17mm thick cover glass. When specimens are examined without a cover glass, objective performance suffers. This is especially true of high N.A. immersion objectives and dry objectives with magnifications of 20X or higher.

NC S Plan





▲Human blood. NC S Plan Apo 100X, NFK 3.3XLD

Strain-Free Objectives

PO D Plan

PO D Ach

▲Phenyl salicylate (Organic substance).

PO D Plan and PO D Ach

Polarized light microscopy, in addition to its traditional role in the study of minerals and crystals, is enjoying increased use in oil related industries and pharmacology. Olympus objectives are completely strain free. This is an essential requirement in polarized light microscopy. Two strain-free objective series for transmitted light microscopy are available, the PO D Ach with excellent resolution and the PO D Plan with superb resolution and field flatness.

Data of LB Optics

LB Objective Series for Biological Use

Magnification		Numerical Aperture	Working Distance mm	Focal Length mm	Remarks
S Plan Apochromatic					
S Plan Apo	4X, dry*	0.16	9.83	36.71	S.W.
	10X, dry	0.40	0.55	16.92	S.W., Spring-loaded.
	20X, dry	0.70	0.55	7.68	S.W., Spring-loaded.
	40X, dry	0.95	0.13	4.18	S.W., Correction collar (0.11 ~ 0.23), Spring-loaded. D.I.C. (with UCD)
	60X, oil*	1.40	0.12	2.80	S.W., Spring-loaded.
	100X, oil	1.40	0.15	1.62	S.W., Iris diaphragm, Spring-loaded.
S Plan Achromatic Objectives					
S Plan	4X, dry*	0.13	15.50	36.54	S.W.
	10X, dry	0.30	7.50	18.98	S.W., D.I.C.
	20X, dry	0.46	1.50	8.03	S.W., D.I.C., Spring-loaded.
	40X, dry	0.70	0.50	4.13	S.W., D.I.C., Spring-loaded.
	100X, oil	1.25	0.17	1.69	S.W., D.I.C., Spring-loaded.
	100X, dry	0.95	0.20	1.68	S.W., D.I.C., Correction collar (0.14 ~ 0.20), Spring-loaded.
S Plan Fluorite Objectives					
S Plan FL	1X, dry*	0.04	2.2	137.90	
	2X, dry*	0.08	5.5	73.42	S.W.
D Plan Apochromatic Objectives					
D Plan Apo	60X, dry	0.90	0.10	3.06	Correction collar (0.11 ~ 0.23), Spring-loaded.
D Plan Achromatic Objectives					
D Plan	4X, dry*	0.10	7.03	34.23	
	10X, dry	0.25	7.40	17.69	
	20X, dry	0.40	0.83	8.99	Spring-loaded.
	40X, dry	0.65	0.47	4.61	Spring-loaded.
	50X, oil*	0.90	0.23	3.80	Spring-loaded, Iris diaphragm.
	100X, oil	1.25	0.17	1.75	Spring-loaded.
D Achromatic Objectives					
D Ach	4X, dry*	0.10	18.23	30.03	
	10X, dry	0.25	7.18	16.90	
	20X, dry	0.40	1.63	8.63	Spring-loaded.
	40X, dry	0.65	0.63	4.58	Spring-loaded.
	60X, dry	0.80	0.23	3.14	Spring-loaded.
	100X, oil*	1.30	0.20	1.66	Spring-loaded.
I D Ach	100X, oil	1.30	0.20	1.92	Spring-loaded, Iris diaphragm.
ED Achromatic Objectives					
ED Ach	4X, dry*	0.10	29.00	31.05	
	10X, dry*	0.25	6.30	16.45	
	40X, dry	0.65	0.53	4.59	Spring-loaded.
	100X, oil*	1.25	0.20	1.90	Spring-loaded.
Long and Ultra Long Working Distance Objectives					
LWD CD Ach	20X, dry	0.40	5.40	8.31	Cover grass 1.2mm
PC LWD CD Ach	20X, dry	0.40	5.40	8.30	Cover grass 1.2mm
LWD CD Plan	20X, dry	0.40	3.00	7.69	D.I.C., Correction collar (0 ~ 2).
	40X, dry	0.55	2.04	4.39	D.I.C., Correction collar (0 ~ 2), Spring-loaded.
ULWD CD Plan	20X, dry	0.40	10.50	7.93	Correction collar (0 ~ 2).
	40X, dry	0.50	7.40	3.82	Correction collar (0 ~ 2).
PC LWD CD Plan	20X, dry PL	0.40	3.00	7.69	Correction collar (0 ~ 2).
	40X, dry PL	0.55	2.04	4.39	Correction collar (0 ~ 2), Spring-loaded.
PC ULWD CD Plan	20X, dry PL	0.40	10.50	7.93	Correction collar (0 ~ 2).
	40X, dry PL	0.50	7.40	3.82	Correction collar (0 ~ 2).

Cover glass thickness is theoretically designated at 0.17mm.

Magnification			Numerical Aperture	Working Distance mm	focal Length mm	Remarks
Phase Contrast Objectives						
PC S Plan	4X, dry	PL* NH*	0.13	15.50	36.54	S.W.
	10X, dry	PL NH	0.30	7.59	18.98	S.W.
	20X, dry	PL NH	0.46	1.50	8.03	S.W., Spring-loaded.
	40X, dry	PL NH	0.70	0.50	4.13	S.W., Spring-loaded.
	100X, oil	PL NH	1.25	0.17	1.69	S.W., Spring-loaded.
PC D Ach	10X, dry	PL PLL NH NM	0.25	7.18	16.90	
	20X, dry	PL PLL NH NM	0.40	1.63	8.63	Spring-loaded.
	40X, dry	PL PLL NH NM	0.65	0.62	4.58	Spring-loaded.
	100X, oil	PL* PLL* NH* NM*	1.30	0.20	1.66	Spring-loaded.
Objectives (for reflected light fluorescence)						
D Plan Apo	10XUV, dry		0.40	1.10	15.69	D.I.C., Spring-loaded.
	20XUV, dry		0.70	0.75	7.8	D.I.C., Spring-loaded.
	20XUV, oil*		0.80	0.18	7.78	D.I.C., Spring-loaded.
	40XUV, dry		0.85	0.25	4.04	D.I.C., Correction collar (0.11～0.23), Spring-loaded.
	40XUV, oil*		1.00	0.16	4.34	D.I.C., Spring-loaded, Iris diaphragm.
	100XUV, oil		1.30	0.16	1.69	D.I.C., Spring-loaded, Iris diaphragm.
D Apo	20XUV, dry		0.65	1.03	8.11	Spring-loaded.
	40XUV, oil*		1.30	0.12	4.34	D.I.C., Iris diaphragm, Spring-loaded.
	100XUV, oil		1.30	0.12	1.88	Iris diaphragm, Spring-loaded.
D Plan Apo	10XUVPL, dry		0.40	1.10	15.69	Spring-loaded.
	20XUVPL, dry		0.70	0.75	7.8	Spring-loaded.
	40XUVPL, oil*		1.00	0.16	4.34	Iris diaphragm, Spring-loaded.
	100XUVPL, oil		1.30	0.16	1.69	Iris diaphragm, Spring-loaded.
D Apo	40XUVPL, oil		1.30	0.12	4.34	Iris diaphragm, Spring-loaded.
	100XUVPL, oil		1.30	0.12	1.88	Iris diaphragm, Spring-loaded.
No Cover Objectives						
NC S Plan	40X, dry		0.70	0.45	4.19	S.W., Spring-loaded.
	100X, dry		0.95	0.30	1.70	S.W., Spring-loaded.
NC S Plan Apo	60X, dry		0.90	0.42	2.78	S.W., Spring-loaded.
	100X, oil		1.40	0.15	1.62	S.W., Iris diaphragm, Spring-loaded
Strain-free Objectives (for transmitted polarized light)						
PO D Plan	4X, dry*		0.10	7.03	34.23	
	10X, dry		0.25	7.40	17.69	
	20X, dry		0.40	0.83	8.99	Spring-loaded.
	40X, dry		0.65	0.47	4.61	Spring-loaded.
	100X, oil		1.25	0.17	1.75	Spring-loaded.
PO D Ach	4X, dry*		0.10	18.23	30.03	
	10X, dry		0.25	7.18	16.90	
	20X, dry		0.40	1.63	8.63	Spring-loaded.
	40X, dry		0.65	0.62	4.58	Spring-loaded.
	100X, oil*		1.30	0.20	1.66	Spring-loaded.

Denote:
S.W. = *Super Widefield.*
PL = *Positive Low Contrast.*
PLL = *Positive Low-Low Contrast.*
NH = *Negative High Contrast.*
HM = *Negative Medium Contrast.*
D.I.C. = *Nomarski Differential Interference Contrast*
* = *Can be used for specimens with/without cover.*

Eyepieces

WHK eyepieces are designed for use with LB Series objectives. They are easy to use, comfortable and feature a widefield design (F.N. 20 for WHK10X). Their high eye point makes them easy to use by persons who wear glasses and enables fatigue-free observation over long periods of time. Other eyepieces in the series include the WHK8X, WHK15X, NF5X, NK20X and super widefield eyepieces SWHK10X and SWHK8X (F.N. 26.5).

[Reference]
Diameter of microscope visual field (mm)

$$\fallingdotseq \frac{\text{eyepiece visual field number}}{\text{objective magnification}}$$

[Example]
When observing with the WHK10X eyepiece and the S Plan 40X objective, the diameter of the visual field

$$= \frac{20}{40} = 0.5\text{mm}$$

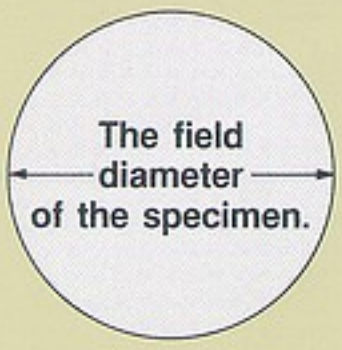
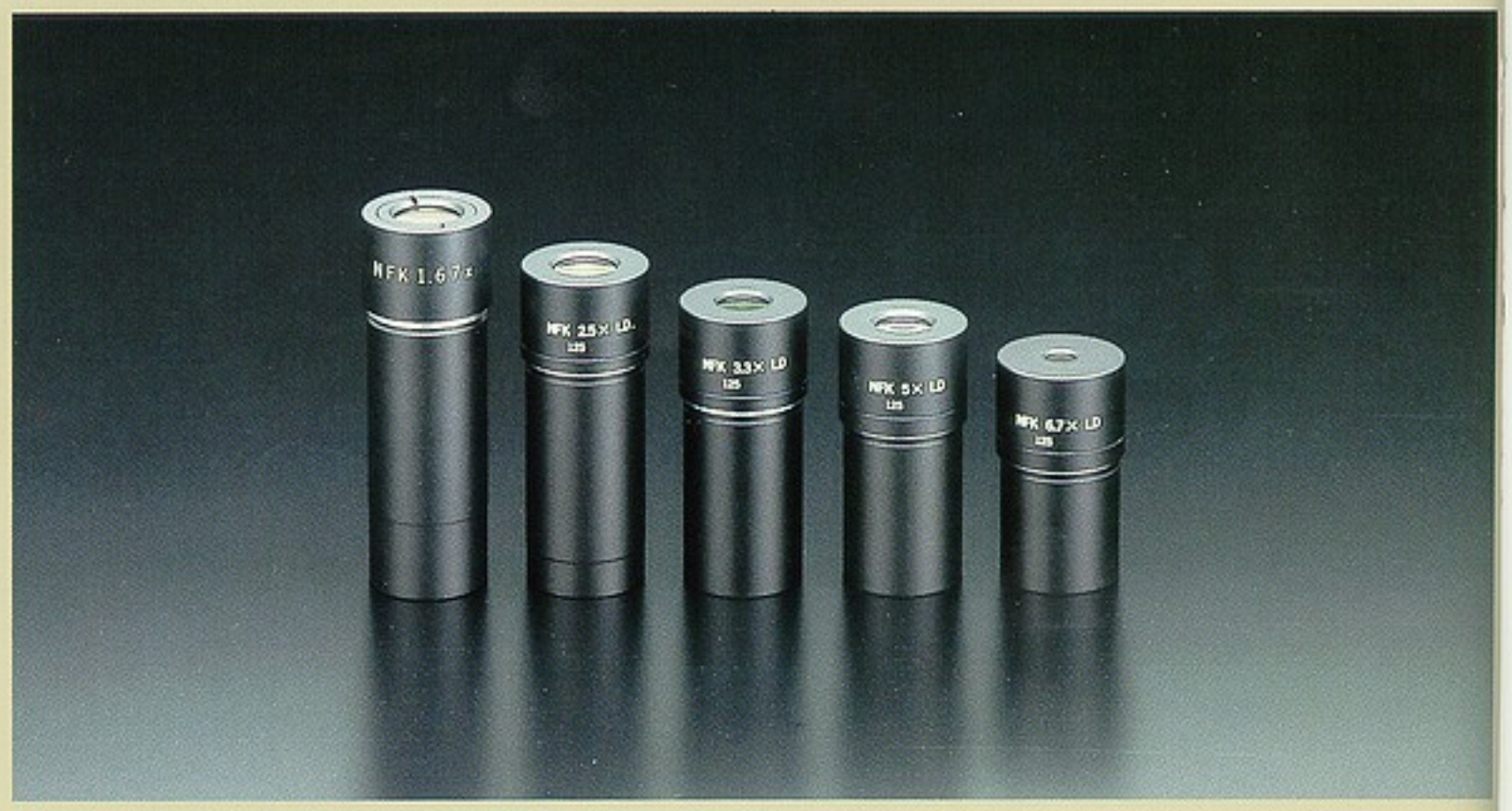


Photo Eyepieces

These eyepieces are specially computed to complement LB Series objectives for photomicrographic purposes. They provide excellent field flatness and aberration correction. Available magnifications are 2.5X, 3.3X, 5X and 6.7X. Each eyepiece is designed to focus at a projection length of 125mm, which equals the film plane distance of the 35mm camera back of the PM-10AD(S) and PM-10M photomicrogrpahic camera attachments. Magnifications for large format cameras are three times greater than for 35mm cameras, i.e., NFK 2.5XLD becomes 7.5X, NFK 3.3XLD becomes 10X, NFK 5XLD becomes 15X and NFK 6.7X becomes 20X.



LB Eyepiece Series

	Field Number minϕ	Eyepoint mm	Focal Length mm	Remarks
Widefield Eyepieces				
GS-WHK 10X*	20	18.7	25.0	With built-in grain scale.
CWHK 10X	18	18.8	25.0	
WHK 8X	20	18.7	31.25	
WHK 10X	20	18.7	25.0	
WHK 10X H*	20	18.7	25.0	
WK 10X	20	15.8	25.0	
WK 10X H*	20	15.8	25.0	
WHK 12.5X	16	15.5	20.0	
WHK 12.5X H*	16	15.5	20.0	
WHK 15X	14	16.3	16.7	
Micro-WHK 10X*	20	18.7	25.0	Built-in 10/100 micrometer disc.
Cross-WHK 10X*	20	18.7	25.0	Buit-in cross micrometer disc.
Micro-WK 10X*	20	15.8	25.0	Built-in 10/100 micrometer disc.
Cross-WK 10X*	20	15.8	25.0	Built-in cross micrometer disc.
GS-CWHK 10X	18	18.8	25.0	Built-in 8 grain size reticles.
Compensation Eyepieces				
NK 5X	21	16.4	50.0	
NK 20X	10	10.4	12.5	
Super Widefield Eyepiece				
SWHK 8X*	26.5	17.0	31.25	
SWHK 10X*	26.5	15.6	25.0	
Finder Eyepieces				
35-WHK 10X*	20	18.7	25.0	With built-in mask for 35mm camera. — to be matched with WHK 10X
P-WHK 10X*	20	18.7	25.0	With built-in mask for 3¼″ × 4¼″ Polaroid.
4 × 5-WHK 10X*	20	18.7	25.0	With built-in mask for 4″ × 5″ Polaroid
35-SWHK 8X*	26.5	17.0	31.25	With built-in mask for 35mm camera — to be matched with SWHK 8X
35-SWHK 10X*	26.5	15.6	25.0	With built-in mask for 35mm camera. — to be matched with SWHK 10X
P-SWHK 10X*	26.5	15.6	25.0	With built-in mask for 3¼″ × 4¼″ Polaroid.
4 × 5-SWHK 10X*	26.5	15.6	25.0	With built-in mask for 4″ × 5″ Polaroid.
Photo Eyepieces				
NFK 1.67XLD	—	—		
NFK 2.5XLD	—	—		
NFK 3.3XLD	—	—		
NFK 5XLD	—	—		
NFK 6.7XLD	—	—		
Others				
H 5X LB	19	11.4	50.0	
P 10X LB	13	6.1	25.0	
P 15X LB	10	10.1	16.6	

*Diopter adjustment −8 ~ +2.

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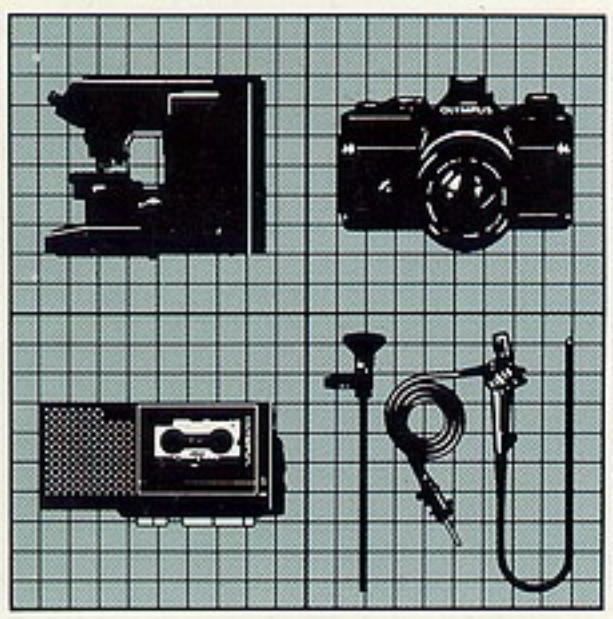

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