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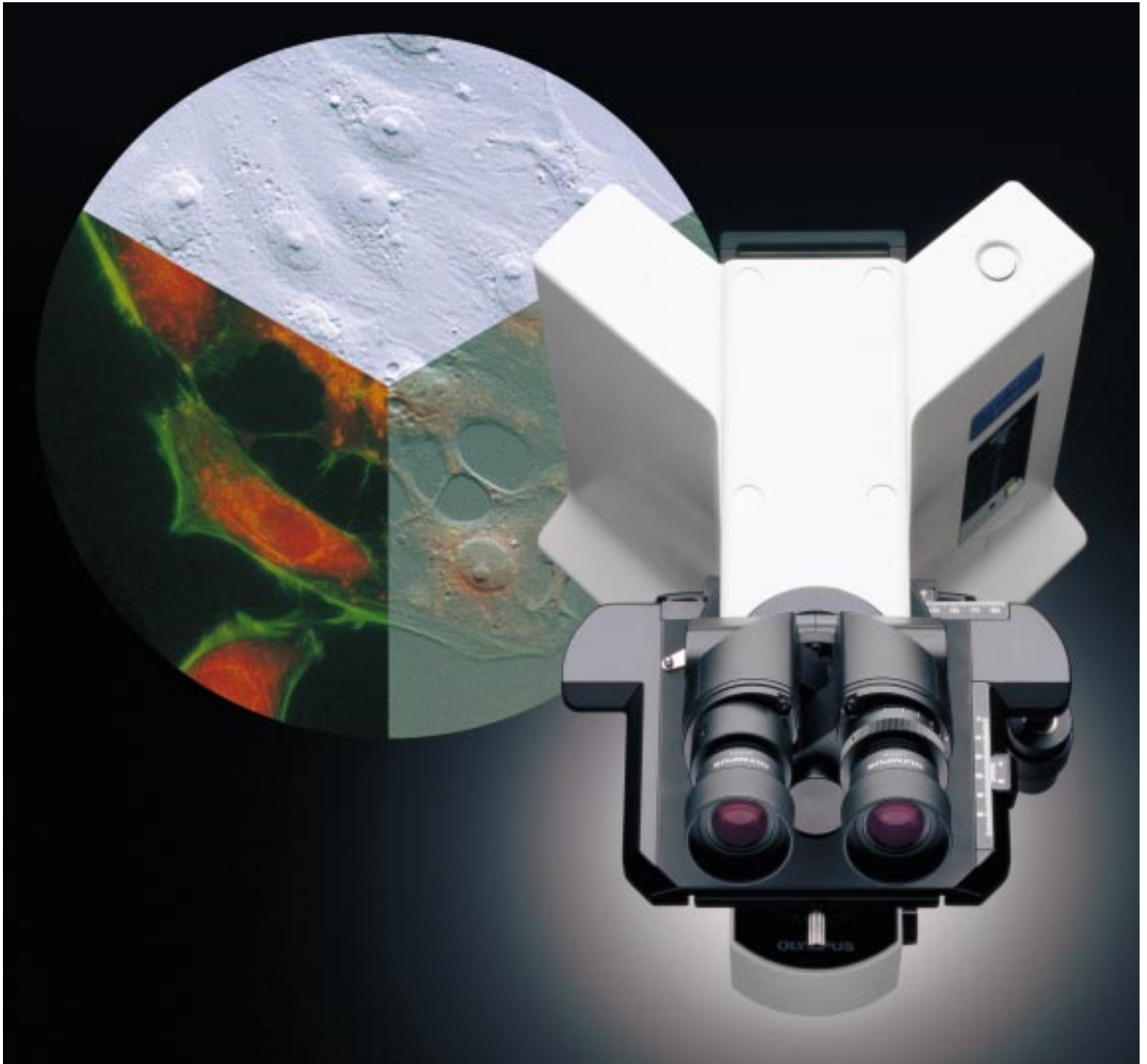
SYSTEM MICROSCOPE


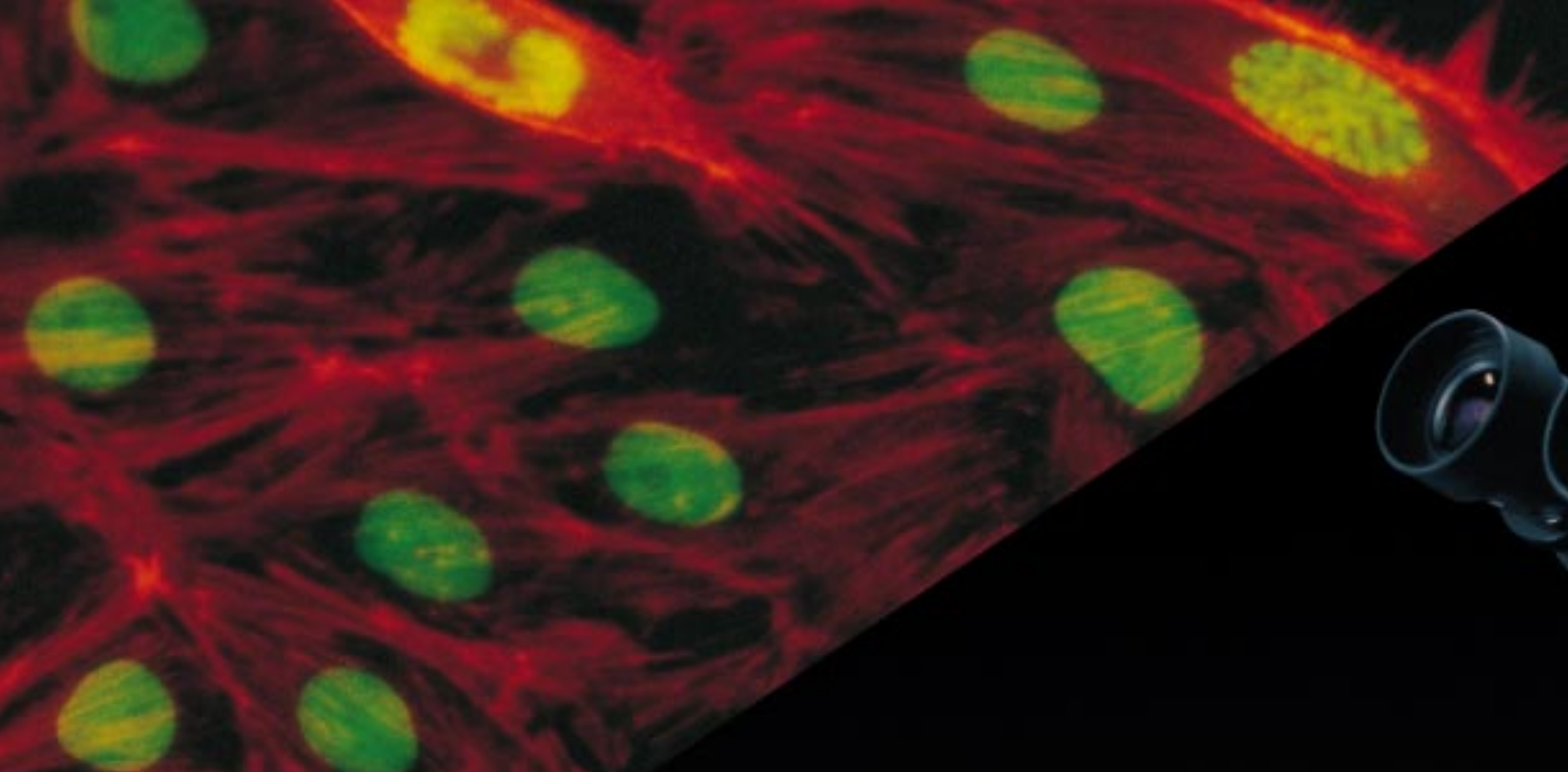
# BX51

BX2 SERIES

*The new standard in research microscopy*

*UIS*  
UNIVERSAL  
INFINITY SYSTEM





# ***BX51 universal research microscopy***

*The perfect union of Olympus UIS optics and  
advanced fluorescence technology*

- *Superb optical performance*
- *Outstanding fluorescence capability*
- *Contrast and resolution optimized  
Nomarski DIC*
- *Structural rigidity and compact Y-shape*
- *Research imaging platform*
- *Logical layout and ergonomic design*
- *Great system versatility with a wide range  
of accessories*

*\*Note:  
UIS optics: The original Olympus infinity-corrected optical system.  
This system expresses the superb Olympus optical technology,  
provides high resolution, high contrast images and the flexibility to  
meet current and future applications.*





Overlay image of the microscope frame and the dicast

## Sophisticated fluorescence detection, observation and imaging

### Two new illuminators for more efficient illumination

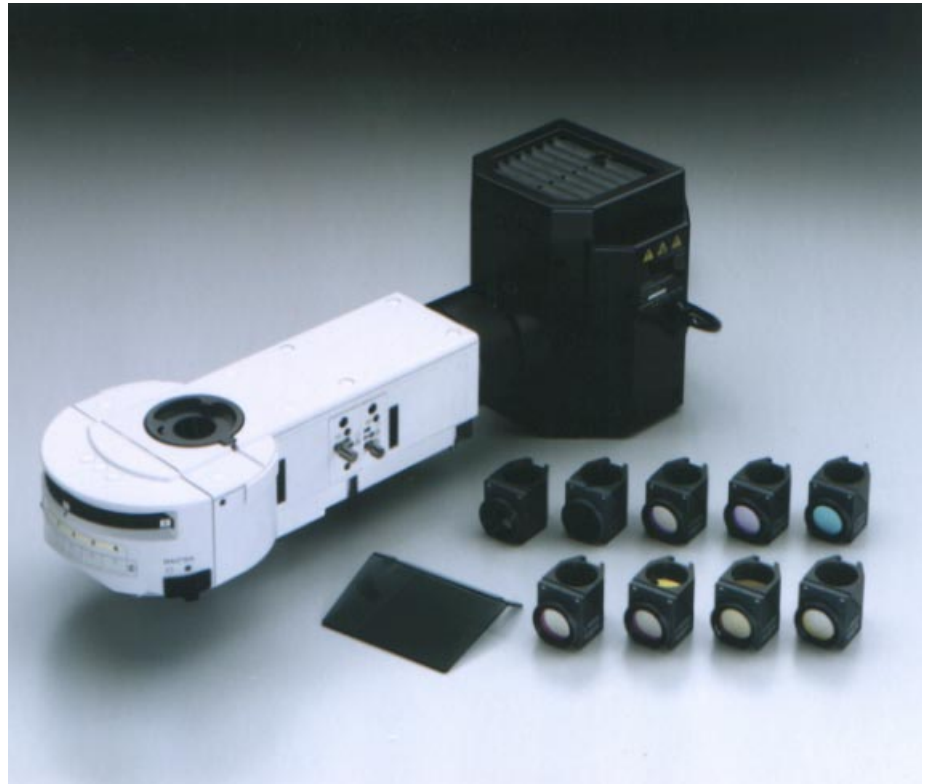
With greater efficiency and significantly brighter images, two new fluorescence illuminators support every aspect of your imaging needs. The illuminators, for routine and for advanced applications, benefit from illumination optics that efficiently capture all available light from the Mercury or Xenon arc lamps. Fully integrated into the microscope arm, the illuminators add to the stability of the imaging platform.

### Chromatically corrected illumination from UV to IR

A new aspheric collector lens improves the light collection ability and stretches the achromatic performance of the illumination optics to include the wavelength range from UV to IR (infrared). This meets the need for even and efficient illumination throughout this extended spectrum; from fura-2 to Cy7 the improved efficiency leads to greater detection sensitivity, brighter images and shorter exposures for imaging.

### Fast access to 6 filter cubes

Fast access to more filter cubes takes the ever increasing need for highly tailored single and multi band imaging of new fluorochromes and fluorescent proteins into account. The 6-cube filter turret can be swapped easily for even greater filter selection. When requirements change, filter cube replacement takes only seconds. Large, luminous labels identify the filter cube in use, even in a darkened environment.



BX-RFA BX fluorescence illuminator and filter cubes



### Impressive objectives for fluorescence microscopy

Olympus objectives are renowned for producing images of great brightness, clarity, high contrast and high resolution. To meet the special needs of fluorescence microscopy, of live cell observation or to address emerging needs, Olympus has designed objectives with specialized performance characteristics.

Included in these objective sets are high numerical aperture (N.A.) oil and water immersion objectives, for best fluorescence performance, absence of spherical aberration and the best resolution possible. There are special objectives for applications with UV confocal laser scanning microscopes, whose apochromatic correction spans from ultraviolet to infrared. And there are special objectives for enhanced performance with 2-photon microscopy and those with a super symmetrical point spread function, supporting deconvolution techniques.



### UPLAPO Series

Universal objectives, perfect for general fluorescence observation, also in combination with differential interference contrast.

### UAPO W Series

High numerical aperture, water-immersion objectives which prevent the occurrence of spherical aberrations. As a result, they procure high resolution, high contrast and aberration-free images of the interior of cultured cells, fixed specimens in aqueous media or other specimens with a refractive index similar to that of water.

### UAPO/340 Series

This objective series has enhanced transmission for UV excitation at 340nm, making them particularly effective for use with fluorescent probes such as fura-2, indo-1, and others for Calcium Ratio Imaging or intra cellular pH measurement. With their high transmission and numerical aperture, these objectives provide the maximum performance in fluorescence microscopy.

### UPLAPO60×W/IR

This water immersion objective is corrected for apochromatic performance, including the wavelengths from 450 -1100nm, making the objective suitable for 2-photon microscopy and for simultaneous observation of IR-DIC with images in the visible and near UV range, without focus errors between these extreme wavelengths.

### APO100× N.A. 1.65

Enabling illumination of specimens with a N.A. higher than the refractive index of living cells, this objective makes the observation of cells at the molecular level possible.

### Multi band fluorescence excitation with a stationary beamsplitter

The auxiliary filter slots in the excitation and emission positions accept six-position filter sliders. Now the utility of multi-band filter sets can be fully utilized, even with manually operated components. As an example such a slider can be equipped with three single, two dual and one triple band exciter, providing all excitation modes typically wanted with just one filter set. The emission position can be treated similarly. Such a filter slider set (excitation and emission) can be conveniently linked and operated simultaneously for further optimization.

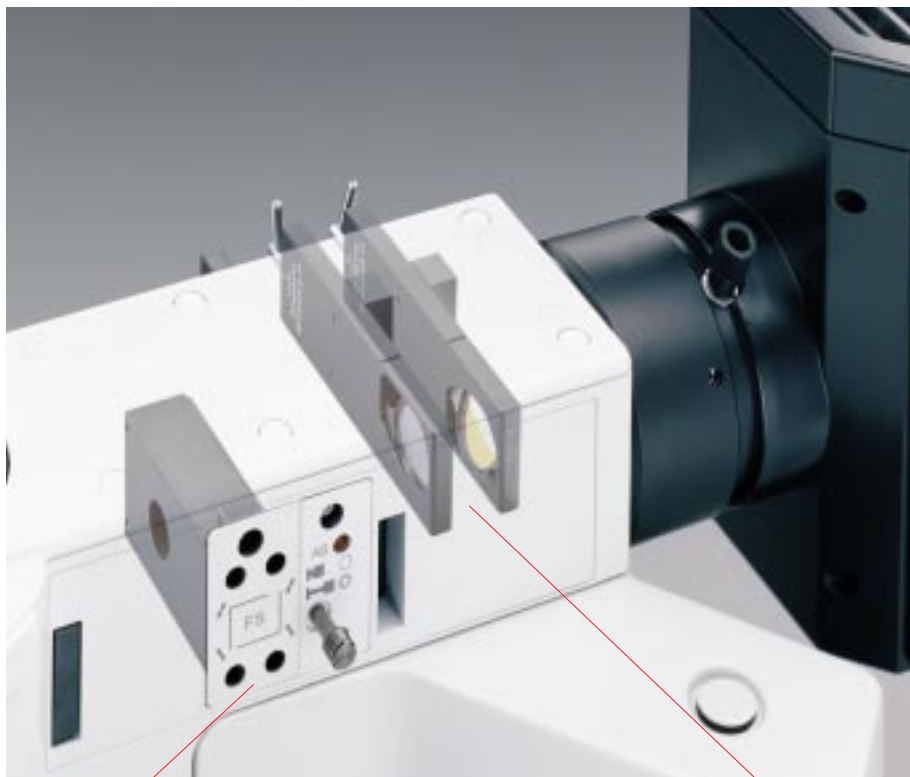


# Addressing imaging challenges and broadening system versatility

## Accessible field and aperture planes

The fluorescence illuminator BX-RFA, with its interchangeable / removable field and aperture stops, opens the microscope to an entirely new range of imaging options.

A rectangular field diaphragm can be substituted for the conventional circular diaphragm, a light source or flash for decaging can be introduced or imaging accessories, yet to be invented, can be easily placed into the appropriate optical planes.

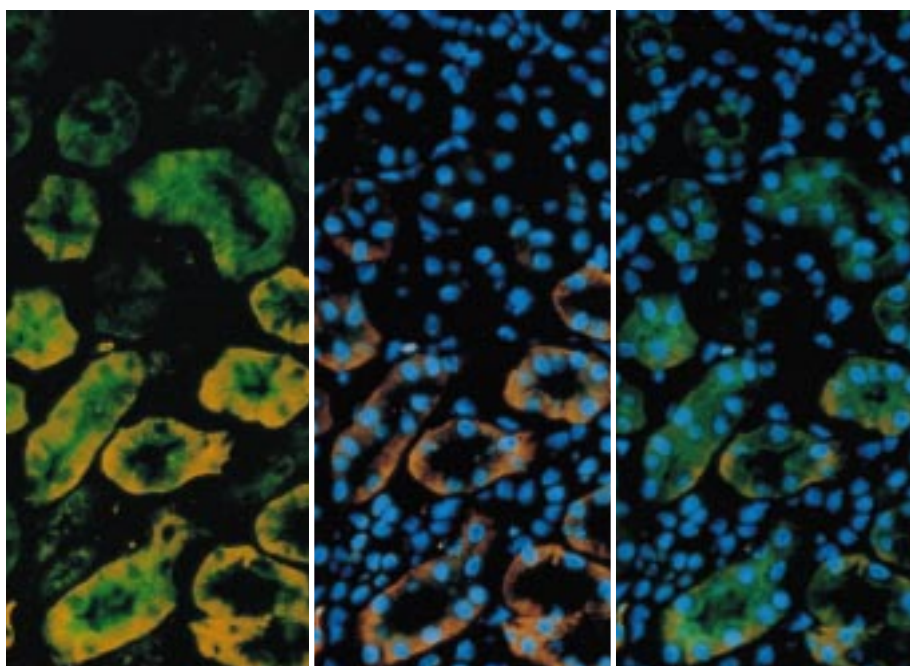


BX-RFSS rectangular field stop

Excitation balancers

## Fluorescence excitation balancers

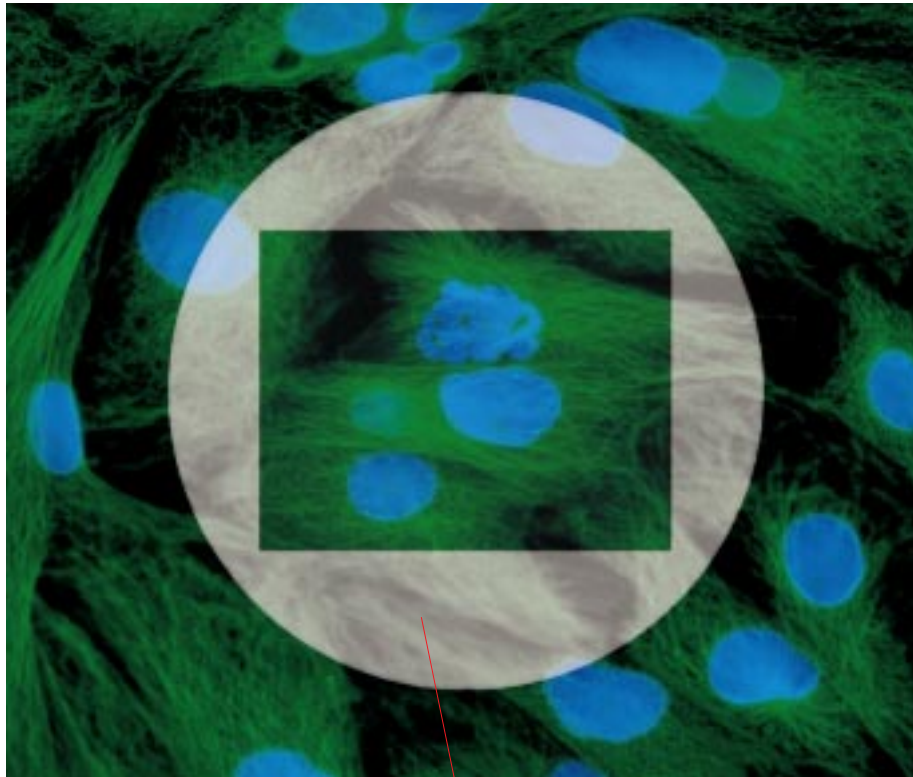
Excitation balancers are an exclusive Olympus accessory, available for most common dual or multi-label specimen. Used singly or in tandem, they curtail the individual excitation bandwidths of the fluorochromes under observation. This purposefully restricted excitation equalizes the emission intensities. Better differentiation of the multi-labels and better visibility of detail is achieved. This simple and visually controlled adjustment leads to perfect photomicrographs and digital images benefit from less severe post processing.



Triple labeled specimen with FITC and Cy3 enhanced

Triple labeled specimen with DAPI and Cy3 enhanced

Triple labeled specimen with balanced fluorescence representation



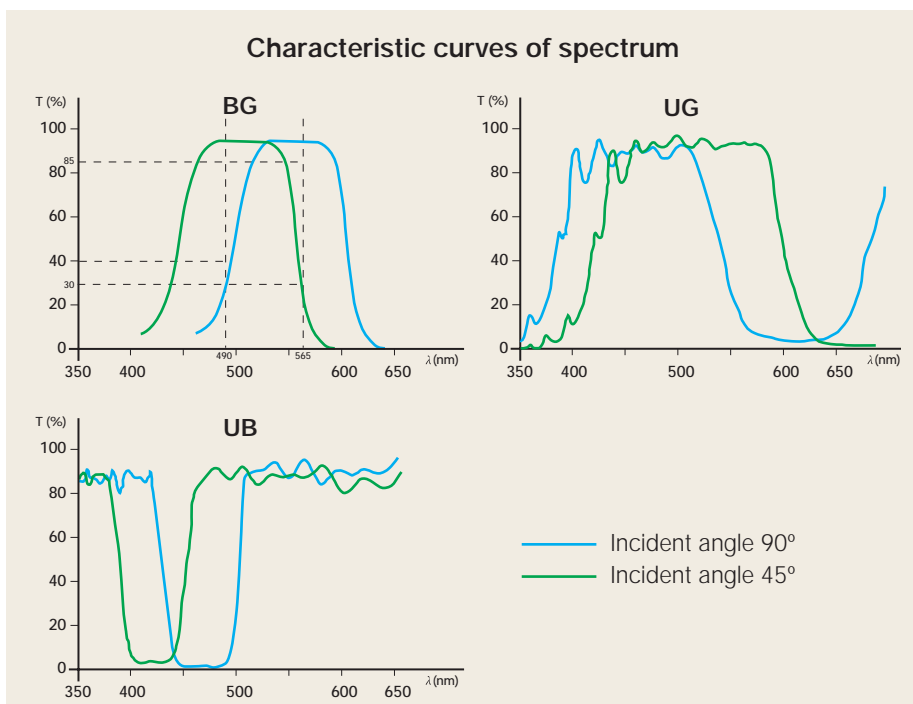
Unnecessary exposure area caused by a round field stop

## Comparing the circular and rectangular field stop options

Traditionally field stops have been designed with visual observation in mind. They deliberately restrict the area of illumination and thereby increase image contrast. With the prevalence of digital imaging and rectangular imaging sensors, rectangular field stops are the next logical step toward maximizing Koehler illumination and S/N (signal to noise) ratio for those devices. As an additional benefit a larger specimen area is protected from fluorescence excitation and potential photo bleaching. When using programmable scanning stages the image rectangle can be adjusted to coincide with the stage step size.



BX-RFSS rectangular field stop



Excitation balancers are available for adjustment of the following fluorescence excitation pairs:

#### Excitation balancer BG (U-EXBABG)

blue / green, adjusting green and red emissions

#### Excitation balancer UB (U-EXBAUB)

UV / blue, adjusting blue and green emissions

#### Excitation balancer UG (U-EXBAUG)

UV / green, adjusting blue and red emissions



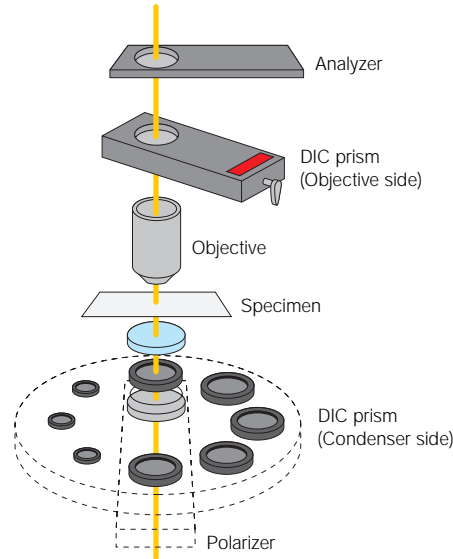
# DIC without compromises — higher resolution, higher contrast

## Optimal prism combinations for all specimen and magnifications

The nature of the specimen, such as its refractive index, thickness and surrounding medium, greatly influences formation of images in Differential Interference Contrast. Achieving the best visibility, the balance between high contrast or high resolution, calls for specimen and magnification dependent DIC-prism shearing distances and prism selection.

The Olympus Nomarski DIC system includes the prism combinations to choose for each imaging task. The general-purpose prism sets are supplemented with special purpose sets, addressing the demands for the highest resolution or highest contrast under specific magnification and specimen conditions.

For ease of use, prism markings follow the ISO objective color coding principle. Prism adjustment is carried out away from the objective, on the DIC slider that is housed in its nosepiece slot.



## Universal condenser with 8 turret positions

The universal condenser simultaneously accepts up to 6 DIC prisms and 2 other optical components at maximum. The condenser numerical aperture of 0.9 or 1.4 (oil) can be selected through interchangeable top elements.



U-UCD8

	For high contrast	For high resolution	General	
Specimen	Thin (NG108)	Thick (Diatom)	— (PtK <sub>2</sub> )	
Objective	High magnification <sup>*1</sup>	Low to High magnification	Low to High magnification	
DIC slider (Objective side)	U-DICTHC	U-DICTHR	U-DICT	U-DICTS <sup>*2</sup>

<sup>\*1</sup> For low magnifications of thin specimen the U-DICT prisms are recommended. <sup>\*2</sup> Height adjustable, compatible with objectives having different pupil positions



## **Brightfield:** **Greater resolution and flatness for all magnifications**

Images of high resolution and flatness, from low to high magnifications are produced with the PLAPO objectives. Their widefield capability, combined with an Achromatic/Aplanatic condenser (U-AAC), specially designed for brightfield observation, results in a 26.5 field of view number. With the U-SC3 swing out condenser, it is possible to get optimal illumination from 1.25x\* to 100x without changing the condenser. For optimum results at the low magnification side a special condenser (U-ULC) serves overview magnifications with the PLAPO objectives 1.25x and 2x.

\*When photographing with the 1.25x objective, please use the ultra low condenser U-ULC2.

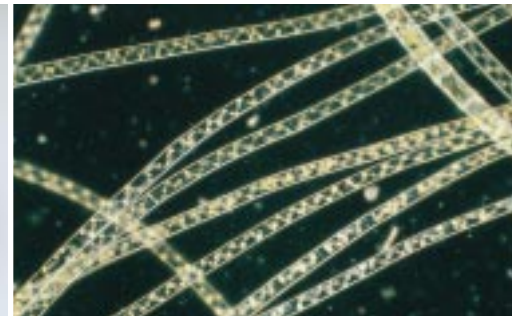


## **Darkfield:** **Outstanding contrast from low to high magnifications**

Two darkfield condensers are provided: Dry darkfield condenser U-DCD, for magnifications from 10x to 40x (up to N.A. 0.65).

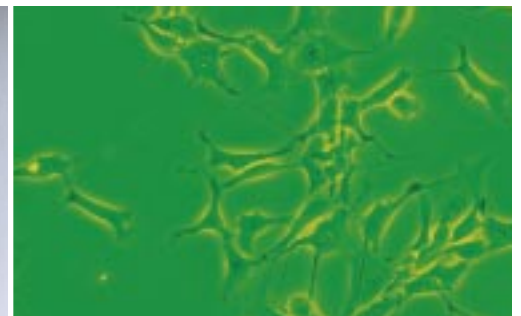
Oil immersion darkfield condenser U-DCW, for magnifications from 10x to 100x (up to N.A.1.02)

The Universal Condenser U-UCD8 and the phase-contrast condenser U-PCD2 produce darkfield with objectives up to N.A 0.7.



## **Phase-contrast:** **Superior resolution and contrast**

High contrast phase imaging allows close observation of the cell interior and of live bacteria. The BX51 uses the UPLAPO PH series of objectives, which produce very high resolution transmitted light phase-contrast with the phase-contrast condenser U-PCD2. Standard brightfield and dry darkfield observations and simultaneous observation of incident light fluorescence are possible.



## **Polarized light:** **Qualitative and quantitative polarized light microscopy**

The range of specialized POL-accessories equips the BX51 as a full range polarized light research microscope. Important components include the centerable precision rotating stage, the centerable POL-nosepiece with compensator slot and a complete selection of compensators, covering a wide retardation range. The special POL-condenser and the universal pol objective series UPLFL P, together with conveniently attachable modules for orthoscopic and conoscopic observation complete the instrument.



# Design priorities include advanced ergonomics for operational efficiency and convenience

## Comfortable working position

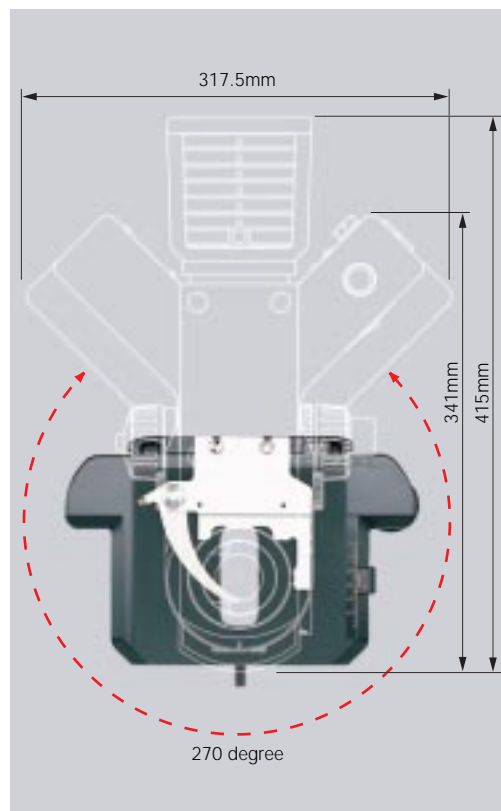
Employing the U-ETBI ergonomic binocular observation tube ensures that every user can work with the most comfortable eyepoint and observation posture, even when using an additional intermediate component. The inclinable and telescoping observation tube increases the distance between the microscope and the user and can be adjusted within a range of 45mm. This, together with the inclination option, provides ample flexibility to accommodate the natural differences in stature and posture between users.

## Compact Y-shape utilizes space efficiently

With more room to the left and right of the microscope observation tube, the Y-shaped frame is now more compact than ever. The depth of the microscope has been shortened and the new design of the lamp housing minimizes protrusions. As a result the BX51 frame allows more effective use of space. Peripheral equipment, accessories or various control units can be placed right beside the microscope, in easy reach of the operator. Especially research setups requiring connection to PC's and electronic image recording equipment benefit from the space efficient layout.

## Convenient operation

Stage controls and focusing knobs are ideally positioned for easy manipulation with minimal movement and without raising the forearms from the work surface. The fine focusing knob can be moved to either side of the microscope and its slim design and smooth tactile surface enables it to be operated even with a single finger. The high focus sensitivity makes fine focusing accurate, especially for high magnifications. Ergonomic stage control knobs have a large diameter for enhanced feel and precision positioning.

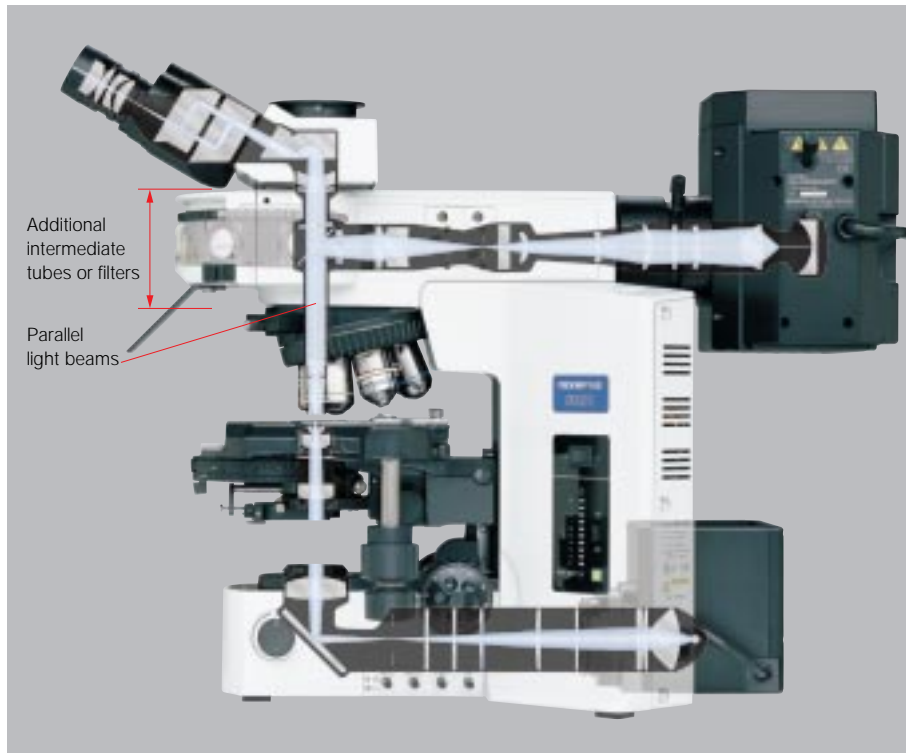


U-SVLB-4 mechanical stage with left-hand control & tactile covers



U-SVRB-4 mechanical stage with right-hand control & tactile covers

## Whatever the application, world-class optical performance and structural rigidity are vital



### UIS optics: The first choice for all applications

The UIS optical system maintains the same intermediate image plane even when prisms, sliders or other optical accessories are interposed in the light path between the objective and tube lens, so that total magnification remains the same. Within the UIS system objectives are fully corrected and imaging devices receive a fully corrected image under all adaptation conditions. This combination of flexibility and high performance makes the UIS optical system ideal for both present and future research needs.

### Easy changeover between observation methods

Switching between observation methods is much easier with the wide range of equipment selections available for the BX51 microscope.

Important examples are:

- The septuple revolving nosepiece for faster access to a greater objective selection,
- The 8-position universal condenser, holding as many DIC prisms or phase annuli,
- The incident light fluorescence illuminator with its 6 filter cube capacity for fast change of excitation modes,
- The unique 6-position tandem filter slider for the most economical application of multi-wavelength excitation

Fully prepared for the growing research requirements in fluorescence microscopy and in digital imaging, the BX51's combination of versatility and stability makes it the natural first choice for users with a diverse range of advanced research microscopy needs.

### Structural reinforcement for superior rigidity and stability

The BX51 frame is reinforced for the greatest rigidity and stability, a key requirement for meeting the entire range of research microscopy challenges and applications. Designing the microscope arm as a monolithic component, an Olympus innovation, enhances its structural integrity. The fluorescence illumination axis remains entirely stable, a prerequisite for the most demanding multi-label applications where sub-pixel registration is essential.



# Imaging and documentation: Fast, easy and universal

## Limitless options

As a research microscope the BX51 is open to the adaptation of the entire spectrum of imaging devices from confocal microscopes to digital cameras of every make and specialization, to spectral imaging devices, PMT's, APD's and devices yet to be invented. The variety of readily available adapters is extensive, custom adaptation options are limitless.

### Microscope digital camera system

#### DP50

The DP50 digital camera employs a 1/2 inch, 1.5 million pixel CCD to obtain superbly detailed images, recorded at a 5.8 million pixel equivalent, whose quality rivals that of conventional 35mm film photography. A built-in Peltier device cools the CCD sensor, reducing noise and ensuring excellent color reproduction even of fluorescence specimens. Framing and focusing functions are performed expediently through the microscopy user interface.



DP50



### Automatic photomicrographic system

#### PM30

A "super FL auto exposure mode" and a conventional auto exposure mode are available to the user, providing superior fluorescence photomicrography at the release of the shutter. Tedious exposure calculations and compensations are performed automatically. In combination with selectable spot and averaging metering options (0.1% micro-spot, 1% spot and 30% average), photomicrographs are guaranteed to be perfect every time.

PM30

### Trinocular intermediate attachment

#### U-TRU

This intermediate trinocular attachment can be used simultaneously with the inclinable binocular observation tube (U-TBI3). Two light paths are selectable: 100% light for binocular observation or 20% for binocular observation and 80% for imaging through the trinocular port.



### Dual port

#### U-DP

The dual port may be used for a variety of purposes: separating the image by spectral composition (e.g. directing fluorescence to one port, infrared to the other), as an illumination port for adding a new incident light source or as a C-mount compatible trinocular port for image output. A 1x image formation lens is also provided.



# A range of attachments for easy multi-observation

## Multi observation bodies

Universal components can be linked into multi observation / discussion stations, accommodating from 2 to 10 observers. An arrow pointer with LED aids communication, the visual field to each observer is identical.



U-MDOB3 for five persons



U-SDO3 for two persons

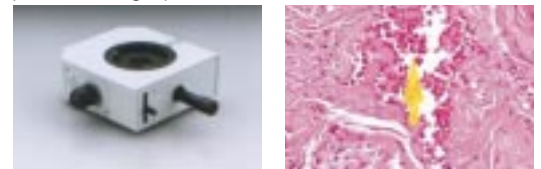


U-MDO10B3 for ten persons

## Arrow pointer

### U-APT

Enables insertion of a red or green LED arrow for display on a monitor or for reproduction with a photomicrograph.



U-APT + Video camera

## Accessories

### Centerable sextuple revolving nosepiece

#### U-P6RE

Sextuple centerable revolving nosepiece, allowing centration of 3 objectives.



### 2x magnification changer

#### U-ECA

Magnification is doubled by engaging the auxiliary 2x lens. Acting on both the visual and the camera ports, this is the most convenient way to increase magnification for observation or imaging.



### Drawing attachment

#### U-DA

The drawing attachment projects an image of the pencil and drawing surface into the visual field. Tracing of microscopic structures is made easier and more accurate. A 10x magnification attachment is available.

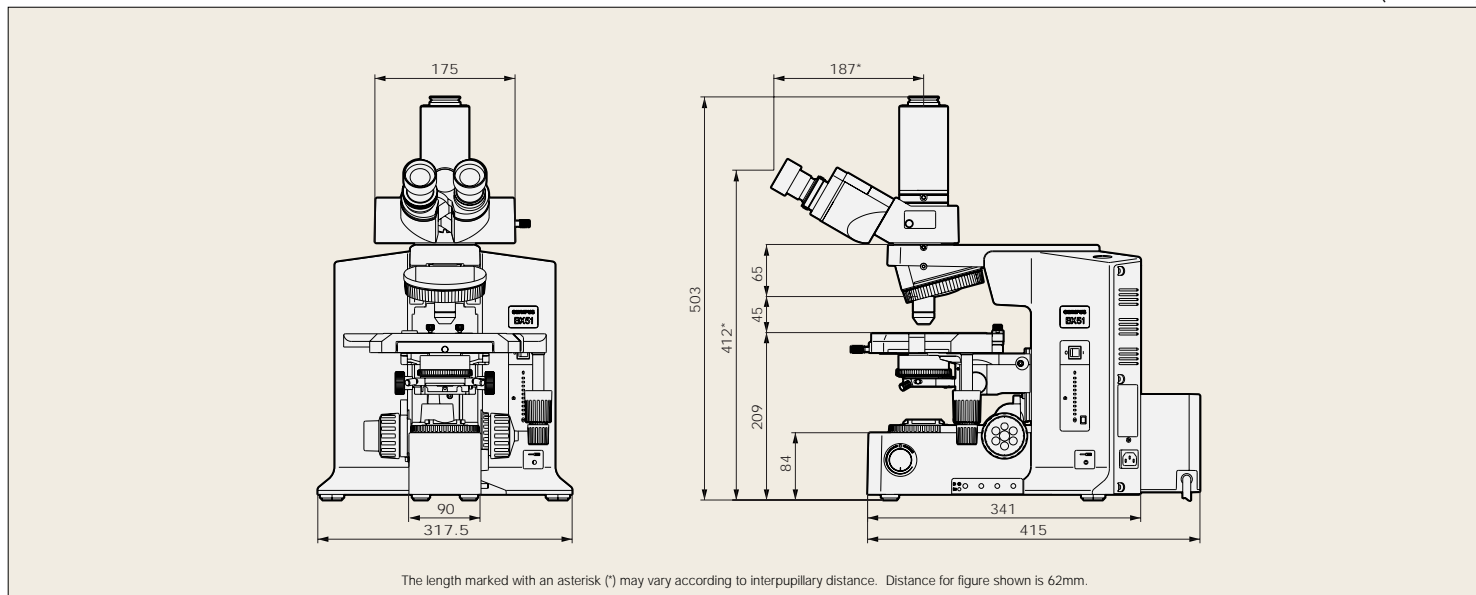


## BX51 specifications

Microscope frame	Optical system	UIS optical system
	Focus	Vertical stage movement: 25mm stage stroke with coarse adjustment limit stopper Torque adjustment for coarse adjustment knobs Stage mounting position variable High sensitivity fine focusing knob (minimum adjustment gradations: 1µm)
	Illuminator	Built-in Koehler illumination for transmitted light 12V100W halogen bulb (pre-centered) Light preset switch Light intensity LED indicator Built-in filters (LBD-IF, ND6, ND25 optional)
Revolving nosepiece	Interchangeable reversed quintuple/sextuple/septuple nosepiece	
Observation tube	Widefield (F.N. 22)	<ul style="list-style-type: none"> <li>•Widefield binocular, inclined 30°</li> <li>•Widefield tilting binocular, inclined 5°-35°</li> <li>•Widefield trinocular, inclined 30°</li> <li>•Widefield ergo binocular, inclined 0°-25°</li> </ul>
	Super widefield (F.N. 26.5)	Super widefield trinocular, inclined 24°
Stage	Ceramic-coated coaxial stage with left or right hand low drive control: with rotating mechanism and torque adjustment mechanism, optional rubber grips available (Non stick grooved coaxial, plain, rotatable stages are also available)	
Condenser	<ul style="list-style-type: none"> <li>•Abbe (N.A. 1.1), for 4x—100x</li> <li>•Swing out Achromatic (N.A. 0.9), for 1.25x—100x (swing-out: 1.25x—4x)</li> <li>•Achromatic Aplanatic (N.A. 1.4), for 10x—100x</li> <li>•Universal (N.A. 1.4/0.9), for 2x—100x (swing-out: 2x—4x, with oil top lens: 20x—100x)</li> </ul>	

## BX51 dimensions

(unit: mm)



Web site addresses: <http://www.olympus.com>




**ISO 9001**  
Certification  
Certificate No. 40826  
Design and production adheres to ISO9001 international quality standard



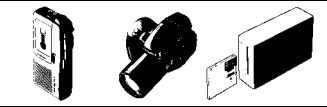
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Certification  
Certificate No. 961049  
Design and production at the Olympus Optical Co., Ltd. Ina Plant conforms with ISO14001 specifications for environmental management systems.

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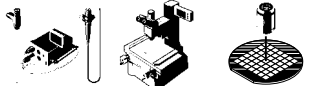
### Olympus business areas



Medical and health-care area



Imaging and information area



Industrial applications area

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