OLYMPUS

Your Vision, Our Future

Stereomicroscopes

SZX2

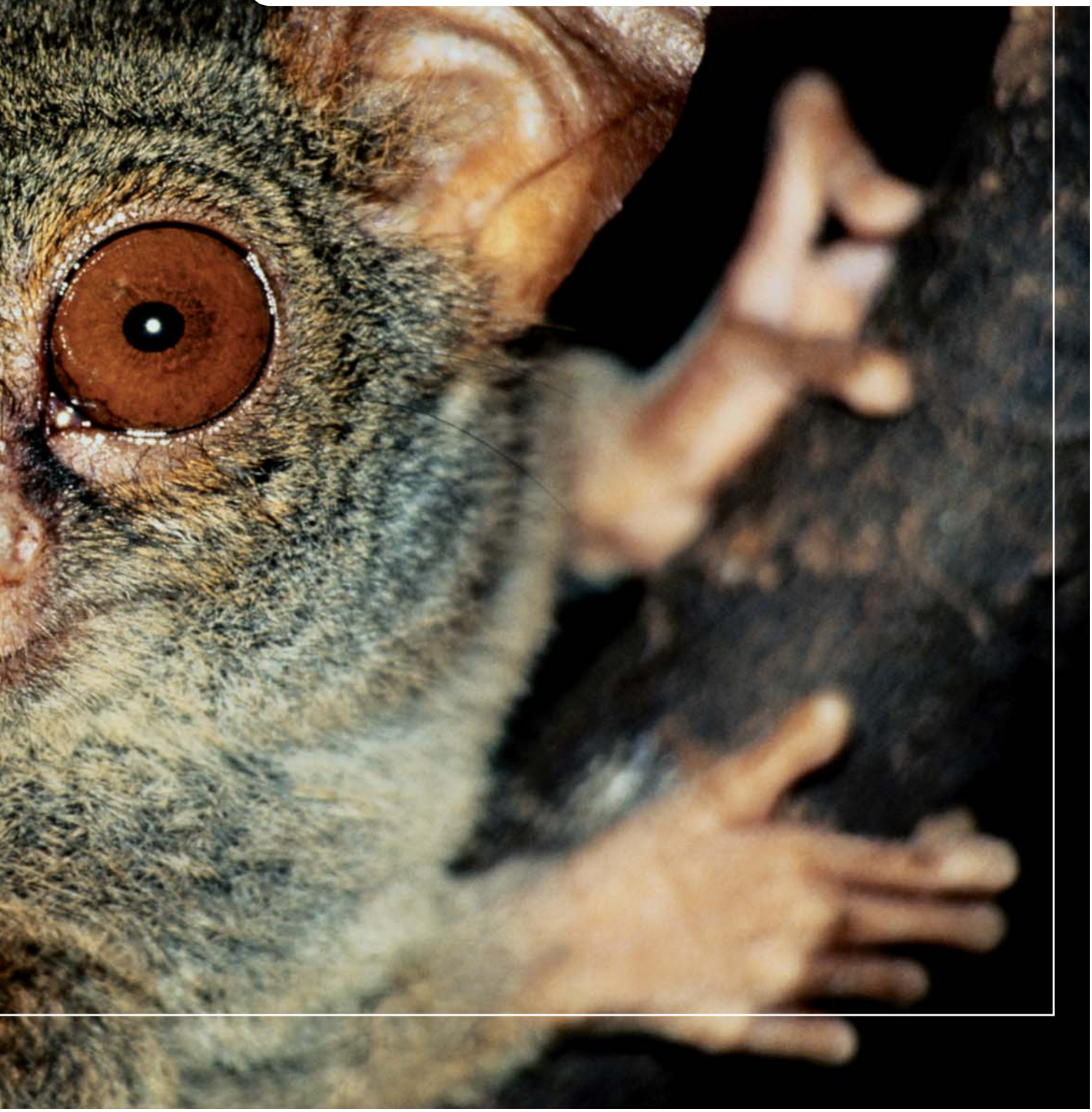
SZX10/SZX16 for Life Science

Advanced Functionality as Standard

SEEING THE WHOLE PICTURE

A work of art

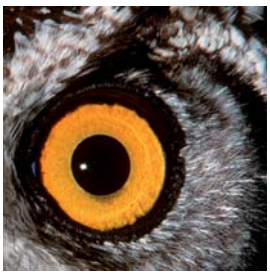
With life being such a complex blend of known and unknown interactions, it is important to take a step back and look at the bigger picture. Doing this properly requires the correct tools. In microscopy, advanced techniques have been developed for high-magnification instruments, giving clear views of ultra-fine details. With Olympus, the same techniques are now available in the less magnified realm of stereomicroscopy – excellent optics, peerless illumination and improved ergonomics. The new SZX2 range of stereomicroscopes combines enhanced flexibility with significant advances to enable an extended range of techniques, from screening and manipulation to routine stereomicroscopy and imaging. Moreover, with superior fluorescence detection capabilities, the Olympus SZX2 range will take you to the next level of stereomicroscopy.



THE FUTURE IS HERE TODAY

Whatever you want: the SZX2 range

Whether you are doing an everyday task or something that has never been done before, you can be confident that an Olympus microscope is perfect for you. With a strong heritage and many groundbreaking advances, Olympus knows how to get the most out of your samples – the SZX2 proves this principle.



Your vision: our future

Olympus is dedicated to making state-of-the-art microscopes and accessories to support your work at all levels. We have therefore worked closely with customers to produce the ultimate in stereomicroscopy – the SZX2 range. As a result, our goal is your success, both now and in the future.

Title image courtesy of Rijken Brain Science Institute, Laboratory for Developmental Gene Regulation, Wako, Japan

ONE GIANT LEAP

Stereo solution

Whatever your needs, you can be sure that you will always see more with an Olympus microscope. Superior optics and ergonomic designs are included as standard across the range. So whether you specify an advanced routine stereomicroscope with transmitted illumination or a flexible research stereomicroscope with full fluorescence capabilities, you are in good hands. To get the most out of your specimens and experiments, create the perfect system with your SZX2. From basic acquisition packages to high-end image and analysis systems, we have the solution to fit your needs.

A SZX16
Research stereomicroscope

SZX16 – UNLIMITED POTENTIAL

As the range of microscopy techniques increases, Olympus has made major advances across its extensive product groups to enable all users to benefit easily from every protocol. This is especially true for stereomicroscopy, where Olympus has left no stone unturned in designing the new Olympus SZX16: a completely new microscope for modern research.

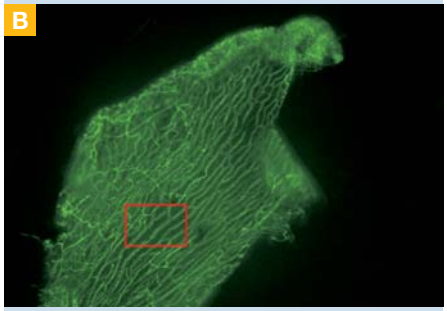
A New resolution

A The primary aim of any microscope user is to see details on their sample that aren't visible to the naked eye. The SZX16 is designed to do this better than any other stereomicroscope available, for both brightfield and fluorescent techniques. Its larger lenses enable significantly increased numerical apertures (NAs) which greatly increase the collection of light signals from the sample. As a result, with the Olympus SZX16, it is possible to resolve up to a world-leading 900 linepairs per millimetre which means that you can see more detail in your sample than previously possible. But this is only part of the story – the advanced zoom mechanism developed by Olympus means that the resolution at any point on the magnification scale is greater than ever before.

Documentation

Images are documented from stereomicroscopes using a single lightpath. This results in sub-optimal images on the camera chip due to the 'tilted' nature of the lightpaths in stereomicroscopes. With the SZX16 though, a small movement of the objective sends an 'untilted' perpendicular image to the camera. This enables the documentation of a perfect version of the image seen through the eyepieces, with the same resolution. The addition of dedicated microscope cameras, such as the Olympus DP71, produces the ultimate stereomicroscope-based imaging system. Therefore, whether you are working on cytogenetics in the zebrafish *(Danio rerio)*, organogenesis in African clawed-toed frogs *(Xenopus laevis)* or embryogenesis in the fruit fly *(Drosophila melanogaster)*, you will be able to see more detail and record highly accurate images using the SZX16.

B

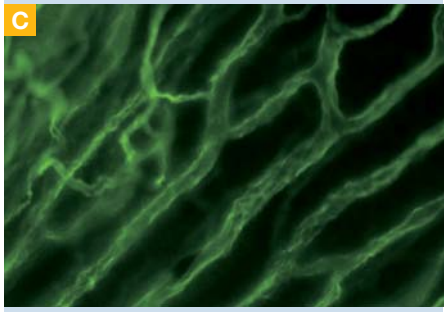


2xPFC objective, zoom 2.5x*

From all to small

B **C** Whilst the excellent optics of the SZX16 have improved the clarity of the images, they have also extended the zoom range, enabling much greater flexibility. With a world-leading 16.4:1 zoom ratio and the largest selection of parfocal objectives, the SZX16 can go from 3.5x to 230x without the need to interrupt the user's view of the sample – peerless. This accelerates the ability to find regions of interest and focus in on them. As well as this, the Olympus Comfort*View* eyepieces allow a stereo image to be formed and maintained across a larger range of eye movements, enabling comfortable long-term use.

C



2xPFC objective, zoom 11.5x

Subcutaneous blood vessels from eNOS-TAG-GFP transgenic mouse, in which GFP (green fluorescent protein) expression is driven by the promoter of eNOS (endothelial nitric oxyde synthease).*

Enhanced 3D

D Accurate sample manipulation is essential during procedures associated with embryo and stem cell work, e.g. micromanipulation and microinjection. The optical system of the SZX16 is designed to produce an enhanced 3D view which improves the depth of information gained from the sample. This enhanced 3D effect is also of use for microsurgery procedures. What is more, the specialised optics produce astigmatism-free views, which further improves the clarity of the images.

* Images courtesy of R. de Crom and R. van Haperen, Erasmus MC, Rotterdam, the Netherlands

The return of physiology

With fluorescence techniques now more accessible across a wider range of applications, stereomicroscopes are becoming powerful tools to visualise fluorescence at low magnifications. For example, visualising the distribution of fluorescent neuronal markers in *Caenorhabditis elegans* requires a view of the entire organism, with the ability to zoom in or out for specific localisation and identification.

Peerless view

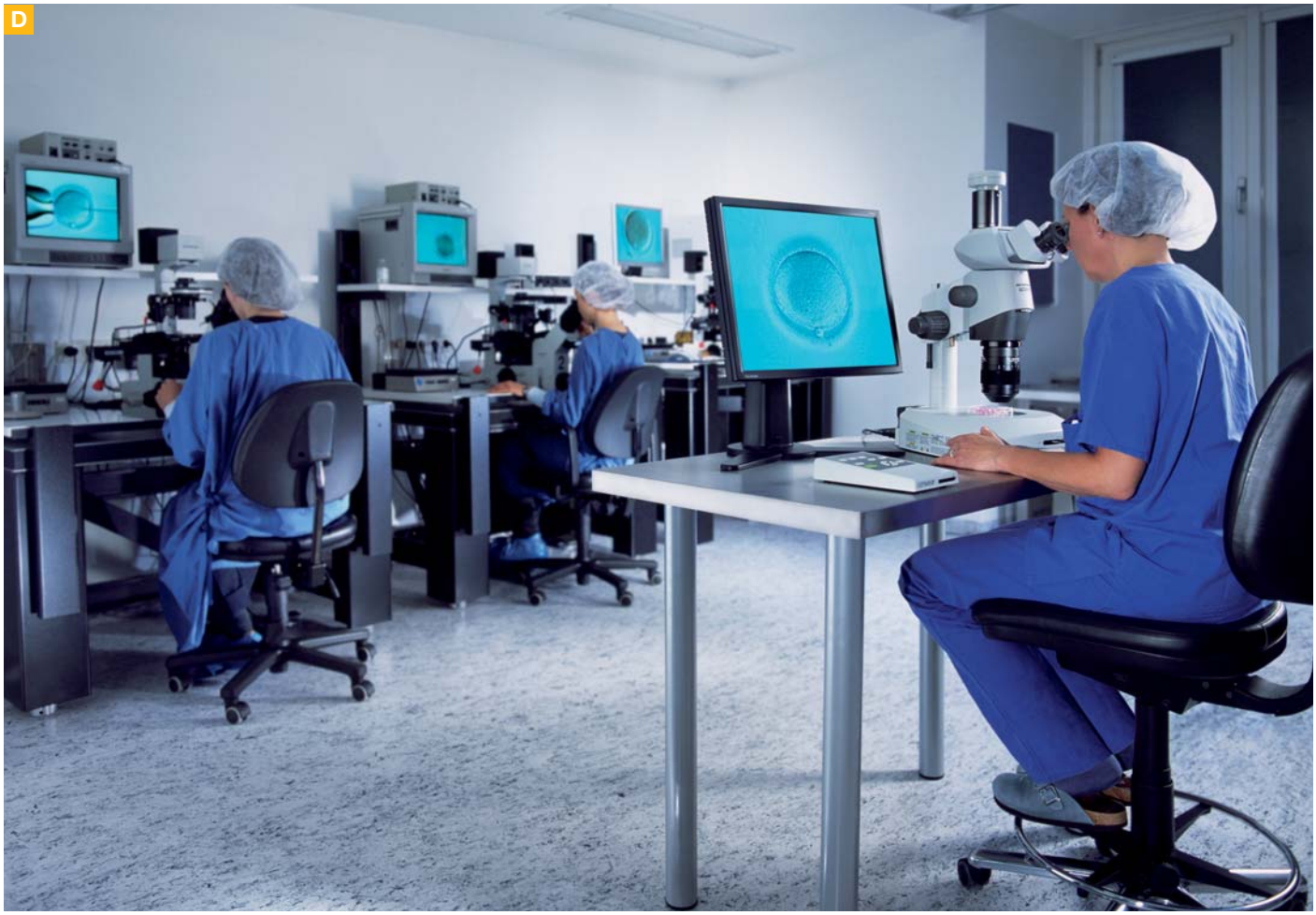
A new generation of objectives with world-leading NAs has been designed by Olympus which are perfect for fluorescence detection as well as standard light microscopy. They incorporate advanced features such as glass materials with low-autofluorescence and improved anti-reflection coatings, which enable long WDs and functional analyses unique to the SZX16. This has produced the ultimate stereo system for collecting even the faintest fluorescence, meaning that all signals can be detected easily from anywhere within the sample.

Very illuminating

E The SZX16 utilises a perpendicular fluorescence illumination pathway and, as a result, avoids the artefacts generated when using alternative illumination methods. Careful engineering guarantees fluorescence filters with outstanding signal separation and S/N ratios. The increased aperture of the fluorescence excitation lightpath and the high quality of all Olympus light sources means that they will combine to produce the perfect fluorescence system for the user and application. Easy adjustment for optimum signal visualisation is assured through the flexibility of the new five-position filter turret and the excitation balancers.

Image D courtesy of FCH Fertility Center Hamburg, Germany.

E **Excitation balancers**
For fluorescence applications



A SZX10
Advanced routine stereomicroscope

SZX10 – ANYTHING BUT ROUTINE

Certain tasks carried out on a day-to-day basis are far from routine and a basic stereomicroscope will not provide the flexibility required to complete the procedures properly. For such applications, Olympus has developed the SZX10 advanced routine stereomicroscope.

The SZX10 – naturally

A The SZX10 is designed to provide a completely natural view of the specimen with perfect stereo and colour representation. The distortion-free optics provide great flexibility and enable excellent NAs across the entire magnification range. As a result, the image produced through the ergonomic Comfort*View* eyepieces is clear, precise and highly detailed.

Distortion-free

For most samples, it is important that the object under observation is in focus and free of any distortion across the entire field of view. The SZX10 has a range of distortion-free plan apochromatic and fluorite objectives available which provide perfect images across the magnification range. Where advanced distortion correction is not required, achromatic objectives are also available, providing an excellent value stereomicroscope.

B

Medaka eggs, acquired with oblique illumination (ILLT stand)

Comfortable stereo

B By combining carefully designed controls, an ultra-slim LED illumination base and multiple binocular options including an ergonomic tilting trinocular with Comfort*View* eyepieces, the SZX10 enables you to work for hours on end without suffering from eye strain or fatigue. Therefore, you know that when it is time to work on your SZX2 you can concentrate solely on your research.

Modular versatility

C With the great variety of objectives available for the SZX10, a full range of requirements can be met with ease. As a result of these excellent optics and versatile stand options, the SZX10 can be fitted with a coaxial fluorescent illumination module, greatly enhancing functionality and allowing the exploration of new territories.

Document everything

D **E** Let others see what you can by creating an imaging system based on the SZX10. Olympus offers a broad range of digital cameras from digital SLRs to the super high-resolution DP71 camera to perfectly tailor your system to your applications in combination with the cell* imaging software solutions range. From basic acquisition to advanced real-time imaging solutions – we have the right choice for you.

C SZX10 stereo objectives
Excellent and versatile

D

Meeting your requirements

Routine tasks are often also regular ones and therefore can take up much of your time. With the SZX10, Olympus has made sure that the optical quality matches the advanced ergonomic design. Features such as the Comfort*View* eyepieces with their extended focusing zone combine with the increased depth of focus and high NAs to produce amazing clarity and flexibility. This ensures that the time you spend on the microscope is both comfortable and rewarding.

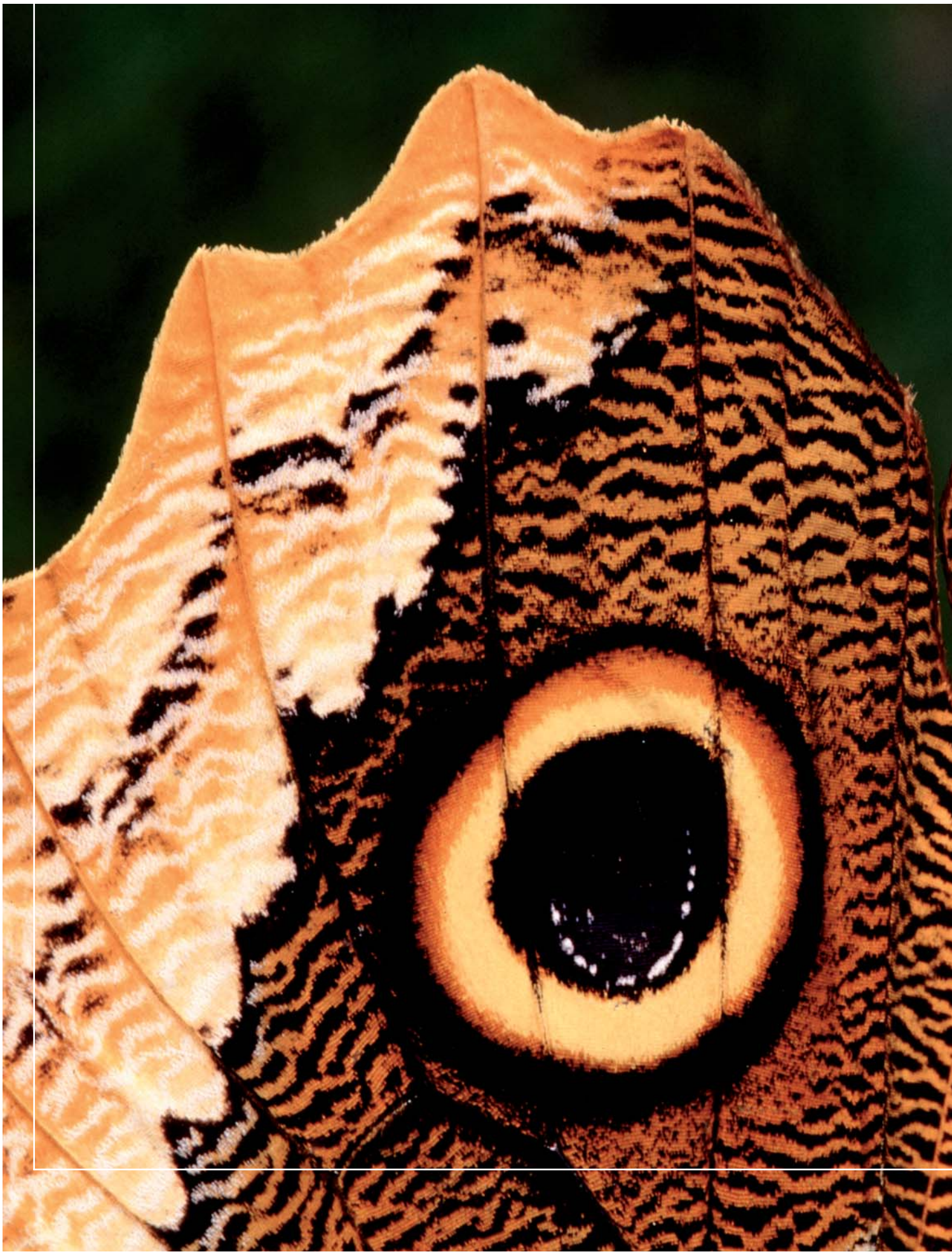
Excellent value

Most new technologies seriously dent budgets, but the SZX10 doesn't; there is no stereomicroscope available that offers better value or flexibility.

Image D courtesy of Garten der Schmetterlinge, Friedrichsruh, Germany.

E **DP71 camera**

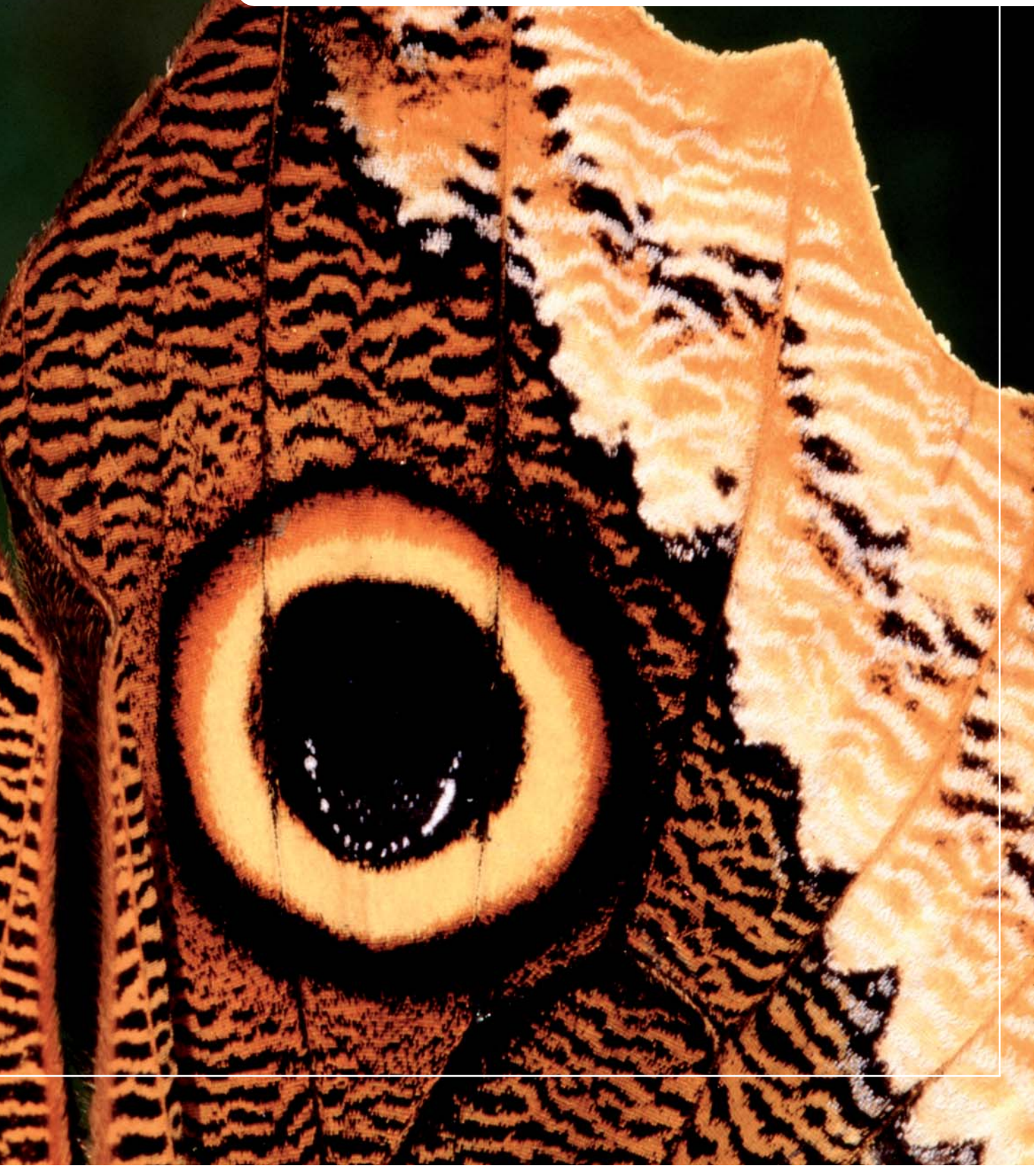
For live-imaging and documentation



PERFECTLY BALANCED

System efficiency

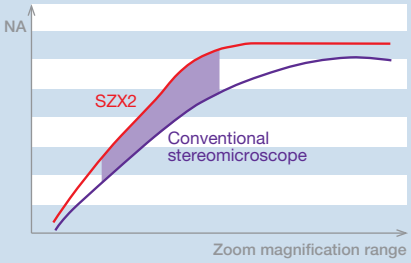
A system can only be totally efficient when all of the various factors important to its operation are in perfect balance. In microscopy, the system not only includes the microscope, but the sample, camera, imaging software and the user as well. The SZX2 stereomicroscope range, as with all Olympus microscopes, has achieved this balance with excellent levels of comfort and flexibility.



A **High-resolution objective**
SDF PLAPO 2XPFC

B **SZX16**
Zoom body

C **Highest NA at all magnifications**
Up to 22% more resolution



D **SZX16 stereo objectives**
Outstanding optical properties

RESOLVE MORE

Microscopes are designed to magnify images and increase resolution at the same time, so that you can see more the closer you go. Therefore, the better the resolution at each magnification, the better the detail you can retrieve from the image. The Olympus SZX2 stereomicroscopes feature a number of special components and advances to provide the best resolutions in their class across their entire magnification range. The SZX16 has the world's leading stereomicroscope resolution of 900 line pairs per millimetre – you will see more wherever you look with an SZX2.

The ultimate objective

A Olympus recently developed a new range of objectives with outstanding properties. The UIS2 range features a unique type of glass with very low autofluorescence and is also developed using Olympus's in-depth knowledge of microscope optics. This experience has also been applied to the new range of SZX2 objectives. Moreover, the new glass is completely lead-free and is therefore environmentally friendly.

Optimise your view

The 2.0x objective available for the SZX16 has the highest NA for any stereo objective at 0.3. This plan apochromat is perfect for working with tissues and cells in medium, since it is the first stereomicroscope objective to feature a correction ring. This enables fine adjustment of the lenses to correct for mismatches caused by the different refractive indices of the vessel and medium. This helps to reach the maximum resolution possible when using Petri dishes and other culture vessels. An additional feature is the tapered objective front, significantly facilitating micromanipulation under high magnification.

Zooming all the way

B **C** The SZX16 stereomicroscope has the largest zoom ratio of any stereo microscope – 16.4:1. Therefore, with the unique 2.0x objective in place, for example, the magnification range is 14x–230x. With such an extensive zoom ratio and large range of objectives, the best magnification range can be selected for any purpose.
More importantly, with an emphasis on resolution, Olympus has engineered the zoom optics to provide world-leading numerical apertures at all points along the magnification range. The explanatory graph shows that in the most frequently used region of the zoom range, this effect is even more prominent.

Remain focused

D Of the six objectives available for the SZX16, four are parfocal plan apochromats: 0.5x, 1.0x, 1.6x and 2.0x. The 0.3x fluorite and 0.8x plan apochromat feature extended working distances. With the parfocal objectives and two-position revolving nosepiece available for the SZX16, switching between objectives is very quick and easy, requiring little refocusing. Therefore, with the 0.5x and 2.0x objectives, the uninterrupted magnification range is 3.5x–230x. This represents an effective zoom ratio of 65.7:1!

Controlled

As well as being ergonomically positioned, the focus knob is easy to use whilst providing solid and precise focus control. Furthermore, with the zoom click stop engaged, it is possible to return to exactly the same magnification power again and again ...

E **SZX16**
Advanced fluorescence for research

LET THERE BE LIGHT

E With an explosion in the number of available fluorochromes in recent decades, fluorescence detection techniques now play a major role in the functional analysis of organisms since they can be applied on a whole organism, down to cellular level. This requires not only a wider field of view, but also the addition of different illumination technologies to ensure fluorochrome excitation. Olympus has also developed a range of general and advanced light sources to cover all requirements. These are available as modules for the SZX2 stereomicroscopes, again extending their functionality.

Computer-controlled

F The EXFO X-Cite 120 PC and Olympus MT10_D light sources provide the user with precisely controlled illumination. Using the X-Cite 120 PC is exceptionally easy: alignment of the bulb is unnecessary and shutter and light intensity modulation are automated. The 120 W metalhalide bulb produces a similar spectrum to standard mercury burners, but is guaranteed to last for 2,000 hours.

Ultra precise

G For more advanced research, the MT10_D system can switch extremely quickly between different excitation wavelengths and light intensities. By using Xe or Xe/Hg burners with advanced electronic control, the light sources are highly stable with minimal flickering, making fluorescence quantification easy.

Perfect system integration

Both light sources can be controlled via the convenient user interface of the Olympus cell* imaging software, which enables simple integration of all automated functions into fluorescence acquisition protocols. This simplifies workflows for all types of fluorescence experiments, enabling researchers to focus on generating and analysing data. The cell* software modules contain an array of powerful and flexible tools to enable the user to create the perfect imaging system for their requirements.

F **EXFO X-Cite 120 PC**
Pre-aligned illumination system

G **MT10_D**
Precise wavelength control

A

Exceptionally comfortable for the eyes

IN THE COMFORT ZONE

Being in one position for too long can lead to high levels of stress and fatigue. For stereomicroscopy, the eyes are often fixed in one position for long periods in an effort not to lose the image, leading to eye strain and increasing the likelihood of headaches. With the SZX2 range though, a plethora of ergonomic features have been included to allow a much more restful experience. This not only makes finding and retaining the stereo image easier, but reduces the chance of missing important features.

For your eyes only

A The innovative Comfort*View* eyepieces in combination with the well-selected stereo angle enable natural, comfortable vision, thus considerably reducing the time required for adjusting the microscope. Your eyes focus more quickly on the stereo image while your head and eyes enjoy more freedom of movement – without forfeiting the 3D effect.

Flexible

B The new tilting trinocular heads ensure complete user comfort. The broad adjustment angle (5 to 45°) allows almost every user to look straight into the eyepiece without tilting their head. This ensures the most comfortable working position, crucial when spending long hours on the microscope.

B **Tilting trinocular head**

And DP71 camera

Taking a stand

As well as producing a stable platform for the rest of the microscope, the stand is an important source of illumination in many procedures. Flexibility and ergonomy are key here, too, and Olympus has developed a range of stands to suit every purpose.

The all-rounder

C For an all-round, ultra-slim transmitted-light solution, the unique Olympus LED stand (SZX2-ILLT) houses an advanced LED array in its base containing 144 ultra-bright white LEDs. These provide bright and even illumination suitable for all specimens. More importantly, there is also a carousel enabling normal brightfield, enhanced contrast brightfield, darkfield and oblique illumination. At just 41 mm, the LED base is half the height of the normal bases and yet offers amazing flexibility, ergonomy and robustness for both experienced and first-time users.

C **ILLT LED-Base**

For various contrast methods

Unique functionality

D For transparent samples with little or no natural contrast features, unique contrast inserts have been designed to provide finely adjustable oblique illumination and enhanced brightfield. To achieve this, a special coating is used on the insert glass which causes the light to exit at an oblique angle. A knob on the front of the stand changes the angle of the oblique illumination insert, providing excellent control of the resulting contrast. Whatever the level of contrast generated by the LEDs and glass insert, it is completely even across the entire field of view.

D **ILLT filter wheel**

With different contrast inserts

Constant conditions

The LEDs have a very long life and produce a high-quality pure white light, meaning colour reproduction is excellent. This also means that there is no need for white balancing in imaging since the colour temperature is constant over the complete intensity range and there are no bright spots, ensuring the entire field is illuminated to the same extent. Since LEDs emit no heat, there are no unwanted temperature changes to the microscope stand or, more importantly, the sample.

The specialists

E F G An economical solution for brightfield illumination is the transmitted-light stand (SZX2-ILLK) which also provides basic oblique contrast. For more advanced oblique contrast with light intensity and colour filters as well as high/low contrast selection, the high-level transmitted-light stand (SZX2-ILLB) cannot be bettered. For switching between brightfield and darkfield with the added benefit of intensity and colour filters, the brightfield/darkfield transmitted-light stand (SZX2-ILLD) is the perfect option.

Transmitted-light stand

E The transmitted-light stand (SZX2-ILLK) uses oblique illumination to provide contrast-enhanced images of transparent specimens. This transmitted light illuminator has a built-in 6 V/30 W halogen lamp.

Brightfield/darkfield transmitted-light stand

F The brightfield/darkfield transmitted-light stand (SZX2-ILLD) is designed to produce intense and evenly distributed illumination. It can be switched between brightfield and darkfield illumination, reducing background noise and improving contrast to resolve even the finest details. It therefore lends itself to a wide range of general applications.

High-level transmitted-light stand

G The high-level transmitted-light stand (SZX2-ILLB) with its high and low contrast selection provides clear, effective contrast and illumination. Light intensity and colour temperature are easily adjusted. Used with a high-magnification objective, such as the 2.0x with correction ring, it permits the observation of extremely small details on highly contrasted structures. This illumination technique is particularly effective for the observation of *C. elegans*, oocytes, embryos and many other biological organisms and structures.

Bright light

H As well as the excellent range of transmitted-light stands available, Olympus also offers a complete range of cold-light sources for reflected-light procedures. They are ideal light sources for research and development, as well as demanding tasks in routine applications. Fibre guide illumination systems offer high illumination quality. Moreover, a broad range of different goosenecks, ring lights, slit ring lights and line light assemblies ensure excellent lighting flexibility.

E ILLK base
For transmitted light

F ILLD base
For darkfield illumination

G ILLB base
For high-level transmitted light illumination

H Cold-light sources
For reflected-light observations

A DP71 high-resolution camera
With high-speed live display

IMAGING SOLUTIONS – HARDWARE

Microscopy is now very closely allied with imaging and analysis, which not only allows users to record their work for posterity, but opens up a whole new area of science. Images can be recorded singularly, as a time-lapse series or even in real time, and calculations carried out based on size, shape, intensity, as well as many other key parameters. Olympus can provide the correct balance of components for your entire microscopy, imaging and analysis applications.

Captured

A Olympus produces a range of imaging cameras for every purpose. At the head of these is the new Olympus DP71 CCD camera – a truly flexible solution for all imaging requirements. Its live mode is based on the same technology as HDTV. This provides very high resolution and ultra-fast image transfer, giving true colour, full-frame (1,360 x 1,024) live images. For advanced fluorescence, the custom monochrome mode allows the user to enhance individual signals. Additionally, the sensitivity can be increased using 2x2 or 4x4-pixel binning for faint signal collection. The camera represents one of the most advanced and versatile tools for all imaging and analysis procedures, from simple image capture to multicolour, real-time fluorescence. The DP71 is Peltier cooled to 10°C below the ambient temperature, which is especially important when using the B&W recording for fluorescence protocols.

Hand in hand

B Whilst our two eyes are designed to utilise the stereoscopic view as generated by a stereomicroscope, a single camera cannot interpret this. On the SZX2 range though, a small rotation of the revolving nosepiece moves the objective such that the image is sent via a single, axial light path. This produces a perfectly focused image over the entire field of view with optimal resolution. As a result, the SZX2 microscopes are perfectly suited to both optical and digital use and make excellent macro-to-micro imaging systems.

B Axial objective position
For optimum resolution imaging

IMAGING SOLUTIONS – SOFTWARE

The Olympus cell* family of software packages ranges from easy documentation software up to advanced real-time imaging solutions. A unified collection of powerful tools enables the creation of the perfect imaging system by providing a fully flexible and modular resource for all microscopy, imaging and analysis requirements.

cell* software for life science

C The cell* family is a comprehensive series of high-powered and mutually compatible imaging products, combining excellent performance with user-friendly operation. Due to their modular set-up, all cell* family members are fully upgradeable and able to grow with evolving research requirements and system modules, so users do not have to get used to new software. For advanced research protocols, especially where fluorescence is required, the intuitive Experiment Manager of cell^M and cell^R provides the perfect interface to make even the most complex protocols easy to set up and run. The graphical nature also ensures that, with minimal training.

Extended focal imaging (EFI)

D Generally, high lateral resolution and large depth of focus are mutually exclusive optical parameters. With a stereo imaging system from Olympus though, a series of high-resolution images taken in the Z direction can be combined to produce a single image with an unlimited depth of focus. EFI acquisition can be automated using the optional motorised Z-drive with a resolution of 1 µm, which can be controlled directly via the Olympus cell* imaging software.

Data analysis

E With the cell* software family, microscopy becomes more than just recording images. A range of routine and advanced analysis processes enables the extraction of vast amounts of data such as cell number, volume and size, and inclusion frequencies, as well as fluorescent intensity calculations and much more.

Documentation

It is more important now than ever before to record the aspects of an experiment that make it what it is. For microscopy and imaging, this includes information such sample type, microscopy technique, objectives and filters, as well as any resulting images and analysis. The cell* software family enables in-depth documentation and reporting, making compliance with any GLP, QA and traceability requirements easier.

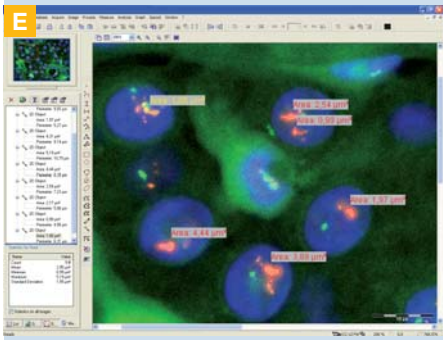
C cell*

Family of imaging systems for life science

D Motorised focus

For automated EFI

E

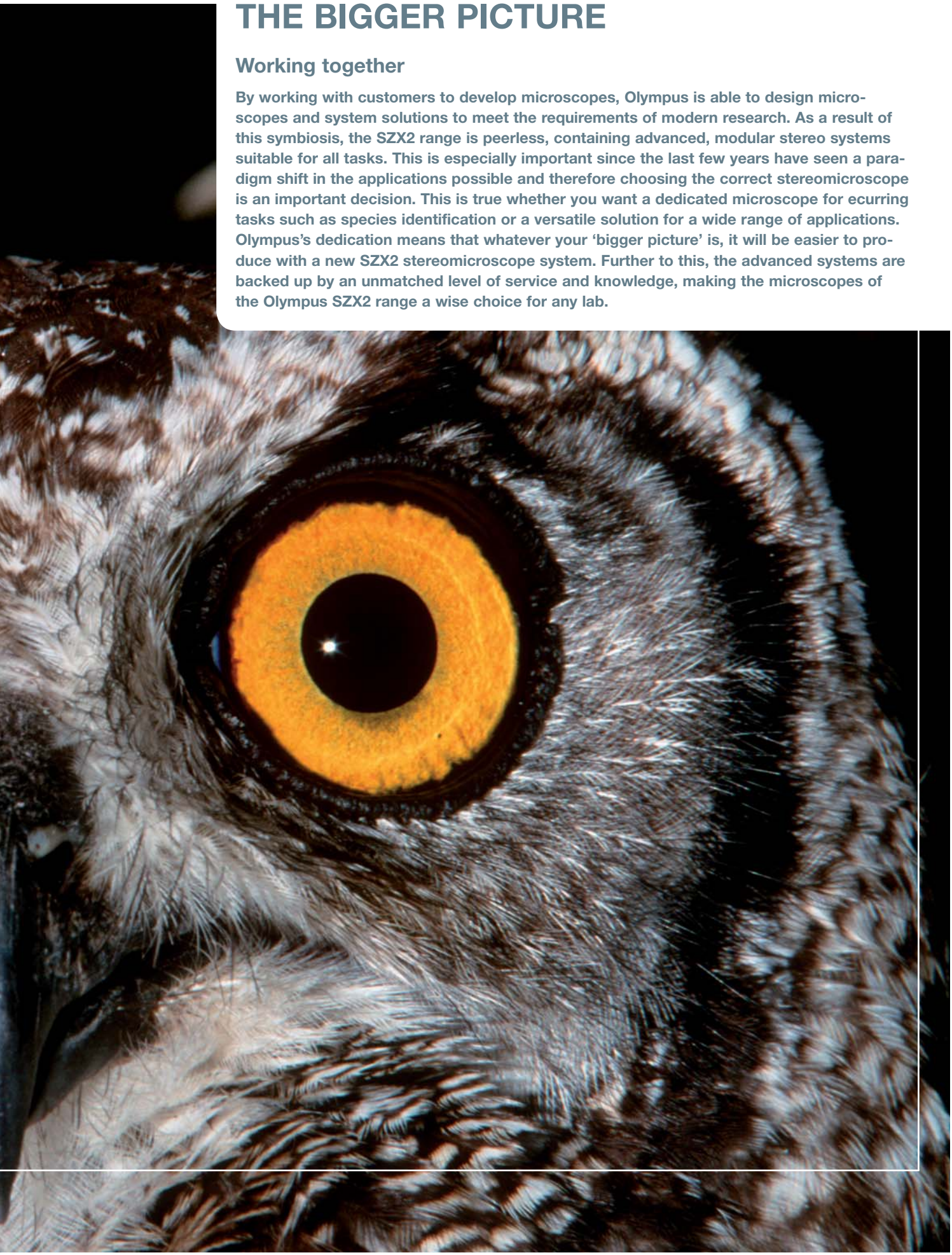


Data analysis with cell* software

THE BIGGER PICTURE

Working together

By working with customers to develop microscopes, Olympus is able to design microscopes and system solutions to meet the requirements of modern research. As a result of this symbiosis, the SZX2 range is peerless, containing advanced, modular stereo systems suitable for all tasks. This is especially important since the last few years have seen a paradigm shift in the applications possible and therefore choosing the correct stereomicroscope is an important decision. This is true whether you want a dedicated microscope for ecurring tasks such as species identification or a versatile solution for a wide range of applications. Olympus's dedication means that whatever your 'bigger picture' is, it will be easier to produce with a new SZX2 stereomicroscope system. Further to this, the advanced systems are backed up by an unmatched level of service and knowledge, making the microscopes of the Olympus SZX2 range a wise choice for any lab.



A **SZX16 filter wheel**
For fluorescence observations

B **Fluorescence filters**
For SZX16

OPTICAL BENCH

Olympus designs all of its microscopes to fit the needs of the laboratory and therefore they are extremely flexible system solutions – the SZX16 stereo is no exception. The advanced optics enable peerless resolutions across the entire, unmatched zoom range. In addition to this, the SZX16 can be fitted with superb fluorescence capabilities as well as environmental control modules and a range of digital cameras. All of these individual elements combine with the intuitive cell* family software to produce system solutions for any protocol in all laboratories.

Fluorescence advances

Fluorescence techniques place numerous benefits in the hands of researchers wishing to exploit the upper limits of sensitivity and resolution in microscopy. Beyond the application benefits, simply studying fluorescence images frequently offers new insights into a reality that is usually hidden from view. The application of fluorescent markers conjugated to antibodies also enables imaging to be carried out in living cells, making functional assessment of a protein's role much easier. The discovery of a family of naturally fluorescent proteins represented a further breakthrough in the observation of living specimens, since proteins can be expressed with these fluorescent tags 'built in'. As a result, more complex studies into intracellular transport, for example, can be fully researched.

In the genes

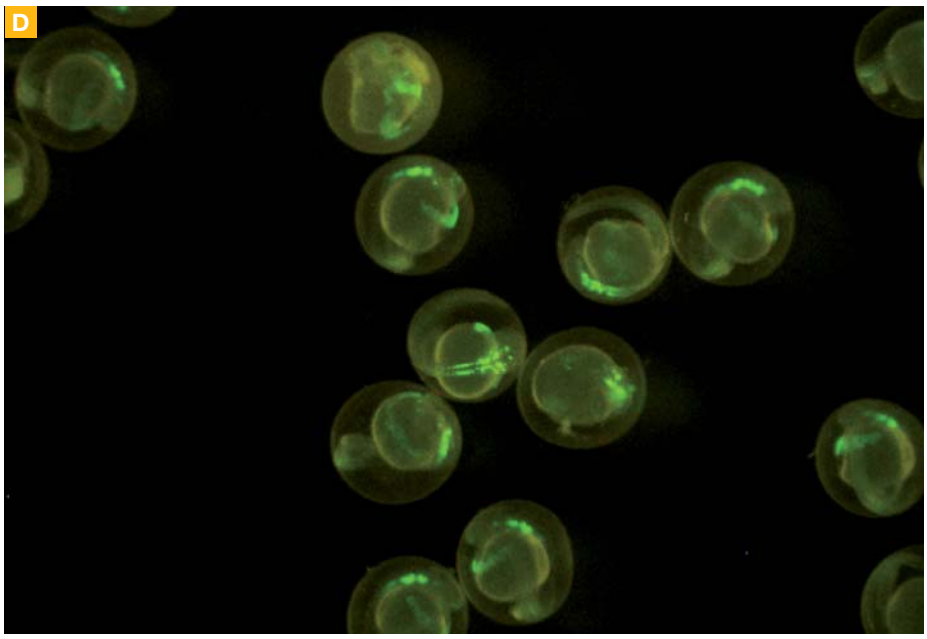
More recently still, these fluorescent proteins have been adapted for use in the generation of transgenic organisms. Using this method, the adapted DNA is integrated into the organism's genome and therefore not only marks the transport and target of the protein but also directly indicates its expression and turnover rates.

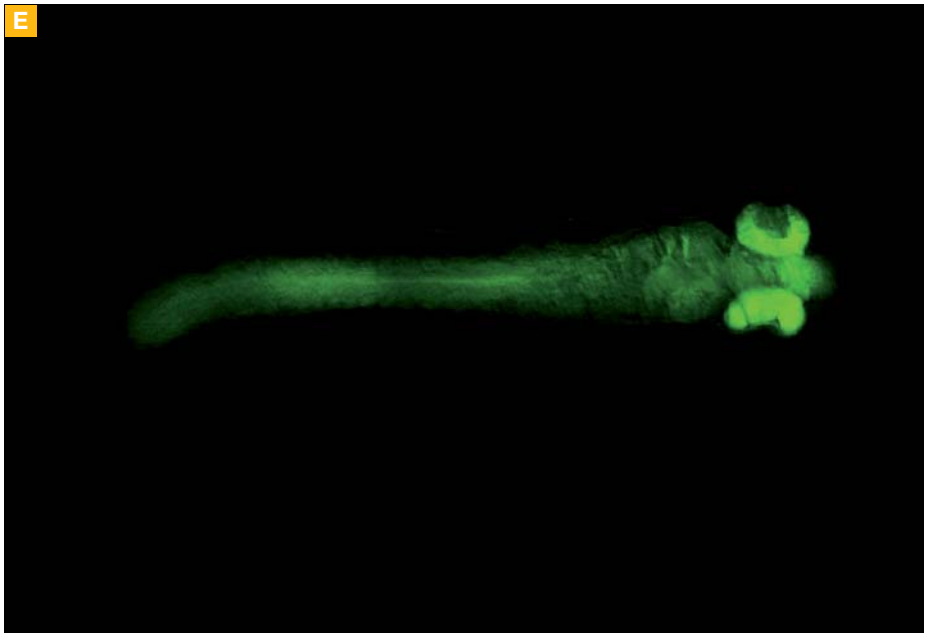
Fluorescence champion

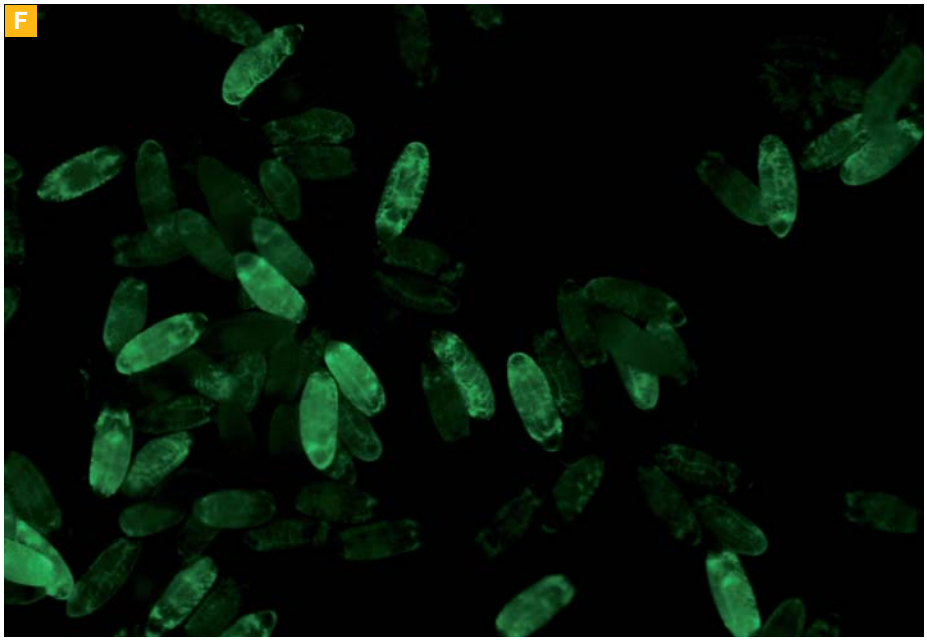
A **B** To leverage the most out of these fluorescent advances, the SZX16 has been equipped with a world-leading stereo optical system. The precisely engineered zoom optics enable optimised magnification control, which, when coupled with the advanced glass materials and surface coating techniques, provide greatly increased apertures throughout the system. These also produce very high transmission of wavelengths from the entire spectrum. The glass also has extremely low autofluorescence, greatly improving clarity. As a result of all these novel features, there is an excellent S/N ratio and high fluorescence signal intensity for emissions. For fluorescence control, the five-position filter wheel and excitation balancers give the user flexible illumination for perfect low-magnification, high-resolution imaging.

Viewing and previewing

A unique perpendicular fluorescence unit coupled with the environmental control modules enable the SZX16 to perform long-term live-cell/organism imaging for both transfected and transgenic fluorescent molecules. It must not be forgotten, though, that stereomicroscopes still provide an excellent platform for pre-screening preparations for observation on compound microscopes. The addition of fluorescence modules enhances this capacity, providing true 'utility' microscopes.







Fluorescence imaging

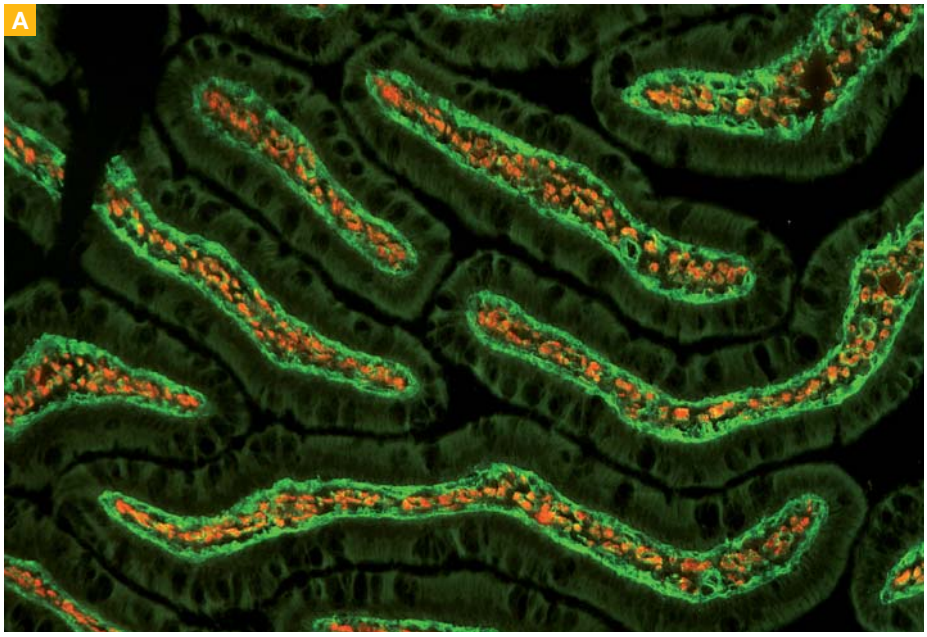
D 28–30 hours old zebrafish (*Danio rerio*) embryos expressing green fluorescent protein (GFP)

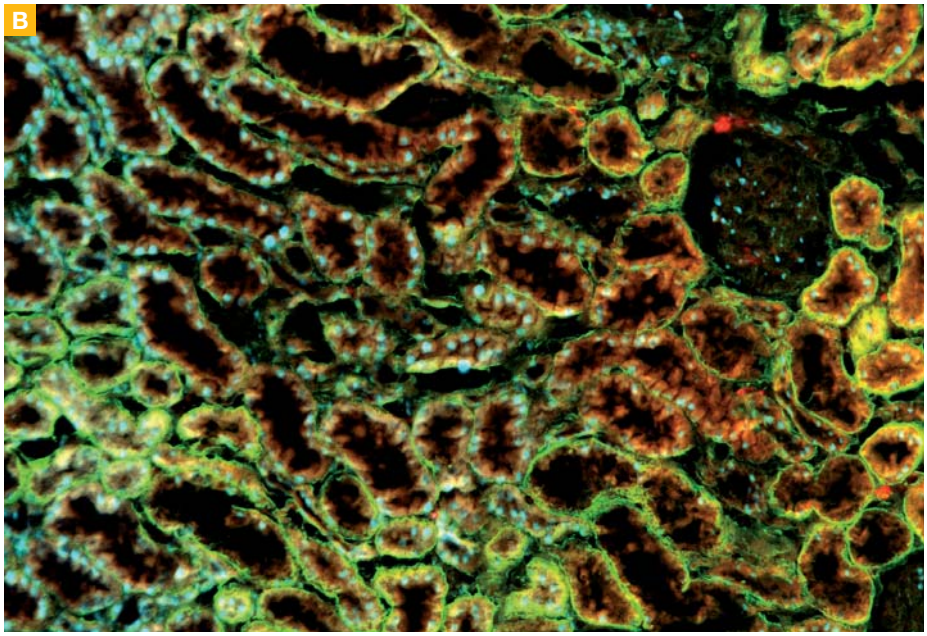
E Fluorescence image of medaka embryo (*Oryzias latipes*, small ricefish). The image shows the distribution of GFP-tagged transcription factor RX3, which is involved in eye development. (2x objective, zoom factor 5)**

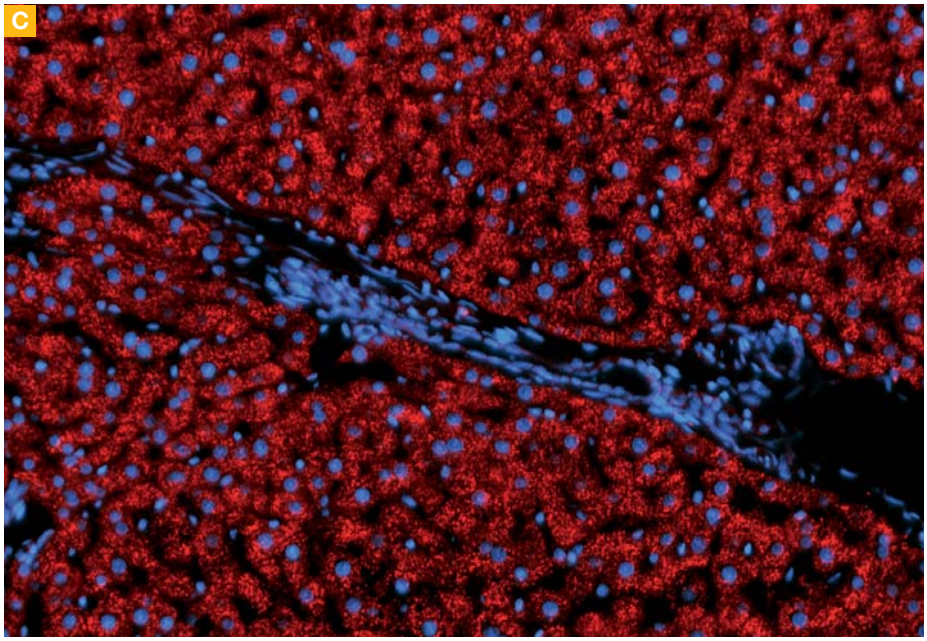
F Drosophila eggs expressing GFP

* Image courtesy of Riken Brain Science Institute, Laboratory for Developmental Gene Regulation, Wako, Japan.

** Image courtesy of Drs Rembold and Wittbrodt, EMBL Heidelberg, Germany.







High-clarity fluorescence on the SZX16

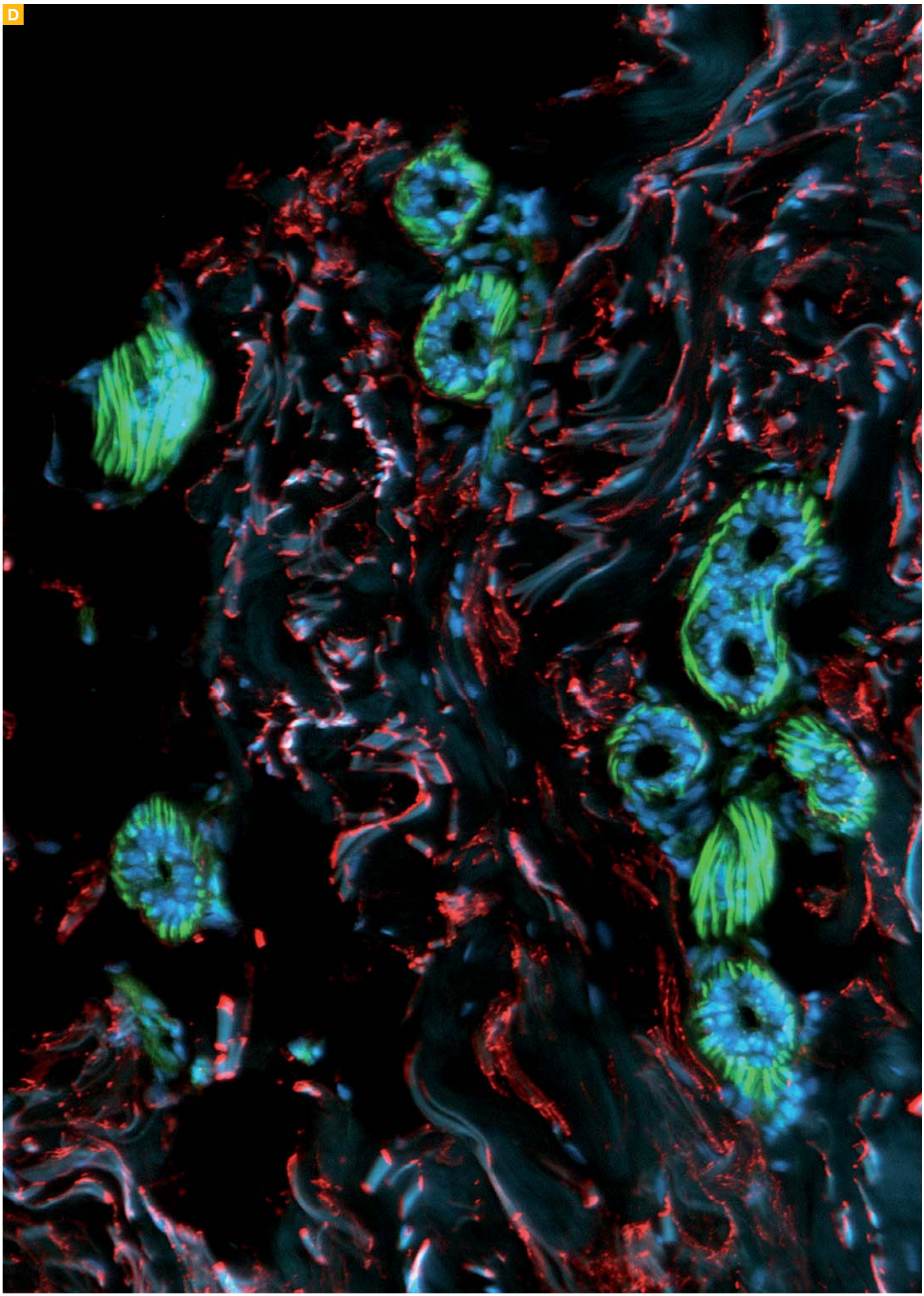
The proof of a system is in the results it generates. For the SZX16 research stereomicroscope with fluorescence, this is the images that are produced. Here are a number of images of gut, kidney, liver and skin tissue sections taken from rats.

A Rat gut section, 2xPFC objective, 10x zoom.
Red: Cy3; smooth muscle actin
Green: Alexa488; laminin

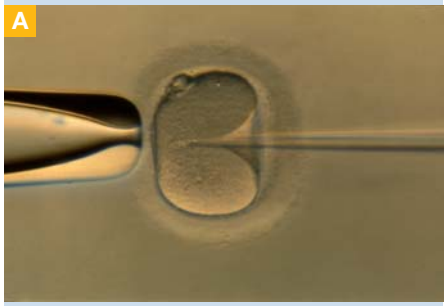
B Rat kidney section, 2xPFC objective, 10x zoom.
Red: Cy3; CD31
Green: Alexa488; laminin
Blue: Hoechst; nuclei

C Rat liver section, 2xPFC objective, 11.5x zoom
Red: Cy3; peroxisomes labelled with a primary antibody to PMP70
Blue: Hoechst; nuclei

D Rat full skin section, 2xPFC objective 11.5x zoom
Red: Cy3; elastin
Green: Alexa488; F-actin
Blue: Hoechst; nuclei


D

A



In vitro fertilisation

MANIPULATION

A One of the most common uses for stereomicroscopes is micromanipulation. This includes processes such as cell selection, microinjection, *in vitro* fertilisation and microsurgery. For these processes, an enhanced 3D view, which gives the appearance of extra depth, has proven beneficial to accuracy and precision. The SZX16 optics have been adapted to provide this feature, which combines with the distortion-free clarity and the Comfort*View* eyepieces to produce a relaxed and clear view of the samples under manipulation.

SZX16 – the professional

3D boost

B By enhancing the depth of the 3D view produced by the SZX16, Olympus has enabled a clearer view of the object under observation, allowing more precise manipulation and injection. This enhanced 3D view is evenly applied across the entire visual area due to the astigmatism correction and carefully controlled embossment.
The excellent parfocality and fine focus control are also important to manipulation, enabling much quicker target identification at low magnification and manipulation at higher magnification.

Space – the final frontier

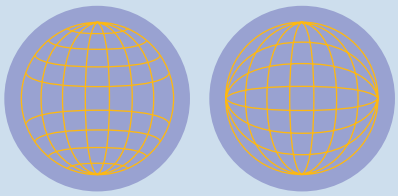
C Any type of manipulation under a microscope requires a space between the top of the sample and the bottom of the objective (WD) for the tools. The objectives available for the SZX16 have large WDs, which enable the use of both manual and automated manipulation and injection tools. Moreover, the front end of the high-magnification 1.6x and 2x objectives is tapered. This significantly increases the available movement range for manipulators and the illumination angle of reflected cold-light sources, which are often used in manipulation set-ups. Where working distances need to be even larger without compromising on NA, the Olympus extended WD objectives provide ample space between the sample and the lens without reducing clarity or resolution. This selection of objectives covers all present and future research requirements, making the SZX16 a key research tool.

Long-standing

D The stands available for the SZX2 range have also been carefully designed to provide stability, flexibility and ergonomy. With both specialist and all-rounder stands available, the perfect system can be developed for brightfield, oblique, darkfield and fluorescence techniques. The base of the LED stand, for example, is only 41 mm thick, yet is fitted with an ultra-bright LED array and contrast inserts for brightfield, oblique and darkfield illumination. This makes it an extremely versatile stand for both experienced and new users.

B Embossment

Enhanced depth of 3D view

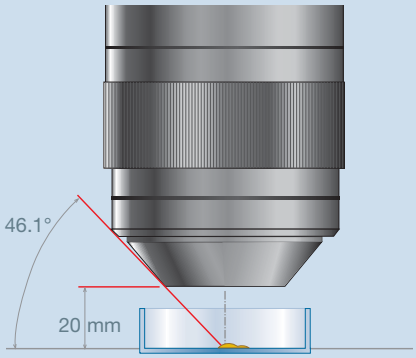


Conventional stereomicroscope

SZX16

C Tapered objective

For unimpeded micromanipulation



D ILLT LED-Base

Enables different illumination methods

Cultured

Observation of living specimens needs stable environmental conditions to exclude unwanted artefacts caused, for example, by short term temperature shifts. Olympus offers a range of environmental control solutions for stereomicroscopy. The glass heating plate ensures that temperatures are held very stable over prolonged periods coupled with the advantage of a non-restricted observation area. This greatly facilitates applications like specimen preparation for IVF, where a large field of view is necessary for fine manipulation work.

Ultimate control

E For more comprehensive environmental control, the stand incubator gives control over several factors. The heated glass bottom plate ensures a very consistent and even specimen temperature. The temperature-controlled glass lid prevents condensation, which can obscure the view of the specimen. To reduce medium evaporation, a heated water bath can be used to create a saturated atmosphere. The pH of the culture media can be maintained via precise CO_2 control. The unit passes the gas through the heated water bath, warming and moistening it. Moreover, the slim design of the stand incubator enables the use of every objective, independent of its working distance.

E Environmental control
On the stereomicroscope

SPECIATION: THE BEETLES

Within and between some species, phenotypic differences can be very diminutive and it is therefore important to have a very natural view under a microscope. The Olympus SZX10 stereomicroscope is designed to produce images with natural 3D as well as perfect colour representation, making it ideal for investigating even the smallest of phenotypic differences. With the SZX10, Olympus has designed a very flexible stereomicroscope for routine and advanced routine processes as well as several research applications. It is based on the same principles as the SZX16 with the modular 'optical bench' approach, giving the user the ability to create the best imaging system for their needs, be that looking at phenotypic differences in beetles or injecting hundreds of *Xenopus laevis* oocytes.

SZX10 – The Naturalist

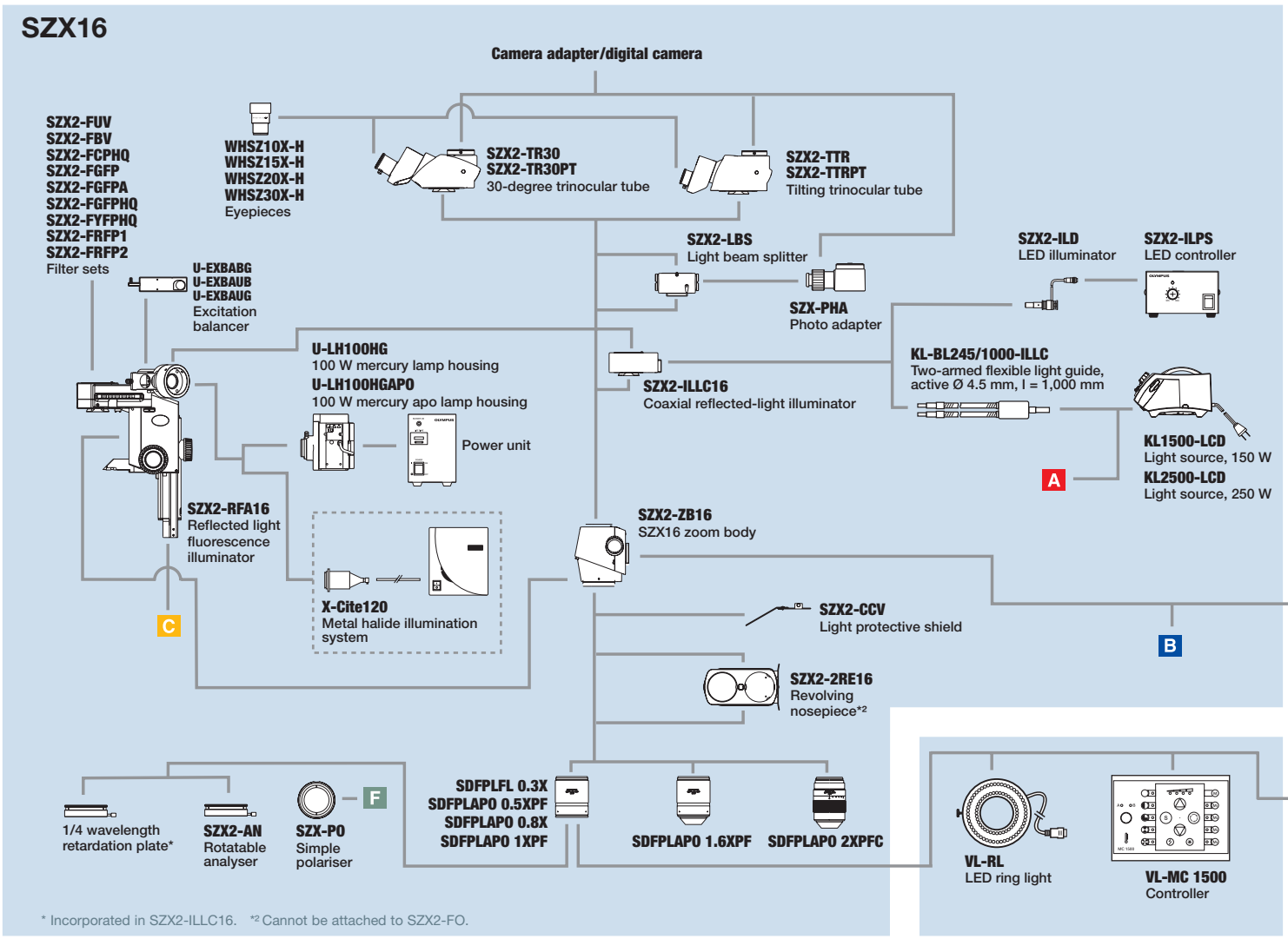
F Very illustrative examples of the need for a 'natural view' are studies of the members of the order *Coleoptera*. About 380,000 different beetle species are known (but estimates reach up to 5 million). This represents 20% of all animal life with a major impact on the ecosystem. Two of its biggest families are weevils with 55,000 known species and ground beetles with 30,000. The latter show, besides some common features such as antennae built of 11 elements, many species variations. Some are obvious but most of the species vary only in the finest of details and painstaking observations are required to differentiate between species and between the sexes. Ground beetles don't show obvious differences between the sexes like scarab beetles or the genus *Eudicella* (image), for example. In these situations, a high-resolution, natural stereomicroscope view with high fidelity is a must to enable differentiation via the finest details.

F

F

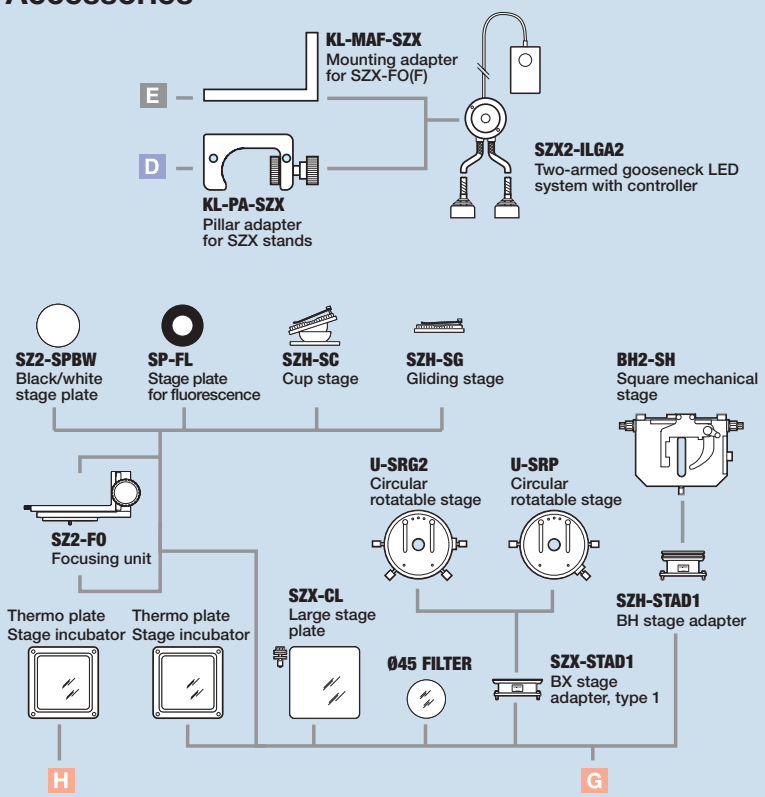
Eudicella Gralli orientalis, male

SZX16

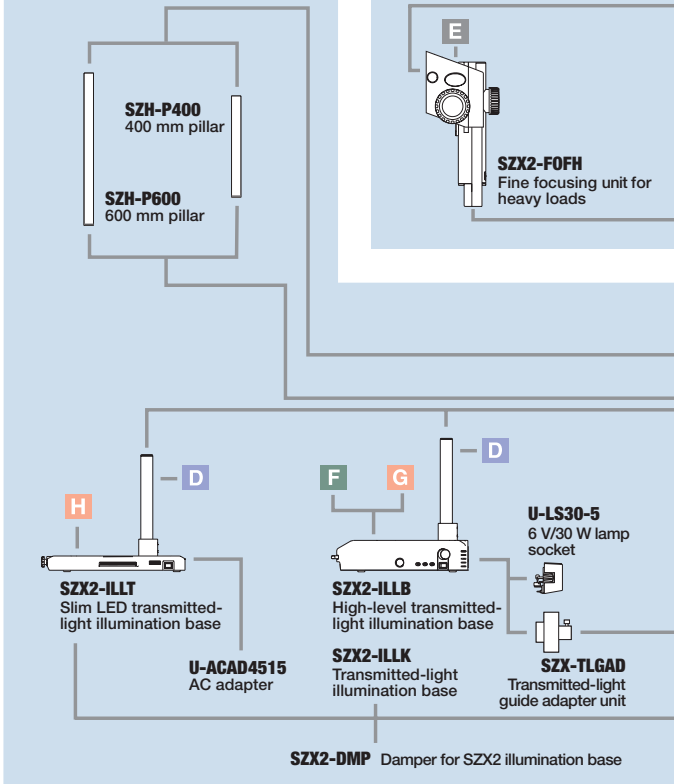


* Incorporated in SZX2-ILLC16. *2 Cannot be attached to SZX2-FO.

Accessories

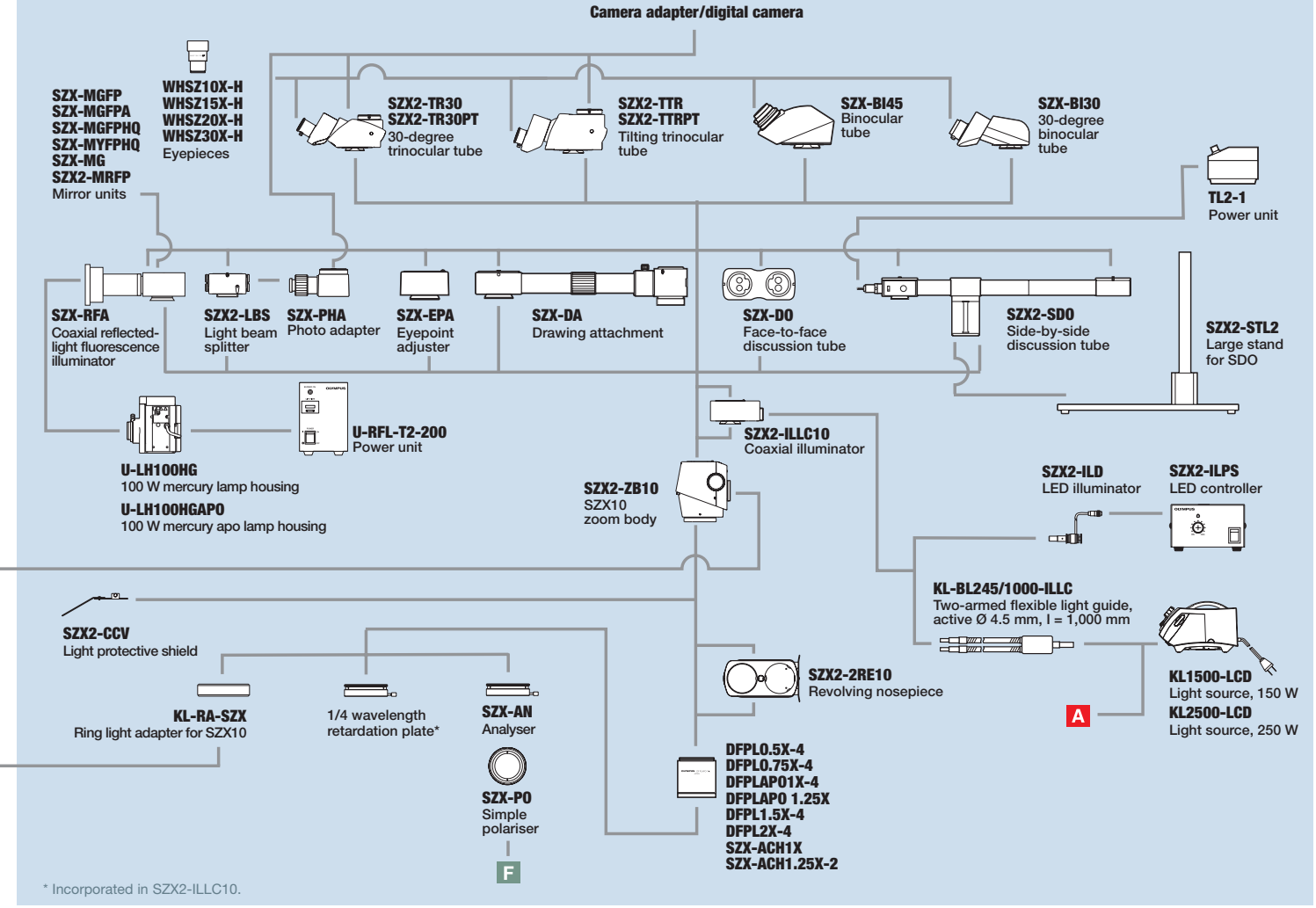


Stands

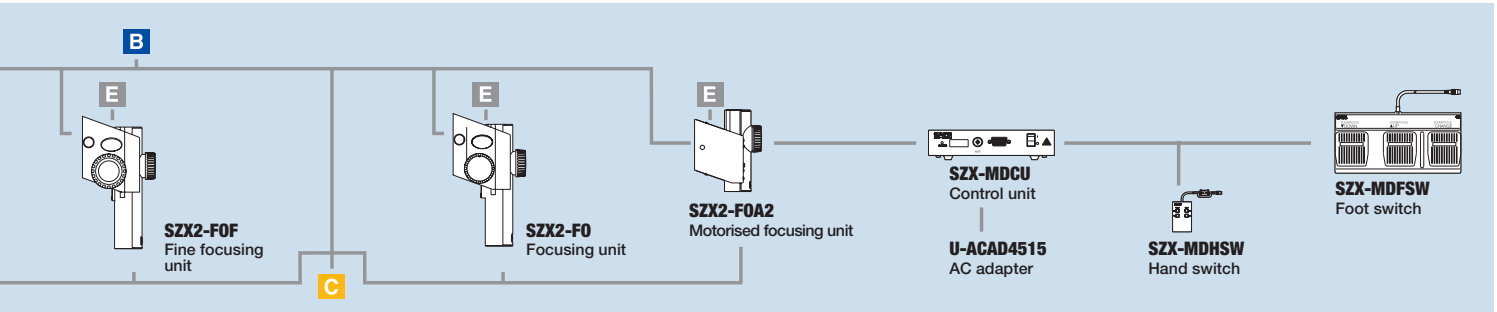


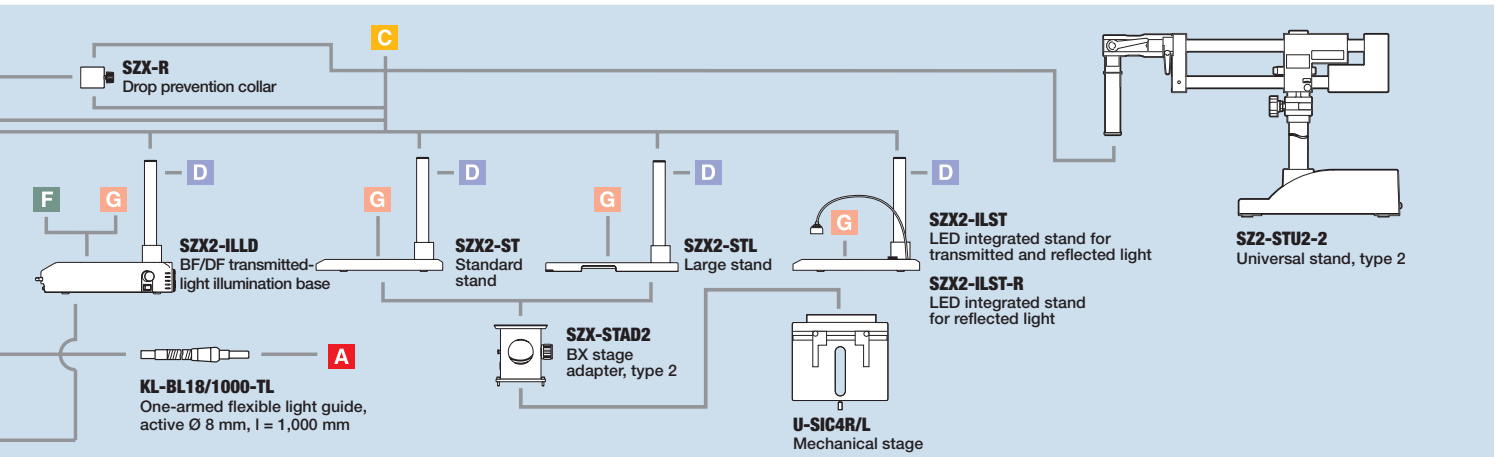
Focusing units

SZX10



* Incorporated in SZX2-ILLC10.





SZX2 specifications

Zoom bodies

	SZX2-ZB16	SZX2-ZB10
Zoom ratio	16.4	10
Zoom range	0.7–11.5	0.63–6.3
Click stop positions	0.7/0.8/1/1.25/1.6/2/2.5/3.2/4/5/6.3/8/10/11.5	0.63/0.8/1/1.25/1.6/2/2.5/3.2/4/5/6.3
Aperture stop	Integrated	Integrated

Focusing units

	SZX2-FOFH	SZX-FOF	SZX-FO	SZX-FOA2
Type	Coarse/fine focus	Coarse/fine focus	Coarse focus	Motorised coarse/fine focus
Movement range	80 mm	80 mm	80 mm	75 mm
Stroke	36.8 mm/0.77 mm per rotation	36.8 mm/0.77 mm per rotation	21 mm per rotation	1.5 mm/0.3 mm per second, resolution 1 µm
Load capacity	10 to 25 kg (built-in counterbalance)	5 to 20 kg (built-in counterbalance)	Max. load: 10 kg	0 to 18.0 kg (built-in counterbalance)

Observation tubes

	SZX2-TR30	SZX2-TR30PT	SZX2-TTR	SZX2-TTRPT
Type	Trinocular observation tube	Trinocular observation tube	Tilting trinocular tube	Tilting trinocular tube
Tilt angle	30°	30°	5° to 45°	5° to 45°
Light path selection, position 1	100% observation	100% observation	100% observation	100% observation
Light path selection, position 2	50/50% observation/camera	0/100% observation/camera	50/50% observation	0/100% observation/camera
Interpupillary distance adjustment	52–76mm	52–76mm	52–76mm	52–76mm
Eyepieces	Comfort*View* WHSZ series	Comfort*View* WHSZ series	Comfort*View* WHSZ series	Comfort*View* WHSZ series

Stands

	SZX2-ST	SZX2-STL	SZX2-ILST	SZX2-ILST-R
Type	Reflected-light stand	Large reflected-light stand	Transmitted/reflected white light LED illumination stand	Reflected white light LED illumination stand
Base dimensions	284 (W) x 335 (D) x 31 (H) mm	400 (W) x 350 (D) x 28 (H) mm	284 (W) x 335 (D) x 31 (H) mm	284 (W) x 335 (D) x 31 (H) mm
Pillar height	270 mm	270 mm	270 mm	270 mm

Transmitted-illumination bases

	SZX2-ILLT	SZX2-ILLB	SZX2-ILLK	SZX2-ILLD
Type	Universal illumination base for transmitted light	Oblique illumination transmitted-light base	Brightfield transmitted-light illumination base	Darkfield transmitted-light illumination base
Illuminant	White-light LED	6 V, 30 W halogen	6 V, 30 W halogen	6 V,30 W halogen
Contrast methods	Brightfield, enhanced brightfield, darkfield, oblique illumination (four position cassette turret)	Brightfield and oblique illumination	Brightfield and oblique illumination (by tilting mirror)	Brightfield and darkfield
Illuminated area	Brightfield: Ø 63 mm, darkfield/oblique: Ø 35 mm	Ø 40 mm	Ø 40 mm	Brightfield: Ø 40 mm, darkfield: Ø 35 mm
Base height	41 mm	80 mm	80 mm	80 mm
Pillar height	270 mm	270 mm	270 mm	270 mm

Fluorescence illuminators

	SZX2-RFA16	SZX2-RFA
Type	Near-vertical fluorescence illuminator with focusing unit	Coaxial fluorescence illuminator
Fluorescence filter positions	Five sets of excitation/emission filter sliders are mountable (turret)	Three fluorecence filter cubes are mountable (slider)
Excitation balancer	Slot for one excitation balancer	-
Focus drive type	Coarse/fine focus	-
Movement range/stroke	69 mm movement range, stroke per rotation 36.8 mm (coarse), 0.77 mm (fine)	-
Load capacity	2.7–15.0 kg	-

SZX10 objectives

	Numerical aperture	Max. resolution (lp/mm)	Max. resolution (µm)	Working distance (mm)	Parfocal distance (mm)
DFPL0.75X-4	0.075	225	4.44	116	123
DFPLAPO1X-4	0.1	301	3.32	81	119
SZX-ACH1X	0.1	301	3.32	90	106
DFPLAPO1.25X	0.125	376	2.66	60	216
SZX-ACH1.25X-2	0.125	376	2.66	68	164
DFPL1.5X-4	0.15	451	2.22	45.5	110
DFPL2X-4	0.2	601	1.66	35.5	123

Eyepiece observation

	WHSZ10X-H (Field number 22)	
	Total magnification	**Field diameter (mm)**
DFPL0.75X–4	4.7x–47.3x	Ø 46.6–Ø 4.7
DFPLAPO1X–4	6.3x–63x	Ø 34.9–Ø 3.5
SZX–ACH1X	6.3x–63x	Ø 34.9–Ø 3.5
DFPLAPO1.25X	7.9x–78.9x	Ø 27.9–Ø 2.8
SZX–ACH1.25X–2	7.9x–78.9x	Ø 27.9–Ø 2.8
DFPL1.5X–4	9.5x–94.5x	Ø 23.3–Ø 2.3
DFPL2X–4	12.6x–126x	Ø 17.5–Ø 1.7

Camera observation

	1/2 inch (U-TV0,5xC) (chip size 4.8 x 6.6 mm*)	2/3 inch (U-TV0,63xC) (chip size 8.8 x 6.6 mm*)	2/3 inch (U-TV1x) (chip size 8.8 x 6.6 mm*)
	Field size (mm)	**Field size (mm)**	**Field size (mm)**
DFPL0.75X–4	27.1 x 20.3–2.7 x 2.0	29.6 x 22.2–3.0 x 2.2	18.6 x 14.0–1.9 x 1.4
DFPLAPO1X–4	20.3 x 15.2–2.0 x 1.5	22.2 x16.6–2.2 x 1.7	14.0 x 10.5–1.4 x 1.1
SZX–ACH1X	20.3 x 15.2–2.0 x 1.5	22.2 x 16.6–2.2 x 1.7	14.0 x 10.5–1.4 x 1.1
DFPLAPO1.25X	16.2 x 12.2–1.6 x 1.2	22.2 x 16.6–2.2 x 1.7	11.2 x 8.4–1.1 x 0.8
SZX–ACH1.25X–2	16.2 x 12.2–1.6 x 1.2	22.2 x 16.6–2.2 x 1.7	11.2 x 8.4–1.1 x 0.8
DFPL1.5X–4	13.5 x 10.2–1.3 x 1.0	14.8 x 11.1–1.5 x 1.1	9.3 x 7.0–0.9 x 0.7
DFPL2X–4	10.2 x 7.6–1.0 x 0.7	11.1 x 8.3–1.1 x 0.8	7.0 x 5.2–0.7 x 0.5

SZX16 objectives

	Numerical aperture	Max. resolution (lp/mm)	Max. resolution (µm)	Working distance (mm)	Parfocal distance (mm)
SDFPLFL0.3X	0.045	135	7.41	141	210
SDFPLAPO0.5XPF	0.075	225	4.44	70.5	135
SDFPLAPO0.8X	0.12	360	2.78	81	140
SDFPLAPO1XPF	0.15	450	2.22	60	135
SDFPLAPO1.6XPF	0.24	720	1.39	30	135
SDFPLAPO2XPFC	0.3	900	1.11	20	135

Eyepiece observation

	WHSZ10X-H (Field number 22)	
	Total magnification	**Field diameter (mm)**
SDFPLFL0.3X	2.1x–34.5x	Ø 104.8–Ø 6.4
SDFPLAPO0.5XPF	3.5x–57.5x	Ø 62.9–Ø 3.8
SDFPLAPO0.8X	5.6x–92x	Ø 39.3–Ø 2.4
SDFPLAPO1XPF	7x–115x	Ø 31.4–Ø 1.9
SDFPLAPO1.6XPF	11.2x–184x	Ø 19.6–Ø 1.2**
SDFPLAPO2XPFC	14x–230x	Ø 15.7–Ø 1**

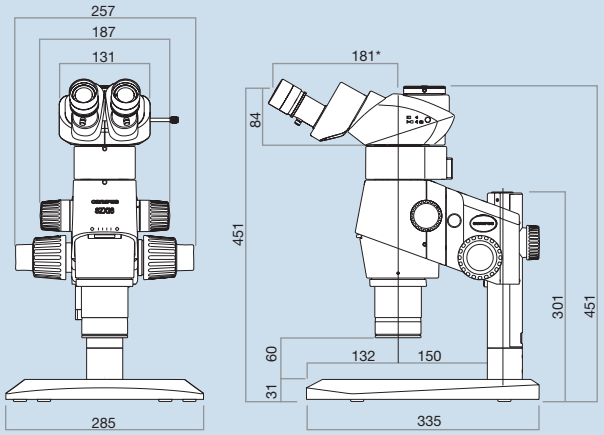
Camera observation

	1/2 inch (U-TV0,5xC) (chip size 4.8 x 6.6 mm*)	2/3 inch (U-TV0,63xC) (chip size 8.8 x 6.6 mm*)	2/3 inch (U-TV1x) (chip size 8.8 x 6.6 mm*)
	Field size (mm)	**Field size (mm)**	**Field size (mm)**
SDFPLFL0.3X	61.0 x 45.7–3.7 x 2.8	66.5 x 49.9–4.1 x 3.0	41.8 x 31.4–2.6 x 1.9
SDFPLAPO0.5XPF	36.6 x 27.4–2.2 x 1.7	39.9 x 30.0–2.4 x 1.8	25.1 x 18.9–1.5 x 1.1
SDFPLAPO0.8X	22.9 x 17.1–1.4 x 1.0	25.0 x 18.7–1.5 x 1.1	15.8 x 11.8–0.9 x 0.7
SDFPLAPO1XPF	18.3 x 13.7–1.1 x 0.8	19.9 x 15.0–1,2 x 0,9	12.5 x 9.4–0.7 x 0.5
SDFPLAPO1.6XPF	11.4 x 8.6–0.7 x 0.5	12.4 x 9.3–0,8 x 0,6	7.8 x 5.9–0.5 x 0.3
SDFPLAPO2XPFC	9.1 x 6.9–0.6 x 0.4	10.0 x 7,5–0.6 x 0.5	6.3 x 4.7–0.4 x 0.3

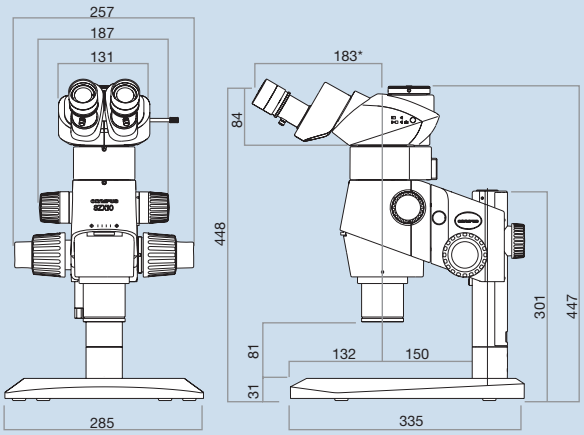
* Actual chip size might vary depending on the manufacturer. ** Some vignetting may occur at low magnifications.

SZX2 dimensions

SZX16



SZX10



Dimension unit: mm. * This dimension may vary according to the interpupillary distance.

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