

# OLYMPUS

Your Vision, Our Future

Stereomicroscopes

## SZX2

SZX10/SZX16 for Life Science

*Advanced functionality as standard*



# 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 ground-breaking advances, Olympus knows how to get the most out of your samples – the SZX2 proves this principle.**

**One giant leap ..... p. 04–07**

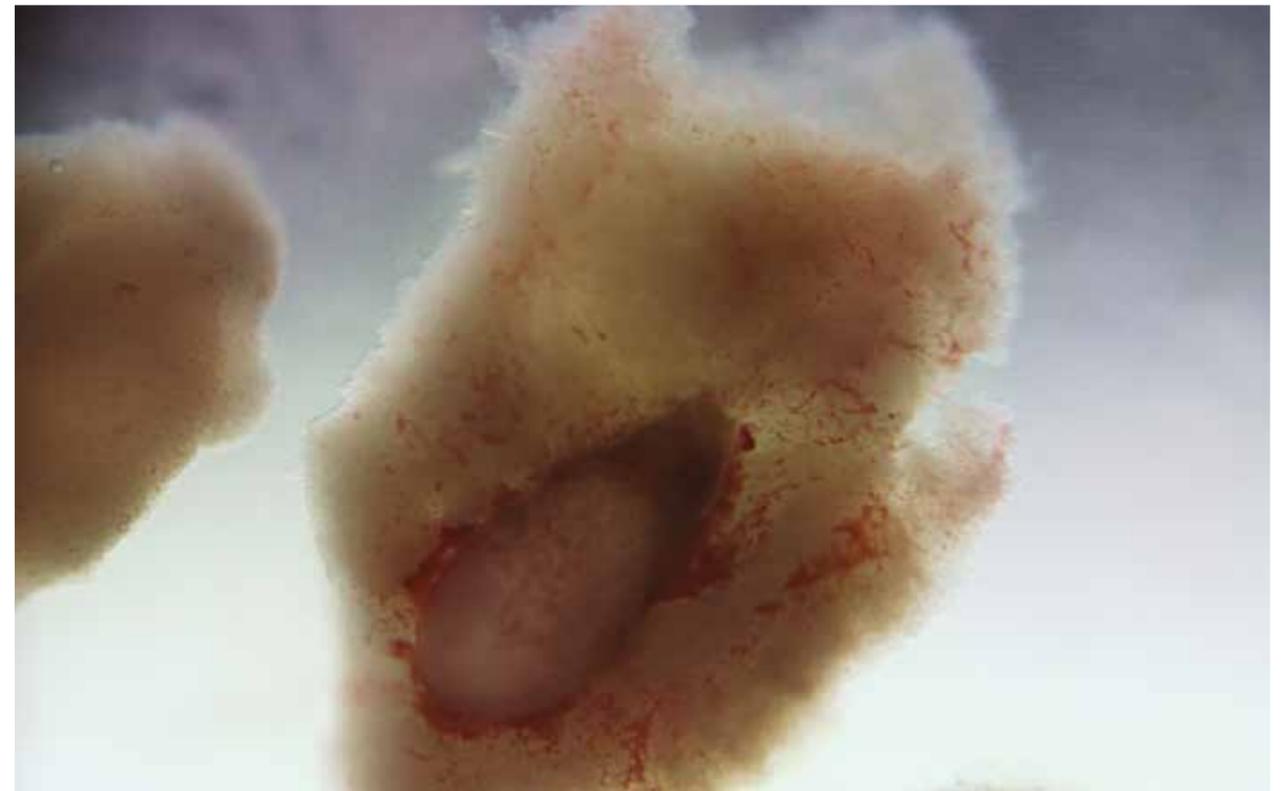
Stereo solution: whatever your needs, you can be sure that you will always see more with an Olympus microscope. Superior optics and ergonomic designs are included as standard across the range. So whether you specify an advanced routine stereomicroscope with transmitted illumination or a flexible research 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.

**Perfectly balanced ..... p. 08–13**

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.

**The bigger picture ..... p. 14–19**

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 recurring 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 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.

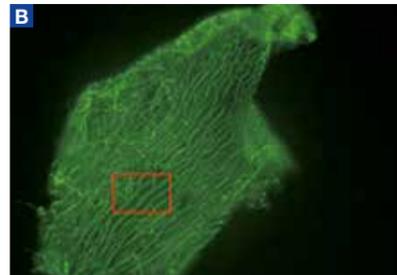


Graduate School of Medicine and Faculty of Medicine, the University of Tokyo, Department of Cell Biology and Anatomy, Dr. Yasushi Okamoto

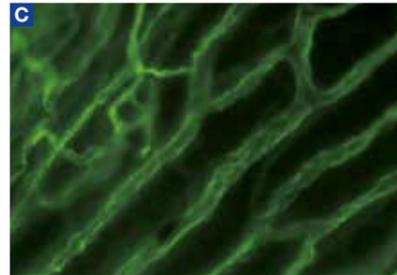
# ONE GIANT LEAP



SZX16: research stereomicroscope

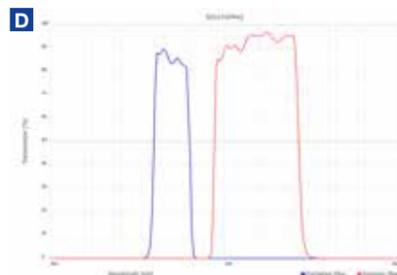


2xPFC objective, zoom 2.5x



2xPFC objective, zoom 11.5x  
Subcutaneous blood vessels from eNOSTAG- GFP transgenic mouse, in which GFP (green fluorescent protein) expression is driven by the promoter of eNOS (endothelial nitric oxide synthase).\*

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



Fluorescence filters sets: imaging with high S/N ratio

## 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 Olympus SZX16: completely dedicated to modern research.

### New resolution

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 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 DP73, 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.

### From all to small

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 16.4:1 zoom ratio and the large selection of parfocal objectives, the SZX16 can go from 3.5x to 230x magnification without the need to interrupt the user's view of the sample – peerless. This accelerates the ability to find regions of interest and focus them. As well as this, the Olympus ComfortView eyepieces allow a stereo image to be formed and maintained across a larger range of eye movements, enabling comfortable long-term use.

### Very illuminating

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 five-position filter turret.

### 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 outstanding high 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.

### Enhanced 3D

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.

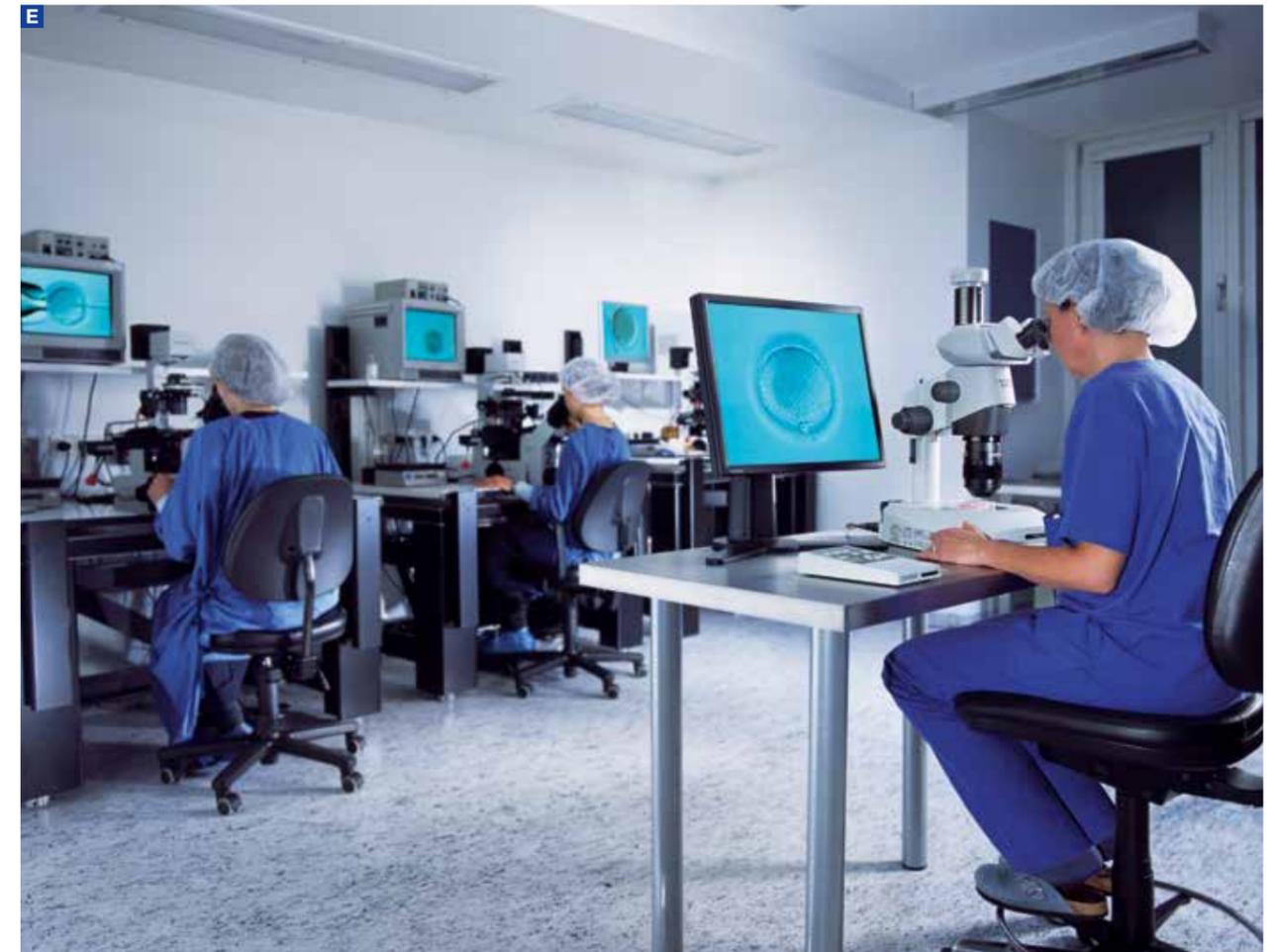


Image E courtesy of FCH Fertility Center Hamburg, Germany.

# ONE GIANT LEAP



SZX10: advanced routine stereomicroscope



Medaka eggs, acquired with oblique illumination (ILLT stand)



SZX10 stereo objectives: excellent and versatile



DP73 camera for live-imaging and documentation

## 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 ComfortView 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.

### Comfortable stereo

**B** By combining carefully designed controls, an ultra-slim LED illumination base and multiple binocular options including an ergonomic tilting trinocular with ComfortView 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 to perfectly tailor your system to your applications in combination with the cellSens imaging software range. From basic acquisition to advanced real-time imaging solutions – we have the right choice for you.

### 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 ComfortView 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.

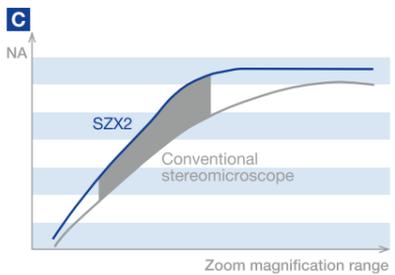
# PERFECTLY BALANCED



High-resolution objective SDF PLAPO 2XPFC



SZX16 zoom body



Highest NA at all magnifications: up to 22% more resolution



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 an outstanding stereomicroscope resolution of 900 line pairs per millimetre – you will see more wherever you look with an SZX2.

## The ultimate objective

Olympus developed a 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 full range of SZX2 objectives. Moreover, the 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

The SZX16 stereomicroscope has a wide zoom ratio of 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 highest 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

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.

## Let there be light

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

The Lumen Dynamics X-Cite XLED1 is an unprecedented stable light source with rich spectral excitation over extended lifetimes. Up to four LED modules can be easily configured from 365 to 735 nm and they can be switched almost instantaneously with no additional shutters. State-of-the-art technology provides full, individual control over LED intensity and signalling via touch screen or trigger for simplified switching or control of protocols using cellSens software. Remote placement of the light source reduces vibration and heat.

## Even illumination-alignment free

The Olympus 130 W U-HGLGPS is a light guide-coupled illumination system. With a very long-lifetime, its powerful pre-centred burner reduces running costs, is easy to install and delivers long- and short-term stability. Its six-step iris effectively controls intensity and enables simple, staged intensity adjustment. Coupling via the light guide reduces thermal effects and vibration at the microscope frame.

## Perfect system integration

The Olympus cellSens imaging software 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 cellSens software modules contain an array of powerful and flexible tools to enable the user to create the perfect imaging system for their requirements.



SZX16: advanced fluorescence for research



High power LED light source: X-Cite XLED1



Uniform light output: U-HGLGPS

# PERFECTLY BALANCED



Exceptionally comfortable for the eyes



Tilting trinocular head



ILLT LED-Base for various contrast methods



ILLT filter wheel with different contrast inserts

## 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

The innovative ComfortView 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

The 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.

## 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 ergonomics are key here, too, and Olympus has developed a range of stands to suit every purpose.

## The all-rounder

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, ergonomics and robustness for both experienced and first-time users.

## Unique functionality

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.

## 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.

## Transmitted-light stand

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

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

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 and flexible

Our cold-light illumination systems offer the largest range of accessories and so provide the greatest flexibility in tailoring the lighting to the specific inspection or research task. Three light sources and approximately 100 accessories, from simple, single-spot light guides to darkfield illumination rings, make this system the perfect choice for both routine work and research and development, with its constantly changing requirements.

## Variable contrast

The advanced Olympus LED light systems open up new contrast possibilities with the smallest space requirements. The segmented circular light arrays provide the correct type of lighting for all samples. From homogeneous illumination to sharp contrast, mixed reflected transmitted light and the highlighting of direction-oriented structures without moving the specimen or manually repositioning the light element – all of this is available at the push of a button.



ILLK base for transmitted light



ILLD base for darkfield illumination



ILLB base for high-level transmitted light illumination



VisiLED: segment ring light

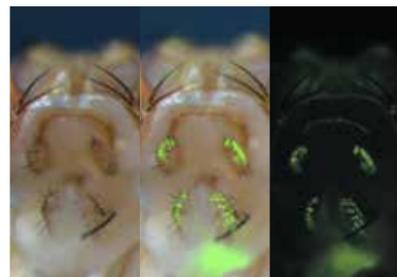
# PERFECTLY BALANCED



DP80: dual CCD colour and monochrome camera



Axial objective position for optimum resolution imaging



Centre panel shows overlay of colour and monochrome images of GFP expressing drosophila sample. DP80 pixel-precise centring mode and HDR processing of fluorescence image were used.

Image courtesy of Kei Ito, Ph.D. Institute of Molecular and Cellular Biosciences, University of Tokyo.

## 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 DP80 CCD camera - a truly flexible solution for all imaging requirements. The unique DP80 combines both a colour and a monochrome sensor within the same housing, providing high-resolution colour documentation together with highly sensitive fluorescent detection. With versatile functionality, the cellSens control software enables rapid and automatic exchange between the chips, without mechanically switching the microscope optical path. Furthermore, the DP80 has the capacity to overlay images from the two sensors with accurate pixel-to-pixel correspondence, presenting significant opportunities for efficient and accurate joint colour and fluorescent imaging in both research and clinical environments. Quality live cell imaging is achieved with speeds up to 57 fps, guaranteeing a fluid and comfortable imaging experience without colour ghosting or striping artefacts. Peltier cooling of both chips gives increased S/N ratio for noise free images.

### 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.

## Imaging solutions — software

The Olympus cellSens 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.

### cellSens software for life science

**C** The cellSens 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 cellSens 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 the cellSens software 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)

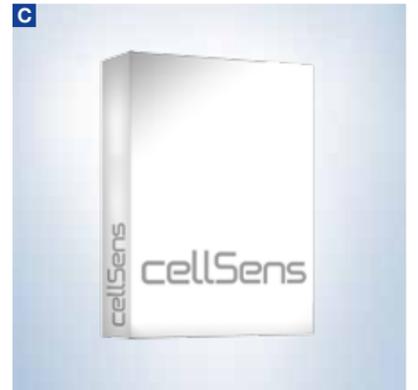
**D** Generally, high lateral resolution and large depth of focus are mutually exclusive optical parameters. With a stereo imaging system from Olympus though, a series of high-resolution images taken in the Z direction can be combined to produce a single image with an unlimited depth of focus. EFI acquisition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

### Data analysis

**E** With the cellSens 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

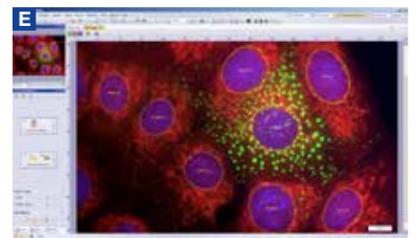
It is more important now than ever before to record the aspects of an experiment that make it what it is. For microscopy and imaging, this includes information such sample type, microscopy technique, objectives and filters, as well as any resulting images and analysis. The cellSens software family enables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



cellSens: imaging software



Motorised focus: for automated EFI



Data analysis with cellSens software

# THE BIGGER PICTURE



SZX16 filter wheel for fluorescence observations



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 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 cellSens imaging 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 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 gives 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

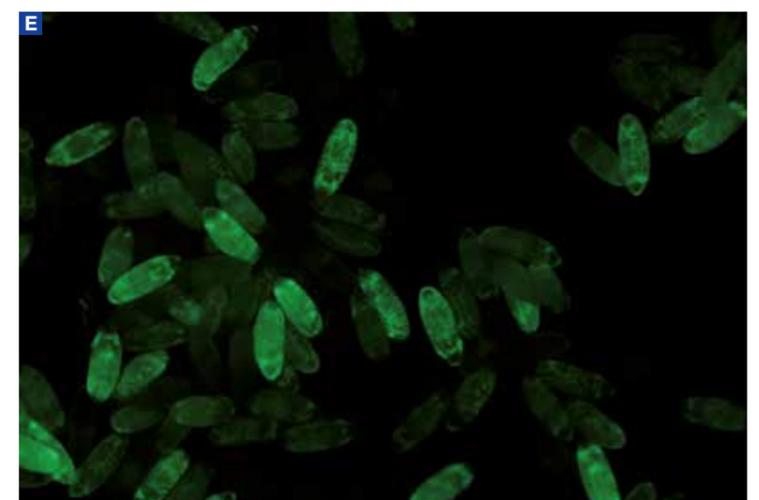
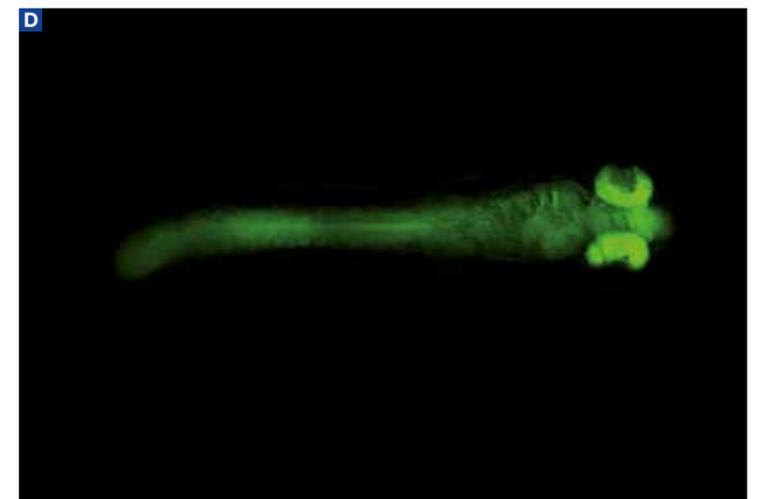
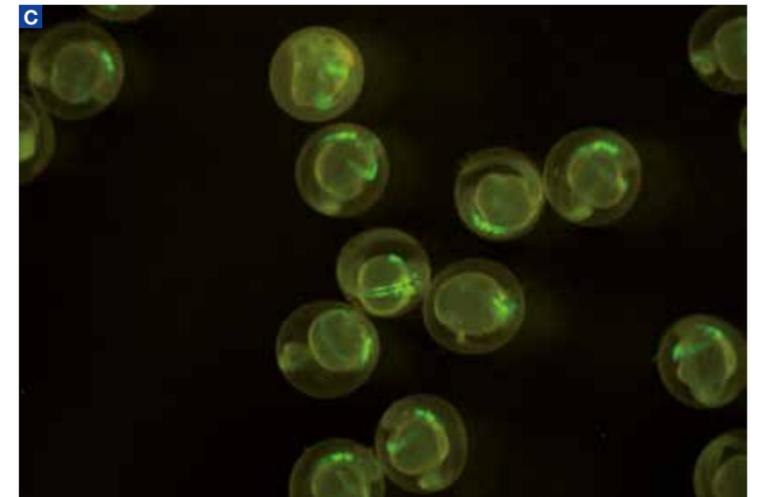
**C** 28–30 hours old zebrafish (*Danio rerio*) embryos expressing green fluorescent protein (GFP)

**D** 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)\*\*

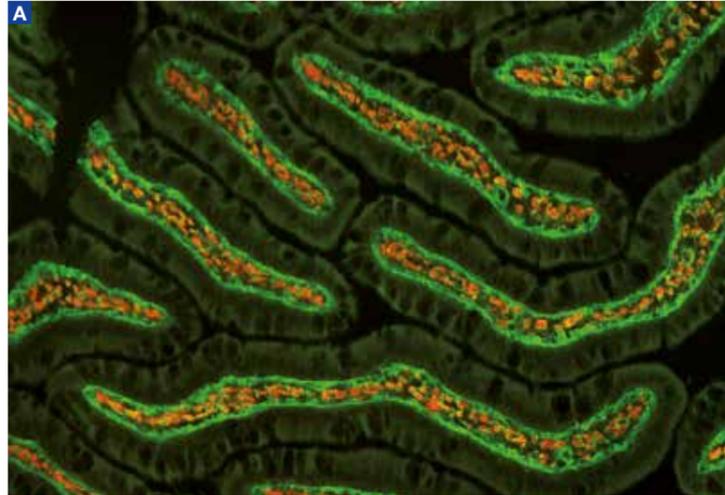
**E** *Drosophila* eggs expressing GFP

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

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



# THE BIGGER PICTURE



## High-clarity fluorescence on the SZX16

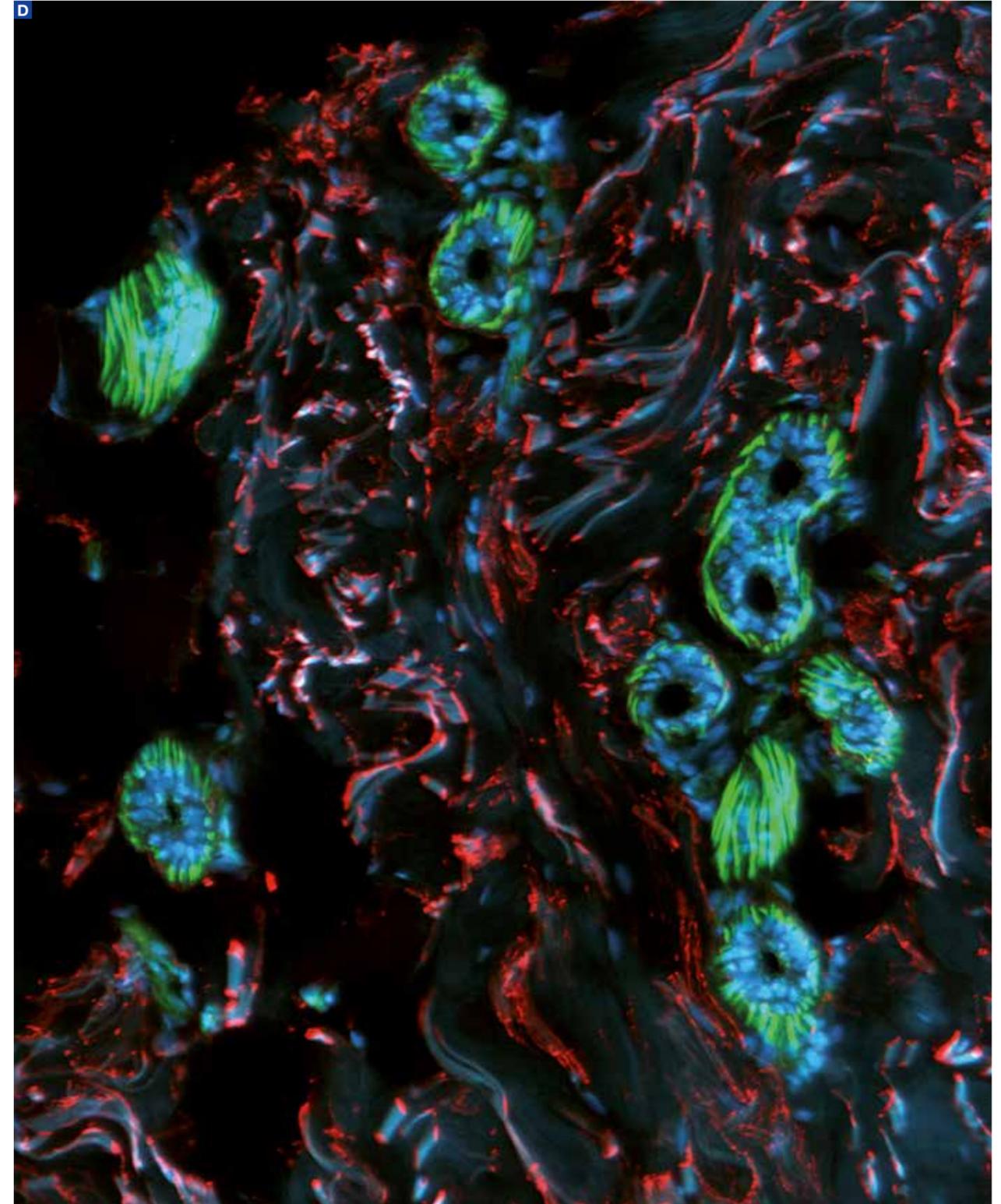
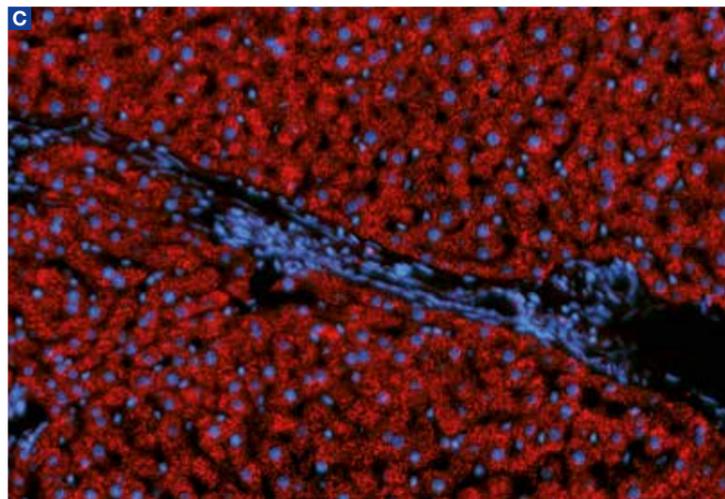
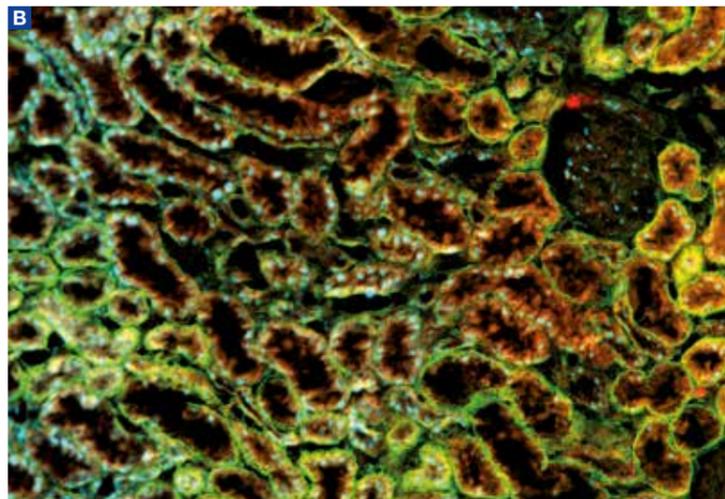
The proof of a system is in the results it generates. For the SZX16 research stereomicroscope with fluorescence, this is the images that are produced. Here are a number of images of gut, kidney, liver and skin tissue sections taken from rats.

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

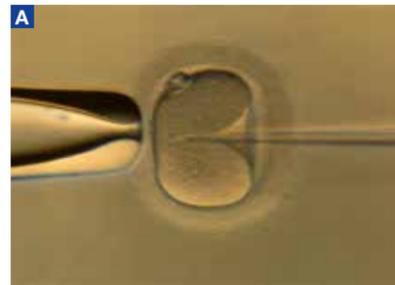
**B** Rat kidney section, 2xPFC objective, 10x zoom.  
Red: Cy3; CD31, green: Alexa488; laminin, Blue: Hoechst; nuclei

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

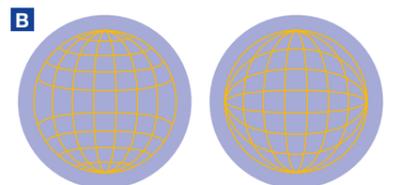
**D** Rat full skin section, 2xPFC objective 11.5x zoom, red: Cy3; elastin, green: Alexa488; F-actin, blue: Hoechst; nuclei



# THE BIGGER PICTURE



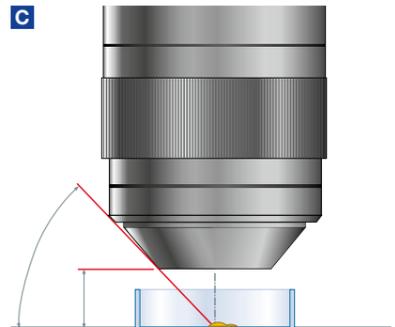
In vitro fertilisation



Conventional stereomicroscope

SZX16

Embossment: enhanced depth of 3D view



Tapered objective for unimpeded micromanipulation



Environmental control on the stereomicroscope

## Manipulation

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 ComfortView eyepieces to produce a relaxed and clear view of the samples under manipulation.

## 3D boost

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

Any type of manipulation under a microscope requires a space between the top of the sample and the bottom of the objective for the tools. The objectives available for the SZX16 have large working distances (WD), 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.

## 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

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<sub>2</sub> 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.

## 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

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.



*Eudicella Gralli orientalis*, male





# 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	SZX2-FOF	SZX2-FO	SZX2-FOA
Type	Coarse/fine focus	Coarse/fine focus	Coarse focus	Motorised coarse/fine focus
Movement range	80 mm	80 mm	80 mm	78 mm
Stroke	36.8 mm/0.77 mm per rotation	36.8 mm/0.77 mm per rotation	21 mm per rotation	2.7 mm/0.3 mm per second, resolution 1 µm
Load capacity	8 to 25 kg (built-in counterbalance)	2.7 to 15 kg (built-in counterbalance)	Max. load: 10 kg	0 to 23 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	ComfortView WHSZ series	ComfortView WHSZ series	ComfortView WHSZ series	ComfortView WHSZ series

## Stands

	SZX2-ST	SZX2-STL
Type	Reflected-light stand	Large reflected-light stand
Base dimensions	284 (W) x 335 (D) x 31 (H) mm	400 (W) x 350 (D) x 28 (H) mm
Pillar height	270 mm	400 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	82 mm	82 mm	82 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 fluorescence filter cubes are mountable (slider)
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	4–18 kg	-

## SZX10 objectives

	Numerical aperture	Max. resolution (lp/mm)	Max. resolution (µm)	Working distance (mm)	Parfocal distance (mm)
DFPL0.5X-4	0.05	149	6.71	171	216
DFPL0.75X-4	0.075	224	4.47	116	164
DFPLAPO1X-4	0.1	298	3.36	81	137
SZX-ACH1X	0.1	298	3.36	90	119
DFPLAPO1.25X	0.125	373	2.68	60	123
SZX-ACH1.25X-2	0.125	373	2.68	68	110
DFPL1.5X-4	0.15	447	2.24	45.5	109.5
DFPL2X-4	0.2	596	1.68	33.5	123

## Eyepiece observation

	WHSZ10X-H (Field number 22)	
	Total magnification	Field diameter (mm)
DFPL0.5X-4	3.2x–31.5x	Ø 69.8–Ø 7.0
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 6.4 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)
DFPL0.5X-4	40.6 x 30.5–4.1 x 3.0	44.3 x 33.3–4.4 x 3.3	27.9 x 21.0–2.8 x 2.1
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 x 16.6–2.2 x 1.7	14.0 x 10.5–1.4 x 1.0
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 1.0
DFPLAPO1.25X	16.3 x 12.2–1.6 x 1.2	17.7 x 13.3–1.8 x 1.3	11.2 x 8.4–1.1 x 0.8
SZX-ACH1.25X-2	16.3 x 12.2–1.6 x 1.2	17.7 x 13.3–1.8 x 1.3	11.2 x 8.4–1.1 x 0.8
DFPL1.5X-4	13.5 x 10.2–1.4 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 0.8	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

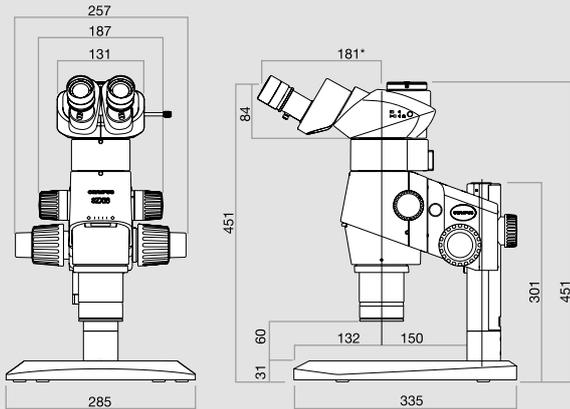
	WHN10X-H (Field number 22)	
	Total magnification	Field diameter (mm)
SDFPLFL0.3X	2.1x–34.5x	Ø 104.8–Ø 6.4
SDFPLAPO0.5XPF	3.5x–57.5x	Ø 62.9–Ø 3.8
SDFPLAPO0.8X	5.6x–92x	Ø 39.3–Ø 2.4
SDFPLAPO1XPF	7x–115x	Ø 31.4–Ø 1.9
SDFPLAPO1.6XPF	11.2x–184x	Ø 19.6–Ø 1.2**
SDFPLAPO2XPFC	14x–230x	Ø 15.7–Ø 1**

## Camera observation

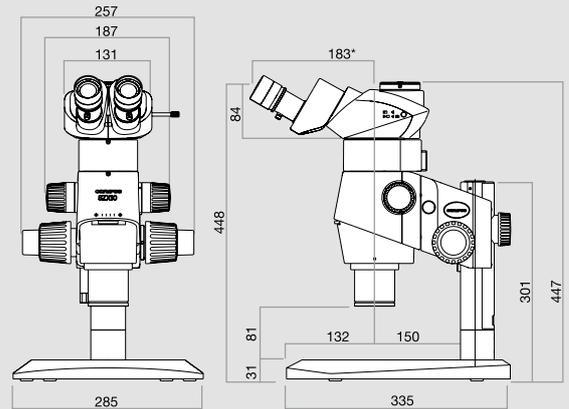
	1/2 inch (U-TV0,5xC) (chip size 4.8 x 6.4 mm*)	2/3 inch (U-TV0,63xC) (chip size 8.8 x 6.6 mm*)	2/3 inch (U-TV1x) (chip size 8.8 x 6.6 mm*)
	Field size (mm)	Field size (mm)	Field size (mm)
SDFPLFL0.3X	61.0 x 45.7–3.7 x 2.8	66.5 x 49.9–4.1 x 3.0	41.8 x 31.4–2.6 x 1.9
SDFPLAPO0.5XPF	36.6 x 27.4–2.2 x 1.7	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.

### SZX16



### SZX10



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