OLYMPUS

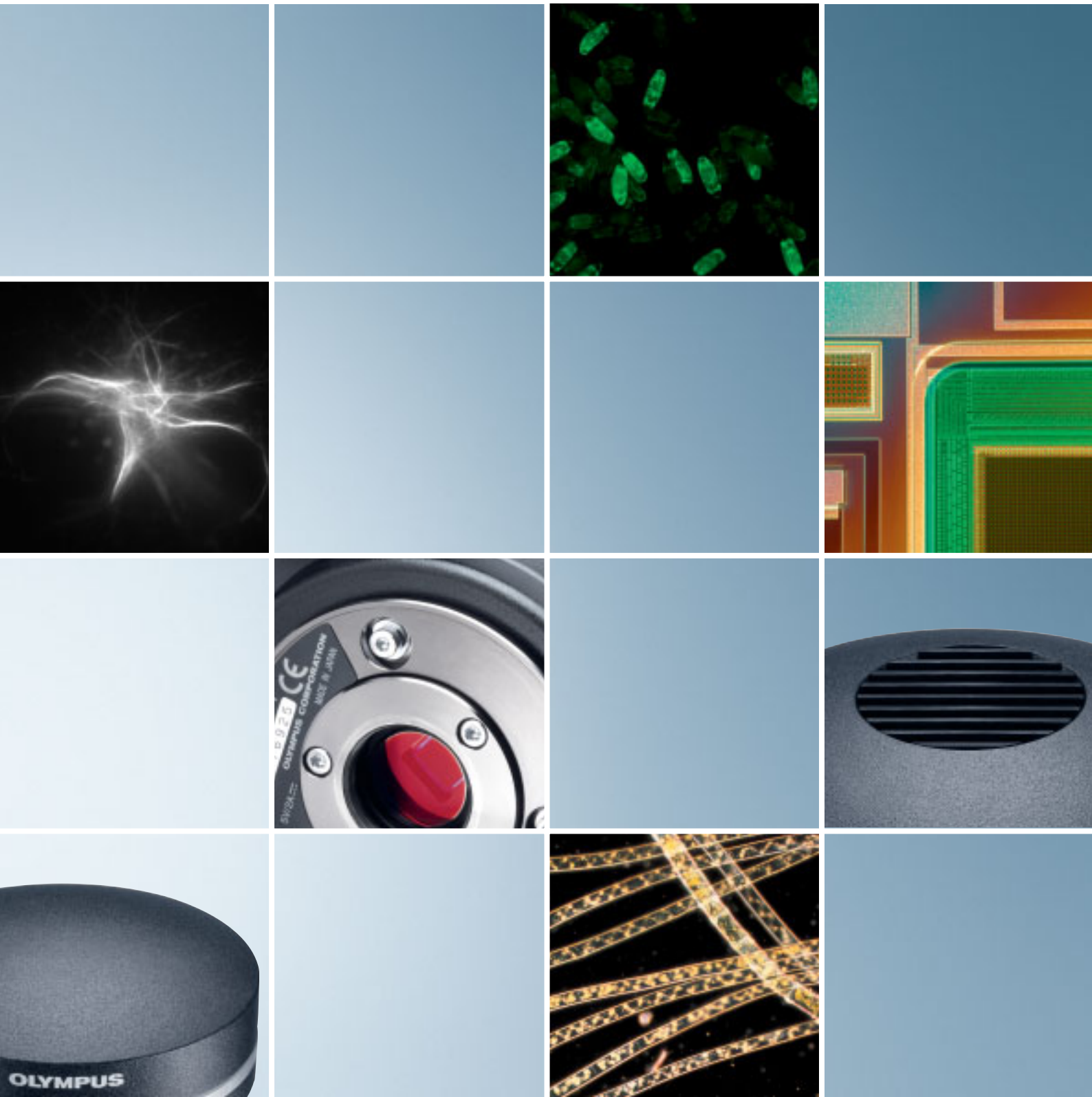
Your Vision, Our Future

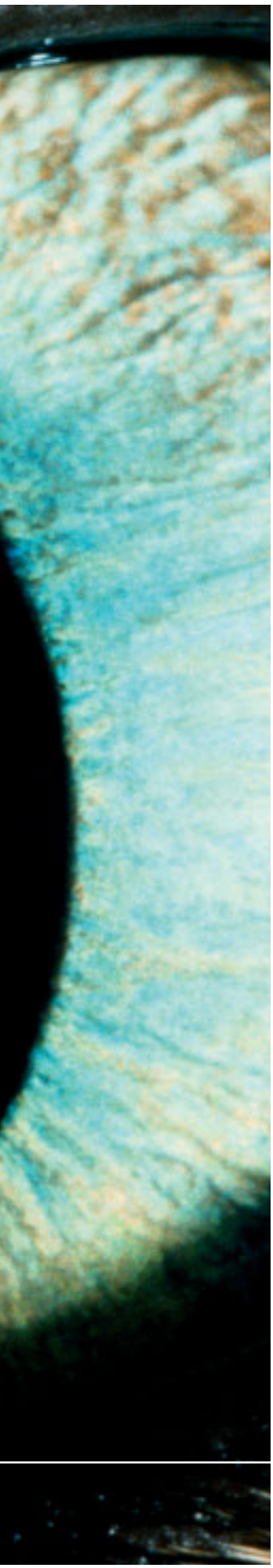
Digital Microscope Cameras

Camera Overview

Colour, B&W and Universal

Versatility by Design

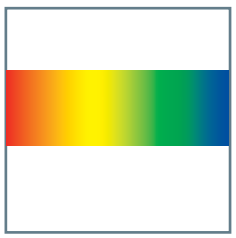




THE FLEXIBILITY OF CHOICE

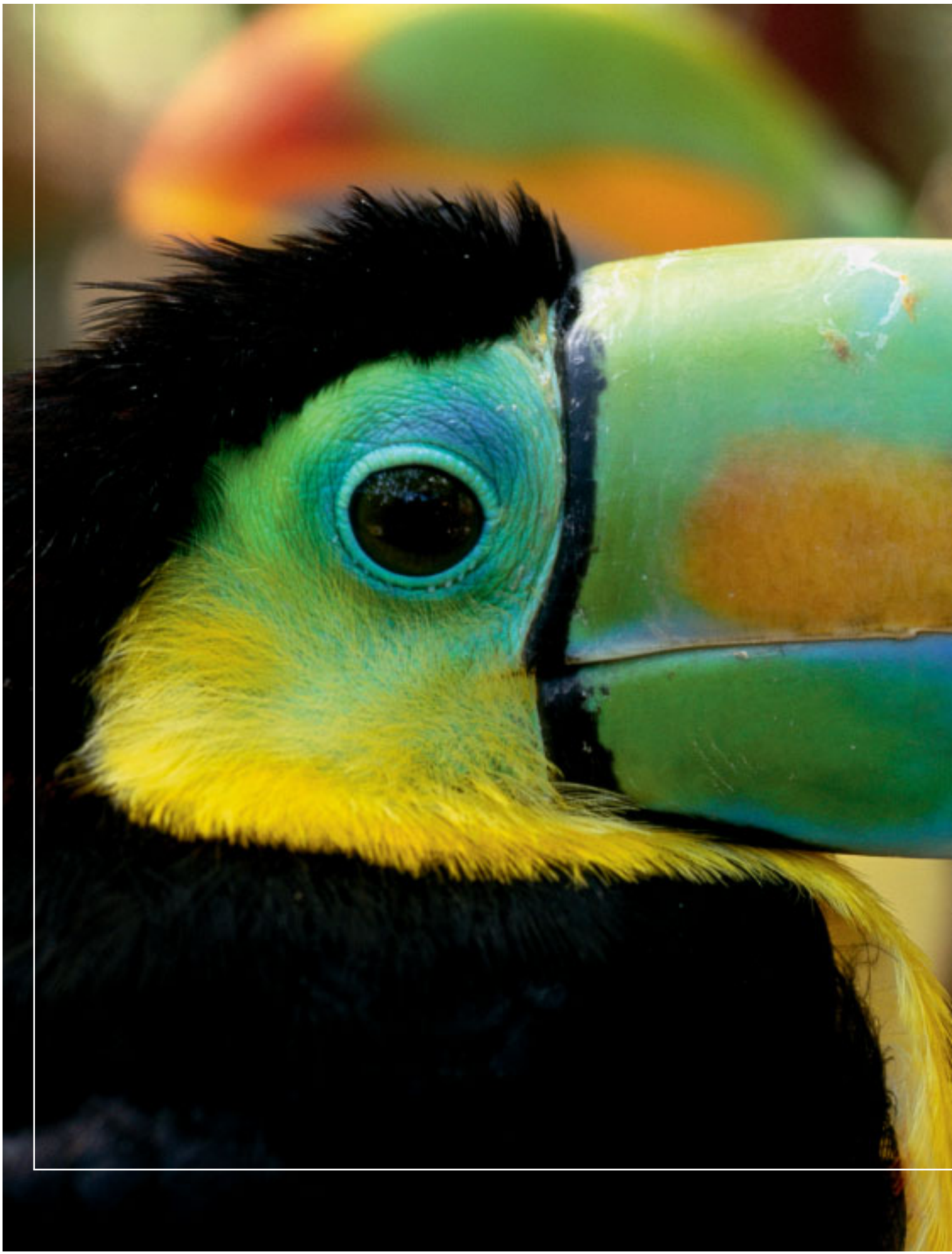
Your project needs the right camera

It is always preferable to have a choice, and this is definitely true when it comes to matching your digital imaging requirements with your project work. Sometimes you'll want dazzling colour fidelity and at other times you'll need pixel-precise black and white capture. There are also those occasions when you would like a microscope camera that can do both. Add to this selection the ability to choose from a range of image sizes and resolutions, and the Olympus digital microscope camera range really does offer you the flexibility of choice.



Your vision: our future

Olympus is dedicated to making digital imaging solutions to support your work at all levels. We have therefore developed a comprehensive range of digital cameras to make the most of any application, whatever the microscope.



PERFECT COLOUR MATCH

Colour: an exact science

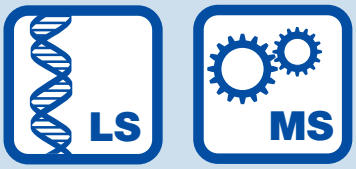
Colour reproduction presents microscope camera manufacturers with a very complex set of issues. Besides the colour itself, the intensity and weighting within the given spectral range has to be taken into account, and Olympus has worked very hard to produce a range of cameras that provide perfectly balanced solutions for each and every application.

A **DP20**

Fast, high-resolution camera with stand-alone functionality

B **Versatile camera**

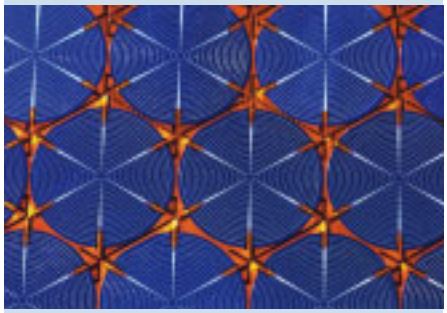
For life and materials science



C **Authentic colours**

Internal colour management

In vitro fertilisation



Solar cells: photovoltaic silicon waver

DP20

With an ultra-fast full-frame rate of 15 fps, the 2-megapixel Olympus DP20 digital microscopy camera offers a smooth and easy-to-view live display of the field of view. The stand-alone DP20 is designed to output directly to a high-resolution UXGA (1,600 x 1,200 pixels) monitor or projector, and is perfect for all life science and industrial imaging requirements.

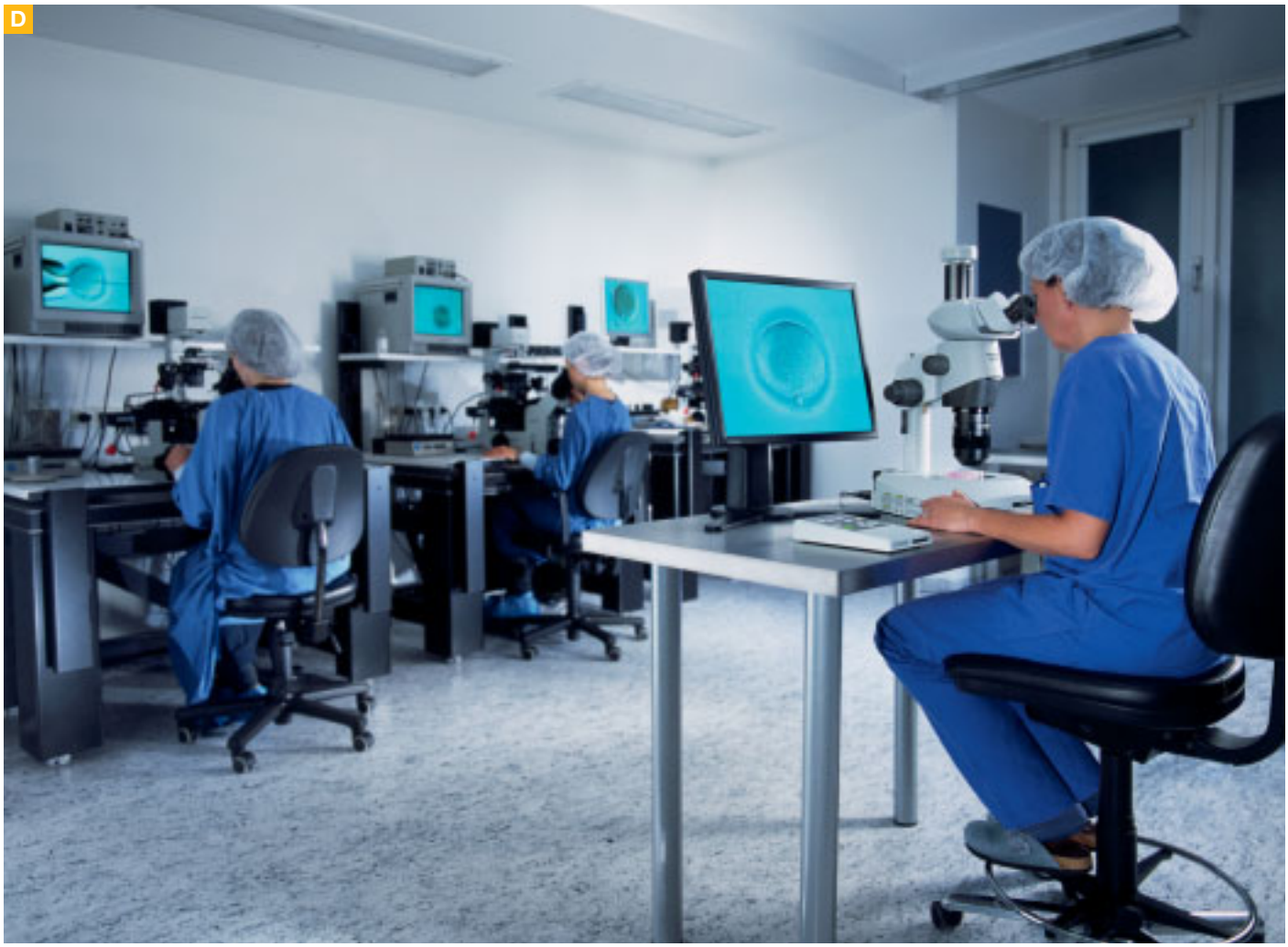
Broad range of applications

The DP20 is ideal for a broad range of biomedical, clinical, diagnostic and educational applications with its rapid, real-time live display, stunning colour and crisp detail. This is also a great camera for a wide range of end users who require a camera for documentation purposes including bright fluorescence as well as inspections of electronic parts and industrial materials. The stand-alone functionality, which means that the camera does not require any further connections such as a PC or network, ensures excellent flexibility in terms of the technology and space required for use.

Outstanding colour reproduction

The 2-megapixel DP20 uses a 1,200 x 1,600-pixel CCD and a 12-bit analogue-to-digital converter. This enables it to display subtle colour differences, which is very important for accurate colour reproduction. The result is images with outstanding colour and fine detail. Pathologists, cytologists, haematologists and microbiologists will find the accurate colour reproduction of their specimens a welcome change.

Image D courtesy of FCH Fertility Center Hamburg, Germany


D

Stand-alone operation

The DP20 has been developed to offer complete stand-alone (no PC required) functionality, making it ideal when precious bench space is limited. The camera is controlled from an ergonomic, handset control box providing smooth operation via a functional key layout. The focusing indicator and panning 4x digital zoom function mean that faster and more accurate focusing can be achieved with ease, even at lower magnifications. This, together with a calibrated scale bar and numerous measurement functions, enables maximum flexibility in imaging protocol development.

As a result, manual imaging is quick and easy, and the camera can even be set to automatically control the exposure and white balance for the image. Furthermore, an over/underexposure notification ensures images are perfect every time. Images can be stored in different resolutions onto type-I, CompactFlash storage media of up to 4 GB maximum capacity. Images can be retrieved from the storage media using the integrated file transfer software and USB 2.0 interface.

PC connectivity

The DP20 camera is also fully integrated into and supported by the Olympus cell* or Olympus analysis family of imaging and analysis software packages. Each range presents an array of solutions specially designed to provide flexible and easy-to-use functionality for better image acquisition, processing, analysis, evaluation and report generation.

E **DP20 handswitch**

Enables operation without PC

A SC20

Camera head

B Brightfield camera

For materials science

MS

SC20

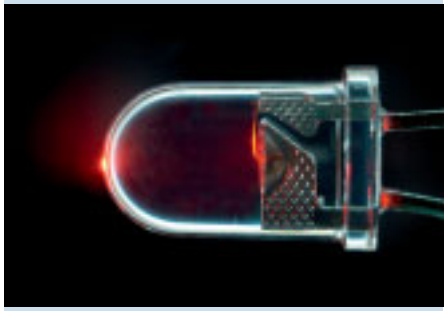
The Olympus SC20 uses a 2-megapixel CMOS chip which is excellent for standard brightfield applications and is superb for simple digital documentation purposes. In conjunction with its excellent cost/performance ratio, the SC20 is the ideal introductory model for digital image acquisition for light microscopes.

Operational versatility

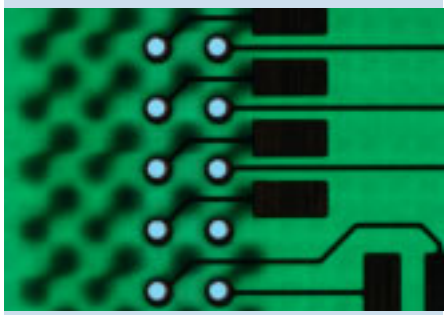
The SC20 has been designed for fast frame rates, so even at full resolution (1,596 x 1,196, 10 bits per colour channel), the camera can deliver 10 fps and, with the use of 2x pixel binning, this can exceed 32 fps.

Easy integration

The SC20 uses the standard C-mount adaptor for optical coupling, and data transfer and power requirements are dealt with by a single high-speed USB 2.0 cable. This ensures that both hardware and software integration into any system is easy. SC20 is fully compatible with the Olympus cell* and Olympus analysis software environments.



LED lamp, darkfield image



Printed circuit board

UC30

The Olympus UC30 offers an excellent 3.2-megapixel resolution and fast frame rates with the added benefit of 2x and 3x colour binning, making it ideal for entry-level imaging requirements in both life and materials sciences. The CCD chip provides 2,080 x 1,544 pixels with 14 bits per colour channel and supports a number of different frame rates.

High resolution: sensitive touch

The colour CCD chip ensures users can see more and, as a result, measurements can be carried out with great precision and sensitivity, providing detection of even very weak signals. The camera also offers three frame rates:

Search mode uses 3x pixel binning to offer nearly 35 images per second at 688 x 514 pixels. This makes finding suitable areas of a sample very easy. The focus mode uses 2x pixel binning to offer 14 images per second at 1,040 x 772 pixels. This ensures that focusing can be carried out quickly and accurately.

The full-resolution mode offers 5 images per second at 3.2-megapixel resolution. These modes enable users to quickly find, focus on and image exactly what they are looking for with good colour fidelity. Additionally, the UC30 offers a broad exposure range (100 µs–10 s) and a black-and-white acquisition mode at 1,040 x 772 pixels.

Easy installation

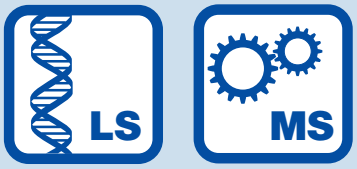
The UC30 can be quickly and easily mounted onto all light microscopes with a C-mount adaptor. Furthermore, FireWire™ technology guarantees that installation onto a PC or laptop equipped with a FireWire™ port is simple, rapid and flexible, with power and data all from one cable.

Clear controls

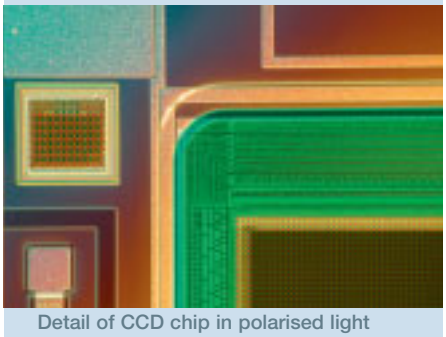
The UC30 can be fully operated via the cell* and Olympus analysis families of Olympus imaging software. This ensures that it can be used to its maximum capacity very easily and enables innovative solutions to all challenges, including image commenting, archiving, report generation and emailing.

A **UC30**
Routine excellence

B **High-resolution camera**
For life and materials science



C **Olympus True Colour**
OTC colour management



Detail of CCD chip in polarised light

A XC30

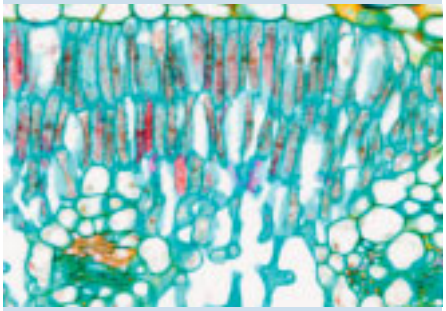
3-megapixel cooled camera head

B Peltier-cooled camera

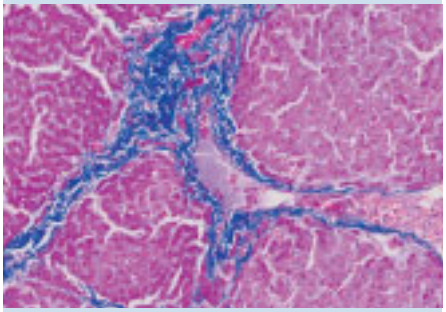
For life science

C Olympus True Colour

OTC colour management



Oleander leaf section



Liver section, malign

XC30

The Olympus XC30 is similar to the UC30 but has the powerful benefits of Peltier cooling and partial readout technology. As a result of the cooling, the performance of the XC30 is perfectly balanced in terms of background noise and colour fidelity. This is especially relevant to pathology and histology applications. The versatile CCD can also be used for high-intensity fluorescence.

Keeping a cool head

The Peltier cooling mechanism maintains the CCD chip at a constant 10 °C (at 25 °C ambient temperature) to guarantee perfect colour images that are rich in contrast, with excellent colour fidelity and extremely low background noise. The cooling also enables the exposure range to be expanded to cover 100 µs–160 s.

Versatile functionality

The 2,080 x 1,544-pixel CCD chip offers 14 bits per colour channel and can be switched between various frame rates for easier use. As well as the 2x and 3x pixel binning capabilities, the XC30 also offers a partial readout mode where a segment of the entire field of view can be defined by the user and only this image segment is read out by the camera. This enables faster focusing on and imaging of the features of interest within the field of view.

Consistent control

As with the UC30, the XC30 can be fully operated using the cell* and Olympus analysis families of imaging software. This makes it both easy and quick to use it to its maximum capacity, ensuring that it provides the best solution to all challenges including image labelling, commenting and archiving, report generation and emailing.

Image C on the right shows crystalline structures in polarisation microscopy

XC50

The Olympus XC50 offers a high resolution of 5 megapixels and is Peltier-cooled to provide a wide dynamic range along with a number of different frame rates using pixel binning and partial readout modes. These make the XC50 a versatile colour camera with excellent sensitivity and flexible operation.

The chip

The 2,576 x 1,932-pixel CCD chip used in the XC50 offers 14 bits per colour channel and can be used for variable exposure times between 100 µs and 160 s with the help of Peltier cooling, which maintains a constant 10 ˚C (at 25 ˚C ambient temperature). These features, along with the high sensitivity, colour fidelity, superior contrast and extraordinary signal-to-noise ratio make the XC50 a great universal high-resolution colour camera.

In the frame

The XC50 supports three different binning modes: 2x, 4x and 6x, as well as a partial readout mode which is used to concentrate and retrieve the information from a region of interest (ROI) within an image. At full resolution, the XC50 provides a live frame rate of 5 fps, which increases to 24.5 fps using the 6x binning mode.

Installation and control

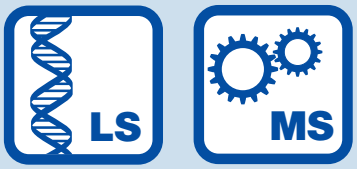
Using the standard C-mount adaptor and FireWire™ connectivity, the XC50 is easy to integrate into any system and ensures a tidy working space. Furthermore, the camera can be fully operated using the cell* and Olympus analysis software families, which also offer a host of image processing, storage and measurement functions. In addition, the software uses real-time functions to ensure that the entire dynamic range is exploited, for optimally balanced contrast and superior image quality.

A **XC50**

High-resolution camera

B **Peltier-cooled camera**

For life and materials science



C **Olympus True Colour**

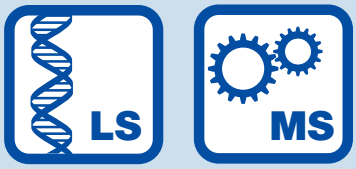
OTC colour management

A **DP25**

Colour performance camera

B **Versatile camera**

For life and materials science

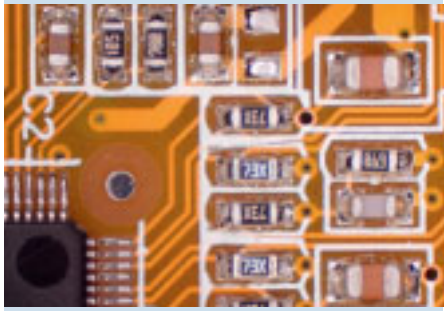


C **Authentic colours**

Internal colour management

D **Nut weevil (*Curculio nucum*)**

Image acquired with EFI (extended focal imaging)



SMD-welded circuit board

DP25

The DP25 5-megapixel colour digital microscopy camera takes imaging to the next level through the integration of superior technologies, such as ICC profiles for colour fidelity and field update algorithms for fast frame rates. As a result, the Olympus DP25 is an easy-to-operate digital colour camera system for a broad range of microscopy and imaging processes such as image documentation, reporting and analysis.

The power to perform

The CCD chip has a maximum resolution of 2,560 x 1,920 pixels and, with three binning levels (2x, 3x and 4x), can be used in live mode with various frame rates from 8 fps (full resolution) to 32 fps (4x binning), ensuring the correct balance between frame rate and display quality for each and every application.

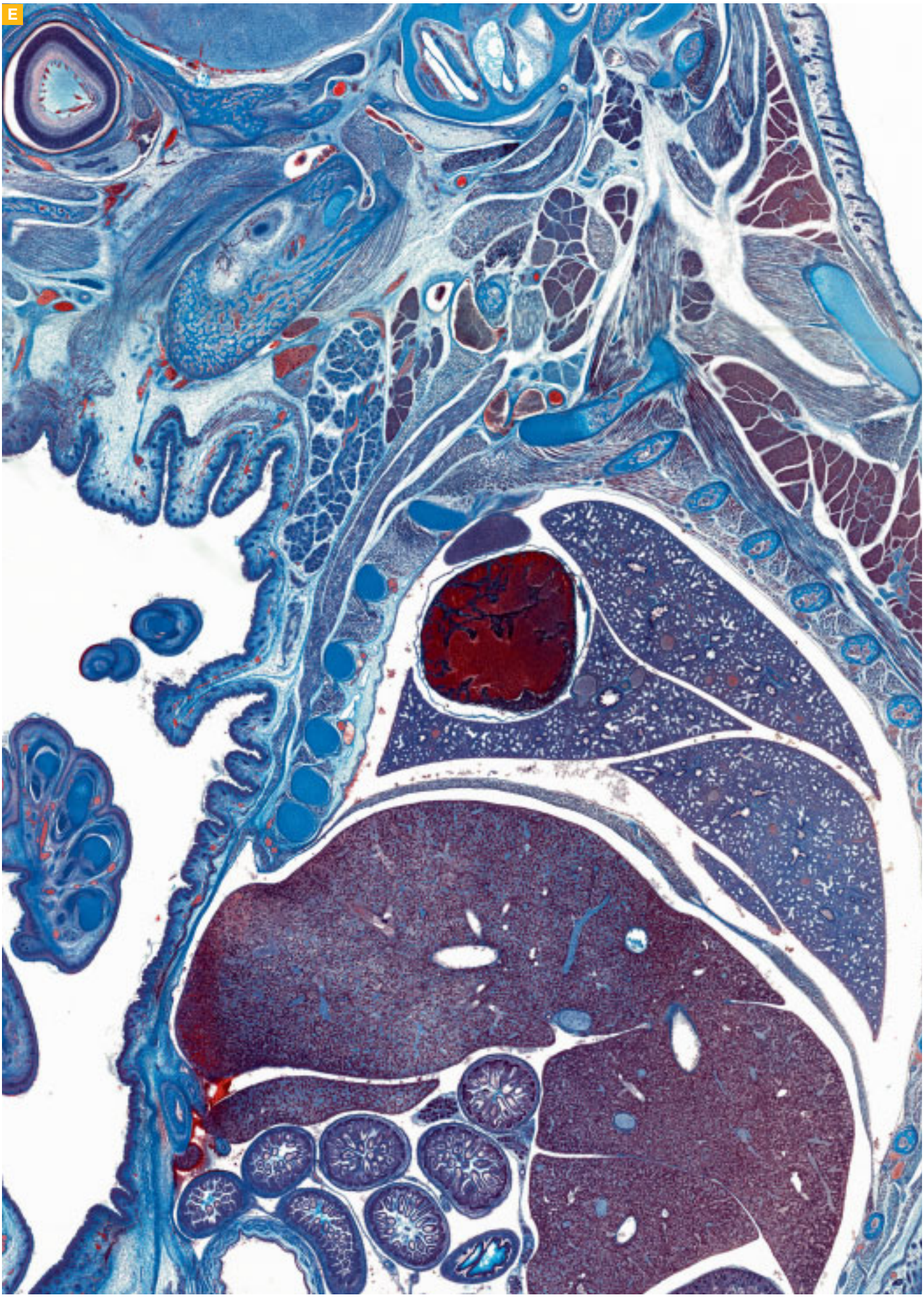
The quality to capture

The extensive dynamic range of the DP25 ensures that all images are of outstanding quality. This is supported strongly by the application of real-time true colour optimisation. As a result, images look natural, with very high fidelity to the actual colours in the sample.

The experience to enable

The DP25 draws on Olympus' extensive experience to provide intuitive installation and set-up. It uses the standard C-mount optical coupling for easy installation to all microscopes, and data transfer and power are provided by FireWire™ technology, guaranteeing that the DP25 is simple to install. Using the camera is just as simple, since there is a choice of either automatic exposure routines or manual control, and all acquired images are calibrated automatically. In addition, images can be prepared as desired with post-acquisition geometry, enhancement and filtering functions. Furthermore, the DP25 is seamlessly integrated into the extensive cell* and Olympus analysis family software ranges from Olympus.

Image E shows a sagittal section of a rat embryo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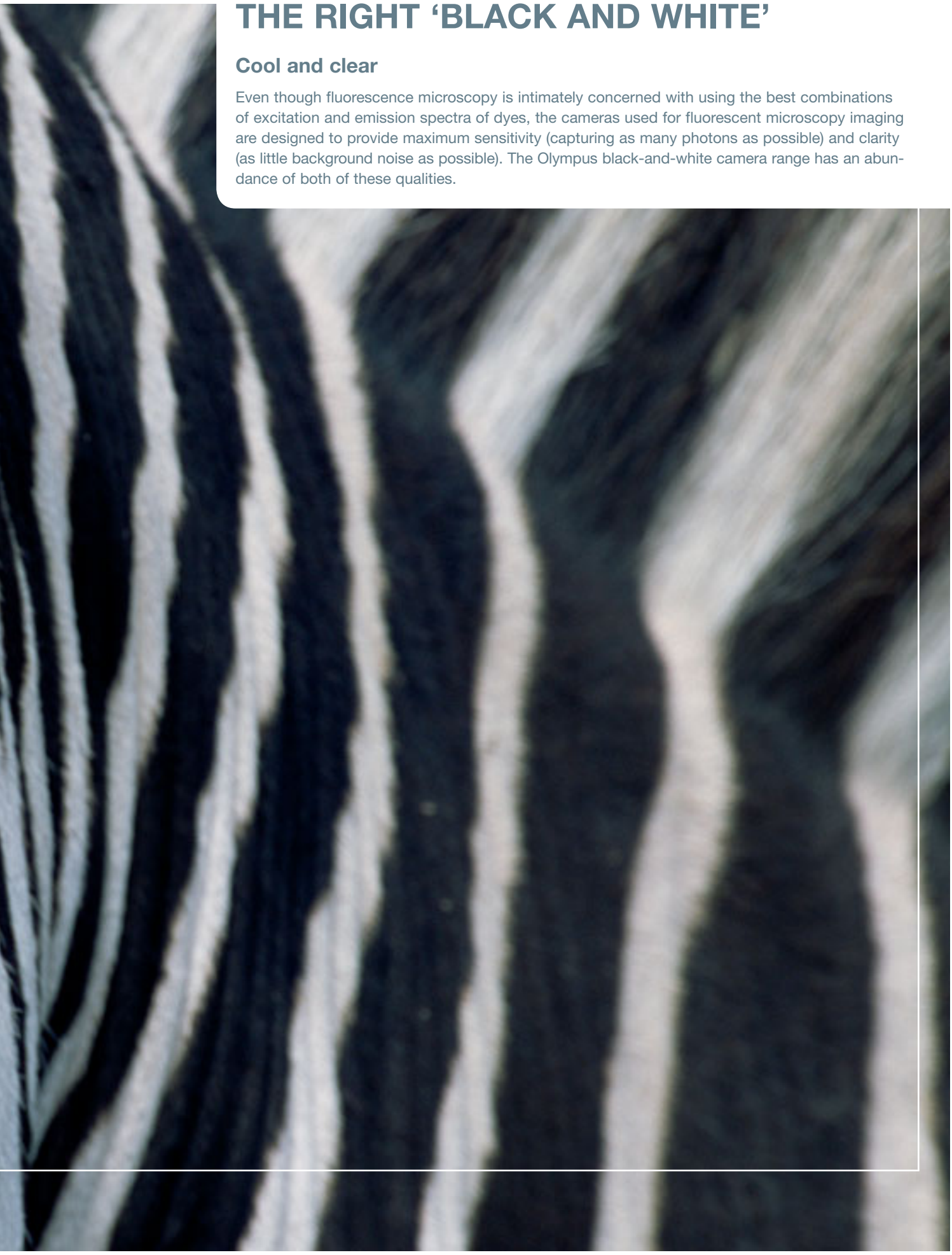
THE RIGHT ‘BLACK AND WHITE’

Cool and clear

Even though fluorescence microscopy is intimately concerned with using the best combinations of excitation and emission spectra of dyes, the cameras used for fluorescent microscopy imaging are designed to provide maximum sensitivity (capturing as many photons as possible) and clarity (as little background noise as possible). The Olympus black-and-white camera range has an abundance of both of these qualities.

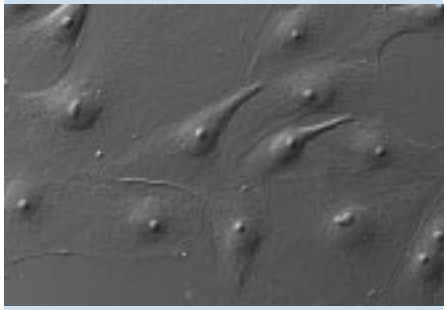


A XM10

Monochrome cooled CCD

B Sensitive black-and-white

For life science



PtK cells, differential interference contrast

XM10

The XM10 offers all of the properties required to provide dependable fluorescence microscopy images: high resolution, extremely high sensitivity, a cooled CCD chip, variable resolutions and an optional external trigger function.

The right tool for the job

The XM10 uses a 1,376 x 1,032-pixel CCD chip cooled to 10 ˚C (at 25 ˚C ambient temperature) with a 14-bit dynamic range and 15 fps at full resolution. It offers three binning modes: 2x, 4x and 8x, resulting in increased sensitivity and excellent frame rates in live mode, which make it easier to focus and locate areas of interest within the viewfield while conserving highly sensitive fluorescence samples:

- 25 fps at 688 x 516 pixels (2x binning)
- 50 fps at 344 x 258 pixels (4x binning)
- 80 fps at 172 x 129 pixels (8x binning)

Four models

The XM10 is available in four different versions to reflect its key capabilities. Amplifying the basic XM10, the IR-extended version (XM10-IR) is perfect for the full range of fluorescent dyes, including those in the near-IR region such as CY5 and CY7. The external hardware-triggered XM10-T version provides the capability for the user to capture images precisely when they want to via cell™ or cell®. The XM10-TIR combines these two properties to offer users the perfect camera for all levels of fluorescence microscopy.

Easy to integrate

The Olympus XM10 makes a great addition to any microscopy system not only because of its great features, but also since it is easy to integrate, using a standard C-mount adaptor to connect to the microscope, and the high-speed data transfer and power capabilities of the FireWire™ interface.

The XM10 is fully supported by the Olympus cell* and analysis software families, ensuring that whatever the application, the information is not only fully collected but properly analysed, processed and displayed.

Real-time image optimisation functions enable the utilisation of the entire dynamic range under all conditions and guarantee the best contrast. The XM10's integration into analysis functions provides all the capabilities and advantages of state-of-the-art digital image processing and analysis, ranging from image labelling, archiving, report generation and emailing, as well as photo-realistic printouts without the darkroom.

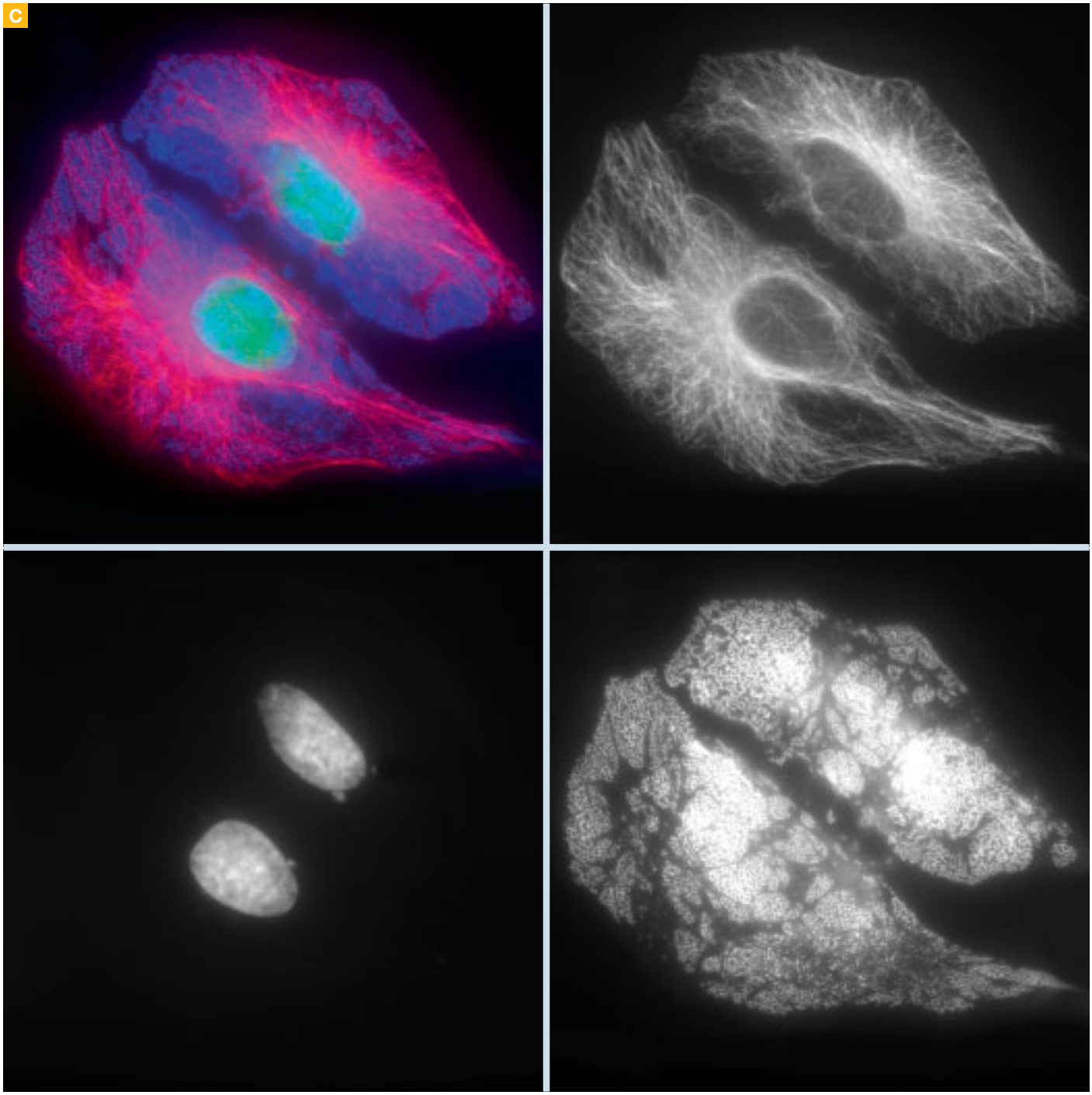
Designed for fluorescence

At full resolution, the XM10 is ideal for all fluorescence acquisitions since it is extremely sensitive, low in electronic noise and supports long integration times of up to 160 seconds. The chip has a pixel size of 6.45 µm x 6.45 µm, which, in combination with the camera cooling, ensures that the XM10 is ideal for recording even the faintest fluorescence signals in your specimen.

C Human HeLa cells

Red: alpha-tubulin subunit of microtubule cytoskeleton, green: nuclear DNA stained with Hoechst 33342, blue: GFP-tagged synaptotagmin-III, clustered in patches on the cell surface

Image courtesy of Dr Jeremy C. Simpson, Cell Biology & Biophysics, EMBL, Heidelberg, Germany



MULTI-TALENTED ALL-ROUNDERS

Trendsetters

When there is a requirement for two or more seemingly distinct technologies in one instrument, there is often a compromise reached whereby the product is good but not great. The Olympus universal microscopy imaging cameras reverse this trend, though, with two multi-talented cameras which excel at every task.

A DP72

Multi-purpose camera

B High-performance camera

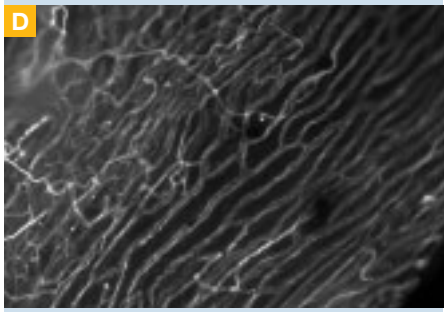
For life and materials science

LS MS

C Authentic colours

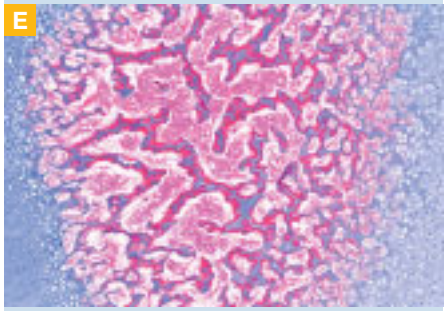
Internal colour management

D



Axon and dendrite morphogenesis during neuronal maturation task*

E



Spinal column section

DP72

The new Olympus DP72 digital camera offers unmatched versatility for microscopists, combining a 12.8-megapixel resolution with the highest sensitivity, very fast image acquisition rates and colour match performance. These unique features mean that the DP72 now unites unrivalled performance in brightfield and fluorescence imaging in one camera.

Latest technology

The new Olympus DP72 digital camera uses the latest interface technology and a high-sensitivity CCD to provide the fastest image acquisition rates of any comparable camera. In live mode, full-frame images (1,360 x 1,024 pixels) can be viewed at 15 frames per second, making it ideal for viewing, discussion and documentation. A real-time frame-averaging function minimises noise and optimises the display, resulting in low-noise live images. Still images, at pin-point resolutions of up to 12.8 million pixels, can be obtained in less than 2.5 seconds with Olympus' unique piezo-shift technology.

Faithful colours

With superior hardware-driven image processing capabilities, the DP72 is especially suitable for applications such as pathology, where faithful colour reproduction is essential. Images are captured in 12-bit resolution using CCD technology to present authentic, smoothly graduated colours.

Sensitive B&W

In applications such as fluorescence microscopy, where a specimen is wholly or partially dark, the DP72 records black-and-white images with exceptional sensitivity. The custom monochrome mode allows the user to optimise the recording sensitivity according to the emission wavelength of the fluorescent dye in the specimen. High sensitivity and low noise is ensured for the faintest of images by Peltier cooling of the CCD chip to 10 ˚C below ambient temperature, allowing long exposure times. These features ensure that the Olympus DP72 gives sharp, clear results with even the faintest of fluorescent signals.

System integration

The DP72 is so advanced that it comes with its own PC control board, which enables all of the functions to be completed 'off-chip' but also without using precious computer CPU resources. The DP72 can be fully controlled via the cell* and analysis software, which also offer enhanced image acquisition, archiving, analysis and distribution.

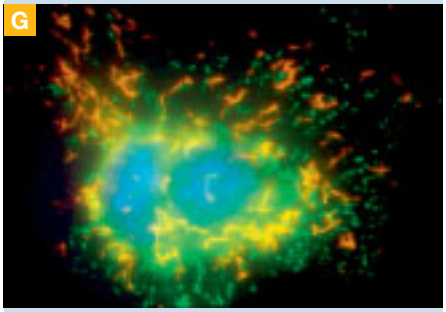
* Image D courtesy of Josh Morgan, Dr Rachel Wong group, Department of Anatomy and Neurobiology, Washington University, School of Medicine, St Louis, United States

The difference

The DP72 is the best choice for all researchers, since it can be set to provide accurate automatic exposure for both fluorescent and brightfield specimens: the SFL Auto Exposure Mode makes it easy to acquire fluorescence images, since it correctly adjusts to the ideal exposure time automatically. It is also possible to set the parameters manually. Furthermore, images can be acquired in greyscale whilst maintaining the dynamic range of each RGB colour channel. Using this feature increases the sensitivity of the camera and, as a result, the exposure times can be shortened to limit cell damage.

The custom monochrome function allows the user to maximise the readout intensity of specific dyes by accentuating the respective pixel colour. Sensitivity can be increased by implementing binning modes, which combine the light intensity of 2 x 2 or 4 x 4 pixel areas. As a result, clear, sharp images are produced consistently for all illumination methods and experimental protocols.

Vincent van Gogh, 'Drawbridge' (1888), oil on canvas; detail showing brushstrokes*



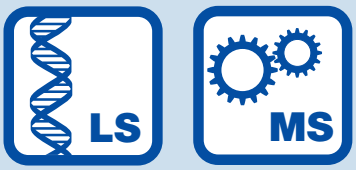
1806b, human HeLa cells.**

* Image F courtesy of Wallraf-Richartz-Museum – Fondation Corboud, Cologne, Germany

** Image G courtesy of Dr Jeremy C. Simpson, European Molecular Biology Laboratory (EMBL), Cell Biology and Biophysics Programme, Heidelberg, Germany

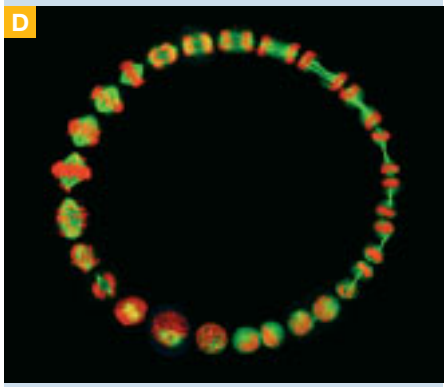
A **XC10**
Sensitive, cooled CCD

B **Flexible universal camera**
For life and materials science



C **Olympus True Colour**
OTC colour management

D



Sequentially recorded cell cycle

XC10

With excellent image quality, high sensitivity and long integration times, the Olympus XC10 Peltier-cooled colour camera offers every user a flexible general-purpose imaging set-up.

Fast, smooth and sensitive

The powerful 1,376 x 1,038-pixel CCD chip offers the clarity of 14 bits per colour channel and has the ability to provide very high frame rates via the use of pixel binning. In the 2x binning mode, the camera provides more than 25 fps, which increases to nearly 50 fps when using 4x binning. This makes the XC10 ideal for applications that require fast image acquisition of dynamic objects. In addition, the high image frequency can be used to focus on samples or locate areas of interest directly on the PC screen.

The high sensitivity of the XC10 is the result of a large pixel size of 6.45 x 6.45 µm. This defines the camera's ability to be a well-equipped all-rounder; not only perfect for colour imaging, but also for meeting high expectations in sensitive fluorescence applications.

Chilled

The Peltier-cooled CCD maintains a temperature of 10 ˚C (at 25 ˚C ambient temperature), enabling this multifunctional camera to provide colour and black-and-white images that are rich in detail and contrast, with extraordinarily low background noise. The extensive exposure time range (100 µs–160ms) also adds to the XC10's appeal, ensuring that both strong and weak signals are captured with equal fidelity.

A team player

Whatever the application, the XC10 can provide the images that enable research to be pushed forward. With the ease of both C-mount optical coupling and FireWire™ data and power connectivity, integrating the XC10 into your imaging system is easy.

STAYING IN THE SHADE: COLOUR MANAGEMENT

Colour is an extremely important parameter to consider when choosing a microscope imaging system. In microscope imaging, there are many different ways of electronically interpreting colour and various pieces of equipment that are used to transfer or process the image. As a result, being sure that the final version of the image is a true representation of what was actually there in the original sample, was previously a hit or miss procedure. Olympus has changed this by incorporating Olympus True Colour (OTC) technology across its new colour microscope imaging camera range, the UC and XC series. OTC ensures that there is the same colour distribution in the sample, live image and recorded image, enabling the 'real image' to be viewed at every stage.

The importance of colour

Colour is one of the main methods of differentiating the relevant aspects of a sample. The colours in the sample could be natural or imposed by the research protocol, and the overall balance of the colours is often used to determine certain properties or even diagnose disease. Therefore it is essential that, as well as ensuring the optimum resolution and clarity, colours are captured with the right hue, saturation and intensity as seen through the eyepiece by the user.

Highest fidelity

The unique Olympus True Colour (OTC) system ensures consistency between input and output colours, as well as between different cameras. OTC uses internal International Color Consortium (ICC) reference profiles to govern the relationship between the colours at every stage of the imaging process. This ensures true colour fidelity from the specimen to the monitor, for every protocol on any new Olympus colour microscope camera.

Real-time: real colour

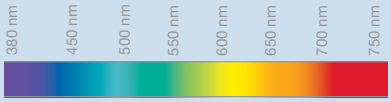
The Olympus True Colour system also works in real time, applying the profiles in live mode to ensure the best possible colour representation at the highest possible speed (patents pending). As a result, the user can capture the image they require directly from live mode, without worrying about the quality of the colours.

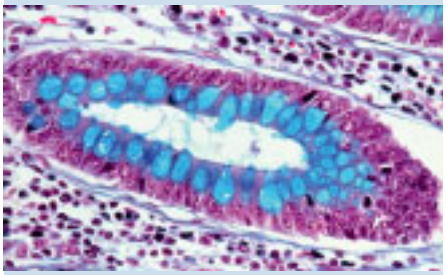
Colour profiles

Different components in an imaging system use different 'colour spaces' to process colour. The International Color Consortium profile format supports a variety of colour spaces divided into three basic families, each of which has a predefined subset of colours that it can process (otherwise known as a 'gamut'). If the gamut of the source and destination colour spaces differ (e.g. the camera and the monitor), 'gamut mapping' has to be performed and those colours that cannot be represented in the destination need to be altered to the closest colours available. This mapping process is carried out by the software driving the Olympus colour cameras to ensure that there is excellent consistency between different components of the same system, and also between different cameras in the range.

A **Human vision**

"Optical spectrum" 380–750 nm

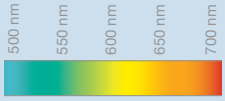


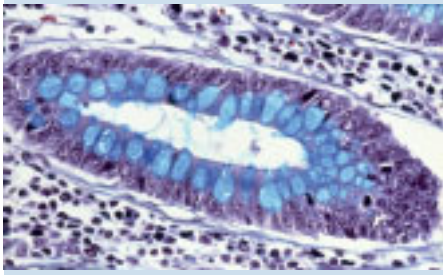


Typical specimen as seen through human eyes on an Olympus microscope

B **Camera vision**

"Optical spectrum" 500–710 nm



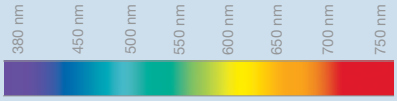


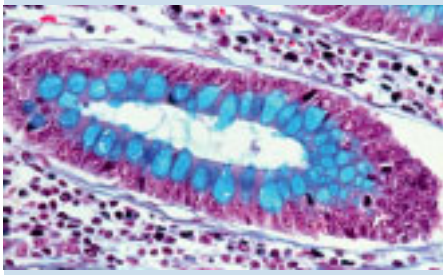
The same specimen "seen" by the CCD sensor of a digital camera

OTC

C **Your display**

"Optical spectrum" 380–750 nm





Monitor display of the image (image taken by an Olympus CCD camera, after the application of the OTC algorithm)

Camera specifications

Colour cameras

	DP20	SC20	UC30	XC30	XC50	DP25
Image sensor	Colour CCD	Colour CMOS	Colour CCD	Colour CCD	Colour CCD	Colour CCD
Sensor type	Sony ICX 274 AQ	Micron MT9D001	Sony ICX 252 AQ	Sony ICX 252 AQ	Sony ICX 282 AQ	Sony ICX 282 AQF
Sensor size	1/1.8 inches	1/2 inches	1/1.8 inches	1/1.8 inches	2/3 inches	2/3 inches
Resolution (max.)	1,600 x 1,200 pixels	1,596 x 1,196 pixels	2,080 x 1,544 pixels	2,080 x 1,544 pixels	2,576 x 1,932 pixels	2,560 x 1,920 pixels
Pixel size	4.2 µm x 4.2 µm	4.2 µm x 4.2 µm	3.45 µm x 3.45 µm	3.45 µm x 3.45 µm	3.4 µm x 3.4 µm	3.4 µm x 3.4 µm
Binning	No	No	2x, 3x	2x, 3x	2x, 4x, 6x	2x, 3x, 4x
Readout speed	n/a	24 MHz	24.5 MHz	24.5 MHz	24.5 MHz	24.5 MHz
ADC*	10 bit	10 bit	14 bit	14 bit	14 bit	12 bit
Exposure time	0.05 ms–8 s	0.1 ms–1 s	0.1 ms–10 s	0.1 ms–160 s	0.1 ms–160 s	0.2 ms–16 s
Live frame rates*²	15 fps at 1,600 x 1,200	9.8 fps at 1,596 x 1,196	7.0 fps at 2,080 x 1,544	7.0 fps at 2,080 x 1,544	4.5 fps at 2,576 x 1,932	8 fps at 2,560 x 1,920
	15 fps at 1,280 x 960	32 fps at 796 x 596	13.6 fps at 1,040 x 772	13.6 fps at 1,040 x 772	9 fps at 1,288 x 966	8 fps at 1,280 x 960
	15 fps at 800 x 600	93 fps at 396 x 296	35 fps at 688 x 514	35 fps at 688 x 514	16.5 fps at 640 x 480	24 fps at 854 x 640
					24.5 fps at 424 x 318	32 fps at 640 x 480
Cooling system	No	No	No	Peltier 10 °C at 25 °C ambient	Peltier 10 °C at 25 °C ambient	No
Readout noise	n/a	n/a	<10 e^-	<10 e^-	<10 e^-	<10 e^-
External trigger	No	No	No	No	No	No
Data transfer	USB 2.0	USB 2.0	FireWire™ IEEE 1394a	FireWire™ IEEE 1394a	FireWire™ IEEE 1394a	FireWire™ IEEE 1394a
OTC support*³	No	No	Yes	Yes	Yes	No
Partial readout	No	No	Yes	Yes	Yes	Yes
Remarks	Including control panel/	–	–	–	–	Field update technology
	compact flash storage;					
	directly connectable to					
	UXGA monitor					
Operating system	Windows 2000/XP	Windows 2000/XP	Windows XP/Vista	Windows XP/Vista	Windows XP/Vista	Windows XP SP2/Vista
Application	LS MS	MS	LS MS	LS	LS MS	LS MS

Black-and-white camera

	XM10
Image sensor	Monochrome CCD
Sensor type	Sony ICX 285 AL
Sensor size	2/3 inches
Resolution (max.)	1,376 x 1,032 pixels
Pixel size	6.45 µm x 6.45 µm
Binning	2x, 4x, 8x
Readout speed	24.5 MHz
ADC*	14 bit
Exposure time	0.1 ms–160 s
Live frame rates*²	15.0 fps at 1,376 x 1,032
	25 fps at 688 x 516
	50 fps at 344 x 258
	80 fps at 172 x 129
Cooling system	Peltier 10 °C at 25 °C ambient
Readout noise	<10 e^-
External trigger	Optional
Data transfer	FireWire™ IEEE 1394a
OTC support*³	No
Partial readout	Yes
Remarks	–
Operating system	Windows XP/Vista
Application	LS

Universal cameras

	DP72	XC10
Image sensor	Colour CCD	Colour CCD
Sensor type	Sony ICX 275 AQ	Sony ICX 285 AQ
Sensor size	2/3 inches	2/3 inches
Resolution (max.)	4,140 x 3,096 pixels	1,376 x 1,032 pixels
	(1.45 Mpx w. pixel shift)	
Pixel size	6.45 µm x 6.45 µm	6.45 µm x 6.45 µm
Binning	2x, 4x	2x, 4x
Readout speed	28 MHz	24.5 MHz
Dynamic range	12 bit	14 bit
Exposure time	23 µs–60 s	0.1 ms–160 s
Live frame rates*²	15 fps at 1,360 x 1,024	15 fps at 1,360 x 1,024
	15 fps at 680 x 512	25 fps at 688 x 516
	29 fps at 680 x 510	50 fps at 344 x 258 pixels
	57 fps at 340 x 250	
Cooling system	Peltier 10 °C at 25 °C ambient	Peltier 10 °C at 25 °C ambient
Readout noise	n/a	<10 e^-
External trigger	Yes (not available in cell*A–cell*P)	Optional
Data transfer	PCI Express Rev 1.0a or later	FireWire™ IEEE 1394a
OTC support*³	No	Yes
Partial readout	No	Yes
Remarks	Optional custom monochrome	–
	mode, IR filter optionally removable	
Operating system	Windows XP SP2/Windows Vista	Windows XP/Vista
	Business	
Application	LS MS	LS MS

* Analogue digital conversion. Actual bit depth of the camera depends on software used.

*² Conditions for performance measurement: SC20: Pentium D, 3 GHz hyperthreading at 1 ms exposure time
All other cameras: Dual Athlon AMD 2.6 GHz with ICC profiles at 1 ms exposure time

*³ Olympus True Colour optimisation algorithm

The manufacturer reserves the right to make technical changes without prior notice.

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