Imaging the whole organism

From all to small and back

In some respects scientific research has come full circle: Scientists started looking at whole organisms and then drilled down to the molecular level. Now they are beginning to look at the whole organism again, but with a better knowledge of the fundamental molecular building blocks.

This new 'physiology' research has led Olympus to develop a number of new instruments such as the SZX2 stereo microscope series, the MVX10 Macroscope and OV110 whole animal imaging system. The sensitivity and resolution of these microscope systems drives 3D fluorescence work to new levels, enabling researchers to gain new insights into the complex mechanisms of life.

The ultimate 3D view

With our visual system tuned to seeing things in three dimensions, flat images, even in high resolution, can fail to successfully show the information fully. At higher magnifications though, there is not enough depth of field to generate a 3-dimensional view. Therefore, stereo microscopy has always had a place in the low magnification observation of samples that have enough depth information.

The SZX2 range from Olympus has taken stereo microscopy a step further, providing high resolution and high fidelity images across a very broad magnification range.

The UIS2 optics also enable an unprecedented fluorescence capability through the use of high numerical apertures (NAs) and autofluorescence-free glass. This maximises the light available for each of the two optical paths in the Galileo-based arrangement. This plus other features enable the SZX2 series to offer the best all round low magnification imaging systems.

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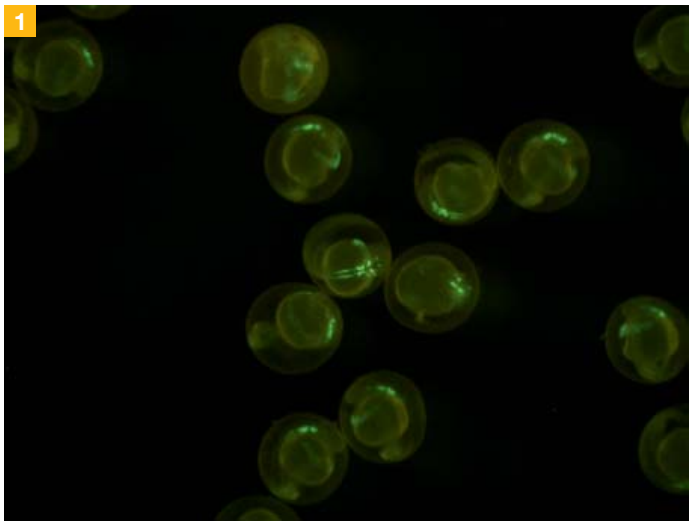

*28-30 hour old zebrafish (*Danio rerio*) embryos expressing green fluorescent protein (GFP)*

High sensitivity fluorescence zoom macroscope

The MVX10 provides the ultimate in fluorescence microscopy at low magnifications with a specially developed optical system using very high NA objectives. As a result, they provide excellent resolution and extremely efficient light collection even with its large working distances (WDs). This means that the faintest of fluorescent signals from an entire organism such as a *C. elegans* or a zebrafish (Dario rerio) can be viewed at low magnification and then zoomed in on for a closer look and further investigation.

This seamless process is possible due to the parfocal design of the objectives, the precision zoom optics and the two position revolving nosepiece. These outstanding features mean that the MVX10 is an excellent tool for the pre-screening of samples, for example, which improves workflows and efficiency. Identification of interesting regions within an entire organism can be done quickly and easily.

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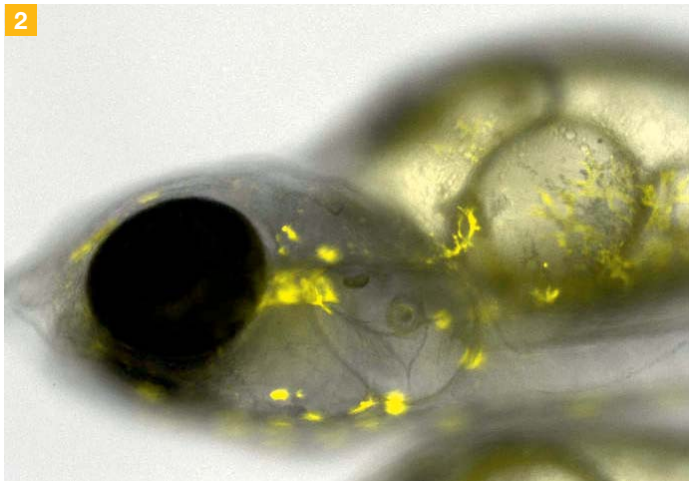

A young Medaka one day after hatching with macrophages labelled with membrane YFP driven by a macrophage specific promoter. Taken on an MVX10. Courtesy of Dr. Adam Cliffe, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany.

Since this is not so easy with high magnification systems such as confocal laser scanning microscopes (CLSMs), researchers can save a lot of time in screening whole organisms using an MVX10. This allows them to screen out unsuitable specimens (no signal) without blocking important and expensive resources such as cLSMs.

As a result, research become more time and cost efficient and is also accelerated.

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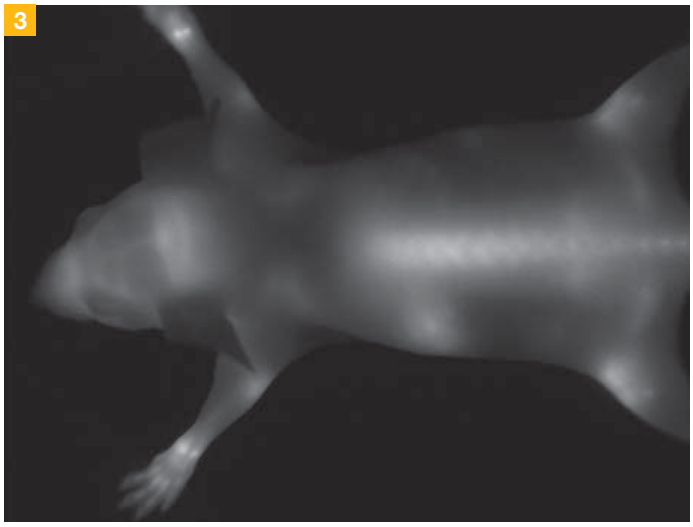

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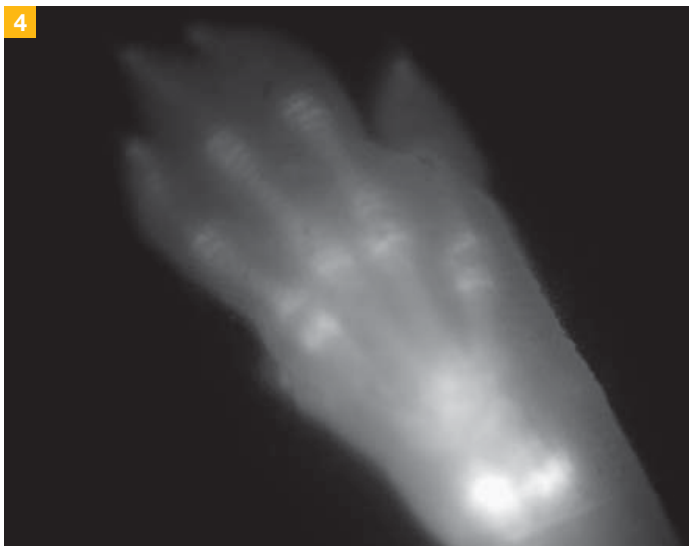

Mouse showing bone remodelling in real time using OsteSenseTM . For NIRF imaging the 0.14x and 0.8x objectives of OV110 have been used

Highly sensitive and fast imaging of small laboratory animals

The OV110 imaging system uses a combination of motorised magnification changer, high NA optics, heated chamber (plus optional anaesthesia equipment), an advanced zoom system, and digital camera to provide whole animal to cellular level bio-illuminated (e.g. fluorescence etc) imaging in live samples.

As a result, the OV110 delivers the optimum clarity at all levels: anatomical, tissue, vascular and cellular. These features combined with the latest fluorescent dyes and advanced post acquisition processing software, make the OV110 perfect for a large number of investigations, such as the extravasation of labelled cancer cells, the growth/shrinking of tumours, bone healing as well as the blood system for example.

Information

Further information is available at: *www.olympus-europa.com/microscopy*

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