VS2000 document de presentation technique

VS200 v3.4 ASW – Version 1.0

01

About SLIDEVIEW VS200

SLIDEVIEW VS200 - Concept

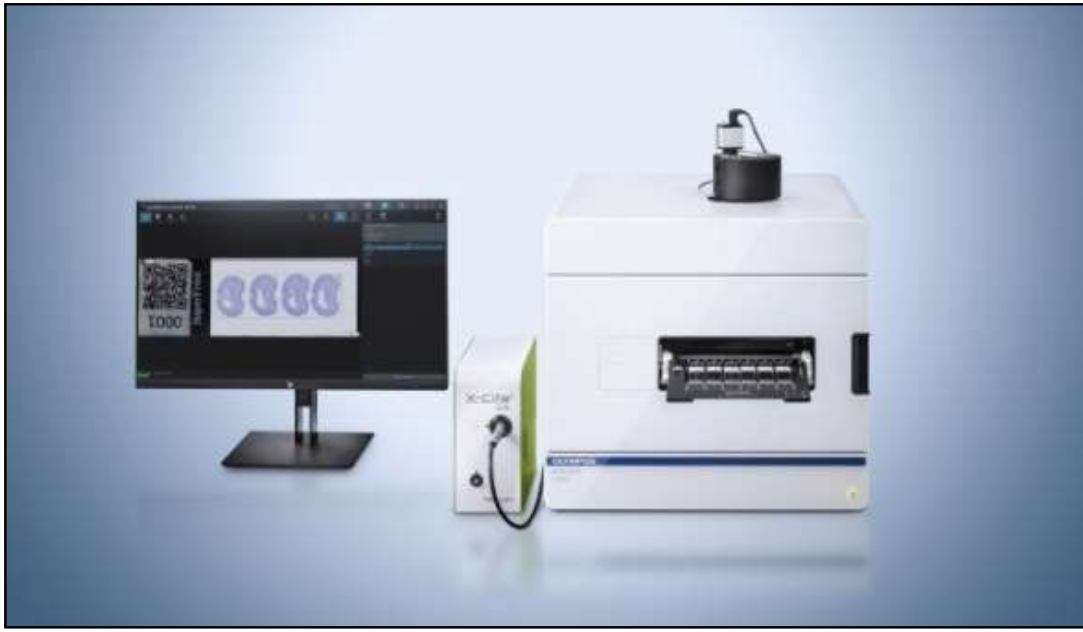
The Power to See More

- Excellent Image Quality for Quantification
- Flexibility for Many Application
- Achieve More in Less Time
- Simplified, Powerful Workflow
- Image Analysis, Deep Learning
- NIS Database and Data Management

Product Concept

The VS200 is a **slide scanner for research applications**. It delivers improved image quality, improved stability to reduce vibrations and high precision Z positioning. High resolution scan with immersion objectives (oil or silicone) using an automated liquid dispenser is also available.

The unique features are **upgradeability from single tray to multi tray loading**, optional **immersion media scans** and **multiple observation method (FL, PO, PH and DF)** with easy operation for stained and non-stained samples. The system supports different slide size formats: 1″ x 3″ (6 slides), 2″ x 3″ (3 slides), 3″ x 4″ and 4″ x 5

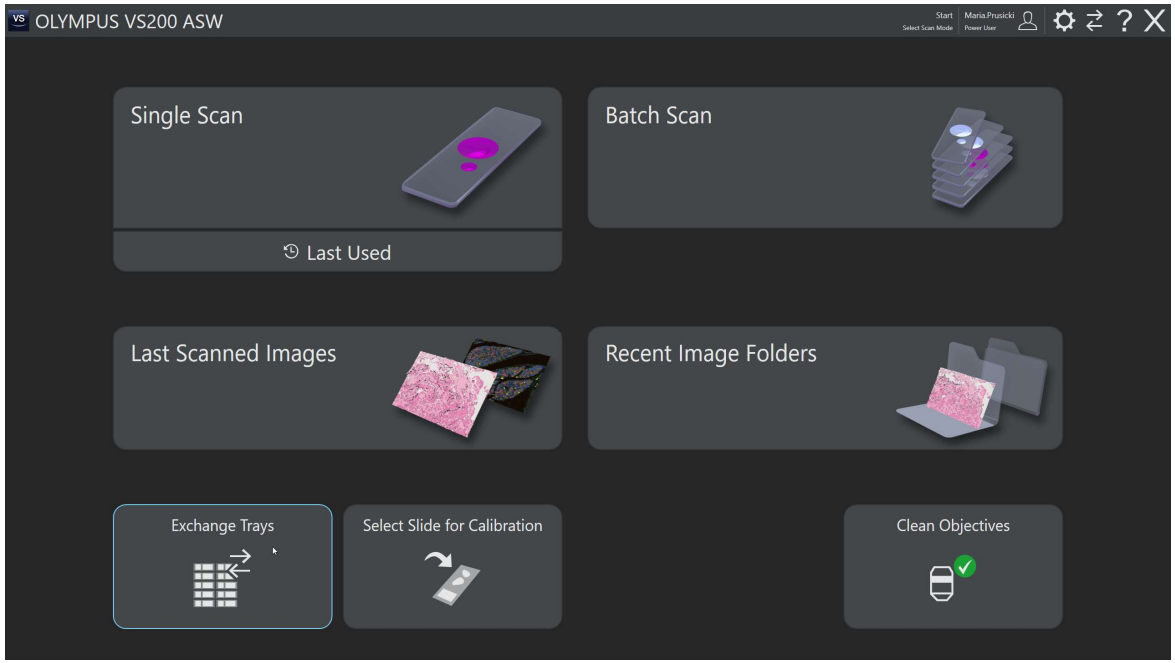


Product Concept

High scan speed and **fast slide loading** in combination with a new software **wizard-based GUI,** implemented with **TruAI sample detection**, enables easy and fast acquisition of digital slide image.

Data can be easily managed, stored and shared thanks to access to **databases and servers** such as NISSQL, moreover they can be saved directly as **DICOM** files and uploaded to PACS database.

Functionality can be enlarged by **dedicated desktop solutions** including deep learning, image analysis and 3D deconvolution.



SLIDEVIEW VS200 – System Lineup

SLIDEVIEW VS200 ST

Single **T**ray – max 6 slides

SLIDEVIEW VS200 MTL

Multi **T**ray **L**oad – max 210 slides

SLIDEVIEW VS200 – product appearance - SINGLE TRAY Front &Top

- Camera for FL imaging
- High-speed EM filter wheel

- Status lamps

  - Status
  - Tray inserted
  - Exchange tray

- Main power button

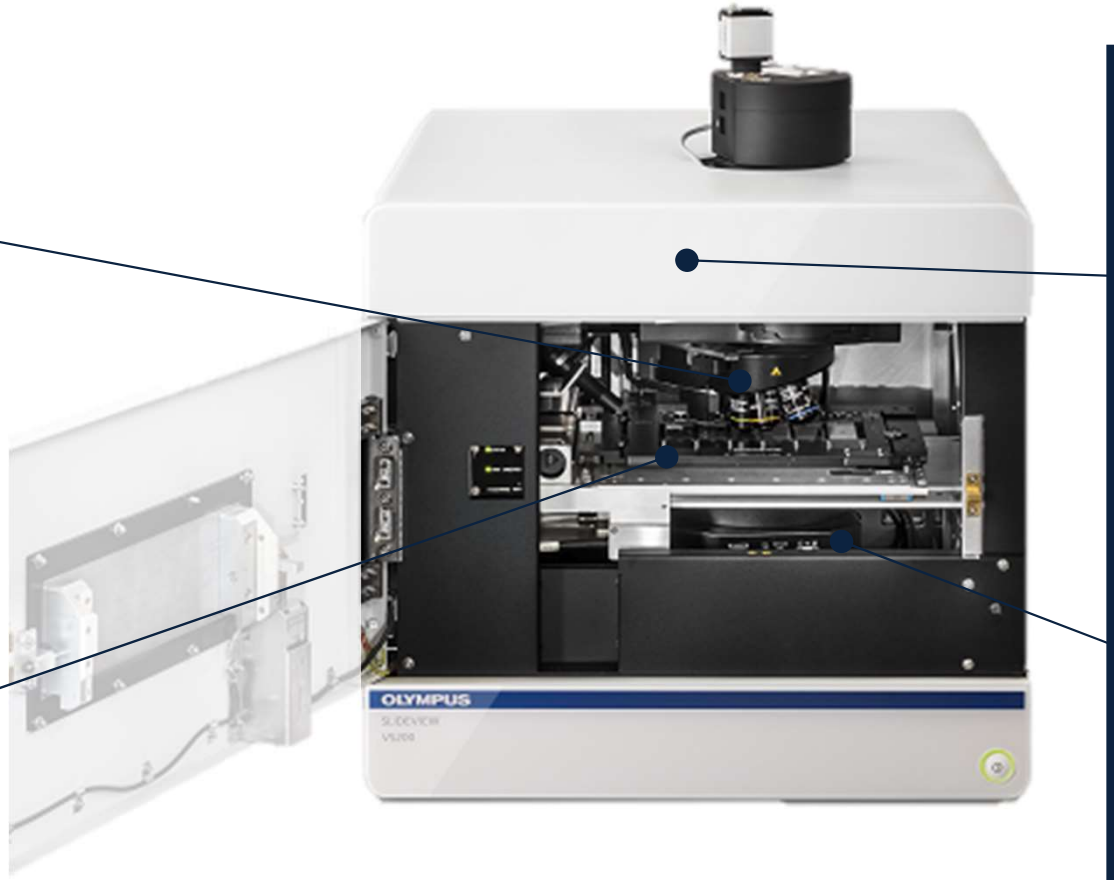
- Flapper

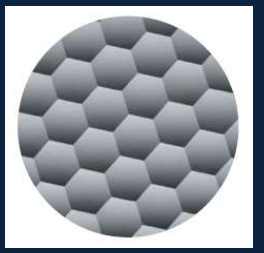
- Slide Tray

SLIDEVIEW VS200 – product appearance – SINGLE TRAY Inside

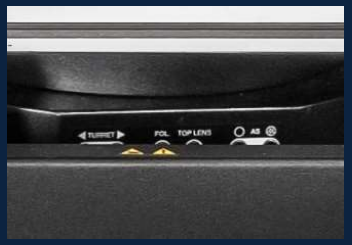
X Line objectives on 6-position revolving nosepiece

Motorized scanning stage





Inverted illumination system with fly-eye lens



Transmitted illumination system with high-power true-color LED

SLIDEVIEW VS200 – product appearance - MULTI TRAY LOADER Front & Top

Camera for FL imaging & high-speed EM filter wheel

Status lamps

- Status
- Tray inserted
- Exchange tray

Main power button

Automated slide loader

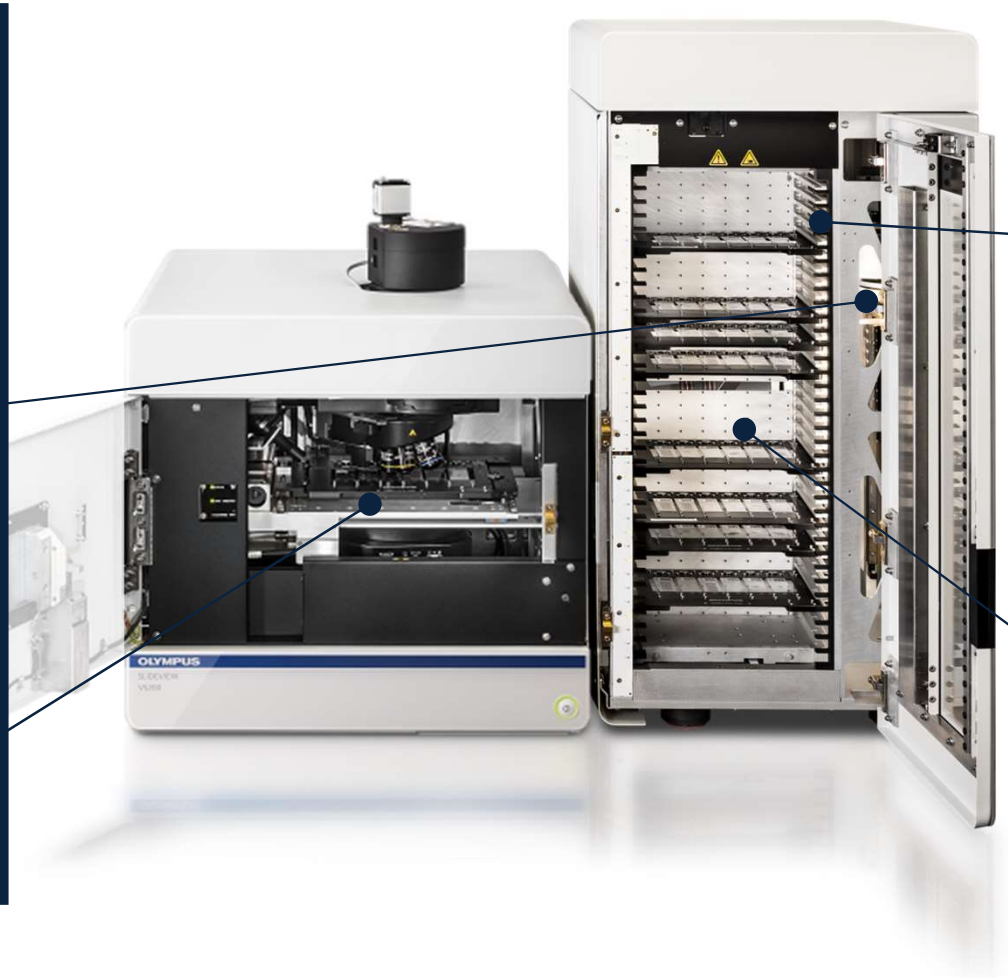
Status lamps
- Tray inserted
- Exchange tray

Window to see inside

SLIDEVIEW VS200 – product appearance – MULTI TRAY LOADER Inside

Loading arm

Loading a slide tray on motorized scanning stage



35 inserts for Slide Trays

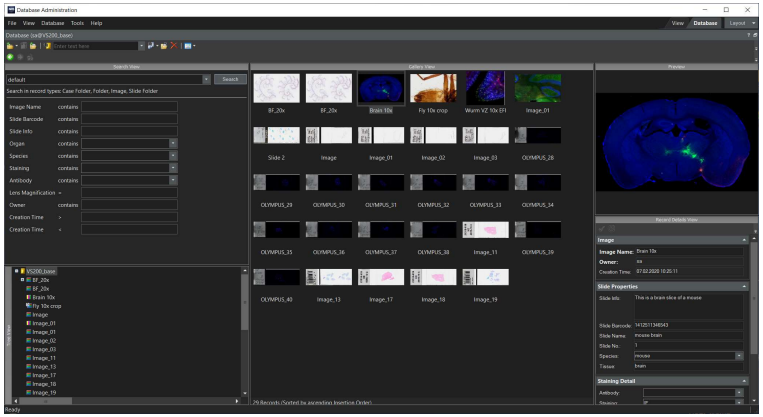
RFID automatically recognizing the type of Slide Tray

SLIDEVIEW VS200 – System Lineup

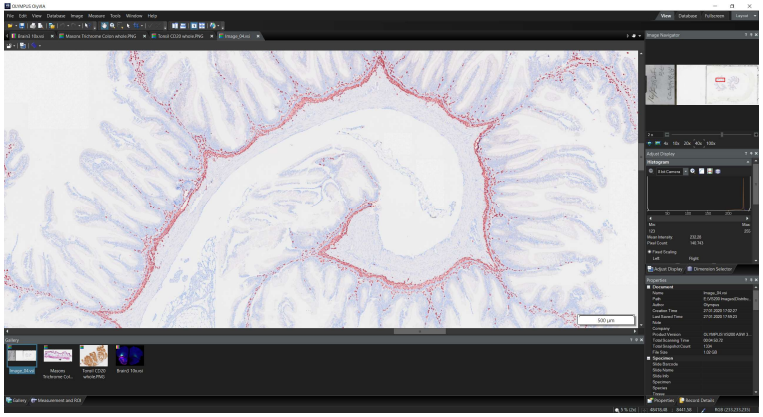
Model	BF	FL	DF, PH, PO	Multiple Size Slide Formats	Camera	Immersion Media Scan	Automated Loader up to 210 Slides
BF Single tray	✔	**upgradable**	✔	✔	Color (B&W upgradable)	**upgradable**	**upgradable**
FL Single tray	✔	✔	✔	✔	Color & B&W	**upgradable**	**upgradable**
BF Multiple tray loader	✔	**upgradable**	✔	✔	Color (B&W upgradable)	**upgradable**	✔
FL Multiple tray loader	✔	✔	✔	✔	Color & B&W	**upgradable**	✔

SLIDEVIEW VS200 - Product Family

- **Desktop**
  Desktop version without hardware support
- **VSI conversion tool**
  Solution for VSI image conversion for both ASW and Desktop version
- **DICOM**
  Batch converter to DICOM format for both ASW and Desktop version
- **Detect**
  Solution for image analysis for Desktop version
- **TruAI**
  Deep Neural Network solution for Desktop version
- **3D Deconvolution**
  Solution for 3D deconvolution for Desktop version
- **Net Image Server SQL** (NIS-SQL)
  SQL based database software
- **OlyVIAweb**
  Web access for image viewing
- **OlyVIA (desktop)**
  Free-of-Charge Image viewer solution for Windows



NIS-SQL Database



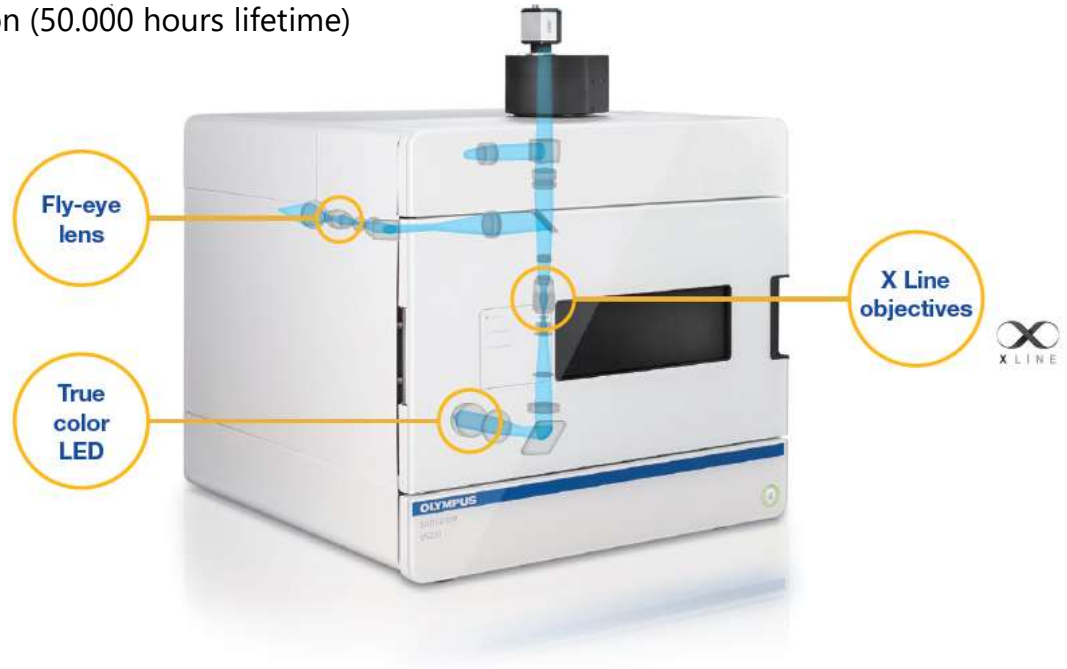
OLYVIA VIEWER

02

Excellent Image Quality for Quantification

IMPROVED ILLUMINATION BY HOMOGENEITY

- Dedicated optical design for slide scanner
  1. Excellent Optics: Supporting X Line objectives
  2. Beam splitter & tube lens for BF & FL cameras
  3. Olympus True color LED, for bright and uniform illumination (50.000 hours lifetime)
  4. FL illumination system with fly-eye lens

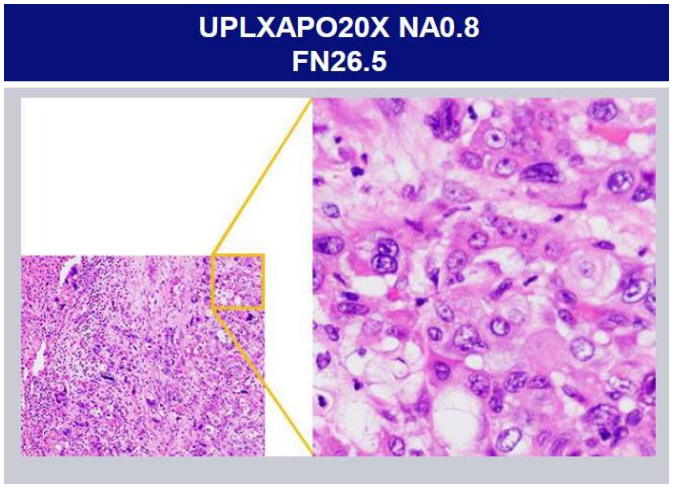


1. Excellent Optics: The X Line objectives

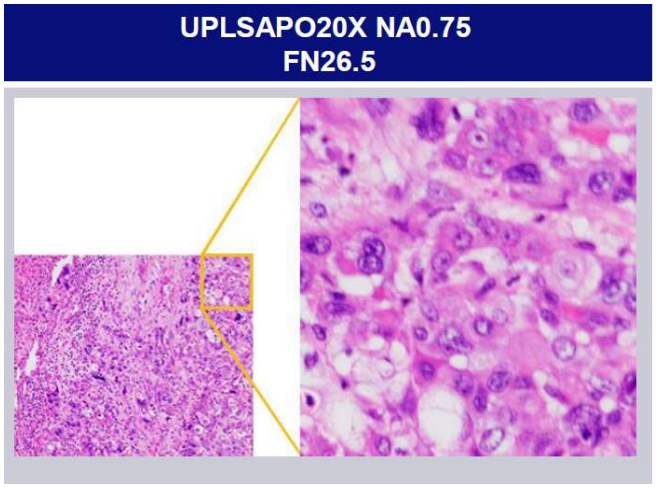
- Outstanding flatness and higher NA
- The UPLXAPO20X, NA 0.80 comes **standard with the system**
- Better quality in each image and more efficient acquisition of tiled images

X LINE

X Line Objectives



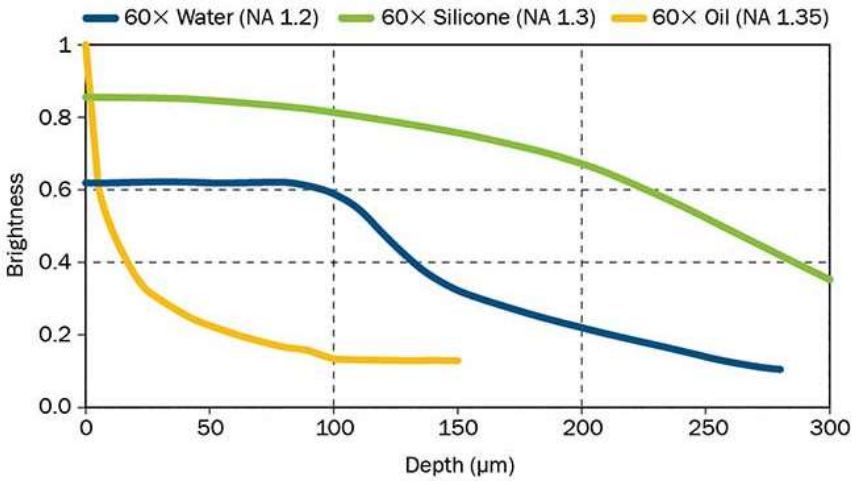
Previous Objectives



Objective	NA
UPLXAPO10X	0.40
UPLXAPO20X	0.80
UPLXAPO40X	0.95
UPLXAPO40XO	1.40
UPLXAPO60XO	1.42
UPLXAPO100XO	1.45

1. Excellent Optics: Silicon immersion

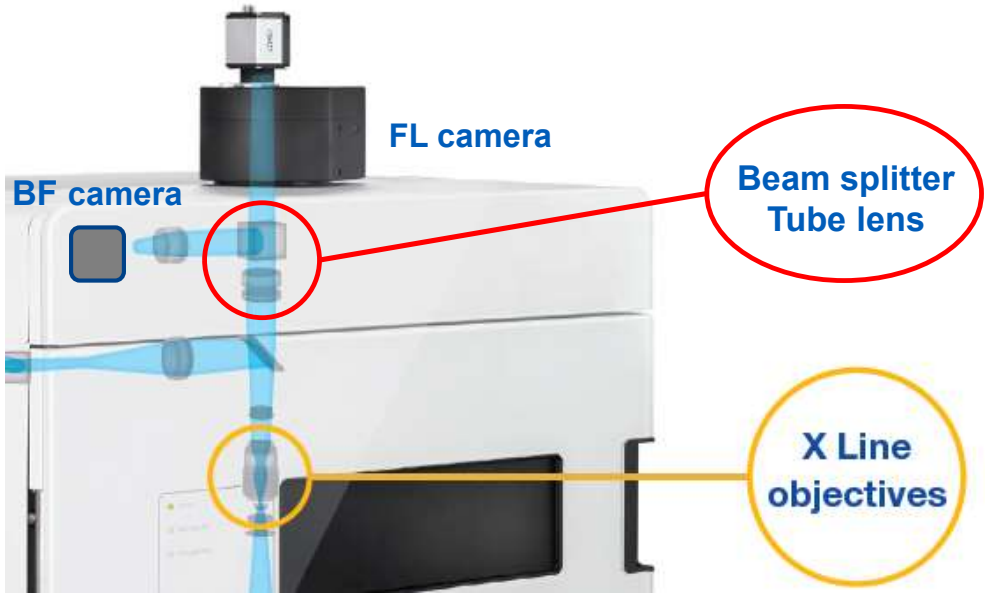
- Available magnifications: 40x, 60x and 100x
- Ideal for thick brain sections
- Silicone immersion objectives are brighter than comparable oil immersion objectives at sample depths > 6µm
- Silicone immersion oil has almost no evaporation.



Objective	NA
UPLSAPO40XS	1.25
UPLSAPO60XS2	1.3
UPLSAPO100XS	1.35

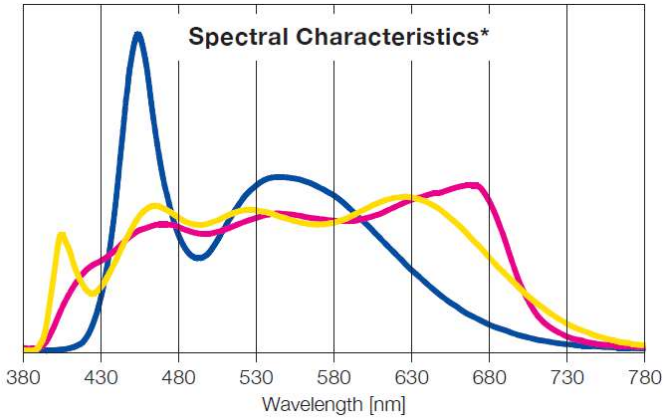
2. Beam splitter & tube lens for BF & FL cameras

- Beam splitter & tube lens for BF & FL cameras
  - High-quality tube lens (ATL)
    - Improvement of aberration correction
  - Shorten distance between tube lens and objective
    - Reduction of vignetting loss
  - Common for both BF & FL camera
    - Smaller space

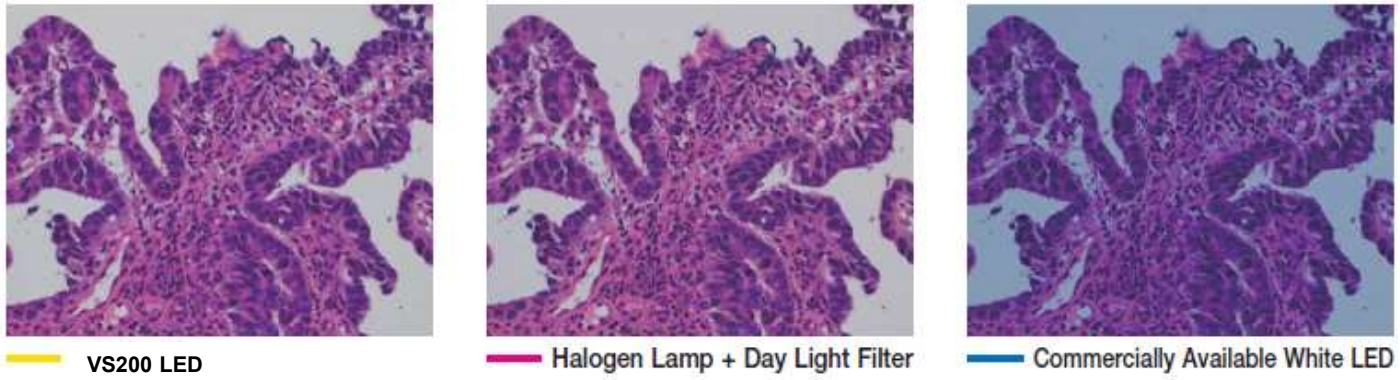


3. Transmitted optics with true-color LED

- Spectral characteristics that mimic halogen light sources
- Clearly reproduce the purple, cyan, and pink colors

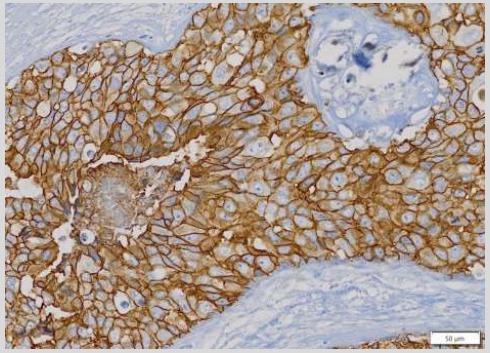


This graph shows the spectral characteristics of each light source regularized with the luminosity curve. It does not compare the strength of light for each light source.

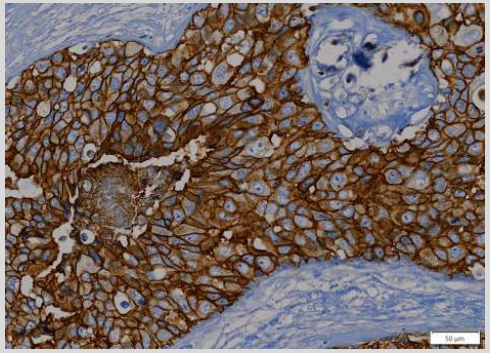


Color Fidelity and Precision

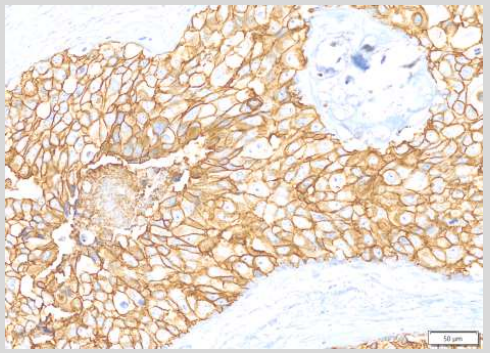
- Eyeballing digital images can be very subjective as different acquisition settings lead to different image outcome.
- Olympus VS200 uses color corrected cameras and provides ICC profiles for perfect color and intensity reproduction on computer monitors



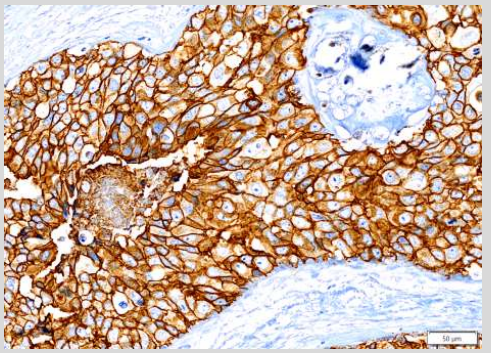
VS200



Incorrect Gamma



Incorrect Brightness



Incorrect Contrast

Integrated Color Camera with High Pixel Resolution

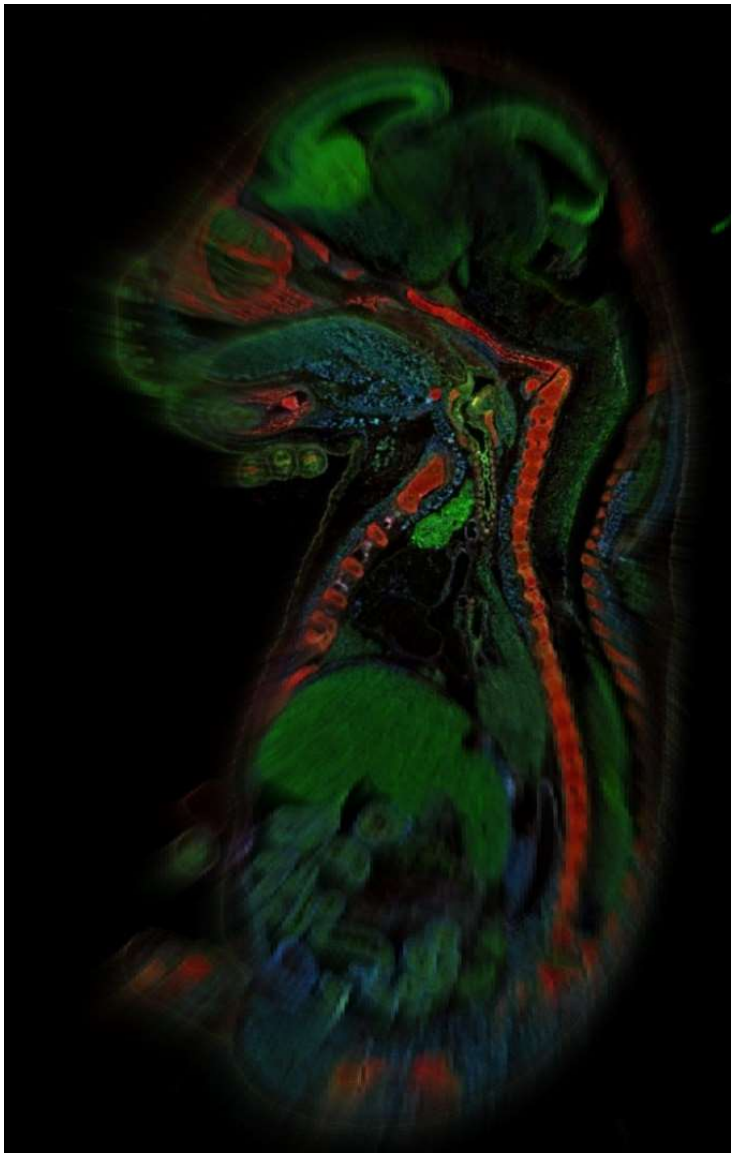
- 5.0 MP fast USB3 color camera with high pixel resolution

Integrated Color Camera	
Pixel Number	2448 x 2048 pixels
Pixel Size	3.45 x 3.45 µm
Bit Depth	12 bit
Sensor Size	8,445mm x 7,065mm
Field Number	FN 17,5
Sensor Type	CMOS
Interface	USB3.0

Objective	Resolution
UPLXAPO4X	1.369 µm/pix
UPLXAPO10X	0.548 µm/pix
UPLXAPO20X	0.274 µm/pix
UPLXAPO40X	0.137 µm/pix
UPLXAPO60XO	0.091 µm/pix
UPLXAPO100XO	0.055 µm/pix

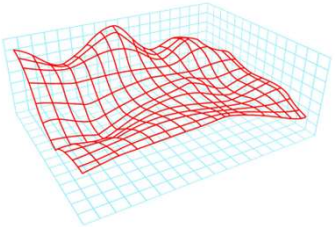
Accurate Scanning

- Optimal auto-focus (AF) performance thanks to:
  - faster camera
  - optimized step size for finding an initial focus point
- Accurate auto focus at all magnifications and up to highest optical resolution
- Z-accuracy of +/- 100 nm
- Slides are protected from breakage by application of Z-Limit
- Calibration of the Z-offset between trays to guarantee the finding of focal plane despite of Z-limit

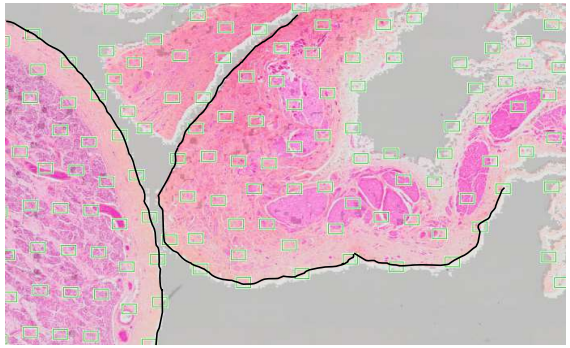


Focus Map

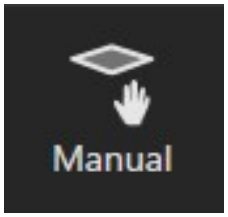
- Height profile of the sample
  - The sample is focused on several positions and each Z value is saved



- Editable focus map
  - Multiple Mapping Density
  - Add and delete Auto Focus (AF) position freely
  - Cracks, air bubble and no-sample areas can be removed from AF positions

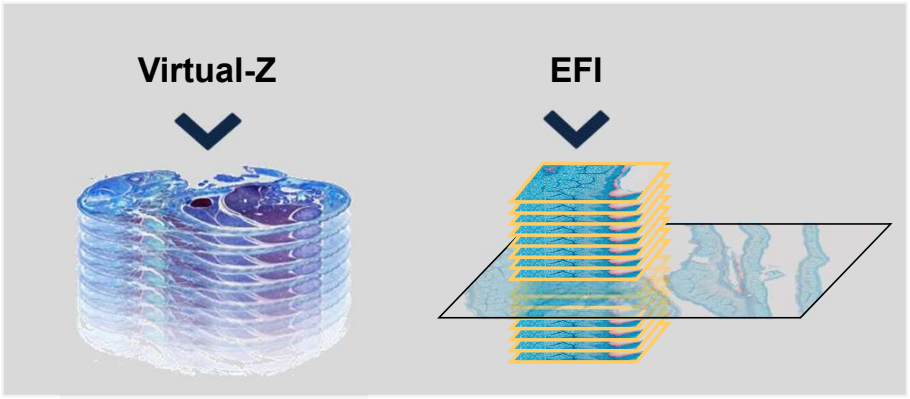


- Manual focus available
  - Focus can be adjusted manually
  - One position manual focus is effective for Z stack and EFI imaging.



Z-Stacking – Virtual Z

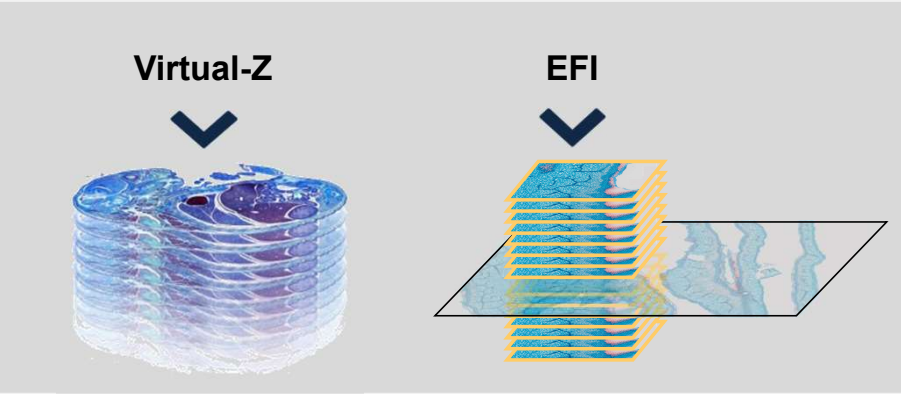
- Up to 41 planes at highest resolution
- Up to 100 µm in thickness
- Applicable with every observation method
- Easy to obtain information from all dimensions of your sample
- Possibility to calculate projections (Deconvolution, Maximum Z or EFI)

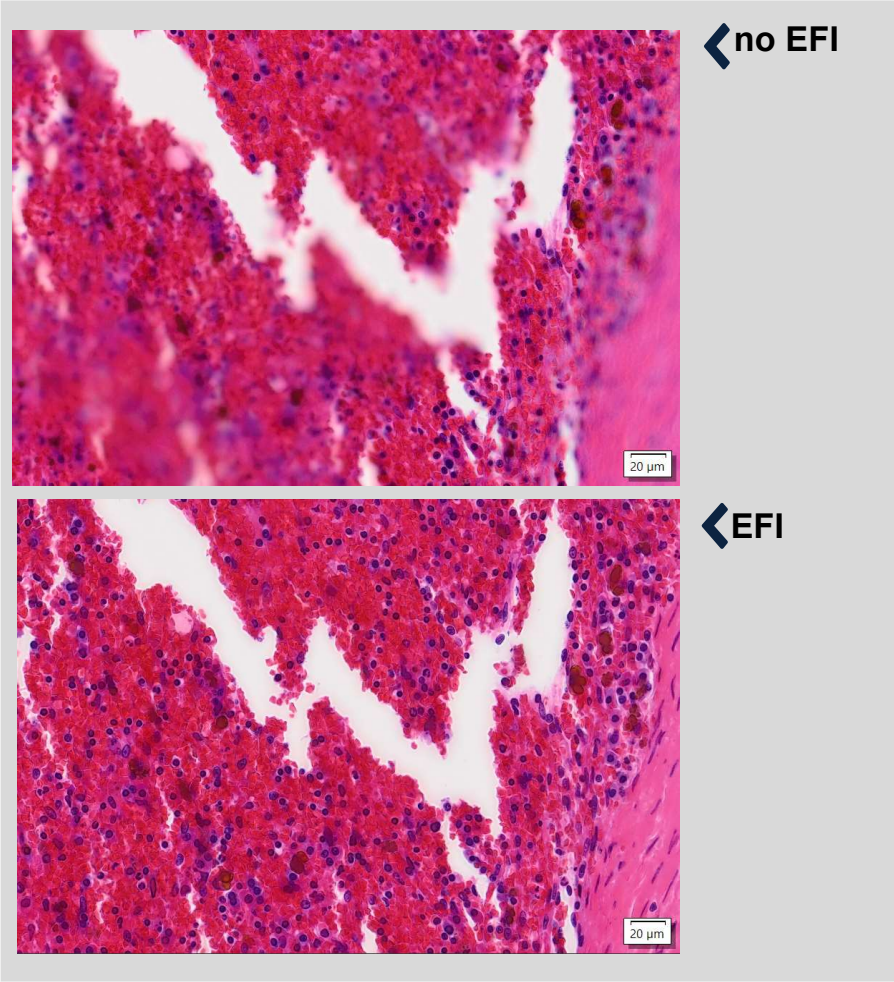


Virtual-Z

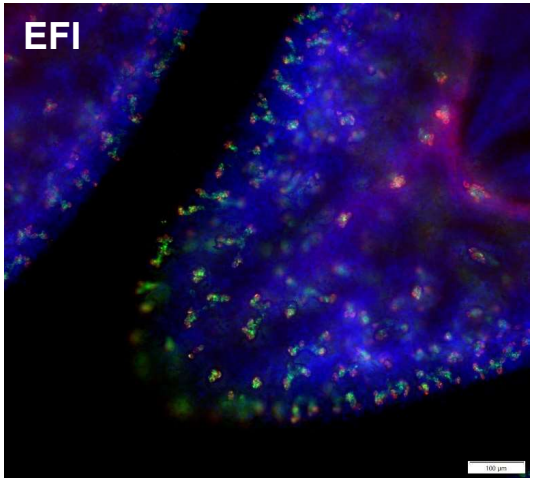
Extended Focal Imaging (EFI)

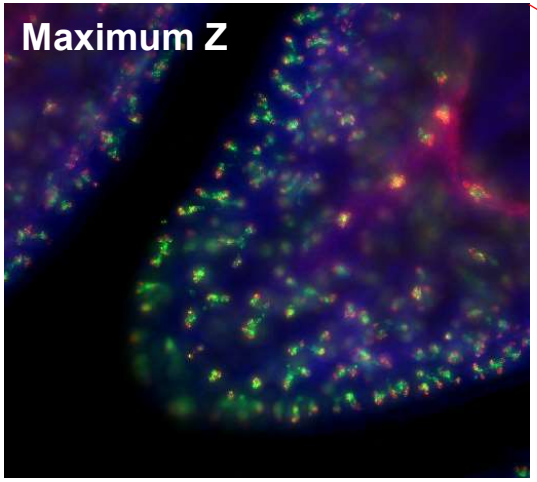
- Improves your image quality when analyzing thick or uneven samples
  - **Highlight FL expressions**
  - **Visualize neuron axons clearly**
  - **Visualize buried blood vessels**
- Multiple planes are automatically merged into a single ultra-sharp image
- Decreases file size compared to Z-stack

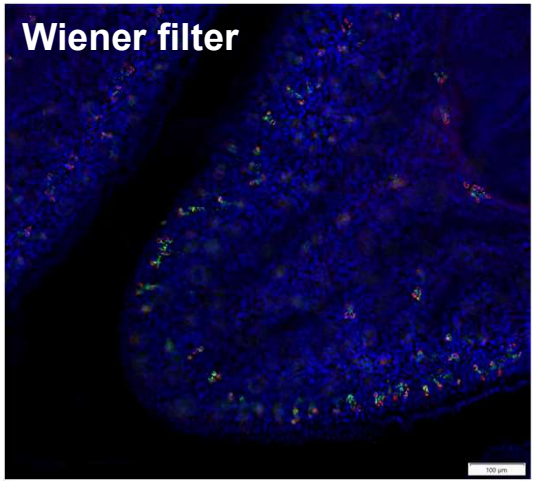


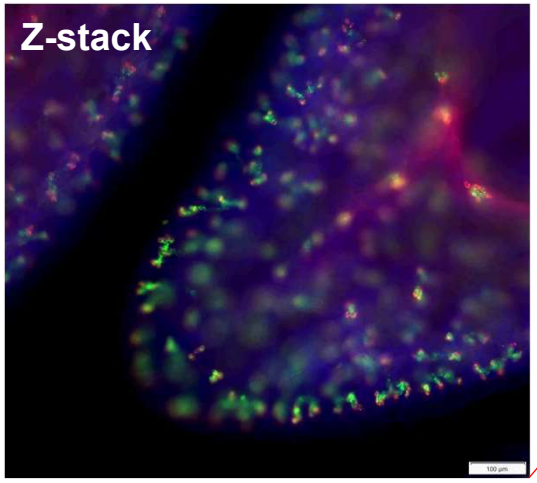


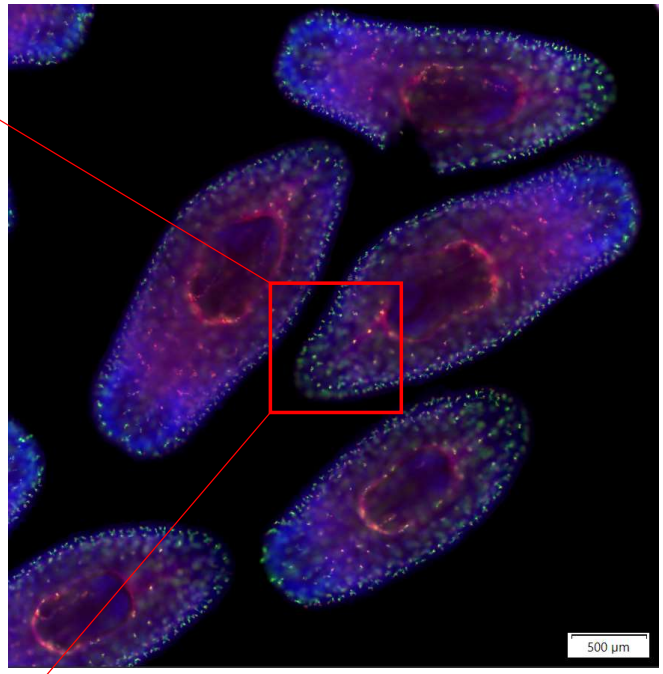
Projections and Deconvolution











Worms

03

Flexible for Many Applications

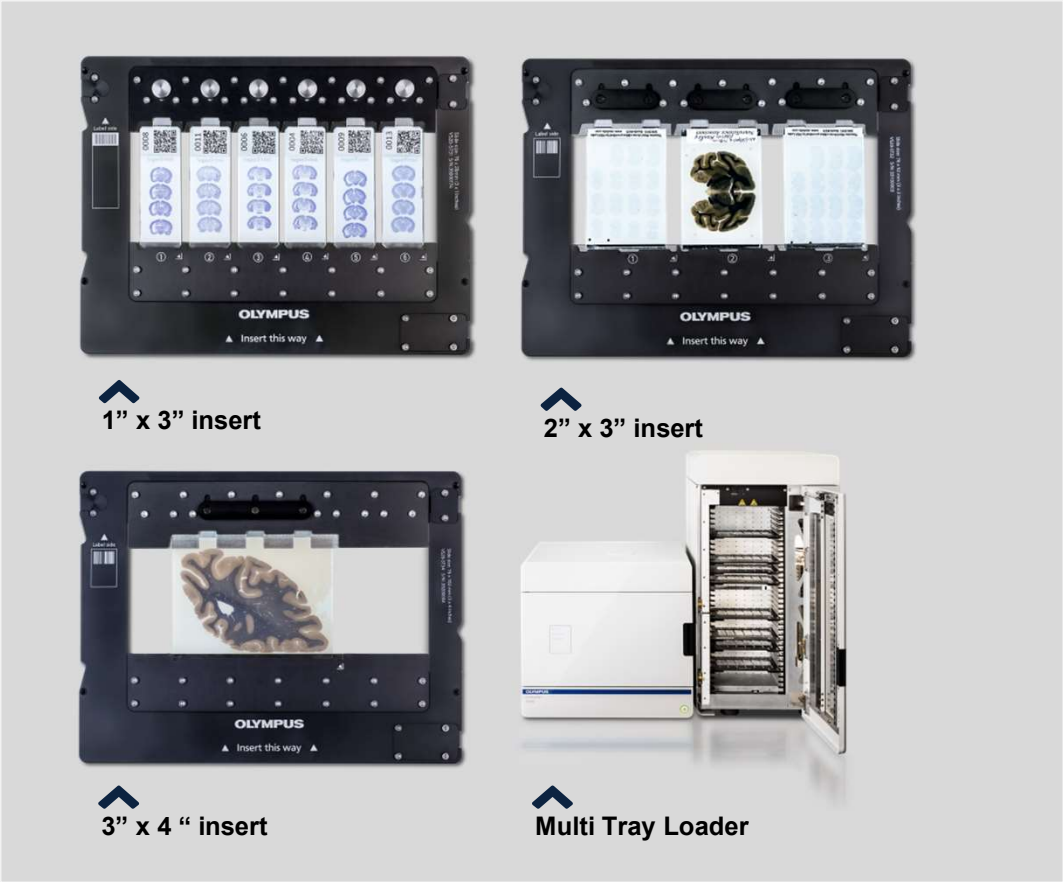
Slide Tray concept: From Single Glass Slides up to Glass Plates

- Slides are loaded onto trays before scanning
- Supports 1“x 3“, 2“x 3“, 3“x 4“ and 4“x 5“ slide formats
- Up to 35 trays can be scanned in one batch
- Scanning of different slide sizes in the same batch experiment
- Automatic tray type detection by RFID and slide glass detection by proximity sensors
- *Hot swap and priority scan possible

Field Upgradability

- **Add multi tray loader onto 6 slide system**
- **Add slide trays by 1 piece**

*more details are following



Objective Lineup Including Oil Immersion and Silicone Oil Immersion

Standard Objectives

	Objective	
2X	PLN2X	BF Overview
4X	PLN4X	FL Overview
20X	UPLXAPO20X	Detail Scanning

Optional Objectives

	XAPO/SAPO Objective
4X	UPLXAPO4X
10X	UPLXAPO10X
40X	UPLXAPO40X
40X	UPLXAPO40XO
40X	UPLSAPO40XS
60X	UPLXAPO60XO
100X	UPLXAPO100XO

	PH Objective
10X	UPLFLN 10X2PH
20X	UPLFLN 20XPH
40X	UPLFLN 40XPH
60X	UPLFLN 60XOIPH
100X	UPLFLN 100XO2PH

Automatic Immersion Media Dispenser

- Oil immersion and silicon immersion objectives are combined with the liquid dispenser

  ↳ Possibility to acquire images with up to 100X magnification

- The dispenser support completely automatic workflow for Batch Scans

- The volume of droplets can be tightly regulated

OLYMPUS

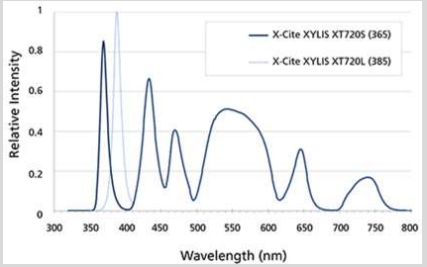
Olympus VS200

Automatic Oil Dispenser for High Resolution Imaging

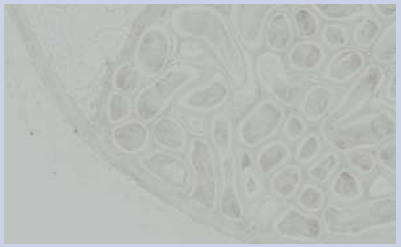
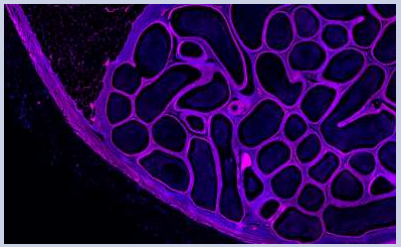
X-Cite Light Source

X-Cite XYLIS

- High-power white LED
- Compatible with broad wavelength from DAPI to Cy7
- ON/OFF UV (365nm or 385nm) to reduce sample damage

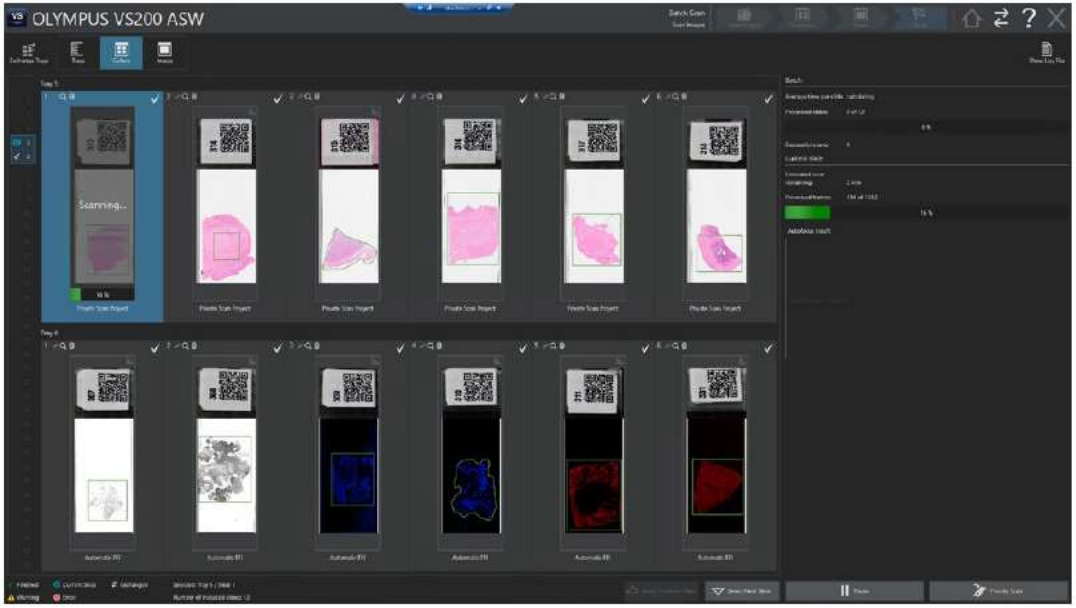


Multi Observation Methods in one system

Brightfield (BF)	Darkfield (DF)	Phase contrast (PH)	Polarization (PO)	Fluorescence (FL)
				
Integrated in Base Unit ・True-color LED ・Color camera ・PLN2X, UPLXAPO20X	**Integrated in Base Unit** ・DF filter	**Integrated in Base Unit** ・PH ring slits （Ph1/Ph2/Ph3）	**Integrated in Base Unit** ・Motorized polarizer	
	Optionally Required ・Objectives 10X or more, NA < 0.7 (UPLXAPO10X)	**Optionally Required** ・PH objectives (UPLFLN-PH series)	**Optionally Required** ・Analyzer cube （U-FDICT） ・Motorized turret （IX3-RFACA）	**Optionally Required** ・FL modules ・B&W camera ・LED light source （X-cite XYLIS or TURBO）

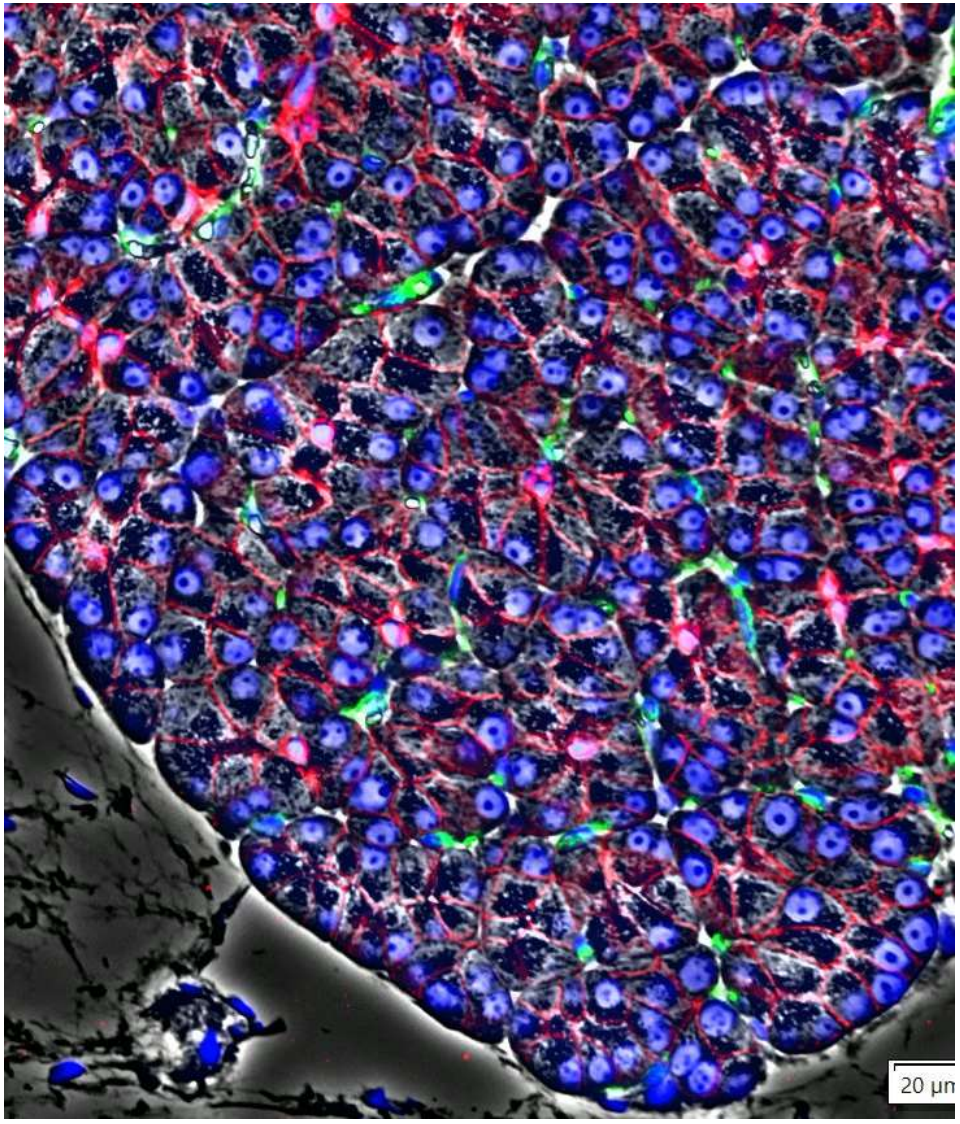
Multi Observation Methods in One System

- Flexible Batch scan mode enables you to designate a different observation method such as FL, BF, POL, DF, PH for each slide contained in the batch.



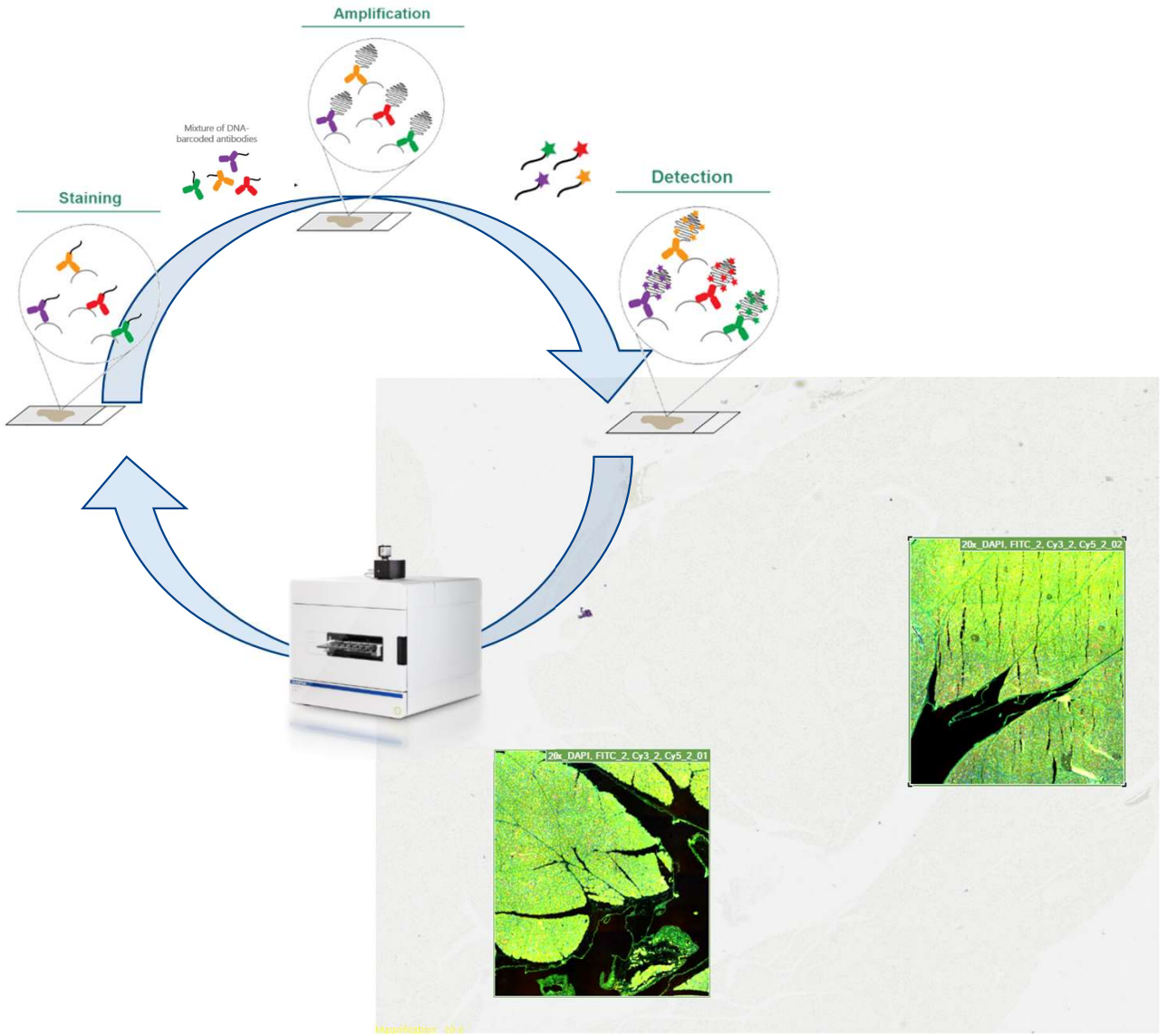
Combine Observation Methods (FL & PH)

- Observation Methods acquired with the same camera can be combined
- A Darkfield OM can be used for fast focusing when acquiring fluorescent samples



Multiplexing

- Combine up to **6 channels + 1** transmitted overlay in a single detail scan
- Combination of multiple acquisition of the same ROI into a single image including **up to 32 channels**
- The system **handles multiple scan areas** on the same slide for Multiplexing experiments



File Format Compatibility

- VS200 saves images in .vsi (virtual slide image), .tif and .dcm (**DICOM**) format

A wide range of other file formats is supported for better compatibility:

- Open Microscopy Environment (OME) Tiff
- BigTif
- JPEG2000
- TIF
- JPEG
- PNG

04

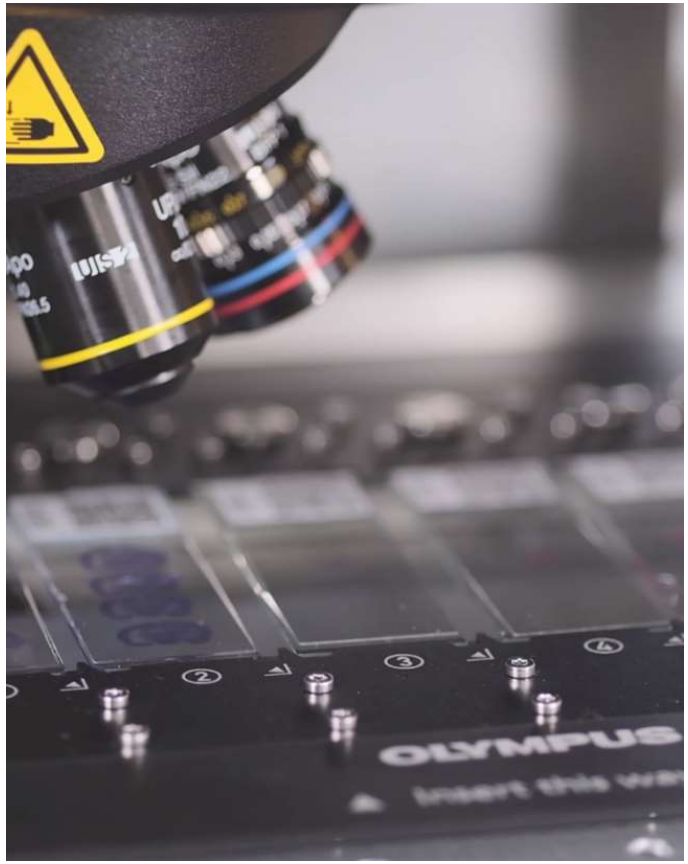
Achieve More in Less Time

Speed Up Your Workflow

- Average loading time per slide is **12** sec!
- VS200 offers fast slide scanning (20X, 15 mm x 15 mm):

Brightfield	Time	Fluorescence	time
Overview	12 sec	Overview 4x DAPI (100ms)	48 sec
Focus map (low density)	20 sec	Focus map (low density)	25 sec
Detail scan	96 sec	Detail scan (4ch @ 10ms)	378 sec

- **Slide/hour**: BF, 20X, 15x15mm, low focal density → 33 slides
- Versatile sample detection algorithm, including AI option reduces the time needed for manual adjustment
- Detail scan settings per slide can be applied while the VS200 is performing overview scans



High Capacity

- **S**ingle **T**ray capacity: up to **6** 1”x 3” slides
- **M**ulti **T**ray **L**oader capacity: up to **210** 1”x 3” slides
- Hot-Swap functionality
- Priority Scan functionality

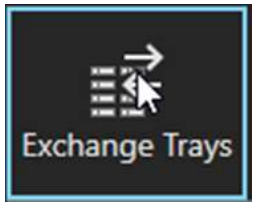
OLYMPUS

Olympus VS200

Achieve More in Less Time

Hot-Swap Functionality

- Exchange already scanned slide trays to new slide trays during batch processing
- Add new slides even before completing all the maximum 210 slide scanning
- Minimize time the system is idle and let the system run 24/7



Priority Scan Functionality

- Pause a running scan to allow the scan of an urgent slide
- The batch scan is interrupted and can be easily resumed after the priority scan
- Batch Scan settings and information are retained

Barcode Support and Data Parsing by Integrated Barcode Reader

- Integrated barcode reader via OCR
- Barcode image acquired with Overview
- Barcode information reflected on slide naming

QR

DataMatrix

EAN Code

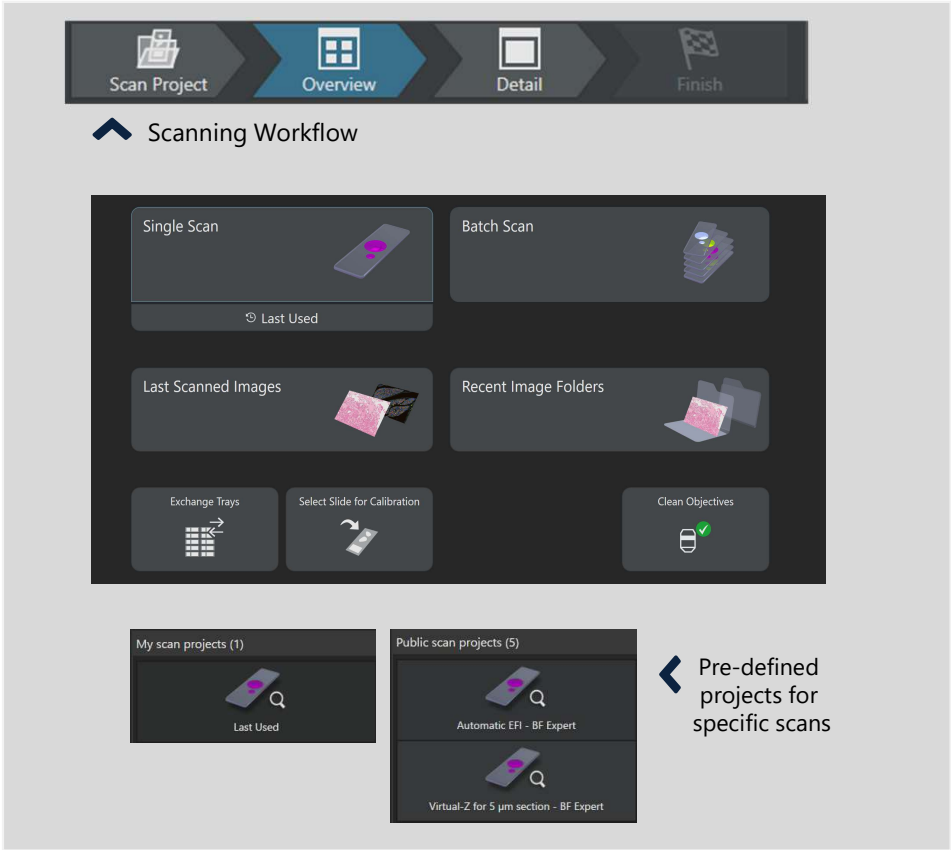
05

Simplified, Powerful Workflow

Workflow-Oriented User Interface

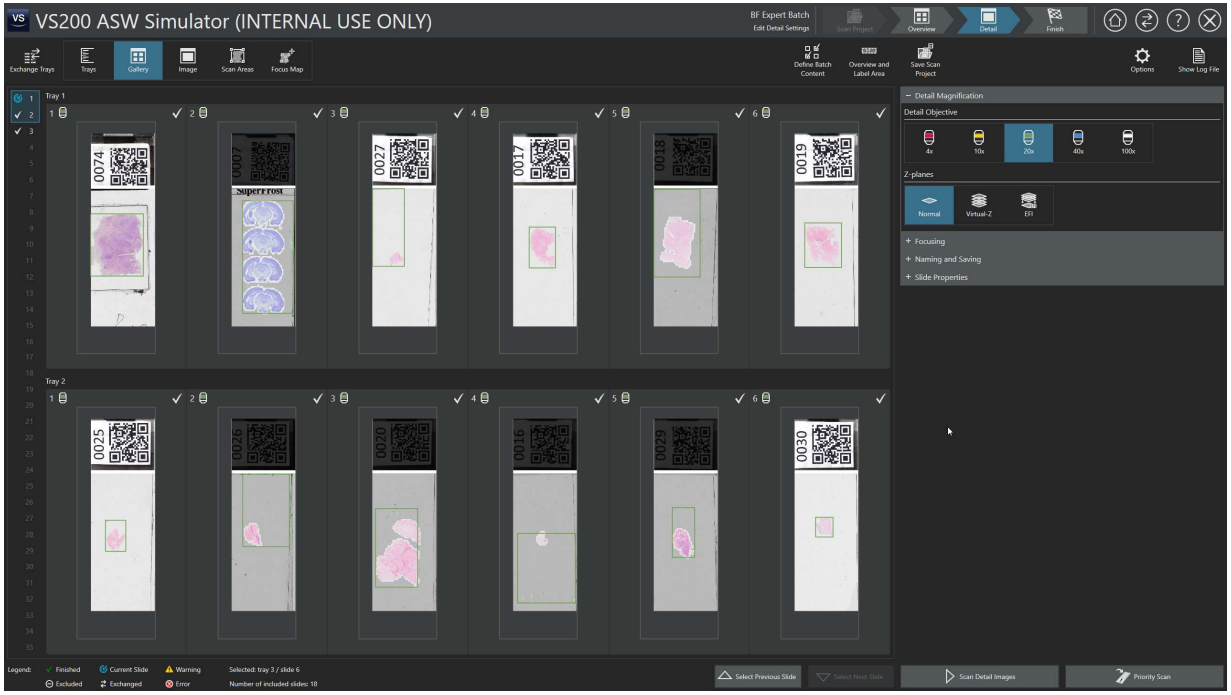
- Quick mode allows whole slide imaging using pre-defined parameters and scans with just three click
- Expert mode allows detailed, customized scan settings
- Pre-defined acquisition settings for specific scans can be saved and reused

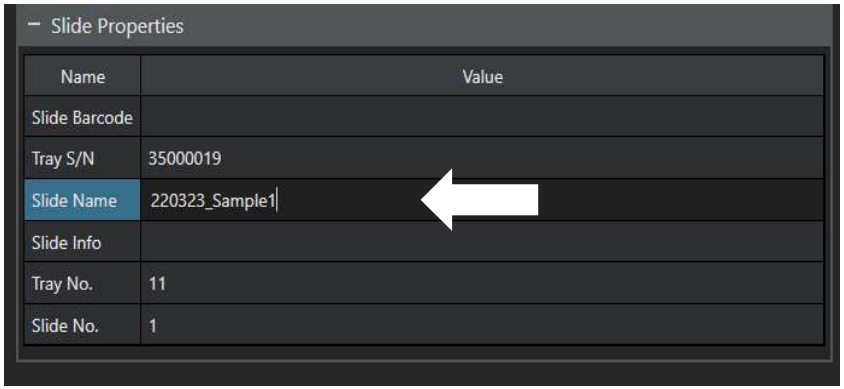
Segregation of scan projects based on sample type



Tray Gallery – Full Access to Your Slides

- Easy Slide selection for scanning
- Copy & paste scan parameters
- Possibility to edit slide properties and naming after acquistion of the slide overview

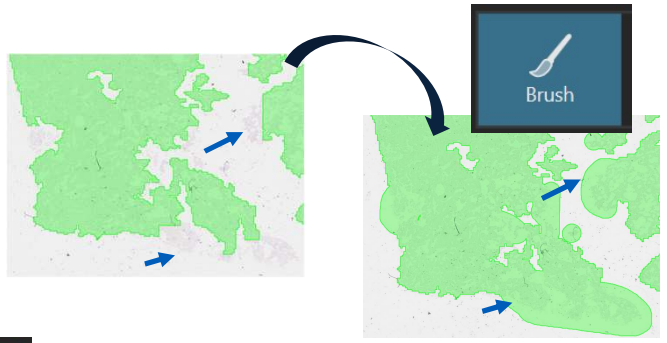


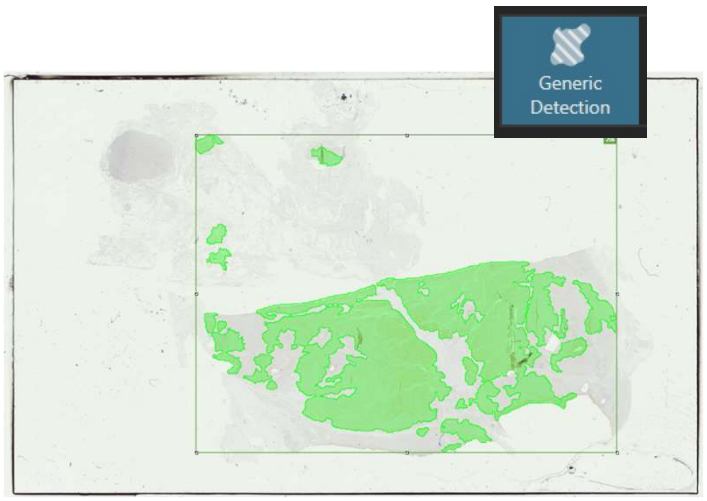


Gallery View of trays

Sample Detection and Scan Area

- Sample detection is done automatically using [Generic] Mode
- For faint samples or morphological samples, [AI] Mode is available
- User can also modify the sample mask manually if desired





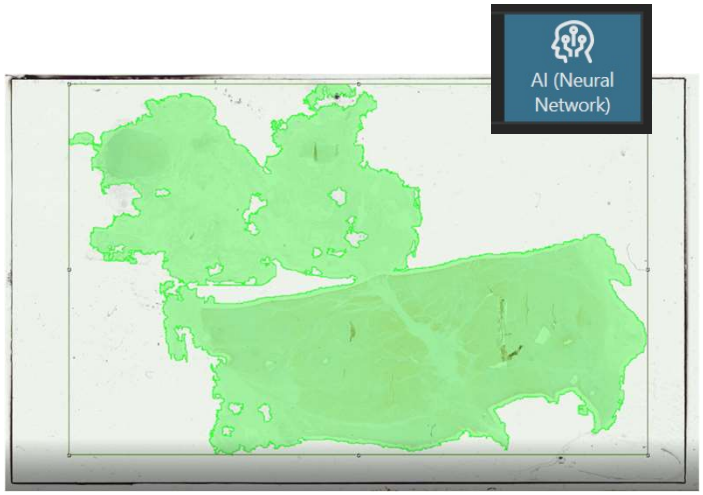


Image courtesy of Dr Silvia Ferro, DMV,
Department of Comparative Biomedicine and Food Science, University of Padova, Italy

VS200 TruAI - Deep Neural Network (DNN) solution

- Available **during acquisition** for the automated generation of a more **accurate Scan Area** and sample detection
- Available for **data analysis** to obtain a more reliable and accurate analysis:
- Possibility to train your own neural network in DNN solution and apply it for both sample detection and/or data analysis

Detect More with less effort

Value	Feature	Deep Learning Technology
▪ Accurate generation of scan area ▪ Accurate image analysis and efficient experiment	▪ Object detection and segmentation from complex and challenging image with much higher accuracy than existing method ▪ Further analysis such as counting and measurement based on segmentation results	▪ A type of Artificial Intelligence (AI) which imitate the human brain [Neural Network] as it can learn structures and make intelligent judgement (application) after training. ▪ Olympus Deep Learning has both training and application function

VS200 TruAI - Deep Neural Network (DNN) solution

- Application Example – Pancreatic islets

  Detect and separate pancreatic islets in pancreas tissue fluorescence stained with DAPI and Cy3

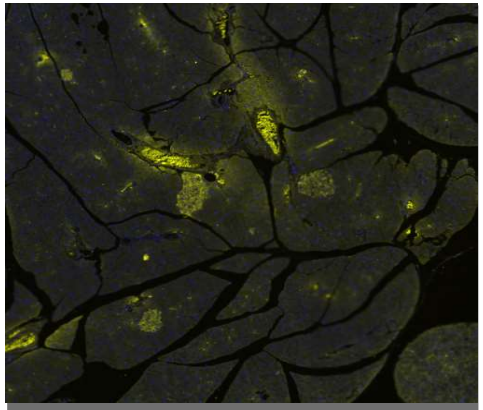
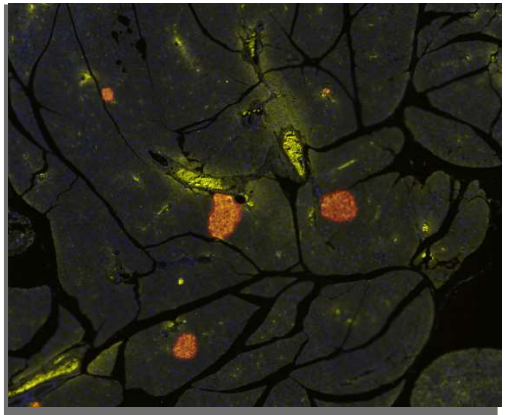
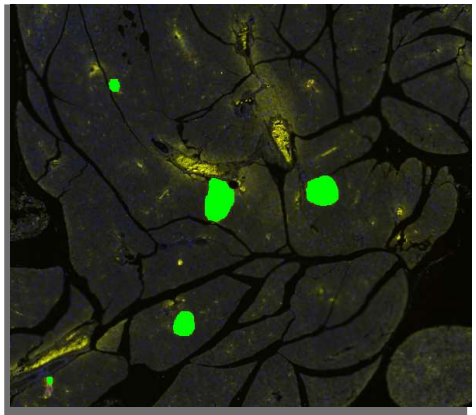


Image scanned with VS200 SLIDEVIEW not used for DL learning



Result after applying the AI filter (object recognition of the neural network or probability map)



Result of the VS200-Detect function based on the probability map

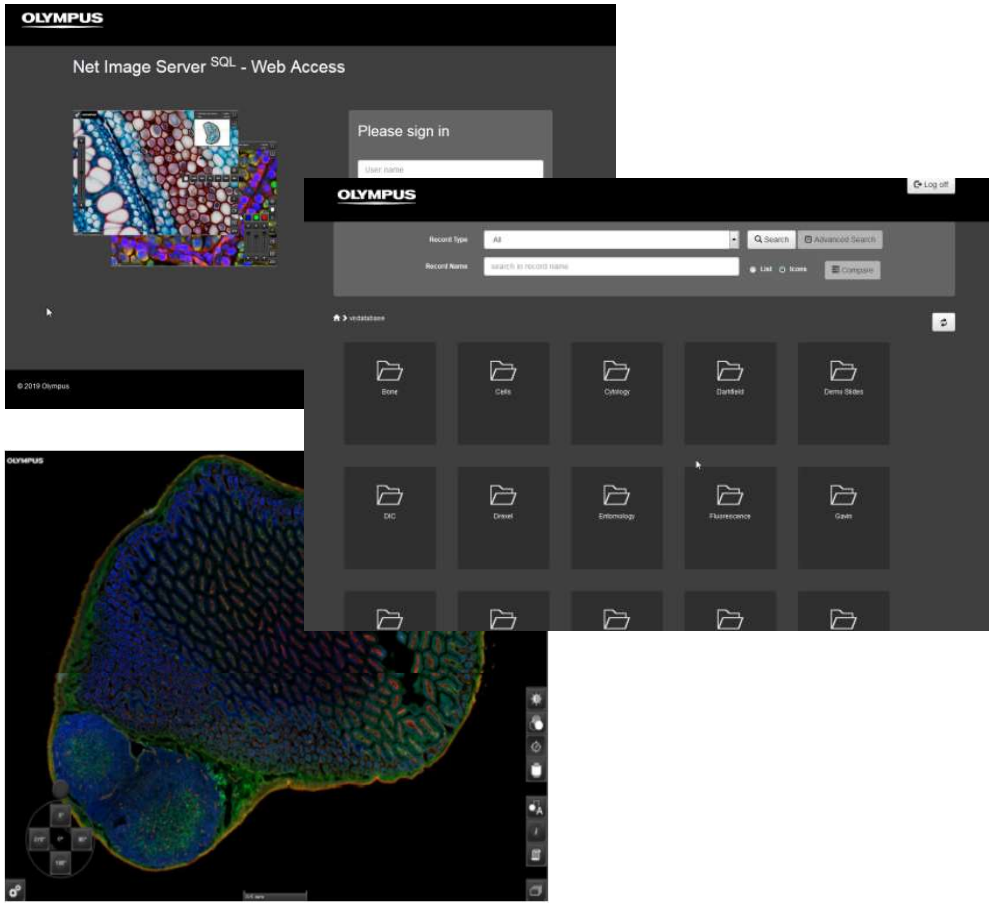
The output result is number of pancreatic islets per pancreas section

06

Comfortable Data Management

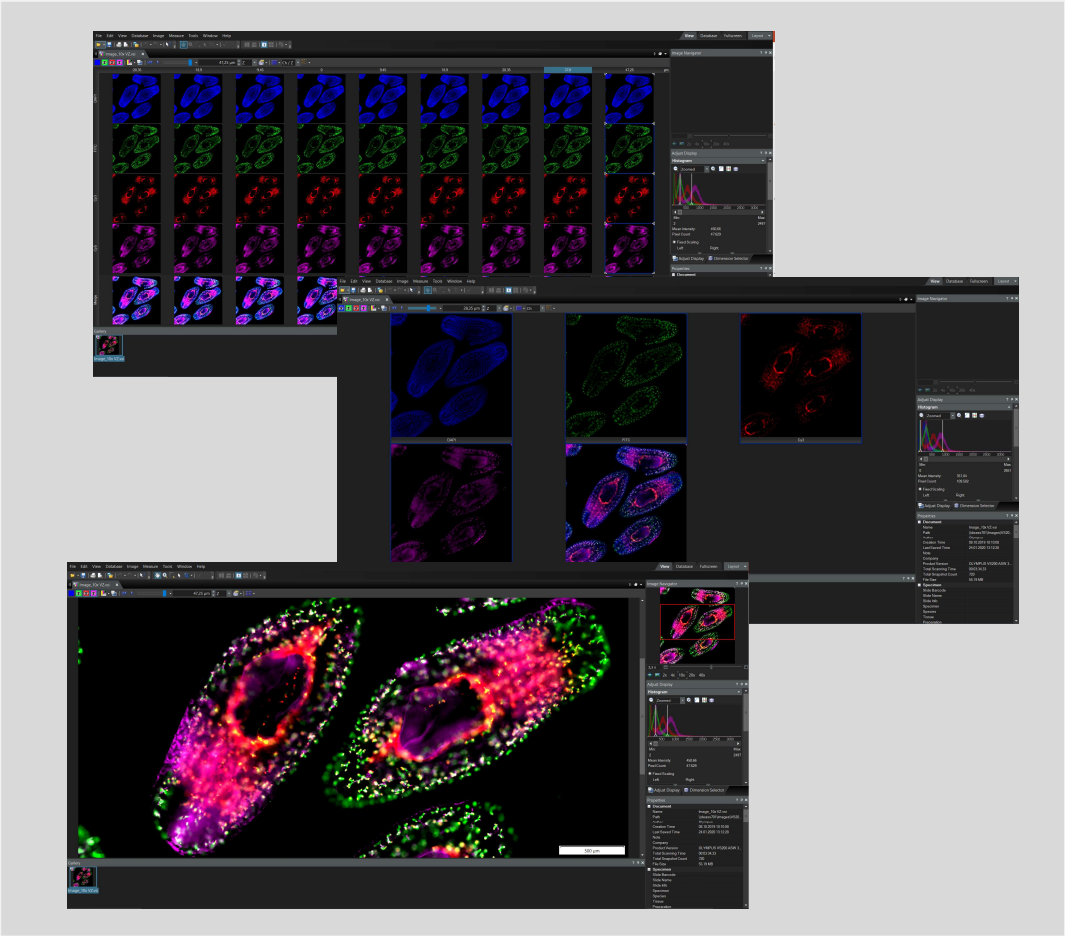
NISSQL Data Management Server

- Manage individual user access to virtual slides and other documents
- Search and filter images using metadata
- Conveniently share images through LAN or OlyVIA web
- Fast image access due to a sophisticated caching mechanism
- Support of most common image formats
- Support of PDF, MS word and others



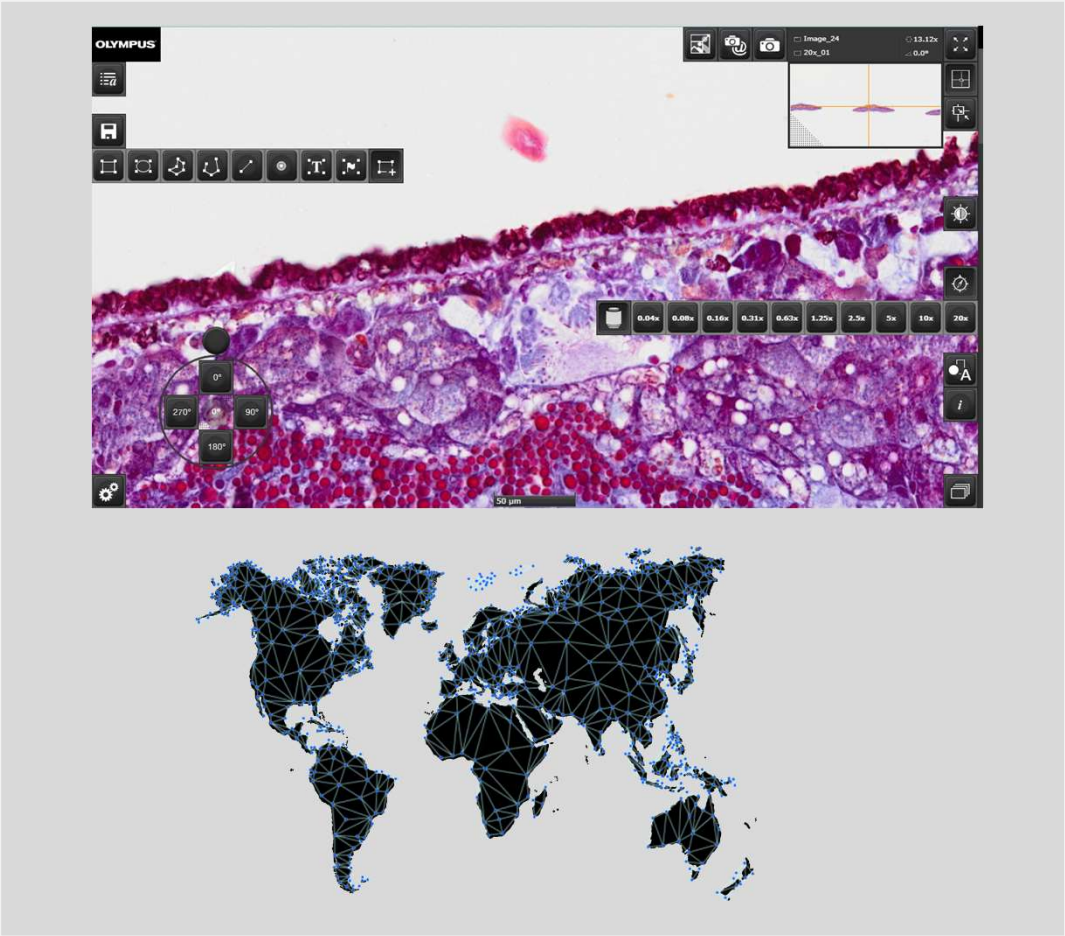
OlyVIA Desktop - Powerful Image Viewer

- Free of charge
- Desktop version
- Open images from local/network storage or the database
- Measurement options
- Crop functions
- Draw AI training labels
- Save VSI in different file formats



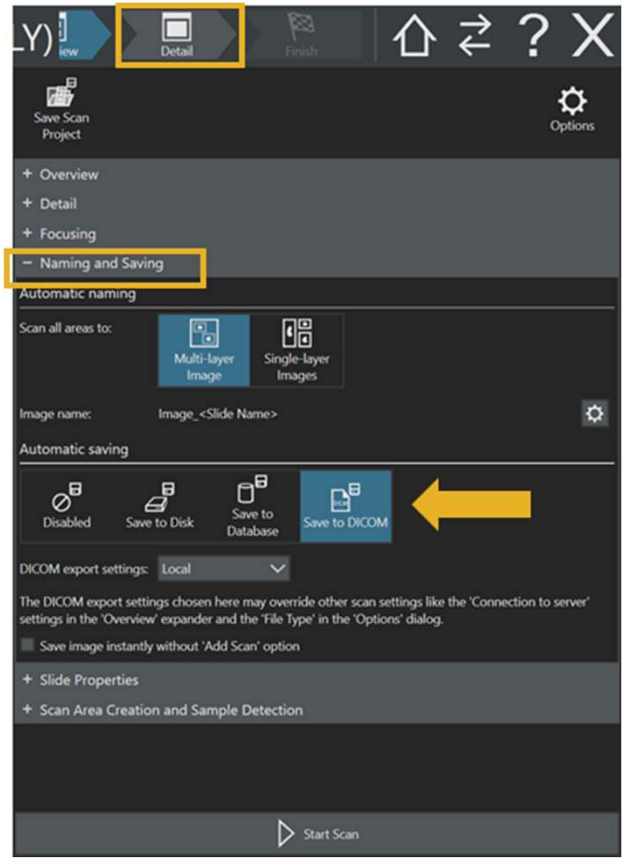
OlyVIAweb - Share Images with Anybody, Anywhere

- Free of charge in combination with NIS^{SQL}
- Platform independent (Windows, MAC, Linux and Android)
- Fast Multi-User image access
- Supports VSI, TIF, JPEG, JPG2000, BTF, Hamamatsu and Aperio svs image formats
- Supports Word, PDF
- Possibility to annotate and measure images
- Secure User Access
- Image sharing per folder or per image
- Up to 4 images for simultaneous viewing



DICOM and PACS (Picture Archiving and Communication Systems)

- Images can be saved as DICOM (.dcm) directly from the acquisition Wizard, without the need of post-acquisition conversion
- Images can be uploaded directly to PACS databases
- The format offered by ASW 3.4 complies with the standard specification of DICOM work-group 26 (DICOM Whole Slide Imaging: nema.org)

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