Technology Brief

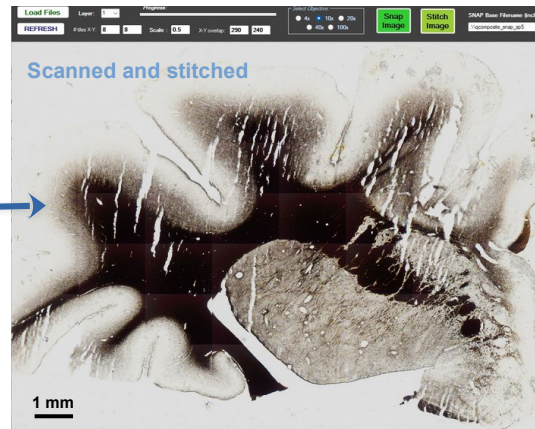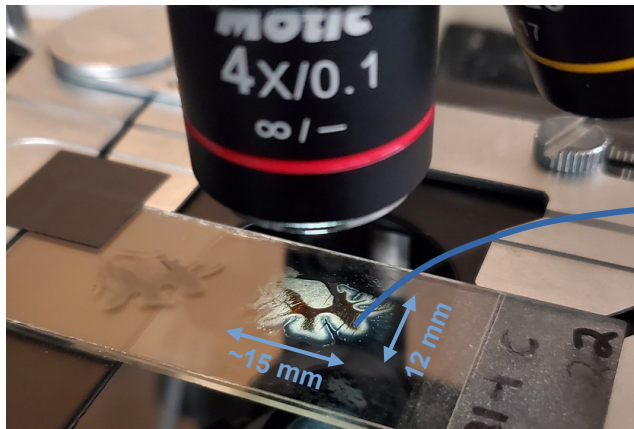# HScope: New GUI, Scanning a large whole brain cross-section

New Q4 GUI fixes and features, automated stitching, and an example scan.

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The sample shown here is a medium size 15x12 mm brain cross section (the new PA53-based system can scan up to **100x80 mm** specimens).

The GUI now has *full keyboard and controller capability*. Just hit the arrow keys (or w,a,s,d) to move the stage, z & c keys for Z-axis control. Joystick control is in development. Below shows the GUI with sample in standard 4x live-view. Controls are indicated.

New GUI with controls for stage XYZ position, Exposure, Calibration, File management, and Auto-mosiacing with new Autofocus (edge based) and 3D scanning. Essentially, a Z-scan (stack) is performed for each mosaic tile, or a single Z-scan can be done at any current tile. The anti-vibration motor mounts enable fast acquisition (low or no damping wait times). Files are automatically named and stored at specified camera resolution with L (z), Row (y), and Column (x) labels. Files can be Tif or Jpg with specified %. Other file types can be easily added to suit the application.

Clicking on **PreVu** brings up the Quick Preview-Stitching window brings up...

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The New Preview-Stitching window:

The PreVu button brings up the new Quick Scan Preview window where the images are loaded, properly arranged, and composited with a pre-calibrated overlap for each objective. The overlap and all other parameters are adjustable. You can interactively grab and pan the image with the mouse to explore minute detail, and:

- "Snap" image to save the composited image at the current specified resolution/scale and filename.
- View 3D layer-by-layer using the PgUp and PgDn keys (great!), or by selecting the light-sheet layer in the drop box.
- Quantitatively stitch the image using ImageJ Grid/Collection or fast MIST (NIST's microscopy image stitching tool). GPU assisted stitching, super-resolution, and deconvolution are available and in development (Nvidia-based).
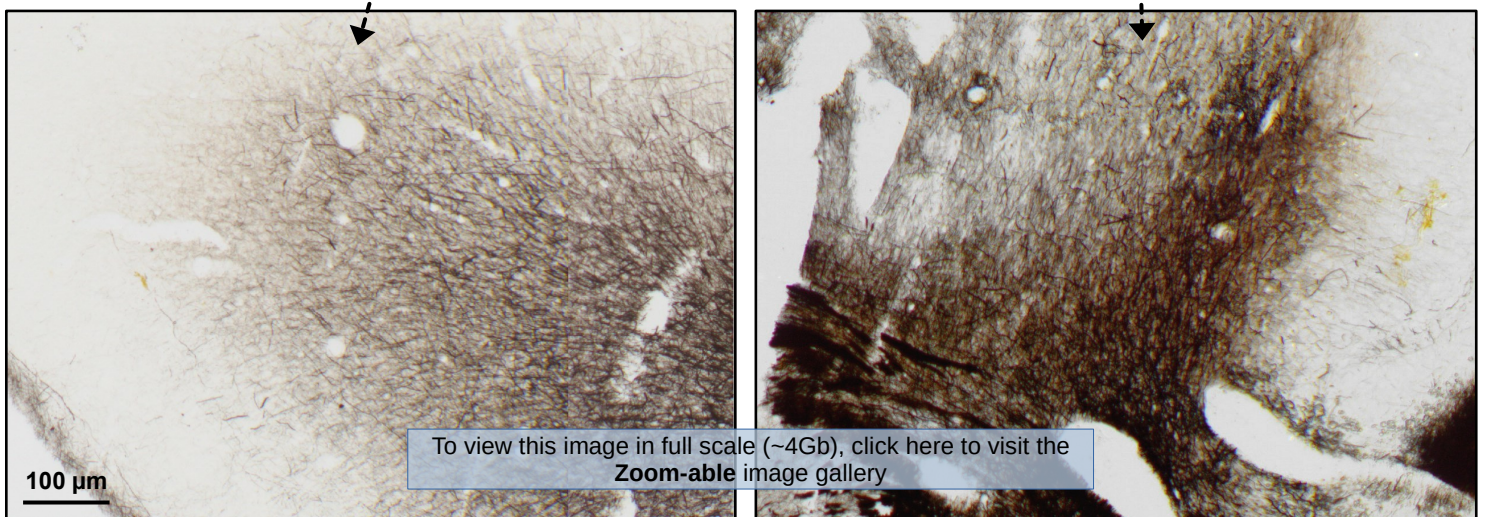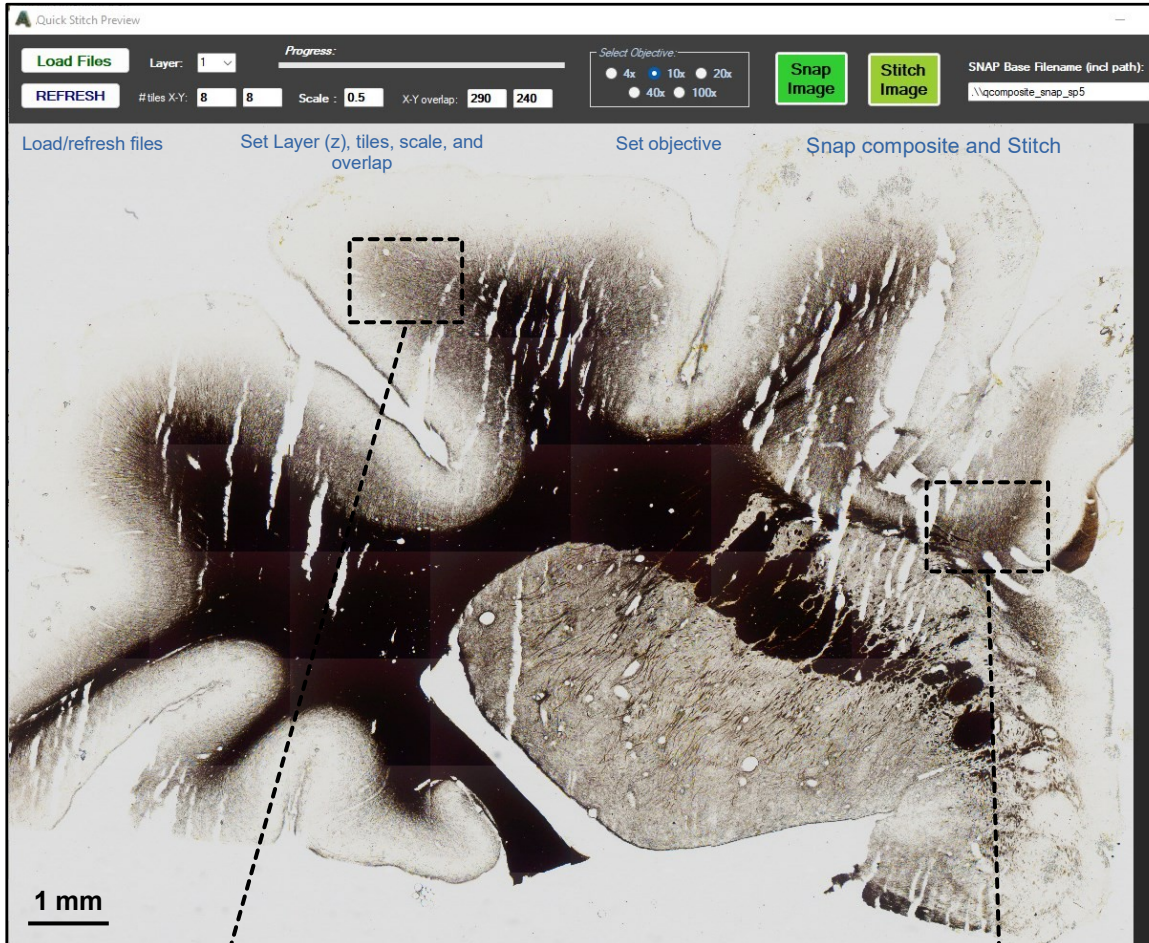
Full scale (top) and close ups of the 4x scan. Note that there is no visible mosaic artifact. Zoom and browse with mouse and/or keyboard control. Hit the **Snap** button for a fast composite image. Hit the **Stitch** button to perform quantitative stitching of the mosaic. Adjust overlaps to achieve sub-pixel accurate results. Super-resolution and 3D deconvolution are in working alpha.

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