Neurolucida 360: Detecting muscle fiber orientation

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1 Works for me

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ABSTRACT

Detecting muscle fiber orientation in 3D microscopy images using Neurolucida 360.

PROTOCOL CITATION

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Setup

1 Launch SPARC-enabled Neurolucida 360.

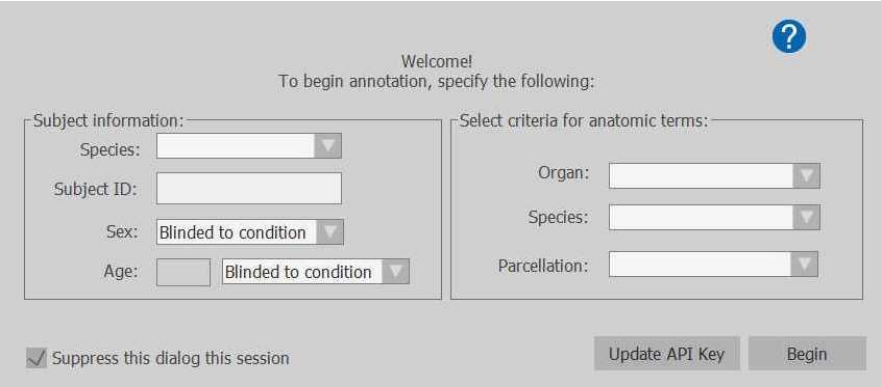
Neurolucida 360
by MicroBrightField Bioscience

2 Open a microscopy image via the Open icon, File>Open, or dragging and dropping into the program window.

NOTE: MBF Bioscience software supports a variety of image file formats from common microscopy vendors such as JPX/JP2, TIFF, LIF, ND2, IMS, OIF/OIB, almost all CZI, and more.

3 The SPARC Vocabulary Services window will appear. The dialog is displayed so that you can specify subject-specific metadata and gain access to the SciCrunch database to retrieve anatomical terminology lists compliant with FAIR data principles to use during annotation.

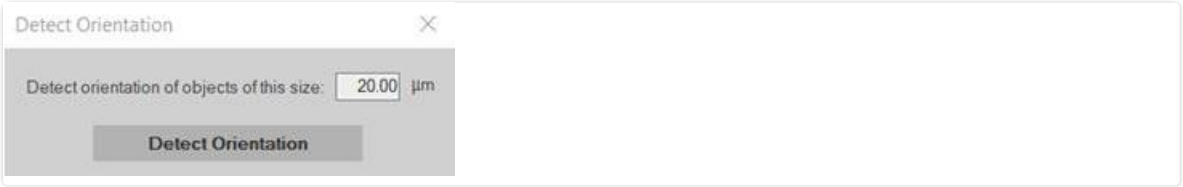
3.1 Fill out the **Subject Information** and select your **Criteria for Anatomic Terms.** Then select **Begin.**



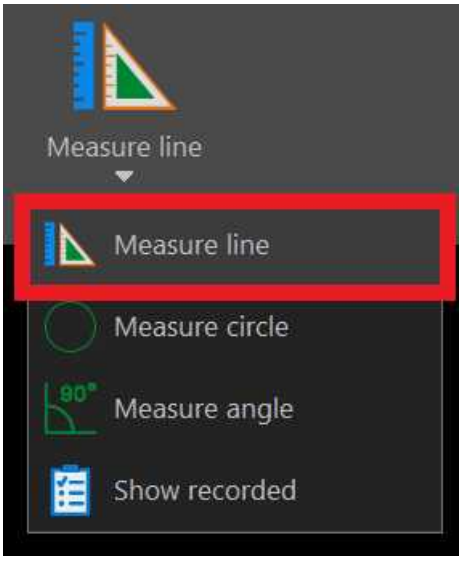
Using the Detect Orientation tool

4 When your image is loaded, close the 3D window. From the **TRACE** ribbon, select the **Detect Orientation** icon.

5 Specify the size of objects to detect in the **Detect Orientation** dialog box.

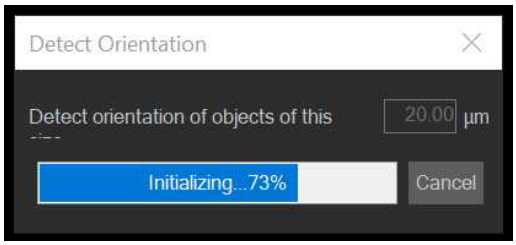


5.1 NOTE: If you are unsure of the size of your object of interest, find the measure line tool from the **TRACE** ribbon.

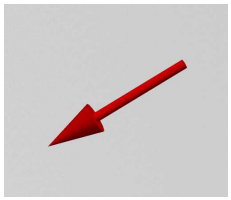


6 Once your object size is specified, select **Detect Orientation.** The detection algorithm will then detect the orientation of the local region of image signal at that designated size.

A progress indicator will display while Neurolucida 360software determines muscle fiber orientation.



7 View results in the 3D window. The muscle fiber orientations are modeled with red arrows overlaid on the image data.



8 Save the data file in XML format.

The orientation data for all detected vectors will be written to the XML file for use in your individual analysis pipelines and/or MAP-Core segmentation registrations to organ scaffolds.

8.1 The algorithm detects the orientation of image regions based on a user-defined size (orientation *scale*). The orientation *score* for each detected vector, represented as an arrow is calculated; values range from 0 to 1, with 1 representing perfect alignment in a principal direction. Only the fiber direction vectors are displayed in Neurolucida 360 software, however, the orientation of the *sheet* vector (lateral direction normal to the fiber in the plane of the sheet) and the vector normal to these two are recorded in the XML data file.