

Before you start

- Trace the trees.
- To display the panel, click the **Varicosities** button.



Detecting all varicosities automatically

1. Click **Detect All** for an initial detection with the default settings. Automatic detection may take a few seconds. The program renders the varicosities that meet the criteria defined below using a surface mesh. Because rendering is based on a different algorithm than the one used for detection, it might not reflect exactly the profiles generated by the detection process.
2. Inspect the results of the detection and adjust the detection settings before detecting again.
 - **Minimum thickness ratio:** $[\text{Varicosity diameter at middle point}] / [\text{Underlying branch thickness}]$ where $[\text{branch thickness}] = [\text{diameter at varicosity's first point} + \text{diameter at varicosity's last point}] / 2$
 - **Maximum length ratio:** $[\text{Varicosity length}] / [\text{Diameter at varicosity middle point}]$
 - **Image sensitivity:** Used by the detector during image segmentation. Higher percent values result in image appearing brighter to the detector.
3. Optional: To detect varicosities in addition to varicosities already detected with Detect All, check the Keep existing varicosities box.
4. Click **Detect All** to detect again.

Detecting individual varicosities individually

1. Zoom, rotate, and pan as needed to view the varicosity of interest clearly.
2. Adjust settings as necessary.
3. Click the varicosity of interest. The detected varicosity is displayed with a color overlay. You may see a warning: "Unable to detect a varicosity at the selected location." Under **Detection Settings**, increase the **Image sensitivity** (e.g., from 100% to 125%) then click the varicosity again to detect it

Detecting varicosities on a single branch

This is useful for testing the detection settings on a small region of a large image.

1. Under **Detection**, adjust the settings.
2. Under **Options**, check the box **Click to detect all varicosities on nearest branch**.
3. Click the desired branch to select it and detect all the varicosities on that branch.

Things to keep in mind

- If your image is “noisy,” check the Filter image noise box.
- To detect varicosities in addition to varicosities previously detected manually, check the Keep existing varicosities box.
- Editing trees (by deleting or moving points) after detecting varicosities may result in deleted varicosities.



Now, let's explore the editing options. First, click the **Edit** button to access the **Edit varicosities** panel.



To see all the options, you need to select varicosities first.

Selecting varicosities

Click **Select All** or click a varicosity in the tracing window. Selected varicosities are displayed with wireframes.

Deleting varicosities

Press the **Delete** key OR click **Remove** in the panel.

Changing varicosity color

1. Click a single varicosity OR hold down CTRL and click several varicosities to select them OR click the **Select All** button. Additional options are displayed in the Edit varicosities panel.
2. Click the arrow near the colored square to access the Color menu.
3. Select a new color.