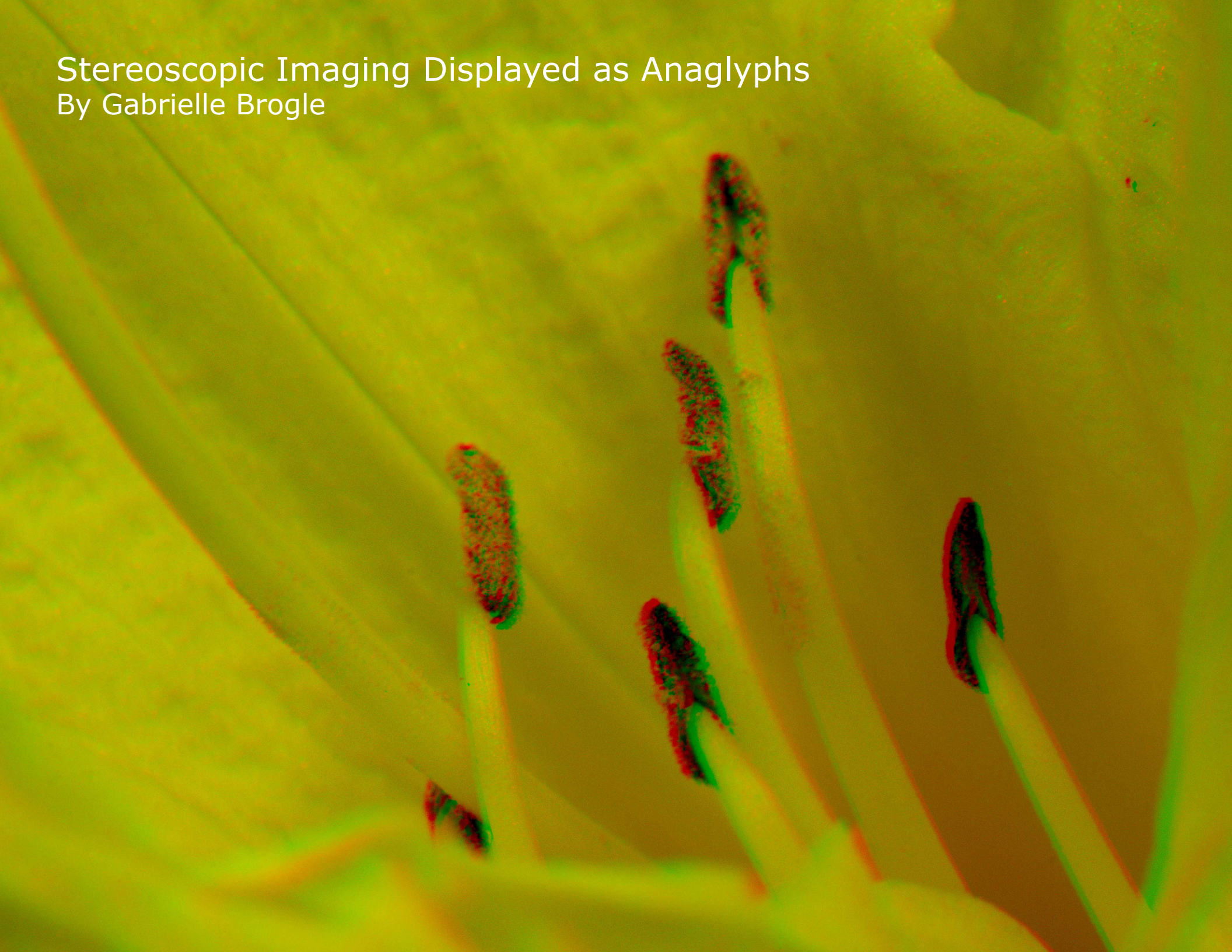
Stereoscopic Imaging Displayed as Anaglyphs

By Gabrielle Brogle



General Information

Stereoscopic imaging is a technique that is used to create the illusion of depth within an image. The image provides spatial information that trick's the brain to believing and seeing depth in the image. The brain is able to fuse the two signals into one image and interprets that as depth.

Queen Victoria's interest in stereo photography is claimed to have started a new craze leading into a new industry. The stereoscopic story really starts with Professor Sir Charles Wheatstone. He published in June of 1838 a paper describing how to see images in 3D. He provided drawings in order to support his idea. To see the drawings in 3D, he invented the Wheatstone Stereoscope in the 1830's. In 1940, Wheatstone wrote to Fox Talbot and Antione Claudet. He suggested that they make some stereoscopic photograph. It was Fox Talbot who made the first photographic 3D images that were ever made.

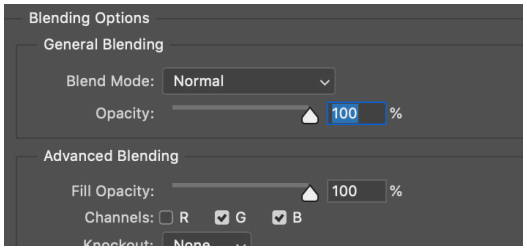
The general method for shooting stereo is using two camera that are capturing from slightly different viewpoints. The interaxial distance is adjusted to increase or decrease the depth / disparity. The normal horizontal displacement is about 2.5 inches, which is the average interocular distance for a human. This is assuming that there is an average subject distance of about 6 feet. If you are shooting at a 1:2 reproduction ratio with a 60mm lens, the working distance would be 240mm, and there would be a disparity of 8mm.

There are two different types of stereo: hyperstereo and hypostereo. With hyperstereo, you are increasing the distance to something that is greater than the interpupillary distance. With hypostereo, you are decreasing the distance to something that is smaller than the interpupillary distance. Hypostereo allows you to see depth at close distance when you would normally be unable to. Human vision normally switches to using the signal from one eye close up.

Technique

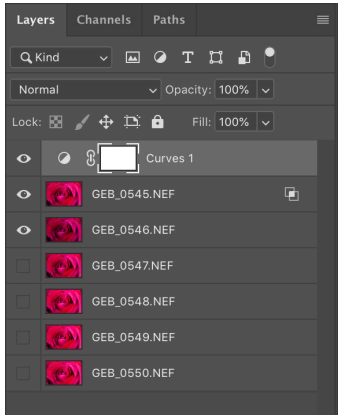
For each image, a series of images was taken. An initial image was photographed, and then the subject was rotated 0.5°. The subject was rotated again, and an image was taken at the following degrees: 1°, 2°, 3°, 4°, and 5°. This rotation was achieved using the Newport model 472 precision rotation stage. The dial allows for precise rotations. It is important to keep the subject in the center of the stage at all times.

The images were first brought into Lightroom. All of the images in the series were then selected and right-clicked and the "open as layers in Photoshop" option was chosen. The first image, the one with no rotation, was set to be the top layer. It was right-clicked, and blending options was chosen. As seen below, the "R" boxed was unchecked.



The rotation images were set to a color channel of red, unchecking the "G" and the "B" channels.

In order to find which pair of images worked best, the "eye" next to each image was checked and unchecked for all of the images. The first image remained visible at all times to find the best fit stereo image. While looking at each pair of images, the glasses were worn at all times in order to see the 3D effect.



For some of the images, a curves layer was added in order to have the 3D effect become more prominent. The curves were adjusted while viewing the image through the red and cyan glasses.

Applications

There has been a development in the area of stereoscopic medical imaging devices. The technology provides more realistic depth perception to the viewer. Due to this, it allows for a more accurate understanding and analysis of the morphology of an object. With a more accurate understanding and analysis, surgical accuracy has been improved, operation times has been reduced, and it enhances patient safety.

References

http://www.stereoscopicsociety.org.uk/WordPress/early-3d/

https://andymodlaphotography.blogspot.com/2011/12/hyper-and-hypo-stereo-photos.html

https://www.physiology.org/doi/full/10.1152/advan.00034.2014

https://www.researchgate.net/publication/232746285_Application_of_Stereo-Imaging_Technology_to_Medical_Field

About Me

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My name is Gabrielle Brogle and I am currently a third-year student at the Rochester Institute of Technology majoring in Photographic Sciences. I am particularly interested in microscopy, as seeing specimens on a microscopic level is fascinating.