BioArt: The Beauty of a Small World

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Abstract

The perceived divide between art and science is often misleading, as the fields of Art and Science are more connected than generally accepted. BioArt is a contemporary art form that combines these two disciplines, using biological samples and scientific processes and practices to create unique artistic works. In this research project we explore a sub-field of BioArt, Microscopic BioArt, by utilizing various microscopy techniques to image live samples, including brightfield and darkfield microscopy, phase contrast, and epifluorescence microscopy. We also apply various post processing techniques to raw images, using software such as DaVinci Resolve and Adobe Photoshop to incorporate further artistic aesthetics into the work. By merging scientific techniques and biological organisms with creative expression, BioArt challenges traditional ideas of both art and science, fostering new perspectives on the relationship between technology and life. By bridging the gap between scientific knowledge and creative expression, BioArt serves as a catalyst that inspires interdisciplinary innovation, collaboration, and curiosity surrounding science and the world around us.

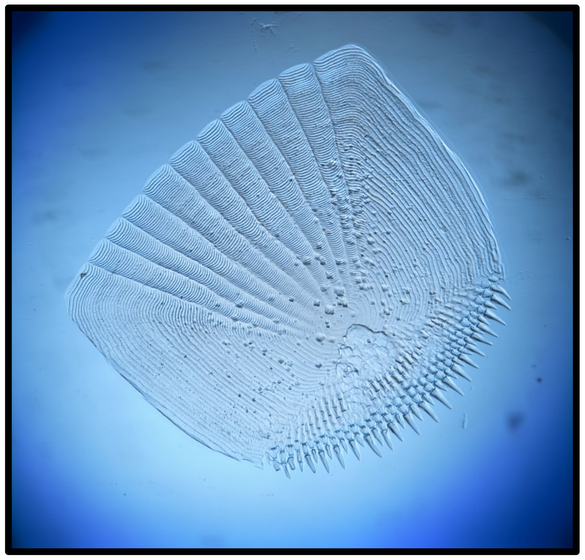
Introduction

Due to the exponential growth of biotechnology and as a result how we view science and our surroundings, there is an increasing need for a way for people to more easily learn about the world around us. Simultaneously, as these new technological and scientific advancements are made and are made more and more easily accessible, people have began using such knowledge and resources to create their own artistic projects and interpretations. Bioart is an artistic approach that utilizes scientific methods and techniques to produce creative and artistic interpretations of various biological fields such as genetics, molecular biology, and biotechnology, illustrating intricate connections between science and everyday life. This concept can aid in educating and exciting the public about science, an important task in a rapidly developing scientific world.

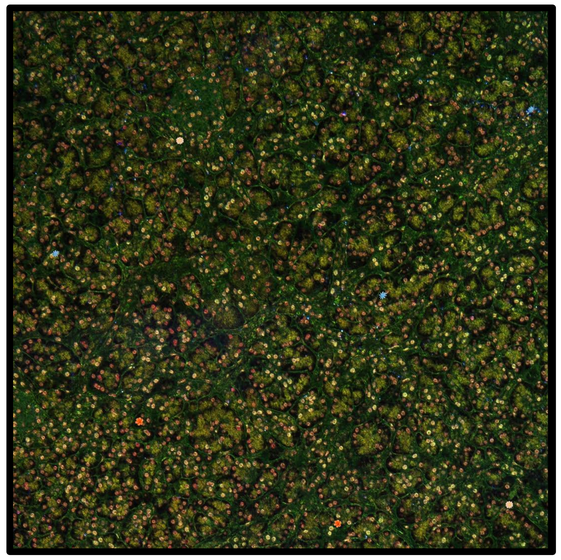
References

- Yetisen, A. K., Davis, J., Coskun, A. F., Church, G. M., & Yun, S. H. (2015). Bioart. Trends in Biotechnology, 33(12), 724–734. https://doi.org/10.1016/j.tibtech.2015.09.011
- Spring, K., & Davidson, M. (n.d.). Specialized Microscope Objectives. Nikon's MicroscopyU. https://www.microscopyu.com/microscopy-basics/specialized-microscope-objectives\

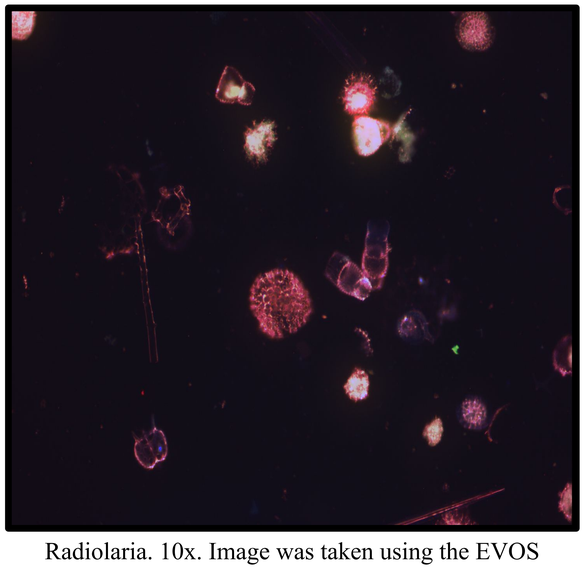
Results



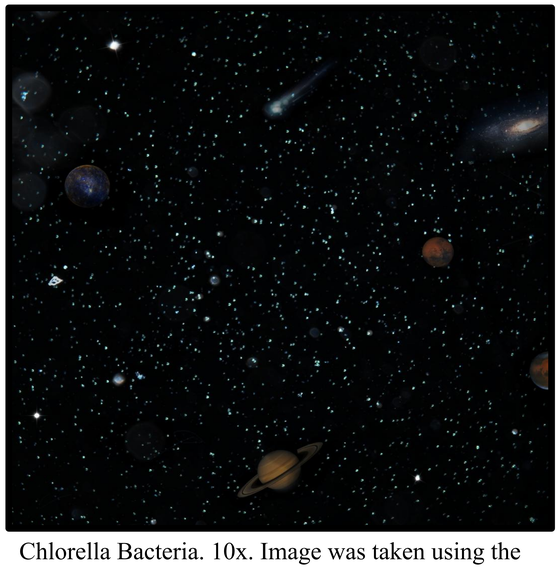
Ctenoid Scale. 10x. Image was taken using the Nikon Ni-U Microscope with brightfield microscopy. DaVinci Resolve was used to further color, sharpen, and brighten the image.



Human Pancreas. 10x. Image taken using the Nikon Ni-U Microscope with darkfield microscopy. Contrast and sharpening was added using Davinci Resolve. Photoshop was also used to add decorative flowers to the piece.



Radiolaria. 10x. Image was taken using the EVOS M5000 with epifluorescence microscopy. DaVinci Resolve used to sharpen, brighten, and add a glowing effect to the image.



Chlorella Bacteria. 10x. Image was taken using the Nikon Ni-U Microscope with darkfield microscopy. Contrast was enhanced using Davinci Resolve. Photoshop was used to add cosmic elements to resemble outer space.

Methods

- Several microscopy techniques were employed throughout this project, including:
  - ❑ Darkfield and Brightfield Microscopy
  - ❑ Polarized Light Microscopy
  - ❑ Phase Contrast Microscopy
  - ❑ Epifluorescence Microscopy
- Practicing these techniques were executed using a variety of different microscopes, each having their own unique strengths. The microscopes I utilized throughout my exploration include:
  - ❑ Keyence VHX-7000- a digital, optical microscope that is useful for imaging larger samples
  - ❑ Nikon Ni-U- a versatile, upright microscope useful for smaller samples
  - ❑ EVOS M5000- a digital, inverted benchtop microscope used primarily for epifluorescence
- Using these devices, the sample is magnified through one, or many lenses in the microscope. The light is then bent, making the image appear much larger. Several optical imaging techniques may also be employed, allowing for unique ways to view the samples, such as those with low contrast or visibility.
- The samples chosen consisted of both slides and live samples. The specimens chosen include a ctenoid scale, a human pancreas, radiolaria, and chlorella.
- Editing techniques were carried out using DaVinci Resolve and Photoshop. Davinci Resolve was used for coloring, blurring, and sharpening images. Photoshop was used to add a creative flair to certain images.

Conclusions

- This project explored BioArt through various microscopy techniques.The Nikon Ni Upright Microscope and EVOS M5000 proved to be the most useful in this artistic work, along with darkfield, brightfield, and epifluorescent microscopy:
  - ❑ The Nikon Ni-U microscope proved to be the most versatile, producing high-quality images through both brightfield and darkfield microscopy, which emerged as the most visually appealing techniques.
  - ❑ The EVOS M5000 microscope's epifluorescence microscopy created captivating images through its bright colors.
- Future explorations could benefit from the use of scanning electron microscopy (SEM) to generate three-dimensional images of samples in high definition. This could offer an enhanced perspective of microscopic structures, further bridging the gap between science and artistic expression.

Acknowledgements

This work was performed at the National High Magnetic Field Laboratory, which is supported by National Science Foundation Cooperative Agreement No. DMR-2128556 and the State of Florida.