



BPC Bulletin

Biomedical Photographic Communications ❄ Winter 2012-13

letter from the editors

exploring new forms of content delivery

We would first like to thank everyone for making the first all digital BPC Bulletin such a success. By using Google Analytics on our website, we were excited to track how many hits the website received. Within the first twenty-four hours of release we had over 500 visitors download the issue. Additionally, Google Analytics provided us with valuable information such as the location of our readers, how they were referred, and the technology they used. Optimizing for the variety of browsers, operating systems, and mobile technology is a challenge in this medium. The demographics and data helped us make changes to better meet the needs of our readers.

Our primary target for advertising was Facebook for the first issue, so it was a priority this quarter to advertise in others areas as well. We also saw that the majority of readers viewed the issue on a computer when we had originally targeted tablets. With this information, we decided to use a widescreen aspect ratio for this issue, optimized for full screen viewing.

Last quarter we were happy to introduce videos for the first time ever, and they proved to be a major hit. We have again included a video gallery but we have also expanded video content into our articles.

This quarter we are excited to introduce interactive 3D models. A little-known feature of the PDF format is that 3D objects can be placed onto a page. Though

many portable devices unfortunately do not support this feature, it is exciting to be able to rotate, zoom, and interact with 3D models. To embrace this feature, we photographed ourselves in 3D for this page, another 'first' in BPC Bulletin history. Read about the process of photographing and creating these 3D renderings in the Tutorials section of this issue.

Another exciting addition to photo science programs this winter is the snowflake shack. Thanks to Michael Peres, Associate Administrator Chair of the School of Photographic Arts and Sciences, and Bill Wadeikis, Photographic Repairs Technician, a microscope is housed outside of the Gannett building. This allows the students to photograph snowflakes at their own convenience., creating snowflake images such as the ones on this page to be made.

As with our last issue, every person's name listed in a photo caption is a clickable hyperlink to the individual's email. This allows for easy networking between our readers and the student photographers, whether to comment on the image or to gain insight on the technique.

We would like to thank our wonderful advisors Rachael Gootnick, Christye Sisson, and Josh Shagam for another great quarter.

We look forward to hearing feedback from our readers at bpcbulletin@gmail.com.



Ryan

Ryan
Harriman



Kylie

Kylie
Madigan

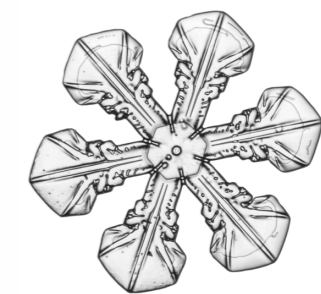


Sarah

Sarah
Oros

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Front Cover Image: Zachary Pezzillo

Back Cover Image: Erin Walsh

Background Image: Ryan Harriman and Tim Tiebout

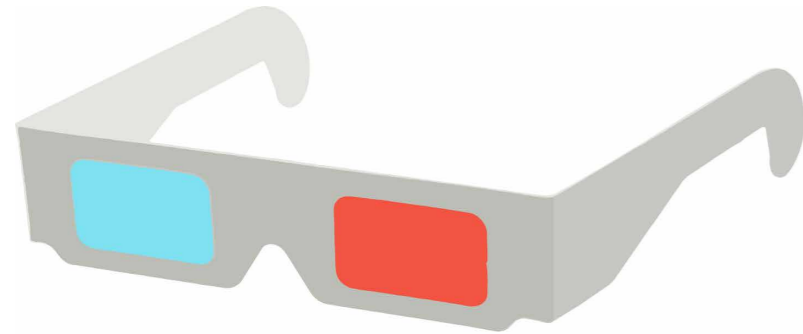
Above Snowflake Image: Marissa Masek and Sarah Oros



Although scientific photography is considered a niche field, it has countless applications. Students in the Biomedical Photographic Communications and Imaging and Photographic Technology programs learn a wide variety of skills to become versatile photographers and problem solvers. Read on to discover some photography tips and techniques related to the world of scientific photography, such as 3D imaging, shooting in cold weather, and creating a macro studio outdoors.

3D imaging

learn how to easily render 3D models by taking only two photographs



Have you ever put on a pair of these glasses?

Many people's first experience with three-dimensional images is at the cinema. 3D movies have gone in and out of popularity over the decades due to changing technologies and market trends. Even with the success of recent 3D films such as James Cameron's *Avatar* and Peter Jackson's *The Hobbit*, the current industry trend in movies and television is actually shifting away from 3D. Despite this, the technology behind capturing and viewing 3D content is constantly evolving.

In spite of the decline of 3D movies, there is an increasing popularity among scientific and medical photographers for stereoscopic imaging, such as in the fields of dentistry and ophthalmology. Capturing images in the third dimension is becoming easier and more accessible and has a lot of potential in the scientific community because it allows for greater analysis and understanding of subjects.

You do not have to be a filmmaker or a scientist to experiment in the field of 3D imaging. With

any digital camera, free software called Agisoft StereoScan, and a little bit of time and patience, a 3D model of an object or person can be made with ease. After taking only two photographs of an object or person, the computational power of Agisoft StereoScan can generate an impressive 3D model can be reconstructed based on the slight differences between the two photographs—no glasses required!

To take stereoscopic photographs yourself, you can either use one camera that you move laterally between shots, or use two of the same cameras that are triggered simultaneously. The two camera method will potentially produce more repeatable results, but many will prefer the one camera method due to the much simpler setup.

You can either shoot your subject hand-held, or attach your camera to a monopod that has an arm that can be moved laterally. The distance between the two photographs that you take is entirely subject dependent. You can shoot very small subjects in a macro setup, in which case you would only move the camera about a centimeter. You can also shoot an entire building, in which case you would move the camera up to about a meter.

Do not be tempted to move the camera too much between shots. You only need a subtle amount of stereo separation in your images for Agisoft

StereoScan to work. It is best to take one photo of your subject straight-on, and then another photo slightly offset. Figure 1 demonstrates too much stereo separation, in which the camera was moved to the far left and the far right of the subject. Figure 3 demonstrates optimal stereo separation, in which the camera was only moved slightly between shots.

You can shoot your subject in natural light or in a studio. The important thing to remember is to keep lighting consistent between the two images, and this is easiest done in a controlled studio environment. If the lighting changes between shots, or the subject moves between shots, Agisoft StereoScan will not know what to do with that data. Figure 2 demonstrates a change in lighting in the stereo pair, and the software fails to render a model with these images. Figure 3 demonstrates consistent lighting, providing better data for the software to generate a 3D model.

A final tip is to make sure that your subject has to stay absolutely still between images. If you are shooting a person and he or she changes his or her expression between shots, the software will confuse that change with the depth of their face, producing some very interesting results!

Watch the video on the following page to see how to use Agisoft Stereoscan to render a 3D model from your photographs.



Figure 1. Too much stereo separation



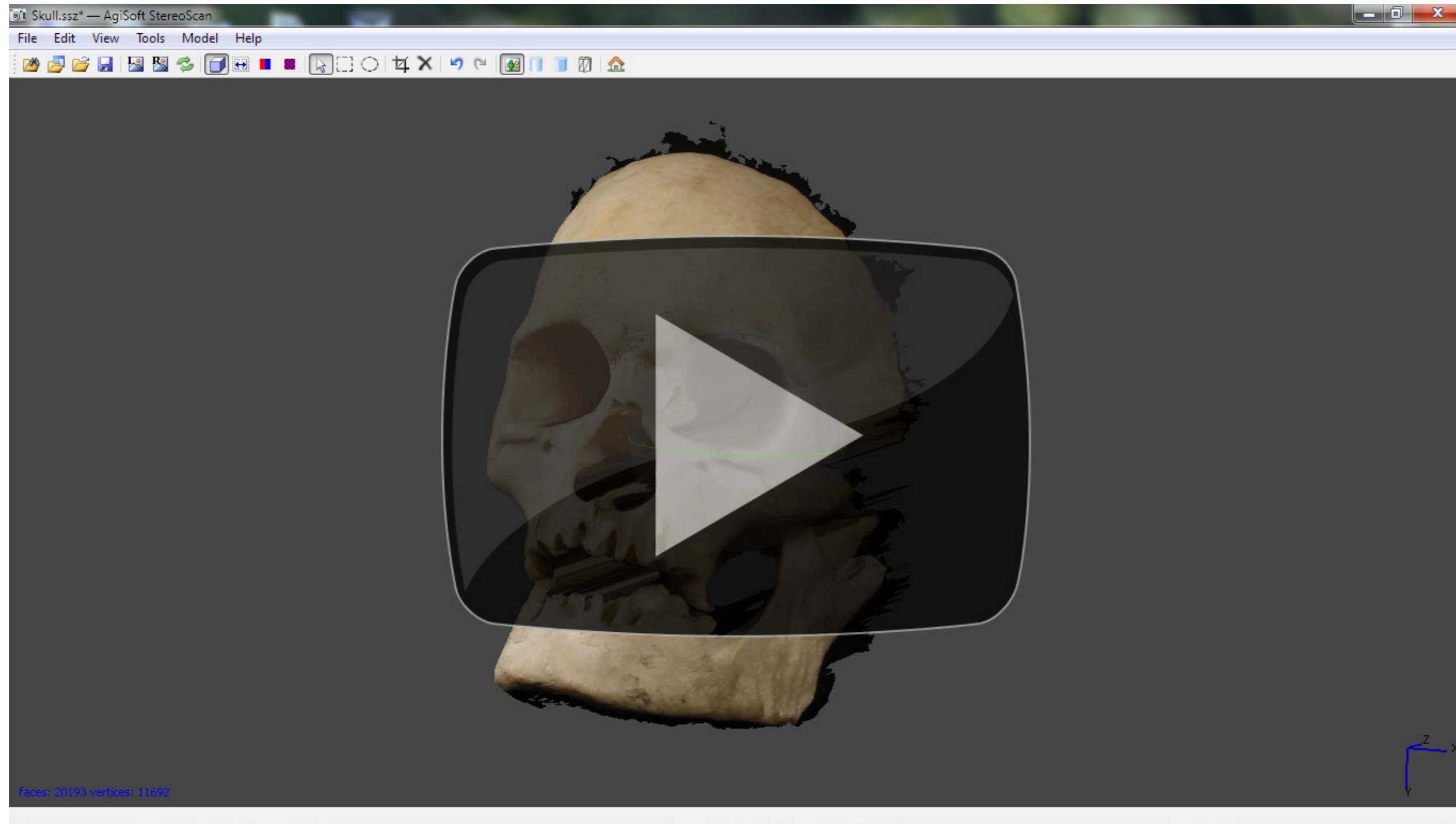
Figure 2. Change in lighting between shots



Figure 3. Optimal stereo separation and lighting

3D imaging

learn how to easily render 3D models by taking only two photographs



Interactive rendering from Agisoft StereoScan—the model has been compressed for PDF viewing:



Own a Smartphone? Try This!

Download a free app called 123D Catch, made by Autodesk, by clicking [here](#). It works similarly to Agisoft StereoScan, but allows you to take up to 40 photographs from all angles of your subject. The app will then upload those photos to "the cloud" for rendering, and then an interactive 3D model will be sent back to your smartphone in a matter of minutes!

Download Agisoft StereoScan for free from the publisher's website by clicking [here](#). The software is both Mac and PC compatible.



winterizing



a tutorial on shooting in winter weather



bringing the studio outdoors

Josh Shagam's assignment revisits Mendon Ponds



Brittany Bateman ✱ Mushroom

Every year, students in the Applications of Scientific Photography class travel to Mendon Ponds to shoot nature photography, but this year, the students were challenged with a brand new assignment; creating a field studio at Mendon Ponds Park, a popular nature reserve about twenty minutes southeast of RIT. Armed with panels of white acrylic glass and electronic handheld flashes, the students in the class travelled to Mendon Ponds to take photographs of nature, but without taking the individual subjects out. The aim of the project was to isolate subjects from nature by using the flash and acrylic glass to make the background of the photograph white, and give the subject even diffuse illumination that presents its characteristics.

Josh Shagam, Visiting Lecturer in the Photographic Sciences, created this project for students to learn the details of handheld flash while having a hands-on photography experience. Electronic flash treatment can be used for artistic as well as scientific purposes. It isolates the subject, which can be a beautiful effect. The documentation of plants and animals is an excellent use of this technique, as tracking certain species and populations without removing them from their habitat is valuable when doing research.

Another criterion of the assignment was recording the GPS coordinates of each photograph taken. To

do this, the students used cameras with GPS tagging features and smart phones that could pinpoint the coordinates of their location. These techniques could easily be applied for photography in other fields, including biology, archeology, and geology.

Completed at the end of fall quarter, the project required syncing up multiple flashes and other gear out in Mendon Ponds Park, while temperatures got colder by the day. In addition, the search for living specimens was made more difficult by the growing cold. Despite these challenges, the students created wonderful photographs.

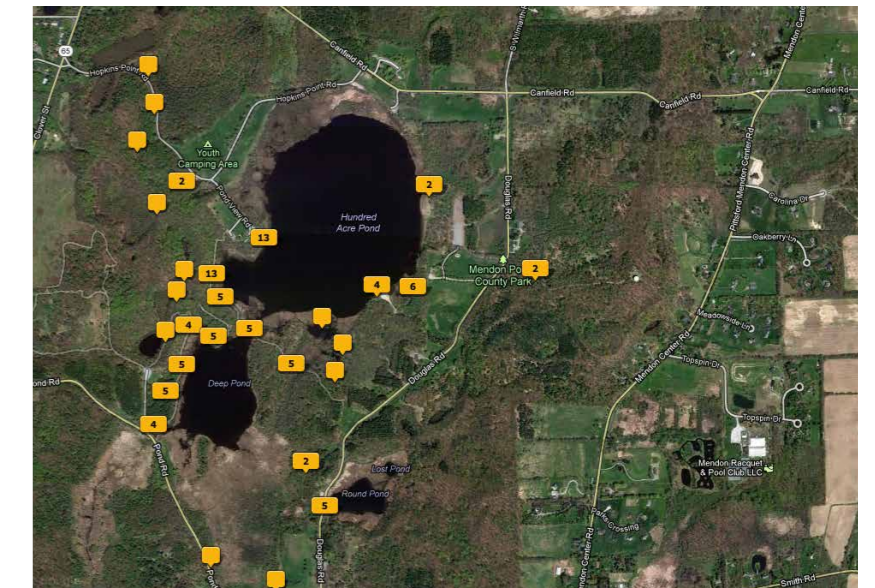
The assignment was inspired by Niall Benvie and Clay Bolt with the "Meet Your Neighbors" project, a worldwide conservation project founded on the importance of knowing what lives in your backyard and documenting the living specimens within. The project spread like wildfire since 2009, and many people from around the world participate in it. There are photographs from Massachusetts to Zambia.

Josh Shagam knows that there are many portfolio pieces to come out of this project. He is also hoping to continue the assignment in the future and grow a database of photographs of the wildlife at Mendon Ponds. In this way, changes from year to year can be observed, with populations and even particular specimen attributes.

Tips and tricks:

- ✱ The lighting using electronic flash should be diffused in the foreground, with few shadows.
- ✱ The background should be perfectly white and appear to be clipping in your histogram.
- ✱ Prepare yourself for the environment you will be photographing—bring appropriate clothing.
- ✱ Bring a friend or two to help out with the process. Also, having additional people will result in finding better specimens.
- ✱ A macro lens and tripod are essentials, as well as a sheet of acrylic glass that is an appropriate size for your subjects.

For more information: www.meetyourneighbours.net



Map of geotagged photos locations in Mendon Ponds

bringing the studio outdoors

examples of student work



Sam Chalut * Ladybug on Flower



Jace Artichoker * Spider

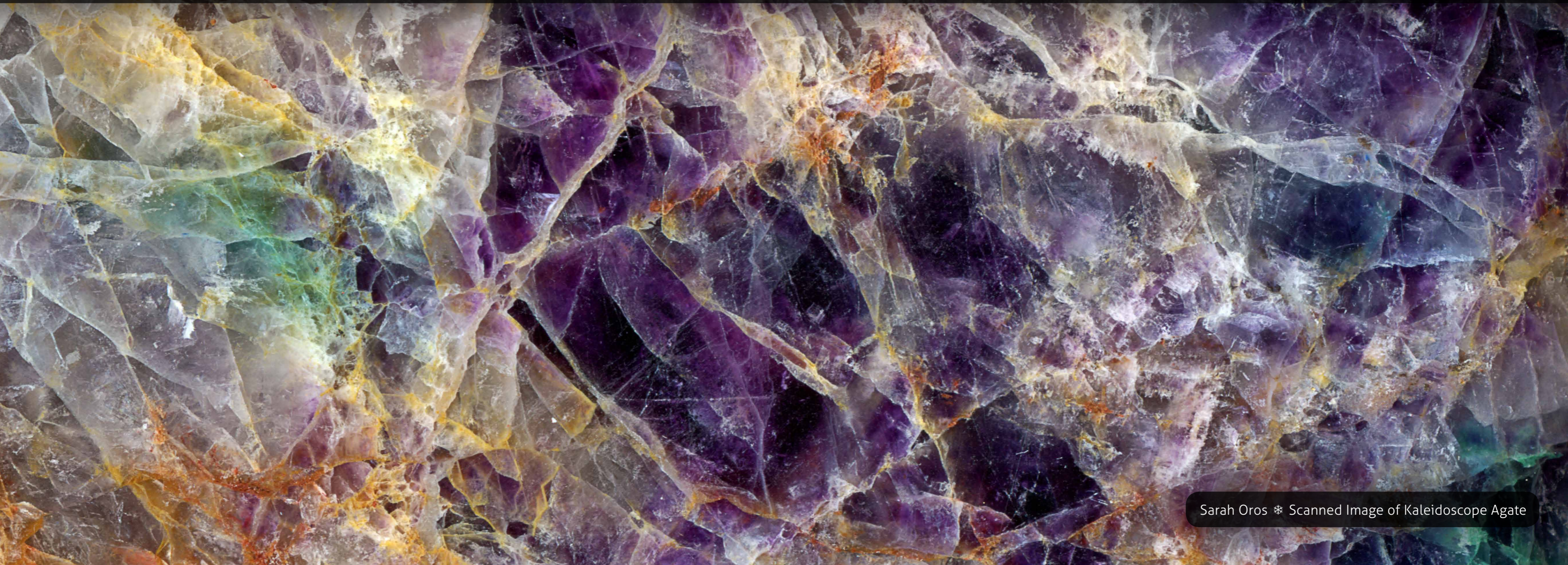


Evan Darling * Wasp



interviews with professionals

With a huge and growing network of professionals that work in the field of photographic sciences, we had the pleasure of talking with professionals about topics relevant to our studies. With topics ranging from astronomical photography to the challenges of sending students to the 2013 Big Shot in Dallas, Texas, read what these professionals have to say about their work.



Sarah Oros * Scanned Image of Kaleidoscope Agate

scanners as cameras

a look into Steve Diehl's innovative new class

Scanners as Cameras is a new, innovative class that allows students to experiment with an underappreciated photographic method: scanning. This class encourages students to use their imaginations with a scanner and to experiment. This class is open to all students in the School of Photographic Arts and Sciences.

A flatbed photo scanner has several characteristics that make it unique. First is that any subject touching or located a few millimeters above the scanning glass will be in perfect focus. Past that point, the focus falls off dramatically. In addition, high image magnification can be achieved when scanning at higher resolutions. Finally, the light source of the scanner is in close proximity to the photoreceptors on the linear array making the lighting atypical.

A flatbed scanner capable of scanning at a high resolution costs significantly less than a professional macro lens, but can create comparable image characteristics in still subjects. In moving subjects, the scanner's mechanism creates image artifacts due to the slow travel of the linear array sensor. These artifacts form RGB patterns that become part of the image, and can allow for more abstract compositions.

The class has several assignments, such as self-portraits, raw fish and seafood, liquids, plants, and a

final assignment that is self-directed and proposed by each student.

We sat down with Steve Diehl, Associate Professor and originator of the class, to ask him some questions about the class:

What does the class try to achieve? What do you hope the students learn?

I hope that the students learn that you can take a rather ordinary device, like a scanner, and put ordinary things on the scanner and come out with extraordinary images.

What is the main appeal of the scanning technique and process that differentiates it from traditional camera imaging?

The process allows, or even forces you, to look at fine detail that you otherwise might not take the time to achieve through other imaging techniques. Also, you can experiment very easily with the scanner. Even an inexpensive home office scanner can provide a suitable platform for imaging.

Why are images from scanning so distinctive?

Part of the footprint of them, if you will, is that they are fairly limited in terms of depth of field, which can

help or not help the photograph, and the backgrounds can be quite stark, either a brilliant white or a very dark black. Scanning can be a very graphic platform to work with.

What is your favorite part of the class?

My favorite part is interacting with students as they are scanning, suggesting they try this or that, and after countless hours of directing students, I am still amazed to see what they are coming up with.

Other imaging techniques can have predictable outcomes; I find it exciting to be scanning because the aesthetic is so new. I always look forward to the lab sessions with the students.



scanners as cameras

student work



Erin Walsh * Birch Tree Bark



Erin McIntosh * Flower



Maggie Granzier * Papaya

astronomical photography

an interview with David Malin

David Malin is a British-Australian astrophotographer known for his work in color. His interest in photography grew during his teenage years. As a young adult he trained as a chemist, and soon thereafter started his career in scientific imaging. During this time, he worked with optical and electron microscopes as well as x-ray diffraction. In his thirties he was offered a job as a scientific photographer at the Anglo-Australian Observatory (AAO). At the AAO, he used a telescope to capture invisible light and utilized various photographic processes to extract scientific information from the resulting images. We had the opportunity speak with David and discuss his work and career.

What kind of information can be learned from these photos and how do the photos help scientists?

The data (photographic plates) from which the colour photographs were taken for scientific purposes. The fact that these same plates could be used to create color images was a bonus. The photographs usually show objects that are too faint to be seen by eye, even with a large telescope, so just having a detailed image is scientifically very useful. A true-colour version greatly adds to the usefulness, and allows an astronomer to see directly where the star forming regions are in a distant galaxy, or to explore star forming regions in our own galaxy, the Milky Way.

You are well known for your three color images. Can you explain how this process is different from monochromatic images?

If you look at your TV screen with a magnifier you will see the picture is made up of red, green and blue dots, called pixels. It has been known since 1861 that all the colors in the rainbow can be created by mixing various amounts of red, green and blue light. If you take three separate, black and white pictures using filters to capture the red, green, and blue light on separate negatives, you can reconstruct a true-colour image from these in a variety of ways.

The same foundations of photographic processes are used for astronomical imaging but there are distinct variations that make this type of work more difficult. Special photographic plates are used to capture these images with exposures lasting as long as 90 minutes. These images are still very faint after the long exposure so post-processing must be done.

What imaging processes have you utilized?

Before it was a Photoshop filter, unsharp masking was an analog, non-destructive contact copying process that changes the dynamic range and apparent sharpness of a photographic negative.

Another non-destructive process is photographic amplification, which is a contact copying method

that uses a high contrast film and a very carefully controlled exposure to emphasise faint, low contrast detail on photographic plates. It was responsible for many astronomical discoveries and lends itself to combining multiple images.

Multiple-image addition is a technique that can be used in the darkroom or Photoshop to combine multiple exposures to reduce the noise level of the images. By reducing the noise, one is able to see small detailed structures better than one could view in a single exposure.

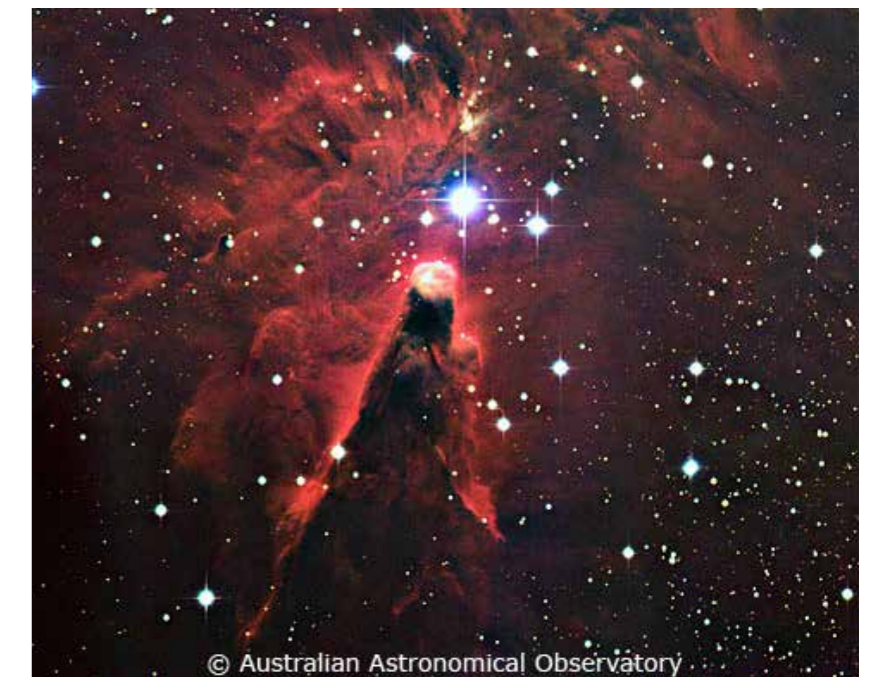
What do you find most enjoyable about taking astronomical images?

I enjoy a technical and intellectual challenge, and astronomical photography provides both. Technically, you are usually photographing something you cannot see by eye—even with a big telescope—so setting up a shot is quite demanding. Because telescope time is so scarce you have to work quickly and you very rarely get a second chance.

The intellectual challenge involves interpreting the information you gather. The images that were used to make the colour pictures were taken for scientific purposes if you can produce or contribute to a scientific research paper from your data. The colour pictures were a handy by-product.

The other challenge is the artistic aspect of astronomical photography. Unlike most branches of photography, in astronomy you cannot fiddle with the subject matter in any way by altering the lighting, colour, viewing distance, or orientation, so you have to make the best of what you get. While it might be ideal for scientific purposes, it might be less than optimal for a visually interesting image, so you must balance the science with the aesthetics.

For more information and astronomical images, visit David Malin's website by clicking [here](#).



David Malin * The Cone Nebula in Monoceros

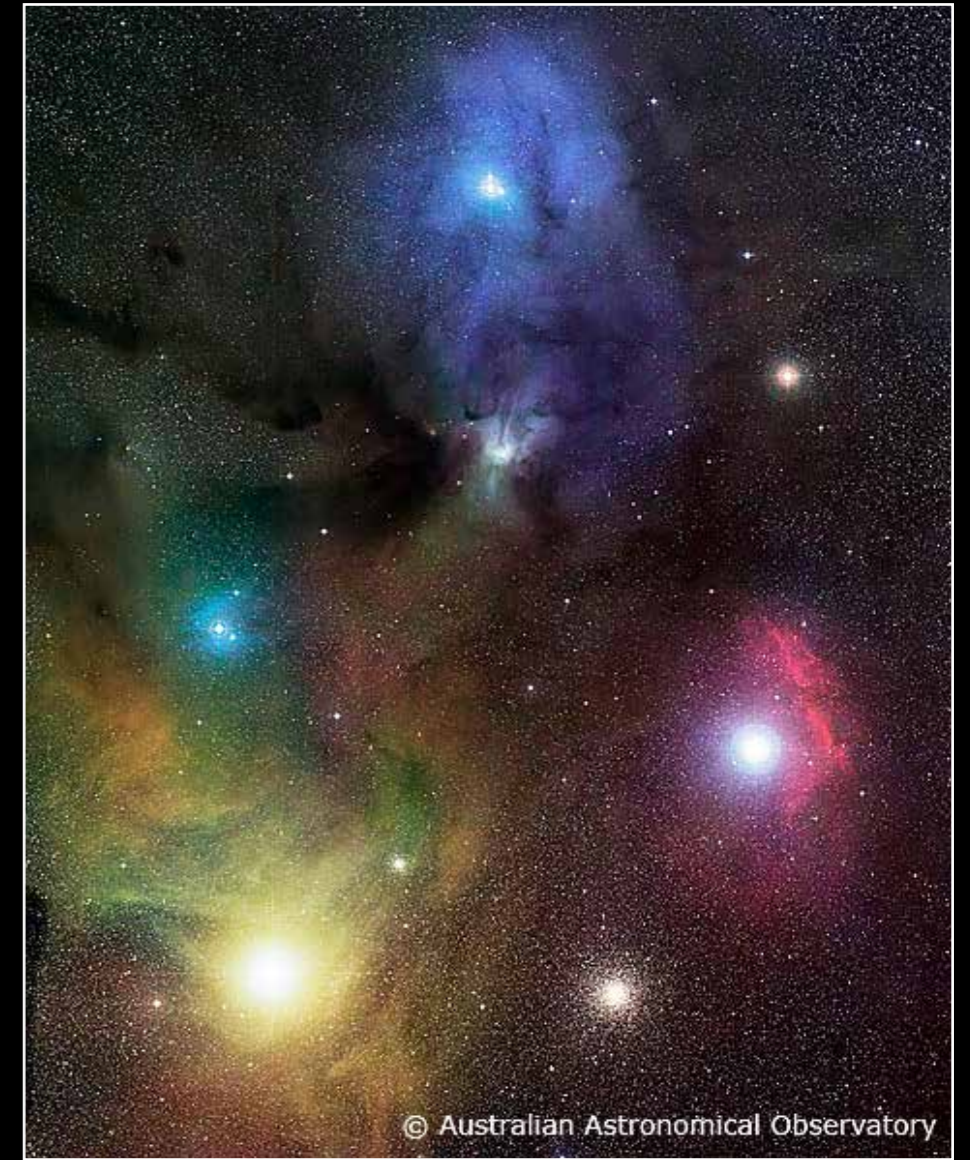
David Malin's astronomical photographs



David Malin * The Fox-fur Nebula and S Monocerotis



David Malin * Reflection in Nebula Orion



David Malin * Antares and the Rho Ophiuchi Dark Cloud

Big Shot no. 28 at Cowboys Stadium

interview with Debbie Kingsbury, Assistant Dean of the College of Imaging Arts and Sciences

Since its inception in 1987, the Big Shot has grown from a experimental event for students to try out “painting with light” to something much larger. On March 23, 2013 in Arlington, Texas, thousands will arrive to light up the Cowboys Stadium at night, making it the biggest Big Shot ever. A tremendous amount of work goes on behind-the-scenes to make an event like this happen. Here, Debbie Kingsbury discusses her involvement with sending RIT students to this once-in-a-lifetime event.

What is your involvement with the Big Shot, both past and present?

My first Big Shot was the USS Intrepid in NYC, and that is when I met Michael Peres. I worked in the College of Business then, and we took fourteen students to the city in a van. I have only missed two Big Shots since then. While every Big Shot is different, my role has always been “how to get students there”.

This year has been very different. The cost per student to get to Arlington, Texas is just over \$1,000, which includes airfare, hotel, meals, ground transportation, the alumni reception, and touring the stadium. Our goal was to get the out-of-pocket cost per student below \$500—something that would not be cost prohibitive. Thirty-four students made deposits and started fundraising. Thanks to an interactive learning grant from Dr. Mary Beth Cooper,

Senior Vice President of Student Affairs at RIT, a grant from the McGowan Foundation, the volunteer efforts and donations of faculty and staff, and the very hard work of our students, we have brought the student out-of-pocket cost down to \$200.

How much planning has gone into an event this large for the 2013 RIT Big Shot?

Discussions for any Big Shot typically start a year in advance. While negotiations began over a year ago, this site was not confirmed until October, leaving the team less than six months of actual planning time.

The photo team is focusing on the shot itself—where to place people, how to communicate with a crowd of this size, where to rent the necessary equipment, etc. Three members of the RIT Alumni Relations team are working with us on the reception and communicating with alumni in Texas. The development staff are working with corporate sponsors. Staff from University News Service are working on publicity in Texas. Lisa DeRomanis, Senior SPAS Staff Assistant, and I are working on aspects relating to the students. We are fortunate to have the support of the administration and the campus community behind us as we fundraise and gather information, as well as the design talents of our students who are helping with various projects.

How many people are expected to attend to attend?

We are planning for 500 people at the alumni reception prior to the photograph being made, and based on community support from the City of Arlington, we have been told to expect close to 5,000 for the Big Shot itself. Nothing is small in Texas, and whether we reach 5,000 or not, we do expect this will be our biggest crowd ever for a Big Shot.

What do you hope participants—students in particular—will get out of this experience?

As always, we hope our students grow from this educational experience, learning through fundraising and planning efforts. The experience will enhance their photography skills and overall education. For me personally, I hope they gain something more... something that is not in a textbook.

To understand what it means to be part of something bigger than themselves, to forge new relationships, to learn to love the adventure of a new experience, to look back at their time in college and remember it fondly; these are all things I hope students get out of the experience. The thirty-four students traveling with our group have already started down that road. They worked side-by-side with people they did not necessarily know at fundraising events, they are forming new relationships, and they took a risk on

us and this adventure. That \$1000 price tag was pretty scary for them—and us—in October, and look what they accomplished already. I have traveled with students for many years, and for me seeing that excitement and sense of accomplishment that lights up their faces makes all the hours worthwhile. I want them to feel proud of their accomplishments, to have fun, to grow and develop as individuals, and to build memories that will last a lifetime. And it will all be captured for them in that one image—thanks to the power of a camera lens.

For more information on the Big Shot, click [here](#).



Debbie Kingsbury lands the plane in Dallas as students surpass the fundraising goal of \$30,000

from Rochester to Dallas

students help fundraise to make the trip to Cowboys Stadium possible



At \$5 for three throws, student Ben Lubin dunks IPT faculty Nanette Salvaggio. Many other faculty and staff volunteered for this fun event



Set-up team for the SPAS Holiday Auction



Holiday portrait team in the studio



Time lapse video of the SPAS holiday Auction, led by Bill Dubois



RIT President Bill Destler chats with Big Shot coordinators Michael Peres and Bill DuBois during the "Get Happy at The Ritz" bartending event



Students celebrate their earnings



Dunk tank video, courtesy of RIT University News



2013 Big Shot trailer, courtesy of RIT University News

❄️ student gallery

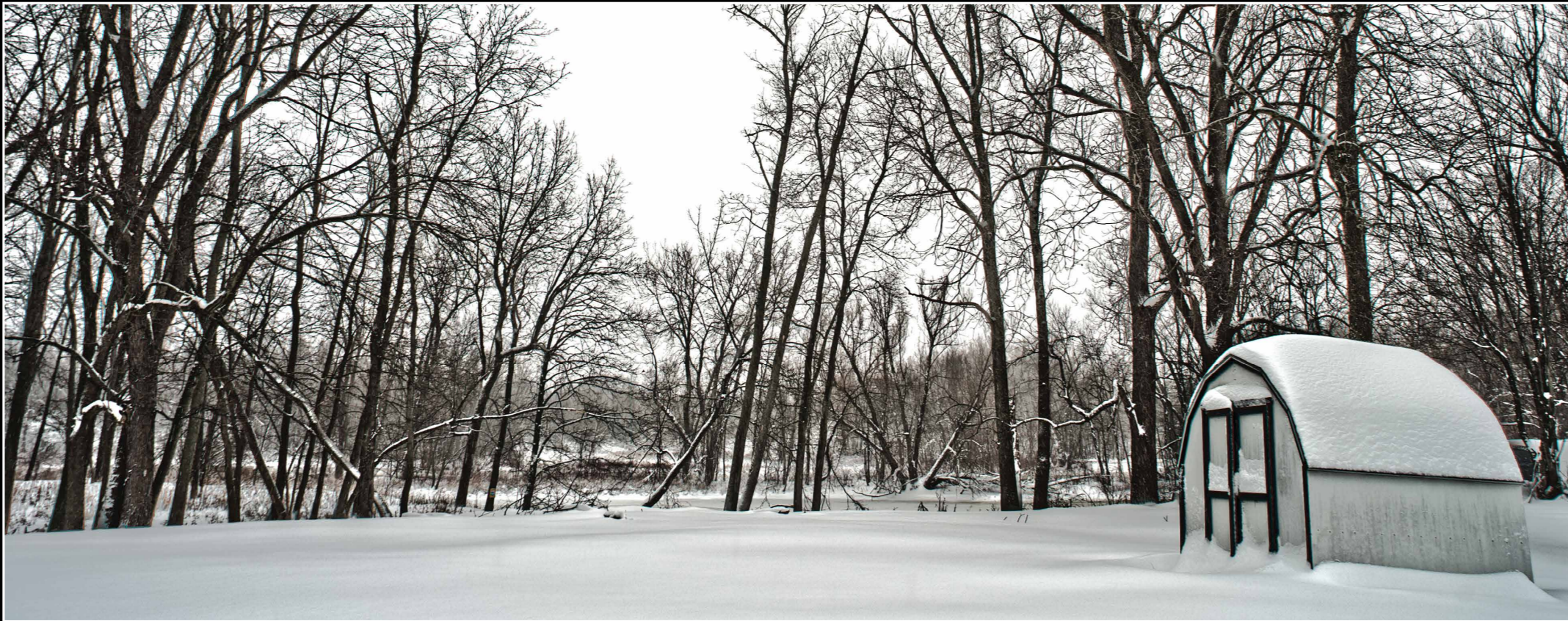
In the Biomedical Photography and Imaging and Photographic Technology programs, students use technical knowledge and creative skills to obtain incredible images. Here is a selection some of their best images.



Caitlin Williams ❄️ Winter Hills



Lindsay Quandt * Great Wall of China



Carissa Hurdstrom * Snow Day



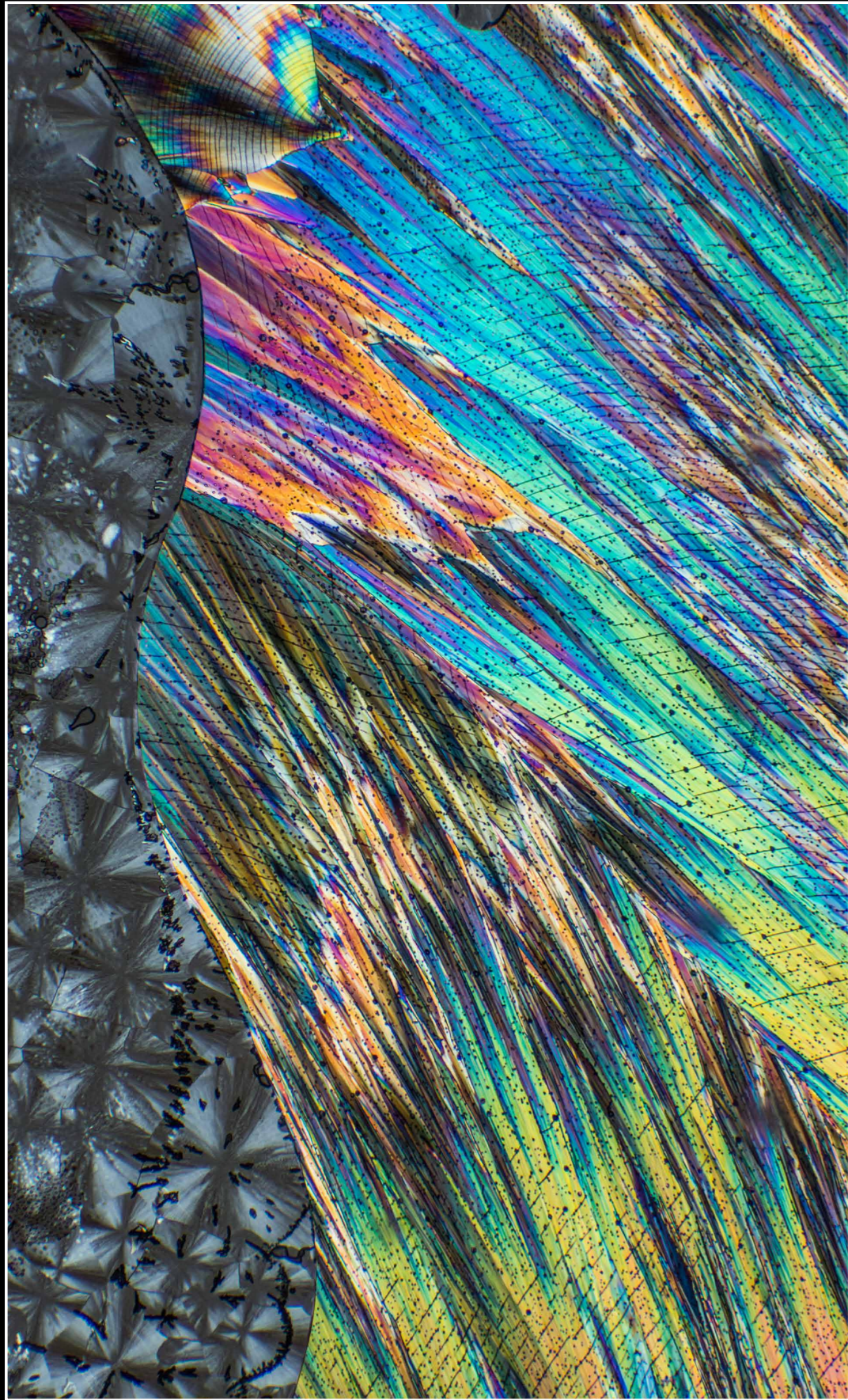
Evan Darling * Daphnia



Lauren Held * IV Bags



Amber Schultz * Facelift



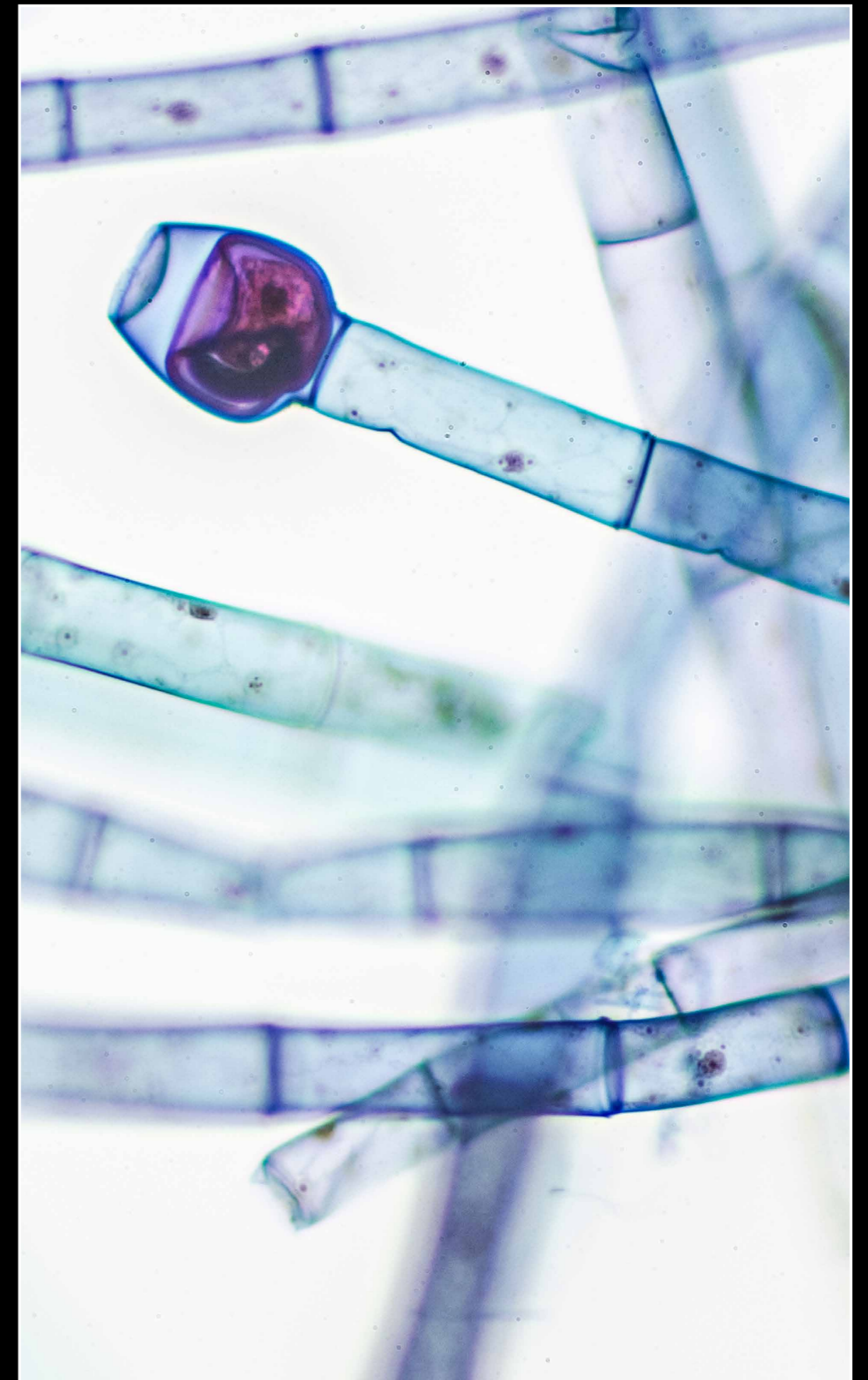
Zachary Pezzillo * Polarized Crystals



Carissa Hurdstrom * Message in a Bottle



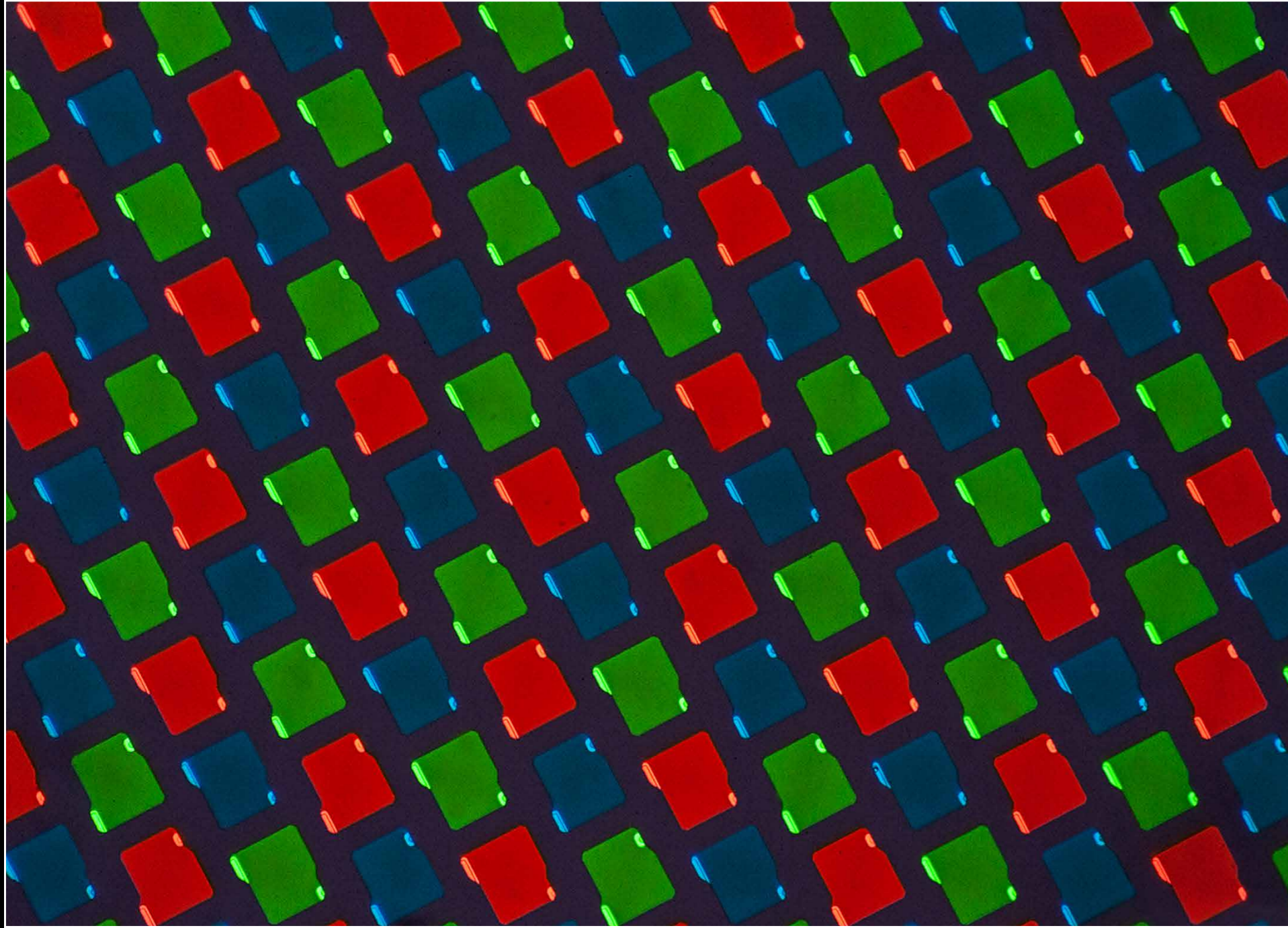
Tim Tiebout * Coral



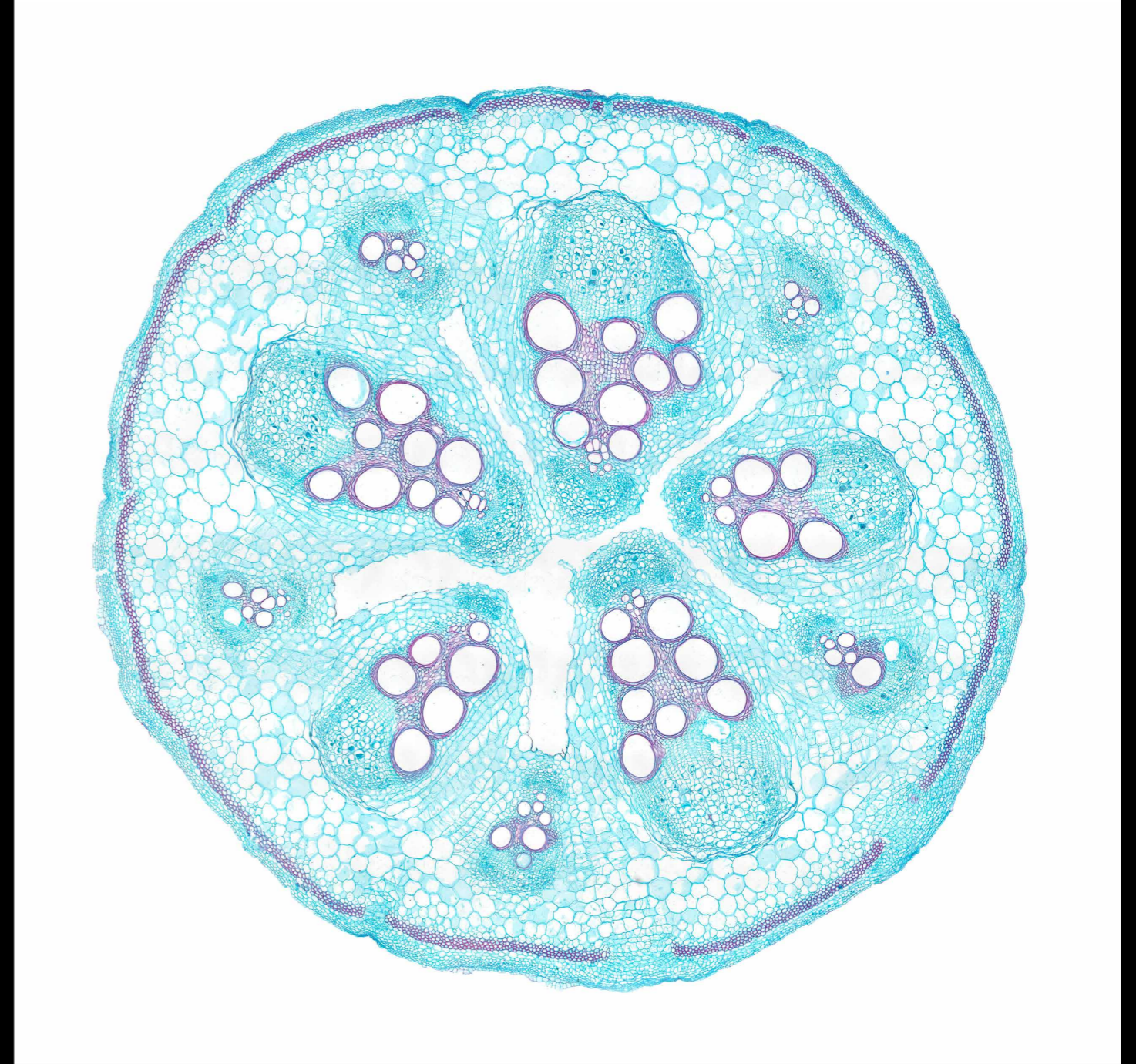
Steven Wilbert * *Oedogonium nannandrous*



Adrienne Sherman * Night Train



Griffin Kettler * Pixels



Lia DiRico * Pumpkin Stem



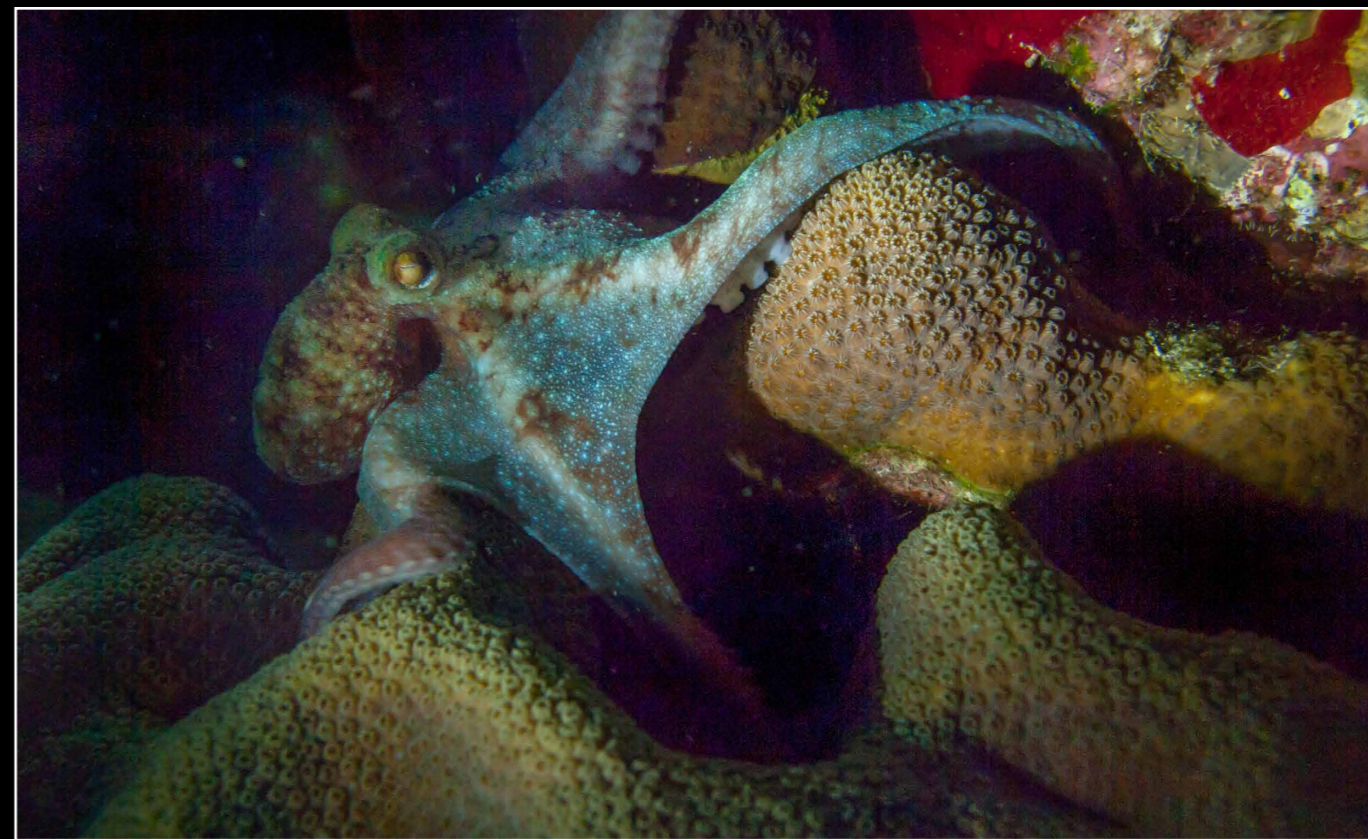
Tim Tiebout * Pufferfish



Yasmeen Smalley * Pederson Cleaner Shrimp



Yasmeen Smalley * Sea Turtle



Tim Tiebout * Octopus



Sarah Alharbi * Yemeni with Sackcloth



Adrienne Sherman * Minneapolis Skyline



Carissa Hurdstrom * Fluorescent Scorpion



Amber Schultz * Abandoned Psych Ward



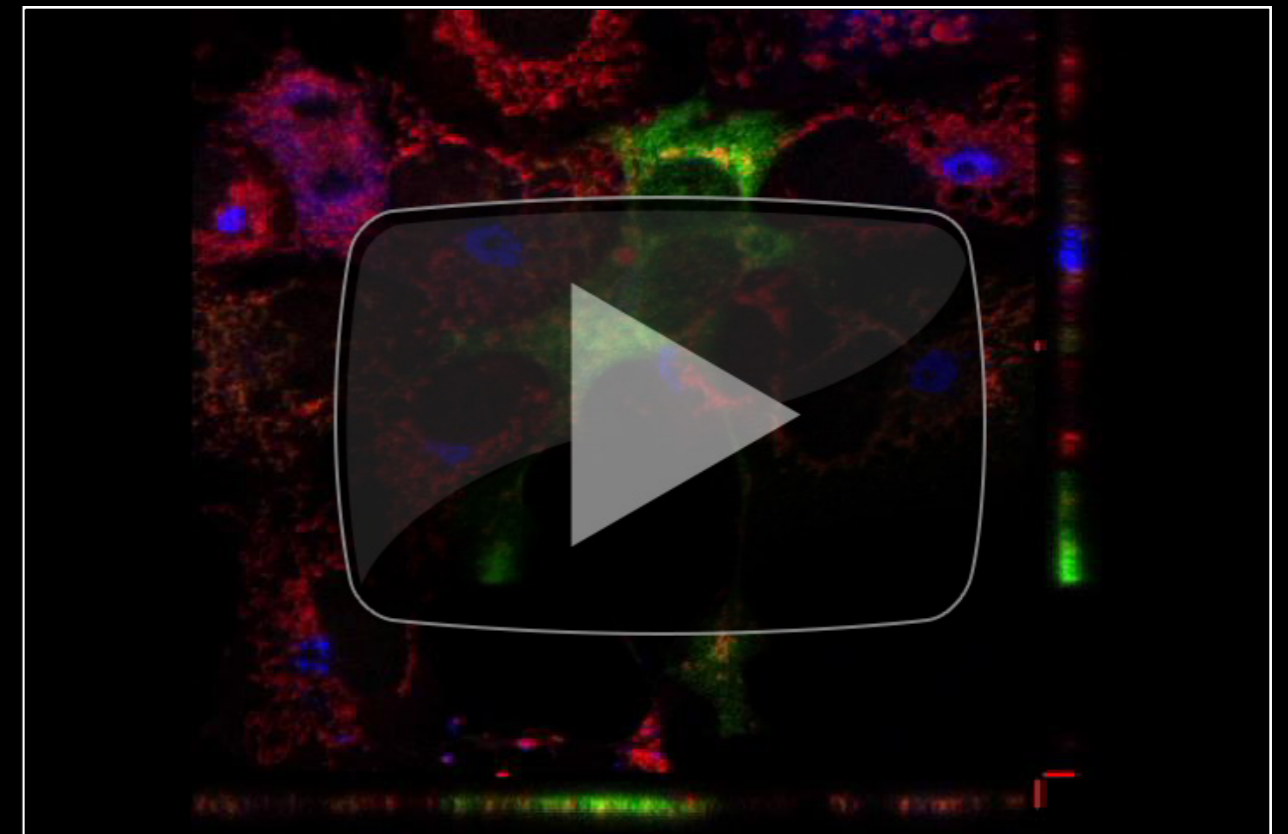
Zach Pezzillo * Haleakala Crater, Maui

video gallery

Students in the photographic science programs are not only highly skilled photographers, but they also receive experience with video production. Press play to watch the amazing productions by students!



Ryan Harriman * Time Lapse UK



Lauren Held * Confocal Z-Stack of Infected Green African Monkey Kidney Cells

❄️ winter photographic science events



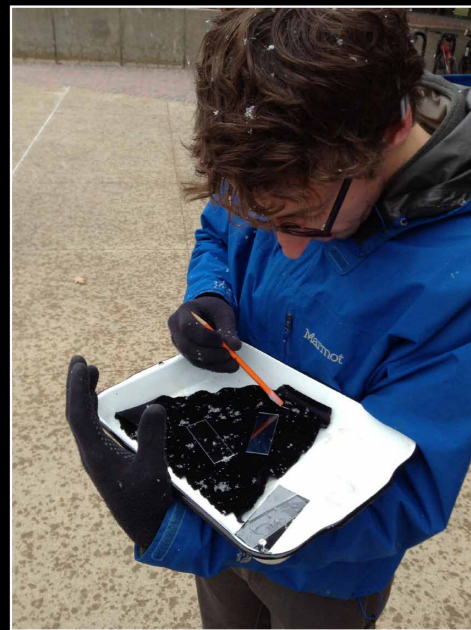
Alumnus Tim Steffens from Heidelberg Engineering speaks to the Intermediate Ophthalmic Photography class



IPT alumnus Paul Reichert at the Charles Arnold Alumni Panel



SPAS alumnus Christian Munoz from Hirox giving a demo on their 3D digital microscope in the high magnification imaging lab



Student Tim Tiebout collects snowflakes and photographs them outside using the equipment in the snowflake shack



BTPA students and members of the SPIE Chapter at the University of Rochester make a trip to Laser Quest



BTPA students gather in Tech Alley for a club meeting to discuss and plan upcoming events

BPC Bulletin

Biomedical Photographic Communications ❄ Winter 2012-13

We would like to thank the following supporters for their interest and support to the photographic science programs at RIT:

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