

I gasp, wondering what will happen next. *Carchesium*, a protist that looks like a delicate flower on a long, transparent stem, is being smacked by a chain of *Nostoc*, which slowly approaches the swaying microorganism and whips its long "body" in a flash, only to circle again for another round. *Carchesium* contracts, and instantly it becomes a compact spiral, safe and sound. Elsewhere, an amoeba, all slime and cytoplasm, engulfs bits of food; it plucks the minute particles with its plasmodia like water moving through water. It's another world under my microscope, hidden in a single drop of lake, stream, or puddle. It's a world that has stolen my heart, a world where every backlit, gossamer bodied creature inspires the artist in me to create.

What are protists? They are microorganisms with a true nucleus, but no diversification of tissues. They live almost everywhere. Protists differ remarkably from one another. Some are photosynthetic and make their own food while others catch smaller protists and bacteria, which they use for food. Certain protists are responsible for spreading diseases like malaria and sleeping sickness. Yet others, such as those that digest plant material in the stomachs of herbivores, are essential for life to continue as we know it.

This summer I visually represented unicellular microorganisms belonging to Kingdom Protista, using paint and marker. At the completion of my 10 week stay at the Pierce Cedar Creek Institute, I finished 2 large, original paintings (18" x 24" and 20" x 24") and a comprehensive sketchbook. I still remember the first day, looking into the eyepiece of my microscope. I was nervous then; I worried that I would never be able to find any protists, worried that if I found one, I would be unable to draw such an alien being. To my delight, after only a day or so of practice, I could find and draw them with relative ease. At first it was difficult to view the textures and details of smaller protists; however, this issue was resolved when my mentor, Paul Krieger, gave me a 100x oil immersion lens for the microscope. In the beginning I had also planned to use a microscope-mounted camera for capturing images of protists in motion. Some of the organisms move very fast, which makes it difficult to draw them from live observation. The camera was finicky, often refusing to focus. Instead, I used my cell

phone, an Iphone 4S, for image capture of some protists. I was also able to capture video. Still, many of the fast moving protists had to be excluded from my paintings-because I was unable to get an adequate view of them.

Pierce Cedar Creek Institute is a sprawling 661 acre oasis in Hastings, MI. The property includes an impressive diversity of aquatic habitats which include fens, swamps, a lake, and a creek. There are also pools of water throughout the woods, shallow and full of rotting leaves, which make delightful homes for many protists. I gathered samples from each of these habitats for my observation drawings in the sketchbook.

At the onset of this project, Paul Krieger set up a meeting for me with scientific illustrators Amelia Hansen and Gail Guth. I was able to ask them questions about creating professional pieces, which was very helpful. Hansen and Guth shared some of their experiences as scientific illustrators and gave me tips about starting my paintings, as well as maintaining an interesting sketchbook. The two also continued to offer advice and critiques via email throughout the summer. Not many artists can say they were able to receive valuable insight from THREE scientific illustrators at the beginning of their careers! I am beyond grateful to Krieger, Hansen, and Guth for being so encouraging and involved with my project at PCCI. They have certainly helped me grow as an illustrator.

Using small, clear plastic jars, I collected samples of water and plant debris from various locations around PCCI property, as well as a bog on the Shultz farm. The jars were kept in an area with sun and shade mixed-with lids cracked for circulation, as some protists require light and oxygen. This allowed the samples to stay fresh for weeks. I viewed the samples with a light microscope at mainly 400x and 1000x magnification. I drew the active Protists as they swam, ate, and formed colonies. For these observation sketches I typically used a graphite pencil, as well as colored pencils. When possible, I also took photos through the microscope's eyepiece with my phone. I was able to consult the images for further reference when redrawing some of the protists. Using the sketches and photos as guides, I chose samples with an interesting diversity of protists. I then created compositions for large paintings

that incorporated various species. The paintings were done with watercolor, some acrylic, and detailed with fine black marker.

For the first painting, I used a water sample from the bog on the Shultz farm. The sample included bits of the bladderwort plant, which are aquatic and carnivorous. I chose this sample because it contained an impressive diversity of protists. There were both photosynthetic and nonphotosynthetic species, with a wide range of shapes, sizes, and pigmentation. Types of protists found in this sample included members of genera *Actinopoda*, *Navicula*, *Eudorina*, *Cinetochilum*, and the species *Onychodromus grandis*. I was unable to identify two of the protists. Strands of an algal filament were used to lead the viewer's eye around the composition. Nine different protist types were showcased in the painting, and I painted the protists at various angles in order to give the viewer an idea of how these microorganisms might behave in everyday life. I worked with my mentor to develop a strong composition by sketching various thumbnails, as seen in my sketchbook. The process of drawing multiple possible compositions helped to strengthen the final choice. The sample used for inspiring the second painting was obtained from a shallow pool of water I found off the Beech Maple Ridge Trail. A vast amount of leaves were decaying in the water, which I incorporated as a background element in the piece. Working with advice I received from Amelia Hansen, I added warm tones to the second painting in addition to cool tones, giving the artwork a more dynamic appearance—with a greater sense of visual depth. The second painting includes protists belonging to genera *Vorticella*, *Rhipidodendron*, *Amoeba*, *Navicula*, and two unidentified protists. I found that although my samples contained different populations of protists depending on the water they lived in, all of the samples contained *Navicula*, which is a type of Diatom. For this reason, I included *Navicula* in both paintings.

Filling my sketchbook helped me figure out how protists move and how they appear from different angles. I used the book every day to work on my drawing and painting skills. Also, through the use of my sketchbook, I was able to become comfortable with drawing many other living organisms in the natural world. It was wonderful to experiment with different painting techniques without fear of

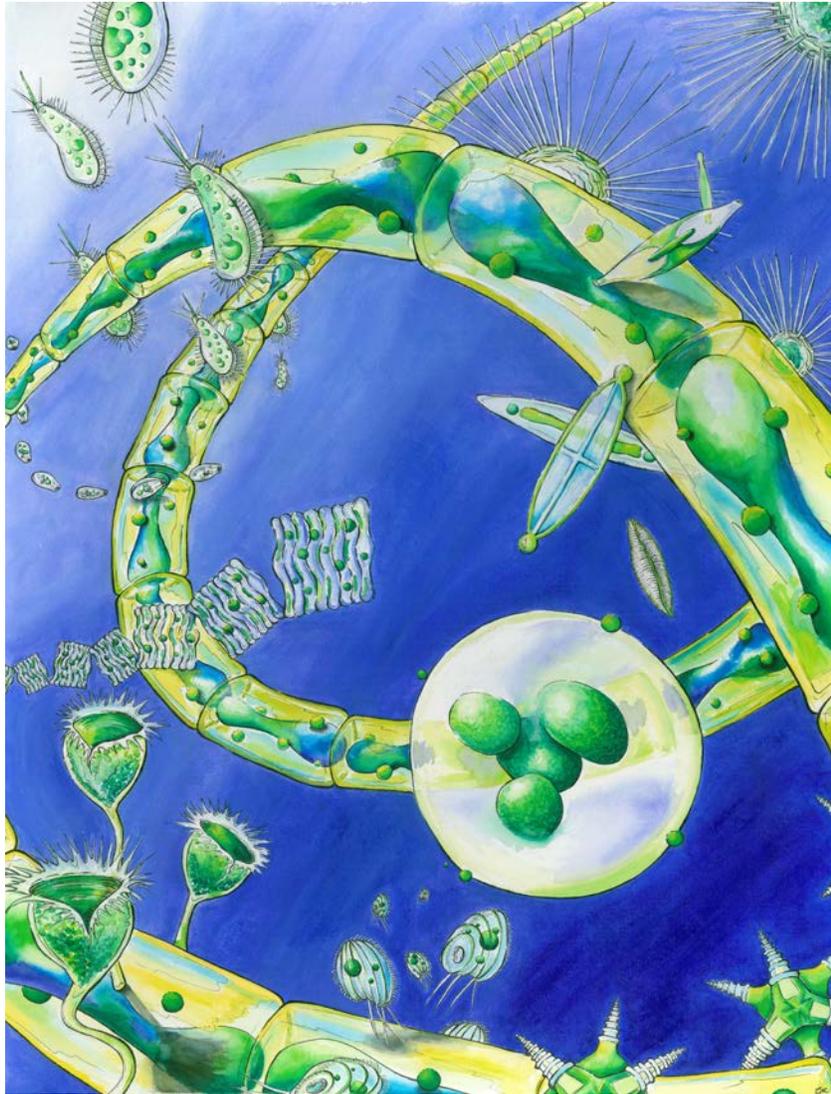
"messing up", and through that experimentation I grew very much as an artist. I filled 60 pages in the book, which was a Moleskin, measuring 8.25 x 11.5 inches. I painted a diversity of subjects found here at the Institute, from trees to crayfish to moth legs. In addition to drawing and painting, I included notes about where I found things, how they acted, and other useful information. The written notes make the sketchbook more interactive-and more meaningful for viewers, giving them a chance to understand the context of my sketches. A digital version of my sketchbook has been given to Pierce Cedar Creek.

My goal in painting these protistan landscapes is to raise awareness and pique the interest of my viewers, both scientists and nonscientists, about the beauty and diversity right under their noses. I hope to encourage others to look at this stunning microscopic world on their own. Rather than portray these microorganisms in a clinical, scientific poster style, I chose to paint them in an underwater scene. I wanted people to imagine what it might be like to live in the world protists do, where each individual is less than a millimeter tall. Each tiny thing that we fail to notice comes to life as something almost cosmic from the perspective of a protist. For instance, in the second painting I added butterfly scales and part of a butterfly leg that had appeared in one of my samples. For some of the protists swimming in that pond, the scales were large enough to hide behind!

There is so much beauty here at PCCI, on every level. Most come here to walk the paths through woods sparkling with sunshine, echoing with the calls of pileated woodpeckers, sand hill cranes, and indigo buntings. The chatter of squirrels and birds, the bright purples of lupine and verdant green of ferns is more likely than not to slow down life for a blessed afternoon. I love it all too. But I came this summer to show everyone something else, something just as sacred: the beauty beneath it all. Protists-shining with color-or transparent bodies stippled with delicate hairs or bumps or both. Protists-flying through the water like any bird or fish. Protists swaying on stalks with proud heads intricate as any Lily or Columbine or great White Oak. Protists hunting like coyotes or slurping nutrients from plants like butterflies. Protists turning light into sugar like Big Bluestem. This beautiful world. This beautiful, bustling, largely undiscovered world. It is there, always, and it is willing to share its

perspective with us. All you need is a microscope. All you need is an open heart, a curious mind, and a pencil with something to write down every wonderful discovery. Don't be afraid of what you may not understand. Don't be intimidated by their fancy names. You are brilliant. You are a pioneer in a strange new world. Explore it. Enjoy it.

Painting #1



Painting #2



Sketchbook Examples

