Journal of Natural Science Illustration

GUILD OF NATURAL SCIENCE ILLUSTRATORS

VOLUME 54 • NUMBER 1 • 2022

A Note From...

Gail Guth, Managing Editor

Welcome to the first Journal edition of 2022! As I write this, the COVID situation has eased remarkably, but the situation in Ukraine has worsened… it seems we can't get a break from stress and fear. Hopefully by the time this reaches your digital or actual mailbox, the situation will have resolved itself and we can take a collective breath. However, as artists, we always have a palliative remedy, if not a cure, for the world's ills: we can turn to our creative selves and find respite and expression in our art. I encourage everyone to limit exposure to the constant drumbeat of fearful news and make a point to spend a bit of time regularly making art.

To inspire you, we offer you the excellent and innovative stories in this issue, ranging from communication and collaboration, inspiration on a career path, a book review on ink drawing techniques, to information on programs at RISD; along with summarized discussions from our GNSI Listserv. And last but not least, a page of lovely sketchbook art from Carol Schwartz. Thank you to all of our contributors!

We hope you find these articles interesting and inspiring! As always, please consider contributing your story to the Journal: studio and technique tips and tricks, career moves, new product reviews, book reviews, business topics…we are open to a wide variety of subjects, and an even wider range of article length, from a photo caption to a full-length feature piece.

Remember, contributing to our Journal looks good on your CV!

—Gail Guth, JNSI Managing Editor

CONTENTS

Cover: The moor frog (*Rana arvalis*). (*Top*) Males can shift to various shades of blue during the mating seasons. (*Bottom*) Female moor frog. © 2021 Monika Jasnauskaite

NATURAL SCIENCE ILLUSTRATORS

The Guild of Natural Science Illustrators is a nonprofit organization devoted to providing information about and encouraging high standards of competence in the field of natural science illustration. The Guild offers membership to those employed or genuinely interested in natural scientific illustration.

GNSI GENERAL INFORMATION

MEMBERSHIP

USA Print: $95/year ($180 for two years)
Global: $115/year ($220 for two years)
Digital Delivery: $75/year ($145 for two years)

Other membership options are available; see website. Secure credit card transactions can be made through *www.gnsi.org*. Or send checks made out to "GNSI" at the address below. Please include your mailing address, phone, and email.

CONTACT

P.O. Box 42410 Washington, DC 20015
General Inquiries: *info@gnsi.org*
Membership Questions: *membership@gnsi.org*

WEB & SOCIAL:

Stay up-to-date with all GNSI happenings at *www.gnsi.org* and through our monthly newsletter. Here you can update your member information, find announcements about members' accomplishments, information about our annual Visual Science Communication Conference, Education Series workshops, and more. You can also find GNSI on Twitter (*@GNSIorg*) and Facebook (*@GNSIart*).

GNSI JOURNAL

Volume 54, Number 1/2022 • © 2022
JOURNAL OF NATURAL SCIENCE ILLUSTRATION (JNSI) (ISSN 01995464) is published at 2201 Wisconsin Ave., NW, Suite 320, Washington, DC 20007, by the Guild of Natural Science Illustrators, Inc.

This paper meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

POSTMASTER: CHANGE OF ADDRESS

Send notices to:
GNSI Membership Secretary
P.O. Box 42410
Washington, DC 20015

GNSI JOURNAL SUBMISSION REQUIREMENTS

gnsi.org/journal-author-guidelines

JNSI STAFF

GNSI 2021 Special Projects Award: Joel Floyd

Presented by GNSI President Kalliopi Monoyios at the All-Member Open Board Meeting on August 4th, 2021

Established in 1994, this award is given to the person or persons who have demonstrated special determination to promote and develop major projects and initiatives that are instrumental in furthering the GNSI's mission, and that required a special determination to pursue into being. This year we are pleased to present the Special Projects Award to Joel Floyd for his role in steering us through the turbulent waters of pandemic conferencing.

As Chair of the Conference Oversight Committee in early 2020, Joel was about ready to hang up his hat and sail into retirement when widespread quarantine orders dashed our plans just weeks before we were to open registration for our 52nd annual conference in Salt Lake City, UT. Without missing a beat, Joel deftly switched to steering our ship into virtual waters. He instituted weekly meetings, kept everyone on task, identified holes that needed plugging, and was the steady organizational hand we needed amidst turmoil and uncertainty. The end result was a highly successful and totally innovative conference that was pulled together in just four months. When we asked him to rinse and repeat for 2021, he did so with his characteristic grace and determination.

As it turns out, both virtual conferences set attendance records and became models for accessibility, affordability, and international reach. We are profoundly grateful to Joel for helping us not just survive, but to thrive in the face of adversity, and help usher in a new chapter of online engagement for the Guild. Thank you, Joel!

ABOUT JOEL

Joel caught the "bug" for science illustration as an undergrad at Northern Arizona University in Flagstaff when a museum curator noticed he could draw and asked him to illustrate entomological specimens. Later while pursuing an MS degree in entomology at the University of Arizona in Tucson, he enrolled in Don Sayner's scientific illustration classes and illustrated a book on venomous animals of Arizona. He also took several classes from Jerry Hodge at the Scottsdale Artists School and learned a variety of techniques from many GNSI workshops at conferences.

Joel worked for a regulatory agency in the US Department of Agriculture for thirty-five years where he was an insect and plant disease identifier at international ports of entry, and later managed national invasive species programs, emergency programs, and plant pest diagnostics coordination. All along Joel has done freelance work for various nonprofit organizations, government agencies, publishers and museums. He has taught natural science illustration at Montgomery College in Maryland, held drawing workshops for young people, and completed a large-scale indoor mural. Before the pandemic, he volunteered for several years at the Smithsonian's National Museum of Natural history, assisting in maintenance of the entomology department's insect illustration archive.

Joel has been a member of the GNSI since 1981 and he served as President of the GNSI DC Chapter from 2015–2017. Prior to serving as Chair of the Conference Oversight Committee from 2019–2021, Joel chaired GNSI's 50th anniversary conference in 2018 in our founding city: Washington, D.C.

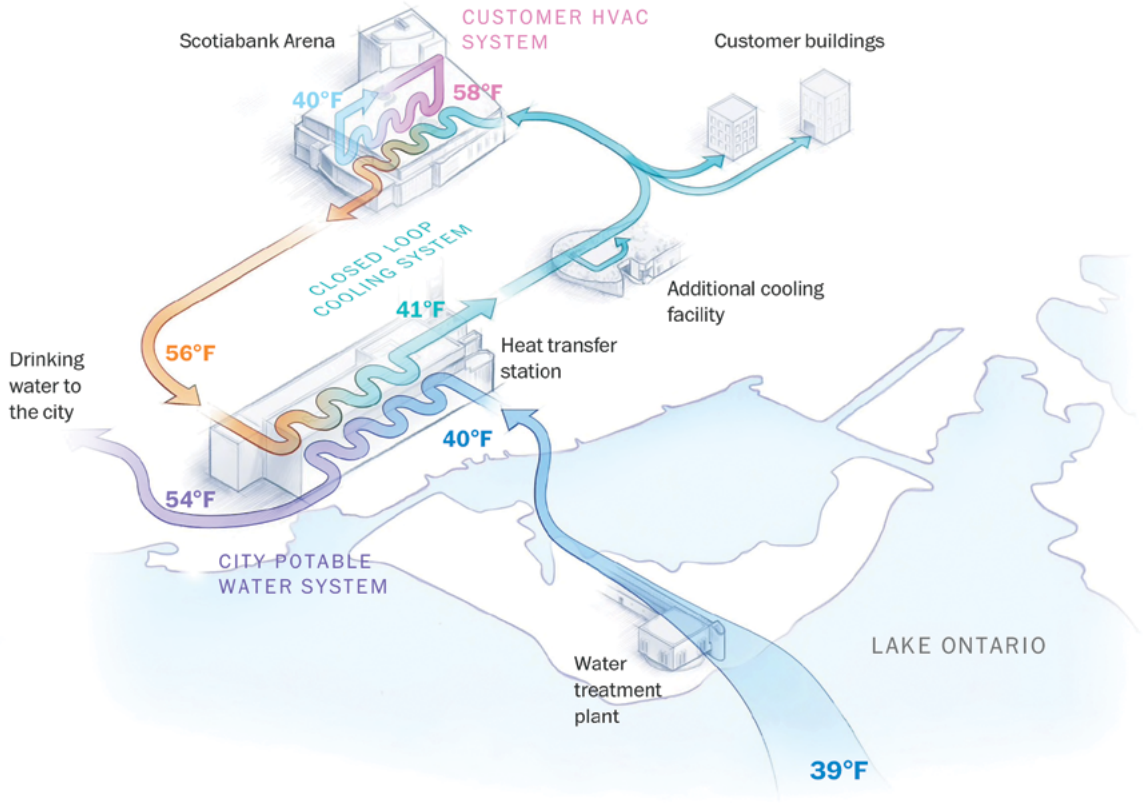


Figure 1: A final image from the article, the overview map. Published on November 5th, 2021, in "Toronto is home to the world's largest lake-powered cooling system. Here's how it works." Source: *The Washington Post*

Visualizing Climate Solutions

—By Daisy Chung

The brief from The Washington Post *was to create a set of illustrated information graphics to tell one of a series of stories on developing climate solutions. This story is about how some of these graphics were created.*

In April 2021, I was approached via email by *The Washington Post* Climate Solutions team graphics editor Monica Ulmanu, who asked if I was interested in collaborating on a series of "visual-first" climate solution stories[1] for the *Post* website. As climate communication has been a huge passion and interest for me, and an urgent matter to communicate, I was thrilled by the opportunity to contribute my visual skills to the team. We discussed some potential ways to collaborate, including supporting their stories in more creative graphic-first interactive ways (such as the Toronto story here) or sharing pitch ideas that I can work on with the *Post* team—such as a second story on the climate impacts and solutions for our Thanksgiving food (see the *Post* article: "What's on the Thanksgiving table in a hotter, drier world").

The article describes the company ENWAVE's deep lake water cooling project in Toronto, a sustainable cooling process that taps into the coldness of Lake Ontario to provide air conditioning. It saves 90,000 megawatts of electricity use annually, enough to power a town of 25,000 people, or cool 100 substantial downtown buildings.

I was tasked to create visuals that can explain how the system works. Below I share the process of creating the multiple graphics for this story, which played out over a six-month period.

RESEARCH AND VISUAL NARRATIVE

Projects begin with gathering information from the client's graphics team and outside experts. With that

1 Visual-first stories allow the visuals to take the lead of forming the story and narrative as opposed to having the writing drive the story.

information at hand, I can define the focus of the graphics and what story I want to tell, as well as find which parts would be helpful for readers to have visual support. For me, this stage always starts with pencil and paper. As an illustrator, I used to be embarrassed to show my ugly sketches. But looking back I'm surprised how much I can resolve the narrative, being much braver and exploring freely when I don't care how it looks.

The article's writer, Tik Root, came up with the written narrative hook to use the Toronto's Raptor stadium as a case study of how the cooling system works. Reading his draft text helped me understand the overall story, and the key elements that could benefit from a more visual-driven narrative. I gathered a lot of research material to see what visuals are out there to understand more about the science of heat exchange (there are quite a few, but not good at all—google "deep lake cooling"), and to understand the project from the experts at ENWAVE. From this research I identified two key parts to visualize:

- The location of the cooling network with a map
- The step-by-step process of how the cooling system works, using the stadium as an example

VISUAL SOLUTION AND INITIAL SKETCHING

I began to do some pencil sketches to explore what works and how we can visually interpret and organize the information. I realized it would be helpful to "color code" the water based on its temperature change and source. I also started gathering visual styles that I thought would work. I wanted the illustration to have a translucent feel so people can see what's happening within those mechanical components. The illustration style of Bruce Morser, a frequent collaborator with *National Geographic*, came to mind and became a huge visual inspiration for this piece.[2] These pencil sketches were ugly, but so helpful to explore and identify how many steps to include, and what view should I zoom and focus on… I never showed these to the *Post* (*Fig. 2*).

REVIEW AND ITERATION

I created five sketch ideas to put the process in the context of a storytelling experience. I then tightened up these sketches with digital tools, mainly using Photoshop® along with Sidecar® for iPad for the illustrations.[3] Even though they are fast sketches, I used solid references to get an accurate idea of the key elements. I then started working on information design in Illustrator® by incorporating the sketched illustrations and key graphic notes to be ready for a first review. I find doing drafts digitally allows for more flexibility, including the overlay of text and vector elements such as arrows and diagrams (*Fig. 3*).

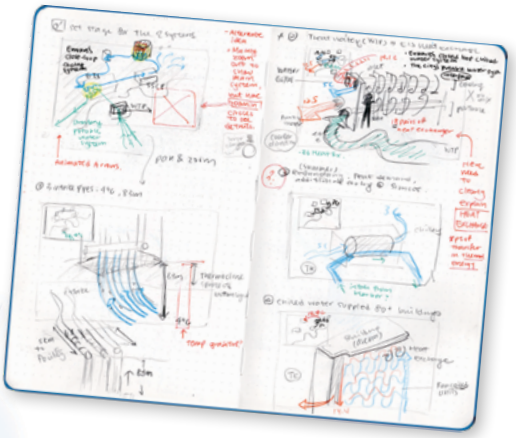


Figure 2: Page from sketchbook with idea doodles and research notes.

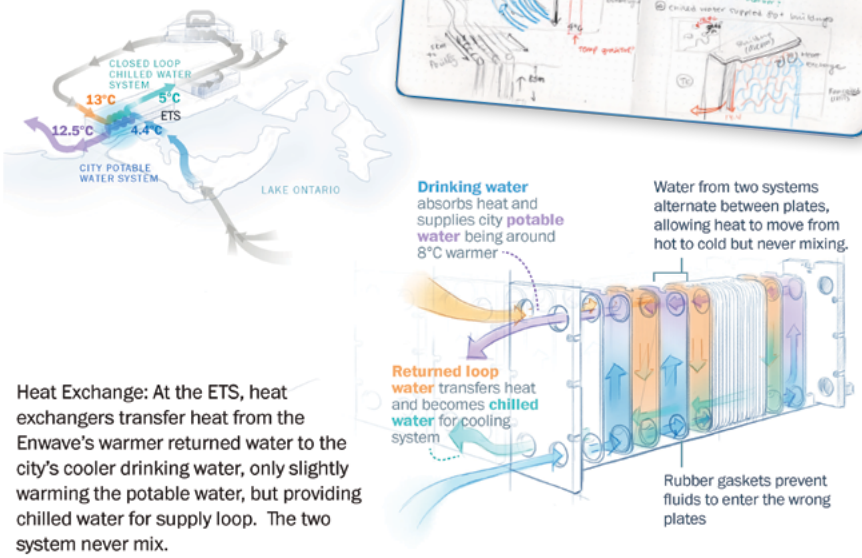


Figure 3: Example of an initial sketch sent to the Post. Heat exchange for the city water system.

These sketches were reviewed by the *Post* team and the experts at ENWAVE to ensure accuracy and that they made sense for the story and our audience. The feedback process has always been a crucial part of my workflow. People with fresh eyes bring in such great new ideas, and can allow me to see if the design conveys the information accurately as well as in an engaging way. In general it just makes the work so much better and more rewarding.

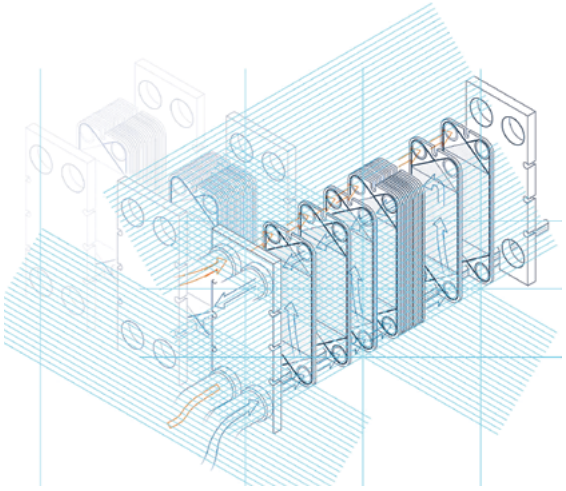


Figure 4: Isometric blue lines, used to guide the construction of the Adobe Illustrator file of the heat exchange core.

FINAL RENDERING

Now it was time to do some technical drawings! I learned from the master at *National Geographic*, Fernando Batista, the technique of

2 *https://rappart.com/artists/bruce-morser/*

3 Sidecar is designed to let you use your iPad as a secondary display for your Mac. Sidecar requires a compatible Mac running macOS Catalina or later and a compatible iPad running iOS 13 or later.

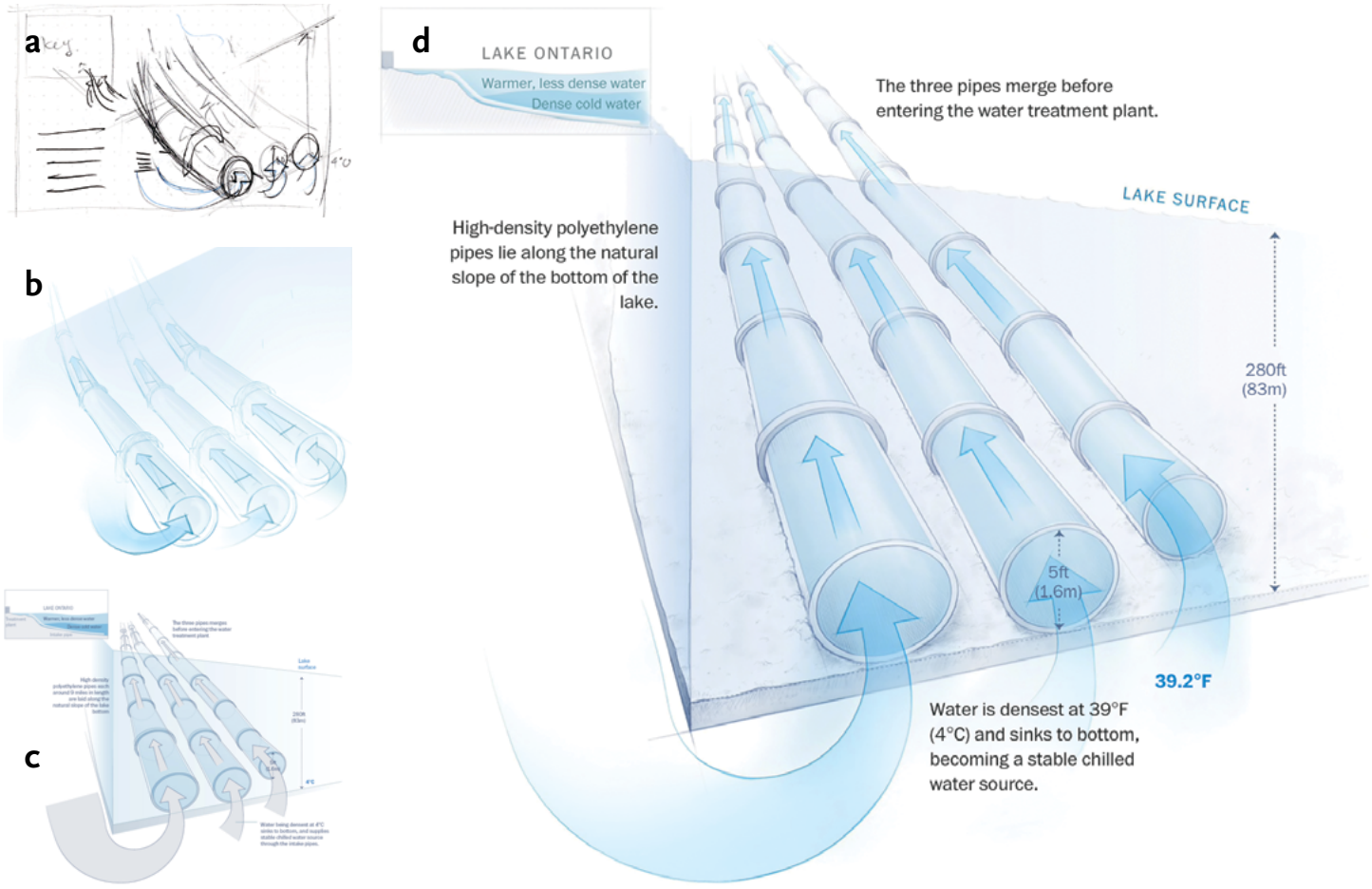


Figure 5: Pipe illustration series. (*a*) Initial rough sketch. (*b*) Proposal sketch. (*c*) Final proposal art with overlaid info. (*d*) Final art as published. Source: *The Washington Post*.

using Adobe Illustrator to achieve clean baselines. I set up parallel isometric lines in Illustrator and turned them into blue guidelines (*Fig. 4*). For most of the illustrations I used an isometric view/projection so people can get a more accurate sense of dimension. Isometric is a conventional perspective used for technical and engineering drawings.

The only illustrations I did in a perspective view were the map and a view of underwater pipes (*Fig. 5*). I wanted the audience to see that the pipes extend far off shore and communicate a sense of distance. For the map, I reached out to my cartographer friend at Mapbox, Clare Trainor, for guidance on getting an accurate base map using a web-based app: Mapbox Studio®. For the pipes, Adobe Illustrator has an automated perspective guide tool[4] which I used a bit for the underwater pipes, but I find manually drawing grids sometimes easier.

The final renderings were built on the base Illustrator drawings, with added drawing touches to bring some hand-drawn quality and sketch quality. I wanted these often sterile-looking building blocks to also have an illustrative warmth. For this process I imported the clean Illustrator drawn lines to Photoshop and set them to a low opacity. Then I drew over them using a pencil brush, and added some cross-hatching for shadows, etc. to give a hand drawn look.

Maybe the most challenging aspect of this project, in addition to the pipe structures, was the stadium (*Fig. 6*). It was really hard to get any reference images. I collected a lot of screenshots from Google Image® in all angles, found some 3D models in Sketchup's 3D Warehouse®[5], and hand drew the stadium seats one by one. The whole process took about four days.

I had the most fun when animating the heat transfer process (*Fig. 7*). I had to relearn the first law of thermodynamics and researched several YouTube® animations on heat exchange to get an idea of how

SEARCHABLE IMAGES

For the final graphics placed online by the Post, the text overlays are true searchable text and are positioned over the image with a series of html tags set to percentages of the image size. This sort of presentation allows the text to be crisper, easier to edit, and enhance searchability. You can create this type of presentation using a script called ai2html (*http://ai2html.org*), an open-source script developed by *The New York Times*, and run from within Illustrator that converts your documents into web-ready html and css.

4 *https://adobe.ly/3yY23uE*

5 *https://3dwarehouse.sketchup.com*

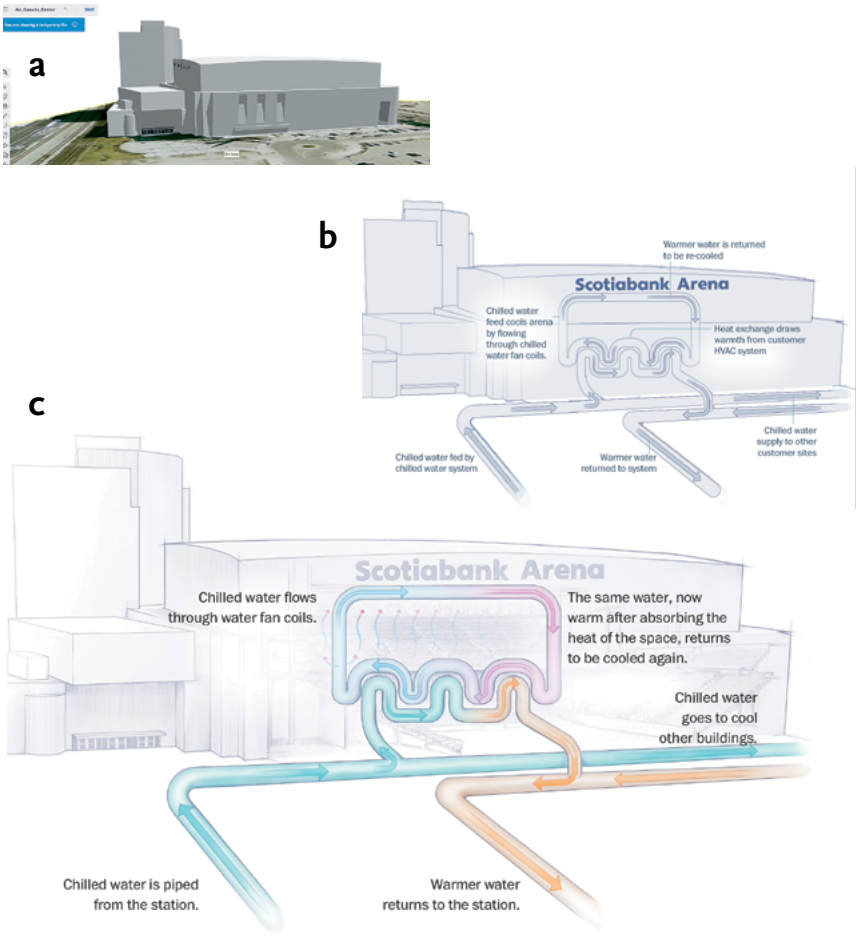


Figure 6: (*a*) 3D Warehouse Stadium Model. (*b*) Submitted sketch. (*c*) Final rendering for the article. Source: *The Washington Post*

ABOUT THE AUTHOR

Daisy Chung is an award-winning freelance visual science communicator and illustrator originally from Taiwan and New Zealand. She works at her home studio in Sunnyvale, California, where she creates infographic designs to communicate complex science to a global audience.

Previously, Daisy was the Science Data Visual Designer at Surgo Ventures, creating data-driven visual stories to share important research findings addressing global health and social issues. She is a former Creative Director at wikiHow and Graphics Editor at *National Geographic Magazine*, where she worked with a collaborative team to engage the public through powerful visual storytelling. Her work has appeared in The *Washington Post*, *Scientific American*, *National Geographic*, *Cell Press*, *The Journal of Neuroscience*, and various science and educational platforms.

Daisy can be reached at:
https://twitter.com/daisychungart
https://daisychung.com

to animate the concept. The animation was created using Adobe After Effects®, with animated masks to reveal the arrows and fluid flow in sync with the color change of the heat exchanger plates.

With the help of *The Washington Post* graphics editor Monica Ulmanu to polish the story presentation, the copy editors, and additional reviews from the experts and the Climate Solution team, I brought the presentation's choices to a final form.

The story was published on November 5th, 2021: "Toronto is home to the world's largest lake-powered cooling system. Here's how it works."[6] The timeline for this project was pretty long, from May to November, mainly because of publication calendar scheduling. However, I believe even in a fast-paced newsroom, there is value to invest time in creating quality visuals for climate stories to reach and engage a wider audience. I am excited to continue contributing visuals and story ideas to additional climate solution stories for *The Washington Post* and other platforms in the coming months.

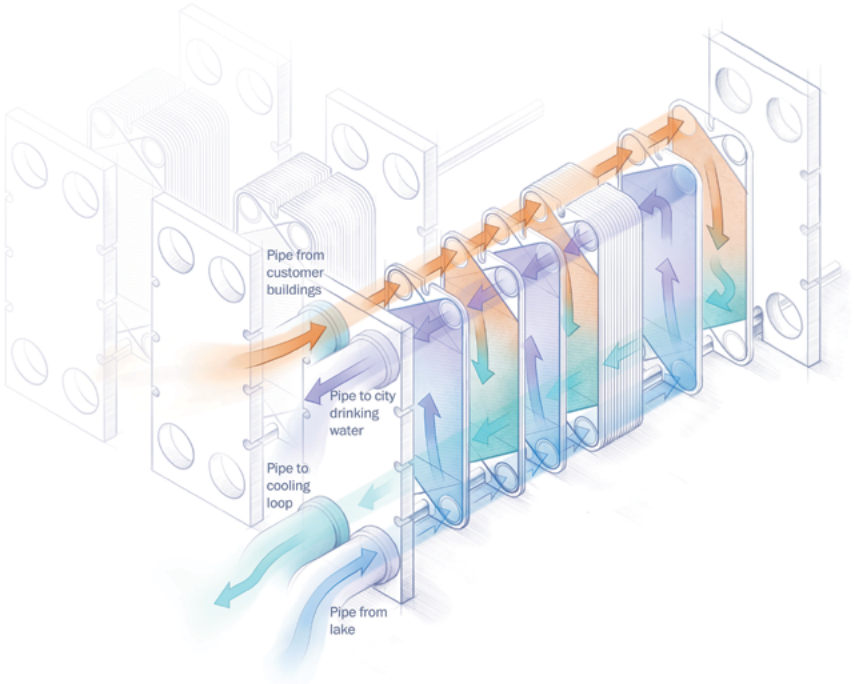


Figure 7: The heat exchange GIF animation, showing how the cooling loop water and lake water interface and exchange heat. Note the hand drawn lines were rendered in Photoshop to enhance the original Adobe Illustrator vector art. Source: *The Washington Post*

6 The published article is available at *https://wapo.st/3FDqYGw*

Collaborative Creation:

Bringing Scientific Illustration and Environmental Agencies Together

—Monika Jasnauskaite

Scientific nature illustration preserves accuracy and distinguishes closely related species while being appealing and understandable. These features are highly appreciated by environmental agencies in projects aimed at creating educational aids. I had an opportunity to collaborate in such a poster design project which focused on featuring amphibian and reptile species of Lithuania in order to highlight the biodiversity related to aquacultures.

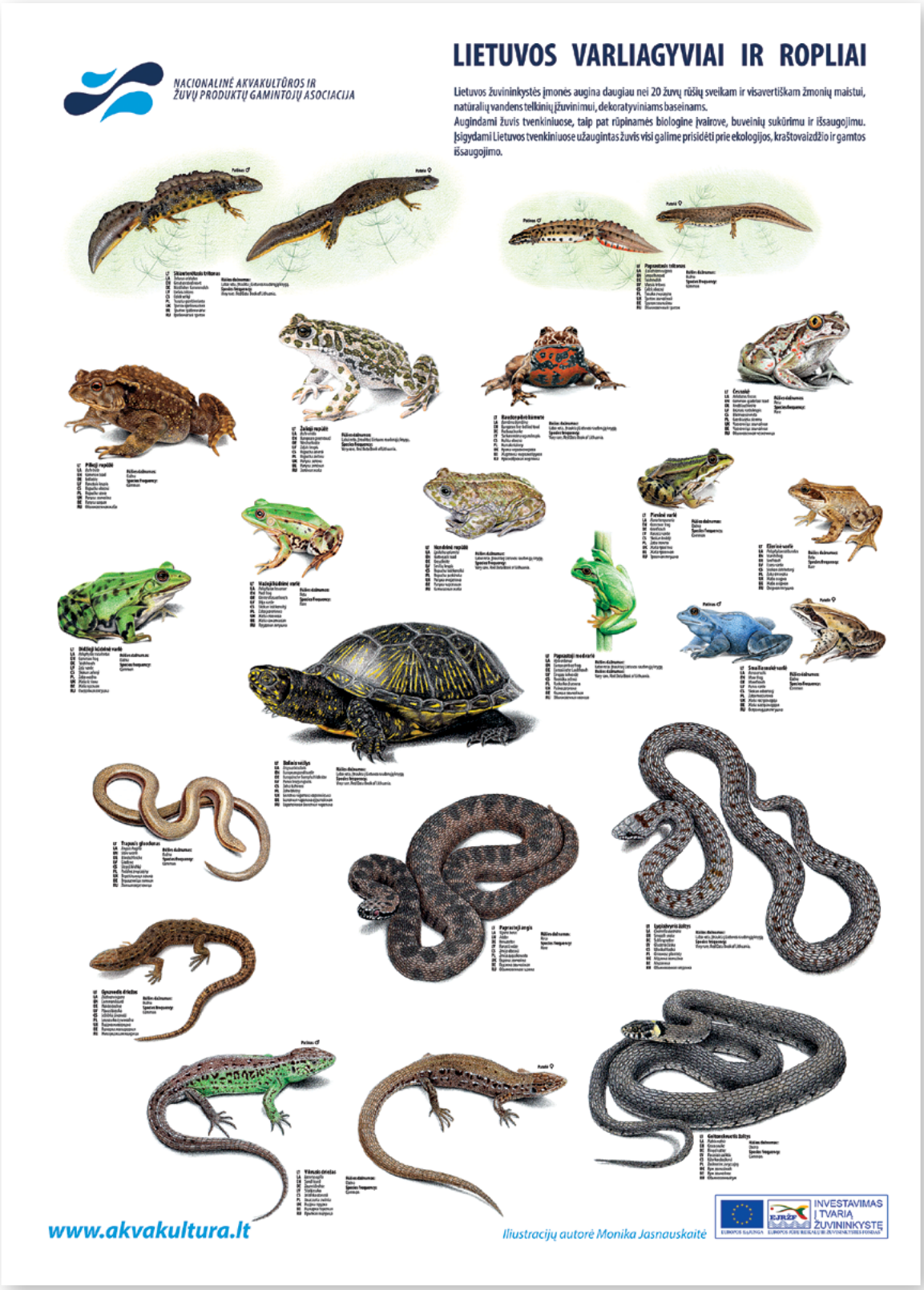
The poster was commissioned by the National Association of Aquaculture and Fish Product Producers (NAAFPP). The members of the NAAFPP supply 98% of the total amount of fish produced in Lithuania. They manage fishery ponds, buildings, machinery, mechanisms and equipment for the needs of aquaculture business. The NAAFPP partnered with The Lithuanian Fund for Nature (LFN) for this project. LFN is a nongovernmental organization for the conservation of nature. Employees of this organization are educated and experienced in such areas as ecology and biology. LFN's activities include cooperation with various institutions and organizations in areas such as environmental education.

Above: The moor frog (*Rana arvalis*). Males (*above*) can shift to various shades of blue during the mating seasons.

Right: Female moor frog.

I was invited to join the project by one of LFN's environmental specialists, Adele Baneliene. I was excited to create the pieces for the poster because I'm a nature lover and enjoy creating naturalistic animal illustrations. The poster was made to educate members, partners and colleagues of the NAAFPP about biodiversity in ecosystems. There is only one short educational field guide focused on amphibians and reptiles that live in Lithuania, so this project was a unique opportunity to expand the variety of education aids related to these species. The poster was shared on Lithuania's herpetology club Facebook page. It was acquired by a diverse group of people—from kindergarten teachers to botanical gardens' employees to people who are just passionate about nature.

I always start my work with detailed research in order to better understand the species I am illustrating. This poster included 13 species of amphibians and 7 species of reptiles that are found across Lithuania. Most species are common in Lithuania, although 7 are endangered and protected by Lithuania's government. I'm a Molecular Biology graduate so learning about illustrated species' features and zoology was a new exciting challenge. Amphibian species are very delicate and hard to identify so Adele summarized all specific information that is needed to distinguish some species. She also provided helpful websites in order to continue researching species on my own. I have found out that there are 4 species in Lithuania that change their appearances during the mating season. One of them, the moor frog, goes through an extraordinary transformation during this period. Males can shift their color from reddish-brown to various shades of blue. Another species that surprised me with its colors was European fire-bellied toad; their bellies, as the title suggests, have a beautiful bright red color. It was very exciting to learn about these species because bright colors are found quite rarely in Lithuania's nature. Researching and learning new information are the most



Left: The finished poster represents biodiversity of amphibian and reptile species of Lithuania. The illustrated species are inseparable from aquatic environments. This poster will help NAAFPP members, its partners, and people who are interested in learning about nature to expand their knowledge of aquatic biodiversity.

fascinating parts of my work, and I was very happy to expand my knowledge of amphibians and reptiles that are found in Lithuania.

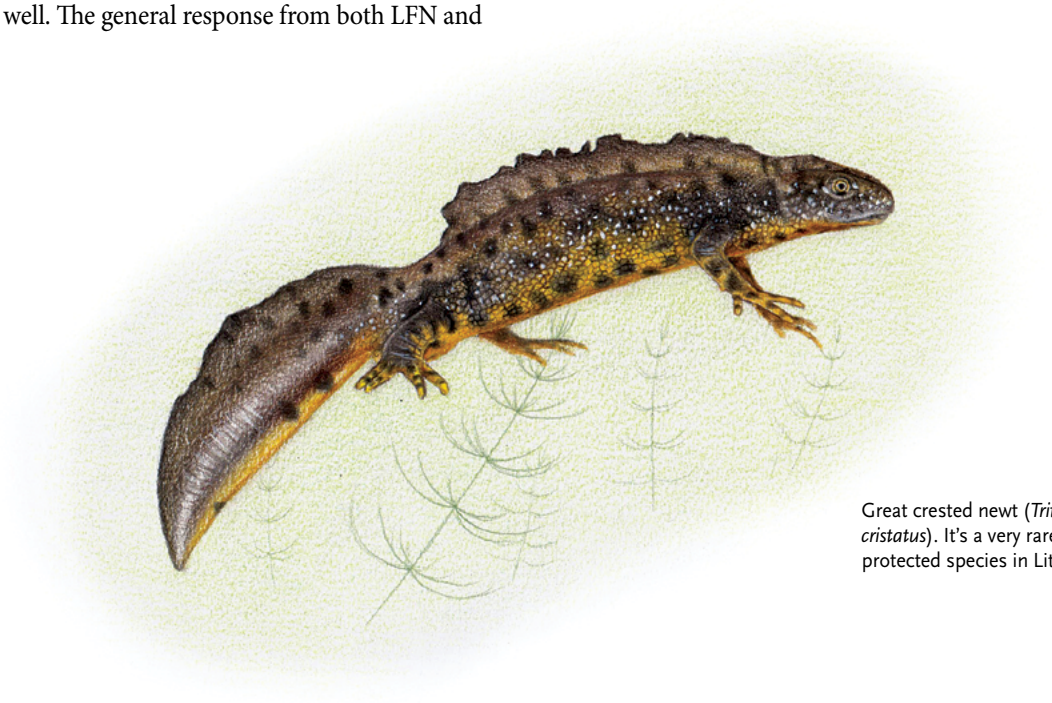
The drawing and coloring stages are the most challenging in these types of projects for me: it is very important to make illustrations original, species well represented, and easily recognizable. After I went through all essential information about featured species, I moved on to drafting initial sketches for the poster. I tried to figure out the best poses to represent the most important features. I have applied a realistic,

Right: The European pond turtle (*Emys orbicularis*). It was my favorite illustration to work on. I had an opportunity to include different textures and forms in one illustration.

traditional hand-drawn style using colored pencils to create organic, highly detailed pieces. It was a great challenge to work on amphibians that have slick and smooth textures followed by reptiles that had rough, characteristic skin. I colored amphibians rather quickly and spent the majority of the time working on reptiles. Drawing realistic scales and keeping the full illustration of the species intact, even, and organic was a great challenge for me. My favorite illustration to work on during this project was the European pond turtle. Their shells are shiny and sturdy while the skin is rough and scaled, both sprinkled with bright yellow spots. It gave me an opportunity to include different textures and forms in one illustration. After the pieces were finished, I sent Adele scanned files for revisions.

Collaboration and feedback were essential to make the final versions of illustrations. After Adele received finished pieces from me, she contacted NAAFPP members in order to receive observations from them as well. The general response from both LFN and NAAFPP were very positive and encouraging. I was professionally guided to include some improvements as well: include the background for newts, slightly change color range for several details, and position or size for several amphibian limbs. It was concluded that species were represented naturally and scientifically correct. Graphic designers laid out the final poster design and adjusted the species' sizes relative to each other.

The finished poster represents biodiversity of amphibian and reptile species of Lithuania. The illustrated species are inseparable from aquatic environments; this poster will help NAAFPP members, its partners, and people who are interested in learning about nature to expand their knowledge of aquatic biodiversity.



Great crested newt (*Triturus cristatus*). It's a very rare and protected species in Lithuania.

Work-for-Hire Contracts

Art © Stephen DiCerbo

Gretchen Halpert presented the GNSI Sciart-Listserv with a situation involving a work-for-hire contract for her Scientific Illustration Distance Program (SIDP) students. One requirement of the SIDP is to complete an internship. Gretchen and her students are currently negotiating a contract with a museum that wants full "work-for-hire"—not an uncommon request—but demanding full usage and copyright with no compensation, no credit for the work, no exception for portfolio and publicity use (e.g., on the SIDP website), and no artists' rights is exploitative.

Listserv readers suggested negotiating further so both parties can benefit:

- The student can accept this internship and receive professional credit and portfolio use.
- The museum can protect their unlimited use.
- Including a limit on the length of time the museum can claim exclusive rights may be an option.

"The museum can't have their cake and eat it too..."

—Jim Perkins

Several GNSI members also pointed out that this is a good teachable moment for organizations, who may not be aware of ethical practices in hiring or who may need a reminder. The general consensus was to walk away from the negotiations if the museum won't budge; this too is a good teaching moment... for the students! A good lesson in real-life negotiations.

Jim Perkins weighed in with a detailed discussion of what constitutes work-for-hire versus employee status, stating that, based on his understanding of U.S. Copyright law, it simply isn't legal for the museum to insist that this be a work-for-hire situation. Jim cited several U.S. Copyright circulars that define work-for-hire and employee status, specifically Circular 30: "Works Made For Hire," published by the U.S. Copyright Office (available online at *https://copyright.gov/circs/circ30.pdf*).

Additionally, the Fair Labor Standards Act (FLSA) has a six-step test to determine if an intern or trainee is considered an employee (see *https://webapps.dol.gov/elaws/whd/flsa/scope/ee15.asp*). If the internship fails to meet even one of these six criteria, then the intern is considered an employee. If the intern is considered an employee, then they must be paid for their work (at least minimum wage) according to the Fair Labor Standards Act (see *https://www.dol.gov/agencies/whd/fact-sheets/13-flsa-employment-relationship*).

Jim concludes, "The museum can't have their cake and eat it too. They can't consider the intern an employee for the purpose of taking their intellectual property as work-for-hire but then NOT consider them to be employees so they don't have to pay them. The intern could choose to sign over certain limited rights to the museum, but the relationship can NOT be considered work-for-hire."

DID YOU KNOW? The GNSI's SciArt-L Listserv is a friendly place where members can e-mail questions and share ideas about science illustration. If you have not yet subscribed to the Listserv, please visit *https://www.gnsi.org/listserv* for instructions on how to sign up. We would love to hear from you!

Right: Jahne Hope-Williams. Portrait © 2018.

An Artist's Life Enriched by the Smithsonian

—Jahne Hope-Williams

All illustrations © Jahne Hope-Williams, unless otherwise noted.

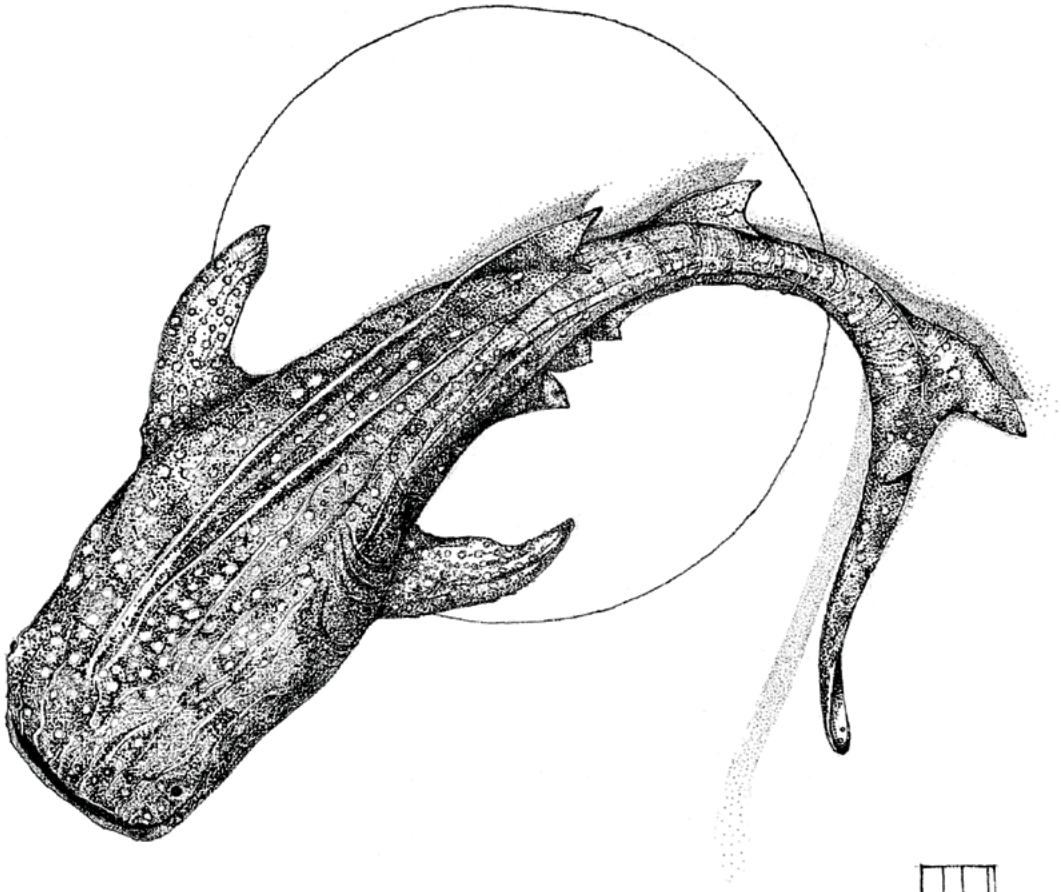
My training at the Smithsonian all seems so long ago, and in other ways, just yesterday. Although born unable to see (a temporary setback that actually revisited me once in later life), I have always painted and drawn (encouraged by my father), hence when I got old enough to choose, and it became obvious that opera singing was not going to be in my future, I pushed for art.

In Australia in those days (1970s), only DaVinci and other Italians of that era were considered to be artists, and the only ones who could make REAL art. Everyone else was an "also ran" as we say. But in spite of various adult and sophisticated forms of dissuasion, I kept at it, alongside another pursuit I was later to recognize as yoga.

The turning point came in about 1977 when I was invited to show my ink drawings of marine mammals at the Oceans Congress hosted by Monash University. A one-person show! It was a sell-out. It was seen by Dr. Wilson who was then the Director of the Australian Museum of Natural History in Russell Street in Melbourne. A fabulous place in those days—sadly no longer there. Dr. Wilson asked me to exhibit at the museum, which was wonderful, and then he asked me to join the staff as a SCIENTIFIC ILLUSTRATOR. I had never heard of one, and didn't know what one was or did. I soon found out, starting the next day (I didn't leave him time to change his mind) under the patient tutelage of Dr. C. C. Lu. It was amazing and I loved it. I got my own room —"The Melba Room" as it happens—and my own microscope.

Because I was now a REAL Scientific Illustrator, I received magazines from The Smithsonian. I wrote to them and let them know there was an SI at The Museum and it was me. I was the only one. There was a part-time illustrator in Perth, but apparently across Australia there were no others, or none that had answered my mail (and in those days it was letters in the post).

But I had written the Smithsonian. The letter I received in return invited illustrators to apply for a workshop. There would be 14 students chosen from an international field, and 10 teachers. There were some entry requirements that I didn't meet, but I thought I would send a portfolio and enter; at the very least they would know I was working, and in Australia—the end of the world.



Left: Leopard shark; pen and ink on canvas. © 2019 Jahne Hope-Williams.

I forgot about it, figuring that I had no chance, but I was wrong. A few months later I received an invitation to join the group. This was fabulous but it posed a few monetary challenges, all of which were met by a grant engineered by Dr. Wilson, and I was off to Washington DC. In those days it was an unbearably long flight with a number of stops.

Along the way I had a job to do. Dr. Lu asked me to deliver a box containing a specimen of a tiny, exquisite squid from Botany Bay collected by Joseph Banks on the original voyage with Captain Cook. A gift from one Institute to the other. Quite an honor. The tiny treasure sat on my knee in a quite big wooden box for the whole trip, a glass phial, inside a box inside a box—it never left my hands or my sight.

It was such an adventure, even the long plane flight, even with a wooden box on my knee. I think we went through customs in Hawaii, then to LA and then to DC. Even being in "cattle class" was fantastic. I held the box tight.

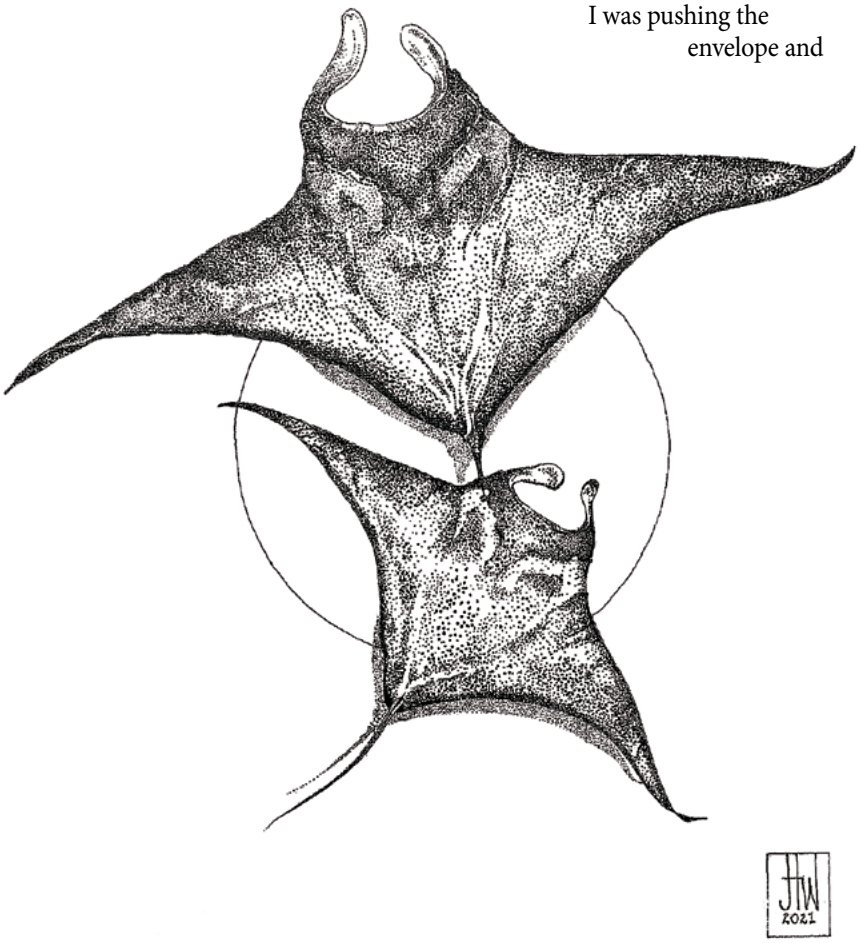
When I arrived in DC, I found the Smithsonian, and took the box in to Dr. Clyde Roper of the Department of Invertebrate Zoology for the "hand-over" which was done with some ceremony (looking back maybe this was a bit tongue-in-cheek on Clyde's part). I was mortified to discover that the liquid surrounding the squid had evaporated and all that was left was a little raisin-like thing in the bottom of the glass tube. But Clyde didn't seem to care, and he and illustrator George Venable prised the box out of my hands, added a little bit of this and a little bit of that and assured me that all was well. When I went back the next day the squid looked revived or perhaps (like a child after the death of a mouse)—they had replaced it. Either way, all was well.

We had illustration classes every day for a month. One day in the lecture hall I actually asked the lecturer a question. She looked bemused, and asked if

Below: Owl eye; watercolor on tea bag. © 2021 Jahne Hope-Williams.

we could be provided with a translator—Australian English obviously was an unknown dialect, but once I realized there was a problem I tried to talk "American" and we managed. I was asked "What part of America Australia was?" No-one seemed to know. They knew where the moon was, America had landed on it, but hardly anyone knew where Australia was, or how far away.

That being said, I fell in love with America (and it still feels like a second home), although I am sure in retrospect that America may have had a hard time with me. Yes, I could draw, but I had hardly traveled outside of Australia. I was pushing the envelope and testing the waters in a new world, and I had an able and willing partner in George Venable. He may not have taken part in escapades, but he was able to supply endless ideas for "the next one".



Above: Manta rays; pen and ink on canvas. © 2019 Jahne Hope-Williams.

I was totally in awe of his drawing ability, and (to my mind) his varied Leonard Cohen-like life. He made me feel powerful and like an artist. I even landed (egged on by George) a short drawing assignment at the National Geographic, and another at the Smithsonian's National Zoo, where I made the mistake of using paint that was not light tolerant in a full sun environment (oops!), but I did the job again and we moved on. Every interaction became a learning experience—at the zoo (surprisingly) I learned about foraminifera from a visiting professor from the University of Hawaii.

Back home I was a team of one, but in Washington DC there were many illustrators in the building, and I learned from anyone prepared to spend time with me. I learned how to look after steel nib pens; how to sharpen and smooth them on a stone to work with my drawing style; how to choose and maintain my brushes, properly sharpen pencils and how to use the graphite that resulted from that effort, and which papers and acetate to use; how to make a silver point and make scraper board, and what "snodgrassing" was (an ink line shading technique). I learned how to use the Lazy Lucy (large projection lucidagraph), adapt a microscope, and use microfiber optics; how to draw a squid's "ear" in a wet-field. All this and not a computer in sight. George, unlike myself, was embracing technology. He tried to hint to me that computerization (even the now old fashioned fax) was on the way—but I didn't (and still don't) want to listen.

The Smithsonian taught me things only people now known as "Japanese Living Treasures" know how to do. I learned from these guys. I was a sponge, and George was central to my learning. If you know his drawings, and I am sure you do, they were magical —almost like photographs—but there were others all doing wonderful artworks at work and in their spare time. I don't remember all their names but I do remember the beautiful work, not just at the office, but the fabulous work they exhibited in their studios —like the artist Carolyn Gast drawing stereoscopic graphics.

I also remember the Smithsonian's fabulous small store rooms (treasure troves) with big drawers full of the most wonderful drawing paper which we could use. I remember traipsing through the exhibit halls and behind the scenes watching the artists at work drawing mural backdrops. I did masses of drawings and was invited to use strange and wonderful papers, brushes and ink. All of which I used to teach others over the years. Unfortunately, as more and more people have turned to computers, the papers and inks we used to use are no longer available, "*and everyone thinks they are an artist*" as George would often say. But no one could do art like George could, even with a computer!

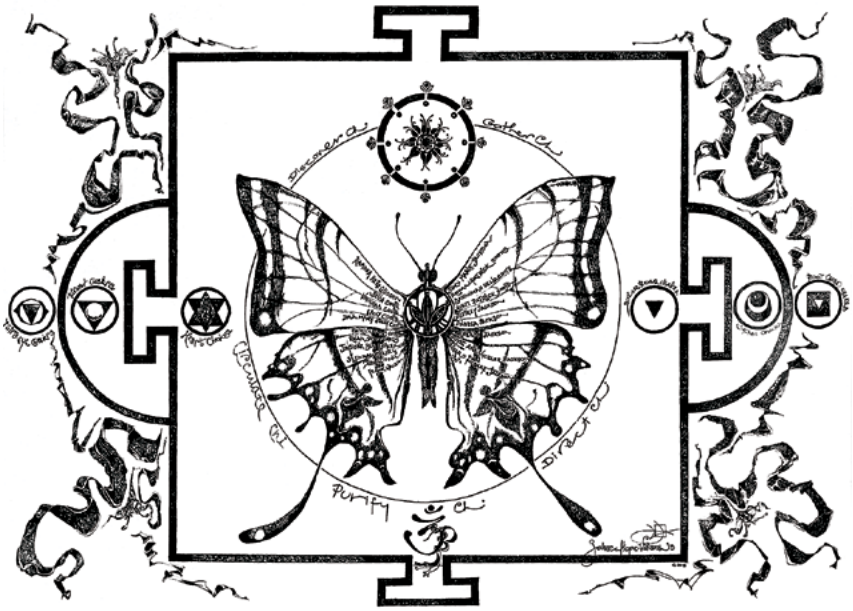
A number of years after my visit, my house (along with 200 others in my community) was burned to the ground in a bushfire. You might not have

understood what a bushfire was in those days, but many of you may now have experienced what happens here in Australia. Everything was lost. There was nothing left, and I found it difficult to pick up the pieces. I still had to earn an income and all my art was gone, so I turned to yoga and started The Australasian Yoga Institute. I continued drawing and painting and teaching when I could, but only recently have I decided to really get back to scientific illustration—a place where I feel very comfortable, very at home, and where now, the anxiety, the fear of the bushfire which flattened everything inside me and outside, has faded. I can now reach into my internal storehouse of skills and once again use and teach Scientific Illustration, and talk about the Smithsonian and the great gift it gave me.

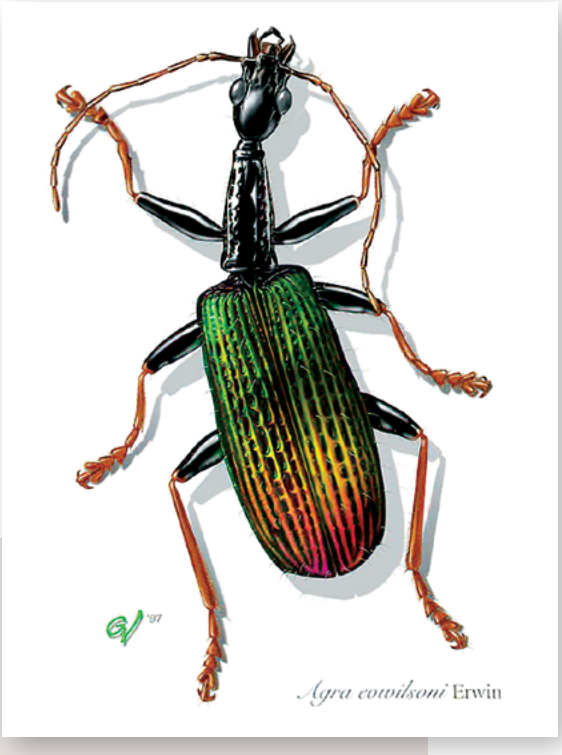
To all the wonderful artists I worked with—I am not sure how many students over the years you have influenced secondhand by teaching me, but I would say hundreds of budding Australian artists and illustrators have come through my studio over the years, changed by all of you who taught me. I cannot express to you the thanks I feel. You shaped my life, and it has been a surprisingly good one. Thank you!

Namaste,

Jahne Hope-Williams (nee J. Andrewartha)



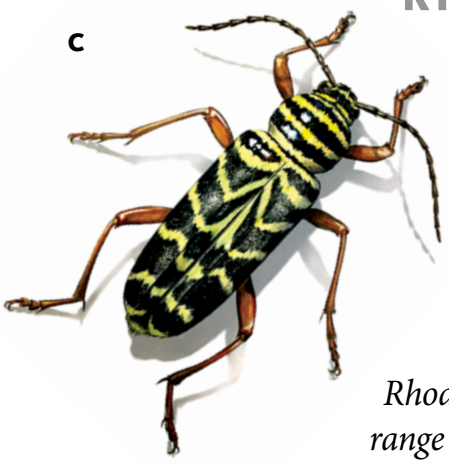
Above: Decorative butterfly; pen and ink on canvas. © 2015 Jahne Hope-Williams.



Right: Rainforest beetle, *Agra cowilsoni Erwin*; Adobe Photoshop and Illustrator, by George L. Venable, Department of Entomology, National Museum of Natural History. © 1997 Smithsonian Institution.

ABOUT GEORGE

George Venable joined the staff of the Smithsonian Institution, Museum of Natural History, in 1971 as a scientific illustrator in the Department of Entomology. During his tenure he became the Senior Scientific Illustrator of that department. One of the most satisfying aspects of George's career at the Smithsonian was the opportunity to teach. He had many students who came to learn methods and materials involved in scientific illustration. He also taught two-week courses in scientific illustration in Denmark and Costa Rica. During his active membership in the GNSI, he served in many capacities, including Director of the Guild's Summer Workshop, an intensive course in scientific illustration. Among his awards that he values most are: First Place in the "Best of the Best" competition for the "Insects Interactive" animation presentation (1994); the "Outstanding Achievement in Graphics Award" (1995); and the "Peer Recognition Mentor/Outreach Award" (1997).



Above: (*a*) The Conversation; watercolor and gouache, © 2010 Kathy Kelly. (*b*) Family (*Tyrannosaurus rex*); acrylic on canvas, © 2016 Rex LeBeau. (*c*) Locust borer (*Megacyllene robiniae*); colored pencil, © 2017 Madeline Verbica.

RHODE ISLAND SCHOOL OF DESIGN CONTINUING EDUCATION

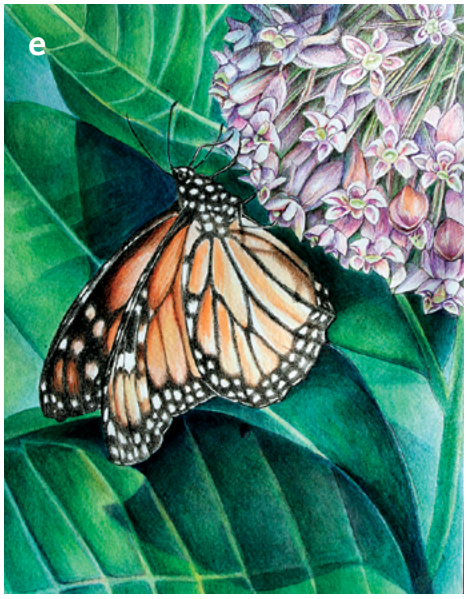
Natural Science Illustration Courses for All Walks of Life

—Margaret Oliver

Rhode Island School of Design Continuing Education (RISD CE) offers a wide range of noncredit programs and coursework for children to adults of all backgrounds, varying interests and skill levels, who desire to grow creatively.

Students may enroll in classes for personal or professional development. There are twelve adult certificate programs with a wide range of curricula, including Natural Science Illustration. (Full disclosure—I am a current student about a third of the way through this program and I am thoroughly enjoying it.) These certificates are open to everyone, and are mostly geared toward nontraditional students interested in gaining new skills, or exploring a new career path, and who want flexible scheduling. The required coursework for the Natural Science Illustration Certificate program includes classes covering the fundamentals of art and design, introductions to a variety of traditional and digital media, and other more specialized classes focused on preparing students' portfolios towards career opportunities. The certificate curriculum also requires 54 credit hours of electives, which can be satisfied with any of the courses from the catalog, enabling students to tailor the certificate to fit their specific interests and needs.

When COVID-19 shut down in-person classes in 2020, RISD CE quickly pivoted to move all courses online. This created new challenges for instructors and students, but also allowed prospective students from all around the world to begin pursuing their interests in the visual arts through RISD CE. The Nature Lab at RISD has also worked hard to digitize large portions of its collections to make them freely available online. RISD CE students have access to some of the events and resources offered by RISD Careers, which helps RISD students prepare for the job market in the arts, find internships and job opportunities, and network. With a large increase in



the number of students across all certificate programs, RISD CE is continuing to work on new models to advise its distance students and help prepare them for success in the field.

What personally drew me to RISD CE's Natural Science Illustration Certificate program was its accessibility, offering me the opportunity to be a distance student while continuing to work full-time; the cost of the program, which is manageable for my budget; and the wide variety of classes that are offered, taught by a diverse group of instructors with different backgrounds and experiences in the visual arts. Feeling connected with peers and instructors online can sometimes be challenging, but that is a challenge all distance learning shares. My peers and instructors all seem to recognize this as well. We all work hard to engage in online discussions and through Zoom over one-on-one or group meetings. I feel very privileged to be able to pursue further education in a field I have had such a strong interest in for so long, and I am so excited to continue to grow as an artist as I continue the program!

Special thanks to the RISD CE staff who took the time to exchange emails with me, talk with me over Zoom, answer my questions, and help connect me with RISD CE alumni, especially Mariah Doren, Kathy Kelly, Ashley Nikolyszyn, and Amy Wright. Thank you also to the students and alumni of the Natural Science Illustration program who contributed their beautiful artwork for this story. It was great connecting with all of you and seeing some of the amazing work you produced at RISD CE!

Above: (*d*) Hoverfly (biomimicry diptych); watercolor and colored pencil, © 2019 Ava Varszegi. (*e*) Monarch butterfly with milkweed; color ink, © 2017 Alissa O'Brien. (*f*) Yellow orchid; watercolor and gouache on Bristol 400, © 2002 Marie Stile. (*g*) Red-bellied woodpeckers; acrylic on illustration board, © 2012–2016 Jonathan Cook. (*h*) Bald ibis; Adobe Illustrator®, © 2015 Elissa Sorojsrisom. (*i*) Milkweed beetle (*Tetraopes tetrophthalmus*); colored pencil, © 2017 Olive Wicherski.

In a High School Classroom

—*Cheryl Wendling*

I will start by saying that I am not a professional illustrator. I'm a retired science teacher and a mostly self-taught artist. When I retired from teaching, I worked for several years as a science editor for a major publishing company before going back to school to learn how to create visual illustrations, using Adobe Photoshop® and Adobe Illustrator®.

While teaching at any level is never easy, getting teenagers interested in a lesson and keeping their attention is a particular challenge. During 26 years of teaching high school, my philosophy was always, "If I'm bored, then they're bored". As a result, no two years of my career were exactly the same and I spent many a summer in professional development, learning new ways to enrich the curriculum.

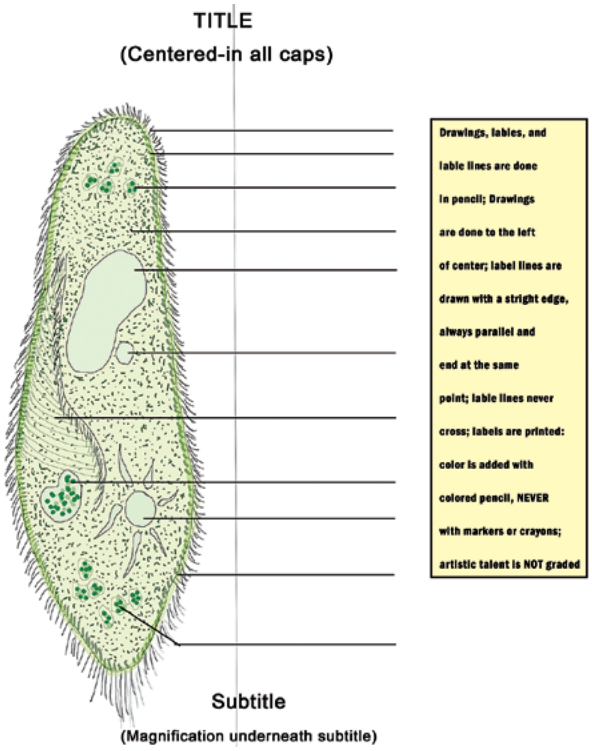


Figure 1: Facsimile of a transparency teaching high school biology students how to do a lab drawing.

Getting students to become invested in learning involves creating ways for them to retain the information they're being taught. Information is stored in the brain by a process called "memory encoding". Some of the ways that information is encoded in the brain are visual, acoustic, tactile, and semantic encoding. Although some educational researchers in the past decade have labeled the effectiveness of individual learning styles as a myth, my experience has been that visual–kinesthetic (tactile) experiences better captured the interest of my students and consequently led to increased participation in most cases. A recent study, done by researchers at the University of Liverpool, showed that having students illustrate information can increase recall by nearly double that of just reading or writing it, because it forces the person to process information visually, kinesthetically, and semantically (*The Science of Drawing and Memory*; *https://www.edutopia.org/article/science-drawing-and-memory*).

Many students make it to high school with little or no concept of study skills. Creating graphic organizers, such as making lab drawings in freshman biology, is one way that students were (and still are) taught to organize information, and most teachers use very similar criteria for the drawings. In my classes, there were always a few students with some level of artistic skill, but what they were assessed on was whether or not they had done their drawings using the criteria that had been established. Whatever their skill levels, drawing the structures or organisms seen in the lab allowed them to associate those images with the information they needed to know.

In the early days of my career, computers weren't available in the classroom and digital projectors didn't exist. Teachers at that time often did not have access to professionally-created transparencies for overhead projectors because school districts found the cost prohibitive. As a result, I often created my own transparencies and taught my students a way to make lab drawings that reinforced what was taught in class and helped them to retain the information. I've recreated one here using Adobe Photoshop (*Fig. 1*).

Illustrations in textbooks help students visualize a concept, but sometimes the information is not retained because the images are static. One of the best ways to learn is to teach someone else. By having students create their own visualizations and present them to their peers, it served to reinforce the information about a topic. Often, their visual works were used as alternative assessments to standard tests. This allowed students who did not do well on written objective tests to show what they'd learned and be successful.

Over time, my students built rainforests in the hallway, created comic books and simple animations to help them to understand complex topics, and built both physical and virtual models illustrating scientific principles. Rather than just showing the appearance of cell organelles, as freshman students did, my AP Biology classes built large-scale models of cells that were required to illustrate the functions of the organelles. In one model, a child's wading pool represented

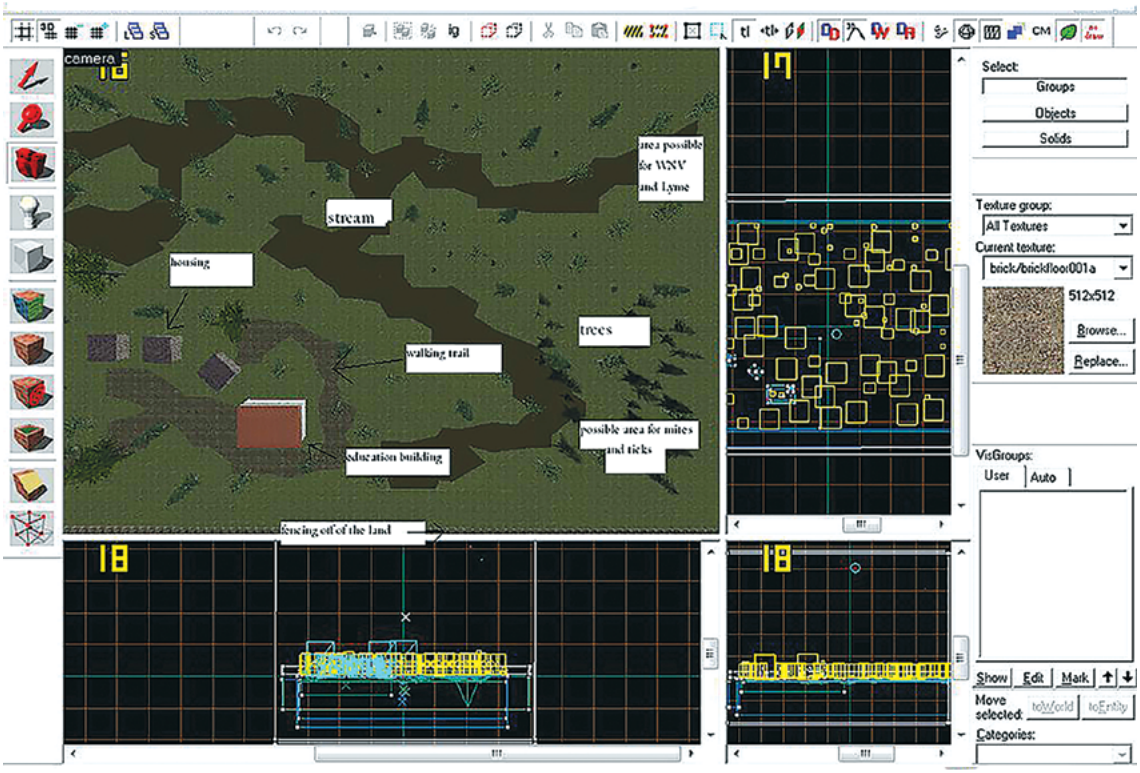


Figure 2: A site map of a virtual park generated by a group of AP Environmental Science students as part of a project about Vector Borne Diseases (VBD), done in conjunction with Yale's Peabody Museum.

the cell wall, an external hard drive was the nucleus, and a battery charger was used to show the function of mitochondria. While not hand-drawn illustrations, the items gave them something visual to help them recall the functions of the cell organelles.

One particular project was done by my Advanced Placement Environmental Science classes (APES) in conjunction with Yale University's Peabody Museum. Focused on the prevention of vector-borne diseases (VBDs), such as Lyme Disease, the project had previously been done only with lower grade levels and ramping it up for a college-level class was a challenge. Along with associated lab work, much of the project entailed research into which animal vectors commonly carried diseases (particularly in the United States) and what eco-friendly resources could be used to prevent them. At the end of the project, which was done in groups, students were asked to create models of parks that incorporated various means of preventing humans from contracting VBDs. Most of the groups built three-dimensional models of parks. A requirement that they were given for those types of models was that they use found or recycled materials to build their parks, with the exception of a piece of foam board for the base. One enterprising group of young men were playing a video game in their free time outside of school that allowed them to build their own game levels. Using the software provided in the game for that purpose, the group designed a virtual park and a video tour through the park. Computer graphics were not as sophisticated then, but in the screen capture (*Fig. 2*) of their site map, labels indicate areas of their park that were habitat for mites and ticks, as well as a region where mosquitoes carrying West Nile Virus (WNV) and ticks that were vectors for Lyme disease were found. Since deer are the intermediate vectors that carry the ticks, their design included deer-resistant plants, as well as those that are known to repel mosquitoes, the vectors of WNV. An education building was planned for the park, where scientists provided information (in text boxes) to the virtual visitors on the areas of the park to avoid. (Note: being teenage boys, at the end of their video, a T. Rex appeared, stalked all of the park employees, and ate them. This inclusion, while being extremely funny, ended up being the main thing about their park that the rest of the class recalled later.)

Trading cards of one kind or another have always been popular with kids. In order to get biology students to learn more about microscopic organisms in a way that would capture their interest, materials were provided for them to create trading cards for an organism of their choice (*Fig. 3*) and to make copies to trade with classmates, in addition to the one turned in for a grade. Students were assessed using a rubric that concentrated on the accuracy of the information provided on the cards, whether their drawings were at least recognizable as their chosen organism, and whether or not the information was organized according to directions. Some of the information that

was required for everyone was generalized and used to create assessment questions.

Where once students were taught how to use a library for research, access to computers in the classroom and in many homes gave them new avenues to find information. The activity, *Investigating Endangered Pollinators* (*Fig. 4*), was modeled after the "murder boards" found on television detective shows and in mystery novels. Images of different species and some information about habitat were provided, with students being expected to research and fill in pertinent information. Using colored pencils, students would then color in the outlined plants and animals, as accurately as possible.

By engaging their interest and providing ways for students to research, create visual associations to information, and disseminate that information, the ultimate goal is for them to carry that skill forward and apply it in future situations. The goal of every good teacher is to create lifelong learners, who know how to find accurate information for themselves, rather than just have it given to them. This has always been important, but never more than now.

Figure 3 (*left*): Re-created microbe "trading card" of a tardigrade.

Figure 4 (*below*): "Murder board" activity prompting research into endangered pollinators.

Book Review

Natural History Illustration in Pen and Ink, by Sarah Morrish

—Camille Werther

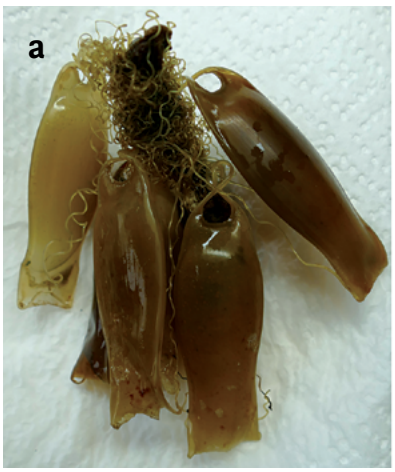
There are few instructional books that are dedicated to the use of traditional pen and ink materials in natural history illustration. Those interested in developing those skills now have a new reference thanks to GNSI member, Sarah Morrish, who has written *Natural History Illustration in Pen and Ink*. The beautifully illustrated book provides instruction for both the beginner and the experienced illustrator who is looking for inspiration or new ways to combine media. Morrish is an illustrator for *Curtis's Botanical Magazine* and has produced work for the Natural History Museum in London.

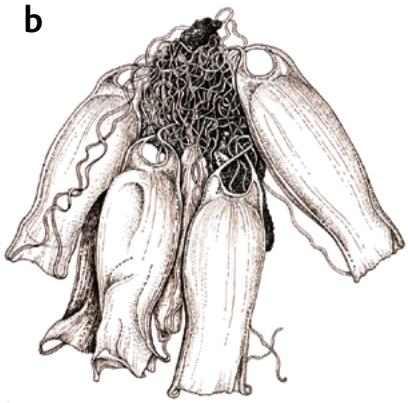
"To me and many others, this is truly the marriage of science and art." (P.8)

The book begins with an overview of the history of pen and ink illustration, from the first use of reed pens to contemporary botanical and natural history illustrators working in pen and ink. In addition to providing context for the use of pen and ink in this type of illustration, she has included a fascinating chart showing the timeline of the history and development of ink and pens.

Her use of charts throughout the book provides an organized approach to the contents that will be appreciated by both teachers of illustration and their students. The charts showing projects and case studies in the beginning of the book provide a very clear outline of the skill level involved for each, and the aim of the projects.

She gives an overview of possible subjects and a sensitive discussion of the ethical means of obtaining reference material. The author is based in the U.K., and she notes that laws regarding the collection of

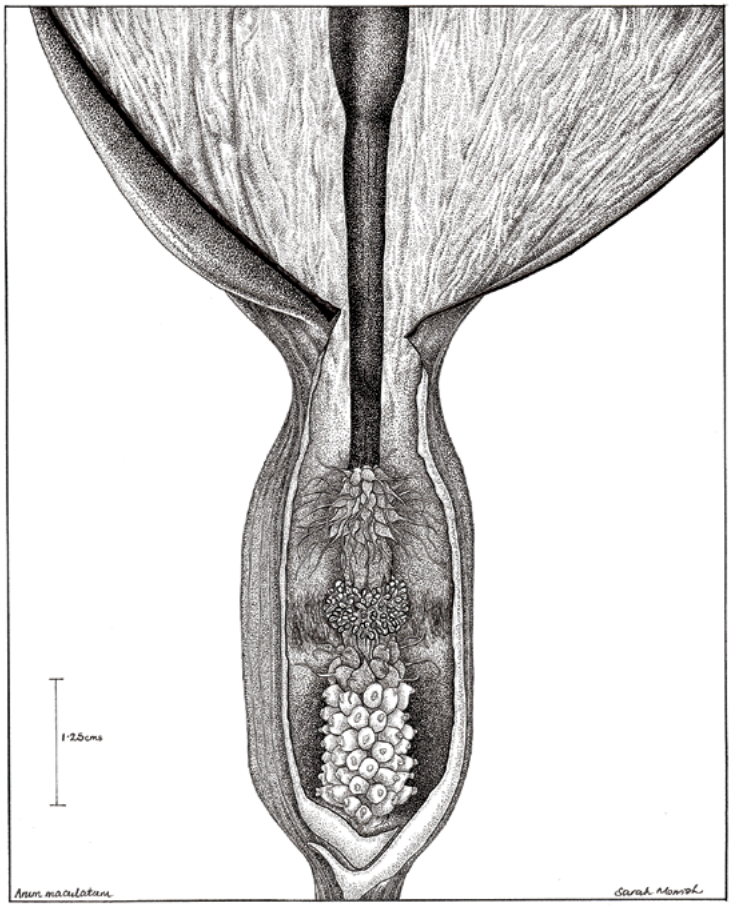




Morrish, Sarah (2021). *Natural History Illustration in Pen and Ink*. The Crowood Press, Ltd. ISBN-10: 1785009222; ISBN-13: 978-1785009228. $45 USD.

Above: Helicoid shell.

Below: (*a*) Small-spotted catshark egg case. (*b*) Illustration in pen and ink.



Left: Stag beetle, step 9.

Right: *Arum maculatum*.

natural materials for illustration differs by location. (Indeed, in the U.S., possessing feathers and birds requires a permit from the U.S. Fish and Wildlife Service and state agencies.) She also discusses working with museums and museum etiquette, and the use of photography and field sketching.

Next, Morrish gives the reader an extensive overview of materials, from fiber-tipped pens to nibs to papers and inks, and an interesting demo of making your own oak-gall ink.

"Never underestimate the power of a sketchbook." (P.41)

I enjoyed reading the chapter on the importance of sketchbooks and making study pages, as I find inspiration in seeing the process behind a finished illustration. She also has a good discussion of measuring and using dividers, which is helpful for those new to the field.

Mark-making, shading, and tone are described, with charts showing possible solutions to illustration challenges such as ink bleeding, nib clogging, and splatters. Again, her use of charts to guide the reader throughout the book is very user-friendly.

The chapter on composition could be expanded (I admit, though, that this subject is so large, it could encompass a book of its own!). She addresses the elements and principles of design and gives examples from her own illustrations.

Morrish then discusses different subject areas of natural history illustration, including botanical subjects, marine, fossil, insect and invertebrates, birds, and mammals. Step-by-step exercises and case studies demonstrate pen and ink techniques to describe each of these subjects. Sixteen contributing illustrators add additional perspectives in this section.

In the final chapters of the book, she discusses combining pen and ink with other materials and framing and presentation. The chapter on combining media is generously illustrated and provides the reader with several options to explore, including pen and ink combined with watercolor, colored pencil, and charcoal. She emphasizes that the additional media should complement, not overwhelm, the pen and ink work.

Lastly, there is a list of contributing artists and their contact information. I would have also enjoyed seeing a bibliography, as she mentions some out-of-print references in the beginning of the book that look intriguing.

Overall, this is a beautiful guide to the use of traditional pen and ink in natural history illustrations. Because of the book's well-organized structure and inclusion of some beginner-friendly projects, it would also be a useful resource for instructors to share with their students.

Sketchbook

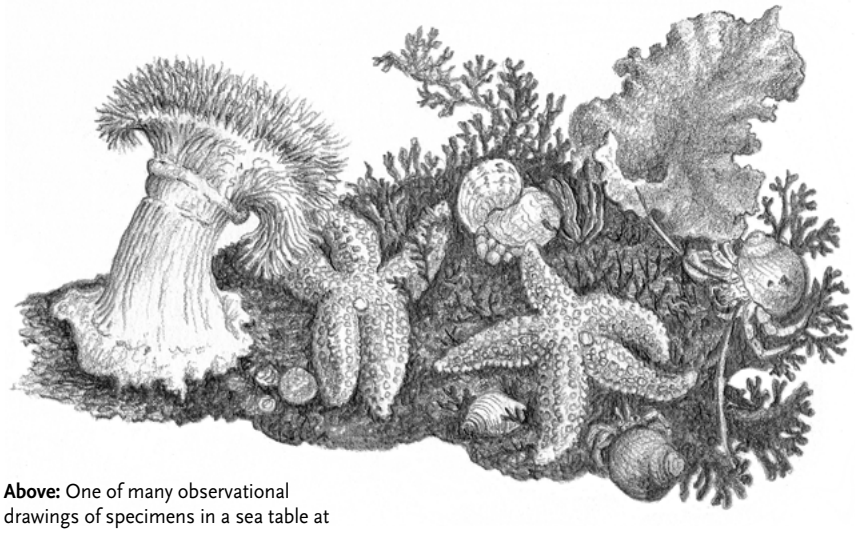
Carol Schwartz

A constant supply of drawing materials accompanied Carol while growing up in Missouri.

Carol Schwartz's favorite medium is gouache, an opaque watercolor, although she also works digitally, often taking her gouache paintings into Photoshop where she continues to build and improve on them. Creating textures and detail is characteristic of her style, giving deeper understanding and connection to her subjects.

For many years Carol lived in the Washington, DC area, raising a family and managing her illustration business. Life has taken her to a number of areas of the country, most recently Connecticut, where she teaches at the University of Hartford. Her artistic process and love of nature have been a topic for presentations at elementary schools, libraries, conferences and colleges.

Carol has been an Artist-In-Residence at the Shoals Marine Laboratory on Appledore Island, Maine for several years, where her love of the ocean and art come together through visually documenting her experiences and teaching.



Above: One of many observational drawings of specimens in a sea table at the Shoals Marine Laboratory, Appledore Island, Maine done in graphite pencil in sketchbook. © 2020 Carol Schwartz

Below: Being on Appledore Island at different times of the summer over several years allowed Carol to see a progression of late spring to late summer blooms, which was a joy to document. The flowers were collected and painted from life in gouache in a sketchbook on Arches paper. © 2020 Carol Schwartz

CAROL SCHWARTZ graduated with a BFA from the Kansas City Art Institute, attending her senior year at Rhode Island School of Design. In 2014 she received her MFA from the University of Hartford, Connecticut. Her illustrations have appeared in over 60 picture books and countless magazines, newspapers, and advertisements.

With a focus on science and nature, a few of the companies Carol has worked with include Scholastic, Hyperion, National Geographic Society, National Wildlife Federation, and *The Washington Post*. Her children's books have been chosen as "Outstanding Science Trade Books" by the National Science Teacher's Association and Children's Book Council, and honored with the Children's Choice Book Award. Her artwork has been exhibited throughout the country, including Focus on Nature XIV and XV, The Society of Illustrators in New York, and The Illustrator's Club of Washington DC. Carol's work is included in the Society of Illustrators' permanent collection from the exhibition, "Women Illustrators Past and Present."

Website: *https://www.csillustration.com/*

GUILD OF
NATURAL
SCIENCE
ILLUSTRATORS

P.O. Box 42410
Washington, DC
20015

VISUAL SCICOMM
CONFERENCE
2022

Visualizing Science for All

CONFERENCE
August 12–14

WORKSHOPS
August 20–21 + August 27–28

Over the last few years, we've seen how important science communication is. It affects our climate, our health, and our society. Clearly conveying vital and relevant scientific information creates significant change in our world. The virtual 2022 GNSI Visual SciComm Conference: *Visualizing Science for All* highlights how artists, scientists, researchers, healthcare professionals, and students build connections between the lab and the public through science visuals.

Registration opening soon!