

Journal of NATURAL SCIENCE ILLUSTRATION

GUILD OF NATURAL SCIENCE ILLUSTRATORS



VOLUME 54 • NUMBER 2 • 2022

A Note From...

Gail Guth, Managing Editor

By the time this reaches your mailbox it will be early summer, time to load up the traveling sketch or paint kit and head out to the garden or the woods, or vacation spots near and far. Be sure to keep the *Journal* in mind and send us a few scans of your summer sketches! Include a few short comments on where and when, or anything else relevant. They don't need to be "frame-worthy"; we just love seeing and sharing your work.

As you know by now, the GNSI Visual SciComm Conference will once again be virtual (August 12–14, with workshops the following two weekends). We certainly miss the in-person get-togethers, but with COVID still menacing us, this is a sensible alternative—and one we have all found to be a great experience in its own right. Kudos to the Board and the Conference Committee for turning the COVID lemon into excellent lemonade, bringing us all together. It's been wonderful to meet and greet new members, and those from near and far who couldn't otherwise attend in person.

In the meantime, enjoy this issue's articles: suggestions for 3D molecule renderers, a preview of the conference, a fascinating decal project by the Finger Lakes Chapter, wonderful artwork by this year's CSUMB science illustration graduates, and an exploration of watercolor papers by Kathryn Killackey.

Please consider sharing your story, long or short, with us. Anything related to our profession is fair game and we'll be happy to help you turn your thoughts into a lovely and informative entry into our publication.

With regards,

—Gail Guth, JNSI Managing Editor

IF YOU HAVE AN IDEA for a *Journal* article topic, or an article you want to submit for consideration, please send us an email with the details to journal@gnsi.org, and accept our thanks in advance!

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Cover: Osprey (*Pandion haliaetus*)
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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.

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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

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Suggestions for Affordable 2D and 3D Molecule Renderers

These days an ability to generate molecules is a very useful tool to have in any science illustrator's toolkit. How can you do it economically?

—Catherine Wilson, Gloria Fuentes, and Jeremy Swan

PYMOL

One of the standard 3D tools, PyMOL, originated in an open source license by its author, has since been moved to a subscription model. But the basics of the open source project are still available, without the current tools in the commercially developed product (comparison chart here: <https://pymol.org/compare.html>). If you are comfortable with compiling your own programs or are willing to learn, you can convert the open source software coding into a working program, potentially saving you \$100–\$1,000/yr.

OTHER TOOLS

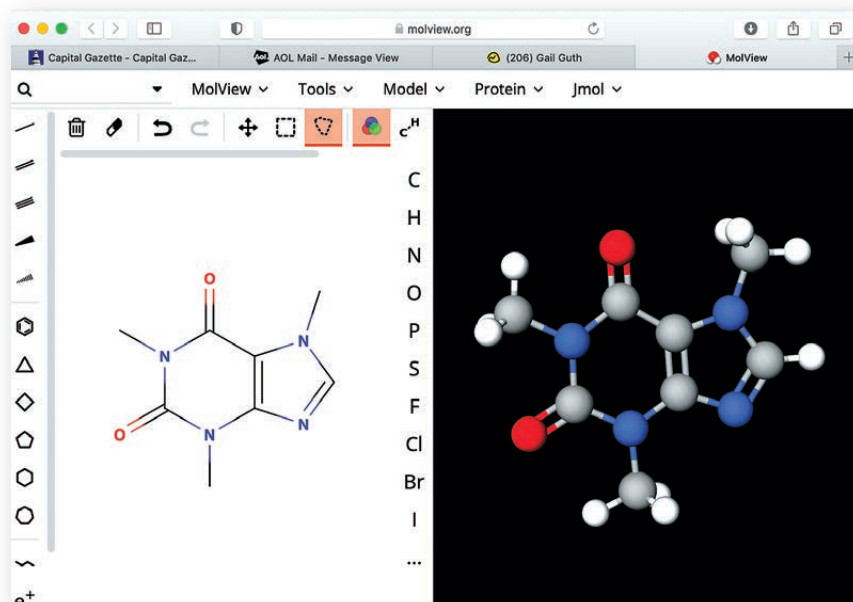
Chimera: Free for academic use, commercial use \$2,000, 3-year license. <https://www.rbvi.ucsf.edu/chimera/>

ChimeraX: Beta for larger data sets. Free for academic use, commercial use \$2,000, 3-year license. <https://www.rbvi.ucsf.edu/chimerax/>

Chemdraw: Free online 2D molecular drawing tool with standardized objects to put together molecular diagrams: <https://chemdrawdirect.perkinelmer.cloud/js/sample/index.html>

MolView: A 2D and 3D online renderer. <https://molview.org>

There are 15 open-source free web-based 3D molecular and protein modeling software programs. A few of these tools require the ability to compile programs from GitHub sources, so you will need to get over your fear and dig in to figure out how—maybe with the help of a knowledgeable friend? Others are



Above: Screenshot of MolView.

accessible through online interfaces such as: <https://medevel.com/15-3d-molecular-protein-modelling/>.

DATA LIBRARIES

NIH 3D print exchange: Free online tools for creating 3D molecular models for rendering and download. <https://3dprint.nih.gov/create>

UNIPROT: Universal Protein Resource, a comprehensive database for protein sequence and functional information with a large amount of annotated data. <https://www.uniprot.org>

PDB: Protein Data Bank, a reliable source for 3D protein models. <https://www.wwpdb.org>

EMDB: Electron Microscopy Data Bank, a public repository containing electron cryogenic-microscopy maps and tomograms of biological macromolecular assemblies. <https://www.ebi.ac.uk/emdb/>

Protein Imager: An online imager hosted by an illustration company. <https://3dproteinimaging.com/about-protein-imager>



Logo © Stephen DiCerro

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: Logo illustration kindly provided by Erin Hunter; design by Fiona Martin.

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Visualizing Science for All

PRESENTATIONS: AUGUST 12–14, 2022

WORKSHOPS: AUGUST 20–21 & 27–28, 2022

—GNSI Conference Committee

Over the last few years, we've really seen how important science communication is. It affects our climate, our health, and our society. Clearly conveying vital scientific information can create significant change in our world. But making an impact requires accurate, inclusive, and accessible science communication, or scicomm.

REGISTER for the conference at <https://www.gnsi.org/2022conf>

Our 2022 GNSI Visual SciComm Conference—*Visualizing Science for All*—focuses on how artists, scientists, researchers, healthcare professionals, and students create connections between the lab and the public through science visuals. This year's speakers and workshop instructors will showcase a variety of projects and careers that reach communities around the world. Presenters will also share insights and techniques for creating successful visual scicomm.

In addition to presentations and workshops, there are exciting opportunities for sharing your work and

connecting with the global scicomm community, including:

- Social media portfolio sharing
- The Annual Members' Exhibit, with more categories including "broader visual scicomm"
- An online auction
- Two evening social events partnering with SciArt Initiative and the National Association of Science Writers (NASW).

Due to the unpredictable nature of the pandemic, this year's conference is fully virtual (as in 2021 and 2020). This virtual format makes the conference more accessible for many—it doesn't require a plane ticket or lodging, and we can join wherever we are, whenever we can! Plus, recorded sessions will be available to anyone who registered following the conference. We do hope to meet in person again soon, hopefully in 2023!

Register for the conference here, renew your skills, and connect with friends and colleagues from around the globe!

<https://www.gnsi.org/2022conf>



Auction boreal toad © 2022 Amelia Janes

IT'S AUCTION TIME!

Burrow in your studios and your closets to find your toad-ally awesome stuff you're not using any more that somebody else would probably love! Or how about prints, cards, books, t-shirts? Get creative!

Submit your items any time up until July 31: <https://www.jotform.com/form/221105769490053>

The online auction is going to be up and hopping Aug. 5–14!

Please contact Nora Sherwood, Virtual Auction Coordinator at nora@frii.com if you have any questions.

Half of the proceeds from the auction goes toward the GNSI Education Fund and half goes to the GNSI General Fund.



PRESENTATIONS (20–40 minutes)



Portrait of a Denisovan Girl: Reconstructing Anatomy Without a Skeleton

Maayan Harel | Maayan Visuals | www.maayanvisuals.com
@maayanvisuals | [linkedin.com/in/maayan-harel-a3776762](https://www.linkedin.com/in/maayan-harel-a3776762)

For nearly a decade, the Denisovans' anatomy has been a mystery, as the group has been defined by its genome. The portrait of a Denisovan girl was published in news media worldwide, but this was only the final step in a process that began a full two years earlier, with the creation of a skeletal profile in collaboration with anatomists and genetic researchers. This talk will cover how this illustration was created from the ground up, and describe what is known about Denisovan anatomy and what is not.

Maayan Harel is an artist, scientific illustrator and designer. She specializes in visual storytelling for scientific publications, and has an M.S. in atmospheric science. After graduating from the science illustration program at CSUMB, she interned at National Geographic Magazine and the Smithsonian, and spent 2 years working at the Los Angeles Zoo as a designer and graphic artist. As an illustrator she creates works for a broad range of fields, including geosciences, ornithology, human evolution, artificial intelligence, psychology, and neuroscience. Maayan also gives workshops and talks to scientists looking to improve their visual communication skills.



Creating a Fine Art Painting, From Research to Exhibit

Erin E. Hunter | Erin E. Hunter Fine Art & Illustration
Annual Reviews | www.eehunter.com | @erinhunterart

Erin Hunter is a science illustrator and fine artist with a graphic design background—and each of those roles influences how she approaches her pollinator-themed paintings. In this presentation, Erin will provide a behind-the-scenes look at her most ambitious piece yet, a large painting of California native bees and wildflowers that anchored a 2022 solo show at the San Francisco Botanical Garden. In addition to discussing what inspired the project, she'll discuss the process of sketching, designing a layout, painting, and presenting the piece in multiple formats to various audiences.

Erin E. Hunter is an artist and science illustrator who splits her time between creating pollination-themed paintings, and technical illustrations for an academic journal, Annual Reviews. Erin's fine art paintings highlight the impact that individual species have on the wider ecosystem, bringing attention to the significance of tiny honeybees, dazzling hummingbirds, delicate thistles, native plants, and other ecological treasures.

Visualization and the Supportive Role of Typography

M. Genevieve Hitchings | www.artorium.com | @MGHitchings

At its best, information design is a story-driven experience that educates and makes scientific concepts visible, understandable, and usable. This presentation explores the process of planning and developing illustrated visualizations with emphasis on the supportive role typography can play in communicating complicated ideas. We will look at the typographic order of things—from simple to complex—in different types of illustrated visual presentations including diagrams, dissections or cutaways, geographic, timelines, and flowcharts. And we will analyze the act of reading (left/right/up/down), which should influence but not dictate typographic decisions.

M. Genevieve Hitchings is Associate Professor of Communication Design at New York City College of Technology, CUNY. With expertise in communication design and illustration, she is principal designer of ARTORIUM, a graphic design studio committed to communicating the essentials of complex information quickly, clearly, and appealingly. Genevieve also works as a contract artist for scientists at several research organizations.



Off the Charts: How a Personal Project Fueled My Knowledge for Data Visualization

Diogo Guerra | Medical & Veterinary Illustration by Diogo Guerra
www.diogoguerra.com | [@medical_vet_art](https://twitter.com/medical_vet_art) |
[linkedin.com/in/diogo-guerra-314b0492](https://www.linkedin.com/in/diogo-guerra-314b0492)

In this era of information explosion, dataviz is an increasingly important tool for visual communication. However, numbers and statistics can sometimes feel scary for sci-artists. In this session, we will explore how I used a fun personal project to gain more experience in dataviz, and demonstrate that, in reality, the principles to design effective visualizations are often similar to the ones used to create engaging and accurate sciart.

Diogo Guerra, DVM, dr. med. vet., is a medical illustrator with an atypical background. He completed a Masters in Veterinary Medicine at the University of Lisbon, and a doktorarbeit (PhD) in Veterinary Parasitology at the University of Zurich, Switzerland. He has worked as a freelance medical illustrator since 2014, after several trainings and courses in scientific illustration, painting and data visualization. He was part of the graphic department of the VetSuisse Faculty in Zurich (VETCOM) between 2014–2015, and worked as a medical illustrator in the medical communications agency Medicalwriters.com between 2018–2022. His medical illustration portfolio combines his scientific background with the passion to visualize complex ideas, especially in the fields of human and animal medicines, virology, parasitology, and pharmacology.

Using Visual References in Biomedical Illustration

Nancy Chu Ji | BioHues Digital | www.biohuesdigital.com

Reference gathering is a fundamental skill for medical illustrators. Since many of our subject matters are difficult to visualize directly, we must draw inspiration from nature to inform our artistic decisions. In this talk, I will be sharing the tools and techniques our team uses.

Nancy Ji is a medical illustrator and the co-founder of BioHues Digital. She holds a Master's Degree in Biomedical Communications from the University of Toronto. Nancy's specialty is medical animation as well as project management. She wants to advance health equity through accessible medical visuals.



Molecular Visualization Workflow of the Animation Lab

Grace Hsu | University of Utah | www.hsubiomedicalvisual.com | [@GraceIHsu](https://twitter.com/GraceIHsu)

Scientific visualization is a growing field with a myriad of possibilities, especially with advancements in 3D graphics, mixed reality, and scientific techniques such as CryoEm. In this session, Grace Hsu will share her experience working as a scientific animator with structural biologists using their data. A general workflow from Protein Data Bank and UCSF Chimera to Maya will be presented.

Grace Hsu is a board-certified medical illustrator. She earned a MS in Biomedical Visualization from the University of Illinois at Chicago. At her current position as a Scientific Animator at the Animation Lab headed by Dr. Janet Iwasa in the Department of Biochemistry at the University of Utah, she collaborates with scientists to help tell their research stories visually. Her main focus is on molecular and cellular animations. Grace is also a Science Communication Fellow at the Natural History Museum of Utah where she further develops her skills in public outreach to make science information accessible to non-expert audiences.

Art in the Museum: Historical Practices and Looking to the Future

Jacki Whisenant | University of Wisconsin–Madison Zoological Museum | www.jwhisenant.com | [@jacki.whisenant](https://twitter.com/@jacki.whisenant)

This will be a discussion of historical and contemporary artist placement in museum settings, as staff illustrators or artist-in-residence, with suggestions of how museums can cultivate a collaborative practice with artists to showcase collections in new and innovative ways.

Jacki Whisenant is an illustrator and educator at the University of Wisconsin–Madison, where they recently completed a master's degree in Entomology and currently work in the campus natural history museum. Jacki is grateful to have been a student of the California State University–Monterey Bay program in scientific illustration, and hopes to encourage thoughtful collaboration between the conservation work done in collections and artists who can communicate that work to a wider audience.



Science is Everywhere, Science is for Everyone: The Art of Storytelling

Dr. Jeanette Davis | Science is Everywhere, LLC | www.drjeannedavis.com | @DrOcean24

Geosciences is one of the least diverse sciences yet the complex and pressing issues facing the environment require an environmentally literate society with diversity in both expertise and experiences. Through the art of storytelling, Dr. Davis delivers authentic experiences to encourage audiences to make real-world connections to science and concerted efforts towards meaningful diversity, equity, and inclusion so all can contribute to environmental solutions.

Dr. Jeanette Davis (also known as Dr. Ocean) is a Marine Microbiologist and best-selling author. Dr. Davis has combined her love for science, communication, and art through her children's science books Science is Everywhere, Science is for Everyone and Jada's Journey Under the Sea, both created to explore and diversify science. Her scientific expertise includes studying bacterial symbiosis to find new medicines from the ocean. She is cited in Science for helping to discover a marine bacterium that fights cancer. Dr. Davis attributes her success to the strong foundation that she received at Hampton University. Dr. Davis continues to be an ocean advocate and travels around the world to speak on genetic tools to manage ocean resources.

Illustrating for the Children's Educational Publishing Market

Sara Lynn Cramb | Freelance Illustrator | www.saralynncreative.com | @saralynncreative

This presentation covers tips for working with educational children's book publishers—including preparing your portfolio, finding work, art agents, personal projects as a gateway to new and exciting work, and the logistics of working with publishers. There will also be an overview of the publishing process from contract signing to published book. Great for those interested in breaking into the world of children's book publishing.

Sara Lynn Cramb is an illustrator of over 30 educational children's books with subjects including animal poop, geography, human anatomy, and prehistoric animals. In her nine years working in children's publishing, she has collaborated with many amazing publishers such as Oxford University Press, Scholastic, Nosy Crow, Pearson, and Quarto Publishing Group. When not drawing you can find her in the woods or curled up with her feline friends and a cup of tea. She currently resides in Fairbanks, Alaska.



Business Lessons from Nature

Ikumi Kayama | Studio Kayama LLC | studiokayama.com

Learning business practices can seem daunting, unfamiliar, and scary for many artists and illustrators. One way to perhaps overcome this speed bump is to compare the business concepts to how similar challenges are played out in nature. This presentation is aimed to help unwind some basic business concepts into more familiar, exciting challenges for the artists.

Ikumi Kayama is the founder of Studio Kayama. Ikumi is currently working with surgeons and researchers to create educational illustrations on neurosurgery and orthopaedic surgery procedures. When not illustrating, she is walking about drawing, counting, and painting birds. Ikumi holds an MA in medical and biological illustration from Johns Hopkins University School of Medicine and a BFA in scientific illustration from the University of Georgia. Her work has appeared internationally in juried shows, exhibits, textbooks, scientific journals, presentations, and websites. Some of her clients include: Cal Tech, MIT, Johns Hopkins, USC, Maryland Ornithological Society, and The Nature Conservancy. She is a recipient of the Frank Netter Scholarship in medical art and is a TEDx speaker on medical and scientific illustration. Visit <http://studiokayama.com> and say hello!

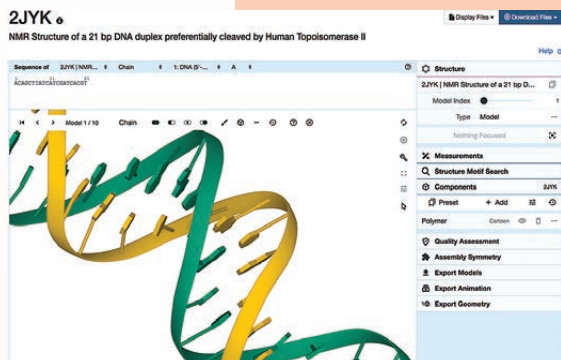


The Value of Copyright for Natural Science Illustrators

William B. Westwood | Westwood Medical Communications | [linkedin.com/in/westwoodmedical](https://www.linkedin.com/in/westwoodmedical)

In today's world, digital theft of creative works is rampant—especially visual works. The only tool creators have to counter this theft is copyright law. But to effectively use a copyright, one must have a thorough understanding of what it is, what it does and doesn't protect, and how to use it to maximum benefit. This presentation will discuss the basics of copyright law and its value to natural science illustrators.

Bill Westwood, MS, CMI, FAMI is graduate of the Georgia Medical Illustration Program. A past President of the AMI, he also served two terms on the Board of Governors. He's a recipient of the AMI's Lifetime Achievement Award and the Brodel Award for Excellence in Education. His medical artwork has won 37 national awards, including a Billings Gold Medal from the American Medical Association and a Silver Medal from the LA Society of Illustrators. Bill's a long-time speaker/author on business issues affecting medical illustrators and other visual creators, including: copyright, contracts/licensing, marketing, negotiation and pricing. In 1982, he created the Medical Illustration Source Book and guided its growth as Editor through 2000. He has been successfully self-employed since 1982, with a studio in Albany, NY.



WORKSHOPS

Is your DNA Left-Handed? The RCSB as a Resource for Molecular Illustration

David S. Goodsell | Scripps Research, RCSB Protein Data Bank

ccsb.scripps.edu/goodsell | [@dsgoodsell](https://twitter.com/dsgoodsell)

This 2-hr workshop will provide a hands-on tour of resources available at the RCSB Protein Data Bank for finding biomolecular structures and visualizing them. The workshop will be useful to artists who wish to use atomic structures from the PDB archive to add accuracy to their work.

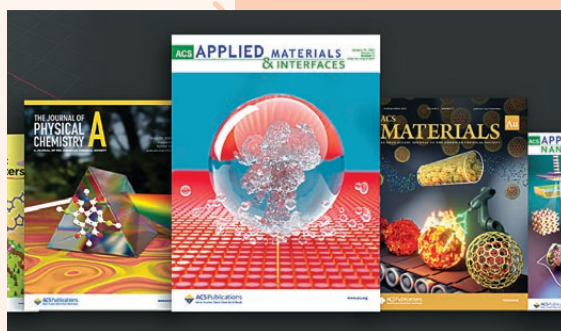
David S. Goodsell is a scientist and artist who divides his time between research in computational biology and creation of new materials for science outreach. At the Scripps Research Institute, he is developing methods for modeling the molecular structure and function of entire bacterial cells, HIV and SARS-CoV-2. With the RCSB Protein Data Bank at Rutgers University, he is creating educational materials for exploring molecular and cellular structure. This includes the "Molecule of the Month," a popular column for general audiences that presents the molecular mechanisms of fundamental biology, health and disease, and bioenergy. For more information, see his website (above) and PDB-101, the education portal of the PDB at pdb101.rcsb.org.

Intro to Motion Design for Illustrators

Bailee DesRocher | Ingenuity Studios | www.beautifulcritters.com

In this 2-hr workshop, we'll learn basic motion design techniques to bring your scientific illustrations, maps, and graphics to life using Adobe After Effects. Participants can download a free trial of After Effects prior to the workshop and follow along.

A graduate of the Science Illustration Program at CSU Monterey Bay, Bailee's career in illustration, motion design and visual effects has consistently taken her to the realms of both science and entertainment, where she's come to focus on art direction, concept art, and professional development for junior artists.



Introduction to Blender®

Rafeeqe Mavoor | Scidart Academy | www.scidart.com | [linkedin.com/in/rafeeqemavoor](https://www.linkedin.com/in/rafeeqemavoor)

Blender is an open-source 3D illustration program. We will learn how to use blender from the very basics to advanced techniques for creating high-quality 3D illustrations for science communication. This is a 2-day workshop (4 hours on Saturday, 1 hour on Sunday).

Rafeeqe Mavoor is a scientific illustrator. He works with researchers, developing illustrations for scientific publications and science communication projects. He completed a BS MS dual degree with a major in chemistry from IISER Thiruvananthapuram (IISER TVM) in 2016 and has been working on scientific illustration and animation projects for 5 years at IISER TVM and IISER Pune. Later he conducted multiple science illustration workshops at IIT Gandhinagar, IIT Guwahati, IISER Bhopal, IISER TVM, IISER Pune, SciRio, Wow Science, and more. In 2021, He founded Scidart

Academy, an online platform to help researchers learn graphic designing for science communication. In the last nine months, the academy has trained more than 500 researchers, and is looking forward to creating a change in the way researchers communicate their findings via illustrations.

Utilizing CT Data for Illustration Reference

Lauren Conroy | The University of Chicago | LaurenConroyArt.com | [@spellbinder ceramics](https://twitter.com/spellbinder ceramics)

April Isch | The University of Chicago | AprilNeander.com | [@aaineander](https://twitter.com/aaineander)

This 4-hr workshop will introduce participants to free CT dataset and 3D model [databases] and the tools necessary to use this data. Users will learn about two free and open-source software. 3D Slicer is used to create 3D models from CT Data, a process called segmentation. Blender is a versatile open-source software that can be used to manipulate, texture, light and render those 3D models. By the end of the workshop users should be able to find, download, and open CT datasets as well as orient, light, and render a 3D model to create useful reference images.

Lauren Conroy is the Research Manager and Scientific Illustrator for the University of Chicago's Sereno Fossil Lab. She utilizes scans from the microCT and hospital CT scanners to create 3D models to aid in the digital reconstruction of dinosaur skeletons such as Spinosaurus. She often uses rendered 3D elements in figures for scientific publications. She also spends her free time drawing animal skeletons on her ceramic art.

April Neander is a Scientific Illustrator and Micro-CT Research Specialist at the University of Chicago's Luo Lab and PaleoCT Lab. She specializes in mammal paleontology, micro-CT scanning, segmenting CT data, 3D modeling, and digital illustration. She frequently uses CT data in the illustration process, either as reference, or by more directly using rendered 3D elements. April has been awarded the Lanzendorf paleoart prize twice, once for Digital Modeling and Animation, and once for Scientific Illustration. You can see her illustration work in multiple Science and Nature papers, and in the recently published book Beasts Before Us by author Dr. Elsa

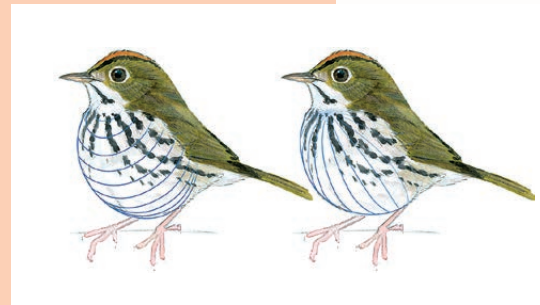
Pancioli.

Bird Anatomy and Form

John Muir Laws | johnmuirlaws.com | [@johnmuirlaws](https://twitter.com/johnmuirlaws)

Explore bird anatomy and structure to help you create fast and accurate field sketches or careful studio pieces with the help of reference. This 1-day, 6-hr workshop (with a 1-hour lunch break) will teach you to deeply understand bird structure and how to suggest what you know instead of getting lost in the feathers. We will also explore how to capture bird posture and proportions, draw foreshortened birds, and represent their textures with pencil, watercolor, gouache, and toned paper.

John (Jack) Muir Laws is a principal leader and innovator of the worldwide nature journaling movement. Jack is a scientist, educator, and author, who helps people forge a deeper and more personal connection with nature through keeping illustrated nature journals and understanding science. His work intersects science, art, and mindfulness. Trained as a wildlife biologist and an associate of the California Academy of Sciences, he observes the world with rigorous attention. He looks for mysteries, plays with ideas, and seeks connections in all he sees. Attention, observation, curiosity, and creative thinking are not gifts, but skills that grow with training and deliberate practice. As an educator and author, Jack teaches techniques and supports routines that develop these skills to make them a part of everyday life.



Moist Brush Technique

Karen Ackoff | Indiana University | www.linkedin.com/in/karen-ackoff-81853635

Moist brush technique is part-way between dry brush and a wash. It allows for layering and can be used with a variety of media and allows for a controlled approach to establishing detail and shading. This 4-hr workshop will address the use of both waterproof ink and watercolor.

Karen Ackoff has a BFA in Illustration from the Philadelphia College of Art (1977) and an MFA in Medical Illustration from the Rochester Institute of Technology (1985). From 1987–1997, she worked as Scientific Illustrator at the National Museum of Natural History, Smithsonian Institution in Washington, DC. From 1997–2013, she was Professor of Fine Arts at the Ernestine M. Raclin School of the Arts at Indiana University South Bend, and was Program Director of Graphic Design. She continues to conduct workshops, exhibit, write, and make art.

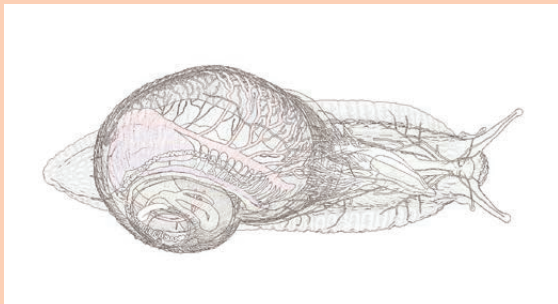
Representing Underwater Worlds

Bruce Kerr | KerrCom | brucekerrart.com | kernview.blogspot.com

Illustrating underwater environments can pose unique challenges, from capturing good reference material to compensating for varied lighting conditions in sometimes chaotic and dynamic settings. In this 2-day, 8-hr workshop, we'll explore practical techniques for overcoming some of these challenges while giving participants the opportunity to explore a sample scene using the media and techniques of their choice.



Over the course of his varied career, Bruce Kerr has worked as an industrial designer, an owner of an award-winning graphic design and multimedia studio, a Lean Six Sigma process improvement expert and meeting facilitator, and a scientific illustrator and fine artist. His illustration and media work has been used in publications, interpretive centers, museums, and research firms throughout the country. Bruce is versatile in a number of natural media including graphite, oil, watercolor, and acrylic, as well as digital rendering.



How To Get the Most Out of the Render Possibilities in ZBrush®

Mieke Roth | miekeroth.com | [@miekeroth](https://twitter.com/miekeroth)
[linkedin.com/in/miekeroth](https://www.linkedin.com/in/miekeroth)

If you're working in ZBrush, chances are you export your models to another application to get it rendered. But did you know that Zbrush has the capability to produce beautiful renditions? In this 2-hr workshop, you'll learn how to get the

most out of the render engine of ZBrush, and create renditions that look as if they're actual drawn illustrations.

As a veteran of 18+ years, Mieke has always pushed the boundaries of what is possible with her work. She's specialized in animal anatomy since 2012, and works solely in digital 3D. The end products however can be anything from spreads to 3D-printed installations in museums.

The Small Business Studio's Toolbox

JENNIFER E. FAIRMAN, MA, MPS, CMI, FAMI
ASSOCIATE PROFESSOR & ASSISTANT DIRECTOR OF PRODUCTION
ART AS APPLIED TO MEDICINE, JOHNS HOPKINS UNIVERSITY, SOM



To Market! The Small Business Studio's Tool Box

Jennifer Fairman | Johns Hopkins University, Fairman Studios LLC
www.fairmanstudios.com | [@fairmanstudios](https://twitter.com/fairmanstudios)

In this 4-hr workshop, participants will learn the ins and outs of marketing, what it means to study the market, target clients, create a routine for building and maintaining a client base as well as branding principals and techniques (building your company voice).

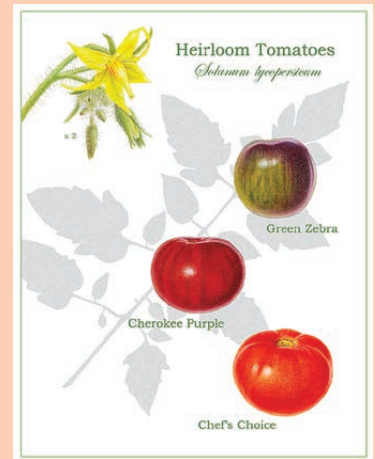
Jennifer "Jeni" Fairman is an Associate Professor and is the Assistant Director of Production for the Department of Art as Applied to Medicine at the Johns Hopkins University School of Medicine. Jeni brings over 20 years of experience in science, education, business policy, research, communication and design to be an effective visual problem-solver for her colleagues throughout the Hopkins community, and a dedicated educator and advisor to her students. Jeni is a professional member and served on the Board of Governors of the Association of Medical Illustrators (AMI) and has served for 4 terms as a Board Member of the Vesalius Trust (VT). She is currently an advisor to the VT and the Walter Spohn Trust. Her contributions are highly recognized by the AMI, Illustrators Club of DC, The National Science Foundation, Smithsonian Women's Committee, James Smithsonian Society, and the VT. Jeni is the 1999 recipient of the Trust's prestigious honor, the Inez Demonet Award. She is also a Fellow of the AMI and received its Outstanding Achievement Award.

An Introduction to Tradigital Illustration

Scott Rawlins | Arcadia University | www.arcadia.edu/profile/w.-rawlins

For those who would like to create drawings that combine the advantages of digital software with the "personality" associated with traditional media, this 4-hr "tradigital" workshop might be for you! Blending vector-based line work with hand-drawn details allows artists to generate accurate outline drawings filled with local color that can be adjusted easily but also exhibit the quirkiness and spontaneity specific to each artist.

Scott graduated from Earlham College with a degree in biology, and holds graduate degrees in museum education and medical illustration from the George Washington University and the University of Michigan respectively. Scott is a Professor Emeritus at Arcadia University where he teaches scientific illustration. He also teaches classes for the program in botanical illustration at the New York Botanical Garden. He has served on the boards of the American Society of Botanical Artists, the Guild of Natural Science Illustrators, and the Philadelphia Society of Botanical Illustrators. Scott's illustrations have appeared in numerous books, including *Your Inner Fish* and *The Guild Handbook of Scientific Illustration*. Journals that have published his illustrations include *Acta Zoologica*, *Harvard's Bulletin of the Museum of Comparative Zoology*, *Geobios*, and *Zootaxa*.



PANEL DISCUSSION (90 minutes)

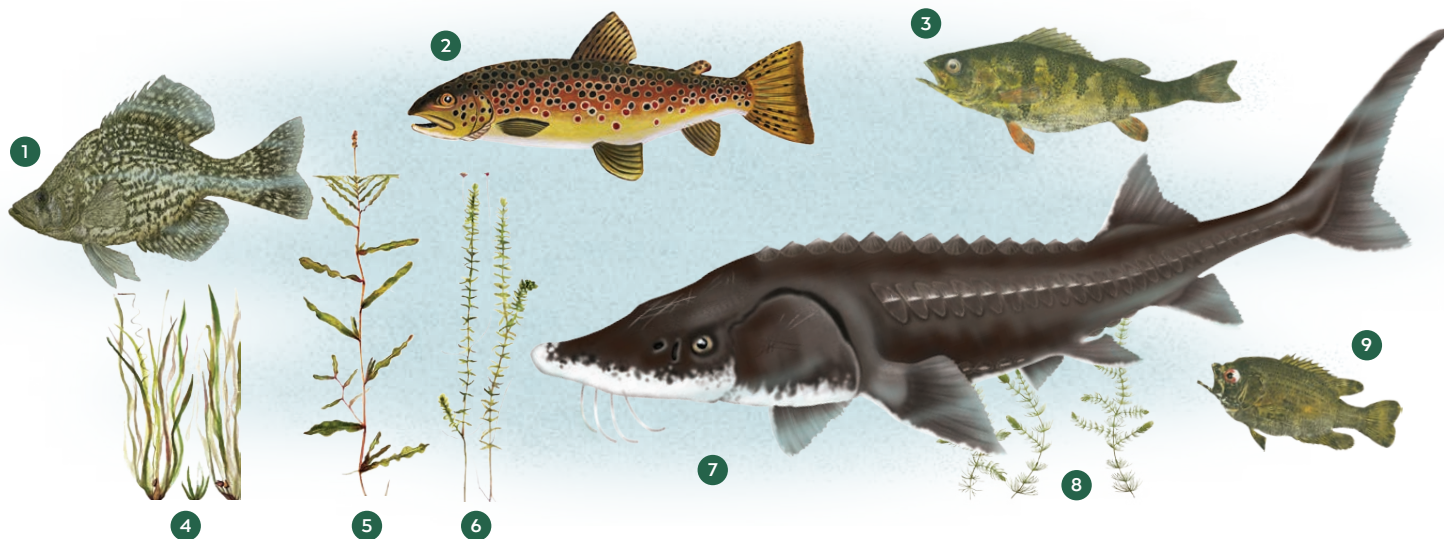
Accessibility and Inclusivity in SciComm

Jeff Day | Johns Hopkins Univ. | medicalart.johnshopkins.edu/day | [linkedin.com/in/jeff-day-52267525](https://www.linkedin.com/in/jeff-day-52267525)
Elena YH Lin | UC San Diego | elenalin.wixsite.com/artportfolio | [@elnlx](https://twitter.com/elnlx)
John Muir Laws | johnmuirlaws.com | [@johnmuirlaws](https://twitter.com/johnmuirlaws)

Jeff Day, MD, MA is an assistant professor in medical and biological illustration at Johns Hopkins University, where he teaches animation and design. Jeff has also worked as a digital media specialist at the US National Library of Medicine, National Institutes of Health, focusing on improving online engagement. He holds a BA in biology and an MD from Case Western Reserve University, and an MA in medical and biological illustration from Johns Hopkins University.

Elena YH Lin (they/she) is a Taiwanese-Canadian PhD student at UC San Diego studying T cell immunology. Informed by their lived experience and interdisciplinary training in the arts and sciences, Elena uses visual media as a form of advocacy for marginalized communities. Elena also co-founded and co-directs SciComm Collective, where they bring together science, art, and social justice to build more inclusive spaces and practices in science communication.

John (Jack) Muir Laws is a principal leader and innovator of the worldwide nature journaling movement. Jack is a scientist, educator, and author, who helps people forge a deeper and more personal connection with nature through keeping illustrated nature journals and understanding science. His work intersects science, art, and mindfulness. Trained as a wildlife biologist and an associate of the California Academy of Sciences, he observes the world with rigorous attention. He looks for mysteries, plays with ideas, and seeks connections in all he sees. Attention, observation, curiosity, and creative thinking are not gifts, but skills that grow with training and deliberate practice. As an educator and author, Jack teaches techniques and supports routines that develop these skills to make them a part of everyday life.



Cayuga Lake

Floating Classroom Decal Project

—Elizabeth Morales, Marla Coppolino, Carla DeMello, Lucy Gagliardo, and Annie Zygarowicz

The Finger Lakes Chapter of GNSI is based in central New York State, where 11 elongated, narrow lakes; the so-called Finger Lakes, are situated between rolling hills, nearly parallel in a nearly north-south direction. The region is home to gorges and forests and is abundant in wildlife, on both the land and in the waters.

PROJECT INCEPTION

In July of 2019, our chapter had the wonderful opportunity to take an educational cruise on Cayuga Lake aboard the MV *Teal*. The cruise was conducted by Discover Cayuga Lake (www.discovercayugalake.org). For many years, this organization has offered a variety of fun and interesting boat tours including hands-on science and educational cruises to help inspire and engage children and adults in learning about the ecology and history of Cayuga Lake and its watershed. This project was called *The Floating Classroom*.

Our cruise was organized by Lucy Gagliardo. The purpose of the cruise was to gather information and prepare for an upcoming chapter show entitled: “Life in the Waters of the Finger Lakes.”

About 20 members of our group had a great time cruising the lake and learning about the plants and animals, including microscopic life, living in and around these beautiful waters. Bill Foster, the Executive Director and Director of Educational Programs, and his knowledgeable and friendly crew made us feel very welcome. In addition to sharing

his appreciation for the fish and other macro-life of Cayuga Lake, he allowed us to help haul in some microorganisms with a plankton net. Thanks to dissecting scopes right there on the boat, we enjoyed looking at rotifers, water fleas, algae, and other tiny life forms.

In exchange for this cruise, we discussed an art project that we thought might add a visual component to this unique learning experience. We offered to paint scientifically accurate and colorful representations of some of the plants and animals of the lake region that could then be displayed on the inner white walls of the vessel. We felt that the philosophy behind the Floating Classroom was a perfect fit for our artwork. Here is a quote from the Discover Cayuga Lake website:

“Discover Cayuga Lake is invested in environmental literacy, not only as part of a good education, but as a key to long term social justice and sustainability. The Floating Classroom is where science on the water happens! Our boat, the MV Teal, is the perfect platform for children and adults alike to participate in

Decal #1: Water: (1) black crappie (*Pomoxis nigromaculatus*) by Liisa Mobley; (2) brown trout (*Salmo trutta*) by Thaddeus Zygarowicz; (3, 9) yellow perch (*Perca flavescens*) and rock bass (*Ambloplites rupestris*) by Stephen DiCerbo; (4–6) eelgrass (*Vallisneria spiralis*), curly leaf pondweed (*Potamogeton crispus*), and elodea (*Elodea canadensis*) by Gretchen Halpert; (7–8) sturgeon (*Acipenser fulvescens*) and coontail (*Ceratophyllum demersum*) by Elizabeth Morales.

All images © 2022 by individual artists or the Finger Lakes Chapter of GNSI, unless otherwise noted.

Decal #2: Water: (1) pumpkin-seed sunfish (*Lepomis gibbosus*) by Maureen Dunphy; (2) greater scaup (*Aythya marila*) by Lucy Gagliardo; (3) crayfish (*Procambarus acutus*, *Faxonius rusticus*) by Carla Elizabeth; (4–5) elodea (*E. canadensis*) and eastern painted turtle (*Chrysemys picta*) by Lynn Bertoia; (6) zebra mussels (*Dreissena polymorpha*) by Travis DeMello; (7–9) curly leaf pondweed (*Potamogeton crispus*), elodea (*E. canadensis*), and watermilfoil (*Myriophyllum spicatum*) by Gretchen Halpert; (10) snapping turtle (*Chelydra serpentina*) by Thaddeus Zygarowicz.



Decal #3: Water surface: (1, 3, 4) common bluet damselfly (*Enallagma cyathigerum*), green darner dragonfly (*Anax junius*), and ebony jewelwing damselfly (*Calopteryx maculata*) by Frances Fawcett; (2) hooded merganser (*Lophodytes cucullatus*) with yellow perch (*Perca flavescens*) by Amy Maltzan; (5) great blue heron (*Ardea herodias*) by Elizabeth Morales; (6) Canada geese (*Branta canadensis*) by Iva Lesky; (7) loons (*Gavia immer*) by Louisa Sandvik; (8) great egret (*Ardea alba*) by Liisa Mobley.



Decal #4: Land: (1) North American beaver (*Castor canadensis*) by Mary Roche; (2) North American river otter (*Lontra canadensis*) by Amy Maltzan; (3, 4, 8) American mink (*Neovison vison*), firefly (*Lampyridae*), and American bittern (*Botaurus lentiginosus*) by Iva Lesky; (5) muskrat (*Ondatra zibethicus*) by Liisa Mobley; (6) common whitetail dragonfly (*Plathemis lydia*) by Frances Fawcett; (7) spring peeper (*Pseudacris crucifer*) by Elizabeth Morales.



scientific experiments and observations concerning our Cayuga Lake watershed. Every year we take thousands of people out on the lake to show them what we do and give them a chance to do it themselves."

In August 2019, Lucy sent an email to members about the Floating Classroom project. She had met with Bill earlier to photograph the areas he was proposing that we paint; she then shared those photos with the group.

At our group meeting, we discussed the best way to get our artwork on the walls of the boat. These areas are low to the ground and would be difficult to paint.

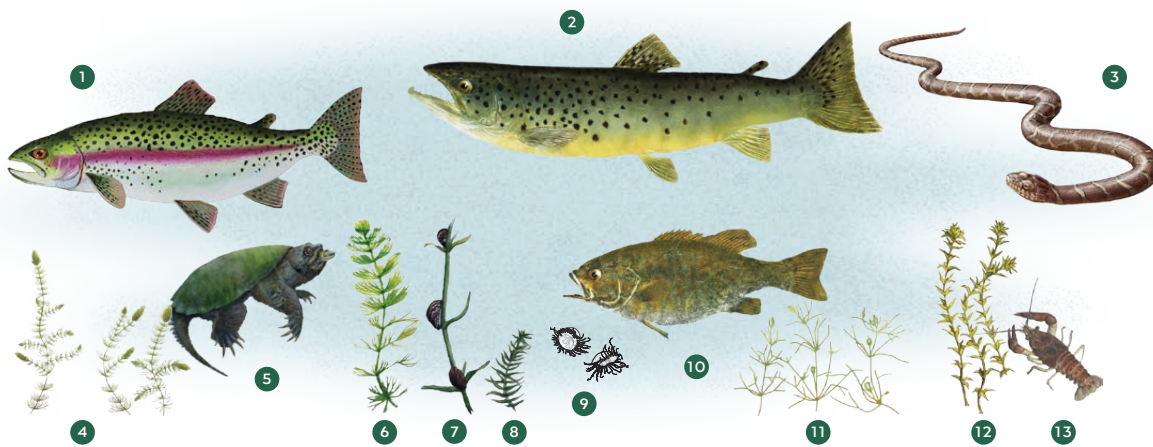
Carla DeMello suggested, as an alternative to painting directly on the boat walls, having the images printed as high-quality decals on weatherproof UV-coated vinyl surfaces with good adherence. The group agreed that our chapter could contribute to covering the costs. We discussed looking into funding from other sources, such as the Education Fund.

DEVELOPMENT OF THE BOAT DECAL PROJECT

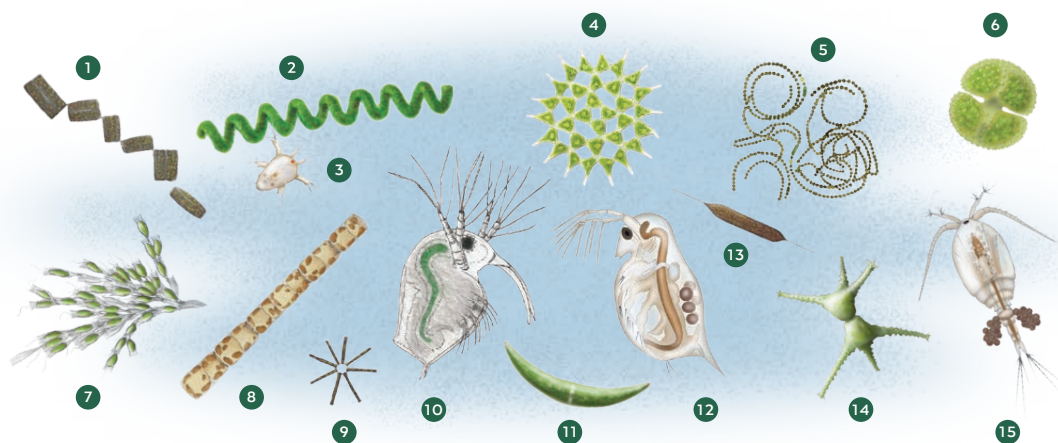
In November of 2019 at a group meeting, we discussed forming a committee to oversee the planning and development of the project. Several members



Decal #5: Air: (1, 4) Bald eagle (*Haliaeetus leucocephalus*) and Caspian tern (*Hydroprogne caspia*) by Carla Elizabeth; (2) snow geese (*Anser caerulescens*) by Louisa Sandvik; (3) osprey (*Pandion haliaetus*) by Elizabeth Morales.



Decal #6: Water: (1) rainbow trout (*Oncorhynchus mykiss*) by Thaddeus Zygarowicz; (2, 10) landlocked Atlantic salmon (*Salmo salar sebago*) and smallmouth bass (*Micropterus dolomieu*) by Stephen DiCerbo; (3) northern water snake (*Nerodia sipedon*) by Frances Fawcett; (4, 11) coontail (*Ceratophyllum demersum*) and starry stonewort (*Nitellopsis obtusa*) by Elizabeth Morales; (5–8) snapping turtle (*Chelydra serpentina*), coontail (*C. demersum*), North Eurasian milfoil (*Myriophyllum spicatum*) with zebra mussels (*Dreissena polymorpha*), and elodea (*E. canadensis*) by Paula Bensadoun; (9) freshwater jellyfish (*Craspedacusta sowerbii*) by Marla Coppolino; (12) elodea (*E. canadensis*) by Lynn Bertoia; (13) crayfish (*Faxonius rusticus*) by Margaret Corbit.



Decal #7: Microworld: (1, 8, 9, 13) *Diatoma*, *Melosira*, *Asterionella*, *Rhizosolenia*, by Amy Maltzan; (2, 4, 10) *Spirulina*, *Pediastrum*, *Bosmina*, by Lucy Gagliardo; (3, 12, 15) *Nauplius larva*, *Daphnia*, *Copepod* (*cyclops*), by Elizabeth Morales; (5) *Dolichospermum* by Adrianna Hirtler; (6, 7, 11, 14) *Cosmarium*, *Dinobryon*, *Closterium*, *Straurastrum*, by Frances Fawcett.

volunteered: Carla DeMello, Marla Coppolino, Lucy Gagliardo, and Elizabeth Morales.

In August 2020, the boat project committee met with Bill Foster and Astrid Jirka, Director of Tourism and Outreach, to present both options: producing decals with color background or painting murals directly on the boat. We explained the difference in style.

We invited Brian Poulsen, a representative from a local print company, Dataflow of Ithaca, to our meeting. He had produced several decal samples

from members' work. The results were outstanding, and everyone was convinced that the decals were the way to go.

We also discussed grouping the organisms in some way. We finally decided that there would be vignettes of different ecosystems of appropriately grouped organisms on 4 ft by 20 in sections, with a very subtle background color gradient to anchor the composition. We discussed the lifespan of decals. He was comfortable with an estimate of 4 to 5 years before needing replacement or restoration.

Top left: The MV *Teal*. Photo by Elizabeth Morales.



Top right: Installation of the panels. (Left to right) Bill Foster, Hunter Zimmerman, Brian Poulsen. Photo by Elizabeth Morales.



Bottom left: Decals #4, #5, and #6 on the boat.



Bottom right: The GNSI Finger Lakes Chapter celebrates aboard the MV *Teal*. Credit: Astrid Jirka



Bill provided a long list of animals and plants that he wanted to see represented. Chapter member Adrianna Hirtler, experienced in freshwater bio-monitoring, advised some of the artists working on microorganisms.

We discussed ancillary items such as printed hand-outs and web-based images for Discover Cayuga Lake social media outreach.

DESIGNING THE DECAL PANELS

So, now we are all very excited about this project! Over several months, Elizabeth gathered the artwork from our members and designed the layouts, which she presented to the group for review and comment. We hoped to have 10 decal panels ready for installation by May 2021, when the MV *Teal* went back into the water for the summer season. By April 2021 we produced 10 panels of 82 plants, animals and microorganisms by 20 chapter artists. We also produced a *beautiful catalog*, designed by member Travis DeMello, which includes a key to the panels, biographies and contact information for the contributing artists.

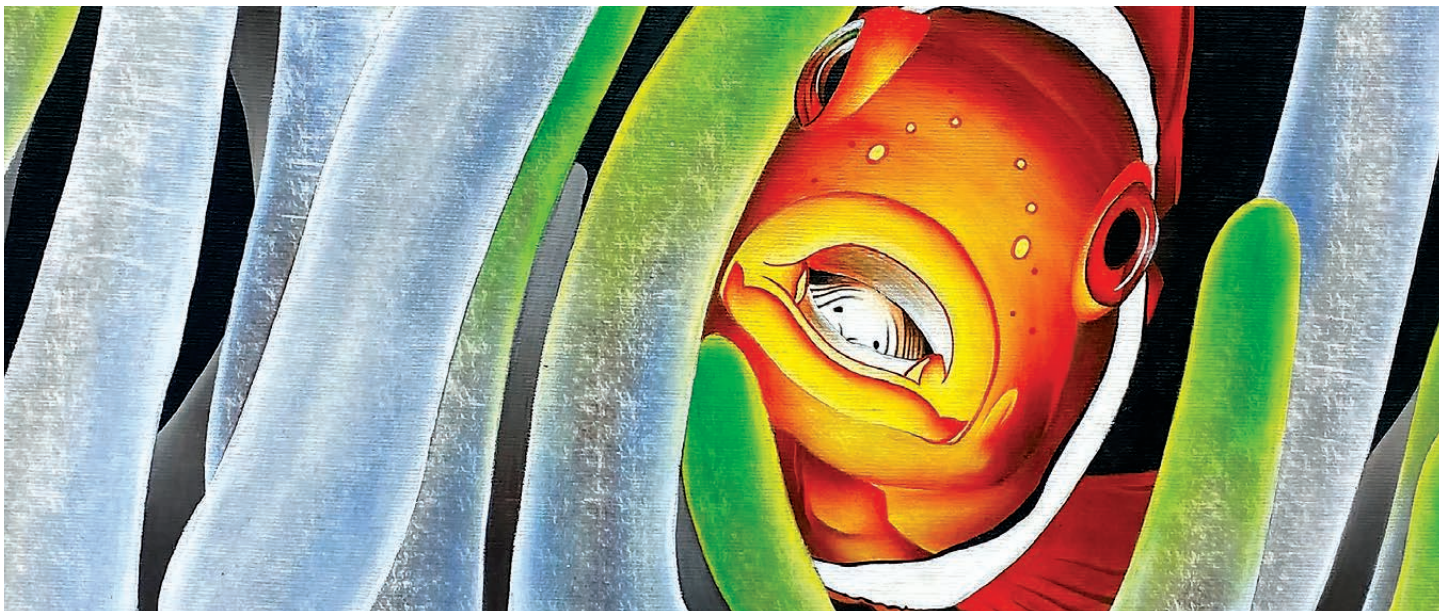
PRODUCTION AND INSTALLATION OF DECAL PANELS

The production was overseen by Carla. She worked with the folks from Dataflow to produce high quality decals. In May 2021, several of us gathered with the Dataflow staff to install the panels on the walls of the MV *Teal*. The cost of the project was approximately \$100.00 per panel.

CHAPTER MEMBERS CELEBRATE INSTALLATION ABOARD THE BOAT

This collaborative art project was a great opportunity for our membership. It will provide our chapter with a permanent, floating exhibit of our work. Our art will be viewed by over 5,000 visitors annually and provide a valuable tool for educational programs for over 3,000 students. We are proud to carry out GNSI's mission of communicating science visually.





Above: You've got a friend in me. Clownfish (*Amphiprion* sp.), tongue-biting isopod (*Cymothoa* sp.).
© 2022 Cady DeLay

Illustrating Nature

CSUMB Science Illustration Graduate Program: Class of 2022

—Emma Oyle

Illustrating Nature, an annual exhibit put on by California State University, Monterey Bay's Science Illustration Certificate Program, celebrated its return to the Pacific Grove Museum of Natural History on Friday, May 6th. This showcase of coursework completed by students in the program has been virtual since the beginning of the pandemic. Museum staff, program instructors, and students alike are excited to participate in the in-person exhibit that will be open through June 11th.

Likewise, the students and instructors of the Science Illustration Certificate Program were excited to return to in-person classes in September of last year. While some members of the class of 2022 are California natives, others traveled from homes in the Midwest, the South, and East Coast of the United States—as well as from Hong Kong—to participate in CSUMB's prestigious program.

Most of the class of 2022 came to the program with an undergraduate background in the biological sciences, while others came to the program with degrees in visual art, psychology, and science illustration.

Regardless of background, all 18 students of the class of 2022 have advanced through the 30 weeks of the program under the instruction of a team of talented science illustrators including Program Director Ann Caudle as well as instructors Andrea Dingeldein, Justine Lee Hirten, and Amadeo Bachar.

CSUMB's Science Illustration Certificate Program is a comprehensive set of classes intended to turn out students with a high degree of technical skill and ability to visually represent complex, abstract concepts. Coursework includes projects done in media traditionally used for scientific illustration, as well as instruction in digital illustration techniques. Thanks to the collaborative atmosphere fostered by the instructors, the class of 2022 took advantage of their different academic and artistic backgrounds to share knowledge and skills with one another.

Throughout the instructional portion of the program, the members of this year's cohort bonded through shared struggles and new

Students:

Hannah Kanne
Laura Gleason
Brittany Costanzo
Nicole Kit
Cady DeLay
Maria Klos
Anna Pedersen
Bridget Bailey
Joshua Zupan
Anh Kim Loc
Emma Oyle
Deborah Besser
Kobie Boslough
Connie Speer
Kristen Burroughs
Nina Grauley
Phillip Callahan
Linda M. Amoruso

experiences. Field sketching trips during the program's first quarter allowed students to get out of the classroom together and explore the unique beauty of the Central Californian Coast, while learning to record information quickly and accurately in uncontrollable environments. In-between late nights and early mornings, the students found time to celebrate occasions like making it to spring break, as well as the birth of Ann Caudle's first grandchild.

After the conclusion of the instructional quarters and the *Illustrating Nature* showcase, this year's science illustration students will go on to finish their program requirements by completing 400 hours of internship work at scientific institutions such as the Smithsonian Institution's Division of Amphibians and Reptiles, Kanahau Uila Research and Conservation Facility, the University of Hawaii's Marine Mammal Lab, and Monterey Peninsula Regional Park District.

As the members of the class of 2022 move forward while holding on to their hard-earned new skills and new friendships, they look forward to starting careers engaged in helping to bridge the gap of understanding between the scientific community and the public they're trying to reach.

DID YOU KNOW? CSUMB also offers summer classes in science illustration. These skills enrichment classes are open to all experience levels. Visit csumb.edu/scienceillustration to find out more!



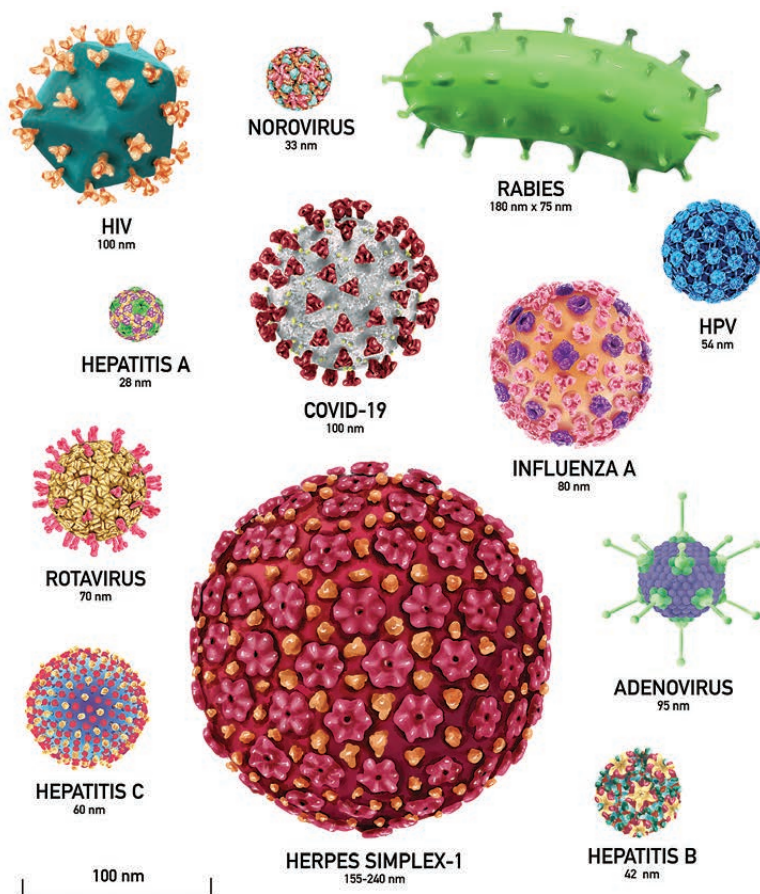
Above: Three-lined potato beetles (*Lema daturaphila*) on jimsonweed (*Datura stramonium*). Watercolor and gouache. © 2022 Anh Kim Loc

Samsāra. Gouache.
© 2022 Maria Klos



Below: Juvenile green sea turtle (*Chelonia mydas*). Acrylic on canvas. © 2022 Anna Pedersen



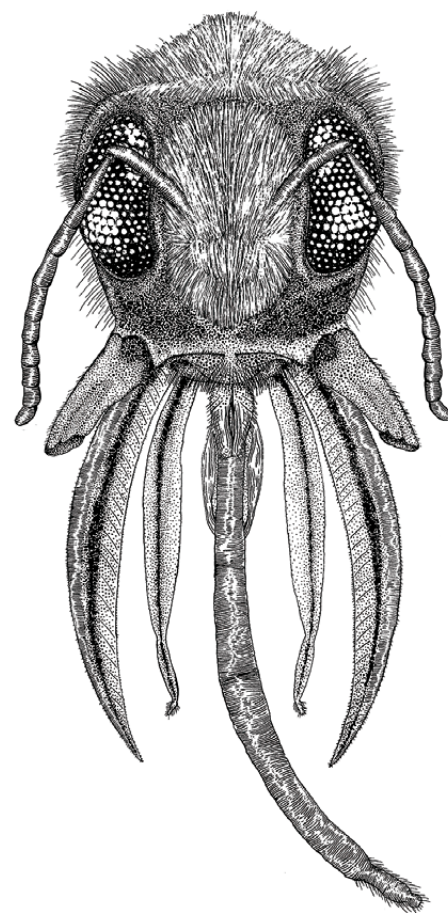


THE RELATIVE SIZES OF COMMON U.S. VIRUSES

Most viruses are spherical and can range from 20-300 nanometers (nm) in diameter. However, some viruses have been discovered that are over 1000 nm in diameter. There are also common forms of viruses that are not spherical, such as rabies. The viruses depicted in this visual are found commonly amongst the human population in the United States, and are visualized by their average diameter, to scale.

Above: Relative sizes of common U.S. viruses. Digital painting (Clip Studio Paint®, Adobe InDesign®).
© 2022 Laura Gleason

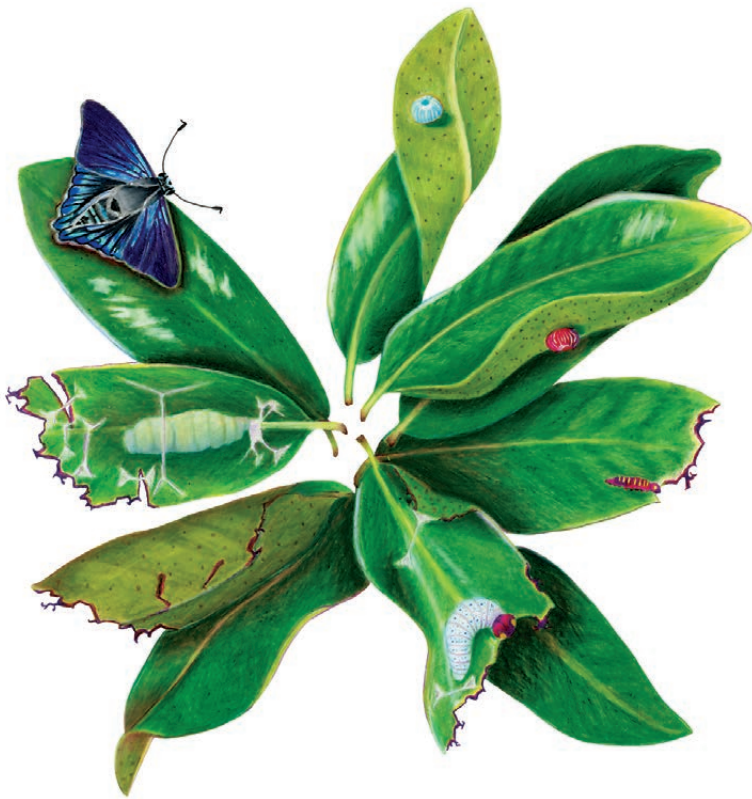
Below: Plague doctors. Black colored pencil on coquille paper, Adobe Photoshop®.
© 2022 Linda M. Amoruso



Above: Bee mouth parts. Yellow-faced bumblebee (*Bombus vosnesenskii*).
Scratchboard. © 2022 Phillip Callahan

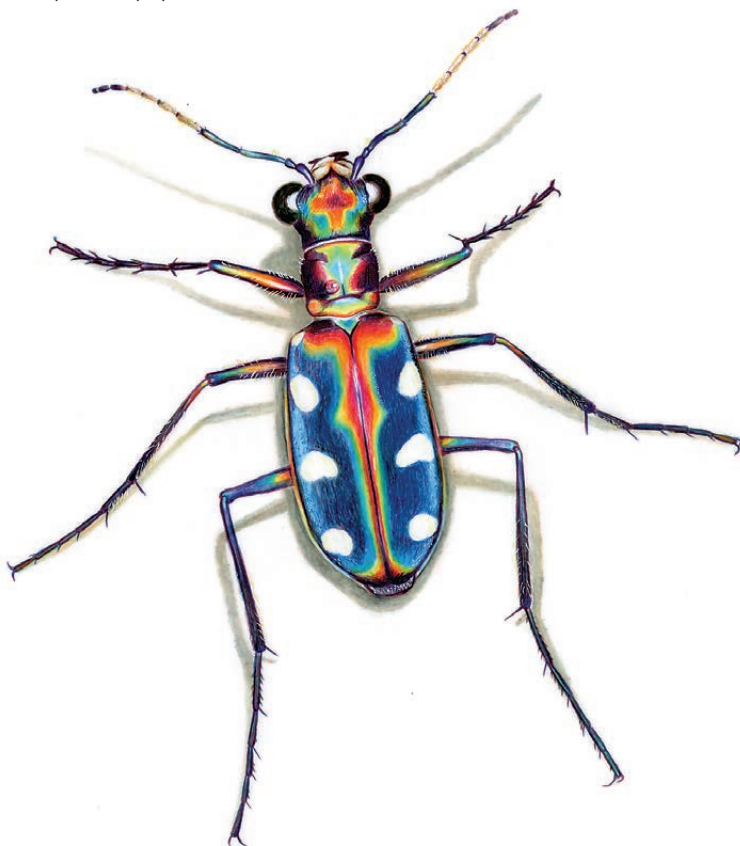


Above: Chicken of the woods mushroom (*Laetiporus sulphureus*). Colored pencil on polyester film. © 2022 Bridget Bailey



Above: Mangrove skipper life cycle. Mangrove skipper (*Phocides pigmalion*), red mangrove (*Rhizophora mangle*). Colored pencil on polyester film. © 2022 Deborah Besser

Below: A rainbow of colors on a small beetle. Golden-spotted tiger beetle (*Cicindela aurulenta*). Colored pencil on polyester film. © 2022 Nicole Kit



Above: Pedro the parrot. Red-crowned parrot (*Amazona viridigenalis*). Acrylic on illustration board. © 2022 Emma Oyle



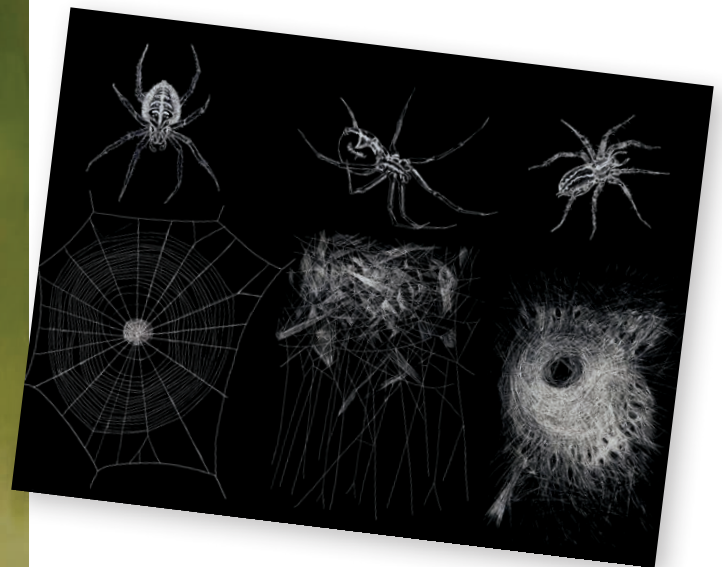
Above: Padre's shooting star (*Primula clevelandii*) and yellow-faced bumblebee (*Bombus vosnesenskii*). Colored pencil on polyester film. © 2022 Joshua Zupan



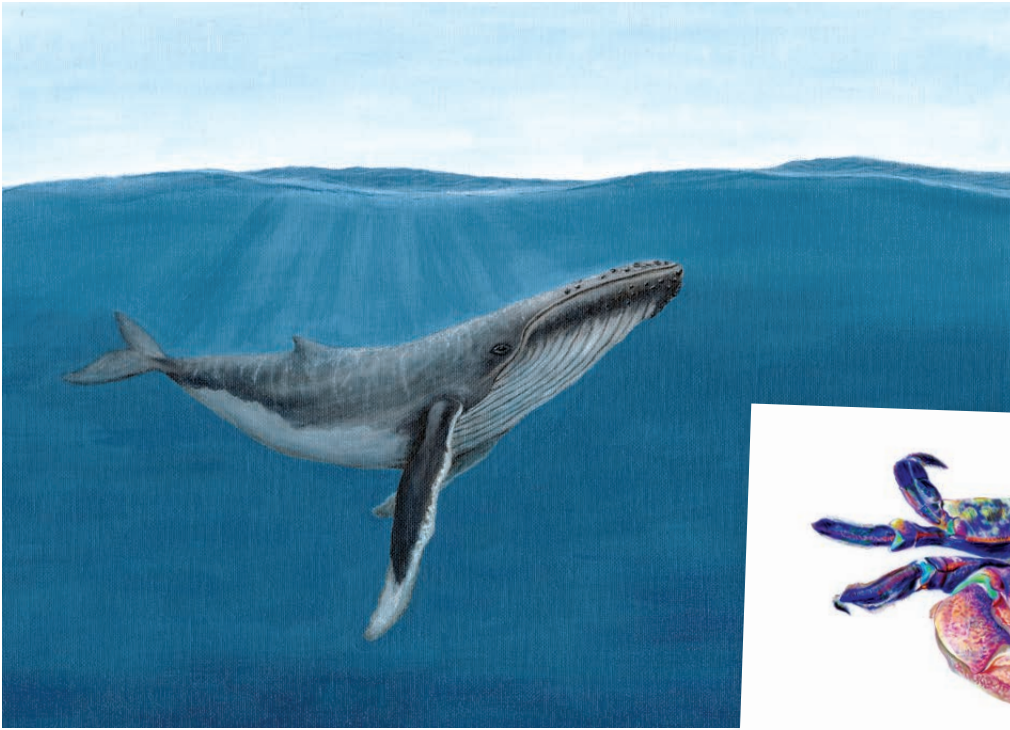
Above: Early morning hunt. Barn owl (*Tyto alba*).
Acrylic on canvas. © 2022 Kristen Burroughs



Above: Barn owl (*Tyto alba*). Acrylic on
canvas. © 2022 Brittany Costanzo .



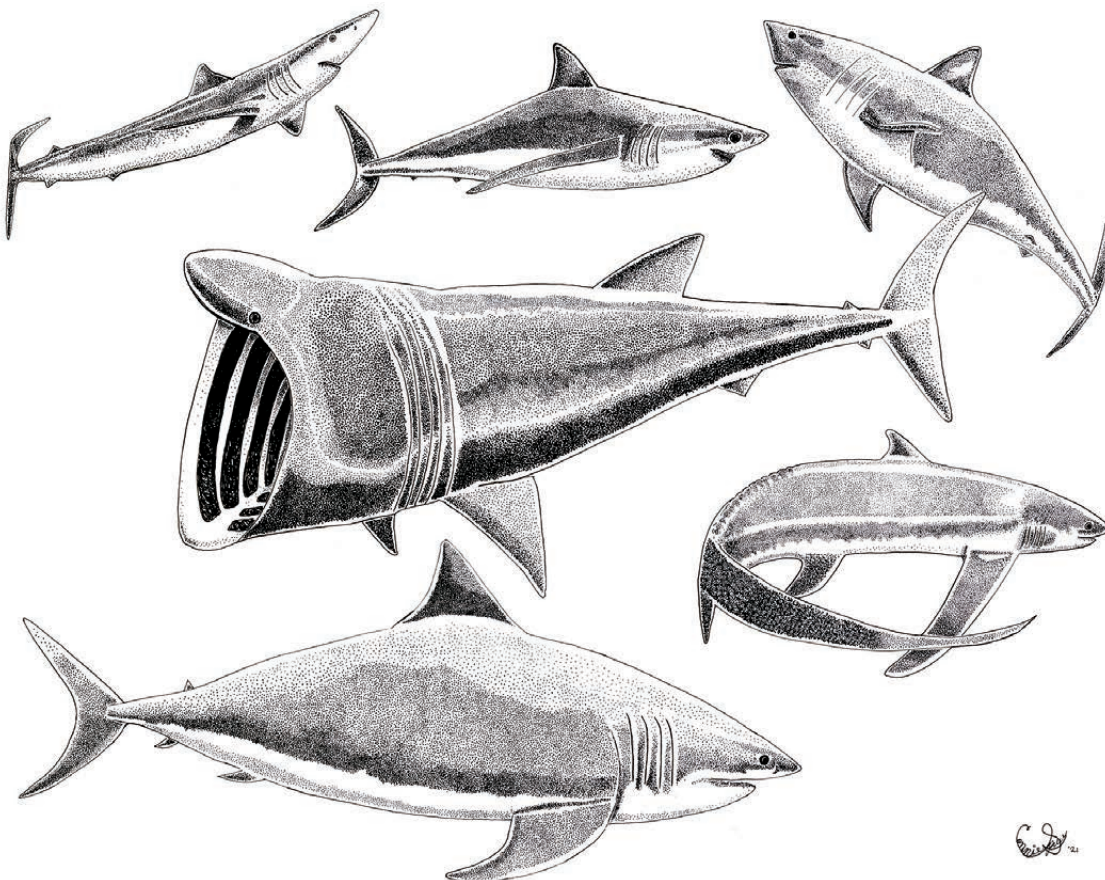
Above: Architecture of araneomorph
webs. (Left to right) *Araneus diadematus*,
Latrodectus hesperus, *Hololena tentativa*.
Scratchboard. © 2022 Kobie Boslough



Left: Get your cameras ready. Humpback whale (*Megaptera novaeangliae*). Acrylic on canvas. © 2022 Hannah Kanne



Below: Striped shore crab (*Pachygrapsus crassipes*). Colored pencil on polyester film. © 2022 Nina Grauley



Left: Pelagic sharks of Monterey Bay: blue shark (*Prionace glauca*), shortfin mako shark (*Isurus oxyrinchus*), salmon shark (*Lamna ditropis*), basking shark (*Cetorhinus maximus*), common thresher shark (*Alopias vulpinus*), and white shark (*Carcharodon carcharias*). Ink. © 2022 Connie Speer



Figure 1: Spread of all testing papers.

All images © 2022
Kathryn Killackey

Searching For My Perfect [Watercolor Paper] Match

— Kathryn Killackey

Arches® hot-pressed 140 lb paper has been my go-to for watercolor ever since Ann Caudle introduced me to it at CSUMB. I create on average four detailed watercolor paintings a year on average and I've been mostly happy with Arches. Its tendency to absorb and dull colors is its one weakness. Even though I should know better, last year I impulsively switched to Fabriano Artístico® 140lb watercolor paper for several paintings without vetting it beforehand. I was dismayed to find areas of the surface becoming fuzzy and saturated with pigment after only one or two layers of glazing. There didn't seem to be any pattern to when or where the surface would break down in this way.

At first I thought these areas were due to my technique, I'm not a consistent watercolorist and perhaps my technique was rusty? But I knew where to place the blame after three paintings on Fabriano paper. I started researching online and quickly found that many watercolorists, especially botanical artists, had been struggling with the same issues. In fact, the Society of Botanical Artists in the U.K. had spent considerable time in 2016 investigating the matter and had even held meetings with Fabriano. It seems that the Fabriano Paper Mills made changes to their machines settings to accommodate production of another paper line and these changes affected the

Fabriano Artístico production as well. Botanical artist Katherine Terrell has summarized the saga here: <https://www.botanicalartandartists.com/news/what-to-use-instead-of-fabriano-artistico>

After reading about these changes, learning about watercolor paper properties, and consulting with the GNSI Listserv, I decided to test out a range of hot press papers. Maybe my perfect paper match was out there.

METHOD

There are many ways and levels of intensity with which you can test watercolor paper. Katherine Terrell gives a very thorough summary of paper facts and the testing process here: <https://www.botanicalartandartists.com/botanical-art-paper.html>

Lizzy Harper's blog posts on testing 13! different hot press papers are particularly helpful and descriptive. The first post with links to the others is here: <http://lizzieharper.co.uk/2017/05/botanical-illustration-comparing-hp-watercolour-papers-1>

And if you want to be extremely rigorous, you can follow the testing procedure laid out by Bruce MacEvoy: <http://www.handprint.com/HP/WCL/paper3.html>

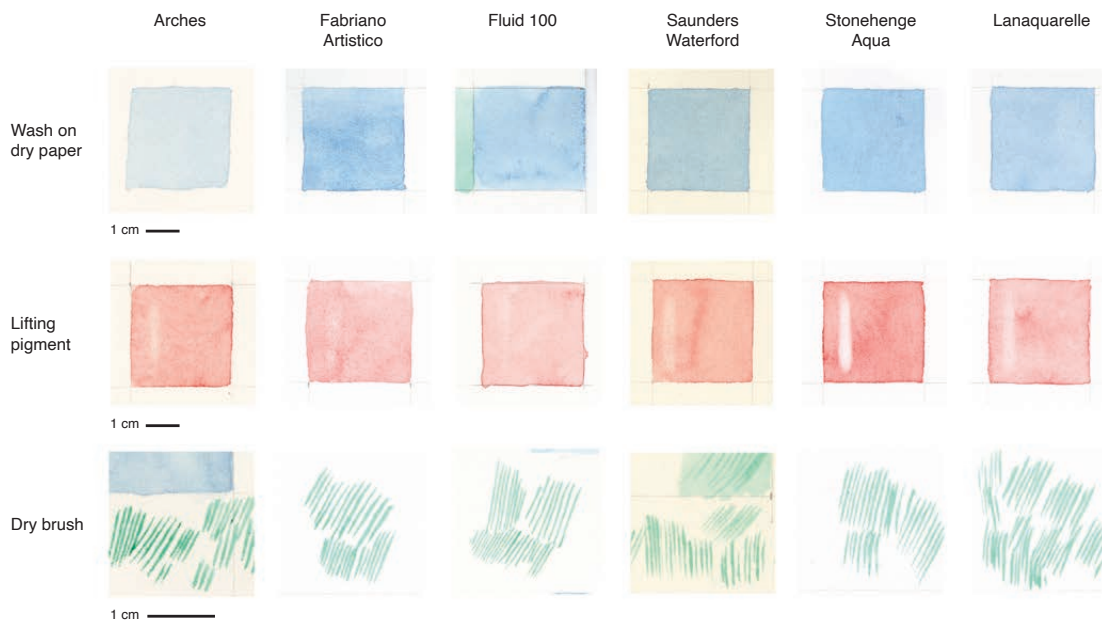


Figure 2: Comparison of washes on dry paper, color lifting, and dry brush strokes.

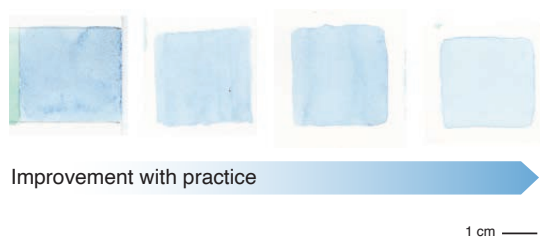
I limited myself to testing for the characteristics I find most suitable for my painting technique:

- Crisp, precise marks with dry brush application
- Even, clean washes
- Vibrant colors
- The ability to take many layers of glazing
- The ability to lift areas of dry paint without damaging the paper surface
- The ability to erase graphite lines

I tested six brands of paper, all 100% cotton, none with optical brighteners, based on recommendations from the GNSI Listserv and my ability to order them online from Canada in this time of uncertain and delayed supply (Fig. 1). They were:

- Arches® 140-lb hot pressed block
- Fabriano Artistico® 140 lb hot press block
- Fluid 100® 140 lb hot press block
- Saunders Waterford® white 140 lb hot press block
- Stonehenge Aqua® white 140lb hot press block
- Lanaquarelle® 140 lb hot press sheet

Figure 3: Improvement in wash evenness with practice on Fluid 100.



I used four colors of Winsor & Newton® Professional Watercolor paint, picked for their different properties; Burnt Sienna (transparent), Cadmium Red (opaque), Prussian Blue (transparent, staining),

Viridian (transparent, granulation). I marked out 3-cm squares on a sheet of each paper and mixed a supply of medium saturated color for each pigment (Fig. 2). On each sheet I then:

- Filled a dry square with wash
- Filled a dry square with wash, let dry, and glazed with second layer of wash
- Wet a square with clean water and filled the damp square with wash
- Filled a square with a graduated wash
- Lifted paint from a dried wash with clean water
- Experimented with dry brush strokes and glazing over dry brush strokes
- Erased plain pencil lines and pencil lines that had been painted over.

Arches 140 lb Hot Press

My old standard held up well, though testing reinforced my earlier impression that colors appear slightly muted. Pigment seems to be absorbed into the paper, lowering vibrancy and softening edges. Dry brush and edges are not as crisp as with some of the other papers. It still seems to me to be one of the most forgiving papers, along with the Saunders Waterford®.

Fabriano Artistico 140 lb Hot Press

While I did not run into any of the troublesome spots that caused this whole quest, I did find my test washes to be “noisy” and finely mottled. Pigment stays on the surface, leading to vibrant colors but also quick build up.

Fluid 100 140 lb Hot Press

At first attempt, this paper took the most uneven washes filled with pigment “tide lines”. Pigment was hard to move around, making graduated washes difficult. I was about to completely dismiss this paper but then re-read Lizzy Harper’s tests where she named Fluid 100 as her “Holy Grail.” I was convinced to try again and found that if I was decisive and meticulous in my application, allowing no edges to sit nor pigment to pool, I could get some beautifully even and clear washes (Fig. 3). I think it’s an unforgiving paper, quick to dry and stain, calling for advanced technique. Perhaps I could get wonderful results with

this paper after putting significant time in refining my technique and uncovering its nuances.

Saunders Waterford White 140 lb Hot Press

I found this paper to have many similar qualities to Arches. Wash application seemed easy and smooth. Although it's a stronger cream color than the Arches off-white, painted colors appear more vibrant.

Stonehenge Aqua 140 lb Hot Press

This paper behaved in a similar fashion to the Fabriano Artístico. It's texture is a bit too obvious for me though I was very impressed by the amount of color lifting possible.

Lanaquarelle 140 lb Hot Press

While this paper performed moderately well, it is significantly thinner than the others and I'm afraid it would not stand up to much glazing or intense work in one area.

CONCLUSIONS

It's not a satisfying conclusion, but there really is no universally best watercolor paper. While all of the papers tested are very useable, I have not found my perfect match. Looking at my and others' tests, each paper has different qualities and artists' preferences vary greatly. Individual experimentation is the only way to find the best (but probably not perfect) match for your preferences, techniques, and even skill level. You can either pick a paper that meets many of your requirements and works with your technique or find ways to adjust your technique to work with a paper that has the most potential. I think I'll go back to the comfort and forgiving nature of Arches for now while continuing to experiment with the Saunders Waterford. And when I'm feeling a bit more brave, I'll try to master the Fluid 100.



Table 1: Overview of tested papers and characteristics.

	Arches	Fabriano Artístico	Fluid 100	Saunders Waterford	Stonehenge Aqua	Lanaquarelle
Texture and Appearance	Slightly rough; off-white color	Moderate texture of parallel striations; white color	Very smooth; white color	Slight dimpled texture; cream color	Obvious irregular texture; bright white color	Very thin, very smooth almost flimsy; white color
Dry brush	Crisp lines, but margins can be uneven and soften under glazing	Very crisp lines, stay crisp under glazing	Very crisp lines, stay crisp under glazing	Crisp lines, but margins can be uneven, stays crisp under glazing	Margins slightly uneven, texture shows through, slight blurring with wash	Crisp strokes, slight blurring with wash
Washes	Smooth, granulation pronounced, pigment mobile in wet areas	Even but mottled washes, pigment is mobile in wet areas	Erratic washes on first attempts, pigment not mobile, paper dries quickly	Even washes with faint texture visible	Washes even but a little mottled, the paper texture comes through	Average wash, pigment not very mobile in wet areas, granulation visible
Color	Slightly muted and softer	Vibrant color, pigment sits on surface	Vibrant color, pigment sits on surface	Medium color vibrancy	Moderately vibrant color, pigment sits on surface	Vibrant color
Glazing	Does not disturb earlier layers	Does not disturb earlier layers	Does not disturb earlier layers	Does not disturb earlier layers	Does not disturb earlier layers	Does not disturb earlier layers
Color lifting	Color can be lifted but not dramatically	Color does not lift easily	Color does not lift easily	Average color lifting, less good with staining pigments	Best color lifting, even with the staining Prussian Blue	Average color lifting
Erasing Graphite	Plain pencil erases easily but does not erase as well under washes	Plain pencil erases easily but does not erase as well under washes	Plain pencil erases easily but left marks when erased from under washes	Plain pencil erases easily, under washes it mostly lifts but surface breaks up slightly	Plain pencil erases easily, under washes it mostly lifts but surface breaks up slightly	Plain pencil erases easily but does not erase as well under washes

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