

Journal of NATURAL SCIENCE ILLUSTRATION

GUILD OF NATURAL SCIENCE ILLUSTRATORS



VOLUME 54 • NUMBER 3 • 2022

A Note From...

Gail Guth, Managing Editor

It seems like every time I write one of these notes, I end up talking about how unsettled the world is and how wonderful it is to have our art to help us stay positive and strong, focusing on creativity instead of negativity. Well, of course it's still unsettled, and probably will remain so. I'm a reading fanatic; from Shakespeare to the great novels of the 19th century. The struggles and conflicts of the characters and situations provide perspective and help remind me that human life has always been unsettled and unpredictable. Somehow, we manage to survive and even slowly improve our condition, so take heart and focus on the positive energy our art provides us.

And as usual, this issue focuses on the positive and highlights wonderful examples of natural science art at its best. We have a review of yet another highly successful virtual conference, and articles about an early science art pioneer, a science-based fine art painting, an orchid project, and tips on using Photoshop to make layout and color decisions. We also feature a piece on working collaboratively with scientists and researchers to help tell the story of advancements in medicine, and a review of a GNSI member's new book. We wrap up the issue with a memorial to Peg Estey, long-time active GNSI member, with samples of her lovely artwork.

Please contact us with ideas for articles, either something you would like to read about or something you would like to share with your fellow GNSI members about your work, your career, your experiences, your discoveries. We are game to print just about anything related to our profession, from short how-to tips to interesting books you have found (or have written!) to techniques, business practices, or info on artists from times gone by that you may find interesting and relevant to today. We always need content, and do not exist without your generous participation. Email us: journal@gnsi.org.

CORRECTIONS

The print version of the previous issue had two errors in the Cayuga Lake article; corrections have been made to the digital issue. On pg 11, the author list should have included Anne Zygarowicz, not Thaddeus Zygarowicz. On pg 13, the caption for Decal #7 should read: *Microworld: (1, 8, 9, 13) Diatoma, Melosira, Asterionella, and Rhizosolenia* by Amy Maltzan; (2, 4, 10) *Spirulina, Pediatrum, and Bosmina* by Lucy Gagliardo; (3, 12, 15) *Nauplius larva, Daphnia and Copepod (cyclops)* by Elizabeth Morales; (5) *Dolichospermum* by Adrianna Hirtler; (6, 7, 11, 14) *Cosmarium, Dinobryon, Closterium, and Straurastrum* by Frances Fawcett. Our apologies to the Finger Lakes Chapter for these errors.

CONTENTS

Editor's Note, by Gail Guth	2
GNSI's Third Online Conference a Success, by Kalliopi Monoyios.....	3
Who Was William Hamilton Gibson? by Mary Ellen Carsley.....	4-6
Creating a Fine Art Painting: From Research to Exhibit, by Erin E. Hunter	7-11
Cold Canyon Fire Journals by Robin Carlson, reviewed by Linda M. Feltner	12-13
Illustrating the Unknown, by Holly Zink and Suzanne Sadilek.....	14-18
Using Photoshop to Speed Up and Refine Composition and Layout, by Gail Guth.....	19
Intersections Between Orchids, Science, and Advocacy, by Kathleen Garness..	20-22
In Memoriam: Margaret L. (Peg) Estey, by Jane Neroni	23

Cover: Sympathy card for a friend, by William Hamilton Gibson.

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

General Inquiries: info@gnsi.org

News and Announcements: news@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 3/2022 • © 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: info@gnsi.org

GNSI JOURNAL SUBMISSION REQUIREMENTS

gnsi.org/journal-author-guidelines

JNSI STAFF

Managing Editor: Gail Guth

Managing Editor Assistant: Jamie Butler

Production Editor: Laura Sohl-Smith, Camille Werther

Technical Editor: Caitlin O'Connell

Senior Consulting Editor: Britt Griswold

Layout Manager: Fiona Martin

Layout Editor: Sarah McNaboe

Content Editors: C. Olivia Carlisle, Kathleen

Garness, Cheryl Wendling, Bridget Vincent

Post Production: Jennifer Lucas

GNSI Outreach Director: Madison Mayfield

Guest Proofreader: Janet Griswold

GNSI's Third Online Conference a Success

—Kalliopi Monoyios

The 2022 Visual SciComm Conference, “Visualizing Science for All,” concluded August 28th after three exciting weeks of conference content. Phew!

Following the pattern established for our online conferences in 2020, Conference Chair Bricelyn Strauch and her team of 20 volunteers created three days of core conference presentations August 12–14. With a theme of inclusivity and accessibility at the fore, we heard from accomplished visual science communicators in a variety of fields who detailed techniques and philosophies they use daily in pursuit of accessible sciComm. The core conference was followed by two full weekends of workshops August 20–21 and 27–28—a significant upgrade from the 4 workshops offered as an experiment last year—covering topics ranging from moist brush technique to bird anatomy to 3D rendering software such as ZBrush® and Blender®.

In all, 312 individuals attended the conference with 275 of those attending the core conference and 232 workshop seats sold. Registrants hailed from 24 countries including Australia, Belgium, Canada, China, Denmark, Germany, Grenada, India, Ireland, Israel, Japan, Netherlands, New Zealand, Poland, Portugal, Puerto Rico, Saudi Arabia, Singapore, Slovenia, Spain, Switzerland, Taiwan, UK, and USA. These attendance numbers far exceed last year's virtual conference and every one of our in-person conferences for the third year in a row, showing just how successful these online gatherings can be. Considering our typical attendance for in-person conferences generally hovers around 150–180 people, it's encouraging to note these online conferences have consistently almost doubled our reach. Fitting for an event themed “Visualizing Science For All.”

Continuing on the accessibility theme, we're proud to report we awarded 12 grants to make the conference and workshops available to people who would not have been able to attend otherwise. For this,

we owe thanks to all the GNSI's generous donors who contributed to last year's matching campaign led by GNSI Distinguished Service member Britt Griswold. If you recall, those funds created the new GNSI Accessibility Grant Fund with the intention of sponsoring these important grants. At the same time, we'd like to extend thanks to everyone who contributed to our auction. This staple fundraiser raised approximately \$3,000 for us, to be split evenly between the General Operating Fund and the Education Fund.

Other highlights to note: This year's *Juried Members' Exhibition* is on display at gnsi.org/2022conf_exhibition using a new exhibition platform that beautifully showcases 146 pieces of exceptional work that our four esteemed jurors accepted. We also tested a new format for our evening social events by hosting a SciArt Mixer with the *SciArt Initiative*, a sister organization that promotes cross-pollination between the arts and sciences. Our online portfolio

sharing on Facebook highlighted 18 members' portfolios, and our annual #sciartportfolio week on Twitter continues to be a success, introducing new people to the GNSI and generally promoting our field in a positive way. We also started a *Discord group* in response to requests for sustained connection, so consider joining if

Logo illustration by Erin Hunter; design by Fiona Martin.



you haven't already.

Thank you to all the great volunteers who gave their valuable time to make this 2022 Visual SciComm Conference happen and make it a fantastic experience for attendees!





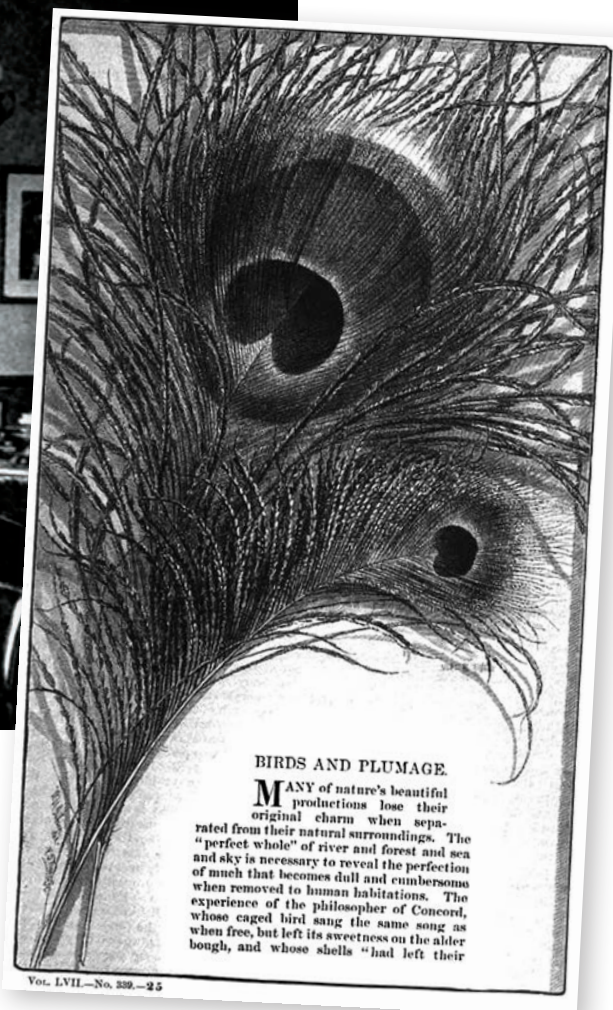
Who was William Hamilton Gibson?

— Mary Ellen Carsley

Living from 1850 to 1896, William Hamilton Gibson was a unique American illustrator whose art was inspired by the natural world. As a self-taught artist, amateur botanist, and entomologist, he became a prolific writer on the natural world, authoring over thirty books and hundreds of articles. As a popular lecturer, he spoke to the wonders of the natural world in one's backyard. His keen mind, patient teaching style, and witty and warm character gave clarity, vivacious spirit, and charm to his illustrations.

Gibson was born on October 5, 1850, in the village of Sandy Hook in Newtown, Connecticut. He was the fourth son, and sixth of nine children. At an early age, Gibson, known as "Willie", was interested in nature. He enlisted his mother in collecting, among other things, cocoons and seeds. Their letters reveal that his mother even used one of her dresser drawers filled with tired silk stockings as a nursery for Willie's caterpillars.

His first opportunity as a professional illustrator was a two-week trial at *Harper's Magazine*, but the head



Above right: Gibson in his studio.

Above left: Title page for 1878 *Harper's* article on "Birds and Plumage."

All images reprinted courtesy of the Gunn Historical Museum, as well as the Jackson, Fasman, and Krinsky families.

of the art department told him, "I do not see that you will ever succeed in an artistic career. I advise you to drop it at once."

Gibson was undeterred and demonstrated a great deal of faith in himself and understanding of the marketplace by seeking out other publishers for whom his style was more appealing. Soon, Gibson succeeded in placing illustrations, including botanical sketches, in popular magazines, including *Frank Leslie's Boys and Girls Weekly*, the *American Agriculturalist*, and *Appleton's American Encyclopedia*.

It was a series of illustrations, for an 1878 *Harper's* article on "Birds and Plumage", which vaulted Gibson into fame. The title page for the article depicted a peacock's feather and was extraordinary for its detail and composition filling the whole page. It soon became known as "The Peerless Plume". Other illustrations for the article were equally striking, both for their

Top left: Cocoons

Right: Self
Portrait

Bottom left:
Pollinators

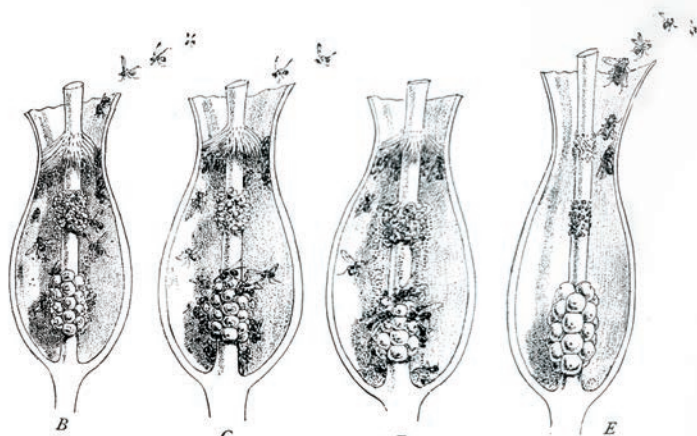


Fig. 13

style and for the clever ways Gibson composed them to wrap around accompanying text.

Following the publication of *The Peerless Plume*, Gibson was enlisted as both author and illustrator by the editor at *Harper's Magazine*. The resulting work, "Snug Hamlet and Hometown" was published in *Harper's* in August 1879 and draws heavily upon his boyhood reminiscences of Sandy Hook and Washington, CT.

Due to the success of this article, Gibson was asked to prepare another article highlighting the winter season. It was followed by two more heavily illustrated articles about life in Newtown and Washington during the spring and fall. The four articles combined reminiscences of his youthful experiences with naturalist observations about the cycle of the four seasons for plants and animals and were so successful that in late 1880 *Harper & Brothers* republished the articles in an impressive, large format volume entitled *Pastoral Days or Memories of a New England Year*. The book included 76 illustrations and had gilt-edged pages. This expensive publication, timed for holiday giving, was evidence that Harper expected Gibson to have a large audience, and indeed he did.

In 1886 he published "Backyard Studies" where he expressed that city backyards could become "a means of grace" citing that a local friend's plot no bigger than 25' by 12' contained no fewer than 64 varieties of wildflowers. However, in the spring of 1887, the Brooklyn Parks Commission decided to chop down dozens of trees and clear the undergrowth of this last corner of untamed nature in the city. Gibson sounded the alarm in a series of letters to the *Brooklyn Daily Eagle* writing that "One of the wildest and most beautiful sections of the Park has been invaded by the butcherly Goth and Vandals known as our Parks commissioners." The commissioner decided that Prospect Park was free to remain a wild space within the city as it does today.

Many articles were collected and later published as books, including *Happy Hunting Grounds* (1886), *Strolls by Starlight and Sunshine* (1891) in which Gibson visited gardens during the nighttime to observe how flowers and insects change, *Sharp Eyes: A Rambler's Calendar of Fifty-Two Weeks Among Insects, Birds and Flowers* (1891), and *Our Edible Toadstools and Mushrooms*



Above: Butterflies Eggs

and *How to Distinguish Them* (1895) which induced countless readers to send him mushrooms in the mail for evaluation.

Gibson's work was so well received that in 1891, he devised a series of ten talks on plants, insects, and birds, which he illustrated with large charts and drawings for both adults and children in Washington. Soon he began delivering them widely to popular audiences. They were extremely successful. He used ingenious mechanical charts which opened and closed with wires to show, for example, how an insect enters a Venus flytrap, is captured and consumed. Over his years of lecturing, he created 200 charts and 80 models.

By May 1896, Gibson was back home, continuing his artistry and writing. Tragically, at the age of 46, he suffered a stroke believed to be brought on by overwork. Throughout his life he shared his love of the natural world by exquisitely depicting the trees, flowers, and animals that he loved walking among so much. He was among the first to herald the call for a true stewardship of the environment, even if it was only a small urban grass plot.



Above: Studio.



Far left: Predator.



Left: Funny Frogs.

Below: Three pages from *Strolls by Starlight and Sunshine*.

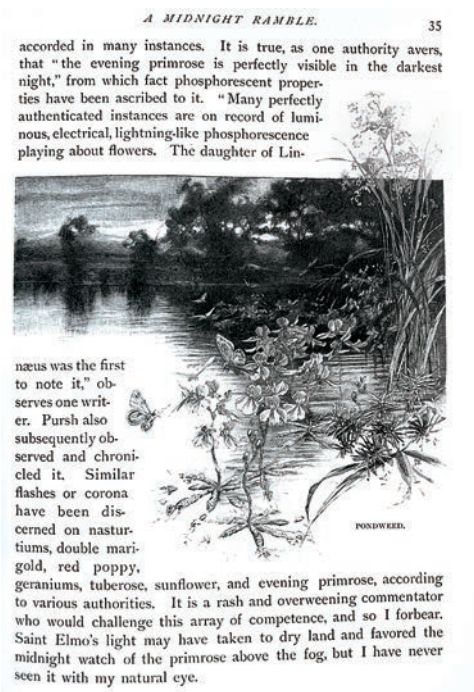




Figure 1: “Look Closer” final art, 40” x 30” acrylic on Arches watercolor paper, ©2021 Erin Hunter

Creating a Fine Art Painting: From Research to Exhibit

— Erin E. Hunter

Erin E. Hunter’s most ambitious piece yet is “Look Closer,” a large painting of California native bees and wildflowers that anchored a 2022 solo show at the San Francisco Botanical Garden. She tells the story of its creation – inspiration to process – from the sketching, designing and painting, to presenting the piece in multiple formats to various audiences.

*“... I had long observed the curious fact that people will look closely at something an artist has taken pains to paint faithfully when they will not give more than a passing glance to the thing itself, which in many cases is more beautiful and interesting. It is as though they say to themselves, ‘As someone bothered to paint it, it may be worth looking at.’” —John Cody, *Wings of Paradise: The Great Saturniid Moths*.*

Like most illustrators, I loved to draw as a kid. I read field guides and picture books, wishing I could draw and paint like a professional artist. I played with patterns, making designs within a circle using a compass or coloring squares of graph paper with bright jewel tones. As a traveling college student, I fell in love with the repeating architectural motifs of Spain’s Alhambra and the rose windows of Gothic French cathedrals. In my classes,

**“Art isn’t finished
until it’s shared.”**

— MARCIA PERRY,
MONTEREY ARTIST

All images and text
© 2022 by Erin Hunter

Figure 2 (left): Sketching plant specimens at the California Native Plant Society's annual wildflower show, hosted by the Pacific Grove Museum of Natural History.

Figure 3 (right): Plant sketches on tracing paper. Whenever possible, I sketch plants from life; these were sketches from the wildflower show.



I fell for typography and majored in graphic design. I learned to use my eye for symmetry and balance to combine text and imagery, and got interested in creating my own images as an illustrator. After working as a graphic designer and then freelancing in New York, I joined the science illustration program at UC Santa Cruz (now at Cal State Monterey Bay). It was thrilling to explore the detailed drawing and painting that I'd always loved, while being amongst knowledgeable and talented peers.

I came to the science illustration program without a degree in fine art or science. What I did have was curiosity and willingness to learn. My teachers and classmates generously caught me up on things like scientific naming conventions and painting a smooth watercolor wash. Soon, I was painting portraits of plants and animals, mostly cultivated flowers and exotic birds and mammals. After my classmate, Erika Beyer, recommended the wonderful book *The Forgotten Pollinators* by Stephen L. Buchmann and Gary Paul Nabhan, I began combining wild plants with their native pollinators in my pieces—the first was a pair of orange-breasted sunbirds atop a pin-cushion protea. The plant is a common landscaping plant along the California coast, where I live. But until I read *The Forgotten Pollinators*, I had never wondered “Where are these plants from? Who pollinates them in their native habitat?”

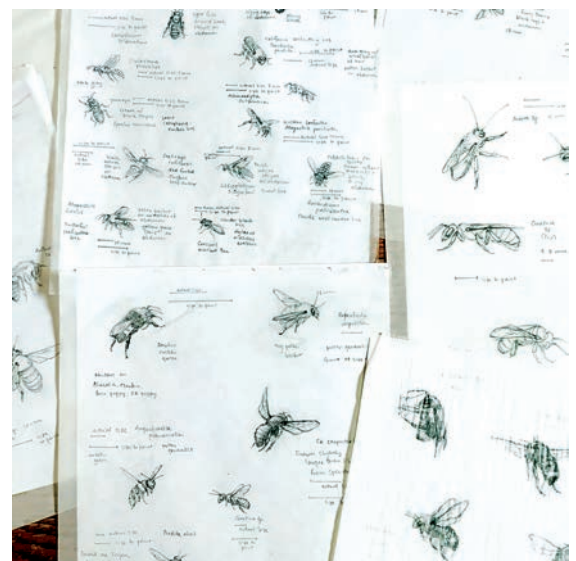
I started painting more portraits of the African or Australian plants common in California but pollinated by perching birds in their home habitats. I also interned as a botanical illustrator at Cal Academy, creating a botanical plate of a California wildflower with its own bird pollinator: migrating Costa's hummingbirds visit chuparosa, or *Justicia californica*, as they move from Mexico through California. Later, I joined the California Native Plant Society (CNPS)

and focused my artwork on local flora and fauna, particularly pollinating insects.

While happily working as an illustrator, I started thinking more like a fine artist with my personal work. In the science illustration program, I had learned about Margaret Mee and John Cody, painters who used their art and knowledge of the natural world to attract attention to ecological issues that mattered deeply to them. I wanted to do the same, especially as I learned more about habitat loss for native wildflowers and pollinators in my home state.

After completing a rose window-style painting of local hummingbirds and wildflowers, I was ready to do another fine art pollinator painting that focused on California's native bees. Many of us can identify honeybees and maybe bumblebees, but not the wild array (1,600 species!) of solitary bees that live in California. My research was great fun. I sketched

Figure 4: Bee sketches and notes on tracing paper. My list of California native bees came from a record of observed bee species from Hastings Natural History Reservation.



bee-friendly wildflowers at the local CNPS wildflower show (Fig. 2 and 3). I read books and looked at specimens. I emailed naturalists and bee scientists for suggestions, and I mooned over bee photos. I saw huge, 3-centimeter carpenter bees and tiny solitary bees only 5 millimeters long; metallic green and blue bees; bees with furry bellies and others with tiny leg tassels. I wanted to paint them all, but eventually I chose a tidy percentage of 40 bee species—that's 2.5% of California's 1,600 (Fig. 4).

The layout initially stumped me. Then one day, my daughter came home from preschool with a tessellated design of triangles that she'd created (Fig. 5). I was inspired. I played around with designs in Adobe Illustrator® until I landed on a hexagonal design that

seemed bee-ish and would accommodate my wildflowers. I printed out my tessellation, photocopied my flower sketches, and cut them out. I moved the flowers around on my kitchen table and taped them down once I settled on placement (Fig. 6).

When I started sketching bees, I realized that some were too tiny to cut out and tape to my layout. So, I scanned the tessellation/flower design and imported it into Illustrator. Then I imported the bees, which I'd scanned in and silhouetted in Photoshop®. This step turned out to be crucial, as it allowed me to size each bee accurately. Because some of the bees were so tiny, I decided to paint the piece at 3 times' life-size (40" x 30") and I got a giant, bond paper printout of the composition at my local copy shop (Fig. 7).



Figure 5 (above): I found design inspiration in my daughter's school art project.

Figure 6 (middle left): Using sketch photo copies, I cut out and composed the placement of the elements at twice life size; later, I scaled up to three times life size.

Figure 7 (middle right): I scanned the results and added the bee sketches in Adobe Illustrator, then sent a pdf of the composition to a local copy shop, where it was printed on bond paper.

Figure 8 (below): Using the graphite sheet transfer technique, I placed my sketch on the watercolor paper, making final positioning corrections as needed. Note my large Masonite board, the paper had to be soaked in the extreme to make it completely pliable throughout.





Figure 9: I then blocked in basic washes for the base colors, using Liquitex acrylic thinned down with water.

Now that I had my composition, I needed to get it onto my preferred substrate, watercolor paper. I bought a roll of oversize Arches® watercolor paper, soaked it in my bathtub to size it, and taped it to Masonite. (I had to do this three times before I got it right! An extremely though soaking is required, longer than expected.) Then I taped my drawing on top of this and transferred my composition using graphite paper (Fig. 8). It was a tedious process, but it allowed me to correct a few mistakes I encountered along the way. When it was time to paint, I blocked in the color throughout the painting in thin washes of acrylic, with the tessellation and background colors in a blue-and-gold theme. This seemed appropriate for bees, since they can perceive these colors and tend to be attracted to flowers in this color range (Fig. 9).

I continued adding layers of paint to my giant bee painting, feeling confident that I could finish before long. I had lined up a solo show at the San Francisco Botanical Garden's Library of Horticulture, and this painting was going to be the star of the show. But then Covid hit, and I found it hard to juggle painting time and regular illustration work with young children at home full time. Sometimes I forgot what bees I was painting (Fig. 10) and I'd have to go back to my notes and re-research the bees. Eventually, the show

was deferred by a year. That gave me time to finish, while also documenting my progress on Instagram. Each time I posted a step, I had an opportunity to talk about what bee I was painting and tag related accounts like @the_bees_in_your_backyard or @pollinatorpartnership.

After more than two years, I finished my painting. I thought I'd done the hard part, but extra-large paintings on watercolor paper are complicated. I had to find a place that could flatten any wrinkles under glass while scanning the oversized painting. And I ordered large, expensive matting and plexi to frame it for the show, but the framer said the buckled paper was fighting the mat. He found a solution to hide some of the buckling with adjusted spacing between the mat and glass, but even the framer's skill couldn't completely conceal the painting's wavy edges. The finished piece was big. When I came to pick up the project, the 47" x 45" framed piece wouldn't fit in my car. My husband returned with his truck and we delivered it to the SF Botanical Garden (Fig. 11).

"Look Closer", together with a panel listing the names of featured bees and flowers, anchored my "Wild Nectar" show. The painting was finally on display, communicating its thesis: native bees are beautiful,



Figure 10 (above): Final painting process. Once color was blocked in with thin washes of acrylic, I added more detail with several layers of more opaque acrylic. In some areas (for example, bee legs and antennae), I used very fine-point Copic Multiliner pens or mechanical pencil for sharp lines.

Figure 11 (left): The extremely large (47" x 45") final painting framed and ready to hang in the San Francisco Botanical Garden's Library of Horticulture. Paper buckling was an issue, which was minimized when the painting was fitted in between backing and the mat window with a bit of extra spacing, but not eliminated.

important, and worthy of our protection. To promote the show, and the message of the painting, I also shared videos, wrote blog posts, and did podcast interviews about this work.

I titled the piece "Look Closer" to call the viewer to look closer at the bees I had painted, and then turn around and explore their own surroundings with the same close attention. As I shared the painting online and in person, the number one thing I heard from people was, "I had no idea there so many other bees!" I was excited to hear people respond to the painting

in that way, and I hoped they would take a new awareness away with them.

Unlike some of my other pieces, "Look Closer" isn't ideal for notecards and it's so large that I don't expect to sell many prints of it. But, my goal was to open viewers' eyes to the world that is surrounds them. Like John Cody, I hope that drawing attention to my larger-than-life bees will communicate their value and show their true beauty.



ABOUT THE ARTIST

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 bees, dazzling hummingbirds, delicate thistles, native plants, and other ecological treasures.



Book Review

The Cold Canyon Fire Journals: Green Shoots and Silver Linings in the Ashes, by Robin Lee Carlson

—Reviewed by Linda M. Feltner

Above (left to right): Pages from *The Cold Canyon Fire Journals: Green Shoots and Silver Linings in the Ashes*. flowers and pollinators; narrow-leaf milkweed and beetles; and fence lizards.

All images © 2022
Robin Lee Carlson

Robin Lee Carlson's book is an up-close-and-very-personal study of fire's relationship with Stebbins Cold Canyon ecosystems. Her familiarity with this canyon grew through many years of walking, observing, and sketching in the Reserve. She watched with sadness and grief as her familiar trails and forested canyons succumbed to wildfire. Her journey begins armed with her scientific background, creative and curious mind, while she devotedly recorded its recovery.

Robin is a GNSI member and serves on the Board of Directors and the Conference Oversight Committee. With a background in evolutionary biology, stream ecology, and translating science processes into understandable stories, Robin weaves the complex stories of devastation and reemergence with consideration

about the future of fires and our current culture that must now embrace it.

Her perseverance in numerous return trips, both day and night, revealed mysteries and answers to life within the canyon. With an observant eye and inquisitive mind, she records the first animals to return to the still-smoldering tree bark. She writes of newts who walk through fire, notes the undervalued wasps, and marvels at myriad animals and plants that adapt to cyclical fire. Even the world beneath the soil surface holds unseen secrets that aid the returning landscape.

"I will always be profoundly glad that there is so much happening in the world right around us, above us, and under us that we will never know. This is

perhaps the greatest beauty in the world—that we cannot know everything, and that every new discovery only reveals more mysteries.” (p. 190–192)

Curious behaviors of beetles, salamanders, birds, and plants emerge in her study and fascinated me throughout the book. I was fully engaged in the pathway of discovery she endured and embraced. With the diligence of a naturalist with a sketchbook, her pathway is revealed. This canyon became her laboratory and inspiration, walking, pausing, drawing, and carefully observing everything that caught her eye. The book is illustrated with her spontaneous and colorful illustrations. Direct and lively, they are as dynamic as her writing is engaging.

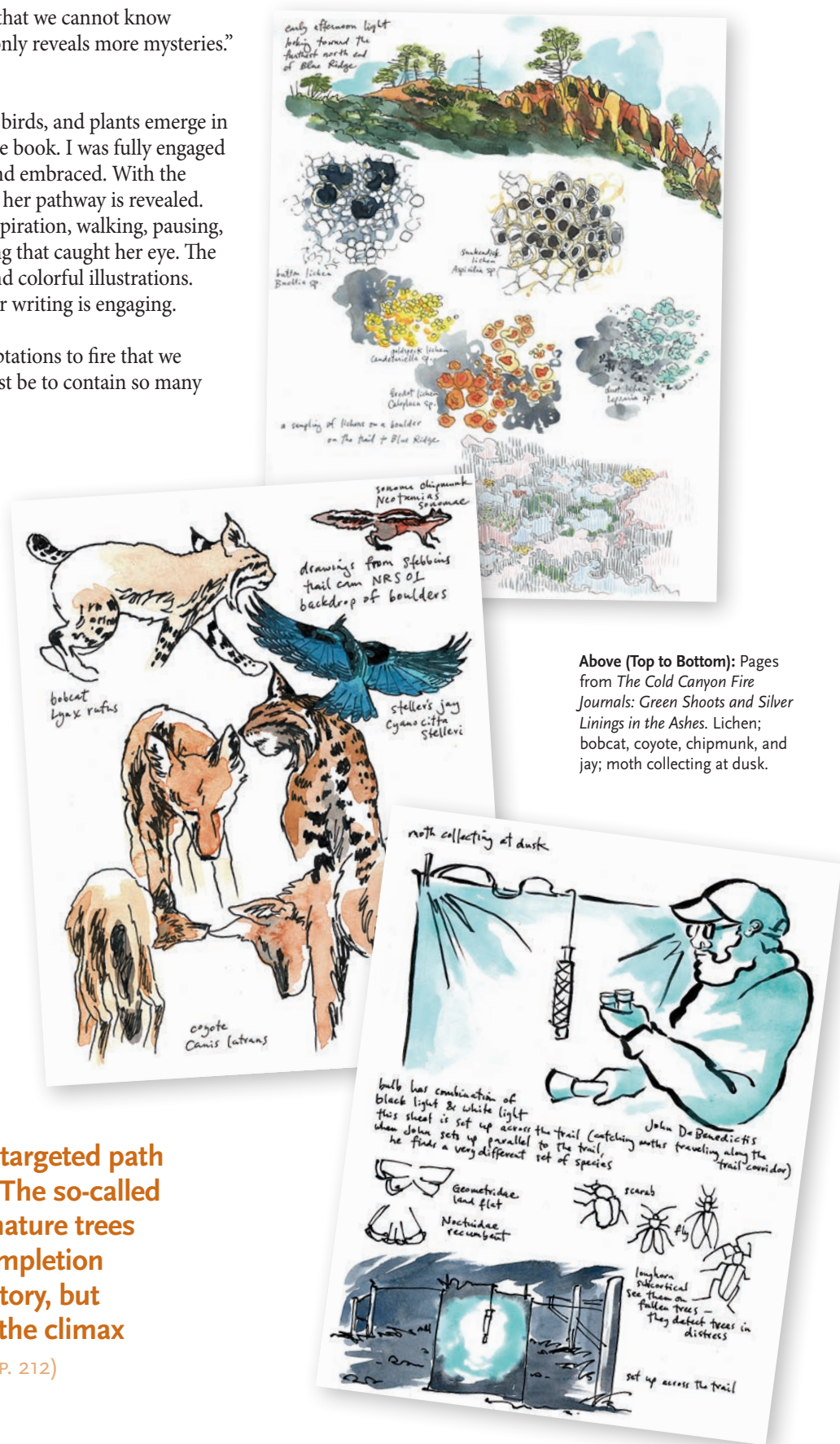
“I boggle at the thought of all the other adaptations to fire that we are unaware of and how rich the world must be to contain so many still-unseen wonders.”

I want a signed copy of this book for my bookshelf to celebrate the power of observation and curiosity that opens our minds to Nature’s mysteries, whether it is devastating or profound with marvels of the sustainability of biodiversity in our ever-changing environment.

“We need diversity because it is only in diversity that we will find resilience.”

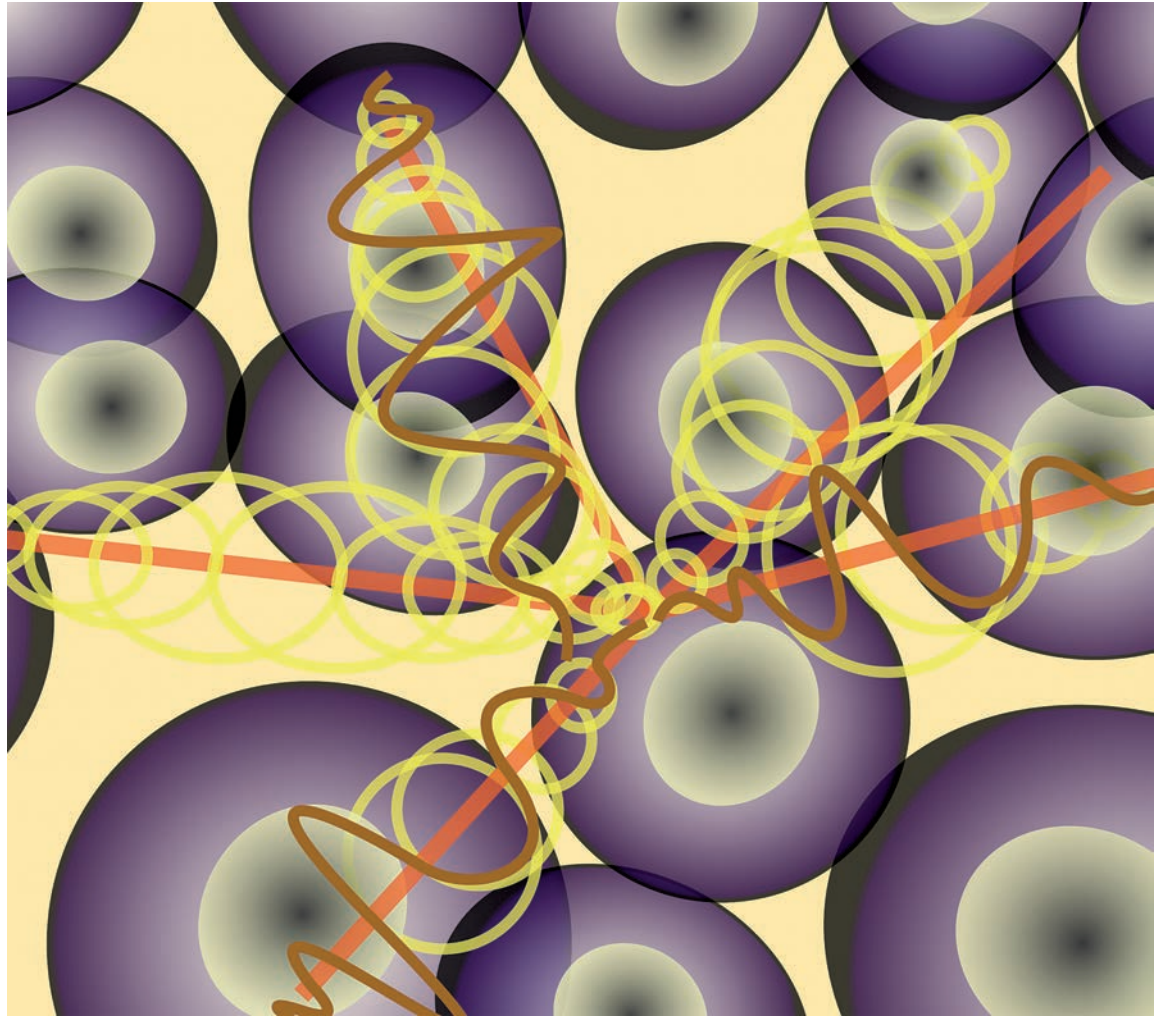
Publisher: Hayday
Paperback with Flaps, 7 x 9, over 100 full-color images, 288 pages.
ISBN: 9781597145848

“What my immersion in this process has taught me, though, is that the cycle of succession is not a targeted path with a final goal at the end. The so-called climax community of tall, mature trees and shrubs may feel like completion and the perfect end to the story, but every step along the way is the climax for a group of organisms.” (P. 212)



Above (Top to Bottom): Pages from *The Cold Canyon Fire Journals: Green Shoots and Silver Linings in the Ashes*. Lichen; bobcat, coyote, chipmunk, and jay; moth collecting at dusk.

Figure 1a: Original
Napkin Sketch.



ILLUSTRATING THE UNKNOWN IN TRANSLATIONAL RESEARCH:

How the Artist, the Investigator, the Engineer, and the Physician Collaborate to Create Medical Innovation

— Holly R. Zink and Suzanne Sadilek

INTRODUCTION

Through the years, medical and scientific illustration have captured the precise and beautiful structures of the world, including marvels that cannot be seen with the naked human eye. But what about the new and abstract scientific concepts that are breakthroughs in current scientific thought? Medical illustration in translational research often requires a complex collaboration between the investigator, the engineer, the physician, and the artist. This article discusses the modern standards for creating research illustrations in academic publications, the role of illustration in research discourse, and tips for creating a more

successful investigator-engineer-physician-artist collaboration.

Research breakthroughs in translational research combine biomedical and medical sciences to improve human health. Investigators use biomedical science to learn about how diseases work and how to study them in laboratories. Engineers translate laboratory discoveries to create new treatment technologies. Physicians interact with patients to diagnose and cure them using these new technologies. Together these experts collaborate to bring new knowledge from the laboratory bench to the engineer's board to the patient bedside. The role of the medical illustrator is

critical throughout the translational research lifecycle to ensure patient and provider literacy and to further the research discourse.

MODERN STANDARDS FOR CREATING RESEARCH ILLUSTRATIONS

Historically, medical illustration standards have been largely left to the publisher's discretion. However, with the rapid rise of digital technology, the field of medical illustration has become more popular, and medical illustration standards have become proportionally more complex. Digital technology has made it easier to create accurate and attractive artwork that allows investigators to present their ideas and research in a more meaningful way. Academic medical publications now accept various artwork formats, including the traditional tables, figures, and photographs to more abstract pieces, including abstract line art, videos, and 3D animations. Modern standards and methodology were co-developed with the rise of digital tools to ensure increased accountability and clarity within the industry. However, the artist's primary directive is unwavering to communicate a thorough understanding of the research purpose. Medical illustration is first and foremost a way to clarify and communicate the research topic and methods for the intended audience. The artist's role in transformational research is to clarify the research constructs, highlight key findings, and translate main conclusions for broad audiences.

While many artists begin preliminary sketches using nothing more than pen and paper (or a relatively clean napkin), most medical illustrations are ultimately published using digital technology. Today's most common programs and tools are professional-grade software intended for graphic design (e.g., Adobe Illustrator®). It is only within the last few years that digital tools specific to medical illustration have entered the market (e.g., BioRender®). Most academic publications have explicit guidelines when it comes to artwork, often down to line size, colors used, and file type. These guidelines often dictate the tools used to create the final artwork. Artists must navigate the requisite guidelines while creating a piece of artwork that effectively communicates the scientific constructs.

ROLE OF ILLUSTRATION IN RESEARCH DISCOURSE AND LITERACY

The role of the medical illustrator is often to illustrate the unknown. Research breakthroughs are often obscure and abstract. Moreover, these illustrations often play two roles, first to further research discourse within the field and ensure patient and provider literacy. Illustration efficacy comes with translating complex and abstract scientific

constructs into a relatable and accurate visualization that immediately communicates the main research message. Translational research breakthroughs often lead to life-saving solutions that close gaps in the existing standard of care. These breakthroughs are critical to academic, industry, government, physician, and patient populations worldwide. The dance of the medical illustrator lies in designing a simple image that communicates a complex concept for both patient and physician literacy while meeting publisher guidelines.

Artist's Story: One of my most potent memories is when a long-time colleague turned to me and said, "I need to create an image of something that's never been known or seen before. It's a brand-new concept—but I have no idea where to start. Can you help?" It was a long and iterative process. It took many conversations for me to learn the basic scientific concepts enough to grasp what was needed. Then, I just began to sketch thumbnails (Fig. 1a). Together, little by little, we found a way to approximate what is happening in the human body. We continued to refine the illustration to ensure patient and provider literacy (Fig. 1b).

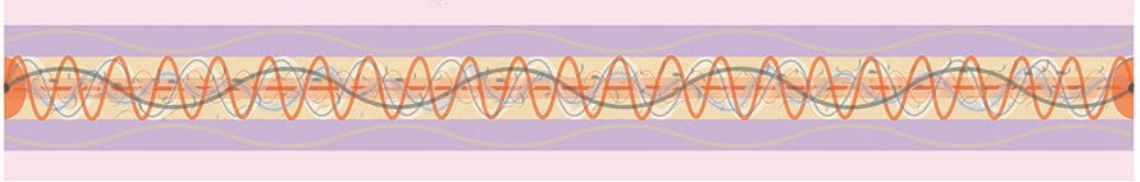
ROLES AND KNOWLEDGE MANAGEMENT IN TRANSLATIONAL RESEARCH

Within the lifecycle of translational research (Fig. 2), it is important to understand each member's role in the collaboration. The role of the investigator is to translate money (scientific grant funding) into new knowledge by learning about how the disease works in basic laboratories. The role of the engineer is to translate that new understanding into innovation by creating new technology. The role of the physician is to apply that new technology at the patient's bedside. The role of the artist is interspersed throughout the lifecycle to translate this new knowledge into understanding by conveying discovery in the scientific field.

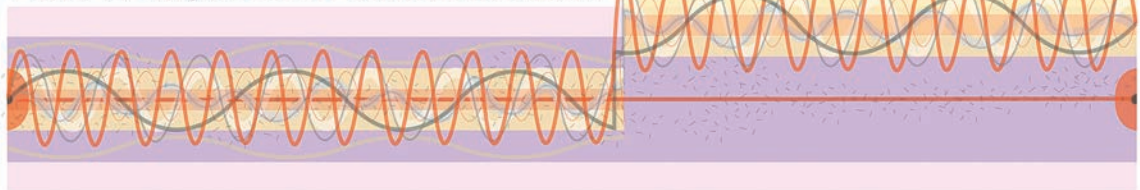
Similar to the unique role that each member plays, so too does each member work with a different form of knowledge. The investigator deals with explicit knowledge or documented information that is easy to articulate and write down. Although they are often working with abstract constructs, their work is conveyed through the scientific method and mathematical data that can be processed, organized, structured, interpreted, and, most importantly, recreated by others. Both the engineer and the physician operate with implicit knowledge, or applied information. The engineer takes the investigator's practical and documented knowledge and creates an applied technology. The physician is using that documented method in a hundred thousand patient rooms.

Figure 1b: Final Image. Congenital heart defects are caused by abnormal embryological development of the walls and valves of the heart, and the arteries and veins serving the heart. This figure illustrates a breakthrough model for the regulation of developmental information and the consequences of severe mutation, as well as accumulated smaller contributions to regulatory distortion. Normal development (Panel A) relies on feedback buffering which maintains information signals in normal boundaries. Single severe mutations (Panel B) and noisy background signals (Panel C) may be contained by robust buffering, explaining incomplete penetrance. Accumulated deviations in gene function (Panel D) occur when signal distortion continuously exceeds buffering capacity leading to developmental defects in the heart.

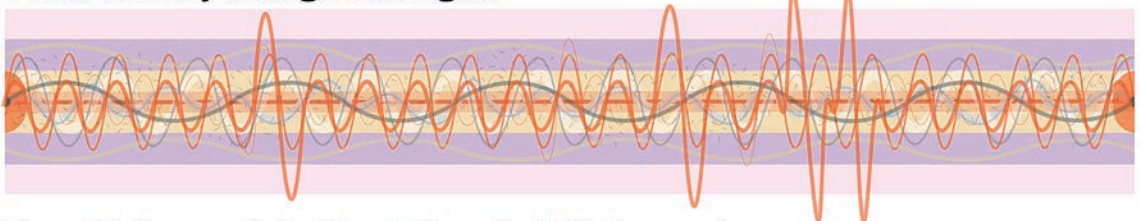
Panel A: Normal Heart Development



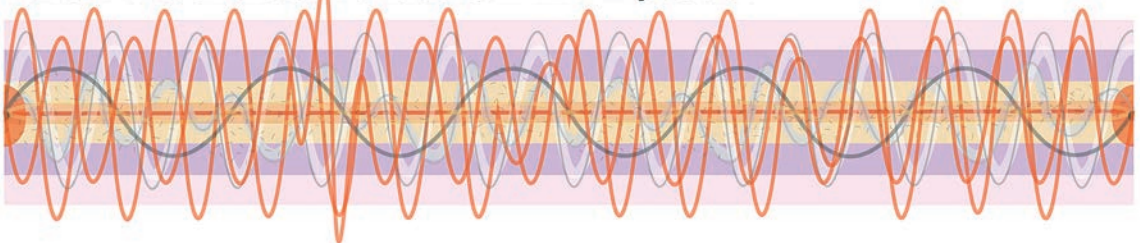
Panel B: Single Severe Genetic Mutation



Panel C: Noisy Background Signal



Panel D: Accumulated Deviations in RNA Expression



The artist, however, deals more closely with tacit knowledge, or understood information, at every stage of the cycle. Tacit knowledge is gained through personal experience and context and is often the most challenging form of knowledge to articulate or present in a tangible format. The artist's job, at first, is to bring the investigator's abstract and innovative constructs into a visual form of communication. Their job is to not only depict what is happening on a concrete level, but also to communicate the feelings and emotions that are related within the abstract concepts. Later, the artist's job is to provide patient-facing materials that communicate difficult scientific constructs to a lay audience.

Research breakthroughs in translational research require these key players to be successful. The investigator turns money into knowledge through scientific funding. The artist turns knowledge into understanding through medical illustration. The engineer turns understanding into innovation through technology. The physician turns innovation into practical application at the bedside. Together these

members facilitate research discovery and advance the field of medicine.

TIPS TO CREATE A SUCCESSFUL INVESTIGATOR – ARTIST COLLABORATION Environment

A successful collaboration between the investigator and the artist depends on several factors. As a medical illustrator, it is essential to understand the community and environment in academic research. Within the scope of this conversation, the academic rank of the investigator is likely high, as breakthrough innovations tend to occur in well-established laboratories. Investigators are often at the top of their field, are seen as leaders in their community, and command great respect within their institution. A successful collaboration will require cursory knowledge of the political and social climate of the institution, laboratory, and general field of research.

Artist's Tip: Read the investigator's prior publications, academic website, and resume. Note the director-level positions that they hold within the

institution. Ask a research librarian to help you do a literature search in their field of research. Study news articles pertaining to their industry. Prepare five to six bullet points on their background and field of research prior to your introductory meeting.

Membership Characteristics

There are specific member characteristics that are important within this collaboration. Investigators of this high caliber are highly motivated individuals with a strong work ethic. They can also be protective of their research to limit unwanted or premature disclosure to rival academics. A successful collaboration hinges on mutual respect, understanding, and trust between the investigator and the artist. A shared strong work ethic is valuable and is easily facilitated as both members have a self-interest in the success of the project. Perhaps the most difficult aspect of this unique collaboration comes with the ability to compromise. A successful collaboration hinges on both the investigator's and the artist's ability to find the middle-ground in illustrating an abstract breakthrough discovery in both an accurate and meaningful way.

Artist's Tip: Create a workflow that clearly indicates how much time should be expected between revisions. Medical illustration is repetitive and cyclical—you will go through a lot of rough drafts before you fully understand the investigator's vision and artistic preferences. To keep the communication lines open and optimistic, be sure to have regular communications with clear goals (e.g., send an email every two days with an updated draft and ask specific questions regarding clarity, purpose, and overall aesthetic.) Do your best to ensure that every communication makes measurable forward progress in finalizing the artwork.

Process/Structure

As previously mentioned, the investigator's target academic publications will likely have explicit guidelines when it comes to artwork. The investigator may not be aware of these guidelines or their impact on artistic decisions. A successful collaboration will depend on a clear understanding of each member's roles, rights, and responsibilities. The shared goal is to ensure that the artwork strengthens and adds clarity to the published work and that all guidelines are followed to ensure prompt publication.

Artist's Tip: Solicit the target publication prior to your first meeting and review the artwork guidelines. Ask a research librarian to help you download recent articles from that publication. Look over each article and compare the prominence of the artwork and how the artwork is placed within the

final article. Work to ensure the final artwork meets the publication's guidelines and follows the general standard of what has been previously published.

Artist's Tip: Consistent shape and linework are critical. It is important that all artwork included in the publication, or across multiple publications, looks like it was created by one person. For example, rectangles and squares may all have rounded corners. Stroke weight should remain the same in width and color from object to object and illustration to illustration.

Artist's Tip: Font usage must be consistent in the illustrations also. The choice of fonts may be determined by the journal guidelines and must be followed. Generally, sans serif fonts are more legible than serif fonts, particularly in illustration at smaller sizes. The guidelines of the journal may also regulate font color choice and size. When creating the illustration, ensure sufficient contrast for the colors of fonts and the illustrated objects. Also, be aware that the color contrast is crucial when the article is printed out in black and white or for a color-impaired reader.

Communication

All collaborations depend most on open and frequent communication. Within the realm of academia, that communication can take many forms across many channels, including email, in-person or virtual meetings, or phone calls at inappropriate hours of the wee morning (when investigators do their best work). Successful collaboration depends on frequent interactions, open and honest discussions, and constructive feedback to ensure a better, more informed, and cohesive finished product. However, the truth is—investigators are not always the best communicators. It will be up to the artist to stimulate and foster good communication in most cases.

Artist's Tip: Take a moment in your first meeting to ask specific questions related to the investigator's communication style and how they want to handle revisions/drafts. Ask, "What is your preferred method of communication? How do you want to handle file sharing? How do you prefer to handle the revision process and new draft documents?" Knowing these things upfront will help establish a stronger communication cadence throughout the project.

Artist's Tip: When starting a project, relationship-building between the researcher and the artist is paramount. The development of trust between the parties is essential. Creating a timeline is crucial and the first step of trust to ensure on-time delivery of

the final product. Outline a timeline based on the final due date and work backward to the start date. Together, decide on due dates for rough sketches, approvals, and fixes and changes.

CONCLUSION

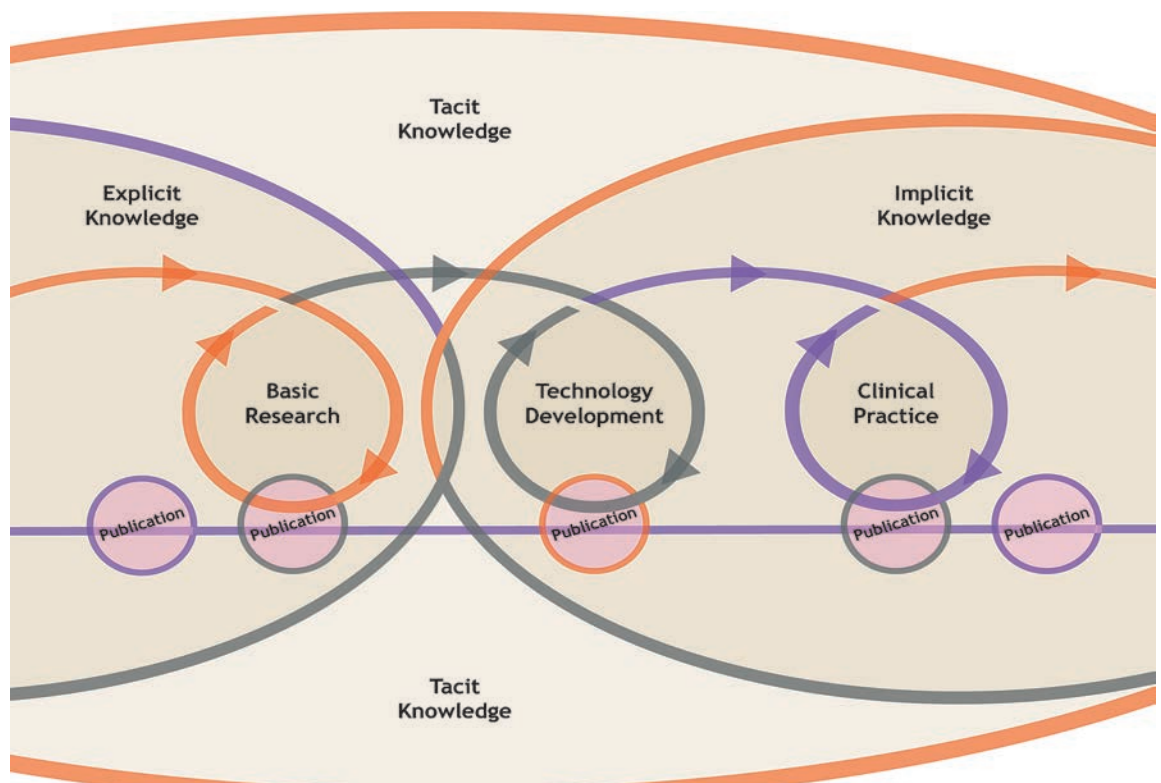
Medical illustrators help to capture new and abstract scientific concepts that are breakthroughs in current scientific thought. Translational research, and the complex collaborations that it brings, delivers new knowledge from the laboratory bench to the engineer's board to the patient bedside. The role of the medical illustrator is critical throughout the translational research lifecycle to ensure patient and provider literacy and to further the research discourse. However, collaborations between the investigator, the engineer, the physician, and the artist can be complicated. This article discussed the modern

standards for creating research illustration in academic publications, the role of illustration in research discourse, and tips for creating a more successful investigator-engineer-physician-artist collaboration. Together these members facilitate research discovery and advance the field of medicine.

Translational research delivers new knowledge from the laboratory bench to the engineer's board to the patient bedside. By following a few basic principles, scientific illustration can provide a way to share ideas and concepts in an engaging, educational way. By concisely designing a concept, an illustration can provide education to patients (to explain a procedure), to students (to teach the next generation of medical professionals), and to peers (to demonstrate new research results). The possibilities are endless for the collaboration of art and science.



Figure 2: Translational Research Cycle of Knowledge Development and Publication



ACKNOWLEDGMENTS

The authors would like to acknowledge Douglas C. Bittel, Ph.D., Manager of the Genetics Research Laboratory at Children's Mercy Research Institute and Professor of Biosciences at Kansas City University for the use of Figure 1b.



Figure 1 (far left, top):
Initial rough sketch

Figure 2 (far left, bottom):
Scanned sketch; I experimented with color, blocking out the fore-, middle- and background colors, and layout—note the baby birds have been moved apart slightly.

Figure 3 (left): Final art, in watercolor and gouache. Note the baby birds are back together again, the momma robin's pose has changed, and the birdhouse is a bit larger. All revisions were made in Photoshop before starting the final painting.

All art © 2022 Gail Guth

Using Photoshop® to speed up and refine composition and layout

— Gail Guth

If you are a traditional artist who doesn't think that Photoshop can be a handy tool to use, think again! It can really help you develop composition, experiment with colors, and adjust elements of your sketches, and do so quickly. I often bring my sketches into Photoshop and play around with layout, colors, etc.

I scan in my initial sketch, then make new layers that are set to "multiply". With this setting you can paint at will on the new layers. The sketch lines on the base layer show through if you want them to. Each layer can be a different color or added element. You can select and move your sketch areas around, change the size, or make other modifications you need. I especially use this to establish where the light and dark parts of the image need to be (as I did with the dark green behind the birds), and to decide on the main colors. The finished piece wasn't that dark, but I knew I needed to have that dark area to set off the birds in the foreground and really push the light background to the distance. It's a great way to develop a composition and it's SO much faster than doing it by hand. It's a real help when you are on a set budget—I wasn't getting paid to mess around with multiple hand-made renditions of the image.

Another good reason to use Photoshop is to see what the art will look like at its final size. This image was for a Guideposts® book cover; the final printed image is only about 2.5" × 2.5". What looks good at 10" × 10" on your drawing table may not work as well at a much smaller size. Small details tend to drop out and the overall composition and contrast is what counts. I use Photoshop to visualize, especially when the final image will be quite small, but it also helps if you are going large to see how that actually looks. The impact definitely changes depending on the print size!

I used Photoshop as a review for another one of these book cover pieces, a whitetail fawn lying in the grasses with its mom in the background. I thought I was done, but the scan showed me that the mom's head was way too large—I just didn't notice earlier, as I was more focused on the colors and the brush strokes. I used Photoshop to select her head and reduce the size, then filled in around and voila! Finished work.

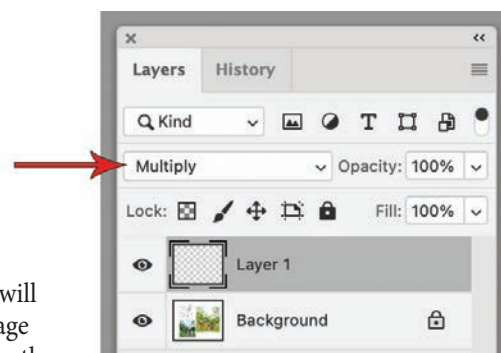


Figure 4 (above): Photoshop layers palette: use the scanned sketch as a base layer, then add layers to experiment with color and layout.

Right: *Spiranthes* complex,
Chiwaukee-Waukegan
beach ridge plain species

All images © 2022
Kathleen Marie Garness



Intersections between orchids, science, and advocacy

— Kathleen Marie Garness

It's not often that a grant opportunity aligns with your life mission. In early 2021, the American Society of Botanical Artists announced the Juliet Kirby Grant, whose purpose was to encourage the study of botanical art and orchids and bring that to new and diverse audiences. It felt as if everything in my life to date had prepared me for this challenge, so I applied. And was selected—to begin an effort to document the recorded orchids of the almost 4,000-acre Chiwaukee-Waukegan lake plain, and bring what I learned to new audiences, with an especial focus on its historically underrepresented Spanish-speaking adults and teens.

There are over 26,000 species of orchids worldwide, with ~220 species here in North America. In Illinois, at least 53 species (57 taxa) have been documented so far. Forty four orchid taxa have been documented

from the 22-county Chicago Region. Three species of orchids new to science had not even been documented in the 1994 edition of *Plants of the Chicago Region*, so it's significant that our native flora is still being studied by botanists.

It is also significant that nearly half of those 44 have been found in this 4,000-acre area, a Wetland of International Importance dedicated in 2015 by the Ramsar Convention on International Wetlands. This Convention gives special attention to wetland areas that meet a certain number of criteria. The Chiwaukee-Waukegan lake plain meets three of the Convention's nine criteria for dedication: cultural, regulating, and supporting ecosystem services. We know that healthy water is related to healthy soils and habitats, all critical to the survival of life on earth. Orchids, therefore, can be indicator species

of ecosystem health—when they are present and thriving, we know that the systems are in good working order. When they're not, perhaps we should try to discover why.

The project involved several primary facets: identifying which orchid species had been documented from the area; enlisting the assistance of well-qualified botanists to help guide the illustration process; making line drawings and then full watercolor renderings of each species; scanning the paintings; framing and hanging them in a public venue; creating bilingual educational materials and a website about them; and teaching several nature drawing classes as an accompaniment to the exhibit(s).

To identify the species present, I gained access to herbarium collections at the Field Museum, Morton Arboretum, the Chicago Academy of Science, Lake Forest College, the Chicago Botanic Gardens, and the Consortium of Midwest Herbaria. In a few instances, with the permission of the herbaria curators, I was able to correct misidentified herbarium specimens I encountered. And just the camaraderie of the visits felt so good after two years of pandemic lockdowns!! The herbarium research raised more questions than answers, however: why were there more orchid species at the southern tip of Lake Michigan, in the same or comparable habitat (as determined by

associate species) than we could see in the voucher records? Botany was once a much more popular, even fashionable, pastime than it is today, and even then, orchids were considered some of the “Oh MY!” plants—which eventually led to the demise of many due to ecotourism’s trampling, and even poaching. What was probably most interesting in all this research was seeing the genealogy of each herbarium specimen.

Here is just one specimen:

The original label says: *Spiranthes cernua* (L.) Rich., Lake Forest, Ill. Sept. 25, 1889, R. A. Harper (Illinois botanist Robert Almer Harper, 1862–1946, who collected this while an instructor at Lake Forest Academy. His collections are in the Field Museum and



Above: Botanical specimen, *Spiranthes magni*.



Left: Botany blitz participants.

other institutions). Then there are dated annotations, in order: “Fred Case, 1961” (with an exclamation mark indicating agreement with ID (he was an orchid researcher affiliated with the Cranbrook Institute of Science)); “*Spiranthes magnicamportum* Sheviak, low prairie rare, Charles J. Sheviak, 3 March 1973” (Dr. Sheviak did an early sort of the *Spiranthes* complex, separating out *S. magnicamportum* from the historic *S. cernua*); “mapped TRT 1977, P. M. Catling” (one of the world’s leading authorities on North American orchids); then lastly “Fred Case, 1983”, with another exclamation mark, and an arrow pointing to Sheviak’s label. Just recently Dr. Matthew Pace of the New York Botanical Garden has reassigned most Illinois populations of *Spiranthes cernua* to *Spiranthes incurva*, continuing the thread of taxonomic changes. These annotations are valuable in describing how our understanding of species’ taxonomy changes over time. This could be a topic for another entire article!

So how many species did I end up with? Twenty-one, including the European, *Epipactis helleborine*, which has several color forms, and often pops up in gardens and disturbed natural areas. (It seems to especially like hosta beds!) One of the side errands of this project was a two-day botany blitz, involving 30 professional and avocational botanists. After

all, we didn’t want to know just what *used* to be there, but also how are they doing *now*. Right? On the first morning of the blitz, a birder came up to Ken Klick, who was the event’s key organizer, and mentioned that he saw some contractors tearing their way through an area he knew was habitat for the federally–threatened Eastern Prairie Fringed Orchid. Ken told Pati Vitt, who was head of Lake County’s natural resources department, and Pati contacted the contractors about her concerns. The rest of the orchids’ habitat was saved from further disruption. That was some amazing synchronicity! We also found two new populations of native orchids, as well as a county record for a rare sedge.

We’re hoping more good will come out of this work: new and renewed interagency partnerships in the field of natural resources; bringing young people into natural areas; botany and rare plant monitoring via digital apps; and increased stewardship resources for the few precious remnant areas we still can enjoy. Visual communication takes many forms, but the best, most lasting form might just be those one-to-one relationships we foster.



Left: Library exhibit.



In Memoriam

Margaret L. (Peg) Estey

1937–2022

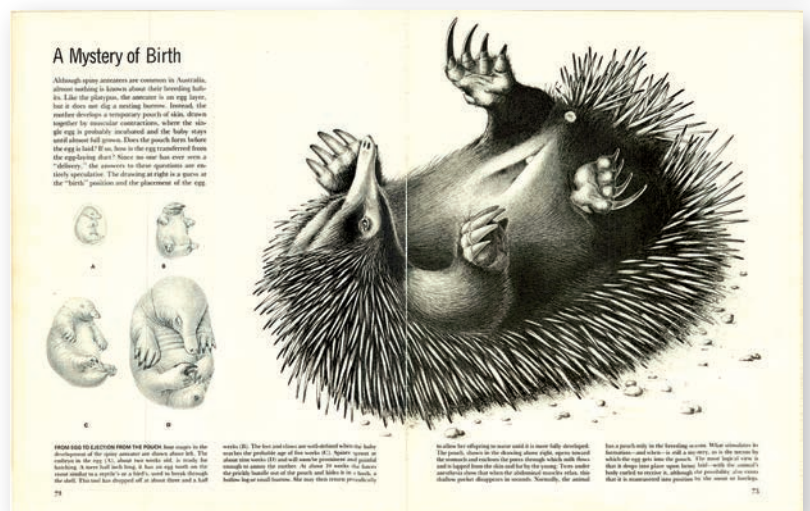
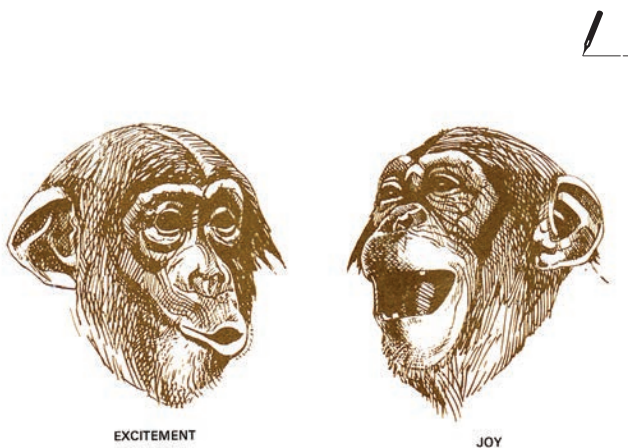
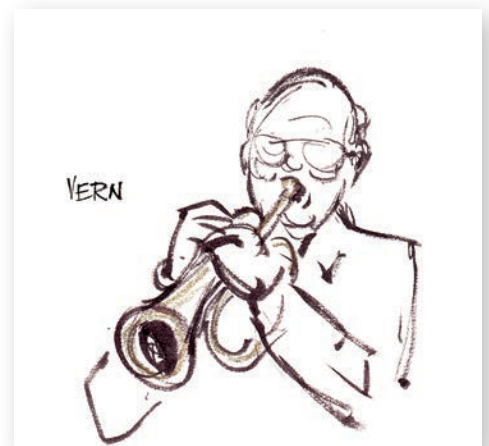
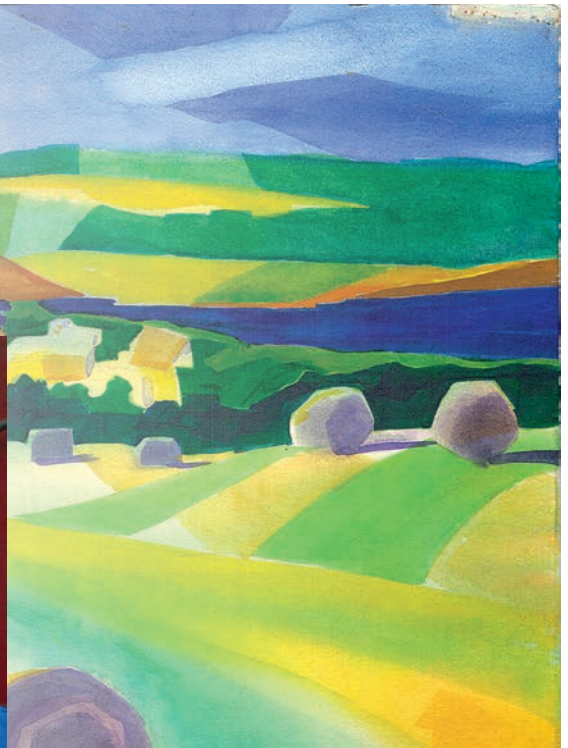
—Jane Neroni

A wonderful science illustrator and inspired teacher passed away on April 25, 2022. Peg Estey originated the Natural Science Illustration program at Rhode Island School of Design and was instrumental in bringing GNSI to Providence for a summer meeting. An active GNSI member for many years, she attended conferences in California, Colorado, and Arizona, and especially enjoyed camping in Big Sur after one of the California meetings.



Peg graduated from Simmons College and the Museum of Fine Arts in Boston. She was staff artist at Harvard University's Museum of Comparative Zoology in Cambridge, the Massachusetts Audubon Society in Lincoln, the University of Florida's State Museum in Gainesville, and the Charles Darwin Research Station in the Galapagos Islands in Ecuador, South America. Her natural history drawings, paintings, and biological illustrations were published in *World Book Encyclopedia*, *Time-Life Books Nature Library* (10 vols.), *Animal Kingdom* magazine, *Scientific American* magazine, and numerous other publications and textbooks. Several museums hold her work in their permanent collections, including Yale University's Peabody Museum. Peg's drawings and paintings are also in private collections in Great Britain, Canada, and the US.

Peg taught drawing and illustration courses at Harvard's Museum of Comparative Zoology and at the Rhode Island School of Design. Because of her efforts, many of her students became active members of GNSI, and she was instrumental in helping to form GNSI New England. We extend our sincere condolences to her family and friends.



GUILD OF
NATURAL
SCIENCE
ILLUSTRATORS



P.O. Box 42410
Washington, DC
20015

Science-Art.com is moving to GNSI's Portfolio+

GNSI members will soon be offered an affordable membership upgrade - to include a personal portfolio!

Your images will be presented in a personal collection, the GNSI collection, and can be embedded in your own site.

More details coming soon in the GNSI Newsletter!

Piece Search



Science-Art.Com



GUILD OF NATURAL SCIENCE ILLUSTRATORS

The GNSI is a 501(c)(3) that connects,
provides professional development &
networking opportunities to visual
science communicators.



Message

[Portfolio](#)

[Collections](#)

[Artists](#)

