Journal of Natural Science Illustration

GUILD OF NATURAL SCIENCE ILLUSTRATORS

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A Note From...

Kathleen Garness, Content Editor, JNSI

Our primary focus for this issue is botanical art; but, in keeping with our members' diverse interests, we have sprinkled in a few other topics.

Two regular columns, "RRRRipped from the List" and "The Business of Illustration," address common problems: the ongoing dilemma of pricing illustration work fairly, and keeping our illustration business organized (the first of two articles on often overlooked but essential skills). We also offer two book reviews: Dick Rauh's captivating new book, *The Science Behind Flowers: Plant Morphology for Botanical Artists*; and Eleanor Jones Harvey's biography of Alexander Van Humboldt, "first and foremost a book of history, woven together with a web of connections embodied in one extraordinary man."

"Illustrating Nature 2020" shows us how intrepid students were still able to hold their CSUMB exhibit in a time of COVID-19. The delicious imagery in Karen Johnson's beautifully designed Costa Rica sketchbook gives us a brief vacation from the mundane as well as a reminder that field sketching gives us a space to deeply savor the present moment.

We are enthusiastic about several members' initiatives to put scientific illustration in front of new audiences: Gail Selfridge describes how our own Dick Rauh uses her *Colorful Leaves* book in a series of classes for lifelong learners. Jonathan Higgins describes his production process and challenges in a new and thoughtfully-written *Anatomy and Physiology Coloring Book*. And there is a peek at a scientifically accurate fabric dunesland field guide—a.k.a. a bandana—printed by the Nature Conservancy this year to celebrate the hatch of baby piping plovers in Chicago.

We hope you enjoy them all!

— Kathleen Garness
journal@gnsi.org

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Cover: Honesty capsules (*Lunaria annua*).
Watercolor. © 2020 Dick Rauh

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.

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JNSI STAFF

Colorful Leaves Classes with Dick Rauh

— *Gail Selfridge*

Funded by the ASBA 2015 Anne Ophelia Dowden Award, Colorful Leaves *is a tool for introducing/encouraging nature observation. It provides a way to learn about and develop drawing skills while experimenting with various art techniques.*

Above: Student drawings of sugar maple (*Acer saccharum*) and *Viburnum* sp. leaves.

While it is always elating to receive a grant or an award, eventually all the work is finished and whatever commitments and rewards that accompanied it subside. Then what?

Amazon had sold out of the publication. The PowerPoint grant presentation was given and well received at the 2016 annual ASBA conference. Workshops were completed and found their way to the ASBA Website where they were featured as a free download along with a free download for the entire *Colorful Leaves* publication. So out here alone with the tall grass and the prairie dogs, I was left picking up fall leaves, marveling at their beautiful colors, and thinking my fifteen minutes were definitely over.

Then one day I received an email message from Dick Rauh that he was giving more classes and using *Colorful Leaves* in his teaching. Now this isn't the first time Dick has used the materials. Earlier he had sent me info and images for inclusion in the original download devoted to workshops and presenters, but unfortunately by the time his classes were held, that file had already been placed online.

So I requested, and Dick graciously sent, a description and images of his latest class. Meanwhile, it was possible to resurrect his earlier work. All of his material contained such good information for potential *Colorful Leaves* users that an article featuring both classes seemed the perfect way to share his methods.

NOTES FROM DICK REGARDING THE FIRST CLASS

"The first class was a four week session at my local Lifetime Learners Institute using the *Colorful Leaves* theme. Students were all mature women that had some (or much) art experience. The sessions were two hours each on consecutive Friday mornings.

I opened each class with some botanical information: why leaves turn color, types of leaves, leaf margins,

Colorful Leaves as Educational Outreach

Why choose leaves? Well, as specimens they are readily/abundantly available to anybody and free of charge. They come in a wonderful array of colors, and can be used to both teach and learn about art materials and techniques as well as science concepts including leaf identification, leaf structure, leaf shapes, leaf venation, photosynthesis, seasonal color changes, etc.

The initial challenge of working in educational outreach is overcoming drawing phobia, a condition that ranks alongside the fears of math and public speaking. Time is also an important factor because classes may only last from one to four sessions. Given both the objectives and the constraints, what is needed is a way to bypass a lengthy development of drawing skills and study of color theories. But even working at this level, an underlying image is required.

Colorful Leaves starts by providing participants with scientifically accurate preliminary leaf drawings in order to move them directly into observing actual leaf specimens and matching/reproducing the color(s) of the specimens. The focus then shifts to finding leaves in their own neighborhood and ultimately to developing their own preliminary drawings.

Materials for teaching this method were developed and brought together in the form of a publication called *Colorful Leaves*. Funded in 2015 by the American Society of Botanical Artists, the *Colorful Leaves* program was tested in workshops given by members of both the Guild of Natural Science Illustrators and ASBA. In exchange for complimentary copies, workshop presenters/teachers agreed to provide descriptions and photos of their events, and these are now available for all to see and use on the ASBA Website: *asba-art.org/node/13130*.

Right: Student drawings of hibiscus and dogwood leaves.

arrangements, etc. for about 15 minutes. In each session I brought different leaves starting with simple entire leaves in session one, lobed leaves in session two, leaves with more dimension in session three, and leaves on a branch in session four.

These were classes teaching the use of colored pencils as well as focusing on leaves. In the first session I had them draw directly from the leaves (dogwood, linden, hibiscus). In the second session I introduced them to leaf rubbing using sugar maple and silver maple leaves, then trace the image from that rubbing and transfer the image to art paper to do their coloring.

In all cases they were unable to complete the drawing in class, but took the leaves home, used their copiers to help keep information about color, etc., and brought the finished work to the next session.

In the last session I brought branches of Winged Euonymus (*Euonymus alatus*) in full color. This time I provided plastic saucers and half blocks of floral foam, so they could draw the branches from life, and emphasize the three dimensional quality of the leaves. I had them include the insect damage and imperfections on the leaf surfaces and margins, as well as the variations in color, to enhance their drawings.

I provided a good pencil sharpener but also had them bring their own to keep their drawing clean and accurate. *Colorful Leaves* provided the spark, and on the whole I thought the results were exceptional . All were given the link to the download, and a number of them availed themselves."

NOTES FROM DICK REGARDING THE SECOND CLASS

"I use the text and the *Colorful Leaves* name in classes for seniors at local Senior Centers and the Lifetime Learning Institute. Each class consists of four two-hour sessions, once a week. Although it is primarily

Dick Rauh:

I came to botanical painting in retirement, after a career in Motion Picture Special Effects. In the eighties I completed a certificate program in Botanical Art at the New York Botanical Garden and started illustration work for a number of scientists.

This led me to pursue a graduate program in Plant Sciences at the City University of New York, ending up with a doctorate in 2001. My illustration of Carol Levine's *Guide to Wildflowers in Winter* sparked an interest in the dry fruits and other remnants of out-of-season natives. I paint enlarged versions to better show their beauty and architecture. These paintings won a Gold Medal in the January 2006 Royal Horticultural Society Flower Show in London, where I also gained a Best in Show. Two of the paintings have recently been included in the Hunt Collection at Carnegie-Mellon University. Others are in the collections of the New York State Museum and the Lindley Library in London.

As a member of the Brooklyn Botanic Garden Florilegium, I have been drawing a number of the specimen trees on their grounds as well as in their Bonsai collection. I teach at the New York Botanical Gardens, and at workshops throughout the country. I have been on the board of ASBA for a number of years, and I am a past president of the GNSI.

billed as a drawing class I never let them get away without a talk each time, giving them an introduction to the science side of leaves, why they turn color, how important they are, and give them a glimpse into the variety of forms and a vocabulary.

They are given the link to download the book, and a talk about the ASBA. This is a fall-oriented program (I teach flower drawing at other times of the year) and we work with colored pencils. I have them do the rubbings as described, and careful tracings which they then transfer to their sketchbooks.

I use a variety of leaves, depending on what is available, and give each student one to work with and take home if they want to finish their work. Or they can reuse the tracing to try another medium. My classes run from 12 to 18 students and I sometimes use seasonal gourds to give them a break from leaves.

These are adults with mixed abilities, but with demos and a constant review of their work, I get amazing results. At the end of each class we look at all the student work, mostly unfinished, and then another review of last week's drawings at the start of the class. This tends to be inspiring for all."

COLORFUL LEAVES IS AVAILABLE TO ALL

It is rewarding to see that the material created for teaching adults as well as children is still being used by educators including ones with the level of experience and expertise of Dick Rauh. Developing *Colorful Leaves* from a good idea to a program with a publication took the efforts of many. Much appreciation and credit for its success goes to all the workshop presenters/teachers and to the ASBA for its financial support. For a free *Colorful Leaves* download, additional examples of how the material has been used with both children and adults, and notes plus images of student work from Dick Rauh's classes see: *asba-art.org/node/13130*.

A Note from Gail Selfridge

As members of GNSI we are all creative people and as such we each have about 100 brilliant ideas every day, but it's when we actually begin to test even one of those ideas that we discover being creative does not just mean "Gail Selfridge, good draw-er." To truly see any one of those ideas to completion requires not only drawing skills but what may be the most difficult task of all—to develop and use our creativity to solve reality-based problems.

Such was the case with the *Colorful Leaves* project—an idea originally conceived at the Huyck Nature Preserve and Scientific Research Station during my stay as an artist-in-residence (see journal article in *JNSI 2013, volume 45, number 1:* "The COM.EN.ART Experience"). It was further developed while I served as the Art Director at the Kansas State University Gardens (see *JNSI 2015, volume 47, number 1:* "Leaf Rubbing as Educational Outreach"). Securing grants has become a way of life for me, so applied for the ASBA Anne Ophelia Dowden Award and received funding for the *Colorful Leaves* project. Working alone in my studio and in my neighborhood, I researched, created, wrote, illustrated, secured a printer, and submitted online a press-ready file for the entire *Colorful Leaves* publication (44 black-and-white pages and 4 color pages). I worked with the printer and, after much experimentation, selected a paper that made it possible for users to work directly in the book if they so desired.

Once the publication was printed, I attempted to have it made available in museum and botanical garden shops. I quickly discovered that there was one group operating in California that decided and determined what many if not most of these shops will carry. What a disappointment when they turned me down. Not only were they rejecting my great idea, but at that point I had to put on my Tom Terrific thinking cap and figure out where to go next. Nothing to do but place the book on Amazon. Not an easy task I can assure you.

But then what? I am sitting on top of all these books that had to be distributed and had to devise a plan for getting them into the hands of users—that was part of the grant agreement. Contacts were made with persons who agreed to accept a copy and write a review for the Amazon page. I let members of ASBA and GNSI know that I would send 10 free books to anyone who would agree to give a workshop using the materials then send me photos of their event and a brief description of what they did. Those workshops can now be seen at the ASBA Colorful Leaves site, a PDF called *Colorful Leaves Inspired Workshops and Presenters*. Raising the visibility of the publication in this manner was not part of the original plan, but plans must evolve to accommodate real circumstances. The workshops and the people who gave them became a very important part of not only selling/distributing the remaining copies, but also the success of the entire project, and I am forever grateful for their participation.

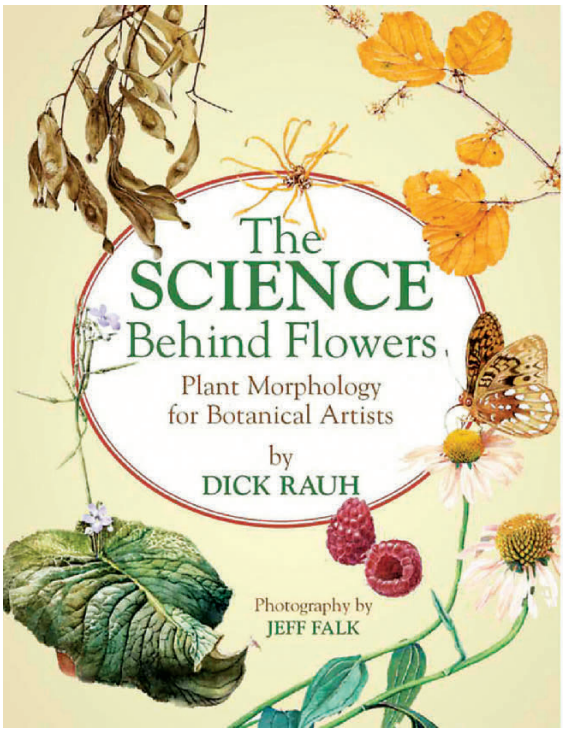
Once the supply of printed books was gone, I decided that being a book publisher/distributor was definitely not my calling, so contacted ASBA and asked if they wanted to put the material online as a free download for any and all to use. After all, it was funded through their grant money. They said yes, so I created and produced the PDF files that are now online for all to see and use free of charge.

Book Review:

The Science Behind Flowers, by Dick Rauh

— Reviewed by Camille Werther

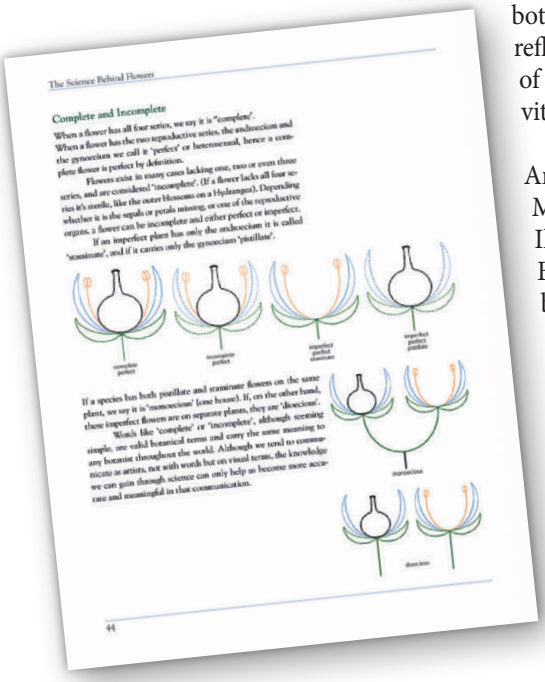
GNSI Past President, Dr. Dick Rauh, has written an invaluable reference book for those who love flowers, those who teach scientific and botanical illustration, and artists who want to deepen their knowledge of how plants work. The author is both an artist and a scientist, having earned a PhD in Plant Sciences at CUNY, and brings his knowledge of both disciplines to the format of the book.



All illustrations © Dick Rauh, unless otherwise noted.

Right: Book cover, *The Science Behind Flowers*.

Below: Page from the book *Complete and Incomplete*.


The Science Behind Flowers

Complete and Incomplete

When a flower has all four series, we say it is "complete". When a flower has the two reproductive series, the androecium and the gynoecium we call it 'perfect' or heterosexual, hence a complete flower is perfect by definition.

Flowers exist in many cases lacking one, two or even three series, and are considered "incomplete". (If a flower lacks all four series it's sterile, like the outer blossoms on a Hydrangea). Depending whether it is the sepals or petals missing, or one of the reproductive organs, a flower can be incomplete and either perfect or imperfect. If an imperfect plant has only the androecium it is called 'staminate', and if it carries only the gynoecium 'pistillate'.

If a species has both pistillate and staminate flowers on the same plant, we say it is "monoecious' (one house). If, on the other hand, these imperfect flowers are on separate plants, they are 'dioecious'.

Words like 'complete' or "incomplete', although seeming simple, are valid botanical terms and carry the same meaning to any botanist throughout the world. Although we tend to communicate as artists, not with words but on visual terms, the knowledge we can gain through science can only help us become more accurate and meaningful in that communication.

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The book is a visual feast, including the author's beautiful paintings, examples of student notebook sketches, stacked dissection photography by Jeff Faulk, and numerous diagrams and charts to highlight the concepts presented in the text. The decision to include the stacked photos of the dissections is noteworthy. The author mentions in the introduction how he first came across stacked photos, which are photos taken in slices through the depth of the plant and stitched together to make a composite where everything is in focus. He discusses how photographs are different from botanical art, which inevitably reflects the intent and perceptions of the artist, and argues for the vital role of the artwork.

Arising from his Plant Morphology for Botanical Illustrators class at the New York Botanic Garden, the 184-page book is patterned after eight class sessions, based on his lecture notes and dissections. Thirty representative plant families are presented in the dissections in the book (he suggests using 24 in class, so there are extras if one is unavailable to the teacher). The book is divided into six chapters, with a helpful book list at the end.

Throughout the book, Rauh is attentive to the needs of teachers like himself. Tips for obtaining plant material are noted: some flowers freeze well and can be collected in season and preserved for a later class. Alternate plants for some of the dissections are also given, and there are notes regarding supermarket flower sources. Lilies, for example, often have the stamens removed, and stamens in carnations are often malformed.

Chapter One, "Basics," answers the question of how plants are organized. What is Plant Science? What are the parts of a flower, and how did they originate? What is the purpose of a floral dissection, and how should it be done? What is a floral formula? Beginning with the Magnolia family, Rauh shows how he leads his students to set up a notebook page, from habit drawings to dissections. The strikingly clear, stacked photographs with labels show the student what to look for during the dissection. Facing the photographs are drawings from student notebooks, which show a range of individual approaches to the study. Next, he moves through the Arum, Lily, Iris, and Orchid families, pointing out the differences in the floral formulae.

Chapter Two, "The Flower," delves into the organization of floral structures. Complete and incomplete flowers are explained. Helpful diagrams of ovary position, placentation, and inflorescences are given and discussed in the text. The dissections include the Buttercup, Witch Hazel, Spurge, and Violet families.

Chapter Three, "The Big Picture," addresses the position of the flowering plants in the overall classification of plants, and delves into the fossil record and the current topics in plant taxonomy. Dissections in this chapter include the Willow, Pea, and Rose families.

Chapter Four, "Alternation of Generations, Double Fertilization, and Pollination," is a lengthy chapter. Life cycles of ferns, mosses, and flowering plants are compared. There are very clear illustrations which lead the reader through what happens during fertilization and seed formation. Pollination is discussed; the author explains how scent, color, and form all contribute to the pollination of a plant. Dissections include the Begonia, Birch, Beech, and Geranium families.

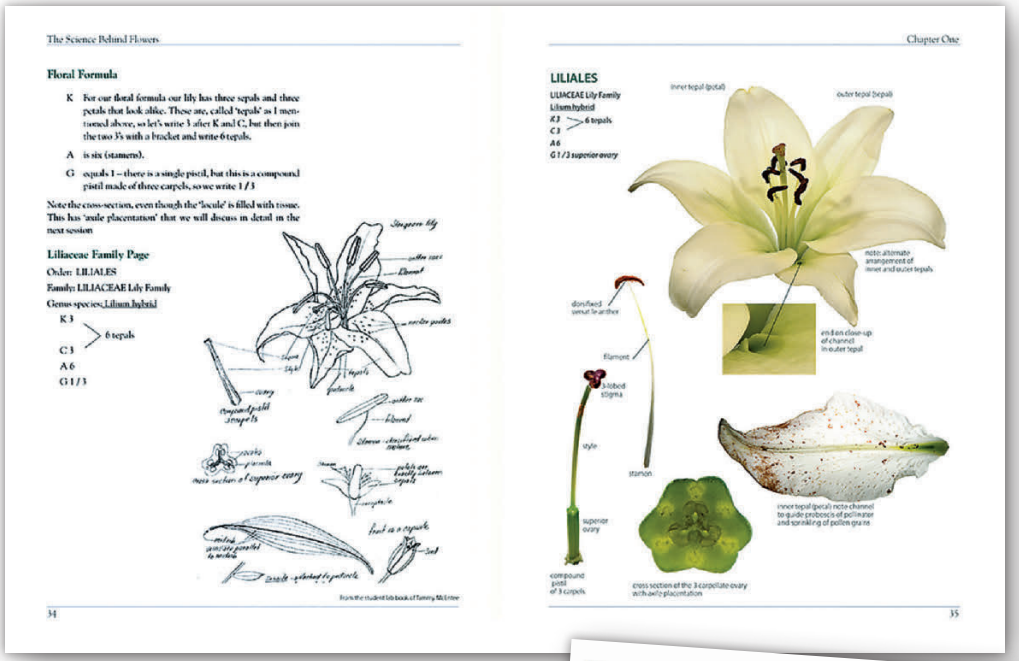
Chapter Five, "Fruit," introduces us to the classification of fruit. He devotes two class sessions to this topic, so the chapter contains seven possible dissections. Dr. Rauh mentions the shifts in terminology behind fruit nomenclature and his own approach to the topic. This is very helpful, because students may come across conflicting information in their reading, and it is good for them to be aware of the different schools of thought on the topic. Fleshy and dry fruits are covered, and the author's beautiful illustrations of dry fruit are notable in this chapter. Dissections include the Mustard, Mallow, Maple, Pink, Pokeweed, Cactus, and Smartweed families.

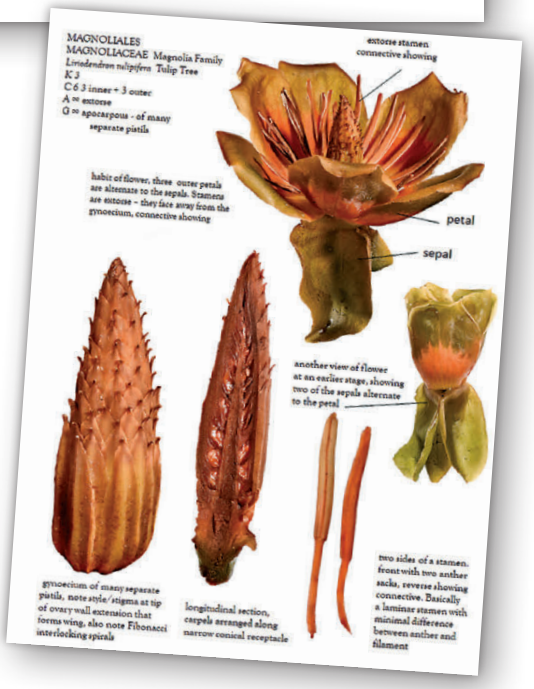
Chapter Six, "Vegetative Morphology," covers roots, stems, and leaves. Again, there are helpful illustrations to introduce topics such as storage organs, phyllotaxy, and leaf forms. Because he devotes two class sessions to the subject matter, the seven dissections in this chapter include the Dogwood, Heath, Nightshade, Plantain, Mint, Carrot, and Aster families.

The book list at the end is invaluable. I found old favorites listed, and some new books to investigate. It is important to note that the author intends his text to be used alongside a good botanical glossary. Attempting to define the large number of specialized terms used is outside the scope of this book, but students will need to know what the terms mean. Two comprehensive botanical glossaries are listed.

One suggestion I would make for future editions is the inclusion of an index. When questions arise in class, it would be helpful to know where information in the body of the text is located. I would also suggest expanding the table of contents to include the families included in the dissections.

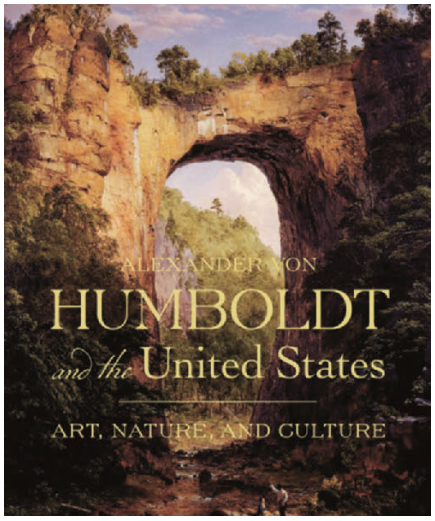
The Science Behind Flowers is a much-needed text for botanical illustrators at any level. Teachers of botanical illustration, especially, will find it helpful to structure their classes and provide an engaging text for students to use in the classroom during dissections. I know from my own teaching experience that students are looking for this type of text to use in the classroom, having been asked to "put everything we talked about in class into a handout!" Rauh's book is the answer to this problem and will be a welcome addition to my teaching materials.





Above top: Lily pages, student drawing, and stacked photography.

Above: Magnolia Family page.



Above: Book Cover. Frederic Edwin Church, *The Natural Bridge*, Virginia, 1852, oil on canvas, 28 x 23 in.

Book Review:

Alexander von Humboldt and the United States: Art, Nature, and Culture by Eleanor Jones Harvey

— Reviewed by Theophilus Britt Griswold

A new, coffee table-style exploration of Prussian naturalist Alexander von Humboldt provides a view of the early 19th century in America and how one man's multitude of societal influences mirrors the connectedness of our world. This view of the world is the one Humboldt proselytized throughout his career. His insight allowed him to champion the natural wonders of the Earth and warn of the threat humans were creating with the destruction of the world's resources. This book is a companion to the coronavirus-delayed new exhibit at the Smithsonian American Art Museum in Fall 2020.

Humboldt lived from 1769–1859, but only spent six weeks in America, in 1804. Already a well-known figure, during this short time he met with many leading artists and cultural luminaries, including President Thomas Jefferson. Humboldt's view of connectedness of all things led him to explore many areas of science and work with leading researchers of the age. This ultimately resulted in a master work, *Cosmos*, a series of five volumes published from 1845 to 1859. The series cemented his reputation as one of the leading authors of his age, with wide influence on the thinking of American and European artists, authors, and politicians. Indeed, one might consider him to be the Carl Sagan of his time, only more so: learned, multi-talented, artistic, and well-connected; a mentor for scientists, with a large public following.

Author Eleanor Jones Harvey wades deeply into Humboldt's influence in America, exploring major themes and social issues as they are reflected in the art, writing and events of the 19th century. This is first and foremost a book of history, woven together with a web of connections embodied in one extraordinary man. It illuminates the history of America and the influence of the natural world on its development. It is graced by art, illustrations, and objects produced by American and European artists and artisans whose subject matter is the natural world, landscapes and people of the western hemisphere. The book's art contains much well-known material from the archives of the Smithsonian and other collections, curated to support the narrative of history presented here. The handsomely presented artwork is that of many leading artists of the age. Notable inclusions are from members of the Peale family, George Catlin's visual exploration of the Indians of the American West, and the majestic landscapes of Frederic Edwin Church. These and many more artists are explored in the context of the historical events of their time. Ultimately Humboldt's influence was felt by the English chemist James Smithson, whose decision to bequeath the funds needed to establish an American center for science and learning, memorialized with the phrase, "…an establishment for the increase and diffusion of knowledge", may have been pivotally affected by Humboldt's enthusiasm for the potential embodied in the United States of America and its natural wonders.

Why do we not know and revere this amazing life from the early 19th century? Humboldt's eminence fell out of favor in America in the early 20th century with the anti-German hysteria of World War I and the specialization of study in the various domains of science. It is intriguing to be able to rediscover this lost prophet of a bygone age, just as we are beginning again to re-establish the need for a fuller understanding of the web of life that connects all things.

Below left: Friedrich Georg Weitsch, *Portrait of Alexander von Humboldt (1769–1859)*, 1806, oil on canvas, 49 5/8 x 36 3/8 in.

Below right: George Catlin, *Máh-to-tóh-pa, Four Bears, Second Chief, in Full Dress, 1832*, oil on canvas, 29 x 24 in. Smithsonian American Art Museum.

Anatomy Coloring Book

— Jonathan Higgins

COLORING WITH BENEFITS

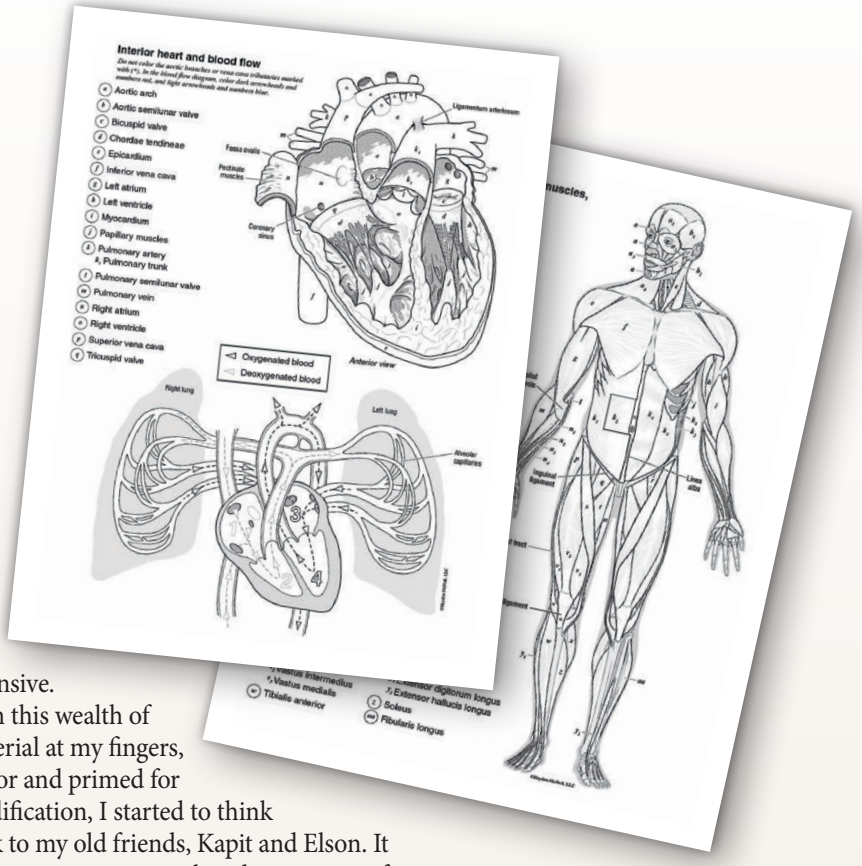
My slightly ragged copy of Kapit and Elson's *The Anatomy Coloring Book* still holds a treasured spot both on my reference shelf and in my heart. Throughout Gross Anatomy in my medical and biological illustration program, it was an indispensable tool for learning terminology and a dependable late-night review companion. The tactile and intentional act of coloring an anatomical structure while concurrently coloring its name somehow cemented the connection in my mind.

What Kapit and Elson knew back in 1977 has been tested and proven many times since. Coloring lowers cortisol levels, which run high during times of anxiety and stress.[1,2] Color is an "indisputable" aid for enhancing attention and improving permanent memory storage.[3] Motor activities like coloring positively affect memory performance; this is termed the "enactment effect."[4] Kapit and Elson, in the preface to their first edition, correctly identified coloring as "one of the most effective and pleasant methods of learning."[5]

THE HAYDEN-MCNEIL APPROACH

The publishing company I work for specializes in custom lab manuals for the higher education market. The illustrations my colleagues and I create for any particular publication are keyworded and added to a content collection. Other authors may then search the collection and select appropriate images for their own publications. In the interest of easily modifying for future applications, we use Adobe Illustrator to create vector files. This allows us to efficiently revise labels and the artwork itself: modifying or colorizing based on the custom requests.

With biology, chemistry, physics, and geology titles, to name a few, we have amassed a sizable and diverse assortment of artwork. Our anatomy and physiology illustration collection especially has gotten to be quite extensive.



Above: Thumbnails of anatomy coloring pages. © 2020 Hayden-McNeil, LLC

With this wealth of material at my fingers, vector and primed for modification, I started to think back to my old friends, Kapit and Elson. It took some persistence, but the prospect of our own Anatomy and Physiology Coloring Book was finally attractive enough to get the green light.

CONVERTING ART CHALLENGES

The first step was deciding how many individual activities we would need. After compiling a comprehensive list including every activity I thought necessary (over one hundred and seventy!), it was time to peruse the content collection and see if we had the art to do it. Most images would translate well into coloring activities. Color images could easily be converted to grayscale, fills could be changed to white, and line weights could be adjusted. Some images presented challenges, however.

Distinct structures make sense with bold outlines, but some anatomical areas aren't so clearly defined. Consider the lobes of the brain, or the fundus, body, and cervix of the uterus. I would have to come up

[1] Kaimal, Girija, Kendra Ray and Juan Muniz. 2016. *Reduction of Cortisol Levels and Participants' Responses Following Art Making, Art Therapy.* 33(2): 74–80.

[2] Holt, Nicola J., Leah Furbert and Emily Sweetingham. 2019. *Cognitive and Affective Benefits of Coloring: Two Randomized Controlled Crossover Studies, Art Therapy*. 36(4): 200–208.

[3] Dzulkifli, Mariam Adawiah and Muhammad Faiz Mustafar. 2013. "The Influence of Colour on Memory Performance: A Review." *The Malaysian Journal of Medical Sciences*. 20(2): 3–9.

[4] Maden, Christopher R. and Anthony Singhal. 2012. "Using Actions to Enhance Memory: Effects of Enactment, Gestures, and Exercise on Human Memory." *Frontiers in Psychology.* 3:507.

[5] Kapit, Wynn and Lawrence M. Elson. 1977. *The Anatomy Coloring Book.* HarperCollins Publishers.

Next page: Full-size coloring page of the human skull. Color, be happy, and learn!

with a solution for that. And how can you identify and color an intestinal villus, if you've already colored it as mucosa? Another puzzle.

The number of unique colors a student can acquire is a big consideration. You could require each student to purchase a set of 72 Prismacolors, but that's obviously unreasonable. Locating a set of 24 colored pencils is an easier sell. But that limits the number of terms you can include on one page without repeating colors and strewing confusion. I would have to keep the terminology lists as succinct as possible.

Internal details would sometimes need to be retained: muscle striations, fat globules, individual cells. But they shouldn't compete or interfere with the coloring outline. On occasion it seemed necessary to include a modest amount of shading to make relationships between structures clearer. But would pencil adhere well to these heavier areas of ink? Would they be clearly part of the structure to be colored? Additionally, I would have to designate an identifier for areas not to be colored at all, like a foramen or hiatus.

A decision had to be made regarding the appearance of the terms list. My experience with Kapit and Elson was coloring the entire name of the structure, written in bubble letters. Not a font, by the way! Every letter was hand-drawn. Some offerings since, though, like *Netter's Anatomy Coloring Book*, adopt a color key approach, with boxes to color in front of the terms. Although I saw pedagogic value in coloring each letter of the terms, our market research determined that users would clearly prefer not to do this, and liked the Netter approach better.

Another decision needed to be made concerning whether we would provide a "color-by-number" key to help students identify the right structure, or gear the activities more toward self-learning by requiring the student to locate the correct structures on their own. Although the second option opens up the possibility of the wrong structure being colored, thereby rendering the plate unusable for future review, the market was split on this point. I needed to ensure I could accommodate both versions.

"Distinct structures make sense with bold outlines, but some anatomical areas aren't so clearly defined. Consider the lobes of the brain..."

Since we're all about custom here at Hayden-McNeil, this was right up our alley. This also drove the decision not to print a stand-alone, off-the-shelf product. Rather, we would create individual activities that would be available within our content collection for inclusion in any lab manual—perhaps combined at the end as an appendix, or placed within each relevant chapter, at the author's discretion. They could be keyed or unkeyed as needed, and we would of course be able to modify the art and terms to match individual teaching approaches. Do you call it the Achilles or the calcaneal tendon in your class?

CHALLENGES ACCEPTED

I liked the look of 0.8 pt strokes for the heavy outlines, and used 0.4 pt for interior details. Most of these detail strokes utilized a tapered brush of some variety, so I did tweak line weights according to the brush parameters for consistency. I found it helped to go with 65% gray strokes as well, for muscle striations and bone details and the like, so as not to compete with the bold structure outlines.

Structures that were not to be colored as part of a particular activity, but were necessary to include for reference, were filled in gray with gray strokes. For example, the bones of the pelvis to which the perineal muscles attach. To solve the problem of structures without clear boundaries I utilized a gray dashed line, defining this style in the instructions. This ensured the student would know where to stop coloring without a strong black outline confusing the actual definition of a structure.

Dimensional shading, when needed, worked just fine with a gray shape set to multiply transparency—as long as it was minimal. Anything larger than a thin swash I handled with a hatching pattern set to multiply transparency and 75% opacity. This did not interfere with pencil pigment adhesion but still provided enough modeling to the structure beneath once colored.

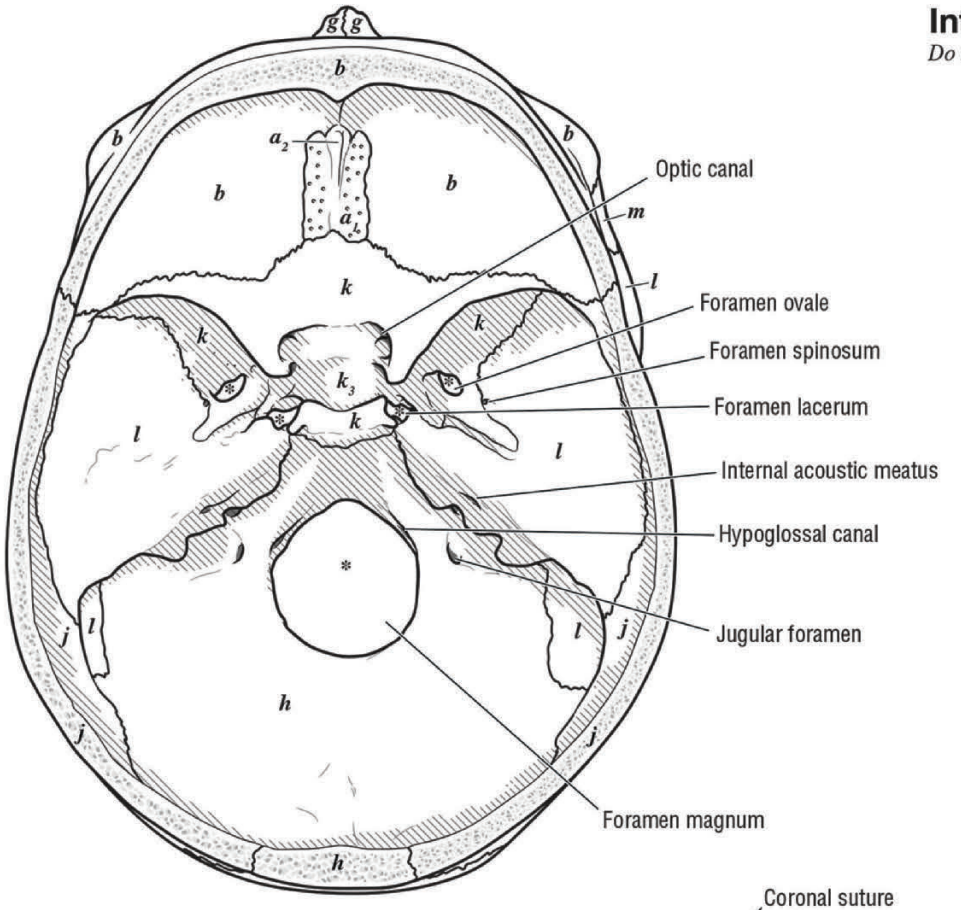
I used the terminology list itself to solve some of the other challenges. By creating subentries, I could have the student use one color for a set of related structures, but still recognize the individual components. The ethmoid bone is treated with one color, yet understood to be comprised of the cribriform plate, crista galli, and middle concha. This also helped to keep the required number of unique colors manageable on term-heavy activities.

Labels on the art itself came in handy when something was important enough to be called out but wouldn't make sense to color separately (the supraspinous fossa and coracoid process of the

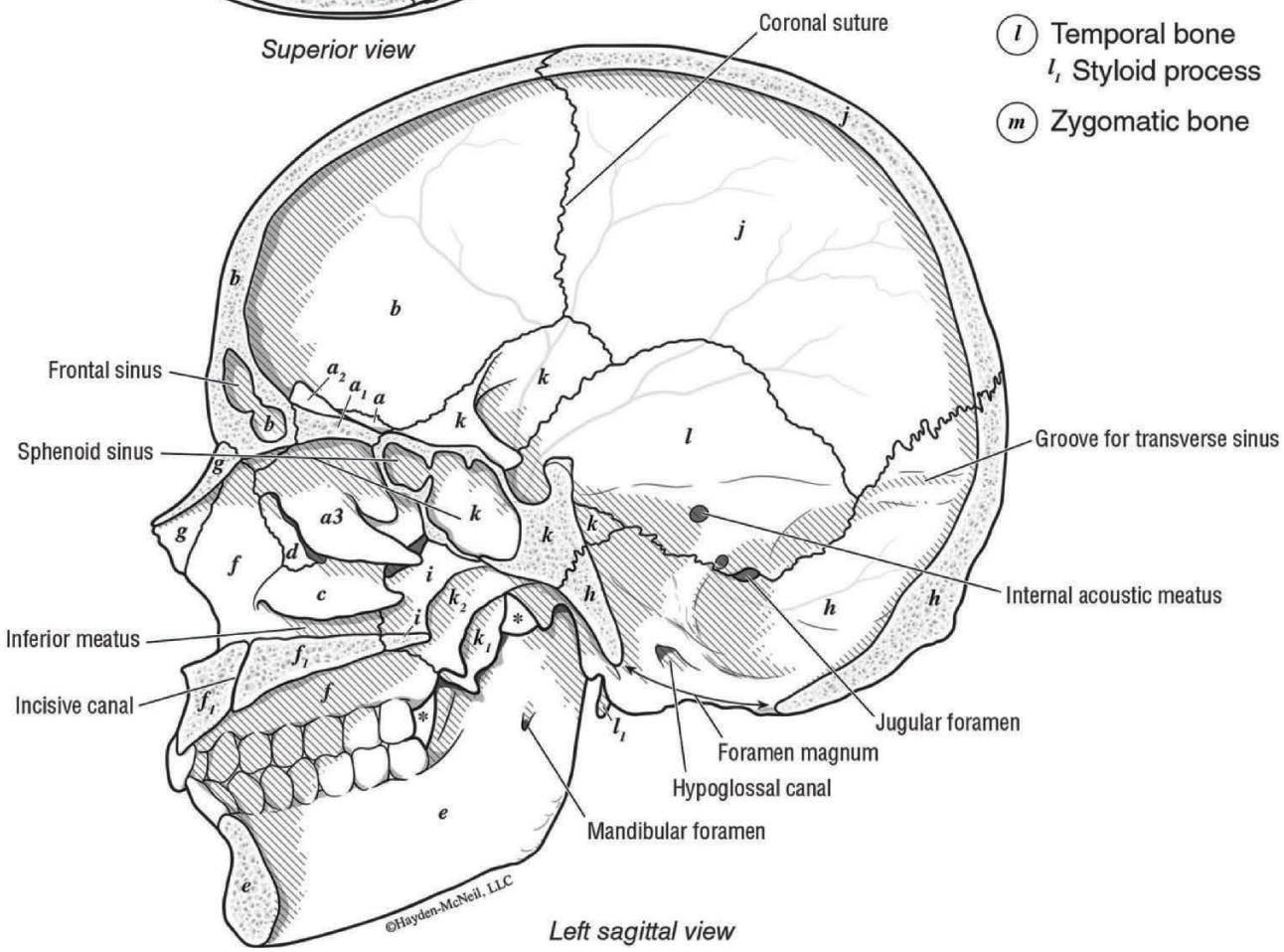
Interior views of the skull

Do not color the teeth or holes marked with (*).

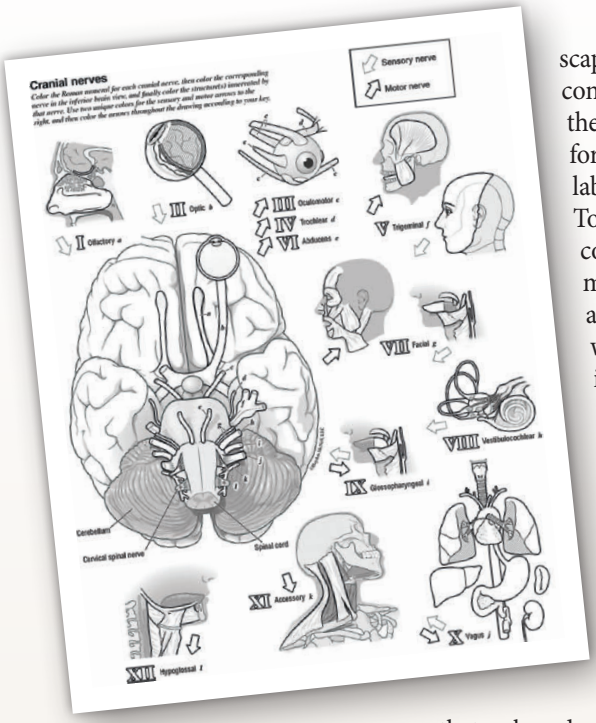
- (a) Ethmoid bone
  - a_1 Cribriform plate
  - a_2 Crista galli
  - a_3 Middle concha
- (b) Frontal bone
- (c) Inferior concha
- (d) Lacrimal bone
- (e) Mandible
- (f) Maxillary bone
  - f_1 Palatal process
- (g) Nasal bone
- (h) Occipital bone
- (i) Palatine bone
- (j) Parietal bone
- (k) Sphenoid bone
  - k_1 Lateral pterygoid process
  - k_2 Medial pterygoid process
  - k_3 Sella turcica
- (l) Temporal bone
  - l_1 Styloid process
- (m) Zygomatic bone



Superior view



Left sagittal view



Above: Cranial Nerves coloring page. © 2020 Hayden-McNeil, LLC

scapula, for example). I used a condensed font, smaller than the terminology list by 2 pts, for these. This is also how I labeled foramina and hiatuses. To ensure that these didn't get colored at all, I adopted the method of Kapit and Elson and marked each opening with an asterisk. This style is defined in the coloring instructions.

For keyed activities I used an italicized serif font within the key color circle in the term list and placed the corresponding letter on the structure. These key letters were all kept on a separate layer so that unkeyed activities could be produced by simply hiding that layer. I wanted the letters to be small and unobtrusive but after internal testing it was apparent that for many they were too hard to see; bolding and bumping to 8 pt improved legibility.

QUALITY CONTROL

Color-testing in house was essential. Not only did I find out which fonts needed to be more readable, it became clear which structures needed better definition and better labeling. Where do I stop coloring? Cut edges, sinuses, and structures which pass behind others were problematic. I may know the semimembranosus muscle continues through to the other side of the semitendinosus, but a student unfamiliar with the anatomy may not. A few more key labels, and descriptions within ("cut edge of b"), helped clear up the confusion like this.

I discovered through testing that some areas didn't work well with every color choice. I added activity-specific coloring instructions where needed to encourage the student to use appropriate colors. Lighter colors for larger areas work best, and bold colors for small or thin structures. I reminded students not to color certain areas marked with asterisks. And I suggested that standard color conventions be followed when feasible, for example, with the retinal artery (red) and vein (blue) in the cross-section of the eye.

With the internal feedback received and revisions made, I worked with one of our authors and field-tested the activities with his anatomy students. They utilized a set of coloring activities in their classes that semester and responded to our survey. The responses were very favorable! As a whole they found them helpful, easy to follow, and rewarding. Confident that the coloring activities were ready for public distribution, I loaded them to our content collection and announced their availability to our editors and sales staff.

COLOR, BE HAPPY, AND LEARN

Since releasing the coloring activities, our existing anatomy and physiology authors have been enthusiastically adding them to their manuals. New authors have been eager to select coloring activities to accompany the other illustrations in their publications, while some have compiled manuals of nothing but coloring activities—their own custom coloring books. We have already expanded the initial lineup of activities based on author requests, and plan to continue building out our physiology offerings, as well as spreading out to biology, botany, and beyond.

"The responses were very favorable! As a whole they found them helpful, easy to follow, and rewarding."

The next time you feel your cortisol levels rising, or the world just seems a bit disordered, grab some sharpened colored pencils and a coloring book. And if you grab the right one, you just may learn something along the way!

Jonathan Higgins
Jonathan works with an amazing and talented team of science illustrators at Hayden-McNeil in Plymouth, MI, creating custom lab manuals and course materials for higher-education authors across the country. He graduated from the University of Michigan with an MFA in Medical and Biological Illustration. His trail name is Buzz, as in buzzard, because you can always count on him to sniff out discarded bones, feathers, and carcasses.

Curated Colored Pencils

— *Kathleen Garness*

As winter approaches we might want to spend more time being creative. But sometimes I find myself overwhelmed by too many choices! This is the curated colored pencil set I have been using with my botanical art students at the Prairie House in Westchester.

My goal was to find a high-chroma, small, and efficient palette of high-quality colored pencils at a reasonable price. From this palette of Prismacolor® pencils you can mix all the other colors. I did not find a comparable magenta (the process red) in any other brand lines, sorry to say. I do like the Faber-Castell® oil-based line and was disappointed they did not have a pure magenta. The Faber-Castells do not produce a waxy bloom that can be an issue with Prismacolors when layered thickly.

What we have is the purest primary and secondary colors I could find, plus some light value warm and cool grays. These are indispensable for many botanical art subjects but are also useful for landscape, portrait, still life, and abstract as well. Two "convenience colors" in darker values are also included. Here is the range:

- PC915 Lemon Yellow
- PC1002 Yellowed Orange
- 746 1/2 Verithin® Tuscan Red (you can also use the regular Tuscan Red—the Verithins are great for detail work though and this maroon red is so ubiquitous in plants, especially new growth and senescence)
- PC994 Process Red (a true magenta)
- PC932 Violet
- PC903 True Blue
- PC989 Chartreuse
- PC1050 10% Warm Gray
- PC1059 10% Cool Gray
- PC1052 30% Warm Gray
- PC1026 Greyed Lavender
- PC901 Indigo Blue

These all fit into a 12-pencil box. I use the white of the paper for white. If you're working on colored paper, a good white pencil (PC938) is needed. To keep a total of 12 pencils, you could swap out the 30% warm gray for white and use the other colors plus either white or the 10% warm gray to get to your 30% warm. The three darkest colors combine well to make a good black, which you can shift either warm or cool depending on your subject, using different combinations of the colors.

Above: Color pencil set and blending chart.

Below: Persimmon

For watercolor pencils, the General's® set has a good magenta and clear primaries. I provided this set to my students when I was doing my artist residency with the Forest Preserves of Cook County three years ago.

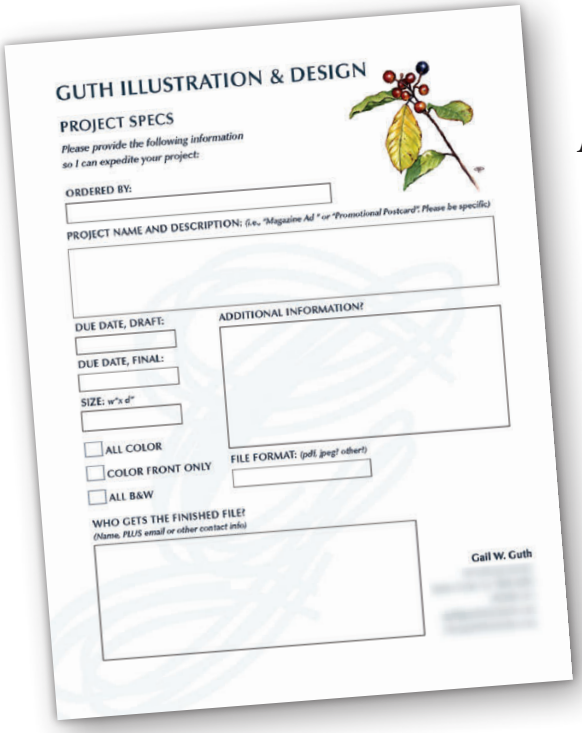
Hopefully this might encourage you! I would love your feedback on my selections.

The Business of Illustration

Getting Organized

— *Gail Guth*

Many of us, like myself, are largely self-taught in illustration in general and particularly in running the business of illustration. Dealing with clients, time management, file and asset management and billing are all skills—and they ARE skills!—that are often hard-learned over time. Maybe you are just starting out on your career as a freelancer or perhaps the COVID meltdown has put you into freelance status for the first time. This is the first of two articles that offer a few suggestions for all of you who are taking that big step into the world of freelancing. The next article in an upcoming issue offers tips on dealing with clients.


GUTH ILLUSTRATION & DESIGN

PROJECT SPECS

Please provide the following information so I can expedite your project:

ORDERED BY:

PROJECT NAME AND DESCRIPTION: (i.e., "Magazine Ad" or "Promotional Postcard". Please be specific)

DUE DATE, DRAFT:

DUE DATE, FINAL:

SIZE: w"x d"

ADDITIONAL INFORMATION?

ALL COLOR

COLOR FRONT ONLY

ALL B&W

FILE FORMAT: (pdf, jpeg? other?)

WHO GETS THE FINISHED FILE? (Name, PLUS email or other contact info)

Gail W. Guth

Above:
Project Specs Sheet

SETTING UP FILES

I struggled for a while to find a good system for record keeping, and finally settled on a job number format that has worked for me ever since. I assign a job number (the two-digit year + a sequential number, i.e. 20-001, 20-002). Over the years I've found this to be the most efficient way to keep track of jobs, particularly with jobs that recur from one year to another.

Whatever system you come up with, just titling a job "Leopard Frog Eggs" won't help you keep track if you have to do separate Leopard Frog Eggs projects for the next three years. It also helps you locate the file if the client asks for changes several years later (it happens). It's best to add a date. I then create a desktop folder with the job number and a short name: 20-001 My New Job. Within that folder I make subfolders: ART, ASSETS, and DOCS & MISC.

ART

The ART folder obviously has the working art files. Each is dated and identified so I don't lose track of when changes are made. [ladybug 3-12-20; ladybug 3-12-20b; ladybug 3-13-20 etc.].

I keep all files until the job is done and billed. If this gets to be an annoyingly long list, make a new subfolder entitled "ARCHIVES" or similar and place the older files there. You never know when a client will want to go back to a much earlier version, or when you need a bit of art from that earlier attempt. Once the job is long finished (printed and billed), you can dump the Archives folder, or keep it for as long as you like. I recently had a client ask for a bit of art from 2013, and yes, I still had it (see Back Up below).

ASSETS

The ASSETS folder has whatever bits of art, clip art, or photos you find, add, or generate, including all reference materials. If you use Adobe CC®, you can create assets folders in *Libraries* as well which are then accessible from all of your Adobe CC programs, quite handy; but I still use the desktop file as well to store these bits and pieces.

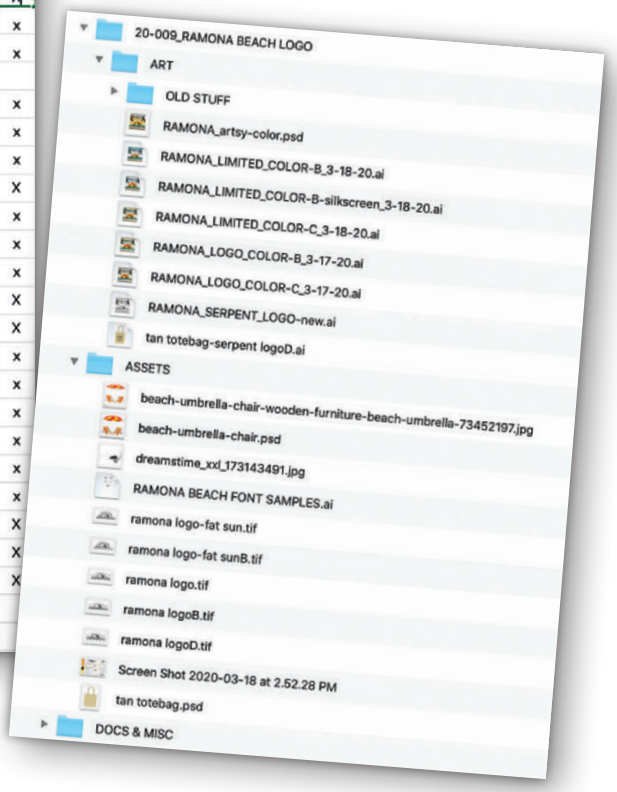
DOCS & MISC

The DOCS & MISC folder holds the original project notes, estimates, proposals, any other necessary documents, vital emails, and eventually, the invoice. I make subfolders in my email program to hold the back-and-forth exchanges, but I also save a copy of the more important exchanges in this file for quick reference and permanent storage with the project files. You can add other subfolders as needed, but for most projects, this seems to do well for me.

BACK UP

Back up the main project folder regularly on an external drive. Do this *at minimum* several times during your project (daily or even more often as you work if the project is especially complex) and definitely when the project is finished. External drives

Job #	Job Name	Client	Contact	Date In	Date Due	Done
18-008	Wild Ones Brochure Rev.	Kzoo Wild Ones	Mike Klug	9/27/18	10/17/18	x
19-005	Estivant Pines	Michigan Nature Assn.	Julie Stoneman	9/21/18	TBD	
19-006	Portage Park Farmer's Market logo	city of Portage	Kathy Hoyle	9/1/19	ASAP	x
19-011	Destination: Portage PPT	City of Portage	Kathy Hoyle	12/26/19	ASAP	x
19-012	MLK Panels	City of Portage	Kathy Hoyle/Lauren	12/26/19	1/20/20	x
20-001	Ramona Exhibit Panels	City of Portage	Kathy Hoyle/Lauren	1/9/20	ASAP	x
20-002	MLK Banner	City of Portage	Kathy Hoyle/Lauren	1/9/20	1/20/20	x
20-003	Summer Events Posters & Banners	City of Portage	Kathy Hoyle/Alyssa	1/9/20		x
20-004	Sea Serpent Hunt	City of Portage	Kathy Hoyle	2/6/20		X
20-005	Founding Families Exhibit panels	City of Portage	Kathy Hoyle	2/6/20		x
20-006	My Turn To Drive web page revision	Rafaill & Associates	Bill Rafaill	2/6/20		x
20-007	Blast Off Illustrations	Center for Collaborative	Roberta Morris	2/6/20	3/31/20	x
20-008	Thank You Sponsors Banner	City of Portage	Alyssa Milbeck	2/17/20	3/16/20	X
20-009	Ramona Park Logo	City of Portage	Kathy Hoyle	2/28/20		X
20-010	JayDor Logo	JayDor	Teresa Clark	3/3/20	ASAP	x
20-011	Staff Caricatures	City of Portage	Kathy Hoyle	3/25/20	ASAP	x
20-012	Exhibitions Booklet Covers	City of Portage	Kathy Hoyle	3/30/20	4/1/20	x
20-013	Portage JrRanger icon	City of Portage	Kathy Hoyle	3/31/20	4/10/20	x
20-014	Portage JrRanger badges	City of Portage	Kathy Hoyle	4/1/20	4/10/20	x
20-015	2021 Show Logos	Cornwell's	Patti Cornwell	4/25/20		x
20-016	2021Groups Flier	Cornwell's	Patti Cornwell	5/15/20	ASAP	X
20-017	Revise banners & posters	City of Portage	Kathy Hoyle/Alyssa Milbank			X
20-018	I Love Portage Panels & Banner	City of Portage	Kathy Hoyle/Lauren	7/13/20	7/31/20	X
20-019	Portage Art Award Poster & Banner	City of Portage	Kathy Hoyle/Lauren	8/18/20	9/15/20	
20-020	Sarah's Nail Art	Sarah	Jamie	8/21/20	ASAP	



Left: Job tracking spreadsheet.

Below: File folder example.

are quite inexpensive now, and well worth the cost. A project I just finished (one of four very hectic projects all going on at the same time) had me diving into my backups for files I had deleted on my desktop by mistake.

Apple computer users also rely on Time Machine®; it has saved me many times, but I don't like to rely only on that program. I let Time Machine do its thing, but also backup on external drives for an extra layer of safety.

How you set up your files is up to you but find a system that is clear to you and get into the habit of regular backups while you work. Particularly if you are managing several projects at once, you will find the regular habit system invaluable to keeping your work organized and save you countless hours hunting for a bit of art or a client note, or—*horrors!*—rebuilding the work you just inadvertently trashed.

TIME-TRACKING

It's vital to keep track of the time spent on a project, both for billing purposes and to keep you on the straight-and-narrow…you will be amazed at how much time you spend fiddling around on a tiny piece of the project, or how often you step aside to fiddle with something unrelated. I have used OfficeTime® (*officetime.net*) for years to keep track of time spent on projects. When you set up your project you can add the job number, the hourly rate you expect to charge, and client name; when you begin working you start the timer. The timer keeps track of physical activity using the keyboard or drawing tablet; if you step away, you get a reminder that you have been inactive for XX minutes. The program is still timing, but you have the option to delete those stray minutes or keep them if you were actually still on the job, maybe doing research and just not using the keyboard or tablet. When finished, you can generate a spreadsheet report and even invoice directly from the program.

I track my time even if I am working on a set quote and not hourly; it helps keep me on track so I don't end up losing money. If nothing else, it helps me get an accurate idea of how long a particular type of job takes me to do, which is useful the next time I quote on a similar project. It's also helpful if I am working on more than one project at a time.

There are many similar programs out there; it's well worth your time to explore them and find one that meets your needs.

Good luck with your new projects! We welcome any questions or, if you are a seasoned professional, please submit additional suggestions and thoughts to help others get their careers going smoothly.

Art © Stephen DiCerbo

Working Essentially for Free?

This conversation on pro bono work is taken from the GNSI Sciart-Listserv. It is lightly edited for readability and clarity. Enjoy!

— Britt Griswold, RRRRipped Guest Editor

THESE POSTS are from the GNSI's SciArt-L Listserv, 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 *gnsi.org/listserve* for instructions on how to sign up. We would love to hear from you!

ORIGINAL POST

From: Taina Litwak
Hi All,

I got a pretty detailed proposal today in an email and wonder if I am the only one who finds it insulting. I can only imagine he will be reaching out to many of us, as I am certainly not a tetrapod specialist. This is how I answered him:

Dear Dave,

I am pleased you like my work, but really? Its an interesting project, but you are basically me to do A LOT for you, essentially for nothing, and then give my illustration away in perpetuity through Creative Commons licensing. I would never "volunteer" to do this sort of work, and I seriously doubt any other real professional would either. I am a scientific illustrator, and I have made a living doing this for 35 years. This is not a hobby, though it is a passion.

I would think you will get few takers, though you may attract some younger inexperienced students. The products they produce, with only your vague suggestion that they find (on their own) and show their work in progress to "scientists" is an almost certain recipe for inaccuracy or outright copying of scientifically established work.

RESPONSES

.....

From: Mieke Roth
I still am not used to these kind of requests although I get them almost on a weekly base. Yes they are insulting and I actually stopped responding to them other than giving an estimate on how much this would actually cost. I keep advising students not to fall into these traps, because this is how people like this still can get what they want. And it is actually one of the reasons I am in the process of getting a university job (with PhD tract) instead of being freelance. I'm fed up with "gratis".

.....

From: Gail Guth
Maybe the request is not intentionally insulting, more like breathtakingly naive at best, definitely presumptuous, and arrogant at worst. Methinks he thinks "what a wonderful project, and what a wonderful opportunity for an artist to be involved in it!" Um, no.

.....

From: Kathleen Garness
My rule for volunteering my time via artwork is: "Would I donate the equivalent of what this project will cost me in time and materials to the cause at hand?" And even then, on the one time I did this with a clear conscience, it seemed to take on a life of its own, gobbling up much more time than I might have initially anticipated. So yes, what Gail, Taina, and Mieke said!

.....

From: Elizabeth Morales
If you go to the link that shows his project thus far, it indeed does look like the work of inexperienced student illustrators. If he has paid for some of this work, as he mentions, my guess is that the rates must be low.

I would say "thanks but no thanks." Maybe if he came back with real money you might consider doing some of this, or turning it over to an illustrator who can benefit from the job.

From: Linda M. Feltner
Way down under Plan #3, there's a reimburse amount (typically between $200 and $500 USD). So there is some small payment intended. However, that depends entirely on the success of his future crowd-funding campaign. I didn't read it in detail. I read enough to agree with Gail that this sounds like naiveté, or presumption. I meet and hear from a lot of project managers who are new to the field, and they are still uneducated. Disappointing, extremely.

.....

From: Britt Griswold
This is obviously someone with a passion for a side project and he is looking for other people with the same passion—that understands his vision. Looks like he is not getting paid to do it and he would probably do it all himself if he had all the needed skills. I suspect he has the best of intentions to create something he thinks the world needs.

Best to congratulate him on his mission to educate the planet and let him know what this sort of thing really costs and the time involved to do it right, then send him on his way. Unless of course you share his vision and want to give of your time freely to the world... though this does really look like a mission for National Geographic, more multimedia skills, and a suitable budget...

.....

From: Mieke Roth
I agree that this is passion. The biggest problem I have with these requests, and I get them frequently, is that people just assume all artists are willing to follow someone else's passion instead of having to work for a living like every body else.

From: Barbara Harmon
I try to be as kind as I can in explaining things to people, but sometimes I just have to ignore the requests. Explanation takes time and energy and patience, all of which are (at least for me) in short supply, unfortunately.

I am asked for usage quite often from students, primarily for PowerPoint presentations, and I often end up giving it—when I can justify it being for some sort of overall good. I do like to promote conservation and education, and in each of these cases I could see that benefit.

Sometimes I will ask for a little administrative fee (seriously token—like $25) just to help me mentally with the time I must spend just to package even a small resolution file, and to help them understand that even a little means something (to me anyway!!); they are usually able to pay that small fee.

I just wanted to make the point that there are times when free or nearly-free is OK; I would never, ever, create anything new for free however!

Once you have vetted the inquiring individual (ask them questions, Google their research etc.), they will usually emerge as reasonable, and they can become sort of allies. I admit not much further work has come from these situations, but I think I am held in good esteem and SHOULD the situation arise, they will think of me. Also, I have met a few people this way that have become friendly enough that we keep in touch with progress on their research etc., which is of personal interest to me.

DID YOU KNOW?

The GNSI has a fantastic resource in the SciArt-L Listserv. Over 450 list members are waiting to hear from you. A wide range of experience and skills are represented in this group. Have a question? This is the place to go.

The one area that must be carefully trod is the question of pricing of your jobs. Explicit discussion of the pricing of a specific job could be considered "collusion" and "price-fixing." But discussing past prices (3 months or older) for specific work, and prices/hourly wages listed in the public sphere may be fair game. It is never appropriate to ask for specific pricing on an upcoming job for a specific customer or market.

Karen sketching an elephant beetle in watercolor.

Sketchbook Costa Rica

— *Karen A. Johnson*

On February 21st, 2020, I left the 13°F cold of Chicago for an adventure in the tropics of Costa Rica. For 20+ years, Mindy Lighthipe has led art and photography tours there and I had been wanting to go for some time and determined that this was the year. Before leaving, I did some studying on what wildlife we might see and what I might want to draw in my sketchbook. We were planning on visiting rehabilitation centers as well as the La Paz Waterfall gardens so I knew there would be a chance to draw birds and frogs in a contained setting. Upon arriving at San Jose, the heat, colors, and sounds of birds and insects was rather overwhelming but very welcome. It was hard to decide what to sketch first but the scarlet and yellow flowering vine was gorgeous and allowed me to break the white page, always a difficult thing to do.

Sketching while I travel helps me remember what I love the most, allows me to be in the moment and slow down, and helps me see details that aren't always captured in a photo. My travel sketches are a variety of *plein air* sketches, slower life studies and drawings from photos back at the hotel or home. I took thousands of photos, but I generally remember what I drew the most. I'm sure I provided quite a few people with some humor as they watched me sketching insects on the screens of the dining hall or obsessing over a giant elephant beetle on a trunk (*left*). Frequently, I start *en plein air* and finish later as I'm pulled away by timetables or people. Being flexible is important as the point isn't to have perfect pieces, but good memories. Capturing the mood or color of a scene is often enough to be able to work on a more finished piece later.

While most of my travel sketches emphasize nature, I do include some that are art, architecture or food, like chocolate, that brought me joy at the time.

KAREN A. JOHNSON is a freelance natural science illustrator. She's been a GNSI member since 1988 and recently served as Treasurer. Karen is an instructor of insect and botanical art at the Morton Arboretum and works in a variety of media including watercolor, acrylic and polymer clay. Sketching at home and while traveling is one of her favorite activities. Follow her on Instagram (*@karensnatureart*) or visit her site, *karensnatureart.com* to find links to Society6 and Spoonflower where she combines her sketches into designs for sale.

Left: Costa Rica spread pages 1 and 2.

All illustrations © 2020 Karen A. Johnson, unless otherwise noted.

Right: Costa Rica spread pages 3 and 4.

Left: Costa Rica spread pages 5 and 6.

Right: Costa Rica spread pages 7 and 8.

Illustrating Nature

CSUMB Science Illustration Graduate Program: Class of 2020

—Madelyn Neufeld, Liz Wahid, Ying Wang

Hi, we're the California State University, Monterey Bay (CSUMB) Science Illustration class of 2020. We're a tight-knit class of 16 students from the West Coast, East Coast, and even Taiwan! We have a variety of scientific and artistic backgrounds spanning the likes of paleontology, mycology, marine biology, entomology, ornithology, and more. We all met for the first time in September of 2019, and began intensive study in various forms of science illustration such as field sketching, natural history illustration, technical illustration, conceptual illustration, animation, and everything in between—with too many different types of media to count. Truly, it was an invaluable experience.

Back in March, we began to plan for the program's annual art show—usually held at the Pacific Grove Museum of Natural History—when suddenly social distancing mandates turned into stay-at-home orders, which then turned into the canceling of in-person classes for all CSUMB students. The possibility of having our graduate gallery show seemed to disappear before our eyes. But with classes moving to a new, virtual landscape, we were determined to have our gallery do the same. In large part due to the hard work of instructor Andrea Dingeldein, our gallery show *Illustrating Nature 2020* officially opened on June 5th, 2020 at 5:00 pm PST with a class reception through Zoom. With this move to a digital space we were able to reach a wider audience than ever before, with international reach! We're happy to now have a format in which future students can benefit from the scale of exposure this gallery show provided.

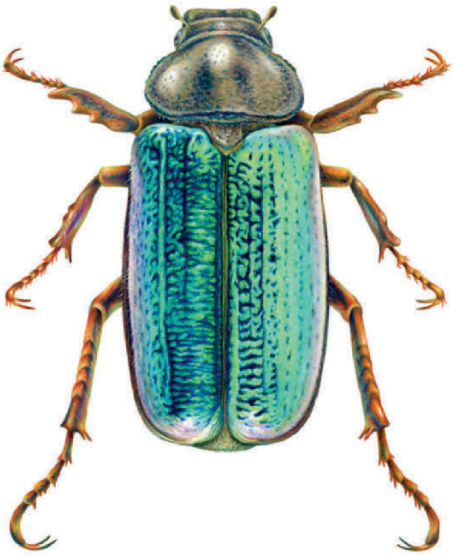
We all feel very fortunate that we were able to attend this program, meet each other in person,

Students:

James Adams
Julia Beery
Hannah Caisse
Sami Chang
Ashley Ersepke
Angela Fan
Walter Householder
Becca Hoskins
Samantha Johnson
Katie Parker
Madelyn Neufeld
Sonja Pinck
Serena Richelle
Emma Vogan
Liz Wahid
Ying Wang

Above: Blue tortoise beetle (*Stolas areolata*) with host plant (*Calea pinnatifida*). Colored pencil on Dura-lene® film. © 2020 Madelyn Neufeld. Website: *madyrose.com*

Below: June bug (*Dichelonyx* sp.). Colored pencil on Dura-lene film. © 2020 Walt Householder. Instagram: *instagram.com/wchouseholder/*



and enjoy the diversity of perspectives each of us has. We give a special thanks to all our amazing instructors: Ann Caudle, Jenny Keller, Amadeo Bachar, Andrea Dingleldein, Justine Lee Hirten, our program organizer Gina Garcia, and all the wonderful guest speakers we had the pleasure of learning from throughout the program. Thanks to the wealth of knowledge we were given, and our newfound experience with the digital gallery, we are confident that we have the skills to launch successful professional careers in science illustration.

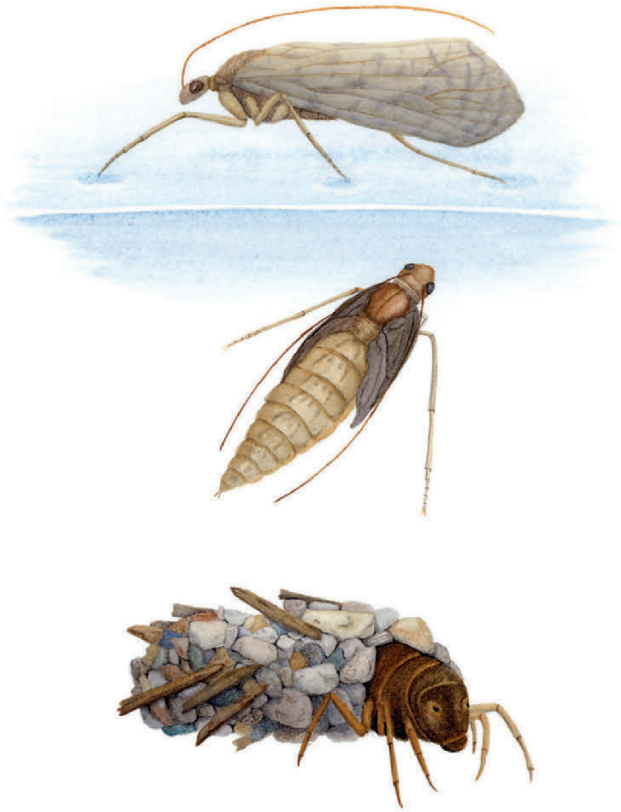
Please enjoy this selection of pieces from our virtual gallery. The gallery is still available for viewing at *illustratingnature.com* where you can see all the works from the show as well as behind-the-scenes images of our class. Feel free to visit our artists' websites to see our growing portfolios!

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!

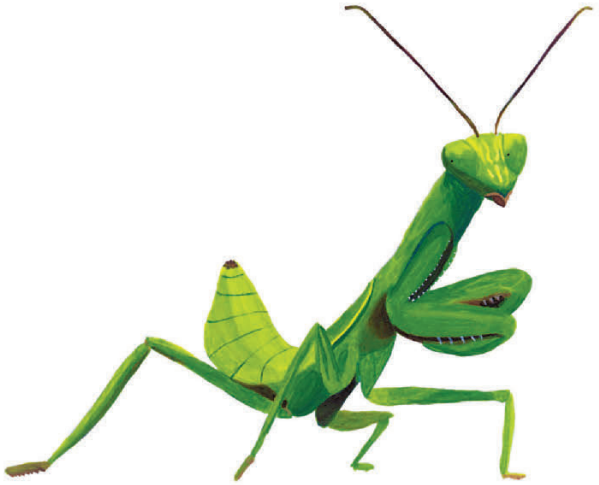
Right: Double-crested cormorant (*Phalacrocorax auritus*). Colored pencil on Dura-lene film. © 2020 Emma Vogan. Website: *emmavoganart.com*

Below: Sticks and stones and clovers and bones. Gouache.© 2020 Sonja Pinck. Website: *pinkfigstudios.com*

Below: Caddisfly life stages (*Dicosmoecus* sp.). Watercolor. © 2020 Katie Parker. Website: *katieparkerart.com*



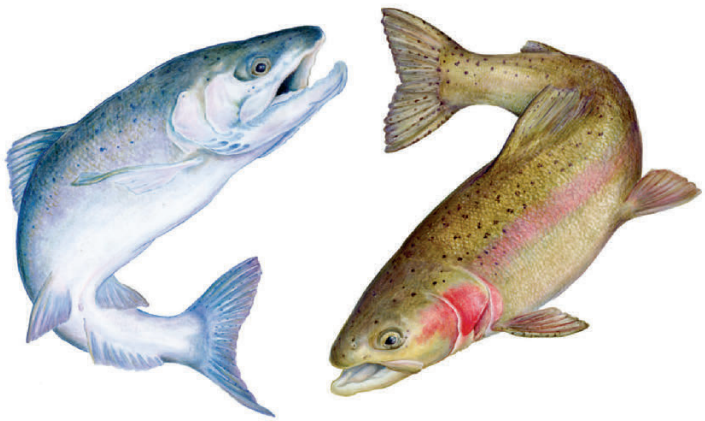
Right: Collared aracari (*Pteroglossus torquatus*). Colored pencil on Dura-lene film. © 2020 Ashley Ersepke. Website: *aeeillustration.com*



Above: A praying mantis (*Mantoidea* sp.) giving some serious side-eye. Acrylic. © 2020 Samantha Johnson. Website: *sandandsagestudio.com*

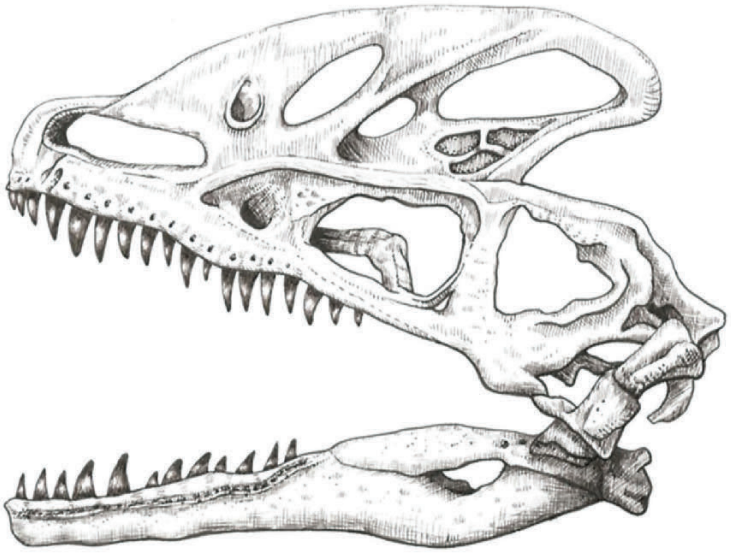
Left: Blue jay (*Cyanocitta cristata*). Colored pencil. © 2020 Liz Wahid. Website: *ornithart.com*

Above: Orchid tree (*Bauhinia purpurea*). Watercolor. © 2020 Ying Wang. Website: *ywangstudio.com*



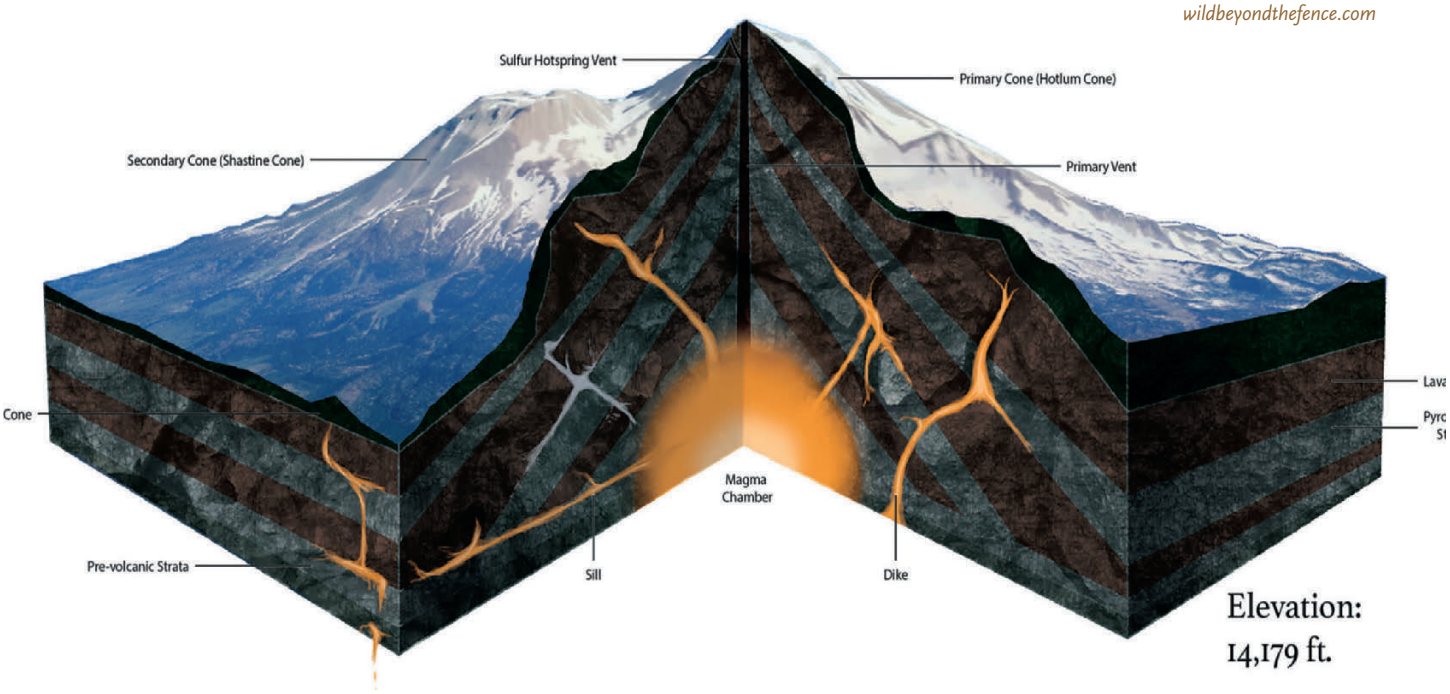
Above: *Oncorhynchus mykiss* × *Oncorhynchus mykiss*. Colored pencil. © 2020 Serena Richelle. Website: *serenarichelleart.com*

Below: Kelp "home" fast (*Macrocystis pyrifera*). Scratchboard and ink. © 2020 Sami Chang. Website: *schangstudios.com*



Above: A tyrannasaurid dinosaur skull (*Guanlong wucaii*). Ink. © 2020 Hannah Caisse. Website: *hannahcaisse.com*

Below: Down in the grass. (*Pleurotus ostreatus*). Gouache. © 2020 Becca Hoskins. Website: *beccahoskinsart.com*



Left: Mount Shasta—the anatomy of a stratovolcano. Adobe Illustrator® and Photoshop®. © 2020 James Adams. Website: *wildbeyondthefence.com*

Left: *Lactarius* lifecycle (*Lactarius aestivus*). Ink on scratchboard. © 2020 Julia Beery. Website: *florafungi.com*

Right: Motherhood (*Ailuropoda melanoleuca*). Ink on scratchboard. © 2020 Angela Fan. Website: *angelayfan.com*

Artwork You Can Wear!

— Kathleen Garness

At the 2013 Wild Things Conference, I was approached by Karen Tharp from the Illinois Nature Conservancy. She asked whether I had a drawing of the federally-threatened prairie white-fringed orchid. She was looking for something tangible to give their volunteers and she had seen a bandana design that she hoped to adapt. I happened to have one, so I said "Sure!" When she sent me a folder of clip art, I offered to provide her camera-ready art of the bandana, which she happily accepted. After receiving the species that she wanted included, we decided upon a theme for the bandana: "Species in Recovery." She also wanted to highlight children in the outdoors, so after brainstorming a bit she slathered some tempera paint on her five-year-old son's hands, made prints, and scanned them. I also solicited some reference images from a number of naturalists who were happy to participate in the project. The bandana was released later that year (*Fig. 1a*).

BANDANAS FOR ENDANGERED SPECIES

A couple of years later, The Nature Conservancy (TNC) was partnering with some other agencies to create a Green Corridor in the Burnham Park neighborhood. They were planting a number of native tree species to enhance native plantings (*chicagoparkdistrict.com/parks-facilities/burnham-wildlife-corridor*). They sent me their list, and I designed and illustrated a new educational bandana for them featuring these species with their leaves and fruits. Several hundred of these bandanas were given to volunteers in natural areas, many of whom were students of the inner city schools nearby (*Fig. 1b*).

A year or so after that, while I was working on the Field Museum's *Common Plant Families of the Chicago Region*, Karen asked if I could create another bandana featuring prairie plants and their pollinators, since it was the Year of the Pollinator. Working with Cook County Forest Preserve ecologist Laura Rericha, I drew a number of prairie plants and associated fauna (and wind, which pollinates many species too!) (*Fig. 1c*). This bandana highlighted the often delicate relationships between native plants and animals, and helped new volunteers put names to the plants and insects they often see in their areas.

THE EVOLUTION OF A HABITAT GUIDE

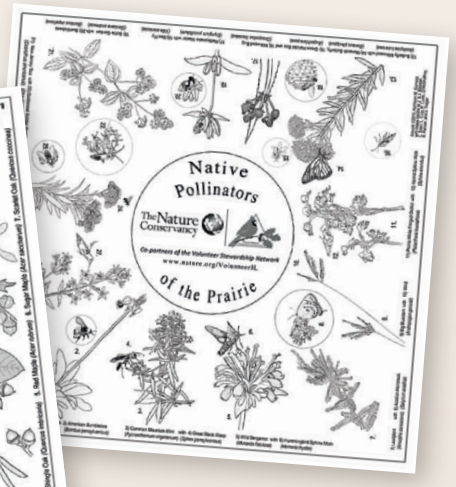
In February of 2019, Emma England, president of Lake County Audubon Society, approached me about my interest in contributing some illustrations for a new initiative they had designed called "Sharing Our Shores." Their goal was to promote awareness of federally-endangered piping plovers which had been seen nesting at Waukegan Beach the previous year. Waukegan Beach serves a very diverse community, and all the materials were translated into Spanish to reach a wide audience. The National Audubon Society provided funds for a booth, volunteer training, and promotional materials. They initially wanted just one or two pages containing illustrations of the most common dunesland species, but the guide gradually grew to five pages, and then to fifteen!

Figure 1: (*a*) "Species Making a Comeback" bandana. (*b*) "Native Trees" bandana. (*c*) "Native Pollinators of the Prairie" bandana. All three bandanas were designed and illustrated for the Illinois Nature Conservancy.

a

b

c



One caveat is that many of the ubiquitous dunesland plants are very rare, and even listed as endangered. As a Plants of Concern monitor, the confidentiality agreement we sign prohibits us from saying where a plant we monitor is located. I reached out to both Susanne Masi, founder of Plants of Concern, and Gretel Kiefer, the present manager of the program. They advised that as long as a wide range of sites and counties were included, without specificity about any one location, I could cover those rare species. So, the Field Museum's *Dunesland Habitat Guide* was born! The guide can be viewed online at: *fieldguides.fieldmuseum.org/guides/guide/1189*.

Stewards and several regional scientists assisted me in choosing the best species for the guide. Field Museum staff asked for pages on lichens and other cryptogams, so those were included as well. The lichens page, especially, was a steep learning curve! Drs. Todd Widhelm and Robert Klips, along with Bill McKnight from the Indiana Academy of Science, patiently shepherded me through those two pages. Dr. Gerould Wilhelm, co-author of *Plants of the Chicago Region* and the new *Flora of the Chicago Region*, helped with the others. (He declined to look at the lichen and mosses pages more than once, saying, "Kathleen, I wouldn't even know where to start to teach you about lichens and mosses!"—although he did give me valuable suggestions for ubiquitous species. They really are the province of the patient specialist. My work is merely intended to be an introduction to them).

Figure 2: Figure 3: "Habitat Treasures of the Illinois Dunelands" bandana designed and illustrated for the Illinois Nature Conservancy.

COME FULL CIRCLE

Realizing it had been a couple of years since a new bandana came out, and with all this new artwork in hand, I pitched the idea of a dunesland bandana to the new TNC volunteer stewardship network coordinator, Brooke Thurau. The Sharing Our Shores volunteers would benefit, and so might the dunesland volunteers along the Lake Michigan shoreline. She liked the idea, and I pulled images from the *Dunesland Habitat Guide* into the template I had created for previous bandanas (*Fig. 2*). The template features the image, scientific name, and common name of each species, along with a number key to each image (since names are typed along the border of the bandana).

Another impetus for this was that in 2019, a pair of piping plovers had attempted to nest at Montrose Dunes, a site that has been stewarded for many years by a dedicated group of volunteers working with the Chicago Park District. Unfortunately, the chicks did not survive, the plover parents migrated south, and interest in the bandana decreased. In 2020, the piping plovers, dubbed Monty and Rose, returned to Montrose Dunes and successfully raised three chicks! As soon as the first egg was laid, excitement redoubled; I added a plover to the bandana art (*Fig. 3*), and the bandana went into production. The babies have fledged already and will soon migrate south along with their parents. I am thrilled to have played a small role in celebrating the many volunteers who observed the plovers while the beach was closed due to COVID-19 restrictions.

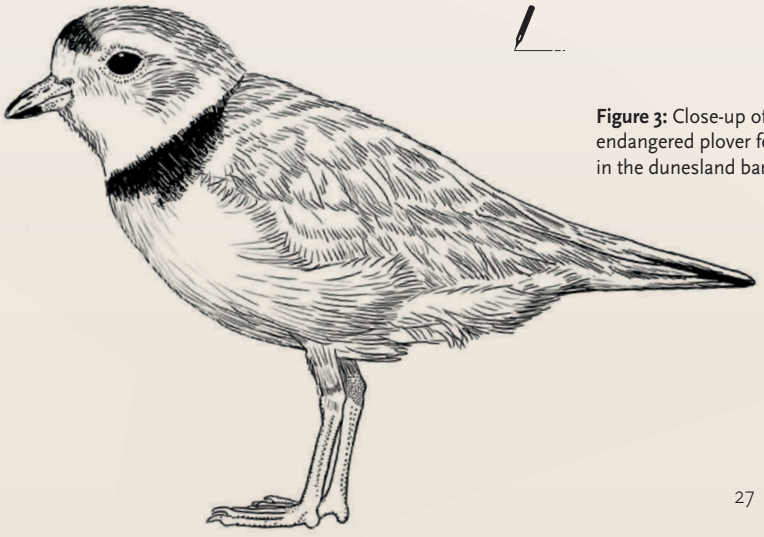


Figure 3: Close-up of the endangered plover featured in the dunesland bandana.

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Contribute to the Journal!

Yes, you too can reap the benefits of having an article of yours in GNSI's *Journal of Natural Science Illustration*. Just imagine how gratifying it will be to see your thoughts, techniques, and images well-presented as what you see here! Plus, think what it will do for your resume.

Have an idea but think you can't write? Contact us and let's talk about it. Our Content Editors are really good at helping people refine their ideas. Just as with drawing, a number of drafts—layers of verbal tracing paper, really—do lead to a quality piece of writing (as several of our authors can attest)! Some articles take a long time to come to fruition, but there's always the next issue… or the next after that.

Your contribution helps our community to further the conversation of all things scientific illustration. We began as a forum for sharing techniques and ideas. Keep that going—share yours via the Journal.

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