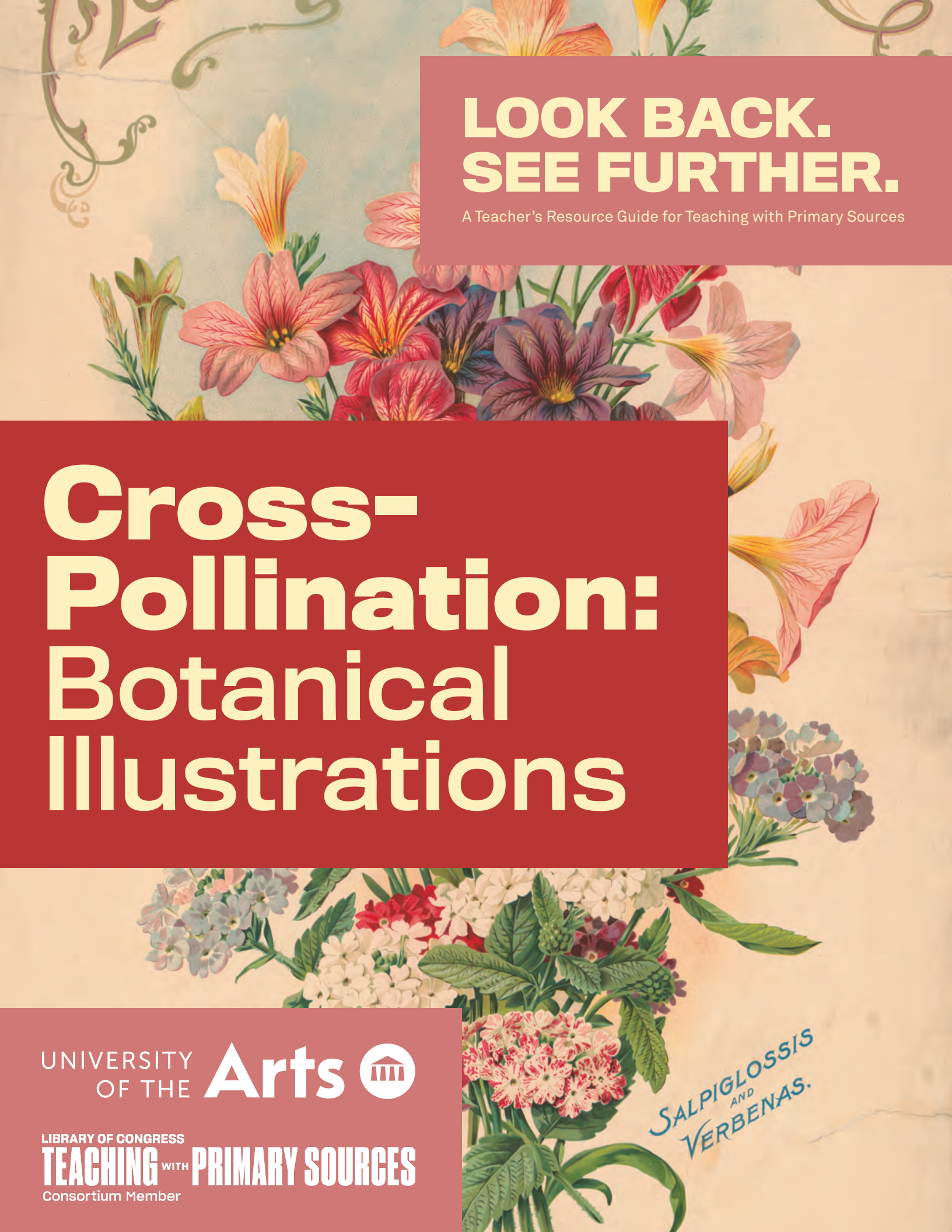

LOOK BACK. SEE FURTHER.

A Teacher's Resource Guide for Teaching with Primary Sources

Cross-Pollination: Botanical Illustrations

UNIVERSITY OF THE Arts

LIBRARY OF CONGRESS
TEACHING WITH PRIMARY SOURCES
Consortium Member

Acknowledgements

The University of the Arts, established in 1876, is one of the nation's only universities dedicated solely to educating students in visual arts, performing arts, design, and liberal studies. UArts acts as a catalyst to connect, collaborate, and create across disciplines and traditional boundaries. The Professional Institute for Educators & MEd Programs develops contemporary and creative educational programming to serve the professional development needs of K-12 teachers through the arts.

The Library of Congress is the nation's oldest federal cultural institution. The Library is the world's preeminent reservoir for knowledge, providing unparalleled, integrated resources to Congress and the American people. Founded in 1800, the Library seeks to further human understanding and wisdom by providing access to knowledge through its magnificent collections, which bring to bear the world's knowledge—as well as it's intellectual and cultural creativity—in almost all languages and formats. The Library seeks to spark the public's imagination and celebrate human achievement through its programs and exhibits. In doing so, the Library helps foster the informed and involved citizenry upon which American democracy depends. Today, the Library serves the public, scholars, and Members of Congress and their staff—all of whom seek information, understanding, and inspiration. Many of the Library's rich resources and treasures may also be accessed through the Library's award-winning website.

Library Company of Philadelphia is an independent research library specializing in American history and culture from the 17th through the 19th century. Open to the public free of charge, the Library Company houses an extensive collection of rare books, manuscripts, broadsides, ephemera, prints, photographs, and works of art. The mission of the Library Company is to foster scholarship in and increase public understanding of American history by preserving, interpreting, disseminating, and augmenting the valuable materials in its care, ensuring that the lessons of the past will continue to amaze, instruct, and inspire future generations.

The College of Physicians
Founded in 1787, The College of Physicians of Philadelphia is one of the oldest professional medical organizations in the country. Twenty-four physicians of 18th-century Philadelphia gathered to advance the science of medicine and to thereby lessen human misery. Today, nearly 1,500 Fellows continue to convene at the College and work toward better serving the public. Throughout its 227-year history, the College has provided a place for both medical professionals and the general public to learn about medicine as both a science and as an art. The College is home to the Mütter Museum and the Historical Medical Library.

Winterthur Museum, Garden & Library is an estate and museum in Winterthur, Delaware. In 1951, collector and horticulturist Henry Francis du Pont opened his childhood home, Winterthur, to the public. It now houses one of the most important collections of Americana in the United States. The estate includes a 60-acre naturalistic garden with plants from around the world selected by du Pont. Winterthur's library was established in 1952 to furnish research materials about American decorative arts and has become a recognized research center dedicated to the understanding and appreciation of America's artistic, cultural, social, and intellectual history from the 16th century to the 20th century.

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UNIVERSITY OF THE Arts

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Consortium Member

Cross-Pollination: Art and Botany

Catherine Cooney

Librarian Facilitator — TPS Program at University of the Arts

Botanical illustrations are compelling. The human hand's ability to reproduce the intricacy of nature is astounding. Botanical illustrations encapsulate more than can be seen with the naked eye. The tension between order and chaos is evident in images of the tight spiral of a fiddlehead fern, the geometry of a cactus blossom, or the whiplash forms of a pitcher plant. Botanical illustrations fascinate us because they make visible that which we cannot usually see: the inner structures of plants and their systems of growth and reproduction. These works are also evidence of the close looking that has led to deep knowledge.

Students who become familiar with the natural world develop a meaningful relationship with nature. By growing plants in school gardens, identifying trees in neighborhoods, or exploring native plants on field trips to state parks, students get a deeper understanding of their world and the vegetal life around them. They discover the sources of their food and medicines and experience firsthand the role of plants in their ecosystem. When we care about plants, we care about the earth.

Art helps us engage with plants. Observational drawing is a simple way to begin, whether as part of a science laboratory or art studio practice. It requires little more than pencil and paper, specimens, and time. Learning to identify plants through their physical characteristics builds visual literacy. Drawing requires us to process, interpret, and communicate visual information. When we sketch, we are building visualization skills and making connections—a tried and true method for enhancing memory and recall. When we draw, our minds reach the state of flow essential for construction of knowledge and true learning.

Botanical illustration springs from our desire to understand, organize, and marvel at the natural world. Plants are endlessly fascinating. We rely on them for food and medicine. They delight our senses. We collect them, grow them in gardens, decorate our homes with them, share them, and document them. They represent the limitless variety of the natural world. They are the source of artistic inspiration. As a part of environmental education, children need to learn to be aware of plants, to understand and appreciate them. The Teaching with Primary Sources method depends on honing observational skills in order to stimulate critical thinking. Both the science of botany in which students learn to discern differences and notice details to identify plants and the art of illustration in which students learn to look closely and represent what they see, depend on observation.

Studying botanical illustration teaches us about more than the plants themselves. Through examining the printed botanical primary sources included in this guide, as well as the world of materials available via local collections and online databases, students can explore ideas related to the history of printing, trade, exploration, colonization and control, women's history, the history of education, and the source materials for design, architecture, and art. This guide focuses on printed sources from Europe and the United States, and therefore leaves out large areas of study, such as oral and storytelling traditions in the Americas, Pre-Columbian manuscripts, and non-Western literature related to botany and horticulture. It is a starting place, a small root from which many vines may sprout.

Botanical illustration springs from our desire to understand, organize, and marvel at the natural world.

Working with Teachers

Stormy Vogel

Coordinator — TPS Program at the University of the Arts

One of the essential messages of the Teaching with Primary Sources program is that primary source material surrounds us. This guide is intended to encourage teachers and students to step out and examine the place they live with the curiosity of a historian and/or scientist. The Library of Congress provides tools (https://www.loc.gov/teachers) to assist with investigations and analyses of the world around us. Recommended Library of Congress blogs (https://blogs.loc.gov) can get us started in our examination of botanicals and how we utilize them in everyday life (See Resources on p. 5). Easy ways to engage students can literally be a walk in the park. Here students can observe nature in their backyard and collect materials for further study, art projects, or souvenirs. Botanicals are an easy way to engage students in learning. They have great visual appeal and are very common, so most students will have some knowledge of their existence.

Use this guide as a way to look at plants, study them, and learn how important they are to our past and future.

This guide is intended to encourage teachers and students to step out and examine the place they live with the curiosity of a historian and/or scientist.

Resources for Botanical Study Botanical Illustrations Primary Source Collections:

Biodiversity Heritage Library
https://www.biodiversitylibrary.org/

PHS McLean Library's Digital Collections: Introduction
http://pennhort.libguides.com/DigitalCollections

University of Minnesota Andersen Horticultural Library
https://www.lib.umn.edu/ahl/seed-nursery-catalogs

Hunt Institute for Botanical Documentation
http://www.huntbotanical.org

Local Gardens (Near Philadelphia, PA):

Bartram's Gardens
https://bartramsgarden.org/

Winterthur Museum, Garden & Library
http://www.winterthur.org/

The Benjamin Rush Medicinal Plant Garden
https://collegeofphysicians.org/garden

Morris Arboretum
http://www.morrisarboretum.org/

Chanticleer
https://www.chanticleergarden.org/

Longwood Gardens
https://longwoodgardens.org/

Sources Consulted and Additional Information:

Simmons Botanical Illustration
http://simmonslis.libguides.com/c.php?g=894435

University of Delaware. Library, Museums and Press: Research Guides. "Primary Sources in Science and Technology in Special Collections: Horticulture and Botany."
https://guides.lib.udel.edu/specsci/horticulture

Printmaking in the Service of Botany.
http://www.huntbotanical.org/admin/uploads/hibd-printmaking-cat.pdf

University of Minnesota Libraries. "The Transfer of Knowledge: The Art of Botanical Illustration [1491-1920]."
https://apps.lib.umn.edu/botanical/intro.php

Nature Illustrated: Flowers, Plants, and Trees, 1550-1900
https://digitalcollections.nypl.org/collections/nature-illustrated-flowers-plants-and-trees-1550-1900

Biodiversity Heritage Library: Women in Natural History
https://www.biodiversitylibrary.org/collection/NHwomen

Dumbarton Oaks. "The Botany of Empire in the Long Eighteenth Century."
https://www.doaks.org/resources/online-exhibits/botany-of-empire

Animal, Vegetable, Mineral: Selections from the University of Delaware Library Natural History Collection
http://exhibits.lib.udel.edu/exhibits/show/animalvegetablemineral

William Bartram's Travels and the Early Naturalist's Library
https://bartramsgarden.org/william-bartrams-travels-early-naturalists-library/

University of Virginia: Historical Collections at the Claude Moore Health Sciences Library Herbs: Friends of Physicians, Praise of Cooks
http://exhibits.hsl.virginia.edu/herbs

New York Public Library. "The Natural History of Early Modern Needlework," by Madeleine Viljoen, Curator, Wallach Division, Stephen A. Schwarzman Building, September 28, 2015.
https://www.nypl.org/blog/2015/09/28/early-modern-needlework

The Met: Heilbrunn Timeline of Art History American Needlework in the Eighteenth Century
https://www.metmuseum.org/toah/hd/need/hd_need.htm

The Natural History of Carolina, Florida, and the Bahama Islands
https://digitalcollections.nypl.org/collections/the-natural-history-of-carolina-florida-and-the-bahama-islands

Look Back and See Further

Erin Elman

Dean of the School of Critical & Professional Studies with the Center for Engagement at the University of the Arts.

Throughout history, humans have been inspired by nature. Nature provides us with fantastic colors, ingenius design, and harmonious relationships as well as medicinal cures, recipes, commerce, and beauty. Artists' investigations and representations of the botanical world allow us to appreciate and interpret the natural wonders around us. Artistic creations and the artifacts of the artistic process provoke engagement with the world in myriad ways.

The arts teach us to think about relationships and movements, celebrate multiple perspectives, develop aural and visual literacy skills, and consider complex forms of problem solving. Utilizing visual literacy skills to decipher images and meanings empowers our students to better understand the world around them. Teaching with primary sources through the arts allows students to investigate how individuals use their creativity to celebrate and explore the natural environment and its role in our individual and collective identities.

At the University of the Arts, we are honored to be a Library of Congress TPS Consortium member and to bring an artistic perspective to teachers, allowing them to look back and see further. We hope that teachers find this guide to be useful in their classrooms as they guide their students through learning.

Utilizing visual literacy skills to decipher images and meanings empowers our students to better understand the world around them.

How to Use This Guide

Use These Steps To Get Started:

1 Engage students with primary sources.

Draw on students' prior knowledge of the topic. Ask students to closely observe each item.

- Who created it?
- When was it created?

Help students see key details.

- Where does your eye go first?
- What colors and shapes are used?
- Are there images? How does the text connect to the images?

Encourage students to think about their personal response to the item.

- What feelings and thoughts does the item trigger in you?
- What do you wonder about it?

2 Promote student inquiry.

Encourage students to speculate about each piece, its creator, and its context.

- What was happening during the time period?
- What was the designer's purpose in making this?
- How does the artist get their point across?
- Who was the audience?

Ask whether this source agrees with other primary sources or with what the students already know.

- Ask students to test their assumptions about the past.
- Ask students to find other primary or secondary sources that offer support or contradiction.

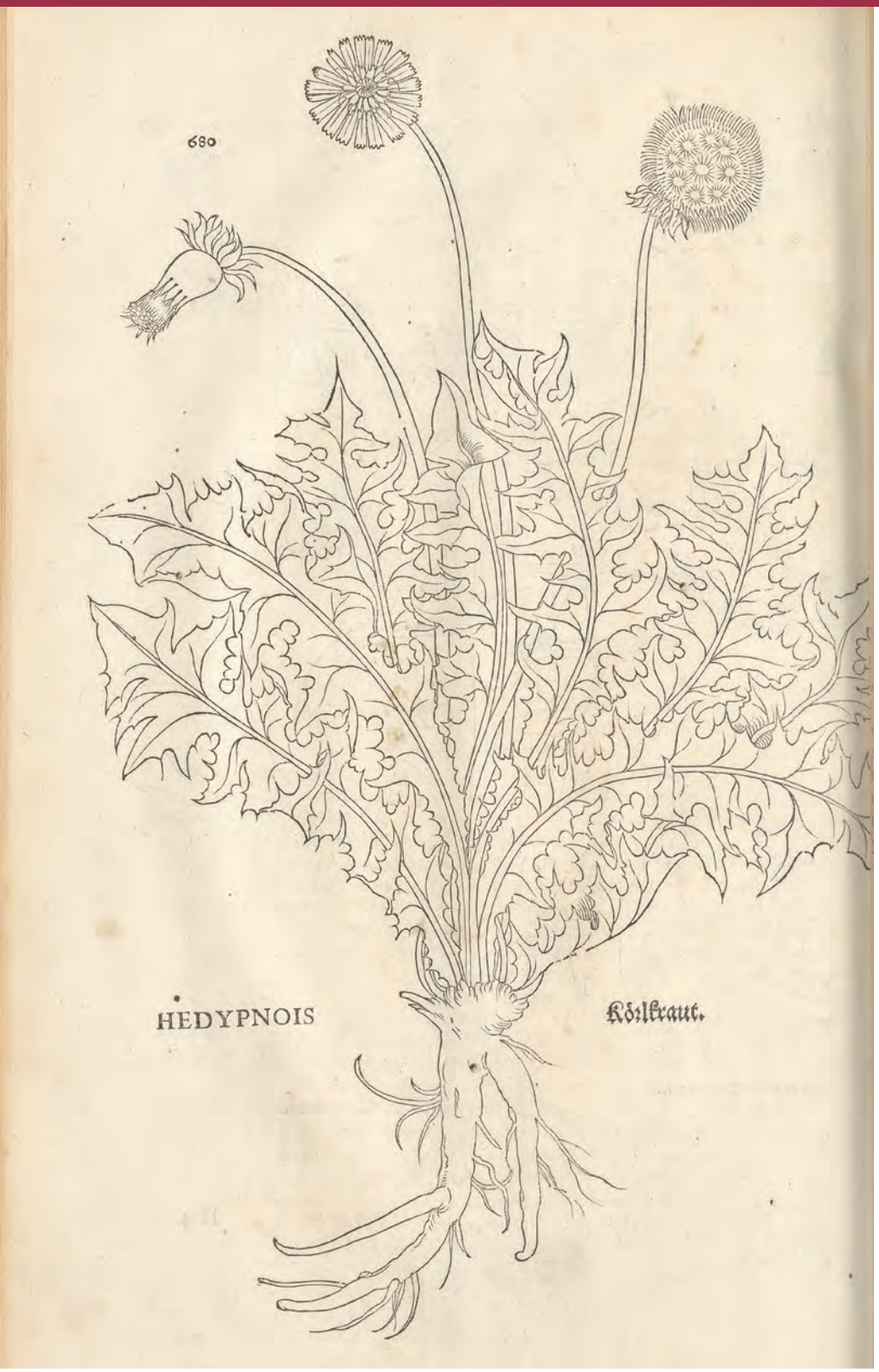
3 Assess how students apply critical thinking and analysis skills.

Have students summarize what they have learned.

- Ask for reasons and specific evidence to support their conclusions.
- Help students identify questions for further investigation and develop strategies for how they might answer them.

Adapted from Library of Congress Using Primary Sources, Library of Congress.
http://www.loc.gov/teachers/usingprimarysources/

Propagating Knowledge



A Closer Look

Examine the plant in the black and white image.
What parts do you see?
Why would the artist include the parts he did?

Describe the leaves and flowers.
What shapes do you see?
What textures do you notice?
If you were going to finish the image, what colors would you use?

Have you ever seen a plant like this?
Where was it?
Notice any text on the image; what clues does the text give you about this plant?
What do you think the purpose of this illustration was?

De Historia Stirpium

Herbals, such as Leonhart Fuchs' pictured here, are books that compile information about the usefulness of plants as food and medicine. They have been a part of natural history literature since antiquity. In Western Europe, knowledge of plants was preserved in monasteries and convents where monks and nuns grew medicinal gardens and copied botanical texts. Many of these books were copied and recopied without firsthand experience of some of the plants described. As printing developed in the 15th century, herbals were among the earliest books published. They would often be illustrated with woodcuts, which allowed pictures to be placed alongside the text as an aid in identification; this was very important when considering possible poisons. A woodcut is a relief print made by cutting away the surface of a woodblock, leaving the image to be printed raised up, just as type would be. Though the art can be highly refined, the resulting images can be somewhat stiff. The illustrations were printed in black ink and many were later colored by hand.

De historia stirpium is a landmark in botanical illustration. Not only are the plants drawn from life, sometimes with images of the bud, bloom, and seed together, but the artists are credited and depicted drawing from observation. (https://www.loc.gov/resource/rbctos.2018rosen0905/?sp=931) Rather than stylized images of generic plants, the Fuchs' herbal shows more naturalistic—though still idealized depictions—of flowers and herbs to help the user identify plants for medicinal use. Many of the plants included in this book are ones we commonly see in yards across the country. Dandelions, while treated as a weed, have edible leaves full of vitamins and minerals, as well as flowers used to make wine, and roots used to make a coffee substitute.

Leonhart Fuchs. De historia stirpium commentarii insignes ... adiectis earvndem vivis plusquam quingentis imaginibus.... Basil, In officina Isingriniana, 1542.

https://www.loc.gov/item/65059148/

American Medical Botany

This image of the Asarum canadense, also known as Snake Root, Canadian Wild Ginger, or Wild Ginger comes from Jacob Bigelow's American Medical Botany book published in 1817. Intended for the public, the book offers descriptions of a plant's botanical history, including medical uses. Wild Ginger is a perennial plant that is found in deciduous forests in eastern North America. Bigelow believed the Wild Ginger plant was mainly of use as a stimulant and diaphoretic even though Native Americans used the plant in a myriad of ways including treating headaches, dysentery, coughs, and colds.

William B. Annin et al. "Asarum canadense," The College of Physicians of Philadelphia Digital Library, accessed March 7, 2020.

https://www.cppdigitallibrary.org/items/show/96

Hunting Plants

A Closer Look

Examine the print of the rose.
What parts of the plant are depicted?
What has been left out?
Why would the artist show that part and not others?

Do you have any collections?
What parts of your collection would you want to share with others?
What would a publication of your collection look like?

How did the artist depict the texture of this plant?
What would it feel like?
What do you think the purpose of this illustration was?

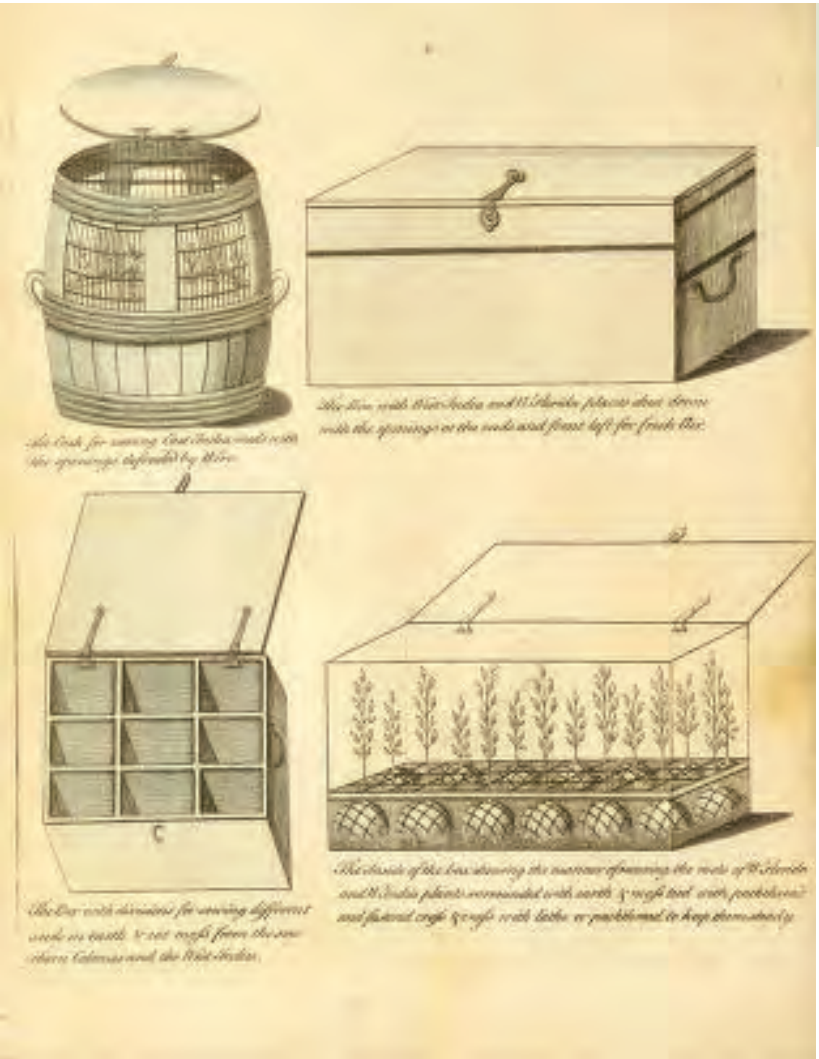
Roses

The art of botanical illustration, especially in printed books, allowed collectors to share their rare treasures in the days when shipping plant material proved impractical. Living plants would die in transit. Pressed and dried materials were subject to crumbling into dust, besides being unsatisfactory representatives of the thriving vegetation. Illustrations were useful accompaniments to a box full of seeds or bulbs. Explorers and collectors could commission botanical artists such as Redouté to depict the distinctive qualities of the varieties they accumulated, in this case more than two hundred roses from Empress Josephine's garden at Château de Malmaison. Plant collecting was a form of connoisseurship that spoke to one's social standing; only those with the time and financial means could make a deep study of plants, collecting illustrated botanical books, and trading seeds, bulbs or rootstock, let alone funding explorations to procure rare specimens. Only a trained eye could easily discern the one hundred and seventy different rose varieties depicted in Redouté's prints Les Roses.

Redouté came from a family of artists and was the official court painter of Marie Antoinette. He collaborated with the most notable botanists of his day, working with flora collections and plant explorations, gaining a broad connoisseurship of the botanical world. He tread the line between a flower painter who depicts realistic but idealized blooms to please the eye and a botanical artist who creates beautiful but highly accurate representations to satisfy the scientist. He is credited with advancing the technique of stipple engraving, in which his watercolors were translated by talented engravers into tiny dots on copperplate rather than the usual lines and crosshatchings. The plates were run though the press once in black ink, and again in color, then applied a la poupée, a technique that allowed for great subtlety and variation in color. Redouté retouched and colored some of the plates by hand, making the illustrations as extraordinary as the collection they represent.

Pierre Joseph Redouté. Les Roses. Paris, Imprimerie de Firmin Didot, 1817.

https://www.loc.gov/resource/rbctos.2018rosen1892v1/?sp=333



Plant Boxes

These early plant transporters are depicted in John Ellis' book describing how plants and seeds could be transferred from region to region or country to country. This safe way to transport plants was important for international trade, making it possible to transplant profit-oriented significant plants from their native habitats and introduce them to new countries and new markets. However, along with plants came soil and insects, introducing some invasive species to other lands.

John Ellis. Directions for bringing over seeds and plants, from the East-Indies and other distant countries, in a state of vegetation... [1770].

https://www.biodiversitylibrary.org/page/48674381#page/7/mode/1up

Drawing to Learn, Learning to Draw

A Closer Look

Notice the photograph of the classroom.
Who do you see, and what are they doing?
Who isn't included in this photograph?
Imagine your classroom.
Is it similar or different from this?
How?

Notice what the people in the picture are doing.
Have you ever done something like that
in your class?
How was the activity similar or different?

Bowles's Florist

Bowles' Florist is an example of the intersection of botany and the arts in the eighteenth century, as well as the involvement of women in both disciplines. Painting, especially flower painting, was seen as an appropriate activity for women during this period. While girls' education was limited, young women of high social standing were expected to have abilities in music and art. Printed books, specifically hand-colored books, were an expensive luxury item. Bowles' Florist was intended to be used by a wealthy woman, who had leisure time to paint and draw. The hand-coloring of the plates, however, may very well have been executed by a woman or child laborer who would have been paid by the print. A close look at the stem of the hollyhock reveals where the colorist's brush strayed outside the lines.

Carington Bowles. Bowles's florist. Plate 40. London: Printed and sold by the proprietor, Carington Bowles, at his map and print warehouse, no. 69, in St. Paul's Church-yard, 1777.

Winterthur Museum, Garden & Library. Printed Book and Periodical Collection.

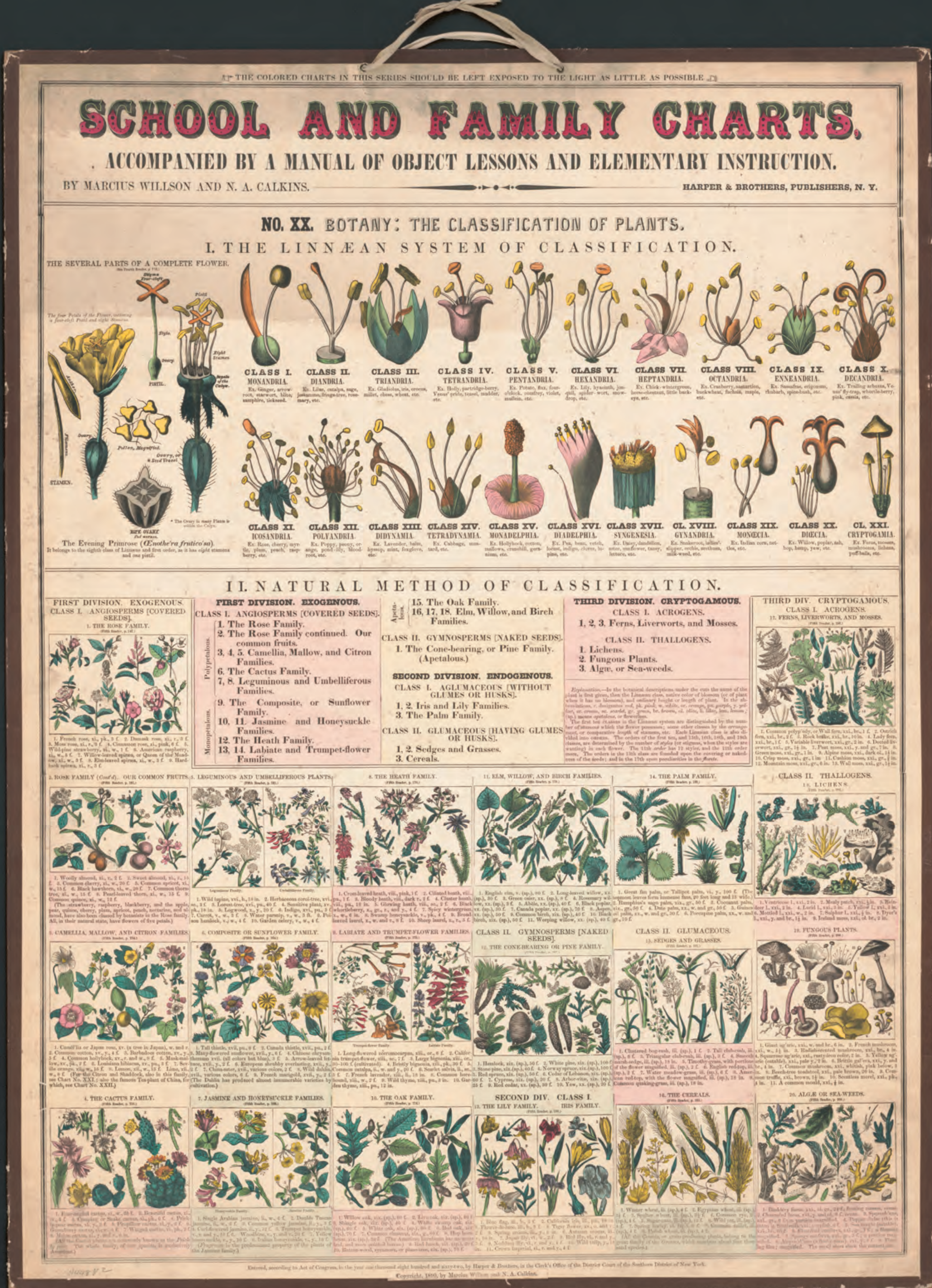
Also available online via the University of Wisconsin, Digital Library for the Decorative Arts and Material Culture, http://digital.library.wisc.edu/1711.dl/DLDecArts.BowlesFlorist

Leaf and Flower Painting

Drawing from life—that is—drawing what one sees before them, has been a part of laboratory practice since botany became a science. The practice of drawing from nature hones observational skills and allows time and space for noticing details, entertaining questions about what one sees, and making connections with prior knowledge. Object inquiry was a popular pedagogical technique in the mid-19th century. Its influence lasted generations and left us with the term "object lesson." Object lessons, such as the one on this classroom wall chart, were inquiries that started with the close observation of a physical item. In the case of botany, students would have learned about the properties of plants by observing specimens, and as we see in the photo by Frances Johnston, making drawings in their lab books. Wall charts were a useful adjunct to hands-on study, allowing students to view plant parts in magnification, a supplement or substitute for dissection and microscope study.

Frances Benjamin Johnston. Leaf and flower painting, 2nd Division. Washington D.C, c. 1899.

https://www.loc.gov/item/2001703620/


THE COLORED CHARTS IN THIS SERIES SHOULD BE LEFT EXPOSED TO THE LIGHT AS LITTLE AS POSSIBLE
SCHOOL AND FAMILY CHARTS.
ACCOMPANIED BY A MANUAL OF OBJECT LESSONS AND ELEMENTARY INSTRUCTION.
BY MARCIUS WILLSON AND N. A. CALKINS.
HARPER & BROTHERS, PUBLISHERS, N. Y.
NO. XX. BOTANY: THE CLASSIFICATION OF PLANTS.
I. THE LINNÆAN SYSTEM OF CLASSIFICATION.
THE SEVERAL PARTS OF A COMPLETE FLOWER.
CLASS I. MONANDRIA.
CLASS II. DIANDRIA.
CLASS III. TRIANDRIA.
CLASS IV. TETRANDRIA.
CLASS V. PENTANDRIA.
CLASS VI. HEXANDRIA.
CLASS VII. HEPTANDRIA.
CLASS VIII. OCTANDRIA.
CLASS IX. ENNEANDRIA.
CLASS X. DECANDRIA.
CLASS XI. ICOSANDRIA.
CLASS XII. POLYANDRIA.
CLASS XIII. DIDYNAMIA.
CLASS XIV. TETRADYNAMIA.
CLASS XV. MONADELPHIA.
CLASS XVI. DIADELPHIA.
CLASS XVII. SYNGENESIA.
CL. XVIII. GYNANDRIA.
CLASS XIX. MONŒCIA.
CLASS XX. DIŒCIA.
CL. XXI. CRYPTOGAMIA.
The Evening Primrose (Œnothe'ra frutico'sa).
II. NATURAL METHOD OF CLASSIFICATION.
FIRST DIVISION. EXOGENOUS.
CLASS I. ANGIOSPERMS [COVERED SEEDS].
1. The Rose Family.
2. The Rose Family continued. Our common fruits.
3, 4, 5. Camellia, Mallow, and Citron Families.
6. The Cactus Family.
7, 8. Leguminous and Umbelliferous Families.
9. The Composite, or Sunflower Family.
10, 11. Jasmine and Honeysuckle Families.
12. The Heath Family.
13, 14. Labiate and Trumpet-flower Families.
15. The Oak Family.
16, 17, 18. Elm, Willow, and Birch Families.
CLASS II. GYMNOSPERMS [NAKED SEEDS].
1. The Cone-bearing, or Pine Family. (Apetalous.)
SECOND DIVISION. ENDOGENOUS.
CLASS I. AGLUMACEOUS [WITHOUT GLUMES OR HUSKS].
1, 2. Iris and Lily Families.
3. The Palm Family.
CLASS II. GLUMACEOUS [HAVING GLUMES OR HUSKS].
1, 2. Sedges and Grasses.
3. Cereals.
THIRD DIVISION. CRYPTOGAMOUS.
CLASS I. ACROGENS.
1, 2, 3. Ferns, Liverworts, and Mosses.
CLASS II. THALLOGENS.
1. Lichens.
2. Fungous Plants.
3. Algæ, or Sea-weeds.
THIRD DIV. CRYPTOGAMOUS. CLASS I. ACROGENS.
CLASS II. THALLOGENS.
CLASS II. GYMNOSPERMS [NAKED SEEDS].
CLASS II. GLUMACEOUS.
SECOND DIV. CLASS I.

School and Family Charts: Botanical

Observational drawing is a major component of art education. Art students draw still lifes and figures, and of course, plants. Drawing manuals from the renaissance to the present day include guides to depicting the natural world. Drawing and painting were considered appropriate activities for women during the eighteenth and nineteenth centuries, and those with leisure time and financial means would receive art education. Drawing manuals included botanically accurate representations of flowers and were meant as models for needlework as well as painting or drawing. Women brought together their interest in science and their skills with handwork, a socially acceptable way for women to share botanical knowledge and signal their refinement and education. Naturalists created model books for decorative work based on botanical illustrations. Similarly, artists and craftspeople used natural history books as pattern books for decorative arts.

School and Family Charts: Botanical; Forms of Leaves, Stems, Roots, and Flowers; Botany; the Classication of Plants. ca. 1890. New York: Harper & Brothers.

https://www.loc.gov/item/2018757056/

A Closer Look

Consider the wall chart, and take some time to notice the images and the words.
Where do you think this chart would be used?
Why?

What plants are included on this chart?
What parts of the plants can you see?
Some of the pictures are larger than others.
What pictures are bigger?
Why would they be presented that way?

Printing Plants

A Closer Look

What do you notice first about this photograph?
Describe the objects in the image, as well as the image itself: consider the shapes, colors, and composition.
Is it busy or simple? Active or calm?

The title tells us a bit about where these plants came from.
Why do you think these plants were at the White House?
Are there any clues in the photograph that tell you where they were grown?
Have you ever seen plants like this growing? Where?

White House Orchids

The art of printing has been encouraged to great heights and novel techniques in the effort to depict the beauty of nature. Plant enthusiasts, horticulturalists, and artists embraced new printing technologies to better show the exquisite details of plant life. Here we see a cyanotype, a photographic process that is easily recognizable for its color—the same pigment that makes Prussian blue. The tones of Frances Benjamin Johnston's photo capture the structure of the orchid blooms, flowers that were grown in the White House greenhouses to be used in floral arrangements and décor. While these cyanotypes are taken with a camera, others would be taken directly from the plants, by placing cuttings directly on treated paper and exposing them to light. The first photographically illustrated book contains cyanotype prints of seaweed by British naturalist Anna Atkins. Solar plant printing continues to be a popular way for students to engage with art, botany, and chemistry.

Frances Benjamin Johnston, photographer. *White House orchids*. Washington D.C, Between 1889 and 1906.

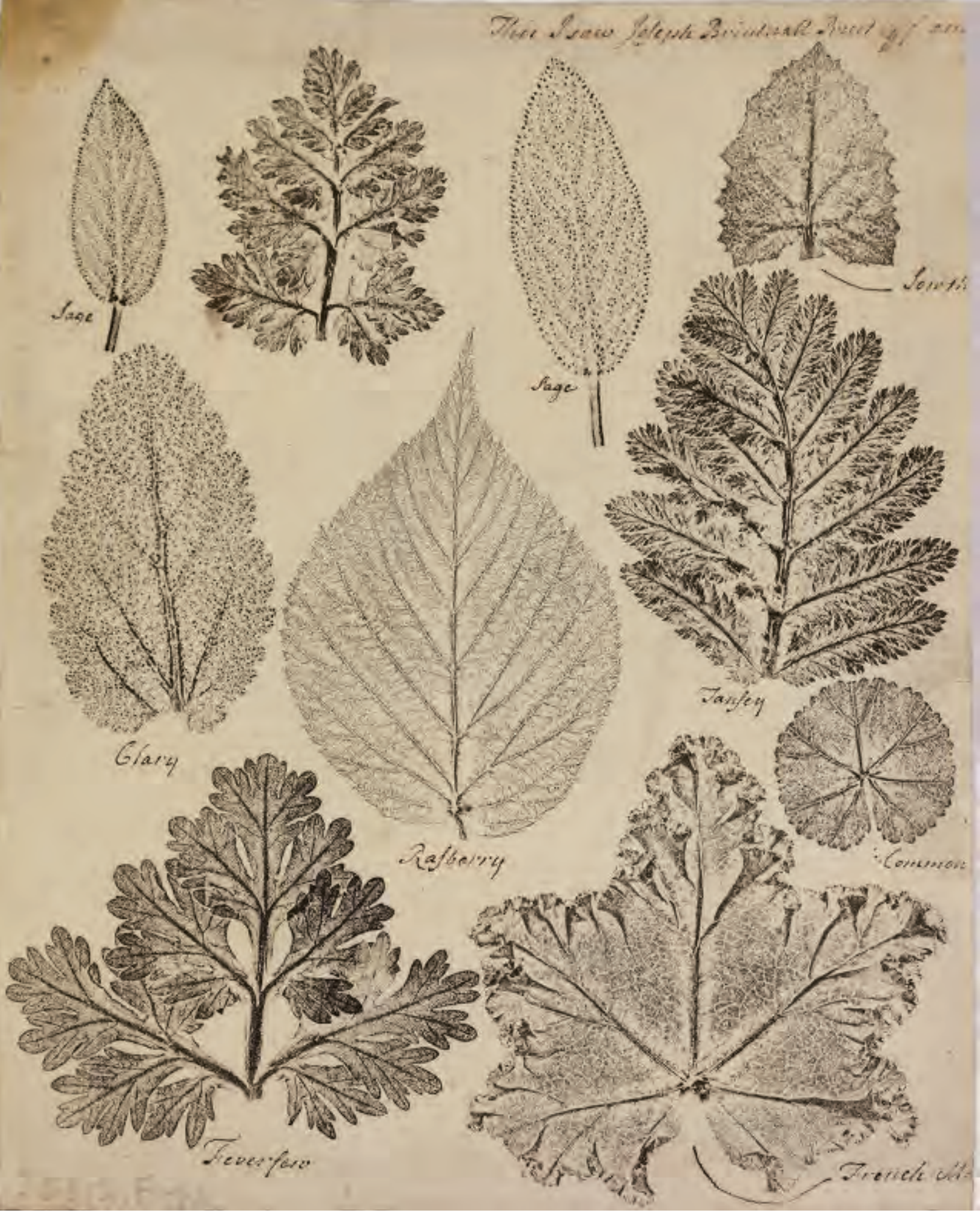
https://www.loc.gov/item/2012646234/

Superior Flower Seeds

Botanists, horticulturalists, and other plant enthusiasts embraced new printing technologies to better depict flora. As color lithography developed in the middle of the 19th century, it was quickly adopted for botanical illustration as a way to cheaply reproduce colorful images, most notably in advertisements for the plant and seed industry. Brilliantly colored seed packets and catalogs enticed a growing middle class to try new varieties of plants in their home gardens.

Mandeville & King Co., *superior flower seeds, salpiglossis and verbenas*. Rochester, NY, c. 1905

https://www.loc.gov/item/2018694523/


Sage
Sage
Tansey
Glary
Raspberry
Feverfew

Nature Prints of Leaves

Starting in the 1730's, Joseph Breintnall created hundreds of leaf prints as records of botanical specimens he gathered himself and from networks of plant enthusiasts. He experimented with making prints of fresh leaves by inking the specimens and placing them between sheets of folded paper before running them through a press. It is also said that Breintnall most likely used his experience with leaf printing to assist Benjamin Franklin in the creation of a metal cast of a leaf impression used to print currency incapable of being counterfeited. Breintnall was a founder and secretary of the Library Company of Philadelphia and engaged in the study of botany.

Printing blocks tied to colonial currency. 2015. Numismatic News.

https://www.numismaticnews.net/article/printing-blocks-tied-to-colonial-currency

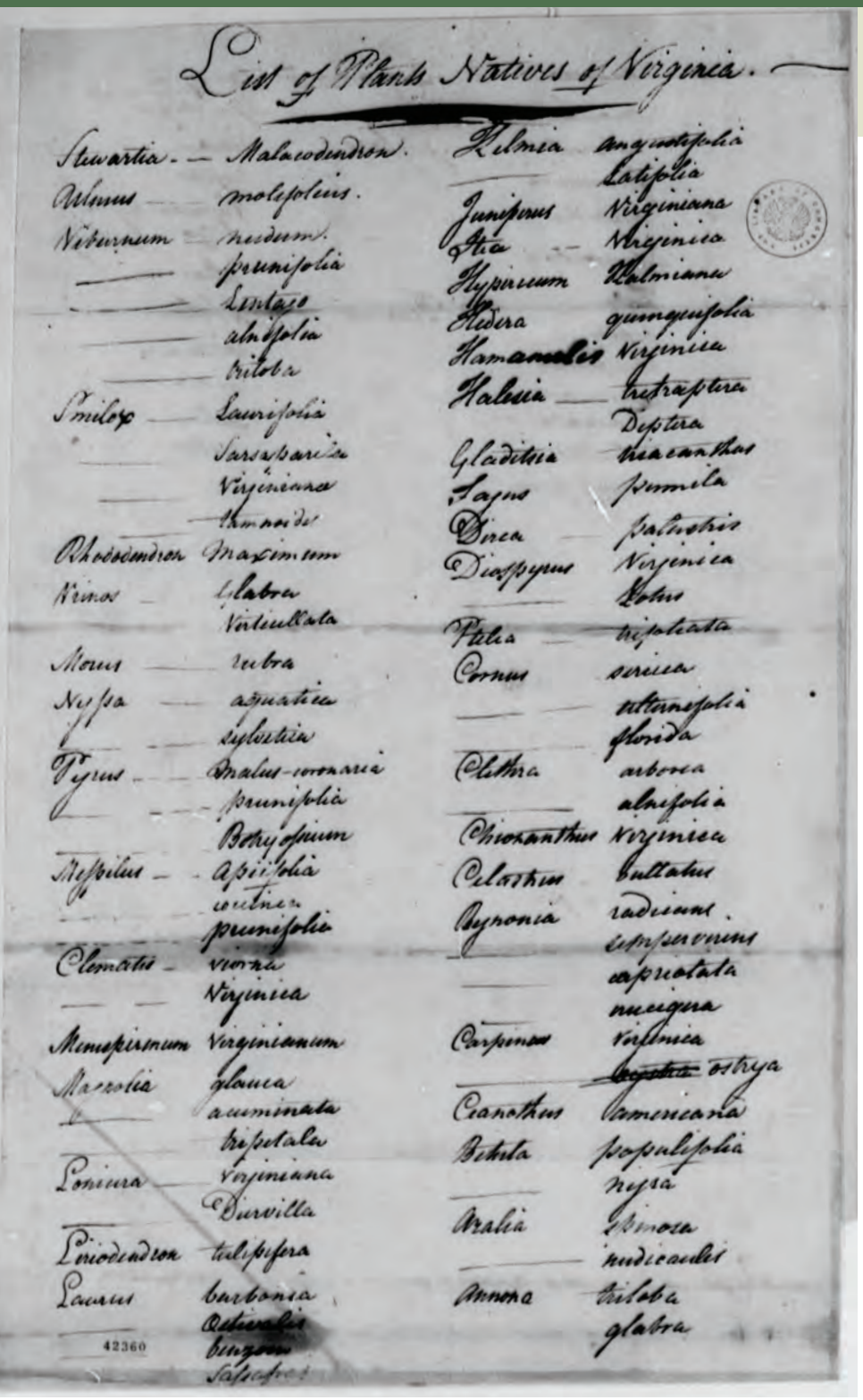
Joseph Breintnall. [Nature Print of leaves]. [ca.1731 - ca. 1744]. Library Company of Philadelphia.

https://digital.librarycompany.org/islandora/object/digitool%3A116475?solr_nav%5Bid%5D=ecfd1478820399ec58c7&solr_nav%5Bpage%5D=0&solr_nav%5Boffset%5D=4#page/1/mode/1up/search/breintnall

A Closer Look

Take a look at the image of the leaf prints.
What do these prints show?
How do you think they were made?
What do you notice about the leaves?

Growing America


List of Plants Natives of Virginia.

Stewartia — Malacodendron.
Ulmus — molifolius.
Viburnum — nudum.
— prunifolia
— Lentago
— alnifolia
— trilobo
Smilax — Laurifolia
— Sarsaparilla
— Virginiana
— Rotundifolia
Rhododendron Maximum
Vitis — Glabra
— Vulpina
Morus — rubra
Nyssa — aquatica
— sylvatica
Pyrus — Malus-coronaria
— prunifolia
— Botryapium
Mespilus — Apiifolia
— cordata
— prunifolia
Clematis — viorna
— Virginica
Menispermum Virginianum
Magnolia — glauca
— acuminata
— tripetala
Lonicera — Virginiana
— Caprifolium
Liriodendron tulipifera
Laurus — Benzoin
— Sassafras
42360

Zelmea — angustifolia
— latifolia
Juniperus — Virginiana
Ilex — Virginica
Hypericum — Kalmiana
Hedera — quinquefolia
Hamamelis — Virginica
Halesia — tetraptera
— Diptera
Gleditsia — Monacanthos
Fagus — pumila
Betula — palustris
Diospyros — Virginica
— Lotus
Platanus — Occidentalis
Cornus — sericea
— alternifolia
— florida
Clethra — arborea
— alnifolia
Chionanthus Virginica
Celastrus — scandens
Bignonia — radicans
— sempervirens
— capreolata
— nucifera
Carpinus — Virginica
— Ostrya
Ceanothus — Americana
Betula — populifolia
— nigra
Aralia — spinosa
— nudicaulis
Annona — triloba
— glabra

List of Virginia Plants

The vegetation of North America was of great interest to the European colonizers, both as a wonder to behold and a resource to exploit. The early settlers were deeply interested in plants. They explored what seemed to them an endless wilderness, and with the zeal of the enlightenment, set out to catalog, understand, and control the natural world. Thomas Jefferson epitomizes this drive, with his gardens at Monticello, and his desire to explore Westward. At Monticello, where he enslaved over 400 people to work his estate, Jefferson kept meticulous records of the flora and fauna, the seasons and weather changes. In these notes for Jefferson's book *Notes on the State of Virginia*, published in 1788, we see a list he made of plants native to Virginia, including the Magnolia acuminata, or cucumber tree.

Thomas Jefferson, *List of Virginia Plants*. 1786.

https://www.loc.gov/item/mtjbib002443/.

https://www.loc.gov/resource/mtj1.006_0964_0965/?st=gallery

A Closer Look

Examine Jefferson's plant list.
Can you read it? How was it written?
Are there any familiar plant names?
Which ones?

How did he list the plants? In what order?
What information is included?
What is left out? Why?

Describe the image of the magnolia.
How big do you think the leaves and flowers are?
What clues do you see that tell you about its size? Are they accurate?
Look closely; how did the artist show light and shade?
What techniques were used?
What clues tell you that this is a print and not a drawing?

Magnolia

Mark Catesby included the Magnolia acuminata in his work, *The natural history of Carolina, Florida and the Bahama Islands*. The engraving was likely done by Catesby himself, who taught himself the skill in order to produce this lavish publication more affordably. As a young man, Catesby had spent more than seven years in Virginia, where he collected seeds and documented plants. He returned to the Carolinas and traveled south to create this grand work on the birds and plants of the region. While most of the book's illustrations are from Catesby's own sketches, often done from nature, the plate shown here is based on a watercolor by Georg Dionysius Ehret, who never visited North America. Erhet appears to have seen two specimens of magnolia and conflated them here, with the leaves of the M. acuminata, and the bloom of the M. virginiana. Jefferson owned a copy of The Natural History of and cross-referenced Catesby on his Birds of Virginia list in *Notes on the State of Virginia*

Mark Catesby. *The natural history of Carolina, Florida and the Bahama Islands: containing the figures of birds, beasts, fishes, serpents, insects, and plants: particularly the forest-trees, shrubs, and other plants, not hitherto described, or very incorrectly figured by authors: together with their descriptions in English and French, to which, are added observations on the air, soil, and waters, with remarks upon agriculture, grain, pulse, roots, &c.: to the whole, is prefixed a new and correct map of the countries treated of.* London: Printed at the expense of the author, and sold by W. Innys and R. Manby ... by Mr. Hauksbee, at the Royal Society House, and by the author, at Mr. Bacon's in Hoxton, -43, 1731.

https://www.loc.gov/resource/rbctos.2017gen00176v2/?sp=396&q=catesby+mark

Franklinia

This drawing by Willaim Bartram is the Bartram's Garden (Philadelphia, PA) signature tree, the Franklinia alatamaha, named for Benjamin Franklin, a close friend of the Bartram family. William and his father, John, discovered the tree in 1765 in southern Georgia during one of their plant and seed hunting trips. William brought the seed back to the garden in 1777. The plant has not been found in the wild since the early 19th century but cultivation by the Bartrams saved it from extinction. All current Franklinia are descended from those grown by the Bartrams. Bartram's Garden is a 46-acre historic Philadelphia garden and arboretum. Founded in 1728, it is the oldest surviving botanical garden in North America.

Bartram, William. Franklinia alatamaha. (n.d.) Violettea Delafield - Benjamin Smith Barton Collection.

https://diglib.amphilsoc.org/islandora/object/franklinia-alatamaha

Primary Source Analysis Tool

The Library of Congress provides teacher's guides that help students analyze primary sources, guiding them toward higher-order thinking and better critical thinking and analysis skills. The Library provides a variety of these guides based on primary source material. On the Library of Congress's website one can find a variety of these tools, which help students analyze photographs and prints, books and other printed text, manuscripts, maps, political cartoons, motion pictures, sheet music and song sheets, oral histories, and sound recordings. Each analysis tool includes questions to help students construct knowledge as they form reasonable conclusions based on the evidence they see, hear, or read. Then students can connect primary sources to the context in which they were created. When viewing illustrations, drawings, or photos, students should be able to answer these probing questions.

The analysis tools are not linear; teachers should encourage students to go back and forth between the columns to answer the questions.

TEACHER'S GUIDE
ANALYZING PRIMARY SOURCES

OBSERVE · REFLECT · QUESTION

Guide students with the sample questions as they respond to the primary source. **Encourage them to go back and forth between the columns; there is no correct order.**

OBSERVE

Ask students to identify and note details.

Sample Questions:

What do you notice first? · Find something small but interesting. · What do you notice that you didn't expect? · What do you notice that you can't explain? · What do you notice that you didn't earlier?

REFLECT

Encourage students to generate and test hypotheses about the source.

Where do you think this came from? · Why do you think somebody made this? · What do you think was happening when this was made? · Who do you think was the audience for this item? · What tool was used to create this? · Why do you think this item is so important? · If somebody made this today, what would be different? · What can you learn from examining this?

QUESTION

Invite students to ask questions that lead to more observations and reflections.

What do you wonder about...

who? · what? · when? · where? · why? · how?

FURTHER INVESTIGATION

Help students to identify questions appropriate for further investigation, and to develop a research strategy for finding answers.

Sample Question: What more do you want to know, and how can you find out?

A few follow-up activity ideas:

Beginning
Have students compare two related primary source items.

Intermediate
Have students expand or alter textbook explanations of history based on primary sources they study.

Advanced
Ask students to consider how a series of primary sources support or challenge information and understanding on a particular topic. Have students refine or revise conclusions based on their study of each subsequent primary source.

For more tips on using primary sources, go to

http://www.loc.gov.teachers

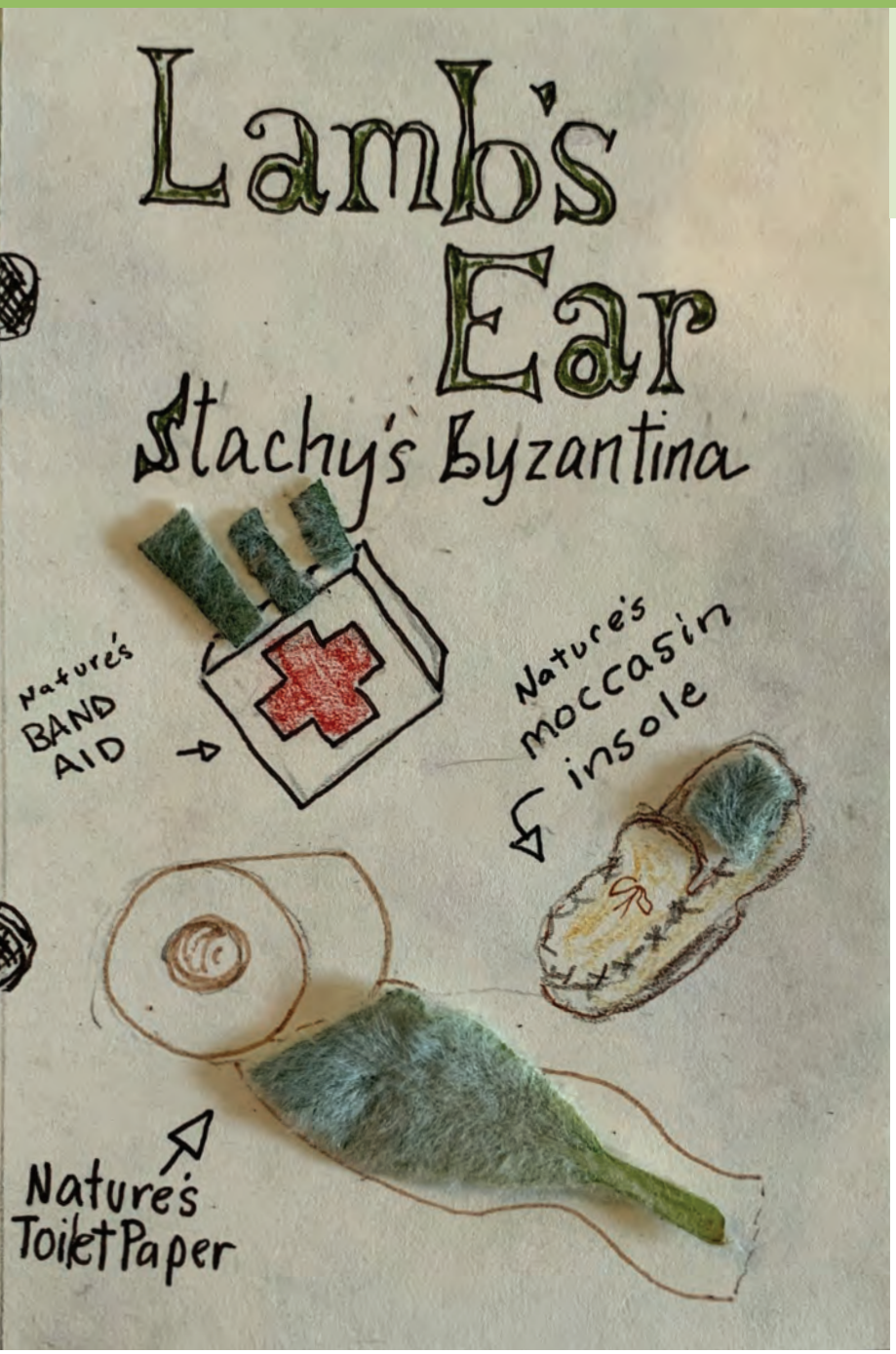
Extension ideas are available for each analysis guide at https://www.loc.gov/teachers/usingprimarysources/guides.html

Common Core Standards for Botanical Illustrations

Examples of Common Core Standards from the Art and Science disciplines which teachers can cite when using botanical illustrations to teach certain core concepts. Grade 6 standards are referenced here.

Image from LOC		Common Core Art Standards / PA Science Standards	
	**Fuchs, Leonhart, and M Isingrin. New Kreüterbüch ... Noch an Tag Komen. Basell, Durch M. Isingrin, 1543.** https://www.loc.gov/resource/rbctos.2017gen01412/?sp=681	**Art VA:Cr1.2.6a** Formulate an artistic investigation of personally relevant content for creating art.	**Science 3.3.7.A.1.** Describe how the structures of living things help them function in unique ways.
	**Redouté, Pierre Joseph, Claude-Antoine Thory, and Lessing J. Rosenwald Collection. Les Roses. Paris, Imprimerie de Firmin Didot, -24, 1817** https://www.loc.gov/resource/rbctos.2018rosen1892v1/?sp=333	**Art VA:Re.7.2.6a** Analyze ways that visual components and cultural associations suggested by images influence ideas, emotions, and actions.	**Science 3.1.7.B.3.** Explain systems by outlining a system's relevant parts and its purpose and/or designing a model that illustrates its function.
	**Johnston, Frances Benjamin, photographer. Leaf and flower painting, 2nd Division. Washington D.C, 1899. [?] Photograph.** https://www.loc.gov/item/2001703620/	**Art VA:Cr1.1.6a** Combine concepts collaboratively to generate innovative ideas for creating art.	**Science 3.1.7.D.1.** Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications.
	**Johnston, Frances Benjamin, photographer. White House orchids. Washington D.C, None. [Between 1889 and 1906] Photograph.** https://www.loc.gov/item/2012646234/	**Art VA:Re.7.1.6a** Identify and interpret works of art or design that reveal how people live around the world and what they value.	**Science 3.2.7.D.4.** Design and propose alternative methods to achieve solutions.
	**Catesby, Mark, Edmund C Hartopp, and James Frothingham Hunnewell. The natural history of Carolina, Florida and the Bahama Islands... Mr. Bacon's in Hoxton, -43, 1731.** https://www.loc.gov/resource/rbctos.2017gen00176v2/?sp=396&q=catesby+mark	**Art VA:Cn11.1.6a** Analyze how art reflects changing times, traditions, resources, and cultural uses.	**Science 3.3.7.A.3.** Account for adaptations among organisms that live in a particular environment.

Botanicals, Beyond Beautiful Blooms: An Interdisciplinary Class Project



Moira Messick

Guest Instructor — TPS Program at the University of the Arts

Upon their arrival in the United States, colonists were faced with new challenges which they solved with both native plants and seeds/sprouts they brought with them from the old world. They valued each plant based on functionality over aesthetics. For example, the soft absorbent texture of lamb's ear used by the Native Americans as moccasin insoles, made it a perfect bandage material for colonists. The rigid, silicate filled aspects of horsetail, on the other hand, made this plant ideal for scouring pots and dirty dishes. Life was hard enough for the colonists; luckily they used the land's bounty to make it easier.

In the fall, ask students to bring in a cut plant from their garden. Explain that they will be creating a class book that documents how each plant made life easier for American colonists in their new world. As not all students have access to gardens, you should spend a little time during the summer before the school year, gathering a variety of plants, just before they open.

Student Research

Have students select a plant and research its common name and scientific name, create an illustration, identify the origins of the plant and explain the way it made life easier for the colonists. Students will then infuse the pressed plant into a sheet of homemade paper derived from plant materials.

Gather Supplies

dried cellulose fiber pulp
(irises or daylillies work best), 100 grams

soda ash, 20% of the weight of the pulp,
(found in the laundry supply aisle of
a store)

dried flowers (collected by yourself
& your students in the fall)

stainless steel stockpot
(> 1 gallon, non-food use)

fine strainer (colander + cheesecloth)

water

deckle & mold (two frames,
approximately 8x11" in size,
cover one frame with screening)

vat (plastic or rubber storage tub,
bigger than the frames)

blender (non-food use)

brayer (rolling pin)

4 pressing cloths
(absorbent material such as towels
or wool blankets, "Sham-Wows"
work great!)

protective eyewear

Gather Your Cellulose Fiber

(it is suggested that you do the "cooking" portion at home)

Although it is easiest to use torn scrap paper, we are going to make our paper using plants with a high cellulose content. Depending on class size, you may want to cut the pulp with paper scraps (1:1 ratio), during the blending phase, as it takes a great deal of plant material to create the paper. Irises or daylilies are a great choice because they are high in cellulose content and their long leaves contain long fibers which will add strength and elasticity to our paper.

Dry Your Plants

Once harvested, bundle the leaves and hang them downward to dry in a bright and well ventilated room for about 10 days.

Break Down Your Fibers

Wearing protective eyewear, tear leaves against the grain into ½ to 1" strips. Place a handful of fiber into a gallon pot filled with water and stir in ½ a cup of soda ash before bringing to a boil. *Be sure to add soda ash to water. Never add water to soda ash. Bring pot to a simmer and test every ½ hour for 1-3 hours for doneness by tearing the leaf along the grain of plant growth. When it tears easily, it is ready to be processed; do not overcook. Using a fine strainer, rinse the plant material until the water is clear and no longer appears soapy.

Blend Your Fibers

Fill the blender 3/4 of the way with water and no more than a palm full of the cooked fiber. Beat on medium to high speed, in twenty minute increments to ensure the fibers are not wrapped in the blade. The end goal is to break the fibers into a uniform pulp that is finely dispersed throughout the water.

Form Your Paper

Hold the deckle firmly to the mold at a 90 degree angle to the water. Keep your thumbs off the screen. Submerge mold and deckle parallel to the tub's bottom and move it around to evenly coat the screen with the pulp mixture. Press your seed and flowers around the edges of the pulp, so they are tucked between the paper fibers. Keeping everything level, slowly lift the frame to allow it to drain. Tilt 45 degrees to allow for more drainage.

Dry And Press Paper

Set the deckle onto a towel. Press sponge over screen 3-5 times, wringing the sponge in between. Carefully flip the deckle and peel paper from the screen. Place another towel over the sheet and use a rolling pin to roll out any bubbles and excess water. Press under some heavy books. Your paper should be dry within 24 - 48 hours.

Creation Of Class Book

When the paper dries, students will create a sketch of the plant (labeled parts of roots, leaves, flowers, and fruit, if applicable) including both its common and scientific name as well as historically functional uses. Teacher may bind the book together (the simplest method would be to use a hole punch with twine) for a classroom copy.

Extension Activities

Binomial Nomenclature, Taxonomy. Have students create a dichotomous key for the plants featured in the class book.

Possible Science Experiment:

Investigate the most effective drying method. Students can investigate different methods (e.g. air dry, pressing, and sand drying) and design an experiment to determine which technique is the most effective in terms of color maintenance and flower integrity.

UNIVERSITY OF THE Arts

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Consortium Member

This undated image shows Hamilton Hall at the University of the Arts when the school was known as the Philadelphia College of Art. The building was originally part of the Pennsylvania Institution of the Deaf and Dumb.

South (front elevation - Pennsylvania Institution of the Deaf and Dumb, 320 South Broad Street, Philadelphia, Philadelphia County, PA.

www.loc.gov/item/pa1043/

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