

Plant Life Cycle Lesson Plan: Science/Art Connections

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Introduction: A five part activity for students on plant life cycles incorporating the themes of science and art in a standards-based curriculum format.

Grades: Seventh, but can be easily adapted to other grades.

Sessions: Approximately 5-10 periods/hours.

Themes:

~ Learn about plant life cycles from flower development and insect pollination to fruit dispersal.

~ Practice skills of observational sketching and the creation of a final scientific-style illustration.

State Educational Standard Correlations (examples from California's 7th grade standards):

Science Standards: Area 2a: Life cycles & reproduction of sexual organisms. Area 5F: Anatomy and physiology of plants and animals and the study of the structures and processes by which flowering plants generate pollen, ovules, seeds and fruit.

Art Standards: 2.1: Develop skill in use of several different media, 5.4: Identify professions in the visual arts, ie botanical/entomological illustration.

Part One:

- 1) Introduce students to plant life cycles as they relate to student's textbook chapters or studies.
- 2) Introduce students to the concept of observational drawing techniques.
- 3) Introduce students to famous historical botanical illustrators/explorers and the importance of field scientists/artists in bringing scientific knowledge to the public in a beautiful and engaging way.

Part Two: Explore honeybee and flower pollen anatomy as they relate to plant life cycles.

- 1) Students observe preserved bees under magnification-preferably a dissecting scope, and create detailed sketches as time permits, including top view, side view, and possibly close-ups of wings, and legs. Use bee anatomy handout to assist students in labeling their sketches.
- 2) Students observe and sketch samples of fresh pollen grains under magnification-preferably a compound scope – noting the varieties of color, shape and textures from different species.
- 3) Educator relates lecture material as appropriate – such as general insect anatomy, importance of pollination to agriculture, crisis in the honey bee populations due to Colony Collapse Disorder, co-evolution of flowers and pollinators, human seasonal pollen allergies, etc.

Part Three: Explore the diversity of flower anatomy as it relates to getting pollinated.

- 1) Students observe flowers – both whole and cross sections – from various families to appreciate the diversity in flower structure and noting how these differences account for the diversity of pollinators attracted to them – ie red, tubular, scentless flowers attract hummingbird pollinators.
- 2) Students create detailed sketches of flowers, using flower anatomy handout and other resources available to label the different parts such as sepals, petals, stamens, pistils, etc.

Part Four: Explore the diversity of fruit anatomy as it relates to getting dispersed and starting the next generation.

- 1) Students observe fruits – both whole and sections – from various families to appreciate the diversity in fruit structure and noting how these differences account for the diversity of fruit dispersal mechanisms – ie a maple samara is dispersed by the wind, a fleshy strawberry is dispersed through ingestion.
- 2) Students create detailed sketches of fruits and label basic parts such as ovary wall, ovule, locule, etc.

Part Five:

- 1) Students create a final illustration that summarizes what they've learned about plants and pollinators. Have students gain inspiration from famous field naturalist/artists. Use one or a combination of media available such as pens, colored pencils, watercolors, acrylics, etc. This could take many forms depending upon time and funding. It could simply entail creating a finished detailed illustration from one of their previous sketches, or it could take the form of a booklet, or it could become a group collaborative effort such as a poster or mural. With imagination, there's no limit!

Materials List:

- ~ Preserved honey bees, which can be ordered from biological supply companies.
- ~ Fresh flowers – gather/purchase a variety of diverse flower types such as members of the following families: sunflower, orchid, legume, mustard, mint, rose, grass, carrot, lily). Many road side and school ground ‘weeds’ fall into these categories.
- ~ Pollen grains - See flower categories above. When collecting, make sure anthers are present and haven’t already matured and lost their pollen.
- ~ Fresh fruit – gather/purchase examples of a variety of diverse fruit types, both dry fruit types (ie: acorn nuts, maple samaras, pea legumes) and fleshy fruit types (ie: strawberry accessory, blackberry aggregate, apple pome, orange hesperidium)
- ~ Magnifiers: preferred compound and dissecting scopes or at least good quality hand lenses.
- ~ Handouts –see links below to handouts I have created for these activities, plus many others available online.
- ~ Art supplies: paper, pencils, and/ or colored pencils, ink pens, paints.
- ~ Your school textbook chapters on plant life cycles, ecology, and food webs.
- ~ Photos/posters/overheads/internet images of bees and/or other pollinators, flowers, pollen, fruits and images of famous botanical illustrators such as Maria Sybilla Merian and Margaret Mee. Search engine hints: type in ‘lesson plan’ or ‘images’ plus words such as ‘honey bee’ and you’ll find more information than you can imagine!

RESOURCES

Supplies: Biological supply companies, such as Nasco Science (www.enasco.com) and Carolina Biological Supply (www.carolina.com)

Handouts:

~PDFs created by Christine Elder (available on her website: www.christineelder.com/teaching.html), including the following:

Honey Bee Anatomy, Flower anatomy of a Sunflower, Flower Anatomy of a Passion Flower, Elements of a Scientific Illustration.

Books:

The Botany Coloring Book. by Paul Young, 1982. Barnes & Noble (excellent diagrams)

Vascular Plant Families by James P. Smith, 1977. Mad River Press (excellent diagrams and definitions)

The Forgotten Pollinators, 1996. Stephen Buchmann and Gary Nabhan. (wonderful background reading)

Websites:**Science:**

California State Educational Content Standards. www.cde.ca.gov/be/st/ss

Biology Resources for Teachers (bees, plants, pollinators, ecology): www.biology-resources.com

Honey bee colony collapse disorder: USDA Agricultural Research Service website

<http://www.ars.usda.gov/News/docs.htm?docid=15572>

Art and arts education:

Art Plantae: www.artplantae.com

Guild of Natural Science Illustrators: www.gnsi.org

Maria Sibylla Merian (Famous early botanical/insect illustrator and explorer 1647-1717).

http://en.wikipedia.org/wiki/Maria_Sybilla_Merian

Margaret Mee (Famous botanical illustrator and explorer in the Amazon, 1909-1988)

http://en.wikipedia.org/wiki/Margaret_Mee

Questions? If you have any questions or comments about this lesson please feel free to contact me by email: christine_elder@yahoo.com. I have left a lot out for the sake of brevity so contact me if you need some more help.