

Glossary

abdomen: The posterior part of the body of an insect, attached to the thorax.

abiotic: Characterized by the absence of living organisms.

alchemy: A speculative practice, elements of which led to the development of the fields of chemistry and medicine, that focused on the conversion of base metals into gold and the finding of a solution for everlasting youth.

allegorical: Related to allegory, a literary and artistic means of using fictional stories, characters, and events to reveal truths about human existence.

alloy: A mixture of two or more metals, combined to add strength or resist corrosion.

ambrotype: An early type of photograph in which an underexposed negative on glass was backed with a black coating, thus creating a positive image.

anode: In an oxidation-reduction reaction, the point where oxidation occurs (where a chemical compound loses electrons).

antennae: A pair of long, thin feelers on the heads of insects.

antiquity: Ancient times, especially those before the beginning of the Middle Ages (A.D. 476).

astronomy: The study of the characteristics and actions of objects and material in outer space.

atom: The smallest unit of a chemical element.

balance: The way a work of art's elements are arranged; also, the way weight is distributed so that a person or thing remains upright and steady.

Baroque: The principal European style in the visual arts in the seventeenth century and first half of the eighteenth century, between Mannerism and the Rococo, characterized by dynamic movement, monumental scale, and overt emotionalism.

bellows: A device that, by alternately expanding and contracting an air chamber, creates a stream of air through a nozzle.

bench dog: An iron clamp with teeth, used to secure wood to a workbench.

binder: A substance, such as egg or oil, that promotes the cohesion of pigments.

binomial nomenclature: The two-name system for classifying living organisms, the first one indicating the genus (scientific family); the second, the specific category (species).

biodiversity: The variety of living organisms in a particular environment.

biological: Related to biology, the study of living organisms and the processes of life.

biotic: Characterized by the presence of living organisms.

bisque firing: An initial firing of clay, before glazing, to cause vitrification into a ceramic state.

bodycolor: Watercolor mixed with opaque white pigment.

botany: The study of plant life.

bronze: An alloy of copper, tin, and sometimes other elements, often used to create sculptures; also, a sculpture made of this metal.

Brueghel the Elder, Jan: (Flemish, 1568–1625) Born in Brussels and trained by his grandmother, Brueghel was a draftsman and painter who worked from nature. He was celebrated in his own time for his skill at painting rich and delicate textures of flowers and landscapes. He frequently provided lush, warm-toned woodland scenes densely populated with exotic animals and flowers as frames for other artists' figures.

Brueghel the Younger, Jan: (Flemish, 1601–1678) Draftsman and painter from Antwerp, who devoted his career to carrying on the painting style of his father, Jan Brueghel the Elder. He sometimes copied his father's works and sold them under his father's signature, making it difficult to distinguish their styles, although Jan the Younger's few dated pictures show lighter colors and less precise drawing. He is best known for landscapes with villages, mythological scenes, allegories, and animals. His allegories depicted the senses, elements, seasons, and abundance.

cabinet de curiosité: In seventeenth-century Europe, a room for the research and display of collections of natural specimens, works of art, manuscripts, and other objects, usually in the homes of wealthy and/or aristocratic collectors.

camera: A device used for capturing visual images.

camera lucida: An optical instrument, invented by William Hyde Wollaston, that casts an image of an object onto a surface through the use of a prism or mirrors so that the object can be traced.

candelabrum: A candleholder with several arms.

carbon-14 dating (carbon dating): The process by which the age of ancient organic materials can be determined by measuring the rate of radioactive decay in their carbon-14 content.

carnivore: An animal that feeds on flesh.

cast: To form an object by pouring a liquid material into a mold and letting it harden; also, an object made by this method.

cathode: In an oxidation-reduction reaction, the point where reduction occurs (where a chemical compound gains electrons).

cell: An organism's smallest biological structure, usually microscopic, containing a nucleus surrounded by a membrane; often called the building block of life.

centrifugal force: The force acting on an object moving in a circle to pull it outward from the center of rotation.

centripetal force: The force acting on an object moving in a circle to keep it moving toward the center of rotation.

ceramic: Material made by shaping and firing clay.

chemical: A substance with a particular composition, structure, properties, and behavior.

chemical reaction: The interaction of two or more chemicals, which alters their properties by forming or destroying the bonds between atoms.

chemistry: The study of the composition, structure, properties, and behavior of substances.

chloride: A compound of chlorine and another chemical element; a common example is sodium chloride (salt).

classical: Related to the culture, art, literature, or ideals of the ancient Greek and Roman world.

clay: A stiff, often sticky, impermeable layer of soil that can be molded into shapes when wet; used for bricks, ceramics, and sculpture.

color: The hue, intensity, and value of the appearance of an object, as perceived by light receptors in the eye; one of the elements of art.

commedia dell'arte: Italian for “comedy of skill,” popular in the sixteenth and seventeenth centuries, where actors playing stock characters improvised their roles in standardized plots.

composition: The arrangement of elements in a work of art.

compound: A chemical combination of two or more elements that cannot be redivided into separate components.

compound microscope: A microscope with two or more convex lenses, providing higher magnifications of a specimen.

condensation: The process by which a gas is converted to a liquid.

conductivity: The ability of a material to transmit electricity, heat, or sound.

conservator: A person responsible for the preservation of items of cultural, historical, or environmental value.

constellation: A formation of stars in a configuration perceived as one of eighty-eight particular designs, including Ursa Major.

consumer: In an ecosystem, an organism that consumes materials created by other organisms.

convection: The process by which heat is transferred throughout a liquid or gas through the movement of its molecules.

convex lens: A lens that curves outward and refracts light toward the center of the lens, providing focus.

copper: A ductile, malleable, reddish-brown metallic element used both by itself and combined with tin to make bronze.

curator: A person responsible for the care, display, and study of particular collections, such as works of art.

cyanotype: A photographic print that shows white outlines on a blue (cyan) background, a product of the chemicals used on the print's photosensitive paper.

Daguerre, Louis-Jacques-Mandé: (French, 1787–1851) The inventor of the photographic process that bears his name (daguerreotype).

daguerreotype: A founding method of photography, announced in France in 1839, in which an image is fixed on a silver-covered copper plate made sensitive to light.

decomposer: In an ecosystem, an organism that breaks down waste materials from producers and consumers.

dendrochronology: The study of growth rings in trees, for measuring environmental variations and dating wood.

direct lost-wax method: A technique used to cast metal sculptures. In this process, a clay model is created first. Next, the model is covered with a layer of wax and then a much thicker layer of plaster. The entire mold is heated to melt the wax, and molten metal is then poured in to replace the “lost” wax. After cooling, the mold is removed to reveal a metal sculpture that preserves the details sculpted in the original clay model.

ductility: The ability of a metal to be easily manipulated into a form (by stretching, for example).

ecosystem: A community of organisms in a specific environment.

element: A substance that cannot be chemically broken down into simpler components.

enamel: A protective and/or decorative coating baked on to a ceramic, glass, or metal object.

energy: Usable power that allows work to occur through the application of force.

entomological: Related to entomology, the study of insects.

evaporation: The process by which a liquid is converted to a gas.

ewer: A decorative pitcher with a base, body, and spout.

exoskeleton: An external skeleton that supports and protects the body of an insect.

faience: A type of earthenware covered with thin, opaque layers of colored glazes.

flat slide: A small glass or plastic plate on which a specimen is placed for viewing under a microscope.

fleur-de-lis: In French, the “flower of the lily,” a stylized iris design used in art and architecture as the symbol of French royalty.

food web: In an ecosystem, a series of interconnected food relationships among producers, consumers, and decomposers.

force: The power exerted on an object that influences its condition, motion, or position.

genre: A style of painting with a specific type of subject matter, including history, portraiture, landscape, still life, flower painting, and scenes of everyday life.

Giambologna: (Flemish, 1529–1608) Influential sculptor, active in Italy between 1550 and 1600, who was one of the leading proponents of Mannerism.

gilding: A surface, such as on furniture or other decorative arts objects, covered in gold leaf or gold paint.

glair: A substance made from egg white, used to prepare a surface for decoration and as a binder.

glass negative: A glass plate coated with photosensitive material and used for capturing an image in a camera.

glass paste: Glass that is ground up and combined with an adhesive in order to decorate objects such as jewelry, statues, and furnishings.

glaze: A liquid substance added to the surface of ceramic objects that creates a protective and/or decorative coating when fired.

grotto: A structure built to resemble a cave.

Guild of Saint Luke: A seventeenth-century Dutch trade organization for artists and artisans, responsible for training young artists and regulating the artistic crafts.

guilder: Currency of the Netherlands from the thirteenth century until 2002; derived from *gulden* (golden).

habitat: The environment in which a plant or animal usually lives.

head: The anterior part of the body of an insect, containing the eyes, antennae, mouth, and brain.

heat: A form of energy applied to a substance that changes its temperature, form, composition, color, condition, etc.

Hellenistic: Related to the art and architecture of Greek culture from 323 B.C. (the peak of influence after the conquests of Alexander the Great) to 146 B.C. (the defeat of Greece by Rome).

herbivore: An animal that feeds on plants.

Hertzsprung-Russel (HR) diagram: A two-dimensional graph created by Ejnar Hertzsprung and Henry Norris Russell about 1910 that plots the temperature and luminosity of stars, which allows for the analysis of stellar evolution.

Hoefnagel, Joris: (Flemish, 1542–1601) Self-taught artist who was a pivotal figure in the history of art from the Netherlands, both as the last important Flemish manuscript illuminator and one of the first artists to work in the new genre of still life. He served as court

artist to Albert V, duke of Bavaria, and the Holy Roman Emperor Rudolf II, creating numerous natural history miniatures for books.

Hooke, Robert: (English, 1635–1703) Experimental scientist, active in the fields of astronomy, biology, chemistry, and mechanics, among others, who published his discovery of plant cells in *Micrographia* (1665).

horticulturist: A specialist in the art and science of growing plants.

Huguenot: A French Protestant of the sixteenth and seventeenth centuries, often persecuted because of opposition to the Catholic Church.

illumination: The art of decorating manuscripts with colored and gilded initials, borders, and miniatures.

insect: A small invertebrate with a body divided into three parts—the head, thorax, and abdomen—with three pairs of legs, generally one or more pairs of wings, and a pair of antennae.

invertebrate: An organism lacking a spine.

isotope: Forms of the same chemical element, but with different atomic mass and physical properties.

kaolinite: A mineral that is the chief component of kaolin, an ingredient used for making porcelain and other ceramics.

kiln: A heated enclosure for firing ceramic works.

lapis lazuli: A bright blue semiprecious stone that is ground to make a pigment of this color.

lens: A piece of glass or other transparent substance with curved sides used for magnification or focus.

lifespan: The length of time an organism is alive.

light: Luminous energy from a natural or artificial source that stimulates the process of sight.

light wave: The movement of light particles.

line: A mark with greater length than width, which describes a contour, establishes a boundary, creates a design, or otherwise defines space; one of the elements of art.

Linnaeus, Carl: (Swedish, 1707–1778) Naturalist and botanist who established the modern method of classifying plants and animals in such publications as *Species Plantarum* (1753).

liquid: A substance that is neither a solid nor a gas, in that its molecules flow freely (unlike a solid) but do not tend to dissipate (unlike a gas).

madder: A moderate to strong red pigment made from the roots of a European herb of the same name.

majolica: A type of earthenware decorated with opaque glazes made from tin oxide.

malleable: The ability of a metal to be easily hammered or pressed into a form.

mandible: Part of the mouth of an insect, used for holding or biting food.

Mannerism: Stylistic phase in European art between the High Renaissance and the Baroque (roughly 1510 to 1600), characterized by exaggerated compositions with elongated forms and contorted poses.

manuscript: A document handwritten on parchment, leather, or other material, necessary before the introduction of mechanical printing.

marble: A type of hard, often colored limestone used for architecture and sculpture; also, a sculpture made from this material.

marshland: An ecosystem of wet, low-lying land with grassy vegetation.

Medici: A powerful Florentine family, active in banking, commerce, politics, religion, and art patronage, from the fourteenth through eighteenth centuries.

metal: A chemical element, such as gold or iron, with properties of conductivity, malleability, fusibility, and ductility.

Metamorphoses: A narrative poem by Ovid that details the transformations (metamorphoses) of characters in Greek and Roman legends and myths, beginning with the creation of the world.

Michelangelo: (Italian, 1475–1564) High Renaissance/Mannerist sculptor, painter, draftsman, architect, and poet, responsible for some of the world's most recognized works of art, including the statue *David* (1504) in Florence and the painted ceiling of the Sistine Chapel (1512) in Rome.

Micrographia: A text written and published by Robert Hooke in 1665 on the topic of biological specimens, including cells, viewed through a microscope.

microscope: An optical instrument used for magnifying specimens, such as cells, that are too small to be seen with the human eye.

mineral: Inorganic matter, neither animal nor vegetable, that occurs naturally in earth and water.

miniature: A small, detailed painting in an illuminated manuscript (from the Latin *miniare*, “to paint red,” referring to the red pigment [minium] used for paint and ink).

mixture: A chemical combination of two or more elements that do not bond together.

molecule: A group of atoms bonded together; the smallest unit of a compound that can take part in a chemical reaction.

Montmorency, Anne de: (French, 1493–1567) Soldier and duke who led Catholics to several victories over Protestants in the Wars of Religion.

mount: An ornamental piece, usually made of gilt bronze, attached to furniture and ceramics as both decoration and protection.

mull: To grind into a powder or beat until well mixed.

negative: The reversal of dark and light tones of a photographic image, captured on various media and used to create a positive print.

Newton, Isaac: (English, 1642–1727) Mathematician, physicist, and astronomer, who invented calculus, studied light and color, and described, through his theory of gravitation, how the universe is held together.

Newton's third law of gravity: Isaac Newton's principle that “for every action, there is an equal and opposite reaction.”

ocular micrometer: A ruled scale in the eyepiece of a microscope, used to measure the size of magnified objects.

omnivore: An animal that feeds on flesh and plants.

Ovid: (Roman, 43 B.C.–A.D. 17/18) The author of *Metamorphoses* (A.D. 1–8) but also of intelligent and humorous love poems, one of which, however, resulted in his expulsion from Rome.

oxidation: The process by which one chemical compound loses electrons to another, as when metal rusts (the metal reacting with oxygen in moisture).

oxidation-reduction reaction: The process by which electrons are transferred between the atoms or molecules of different chemical compounds, with the compound losing electrons being oxidized, and the compound gaining electrons being reduced.

oxide: A compound of oxygen and another element.

oxygen: A chemical element, essential for life, that is a component of air, water, and earth.

patina: Green or brown coloration on the surface of metals, either applied or caused by oxidation.

pattern: A repeated motif, element, or design.

perpendicular: Being at a right angle to something.

photograph: A fixed image captured by using a camera.

photography: The method of capturing an image by chemical, mechanical, or electrical processes.

photosensitive: The quality of a material that makes it react to light.

physics: The study of matter and energy and their relationships.

pigment: A powdered substance mixed with a liquid to add color, as in paint or ink.

porcelain: A hard, white ceramic material made of kaolinite clay fired at high temperatures; often coated with glazes.

press-mold: To shape an object by pressing its source material into a mold; also, a mold used for this purpose.

primary consumer: In an ecosystem, an organism that feeds on plant material (such as a rabbit eating grass).

producer: In an ecosystem, an organism that produces materials consumed by other organisms.

provenance: The history of ownership of a work of art.

pull: To exert force on an object in order to move it toward the source of the force.

push: To exert force on an object in order to move it away from the source of the force.

radiation: The process by which heat is transmitted through a substance in the form of waves.

raw umber: A pigment made of, and the color of, natural earth.

reflective: Capable of casting light back to a light source.

refraction: The deflection of light, radio, and other types of waves as they pass between mediums of different densities.

Renaissance Revival: A nineteenth-century style in art and architecture that was influenced by earlier styles that drew inspiration from ancient Greece and Rome.

Rococo: An elaborate decorative style of painting, architecture, and interior decoration, characterized by asymmetry and natural motifs, originating in France and becoming popular throughout Europe from the 1720s through the 1760s.

salted-paper print: The first type of paper print used in photography, whereby a positive image was created by placing photosensitized printing paper under a negative and exposing both to light, then coating the resulting print with a salt solution in order to fix the image.

Sambin, Hugues: (French, about 1520–1601) Wood-carver, designer, architect, and engineer who, in 1551, became master of the guild of *menuisiers* (designers) and supervised many design projects for Charles IX, king of France.

Savery, Roelandt: (Flemish, 1576–1639) Draftsman, painter, and printmaker whose work for the Holy Roman Emperor Rudolf II included studies of animals in the emperor's menagerie. Savery's creations played important roles in the development of several genres: floral still lifes, paintings of cows and other animals, cityscapes, and landscapes.

scientific illustration: A representation of something from nature that captures its details with accuracy.

secondary consumer: In an ecosystem, an organism that feeds on primary consumers (such as a fox eating a rabbit).

semi-permeable membrane: The part of a cell surrounding the nucleus that allows some substances, but not others, to pass through.

shape: An enclosed space formed by a closed line; one of the elements of art.

silica: A nonreactive chemical compound, naturally occurring in such materials as sand, that is ground and mixed with pigments as a component of glazes.

Snyders, Frans: (Flemish, 1579–1657) The first specialist in animal still-life painting, a new Flemish genre in the 1600s. These works allowed Snyders to display his skill at organizing a rich variety of textures, colors, and shapes. In addition to his own energetic hunting scenes and complex still lifes, Snyders was often employed by his close friend Peter Paul Rubens on the still life and animal sections of Rubens's paintings.

solid: A substance that is neither a liquid nor a gas, but rather firm in shape (unlike a liquid) and stable in condition (unlike a gas).

solution: A chemical mixture where one or more elements is dissolved in another element.

species: A category of organisms with similar characteristics, capable of interbreeding in nature and thus passing along genes.

specimen: A sample of something used for scientific study, or an example of something used as a representative of a particular species.

tensile strength: The maximum tension a material can bear without tearing or breaking.

tertiary consumer: In an ecosystem, an organism that feeds on secondary consumers (such as an eagle eating a fox).

thorax: The middle part of the body of an insect, between the head and the abdomen, bearing the legs and wings.

tin: A chemical element, with anti-corrosive properties, used in making alloys such as bronze.

Ursa Major: A constellation perceived as resembling a "great bear" (in Greek myth, the nymph Calypso, transfigured by Zeus).

value: Gradations of light and dark; one of the elements of art.

varnish: A resinous liquid applied to a surface to provide a transparent protective coating.

vermilion: A bright red pigment made from the mineral cinnabar or from the reaction of mercury and molten sulfur.

vertebrate: An organism possessing a spine.

vitrification: The process of converting a material into glass or a glasslike substance by applying heat.

Wars of Religion: A series of wars fought in France (1562–98) between Protestants (Huguenots) and Catholics over religious doctrine.

wash: A thin coat of watercolor or ink applied with a brush to a paper surface.

waxed-paper process: A photographic process in which a paper negative is coated with a layer of wax prior to exposure and development, allowing for delayed use of the negative and greater clarity of the image.

Wollaston, William Hyde: (British, 1766–1828) Chemist and physicist who invented the camera lucida in 1807.