



*Discovering the Story:
A City and Its Culture*

*The Bedstead's Plant Cells -
Revealed!*

A Science Lesson for
Grades 9-12

Based on *Bedstead*
by Benn Pitman, Adelaide Nourse
Pitman and Elizabeth Nourse

Benn Pitman (1822-1910), designer; Adelaide Nourse Pitman (1859-93), carver; and Elizabeth Nourse (1859-1938), painter

Bedstead, c. 1882-83

Gift of Mary Jane Hamilton in memory of her mother Mary Luella Hamilton, made possible through Rita S. Hudepohl, Guardian, 1994.61

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CONCEPT

The *Bedstead*, made from the mahogany tree, incorporates high-relief carvings of various plants, animals, and trees indigenous to the natural habitats of the Cincinnati area. The teacher will facilitate students in the investigation of the plants represented on the *Bedstead*. Students will study the characteristics and cellular structure of each plant through pre-videoconferencing lesson activities, a videoconference visit with the Cincinnati Art Museum, and post-videoconferencing lesson activities. Students will analyze and predict emerging aesthetic and scientific issues with regards to the impact of human intervention on ecosystems.

OBJECTIVES

- Students will appreciate the art and design of Benn Pitman and the Nourse sisters.
- Students will design and conduct scientific investigations using plant specimens as found on the *Bedstead*.
- Students will know the structures of different types of cell parts and the functions they perform.

Teacher Preparation

CLASS PERIODS REQUIRED

1 to 2 (30-50 min.) periods for Pre-Lesson Activities
1 50-min. class period for Videoconference
1 week for extended Post-Lesson Activities

BACKGROUND INFORMATION

Background Information, which contains additional details on the *Bedstead* and the artists who created it, has been written for teachers to review before the lesson and then share with students. It is on the website at <http://www.discoveringthestory.org/goldenage/bed/background.asp>.

VIDEO

Share the wood-carving video with your students prior to the videoconference. The video, which is on the website at <http://www.discoveringthestory.org/goldenage/bedstead/video.asp>, depicts wood carver Fred Wilbur as he carves in the style of works in the Museum. He speaks at length on the *Bedstead*. This video is an excellent resource that will help to prepare students for the videoconference.

Video Duration – 5 minutes.

Pre- Videoconference Lesson Activities

VOCABULARY

Definitions can be found in the Glossary on the *Discovering the Story* website. The Glossary is on the website at <http://www.discoveringthestory.org/goldenage/bedstead/glossary.asp>.

Cell
Plant
Cell membrane
Nuclear membrane
Nucleolus
Chromatin
Nucleus
Cytoplasm
Mitochondria
Golgi body
Endoplasmic Reticulum
Ribosomes
Vacuole
Lysosome
Cell wall
Chloroplast

GUIDING QUESTIONS

- What is a cell?
- What are the parts of a cell?
- What does a cell do? What is its job?
- How do plant cells and animal cells compare? Contrast?

Art is made to disturb. Science reassures. There is only one valuable thing in art: the thing you cannot explain.

Georges Braque

MATERIALS

Print and/or download the following digital images. You should have a detail image from the *Bedstead* and a real-life image of each of the following plants:

AZALEA

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_azalea_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_azalea_full.jpg

BALLOON VINE

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_balloon_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_balloon_full.jpg

DAISY

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_daisy_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_daisy_full.jpg

DAYLILY

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_daylily_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_daylily_full.jpg

GERANIUM

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_geranium_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_geranium_full.jpg

HYDRANGEA

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_hydrangea_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_hydrangea_full.jpg

PALMETTO (PALMERIS)

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_palmetto_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_palmetto_full.jpg

WILD PARSNIP

Bedstead Image:

http://www.discoveringthestory.org/goldenage/images/bed_wild_parsnip_full.jpg

Real-life Image:

http://www.discoveringthestory.org/goldenage/images/real_wild_parsnip_full.jpg

POPPY

Bedstead Image:

http://www.discoveringthistory.org/goldenage/images/bed_poppy_full.jpg

Real-life Image:

http://www.discoveringthistory.org/goldenage/images/real_poppy_full.jpg

WILD ROSE

Bedstead Image:

http://www.discoveringthistory.org/goldenage/images/bed_wild_rose_full.jpg

Real-life Image:

http://www.discoveringthistory.org/goldenage/images/real_wild_rose_full.jpg

Visual of the *Bedstead* at

http://www.discoveringthistory.org/goldenage/images/bedstead_full.jpg

Plant and tree field guides (print and electronic)

PROCEDURE

Teacher will:

- Use the guiding questions to lead a discussion on living things and ecosystems.
- Introduce students to visuals of the *Bedstead*.
- View the wood-carving video with class.
- Initiate student discussion on the plants found in the *Bedstead* carvings.
- Share with students the detail images and names of the plant and animal representations from the *Bedstead*. See links provided in “Materials.”
- Have students identify the specific real-life images of the plants as represented on the *Bedstead* with the assistance of tree and plant field guides.
 - **Teacher Note:** *The specific species of each of these plants cannot be differentiated. Encourage students to find the closest match to those species represented on the Bedstead.*
- Tell students that they are going to meet the Cincinnati Art Museum staff to discuss the use of these plants as decorative items on the *Bedstead*. Students will discuss with Museum staff the use of natural objects in design and what an artist may need to know to represent plants in a sympathetic manner.
- Inform students that after the videoconference they will each research a plant that is represented on the *Bedstead*.

The purpose of education is not simply to inform but to enrich and enlighten, to provide insights into life as it has been led and as it may be led. No element of the curriculum is better suited to that task than arts education.

D.T. Kearns Chairman and C.E.O.
Xerox Corp.

Videoconference

OBJECTIVES

- Students will interact with the Cincinnati Art Museum staff through a sixty-minute videoconference. Information is at <http://www.discoveringthestory.org/videoconference>.
- Students will learn about Cincinnati history from 1850 to 1900.
- Students will use Museum objects to reinforce activities completed in preparation for this videoconference.

CONCEPT

A videoconference conducted by the Cincinnati Art Museum staff extends student learning through emphasis on the viewing and discussion of art objects. During this videoconference with the Museum, students will explore Cincinnati art history and the methods and practices of many of the artists working in the city.

SCHEDULE

- **5 minutes** Introduction to CAM staff (*This is also buffer time in case of connection complications*)
- **10 minutes** Brief discussion of student pre-videoconferencing activities.
- **10 minutes** Museum staff will lead an interactive discussion with students on the history of Cincinnati from 1850–1900
- **20 minutes** Museum staff will lead students in an in-depth investigation of selected Museum objects.

Objects Include

- *Bedstead* by Benn Pitman, Adelaide Nourse Pitman, and Elizabeth Nourse. http://www.discoveringthestory.org/goldenage/images/bedstead_full.jpg
- *Reception Dress* by Selina Cadwallader. This image can be found at http://www.discoveringthestory.org/goldenage/images/dress_full.jpg
- *Aladdin Vase* by Maria Longworth Nichols Storer, which is available at http://www.discoveringthestory.org/goldenage/images/aladdin_full.jpg
- *Ali Baba Vase* by M. Louise McLaughlin, which is available at http://www.discoveringthestory.org/goldenage/images/alibaba_full.jpg
- *Vase and Dedication Medallion* by Tiffany & Co. This image is on the Website at http://www.discoveringthestory.org/goldenage/images/springer_full.jpg
- **10 minutes** Questions and student sharing of art projects.
- **5 minutes** Closing (*This is also buffer time in case of connection complications*)

Post- Videoconference Lesson Activities

MATERIALS

- Composition notebook
- Samples of the following plants:
 - Azalea*
 - Balloon Vine*
 - Daisy*
 - Day Lily*
 - Germanium*
 - Hydrangea*
 - Palmetto (Palmeris)*
 - Wild Yam*
 - Poppy*
 - Wild Rose*
- Microscope
- Materials for making slides

PROCEDURE

Teacher will:

- Review with students the information provided in the videoconference and open a discussion on the representation of the plants on the *Bedstead*.
- Ask students whether artists should know about a plant in order to use it in their designs; does knowledge of plant species help in design?
- Inform students that they are now each going to investigate a plant from the *Bedstead* and in doing so come to a conclusion on whether plant knowledge is an important aspect of the design process.
- Have all students (or student teams) research one of the plants, find a specimen of their plants, and create a class set of slides of their plants.
- Review at this time the process and procedure of making cellular level plant slides for use with a microscope. Review safety procedures and techniques for effective slide production.
- Have all students prepare a short report on their plants and present to the class. After each presentation, students will examine that plant slide under the microscope.
- Have students draw, in their science journals, a picture of each plant's cell and identify its parts. Students will also include pertinent facts about each plant in their journal.
- Ensure that, at the conclusion of this lesson, all students have an entry in their science journals for each of the plants represented on the *Bedstead*.
- Have students write a short position paper that describes whether plant knowledge is an important aspect of the design process. Instruct students to be detailed as to why this knowledge is or is not important.

Assessment Objectives

- Students design and conduct scientific investigations using plant specimens as found on the *Bedstead*.
- Students know the structures of different types of cell parts and the functions they perform.
- Students write a position paper based on their investigations.

The arts are fundamental resources through which the world is viewed, meaning is created, and the mind developed. To neglect the contribution of the arts in education, either through inadequate time, resources, or poorly trained teachers is to deny children access to one of the most stunning aspects of their culture and one of the most potent means for developing their minds.

Elliot W. Eisner
Professor of Education and Art
Stanford University

Academic Content Standards

NATIONAL STANDARDS: SCIENCE

Life Sciences

Standard 5: Understands the structure and function of cells and organisms.

Grades 9–12

Benchmark 1: Knows the structures of different types of cell parts and the functions they perform (e.g., transport of materials, storage of genetic information, photosynthesis and respiration, synthesis of new molecules, waste disposal).

Nature of Science

Standard 12: Understands the nature of scientific inquiry.

Grades 9–12

Benchmark 2: Designs and conducts scientific investigations (e.g., formulates testable hypotheses; identifies and clarifies the method, controls, and variables; analyzes, organizes, and displays data; revises methods and explanations; presents results; receives critical response from others).

NATIONAL STANDARDS: VISUAL ARTS

Standard 4: Understands the visual arts in relation to history and cultures.

Grades 9–12

Benchmark 1: Knows a variety of historical and cultural contexts regarding characteristics and purposes of works of art.

Benchmark 2: Knows the function and meaning of specific art objects within varied cultures, times, and places.

Benchmark 3: Understands relationships among works of art in terms of history, aesthetics, and culture.

OHIO STANDARDS: SCIENCE

Life Science: Students demonstrate an understanding of how living systems function and how they interact with the physical environment. This includes an understanding of the cycling of matter and flow of energy in living systems. An understanding of the characteristics, structure, and function of cells, organisms, and living systems will be developed. Students will also develop a deeper understanding of the principles of heredity, biological evolution, and the diversity and interdependence of life. Students demonstrate an understanding of different historical perspectives, scientific approaches, and emerging scientific issues associated with the life sciences.

Grades 9–12

Benchmark A: Explains that cells are the basic unit of structure and function of living organisms, that once life originated all cells come from pre-existing cells, and that there are a variety of cell types.

Benchmark B: Explains the characteristics of life as indicated by cellular processes and describes the process of cell division and development.

Benchmark F: Explains the structure and function of ecosystems and relates how ecosystems change over time.

Benchmark G: Describes how human activities can impact the status of natural systems.

Scientific Inquiry: Students develop scientific habits of mind as they use the processes of scientific inquiry to ask valid questions and to gather and analyze information. They understand how to develop hypotheses and make predictions. They are able to reflect on scientific practices as they develop plans of action to create and evaluate a variety of conclusions. Students are also able to demonstrate the ability to communicate their findings to others.

Grades 10-12

Benchmark A: Participates in and applies the processes of scientific investigation to create models and to design, conduct, evaluate, and communicate the results of these investigations.

OHIO STANDARDS: VISUAL ARTS

Historical, Cultural, and Social Contexts: Students understand the impact of visual art on history, culture, and society from which it emanates. They understand the cultural, social, and political forces that, in turn, shape visual art communication and expression. Students identify the significant contributions of visual artists to cultural heritage. They analyze the historical, cultural, social, and political contexts that influence the function and role of visual art in people's lives.

Grades 9-12

Benchmark A: Explains how and why visual art forms develop in the context in which they were made.

Benchmark C: Explains the characteristics and content of culturally and historically representative artworks to demonstrate understanding of how visual art reflects historical issues, events, and cultural traditions.

Analyzing and Responding: Students identify and discriminate themes, media, subject matter, and formal technical and expressive aspects in works of art. They understand and use the vocabulary of art criticism to describe visual feature, analyze relationships, and interpret meanings in works of art. Students make judgments about the quality of works of art using the appropriate criteria.

Grades 9-12

Benchmark A: Applies the knowledge and skills of art criticism to conduct in-depth analyses of works of art.

"I found that I could say things with color and shapes that I had no words for."

Georgia O'Keeffe, artist