

EMS Lesson 5: Genetic Hall of Fame

(Pre or Post Visit)

Objective:

By the end of the lesson, students will understand that genetic research is a relatively new field and that our current understanding of genetics and heredity is a culmination of the work of many scientists from around the world.

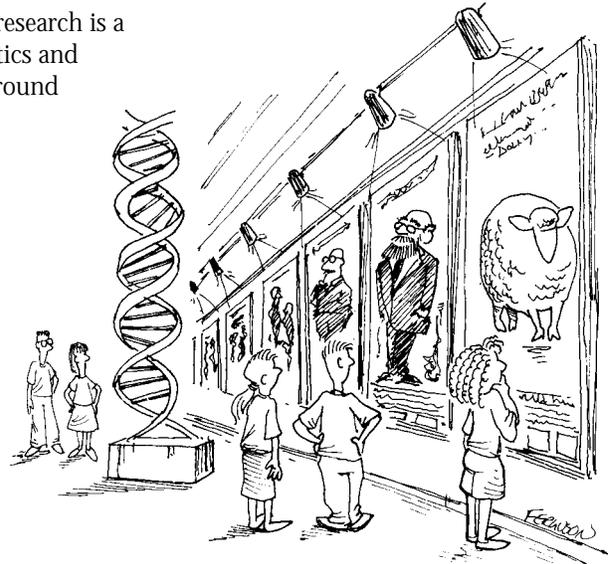
Curriculum Link:

This lesson could be used in any of three ways: 1) as an introduction to the study of genetics; 2) as an ongoing project during a unit on genetics; 3) as an end-of-unit project.

Exhibit Link:

Discovery Timeline

This part of the exhibit shows how many scientists made important discoveries towards the understanding of heredity, beginning with Mendel in 1865 and ending with the first draft of the human genome in 2000.



Time Required:

Teacher Preparation: One hour **Class Time:** Three to five 30-40 minute sessions

Materials Needed:

- Internet access for student research at web sites and/or printed material for student research
- White butcher paper six feet or longer, with dated timeline
- Slips of paper with topics for research
- Colored markers, crayons, yardsticks, and rulers

Lesson Steps/Activity:

1. Assign topics to students or groups of students, or have them choose from milestones that chart the progression of the understanding of human genetics and heredity. Have them research the subject in order to contribute to a class timeline. Following is a suggested list of milestones that might be included:
 - 1866 – Gregor Mendel discovers “factors,” or genes.
 - 1911 – Thomas Hunt Morgan proves genes are carried on chromosomes.
 - 1943 – Oswald Avery discovers genes are made of DNA.
 - 1953 – Watson and Crick discover the structure of DNA (double helix).
 - 1961 – Sydney Brenner discovers messenger RNA.
 - 1973 – Stanley Cohen and Herbert Boyer clone genes by transferring a virus gene to bacteria.
 - 1975 – Fred Sanger and Walter Gilbert develop a technique to read chemical bases of DNA.
 - 1983 – Kary Mullis develops a “copying machine” to make copies of specified regions on DNA quickly in a test tube.
 - 1990 – Scientists propose to decode the human genome within 15 years.
 - 2000 – President Clinton announces that scientists have completed a first draft of the human genome.
2. When students have completed their research, have them write a brief explanation of the milestone and attach it to the appropriate place on the class timeline. Students should also share their findings with the class, likely expanding beyond what is included in their brief write-up.

Extensions & Modifications:

Elementary:

- Focus on events rather than inventors.

- Gather the resource material a week ahead of the assignment, and encourage students to begin browsing through the books/web sites.
- Keep the report to a paragraph or half page, and ensure that all the milestones can be depicted with a picture.
- If possible, ask a middle grade teacher to loan student volunteers to work as “consultants” during one or two of the sessions.

Middle:

- Give students a choice of focusing on the event or the inventor(s).
- Encourage students to come up with an event or date that is not on the timeline.
- If this is an introductory unit, give the vocabulary list a week ahead of time.
- Have students include other important events/people/discoveries from around the same time as the event/milestone that they report on.

Important terms: heredity, genetics, genes, human genome project

Additional Middle School terms: DNA, gene, chromosome, RNA, ribosome, clone, double helix

Writing Prompts/Discussion Questions:

1. Which event or inventor do you think had the most impact on the study of genetics? Why?
2. Are you surprised to learn that we have known about heredity, genes, DNA for as long as we have? Or are you surprised that it hasn't been that long? Explain.
3. Why do you think the human genome was discovered ahead of the original estimate of 15 years?
4. Do you think the study of genetics and heredity is important? Why?

Additional Resources:

Stories from the Scientists: <http://www.accessexcellence.org/AB/WYW/wkbooks/SFTS/>

The Human Genome Project: <http://www.genome.gov/Pages/EducationKit/>

Both of these sites are excellent sources for student research.

National Standards Addressed:

K-4 Content Standard C – Science as a Human Endeavor

- Men and women have made a variety of contributions throughout the history of science and technology.
- Although men and women using scientific inquiry have learned much about the objects, events, and phenomena in nature, much more remains to be understood. Science will never be finished.

5-8 Content Standard G – Science as a Human Endeavor

- Individuals and teams have contributed and will continue to contribute to the scientific enterprise.