

actionbioscience.org lesson

To accompany the peer-reviewed article by Glenn McGee, Ph.D.:

“Primer on Ethics and Human Cloning” (Feb. 2001)

<http://www.actionbioscience.org/biotech/mcgee.html>

Human Cloning: Is It Biological Plagiarism? (Mar. 2002)

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Educator’s section: *p. 1-3*

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Grades & Levels:

- **Handout 1:** high school (general – advanced)
- **Handout 2:** high school (advanced/AP) – undergraduate (year 1-2)

Time Recommendations:

- minimum of 2 hours for planning and research
- 10 to 20 minutes for each presentation

NSES (USA) Content Standards, 9-12:

- NSES 4.1. Life Science: the cell
- NSES 6.1. Science & Technology: abilities of technological design
- NSES 7.6. Science in Personal/Social Perspectives: sci. & tech. in local/national/global challenges

Note: View the NSES content standards on this site to choose other curricular applications for additional activities at:

<http://www.actionbioscience.org/educators/correlationcharts.html>

Learning Objectives: Students will ...

- develop an understanding of the science of cloning using data, theories, principles, and models
- communicate and apply scientific concepts in genetics
- examine prominent positions on the issue of human cloning
- apply scientific principles to personal and social views on the subject of human cloning

Key Words include:

bioethics, cell, cell lines, cloning, culture (as in cell culture), DNA, embryo, (in)fertility, genetics, genome, genetic code, implantation, imprinting, in vitro, mammalian, nucleus, nuclear transfer, progenitor, reproductive technology, zygote

Preparation

Article Discussion:

- Students begin by reading the article “Primer on Ethics and Human Cloning” by Glenn McGee, Ph.D., at <http://www.actionbioscience.org/biotech/mcgee.html>. Discuss the article in class using questions provided on page 3.

Handout 1: high school (general – advanced)

- Instruct students on their assignment. Review “Project Prospectus” on the first page of Student Handout 1 for an overview of what students will be doing. Students will need
 - access to computers
 - journal-style workbook (such as a marbled composition book)
 - a copy of “Student Handout 1,” pages 4-7
 - visual aids for presentations, such as tag or poster boards

- Help students set up their journal. They should insert the “Project Prospectus,” “Web Site Evaluation Checklist,” and “Web Site Evaluation Guidelines” into their journal. All of these inserts are part of Student Handout 1.
- Students will need to form teams to address the presentation questions on page 4, “Advisory Teams.” Note that space has been provided on this sheet for you to insert additional questions.
- The project is structured so that parts of it can be done individually and parts require group work.
- Instruct students on how much time they have for research and planning. Also tell them how much time they have to make their presentations (recommended: 10-15 minutes for each presentation). Allow time for the class to ask questions about each presentation. Some suggested lead-in questions:
 - Do you think human cloning is a worthwhile undertaking? Why/ Why not?
 - Would you like to be a clone? Why, or why not?
 - Do you think medical research on cloning should be allowed to continue? Why/Why not?
 - In what ways, if any, has your opinion of cloning and its potential benefits and detriments changed from the time you began the project to the time you finished it?

Handout 2: high school (advanced/AP) – undergraduate (year 1-2)

- Distribute or have students print out Handout 2 on page 8.
- The activities are divided into those that conclude in a visual presentation, an oral presentation, or a debate. Most activities are best done in groups; however, some may be chosen as individual assignments.
- Inform students about how much time they have for research and planning.
- You may want to provide students with “Web Site Evaluation Checklist” and “Web Site Evaluation Guidelines” from Student Handout 1 to help them with their Internet searches.
- Assign presentation dates. Presentations can range from 10 to 20 minutes. If you wish, provide time for class questions after each presentation.

Presentation Ideas for Handouts 1 and 2

Some variations for student presentations:

- **Group Presenter:** A spokesperson is chosen by consensus or drawn by lot. In handout 1, to foster authentic assessment, invite a guest to play the part of “The President.”
- **Survey:** Students conduct a survey of the class, or perhaps the entire school, to determine the school community’s viewpoint on human cloning. By utilizing one of the free World Wide Web listserv sites, such as ONEList or Topica, they can construct a listserv open to the public to also garner the general public’s opinion on the subject of human cloning. After the results are tabulated, students might graph the results using a pie chart and/or a bar graph.
- **Web Presentation:** Students build an informational web page for the school’s science department web site containing transcripts of each of the presentations. Freeware and Shareware such as HTML Assistant can aid in the web-building process.
- **Newsletter Story:** Teams write an article for the school newspaper based on their research.

Useful Links

- Tell students that their Internet searches will begin with the links that follow the article they have just read and discussed. See the *Learn More* section and “useful links” in the *Educator Resources* section at the bottom of the article’s web page. These links provide resources that may be helpful in the performance of activities. Students can follow the trail from these links to more links.

For Educators: Article Discussion

About the article by Glenn McGee, Ph.D.:
“Primer on Ethics and Human Cloning”
<http://www.actionbioscience.org/biotech/mcgee.html>

Content Questions

1. How is an egg urged to develop into an embryo in cloning technology?
2. What are some of the problems encountered in animal cloning?
3. What is the primary argument used by those who advocate human cloning?
4. Why is it difficult to put laws into place that prevent human cloning?
5. Why do people feel that human cloning “will breach a natural barrier?”
6. Why did Dolly not fully qualify as a cloned embryo?
7. What are the difficulties in defining a clone?
8. How can human cloning violate a child’s “right to an open future?”
9. Explain what the author means in his conclusion when he says that cloning “will in many ways identify the moral features of 21st century biotechnology.”
10. Do you think the author has presented a balanced view of both sides of the issue? Explain.

Extension Questions

1. Make a list of the PROs and CONs of human cloning presented in the article. Do you agree or disagree with each argument?
2. Should human cloning be banned? Explain.
3. Is it inevitable that a human will be cloned one day? Explain.
4. Speculate what it would be like to be the first cloned human.

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Student Handout 1

HUMAN CLONING: SPECIAL ADVISORY COMMITTEES



PROJECT PROSPECTUS

A governmental Subcommittee on the Ethical Issues of Human Cloning has asked that you help shed some light on the technological challenges and ethical dilemmas regarding human cloning. Government aides have compiled lists of questions, found on the “Advisory Teams” page, which they want answered at a meeting with the President and presidential aides. Answer each question on your list as accurately as you can.

Before your presentation it will be necessary to research the issue on the Internet. Be wary of on-line sources. There are no established editors or fact checkers policing the World Wide Web. You will be armed with web site evaluation guidelines to help you become a wise and canny web evaluator.

Your task involves:

- Choose your team from the four listed on the “Advisory Teams” page. Review the questions you must answer for your team.
- Create a journal for your research. Print and insert this page (“Project Prospectus”) into the journal.
- Print and insert copies of “Web Site Evaluation Checklist” and one copy of “Web Site Evaluation Guidelines” into your journal. These are the evaluation worksheets you will use during the project.
- Conduct research on the Internet to help you address your team’s questions. Your search will begin with one article, found at <http://www.actionbioscience.org/biotech/mcgee.html>. Read the article, then follow the links provided at the end of that article to other web sites, some of which will also have links that you can follow.
- Review web sites to decide if their information is valuable for your presentation, using the evaluation worksheets provided. Use information for your presentation only from sites to which you gave a high rating.
- After research is completed, discuss findings with team members.
- Plan a presentation format with your team that best supports your conclusions.
- Make your presentation to the President. Be prepared to answer questions about your presentation.

Advisory Teams

TEAM NAME: BIOTECHNOLOGY ADVISEMENT

Your team's questions/tasks are:

1. How are organisms cloned?
2. What impact do you foresee cloning having on science and society?
3. Discuss advantages and/or benefits that would be possible with the use of cloning.
4. Describe a process for cloning a human.
5. Are organisms classified as asexual reproducers already cloning themselves?

TEAM NAME: GENOME ADVISEMENT

Your team's questions/tasks are:

1. How are organisms cloned?
2. Has a human clone already been created?
3. Compile a list of possible uses and consequences of human cloning.
4. Citing your research, what are the greatest ethical and moral considerations of cloning?
5. Describe some of the portrayals of human cloning in media (movies, novels, TV, etc.).
What effect might these portrayals have on public opinion?

TEAM NAME: DNA REPLICATION ADVISEMENT

Your team's questions/tasks are:

1. How are organisms cloned?
2. Do you believe that long term cloning would impact the evolutionary process? Why?
3. What is the most complex organism cloned by scientists to date? What was the procedure?
4. List disadvantages of human cloning.
5. How are the genes passed to a clone similar to or different from a natural offspring?

TEAM NAME: NUCLEOTIDE ADVISEMENT

Your team's questions/tasks are:

1. How are organisms cloned?
2. Do scientists have the capability to clone humans?
3. Do you foresee major government funding for human cloning research? Why/Why not?
4. Why do you believe there is such emotional polarity on the cloning issue?
5. Citing your research, what are the greatest ethical and moral considerations of cloning?

WEB SITE EVALUATION GUIDELINES

Below are guidelines to help you decide if a web resource contains sound information. A web resource may meet the criteria for some evaluation questions, but be weak in other areas. Use your judgment to determine if the web site/page is worthy of consideration for your research project.

2	Excellent – This web resource is balanced (if bias is present, its foundation is solid, and opportunities to examine both sides of the issue are made available either through the website itself or hotlinks to other sites); contains solid and reputable reference sources (within the text, in a bibliography, or as citations); presents the information in a clear, concise, compelling manner; authored by a person or organization with expertise/qualifications (some resources are even peer-reviewed, i.e., reviewed independently by qualified people); the date when the material was written is evident (publication dates are especially important for people who are looking for the most recent information or up-to-date scientific research).
1	Good – This web resource tries to present both sides of the issue (if bias is present, there is an acknowledgement of the opposing viewpoint/s); some of the information presented is bolstered by good reference sources; the information within is presented fairly, and follows clear, logical arguments; authored by a person or organization that has some expertise on the topic; the date when the material was written is provided but it is difficult to find.
0	Poor/ Not Trustworthy – This web resource does not meet the requirements of sound, responsibly cited information. It presents only one side of the issue in question, with no acknowledgement of or respect for opposing views; the information is not supported by reputable sources, falling almost into the realm of hearsay; the information presented is difficult to follow and vague; authored by unqualified persons or organization; the date when the material was written is not provided.

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Student Handout 2

Choose one of the activities listed in any of the three options (Visual Presentation, Oral Presentation, Debate). Your instructor will tell you how much time you have for research and preparation and assign a presentation date.

Visual Presentation

- Human Cloning Technology: History and Methods
- Differences/Similarities between Animal and Human Cloning
- Comparing Reproductive Cloning and Nonreproductive Cloning

Oral Presentation

- Cloning and the Law in My Country and ... (choose one other country for comparison)
- Positions Taken by Groups/Organizations on Human Cloning (at least 4 positions)
- Scientists and Human Cloning (find at least 2 prominent scientists who oppose it and 2 who embrace it)

Debate

- Human cloning will/will not lead to eugenics.
- Human cloning should/should not be completely banned.
- Human clones would have/would not have the same rights as other offspring.