

Cloning, Stem Cells, and the Current National Debate: Incorporating Ethics into a Large Introductory Biology Course

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Discussing the ethical issues involved in topics such as cloning and stem cell research in a large introductory biology course is often difficult. Teachers may be wary of presenting material biased by personal beliefs, and students often feel inhibited speaking about moral issues in a large group. Yet, to ignore what is happening “out there” beyond the textbooks and lab work is to do a disservice to students. This essay describes a semester-long project in which upperclass students presented some of the most complex and controversial ideas imaginable to introductory students by staging a mock debate and acting as members of the then newly appointed President’s Council on Bioethics. Because the upperclass students were presenting the ideas of real people who play an important role in shaping national policy, no student’s personal beliefs were put on the line, and many ideas were articulated. The introductory audience could accept or reject what they were hearing and learn information important for making up their own minds on these issues. This project is presented as an example of how current events can be used to put basic cell biology into context and of how exciting it can be when students teach students.

Keywords: undergraduate, bioethics, introductory biology course, cloning, stem cells.

INTRODUCTION

A novel project on bioethics grew from the idea that students from two courses could be brought together: 1) upperclass women in a seminar course on cloning and stem cells, and 2) students in the second-semester introductory biology course. Two weeks before the semester began, on January 16, 2002, President Bush announced the 18 members of his Council on Bioethics (<http://www.bioethics.gov/whpress.html>), who were charged with advising him on human cloning, stem cell research, and other biomedical topics. Each student in the upperclass cloning seminar was responsible for learning about a member of the Council, and the culmination of their research would be a mock Council debate put on for the students of the introductory biology course. The members of the President’s Council have a broad spectrum of beliefs and expertise, including ethics, cell biology, medicine, theology, law, and political economy (see Appendix A). The Council was not established to be impartial—each member was chosen by the President because of his or her experiences and personal beliefs. The aim of this exercise at Mount Holyoke College (MHC) was for the upperclass students to articulate the arguments used to support these strong views and for the introductory students to gain insight into how personal

beliefs can be woven around “scientific facts” as society grapples with the need for public policy.

METHODS

Two courses were involved in this semester-long project:

1. *Bio 321: Animal Cloning: Past, Present and Future*. Twelve upperclass female students enrolled, and all had taken (or were concurrently taking) developmental biology and/or cell biology. This class met once a week for 2 h and was worth two credits (a full-credit course at MHC is worth four credits). Assigned readings included Gina Kolata’s 1998 book, *Clone: The Road to Dolly and the Path Ahead*. Articles from the research literature focused on animal cloning by nuclear transplantation and on embryonic and adult stem cell research (see Appendix B, which is the reading list for this class).
2. *Bio 200: How Organisms Develop*. This class is the second-semester part of a year-long introductory biology course that is team taught by an animal developmental biologist and a plant molecular biologist. Typical course enrollment is 130 students, and lecture is held four times a week. Each student has one 3-h lab per week. The course covers the basics of cell and molecular biology under the rubric of developmental biology, including “What is a cell?” mitosis/meiosis, and central dogma, with the use of examples such as sea urchin development, fern life cycles, and gene expression in fruit flies and flowers.

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Preparation by the Upperclass Cloning Students

At the first class meeting, the students in the cloning seminar course were told that the goals were to learn the biology of cloning and stem cell research and to put this science into context by studying the ethical and legal considerations of such work. The students quickly saw how exciting it could be to stage a mock debate. Students received copies of newspaper articles announcing the establishment of the Council and were told to rank 4 of the 18 panelists whom they would be most interested in studying. By the third week of the semester, they had each been assigned their committee member. Much of one class meeting was spent discussing how best to find material. Each student wrote to the member of the President's Council whom they were portraying, and 5 of the 12 received responses. Students did web searches and found articles and books written by their member. However, by far the most useful source of material was the word-for-word transcripts of the Council meetings that were posted on the national bioethics web site by the middle of the semester (<http://www.bioethics.gov/transcript.html>). This web site was a treasure trove and gave the students an unprecedented window into what went on during the meetings. They could read the actual comments spoken by "their" expert and start to build a framework for the information that they wanted to present to the introductory biology students.

The presentation to the introductory biology class was scheduled for the last full week of classes, during a regularly scheduled intro class meeting time, which meant that the entire presentation could last no more than 50 min. Because each of the 12 upperclass students would be presenting the views of their Council member, and some time needed to be saved for questions from the audience, each panelist was limited to a 3-min statement. Because of these limitations, the students spent much more time honing their statements to be clear and informative than if they had had unlimited time to speak.

The week before the event, the students discussed the order in which they should present their information. They quickly decided that the student playing the Chairman of the Council would begin, acting as moderator during the session. The students spent time considering what would make things most clear for the audience and what pieces of information they wanted each Council member to be in charge of. For example, two cell biologists were represented on our

panel, and they gave their statements immediately after the chairman. The students playing these panelists would use some of their time to define reproductive and therapeutic cloning. The students wanted to try to alternate members whom they loosely defined as "pro research cloning" with those staunchly "anti cloning." They wanted to end with a bang and, after thoughtful discussion, chose to end with the student playing Paul McHugh, a physician from Johns Hopkins University School of Medicine because his message was powerfully personal. With many of the students in both classes interested in a career in medicine, his arguments for allowing stem cell research based on his daily interactions with patients with Huntington's disease struck a chord. Thus, the class seriously discussed how to weave a dozen separate speeches into a coherent presentation for the introductory students. After this meeting, each student polished her script for the debate to include remarks showing that this was a real discussion, taking into account what would be said by the previous panelists.

Each panel member had to turn in her speech a few days before the debate, and all the speeches were then put together into the final script (edited only for grammar and spelling; see Appendix C). Students did not have to read these speeches word for word during the presentation, but many had worked hard to get the voice of their panelist right (using many direct quotations from the published transcripts of Council meetings).

The cloning class also wanted to give out a questionnaire to the introductory biology students the day before the event, raising some of the issues to be addressed. The students proposed a wide range of questions, and 12 were chosen to be included (see Table 1).

Preparation by the Introductory Biology Students

The first day of the semester, the introductory biology class was informed of the "special presentation." Because the debate was to be held during a regularly scheduled class time, it was assumed that all students would attend. Periodically during the semester, news headlines were announced that served as "teasers," and soon class members were bringing in such information. This information included the announcement of the cloning of "cc" the cat, an unconfirmed report carried by all major newspapers that three women were pregnant with cloned embryos, and speeches by members of Congress on different bills to ban or allow cloning.

Table 1. Bio 200: Public policy, human cloning, and the stem cell debate: survey and results

Statement	Yes/Agree	No/Disagree	Other
Human cloning is legal in the United States.	18	90	
A clone is the same thing as an identical twin.	36	73	
My clone would look exactly like me.	73	35	
My clone would <i>be</i> exactly like me (personality, behavior, etc.).	3	107	
I support reproductive cloning of humans.	16	91	
I support biomedical cloning to obtain embryonic stem cells.	91	16	
I believe adult stem cell research holds great promise.	83	24	
I believe embryonic stem cell research holds great promise.	93	11	
I would eat meat from cloned cows.	63	28	19 (vegetarians)
I own my cells, my tissues, my body.	106	2	
I feel that I have an adequate scientific background to address these issues.	58	46	

When does human life begin? (Circle on time line below.)

Gametes	Fertilization	Cleavage	Gastrulation	Neurulation	Fetus viable outside womb	Birth
4	44	1	3	20	24	10

Table 2. Comparison of adult and embryonic stem cells presented in introductory biology class

Cell type	Advantages	Disadvantages
Adult stem cells	Not controversial as source of material Found in many tissues Patient's own antigens present, so no immune rejection Some human data for promising experimental therapies	Very rare cells, so difficult to isolate and identify Difficult to maintain in culture in undifferentiated state
Embryonic stem cells	Cells have great potential for differentiating into multiple kinds of tissues (20 yr of mouse research to support this) Relatively easy to maintain in culture in undifferentiated state	Human eggs and embryos difficult to obtain Need to be combined with nuclear transplantation to be immunologically matched to patient Risks of tumor formation Ethical and political issues raised by isolating cells from human embryos

The day before the debate, the class consisted of a lecture on the basic biology of stem cells, cloning by nuclear transplantation, and definitions of reproductive and therapeutic cloning. The students were already familiar with the concept of totipotency, but they had not had much instruction on early mammalian development. Thus, this lecture introduced them to the two cell types in a blastocyst and how the inner cell mass could serve as a source of stem cells. Discussion included how to obtain human eggs by superovulation induced by hormone therapy and surgical removal from ovarian follicles. Adult and embryonic stem cells were compared as possible sources of material for regenerative medical treatments (Table 2). The class ended with a videotape of President Bush's speech (April 10, 2002) calling for a complete ban on all forms of human cloning. As students left, they received the survey (Table 1), the text of President Bush's charge to the Council upon its creation (Appendix D), and a list of the Council members with the names of the upperclass students who would play them.

The Debate

For ease of logistics, the debate was held in the large lecture hall where the introductory biology class usually met. A long table was placed at the front of the room, with name cards at each place identifying the panelists as the actual Council members, including their affiliations and the names of the students portraying them (see Figures 1 and 2). A photograph of the actual Council member (taken from the Web) was projected on the large front screen when each member spoke. The student panelists were a little shocked to be in front of such a large group: although they knew they would be performing for the introductory biology class and they were all familiar with the large lecture hall, they said the reality was intimidating. Many students commented that this audience was the largest that they had had to address while they were students at MHC. The introductory biology students dropped off their completed questionnaires as they arrived and were attentive and engaged throughout the session. During a typical class meeting, there is often a low level of whispering and inattention. However, on this day, the energy in the room was electric, and you could have heard a pin drop while the Council members spoke. Students from both classes commented on how "intense" the atmosphere was and on how engaged students were.

Following is a brief summary of the panel presentations written for this essay, included to introduce the range of positions held by the Council members. These summary statements are far from actual comments made by the real Council members, having been filtered



Figure 1. "President's Council on Bioethics" presentation to introductory biology class, April 2002, Mount Holyoke College.

through the MHC students and then abbreviated by the author. The complete scripts written by the MHC students can be found as Appendix C.

1. *Leon Kass*. Bioethicist, University of Chicago. The audience was immediately drawn into the presentation because the student quoted Dr. Kass on how important it had been for him to watch sea urchin fertilization as a student. Because all the intro biology students in the audience had worked with urchin embryos, this was a powerful connection. "Dr. Kass," opposed to any form of human cloning, ended his statement with a strong plea to "put an end to this evil process."
2. *Janet Rowley*. Geneticist, University of Chicago. "Dr. Rowley" introduced the biology of reproductive cloning and went on to say that because we are just beginning to understand how stem cell therapies could be potentially beneficial, "we must allow this research to continue."
3. *Elizabeth Blackburn*. Cell Biologist, University of California, San Francisco. After defining therapeutic cloning, she discussed what a medical advantage it would be to have genetically identical tissue for therapy so that no possible rejection response could occur.



Figure 2. "President's Council on Bioethics" members.

4. *William Hurlbut*. Medical Ethicist, Stanford University. This panelist raised some of the most profound questions on the current controversies, including how to weigh moral considerations against scientific progress. There are "some things that are at the core of what makes us human, and if we disturb them we will lose our identity and our community," he said.
5. *Mary Ann Glendon*. Professor of Law, Harvard University. "Dr. Glendon" argued, "As clear as murder is a violation of human rights, so is reproductive cloning." Saying that therapeutic cloning raises more difficult issues because it is not so black and white, she implored her audience to think hard about these questions because "each step in any direction is a moral statement with colossal implications."
6. *Gilbert Meilaender*. Professor of Christian Ethics, Valparaiso University. "Dr. Meilaender" used theological language to explore why human cloning is antithetical to religious doctrine, reminding his audience that according to the Bible, "children are made by God through the act of human begetting." Tempting though it might be to think about curing illness by using treatments arising from therapeutic cloning, it "is not how long we live but how we live" that matters, he claimed.
7. *Charles Krauthammer*. Syndicated Columnist, *The Washington Post*. As someone trained in medicine, whose job is to relay the importance of national debate to the American people, "Dr. Krauthammer" clearly stated that he thinks there should be a full ban on all forms of human cloning. Afraid that allowing research on embryos discarded from infertility clinics will lead us down the "slippery slope" toward reproductive cloning, he discussed eugenics and the possibility of a future industry built around designer embryos.
8. *Rebecca Dresser*. Professor of Law and Medical Ethics, Washington University. Concerned with the research ethics considerations of cloning, she said, "Respect for persons in research requires that we protect people who are incapable of making their own decisions. While there are different opinions about whether or not the embryo merits protection, eventually it will be a child who does require protection and this raises the question of whether or not we have enough evidence about how safe the cloning procedure is and what the outcome is to the child." She raised questions about possible exaggeration of what therapeutic cloning can do and whether raising false hopes in patients is ethical.
9. *Francis Fukuyama*. Professor of Political Economics, Johns Hopkins University. "I feel that the entire field of human cloning has the possibility of causing profound and potentially terrible consequences in the

political order," "Dr. Fukuyama" said. He raised concerns about how access to new therapies will be apportioned, in light of the great disparities in access to current basic medical therapies between rich and poor populations.

10. *Daniel Foster*. Internal Medicine, University of Texas. Supporting research on therapeutic cloning, "Dr. Foster" said, "I almost think that the highest respect that one could give societally to a clone or zygote is to allow those few cells to be used for the greater good of conquering human diseases and suffering."
11. *Michael Gazzaniga*. Professor of Neuroscience, Dartmouth College. "Dr. Gazzaniga," who supports therapeutic cloning, based his argument on when brain function begins in a human embryo: "A patient who has requested to be an organ donor is pronounced dead when the brain stops functioning. If we apply this to a human embryo used for therapeutic cloning, we know that it is not until the 40th day that any sign of a nervous system is detected." Therefore, he purported, it is ethical to isolate stem cells from blastocysts, in light of the tremendous potential for curing human suffering that this research holds.
12. *Paul McHugh*. Psychiatrist, Johns Hopkins University. As a physician treating patients with Huntington's, Parkinson's, or Alzheimer's disease, "Dr. McHugh" presented a very personal argument for why therapeutic cloning research must be allowed to continue. "How can I tell my patients and their families that we are doing all we can for them when we are not fighting to see how far therapeutic cloning could take us?" he asked.

Once the presentations were concluded, after a long, loud round of applause, "Dr. Kass" opened the floor up for questions. Students asked panelists about their personal beliefs on cloning and about biological details (including a question dealing with xenotransplantation vs. therapeutic cloning). At one point, more than 20 hands were in the air. What was most exciting was how the panelists responding to the questions stayed in character and answered as they believed their real counterpart would have. In one case, even when the view expressed was completely counter to the student's personal beliefs, she was able to articulate an argument against therapeutic cloning based on her reading of the Council meeting minutes. The discussion was finally stopped 5 min past the regular end of class, even though many students still wanted to ask questions.

RESULTS

Bio 200 Student Evaluation

There was not a separate evaluation for the cloning panel presentation, but every Mount Holyoke course uses a standard form for an end-of-semester course evaluation, which gives space for students to comment on all aspects of their experience. Of 108 introductory biology students who returned evaluations, 31 discussed the cloning panel. All comments were positive, and students seemed most impressed with the opportunity to learn about a national debate in a science class. Students used words such as interesting, awesome, fascinating, informative, and great. Criticisms were limited to frustration at not having enough time to ask questions and lack of class follow-up discussion.

Three months after the event, 10 students who had been in the class, and who were on campus for another program, were given a special evaluation about the cloning panel (Table 3). Eight students filled out the form, and all were extremely positive, recalling much detail. One student wrote this:

Table 3. Follow-up questionnaire given to 10 introductory biology students^a 2 months after the cloning panel

Circle any of the following words or phrases that strike you as true about the panel presentation.			
Interesting (8)	Dull (0)	Too long (0)	Too short (3)
Just right in length (4)	Easy to follow (5)	Confusing (1)	Exciting (5)
Controversial (6)	Informative (8)	User-friendly (6)	Unimportant (0)
Relevant to rest of course (5)	Off the topic for Bio 200 (0)	Successful (7)	A bust (0)

^aEight of the 10 students filled out the questionnaire.

^bIn the questionnaire, these words were spread out on the page to make them easy to circle. Here they are presented in a table, with values in parentheses the number of respondents who circled the word.

The best thing was that it seems so real. It was as if we were the senators trying to make the decisions. It was interesting to see the politics and science combine with religion and beliefs.

Another student wrote the following:

Normally when you hear debates in this subject, it is either wrong or right to support this, that's it. But I gathered a really clear understanding of the spaces in between, which made my opinions of the matter more clear.

In response to the questions "Did you feel that all sides of the issues were presented? Did any of the material presented during the debate offend you personally?" One student wrote this:

Definitely many sides of the issues were presented, though some speakers were more vocal, and therefore I felt I heard a few particular arguments in great detail, while others were simply mentioned for a few moments.

The questionnaire given to the introductory biology students the night before the debate revealed an interesting picture of who the audience was. One hundred ten students turned in completed surveys, and the questions and results are presented in Table 1. One of the most interesting (and most difficult to answer) questions was "When does human life begin?" Students were to circle an answer given on a time line that included gametes, fertilization, cleavage, gastrulation, neurulation, fetus viable outside womb, and birth. Forty-eight students said life begins before or at fertilization, and 58 said life begins after fertilization. A great majority of the students believed that both adult stem cell research and embryonic stem cell research hold great promise. These results (and photos of the debate) were posted on the class web site: <http://www.mtholyoke.edu/courses/rfink/index.html>. It would be interesting to give a survey like this at the beginning of the semester, and then again after the bioethics presentation, to see if student opinions change as they learn the biology and the ethics of such issues.

Bio 321 Student Evaluation

The last cloning seminar class of the semester included a "debriefing" about the panel presentation. Students were unanimous in their enthusiasm, and all were proud of what they had accomplished. One student said she was thrilled after the event when an introductory biology student approached her in the dining hall and addressed her by her

panel expert's name. Students were positive about the different ways in which they learned the material during the event: reading transcripts from meetings, writing a speech, talking among themselves to plan the sequence of the debate, and learning how to try to "become" someone else. The upper-class students also expressed some frustration that the time for questions from the audience was so limited. They thought that they had just begun to interact with the introductory biology students when the event came to an end.

In the written course evaluations, filled out after our discussion, 10 of the 12 students specifically mentioned the panel presentation. All were enthusiastic, and many discussed how speaking to the introductory biology students was an excellent motivator for learning the material. One student wrote this:

The panel helped me experience multiple views and to question and critique my own. Overall I have learned to reevaluate the impact of biology on everything we say or do.

Time Limitations

The time limitation was extremely frustrating. Professors are always in conflict about "content" versus "context" in an introductory class, and in this case, only two meetings were scheduled for this event (one for introductory lecture, one for actual panel presentation). For the introductory students to have had substantive time for discussion, another class period would have been warranted. It would have been beneficial to both groups of students to arrange for the upperclass students to lead discussions with small groups of introductory students for part of this third class time. This session could have ended with an attempt to summarize the different views expressed for the entire class. Some of the issues raised in the debate are questions with much scientific content, and using this "summary day" to help tease apart what is science and what is not would have been useful. It is extremely difficult for senior statesmen to untangle whether at any point the science can or should influence the nonscience—helping the students to at least see this kind of complexity could have been rewarding.

DISCUSSION

Applications of This Approach

An extremely exciting confluence of events helped make this project work so well. The President had just named the members of his Council, the Senate was revving up for a debate and

expected to vote on a cloning ban a few weeks after classes were to end, and newspapers were full of new scientific results on cloning and stem cell research. So, how could this model be broadened to be used at other times? The three general aspects of the project that seemed most successful were the following:

1. Having upperclass students giving a presentation to introductory students
2. Having students take on the personae of real people who have disparate views on a controversial topic
3. Finding material that allowed the students a window on real deliberations and discussions

The President's Council is mandated to discuss a wide range of scientific issues and will exist while Mr. Bush is in office. The panel recently released a written report on reproductive and therapeutic cloning (July 2002; <http://www.bioethics.gov/cloningreport/>) and has meetings already scheduled through the end of the year (December 2002). Certainly, for the near future, this group of experts provides an exciting source of diverse opinions, with well-documented discussions accessible to students.

However, it is not necessary to use the President's Council as the source of information for a similar project. Students could debate any topic on which experts have published differing views on ethical issues, such as gene therapy, genetically modified crops, "nature versus nurture," or medical coverage for infertility treatments. Some wonderful cell biological issues of the past could be re-created as well, such as the question of government oversight of genetic engineering in the early days of molecular biology (the 1970s).

Summary and Conclusions

Undergraduate science students are at a time in their lives when making the connections between what they learn in the classroom and laboratory, and how science manifests itself in the public arena becomes increasingly important. Issues such as stem cell research bring up conflicts in all thoughtful members of our society, and knowing how to present a wide range of views without giving in to personal biases can be tricky. Having students take on the personae of experts who are *required* to state their personal beliefs as part of a government mandate allows these complex issues to be aired. It would be ideal if after such an event students could articulate their

own beliefs with more coherent arguments based on the information to which they had been exposed.

Just as important as the opportunity for an introductory class to make connections between what they see in a microscope (e.g., an early sea urchin embryo) and what they read in the headlines ("... therapeutic cloning requires the destruction of human blastocysts...") is the chance to see upperclass students presenting complex information in an intellectually exciting manner. Colleagues have asked, "Wouldn't it have been great if you could have arranged for the *real* panel to speak to your class?" That would have been an important and special event for a class to have, but the introductory students may not have been as engaged. In fact, in the student evaluations, comments included, "The best thing was that *students* led and took part in the discussion. It helped me relate to the discussion." Our undergraduates are accustomed to listening to adults lecturing on their fields of expertise. Because in this exercise sophisticated views were transmitted by their peers, the introductory students were much more invested in learning the material.

In summary, this exercise worked so well because the topic is fascinating and important, the transcript material was available on the Web, and both groups of students were interested in learning about how ethical decisions on scientific questions are made. The last statement on the survey given to the introductory biology students before the debate was "I feel that I have an adequate scientific background to address these issues." The results were yes, 58, and no, 46. When these results were reported to the students the next class period, they were reminded that as college biology majors they had much more scientific background than many of the people making important decisions about these issues. They were asked, "If you don't have enough background to address these issues, who does?" It is to be hoped that some of the students who participated will read the newspapers more often, will share their opinions on such important matters, and will think more carefully about the intersections between scientific information and societal policy.

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Appendix A

President's Council on Bioethics

ELIZABETH BLACKBURN, Ph.D.

University of California, San Francisco
Cell Biologist

REBECCA DRESSER, J.D.

Washington University School of Law
Lawyer

DANIEL FOSTER, M.D.

University of Texas Southwestern Medical School
Internal Medicine

FRANCIS FUKUYAMA, Ph.D.

Johns Hopkins University
Political Economist

MICHAEL GAZZANIGA, Ph.D.

Dartmouth College
Neurobiologist

MARY ANN GLENDON, J.D.

Harvard University
Professor of Law

WILLIAM HURLBUT, M.D.

Stanford University
Human Biology

CHARLES KRAUTHAMMER, M.D.

The Washington Post
National Columnist

LEON KASS, M.D. (Chair)

University of Chicago
Bioethicist

PAUL McHUGH, M.D.

Johns Hopkins University School of Medicine
Psychiatrist

GILBERT MEILAENDER, Ph.D.

Valparaiso University
Professor of Christian Ethics

JANET ROWLEY, M.D.

University of Chicago
Geneticist

Not Represented at Mount Holyoke College

STEPHEN CARTER, J.D.

Yale Law School
Constitutional Lawyer

ROBERT GEORGE, J.D.

Princeton University
Lawyer

ALFONSO GOMEZ-LOBO, Ph.D.

Georgetown University
Philosopher

WILLIAM MAY, Ph.D.

Southern Methodist University
Ethicist

MICHAEL SANDEL, Ph.D.

Harvard University
Professor of Government

JAMES WILSON, Ph.D.

University of California, Los Angeles
Professor of Public Policy

Appendix B

Reading List for Cloning Seminar, Mount Holyoke College, Spring 2002

Cibelli, J.B., Lanza, R.P., West, M.D., and with Ezzell, C. (2002). The first human cloned embryo. *Sci. Am.* 286(1), 44–51.

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Committee on Science, Engineering, and Public Policy; Board on Life Sciences; National Academy of Sciences. (2002). *Scientific and Medical Aspects of Human Reproductive Cloning*, Washington, DC: National Academy Press. Available online at <http://www.nap.edu/books/0309076374/html/>

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musculus: developmental potential of nuclei from pre-implantation embryos. *Cell* 23(1), 9–18.

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Appendix C

Script for Mock Bioethics Council Presentation to Introductory Biology Class, April 30, 2002

(Disclaimer: These speeches were written by the students portraying these people and are not necessarily accurate representations of the views of the real Council members. This transcript is included with the permission of the student authors.)

1. "LEON KASS" (CHAIRMAN)

First, I would like to thank all of you for coming to the 8th meeting of President Bush's Council on Bioethics. I think I am speaking for all of us when I say we hope that by sitting in on this meeting you will gain a better understanding of the many complex ethical issues surrounding the topic of human reproductive and therapeutic cloning! And before we go any further, let me introduce myself!

I am Dr. Leon Kass, a bioethicist at the University of Chicago and chairman of the Council. Although I am a bioethicist, it is not necessary to have this qualification to be on this Council. We come to the domain of bioethics not as experts, but as thoughtful human beings, who recognize the supreme importance of the issues that may arise at the many junctions between biology, biotechnology and life as humanly lived. When I was a teacher of biology at St. Johns College, I saw one of the most powerful experiences of my life when I looked into a microscope and witnessed a single cell divide. It was a sea urchin egg and while I was watching, this one cell became two cells. I realized there was a power at work here that was absolutely astonishing, and when manipulated, that power will be lost, never to be retained. It is based on this experience that I must proclaim that cloning is a threat to reproductive freedom. It involves the deliberate design of a human being—its genetic makeup will be predetermined and selected for by its parents or scientists. Please note that I am only talking about reproductive cloning—the process of which will be explained by Janet Rowley in a little bit. I feel that any attempt to clone a human being would constitute an unethical experiment upon the resulting child.

In animal experimentation, there has been a large percentage of failures at cloning resulting in fetal death and stillborn infants and the births that are considered successful are infants with major disabilities and deformities. Another issue with cloning is it would create substantial issues of identity and individuality. If a mother or father is cloned to produce a genetically identical child, does that child still call her mom or him dad? My last objection to reproductive cloning is that it represents a giant step towards turning the biological process of procreation into a manufactured process which we can control the design of. In order to put an end to this evil process, we must ban all cloning—both reproductive and therapeutic cloning—in order to preserve the future of all humanity.

2. "JANET ROWLEY"

My name is Janet Rowley, and I am a professor in the Department of Human Genetics at the University of Chicago. I have been doing clinical research for over thirty years, analyzing the chromosomal abnormalities occurring in human leukemia cells. I am very pleased and honored to be part of this distinguished committee and hope to contribute my many years of experience in scientific research and ensure that the issues

raised by this committee have a credible scientific foundation. Cloning is a very complex issue, in part because at least on the scientific frontier, we are just on the brink of understanding what could be potentially very beneficial medical therapy. To make sure we are all on the same wavelength, let me briefly remind the members of this Council that when we speak of reproductive cloning, we mean the creation of a cell by somatic nuclear transfer that will be implanted into a woman's uterus with the express purpose of leading to a live, cloned birth. The fact that there is still so much unknown makes it very challenging to speculate what the consequences of this research could be. For example, one of the issues often raised about cloning is the idea of genetically enhancing humans. This is a valid issue, but in terms of our scientific understanding at this point, it is too far in the future for us to even speculate on, and really should not enter into the realm of arguments used against cloning. Even though the human genome is sequenced and we now know what genes we have, we still don't know what they all do and how they all work to determine such traits as height or IQ. I just want to reiterate that I think it is very important to separate what is scientifically possible some very long time from now with what clearly are scientific possibilities now. Our discussion on the issues of cloning needs to be based on very good information so we can make wise decisions.

This brings me to my next point: since we are still at the very early stages of stem cell research and cloning, we are still at the beginning of trying to understand the situations in which stem cell research will be useful and which situations it will not be useful. I think it is impossible at this point to say what the benefits of therapeutic or regenerative medicine might be. But this, in my view, is all the more reason to allow it to go forward, because the potential of its uses, if realized, will be extraordinarily important for treating many degenerative diseases that people face today. So you have two competing moral considerations. In my opinion, the moral consideration that this research could be of benefit to a large number of people may outweigh the moral harm of destroying an embryo, if in turn this is how it ultimately comes to pass. So at this point, we are just at the beginning of something that is potentially very beneficial and we must allow this research to continue.

3. "ELIZABETH BLACKBURN"

Hi, I'm Elizabeth Blackburn, from the University of California at San Francisco. I would like to focus my time on the panel on bringing us and the public to an equal scientific footing to best understand the dilemma before us, and make the most educated and informed decisions possible. I would also like to stress, as we discuss more and more about reproductive and research cloning, that research cloning is not cloning for the sake of research, that is, just keeping researchers busy pattering around the lab, but rather research cloning is for the

express purpose of investigating means by which to improve the lives of the ill and needy, further, to find the best and most humane treatments for diseases taking the lives of so many in our country and around the world.

Cloning and stem cell research is a hard thing to understand, and there is so much science behind the principles of the techniques involved and the constraining factors. It is my mission on this panel to make this understanding accessible to each member of the panel, scientist or otherwise, as well as any interested member of the country, again, scientist or otherwise.

As Janet has just explained the process of reproductive cloning, I will take the last few minutes of my designated time slot to explain the process of therapeutic, or research cloning. The idea of therapeutic cloning has arisen to relieve the immunological constraints of current transplantation techniques. As long as cells are taken from one human and implanted in another, a rejection response will occur by the host patient's immune system. To alleviate this problem with therapeutic cloning, we can replace the genetic information of the donor with that of the recipient, and no rejection response will occur. To do this we can take a human egg, remove the nucleus, and replace it with the nucleus from any cell of the host patient's body. The egg will divide, and on day 5 stem cells can be removed from the inner cell mass of the blastocyst. These stem cells can be cultured in the lab to differentiate into almost any cell of the body. They will be genetically identical to the patient in need and so no rejection response will occur upon transplantation. Thank you.

4. "WILLIAM HURLBUT"

I'm Dr. William Hurlbut, a professor in Human Biology and Medical Ethics at Stanford University. Well, as a physician I'd have to say that I'm intrinsically pro-life. The difficulty lies in the question of how and when you define human life. It seems to me that even as our mastery over nature has escalated dramatically, our faith in the religious and philosophical groundings of our ethical traditions has been steadily eroded. Now, I am in full support of the incredible importance of stem cell research as a therapeutic tool and there are many good scientific reasons to do this research, but the morality of it is a different question. Progress has two legs: scientific technology and morality. When you have the joining of an egg and a sperm you have the initiation of the most complex chemical reaction known in the universe. What kind of weight do we place on that? I feel that it is really important to have a conversation about whether a created life through the process of cloning could be done in a way that would not raise the moral question for anybody who believed that human life starts at fertilization. I am very concerned that although at this point, when discussing biomedical cloning, there is no desire to take an embryo past the blastocyst stage, what is created has the potential to develop past the blastocyst stage. Right now there is an argument to take the created embryo to the blastocyst stage—eventually there will be an argument to go beyond the blastocyst. Where is the moral stopping point if science were able to create this and keep it alive? The ethics of human subjects in research is a vital question, but does or does not a fetus come under the heading of a subject? It seems that there is a sense which evolution or God through evolution has shaped us for what we need to be able to do in life, not for every un-

derstanding. At some point medicine will say that this isn't what medicine is for even if you can argue that it would be good. There are some things in human life that are designed for surface alteration and some things that are at the core of what makes us human, and if we disturb them we will lose our identity and our community.

5. "MARY ANN GLENDON"

Thank you Bill. . . I am in general agreement with you and want to take off on some of the points you brought up. But first I'd like to bring up an important point about our approach to these issues and a few important considerations we have to make before we make any final determinations on the issue of both reproductive and research cloning.

You all know that as Learned Hand Professor of Law at Harvard University, I have a significant amount of experience with comparative legal traditions, human rights, family and abortion law. Representing the Vatican at the 1995 U.N. Conference on Women in Beijing has also given me the opportunity to explore the bioethics of reproduction in all of its complexity and linkages with all other facets of family and societal life. All this experience has taught me to question dichotomous notions and interpretations of law, policy, and rights.

In the vastly untread regolith of the bioethics of cloning, my recommendation is the same. The question is not simply of the absolute right to scientific discovery versus the absolute right to human life. In fact, this rhetoric of rights easily accommodates the economic, immediate and personal dimensions of the dilemma of cloning while neglecting the moral, long-term, and social implications. Cloning, both reproductive and research, raises larger questions about the way in which American society views its families and its children. These wide-ranging implications must be at the forefront as we consider allowing experiments in human identity.

Given this line of thought, as clear as murder is a violation of human rights, so is reproductive cloning. In all of its dimensions and potential, this line of scientific pursuit can scarcely justify itself even in the most extreme of circumstances. American society cannot and will not condone reproductive cloning. My hesitation with research cloning also stems from my original point about creating polemics arbitrarily. Research cloning is not a universe away from reproductive cloning. It is deeply linked and, as such, raises similar concerns about the moral bases of American society. Our captivation with the immediate benefits of research cloning may well lead us to the moral repugnance of reproductive cloning, which is not as distant as avid proponents would have you believe.

These are my thoughts on these important issues that face us today. Let me again remind you to think twice before you consider the world in black and white. It is, undoubtedly, a world in shades of gray, where each step in any direction is a moral statement with colossal implications.

6. "GILBERT MEILAENDER"

Good morning. I am Dr. Gilbert Meilaender and I'm a professor of Christian Ethics at Valparaiso University in Indiana. I have been writing on various issues in bioethics for the past 25 years and I'm the editor for the *Journal of Religious Ethics*

and Religious Studies Review. Coming from the Lutheran tradition, I seek to use this theological language to expose what is universal and human. The unease about human cloning, which many share with me, is set in certain Christian affirmations that see the child as our equal—someone who is a gift and not a product. In the first chapter of Genesis, the creation story talks about the creation of humankind as male and female, sexually differentiated and enjoined by the grace of God to sustain human life via procreation. Thus there is an important connection between differentiation of the sexes and the begetting of a child. A child is a gift of God that arises from the sharing of love, and the concept of human cloning breaks this connection between marriage and begetting children so emphatically. The act of love should not be a personal project, because if it becomes one, so does the child. The bearing and upbringing of the child is no longer seen as a return we should make for the gift of life. It becomes a task that we take up if it meets our needs and desires. And even if a clone turns out to be a very different person than its immediate ancestor, the point of that person's existence will be grounded in our narcissistic will and desire. Thus a child should spring from the embrace of a man and woman and not be a product that they have made and something whose destiny they should determine. It is crucial to understand the difference between making and begetting. Children are made by God through the act of human begetting. We are not God's equal, but we are of equal dignity with each other as human beings. We should not try to play God by putting other human beings at our disposal.

Now one can imagine various circumstances in which we might be tempted to turn to cloning—parents wanting to replace a child they have lost in an accident, a very ill person needing embryonic stem cells or infertile couples wanting to reproduce. There is no end to good causes and such temptations are irresistible when the child is treated like a project. Our society is simply preoccupied with death and the pursuit of health seems to justify anything. We must learn that what really matters is not how long we live but how we live. We should do all the good that we can, but within the limits morality sets for us.

7. "CHARLES KRAUTHAMMER"

I am Charles Krauthammer. I am a syndicated columnist for *The Washington Post*. I have a degree in medicine. While in med. school, I had a serious accident. I dived into a pool and hit the bottom. I permanently damaged the nerves in my back and am confined to a wheelchair. I am a psychiatrist, but not in practice. I think I have been chosen to be a part of the bioethics panel because of my expertise in medicine and politics as well as because of my job to relay the meaning and importance of issues such as cloning and stem cell research to the public. I see it as my job to challenge conventional wisdom and provide the public with another rationale.

In the debate about stem cells, I think the real issue is the threat posed by the prospect of manufacturing humans. I support current policy on stem cell research, but with restraint. As of now, the President has permitted the use of the discarded embryos from IVF [in vitro fertilization] clinics because they will be destroyed anyway. My fear is that allowing the use of embryos for the creation of stem cells will soon lead to the creation of embryos for the sole purpose of extracting stem cells.

What happens when you allow the creation of cloned human embryos for their destruction? We would be using the human embryo as if it were a commodity. Most of you have probably heard and believe that stem cells may hold the cure for dozens, maybe hundreds of diseases. In fact a cure for spinal injuries such as mine has been predicted. There is a strong implication that there are cures around the corner with stem cell research. I think that is a misleading statement. I have thought deeply about the science and ethical issues on hand. I believe that we have to establish limitations and principles for this research. It is the question of the slippery slope. Once you grant the principle that you can do this then perhaps you get to a point where you are going to have to do this and then where are we and who are we?

On cloning: I think freedom, diversity, creativity, spontaneity, contingency are threatened by the prospects of human cloning. It opens us to a completely new world. I think there should be a full ban on cloning. This would include both reproductive and therapeutic cloning. I think the path from reproductive to therapeutic is clear, and I think it is inevitable. If you allowed it, what would result is an industry of cloned embryo creation and within a short period of time, one such embryo would be implanted. It's hard to imagine that with hundreds and thousands of embryos floating around, and with all that interest, that you would not have one implanted in a woman which would present us with that extraordinary dilemma that under law that embryo—that fetus—would have to be destroyed, which of course no one would want to contemplate.

Look at it from another perspective. If this stuff could work we could essentially manufacture extremely intelligent, extremely powerful, extremely resistant people. Privatized eugenics could produce a class of people who are superhuman. What would it be like to live in a world where you have a class of superhumans among us?

It is not easy to answer the question on why you shouldn't, if you could, choose a child who would have all of these enhanced attributes. I think what scares us and maybe beginning even an understanding of the problem here, the repulsion that we feel is if everybody did it or if the state ordered it, we enter a brave new world. And I think it is again the question of the slope. Where do you draw the line?

8. "REBECCA DRESSER"

Thank you, Charles, you have brought up some interesting points, some of which I am in agreement with. My name is Rebecca Dresser and I am a professor of Law and Ethics of Medicine at Washington University at St. Louis. I am here to represent more of the legal side of the deliberations made by the Council. Beyond that, I have also done extensive research and writing on bioethical issues. Recently I published a book called *When Science Offers Salvation: Patient Advocacy and Research Ethics* which reflects the viewpoint that I carry on to this bioethics council. Beyond considerations of cloning and stem cell research, which are the two major issues at hand, I hope that we can think about things like the allocation of limited resources for health care and research. My other hope is that this Council can make our positions accessible to ordinary people as we are doing today.

I feel that a little more attention must be given to the human research ethics considerations of cloning. There are basic

principles governing research on human subjects, and I have a lot of concerns about the ethics of studying cloning in humans. Respect for persons in research requires that we protect people who are incapable of making their own decisions. While there are different opinions about whether or not the embryo merits protection, eventually it will be a child who does require protection and this raises the question of whether or not we have enough evidence about how safe the cloning procedure is and what the outcome is to the child.

Another major concern with therapeutic cloning and stem cells resides in the way it is presented to the public. I believe there has been a lot of exaggeration about the possible successes of these procedures, and I believe there are distorted beliefs about how well these procedures would work. There is a widely held belief that research will recover us from the burdens of being human—the illness, suffering and death that come with our status as biological organisms—and this simply is not always true. I think it is fine to proceed with research for therapeutic cloning and stem cells as long as scientists and advocates are honest to the public about the unknowns and the fact that this research is in its earliest stages and the actual benefits to patients are a long way off. Any unrealistic optimism is unethical because it denies patients accurate info. about current and future methods of care.

I also feel very strongly about the everyday bioethical issues, which are the issues that have major effects on many people. These issues, such as the current lack of quality health care in the U.S., are largely ignored. At this time there is a disproportionate emphasis on stem cells and therapeutic cloning in contemporary health care politics. At the same time, many people lack the opportunity to benefit from proven therapies because they lack insurance or they are underinsured. Many chronically and terminally ill people do not get the kind of humane care that we would all like to have ourselves. Many lives of patients could be improved and extended if they were able to access the beneficial interventions that already exist. In this new age of vast scientific breakthrough, we need to focus more on the patient and less on the technology. Therefore, my hope is that the Council will spend some time beyond the stem cell and cloning debate to address the “everyday bioethics issues” that have major effects on the citizens of our country.

9. “FRANCIS FUKUYAMA”

Good morning. I am Francis Fukuyama, a political economist based at Johns Hopkins University. In the past, I have studied the implications of the current culture and political environment on the long-term health and growth of human nations. I have recently become increasingly concerned by the potential effects of scientific research and biomedical advances on the future of the human condition. In particular, I feel that the entire field of human cloning has the possibility of causing profound and potentially terrible consequences in the political order, and I have gone into far more detail about these possibilities in my new book *Our Post Human Future*. I will briefly address some specific aspects of cloning that must be considered before the biocouncil makes its final decisions regarding any recommendations for the implementation of cloning technologies.

First, I will reiterate some of my colleagues in saying that human cloning for reproductive purposes must be banned. If this path is followed, I believe it will not be long before par-

ents insist on not merely avoiding terrible genetic diseases in their children, but also on increasing the potential for outstanding physical talents. This enhancement would only be compounded over the generations, until one may fear that only those who have been specifically bred for musical talent or athletic prowess would have a chance to be recorded or play on a professional sports team. I fear that the existing genetic homogeneity of the human race would be undermined, and even that the potential to create a new “subspecies” of humans really exists. For these reasons, I urge you all to ensure that reproductive cloning is banned.

In regards to biomedical, or research cloning, I have some serious concerns that unintended long-term effects on the stability of the political sphere may be experienced. First, while these techniques have the potential (and as yet unproven) possibility of providing new therapies for the diseases already mentioned by my copanelists, I must ask how will access be apportioned? There is already a great disparity in access to basic and well-proven medical therapies between rich and poor populations, both within our own nation, and throughout the world. Biomedicine has already extended the life span amongst those with access to sufficient resources, but this has not come without unanticipated costs. For example, our aging population is not only alive for longer, but is also more likely to experience the problems of aging and more years of debility than its own grandparents. Just spend some time in any of our nursing homes to see the effects of this phenomena.

I grant that therapeutic cloning and stem cell research holds some hope to deal with these problems of aging, but I must remind you all that we cannot yet know the implications of these fields. Therefore, I must recommend that only careful study and tight government regulation can ensure that any genetic modification of human beings is restricted to treating well-known, targeted diseases with therapies that have zero chance of a future negative outcome.

Thank you very much.

10. “DANIEL FOSTER”

I am chair of the Department of Internal Medicine at the University of Texas. My research interest lies mainly in intermediary metabolism, including studies on diabetes and endocrinology. I work in a science-focused medical school, and am a science-focused physician myself. I believe in the necessity of science for modern medicine. Here, we are talking about advances that might be helpful to the community at large. I almost think that the highest respect that one could give societally to a clone or zygote is to allow those few cells to be used for the greater good of conquering human diseases and suffering. If therapeutic cloning using embryos is successful, then perfectly matched replacement organs could become freely available to sick and dying people, such as diabetes patients. This would save countless numbers of lives, and improve the quality of life of countless others. There would also be side benefits resulting from the research; further advances in understanding of how organs regenerate would increase the range of possible treatments that could be considered. The rules of the physicians are pretty simple and pragmatic. After competence what we say is we are trying to prevent premature death when that is possible. We are trying to alleviate symptoms when a cure is not possible. As far as moral issues are concerned, I am not really too worried about the

scientific community being without common sense. If you are to worry about something, worry about the technology driven by the market system, and the contamination of science and scientific medicine by the market. In my opinion, therefore, therapeutic/research cloning is quite advantageous for our own community, as long as safety issues are carefully concerned.

11. "MICHAEL GAZZANIGA"

Hello, I'm Michael Gazzaniga and I'm a doctor of Neuroscience and Psychology at Dartmouth College. I also serve as director to the College's Center for Cognitive Neuroscience. Because of my neuroscience background, I see my position on this bioethics committee as trying to bring some current understanding in the issues that arise from studying the brain in the area of neuroscience. One can see in the current issue of cloning and stem cell research that the question is, is life-with-a-brain versus life-without-a-brain an equivalent status for us to consider. One of the reasons that the public had such a natural revulsion to reproductive cloning is that it goes against the ideas of reproduction that our mind gains through environmental and cultural influences. I also feel that people don't fully realize that these environmental and cultural influences work in tandem with our genetics to create the person we become, so a clone would not in theory be an exact replica of the person cloned. I think once supporters of reproductive cloning grasp this they will lose their enthusiasm.

At this point, no scientist or ethicist that I know supports reproductive cloning of human beings. The debate is solely about therapeutic cloning for lifesaving medical research. I stand in favor of therapeutic cloning and my reason of course involves the brain and when it begins to function. Let us look at the laws now in existence in our country concerning organ transplants. A patient who has requested to be an organ donor is pronounced dead when the brain stops functioning. If we apply this to a human embryo used for therapeutic cloning, we know that it is not until the 40 day that any sign of a nervous system is detected in the developing mass of cells. Basically before this we have a brainless entity. I know that many of my colleagues on this panel will disagree with me distinguishing that this blastocyst and a human being are not quite the same, but it's something someone is either comfortable with or not comfortable with. It doesn't bother me. This blastocyst has no nervous system and is not sentient in any way. It has no trajectory to becoming a human being; it will never be implanted in a woman's uterus. What it probably does have is the potential for the cure of diseases affecting millions of people. I have an analogy that helps me think about this: you go into a Home Depot and there are the building materials for say thirty houses and they have the potential for becoming thirty homes. The Home Depot burns down one night. The headline on the front page of the morning paper is not "Thirty Homes Lost in Fire"; it is "A Home Depot Burns Down." That is the stage those building materials were at—the same stage the cells are in the blastocyst. I do feel that the different views of the developing cells have to be taken into careful consideration, and that's what this committee is for. I just don't want it to come to a ban in America on therapeutic cloning and have to be the doctor who knows there is an option for a sick patient, but it will only be the rich who can travel to another country which supports therapeutic cloning research and be

healed, and there will be those who can't afford it. I don't want that!! When I joined the panel, I was confident that a sensible and sensitive policy might evolve from what was sure to be a cacophony of voices of scientist and philosophers representing a spectrum of opinions, beliefs, and intellectual backgrounds. I was surprised that Mr. Bush gave a speech the other week strongly recommending a complete ban on both reproductive and biomedical cloning. I only hope that in the end the President hears his Council's full debate.

12. "PAUL McHUGH"

I agree with you completely, Michael. I am a pious man, and I think human reproductive cloning is an infringement on human dignity. We cannot create life intended for our own purposes. But I feel that there are still some things to say in regards to therapeutic cloning. My name is Paul McHugh and I have worked for Johns Hopkins hospital for 25 years as a neuropsychologist. In those years I have overseen the development of a major neuropsychiatric research center. We work with Huntington's, Parkinson's, and Alzheimer's disease. We know these patients. The Huntington's patients in particular, and their families. We know them very intimately, and we have cause to join with them in their struggles for life.

Our center is not just a research center. We also do prediagnostic testing and brain imaging, for potential victims, or relatives of carriers. Every day, we see healthy people walk in for these tests, and we have to tell them yes, you carry this gene. This disease was given to you at the time of conception, and you may not see, or feel the effects, for another 35–40 years, but this is your fate, and this is how you will end up. . . . We have to tell them: "I'm sorry, but there is very little we can do!"

Let me tell you how it feels to say this to someone, when we might have the power to manipulate this gene so that it might not show up for 90 years, or 110 years in that patient, and potentially spare these healthy people. Theoretically this is what therapeutic cloning could do. And yet we have to say to these patients: "I'm sorry, there is very little we can do." This is unjust.

How can I tell my patients and their families that we are doing all we can for them when we are not fighting to see how far therapeutic cloning could take us? Yes, you say, it's just a theory, but shouldn't theories be tested? Through research on stem cells and therapeutic cloning we could potentially help people who are suffering.

And some may say that any form of cloning assaults our piety. But with this in mind I should inform you of research that transplants fetal neural tissue into the brains of patients that have Parkinson's disease and the results have been remarkable. But the moral costs of this research are unspeakable. The fetal brain tissue used in this research is harvested from aborted babies. It's a form of human subversion; a kind of desecration; one human for another. Compared to stem cell research this research seems abhorrent, and yet we do not hear people screaming to have it stopped. In fact, we barely hear about it at all. Stem cells could provide potentially just as remarkable results, but the costs could be less. By banning reproductive cloning and allowing stem cell research, we can prevent suffering, while not infringing on our piety. So, now you tell me, what is the best thing I can do for my patients?

Appendix D

Bio 200: Public Policy, Human Cloning, and the Stem Cell Debate Special Event, April 30, 2002

On November 28, 2001, President Bush gave Executive Order 13237, establishing The President's Council on Bioethics. The Order begins as follows:

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Establishment. There is established the President's Council on Bioethics (the "Council").

Section 2. Mission.

a. The Council shall advise the President on bioethical issues that may emerge as a consequence of advances in biomedical science and technology. In connection with its advisory role, the mission of the Council includes the following functions:

1. to undertake fundamental inquiry into the human and moral significance of developments in biomedical and behavioral science and technology;
2. to explore specific ethical and policy questions related to these developments;
3. to provide a forum for a national discussion of bioethical issues;
4. to facilitate a greater understanding of bioethical issues; and
5. to explore possibilities for useful international collaboration on bioethical issues.

The 18 members of the Council were named on January 16, 2002, just before this semester began. The 12

members of my Bio 321 class on cloning have each taken on the persona of one of the Council members and will be representing their positions in a mock debate in class tomorrow. They have been reading the transcripts of the meetings of the Council, which are available on the web site www.bioethics.gov. In order for you to get the most out of the debate, the student presenters have asked that you think about these issues tonight and fill out the attached questionnaire. There are no right or wrong answers—and your replies will be anonymous. What we want is to get an idea of how 130 first-year biology students feel about these important issues.

You will get 1 point of extra credit for turning in the questionnaire. It will *Only* be accepted as you enter the classroom tomorrow and must be handed in to a laboratory instructor. It will serve as your "ticket" to this special event. Bring both pieces of the form—your name will go into one pile (so we can give you extra credit)—the survey into another (so we can tabulate the responses anonymously).

Remember—the views expressed by the student panel members are *not* their own personal views. They are the views of the Council member they represent.