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# **Cloning: Legal, Medical, Ethical and Social Issues**

**Hearing before the  
Subcommittee on Health and Environment  
of the Committee on Commerce  
U.S. House of Representatives**

**February 12, 1998**

## **The Written Testimony of Dianne N. Irving, M.A., Ph.D.**

*Dr. Irving is a lecturer in philosophy at The Catholic University of America, Washington, D.C. In the text that follows, she has added emphasis to aid those lay readers unfamiliar with technical terminology. In addition to the following, Dr. Irving initially presented a verbal summary to the Committee Members.*

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Chairman Bilirakis and Members of the Sub-Committee on Health and Environment, I appreciate the invitation to testify before you today on the profound and critically important issue of human cloning, and am grateful that you are so diligently addressing and pursuing the information necessary upon which to ground a clear and defensible public policy in this area.<sup>1</sup>

I would like to emphasize that what I have to say today is not simply a matter of my own opinion; nor is it a religious or theological position, nor grounded on any "faith" or "belief" system. To the contrary, it is directly based on fully referenced, objectively known scientific facts – scientific facts which any one can ascertain simply by going to their local library.

The bottom-line question concerning human cloning – not just by

means of nuclear transfer, but by any other technique of cloning as well – is, “What is the immediate *product* of human cloning?” If the product of human cloning is a tomato, a head of lettuce, a frog or a giraffe, then our concerns about using that product for destructive experimental research or for commercial purposes would be quite different than if the product of human cloning is a human being. And simply because we *can* do something technically does not make it *ethical* to actually do it. Utilitarian ethics would argue that great advances could be made to cure diseases, to increase our scientific knowledge or to reap great fortunes in the commercial marketplace. But even goals agreed to be truly beneficent and genuinely good are simply not sufficient in the determination of what is *ethical* research. The **means** used to reach those beneficent goals must be ethical as well. If the means used involve the harm and destruction of human beings, or the denigration of their inherent human dignity, then such research and commercialization would be unethical.

A point of clarity first. The question as to when a **human embryo**, or **human being**, begins, is strictly a **scientific** question, and should not be relegated to bioethicists, philosophers, theologians, governmental agencies or politicians. The answer to this question is simple. There is unquestionably a *scientific consensus* that the life of every single individual human being begins at fertilization as a single-cell human embryo (the zygote). I have included in my written testimony scores of scientific footnotes and references, from many different, highly acclaimed and the most commonly used human embryology text books, and have included the xeroxed pages from a number of these text books with my written testimony to demonstrate this scientific fact. What is true of the product of fertilization is true of the product of human cloning.

The question as to when a **human person** begins is a **philosophical** question. I have included for the record several of my articles discussing this at length, demonstrating that “personhood” must begin when the human being begins – at fertilization (or, cloning). I will only refer briefly to the personhood (or philosophical) issue at the end of my testimony.

Many people (including members of Congress) have been thoroughly confused by the bioethics literature that the product of fertilization – or in this case, the product of human cloning – is *not* a human embryo, a human being, or a human person.<sup>2</sup> Elaborate scientific arguments have been flooding the bioethics literature for some years now, positing such unscientific claims as the following.

It is argued that fertilization (or, likewise, cloning) is *not* the beginning of a human embryo or of a human being; it is just a “blob” or



piece of the *mother's* tissues. At most what is there is only a "potential" or a "possible" human being. Fr. Bedate and Dr. Cefalo agree, claiming that *all* of the genetic information specific for a human being is *not* present at fertilization, and that human embryos can give rise to teratomas or hydatidiform moles, and therefore are not even "human" at all.<sup>3</sup>

Many have argued that fertilization (or cloning) may be the beginning of a human *being* but *not* the beginning of a human *person* (a philosophical or theological claim grounded on incorrect science). They have literally invented a new term called the "**pre-embryo**" to designate the product of fertilization (and now, cloning) from fertilization to implantation (5-6 days) or the formation of the primitive streak (14 days). What is present during this early period is only a "potential" or a "possible" human person or individual – and "individuality" is required, they say, before there can be personhood. For example, Dr. Clifford Grobstein (who is an amphibian embryologist, and *not* a human embryologist) and Fr. Richard McCormick, S.J. (a theologian) make the "scientific" claim that a genetically human being *is* present at fertilization, but it is not a human *individual* as yet (because it could still become more than one individual), and therefore not a human *person* as yet – it is just a "pre-embryo". To support this scientific myth they make the following "scientific" claims. To begin its growth, the human pre-embryo divides *exponentially* (i.e., 1,2,4,16,32,etc.). *All* of the outer trophoblast cells from the 5-6 day blastocyst are discarded after birth; *only* the cells from the inner embryoblast layer become the future adult. Therefore, the 5-6 day blastocyst is really a "pre-embryo", not an embryo (which doesn't begin, they say, until about 14 days, or the formation of the primitive streak – others argue similarly for about three weeks after fertilization). Further, these early totipotent cells are only a "loose collection of cells", and "have not decided yet how many individuals they will be". And most influential, they claim that *twinning cannot take place after 14 days*, so 14 days must be the beginning of a human *individual*, and therefore, of a human *person*. The early human "pre-embryo", then, is *not* a true human embryo or a human "individual", and therefore not a true human person yet.<sup>4</sup>

This is precisely the "science", by the way, which the N.I.H. Human Embryo Research Panel referenced in their Report to ground their conclusion that the "pre-embryo" or "pre-implantation embryo" (a legitimate term they use *to mean the same as* the "pre-embryo"), has a "reduced" moral status – and therefore it can be used in destructive experimental research. (It is interesting that there was not even one single *human* embryologist present on that N.I.H. Panel<sup>5</sup>). This is also precisely the "science" currently being used in the cloning debates in Congress to

argue that the product of cloning is only a *potential* human embryo or human being, and therefore can be used in destructive experimentation to find cures for human diseases, etc.

The Australian theologian, Fr. Norman Ford, who wrote the book *When Did I Begin?*, so influential in bioethics and currently used as a *scientific* resource in the American pharmaceutical industry, agrees with the scientific claims of Fr. McCormick and Dr. Grobstein, adding to their "science" his own claim that full differentiation is *not* even completed until 14 days.<sup>6</sup> Finally, some, e.g., MacKay, Rahner, Ruff, Haring, Hans-Martin, Sass, Singer and Wells – most of whom are philosophers or theologians – argue that true "personhood" is not present until "brain-birth", i.e., the formation of the primitive streak, the nerve-net, the neocortex or the whole brain integrating system.<sup>7</sup>

On the contrary, a *human embryo* or a *human being* begins at fertilization (or cloning). This human being, who is a single-cell human embryo or zygote, is *not* a "potential" or "possible" human being, but is an ***already existing human embryo***, which is an ***already existing human being*** – with the "potential" or "possibility" to simply grow and develop bigger and bigger. Scientifically, there is no change in *what* it is, or its nature, once the single-cell human embryo or human being is formed. One can easily verify that scientifically as well (and therefore *all* arguments for delayed personhood are scientifically negated).

The correct scientific facts about which there is a scientific consensus are the following. Human *life* is biologically a continuum which has not halted or been interrupted for thousands of years. Although this continuum may be seen by some to be just a "process", it must be pointed out that there must be *something* there which is undergoing the "process". For example, "childhood" is a "process", yet no one would seriously argue that there is *no child* present which is undergoing that process. Similarly, fertilization (or cloning) is a process; but there is *something* which is undergoing that process. A human sperm or ovum, a kidney cell, or a liver, may be said to have human "life", but the real issue is that they are ***not human beings***, capable *themselves* of directing and sustaining the continuum of human life. One could implant any of these in a uterus and they would simply rot. Only human beings can direct and sustain the continuum of human life and transmit it. Once a skin cell has been used in cloning, a change in natures has taken place. That is, it is no longer a *skin* cell; it has been changed into a *human being*. It no longer acts or functions as a skin cell; it now acts and functions as a human being (we know this scientifically). This is precisely the *difference* between a skin cell and the product of human cloning.



To *scientifically* determine if the immediate product of fertilization or cloning is a *human embryo* or a *human being*, all one has to do is count the number of chromosomes under a microscope, and particularly observe the functions and activities which are present immediately at fertilization or cloning (since scientists know that a thing acts or functions according to *what* it is). Fertilization or cloning does *not* produce a “blob” or piece of tissue of the mother, or a “drug”. In fertilization, when the 23 chromosomes of the sperm and the 23 chromosomes of the ovum are combined, a new, genetically unique, living, individual, *already existing* single-cell *human embryo* or *human being* (the single-cell human zygote) with 46 chromosomes (the number and quality specific for the human species)<sup>8</sup> is formed, and this human being has the capacity *itself* to direct *all* of its further growth and development. Although this means that the human embryo is an *already existing human being*, the chromosomal makeup of the single-cell human embryo is qualitatively *different* from that of either the mother or the father. That is, the genetic identity of the human embryo is *different* from the genetic identity of the tissues of the *mother*. The same would be true of the product of cloning, as the genetic makeup of the new human embryo, although an already existing human being, would be qualitatively different from the genetic makeup of the donor “mother” (due, e.g., to crossing-over of the maternal chromosomes during mitosis and cell division, environmental conditions, mutations, etc.). In fertilization, the single-cell human embryo formed at fertilization is already genetically a male or a female; in cloning, it would already be genetically a female.<sup>9</sup> In beginning its growth, the human embryo divides *asynchronously* (i.e., 1,2,3,etc.).<sup>10</sup>

Immediately *specifically human* enzymes and proteins are formed (*not* tomato, lettuce or giraffe proteins and enzymes). *Specifically human* tissues and organs are formed (tomato, lettuce, or giraffe tissues or organs are *not* formed – that is a scientific fact).<sup>11</sup> Virtually *all* of the genetic information this human being will ever have or need is present immediately at fertilization or cloning. *No* new genetic information is gained or lost throughout development – only the *use* of some information is lost through mechanisms such as methylation.<sup>12</sup> This original genetic information “cascades” throughout the course of human development, determining later molecular information, tissue and organ formation;<sup>13</sup> and it *includes* the genetic information needed for differentiation,<sup>14</sup> totipotency (in which the cells are already expressing differentiation)<sup>15</sup> and all of the processes of human embryogenesis – sometimes even twinning. Entities such as teratomas and hydatidiform moles do *not* arise from genetically normal human embryos, but from abnormal embryos to begin with (e.g.,

dispermy).<sup>16</sup>

Further, the “pre-embryo” is a *scientific myth*. Scientifically we know that all of the cells from the trophoblast layer are *not* all discarded after birth, but many from the yolk sac and allantois are incorporated into the embryo-proper as the early blood cells and the primordium of the primitive gut, and in the human adult as the median umbilical ligament and blood cells.<sup>17</sup> ***Twinning is possible after 14 days and the formation of the primitive streak*** – indeed, months after fertilization – e.g., with fetus-in-fetu twins and with Siamese or conjoined twins.<sup>18</sup>

The term “pre-embryo” has a very interesting history, but has now been rejected by all human embryologists, including the internationally renowned human embryologist Ronan O’Rahilly, who himself literally developed the internationally recognized Carnegie Stages of human embryological development. O’Rahilly has published that the term “pre-embryo” is “scientifically inaccurate” and erroneous, and states in his own human embryology textbook that he refuses to use the term.<sup>19</sup> The N.I.H. Panel – whose conclusions, and the grounding for those conclusions, received unusually harsh responses and reviews even within bioethics itself – gave up using the term (but retained the use of the term “pre-implantation” embryo to *mean the same as* the term “pre-embryo”).<sup>20</sup>

The American College of Obstetricians and Gynecologists (A.C.O.G.), who along with several others have marketed the term “pre-embryo” for many years, has recently and reluctantly decided to go back to the scientifically accurate term “embryo” for the immediate product of fertilization (or cloning). A.C.O.G. also reluctantly agreed to drop its drive to define the “beginning of pregnancy” as implantation, after quite a scientific outcry from within its own membership as well as from colleagues outside of the organization. “Pregnancy” is correctly defined scientifically as beginning at fertilization.<sup>21</sup> Unfortunately, N.I.H.’s federal OPRR regulations<sup>22</sup> and Common Rule, which regulate the use of human subjects in research, still (in several revisions since 1981) contain the scientifically incorrect definitions of “pregnancy” as beginning at implantation (5-6 days after fertilization), and of “fetus” as also beginning at implantation (the fetal period actually does not begin until the ninth week after fertilization<sup>23</sup>). Keith Moore, also *not* a human embryologist, but often quoted by McCormick, Grobstein and others, has agreed in writing that the term “pre-embryo”, which he had just used for the first time in the 5th edition of his human development text book, was scientifically incorrect, and that he would have it removed in the next printings.<sup>24</sup> Even Clifford Grobstein admitted to a scientific audience that he was using frog embryology and just calling it human embryology.<sup>25</sup>



And finally, there is *no scientific* physiological basis for a valid parallel between “brain death” and “brain birth”, “sentience”, or self-consciousness.<sup>26</sup> Full human development, especially brain and nervous system development, and full brain integration,<sup>27</sup> and the actual exercising of what bioethicists call “rational attributes” and “sentience” are not complete until young adulthood.<sup>28</sup>

In sum, the answer to the first question, the **scientific** question, is simple and clear: the life of every human embryo and human being begins immediately at fertilization, or at cloning. Indeed, *human cloning is essentially human embryo research*. Thus cloning would be one ingenious way in which to by-pass or circumvent the current Congressional ban on human embryo research. The human embryo at fertilization or cloning is immediately an *already existing*, new, unique, individual human being – termed by scientists the *single-cell human zygote*. This is a *scientific fact*. And this is the way human beings are supposed to look at this stage of development. This is *not* a religious, theological or philosophical issue, nor a matter of anyone’s belief system or opinion. Anyone – scientist or otherwise – who claims that this is not true or accurate, is scientifically wrong, and should be required to give extensive scientific proofs based only on the work of nationally and internationally recognized human *embryologists* – especially if such critically important public policy is to be explicitly based on it.

It would seem to me that public policy should only be based on the *correct scientific facts*. I would conclude, therefore, on scientific grounds alone, that the cloning or commercialization of any human beings should be banned – both publicly and privately – since human cloning and its commercialization necessarily and immediately produces human beings (which remain human beings whether implanted or not), and is essentially human embryo research. Human cloning and commercialization must by definition be unethical since the *means* used result in harm to and destruction of untold numbers of innocent human beings – human beings used solely as objects for someone else’s goals – no matter how lofty those goals may be. Technology would then surely be master of man, rather than man master of technology.

The last question is, “when does a *human person* begin?”<sup>29</sup> As with public policy, any *philosophical* analysis of personhood must begin with and be based on the correct scientific facts. This is required for philosophical *realism*. Further, **a thing acts or functions according to the kind of nature it has – or what it is**. If a “human being” is a “rational animal”; if the term “rational” must include virtually the vegetative and sensitive powers; if *all* of its powers must be present simultaneously with



the body, with no splits – then personhood must begin when the human being begins – at fertilization, or cloning – when the “matter” is already “appropriately organized”. This actually *matches the correct science*: immediately at fertilization or cloning, *specifically human* enzymes and proteins are produced, and *specifically human* tissues and organs are continuously developed from fertilization or cloning on. Personhood, then, should be based on *what* something is, not on how one actually thinks or feels (merely *functional* definitions of a human person).

Yet other philosophical answers have been offered – based essentially on functionalism and on bioethics’ rendition of philosophical rationalism or empiricism.<sup>30</sup> The question must be, do those arguments for “delayed” personhood square with or *match the correct scientific facts*; are they based on *historically correct* philosophical claims, or even philosophical claims which are theoretically or practically *defensible*, or logically valid and sound? **Where does this bioethics logic take us?** I and many others have demonstrated that these arguments have consistently and extensively used incorrect science, do not match the correct scientific facts, and are often historically inaccurate and philosophically indefensible (e.g., contain a mind/body split). In fact, none of the conclusions of these arguments even follow *logically* from their major and minor premises. It would seem that philosophical, theological or purely political presuppositions have been imposed on the scientific data. **And if the true scientific data does not match, then it is simply changed accordingly.**

Of equal concern is where we would end up as a society if that bioethics logic is pushed. *If* either “sentience” (the ability to feel pain and pleasure) or “rational attributes” (willing, choosing, loving, self-consciousness, the ability to relate to the world around us, etc.) are the rationale for human “personhood”, *then* newborns, young children, Alzheimers and Parkinson patients, alcoholics, drug addicts, street people, runaways, the mentally ill and retarded, the depressed, the frail elderly, comatose patients, paraplegics and other patients with paralysis, patients in a persistent vegetative state – perhaps even teen-agers or politicians – (to name but a few) *are not “persons” either*, and thus, by the same logic, could be “disposed of” or experimented on at will. Indeed, the Australian philosopher Peter Singer (whose book, oddly enough, was the only reference used to ground the N.I.H. Human Embryo Research Panel’s *scientific* charts) has used such arguments to justify the infanticide of normal healthy infants (because they do not exercise high levels of “rational attributes” or “sentience” – yet the higher primates, e.g., pigs, dogs, gorillas, etc., do, says Singer, and therefore he claims these animals *are “persons”*).<sup>31</sup> Philosopher Richard Frey,<sup>32</sup> correctly following Singer’s

logic, has published that many *adult* human beings on the above list are *not* persons because they do *not* actively exercise “rational attributes” or “sentience”; therefore they should be *substituted for the higher primates*, e.g., pigs, dogs, gorillas, etc. – who *are* persons – **in destructive experimental research**. Norman Fost has argued that anencephalic newborns are “brain dead”, and therefore we could take their organs for transplantation **while they are alive**. He has also argued that the “cognitively impaired” are “brain dead” (and one wonders if that means that their organs can be taken while alive as well). **And so the logic goes**.

Not only scientists, but also philosophers, theologians and bioethicists must be held to the same degree of *accountability for their “expertise”*, especially when their “theories” on personhood would in any way be used to *ground public policy*. My guess is that they could never withstand such Congressional scrutiny. Thank you.

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## References

1. Because I had only 24 hours’ notice to write this testimony, I have edited the original summary and written testimony for style, clarity, and the addition of more references. Original copies may be obtained from the Committee: Alan Hill, Legislative Clerk for the Committee on Commerce, 2125 Rayburn House Office Building, Washington, D.C., 20515; 202-225-1919.

2. But see D.N. Irving, *Philosophical and Scientific Analysis of the Nature of the Early Human Embryo*, (400-page Doctoral dissertation in philosophy) (Washington, D.C.: Georgetown University, 1991); W.C. Kischer and D.N. Irving, *The Human Development Hoax: Time to Tell the Truth!* (Clinton Township, MI: Gold Leaf Press, 1995; 2nd ed., 1997, by authors, ALL, distributor) (containing extensive references) In addition to the writers I have referenced *infra*, for a non-exhaustive list of other articles and writers who basically argue similarly, see (arranged in “rough” categories) : **Science**: D.N. Irving, “Embryo research: A call for closer scrutiny”, *Linacre Quarterly* (July 17, 1994); D.N. Irving, “Scientific and philosophical expertise: an evaluation of the arguments on fetal personhood”, *Linacre Quarterly* (Feb. 1993), 60(1):18-46; D.N. Irving, “The impact of scientific misinformation on other fields: philosophy, theology, biomedical ethics, public policy”, *Accountability in Research* (Feb. 1993), 2(4):243-272; D. Irving, “New Age embryology text books: Implications for fetal research”, *Linacre Quarterly* (1994), 61:42-62; C. Ward Kischer, “In defense of human development”, *Linacre Quarterly* (1992), 59:68-75; Kischer, “Human development and reconsideration of ensoulment”, *Linacre Quarterly* (1993), 60:57-63; Kischer, “A new wave dialectic: The reinvention of human embryology”, *Linacre Quarterly* (1994), 61:66-81;



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begin?", *Proceedings of the American Catholic Philosophical Association* (1990), 63:27-47; T.J. O'Donnell, "A traditional Catholic's view", in P.B. Jung and T. Shannon, *Abortion & Catholicism* (New York: Crossroad Publishing Co., 1998), 44-47; Benedict Ashley and Kevin O'Rourke, *Health Care Ethics: A Theological Analysis* (2nd ed.)(St. Louis, MO: Catholic Health Association, 1987), 2-6, 218-233; Jean de Siebenthal, "L'animation selon Thomas d'Aquin: Peut-on affirmer que l'embryon est d'abord autre chose qu'un homme en s'appuyant sur Thomas d'Aquin?", in *L'Embryon: Un Homme: Actes du Congrès de Lausanne 1986* (Lausanne: Société suisse de bioéthique, 1986), 91-98; M.A. Taylor, *Human Generation in the Thought of Thomas Aquinas: A Case Study on the Role of Biological Fact in Theological Science* (Ann Arbor: University Microfilms International, 1982); Benedict Ashley, "A critique of the theory of delayed hominization", in D.G. McCarthy and A.S. Moraczewski, (eds.), *An Ethical Evaluation of Fetal Experimentation: An Interdisciplinary Study* (St. Louis, MO: Pope John Center, 1976), 113-133; G.C. Grisez, *Abortion: The Myths, the Realities and the Arguments* (New York: Corpus Books, 1970). **International documents:** Congregation for the Doctrine of the Faith, "Instruction on Respect for Human Life in its Origin and on the Dignity of Procreation [Donum Vitae]", reprinted in *L'Osservatore Romano* (Vatican City: 16 March, 1987), 3; Commonwealth of Australia, *Senate Select Committee on the Human Embryo Experimentation Bill 1985*, (Official Hansard Report), (Canberra: Commonwealth Government Printer, 1986), 25; Parliamentary Assembly of the Council of Europe, "On the use of human embryos and fetuses for diagnostic, therapeutic, scientific, industrial, and commercial purposes", *Recommendation 1046* (1986) 1.

3. C. Bedate and R. Cefalo, "The zygote: to be or not be a person", *Journal of Medicine and Philosophy* (1989), 14(6):641. Also J.T. Bole, "Metaphysical accounts of the zygote as a person and the veto power of facts", *Journal of Medicine and Philosophy* (1989), 14:647-653, and "Zygotes, souls, substances and persons", *Journal of Medicine and Philosophy* (1990), 15:637-652.

4. C. Grobstein, "The early development of human embryos", *Journal of Medicine and Philosophy* (1985), 10:213-236. Also, R. McCormick, "Who or what is the preembryo?", *Kennedy Institute of Ethics Journal* (1991), 1:1-15.

5. See D.N. Irving, "Individual testimony before the NIH Human Embryo Research Panel - March 14, 1994", reprinted in *Linacre Quarterly* (Nov. 1994), 61(4):82-89; D.N. Irving, "Embryo research: A call for closer scrutiny", *Linacre Quarterly* (July 17, 1994); also, D.N. Irving, "NIH Human Embryo Research Panel revisited: What is wrong with this picture?", *Linacre Quarterly* (in press).

6. N. Ford, *When Did I Begin?* (New York: Cambridge University Press, 1988), 137, 156.

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19. Ronan O'Rahilly and Fabiola Muller, *Human Embryology and Teratology* (New York: John Wiley & Sons, 1994), ftnt, p. 55.

20. See D.N. Irving, "Individual testimony before the N.I.H. Human Embryo Research Panel", and "N.I.H. and human embryo research revisited: What is wrong with this picture?", note 2 *supra* , both republished with permission in the 2nd edition of our book: W.C. Kischer and D.N. Irving, *The Human Development Hoax: Time to Tell the Truth!* - copies of which I submitted to this committee. See also, W.C. Kischer, "In defense of human development", *Linacre Quarterly* (1992), 59:68-75; Kischer, "Human development and reconsideration of ensoulment", *Linacre Quarterly* (1993), 60:57-63; Kischer, "A new wave dialectic: The reinvention of human embryology", *Linacre Quarterly*, (1994), 61:66-81; Kischer, "A commentary on the beginning of life: A view from human embryology", *Linacre Quarterly* (1996), 63:78-88; Kischer, "The big lie in human embryology: The case of the preembryo", *Linacre Quarterly* (in press).

21. E.G., see Bruce M. Carlson, *Human Embryology and Developmental Biology* (St. Louis, MO: Mosby, 1994), p. 3.

22. Code of Federal Regulations 45CFR46, OPRR Reports, "Protection of Human Subjects", Department of Health and Human Services, National Institutes of Health, Office for Protection From Research Risks, 1983 (revised 1989, 1991), p. 12.

23. See, e.g., Ronan O'Rahilly and Fabiola Muller, *Human Embryology & Teratology* (New York: Wiley-Liss, 1994) p. 55; Bruce M. Carlson, *Human Embryology and Developmental Biology* (St. Louis, MO: Mosby, 1994), p. 407.

24. See D.N. Irving, "New age human embryology text books...", *Linacre Quarterly* (May 1994), 61(2):42-62, submitted to this Committee, in which it is demonstrated that in his 5th edition, Moore virtually incorrectly redefines many of the major human embryology terms.

25. See transcripts and video of the Fidea Ethics in Research Conference, Georgetown University, April 1991, including his answers to my questions to him.
26. Jones 1989:15;4;173-178.
27. K. Moore, *The Developing Human* (Philadelphia, PA: W.B. Saunders Co., 1982), 1.
28. Jones 1989:173-178; T. Engelhardt, *The Foundations of Bioethics*, (New York: Oxford University Press, 1985), 111.
29. See extensive philosophical references in note 2, *supra*.
30. Since I only had 24 hours in which to prepare this testimony for the scientific panel, I have focused primarily on the science and scientific references. However, please see the references in note 2, *supra*, and several of the other notes, for extensive philosophical references.
31. Peter Singer, "Taking life: Abortion", in *Practical Ethics*, (London: Cambridge University Press, 1981), p. 118.
32. Richard G. Frey, "The ethics of the search for benefits: Animal experimentation in medicine", Raanon Gillon (ed.), *Principles of Health Care Ethics* (New York: John Wiley & Sons, 1994), pp. 1067-1075.