A One-Act Play:
"Crippled Consciences and the Human Embryo"

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"When _I_ use a word," Humpty Dumpty said in rather a scornful tone, "it means just what I choose it to mean -- neither more nor less." "The question is", said Alice, "whether you CAN make words mean so many different things." "The question is," said Humpty Dumpty, "which is to be master -- that's all."

– Through the Looking-Glass, by Lewis Carroll [Charles Dodgson]

Scene: A dark meeting room somewhere in Brussels.

Characters: Chairman, Lobbyists (including Dr. "Science", Dr. Gyno, Dr. Human Embryology, Prof. Philos, Master Bioethics, Crippled Conscience, and Well-Formed Conscience); also present are, Jaded Judge, Perplexed Parliamentarians, and Narrator.

Plot: The selected committee members are meeting to debate and reach an ethical consensus on proposed legislation concerning human cloning and human embryonic stem cell research. The language of the legislation has been written by those in attendance.

The Chairman enters the dark meeting room and calls the meeting to order. All members, except Well-Formed Conscience, who is knocking politely on the other side of the heavy locked doors, are present.

Mr. Chairman: The purpose of this meeting is to listen to all *relevant* opinions concerning this critically important piece of legislation on human cloning and human embryonic stem cell research that we Parliamentarians have already decided to propose. Each lobbyist

present will be given a full 2 minutes to present his or her suggestions for the language to be used in the legislation before we finally vote. Since the issues involved in this legislation are very technical, I would like Master Bioethics to proceed first, and to explain to the rest of us the *medical* facts we all need to understand accurately in order to be well-informed on these subjects. After all, the starting point for considering these technical issues is the bioethics.

Dr. Gyno: I object, Mr. Chairman. Physicians, especially ObGyn's, are the *medical* experts in these issues. We should proceed first.

Dr. "Science": Objection, Mr. Chairman. Physicians have medical degrees, not Ph.D. degrees. The correct starting point for considering human cloning and human embryonic stem cell research is the *empirical science* of mouse molecular biology and frog genetics.1

Mr. Chairman: Of course, Dr. "Science". Proceed.

Dr. "Science": Everyone would agree that we scientists already have absolute freedom of scientific inquiry; but it would be helpful if such authority were to be fully sanctioned by national legislation, and declared ethical. We only want to derive stem cells from some relatively worthless human "pre-embryos". These "pre-embryos" can be easily obtained using donated "surplus" IVF-embryos, or by creating our own by means of either *sexual* reproduction (e.g., IVF) or *a-sexual* reproduction (e.g., cloning) in the lab. Objections to this research are simply based on nothing more than the *subjective opinions* of scientifically illiterate religious zealots using debatable "scientific facts" who want to force their own morality on the rest of us. They actually claim that these cells are *persons* immediately at fertilization or cloning. Imagine that! Every scientist knows that "personhood" cannot begin until at least 14-days *after* fertilization.2 Right, Master Bioethics? At most, these collections of cells possess only a "reduced moral status". So there are no serious ethical problems with our proposals.

Crippled Conscience: That's right!

Prof. Philos: Not so fast, Dr. "Science". Medicine and science are extremely worthy endeavors, and have accomplished countless good for us all. And we both agree that the scientific facts are the *starting point* for these public policy decisions. But they must be the correct scientific facts. And, may I remind you, that they are also the starting point for the *correct formation of conscience*, and for the *moral decision making process*?3 Thus isn't it even more urgent for us to make certain that all of us in this room begin our deliberations with the most accurate and relevant science available? Remember that remarkably wise caution: "A small error in the beginning leads to a multitude of errors in the end."4 If we

begin with erroneous science, then *all* of our decisions will be erroneous in the end -- and that could lead to great harm and injury!

Crippled Conscience: What is he talking about, Dr. Gyno?

Dr. Human Embryology: Quite right, Prof. Philos. Dr. "Science", you do fail to make several important distinctions. First, the question of when a human *being* begins to exist is strictly a *scientific* question, and should be professionally required to be answered by scientists -- but only by us scientists who are academically credentialed *human embryologists*.5 After all, we are the scientific experts who provide you scientists with the correct, accurate, and most current scientific facts concerning the beginning, growth and development of the early human embryo -- the subjects of this legislation on cloning and stem cell research that we are here to write. And our *objective scientific facts* are hardly "debatable", or based on subjective religious opinions.

In fact, human embryologist are professionally required to use those scientific facts which have been sanctioned by the international Nomina Embryologica Committee, along with the Carnegie Stages of Early Human Embological Development.6 This international committee consists of over 20 of the best and brightest human embryologists from around the world. They meet about every 3-5 years to examine and to evaluate the latest research studies in Human Embryology. They then determine which scientific facts about the beginning and early development of these human *beings* are accurate and reliable, and which are not (and thus rejected). Their scientific conclusions are also published in the international Nomina Anatomica.

Second, the question of when a human *person* begins to exist is not a scientific question at all, but rather left to *philosophers* and the like.

Third, there is no such thing as a **"Pre-embryo"**. The term is a complete *myth*. There is, rather, an already existing, new living human *embryo*, a human **being** that begins to exist **immediately** at fertilization or cloning. Indeed, the terms **"Pre-embryo"** and "individualization" have been formally rejected by the Nomina Embryologica Committee as scientifically inaccurate and misleading. I just happen to have an example of their scientific rationale with me right here:

"The term **'pre-embryo'** is not used here for the following reasons: (1) it is ill-defined because it is said to end with the appearance of the primitive streak or to include neurulation; (2) it is inaccurate because purely embryonic cells can already be distinguished after a few days, as can also the embryonic (not pre-embryonic!) disc; (3) it is unjustified because the accepted meaning of the word embryo includes all of the first 8 weeks; (4) it is equivocal because it may convey the erroneous idea that a new human organism is formed at only some considerable time after fertilization; and (5) it was introduced in 1986 'largely for public

policy reasons' (Biggers)." ... Just as postnatal age begins at birth, **prenatal age begins at fertilization**." [O'Rahilly and Muller 2001, p. 88] ... "Undesirable terms in Human Embryology": **"Pre-embryo"**; **ill-defined and inaccurate; use "embryo"**.7 [O'Rahilly and Muller 2001, p. 12]

Crippled Conscience: I don't think I want to hear any of this. Dr. Gyno, can't you *do* something?

Narrator: A fierce verbal scuffle immediately breaks out among several of the committee members, with Master Bioethics finally gaining unfettered speaking recognition. Well-Formed Conscience continues knocking politely on the other side of the heavy locked doors.

Master Bioethics (in a scornful tone)**:** Mr. Chairman, please. This scientist is absurdly wrong! As everyone knows, the **"Pre-embryo"** has been the international scientific standard used for decades now in all sorts of private and public documents, guidelines, regulations, laws, etc. At fertilization or cloning there just simply is *no* embryo, *no* organism, *no* "developmentally single human being", *no* person, no pregnancy. The embryo doesn't begin until the formation of the *inner cell mass* in the blastocyst -- about 5-7 days *after* fertilization. Pregnancy doesn't begin until the implantation of the zygote -- or fertilized egg. And besides, almost two-thirds of the products of normal fertilization are lost as "wastage" before they even implant. How could they possibly be human beings already? Everybody here agrees on these "scientific" facts. Right, Judge?

Jaded Judge: Well, eh ..... That's right. Until 14-days there is only a -- what did you call it -- a "possible human being", or a "potential human being" -- yes, a **"Pre-embryo"**. At least that is how I was advised by my expert bioethicists. Those other people just couldn't make up their minds about it. Of course ..... if there is a human being present immediately at fertilization or cloning, then we would have to go back and review that legal decision, as we so stated.

Crippled Conscience: Please! Those little **"Pre-embryo"** things are just blobs of the mother's tissues, bunches of cells -- sort of like blood clots! Dr. Gyno assured us of these scientific facts. And he should know. He is part owner of a very famous IVF clinic, and does a lot of IVF research himself.8 With such expert scientific information I gladly signed my "informed consent" forms and donated my tissues to his distinguished research team just yesterday! I am so grateful for all the good to society my tissues can do to help advance science and to cure all such devastating diseases.

Dr. Human Embryology: With all due respect, Your Honor and Crippled Conscience, it has been known, and universally agreed for well *over a hundred years now*, that a new unique

living human being begins to fully exist *immediately* at fertilization. Indeed, this has been known since 1880's, with the publication of Wilhelm His' three-volume treatise on Human Embryology.9 Every human embryologist knows this. But then, no one on your Court, Your Honor, accepted our professional expert position on this question. Only amicus briefs from bioethicists, mouse molecular biologists and frog embryologists were considered relevant.

However, let me take the opportunity now to set the record straight. Fertilization is indeed the beginning of: the *embryo*, the *embryonic* period, the human *organism*, the genetically *and* developmentally *individual* human being, and normal *pregnancy*. "Wastage" usually occurs because the embryo is abnormal, or the uterus is not properly prepared. If it is a normal embryo, it's unfortunate death does not negate it's real but short existence as a living human being. And there is no such thing as a "fertilized egg", especially one that would implant in the uterus. Nor is there such a thing as an "ovum". Further, *the whole* blastocyst is the embryo, not just the cells from the inner cell mass. I can prove these scientific facts with just these few direct quotations from several of our best and brightest human embryologists, some of whom have served on the Nomina Embryologica Committee for decades:10

"**Embryonic** life commences with fertilization, and hence **the beginning of that process may be taken as the point de depart of stage 1**. Despite the small size (ca. 0.1 mm) and weight (ca. 0.004 mg) of the organism at fertilization, the **embryo** is 'schon ein individual-spezifischer Mensch' (Blechschmidt, 1972). ... Fertilization is the procession of events that **begins when a spermatozoon makes contact** with an oocyte or its investments and ends with the intermingling of maternal and paternal chromosomes at metaphase of the first mitotic division of the zygote (Brackett et al., 1972). ... Fertilization, **which takes place normally in the ampulla of the uterine tube**, includes (a) contact of spermatozoa with the zona pellucida of an oocyte, penetration of one or more spermatozoa through the zona pellucida and the ooplasm, swelling of the spermatozoal head and extrusion of the second polar body, (b) the formation of the male and female pronuclei, and (c) the beginning of the first mitotic division, or cleavage, of the zygote. ... **The three phases (a, b, and c) referred to above will be included here under stage 1, the characteristic feature of which is unicellularity.** [See Stage 1 of the Carnegie Stages of Early Human Embryonic Development, at: http://nmhm.washingtondc.museum/collections/hdac/stage1.pdf] (emphases added)

"Although life is a continuous process, **fertilization** ... is a critical landmark because, under ordinary circumstances, **a new, genetically distinct human organism** is formed ... [The] coalescence of homologous chromosomes results in **a one-cell embryo**. ... [I]t is now accepted that **the word embryo**, as currently used in Human Embryology, means '**an unborn human in the first 8 weeks' from fertilization"**. [O'Rahilly and Muller, 2001, p. 87]

"Human pregnancy begins with the fusion of an egg and a sperm, ... Finally, the fertilized egg, now properly called **an embryo**, must **make its way into the uterus** ....". [Carlson 1999, p. 2]

"In this text, we begin our description of the developing human with the formation and differentiation of the male and female sex cells or gametes, which will unite at **fertilization** to initiate the embryonic development of **a new individual**. ... **Fertilization takes place in the oviduct** [not the uterus]...

Embryonic development is considered to begin at this point. ... **This moment of [embryo] formation may be taken as the beginning or zero time point of embryonic development**." [Larson 1997, pp. 1, 17]

Although fertilization may occur in other parts of the tube, **it does not occur in the uterus**." [Moore and Persaud 1998, pp. 2, 34]

"This process, which occurs about 4 days after fertilization, is called cavitation, and the fluid-filled space is known as the blastocoele. At this stage, **the embryo as a whole is known as a blastocyst**. (p. 38) ... **At the blastocyst stage, the embryo consists of two types of cells**: an outer superficial layer (the trophoblast) that surrounds a small inner group of cells called the inner cell mass. The appearance of these two cell types reflects major organizational changes that have occurred within the embryo and **represents the specialization of the blastomeres into two distinct cell lineages**. Cells of the **inner cell mass** give rise to the body of the embryo itself **plus a number of extraembryonic structures**." (Carlson 1999, pp. 39-40)

"'Primordium'" [e.g., "**embryo proper**"]: This term refers to the beginning **or first discernible [i.e., using a microscope] indication** for the earliest stage of development of an organ or structure." (Moore and Persaud 1998, p. 3)

"Thus the germ layers should not be considered in rigid isolation one from another, and many interdependences, particularly what are termed epithelio-mesenchymal interactions, are important in development. (p. 10); ... The **developmental adnexa**, commonly but inaccurately referred to as the **"fetal membranes"**, include the **trophoblast, amnion, chorion, umbilical vesicle (yolk sac), allantoic diverticulum, placenta and umbilical cord**. These temporary structures are interposed between the embryo/fetus and the maternal tissues. ... The **adnexa** are programmed to mature fast, to age more rapidly, and to die sooner than the embryonic/fetal body. **Nevertheless they are genetically a part of the individual and are composed of the same germ layers.**" (O'Rahilly and Muller 1994, p. 51).

"The appearance of the blastocyst demonstrates the differentiation into (1) trophoblast (or trophectoderm), the peripherally situated cells and (under the influence of E-cadherin) in first epithelium formed, and (2) embryonic cells proper. The latter, at first few in number, form **the inner cell mass (ICM)**. The trophoblast at the future site of attachment is sometimes termed polar, the remainder being called mural. **The cells of the ICM (inner cell mass) are considered to be totipotent initially**." (O'Rahilly and Muller 2001, p. 39)

"A high percentage of abortuses (30-80%, depending on the study) are **structurally abnormal**, and it is maintained that all abortuses under 4 postovulatory weeks have abnormally formed embryonic tissue. Thus, spontaneous abortion greatly reduces the number of malformed fetuses born." [O'Rahilly and Muller 2001, pp. 92-93]

"Early spontaneous abortions occur for a variety of reasons, one being the **presence of chromosomal abnormalities in the [embryo]**. The early loss of embryos, once called pregnancy wastage, appears to represent **a disposal of abnormal conceptuses** that could not have developed normally, i.e., there is a natural screening of embryos." [Moore and Persaud 1998, p.p. 42 - 43]

"Egg"; best confined to the hen and to cuisine; use "oocyte". **"Ovum"**; does not exist in human; use "oocyte", "ootid", **"embryo"**. [O'Rahilly and Muller 2001, p. 12]

Narrator: At this point everyone in the dark meeting room starts shouting all at once; Well-Formed Conscience begins banging fiercely on the outside of the heavy locked doors. Eventually the Chairman regains control.

Mr. Chairman: Order! Let's have order in this meeting! Dr. Human Embryology, perhaps you can explain to us in a bit more detail exactly what happens before, during and immediately after fertilization that can help to further illuminate your disagreement with Dr. "Science"?

Dr. Human Embryology: With pleasure, Mr. Chairman.11 There are two basic categories of cells in the human organism: somatic ("body") cells, and germ line ("sex") cells.12 During very early human embryonic development, primitive germ line cells are initially *totipotent*,13 and they are *diploid*, i.e., they each have "46" chromosomes" (and thus they too can be cloned). So before fertilization can take place, the number of chromosomes in each germ line cell must be cut in half through the process known as gametogenesis -- which can ultimately take decades to accomplish. The final effect of gametogenesis is the production of haploid "sex gametes", the sperm and the oocyte, which have only "23" chromosomes in each cell (although the oocyte's chromosomes are not halved until it is fertilized). Once gametogenesis has taken place, then fertilization is at least scientifically possible. During the process of fertilization, the sperm and the oocyte fuse, and each ceases to exist as such. Rather, a new single-cell human *being* is produced. This is a *sexual* method of human reproduction, but there are also *a-sexual* methods of human reproduction that are involved in our debates here this evening, and need to be distinguished.

Sexual reproduction (e.g., in fertilization) and a-sexual reproduction (e.g., in cloning) involve several different, even opposite, biological processes. I like to use the analogy of the "zipper". Think of the process of sexual reproduction roughly as predominantly a sort of "zipping up", and that of a-sexual reproduction as predominantly a sort of "zipping down".

For example, in *sexual* reproduction, this new single-cell *human being* contains all of the genetic information it will ever need. No genetic information is lost or gained during growth and development; this information is only turned on or turned off, depending on what products are needed. This process is called "*methylation*", and the more specialized or differentiated a cell becomes the more methylation of the DNA has taken place.14 The products formed by means of the genetic information in each cell then *cascade*15 down throughout the life of the organism. This is "zipping up".

Scientifically, empirically, we know that immediately at fertilization species-specific *human* proteins and enzymes are produced, and species-specific *human*16 tissues and organs will

be formed. We also know empirically that carrot, corn, frog, or monkey proteins, enzymes, tissues, or organs, are *not* produced.

In *a-sexual* reproduction, such as cloning,17 many of these processes operate in reverse. One begins with a specialized or differentiated cell, in which some or even most of the DNA in that cell has been "silenced", and then the methylation bars on that DNA are incrementally removed -- eventually resulting in, e.g., a new, single-cell zygote, an organism, an embryo, *a human being*.18 This is "zipping down", and roughly what happened with the production of Dolly the sheep. As distinguished human molecular geneticists have documented:

Animal clones occur naturally as a result of [i.e., derived from] sexual reproduction. For example, genetically identical twins are clones who happened to have received exactly the same set of genetic instructions from two donor individuals, a mother and a father. A **form of animal cloning** can also occur as a result of artificial manipulation to bring about a type of **asexual reproduction**. The genetic manipulation in this case uses nuclear **transfer technology**: a nucleus is removed from a donor cell then transplanted into an oocyte whose own nucleus has previously been removed. The resulting 'renucleated' oocyte can give rise to an individual who will carry the nuclear genome of only one donor individual, unlike genetically identical twins. **The individual providing the donor nucleus and the individual that develops from the 'renucleated' oocyte are usually described as "clones", but it should be noted that they share only the same nuclear DNA; they do not share the same mitochondrial DNA, unlike genetically identical twins.** ... Wilmut et al (1997) reported successful cloning of an adult sheep. For the first time, **an adult nucleus had been reprogrammed to become totipotent once more, just like the genetic material in the fertilized oocyte from which the donor cell had ultimately developed.** ... Successful cloning of adult animals has forced us to accept that genome modifications once considered irreversible can be reversed and that **the genomes of adult cells can be reprogrammed by factors in the oocyte to make them totipotent once again**. [Tom Strachan and Andrew P. Read, Human Molecular Genetics 2 (New York: John Wiley & Sons, Inc, 1999), pp. 508-509] (emphases added)

Narrator: There is utter silence in the dark meeting room. Even Well-Formed Conscience stops banging on the outside of the heavy locked doors to try to listen. But rapidly Dr. "Science" regains his usual scornful composure.

Dr. "Science": This is all very interesting, Dr. Human Embryology, but there is still one major scientific problem that you have not confronted: i.e., the empirical fact that these little "pre-embryos" can form *twins* until 14-days, and that *two* of them can fuse to become *one* human being. *That* proves that these "pre-embryos" can't possibly be "developmentally individual" yet!

Dr. Human Embryology: Not a problem, if you understand the basic human embryology. The quickest way to explain what is going on in both of your examples is to understand the biological process called "*regulation*". Regulation is operative in both "zipping up" and

"zipping down". In "zipping up", as in sexual reproduction (fertilization), regulation concerns various processes of differentiation; but it also becomes involved when an injury has occurred to the organism. Here, regulation is the ability of an embryo or an organ primordium to "heal" a normal structure if parts have been removed or added.19 In "zipping down", as in a-sexual reproduction such as twinning, regulation could possibly revert separated totipotent embryonic *cells* back to new living human embryos, i.e., new living *human beings*. Indeed, this is what happens with *human* twinning *in vivo*.20

I know, Dr. "Science" -- you want to know when each twin is to be considered as an "individual", right? Well, please consider twinning from the standpoint of regulation. A normal human embryo is produced sexually *via* fertilization (*in vivo* or *in vitro*). Scientifically we know that this embryo produced at fertilization has *already* been determined scientifically to be *an individual* -- both "genetically" and "developmentally". He or she is a new human being. The embryo grows developmentally in total continuity with itself, and is composed initially of totipotent cells. If cells of the embryo are damaged, the embryo could die, or regulation could set in to "heal" the embryo and restore it to wholeness. On the other hand, if these totipotent cells are actually separated from the whole embryo, then these *separated* cells too could just die, *or* regulation could possibly set in and revert these totipotent *cells* to new human *embryos*. So the first twin is the original human embryo produced sexually and begins to exist as an *individual* at fertilization. The second twin is the new human embryo produced a-sexually and begins to exist as an *individual* when regulation is completed. Thus there is not only a "genetic" continuum involved between twins, but also a "developmental" continuum, from fertilization on. Finally, twinning can take place *after* the arbitrary 14-day marker event.21 And so **there is no "Pre-embryo"** -- other than in someone's mind, as a sort of "thought experiment".

Now please consider the fusion of two early human embryos to form a single chimera from the standpoint of regulation.22 If two human embryos fuse together to make one organism, that organism *is not a human being*. It would have 92 chromosomes -- whatever kind of animal that makes it! Both original embryos have died. If this chimeric organism undergoes regulation, ejects all excess chromosomes, and reduces the number and proper mixture (male and female) of chromosomes to "46", then it could theoretically result in the formation of a new human embryo. But that embryo would not be the same individual as either of the original embryos that fused. However, assuming that this process would even be possible in humans, there would still be both a "genetic" and a "developmental" continuum in this new human chimera from fertilization on.

Most of the "scientific" data used by the proponents of the **"Pre-embryo"** and its various "substitutes" (of which there are many!) is *elementarily* erroneous science; they *selectively* use bits and pieces of "data" *on which is superimposed very specific ideologies*; they leave

out, or don't themselves understand, any of the more sophisticated understanding of the biological processes involved; and the term has been formally rejected by the appropriate international scientific experts in the field. *There is no such thing as a "pre-embryo -- or any of its various "substitutes"*.

Crippled Conscience (slightly upset)**:** Does this mean, Dr. Gyno, that my "morning-after" pills might sometimes be abortifacient?23

Dr. Gyno: Nonsense, my dear Crippled Conscience. Even if there is no such thing as a **"Pre-embryo"**, at least we do know for certain that the early human embryo is not a human being until it *gradually evolves into one* during gestation -- sort of like a tiny "human-being-on-the-way", right Master Bioethics? That's what the famous "biogenetic law" so states.

Dr. Human Embryology: Unfortunately, Dr. Gyno, there is no such thing as a "human-being-on-the-way" either; the "biogenetics law" too has long been rejected by scientists. Quoting from O'Rahilly and Muller:

"Recapitulation, the So-Called Biogenetic Law. The theory that successive stages of individual development (ontogeny) correspond with ("recapitulate") successive adult ancestors in the line of **evolutionary descent** (phylogeny) became popular in the nineteenth century as the so-called biogenetic law. **This theory of recapitulation, however, has had a "regrettable influence on the progress of embryology"** (G. de Beer). ... According to the "laws" of von Baer, general characters (e.g., brain, notochord) appear in development earlier than special characters (e.g., limbs, hair). Furthermore, during its development an animal departs more and more from the form of other animals. Indeed, the early stages in the development of an animal are not like the adult stages of other forms but resemble only the early stages of those animals. The pharyngeal clefts of vertebrate embryos, for example, are neither gills nor slits. Although a fish elaborates this region into gill slits, in reptiles, birds, and mammals it is converted into such structures as the tonsils and the thymus." [O'Rahilly and Muller 2001, p. 16].

Crippled Conscience: I am totally confused now. How can one thing go by so many different names? And I just don't see *why it matters* how one scientifically defines a human being, or when it begins to exist. What *difference* does it make, ethically? Bioethics has already assured us that these are "pre-embryos" and not persons, and that it *is* ethical to use and destroy these little blobs or cells for "the greater good".24 What's ethical is ethical. That's what we're really here to vote on tonight!

Master Bioethics: Precisely, Crippled Conscience. And that should be quick and easy to do. Forget all these scientific facts.25 After all, we bioethicists have already decided *for* you what is ethical. Our ethical principles, you know, *are* ethics -- they are brand new, and perfectly fitted for promoting the rapid progress being made in all of these "converging nano/bio/info/cogno technologies" these days26 -- for that matter, in all areas of human

endeavor -- globally![27] The possibilities are endless! This ethical theory was all sorted out by us back in 1978 at a quiet meeting in Belmont, when we wrote our Belmont Report as appointed members of the *National Commission*.[28] With that famous Report of ours, "bioethics" was formally "born".[29] The U. S. Congress actually mandated that we identify what is ethical in their 1974 National Research Act.[30] So we did just that! Of course, we incorporated all of this sophisticated and enlightened "pre-embryo" science in subsequent documents, regulations, laws and guidelines over the years.[31] And *our* ethical theory is *neutral* -- perfect for public policy decision making in any pluralistic, multicultural, democratic society! Don't worry your little conscience about any of this.

Prof. Philos: Excuse me, Master Bioethics, but your *nouvelle* theory of ethics is *not* "ethics-*per-se*", nor is it in any way "neutral" for use in public policy. There are dozens of different kinds of ethical theories throughout all of human history; and there is certainly no such thing as a "neutral ethics".[32] Even your bioethics Founders and textbooks clearly state this.[33] It would seem that you are imposing your non-neutral normative ethics on the rest of *us*!

Jaded Judge: Perhaps the Master can tell us more about this *new* bioethics theory. It sounds rather invigoratingly new, and we all could surely use a change! What *ethical principles* do you use to determine what is ethical, Master Bioethics?

Master Bioethics: Well, Your Honor, we decided that there would be three ethical principles -- we just combined bits and pieces of those ethical theories used by Kant and Mill, mixed them around a bit, and came up with "autonomy", "justice" and "beneficence" -- otherwise known as "principilism" or "the Georgetown mantra". These three ethical principles are very democratic. They are *prima facie* -- no one principle can outweigh either of the others![34]

Prof. Philos: But if each of these ethical principles are *prima facie*, Master Bioethics, then what happens when one of these principles comes into *conflict* with either of the other two principles? For example, how to we *consistently* respect the "autonomous" demands for medical treatment of a patient, while at the same time respect the medical expertise of the physician who needs to "do good" for his or her patient (or at least "do no harm"), and the "just" cost of the patient's medical treatment to society -- all at the same time? It is impossible. Isn't that why many of your own Founders have recently admitted that after 25 years of application these bioethics principles simply don't work in the real world?[35]

Master Bioethics: Well, we keep trying.

Prof. Philos: What I am most curious to know, Master Bioethics, is precisely how you are *defining* "autonomy", "justice" and "beneficence" in your Belmont Report? You know how

fussy we philosophers are about "definitions"! In my reading of The Belmont Report, those terms have rather "strange" definitions -- and therefore, of course, could lead to "strange" ethical conclusions.

Master Bioethics: There is nothing strange about them. We all agreed that "autonomy" should be defined as "absolute choice by human beings who are actively exercising their rationality". Why, most bioethicists so define "autonomy" -- e.g., Peter Singer, the founder and first president of the International *Bioethics* Institute himself!

Prof. Philos: But wouldn't that mean that *non*-autonomous human beings who are *not* capable of actively exercising their rationality -- e.g., even adult human beings who are mentally ill, the mentally retarded, the emotionally ill and depressed, alcoholics and drug addicts, the physically disabled, the comatose, etc. -- are *not persons*?36 This, again, creates two subclasses of humanity -- one composed of human *beings*, and the other composed of human *persons* -- and we've already been *there* before! And how can you theoretically defend the mixing and blending together of the ethical theories of two totally opposite philosophers?37 Wouldn't that be self-contradictory? That doesn't seem very "rational" to me.

Master Bioethics: Indeed, you are correct, Prof. Philos. I can see you like to "push the logic"! Not to ignore your questions, but to continue, "justice" is defined as "fairness" -- as in John Rawls' Theory of Justice. Of course, "fairness" is then defined as "the fair distribution of the risks and benefits of participation in purely experimental research for the greater good of society" -- which participation is, as we stated in our Belmont Report, a strong moral obligation and duty for every citizen in society. And "beneficence" is defined, of course, mostly in terms of that "greater good" -- you know, the "common good".

Prof. Philos: Those are unique definitions, for sure. But tell me, Master Bioethics, by what process did you eleven selected committee members arrive at such enlightening definitions of what is "ethical"?

Master Bioethics: By consensus, of course -- just as with our "scientific definitions". We want to be strictly democratic. Our "bioethics" and "science" is now used exclusively by literally thousands of *bioethics experts* around the world.

Perplexed Parliamentarian: I am curious, Master Bioethics. Just what makes one an "expert" in bioethics?

Prof. Philos: I can answer that question, Mr. Parliamentarian. Only a handful of "professional" bioethics experts have academic degrees in the discipline, and even for those

few who do, there is no uniform or standardized curriculum. Most professors of bioethics don't know the historical or the philosophical roots of the subject matter they teach; the courses vary from institution to institution; there are no local, state, or national boards of examination; and there are no real professional standards. There is not even a professional code of ethics for bioethicists.38

Jaded Judge: Master Bioethics, I am worried now. It puts me in mind of an old legal colleague of mine who was a legal consultant for the National Commission. He remarked to me one day that he was fearful for the future: "What one fears", he said, "is that the [National] Commission may become the mechanism whereby the speculations of the ethicists become the law of the land. It is already far too easy for abstract notions of right and wrong to emerge as deontological rules which begin their public life as 'guidelines' but culminate in the force of law."

Perplexed Parliamentarian: The more I think about bioethics, Master Bioethics, the more perplexed I get. I seem to recall too that even many of your Founders lately have expressed deep concern about this bioethics theory -- one of them even went so far as to refer to it as an "ailing patient" whose "diagnosis is serious, if not terminal". Well, aside from these minor problems, what are some of the ethical conclusions that bioethicists come to concerning today's urgent bioethics issues?

Master Bioethics: Yes, well ..... we have made great progress over these last 35 years. For example, by *deducing from our ethical principles* we would conclude that the following are "ethical": designer babies; prenatal diagnosis with the intent to abort defective babies; human embryo and human fetal research; abortion; human cloning; the formation of human chimeras (cross-breeding and "back-breeding" with other human and animal species); human embryonic stem cell research; "brain birth; purely experimental high risk research with the mentally ill; euthanasia; physician-assisted suicide; living wills documenting consent to just about anything; and, withholding and withdrawing food and hydration as extraordinary means.41 We are quite certain about these ethical conclusions.

Prof. Philos: In contrast, I would suggest a very *different* ethics, one that has withstood the test of centuries, and is grounded in our empirical experience of human nature, our common natural and supernatural goals, and which goods *we all hold in common* (a *different* definition of "the common good") by virtue of that *common human nature*. It would come to quite *different* ethical conclusions. I am referring to philosophical natural law ethics. In fact, that ethics would conclude that *all* of those actions are *unethical*, because they would lead to serious harm to people, and impede them from ever reaching their common goals as human beings. You see, different *scientific* definitions of "a human being" and when a human being begins to exist lead necessarily to different *philosophical "anthropologies"*.

Different anthropologies lead necessarily to different *philosophical "ethics"* -- and therefore to different *ethical conclusions*.42

Mr. Chairman: Well, this is all much too deep for me. We have a *practical* job to complete here tonight -- to decide on the *legislative language* to be used in these proposed bills on human cloning and human embryonic stem cell research. I want some solid suggestions now.

Dr. "Science": I would suggest that we make this bill a "ban" on all human cloning using the somatic cell nuclear transfer (SCNT) technique. That technique, as you know, would produce a human clone with the *exact genetic information as is in the donor cell*.

Dr. Human Embryology: Objection, Mr. Chairman. A human being cloned using the SCNT cloning technique would not be an "exact genetic copy of the donor cell". The mitochondrial DNA of the donor cell is *not* transferred, and the mitochondrial DNA of the recipient cell is *retained* in the product. If you so scientifically mis-define the SCNT human cloning technique itself, then the bill will *not apply* to the real SCNT technique at all -- isn't that correct, Your Honor?

Jaded Judge: As a matter of fact, that is the case. The bill would *only* apply to those activities that are *specifically articulated* in the language of the bill.

Dr. Human Embryology: And what about all of the *other* cloning techniques that can and could be used to clone human beings? Why aren't *they* specifically articulated in the bill, Dr. "Science"?

Master Bioethics: There are no other cloning techniques. What are you talking about?

Dr. Human Embryology: Come now, there are quite a number of other kinds of cloning techniques. For example, there are cloning techniques such as: germ line cell nuclear transfer;43 "twinning" (blastomere separation and blastocyst splitting)44 -- which is the most genetically exact kind of cloning technique;45 the formation of chimeras (now by using pronuclei, or back-breeding to new human embryos); and many other kinds of "de-methylation" experimental techniques. As the Jaded Judge explained, if *these* cloning techniques are not included in the language of the bill, then *they too* will not be banned. In fact, a bill with such erroneous science and linguistic loopholes would effectively *ban no human cloning at all*.46

Perplexed Parliamentarian: But let's be *practical*, Dr. Human Embryology. First we need to get *some* bill passed, and then later we can come back and refine it. What difference does it

make, as long as we can at least *limit* the evil bill proposed by some of the other Parliamentarians?

Jaded Judge: It makes a big difference, Perplexed Parliamentarian. Once this erroneous science gets passed into law, it is simply reduced to *stare decisis* -- legal precedent.47 The Courts would then only have a legal duty *to apply* this erroneous science to any and all further related legislation. These scientific flaws may *never* be revisited for correction.

Prof. Philos: And I wonder, Perplexed Parliamentarian, can *any and all* "means" be used to reduce or limit the evil in some other bill, or only *morally licit means*? Does knowingly using this false science and these linguistic loopholes in this bill constitute *morally licit* means or not? This bill would *legally guarantee* that any and all human cloning techniques would be legally protected. These "means" would ensure that untold numbers of innocent living human beings would be able to be cloned and used in destructive experimental research. How can that be "ethically" or "legally" acceptable?

Mr. Chairman: Well, I think we have debated these issues long enough. It is time to roll up our sleeves now and actually write this bill so that it can be submitted to the full Parliament tomorrow. Let's unlock the doors, take a short break, and come back here to go to work in exactly 5 minutes.

Narrator: The weary and bedraggled committee members slowly begin to collect their piles of papers, stuff them in their briefcases, and singly file out of the dark meeting room into the corridor, the various points of their heated discussions weighing heavily on them. The silence is deadening. Five minutes later, the Chairman wanders back through the doors, relocks them, and shuffles over to the head of the long committee table. He looks up to discover that the meeting room is quite empty! Everyone else has simply disappeared, except for Well-Formed Conscience, who is now patiently sitting across the table. The Chairman's eyes begin to get a little twinkle in them.

Mr. Chairman: "Well, it's about time you got here, Well-Formed Conscience! It's late -- let's get to work!"

Endnotes:

1 But see, e.g., Dianne N. Irving, "Philosophical and scientific expertise: An analysis of the arguments on 'personhood'", in Linacre Quarterly (February 1993), 60:1:18-46.

2 See, e.g., Richard McCormick, S.J., "Who or what is the preembryo?", Kennedy Institute of Ethics Journal 1:1 (1991). In this paper McCormick draws heavily on the work of frog embryologist Clifford Grobstein, as well as from "an unpublished study of a research group of the Catholic Health Association entitled 'The Status and Use of the Human Preembryo', (p. 14). The influence of the McCormick/Grobstein term **"Pre-embryo"** was (and still is) widespread even among Catholic scholars. In addition to the

works of McCormick and Grobstein, see acceptance of the term **"Pre-embryo"** also in: Andre E. Hellegers, "Fetal development," in Thomas A. Mappes and Jane S. Zembatty (eds.), Biomedical Ethics, (New York: Macmillan, 1981); Hellegers, "Fetal development", Theological Studies (1970), 31:3-9; Charles E. Curran, "Abortion: Contemporary debate in philosophical and religious ethics", in W. T. Reich (ed.), Encyclopedia of Bioethics 1 (London: The Free Press, 1978), pp. 17-26; Kevin Wildes, "Book Review: Human Life: Its Beginning and Development" (L'Harmattan, Paris: International Federation of Catholic Universities, 1988); Carlos Bedate and Robert Cefalo, "The zygote: To be or not be a person", Journal of Medicine and Philosophy (1989), 14:6:641; Robert C. Cefalo, "Book Review: Embryo Experimentation, Peter Singer et al (eds.); 'Eggs, embryos and ethics'", Hastings Center Report (1991), 21:5:41; Mario Moussa and Thomas A. Shannon, "The search for the new pineal gland: Brain life and personhood", The Hastings Center Report (1992), 22:3:30-37; Carol Tauer, The Moral Status of the Prenatal Human (Doctoral Dissertation in Philosophy; Kennedy Institute of Ethics, Georgetown University, Washington, D.C.: Georgetown University, 1981) (Sister Tauer's dissertation mentor was Richard McCormick; she later went on to become the ethics co-chair of the NIH Human Embryo Research Panel 1994); C. Tauer, "The tradition of probabilism and the moral status of the early embryo", in Patricia B. Jung and Thomas A. Shannon, Abortion and Catholicism (New York: Crossroad, 1988), pp. 54-84; Lisa S. Cahill, "Abortion, autonomy, and community", in Jung and Shannon, Abortion and Catholicism (1988), pp. 85-98; Joseph F. Donceel, "A liberal Catholic's view", in Jung and Shannon, Abortion and Catholicism (1988), pp. 48-53; H. Tristram Engelhardt, The Foundations of Bioethics (New York: Oxford University Press, 1985), p. 111; William A. Wallace, "Nature and human nature as the norm in medical ethics", in Edmund D. Pellegrino, John P. Langan and John Collins Harvey (eds.), Catholic Perspectives on Medical Morals (Dordrecht: Kluwer Academic Publishing, 1989), pp. 23-53; Norman Ford, When Did I Begin? (New York: Cambridge University Press, 1988), p. 298; Antoine Suarez, "Hydatidiform moles and teratomas confirm the human identity of the preimplantation embryo", Journal of Medicine and Philosophy (1990), 15:627-635; Thomas J. Bole, III, "Metaphysical accounts of the zygote as a person and the veto power of facts", Journal of Medicine and Philosophy (1989), 14:647-653; Bole, "Zygotes, souls, substances, and persons", Journal of Medicine and Philosophy (1990), 15:637-652. See also: See Richard McCormick's testimony in The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research; Report and Recommendations; Research on the Fetus; U.S. Department of Health, Education and Welfare, 1975, pp. 34-35; McCormick, How Brave a New World? (Washington, D.C.: Georgetown University Press), p. 76; McCormick, "Proxy consent in the experimentation situation", Perspectives in Biology and Medicine (1974), 18:2-20; Paul Ramsey's testimony in The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research; Report and Recommendations; Research on the Fetus; U.S. Department of Health, Education and Welfare, 1975, pp. 35-36.

The use of the term "pre-embryo" has been quite widespread for decades -- nationally and internationally. In addition to the Catholic scholars who accepted the use of the term "pre-embryo" as noted above, a partial list of secular bioethics writers who also accepted the use of the term in these debates includes: Paul Ramsey, "Reference points in deciding about abortion" in J.T. Noonan (ed.), The Morality of Abortion (Cambridge, MA: Harvard University Press, 1970), pp. 60-100, esp. p. 75; John Robertson, "Extracorporeal embryos and the abortion debate", Journal of Contemporary Health Law and Policy (1986), 2;53;53-70; Robertson, "Symbolic issues in embryo research", The Hastings Center Report (1995, Jan./Feb.), 37-38; Robertson, "The case of the switched embryos", The Hastings Center Report (1995), 25:6:13-24; Howard W. Jones, "And just what is a preembryo?", Fertility and Sterility 52:189-91; Jones and C. Schroder, "The process of human fertilization: Implications for moral status", Fertility and Sterility (August 1987), 48:2:192; Clifford Grobstein, "The early development of human embryos", Journal of Medicine and Philosophy (1985), 10:213-236; also, Science and the Unborn (New York: Basic Books, 1988), p. 61; Michael Tooley, "Abortion and infanticide", in The Rights and Wrongs of Abortion, M. Cohen et al (eds.) (New Jersey: Princeton University Press, 1974), pp. 59 and 64; Peter Singer and Helga Kuhse, "The ethics of embryo research", Law, Medicine and Health Care (1987),14:13-14; Kuhse and Singer, "For sometimes letting - and helping - die", Law, Medicine and Health Care (1986), 3:40:149-153; Kuhse and Singer, Should The Baby Live? The Problem of Handicapped Infants (Oxford University Press, 1985), p.138; Singer, "Taking life: Abortion", in Practical Ethics (London: Cambridge University Press, 1981), pp. 122-123; Peter Singer, Helga Kuhse, Stephen Buckle, Karen Dawson, Pascal Kasimba (eds.), Embryo Experimentation (New York: Cambridge University Press, 1990); R.M. Hare, "When does potentiality count? A comment on Lockwood," Bioethics (1988), 2:3:214; Michael Lockwood, "When does life begin?", in Michael Lockwood (ed.), Moral Dilemma's in Modern Medicine (New York: Oxford University Press, 1985), p. 10; Hans-Martin Sass, "Brain life and brain death: A proposal for normative agreement," Journal of Medicine and Philosophy (1989), 14:45-59; Michael Lockwood, "Warnock versus Powell (and Harradine): When does potentiality count?" Bioethics (1988), 2:3:187 213. See also the use of the term "pre-embryo" in many national and international documents (a small sample): Ethics Advisory Board (1979) Report and Conclusions: HEW Support of Research Involving Human In Vitro Fertilization and Embryo Transfer, Washington, D.C.: United States Department of Health, Education and Welfare, p. 101; National Institutes of Health Human Embryo Research Panel Meetings (Washington, D.C.: NIH, 1994), Feb. 2 meeting, pp. 27, 31, 50-80, 85-87, 104-106; in the Feb. 3, 1994 meeting, pp. 6-55; April 11 meeting, pp. 23-41, 9-22. See also, Dame Mary Warnock, Report of the Committee of Inquiry into Human Fertilization and Embryology, (London: Her Majesty's Stationary Office, 1984), pp. 27 and 63; British House of Lords, "Human Fertilisation and Embryology (Research Purposes) Regulations 2001"; Commonwealth of Australia, Select Senate Committee on the Human Embryo Experimentation Bill, (Canberra, Australia: Official

Hansard Report, Commonwealth Government Printer, 1986); Parliamentary Assembly of the Council of Europe, On the Use of Human Embryos and Foetuses for Diagnostic, Therapeutic, Scientific, Industrial and Commercial Purposes, Recommendation 1046, 1986; and On the Use of Human Embryos and Foetuses in Scientific Research, Recommendation 1000, 1989; Ethics Committee of the American Fertility Society (AFS), "Ethical Considerations of the New Reproductive Technologies", Fertility and Sterility (1986), 46:27S. See also Jonsen, esp. Chapters 4 and 12.

3 D.N. Irving, "The woman and the physician facing abortion: The role of correct science in the formation of conscience and the moral decision making process", presented at "The Scientific Congress, The Guadalupan Appeal: The dignity and status of the human embryo", Mexico City, October 28-29, 1999; published in Un Appello Per La Vita: The Guadalupan Appeal: Dignita E Statuto Dell'embryione Umano (Libreria Editrice Vaticana (2000), pp. 203-223, also in, Linacre Quarterly Nov./Dec. 2000); D.N. Irving, "The impact of scientific 'misinformation' on other fields: Philosophy, theology, biomedical ethics and public policy", Accountability in Research April 1993, 2(4):243-272.

4 Aristotle, " ... the least initial deviation from the truth is multiplied later a thousand fold.", De Coelo, I, 1.5.27(1)b8-13, in Richard McKeon (ed.), The Basic Works of Aristotle (New York: Random House, 1941); St. Thomas Aquinas, De Ente et Essentia, Armand Mauer (trans.) (Toronto: The Pontifical Institute of Mediaeval Studies, 1983), p. 28.

5 D. N. Irving, "When does a human being begin? 'Scientific' myths and scientific facts", International Journal of Sociology and Social Policy, 1999, 19:3/4:22-47.

6 Ronan O'Rahilly and Fabiola Muller, Human Embryology & Teratology (New York: Wiley-Liss, 2001), p. ix.

7 O'Rahilly and Muller 2001, p. 12.

8 For a current textbook on clinical and research studies in in vitro fertilization, see Peter R. Brinsden (ed.), A Textbook of In Vitro Fertilization and Assisted Reproduction, 2nd ed. (New York: The Parthenon Publishing Group, 1999); see also, Geoffrey Sher, Virginia Marriage Davis, and Jean Stoess, In Vitro Fertilization: The A.R.T. of Making Babies (New York: Fact On File, 1998).

9 Wilhelm His, Anatomie menschlicher Embryonen (Leipzig: Vogel, 1880-1885); O"Rahilly and Muller 1994, p. 3; Keith L. Moore and T.V.N. Persaud, The Developing Human: Clinically Oriented Embryology (use 6th ed. only) (Philadelphia: W.B. Saunders Company, 1998), p. 12.

10 Full References: "**Embryonic** life commences with fertilization, and hence **the beginning of that process may be taken as the point de depart of stage 1.** Despite the small size (ca. 0.1 mm) and weight (ca. 0.004 mg) of the **organism** at fertilization, the embryo is 'schon ein individual-spezifischer Mensch' (Blechschmidt, 1972). ... Fertilization is the procession of events that **begins when a spermatozoon makes contact** with an oocyte or its investments and ends with the intermingling of maternal and paternal chromosomes at metaphase of the first mitotic division of the zygote (Brackett et al., 1972). Fertilization sensu stricto involves the union of developmentally competent gametes realized in an appropriate environment to result in the formation of an **embryo** (Tesarik, 1986) ... . Fertilization, **which takes place normally in the ampulla of the uterine tube**, includes (a) contact of spermatozoa with the zona pellucida of an oocyte, penetration of one or more spermatozoa through the zona pellucida and the ooplasm, swelling of the spermatozoal head and extrusion of the second polar body, (b) the formation of the male and female pronuclei, and (c) the beginning of the first mitotic division, or cleavage, of the zygote. ... **The three phases (a, b, and c) referred to above will be included here under stage 1, the characteristic feature of which is unicellularity.** [See Stage 1 of the Carnegie Stages of Early Human Embryonic Development, at: http://nmhm.washingtondc.museum/collections/hdac/stage1.pdf] (emphases added) "Although life is a continuous process, fertilization ... is a critical landmark because, under ordinary circumstances, a new, genetically distinct human organism is formed ... . This remains true even though the embryonic genome is not actually activated until 2-8 cells are present at about 2-3 days. ... Fertilization is the procession of events that begins when a spermatozoon makes contact with a secondary oocyte or its investments, and ends with the intermingling of maternal and paternal chromosomes at metaphase of the first mitotic division of the zygote. ... Fertilization takes place normally in the ampulla (lateral end) of the uterine tube. (p. 31); ... Coalescence of homologous chromosomes results in a one-cell embryo. ...The zygote is characteristic of the last phase of fertilization and is identified by the first cleavage spindle. It is a unicellular embryo and is a highly specialized cell. The combination of 23 chromosomes present in each pronucleus results in 46 chromosomes in the [embryo]. Thus the diploid number is restored and the embryonic genome is formed. The embryo now exists as a genetic unity." (p. 33); "... [I]t is now accepted that the word embryo, as currently used in Human Embryology, means 'an unborn human in the first 8 weeks' from fertilization'." (p. 87) [O'Rahilly and Muller, 2001] "Human pregnancy begins with the fusion of an egg and a sperm, but a great deal of preparation

precedes this event. First both male and female sex cells must pass through a long series of changes (gametogenesis) that convert them genetically and phenotypically into mature gametes, which are capable of participating in the process of fertilization. Next, the gametes must be released from the gonads and make their way to the upper part of the uterine tube [fallopian tube], where fertilization normally takes place. ... Finally, the fertilized egg, now properly called an embryo, must make its way into the uterus ....." (p. 2); ... "'Fertilization age' dates the age of the embryo from the time of fertilization." (p. 23) " ... In the female, sperm transport begins in the upper vagina and ends in the ampulla of the uterine tube [fallopian tube] where the spermatozoa make contact with the ovulated egg." (p. 27) [Bruce M. Carlson, Human Embryology & Developmental Biology (St. Louis: Mosby, 1999)]. "In this text, we begin our description of the developing human with the formation and differentiation of the male and female sex cells or gametes, which will unite at fertilization to initiate the embryonic development of a new individual. ... Fertilization takes place in the oviduct [not the uterus]... resulting in the formation of an [embryo] containing a single diploid nucleus. Embryonic development is considered to begin at this point." (p. 1); " ... These pronuclei fuse with each other to produce the single, diploid, 2N nucleus of the fertilized zygote. This moment of [embryo] formation may be taken as the beginning or zero time point of embryonic development." (p. 17). [William J. Larson, Essentials of Human Embryology (New York: Churchill Livingstone, 1997)] "Human development is a continuous process that begins when an oocyte (ovum) from a female is fertilized by a sperm (or spermatozoon) from a male." (p. 2); " ... but the embryo begins to develop as soon as the oocyte is fertilized. " (p. 2); " ... "... Human development begins at fertilization, the process during which a male gamete or sperm ... unites with a female gamete or oocyte ... to form a single cell [embryo]. This highly specialized, totipotent cell marks the beginning of each of us as a unique individual.". (p. 18) "... The usual site of fertilization is the ampulla of the uterine tube [fallopian tube], its longest and widest part. If the oocyte is not fertilized here, it slowly passes along the tube to the uterus, where it degenerates and is reabsorbed. Although fertilization may occur in other parts of the tube, it does not occur in the uterus. ... Human development begins when a oocyte is fertilized. Fertilization ... begins with contact between a sperm and a oocyte and ends with the intermingling of maternal and paternal chromosomes of the zygote, a unicellular embryo." (p. 34) [Keith L. Moore and T.V.N. Persaud, The Developing Human: Clinically Oriented Embryology (use 6th ed. only) (Philadelphia: W.B. Saunders Company, 1998)] "Of verified pregnancies that have survived the first 4 postovulatory weeks, it is generally maintained that 15-20% are lost through spontaneous abortion. Under 4 weeks, however, the number is far larger and may be as high as 40%. Many fertilized oocytes fail to become implanted, and as many as one-third of those implanted may be lost without being recognized. The total loss of conceptuses from fertilization to birth is believed to be considerable, perhaps even as high as 50% to nearly 80%. A high percentage of abortuses (30-80%, depending on the study) are structurally abnormal, and it is maintained that all abortuses under 4 postovulatory weeks have abnormally formed embryonic tissue. Most malformed conceptuses (more than 90%) are spontaneously aborted, compared with the normal 18%. Thus, spontaneous abortion greatly reduces the number of malformed fetuses born." (O'Rahilly and Muller 2001, pp. 92-93). "Early spontaneous abortions occur for a variety of reasons, one being the presence of chromosomal abnormalities in the zygote. Carr and Gedeon (1977) estimated that about half of all known spontaneous abortions occur because of chromosomal abnormalities. Hertig et al. (1959), while examining blastocysts recovered from early pregnancies, found several clearly defective dividing zygotes ... and blastocysts. Some were so abnormal that survival would not have been likely. The early loss of embryos, once called pregnancy wastage, appears to represent a disposal of abnormal conceptuses that could not have developed normally, i.e., there is a natural screening of embryos. Without this screening, about 12% instead of 2 to 3% of infants would likely be congenitally malformed (Warkany, 1981)." (p.p. 42 - 43) [Moore and Persaud 1998]. [**Back**]

11 For extensive scientific references for these processes of gametogenesis and fertilization, see D.N. Irving, "When does a human being begin? 'Scientific' myths and scientific facts", International Journal of Sociology and Social Policy 1999, 19:3/4:22-47. [**Back**]

12 "Gametogenesis is the production of germ cells (gametes), i.e., spermatozoa and oocytes. ... The gametes are believed to arise by successive divisions from a distinct line of cells (the germ plasm), and the cells that are not directly concerned with gametogenesis are termed somatic. ... The 46 human chromosomes consist of 44 autosomes and two sex chromosomes: X and Y. In the male the sex chromosomes are XY; in the female they are XX. Phenotypic sex is normally determined by the presence or absence of a Y chromosome. ... During the differentiation of gametes, diploid cells are termed primary, and haploid cells are called secondary, e.g., secondary oocyte. Diploid refers to the presence of two sets of homologous chromosomes: 23 pairs, making a total of 46. This is characteristic of somatic and primordial germ cells alike. Haploid is used for a single set of 23 chromosomes, as in gametes." [O'Rahilly and Muller 2001, p. 19]. "A subset of the diploid body cells constitute the germ line. These give rise to specialized diploid cells in the ovary and testis that can divide by meiosis to produce haploid gametes (sperm and egg). ... The other cells of the body, apart from the germ line, are known as somatic cells ... most somatic cells are diploid ... ." [Strachan and Read 1999, p. 28]. "Meiosis is a special type of cell division that involves two meiotic cell divisions; it takes place in germ cells only. Diploid germ cells give rise to haploid gametes (sperms and oocytes)." [Moore and Persaud 1998, p. 18]. "In a mitotic division, each germ cell produces two diploid progeny that are genetically equal." [Carlson 1999, p. 2]. "Like

all normal somatic (i.e., non-germ cells), the primordial germ cells contain 23 pairs of chromosomes, or a total of 46. " [Larsen 1998, p. 4].

13 "Future somatic cells thereby lose their totipotency and are liable to senescence, whereas **germ cells regain their totipotency after meiosis and fertilization**." [O'Rahilly and Muller 2001, p. 39]. "Early primordial germ cells are spared; their genomic DNA remains very largely unmethylated until after gonadal differentiation and as the germ cells develop whereupon widespread de novo methylation occurs." [Tom Strachan and Andrew Read, Human Molecular Genetics 2 (2nd ed.) (New York: Wiley-Liss, 1999), p. 191] See also notes 19, 20 and 22 for an explanation of the process of "regulation" involved in "twinning" when separated totipotent cells, such as human primitive germ line cells, and the cells of the inner cell mass of the 5-7-day old human blastocyst, are involved. Note too that because human germ line cells, even the more mature germ line cells, are still diploid, and therefore they too can be cloned.

14 "Cells differentiate by the switching off of large portions of their genome." [O'Rahilly and Mueller 2001, p. 39]. "Gene expression is associated with demethylation. Methylation of DNA is one of the parameters that controls transcription. This is one of several regulatory events that influence the activity of a promoter; like the other regulatory events, typically this will apply to both copies of the gene." [Benjamin Lewin, Genes VII (New York: Oxford University Press, Inc., 2000), p. 678; also p. 603]. "Gene regulation as the primary function for DNA methylation: DNA methylation in vertebrates has been viewed as a mechanism for silencing transcription and may constitute a default position." [Strachan and Read, pp. 193 ff]

15 "The expression of genes is determined by a regulatory network that probably takes the form of a cascade. Expression of the first set of genes at the start of embryonic development leads to expression of the genes involved in the next stage of development, which in turn leads to a further stage, and so on until all the tissues of the adult are functioning." [Lewin, p. 63; also pp. 914, 950].

16 See, e.g., G. Kollias, J. Hurst, E. deBoer, and F. Grosveld, "The Human beta-globulin gene contains a downstream developmental specific enhancer", Nucleic Acids Research 15(14) (July 1987), 5739-47; R. K. Humphries et al, "Transfer of human and murine globin-gene sequences into transgenic mice", American Journal of Human Genetics 37(2) (1985), 295-310; A. Schnieke et al, "Introduction of the human pro alpha 1 (I) collagen gene into pro alpha 1 (I) - deficient Mov-13 mouse cells leads to formation of functional mouse-human hybrid type I collagen", Proceedings of the National Academy of Science - USA 84(3) (Feb. 1987), pp. 764-8.

17 D. Irving, "Testimony Before the U.S. House of Representatives' Hearing on Cloning: Legal, Medical, Ethical and Social Issues", Linacre Quarterly May 1999, 66:2:26-40.

18 "A variety of early experiments in mice were also unsuccessful before the landmark study of Wilmut et al (1997) reported successful cloning of an adult sheep. For the first time, an adult nucleus had been reprogrammed to become totipotent once more, just like the genetic material in the fertilized oocyte from which the donor cell had ultimately developed. ... Successful cloning of adult animals has forced us to accept that genome modifications once considered irreversible can be reversed and that the genomes of adult cells can be reprogrammed by factors in the oocyte to make them totipotent once again. ... Other more recent studies are now forcing us to reconsider the potency of other cells. ... [A]nd so the developmental potential of stem cells is not restricted to the differentiated elements of the tissue in which they reside (Bjornson et al, 1999)." Tom Strachan & Andrew P. Read, Human Molecular Genetics 2 (New York: Wiley-Liss, 1999), p. 509. [emphases added]

19 "Early mammalian embryogenesis is considered to be a highly regulative process. Regulation is the ability of an embryo or an organ primordium to produce a normal structure if parts have been removed or added. At the cellular level, it means that the fates of cells in a regulative system are not irretrievably fixed and that the cells can still respond to environmental cues." (pp. 44-49). ... Blastomere removal and addition experiments have convincingly demonstrated the regulative nature (i.e., the strong tendency for the system to be restored to wholeness) of early mammalian embryos. Such knowledge is important in understanding the reason exposure of early human embryos to unfavorable environmental influences typically results in either death or a normal embryo." (p. 46) [Carlson 1999]

20 "The embryo enters the uterine cavity after about half a week ... Each cell (blastomere) is considered to be still totipotent (capable, on isolation, of forming a complete embryo), and separation of these early cells is believed to account for one-third of cases of monozygotic twinning." (p. 37) "... Biopsy of an embryo can be performed by removing one cell from a 4-cell, or two cells from an 8-cell, embryo. This does not seem to decrease the developmental capacity of the remaining cells." [O'Rahilly and Muller 2001, p.37] "Of the experimental techniques used to demonstrate regulative properties of early embryos, the simplest is

to separate the blastomeres of early cleavage-stage embryos and determine whether each one can give rise to an entire embryo. This method has been used to demonstrate that single blastomeres, from two- and sometimes four-cell embryos can form normal embryos, ... " (p. 44); " ... Some types of twinning represent a natural experiment that demonstrates the highly regulative nature of early human embryos, ..." (p. 48); "... Monozygotic twins and some triplets, on the other hand, are the product of one fertilized egg. They arise by the subdivision and splitting of a single embryo. Although monozygotic twins could ... arise by the splitting of a two-cell embryo, it is commonly accepted that most arise by the subdivision of the inner cell mass in a blastocyst. Because the majority of monozygotic twins are perfectly normal, the early human embryo can obviously be subdivided and each component regulated to form a normal embryo." (p. 49) [Carlson 1999] "If the splitting occurred during cleavage -- for example, if the two blastomeres produced by the first cleavage division become separated -- the monozygotic twin blastomeres will implant separately, like dizygotic twin blastomeres, and will not share fetal membranes. Alternatively, if the twins are formed by splitting of the inner cell mass within the blastocyst, they will occupy the same chorion but will be enclosed by separate amnions and will use separate placentae, each placenta developing around the connecting stalk of its respective embryo. Finally, if the twins are formed by splitting of a bilaminar germ disc, they will occupy the same amnion." (p. 325) [Larsen 1998]

21 "[O]there events are possible after this time [segmentation -- 14 days] which indicate that the notion of "irreversible individuality" may need some review if it is to be considered as an important criterion in human life coming "to be the individual human being it is ever thereafter to be". There are two conditions which raise questions about the adequacy of this notion: conjoined twins, sometimes known as Siamese twins, and fetus-in-fetu. ... Although conjoined twins and fetus-in-fetu have rarely been documented, the possibility of their occurring raises several points related to the notion of irreversible individuality. Conjoined twins arise from the twinning process occurring after the primitive streak has begun to form, that is, beyond 14 days after fertilization, or, in terms of the argument from segmentation, beyond the time at which irreversible individuality is said to exist. ... Similar reasoning leads to the same confusion in the case of fetus-in-fetu. ... One case recorded and studied in detail showed that the engulfed twin had developed to the equivalent of four months gestation and consisted of brain, bones, nerve tissue, muscle and some rudimentary organs. Microscopic study showed that engulfment had occurred at about four weeks after fertilization, in terms of the argument for segmentation long after the time when it is claimed that individuality is resolved." [Her reference is: Yasuda, Y., Mitomori, T., Matsurra, A. and Tanimura, T., "Fetus-in-fetu: report of a case", Teratology 31 (1985), 337-41.] [Karen Dawson, "Segmentation and moral status", in Peter Singer, Helga Kuhse, Stephen Buckle, Karen Dawson, and Pascal Kasimba, Embryo Experimentation (New York: Cambridge University Press, 1990), pp. 57-59]. "MZ [monozygotic] twinning usually begins in the blastocyst stage, around the end of the first week (before formation of the germ disc starting at 8 days).... Uncommonly, early separation of embryonic blastomeres, (e.g., during the 2 - 8 cell stages) results in MZ twins with two amnions, two chorions, and two placentas that may or may not be fused. (p. 159); ... About 35% of MZ twins result from early separation of the embryonic blastomeres; i.e., during the first 3 days of development. The other 65% of MZ twins originate at the end of the first week of development; i.e., right after the blastocyst has formed [5-7 days]. Late division of early embryonic cells, such as division of the embryonic disc during the second week, results in MZ twins that are in one amniotic sac and one chorionic sac." (p. 159); ... If the embryonic disk does not divide completely, or adjacent embryonic discs fuse, various types of conjoined MZ twins may form. ... the incidence of conjoined (Siamese) twins is 1 in 50,000- 100,000 births." [Moore and Persaud 1998, p. 161]. "Partial duplication at an early stage and attempted duplication from 2 weeks onward (when bilateral symmetry has become manifest) would result in conjoined twins." (p. 30); ... Once the primitive streak has appeared at about 13 days, splitting that involves the longitudinal axis of the embryo would be incomplete and would result in conjoined twins." [O'Rahilly and Muller 1994, p. 30]. ... Similarly, after the appearance of the primitive streak and notochordal process, any attempt at longitudinal division would be incomplete and would result in conjoined [Siamese] twins. " (ibid, 2001, p. 55)

22 "Another means of demonstrating the regulative properties of early mammalian embryos is to dissociate mouse embryos into separate blastomeres and then to combine the blastomeres of two or three embryos. The combined blastomeres soon aggregate and reorganize to become a single large embryo, which then goes on to become a normal-appearing tetraparental or hexaparental mouse. By various techniques of making chimeric embryos, it is even possible to combine blastomeres to produce interspecies chimeras (e.g., a sheep-goat)." (p. 45); "... The relationship between the position of the blastomeres and their ultimate developmental fate was incorporated into the inside-outside hypothesis. The outer blastomeres ultimately differentiate into the trophoblast, whereas the inner blastomeres form the inner cell mass, from which the body of the embryo arises. Although this hypothesis has been supported by a variety of experiments, the mechanisms by which the blastomeres recognize their positions and then differentiate accordingly have remained elusive and are still little understood. If marked blastomeres from disaggregated embryos are placed on the outside of another early embryo, they typically contribute to the formation of the trophoblast. Conversely, if the same marked cells are introduced into the interior of the host embryo, they participate in formation of the inner cell mass. Outer cells in the early mammalian embryo are linked by tight and gap junctions ... Experiments of this type demonstrate that the developmental potential or potency (the types of cells that a precursor cell can form) of many cells is

greater than their normal developmental fate (the types of cells that a precursor cell normally forms)." (p. 45); " ... Classic strategies for investigating developmental properties of embryos are (1) removing a part and determining the way the remainder of the embryo compensates for the loss (such experiments are called deletion experiments) and (2) adding a part and determining the way the embryo integrates the added material into its overall body plan (such experiments are called addition experiments). Although some deletion experiments have been done, the strategy of addition experiments has proved to be most fruitful in elucidating mechanisms controlling mammalian embryogenesis." (p. 46). [Carlson 1999]

23 Many women, and men, assume that the **"Pre-embryo"** myth is true, and thus unfortunately believe contraceptive providers that swear that their products could not possibly be abortifacient. However, it is a scientific fact that several so-called "contraceptives" could possibly sometimes be abortifacient: "Inhibition of Implantation: The administration of relatively large doses of estrogens ("morning-after pills") for several days, beginning shortly after unprotected sexual intercourse, usually does not prevent fertilization but often prevents implantation of the blastocyst. Diethylstilbestrol, given daily in high dosage for 5 to 6 days, may also accelerate passage of the dividing zygote along the uterine tube (Kalant et al., 1990). Normally, the endometrium progresses to the secretory phase of the menstrual cycle as the zygote forms, undergoes cleavage, and enters the uterus. The large amount of estrogen disturbs the normal balance between estrogen and progesterone that is necessary for preparation of the endometrium for implantation of the blastocyst. Postconception administration of hormones to prevent implantation of the blastocyst is sometimes used in cases of sexual assault or leakage of a condom, but this treatment is contraindicated for routine contraceptive use. The 'abortion pill' RU486 also destroys the conceptus by interrupting implantation because of interference with the hormonal environment of the implanting embryo. "An intrauterine device (IUD) inserted into the uterus through the vagina and cervix usually interferes with implantation by causing a local inflammatory reaction. Some IUDs contain progesterone that is slowly released and interferes with the development of the endometrium so that implantation does not usually occur." (p. 58); ... [Question Chapter 2, #5 for students:] "#5. A young woman who feared that she might be pregnant asked you about the so-called "morning after pills" (postcoital birth control pills). What would you tell her? Would termination of such an early pregnancy be considered an abortion?" (p. 45); ... [Answer #5 for students:] "Chapter 2, #5. Postcoital birth control pills ('morning after pills') may be prescribed in an emergency (e.g., following sexual abuse). Ovarian hormones (estrogen) taken in large doses within 72 hours after sexual intercourse usually prevent implantation of the blastocyst, probably by altering tubal motility, interfering with corpus luteum function, or causing abnormal changes in the endometrium. These hormones prevent implantation, not fertilization. Consequently, they should not be called contraceptive pills. Conception occurs but the blastocyst does not implant. It would be more appropriate to call them 'contraimplantation pills'. Because the term 'abortion' refers to a premature stoppage of a pregnancy, the term 'abortion' could be applied to such an early termination of pregnancy." (p. 532); ... [Question chapter 3, #2 for students]: "Case 3-2: A woman who was sexually assaulted during her fertile period was given large doses of estrogen twice daily for five days to interrupt a possible pregnancy. If fertilization had occurred, what do you think would be the mechanism of action of this hormone? What do lay people call this type of medical treatment? Is this what the media refer to as the "abortion pill"? If not, explain the method of action of the hormonal treatment. How early can a pregnancy be detected?" (p. 59); [Answer Chapter 3, #2 for students:]: "Chapter 3-2 (p. 532): Diethylstilbestrol (DES) appears to affect the endometrium by rendering it unprepared for implantation, a process that is regulated by a delicate balance between estrogen and progesterone. The large doses of estrogen upset this balance. Progesterone makes the endometrium grow thick and succulent so that the blastocyst may become embedded and nourished adequately. DES pills are referred to as "morning after pills" by lay people. When the media refer to the "abortion pill", they are usually referring to RU-486. This drug, developed in France, interferes with implantation of the blastocyst by blocking the production of progesterone by the corpus luteum. A pregnancy can be detected at the end of the second week after fertilization using highly sensitive pregnancy tests. Most tests depend of the presence of an early pregnancy factor (EPF) in the maternal serum. Early pregnancy can also be detected by ultrasonography." [Moore and Persaud 1998, pp. 45, 58, 59, 532)].

24 But see, D. N. Irving, "The impact of international bioethics on the 'sanctity of life ethic', and the ability of Catholic ObGyn's to practice according to conscience"; presented at the international conference, "The Future of Obstetrics and Gynaecology: The Fundamental Human Right to Practice and Be Trained According to Conscience"; sponsored by the International Federation of Catholic Medical Associations (FIAMC), and MaterCare International, Rome, Italy, June 18, 2001, Proceedings of the Conference (in press).

25 A considerable amount of the erroneous "science" used in current bioethics debates on human embryo research, human cloning, stem cell research, etc., can be found in the earliest bioethics "founding" documents. For example, the National Commission's Report on the Fetus (1975) stated: "For the purposes of this report, the Commission has used the following [scientific] definitions which, in some instances, **differ from medical, legal or common usage**. These definitions have been adopted in the interest of clarity and to conform to the language used in the legislative mandate" [referring to The National Research Act 1974]. Examples of their erroneous scientific definitions are the definition of "pregnancy" as beginning at

implantation, and of "fetus" as also beginning at implantation. (The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research; Report and Recommendations; Research on the Fetus; U.S. Department of Health, Education and Welfare, 1975, p. 5; see also, Title 45; Code of Federal Regulations; Part 46 [45 CFR 46]: Office for the Protection from Research Risks [OPRR]: U.S. Department of Health and Human Services, 1983, p. 12.)

26 Converging Technologies for Improving Human Performance (National Science Foundation, and the U.S. Dept. of Commerce, June 2002); you can find the report at: http://itri.loyola.edu/ConvergingTechnologies/Report/NBIC pre publication.pdf (or at http://www.wtec.org/reports.htm).

27 Peter Singer, One World: The Ethics of Globalization (Yale University Press, 2002).

28 The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, The Belmont Report (Washington, D.C: U.S. Department of Health, Education, and Welfare, 1978).

29 See Albert R. Jonsen, The Birth of Bioethics (New York: Oxford University Press, 1998); also, David J. Rothman, Strangers at the Bedside: A History of How Law and Bioethics Transformed Medical Decision Making (New York: BasicBooks; a subsidiary of Perseus Books, L.L.C., 1991).

30 The National Research Act, Public Law 93-348, 93rd Congress, 2nd session (July 12, 1974); 88 STAT 342.

31 The Belmont Report of the National Commission is the explicit (sometimes implicit) "ethical" basis for all of the following documents (a very small sample): United States Code of Federal Regulations: Protection of Human Subjects [OPRR] 45 CFR 46 (revised Jan. 12, 1981, Mar. 8, 1983; reprinted July 1989, revised 1991 -- now in the Common Rule for all departments of the federal government which volunteer to comply), (Washington, D.C.: DHHS); The President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 10 individual Reports including Summing Up (Washington, D.C., U.S. Government Printing Office, 1983); National Institutes of Health: Report of the Human Fetal Tissue Transplant Research Panel (Washington, D.C.: NIH, December 1988); NIH Guide for Grants and Contracts (Washington, D.C.: NIH, 1990); Office for the Protection from Research Risks (OPRR -- now the OHRP), Protecting Human Research Subjects: Institutional Review Board Guidebook (Washington, D.C. NIH, 1993); National Institutes of Health: Report of the Human Embryo Research Panel (Washington, D.C.: NIH, Sept. 27, 1994); NIH Guidelines on the Inclusion of Women and Minorities as Subjects in Clinical Research, Federal Reg. 59 FR 14508 (Washington, D.C.: NIH, March 28, 1994); NIH Outreach Notebook On the Inclusion of Women and Minorities in Biomedical and Behavioral Research (Washington, D.C.: NIH, 1994); the CIOMS/WHO International Ethical Guidelines for Biomedical Research Involving Human Subjects (Geneva: CIOMS/WHO, 1993); the proposed legislation in the State of Maryland for the use of incompetent mentally ill patients in experimental research; the current NIH Human Pluripotent Stem Cell Research Guidelines, (Washington, D.C.: NIH, 2000). See also Jonsen, esp. Chapter 12.

32 For an extensive 70-page treatment of the historical roots and subsequent expansion of secular bioethics, as well as an extensive scientific and philosophical evaluation of this theory, see Dianne N. Irving, "What is 'bioethics'?", in Joseph W. Koterski, S.J., Life and Learning X: Proceedings of the Tenth University Faculty for Life Conference (Washington, D.C.: University Faculty for Life, 2002), pp. 1-84)] This writer has one of her doctoral concentrations in bioethics from the Kennedy Institute of Ethics, Georgetown University (1991). See also my doctoral dissertation, Philosophical and Scientific Analysis of the Nature of the Early Human Embryo (Washington, D.C.: Georgetown University, 1991).

33 See, e.g., E.g., Tom Beauchamp and James Childress, Principles of Biomedical Ethics (1st ed.) (New York: Oxford University Press, 1979), pp. 45-47; Tom Beauchamp and LeRoy Walters (eds.), Contemporary Issues in Bioethics (2nd ed.) (Belmont, CA: Wadsworth Publishing Company, Inc., 1982), p.26; Tom Beauchamp, Philosophical Ethics (New York: McGraw-Hill Book Company, 1982, pp. 124-128, 141, 188-190; Tom Beauchamp; and Laurence B. McCullough, Medical Ethics: The Moral Responsibilities of Physicians (New Jersey: Prentice-Hall, Inc., 1984), pp. 13-16, 21-22, 39-40, 46, 48, 133-35, 162-64.

34 Ibid.; See also, e.g., D. N. Irving, notes 1, 3, 5, 11, 17, 23, 23 and 32 supra, and notes 36, 38, 42 and 46 infra for extensive scientific, philosophical and bioethical literature references on these and related issues that might be found helpful.

35 For example, The Hastings Center's Daniel Callahan conceded in the 25th anniversary issue of The Hastings Center Report celebrating the "birth of bioethics", that the principles of bioethics simply had not worked. But not to worry, he said, we might try communitarianism now: "The range of questions that a communitarian bioethics would pose could keep the field of bioethics well and richly occupied for at least another 25 years"! [Daniel Callahan, "Bioethics: Private Choice and Common Good", Hastings

Center Report (May-June 1994), 24:3:31]. See also: Gilbert C. Meilaender, Body Soul, and Bioethics (Notre Dame, IN: University of Notre Dame Press, 1995), p. x; Raanan Gillon (ed.), Principles of Health Care Ethics (New York: John Wiley & Sons, 1994) -- in which 99 scholars from around the world jump into the fray over bioethics -- by far the majority of them arguing against bioethics "principlism"; Renee Fox, "The Evolution of American Bioethics: A Sociological Perspective," in George Weisz (ed.), Social Sciences Perspective on Medical Ethics (Philadelphia: University of Pennsylvania Press, 1990), pp. 201-220. Renee Fox and Judith Swazey, "Medical Morality is Not Bioethics -- Medical Ethics in China and the United States," Perspectives in Biology and Medicine 27 (1984):336-360, in Jonsen p. 358; Renee C. Fox and Judith P. Swazey, "Leaving the Field", Hastings Center Report (September-October 1992), 22:5:9-15.

36 D.N. Irving, "Academic fraud and conceptual transfer in bioethics: Abortion, human embryo research and psychiatric research", in Joseph W. Koterski (ed.), Life And Learning IV (Washington, D.C.: University Faculty for Life, 1995), pp. 193-215.

37 For example, as Jonsen noted (p. 335), "When Beauchamp and Childress formulated the principle of autonomy, they fused the Kantian concept of respect for persons with John Stuart Mill's quite different notion of liberty ... Folding together the distinct views of Kant and Mill blurred the edges of both the Kantian and the Millsean notions." It also, of course, blurred the edges of the metaphysical, epistemological, and anthropological presuppositions inherent in those diverse and contrary theories of ethics. Hence, Kant's "respect for persons" evolved rapidly into the Millsean utilitarian version of "respect for autonomy" (pace Tom Beauchamp) -- where "autonomy" referred only to "persons", and "persons" were defined only as "moral agents". Most unfortunately, what it also did therefore was turn non-autonomous human beings into non-persons (since they are not "autonomous moral agents").

38 D. N. Irving, "The bioethics mess", Crisis Magazine, Vol. 19, No. 5, May 2001.

39 Original Hastings Center scholar Robert Morison, in Jonsen (pp. 109-110). As Jonsen noted, "Morison's letter was a sobering reminder of the anomalous role of an 'ethics commission' in a pluralistic, secular society."

40 "A fairly widespread perception exists, both within and without the bioethics community, that the prevailing U.S. approach to the ethical problems raised by modern medicine is ailing. Principlism [bioethics] is the patient. The diagnosis is complex, but many believe that the patient is seriously, if not terminally, ill. The prognosis is uncertain. Some observers have proposed a variety of therapies to restore it to health. Others expect its demise and propose ways to go on without it.", Albert Jonsen, in Edwin DuBose, Ronald Hamel and Laurence O'Connell (eds.), A Matter of Principles?: Ferment in U.S. Bioethics (Valley Forge, PA: Trinity Press International, 1994), p.1. See also note 35 supra.

41 These and other secular bioethics issues have been addressed at great length using predominantly the bioethics principles by secular bioethicists since the beginning of the field -- especially in such classic secular bioethics journals as The Hastings Center Report; The Journal of Medicine and Philosophy; The Journal of Clinical Ethics; Bioethics News; The Journal of Law and Medicine; Law, Medicine and Health Care; American Journal of Law and Medicine; The Kennedy Institute of Ethics Journal; Bioethics; Medical Humanities Review; Cambridge Quarterly of Healthcare Ethics; Christian Bioethics; Journal of Religious Ethics; Philosophy and Public Affairs; etc. (See Jonsen, p. 414). There now exists an entire library containing almost exclusively bioethics articles, books and archives -- i.e., The Kennedy Institute of Ethics National Reference Center for Bioethics Literature, at Georgetown University, much of which is on the software BioethicsLine (which is plugged into the NIH National Library of Medicine, and to bioethics centers around the world). The arguments from these bioethics journals, books, etc., also have been continuously applied for over 30 years to "ethics" issues in other fields, e.g., medical research, law, business, engineering, religion, politics, education, military ethics, education, etc. -- and then extended to international issues.

42 See, e.g., Austin Fagothey, Right and Reason (3rd ed. only)(St. Louis, MO: The C.V. Mosby Company, 1963); Vernon Bourke, Ethics (New York: The Macmillan Company, 1953); Ralph McInerny, Ethica Thomistica (Washington, D.C.: The Catholic University of America Press, 1982). See also D. N. Irving, "Which ethics for science and public policy?", Accountability in Research 1993, 3(2-3):77-99.; ibid., "Quality assurance auditors: Between a rock and a hard place", Quality Assurance: Good Practice, Regulation, and Law March 1994, 3(1):33-52; ibid., "Science, philosophy, theology and altruism: The chorismos and the zygon", address delivered to the Evangelische Akademie Loccum, Loccum, Germany, April 3, 1992, and published in: Hans May, Meinfried Striegnitz and Philip Hefner (eds.), Loccumer Protokoll 1992, (Rehburg-Loccum, Germany: Evangelische Akademie Loccum, Spring 1996); ibid., "Which ethics for the 21st Century?", Presented at the Eighth Annual Rose Mass Brunch, sponsored by the John Carroll Society, The Grand Hyatt Hotel, Washington, D.C., March 14, 1999.

43 See especially, Tom Strachan and Andrew P. Read, Human Molecular Genetics (New York: Wiley-Liss, 1999), pp. 539-541.

44 See esp. notes 18, 19, 20 which explain "regulation", supra; (also 12, 13, 18) supra. See also the use of "blastomere separation" and "blastocyst splitting" proposed by many IVF researchers: Professor Dr. Mithhat Erenus, "Embryo Multiplication": "In such cases, patients may benefit from embryo multiplication, as discussed in the study by Massey and co-workers. ... Since each early embryonic cell is totipotent (i.e., has the ability to develop and produce a normal adult), embryo multiplication is technically possible. Experiments in this area began as early as 1894, when the totipotency of echinoderm embryonic cells was reported ... In humans, removal of less than half of the cells from an embryo have been documented. No adverse effects were reported when an eighth to a quarter of the blastomeres were removed from an embryo on day 3 after insemination. ... Further evidence supporting the viability and growth of partial human embryos is provided by cryopreservation. After thawing four-cell embryos, some cells may not survive, leaving one-, two-, or three-cell embryos. These partial embryos survive and go to term, but at a lower rate than whole embryos. ... Based on the results observed in lower order mammals, the critical period of development to ensure success in separating human blastomeres should be at the time of embryonic gene expression, which is reported in humans to be between the four- and eight-cell stages. .... The second potential method of embryo multiplication is blastocyst splitting. ... Embryo multiplication by nuclear transfer has been used in experimental cattle breeding programs. ... IVF clinics routinely replace multiple (three to four) embryos into the uterus to increase the chances of a successful pregnancy. For couples who have less than three quality embryos for transfer, blastomere separation could be of benefit." [http://www.hekim.net/~erenus/20002001/asistedreproduction/micromanipulation/embryo_multiplication.htm]. See also, "New Ways to Produce Identical Twins -- A Continuing Controversy": "Identical twins occur naturally approximately 3.5 times out of every 1000 human births. And, to date, scientists still don't know why and can't predict that they will, in any given birth, occur. However, in the last half of this century, and indeed, in the past ten to fifteen years, scientific advances have impacted on twins and other multiples and their families in numerous ways. ... Now, a new method of actually producing identical twins looms near. Called "blastomere separation" (the separation of a two- to eight-cell blastomere into two identical demi-embryos), it is potentially one method of helping infertile couples have children through in vitro fertilization (IVF). ... The following is excerpted from the medical journal Assisted Reproduction Reviews, May 1994. Dr. Joe B. Massey, who heads an in vitro clinic in Atlanta. Dr. Massey reviews the advances in blastomere separation and discusses the potential indications, benefits, limitations, and ethics of using this method to produce monozygotic twin embryos for IVF patients. The Twins Foundation, by presenting Dr. Massey's material for your information neither advocates nor rejects any such procedures: 'Embryo Multiplication by Blastomere Separation-One Doctor's Proposal [Massey]: In spite of many advances in human vitro fertilization (IVF), there are still many problems. While leading clinics now have success rates of about 30%, many other clinics lag behind. Still, the number of couples undergoing IVF continues to increase despite high costs.' ... According to Dr. Massey, 'Observations on the potential impact of removing less than half of the cells from the human embryo have been well documented in pre-clinical embryo biopsy studies.' (For more on this story see Research Update Vol. 9, No. 1, 1994)." [on THE TWINS FOUNDATION (http://twinsfoundation.com/ru-v9n1-1994.htm)]. See also "embryo self-selection": "The ability to grow embryos for five days to the blastocyst stage of development in the laboratory, rather than the traditional three days, allows clinicians to determine with greater certainty which embryos are really the "best" in terms of their potential for implantation. Consequently, blastocyst culture makes it possible to select the best one or two blastocysts vs. three or four early embryos to transfer back to the mother. Fertility centers like Shady Grove constantly strive to improve IVF success rates through the steady refinements of clinical and laboratory techniques. Clinical blastocyst culture and transfer is the next important step in that evolution,' explains Robert Stillman, MD: 'After five days of growth, the cells of the embryo should have divided many times over, and have begun to differentiate by function. The embryos that survive to this stage of development are usually strong, healthy, and robust. ... Simply put, this self selection can be viewed as 'survival of the fittest. ... Which ones to transfer? Which ones are really the "best"? Two additional days in the blastocyst culture medium allows the natural winnowing process to continue. Thus, after 5 days of growth in the laboratory, only 2 or 3 of the original ten embryos may remain viable. We now know the best embryos to transfer. ... In thinking of the example above, patients who have fewer oocytes retrieved, fewer fertilized or fewer dividing embryos by day three in culture have no advantage using blastocyst culture, since little is to be gained in further embryo 'self selection'. Dr. Stillman emphasizes." [on FERTILITY NETWORK (http://fertilitynetwork.com/articles/articles-blastocyst.htm)] ETHICS COMMITTEE OF THE AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE, "'Ethical Considerations of Assisted Reproductive Technologies': Originally published as a supplement to the ASRM medical journal (Fertility and Sterility 1994;62:Suppl 1), Ethical Considerations for Assisted Reproductive Technologies covers the American Society for Reproductive Medicine's position on several aspects of reproductive medicine, including: ... the moral and legal status of the preembryo, ... the use of donor sperm, donor oocytes and donor preembryos, ... the cryopreservation of oocytes and preembryos, micro techniques such as: zona drilling, microinjection, blastomere separation (cloning), and assisted hatching." [http://www.asrm.com/Media/Ethics/ethics94.html]. See also: "Because early embryonic cells are totipotent, the possibility of splitting or separating the blastomeres of early preimplantation embryos to increase the number of embryos that are available for IVF treatment of infertility is being discussed. Because embryo splitting could lead to two or more embryos with the same genome, the term "cloning" has been used to describe this practice. ... Splitting one embryo into two or more embryos could

serve the needs of infertile couples in several ways. For couples who can produce only one or two embryos, splitting embryos could increase the number of embryos available for transfer in a single IVF cycle. Because the IVF pregnancy rate increases with the number of embryos transferred, it is thought that embryo splitting when only one or two embryos are produced may result in a pregnancy that would not otherwise have occurred. For couples who produce more than enough embryos for one cycle of transfer, splitting one or more embryos may provide sufficient embryos for subsequent transfers without having to go through another retrieval cycle, thus lessening the physical burdens and costs of IVF treatment for infertility. In addition, this technique may have application in preimplantation genetic diagnosis. ... Whereas these ethical concerns raise important issues, neither alone nor together do they offer sufficient reasons for not proceeding with research into embryo splitting and blastomere separation. ... In sum, since embryo splitting has the potential to improve the efficacy of IVF treatments for infertility, research to investigate the technique is ethically acceptable. Persons asked to donate gametes or embryos for such research should be fully informed that research in embryo splitting is intended or planned as a result of their donation. The fears of possible future abuses of the technique are not sufficient to stop valid research in use of embryo splitting as a treatment for infertility. This statement was developed by the American Society for Reproductive Medicine's Ethics Committee and accepted by the Board of Directors on December 8, 1995. [on AMERICAN SOCIETY OF REPRODUCTIVE MEDICINE (http://www.asrm.com/Media/Ethics/embsplit.html)].

45 Tom Strachan and Andrew P. Read, Human Molecular Genetics 2 (New York: John Wiley & Sons, Inc, 1999): "The term 'clones' indicates genetic identity and so can describe genetically identical molecules (DNA clones), genetically identical cells or genetically identical organisms. Animal clones occur naturally as a result of sexual reproduction. For example, genetically identical twins are clones who happened to have received exactly the same set of genetic instructions from two donor individuals, a mother and a father. A form of animal cloning can also occur as a result of artificial manipulation to bring about a type of asexual reproduction. The genetic manipulation in this case uses nuclear transfer technology: a nucleus is removed from a donor cell then transplanted into an oocyte whose own nucleus has previously been removed. The resulting 'renucleated' oocyte can give rise to an individual who will carry the nuclear genome of only one donor individual, unlike genetically identical twins. The individual providing the donor nucleus and the individual that develops from the 'renucleated' oocyte are usually described as "clones", but it should be noted that they share only the same nuclear DNA; they do not share the same mitochondrial DNA, unlike genetically identical twins. ... Nuclear transfer technology was first employed in embryo cloning, in which the donor cell is derived from an early embryo, and has been long established in the case of amphibia. ... Wilmut et al (1997) reported successful cloning of an adult sheep. For the first time, an adult nucleus had been reprogrammed to become totipotent once more, just like the genetic material in the fertilized oocyte from which the donor cell had ultimately developed. ... Successful cloning of adult animals has forced us to accept that genome modifications once considered irreversible can be reversed and that the genomes of adult cells can be reprogrammed by factors in the oocyte to make them totipotent once again." (pp. 508-509)

46 For detailed scientific analyses of several current national and international proposed legislations on human cloning and human embryonic stem cell research, see: D. N. Irving, "Analysis of Canadian Bill C-56: Human Reproductive Technology Act 2002" (submitted on request to Campaign Life Coalition, Toronto, Canada, on May 17, 2002); ibid., "University Faculty for Life: Submission of Concern to the Canadian CIHR Re the 'Human Stem Cell Research Recommendations 2001'" (written as UFL Board Member on behalf of UFL; submitted to Dr. Alan Bernstein, President, Canadian Institutes of Health Research Working Group on Stem Cell Research, Ottawa, Ontario, Canada, on June 3, 2001); ibid., "University Faculty for Life: Submission of Concern to the British House of Lords Re the 'Human Fertilisation and Embryology (Research Purposes) Regulations 2001'" (written as UFL Board Member on behalf of UFL; submitted to Tony Rawsthorne, Select Committee, House of Lords, London, on June 1, 2001); ibid., "University Faculty for Life: Letter of Concern to Sen. Brownback and Congressman Weldon Re the 'Human Cloning Bill 2001'" (written as UFL Board Member on behalf of UFL; submitted to Sen. Brownback and Congr. Weldon, U.S. Congress, Washington, D.C., on May 27, 2001); ibid., "Analysis: Stem Cells that Could Become Embryos: Implications for the NIH Guidelines on Stem Cell Research", July 22, 2001[written as consultant on human embryology and human embryo research as Fellow of The Linacre Institute (CMA), The Catholic Medical Association (USA), and The International Federation of Catholic Medical Associations (FIAMC)].

47 Henry Campbell Black, Black's Law Dictionary (4th ed.) (St. Paul, MN: West Publishing Co, 1951), pp. 1577-1578.