Dr. Dianne N. Irving, M.A., Ph.D.
Missouri Catholic Conference Workshop
Jefferson City, Missouri

Playing God by Manipulating Man: The Facts and Frauds of Human Cloning [1]

> "*Human life* is thus given a sacred and inviolable character, which reflects the inviolability of the Creator himself. Precisely for this reason God will severely judge every violation of the commandment 'You shall not kill,' the commandment which is at the basis of all life together in society. ... Only Satan can delight therein: for through his envy death entered the world (*Wis* 2:24). He who is 'a murderer from the beginning,' is also 'a liar and the father of lies' (*Jn* 8:44). By deceiving man he leads him to projects of sin and death, making them appear as goals and fruits of life." (*Evangelium vitae*, Par. 53)

I. INTRODUCTION: MANIPULATING THE CLONING DEBATES

These powerful words from EV encapsulate in effect what I am going to address here today with you – the purposeful and massive manipulation of language, science, ethics, legislation and politicians in order to lead us astray from Truth and Reality. We are being led into "believing" that what are being manipulated and dissected in petri dishes in laboratories across the world during human cloning experiments *are not really innocent living human beings who will be killed in the process*. Rather they are "just a bunch of stem cells". Indeed the same cloning and killing of human beings is happening right here, right now, in the honorable State of Missouri.[2] This is obviously not to say of course that all science and all scientists are deceptive; nor to deny the enormous good that science has brought mankind. But it is time to point out, in the spirit of "fraternal love", that many involved in the pursuit of human cloning pursue that goal deceptively.

This propensity of man for manipulation, power and abuse is hardly unique to our contemporary scene. The temptation "to be like unto gods" has been with us since the dawn of time – and is currently flooding our culture, e.g., through multiple New Age[3] cosmologies and intrigues. Like the serpent in the Garden of Eden, the cloning industry tempts us today by assuring us that "Ye shall surely not die...*ye shall be as gods*" – the classic gnostic exhortation! Yet while promising us godlike powers to "create", to "recreate", or to design our own new humanity and immortality through such technologies as human cloning and human genetic engineering, they lay waste the human people and human culture around them.[4] It is only the goal that counts to them – *their* goal. The *means* used to reach that goal, as Nietzsche would say, are meaningless. But are they?

Josef Pieper, a contemporary Catholic philosopher and theologian, recently wrote an amazing small book concerning the advertising and communications industries, *The Abuse of Language – Abuse of Power*,[5] that is astonishingly applicable to the rhetoric found in the human cloning and human embryonic stem cell research debates today. Such rhetoric, he notes, is not new. Plato attributed it to the Sophists whom he described as,

"highly paid and popularly applauded experts in the art of twisting words; able to sweet-talk something bad into something good and to turn white into black."[6] The truth itself cannot in all honesty be the decisive concern of those who aim at verbal artistry, he notes. Rather, as Plato forces Gorgias to admit, "such sophisticated language, disconnected from the roots of truth, in fact pursues some ulterior motives." Language is thus invariably turned into an instrument of power.[7]

And this is indeed what we are experiencing today in these cloning debates – the abuse of language, especially scientific language, in the pursuit of power. We can no longer afford to shove the issue of human cloning back into the innermost recesses of our consciousnesses, in the drawers labeled "not my problem". Nor can we *allow* ourselves to be so profoundly deceived and confused by the rhetoric of cloning. Far too much is at stake.

My challenge here is to try to do a little something about this very sophisticated contemporary sophistic rhetoric by identifying some of the abusive language they have perpetrated in order to sell their products. And all it will take is to present the simple objective scientific truth, the truth that *a new unique innocent vulnerable living human being begins to exist immediately at both fertilization and at cloning*. And thus to intentionally kill these innocent human beings is morally illicit and should be legally banned. Without truth – even scientific truth -- there is eventually no faith or freedom – even scientific freedom.

II. MANIPULATING SCIENTIFIC FACTS OF HUMAN EMBRYOLOGY IN HUMAN *SEXUAL* REPRODUCTION

Human beings can be reproduced both *sexually* (fertilization – both natural, and artificial, e.g., as in IVF) and *asexually* (cloning, e.g., as in human monozygotic twinning). There have been a multitude of ways that scientific terms have been falsified and manipulated over the years to make us think (erroneously) that the immediate product of both sexual and a-sexual human reproduction is something other than what it really is – a new living single-cell innocent human being.

Many of the deceptions now being used in the human cloning debates are really nothing more than the repackaging of the same old deceptions that have already been perpetrated over the last 30 years in the abortion debates -- many of which you are all probably already familiar with. So I will start with a brief summary of the *accurate*, long-known and long-established scientific facts of human sexual reproduction, noting particularly those terms that have been manipulated within the abortion, and now the human cloning, debates. This will be followed by a similar brief summary of the accurate established facts of a-sexual human reproduction (human cloning), noting again more particular terms that are now being manipulated within the human cloning debates. We are then in a much better position to evaluate some current legislative attempts to ban human cloning and to do something about it.

One note before I begin, however. It would seem that many people do not know that, unlike some other fields, in the field of human embryology these objective scientific facts are ultimately determined by the *International Nomina Embryologica Committee*,[8] consisting of over 20 of the best and brightest human embryologist from around the

world. After reviewing the latest research studies in human embryology, their deliberations are published in the *Nomina Embryologica*, part of the larger *Nomina Anatomica*, and are professionally required to be used, along with *The Carnegie Stages of Early Human Development*, by all human embryologists in their own work. The human embryology that I am presenting here is quoted directly from human embryology textbooks using scientific facts determined to be current and accurate by the *International Nomina Embryologica Committee*. It is not my "opinion", nor even that of the authors of these textbooks.

A. When does a Human Being Begin to Exist?[9]

The most devastating scientific myth in both the abortion and in the human cloning debates concerns the question, "When does a human being begin to exist". Proponents of both abortion and of human cloning want you to think that a human being does not begin immediately at fertilization or at cloning. Indeed, they want you to think that the claim that a human being begins to exist immediately at fertilization and at cloning is just a religious "belief" or a personal opinion – and after all, in this democratic, pluralistic, multicultural society one person's or groups "beliefs" or "opinions" may not be imposed on the rest of society.

Now, if you want to "believe" that the immediate product of fertilization or of cloning is a human being, then please feel free to do so. But it is also **an objective scientific fact** that the immediate product of both fertilization and cloning is a new living innocent human being. And it seems to me that those objective scientific facts should be the *starting point* for any discussions, debates, or legislation on these issues. Otherwise, as one wise old Doctor of the Church often warned, "A small error in the beginning leads to a multitude of errors at the end."[10] Indeed, as we shall see, it is the starting point for the Church's own teachings on human cloning.

B. Human Sexual Reproduction -- fertilization ("zipping up")

1. Gametogenesis

There are two basic categories of cells in the human organism: somatic ("body") cells, and germ line ("sex") cells.[11] During very early human embryonic development, primitive germ line cells are initially *totipotent* (and thus they can be cloned by "twinning"); [12] and they are *diploid*,[13] i.e., they each have "46" chromosomes (and thus they can be cloned by nuclear transfer). 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 ("egg"), which have only "23" chromosomes in each cell.[14] 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.

***** SUM OF FALSE SCIENTIFIC CLAIMS ABOUT GERM LINE CELLS USED IN THE CLONING DEBATES:**

1. Somatic cells vs. germ line cells: "There are *only diploid* somatic cells" (thus opening the door for diploid germ line cells to be cloned by nuclear transfer, for "therapeutic" or for "reproductive" purposes);
2. Totipotent vs. pluripotent: "Primitive germ line cells are pluripotent" (thus because they are really totipotent, this opens the door for them to be cloned by "twinning", for "therapeutic" or for "reproductive" purposes);
3. Haploid vs. diploid: "Oocytes used in cloning or parthenogenesis are haploid" (thus because they are really diploid, this opens the door for them to be cloned by nuclear transfer, for "therapeutic" or for "reproductive" purposes).

2. Fertilization

Now that we have looked at the formation of the mature haploid sex gametes, the next important process to consider is fertilization. We have known empirically for over a hundred years[15] that fertilization is the beginning of many things: the human *embryo*, the human *being*, the human *organism*, the human *individual*, the genetic *sex* of the embryo, the "*embryonic* period", and normal *pregnancy* [which begins at fertilization in the *fallopian tube* (or ovaduct) of the mother, *not* at implantation in her womb]. All of these facts and terms are manipulated in both the abortion and in the human cloning debates. But read the objective scientific facts – in concert with the international nomenclature for human embryology -- for yourself:

> O'Rahilly and Muller (2001); ... 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. The **zygote** is characteristic of the last phase of fertilization and is identified by the first cleavage spindle**. It is a unicellular embryo**. (p. 19)

> Moore and Persaud (1998): Zygote: This cell results from the union of an oocyte and a sperm. A zygote is the **beginning of a new human being (i.e., an embryo)**. The expression "fertilized ovum" refers to a secondary oocyte that is impregnated by a sperm; when fertilization is complete, **the oocyte becomes a zygote**. (p. 2)

> Larsen (1997): ... [W]e 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**. (p. 1)

> O'Rahilly and Muller (2001): Although life is a continuous process, **fertilization** ... is a critical landmark because, under ordinary circumstances**, a new, genetically distinct human organism** is formed when the chromosomes of the male and female **pronuclei blend** in the oocyte. (p. 31)

> Moore and Persaud (1998): ... **The embryo's chromosomes sex is determined at fertilization** by the kind of sperm (X or Y) that fertilizes the ovum; hence it is the father rather than the mother whose gamete determines the sex of the embryo. (p. 37); Carlson (1999): The **sex of the future embryo is determined by the chromosomal complement of the spermatozoon**. (If the sperm contains 22 autosomes and an X chromosome, the embryo will be a genetic female, and if it contains 22 autosomes and a Y chromosome, the embryo will be a male.) ... Through the mingling of maternal and paternal chromosomes, **the zygote is a genetically unique product of chromosomal reassortment,** which is important for the viability of any species. (p. 32)

> O'Rahilly Muller (1994): The **embryonic period** proper ... **occupies the first 8 postovulatory weeks** (i.e., timed from the last ovulation) ... The **fetal period extends from 8 weeks to birth**. (p. 55); Carlson 1994: **After the eighth week** of pregnancy the period of organogenesis (**embryonic period**) is largely completed and **the fetal period begins**. (p. 407)
>
> O'Rahilly and Muller (2001): ... **Fertilization takes place normally in the ampulla (lateral end) of the uterine tube**. (p. 31); Moore and Persaud (1998): **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 resorbed. 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**. (p. 34); Carlson (1999): "**Human pregnancy begins with the fusion of an egg and a sperm,** but a great deal of preparation [recedes 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, 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); Larsen (1997): 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 a **zygote** containing a single diploid nucleus. (p. 1); "These **pronuclei fuse with each other** to produce the single, diploid, 2N nucleus of the fertilized zygote. **This moment of zygote formation may be taken as the beginning or zero time point of embryonic development**. (p. 17)

This new single-cell human being immediately produces specifically *human* proteins and enzymes[16] (not carrot or frog enzymes and proteins), and genetically directs his/her own growth and development. (In fact, this genetic growth and development has been proven *not* to be directed by the mother, but rather by the *embryo*.)[17] The human embryo begins to divide and *grows bigger and bigger*, developing through several stages as an embryo over an 8-week period. Several of these developmental stages of the growing embryo are given special names, e.g., a morula (about 4 days), a free blastocyst (about 4-5 days), an implanting blastocyst (about 5-7 days), a bilaminar (two layer) embryo (during the second week), and a trilaminar (3 layer) embryo (during the third week). But it is the very *same* human embryo who is progressing throughout all of these various stages of growth and development.[18]

3. The myth of the "pre-embryo" and its substitutes

There has probably been no greater manipulation of scientific terms over the last 30 years, nor one that has done more violence to human dignity, than the creation and propagation of the scientifically false term "pre-embryo".[19] The purpose of the term is to make you think that there is really no human being or human embryo there yet; in fact, it might mean that there is really no "person" there yet. Therefore, this "pre-embryo" has a "reduced moral status" -- which justifies the use and destruction of these early human embryos for any purpose.

However, we *know* empirically that there is no such thing as a "pre-embryo".[20] The term is admittedly arbitrary,[21] a complete scientific myth, pure propaganda created

for political purposes only, and usually grounded in several other "scientific" myths, e.g., that 'twinning can't take place after 14-days". But twinning *can* take place after 14-days![22] Indeed, the always dubious and arbitrary terms "pre-embryo" and "individualization" have recently been specifically and formally rejected as scientifically ill-defined, inaccurate, unjustified, equivocal, and politically motivated by the *International Nomina Embryologica Committee*:

> O'Rahilly and Muller, 2001: "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**." (p. 88) ... "Undesirable terms in Human Embryology": "**Pre-embryo"**; **ill-defined and inaccurate; use "embryo"**. (p. 12)

Especially because the term "pre-embryo" has now been internationally scientifically discredited, a whole series of what I would call "*pre-embryo substitutes*" have flooded the market place – all of them having the same goal of reducing the "moral status" of these early vulnerable living human beings. Such an example is used typically by Michael Kinsley[23] in several of his promotions for human embryonic stem cell research and human cloning. Kinsley drags up the old long-discredited scientific myth of the **"biogenetic law"** which essentially claims that the early developing human embryo and human fetus is not really a human being yet, but rather just an "embryo-like thing" that first has to "relive" the historical evolution of all of the species that preceded the emergence of the human species before it evolves (*in utero*!) into a member of the *human* species. Here the embryo is rather like what some theologians refer to as "a-seed-on-the-way", "a-being-on-the-way", indeed, "a human-being-on-the-way". That is, the human being isn't there yet! But empirically we *know* that the human being **is already there immediately at fertilization or at cloning**.

If you think about it, the "biogenetics law" is just another kind of "pre-embryo substitute" – until the evolution *in utero* of the human species, "whatever" is there has a "reduced moral status". But like the term "pre-embryo", the old "biogenetic law" too has been long refuted and discarded by science:

> (O'Rahilly and Muller 2001): **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. (p. 16)

An easy thing to remember is that almost all of these false scientific claims, such as the immediate product of fertilization is "just a bunch of stem cells", "just a blob of the mothers tissues", "just an embryo-like thing", "just a thing evolving into a human being", etc., are really nothing more than "*pre-embryo substitutes*", and are used for precisely the same purpose: to "scientifically" devalue the moral status of these early human beings so that they can "justifiably" be used one way or another by other human beings.

***** SUM OF FALSE SCIENTIFIC CLAIMS ABOUT FERTILIZATION USED IN THE CLONING DEBATES:**

1. Fertilization vs. implantation: "The human embryo, human being, human individual, and the human organism *does not* begin to exist until implantation. Until implantation (or sometimes 14-days) there is only "a bunch of stem cells", just "a blob of the mother's tissues", just "a 'pre-embryo', just a "pre-embryo-like 'thing'", or just an "embryo still recapitulating the evolution of the species".

   (a) this leaves the door open for the use of genetic pre-selection, the use of abortifacients, early abortions, and all forms of laboratory and clinical "reprogenetics"[24];

   (b) it also leaves the door open for early human embryos to be used in destructive experimental research, as well as in both "therapeutic" and "reproductive" cloning using all cloning techniques, etc.

2. "Twinning can't take place after 14-days" (thus rendering the embryo before 14-days a "non-person" with a "reduced moral status", and thus mere "biological material" for all types of destructive experimental research, etc.);

3. Totipotent vs. pluripotent: "The cells (blastomeres) of the early embryo are pluripotent, not totipotent" (thus leaving the door open for the cloning of new embryos by the "twinning"of these *totipotent* cells, or by nuclear transfer of these *diploid* cells, for both "therapeutic" and "reproductive" purposes);

4. Totipotent vs. pluripotent: "The cells of the inner cell mass of the early blastocyst are pluripotent", not totipotent (thus leaving the door open for the cloning of new embryos by the "twinning" of these *totipotent* cells", or by nuclear transfer of these *diploid* cells, for both "therapeutic" and "reproductive" purposes).

III. MANIPULATING SCIENTIFIC FACTS OF HUMAN EMBRYOLOGY IN HUMAN *ASEXUAL* REPRODUCTION

A. Human Asexual Reproduction -- cloning ("zipping down")

Human beings can also be reproduced *a-sexually*, without the use of sperm or oocytes -- as we know empirically happens in human cloning by means of nuclear transfer.

There are two (among several) biological processes that can help people understand what happens during human cloning: methylation, and regulation:

1. <u>Methylation</u>:[25]

Briefly, following *sexual* reproduction the early human embryo grows and develops by means of methylating and demethylating the DNA in each of the embryo's or

fetus's cells. That is, the DNA in each cell is "allowed to speak", or is "silenced", by adding or removing these methylation bars -- depending on what products the embryo needs to grow and develop. These products then "cascade"[26] throughout growth and development. The more specialized, or differentiated, a cell, the more methylated its DNA becomes. I will refer to this process during growth and development following *sexual* human reproduction as a sort of "*zipping up*" – the "programming" of the DNA of a cell. By adulthood, the DNA in many of the cells of the human being has been almost completely "silenced" by the insertion of methylation bars -- such as in human skin cells.

In *a-sexual* reproduction or cloning,[27] many of these processes operate *in reverse*. For example, in using the somatic cell nuclear transfer cloning technique, one begins with a highly specialized or differentiated cell – such as a skin cell -- in which some or even most of the DNA in that cell has been "silenced" (i.e., the methylation bars on that DNA are incrementally removed) -- eventually resulting in a new, single-cell zygote, an organism, a single-cell embryo or human being. That is, you begin with just a "cell", but end up with an "organism", an embryo, a human being! This is what I will call the "zipping down" – or the de-programming -- of the DNA in a cell, and roughly what happened with the production of Dolly the sheep. Quoting Strachan and Read:

> 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 amphibians. ... Wilmut *et al* (1997) reported successful cloning of an adult sheep ["Dolly"]. 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**.[28]

That is, any differentiated diploid cell – a cell who's DNA has been "zipped up" – can have its nuclear DNA "zipped down" during the process of cloning – reverting that **cell** back to **a totipotent zygote – a new cloned single-cell embryo**. Similarly, the immediate product of human a-sexual reproduction (cloning) is a new human **embryo**, a new totipotent single-cell human zygote – just as is the immediate product of human sexual reproduction (fertilization). There is no doubt that normal embryos resulting from such a cloning process would be new cloned **human beings**. Even the proponents of human cloning admit this.[29] Expressing disbelief that some deny that human cloning produces an embryo, Van Blerkom, human embryologist at the University of Colorado quipped: "If it's not an embryo, what is it?", and added that researchers' efforts to avoid the word "embryo" in this context are "self-serving."[30]

It is important to note, however, that in cloning by means of nuclear transfer, the cloned human embryo reproduced would not be "virtually genetically identical to the donor cell". That is, the cloned human embryo would have a *different genome*[31] due to the presence in the embryo of foreign mitochondrial DNA, and the lack of the mitochondrial DNA from the donor cell:

> Strachan and Read (1999): 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", <u>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</u>**. (pp. 508-509)

This objective scientific fact, as we will see, has serious consequences in evaluating many of the current human cloning "bans".

2. <u>Regulation</u>:[32]

In addition to cloning by means of nuclear transfer, one may also clone by means of "twinning", e.g., as we know happens in natural monozygotic *twinning*[33] (a common, and the most exact form of, cloning,[34] because the mitochondria are the same). Understanding the natural biological process of regulation can help us understand better what is taking place during human twinning.

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.[35] 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* monozygotic twinning *in vivo*.[36]

Of course the question always arises, when do each of the twins begin to exist as individuals – one of the enduring questions raised in the "pre-embryo" myth? 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 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 these totipotent 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 of the embryo 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.

The same considerations can be applied to questions about the *fusion* of two early human embryos to form a single chimera from the standpoint of regulation.[37] 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.

3. Many other kinds of human cloning techniques

Also, there are *many different kinds of human cloning techniques* possible,[38] e.g., twinning (blastomere separation and blastocyst splitting)[39] -- a cloning technique highly promoted these days by IVF clinics for their patients.[40] Needless to say, these same clinics could also perform twinning for the purpose of providing an unlimited supply of new human embryos for research purposes only. One can also clone human beings by using other cloning techniques, e.g., somatic cell nuclear transfer (SCNT),[41] germ line cell nuclear transfer (GLCNT),[42] pronuclei transfer,[43] "artificially constructed" sperm, oocytes and embryos,[44] etc.

4. "Therapeutic" and "reproductive" human cloning

Finally, in all such cloning techniques, the *immediate* product would be a new living innocent human *being*. That is why the current framing of the cloning debates *only* in terms of "therapeutic" and "reproductive" is so deceptive and purposefully leads people to disregard the existence of, and thus the consideration of, all other human cloning techniques. The real issue is that regardless of the cloning technique used, *all cloning is "reproductive"* – i.e., results in the *immediate* reproduction of new living human beings. The terms "therapeutic" and "reproductive" refer merely to the purpose or reason why human beings are cloned. Some ingenious researchers, like those mentioned earlier in Missouri, are now even trying to reframe the debates again by claiming that "therapeutic" cloning is not cloning at all – since the immediate product is only a bunch of stem cells! Sound like a familiar tactic (like a "pre-embryo substitute")? Rather, they claim, only "reproductive" cloning is cloning![45]

But fortunately most people have not fallen for this false distinction between "therapeutic" and "reproductive" human cloning – as the Vatican's Mission to the United Nations has made clear:

> Every process involving human cloning **is in itself a reproductive process in that it generates a human being at the very beginning of his or her development, i.e., a human embryo**. The Holy See regards the distinction between "reproductive" and "therapeutic" (or "experimental") cloning as unacceptable by principle since it is devoid of any ethical and legal ground. **This false distinction masks the reality of the creation of a human being for the purpose of destroying him or her to produce embryonic stem cell lines or to conduct other experimentation**. Therefore, human cloning should be prohibited in all cases regardless of the aims that are pursued. **... Based on the biological and anthropological status of the human embryo and on the fundamental moral and civil rule that it is illicit to kill an innocent human being even to bring about a good for society, the Holy See regards the conceptual distinction between "reproductive" and "therapeutic" (or "experimental") human cloning as devoid of any ethical and legal ground**.[46]

***** SUM OF FALSE SCIENTIFIC CLAIMS ABOUT ASEXUAL REPRODUCTION USED IN THE CLONING DEBATES:**

1. "The immediate product of human cloning is not a human being" (thus opening the door to the destructive use of these earliest human embryos in all research, for both "therapeutic" and "reproductive" purposes, using all cloning techniques);
2. "The product of the SCNT cloning technique is "virtually genetically identical to the donor cell" (thus by-passing the definition of the *real* SCNT cloning technique which would then be *allowed*, for both "therapeutic" and "reproductive" purposes);
3. "Cloning is defined only in terms of the SCNT cloning technique" (thus leaving out of consideration all of the other kinds of cloning techniques for both "therapeutic" and "reproductive" purposes);
4. "Cloning is defined only in terms of "therapeutic" and "reproductive" cloning (thus leaving out of consideration all cloning techniques other than SCNT for both "therapeutic" and "reproductive" purposes);
5. "Only 'reproductive' cloning is cloning; 'therapeutic' cloning is only stem cell research" (thus leaving out of consideration the cloning of human embryos for all destructive research purposes, using any and all cloning techniques, for both "therapeutic" and "reproductive" purposes);
6. "The twinning and fusing of some early human embryos means that they are not human beings or human persons yet" (thus opening the door to the destructive use of these earliest human embryos in all destructive research, using allcloning techniques, for both "therapeutic" and "reproductive" purposes);
7. "There is no such thing as 'regulation'" (an actual statement by a leading scientist who is a proponent of human cloning, attempting to deny the reality of cloning by means of twinning, for both "therapeutic" and "reproductive" purposes).

Scientifically, then, empirically -- according to 100% of the expert specialists in the field of human embryology worldwide -- there is no question or confusion whatsoever that the **immediate** product of both human fertilization and of human cloning -- and all continuous, contiguous, growth and *developmental* stages thereafter through adulthood -- is an already fully existing unique living *human being*. The massive corruption of these scientific facts in both the abortion and in the cloning debates, however, should give us great pause as to just how profoundly science itself has been so grossly manipulated – thus manipulating us all. As the Church has duly noted:

> [EV III.58]: [W]e need now more than ever to have the courage **to look the truth in the eye and to call things by their proper name, without yielding to convenient compromises or to the temptation of self-deception**. ... Especially in the case of abortion there is **a widespread use of ambiguous terminology**, such as 'interruption of pregnancy,' which tends to hide abortion's true nature and to attenuate its seriousness in public opinion**. Perhaps this linguistic phenomenon is itself a symptom of an uneasiness of conscience**. **But no word has the power to change the reality of things: procured abortion is the deliberate and direct killing, by whatever means it is carried out, of a human being in the initial phase of his or her existence, extending from conception to birth**.[47]

Yet despite the massive efforts to try to get the accurate science into the public debates, proponents of human cloning refuse to acknowledge the objective, internationally sanctioned, scientific facts of human embryology. Many scientists

working in the areas of human cloning and human embryonic stem cell research have probably never even taken a formal graduate course in human embryology in their careers, nor do they particularly care. Note the sheer arrogance – and ignorance -- of the response to one of my students who contacted a well-known IVF researcher about the dubious use of the term "pre-embryo" on their IVF website:

> Dear XXX: sorry for the confusion. Our website is constantly being updated of late, and as it is such a broad and long established website, there is much apparent inconsistency over terminology. However, to answer your question directly: the term "pre-embryo" has been proposed as the appropriate term to refer to an undifferentiated entity that has not even established whether it will be one or two individuals (twinning?), and in a sense (up till day 3 of development) has not even kicked in its own embryonic genetic gameplan. Hence, the term "pre-embryo", being an entity preceding an "actual" embryo. All glorious semantics really - and frankly it is what it is, and this oddity is still used especially by many in the IVF world who have "graduated" from The Jones Institute in Norfolk, VA. Therefore shd you wish to attempt a "fix" on this term, refer to Howard & Georgeanna Jones. As to "human embryologists" this simply defines them as embryologists working with human embryos as opposed to any other species. Nothing more. You cd semantically take exception to this terminology also, as most "human embryologists" are nothing more than clinical early stage embryo jockeys, with little true appreciation of classical embryology as a discipline within biology - this wd probably include me, who, past day 7 of development has only an amateurish grasp of subsequent embryological development. The question to ask yourself really is: was this really worth worrying abt?
> sincerely, XXXX[48]

And these are the "experts" on whom we all depend for their "expertise" in these matters? It all reminds me, as Pieper might say, of Humpty Dumpty in *Through the looking Glass*: "When_I_ use a word, *it means just what I choose it to mean* -- neither more nor less. ... The question is, *which is to be master -- that's all*!" The next time someone challenges you about the accurate scientific facts of human embryology, ask them what their *academic credentials* are *in human embryology*, and insist that they *show you, prove to you,* how "right" they are by sending you the xerox copies from the *human embryology textbooks* from which they get their information! It's a real conversation stopper.

IV. MANIPULATING THE LEGISLATION

But the manipulations go on, especially as all of this gobbleguk is moved through the halls of legislatures that are trying to deal with these complex human cloning issues. Legislators, politicians and lobbyists – on both sides of the debate – seem oblivious to the fact that they are in the process of concretizing into legislation bills that are loaded with much of the false science and other linguistic loopholes discussed above, bills that essentially *define millions of living human beings out of existence*. By what authority, civil or moral, do they presume to do so? As *Evangelium vitae* questions:

> EV 66 The height of arbitrariness and injustice is reached when certain people, such as **physicians or legislators, arrogate to themselves the power to decide who ought to live and who ought to die.** ... Thus the life of the person who is weak is put into the hands of the one who is strong; **in society the sense of justice is lost, and mutual trust, the basis of every authentic interpersonal relationship, is undermined at its root**.[49]

Legislators too have a civic as well as a moral duty to be certain that the "information" used upon which they draft their bills is solid and accurate, and *proven* to be so using the *relevant* academic resources before accepting it – especially given the deadly consequences in these human cloning issues.

Many countries[50] and individual states here have passed or have pending legislation to "ban" human cloning, e.g., Arkansas[51], California[52], Florida[53], Louisiana[54], Massachusetts[55], Michigan[56], Nebraska[57], New Jersey[58], New York[59], North Dakota[60], South Carolina[61], and Wisconsin.[62] But just how well do these "total cloning bans" prohibit the cloning of human beings? Before considering a typical "total cloning ban", some general points about legislation might be helpful.

A. General Legal Considerations

(1) <u>What the bill specifically defines</u>

Most cloning bills state that unless something is specifically addressed in the bill, the bill does not cover it – i.e., it would thus be allowed. For example most cloning bills have the following or similar restriction:

> SCIENTIFIC RESEARCH- Nothing in this section restricts areas of scientific research <u>not specifically prohibited by this section</u>, including research in the use of <u>nuclear transfer</u> or <u>other cloning techniques</u> to produce <u>molecules, DNA, cells other than human embryos</u>, tissues, organs, plants, or animals other than humans.'"

Therefore, any human cloning techniques that are not specifically articulated in the bill would not be covered by the bill – and therefore would be allowed. Most of these cloning bills identify only one human cloning technique – i.e., the somatic cell nuclear transfer (SCNT) technique. Therefore, all other human cloning techniques would not be covered by the bills – and thus they would be allowed.

(2) <u>The "intent" of the bill</u>

When erroneous scientific terms are used in a bill, it is often argued that because the *intent* of the bill was to ban such cloning the courts would defer to that intent. However, this is not necessarily true. Perhaps in civil law cases the courts might allow an intent to override erroneous definitions in the law by deferring to correct definitions in legal precedent. However, in *criminal* law cases – i.e., cases in which there are imprisonments or financial penalties such as in these cloning bills – the intent of the bill would most likely not be favored, and the courts would defer to the precise definition used in the bill. Therefore, as we will see below, the bill would only cover a cloning technique ("SCNT") *that doesn't really exist*, and would not cover (and would thus allow) such a cloning technique that really does exist.

(3) <u>When "intent" is clear</u>

The issue of *intent* is also especially relevant here, because the drafters of such cloning bills are on public record for years as knowing beforehand that the definitions

used in the bills are erroneous.[63] Thus *they must have intended* to use such erroneous definitions in the bills.

(4) *Stare decisis*: Going incrementally backwards

Consider that once this erroneous science gets passed into law, it ceases to be "science". It is then simply reduced to *stare decisis* -- legal precedent.[64] The Courts have no legal duty to correct such erroneous science. Indeed, they would then only have a legal duty *to apply* this erroneous science to any and all further related research legislation – as happened in the application of *Roe* vs. *Wade* to *Webster*, *Carhart*, etc. To allow such erroneous science to become embedded in the law as *stare decisis* simply takes us backwards – incrementally.

(5) So they'll "fix it" later?

These scientific flaws may *never* be revisited for correction, especially given the political and fiscal currency already depleted, and the rapid addition and accumulation of further legal precedent set in these related research issues.

B. Human Cloning Bills Ban No Human Cloning

The following is typical legislative language found in most "total bans" on human cloning:

> **Sec. 301. Definitions**
>
> `In this chapter:[65]
> (1) HUMAN CLONING- The term `human cloning' means human asexual reproduction, accomplished by introducing nuclear material from one or more human somatic cells into a fertilized or unfertilized oocyte whose nuclear material has been removed or inactivated so as to produce a living organism (at any stage of development) that is genetically virtually identical to an existing or previously existing human organism.
> (2) ASEXUAL REPRODUCTION- The term `asexual reproduction' means reproduction not initiated by the union of oocyte and sperm.
> (3) SOMATIC CELL- The term `somatic cell' means a diploid cell (having a complete set of chromosomes) obtained or derived from a living or deceased human body at any stage of development.[66]

Because the Bill uses erroneous scientific definitions, and because the Bill does not specifically address certain kinds of cloning techniques and/or human cloning materials, the Bill is not even a "partial" ban. Indeed, the Bill bans no human cloning at all. None. Be sure to take this list and the references with you when you visit your local politicians to discuss your concerns about the Missouri human cloning bills:

1. "human asexual reproduction": Note that this would apply to all kinds of human cloning techniques, not just the SCNT cloning technique. Note too that the cell(s), or even subcellular materials, used to initiate "human asexual reproduction" could be derived from a normal sexually reproduced IVF human embryo, from a previously cloned

(asexually reproduced) human embryo, from human/non-human chimeras, or from genetic materials that are artificially constructed *de novo*.[67] Finally, note that if such materials were genetically altered before use, or if materials are artificially constructed *de novo*, they would therefore not be derived from any "existing or previously existing" human embryo or human cell. *All of these kinds of cloning techniques and the use of such human genetic materials would be allowed by the Bill* – for both "therapeutic" and "reproductive" purposes.

2. "by introducing nuclear material": This refers to genetic material (DNA) found only inside the nucleus of the cell. *Therefore, the Bill would allow the use of human genetic materials (DNA) found outside the nucleus in the cytoplasm of a cell for human cloning purposes*, e.g., those found in mitochondria.

3. "human somatic cells": The Bill is defining "cloning" only in terms of the somatic cell nuclear transplant (SCNT) cloning technique. *Therefore this bill would allow the cloning of human beings by means of all other kinds of cloning techniques*, for both "therapeutic" and "reproductive" purposes, e.g.: germ line cell nuclear transfer (GLSNT); "twinning" (blastomere separation and blastocyst splitting); pronuclei transfer; mitochondria transfer; embryos cloned by means of artificially constructed sperm and/or oocytes; parthenogenesis; production of human/human chimeras and human/non-human chimeras, etc.

4. "into a fertilized ... oocyte": A "fertilized oocyte" *is already* a new human embryo – a single-cell human zygote, a human being. *Therefore the Bill would allow the cloning of a new human embryo by using an already existing human embryo* who would be profoundly genetically damaged or killed in the process.

5. "to produce a living organism ... that is genetically virtually identical": The Bill is defining SCNT erroneously; therefore the *real* SCNT cloning technique would still be allowed. Even as publicly acknowledged and published by many of the drafters of such bills, since only the "nuclear" genetic material (DNA) is removed from the donor cell, the *mitochondrial* DNA of the donor is NOT transferred to the cloned product (embryo). Furthermore, the *mitochondrial* DNA of the recipient oocyte is retained in the cloned product (embryo). The cloned embryo would NOT contain the mitochondrial DNA of the donor cell, and it WOULD contain the "foreign" mitochondrial DNA of the recipient oocyte cell. Therefore, in the real world, the product (embryo) cloned using somatic cell nuclear transfer is NOT "*genetically virtually identical to an existing or previously existing human organism*" being.[68] *Therefore, the Bill would NOT prohibit human cloning using the SCNT human cloning technique* for either "therapeutic" or "reproductive" purposes.

Additionally, since the cloned human embryo is NOT really "genetically identical to the donor", if cloned from a patient for the purposes of using his/her own "human embryonic stem cells" in "therapy", these stem cells would still evoke a rejection reaction from that patient because of the presence in them of "foreign" DNA as well as because of the "missing donor" *mitochondrial* DNA. Finally, many scientists have grave concerns

about the use of germ line cells in sexual or in a-sexual human reproduction for eugenic purposes.[69]

6. "to an existing or previously existing human organism": Note that human embryos cloned using several other human cloning techniques – e.g., pronuclei transfer, the use of artificially constructed sperm, oocytes, embryos, etc. – would NOT be "genetically similar" to an "existing or previously existing human organism". They would be *completely genetically unique*, having never existed genetically as such before. *Therefore the Bill would allow the cloning of such genetically unique human embryos* for both "therapeutic" and "reproductive" purposes.

7. "'somatic cell' means a diploid cell (having a complete set of chromosomes)": By defining only a "somatic cell" as "a diploid cell", it blurs any distinction between diploid somatic cells and diploid germ line cells. There are two basic categories (or subsets) of diploid cells in the human organism, both of which have a complete set of chromosomes – somatic cells and germ line cells.[70] Since both kinds of cells are *diploid*, both kinds of cells can be used to clone human embryos using the nuclear transfer cloning technique. The Bill does not refer specifically to the use of diploid germ line cells. *Therefore it would allow the cloning of human embryos by means of the germ line cell nuclear transfer (GLCNT) technique* for both "therapeutic" and "reproductive" purposes. Additionally, since *primitive* germ line cells are also *totipotent*,[71] the *Bill would allow the cloning of human embryos by means of the "twinning" cloning technique* for both "therapeutic" and "reproductive" purposes.

8. "obtained or derived from a living or deceased human body": Because germ line cells are not specifically addressed, the Bill would allow the cloning of human embryos by using *diploid* germ line cells in a nuclear transfer (GLCNT) cloning technique, and by the "twinning" of *totipotent* primitive germ line cells, for both "therapeutic" and "reproductive" purposes, obtained or derived from any living or deceased body. Because the use of artificially constructed gametes or embryos that never existed before are not specifically addressed, the Bill would allow the cloning of human embryos by means of all cloning techniques using these cloning "materials" for both "therapeutic" and "reproductive" purposes.

These are just some of the problems with the definitions used (or omitted) in the Bill. But there is more. Before, I mentioned a restriction (above) that most bills include, usually in the section on "prohibitions":

> SCIENTIFIC RESEARCH- Nothing in this section restricts areas of scientific research not specifically prohibited by this section, including research in the use of nuclear transfer or other cloning techniques to produce molecules, DNA, cells other than human embryos, tissues, organs, plants, or animals other than humans.'"

At least here the Bill acknowledges that there *are* "other cloning techniques". But, again, the use of specific language in the prohibition would still allow some human cloning. For example:

1. "molecules, DNA": Some cloning of human embryos is accomplished by means of pronuclei transfer. For example, the male pronucleus from the just-fertilized oocyte of one human embryo, and the female pronucleus from the just-fertilized oocyte of another human embryo can be removed by micromanipulation and placed together in an enucleated oocyte, which is then stimulated, and a new cloned human embryo would be reproduced. In fact, such embryos would be human/human chimeras. Human pronuclei are not whole cells, nor whole nuclei, but only *parts* of nuclei – just *molecules*, and they are molecules of *DNA*. Therefore the prohibition in the Bill would allow the cloning of human embryos by means of pronuclei transfer for both "therapeutic" and "reproductive" purposes. The same problem exists with the use of artificially constructed sperm, oocytes and/or embryos.

2. "cells other than human embryos": would not cover the cloning of **a single cell** -- such as the single-cell human zygote – using all cloning techniques for both "therapeutic" and "reproductive" purposes. Nor would it cover -- depending on when during the fertilization process a new human being begins to exist -- the use of pronuclei transfer for both "therapeutic" and "reproductive" purposes, since pronuclei are only **parts** of a single cell.

3. "tissues": many researchers use the phrase "human **tissues**" to refer to what are in reality totipotent diploid human primordial germ line **cells**. Thus the cloning of new human beings by means of twinning these totipotent cells, or cloning them by means of nuclear transfer, for both "therapeutic" and "reproductive" purposes, would not be covered if the researchers' deceptive definition of "tissues" is accepted.

V. MANIPULATING THE ANTHROPOLOGY ("PERSONHOOD")

Now, while it is clear scientifically that the immediate product of both sexual and asexual human reproduction is a new living human *being*, the inevitable philosophical question is posed: "Is it a human *person*?" And the answer, again, is "yes".[72] What is clearly at stake, as the Church keeps constantly trying to tell us, is the corruption of the very concept of "man" – the anthropology, the "person". And the devastating consequences that would flow from that would fall on *all* of us, regardless of how many cells we have in our bodies.

I will address the philosophical issue of "personhood" briefly in a moment. But I think it is critical to point out first that in both the abortion and in the cloning debates, the *arguments* about "personhood" are essentially irrelevant. What is relevant is if we know there is a human *being* present and when. As succinctly stated by the Pontifical Academy for Life:

> [Pontifical Academy for Life]: From the juridical point of view, the core of the debate on the protection of the human embryo does not involve identifying earlier or later indices of "humanity"

> which appear after insemination, **but consists rather in the recognition of fundamental human rights by virtue of the presence of a human being**. Above all, **the right to life and to physical integrity from the first moment of existence, in keeping with the principle of equality**, must be respected. ... In this great challenge of defending the life and dignity of the human embryo, special commitment is needed on the part of families, and particularly parents, as well as that of the scientific community.[73]

It is the clear and consistent teaching of the Church that it is always wrong to intentionally kill an innocent human *being* – regardless of any "theories" on "personhood". Still, the judgment that whenever there is a human being present there is always simultaneously a human person present is strongly supported by the Church's teachings. The extensive considerations in the Church's documents regarding abortion and cloning make this crystal clear:

> [EV 60]: Some people try to justify abortion by claiming that the result of conception, at least up to a certain number of days, cannot yet be considered a **personal** human life. But in fact, "from the time that the ovum is fertilized, a **life is begun** which is neither that of the father nor the mother; it is rather the life of a new **human being** with his own growth. It would never be made human if it were not human already. This has always been clear, and ... **modern genetic science offers clear confirmation**. It has demonstrated that from the first instant there is established the program of ...: a person, this individual person with his characteristic aspects already well determined. Right from fertilization the adventure of a **human life** begins, and each of its capacities requires time -- a rather lengthy time -- to find its place and to be in a position to act." ***Even if the presence of a spiritual soul cannot be ascertained by empirical data, the results themselves of scientific research on the human embryo provide "a valuable indication for discerning by the use of reason a personal presence at the moment of the first appearance of a human life: how could a human individual not be a human person?*** Furthermore, what is at stake is so important that, from the standpoint of moral obligation, **the mere probability that a human person is involved would suffice to justify an absolutely clear prohibition of any intervention aimed at killing a human embryo**. Precisely for this reason, over and above all scientific debates and those philosophical affirmations to which the Magisterium has not expressly committed itself, **the Church has always taught and continues to teach that the result of human procreation, from the first moment of its existence, must be guaranteed that unconditional respect which is morally due to the human being in his or her totality and unity as body and spirit: "The human being is to be respected and treated as a person from the moment of conception; and therefore from that same moment his rights as a person must be recognized, among which in the first place is the inviolable right of every innocent human being to life.**
>
> [EV61]: **Human life** is sacred and inviolable **at every moment of existence**, including the initial phase which precedes birth. All human beings ... belong to God. ... Throughout Christianity's two thousand year history, this same doctrine has been constantly taught by the Fathers of the Church and by her Pastors and Doctors. **Even scientific and philosophical discussions about the precise moment of the infusion of the spiritual soul have never given rise to any hesitation about the moral condemnation of abortion.**
>
> [EV 63]: ***This evaluation of the morality of abortion is to be applied also to the recent forms of intervention on human embryos which, although carried out for purposes legitimate in themselves, inevitably involve the killing of those embryos***. This is the case with experimentation on **embryos**, which is becoming increasingly widespread in the field of biomedical research and is legally permitted in some countries. Although "one must uphold as licit procedures carried out on the human embryo which respect the life and integrity of the embryo and do not involve disproportionate risks for it, but rather are directed to its healing, the improvement of its condition of health, or its individual survival," it must nonetheless be stated that **the use of human embryos**

> **or fetuses as an object of experimentation constitutes a crime against their dignity as human beings who have a right to the same respect owed to a child once born, just as to every person.** ... This moral condemnation also regards procedures that exploit living human embryos and fetuses -- sometimes specifically "produced" for this purpose by *in vitro* fertilization -- either **to be used as biological material**" or as **providers of organs or tissue for transplants in the treatment** of certain diseases. The killing of **innocent human creatures**, even if carried out to help others, constitutes **an absolutely unacceptable act**.[74]

> [Pontifical Academy for Life]: "Judgment - as an act of the human mind - on the **personal nature of the human embryo** springs **necessarily from the evidence of the biological datum** which implies the recognition of the presence of a human being with an intrinsic active capacity for development, and not a mere possibility of life. ... The ethical exigency of respect and care for the life and integrity of the embryo, **demanded by the presence of a human being** is motivated by **a unitary conception of man** ("*Corpore et anima unus*"), **whose personal dignity must be recognized from the beginning of his physical existence**. ... The theological perspective, beginning with the light which revelation sheds on the meaning of a human life and on the dignity of the person, supports and sustains human reason in regard to these conclusions, without in any way diminishing the validity of contributions based on rational evidence. Therefore **the duty of respecting the human embryo as a human person derives from the reality of the matter and from the force of rational argumentation, and not exclusively from a position of faith.** ... From the juridical point of view, **the core of the debate on the protection of the human embryo does not involve identifying earlier or later indices of "humanity" which appear after insemination, but consists rather in the recognition of fundamental human rights by virtue of the presence of a human being**. Above all, **the right to life and to physical integrity from the first moment of existence**, in keeping with the principle of equality, must be respected.[75]

And so, even on the *secular basis of the equality of all human beings*, the right to life of these tiniest of human beings must be respected.

Yet how, one might be curious to ask, has this barrage of pro-abortion, pro-cloning "delayed personhood" arguments flooded these debates? There are several causes, I am sure, but it is important to point to one of the major sources for this conceptual contortion and confusion: bioethics – which is quite different from the Church's ethics.[76] You see, if you change the "*anthropology*" – i.e., the concept of "person" -- then you automatically change the *ethics* which are derived from that anthropology. If you change the *ethics*, then you change the *medical or bioethics* that flows necessarily from those ethics. Despite claims to the contrary, this is precisely what bioethics has been doing over the last 30 years, especially in the academy. How is it, you might have asked yourself, that state, federal and even private sector entities justify determining what is "ethical" for the rest of us on *the basis of "bioethics"*?

VI. MANIUPLATING THE ETHICS

A. Short history of "bioethics"[77]

Bioethics was formally "born" in the 1978 *Belmont Report* of the National Commission -- mandated by the U.S. Congress in its 1974 *National Research Act*.[78] This commission identified and quite oddly *defined* the three bioethical principles of "autonomy", "justice", and "beneficence", referred to as "principlism", or "the Georgetown mantra". But bioethics is *not* "ethics-*per-se*"; it is only one of a dozen different ethical theories developed through the centuries -- and a very recent one at that.

Nor is bioethics "neutral"; it defines *itself* as "normative"[79] -- i.e., it takes a stand on what is right or wrong. Thus how can any one justify forcing *that* normative ethical theory on the rest of us through legislation in this democratic, multicultural, pluralistic society?[80]

Furthermore, bioethics is fraught with so many theoretical and practical problems that even many of the Founders of bioethics themselves have admitted that it can't and doesn't work.[81] The bioethics literature is full of hot and turbulent on-going debates on whether or not bioethics is a valid ethical theory at all.[82] And as one of the original scholars of the Hastings Center wisely expressed when observing the creation of bioethics by the National Commission, "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*."[83] Indeed, this is precisely what has transpired since 1978, and it ought to give pause to decision makers on all levels to understand that to base any "ethical" decisions on bioethics theory or bioethics *definitions* of terms is dubious at best, and basically indefensible. Indeed, many of the dubious scientific myths discussed here originated with bioethics.[84]

A. Bioethics and "Personhood": Human Embryos Don't Have It

To claim that these innocent and vulnerable living human beings can be used and destroyed in order to help other human beings -- especially when there are viable alternatives, such as the use of umbilical cord and adult stem cells -- is to *legislatively create a subcategory of human beings* who may be exploited and killed as a mere commodity for the use of other human beings -- and we've been there before. The argument is that some human beings are *not* "persons", and other human beings *are* "persons", and is based on a theory about active "functionality", rather than on the empirical facts about a thing's nature.

Such is the position of many of those in bioethics, e.g., Peter Singer, Director of *Human* Values at Princeton University (Princeton, New Jersey). Singer opines that "personhood" is defined only by the *active exercising* of "rational attributes" (e.g., willing, choosing, knowing, relating to the world around one, etc.) or "sentience" (e.g., the feeling of pain and pleasure)[85] -- a philosophical claim inherently based on passé 17th and 18th century Cartesian, rationalist, and empiricist philosophical systems.[86] Time does not permit a further philosophical analysis, but suffice it to say here that these philosophical systems are fraught with inherent contradictions, are academically and realistically indefensible, and were literally laughed out of the academy by the late 1800's. They were recently revived, however, by contemporary *bioethics*. One reason for their indefensibility is simply that if there are *two separate and different things*, such as a "mind" or "soul" thing, and a "body" thing, there is no possible way to explain any *interaction* between these two different and separated things. In philosophical parlance, this is known as the myth of the "mind/body" split -- or *chorismos*.

Further, virtually *all* of the contemporary bioethics arguments for "delayed personhood" are based on and grounded in very erroneous "science" -- hence their philosophical "personhood" conclusions are *automatically invalid*.[87]

Finally, "pushing the logic" of those bioethics definitions of "person" leads to extraordinarily bizarre conclusions -- and it would be wise, I respectfully suggest, not to cement them into legislation. Peter Singer, for example, opines that some human beings are *not* "persons", and some animals *are* "persons". Indeed, this is the basis for Singer's recent defense of "bestiality".[88] But think about it: if only those who are *actively exercising* "rational attributes" and "sentience" are "persons", then the following list of *adult* human beings are *not* "persons", and thus *not* ethically or legally protected as real "persons": Alzheimer's and Parkinson's patients, the mentally ill and mentally retarded, the frail elderly, the emotionally ill, drug addicts and alcoholics, literally all mentally and physically disabled, -- even all of us when we are sleeping! Richard Frey, a senior bioethics scholar at the Hastings Center, agrees with Singer -- arguing that the adult human beings I have just listed be *substituted for* animal "persons" in destructive experimental research[89] -- proof that abstract concepts can lead to concrete, and devastating, consequences in the real world.

"Personhood", then, must be based on the *kind of nature* a thing possess, not on its active "functionality" -- unless you would agree with the conclusions that necessarily follow from the theories of the likes of Singer, Frey, and most bioethicists. The human being and the human person are inseparable -- from the very beginning of his or her existence.

VII. OTHER CONSEQUENCES OF THESE MASSIVE MANIPULATIONS

It is actually impossible to tally just how penetrating is the damage caused by the purposeful falsification and propagation of these corruptions of the objective scientific facts of human development. But the damage goes far deeper than just the killing of innocent human embryos.

A. On Correct Formation of Conscience

Consider for a moment the consequences on our ability to even form our consciences correctly on these issues. Given the massive "scientific" propaganda that has permeated almost every institution in this country by now, it is almost impossible for anyone to make an *informed* decision, an *informed* choice, or give *informed* consent on these matters.[90] Again, the Church is keenly aware of this:

> [EV 4] ... The end result of this is tragic: not only is the fact of the destruction of so many human lives still to be born or in their final stage extremely grave and disturbing, but **no less grave and disturbing is the fact that conscience itself, darkened as it were by such widespread conditioning, is finding it increasingly difficult to distinguish between good and evil in what concerns the basic value of human life**.
>
> [EV 58] But today, in many people's **consciences**, the perceptions of its gravity has become progressively obscured. The acceptance of abortion in the popular mind, in behavior and even in law itself, is a telling sign of **an extremely dangerous crisis of the moral sense, which is becoming more and more incapable of distinguishing between good and evil, even when the fundamental right to life is at stake**. Given such a grave situation, we need now more than ever to have the courage to **look the truth in the eye and to call things by their proper name, without yielding to convenient compromises or to the temptation of self-deception**. In this regard the reproach of the Prophet is extremely straightforward: "**Woe to those who call evil**

> **good and good evil, who put darkness for light and light for darkness**" (Is 5:20). ... **Perhaps this linguistic phenomenon is itself a symptom of an uneasiness of conscience. But no word has the power to change the reality of things**. ... We **are dealing with murder** and, in particular, when we consider the specific elements involved. **The one eliminated is a human being at the very beginning of life. No one more absolutely innocent could be imagined.**[91]

And as Pieper[92] has wisely noted, "The place of authentic reality is taken over by a fictitious reality; my perception is indeed still directed toward an object, but now it is *a pseudo-reality*, deceptively appearing as being real, so much so that it becomes almost impossible any more to discern the truth." This is precisely what bothered Plato with his own contemporary Sophists. What makes the sophists so dangerous, said Plato, is that they "fabricate a fictitious reality." That the real world in which we all live can be taken over by pseudo-realities *whose fictitious nature threatens to become unnoticed* is truly a depressing thought. And yet this Platonic nightmare possesses an alarming contemporary relevance, for the general public is being reduced to a state where people not only are unable *to find out* about the truth but also become unable even *to search* for it.

B. On Moral Teaching Authority of Church

The Church recognizes too why we must counter these scientific lies and manipulations in our public lives. What is at stake as well are those fundamental and empirically derived moral principles which are essential guideposts we need to choose rightly in decisions regarding such issues as human cloning and human embryonic stem cell research:

> When political activity comes up against moral principles that do not admit of exception, compromise or derogation, the Catholic commitment becomes more evident and laden with responsibility. In the face of fundamental and inalienable ethical demands, **Christians must recognize that what is at stake is the essence of the moral law**, which concerns the integral good of the human person.[93]

And, if you will forgive me for a quick bit of "philosophizing", I would take it one step further. Consider that if the empirically derived definition of individual human embryos and when they begin to exist is erroneous, then the philosophical concept of "human nature" is erroneous. If the philosophical concept of "human nature" is erroneous, then the philosophical concept of "natural law" is erroneous. If the philosophical concept of "natural law" is erroneous, then the theological concept of "the Moral Law" is erroneous. If the theological concept of "the Moral Law" is erroneous, then the moral teachings of the Catholic Church are destroyed. There is, indeed much more at stake in the human cloning debates than just "little embryos".

VIII. CONCLUSION

In conclusion, the purposeful falsification and corruption of the objective scientific facts of human embryology in the human cloning debates are nothing more than pure propaganda that has been propagated for the purpose of power and profits. And seen from the perspective that this involves, indeed requires, the death and destruction of millions of innocent living human beings, all cloning of human beings, the using *any* type

of cloning technique, should be *totally banned* in the legislatures by means of passing bills that are *proven* to be grounded in the most current, accurate, and relevant scientific facts. **Otherwise, scientifically flawed bills become *nothing more than part of the manipulations and deceits themselves***. Especially given the fact that the use of human stem cells from adults and from umbilical cords have been clinically proven to mitigate the diseases of many human patients, there is even *no need* to find "cures" by means of killing human embryos.

As the Church has pointed out, "Respect for life requires that science and technology should always be *at the service* of man and his integral development. Society as a whole must respect, defend and promote the dignity of every human person, at every moment and in every condition of that person's life."[94] To continue in such massive manipulations serves only to further separate the Truth from Reality, *and further enslave us all*:

> At the same time, the Church teaches that authentic freedom does not exist without the truth. **"Truth and freedom either go together hand in hand or together they perish in misery"** In a society in which truth is neither mentioned nor sought, every form of authentic exercise of freedom will be weakened, opening the way to libertine and individualistic distortions and undermining the protection of the good of the human person and of the entire society.[95]

Thank you.

---

[1] Emphases are added throughout in order to help those unfamiliar with the science. Full references for many of the human embryology and human molecular genetics texts used in this article include: Ronan O'Rahilly and Fabiola Muller, *Human Embryology & Teratology* (New York: Wiley-Liss, 2001) [Note: O'Rahilly is one of the originators of *The Carnegie Stages of Early Human Embryological Development*, and has sat on the *International Nomina Embryologica Committee* for decades]; Bruce M. Carlson, *Human Embryology and Developmental Biology* (St. Louis, MO: Mosby, 1999); William Larsen, *Human Embryology* (2nd ed.) (New York: Churchill Livingstone, 1997); also, Larsen, *Essentials of Human Embryology* (New York: Churchill Livingstone, 1998); Keith Moore and T. V. N. Persaud, *The Developing Human: Clinically Oriented Embryology* (6th ed. only) (Philadelphia: W.B. Saunders Company, 1998); also, (7th ed., 2003); Tom Strachan and Andrew P. Read, *Human Molecular Genetics 2* (2nd ed.) (New York: John Wiley & Sons, Inc., 1999); and, Benjamin Lewin, *Genes VII* (New York: Oxford University Press, 2000).

[2] See, for example, Jo Mannies and Bill Bell, Jr., "Fearing a Broad Ban, Washington U. Opposes State Anti-Cloning Legislation", *St. Louis Post-Dispatch*, May 16, 2003; Steven L. Teitelbaum, M.D., Editorial, "Bioethics" (Therapeutic cloning is designed to help people, not create new ones), *St. Louis Post-Dispatch*, Monday, December 3, 2001; Ted Agres, "Cloning Crackdown? Congress expected to revive anti-cloning legislation in light of clone-baby claims", *The Scientist*, January 3, 2003, at: <www.the-scientist.com>; Ted Ares, "House passes anti-cloning measure; Bill would criminalize research using human SCNT", *The Scientist*, Feb. 28, 2003, at: www.the-scientist.com>; Press Release, Washington University at St. Louis School of Medicine, "Missourians Speak Out For Therapeutic Cloning", Thursday, May 30, 2002; Tina Hesman, "Danforth, Eagleton favor cloning cells for research", *The Post-Dispatch*, May 31, 2002; Press Release, Washington Update: FASEB Activities on Cloning Issue, June 2002, "FASEB Opposes Reproductive Human Cloning, But Urges Senate Not to Criminalize Biomedical Research".

[3] See, e.g., Pontifical Council for Culture, and Pontifical Council for Interreligious Dialogue, "Jesus Christ: The Bearer of the Water of Life; A Christian reflection on the 'New Age'", in *L'Osservatore Romano*, Aug. 13-20, 2003, at: http://www.vatican.va/roman_curia/pontifical_councils/interelg/documents/rc_pc_interelg_doc_20030203_new-age_en.html#3 NEW AGE AND CHRISTIAN SPIRITUALITY>; Fr. Alfonso Auilar, "Gnosticism

and the Struggle for the World's Soul", Parts I and II, *National Catholic Register*, April 6-12, 2003, at: http://www.ncregister.com/Register_News/040603gnostic1.htm>.

[4] See Vatican's Mission to the United Nations, U. N. Speech by Archbishop Martino*, Consequences Would Desecrate the Future of Humankind* (Nov. 21, 2001), (Zenit)

[5] Josef Pieper, *Abuse of Language – Abuse of Power* (San Francisco: Ignatius Press, 1992).

[6] Pieper, *ibid*, p. 7.

[7] Pieper, *ibid*., pp. 18-20.

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

[9] For an extensive treatment of the erroneous science involved in this question, see 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, also at: <http://www.lifeissues.net/writers/irv/irv_01lifebegin1.html>; Irving, "'New age' embryology text books: 'Pre-embryo', 'pregnancy' and abortion counseling: Implications for fetal research", *Linacre Quarterly* May 1994, 61(2):42-62.

[10] Thomas Aquinas, *De Ente Et Essentia, from* Aristotle, *De Coelo*.

[11] O'Rahilly and Muller (2001): "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 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 celled secondary, e.g., secondary oocytes. **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." (p. 19); Strachan and Read (1999): "**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 term line, are known as somatic cells**. ... most somatic cells are diploid ... ." (p. 28); Moore and Persaud (1998): "Meiosis is a special type of cell division that involves two meiotic cell divisions; it take place in germ cells only. **Diploid germ cells give rise to haploid gametes (sperms and oocytes)**." (p. 18); Carlson (1999): "In a mitotic division, **each germ cell produces two diploid progeny that are genetically equal.**" (p. 2); Larsen (1998): "**Like all normal somatic (i.e., non-germ cells), the primordial germ cells contain 23 pairs of chromosomes, or a total of 46.**" (p. 4).

[12] O'Rahilly and Muller (2001): "Future **somatic cells thereby lose their totipotency** and are liable to senscence, whereas **germ cells regain their totipotency** after meiosis and fertilization." (p. 39); Strachan and Read (1999): "**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." (p. 191); See also notes below for an explanation of the process of "regulation" that is involved in "twinning", i.e., when separated totiptent cells, such as human primitive germ line cells and the cells if the inner cell mass of the blastocyst , are involved. Generally speaking, any cell – somatic or germ line -- that is *diploid* can be cloned by means of using a nuclear transfer cloning technique. Any cell – somatic or germ line -- that is *totipotent* can be cloned by means of using a "twinning" cloning technique.

[13] O'Rahilly and Muller (2001): "During the differentiation of gametes, **diploid** cells are termed primary, and haploid cells are called secondary, e.g., secondary oocytes. *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." (p. 19); Strachan and Read (1999): "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 term line, are known as somatic cells. ... most somatic cells are diploid ... ." (p. 28); Moore and Persaud (1998): "Meiosis is a special type of cell division that involves two meiotic cell divisions; it take place in germ cells only. **Diploid germ cells** give rise to haploid gametes (sperms and oocytes)." (p. 18); Carlson (1999): "In a mitotic division, **each germ cell produces two diploid progeny** that are genetically equal." (p. 2); Larsen (1998): "Like all normal somatic (i.e., non-germ cells), the **primordial germ cells** contain 23 pairs of chromosomes, or **a total of 46**." (p. 4).

[14] This claim is actually an over-simplification, used primarily to help those unfamiliar with the science understand the process of fertilization. However, in these cloning debates it is often misused. What actually takes place in human gametogenesis is that, while the process ultimately produces a haploid male sperm with only 23 chromosomes, the mature female oocyte remains **diploid** (with 48 chromosomes) until and unless it is fertilized. The fact that it is still diploid before contact with a sperm means that it can be cloned by means of nuclear transfer just like any other diploid cell. If the mature diploid oocyte is not fertilized by a sperm, then it simply dies: (O'Rahilly 2001): "Oogenesis is the production and maturation of oocytes, i.e., the female gametes derived from oogonia. **Oogonia** (derived from **primodial germ cells**) multiply by mitosis and become primary oocytes. More than half a million are present at the end of the embryonic period. The number of oogonia increases to nearly 7 million by the middle of prenatal life, after which it diminishes to about 2 million **at birth. (At this time oogonial stem cells** have disappeared.) [emphasis in original] From these, several thousand oocytes are derived, several hundred of which mature and are liberated (ovulated) **during a reproductive period of some 30 years**. **Prophase of meiosis 1 begins during fetal life but ceases at the diplotene (dictyate) phase, which persists during childhood.** Follicular cells (the statum granulosum) play an essential role in blocking the completion of meiosis. **After puberty, meiosis 1 is resumed** and **a secondary oocyte** (approximately 120 mirometers in diameter) is formed, together with polar body 1, which can be regarded as an oocyte having a reduced share of cytoplasm. **The secondary oocyte is a female gamete in which the first meiotic division is completed and the second has begun. From oogonium to secondary oocyte takes from about 12 to 50 years to be completed**. **Meiosis 2** is terminated after rupture of the follicle (ovulation) **BUT ONLY IF A SPERMATOZOON PENETRATES** ... The term "ovum" implies that polar body 2 has been given off, WHICH EVENT IS USUALLY **DELAYED UNTIL THE OOCYTE HAS BEEN PENETRATED BY A SPERMATOZOON (I.E., HAS BEEN FERTILIZED**). [emphasis in original]. Hence **a human ovum does not exist**. Moreover the term has been used for such disparate structures as an oocyte and a 3-week embryo and hence has no scientific value. *The term "egg" should be discarded from human embryology*. [emphasis in original]. It conveys a negative image that considers women unflatteringly, and hence is best reserved for a nutritive object sometimes seen on the breakfast table." (p. 25)

[15] 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.

[16] E.g., as determined in extensive numbers of transgenic mice experiments as in Kollias *et al*, "The human beta-gobulin gene contains downstream developmental specific enhancer," *Nucleic Acids Research* 15(14) (July 1987), pp. 5739-47; also similar work by, e.g., R. K. Humphries, A. Schnieke.

[17] Moore and Persaud (1998): "Sutton and Boveri declared independently in 1902 that the behavior of chromosomes during germ cell formation and fertilization agreed with Mendel's principles of inheritance. In the same year, Garrod reported alcaptonuria as the first example of mendelian inheritance in human beings. Many consider Garrod to be the Father of Medical Genetics. It was soon realized that **the zygote contains all the genetic information necessary for directing the development of a new human being.**

(p. 12); see also, Holtzer *et al*., "Induction-dependent and lineage-dependent models for cell-diversification are mutually exclusive," *Progress in Clinical Biological Research* 175:3-11 (1985); also similar work by, e.g., F. Mavilio, C. Hart.

[18] Larsen, pp. 19, 33, 49.

[19] 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.

[20] See Irving, *Philosophical and Scientific Analysis of the Nature of the Early Human Embryo* (Doctoral dissertation, Georgetown University, Washington, D.C., 1991); Kischer, C. Ward and Dianne N. Irving. *The Human Development Hoax: Time To Tell The Truth!* (Clinton Township, MI: Gold Leaf Press, 1995 and extensively revised and expanded second edition by co-authors (1997); Irving, "'New age' embryology text books: 'Pre-embryo', 'pregnancy' and abortion counseling: Implications for fetal research", *Linacre Quarterly* May 1994, 61(2):42-62; Irving, "Scientific and philosophical expertise: An evaluation of the arguments on 'personhood'", *Linacre Quarterly* February 1993, 60:1:18-46; Irving, "'New age' embryology text books: 'Pre-embryo', 'pregnancy' and abortion counseling: Implications for fetal research", *Linacre Quarterly* May 1994, 61(2):42-62. Most of these articles by Irving are on-line at: www.lifeissues.net, and at www.ufl.org. See also C. Ward Kischer: "The corruption of the science of Human Embryology", at: http://www.lifeissues.net/writers/kisc/kisc_01humanembryology.html; Kischer, "There is no such thing as a pre-embryo", at: < http://www.lifeissues.net/writers/kisc/kisc_05nopreembryo.html>; Kischer, : "When Does Human Life Begin? The Final Answer -- A human embryologist speaks out about socio-legal issues involving the human embryo", at: <http://www.lifeissues.net/writers/kisc/kisc_04whenlifebegins1.html>.

[21] Dame Mary Warnock, Report of the Committee of Inquiry into Human Fertilization and Embryology (London: Her Majesty's Stationary Office, 1984), p. 17; National Institutes of Health: Report of the Human Embryo Research Panel (Washington, D.C.: NIH, Sept. 27, 1994), pp. 45ff.

[22] **"[O]ther 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].

See also Moore and Persaud, 1998: "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." (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); O'Rahilly and Muller, 1994: "**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**." (p. 30); O'Rahilly and Muller, 2001: "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**. " (p. 55)

[23] Michael Kinsley, "Reason, faith and stem cells", *Washington Post*, Aug. 29, 2000, and also "Faith crucial in stem cell research", *The Daily Yomiuri* (Japan), Sept.5, 2000.

[24] The term "**reprogenetics**" is coined in a recent "Special Supplement" of *The Hastings Center Report* (July/August 2003) at (<http://www.thehastingscenter.org/news/features/repro%20supplement.pdf>), the first sentence of which refers to reprogenetics as "one big embryo experiment". The term refers collectively to the converging of several scientific technologies, especially multiple artificial human reproductive techniques (e.g., IVF and cloning) and human genetics research – other wise known as eugenics. The term is similar to such others as "trans-humanism", "post-humanism", "futurism", etc. – i.e., the remaking of human nature by the use of experimental reproductive and genetic techniques. Such are the stated goals of "nano/bio/info/cogno", supported by this government and many internationally popular "futuristic" programs, e.g., see *Converging Technologies for Improving Human Performance* (National Science Foundation, and the U.S. Dept. of Commerce, June 2002); you can find the report at: httop://itri.loyola.edu/ConvergingTechnologies/Report/NBIC pre publication.pdf (or at http://www.wtec.org/reports.htm). See also, for example, the current New Zealand cloning bill, which defines a "gamete" as including "any other cell (whether naturally occurring **or artificially formed or modified**) that contains only 1 copy of all or most chromosomes; and is capable of being used for reproductive purposes." [*Human Assisted Reproductive Technology Bill: Supplementary Order Paper* [HART SOP], April 2003, at http://www.justice.govt.nz/pubs/other/pamphlets/2003/hart/Supp_order_paper.pdf. To grasp the entirety of what this legislation would embrace, see the government's on-line pamphlet, *Governmental Proposals to Amend the Human Assisted Reproductive Technology Bill: Questions and Answers* [Q&A], May 2003, at: <http://www.justice.govt.nz/justicepubs/other/pamphlets/2003/hart/questions.html>.]

[25] O'Rahilly and Muller, 2001: "Cells differentiate by the switching off of large portions of their genome." (p. 39); Lewin, 2000: "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." (p. 678; also p. 603 ff); Strachan and Read, 1999: "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." (pp. 193 ff)

[26] Lewin, 2000: "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." (p. 63; also pp. 914, 950)

[27] See 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.

[28] Strachan and Read, pp. 508-509. Even proponents of human cloning research admit that the immediate product of cloning is a new living human embryo, a human being. See, for example: Ian Wilmut: "The majority of reconstructed embryos were cultured in ligated oviducts of sheep... **Most embryos that developed to** morula or blastocyst after 6 days of culture were transferred to recipients and allowed to develop to term," etc. [I. Wilmut et al., "Viable offspring derived from fetal and adult mammalian cells," 385 *Nature* 810-813 (Feb. 27, 1997)], and also, "One potential use for this technique would be to take cells -- skin cells, for example -- from a human patient who had a genetic disease... **You take these and get them back to the beginning of their life by nuclear transfer into an oocyte to produce a new embryo**. **From that new embryo, you would be able to obtain relatively simple, undifferentiated cells**, which would retain the ability to colonize the tissues of the patient." - Ian Wilmut, in 7 *Cambridge Quarterly of Healthcare Ethics* 138 (Spring 1988).

On being asked in an interview: "Do you think that society should allow cloning of human embryos because of the great promise of medical benefit?"]: "Yes. Cloning **at the embryo stage** -- to achieve cell dedifferentiation -- could provide benefits that are wide ranging..." - Keith Campbell, head of embryology at PPL Therapeutics and co-author of Dr. Wilmut's landmark paper, in 7 *Cambridge Quarterly of Healthcare Ethics* 139 (Spring 1988).

Lee M. Silver, professor of molecular biology and evolutionary biology at Princeton University, "Yet there is nothing synthetic about the cells used in cloning... **The newly created embryo** can only develop inside the womb of a woman **in the same way that all embryos and fetuses develop**. Cloned children will be full-fledged human beings, indistinguishable in biological terms from all other members of the species. Thus, the notion of a soulless clone has no basis in reality.", in *Remaking Eden: Cloning and Beyond in a Brave New World* (Avon Books 1997), p. 107.

"This experiment [producing Dolly] demonstrated that, when appropriately manipulated and placed in the correct environment, **the genetic material of somatic cells can regain its full potential** to direct embryonic, fetal, and subsequent development." - National Institutes of Health, *Background Paper*: *Cloning: Present uses and Promises*, Jan. 29, 1998, p. 3.

"The Commission began its discussions fully recognizing that any effort in humans to transfer a somatic cell nucleus into an enucleated egg **involves the creation of an embryo, with the apparent potential to be implanted** in utero and developed to term." - *Cloning Human Beings: Report and Recommendations* of the National Bioethics Advisory Commission (Rockville, MD: June 1997), p. 3.

[Expressing disbelief that some deny that human cloning produces an embryo]: "**If it's not an embryo, what is it**?" - Jonathan Van Blerkom, human embryologist at University of Colorado, in *American Medical News*, Feb. 23, 1998, p. 32 (Dr. Van Blerkom said **researchers' efforts to avoid the word "embryo" in this context are "self-serving.**")

[29] See, for example: Ian Wilmut: "The majority of reconstructed embryos were cultured in ligated oviducts of sheep... **Most embryos that developed to** morula or blastocyst after 6 days of culture were transferred to recipients and allowed to develop to term," etc. [I. Wilmut et al., "Viable offspring derived from fetal and adult mammalian cells," 385 *Nature* 810-813 (Feb. 27, 1997)], and also, "One potential use for this technique would be to take cells -- **skin cells**, for example -- from a human patient who had a genetic disease... **You take these and get them back to the beginning of their life by nuclear transfer into an oocyte to produce a new embryo**. **From that new embryo, you would be able to obtain relatively simple, undifferentiated cells**, which would retain the ability to colonize the tissues of the patient." - Ian Wilmut, in 7 *Cambridge Quarterly of Healthcare Ethics* 138 (Spring 1988).

Lee M. Silver, professor of molecular biology and evolutionary biology at Princeton University, "Yet there is nothing synthetic about the cells used in cloning... **The newly created embryo** can only develop inside the womb of a woman in the same way that all embryos and fetuses develop. Cloned children will be full-fledged human beings, indistinguishable in biological terms from all other members of the species. Thus, the notion of a soulless clone has no basis in reality.", in *Remaking Eden: Cloning and Beyond in a Brave New World* (Avon Books 1997), p. 107.

"This experiment [producing Dolly] demonstrated that, when appropriately manipulated and placed in the correct environment, the genetic material of somatic cells **can regain its full potential** to direct embryonic, fetal, and subsequent development." - National Institutes of Health, *Background Paper*: *Cloning: Present uses and Promises*, Jan. 29, 1998, p. 3.

"The Commission began its discussions fully recognizing that any effort in humans to transfer a somatic cell nucleus into an enucleated egg **involves the creation of an embryo**, with the apparent potential to be implanted in utero and developed to term." - *Cloning Human Beings: Report and Recommendations* of the National Bioethics Advisory Commission (Rockville, MD: June 1997), p. 3.

[30] Jonathan Van Blerkom, in *American Medical News*, Feb. 23, 1998, p. 32.

[31] The human genome is not defined in terms of the nuclear genes alone, but in terms of **the total DNA in the cell**, including DNA found outside of the nucleus in the cytoplasm. Strachan and Read (1999): "The **human genome** is the term used to describe the **total genetic information (DNA content) in human cells. It really comprises two genomes:** a complex **nuclear** genome ... , and a simple **mitochondrial** genome ... Mitochondria possess their own ribosomes and the few polypeptide-encoding genes in the mitochondrial genome produce mRMAs which are translated on the mitochondrial ribosomes. (p. 139); In animal cells, **DNA is found in both the nucleus and the mitochondria**. (p. 10); The mitochondria also have ribosomes and a limited capacity for protein synthesis." (p. 18) Lewin (2000): "A **genome** consists of **the entire set of chromosomes for any particular organism**, and therefore comprises a series of DNA molecules, each of which contains a series of many genes. The ultimate definition of a genome is to determine the sequence of the DNA of each chromosome. (p. 4); ... **Genes not residing within the nucleus are generally described as extranuclear**; they are transcribed and translated in the same organelle compartment (mitochondrion or chloroplast) in which they reside. By contrast, nuclear genes are expressed by means of cytoplasmic protein synthesis." (p. 81)

[32] (Carlson, 1999): "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." (p. 44). "... 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) " ... **Some types of twinning represent a natural experiment that demonstrates the highly regulative nature of early human embryos**, ..." (p. 48) "...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); O'Rahilly and Muller, 2001: "**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**." (p. 37); Kay T. Elder, "Laboratory techniques: Oocyte collection and embryo culture" in Peter Brinsden (ed.), *A Textbook of In Vitro Fertilization and Assisted Reproduction* , 2nd edition (New York: The Parthenon Publishing Group, 1999): "Surprisingly, **fragmented embryos, repaired or not, do implant and often come to term. This demonstrates the highly robust nature of the human embryo, as it can apparently lose over half of its cellular mass and still recover."** (p. 197)

[33] O'Rahilly and Muller, 2001, *op. cit*.

[34] Strachan and Read, 1999: "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", <u>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</u>**." (pp. 508-509).

[35] "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]

[36] "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]

[37] "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]

[38] **National Institutes of Health, Office of Science Planning and Policy**, "CLONING: Present Uses and Promises", April 27, 1998), at: <http://www1.od.nih.gov/osp/ospp/scipol/cloning.htm>: "**Cloning and somatic cell nuclear transfer are not synonymous.** Cloning is the production of a precise genetic copy of DNA, a cell, or an individual plant or animal. **Cloning can be successfully accomplished by using a number of different technologies. Somatic cell nuclear transfer is one specific technology that can be used for cloning**." See also: Australia, *The Cloning of Humans (Prevention) Bill 2001* (Queensland): "**Cloning can occur naturally** in the asexual reproduction of plants, the formation of **identical twins** and the multiplication of cells in the natural process of repair. The cloning of DNA, cells, tissues, organs and **whole individuals is also achievable with artificial technologies**. ... **The cloning of a cell or an individual may be achieved through a number of techniques**, including: molecular cloning ..., **blastomere separation (sometimes called "twinning"** after the naturally occurring process that **creates identical twins**): **splitting a developing embryo soon after fertilisation of the egg by a sperm (sexual reproduction) to give rise to two or more embryos**. **The resulting organisms are identical twins (clones)** containing DNA from both the mother and the father. ... **somatic cell nuclear transfer**: the transfer of the nucleus of a somatic cell into an unfertilised egg whose nucleus, and thus its genetic material, has been removed. **A number of scientific review bodies have noted that the term "cloning"**

is applicable in various contexts, as a result of the development of a range of cloning techniques with varying applications", at:
<http://www.parliament.qld.gov.au/Parlib/Publications_pdfs/books/2001036.pdf>.

[39] Strachan and Read, 1999: "**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." (p. 508)

[40] Many IVF providers are strongly promoting the use of twinning cloning techniques, a process they refer to as "**embryo multiplication**", e.g.: **"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**. ... **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.*" See, AMERICAN SOCIETY OF REPRODUCTIVE MEDICINE, at: <http://www.asrm.com/Media/Ethics/embsplit.html>.

See also: "**New Ways to Produce Identical Twins** -- A Continuing Controversy": "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 *in vitro* fertilization (IVF), there are still many problems. ... 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)." See, THE TWINS FOUNDATION, at: <http://twinsfoundation.com/ru-v9n1-1994.htm>.

See also: 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. ... 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** [twinning by "**blastomere splitting**"]. .... The second potential method of embryo multiplication is **blastocyst splitting**. ... **For couples who have less than three quality embryos for transfer, blastomere separation could be of benefit.**." at:
<http://www.hekim.net/~erenus/20002001/asistedreproduction/micromanipulation/embryo_multiplication.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." FERTILITY NETWORK, at: http://fertilitynetwork.com/articles/articles-blastocyst.htm.

Also, 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." at: <http://www.asrm.com/Media/Ethics/ethics94.html>.

[41] Strachan and Read, 1999: "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**." (pp. 508-509).

[42] Larsen, 1998: "Like all normal somatic (i.e., non-germ cells), the **primordial germ cells contain 23 pairs of chromosomes, or a total of 46** [and thus could be cloned by nuclear transplant]" (p. 4); Strachan and Read, 1999: "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. (p. 28); Moore and Persaud 1998: "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)." (p. 18); Carlson, 1999: "In a **mitotic division**, each germ cell produces two diploid progeny that are **genetically equal**." (p. 2); O'Rahilly and Muller, 2001: "Future somatic cells thereby lose their totipotency and are liable to senescence, whereas **germ cells regain their totipotency after meiosis and fertilization** [and therefore could undergo regulation to produce new embryos]." (p. 39); Strachan and Read, 1999: "**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. (p. 191)

[43] See, e.g., Philip Cohen, "Like a virgin", in *Cloning: Special Report*, at: http://iggi.unesco.or.kr/web/iggi_docs/04/952655279.pdf; Gordon, J.W. and Ruddle, F.H. (1981) "Integration and stable germline transmission of genes injected into mouse pronuclei," Science 214: 1244-1246; M. C. Valiotis, O. Lacham-Kaplan and A. O. Trounson, "Pronuclei formation and embryo cleavage

following electrofusion of round spermatids with oocytes from the mouse", *Australian Society for Reproductive Biology*, p. 48, 1993.

[44] See, for example, the current New Zealand cloning bill, which defines a "gamete" as including "any other cell (whether naturally occurring **or artificially formed or modified**) that contains only 1 copy of all or most chromosomes; and is capable of being used for reproductive purposes." [*Human Assisted Reproductive Technology Bill: Supplementary Order Paper* [HART SOP], April 2003, at http://www.justice.govt.nz/pubs/other/pamphlets/2003/hart/Supp_order_paper.pdf. To grasp the entirety of what this legislation would embrace, see the government's on-line pamphlet, *Governmental Proposals to Amend the Human Assisted Reproductive Technology Bill: Questions and Answers* [Q&A], May 2003, at: <http://www.justice.govt.nz/justicepubs/other/pamphlets/2003/hart/questions.html>.] The term "**reprogenetics**" is coined for such "artificially constructed" materials in a recent "Special Supplement" of *The Hastings Center Report* (July/August 2003) at (<http://www.thehastingscenter.org/news/features/repro%20supplement.pdf>), the first sentence of which refers to reprogenetics as "one big embryo experiment". The term refers collectively to the converging of several scientific technologies, especially multiple artificial human reproductive techniques and human genetics research – other wise known as eugenics. The term is similar to such others as "transhumanism", "post humanism", "futurism", etc. – i.e., the remaking of human nature by the use of experimental reproductive and genetic techniques. Such are the stated goals of "nano/bio/info/cogno", supported by this government and many internationally popular "futuristic" programs, e.g., see *Converging Technologies for Improving Human Performance* (National Science Foundation, and the U.S. Dept. of Commerce, June 2002); you can find the report at: httop://itri.loyola.edu/ConvergingTechnologies/Report/NBIC pre publication.pdf (or at http://www.wtec.org/reports.htm).

[45] **Irving Weissman** and Amy Adams, , "Understanding the Institute for Cancer/Stem Cell Biology and Medicine", *Standford Report*, Jan. 22, 2003, at: <news-service.stanford.edu/news/ 2003/january22/weissman.html>. See also, "New Stanford institute sparks cloning quarrel", *Nature*, at: <www.nature.com/cgi-taf/DynaPage.taf?file=/ nm/journal/v9/n2/full/nm0203-156b.html>; John Travis, "Stem Cell Success: Mice fuel debate on embryo cloning", *Science News Online*, March 16, 2002, at: <www.sciencenews.org/20020316/fob1.asp>; "Clone by any Other Name", Weekly Standard, Dec.23, 2002, at: <www.weeklystandard.com/content/public/ articles/000/000/002/016htlqv.asp - 26k>.

[46] Vatican's Mission to the United Nations, **The Views of the Holy See on Human Cloning**, February 2003, at: <http://www.lifeissues.net/writers/doc/doc_11humancloning.html>.

[47] Encyclical Letter: *Evangelium vitae* (Mar. 1995), <http://www.vatican.va/holy_father/john_paul_ii/encyclicals/documents/hf_jp-ii_enc_25031995_evangelium-vitae_en.html>

[48] Personal communication.

[49] Encyclical Letter: *Evangelium vitae* (Mar. 1995), <http://www.vatican.va/holy_father/john_paul_ii/encyclicals/documents/hf_jp-ii_enc_25031995_evangelium-vitae_en.html>

[50] See, e.g., Dianne N. Irving, Irving, "Requested testimony on Canadian Bill C-13 ('Assisted Human Reproduction Act'), House of Commons ,December 9,2002, at: <http://www.lifeissues.net/writers/irv/irv_16canadianbill.html>; also: Irving, "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 (June 3, 2001), at: <http://www.uffl.org/irving/irvcihr.htm>; Irving, "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 (June 1, 2001), at: <http://www.uffl.org/irving/irvlords.htm>; Irving, "One Act Drama: The early human embryo: 'Scientific' myths / scientific facts: Implications for ethics and public policy", presented at Medicine and Human Dignity's "International Bioethics Conference: 'Conceiving the embryo'", (re human cloning and human embryonic stem cell research), Brussels, Belgium, October 20, 2002, (in press, and CD-Rom) at: <http://www.lifeissues.net/writers/irv/irv_11oneactdrama1.html>; .Irving, invited Congressional witness (oral and written testimony), "The *immediate* product of human cloning *is* a human being: Claims to the contrary are scientifically wrong", Scientific Panel (one of 5 panelists), on "Cloning: Legal, Medical, Ethical, and Social Issues", Hearing before the Subcommittee on Health and Environment of the Committee on Commerce, U.S. House of Representatives, Room 2125, Rayburn House Office Building, Washington, D.C. (February 12, 1998), also published in *The Linacre Quarterly* May 1999, 66:2:26-40, and at: <http://www.uffl.org/irving/irvhouse.htm>.

[51] State of Arkansas human cloning "ban", As Engrossed, Senate Bill No 185 (2003): <http://www.accessarkansas.org/lobbyist/arliab/src/public/bills/2003/html/sb185.html>. See Irving analysis at: < http://www.lifeissues.net/writers/irvi/irvi_13arkansas1.html>.

[52] State of California human cloning "ban", Bill No. AB 267 (2003): <http://www.leginfo.ca.gov/pub/bill/asm/ab_0251-0300/ab_267_bill_20030204_introduced.html>.

[53] State of Florida human cloning "ban", Senate Bill 1726 (2003): <http://www.flsenate.gov/cgi-bin/view_page.pl?Tab=session&Submenu=1&FT=D&File=sb1726.html&Directory=session/2003/Senate/bills/billtext/html/>. See Irving analysis at: <http://www.lifeissues.net/writers/irvi/irvi_05floridaamendment.html>.

[54] State of Louisiana human cloning "ban", House Bill No. 1810 (2003): <http://www.legis.state.la.us/leg_docs/03RS/CVT5/OUT/0000K8X5.PDF>. See Irving analysis at: <http://www.lifeissues.net/writers/irvi/irvi_07louisianabill.html>.

[55] State of Massachusetts human cloning "ban", Senate Bill No.1917 (2003): <http://www.state.ma.us/legis/bills/st01917.htm>.

[56] State of Michigan human cloning "ban", Act No. 368 (1998): <http://www.michiganlegislature.org/mileg.asp?page=getObject&objName=mcl-333-16274&queryid=4185768&highlight=human%20cloning>, and Act No. 111 (1998): <http://www.michiganlegislature.org/documents/1997-1998/publicact/pdf/1998-PA-0111.pdf>.

[57] State of Nebraska human cloning "ban", Legislative Bill No. 602 (2003).

[58] State of New Jersey human cloning "ban", Assembly Bill No. 2840/Senate Bill No. 1909 (2003): <http://www.njleg.state.nj.us/2002/Bills/A3000/2840_I1.PDF>. See Irving analysis at: <http://www.lifeissues.net/writers/irvi/irvi_10newjersey1.html>.

[59] State of New York human cloning "ban", Senate Bill No. 206 (2003): http://assembly.state.ny.us/leg/?bn=S00206&sh=t>.

[60] State of North Dakota human cloning "ban", House Bill No. 1424 (2003): <http://www.state.nd.us/lr/assembly/58-2003/bill_text/DAUB0400.pdf>.

[61] State of South Carolina human cloning "ban", House Bill No. 3819 (2003): <http://www.scstatehouse.net/cgi-bin/query2001.exe?first=DOC&querytext=cloning&category=Legislation&session=115&conid=383237&result_pos=0&keyval=1153819&printornot=N>. See Irving analysis at: <http://www.lifeissues.net/writers/irvi/irvi_11southcarolina.html>.

[62] State of Wisconsin human cloning "ban", Assembly Bill No. 104 (2003): <http://www.legis.state.wi.us/2003/data/AB-104.pdf>. See Irving analysis at: <http://www.lifeissues.net/writers/irvi/irvi_08wisconsinban.html>.

[63] Key proponents of "total human cloning bans" have long acknowledged the serious problems concerning mDNA and the consequences of these scientific facts for the lack of genetic identity of the real product of SCNT, the new living cloned human embryo, e.g.: (1) Congressional website, *Cloning Basics: 101*: "What is Cloning?" ... It is false to say that cloning solves the transplant rejection problem. Each embryo clone would still contain mitochondrial DNA from the egg donor; **the clone is NOT an exact genetic copy of the nucleus donor**, and its antigens would therefore provoke immune rejection when transplanted. There would still be the problem of immunological rejection that cloning is said to be indispensable for solving," at <http://www.house.gov/weldon/issues/clone_basics.htm>. (2) "Congressman Weldon's Cloning Facts", quoting testimony of Dr. Irving Weissman before the President's Council on Bioethics, "I should say that **when you put the nucleus in from a somatic cell, the mitochondria still come from the host" [from the female egg]** ... And in mouse studies it is clear that those genetic differences can lead to a mild but certainly effective transplant rejection and so immunosuppression, mild though it is, will be required for that", at http://www.nrlc.org/Killing_Embryos/Weldoncloningfacts022603.hrml; also at: <http://www.traditionalvalues.org/pdf_files/Human_Cloning.pdf>. (3) Transcript of House Hearing introducing Weldon Bill, Cliff Stearns (FL) testimony before *Hearing before the Subcommittee on Health of the Committee on Energy and Commerce*, House of Representatives, 107th Congress, 1st Session on H.R. 1644 and H.R. 2172 (June 20, 2001, "Seven States' proposals ban the creation of genetically identical individuals, but that leaves another loophole. **An egg cell, donated for cloning, has its own mytochondrial DNA, which is different from the mytochondrial DNA of the cell that provided the nucleus. The clone will, therefore, not truly be identical"**, at: <http://energycommerce.house.gov/107/hearings/06202001Hearing291/print.htm>. (4) Senator Sam Brownback, "Some proponents of human cloning claim that an embryo created in this manner will have cells that are a genetic match to the patient being cloned, and thus would not be rejected by the patient's immune system. This claim is overstated at best; in fact there are some **scientific reports that show the presence of mitochondrial DNA in the donor egg can trigger an immune-response rejection in the patient being treated**, in "A True Complete Ban", *National Review Online*, Feb. 26, 2003, at: <http://www.nationalreview.com/comment/comment-brownback022603.asp>. (5) Leon Kass, "Before one starts arguing the morality of embryo farming, we should know that the whole matter is science fiction. **The egg containing my nucleus is not fully my genetic twin. It also contains residual DNA--mitochondrial DNA--from the woman who donated the egg. The cloned embryo and all cells derived from it remain partly 'foreign,' enough to cause transplant rejection**", in *The Chicago Tribune*, July 31, 2001, quoted by Dave Andrusko in, "Averting a Catastrophe", at: http://www.nrlc.org/news/2001/NRL08/editA.html. (6) President's Council on Bioethics, "*The technique of cloning* ... bring to live birth a cloned animal that is genetically virtually identical (**except for the mitochondrial DNA**) to the animal that donated the adult cell nucleus", in *Human Cloning and Human Dignity: An Ethical Inquiry*, "Executive Summary; Fair and Accurate Terminology; Scientific Background", at: <http://www.bioethics.gov/reports/cloningreport/execsummary.html>. (7) George Annas, "How could such stem-cell lines be generated? One way is by transferring somatic-cell nuclei into enucleated eggs (nuclear transplantation). When stimulated to divide, the cell can form blastocysts of predefined nuclear genotype (**with the mitochondrial DNA coming from the egg**)", *The New England Journal of Medicine*, Volume 346:1576-1579 May 16, 200, "Stem Cells Scientific, Medical, and Political Issues", at: <http://www.gardacuore.net/rigenerativa/ARTICOLI/NEJM_Issues.htm>. [[emphases added]]

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

[65] See, e.g., <http://thomas.loc.gov/cgi-bin/query>.

[66] However, see: Irving, "University Faculty for Life Letter of Concerns About the Human Cloning Bans", at: <http://www.uffl.org/irving/irvbrownback.htm>; such definitions are also duplicated in many state and international cloning "bans" (see notes *supra*), as well as in President Bush's United States' proposal for the "United Nations Human Cloning Treaty" to be voted on this month (e.g., see, *Reuters*, "U.S. Plans New Anti-Cloning Push at U.N.", Sept. 17, 2003, at: <http://story.news.yahoo.com/news?tmpl=story&u=/nm/20030917/sc_nm/science_cloning_un_dc_1>.

[67] Such are the stated goals of "nano/bio/info/cogno", supported by this government and many internationally popular "futuristic" programs, e.g., see *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). Also, the term "**reprogenetics**" is coined for such research in a recent "Special Supplement" of *The Hastings Center Report* (July/August 2003) at (<http://www.thehastingscenter.org/news/features/repro%20supplement.pdf>), the first sentence of which refers to reprogenetics as "one big embryo experiment". The term refers collectively to the converging of several scientific technologies, especially multiple artificial human reproductive techniques (e.g., IVF and cloning) and human genetics research – other wise known as eugenics. The term is similar to such others as "trans-humanism", "post-humanism", "futurism", etc. – i.e., the remaking of human nature by the use of experimental reproductive and genetic techniques.

[68] Strachan and Read, 1999: "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**." (pp. 508-509)

[69] See especially, Strachan and Read (1999), pp. 539-541: "From the ethical point of view, an important consideration is to what extent **technologies developed in an attempt to engineer the human germline** could subsequently be used not to treat disease but in genetic enhancement. **There are powerful arguments as to why germline gene therapy is pointless. There are serious concerns, therefore, that a hidden motive for germline gene therapy is to enable research to be done on germline manipulation with the ultimate aim of germline-based genetic enhancement.** The latter could result in **positive eugenics** programs, whereby planned genetic modification of the germline could involve artificial selection for genes that are thought to confer advantageous traits. ... The implications of human genetic enhancement are enormous. Future technological developments may make it possible to make very large alterations to the human germline by, for example, adding many novel genes using human artificial chromosomes (Grimes and Cooke, 1998). Some people consider that this could advance human evolution, possibly paving the way for a new species, *homo sapientissimus*. To have any impact on evolution, however, genetic enhancement would need to be operated on an unfeasibly large scale (Gordon, 1999). ... Even if positive eugenics programs were judged to be acceptable in principle and genetic enhancement were to be practiced on a small scale, there are extremely serious ethical concerns. Who decides what traits are advantageous? Who decides how such programs will be carried out? Will the people selected to have their germlines altered be chosen on their ability to pay? How can we ensure that it will not lead to discrimination against individuals? Previous **negative eugenics** programs serve as a cautionary reminder. In the recent past, for example, there have been horrifying eugenics programs in Nazi Germany, and also in many states of the USA where compulsory sterilization of individuals adjudged to be feeble-minded was practiced well into the present century."

[70] O'Rahilly and Muller, 2001: "**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**. ... **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.**" (p. 19); Strachan and Read (1999): "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 ... ." (p. 28); Moore and Persaud, 1998: " 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)." (p. 18); Carlson, 1999: "In a *mitotic division*, **each germ cell produces two diploid progeny** that are *genetically equal*." (p. 2); Larsen , 1998: "Like all normal somatic cells **(i.e., non-germ cells**), the primordial germ cells contain 23 pairs of chromosomes, or **a total of 46**." (p. 4)

[71] O'Rahilly and Muller, 2001: "[Primordial germ cells] are difficult to recognize in very young human embryos. Claims for them have been made **as early as in the blastocyst, and they are believed to be segregated at latest by 2 1/2 weeks and possibly much earlier**. ... **The unifying feature in the formation of primordial germ cells would seem to be the exemption of those cells from the processes of regional, somatic differentiation.** (pp., 23-24) ... Cells differentiate by the switching off of large portions of their genome. **Future somatic cells thereby lose their totipotency and are liable to senescence, whereas germ cells regain their totipotency after meiosis and fertilization**. (p. 39) ... Stem cells comprise a small subpopulation of multipotent or pluripotent, ultrastructurally unspecialized, slow-cycling cells that possess the ability of self-renewal and can produce cells that are destined to differentiate. (**In contrast, primordial germ cells and those of a morula are totipotent; i.e., they can develop into any type of embryonic tissue and can even form an entirely new embryo**)." (p. 136)

[72] For an extensive scientific and philosophical treatment of the bioethics concepts of "delayed personhood", see Irving, "Scientific and philosophical expertise: An evaluation of the arguments on 'personhood'", *Linacre Quarterly* February 1993, 60:1:18-46, and at: <http://www.lifeissues.net/writers/irv/irv_04person1.html>. This is a mini-summary of my 400-page doctoral dissertation on human embryo research, see *A Philosophical and Scientific Analysis of the Nature of the Early Human Embryo* (Washington, D.C.: Georgetown University, 1991).

[73] Pontifical Academy for Life: Third Plenary Assembly: Concluding Document: Identity and Status of the Human Embryo (Feb. 1997), <http://www.vatican.va/roman_curia/pontifical_academies/acdlife/documents/rc_pa_acdlife_doc_16021997_final-doc_en.html>

[74] Encyclical Letter: *Evangelium vitae* (Mar. 1995), at: <http://www.vatican.va/holy_father/john_paul_ii/encyclicals/documents/hf_jpii_enc_25031995_evangelium-vitae_en.html>. See extensive quotations from many Church documents on this issue in the attached Appendix.

[75] Pontifical Academy for Life: *Third Plenary Assembly: Concluding Document: Identity and Status of the Human Embryo* (Feb. 1997), at: <http://www.vatican.va/roman_curia/pontifical_academies/acdlife/documents/rc_pa_acdlife_doc_16021997_final-doc_en.html>

[76] For a brief comparison of secular bioethics and the moral principles used in Church teachings, see Irving, "Which ethics for the 21st century? A comparison of 'secular bioethics' and Roman Catholic medical ethics", *Linacre Quarterly* (in press), and at: <http://www.lifeissues.net/writers/irv/irv_02ethics1.html>.

[77] For an historical summary and extensive analysis of "bioethics", and the role that it has played in creating and propagating so much of the erroneous science in these human embryo research issues, see Irving, "What is 'bioethics'?", in Joseph W. Koterski (ed.), Life *and Learning X: Proceedings of the Tenth University Faculty For Life Conference* (Washington, D.C.: University Faculty For Life, 2002), pp. 1-84. See also, Irving, "The early human embryo: 'Scientific' myths / scientific facts: Implications for ethics and public policy", presented at Medicine and Human Dignity's "International Bioethics Conference: 'Conceiving the embryo'", (re human cloning and human embryonic stem cell research), Brussels, Belgium, October 20, 2002, (in press, and CD-Rom); 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), also in, *Journal: Canadian Chapter, Fellowship of Catholic Scholars* (Autumn 2002), pp. 7-32; Irving, "The bioethics mess", *Crisis Magazine*, Vol. 19, No. 5, May 2001; Irving, "The stem cell decision in the labs: Beware of flawed ethics and false science", *Newsday.com*, July 15, 2001, B5. Most of these articles can be found on-line at www.lifeissues.net, and http://www.uffl.org/annotated.htm.

[78] 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); *The National Research Act*, Public Law 93-348, 93rd Congress, 2nd session (July 12, 1974); 88 STAT 342. See also, 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); D. N. Irving, "*What* is 'bioethics'?", *UFL Proceedings of the Conference 2000*, in Joseph W. Koterski (ed.), 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 two 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).

[79] 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.

[80] See Irving, "*Which* ethics for science and public policy?", *Accountability in Research* 1993, 3(2-3):77-99, and at: <http://www.uffl.org/irving/irvaccount.htm>; 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, and at: <http://www.uffl.org/irving/irvimpact.htm>.

[81] E.g., 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"! (emphases added) [Daniel Callahan, "Bioethics: Private Choice and Common Good", *Hastings Center Report* (May-June 1994), 24:3:31].

[82] "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: 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.

[83] 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."

[84] 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.)

[85] Peter Singer is the founder of both the “animal rights” movement as well as the founder and first president of *The International Bioethics Institutes* (CIOMS/WHO). See, e.g., Peter Singer, "Taking life: abortion", in *Practical Ethics* (London: Cambridge University Press, 1981), p. 118. See also: Helga Kuhse and Peter Singer, "For sometimes letting - and helping - die", *Law, Medicine and Health Care* 3(4), 1986: pp. 149-153; also Kuhse and Singer, *Should the Baby Live? The Problem of Handicapped Infants* (Oxford: Oxford University Press, 1985), p. 138; Peter Singer and Helga Kuhse, "The ethics of embryo research", *Law, Medicine and Health Care* 14(13-14), 1987. For one reaction, see Gavin J. Fairbairn, "Kuhse, Singer and slippery slopes", *Journal of Medical Ethics* 14 (1988), p. 134.

[86] See Dianne N. Irving, "Science, philosophy, theology - and altruism: the *chorismos* and the *zygon*", in Hans May, Meinfried Striegnitz, Philip Hefner (eds.), *Loccumer Protokolle* (Rehburg-Loccum: Evangelische Akademie Loccum, 1996); Etienne Gilson, *Being and Some Philosophers* (Toronto: Pontifical Institute of Mediaeval Studies, 1949); Frederick Copleston, *A History of Philosophy* (New York: Image Books, 1962); Leonard J. Eslick, "The material substrate in Plato", in Ernan McMullin (ed.), *The Concept of Matter in Greek and Medieval Philosophy* (Indiana: University of Notre Dame Press, 1963); Frederick Wilhelmsen, *Man's Knowledge of Reality* (New Jersey: Prentice-Hall, Inc., 1956), esp. Chaps. 2 and 3. For an excellent explanation of the difference between basing "personhood" on just functionality *vs*. the kind of nature possessed, see Kevin Doran, "Person -- a key concept for ethics", *Linacre Quarterly* 56 (4), 1989, 39.

[87] See my doctoral dissertation, D. N. Irving, *Philosophical and Scientific Analysis of the Nature of the Early Human Embryo* (Washington, D.C.: Georgetown University, 1991). A short version of the dissertation can be found in D. N. Irving, "Philosophical and scientific expertise: An evaluation of the arguments on 'personhood'" (*Linacre Quarterly*, Feb. 1993, 60:1:18-46).

[88] Peter Singer, "Heavy Petting" at: < http://www.nerve.com/Opinions/Singer/heavyPetting//>. [Caution: pornographic website.]

[89] Richard G. Frey, "The ethics of the search for benefits: Animal experimentation in medicine", in Raanan Gillon (ed.), *Principles of Health Care Ethics* (New York: John Wiley & Sons, 1994), pp. 1067-1075.

[90] 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), and at: http://www.lifeissues.net/writers/irv/irv_03facing1.html>. See also 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); also in, *Journal: Canadian Chapter, Fellowship of Catholic Scholars* (Autumn 2002), pp. 7-32, and at: <http://www.lifeissues.net/writers/irv/irv_40bioandconscience01.html>

[91] Encyclical Letter: *Evangelium vitae* 58 (Mar. 1995), <http://www.vatican.va/holy_father/john_paul_ii/encyclicals/documents/hf_jp-ii_enc_25031995_evangelium-vitae_en.html>

[92] Pieper, *supra*, pp. 34-35.

[93] *Doctrinal Note on Some Questions Regarding the Participation of Catholics in Political Life*, Congregation for the Doctrine of the Faith, November 24, 2002, at: <http://www.lifeissues.net/writers/doc/doc_24catholicsandpolitics.html>.

[94] Encyclical Letter: *Evangelium vitae* 81 (Mar. 1995), <http://www.vatican.va/holy_father/john_paul_ii/encyclicals/documents/hf_jp-ii_enc_25031995_evangelium-vitae_en.html>

[95] *Doctrinal Note on Some Questions Regarding the Participation of Catholics in Political Life*, Congregation for the Doctrine of the Faith, November 24, 2002, at: <http://www.lifeissues.net/writers/doc/doc_24catholicsandpolitics.html>.