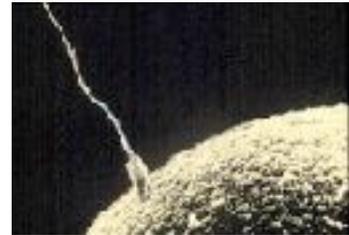


## Summary

Developments in embryology have three times made significant change for society. •First in the 1860s with emerging microscope technology, was discovery of union of sperm and egg and the idea that this union must create the genetic inheritance of the future individual. This helped theology by appearing to define the beginning of life. •Second in the early 2000s with in vitro fertilization and DNA analysis, was observation that on average for all ages and health of women about  $\frac{1}{2}$  to  $\frac{2}{3}$  of fertilized eggs do not survive and that half the time the reason for failure is inadequacy of the egg at the time of ovulation. This refinement in the science appears to reverse the 1860s conclusion. If viable ovulation is just as important as fertilization, there is no single unique event defining the beginning of life. •Then third with advanced biochemistry in 2009, was learning what mRNA to insert into an adult skin cell to switch it to embryonic so that when placed in a blastocyst it grows into a fetus and then new individual. This development showed that while fertilization and ovulation are not required for emergence of new life, the key factor always involved is specialized chemical environment for turning on the embryonic genes in the nuclear DNA material.



### the 1860s

Compared to Galileo's astronomical observations in 1609 using a two-lens telescope, the science of cell biology was delayed some 350+ years by the problem of chromatic aberration. A microscope in principle is just a telescope used backwards, except that it must use a short focal length lens close to the sample, and with a simple lens this separates colors and blurs the image. High quality design and fabrication of compound lens microscopes was not until the late 1800s by Carl Zeiss.

See "[Leeuwenhoek's Lucky Break](#)" by Paul Falkowski, [History of Cell Biology](#), and [Watching As Life Begins](#).

Advances leading to early embryology were:

- 1830s, realization that tissue is made of cells,
- 1827, first undisputed observation of an egg in humans,
- 1850s, Pringsheim's observation of sperm merging into egg for fresh water algae,
- 1866, Mendel's publication showing that genes come in pairs and are inherited as distinct units, one from each parent
- 1870s, merger of egg and sperm nuclei within the cell

1902, evidence that specialty genes shape embryonic development

1911, proof that genes reside on chromosomes

Though not proven for another 45 years, the works by Pringsheim and Mandel spawned the idea that fertilization creates the genetic inheritance of the future individual. This at long last appeared to be a definitive answer from science to the age old question of when life begins, and so was a great aid to theology. The Catholic Church ban on abortion from the time of fertilization came in 1869 three years after Mandel, and many governments soon passed secular laws of the same nature.

The Church's prior position, except for three years, had been to not punish abortion with excommunication if it was performed before approximately the time of quickening, earlier for males. The problem was to decide when formation is complete enough to be called human while knowing that early miscarriages and abortions produce just a jelly blob with no bone or recognizable shape. Formation of genetic inheritance changed the definition of new life.

The shift in timing for when to punish abortion was not a change in values. The Catholic Church has always opposed all abortion. The shift for when to punish was a change in concept for when there is something to protect.

But the idea was not and is not just that physical life begins at fertilization. 1969 was also the year when the Church began teaching that union of soul to physical being is at the time of fertilization. Theologic interpretation of the science is that formation of genetic inheritance is such a unique and definitive event it must mark dual beginning, both physical and theologic.

This timing for ensoulment, though not spoken directly, is arguably now the central most pivotal issue in the US abortion war. And that in turn may be a main driver for today's momentous political schisms with now numerous dissidents who hate and want to destroy government. From their point of view there is higher authority with RvW and the US government in violation of God's law.

Pro-lifers use code words and phrases like conception, life, and whole person; apparently to avoid publicly mentioning the word "soul." But what they're really talking about is dual entity being. This coded wording is fine for communication between pro-lifers, but pro-choicers can't figure out what is being said and don't seem to try. A result is that pro-choicers tend to inadvertently confirm pro-lifers (such as Kerry confirming and propelling Bush) by not publicly disagreeing with phrases like "The beginning of life is at conception."

A critical point here is that if dual being is formed at the time of fertilization, than abortion at any time, or even contraception that might prevent implantation, could deny a soul it's chance to heaven. And again, pro-choicers can't figure out what is being said, or don't care to try, even though 85% believe in after life.

Institutions, of course, are not going to claim proof

for ensoulment occurring at the time of fertilization, only near proof, and in particular, the Catholic Church today specifically states that need to protect fertilized eggs is independent of ensoulment. But then there is the about face that, oh, by the way, since early embryos probably already have souls, law needs to be particularly specific in preventing all abortion.

Bishop [Doerflinger's](#) summary is easiest to read, but most official is the [Vatican encyclical of 1974](#). All abortion is banned, with paragraphs 6 and 13 and endnote 19 adding that,

*"This declaration expressly leaves aside the question of the moment when the spiritual soul is infused... On the other hand, it suffices that this presence of the soul be probable (and one can never prove the contrary) in order that the taking of life involve the risk of killing a man, not only waiting for, but already in possession of his soul."*

This 1974 pronouncement conflicts with today's science which now does show that ensoulment can not reasonably be at the time of fertilization. (See below.) Plus twinning and chimerism have always been problems for the theology. The splitting of a single embryo in two to form twins occurs days after and independent of fertilization. The opposite occurs, too, though less frequently. Two separate embryos can merge into one chimera, half the time a hermaphrodite. The encyclical has problems both with soul count and with timing of ensoulment.

Concerning Roe versus Wade:

1) The Supreme Court documentation fails to point out the scientific reason for why so many anti-abortion laws were passed in the late 1800s, giving instead only review of the laws without any science. It can be argued that it is this error of omission, not just the ruling itself, that has created political backlash.

2) RvW led to [decrease](#) in violent crime.

## the early 2000s

A still common personal view today is that "From the moment the sperm makes contact with the ovum, all subsequent development to live birth is a *fait accompli*." [Kischer](#)

As pointed out initially, though, the science of embryology became more nuanced in the early 2000s with the discovery that early embryos have high attrition. Many eggs lack nutritional stores or have genetic errors that



make them non-viable at the time of ovulation. Fertilization can not revive them. So viable ovulation is just as important as fertilization, and there is no single event for the beginning of life.

Reporting of this was first in medical journals, then in [science magazines](#), and now in web pages of various [fertility clinics](#).

In the 1990s IVF fertility treatments too often led to catastrophically large fetal counts, or to the less known fused embryos that cause chimera and hermaphrodites. That no longer happens, and even twins are less common than before. It's because the success rate per embryo has improved significantly, so there is no longer need to implant a large number of them. Typical now is only two or one.

In the 1990s before early embryo attrition was recognized, dead and about-to-die embryos were

inadvertently being implanted. Modern fertility clinics avoid this by growing IVF embryos as long as possible, five days, and then microscope inspecting to discard the dead or failing and pick out only the healthiest for implantation.

For theologic interpretation this new high-attrition embryology causes a surprising twist. While there can be no proof whether ensoulment is at the time of fertilization, the opposite does now essentially have proof—that ensoulment does not occur at the time of fertilization. This is because it would not be reasonable in theologic logic to have the majority of new souls left on dead embryos. The problem is accentuated in Catholicism for which Baptism is a prerequisite for entry to Heaven. In Catholic parlance the embryo high-attrition conundrum is: Would God impart souls early just to have to turn around and rescue most of them from limbo?

## 2009

In cloning as first achieved with the sheep Dolly in 2003, the nucleus from a skin cell of an adult is automatically reprogrammed to be embryonic when placed in a freshly ovulated egg with its own nucleus removed. This led to a list of candidate proteins likely to be activators for turning on genes specific for embryonic development, and then trial and error was used to determine the correct set.

Viral vectors were used initially to insert DNA material into the genome of an adult skin stem cell, and by 2009 the approach had advanced to just using mRNA to instruct the cell itself to produce the proteins needed to reprogram its gene expression.

Mice have been cloned this way. This iPS technology is being developed in animals for breeding control, and in humans for stem cell research such as potential organ repair or transplant starting with the human's own tissue. Human cloning is and should remain illegal.

The starting skin stem cells are monopotent in the sense that they can reproduce only one kind of cell, for skin. Adding the right mix of mRNA changes them to pluripotent and able to produce almost all types of cells except for placental material. But these induced pluripotent stem cells are only about

1/64 the volume of ovulated eggs (diameters 30 v 120  $\mu\text{m}$ ) and have no store of nutrients for achieving multiple cell divisions. So a sort of double implantation is used. First an iPS cell is inserted into a normal 4-5 day old blastocyst, this replacing its inner cell mass. Then this blastocyst is implanted in the womb. The iPS cell becomes the embryo. The shell of the blastocyst becomes the placenta.

Plus there is a peculiar developmental twist with interesting genetic and theological implications. The sex organ gonads develop like all other tissue from the *inner* cell mass or iPS cell in the blastocyst. But the primordial germ cells that eventually mature to produce sperm or eggs originate separately, from the yolk sac endoderm, which as best I can make out, comes from the *shell* of the blastocyst. These so-called PGC then migrate into the gonads. So if I have this right, the cloned animal is genetically descended from the adult skin cell donor, but its offspring are genetically descended from the blastocyst donor.

Either way, this iPS technology seems to suggest again that genetic inheritance of the future individual should probably no longer be interpreted as a unique single event defining the beginning of life, either physical or eternal.

## And what says this about contraception?

Birth control pills prevent egg formation and ovulation and also alter cervical mucus making sperm passage unlikely. IUDs have an anti-spermicide coating designed to prevent sperm from passing through the uterus so that they can't traverse up the fallopian tube to fertilize eggs ovulated from the ovary. These devices have the advantage that the quantity of anti-spermicide is minute and local rather than systemic in the women's body fluids and can last 7-10 yr from just a copper coating on the IUD. But it can not be claimed that these contraceptives will always 100% of the time prevent fertilization, so a theologic argument about why they are immoral is that they could prevent an embryo from implanting, basically an abortion, and therefore deny a soul it's chance to get to heaven.

This is based on embryology of the 1860s with the interpretation that ensoulment is at the time of fertilization, which we now know from the more nuanced embryology of the 2000s is almost certainly not true. So the reason for Catholics not to use the IUD or pill reverts to classic Catholic theology:

The concept of "Original Sin" with the Garden of Eden scripture holds that all decedents are punished for the sin against God by Adam and Eve and not just in the original Jewish and Biblical text sense of expulsion from the garden of plenty, but by having Sex cast upon humans as punishment on earth. In this view sex did not exist in the perfection before Original Sin and will not exist in heaven. Sex on earth is an "inherited sin" and therefore sinful in all forms except for procreation in marriage.

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end notes

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About half of today's US couples have difficulty achieving pregnancy easily.

60% of abortion patients already have children.

75% are low income. 24-29% are Catholic. 13-27% are ultraconservative.

Drop in violent crime following RvW, 1999 data analysis by Steven D. Levitt and John J. Donohue:

*General Trend:* Drop started when those born in 1973 came of age in 1993.

*Age Group:* The crime drop was due primarily to fewer crimes by people under 25.

*Recipients:* The women with the highest rates of abortion have also been the unmarrieds, teenagers and African Americans whose children are at greatest risk of committing crimes once they would become young adults.

*Timing:* The five states that made abortion legal three years before Roe v. Wade had earlier crime drop-off.

*Rate:* States with especially high initial rates of abortion had the highest rates of crime drop twenty years later.

The current political schism epitomized in Trump and Jan 6, 2021, seems to me to derive from many people having concluded that they hate our government's God-forbidden actions and therefore want to destroy it. Sure, there is plenty of self-serving ego mixed in. And as always disenfranchisement and economic disparity are big drivers in social unrest. But I think that perhaps the biggest factor of all for causing today's hate and destroy groundswell is the sense of hurt and righteousness in the long-loosing side of the US abortion war.

This summary page was newly compiled in late 2021 and early 2022, but the rest of this web site was mostly written before, and sent to, NARAO and the Kerry campaign of 2004. My assessment is that if Kerry or NARAO had used this new science from fertility clinics to counter Bush's "conception" quip, Kerry would have won the election, and also that the intensity of hate-and-destroy government, Trumpism and the overturning of RvW would not have occurred.

If only 1000 fertility technologists understand the above, it means some 99.9995% of American adults have it wrong.

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