

Cloning, Aquinas, and the Embryonic Person

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The opposition of the Catholic Church to embryo or “pre-embryo”¹ experimentation, as well as to abortion, does not rest, as is sometimes supposed, solely on the belief that the human embryo is a human person from the moment of conception² or that killing the embryo or fetus is murder in a strict sense. The Church has always held that even if human ensoulment takes place only after conception as it was once supposed, abortion, although it would not be technically “murder,” would be a very serious sin against human life.³ This is because the natural process of reproduction would already have been initiated and to interrupt it is contrary to our

¹ The recent use of the term “pre-embryo” begs the question and was not used until it was found useful polemically in the ethical debates by those defending abortion or experimentation with embryos. We will ignore it in what follows and use only the older terms “zygote, embryo, and fetus.” Note also the remark of Lee M. Silver: “I’ll let you in on a secret. The term ‘pre-embryo’ has been embraced wholeheartedly by IVF practitioner, for reasons that are political, not scientific.” *Remaking Eden* (New York: Avon Books, 1997), 39.

² In current literature there is some ambiguity in the usage of the term “conception.” Some follow the traditional meaning, as we do in this article, namely, as “fertilization: the onset of pregnancy” (*Random House Dictionary of the English Language, The Unabridged Edition*, 1983) while others mean by the term “the onset of pregnancy, marked by the implantation of the blastocyst”(see *Dorland’s Medical Dictionary*, 26th edition, 1974).

³ On the history of this question, see John T. Noonan, Jr., “An Almost Absolute Value in History,” in *The Morality of Abortion: Legal and Historical Perspectives* (Cambridge, Massachusetts: Harvard University Press, 1970), 1–59.

responsibility to preserve the order of nature that one can and should perfect, but not violate. This is the same principle upon which modern ecology and environmentalism is based.

From the time of the first century *Didache*⁴, those seeking baptism were required to renounce abortion as a grave sin against the sanctity of the human person even if the exact time of ensoulment of the fetus remained debatable. Recently, however, an official Vatican document, without entering into the particulars of that debate, has declared that

[t]he Magisterium has not expressly committed itself to an affirmation of a philosophical nature [as to the time of ensoulment], but it constantly affirms the moral condemnation of any kind of procured abortion. This teaching has not been changed and is unchangeable. The human being is to be respected and treated as a person from the moment of conception, and therefore from that same moment his or rights as a person must be recognized, among which in the first place is the inviolable right of every innocent human being to life.⁵

The objection of the Church is ultimately founded upon the fact that human life, having been initiated, will proceed—because of its teleological orientation, and apart from accident or deliberate human intervention—to be a born human person and not any other creature.⁶

One approach taken by those who seek to justify experimentation on human embryos (or “pre-embryos” as they prefer to term them) is to argue that the “potentiality” for human life begins even with the ovum and the sperm and develops con-

⁴ After the first commandment of love of God and neighbor the *Didache* in the “Two Ways of Life and Death” used to instruct persons for baptism says, “But the second commandment of the teaching is this “Thou shall do no murder; thou shalt not commit adultery ... thou shalt not procure abortion nor commit infanticide.” Translation of Kirsopp Lake, *The Apostolic Fathers*, vol. ii, Loeb Classical Library (Cambridge, MA: Harvard University Press, 1985), 311 f. For the history of the Catholic Church on abortion, see John Connery, S. J., *Abortion: The Development of the Roman Catholic Perspective* (Chicago: University of Chicago Press, 1977).

⁵ Congregation for the Doctrine of the Faith, “Instruction on Respect for Human Life in its Origin and on the Dignity of Procreation: Replies to Certain Questions of the Day,” 1987, I, (1).

⁶ See footnote 19, *Declaration on Procured Abortion*, Sacred Congregation for the Doctrine of the Faith (1974): “This declaration expressly leaves aside the question of the moment when the spiritual soul is infused. There is not unanimous tradition on this point and authors are as yet in disagreement. For some it dates from the first instant; for others it could not at least precede nidation. It is not within the competence of science to decide between these views, because the existence of an immortal soul is not a question in its field. It is a philosophical problem from which our moral affirmation remains independent for two reasons: 1) supposing a belated animation, there is still nothing less than a *human* life, preparing for and calling for a soul in which the nature received from the parents is completed; 2) 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 accepting the risk of killing a man, not only waiting for, but already in possession of a soul.”

tinuously without any clear point at which human personhood (with its human rights) emerges. C. Grobstein argued this view in 1988 in his *Science and the Unborn: Choosing Human Futures*⁷ and it has been accepted by certain Catholic theologians.⁸ Recently, it has been argued even more forcefully by two biologists, Harold J. Morowitz and James S. Trefil, in *The Facts of Life: Science and the Abortion Controversy*.⁹ The view that the human embryo is not yet a person, but is merely the potential to become a person, has been advocated by those who wish to bring Thomas Aquinas to their defense and would use his ideas to defend something that he would clearly reject outright: that human embryos may be destroyed for research purposes. In this article, we first set forth a typical secular argument for this view, then show its supposedly Thomistic origins, and finally, argue that the principles of Aquinas are applied to the date of modern embryology the conclusion supports our thesis, namely, the human person begins at conception.

The Standard Argument

Morowitz and Trefil are a typical example of the secular view that the embryo is not yet a person. For them, “humanness” is only a legal concept relating to human rights, while the question of “ensoulment” is a purely religious and subjective one that cannot be answered in scientific or objective terms. Moreover, since the human species is the product of evolution, there is a continuity between it and other animal species that makes any definition of “humanness” problematic. They grant, however, that “humanness” can at least be given objective biological distinction by the marked development of the cerebral cortex of the human brain that makes possible “new and unexpected functions.”¹⁰

For Morowitz and Trefil, however, this means that conception, that is, the production of the one-celled zygote by the fertilization of the human ovum, does not have the great significance given it by those who believe this is when human life begins.

There is no time in the sequence [from gametes to zygote] we’ve just described where life is created. In fact, from the point of view of the biologist, at conception, two previously existing living things come together to form another living thing.¹¹

Moreover, they say that other systems have “potential life” similar to that of the zygote.¹² They further minimize the uniqueness of the zygote by arguing that the fact its nucleus contains a unique kind of DNA is not so remarkable, since this is

⁷ New York: Basic Books, 1988.

⁸ Notably Richard A. McCormick, “The Embryo Debate 3: The First 14 Days,” *The Tablet* (10 March 1990), 301–304; “Who or What Is the Preembryo?” *Kennedy Institute of Ethics Journal* 1991, 1 (4): 1–15; “The Embryo As Potential: A Reply to John A. Robertson,” *ibid.*, 1991, 1 (4): 303–305.

⁹ New York: Oxford University Press, 1992.

¹⁰ *Ibid.*, 100.

¹¹ *Ibid.*, 46 f.

¹² *Ibid.*, 46–48.

true of surgical tissues, such as cancers, that are gladly discarded.¹³ The fact that perhaps only one-third of fertilized eggs survive also seems to them to indicate that the zygote is nothing special.¹⁴ They argue, however, that what is certain is that it is unreasonable to attribute “humanness” to the fetus until its brain is sufficiently developed so that it can at least feel pain (at about twenty-four weeks of the pregnancy).¹⁵ And they support this by emphasizing that efforts to help infants survive premature birth “hits the wall” at this point in time because both the brain and the respiratory system are too immature. Hence they draw the conclusion that

- 1) Until the burst of synapse formation in the cortex during the seventh month of pregnancy, the right of the woman to choose must take precedence. During this period, abortion should be a matter of choice.
- 2) In the third trimester, mechanisms for decisions should take account of the concerns of the mother, the values of the community, and the realization that the fetus is acquiring a more and more fully functional cortex as times passes.¹⁶

Interestingly, they also say that until this development of the synapses of the cerebral cortex occurs, “[w]e can’t say that humanness has been acquired, but we can’t say that it hasn’t either. This is a classical example of a gray area.”¹⁷

Trefil, in fact, notes that previous to his research on the science of human embryological development he had supported unqualifiedly the “pro-choice” view. He took a more reserved stand afterwards.

The effect of sifting through the scientific literature, then, has been to move me both toward a less absolute position and to make me realize that after the onset of humanness, the interests of the fetus must be taken into account along with those of the woman.¹⁸

This is in itself a striking admission and suggests that the scientific data has sufficient weight to move even those who are ideologically committed to the legal right to abortion.

Nonetheless, the objective scientific certainty these authors claim for denying “humanness” to the pre-embryo, embryo, and fetus up to twenty-four weeks is hardly secure. Does it really make sense to speak, as they do, of the gametes or zygote having “potential life”? The human gametes, individually and separately, do not have the capability of becoming mature human beings. But the zygote does, and it has this capability not “potentially”¹⁹ but actually because it immediately starts

¹³ Ibid., 49–50.

¹⁴ Ibid., 50–52.

¹⁵ Ibid., 157–159.

¹⁶ Ibid., 154.

¹⁷ Ibid., 155.

¹⁸ Ibid., 165.

¹⁹ Having a potentiality is something that is real but that is not here and now an actuality. A one-year-old human child has the potential of becoming an adult human—unless impeded by disease or accident—whereas a one-year-old chimp does not (even if raised by humans in a human environment), for it lacks this intrinsic potentiality.

self-construction into a mature human body through a series of phases determined by its genome. Although Morowitz and Trefil correctly say that the genetic information in the zygote is only “the blue-print, not the building,”²⁰ they strangely neglect to note that the zygote itself, as a living organism, is both the builder and the building, that it is “self-organizing.” Is it not also farfetched to compare the zygote to a cancer or surgically excised tissue in order to show that the zygote is disposable? Cancers and excised tissues cannot construct themselves into humans. Again, when these authors, trying to minimize the biological status of the zygote, cite the large percentage that fail to develop, they pass over the explanations of this fact usually given by embryologists, namely, that in many of these cases the normal fertilization process was not completed, or that at this early stage life is still frail and subject to many risks.²¹

What Morowitz and Trefil regard as the “strongest evidence” against human life beginning at conception, however, is the phenomenon of parthenogenesis,²² demonstrated for amphibians, in which an unfertilized diploid ovum can be artificially stimulated to develop into a mature animal. This has not been observed in placental mammals, probably because their ova have a gene necessary for the development of a placenta, but this gene is deactivated in the mature female gamete. Hence the ova would need to receive this essential gene in activated state from the male sperm that possesses it. Once a technique becomes available for activating this gene in the ovum, mammals also could be produced by parthenogenesis. Therefore, they argue, if the zygote is a person, so must every human ovum be a person before fertilization!

It seems to us, however, that if successful parthenogenesis could be artificially produced with a human diploid ovum, such an activated ovum would simply be the equivalent of a naturally fertilized ovum, but without any male contribution, that is, it would be equivalent to a zygote. It does not follow that unfertilized ova—not artificially made into zygotes—would already be persons. This lack of logic is perhaps explained by the fact that Morowitz and Trefil—when they are not citing those who are already favorable to their position, such as McCormick and Teilhard de Chardin—only seek to refute the arguments of “pro-life” authors who rely chiefly on denouncing the pain caused to the fetus by abortion. Hence they have not really confronted the stronger criticisms of their position. Because they regard the question of “ensoulment” as purely a religious issue, they disregard pro-life arguments of a “philosophical” type that ask whether the definitions and principles they claim to be “scientific” are really such. Such an approach is a nonreligious critique of their position.

²⁰ *Ibid.*, 48.

²¹ “One cause [of spontaneous abortion of the conceptus] may be inadequate production of progesterone and estrogen by the corpus luteum.” Keith L. Moore and T.V.N. Persaud, *Before We Are Born: Essentials of Embryology and Birth Defects* (Philadelphia, W.B. Saunders, 4th edition, 1993), 36. The authors place the rate of failure even higher, at forty-five percent. It is well to note that during the early years of this nation the death rate of infants under one year of age was about fifty percent. Does this minimize their intrinsic worth as human persons?

²² Morowitz and Trefil, 52–57. If the “strongest” scientific argument for a case can only be based on something not yet empirically demonstrated, the case is rather weak.

Making Use of Thomas Aquinas

The declaration of the Catholic Church previously quoted, besides its appeal to faith, leaves room for a critique of “a philosophical nature” of any position that denies that human personhood begins at conception. Hence, in view of the intensification of this debate provoked by the growing experimental use of embryos, it seems important to evaluate the recent “philosophical” defense by some Catholic authors of the theory of “delayed hominization” ascribed to St. Thomas Aquinas.²³ This defense appeals to certain “metaphysical” principles of Aquinas that when applied to current embryological data are alleged to show that though the embryo is “human” by reason of its DNA, it is not a “human person” at conception but attains to personhood only with the appearance of the “primitive streak,” a critical point much earlier than that to which Morowitz and Trefil concluded.

The Catholic defenders of this “delayed hominization” of the embryo correctly say that St. Thomas Aquinas held (a) that there is no human person until ensoulment with a spiritual intellectual soul; and (b) there can be no ensoulment until there is a body proportionate to such a soul. The application of Thomistic principles to biological data was carried out in Norman Ford’s influential but much criticized *When Did I Begin? Conception of the Human Individual in History, Philosophy and Science*, and has recently been renewed by Jason T. Eberl, in “The Beginning of Personhood: A Thomistic Biological Analysis.”²⁴ Ford and Eberl argue that as long as twinning is possible, the embryo is only a collection of independent cells held loosely together by the *zona pellucida*. This contains unique human DNA but does not constitute a unified, individuated body of a complexity proportionate to the human intellectual soul. The early embryo, therefore, has a merely “passive potentiality” to become a person.

This argument, however, is open to two very serious objections. First, twinning is a form of cloning that is not artificial but results from an embryological accident.²⁵ A clone presupposes the existence of a previous unified living organism of the same species and not a mere collection of cells, whether this previous organism is a zygote or a multicelled immature or mature organism. And second, by “a body proportionate to ensoulment as a human person,” Aquinas meant a body with a principal organ capable of being the efficient cause of the activities specific to a human person, given the organism’s state of development. Present embryology shows that the zygote fulfills this requirement. Subsequent development to maturity is simply the life cycle of that person. Therefore, theories of “delayed hominization” are not supported by Aquinas’ principles when these are applied, not to the inadequate embryological data available to him, but to modern embryological discoveries.

²³ The most influential attempt by a Catholic author to revive this view was a philosopher, Joseph F. Donceel, S.J., “Immediate Animation and Delayed Hominization,” *Theological Studies* 1970, 31 (1): 71–105.

²⁴ Norman Ford, *When Did I Begin? Conception of the Human Individual in History, Philosophy and Science* (Cambridge: University Press, 1991); Jason T. Eberl, *Bioethics: Journal of the International Association of Bioethics*, 14 (2) 2000: 134–157.

²⁵ MZ [monozygotic or identical] twinning usually begins in the blastocyst stage around the end of the first week...and results from division of the inner cell mass or embryoblast into embryonic primordial,” Moore and Persaud, *Before We Are Born*, 134.

Before developing these two points, it is important also to note that while we are dealing with a question that is “philosophical” in nature—emphasizing arguments based in reason and not on religious faith—this does not necessarily mean that we are dealing with a metaphysical question, as these defenders of delayed hominization seem to think. The use of the term “ontological individual” places the question into a different context than that in which Aquinas did and makes it difficult to relate it to the empirical data supplied by modern scientific embryology.²⁶ Of course, if by “ontological” one simply means “real,” there is no objection to saying that the individuality of the embryo is an empirical fact, but if the term “ontological” introduces metaphysical considerations, it is not relevant.²⁷ Aquinas’ so-called theory of delayed hominization originated not in Aristotle’s *Metaphysics* but in his *De generatione animalium* and *De anima*, works that form part of his *scientia naturalis* whose foundational principles are treated in his *Physics* and hence are not “metaphysical,” but empirical.²⁸ Thus the existence of the human person and the negative proof of the nonmateriality of the human intellectual soul is for Aristotle and Aquinas first of all a problem proper to natural science. What is left for metaphysics is only a more positive and profound analysis of the essence of spiritual intelligence common to humans, angels, and God. This point is important if questions about human personhood are to be dealt with in a Thomistic context, because for Aquinas the principles, methodology, and criteria of epistemological validity for natural science are quite different from those of metaphysics. Metaphysics deals with truths that are absolutely necessary; natural science with empirical truths that, even though they are certain, are nevertheless conditioned by the contingent nature of our universe and are true only in a general way (*in pluribus*).

Twining Is Cloning

If it were true that as long as twinning remains possible the embryo must be simply a mass of independent totipotential cells (blastomeres), *then why are only one, two (or a very few) persons produced instead of as many as there are embryonic cells?* Since each is totipotential and is said to be independent of the others,

²⁶ Ford, *When Did I Begin?*, 84 f.; Eberl, “The Beginning of Personhood,” 141.

²⁷ Morowitz and Trefil, carefully define their terms (11–17), but for them “person” is a legal concept regarding human rights; “soul” is a religious concept and not a scientific one; and “humanness” has many meanings, so that the borderline between it and the pre-human is ill defined (19–20). We would define “person” as a being with the radical capacity for intellectual cognition and free choice. The term “soul” for Aquinas does not simply mean the human soul, but the form of any living thing, and the human soul one which enables a living thing to think and choose. Given these definitions, the question of the “humanness” of a living organism is whether it has a radical capacity to think and choose. This cannot, therefore, be a matter of degree, any more than whether an organism is alive or dead is a matter of degree. A living organism can have more or less vigorous life, and a human person more or less intelligence and freedom, but life and personhood are not arbitrarily distinguished from death and nonpersonhood.

²⁸ For information on the medieval discussions of Aristotelian embryology see M. Anthony Hewson, *Giles of Rome and the Medieval Theory of Conception: A Study of the “De formatione corporis humani in utero”* (London: University of London Athlone Press, 1975).

each has as much potentiality to become human as any other. Why do they not all develop each individually into an embryo with a primitive streak? How, on the basis of the delayed hominization theory, can we explain why *normally* the human zygote does not produce twins or multiples but a single person? This theory would seem to demand that normally the cleavage of the zygote into what this theory claims is only a loosely collected group of totipotential cells would result in as many individuals as there are such cells.

Ford has no difficulty in admitting that the zygote is a complete organism of the human species,²⁹ but then goes on to say rather oddly,

[w]hatever the cause of monozygotic twinning in the zygote at the two-cell stage, the fact that it cleaves into two individual blastomeres that may develop separately as identical twins does not mean the zygote itself is not a true ontological individual. We know it is a living ontological individual. But once it divides mitotically into two separate twin daughter blastomeres, it apparently ceases to exist and loses its ontological individuality to give rise to two new genetically identical, but distinct living ontological individuals within the zona pellucida.³⁰

This argument neglects a number of biological facts. Twinning in the human species is a reproductive abnormality since it is disadvantageous both to the mother and the offspring. Like the high rate of failure of pregnancies already mentioned, it is not surprising that such aberrations occur, given the extreme complexity of the reproductive process and the frailty of the embryo. About sixty-five percent of identical twinning takes place near or shortly after the end of the first week when the blastocyst of some fifty or sixty cells (blastomeres) forms. The other thirty-five percent occurs during the first three days when cell cleavage, beginning about thirty hours after fertilization, is proceeding rapidly, until about the sixteen to thirty-two-cell state, when the cells undergo "compaction" into a globular cluster called the morula. Twinning at the first cleavage mentioned above by Ford is quite rare and its details have not as yet been much studied.

²⁹ "The zygote is not the same ontological individual as either one of the eventual twins that result from its development, notwithstanding its genetic identity continuing throughout all its subsequent cleavages." *When Did I Begin?*, 119. Cloning, however, does not show that "ontological" individual A "ceases to exist" and that in its place two "ontological" individuals come into existence, but that A existed before B and continues to exist when B, derived from A, comes into existence. This holds also for the zygote as the A clone. The facts in no way show that it ceases to exist but simply that having lost a cell out of which B develops, it can by its regulative power supply this loss by again dividing. Of course, if twinning takes place at the two cell stage it may be arbitrary which of the two cells is called A as the immediate successor of the zygote and which B, since they come into existence simultaneously. If, however, further research demonstrates a polarity in the zygote, such as has been demonstrated in other mammalian species, as is probable, then that cell which contains the cytoplasm of the animal pole can properly be called A, that which contains the cytoplasm of the vegetal pole B, since the animal pole is more active (and thus anticipates the head or primary organ) than is the vegetal pole.

³⁰ *Ibid.*

The argument in question is based on the notion that the cells into which the zygote divides are undifferentiated because their nuclei are genetically identical, but this is only one mode in which the parts of an of embryo are differentiated. In fact cells that are *genetically* identical can be differentiated both by their *cytoplasmic content* and by their *position* within the embryo. Thus a cell or group of cells may, when separated from the embryo, exercise their totipotentiality and produce a clone or twin. They may not be able to do so when occupying a definite position in the embryo as one or several of its constituent cells. It has also been shown that early human embryos have remarkable “regulative” powers, that is, an ability to continue normal development even after their cells have been rearranged or some have been removed. This supports rather than negates the importance for future development of the actual position of a cell or cell group within the embryo, since it is position that ultimately determines the outcome of genetic regulation on any cell.

Until implantation, the embryo receives no additional material from the mother, except some fluids that enter at the blastocyst stage. Hence as the nuclear DNA of the zygote is replicated to supply identical genetic material for each new cell produced by cleavage, the original cytoplasm of the zygote is portioned out among these cells. The new cells are for some time genetically totipotential and hence, in this respect, undifferentiated, but from the beginning they are cytoplasmically differentiated. It is well known that generally in mammals, even in the unfertilized ovum, there is already an “animal” pole of the cell from which, if it becomes fertilized as a zygote, the central nervous system and senses will eventually originate, in contrast to a “vegetal” pole from which the digestive system will originate.³¹ This axial polarity has not yet been demonstrated for human development, but only a ventral-dorsal polarity in the embryo at the blastocyst stage.³² Nevertheless, considering the basic similarity of embryo development among mammals, it would be strange if such a head-tail polarity of the embryo, even at the first cell division, were absent in the human species.

Thus even from the first cleavage, one of the two cells, namely, the one from the animal pole, is related to the primitive streak, or primordial central nervous system that Ford’s argument considers the point at which ensoulment occurs. Moreover, through the early formation of the blastocyst the *zona pellucida* holds the cleaving cells together and “compaction” occurs. This zona must be considered a part of the embryo, though a temporary one, and not something extrinsic to the organism. There is never, therefore, a time after the zygote begins to divide within

³¹ “In this context [of the discussion of how the egg or ovum is asymmetrical] ‘animal’ refers to typical animal organs such as eyes or the central nervous system, which often are formed in the vicinity of the egg’s animal pole. The adjective ‘vegetal’ refers to the future ‘vegetative organs’ that derive from the primordial gut and serve ‘lower’ functions of life such as processing for food.” Werner A. Müller, *Developmental Biology* (New York: Springer Verlag, 1997), 12.

³² “Mammalian and human embryos appear to leave the site where the inner cell mass will segregate to chance. The position of the inner cell mass defines the future dorsal side. How the head-tail polarity is specified is unknown.” Müller, *Developmental Biology*, 169.

this zona in which a loose collection of independent human cells exist. Even before compaction these blastomeres must be interacting physiologically (by means of gap junctions?), otherwise compaction and development of the blastocyst would not occur.

Most twinning takes place at the blastocyst stage in which there is already a differentiation of the inner cell mass (that is to become the permanent body of the fetus) from the trophoblast that surrounds it. This trophoblast develops more rapidly than the inner cell mass because by it the embryo becomes able to implant in the mother's uterus so as to obtain nutrition and begin to grow quantitatively. Monozygotic twins are produced when the embryonic plate, through some accident, splits within the amnion and chorion that protect it and the detached portion of still totipotent cells begins independent development. But obviously this split occurs when the embryo is already considerably structured as a unified living entity that becomes cloned by the separation of part of its embryonic disc.

Thus there is no reason to think that the zygote, the morula, and the blastocyst are different organisms, or that, as it is transformed by successive cleavages, it has "lost its ontological individuality" at any point. If by a developmental accident twinning occurs at any point during these phases of growth of the human individual the only reasonable explanation is that a clone of that individual has been formed by its loss of a part. By reason of its totipotentiality, that part can begin an independent development. Thus organism A that was developing normally up to the point of accidental twinning continues its development alongside its somewhat younger clone, its monozygotic twin (organism B).

Furthermore, although the cells in the morula and blastocyst may not be as tightly bound together as they will later be in the fetus, they are already intimately connected and interacting with each other. Living cells are "sticky" and quickly form chemical bonds, as is evident in the process of "compaction" that unites the blastomeres in the morula that begins at about the sixteen to thirty-two cell stage. Protein synthesis has already begun in this early cleavage phase, or development would cease. There is also clear evidence that cell cleavage is not a random process because it takes place according to a definite pattern and orientation that is regulated by the genome. Thus the notion that once the zygote divides, the jelly of the *zona pellucida* holds only a loose collection of independent organisms is simply contrary to the evidence that a lively interchange of molecular signals is occurring between them as they continue to subdivide in an orderly manner and compact. The embryonic cells, even though genetically totipotent when isolated individually from the embryo, are already the *differentiated* parts of a single self-developing organism and, as long as they remain in the embryo, are predetermined by its guiding genome to form specific parts of its life structure.

Aquinas's Embryological Principles

The Aristotelian biological tradition was never preformist, but always *epigenetic*, that is, it explained embryological development as a process in which living organisms have the power to transform their primitive structures into mature structures. This supposes that the organism from the beginning of its life cycle is predetermined to a certain pathway of development to maturity. Here it is not necessary to go

into all the details of the embryological theory that Aquinas derived from Aristotle and that we have treated elsewhere.³³ The chief question to ask in understanding that theory is “What determines whether a human body is proportionate to ensoulment by an intellectual form so as to constitute a human person and not merely a collection of human cells with the passive potentiality to become a human person, as the theory of delayed hominization claims?”

Aquinas, following Aristotle, answers this question by arguing that the kind of organization that a body must have to be proportionate to an intellectual soul is one in which its principal organ—when the organism has attained sufficient maturity—can serve as the necessary instrument of human intelligence. Intelligence, as contrasted to sense cognition, attains not a merely phenomenological, but an essential knowledge of the reality of things. Yet human intelligence is the weakest of all possible kinds of intelligence and hence is always dependent on sense cognition for all it can know. This sense data must be acquired by the external sense organs and then processed by some internal sense organ. When Aristotle and Aquinas wrote, medical science held that this internal sense organ was the heart because it was the most energetic part of the body, but now we know that this organ is in fact (at least in adults) the human brain.

Thus the application of Aquinas’s principles to modern embryological facts would seem to lead to the conclusion that human ensoulment and personhood is possible only when the brain is formed in the fetus. Is not Eberl then quite conservative in supposing that it is the appearance of the neural groove (the primordial central nervous system) that signals the time when ensoulment can take place? Of course one might press the point and say that human personhood would require not only the neural groove, but also a brain, and not just a fetal brain, but also one developed to the point where intellectual activity becomes possible, namely, when a child is about seven years old. Thus infanticide for seriously brain-damaged children might become ethical!³⁴

Further consideration, however, leads to a very different application of Aquinas’s principle. The principal organ required by his argument need not be one that here and now is capable of acting as the instrument of intellection. We are human persons even when we are asleep or comatose from a brain injury. Instead, for Aquinas a living organism is one capable of acting as the *proportionate efficient cause* of its own self-organization and other vital activities. Thus the primary organ that is required in the fetus for its intellectual ensoulment is not the brain as such but a

³³ See Benedict M. Ashley, O.P. “A Critique of the Theory of Delayed Hominization,” in D. G. McCarthy and A.S. Moraczewski, *An Ethical Evaluation of Fetal Experimentation* (St. Louis, MO: Pope John Center, 1976), Appendix I, 113–133; Benedict M. Ashley, O.P. and Albert S. Moraczewski, O.P., “Is the Biological Subject of Human Rights Present From Conception?” in Peter J. Cataldo and Albert S. Moraczewski, O.P., eds., *The Fetal Tissue Issue: Medical and Ethical Aspects* (Braintree, MA: Pope John Center, 1994).

³⁴ Tristram Englehardt and others have actually argued in this vein, contending that personhood is a social construct. See his “Beginnings of Personhood: Philosophical Considerations,” *Perkins Journal of Theology* 1973 (27): 20–27.

³⁵ See Thomas Shannon and Alan Wolter, O.F.M., “Reflections on the Moral Status of

primary organ capable of producing a brain with the capacity for intellectual cognition in the body at some appropriate phase of the human life cycle.

What is that primary organ that causes the human body to develop so as to be proportionate to ensoulment and human personhood? Modern embryology shows clearly that it is the nucleus of the zygote produced by the fertilization of a human ovum by a human sperm, since that nucleus 1) contains all the genome or *information* (formal cause) required to build the mature human body with its brain as its primary organ and the instrument of intellection; and 2) is the principal *efficient cause* proportionate to the task of the mature development of the human organism. Nor is it a valid objection to this analysis to argue that the original zygote's nucleus is lost at the first cell division. In fact, the efficiency is then passed on to the morula and the blastocyst which continue to self-develop under the guidance of the genome contained in all the cells and principally as contained in a dominant group of cells that are called the "inner cell-mass" inside the trophoblast. It is from this inner cell-mass, which develops into the early embryo and subsequently, at about twenty days, forms the neural groove, that in turn becomes the central nervous system from which the brain finally emerges. Because Eberl attributes only "passive potentiality" to the embryo (that is, considers it only the material cause of the human person), he fails to note that for Aquinas it is not only the *material cause* but is also the active agent of its own development guided by the information (formal cause) in the genome.

It is also true, of course, that for Aquinas ensoulment is an immediate act of God because a spiritual soul cannot be the product of material, biological forces. But in his work God uses secondary causes as far as this is possible. Thus he uses the parents to produce the human body that in his providence he has willed to ensoul. Hence in the natural process of human reproduction its *final cause* (teleology) is always the production of a human person.

Aquinas, however, did not know that the matter out of which the human body is generated is already highly organized at conception and endowed with the efficient and formal causality necessary to organize itself into a system in which, as it matures, the brain becomes the principal adult organ. Hence he was forced to resort to the hypothesis that the male semen remains in the womb, gradually organizing the menstrual blood, first to the level of vegetative life and then to the level of animal life, so as to be capable of the further self-development needed for ensoulment. But he also supposed that this entire process from its initiation was teleologically (final cause) predetermined to produce a human person, not a vegetable, an infra-human animal, or a mere embryonic collection of independent cells. That is why the Catholic Church has always taught that even if it were true that personal ensoulment takes place sometime after conception, nevertheless abortion at any stage is a very grave sin against the dignity of a human *person*.

It is odd that in an attempt to soften this "hard saying," and to make room for embryo experimentation, others have tried to develop a delayed hominization theory, not on the basis of Aquinas's thought but on the basis of the very different philosophy of Duns Scotus.³⁵ Why should medieval scholasticism, otherwise so much

the Pre-Embryo," *Theological Studies* 1990 (51): 603–626.

scorned, suddenly become popular because it can be used to justify departures from official Catholic teaching? In our opinion, Aquinas's view, based as it is not on any *a priori* deduction, but on an analysis of empirical facts, is helpful in providing us with a solid solution to an urgent modern problem, provided, however, that his principles are correctly understood in their full context and correctly applied to modern and scientifically established embryological facts.