

The Metaphysical Nuances of Hylomorphism

I am grateful for David Hershenov and Rose Koch's response to Earl Conee's article on the role of metaphysical views of human personhood in the abortion debate.¹ I fully agree with the hylomorphic account Hershenov and Koch describe as well as the general conclusions they draw. Nevertheless, I would like to raise a couple of points of contrast to their hylomorphic account of twinning along with their description of a human person's post-mortem existence.

With respect to twinning, Hershenov and Koch claim that "two individual souls are infused into the matter and so are co-located, or share the same material boundaries (matter), until they separate" (759). They appeal to the case of conjoined twins to support the notion that there may exist two *persons* in one *organism*. This claim, though, goes against Aquinas's clear argument that only *one* substantial form (rational soul) informs the matter of each individual human organism.² The only way to support Hershenov and Koch's claim is to separate the concept of a

human "person" from that of a human "organism," which is contrary to Aquinas's claim that any subsisting thing with a human nature is a person.³ An alternative description, which supports Hershenov and Koch's overall conclusion that rational ensoulment occurs at fertilization, is that a single rational soul informs the matter of a one-celled human zygote. If twinning occurs, which can happen at any point from the initial mitotic division until uterine implantation, the original human organism loses some of its matter and that matter becomes informed by a new rational soul directly created in it by God.⁴ This metaphysical description of twinning avoids the non-Thomistic and metaphysically problematic consequence that a single organism is informed by *two* substantial forms, but Hershenov and Koch dismiss it as requiring that the original organism "arbitrarily survive as just one of the resulting twins" (758). It would be a mistake, however, to dismiss this result as "arbitrary" due to the fact that, as Hershenov and Koch note, we currently lack a complete causal explanation of why and how twinning occurs. Hence, there may be a forthcoming biological explanation to support the position that one of the resulting twins is more reasonably considered to be identical to the original zygote than the other.

¹David B. Hershenov and Rose J. Koch, "How a Hylomorphic Metaphysics Constrains the Abortion Debate," *The National Catholic Bioethics Quarterly* 5.4 (Winter 2005): 751–764; Earl Conee, "Metaphysics and the Morality of Abortion," *Mind* 108.432 (October 1999): 619–646.

²Thomas Aquinas, *Summa theologiae*, I, Q. 76.3–4; *Sententia libri De anima*, II.5; *De unitate intellectus contra Averroistas*, I.

³Aquinas, *Summa theologiae*, III, Q.16.12 *ad* 1.

⁴I elaborate on this description in my *Thomistic Principles and Bioethics*, forthcoming from Routledge Press.

Lacking this explanation, we are faced only with *epistemic* uncertainty regarding which of the resulting twins is identical to the original zygote.⁵

Hershenov and Koch then argue that it makes a *moral* difference whether or not an embryo or fetus is aborted, because the separation of a rational soul from its body entails an existence in which the soul's functions are diminished, and in which a human person has ceased to exist and only a part of her (the rational soul) exists until bodily resurrection. Hershenov and Koch are exactly right on the first point, but the second point deserves some metaphysical scrutiny. Although it is quite true, according to Aquinas, that a disembodied rational soul is not identical to a human person,⁶ it does not follow that a human person ceases to exist between death and resurrection. As Eleonore Stump and I have argued in separate publications,⁷ "the classic logic of identity" (761) can be replaced by the notion of "constitution (or composition) without identity," which allows for a human person to persist between death and resurrection as composed of (but not identical to) her soul alone. On either metaphysical view, however, Hershenov and Koch's overall con-

clusion still follows that a rational soul's disembodied state is one of "imperfection" (762), and hence *harm* is done to an embryo or fetus that is aborted.

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The authors reply:

We appreciate Jason Eberl's commentary on our paper. However, Eberl's claim that we separate "human person" from "human organism," which he infers from our twinning solution, is a misunderstanding of our position. We, like Eberl (and Aquinas), think that the human form (and the human person) and the human organism match up one-for-one; it is just that we extend this to cases of monozygotic twins that both come into existence at fertilization. We also are not at odds with Eberl's account of the existence of the human being between death and resurrection, and have elaborated elsewhere on this possibility.¹

⁵ On this view, the case of conjoined twins is admittedly problematic. Nevertheless, the case of "dicephalic conjoined twins" (759) could be described in terms of one soul informing the organism and one of the two cerebrums, and the other soul informing just the second cerebrum. Again, epistemic uncertainty would ensue regarding *which* cerebrum was informed by the same rational soul as the rest of the organism, but perhaps some evidence could be found with respect to each cerebrum's capacity to volitionally control the body's movements.

⁶ *Commentarium super Epistolam Primam ad Corinthios*, XV.

⁷ Eleonore Stump, *Aquinas* (New York: Routledge 2005), 50–54; Jason T. Eberl, "The Metaphysics of Resurrection: Issues of Identity in Thomas Aquinas," *Proceedings of the American Catholic Philosophical Association* 74 (2000): 215–230, and "Aquinas on the Nature of Human Beings," *Review of Metaphysics* 58.2 (December 2004): 337–341.

¹ See our "Personal Identity and Purgatory," forthcoming in *Religious Studies*. In our *Quarterly* article, we were not putting forth our own ideas but Aquinas's, and we agree with Eberl that there are some difficulties with Aquinas's unmodified account. However, although we do offer modifications to Aquinas's view in our "Personal Identity and Purgatory," we do not see the need that Eberl does to replace "the classical logic of identity . . . by the notion of 'constitution (or composition) without identity.'" All that is required is to drop some axioms of classical mereology, such as anything that has a proper part must have at least two proper parts. We suggest that one possible hylomorphic account of the afterlife would have the person surviving with just a single proper part, the soul. This is the spiritual analogue of the tree losing its branches and not having any atoms the trunk lacks. Here the trunk should be considered a proper part of the tree in the absence of any other non-overlapping proper part.

In the same paragraph that we propose that monozygotic twinning occurs when “two individual souls are infused into the matter and so are co-located, or share the same material boundaries (matter) until they separate” (759), which is the basis of Eberl’s criticism, we refer to cases of conjoined twins, in which there are two human beings that share a material boundary and parts to some extent. Conjoined twins substantiate our claim that “

it is erroneously assumed that [a] single boundary is sufficient for determining the number of individuals present, so that what appears to be just one embryo indicates the presence of just one human being. (759)

But even more important to understanding our position is the next sentence, which states that it is not “persuasive to argue that since the zygote appears to be a single organism, it is a single human being” (759); on the contrary, we claim that there are two human beings—two composites of form and matter and so two organisms—despite the *appearance* of one zygote, or one organism. The twins are spatially coincident at this point in their development; like the statue and the lump of clay, the two human beings share the same matter, but this does not mean, as Eberl charges, that there “exist two persons in one organism.” Rather, at the zygote stage, each composite of form and matter *is* an organism, and so if twins are present, there are two organisms, spatially co-located but metaphysically distinct.²

²We realize that an appeal to spatially coincident objects of the same kind might arouse skepticism. However, we do not think that conjoined twins are the only case that would benefit from such an analysis; one of the authors has argued elsewhere that other puzzles (which do not involve humans) might benefit from the allowance of spatially coincident objects. See an analysis of two roads that overlap and then have diverging branches that are destroyed, thereby becoming spatially coincident objects (David Hershenov, “Can There Be Spatially Coincident Entities of the Same Kind?” *Canadian Journal of Philosophy* 31.1 (2003): 1–22. See also Kit Fine, “A Counter-example to Locke’s Thesis,” *The Monist*, 83.3 (July 2003): 357–361.

That this is so, we argue (in the same paragraph), is further substantiated by dicephalic conjoined twins, which not only share material boundaries, but appear to share a single organism, and yet have separate streams of consciousness. We suggest that in the case of the dicephalus the one person/one organism rule can (and should) be maintained by claiming that the twins are not *sharing* an organism; rather, each is an organism and these two organisms are spatially coincident.³ We then write that since the dicephalus “... is a case of two persons and actually two organisms where there appears to be just one organism, it is much more plausible to believe that two persons (or two human beings) can share the single boundary of a ‘pre-embryo’” (760). In other words, monozygotic twins at the zygote stage (and perhaps beyond) appear to be a single organism but are in fact two spatially coincident organisms.

Furthermore, this solution is not inconsistent with Aquinas’s views.⁴ And, interestingly, our claim that dicephalic twins are spatially coincident organisms not only garners support for our claim that zygote-stage twins are as well, but is more Thomistic than Eberl’s own suggestion on how to deal with the dicephalus. Eberl admits that the case of conjoined twins is problematic, but that one could describe the dicephalus “... in terms of one soul informing just the second cerebrum.” The problem with this solution is that the cerebrum is not an organism, but merely

³For other puzzles that conjoined twins pose to the human being-to-organism correlation see Rose Koch’s “Conjoined Twins and the Biological Account of Personal Identity”, forthcoming in the *The Monist* 89.3 (2006).

⁴Aquinas allows that it is possible for two individuals to share the same space: in his Commentary on *De Trinitate of Boethius*, Aquinas explicitly states that “one can at least mentally conceive of two bodies being in the same place” (q. 4 a. 3). Furthermore, the unique status that the human soul has as a “subsistent substance” allows for the individuation of each spatially co-located human being. See Koch’s “Totipotency, Twinning and Ensoulment at Fertilization,” forthcoming in *The Journal of Medicine and Philosophy*.

an organ, and so Eberl fails to identify each human person with a human organism, the very Thomistic principle on which he bases his above charge. Our co-location solution maintains person-organism identity in the cases of grown conjoined dicephalus and the co-located unicellular zygotes that are twins.

Because we can offer a coherent account of most human beings' coming into existence at fertilization, without corruption of Aquinas's metaphysics, we see no need to posit a twinning solution such as Eberl's.⁵ One of us does, however, suggest elsewhere that human somatic cell cloning might appeal to a "budding" solution, such as the one Eberl suggests.⁶

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⁵ We do acknowledge that Eberl's twinning solution is more attractive than the standard offering, which is to have the original embryo "fission out of existence" when it gives rise to two new human beings (which thus entails the death of the first).

⁶ See Koch, "Totipotency, Twinning and Ensoulment at Fertilization."

A Critique of Oocyte-Assisted Reprogramming

In response to the continuing controversy over embryonic stem cell research, thirty-five ethicists and scientists support a new research proposal which they believe may overcome the Catholic Church's prohibition of research involving the "creation" or destruction of human embryos.¹

¹ Joint Statement with Signatories, "Production of Pluripotent Stem Cells by Oocyte-Assisted Reprogramming," *National Catholic Bioethics Quarterly* 5.3 (Autumn 2005): 579–583. The

This research proposal, issued June 20, 2005, is called oocyte assisted reprogramming (OAR), and the initial research would involve experiments with mice. OAR is a form of altered nuclear transfer (ANT). Both OAR and ANT use a modified cloning procedure called somatic cell nuclear transfer (SCNT), previously named therapeutic cloning.

In SCNT the nucleus of an oocyte (egg cell) containing the genetic instructions or genome is removed. A somatic cell (e.g., skin cell) is then obtained from an adult animal or from a human person.

The nucleus containing the genome of the donor somatic cell is transferred into the egg cell. The egg cell "reprograms" the genome of the somatic cell such that the combination of egg cell plus somatic cell genome becomes a totipotent zygote.

If this is done with human cells and the zygote is implanted into a uterus, the zygote could develop into a fully grown human infant. In fact, according to Catholic Church teaching, the zygote itself is a human being.²

joint statement was also published in *Origins*, the official publication of the U.S. Conference of Catholic Bishops (July 7, 2005): 126–128.

² Congregation for the Doctrine of the Faith, *Donum vitae*, I.2 (February 22, 1987). The evidence, indeed, indicates the presence of a human person. Thus John Paul II wrote that 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 what this living being will be: 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." *Evangelium vitae*, n. 60 (quoting Congregation for the Doc-

In both ANT and OAR the donor somatic cell's genome is altered before it is transferred to the egg cell.

In ANT the alteration of the genome involves knocking out (i.e., removing) one of the thirty thousand human genes in the donor cell genome. This particular gene is required for the early development of the zygote.

In normal development, a zygote cell divides into two cells called blastomeres. These cells continue to divide so that at the twelve-cell stage the developing person is called a morula. At about 60 to 150 cells, the blastocyst stage is reached.

The blastocyst contains two types of cells:³

1. Embryonic cells in the inner cell mass (ICM) of the blastocyst will develop into all tissues in the body of the human infant. These ICM cells are the type of cells used in embryonic stem cell research. Normally, ICM cells would become the epiblast, from which further stages of the embryo body proper develop.

2. The second type of cells in the blastocyst are called trophoblasts. These cells develop into extra-embryonic tissues (e.g., the placenta or umbilical cord of the infant).

In ANT, the zygote (i.e., human person) cannot develop past the blastocyst stage due to the removal of the gene (*Cdx2*) required for development of the trophoblast.

The ANT procedure has received harsh criticism from scientists and at least one ethicist. One scientist said, "It will be a sad

day when scientists use genetic manipulation to deliberately create crippled embryos to please the Church." Another scientist said, "We thought some would see this as creating a defective human for purposes of exploitation." The ethicist said, "A short-lived embryo is still an embryo."⁴ As a result of these criticisms, this ANT procedure was abandoned as a proposal for research that could be ethically funded, and the OAR procedure was proposed in its place as a morally acceptable alternative.

How does OAR differ from ANT? The biological basis for claiming that the OAR procedure is moral is the fact that all cells in the human body contain the entire genetic code for a human being; however, not all genes are expressed in each cell. For instance, in a skin cell, only the genes responsible for the characteristics of a skin cell are turned on.

The specific set of genes which are turned on or off in a particular cell type is the function of certain proteins in the cell called transcription factors (TFs). The TFs, which specify the cell type, bind to certain genes in the genome and turn the gene either on or off. The proponents of OAR propose using a technique called immunocytochemistry to look for TFs which they claim are absent in the zygote but present in the morula and in ICM cells of the blastocyst. They claim that one of these, called *Nanog*, is absent in the zygote but present in the morula and in higher amounts in the ICM cells.⁵ From this data, they claim they can distinguish the totipotent single cell zygote (i.e., human person) from the morula and ICM cells which they call pluripotent. They claim that OAR will be able to form a pluripotent cell without first forming a totipotent zygote.

trine of the Faith, *Declaration on Procured Abortion* (November 18, 1974), nn. 12–13). 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?" *Evangelium vitae*, n. 60 (quoting *Donum vitae*, I.1).

³R. Warwick and P. L. Williams, eds. "Embryology," *Gray's Anatomy* (Philadelphia: W.B. Saunders, 1973), 54–198.

⁴Constance Holden and Gretchen Vogel, "A Technical Fix for an Ethical Bind?" *Science* 306.5705 (December 2004): 2174–2176.

⁵Subgroup of the President's Council on Bioethics, "The Moral Retrieval of ES Cells," *Ethics & Medics* 30.7 (July 2005): 2. See Shin-ya Hatano et al., "Pluripotential Competence of Cells Associated with *Nanog* Activity," *Mechanics of Development* 122.1 (January 2005): 67–79.

With this hypothesis in mind, they propose to alter the donor cell genome by activating the gene producing Nanog before they transfer it into the enucleated egg cell (oocyte) and/or cause the egg cell to produce Nanog before the transfer. According to their hypothesis, the transfer of this altered donor cell genome into the “reprogrammed” egg cell would not produce a totipotent zygote (i.e., human being) but only a pluripotent stem cell.

This theory provides the basis for the ethical judgment that a totipotent zygote is never present in OAR and does not precede the formation of so-called pluripotent cells.

There are serious problems with the hypothesis, however, which prevent the moral certainty required to make the judgment that the proposed OAR procedure overcomes the principal ethical dilemma involved in ANT or other means of producing “embryonic-like” stem cells. Examples follow:

1. The oocyte (egg cell) is a very powerful reprogramming cell itself. The enucleated oocyte can reprogram a skin cell genome, with all of its specifying transcription factors, to become a totipotent zygote. We have Dolly the sheep as proof of this fact. Therefore, the OAR proponents’ claim that just one more transcription factor, i.e., Nanog, will prevent the oocyte from reprogramming the donor cell to totipotency seems doubtful.

2. Nanog keeps the cell in which it is present in the undifferentiated state. The most undifferentiated state is totipotency. Therefore, Nanog’s presence cannot be interpreted as overcoming totipotency to produce mere pluripotency. What Nanog does is to prevent the zygote from differentiating past a certain stage of development. That is, Nanog is said to keep the embryonic stem cells in an undifferentiated state. Therefore, OAR, like ANT, would produce a crippled embryo incapable of fully developing into a human infant.

3. The term pluripotent used to describe morula and ICM cells is ambiguous and not used by all scientists. For instance, John Shea, M.D., of Toronto, states, “All cells of the early human embryo are totipotent un-

til shortly after the blastocyst stage.”⁶ This same view is described in the “Embryology” chapter of Gray’s Anatomy: “This [ICM cells] represents the residue of totipotent cells, some of which (the embryogenic cells) are destined to form the body of the embryo proper.”⁷ The only cells that ICM cells cannot form are the trophoblasts, which produce extraembryonic tissues like the placenta. In fact, because Nanog is present in morula cells, it cannot prevent these cells from forming trophoblasts. Therefore, Nanog will not prevent the zygotes from forming trophoblasts or the blastocyst. Thus, the zygote, even in the presence of Nanog, is totipotent in the strictest sense. In addition, if cultured ICM cells replace ICM cells in the blastocyst, a normal embryo is formed. Calling ICM cells pluripotent instead of totipotent appears to be a distinction without a morally relevant difference.

4. Finally, one must consider the limits of biological science, which relies on only statistical certainty, to produce the moral certainty required to make the key ethical judgment that OAR can produce a pluripotent cell first, without ever producing the totipotent zygote (human being). In this regard, the immunocytochemical method used to detect Nanog has a biological limit which depends on the potency and specificity of the antibodies used in the procedure.⁸ The lack of detection of Nanog in the zygote does not mean that it is not present. Thus, the biological underpinning of the OAR hypothesis, namely, that the zygote differs from the morula or ICM cells of the blastocyst because it lacks Nanog, cannot be proved with moral certainty.

A simple analogy may help illustrate the essential point that neither ANT nor OAR procedures can truly bypass the production

⁶ John B. Shea, “The Pre-embryo Question,” *Catholic Insight* (January 2005):18–21.

⁷ Warwick and Williams, “Embryology,” *Gray’s Anatomy*, 76.

⁸ Hatano, “Pluripotential Competence,” 67–79.

of a zygote, which, if human cells are used, is a human being at its earliest stage of development.

Let us consider that the zygote is a complete book containing thirty thousand pages, one page for each gene in the genome. If you remove a single page—let us say, page 61, for the gene that directs development of the embryo after the blastocyst stage, as in ANT—would you have created something that is not a book (human being)? Or would you call it a defective book (crippled embryo)?

Carrying this analogy one step further: If you also remove page 200 (that is, alter the gene required for development of the epiblast, as in OAR), would you have an entirely new thing or would you have a defective book (crippled embryo)?

Furthermore, these problems with the OAR hypothesis prescind from the overarching and complex moral questions which surround these procedures that would involve “harvesting” from women the egg

cells that would be required for the purpose of producing the desired stem cells.

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