

Four Queries Concerning the Metaphysics of Early Human Embryogenesis

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In this essay, I attempt to provide answers to the following four queries concerning the metaphysics of early human embryogenesis. (1) Following its first cellular fission, is it coherent to claim that one and only one of two “blastomeric” twins of a human zygote is identical with that zygote? (2) Following the fusion of two human pre-embryos, is it coherent to claim that one and only one pre-fusion pre-embryo is identical with that postfusion pre-embryo? (3) Does a live human being come into existence only when its brain comes into existence? (4) At implantation, does a pre-embryo become a mere part of its mother? I argue that either if things have quidditative properties or if criterialism is false, then queries (1) and (2) can be answered in the affirmative; that in light of recent developments in theories of human death and in light of a more “functional” theory of brains, query (3) can be answered in the negative; and that plausible mereological principles require a negative answer to query (4).

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I. INTRODUCTION

It has become quite fashionable over the past four decades, in both philosophical and theological circles, to deny the claim that the ethical status of induced (or “procured”) human abortion is fundamentally tied to metaphysical issues concerning the *personhood* of unborn humans. Some have argued, for example, that even if the human fetus *is* a human person, it remains the case that abortion is morally justifiable in at least some (if not most) circumstances.¹ It is sometimes pointed out, for example, that at times, killing

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human persons is morally justifiable in certain *non-abortion* contexts and that these contexts are relevantly similar to certain *abortion* contexts. This relation of relevant similarity, it is then argued, provides sufficient moral justification for the intentional killing of some unborn humans regardless of whether or not they are persons. On the opposite end of the spectrum, others have argued that even if the human fetus is *not* a person, there remains good reason to believe that intentional abortion is, in every case, ethically impermissible. According to this view, human organisms at *any* stage of development are beings of such immense value that intending to bring about their deaths under any circumstances is intrinsically evil, whether or not they are persons. This is the magisterial Roman Catholic position on abortion. There is, as far as I can tell, no consistent, binding, dogmatic statement in Roman Catholicism that defines the ontological personhood of early pre-born humans.² Law Professor John A. Robertson (1995, 37), therefore, is mistaken when he asserts that, "Aside from persons who believe that personhood begins at conception, all parties in the debate agree that the preimplantation embryo is not yet an entity with interests or rights, and therefore can be discarded or used in research in ways that human research subjects cannot."

The claim that there is no authoritative dogmatic decree in Roman Catholicism concerning the ontology of very young human embryos might come as a surprise both to those who believe that they are familiar with what informs the Roman Catholic position on the morality of abortion *and* to those who believe that, for anyone who bothers to take a careful look at human embryological development, it is *just obvious* that human zygotes and other pre-embryos are profoundly immature human persons (or, human beings).³ There are, on the contrary, serious and faithful Roman Catholic thinkers who are committed to the Church's moral teaching concerning abortion and who, at the same time, at least hesitate to embrace the metaphysical view that *any single cells* are, or could be, human persons.⁴

Those individuals who think that it is simply obvious that human zygotes are immature human beings will point to the *spatiotemporal continuity of development* between human zygotes and adult humans, claiming that one can track through time and space the material and formal changes that result, beginning with the human zygote, in the maturing of human organisms across the life cycle. These individuals will then claim that the human zygote possesses the same range and quality of *powers* as an adult human, albeit in incipient form, in virtue of being the same *kind* of organism as you and I, further adding that although human zygotes share with us a human essence, they are in such an immature state that they simply are unable to *exercise* the distinctively human, personal powers that they in fact possess. Their *natures* do not change as they develop—human zygotes are not, therefore, *potential* human beings—rather, new opportunities to *actualize* their potential become available to them as their structural and functional complexity ramifies.

Human zygotes do not, therefore, acquire *new* powers as they mature, they simply acquire the required anatomical, physiological, biochemical, and environmental media in which the *personful* human powers that they possessed all along can be fully exemplified. Human zygotes are, after all, *human* zygotes. They are not the zygotes of fish, horses, birds, or thrips.

Is it *just obvious* that a live human zygote, in virtue of being spatiotemporally continuous with a live adult human, is *numerically identical* with that live adult human? No, it is not. There are at least three ways in which one might motivate the counterclaim that live human zygotes (or other pre-embryos) *cannot* be properly identified with live human beings in spite of one's presupposing that such zygotes are human zygotes that are spatiotemporally continuous with adult human beings. First, perhaps a human zygote is neither a *single* human thing nor a multiplicity of human things; rather, perhaps a human zygote is an *indeterminate* number of human things. If this were the case, there simply would be no numerical answer to the question, "How many human things is the human zygote?" Assuming that all human beings *are* essentially a determinate number of human things, namely, one and only one human thing, no indeterminate human thing could possibly be a human being. In 1994, for example, the National Institutes of Health's Human Embryo Research Panel concluded that human preimplantation embryos do not have the same moral status as, for example, human infants partly in virtue of its conviction that developmental individuation had not yet taken place in human pre-embryos.⁵ Second, perhaps human zygotes are not *things* at all (and, hence, *not single human things*), but rather merely *parts* of things.⁶ The thing of which it most commonly claimed that they are mere parts is, of course, their "mothers." But if human zygotes are merely parts of their mother or any other things, then they could not be human beings, for no human being could be merely a part of something else. Third, perhaps human zygotes are single human things but not single human *beings*. Perhaps they are missing a property, for example, a certain organ system or functional architecture, without which they could not possibly be single *human beings*, in spite of the fact that they are single human things of some sort or other.

It will assist us in our present inquiry into the three aforementioned puzzles concerning the ontological nature of early human embryogenesis if we attempt to answer the following four queries. (1) A human zygote undergoes its first mitotic division. Twinning ensues. Is it coherent to claim that one and only one of the twins is identical with the original zygote? (2) Two human zygotes fuse resulting in a single *conceptus*. Is it coherent to claim that the *conceptus* is identical with one and only one of the original zygotes? (3) Suppose that human beings pass out of existence as a result of brain death. Does this not imply that human beings come into existence as a result of coming to possess a properly integrated, functioning brain? (4) At the moment of implantation, do human pre-embryos become parts of their mothers? How these four metaphysical queries are answered has important implications for

the ethical propriety both of conducting potentially damaging nontherapeutic experiments on human embryos (including those procedures that involve either stem cell research or somatic cell nuclear transfer cloning) and of making use of some modern reproductive technologies. I intend, in this paper, to explore these queries as a way of preparing the groundwork for future exploration concerning the relationship between these metaphysical issues and relevant ethical issues in the domain of philosophical embryology.

II

Suppose that a human zygote undergoes twinning as a result of its first mitotic division. Is it coherent to claim that one and only one of the “blastomeric” twins is identical with the original zygote? The notion of “identity” here implied is *numerical* rather than *qualitative* identity. For something x and something y to be numerically identical is for x and y to be the *very same* thing, whereas for x and y to be merely *qualitatively identical* is for x and y to share all of their intrinsic (i.e., nonrelational) properties (i.e., to be “exactly similar” or be “exact duplicates”) but differ with respect to some of their relational properties. Two objects that are, thereby, merely qualitatively identical must also be numerically distinct. Two patches of red (or, alternatively and perhaps more illuminatingly, two positrons), located in two different places, may be qualitatively identical with respect to their color, shape, composition, and size but, in virtue of being located in different places, would not be numerically identical.

Anscombe (1984) examines the aforementioned twinning puzzle by focusing on the following question: Is the human zygote a single human? She concludes that it is not. It is, rather, what Anscombe terms, a “whole human substantial entity”—an entity that is human, but neither a single human nor a multiplicity of humans. In other words, according to Anscombe, a human zygote is an indeterminate number of humans. Anscombe arrives at this conclusion in the following manner. She believes that there are empirical reasons for rejecting the view that either a human zygote Z is somehow *already both* of its daughter blastomeres B and $B1$ *or* that Z is identical with *either* of its daughter blastomeres (such that, e.g., B “grew out” of Z and, hence, is numerically distinct from Z while $B1$ is numerically identical to Z). And, on conceptual grounds, she rejects the view that a numerically single human zygote could (like an amoeba) become numerically two humans. Assuming that B is not identical to $B1$ and given that these appear to be the only conceivable identity relations that could hold between Z , B and $B1$, and in light of Anscombe’s rejecting the aforementioned identity relations between B , $B1$ and Z , what remains is that Z is neither a single human nor a multiplicity of humans, but a “whole human substantial entity” by which she means that although prior to its first mitotic division *materially* Z had been

B and B1, Z had *not* at that time also been B and B1 “in form and existence” (Anscombe, 1984, 115).

Notice that what sets up the preceding puzzle is *not* that B and B1 are qualitatively identical in the same way that the previously mentioned patches of red (or positrons) are qualitatively identical (namely, in virtue of their sharing all of their intrinsic properties, but differing with respect to at least some of their relational properties in virtue of being in different locations). In fact, no two daughter cells of a single zygote’s mitotic division are qualitatively identical (or exactly similar) in this manner. At the very least, these cells have distinct concentrations of molecules and structurally distinct organelles; they exemplify different epigenetic phenomena (e.g., different random cellular phenomena such as random inactivation of the X sex chromosome in females); often have different mutations in their nuclear or mitochondrial DNA; and, in virtue of being in subtly different environments, they are exposed to, and thereby respond differently to, distinct environmental influences.⁷ In fact, it seems to me that Anscombe’s puzzle remains even if the daughter cells were to differ *substantially* in structure or function. Suppose, for example, that a nondisjunctive chromosomal mutation occurs during zygotic mitosis. In such a case, one daughter cell will have 47 chromosomes and the other will have 45. Which daughter cell is identical with the zygote? Even when the supposition of qualitative identity is *grossly* violated, the worry remains: Regardless of whether or not the daughter cells under consideration are qualitatively identical, it appears that *any* judgment concerning the identity of one daughter cell with the zygote is merely arbitrary. But if *merely arbitrary*, then it seems that *neither* daughter cell is identical with the parent zygote. And if this is so, then it appears that neither one of the daughters nor the more mature organisms that result from this twinning used to *be* that zygote.

I find it curious that (to the best of my knowledge) an argument parallel to Anscombe’s never arises (or if it does arise, is rejected out of hand) in current discussions regarding cloning. Suppose that an adult organism’s somatic cell is made totipotent (in the same sense that a naturally occurring zygote is totipotent) at time *t* by way of a somatic cell nuclear transfer cloning procedure. Questions about whether the adult organism *prior* to *t* is identical with the adult organism *after t* or identical with the totipotent cell *after t* do not arise in this context. Rather, it is taken for granted that the adult organism (call it “S”) after *t* is (numerically) identical with the adult organism prior to *t* (call it “S*”), *not* either that (after *t*) S*’s totipotent *cell* or that *neither* S nor S*’s totipotent cell is identical with S. If this latter disjunct were true, S* would have passed out of existence at *t* simply in virtue of totipotency’s being induced in one of S*’s somatic cells. But surely this would be absurd. It appears, therefore, that *only some* deviations from qualitative identity between those organisms that result from twinning pose the sort of puzzle that is strictly analogous to Anscombe’s puzzle.

Consider again Anscombe's puzzle with either qualitatively identical blastomeric daughter cells or daughter cells with a degree of qualitative *non*-identity that is not so great as to remove the heart of the puzzle. In spite of the intuitive force of the conclusions reached regarding cloning in the scenario discussed above, I have not yet found a way (nor has anyone else, to the best of my knowledge) in which reflecting on the actual qualitative difference between blastomeric daughter cell progeny will help in establishing identity conditions for the zygote in *Anscombe's* twinning scenario. Suppose, then, that there is, in fact, no in principle, qualitatively driven algorithm by which to disentangle the identity conditions for a zygote's blastomeric progeny as presented by Anscombe. Further suppose that (contrary to fact) the twin progenies *are* qualitatively identical *both* with each other and with the parent zygote.⁸ Does it then *follow* that *neither* daughter cell is identical with the parent zygote?⁹ No. Because although ex hypothesi the daughters and the parent share all (nonspatial) *qualitative* properties, it remains possible that only one of the daughter cells shares a *quidditative* property with its parent zygote. P is a quidditative property of object O if and only if P either is or involves in a certain way something's *thisness*; it is a property that makes something *that individual thing* rather than a property that characterizes some *quality* of an individual thing. It appears, therefore, metaphysically possible for two or more individual objects to have all of the same qualitative properties but different quidditative properties.¹⁰

There appears to be at least one further possibility. Merricks (1998) has recently argued that there is good reason to believe that there is no *further fact* that is needed for grounding identity over time, that is, that there are no criteria of identity over time and, hence, no informative necessary and sufficient conditions for existence at a time that makes, for instance, organism O at t_1 numerically identical with O at t_2 . It is simply the case that O at t_1 is numerically identical with O at t_2 . What is remarkable about Merricks's thesis is that he does not simply *state* and then *embrace* the thesis that there are no criteria of identity over time, rather he rigorously *argues* for this conclusion. In addition, he also proposes some fascinating, fruitful applications of this theory in novel domains. In particular, he argues (Merricks, 1999) that the Christian doctrine concerning the resurrection of the dead is made more intelligible when informed by this theory of identity.

I will not rehearse Merricks' arguments here, except to say this much: Merricks argues that the reasons typically advanced for embracing *criterialism*—the doctrine that there are criteria of identity over time—all fail and that, if there in fact is no good reason to embrace criterialism, then we ought to reject it. If either Merricks is right or if organisms have quidditative in addition to qualitative properties, then Anscombe's puzzle, including the significantly strengthened version of that puzzle (involving substantial qualitative non-identity) proposed above, dissolves. Although one may be unable to *tell* which daughter cell is strictly identical with the parent zygote, this epistemic

barrier poses no insuperable metaphysical barrier to the possibility that one and only one of the zygote's daughters is identical with the parent and, therefore, that (barring any other conceptual problems) it is at least possible that you in fact used to *be* a zygote.

III

Zygotes not only can undergo mitotic division, or *fission*, they can but also undergo *fusion* (or *recombination*). Suppose that Z and Z1 are fraternal twin zygotes. (They could also be either the blastomeric daughter progeny of a zygote that previously underwent fission, or more mature pre-embryos, two morulas or one morula and one zygote, etc.)¹¹ It is biologically possible that Z and Z1 *fuse* to become one organism O. Is it coherent to claim that one and only one of the zygotes is numerically identical to O? The question here is, in the relevant respects, strictly analogous to Anscombe's. The cost of acknowledging that *neither* zygote is identical with O, supposing that O can mature into an adult organism, is that O was also never a zygote. Again, one need not incur this cost. The identity considerations discussed in Part II regarding twinning also apply here. And, again, our epistemic limitations in this domain need not become transformed into corresponding metaphysical limitations.

IV

Even if one could *demonstrate* either that, following its first mitotic division, a zygote is numerically identical with one and only one of its daughter cell (blastomeric) twins or that products of zygotic fusion are numerically identical with one and only one prefused blastomere, there remain those who will continue to deny that we used to *be* zygotes.¹² They reason as follows: Let us suppose that a zygote Z is numerically identical over time with several (serial) early pre-embryos during the course of Z's putative developmental history. It *still* could be the case that in the normal course of embryological development a *later* pre-embryo could be numerically *distinct* from each preceding pre-embryonic organism in its spatiotemporally continuous developmental lineage in virtue of having undergone certain significant structural or functional changes. This, it has been claimed, is in fact what occurs. The single significant change in functional architecture which has drawn the most recent attention is that, at a certain point in development, the pre-embryo develops a *brain*.¹³ And, it is claimed, just as mature live human organisms go *out of* existence when their brains die, so too human organisms come *into* existence when they are "brained," that is, when they come to possess (as an integrated, suitably functional part) a living brain. *Human life* begins when *brain life* (or *brain birth*) begins, just as *human death* is marked

by *brain death*.¹⁴ Depending on which functional or structural human landmark any given author is willing to count as a “brain,” the brain makes its appearance anywhere from the 2nd to the 20th week of gestation. It is especially common to hear the claim that brain life is coincident with the detection of electroencephalographic waves, which normally appear between the sixth and the eighth week of gestation.

Lockwood (1985), for example, asks us to consider controversies surrounding chemicals used for purposes of inducing early abortions (“morning after” pills). “The worry” in such cases, claims Lockwood (1985, 19), “stems from the fear that what is being destroyed or damaged is an innocent human being. That, on the present view, cannot be true. For newly fertilized human ova and week-old human embryos *do not yet have brains*. If the brain is what is crucial here, then we must conclude that, before the brain comes into being, there is no human being to worry about.” Lockwood (1985, 20) goes on to say that, “The suggestion is that we should apply to the developing embryo a criterion of *brain life* ... as a basis for saying when a human being comes into existence, that is the symmetrical counterpart of the criterion of brain death, used for determining when a human being goes out of existence, or at least when soul and body may be presumed to part company.” Lockwood appears to believe therefore that, necessarily, live human beings have live brains as (suitably functional) parts.

Given the alleged *symmetry* that has been proposed between *brain life* and *brain death* in these arguments, we shall call any argument of this type a *symmetry argument*. According to symmetry arguments, embryos *prior* to being brained cannot be numerically identical with embryos *with* brains, and, therefore, it is *brained* embryos to which we are numerically identical, not to any *non-brained* embryos. It is argued that the reason for this is that *we* are essentially live human beings, while “live” nonbrained embryos are *not* human beings at all; hence, we could not be numerically identical with “live” nonbrained human embryos. What then *are* “live” nonbrained human embryos if not live human beings? One claim is that they are the same kind of thing as brain-dead human “corpses” kept on “life support.” Of course, “live” nonbrained human embryos differ substantially from *formaldehyde-treated* (embalmed) corpses in virtue of nonbrained “live” human embryos’ having *living parts*, a characteristic that they share with brain-dead “corpses” whose hearts are beating and whose bodies are undergoing myriad metabolic processes and who are hooked up to respirators. In fact, unlike such respirator-sustained brain-dead “corpses,” practically *all* (or all) of the (whole cellular) parts of nonbrained embryos are alive. Yet it would be illicit to infer from the fact that all of something’s *parts* are alive to the thesis that the (at least apparent) whole which is composed of those parts is alive.¹⁵

So, one possible answer to the question “If symmetry arguments are sound, what *are* ‘live’ non-brained embryos?” is “‘Live’ non-brained embryos are immature dead human beings.”¹⁶ Another (epistemically) possible answer is

that they are live organisms that are human, but not live human beings, just as one might claim that a (detached, single) live human liver cell is a live organism that is human yet not a live human being. A third possible answer is that they are neither single organisms nor dead organisms but aggregates composed of several live human organisms all huddled somewhat loosely together. A fourth possible answer is that they are live human *beings*, but not live human *persons*.¹⁷ There are other possible answers. However, understanding the metaphysical status of “live” *non-brained* embryos in light of symmetry arguments is not as relevant to our purposes as the primary thesis that spawns these myriad epistemic or ontological possibilities in the first place, namely, the claim that “necessarily, live human beings have live brains as parts.” Is this thesis itself plausible?

There are several ways of responding to symmetry arguments. I will discuss only two. First, there is reason to believe that the symmetry breaks down on the “death side” of the thesis in light of the provocative, but highly plausible (from my point of view), counterthesis that brain death is *not sufficient* for human death. If brain death is not sufficient for human death, then no symmetry claim remains; in other words, if brain death is not sufficient for human death, then we have no distinctive symmetry reason to think that, necessarily, live human beings are brained organisms.

The Uniform Determination of Death Act (UDDA, President’s Commission for the Study of Ethical Problems in Medicine and Biomedical Research, 1981) targets brain death as critical for human death. Relatively recently one of the coauthors of the UDDA, James L. Bernat, M.D., (1998) has defended that Act’s conceptual core, namely, a “whole-brain” conception of death which, he repeatedly states, is both sufficient *and necessary* for the death of human beings (or organisms).¹⁸ It follows immediately from this claim that nonbrained “live” human embryos, if human beings at all, are dead human beings. (The claim here is *not* that “live” nonbrained human embryos are not *single* or some *determinate* number of *live* human beings, but that they, like whole-brain–dead humans, are *dead* human beings *simpliciter*.)

It is quite clear to me that human pre-embryos *are* live human organisms and that their being alive has nothing at all to do with their having cerebral hemispheres or brains stems or thalami, etc. I have argued elsewhere that there is an abundance of biological data to support the claim that human pre-embryos *are*, in van Inwagen’s (1990, 146) terms, “caught up in a continuing, homeodynamic event,” that they are whole human lives, single things in themselves, and therefore that live human pre-embryos are single human organisms.¹⁹

According to a small but growing number of thinkers,²⁰ some *whole-brain–dead adult humans* are also *live human organisms* in virtue of the fact that they, in essence, like live human pre-embryos, are also caught up in continuing homeodynamic events, that they too are single live human organisms. These thinkers reject whole-brain conceptualizations of death,

claiming that although brain death is *necessary*, it is *not* also *sufficient* for human death. (Bernat calls these thinkers, misleadingly as I see it, albeit conveniently, “circulationists” since their view entails that permanent circulatory cessation is sufficient for death.) On this view, a human organism dies when it becomes biologically *disintegrated*, that is, when its integrity *as an organism* is compromised. The circulationist’s counterclaim, then, is that whole-brain death does not appear to be sufficient for organismic disintegration.

One reason that, at least for *mature* human organisms, whole-brain death has, historically, been so widely believed to be sufficient for human organismic death, as noted by pediatric neurologist D. Alan Shewmon, M.D. (1997), is that the brain is commonly thought of as the body’s *central processing unit* or as the body’s *integrator*. This is precisely what many circulationists deny. In addition, according to Bernat, the brain is privileged with respect to death in virtue of its “irreplacability” (1998, 19) either via transplantation²¹ or via a machine. Curiously, Bernat raises this issue in the context of what he calls his “final proof of the validity of the whole-brain criterion” directly after he introduces Tomlinson’s (1984) discussion of the “important distinction between a function and the mechanism that performs that function” (1998, 19). According to Bernat, “[Tomlinson has] correctly observed that what is important for a death criterion is *whether* a function is being performed adequately, not necessarily *how* it is being performed” (1998, 19).

Tomlinson certainly is correct about this with respect to the respiratory and circulatory systems whose functions *can* be performed by structures (e.g., man-made machines) other than hearts and lungs. But in addition, it also appears clear that there is something more basic to the process of respiration than the inhalation and exhalation of gases and something more basic to the process of circulation than the movement of blood, namely, there is *gas exchange* with the environment and *fluid movement* primarily in the service of nutrition, excretion, and other vital organismic metabolic functions, respectively. The *purpose* of inhalation and exhalation by way of our lungs is to exchange gases in order to carry on the business of metabolism in the service of organismic survival and, ultimately, organismic flourishing. Certainly, *this* process could take place without what we would, at first blush, call “lungs,” whether artificial or organic; *mutatis mutandis* regarding circulation. In fact, there are a multitude of organisms that have nothing that most of us would have previously been willing to call “hearts” or “lungs” but which exchange gases and circulate fluids nonetheless, all in the service of an organism’s survival and ultimate well-being.

Well, suppose we take Tomlinson’s point quite seriously. Suppose we call *whatever it is* that exchanges gasses with the environment a “lung” and *whatever* aids in the dispersion of fluids throughout an organism’s body (for the purpose of metabolism, growth, etc.) a “heart.” In that case, *all* live organisms have hearts and lungs that are simply structured very differently

than *ours*. An amoeba, for example, although it does not have paired organs (or *any* organs, for that matter) that in any obvious way structurally resemble our lungs and although it does not have a four-chambered pumplike organ composed, primarily, of myocardial cells, it manages very well to exchange gases with its environment and manages very well to disperse fluids throughout its body (for the purpose of metabolism, growth, etc.), respectively. Based on Tomlinson's view, therefore, amoebae do not, strictly speaking, *have* lungs or *have* hearts, they *are* lungs and *are* hearts. A single amoeba—a single cell—is, on this view, *at once* a heart *and* a lung *and* a whole organism.

As go the heart and lungs, so goes the brain. If what is sufficient for something's being a brain is that it carries out a brain's *functions*, and *if* critical brain functions include maintaining vital functions and organismic integrity,²² then not only is it *false* that early human pre-embryos are *nonbrained* organisms, but there is a deep and important sense in which early human pre-embryos *are brains*. What I am suggesting is this: add to the other good reasons not to embrace the standard conclusions drawn from symmetry arguments the following: Symmetry arguments are sound only if early human pre-embryos are not live brained organisms; however, early human pre-embryos *are* live brained human organisms—in fact they are *live human brains*. But if this is so, then assuming the truth of the symmetry thesis, live early human pre-embryos *are* live human organisms.

Thought experiments involving brains are commonly invoked in the contemporary philosophical literature. Several epistemologists, for example, are preoccupied with brains-in-vats (e.g., Putnam, 1999); some metaphysicians worry about how brain transplants or brain fission might bear on issues pertaining to personal identity (e.g., van Inwagen, 1990; Merricks, 1997); and many contemporary philosophers of mind insist that the human brain—or some proper part of it—is identical with the human mind (following the seminal work concerning “identity materialism” found in Smart, 1959). Although this focus on brains in philosophy has become commonplace, I am concerned that very little has been done to clarify *what brains are*. Just as van Inwagen (1980) has felt the pressing need to investigate how philosophers use the term “human body,” I believe it is high time that we take a closer look at how contemporary philosophers are using the term “human brain” in an attempt to clarify what, precisely, we mean when we use the term “human brain.”

Some of the most sophisticated philosophical discussions concerning the ontology of human brains are provided by Johnston (1987), van Inwagen (1990), and Shewmon (1998). Shewmon, for example, discusses in great detail the thesis that human brains are the central processor of human organisms and, ultimately, rejects this thesis. The human organism, according to Shewmon, is integrated—and, in virtue of this integration, is *an organism* in virtue of an organizing biological principle that is, for lack of a better metaphor, diffusely distributed (and, hence, not localizable in the brain). Just as *non-brained*

organisms (as traditionally understood, such as amoebae) do not require brains (as traditionally understood) for mediating organismic integrity, neither do *brained* organisms (as traditionally understood). Counterexamples to the “brain-as-central processor” view abound, according to Shewmon. He goes on to provide counterexamples from clinical practice that, he believes, demonstrate the falsity of the “brain-as-central processor” theory.

Little, however, in the context of the questions with which we are faced regarding early human embryology—particularly the question concerning brain life and, derivatively, the claim that human pre-embryos are human brains—hinges on whether or not Shewmon is right.²³ Suppose, for example, that Shewmon is wrong, that is, suppose that the human brain *is* the human body’s central processor. In that case, if I am right, it follows that the pre-embryo’s *body* is *identical* to its brain and that the pre-embryo’s brain appropriately (i.e., in a brainlike way) integrates itself, or alternatively, integrates its body (i.e., is its central processing unit). And, on the other hand, if Shewmon is right, that is, assuming that the human brain is *not* the human body’s central processing unit, then the human pre-embryo needs no brain to be a live human being, *contra*-symmetry thesis advocates.

In fact, if human pre-embryos are human brains, advocates of the symmetry thesis have it exactly backwards: Rather than live human pre-embryos’ *developing brains* during the course of embryonic development by way of tissue differentiation from relatively less differentiated pre-embryonic *bodies*, these pre-embryos *develop* (more differentiated) *bodies* by way of tissue differentiation from relatively less differentiated pre-embryonic *brains*. Human pre-embryos are, to be sure, quite immature human brains. The cells that constitute them, for example, are, on the face of it, structurally strikingly dissimilar to mature human brain cells. Still, they do the essential things that mature brain cells (i.e., neurons) do, albeit given their immaturity not as effectively: for example, and centrally, they communicate with each other electrochemically in the course of subserving the developing organism’s vital and integrative functions (or, in the case of the single zygotic cell which, by way of channels of intracellular communication, acts to integrate itself).

V

Grimes (1997) has recently drawn attention to the fact that multiple medical organizations define “pregnancy” in such a way that following conception but prior to implantation, a woman is *not pregnant*.²⁴ Pregnancy, according to Grimes and the organizations that he cites, requires implantation. Of course, nothing of metaphysical or ethical interest follows from a mere definitional stipulation such as this one. What if, however, Grimes is pointing not merely to a *definitional* change concerning the onset of pregnancy at the moment (if there is any such nonvague “moment”) of implantation, but a deep *metaphysical* change in the pre-embryo and mother at

that time? What if, for example, one were to claim that, prior to implantation, since the woman carrying the preimplantation embryo is *not pregnant*, she could not possibly have *an abortion*. In other words, what would prevent one from advancing the claim (as advanced, for example, by Dr. Grimes²⁵ himself, 2002) that it is impossible for “morning after” pills—chemicals that, in many cases, kill the preimplantation embryo—also to be abortifacients, since abortifacients cause abortions, and abortions require pregnancies. On this view, those women with serious moral objections to abortion need not have any moral objections to the intentional killing of their *preimplantation* embryos with pharmaceutical poisons, since even when the killings are carried out as intended, no *abortions* have taken place.

For all of its mischief and foolishness (the details of which are left as an exercise for the reader), this kind of argument generates some welcome side effects. For example, it brings attention to metaphysical and moral puzzles involving embryo implantation. *Is* implantation in any way a *morally relevant* event in a manner that marks *pre-implantation* embryos as proper objects of intentional killing in a way that, perhaps, *post-implantation* embryos are not? I cannot see that it marks any such moral boundary in the stated direction, but it does raise at least one important question in the *opposite* direction; namely, is there something about implantation that *destroys* the identity or individuality of the embryo? What if, for example, embryos were single living human things *prior* to implantation, but then were *no longer* single living human things *following* implantation? What if, to be specific, at implantation, embryos become *mere parts* of their mothers? If, at implantation, a real change occurs and embryos become mere parts of their mothers, then what was before a thing in its own right (the preimplantation embryo) is now merely a part of some other thing (namely, its mother). But no thing that is merely part of some other thing could be a human person, for human persons are things in their own right and no thing in its own right could possibly be a mere part of something.

One popular answer to the question, “At the moment of implantation, do human embryos become parts of their ‘mothers?’” is, “Of course not. The ‘mother’ and the embryo have different DNA. Hence, they must be different organisms.” This answer (call it *A*) suggests that having different DNA is sufficient for being a distinct organism. But (barring the truth of mereological essentialism) this could not be right, for it is possible for human organism *O* to have DNA that *differs* from one (even quite mature) stage of its development to another. Suppose, for example, that as a result of exposure to nuclear radiation *all* of *S*’s DNA develops point mutations at some time *t*. Then, if *A*, *O* would be a different human organism at *t* than *O* was at *t* – 1. In fact, one need not even be this fanciful about it. It is *simply false* that our DNA remains static during the “normal” course of development. Yet surely we would all agree (all, of course, except for diehard mereological essentialists, for

whom *any* change is a *critical* identity-altering change) that we remain the same organism over the course of this time.

What makes some *x* a *thing*, as opposed to “a collection of things” or “neither a single thing nor a collection of things” is, as van Inwagen (1990) has taught us, a vexed metaphysical issue. However, there are uncontroversial cases: two hamsters sewn together do not, suddenly, become one thing. So, too, sewing together—or more intimately yet, *biologically fusing* together—two human organisms, regardless of their stages of development, does not suddenly cause two things (i.e., two things that are both unified homeodynamic systems) to collapse into one. Those of us who are inclined to endorse the existence of composite things (*pace* Unger) are likely to believe that there are all sorts of composite things in the world, perhaps some that more robustly exemplify the *thinghood* property than others. I believe, for example, that my 3-year-old son, Aris, is a composite thing, that my Poljot watch is a composite thing, that my 1921 Peace Dollar is a composite thing, and that an atom of lithium is a composite thing. Aris, however, is a composite thing unlike all of the others because he is a biological organism who is caught up in what van Inwagen calls “a life”—a life that is constituted by an enduring homeodynamic event that is unified, connected, integrated into a biological whole. But 3 years of age is not the only time in Aris’ life at which he is so unified. As has been argued elsewhere (Howsepian, 1992, 1997), that zygote that is spatiotemporally continuous with Aris and every other stage of the whole embryonic life that is spatiotemporally continuous with that zygote also shares with Aris this property. “Aris-the-pre-embryo,” for example, prior to implantation is a single life, distinct from the life of his mother in virtue of the fact that Aris-the-pre-embryo and my wife (his mother, Barbara), regardless of the asymmetrical dependence relation that obtains between them, are not caught up in one and the same unified homeodynamic event: Barbara’s cells and Aris’s cells “hang together” in a way that “Barbara and Aris” cells do not. Nothing changes in this regard *after* the interhuman fusion that we call *implantation*: “postimplantation Aris” and Barbara retain the identities that they possessed prior to implantation, they retain their individuality and the distinctness of their *lives* (although they do not retain their *way of living*). What might be a source of confusion regarding *pre-embryonic implantation* and its mereological consequences is that the thing that implants appears (to our eyes) *so unlike* a thing in its own right—indeed, from whichever angle it is viewed, whether implanted or not, it appears rather more like a blob or a speck—that when it integrates itself in such a biologically intimate way with an unmistakable human being (namely, its mother), it appears to *disappear* into a *mere part* of that human being. Of course as intrauterine development progresses this confusion fades—or at least it should, for that which develops appears more and more unmistakably to be a being like you and I. So, to cite an extreme example, were we now to take 3-year-old Aris and surgically reintroduce him into his

mother's uterus and surgically fuse some of his membranes with hers and make him again dependent upon her for his survival, this confusion would certainly not arise. In that case we would clearly and distinctly perceive that we would not thereby have only one organism, "Aris-Barbara," rather, it would be much clearer and more distinctly obvious that the same two organisms would persist *following* the surgical procedure as existed *prior*, only in much more cramped living quarters.²⁶

VI

I have ventured in this essay to provide answers to four provocative metaphysical queries concerning early human embryogenesis. In summary, I have answered these queries in the following ways. First, although we may not be able to *know* which one of a pair of human blastomeric twins is identical to its parent zygote, if all objects have quidditative properties or if there simply is no further fact concerning identity over time, then in spite of our epistemological limitations regarding which blastomeric twin is identical with the parent zygote, it is coherent to claim that one and only one member of the pair of blastomeric twins is, in fact, numerically identical to its parent zygote; second, *mutatis mutandis*, regarding the fusion of a zygote's twinned daughter blastomeres; third, the symmetry thesis fails because either human pre-embryos *are brains* or brain death is not a sufficient condition for human death; and, fourth, pre-embryos—or any other living organisms—that are connected to adult humans (or to anything else) by implantation (or by any kind of biological tethering or fusion or by any other connection that does not destroy the integrity of the living organisms so connected) do not, in virtue of this connection, cease to *be*, that is, they do not cease to be things in themselves and, instead, begin to be mere parts of something else. If these answers are correct then, in light of the clear spatiotemporal continuity between human zygotes and us, and assuming that we are essentially human persons, it is plausible to believe that live human zygotes, or human pre-embryos generally, are live human persons. We would, as I have argued, be wholly justified in believing that human pre-embryos could not possibly be live human persons if they really were an indeterminate number of things, or if they were not living things, or if they were not things at all (e.g., if they were merely parts of something else or if they were mere aggregates of simpler things). The critical point is that, if I am right, there are no good reasons—based on twinning, recombination, implantation-related mereological, or "brain life/brain death" symmetry considerations—for believing that live human pre-embryos (including live human zygotes) are not, *like us*, single, live human persons. *Unlike us*, however, all such single live human pre-embryos are innocent or, at the very least, are not guilty of anything whatsoever.

NOTES

1. As has famously been argued by Thomson (1971).
2. According to the Congregation for the Doctrine of the Faith (1987), "Certainly no experimental data can be in itself sufficient to bring us to the recognition of a spiritual soul; nevertheless, the conclusions of science regarding the human embryo provide a valuable indication for discerning by the use of reason a personal presence at the moment of this first appearance of a human life: how could a human individual not be a human person? The Magisterium has not expressly committed itself to an affirmation of a philosophical nature, but it constantly reaffirms the moral condemnation of any kind of procured abortion."
3. I shall be using the terms "human organism," "human being," and "human person" interchangeably, recognizing that there are those—including me—who make distinctions between them. Human beings are, as I see it, *essentially* human persons and, perhaps, also essentially human organisms.
4. The late Roman Catholic philosopher G. E. M. Anscombe appears to have held just such a view.
5. Robertson (1995, 37) concurs, claiming without qualification that preimplantation embryos are "not yet truly individuals." Other considerations which influenced the panel's conclusion regarding the moral status of human pre-embryos included the following: (i) there is a very high natural mortality rate during the early stages of human embryogenesis and (ii) human pre-embryos lack the mere possibility of sentience. The panel did, however, assert that preimplantation embryos deserve "special respect" and "serious moral consideration as a developing form of human life," reflecting the panel's continuity of thought with the 1979 Ethics Advisory Board of the (former) Department of Health, Education, and Welfare which concluded that human embryos deserve whatever measure of "profound respect" that is compatible with the ethical permissibility of early abortion.
6. There are yet other conceptual possibilities. Philosopher Peter Unger (1979), for example, does not believe that there exist any composite objects at all. In that case, pre-embryos would be neither things nor parts of things, since there would exist no composite things of which they could be parts.
7. In addition, there are certain to be at least minor mutations in chromosomal DNA in the process of a large number of cell divisions that occur in organisms that are as complex as humans.
8. To make the strongest possible case.
9. One other (at least epistemic) possibility is that the two twinned blastomeres comprise a single (scattered) object. In that case, neither blastomere would itself be an object.
10. In fact, two or more distinct objects that share *all* of their qualitative properties *must* have different quidditative properties.
11. Sometimes the term "pre-embryo" is used to designate the organism in question. This term is ambiguous between, on the one hand, something that is an embryo but that has not yet undergone implantation (hence a *pre-implantation* embryo) and, on the other hand, something that is not yet an embryo (hence a *pre-embryo*). My use of this term is meant to be neutral between these (or any other plausible) senses of this term. What is of central importance for purposes of this essay is not whether the pre-embryo is or is not *an embryo* (unless, of course, this distinction marks any of the differences to follow), but whether it is a *determinate* thing, or a *single* thing, or a *multiplicity* of things, or a *human* thing, or a *person* thing, or a *living* thing, etc.
12. One of the earliest of such denials can be found in Brody (1975).
13. Other properties that philosophers have thought to be essential to personhood include *inter alia* having the concept of a continuing self (Kushner, 1984; Tauer, 1985; Tooley, 1986). The fact that few believe that neonates have a concept of a continuing self commits the adherents to this view to the moral permissibility of infanticide under a variety of otherwise morally objectionable conditions.
14. See, for example, defenses of this thesis by Brody (1978), Goldenring (1985), Bennet (1989), Jones (1989), and Sass (1989).
15. This would constitute an instance of the "fallacy of decomposition."
16. In an effort not to "darken counsel," it is appropriate to point out at this juncture that van Inwagen (1990) has given us good reason to believe that there are, strictly speaking, no *things* that are dead human beings.
17. On this understanding of "brain life," the symmetry constraint is violated, since brain death is considered not merely the death of the human *person* but also the death of the human *being*.

18. As noted in note 3, I shall be using the terms “human being” and “human organism” interchangeably. Perhaps Bernat meant his conception of death to apply *only* to “mature” human organisms. This latter alternative seems unlikely given Bernat’s insistence on a *univocal* definition of human organismic death (unless, perchance, Bernat does not even consider pre-embryos to be *organisms*).

19. As argued in Howsepian (1992, 1997). For related discussions concerning pre-embryonic twinning and mereological considerations concerning an embryo’s connection to its mother (as will be discussed in Part V), see Ford (1988), Olson (1997), and Smith and Brogaard (2003).

20. See, for example, Seifert (1993) and Shewmon (1997).

21. Although van Inwagen also believes that brain transplantation is impossible, Bernat’s reasons for thinking this differ from van Inwagen’s. According to van Inwagen, brain transplantation is impossible because “where the brain goes, the person goes,” whereas for Bernat, such transplantation is impossible in virtue of its being beyond the reach of transplantation technology. Even if van Inwagen’s metaphysical principle is false, Bernat is still mistaken: head (and *a fortiori*, brain) “transplants” (or, more accurately, “body transplants”) on monkeys have already been performed by neurosurgeon Dr. White, et al. (1971).

22. As noted by Bernat (1998, 17). Bernat unconvincingly adds “consciousness” as a third “critical function of the organism as a ‘whole’.”

23. On the other hand, much hinges on Shewmon’s thesis in the context of transplantation medicine and the diagnosis of human death in other contexts.

24. Dr. Grimes (1997) approvingly cites in this regard Hughes (1972).

25. According to Dr. Grimes (2002, 847), “Some opponents claim that the term ‘emergency contraception’ is a euphemism for early abortion and that over-the-counter access will lead to more abortions. In fact, emergency hormonal contraception cannot disrupt an established pregnancy. Medical organizations and the U.S. government concur that implantation marks the beginning of pregnancy. If emergency contraception works after fertilization but before implantation, no abortion has occurred, since no pregnancy was established.”

26. I have recently argued (Howsepian, 2005) that at times *ethical reflection* rather than additional metaphysical speculation might be what is most urgently needed in this domain in order to deepen *metaphysical understanding*. In that essay, I suggest that, perhaps, it becomes most clear that unborn humans are not mere parts of their mothers, but something much more *personal* than that, by considering the reasons why ‘fetophilia’—sexual contact with unborn humans—is morally objectionable.

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