Article

Identifying organisms

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Defenders of human, embryonic, destructive stem-cell research and early abortion typically argue for their position by showing that you and I do not come into existence at conception but rather at some point after. Eugene Mills has provided an ingenious argument that you and I could not have come into existence at conception. I argue against Mills's argument on two counts: first, his argument depends upon a cursory limning of human conception, and when fuller details are considered, a premise in his argument is undercut. Second, Mills's argument invites us to ask questions about how to identify individual organisms. Given a fuller description of human conception and some plausible metaphysical principles, I argue that Mills should hold instead that you and I do in fact come into being at conception.

Summary: One way to argue that early abortions are permissible is to argue against the view that you and I come into existence at conception. Most abortion rights defenders argue for this conclusion by noting that in order for you and I to exist, there must be developed psychological capacities. Eugene Mills takes a different route and argues that you and I could not come into existence at conception because that would mean being identical to an egg – which he rightly notes we cannot be. I argue against Mills in this article.

Keywords: Abortion, Organisms, Embryological development

INTRODUCTION

An article by Eugene Mills (2008) argues that a new human being does not come into existence at the point of conception. He says, “Regardless of your moral attitude toward abortion, you probably hold that human biological conception—the fertilization of the egg ... creates a new being” (2008, 324). Mills goes on to argue that this view of human origins is mistaken. Rather, you must have come into being either sometime before or after conception. Since coming into being before conception is absurd, Mills argues that you and I must have come into existence after conception. Mills’s argument

is clear, provocative, well thought out, and I believe, ultimately unpersuasive. In this essay, I aim to argue that his argument is unconvincing for two reasons. First, Mills provides an insufficient description of early human development and what he leaves aside is ontologically relevant. Second, Mills fails to tell us what counts as an individual organism; he provides no criteria by which to say that you and I do (or do not) come into existence at conception. He appears to appeal to a simple look-and-see approach – this attribution is justified in the following section. Using Mills’s own approach and given a more comprehensive description of early human development that I provide, a view opposite of

Mills's view emerges. I first present Mills's argument, and then turn to critique it on the two counts noted.

MILLS'S ARGUMENT

Mills supplies us with a very clear disjunctive syllogism that runs as follows. Either I am identical to my¹ zygote or I am not so identical (I am related to my zygote something like a butterfly is related to its caterpillar "out of" which it develops). Consider the second disjunct, namely, I am not identical to my zygote. Assume also that "gappy existence" is not likely. Gappy existence would be something like passing in and out of existence. There are at least two reasons against gappy existence. First, no *one* thing can have *two different* beginnings (Toner 2015-). Second, if you and I are human organisms, and organic identity over time requires the continuous existence of *the organism* in question, then you and I cannot come in and out of existence. Therefore, if I am not identical to my zygote and gappy existence is impossible, it follows that I did not exist during, nor before, the existence of my zygote. Lastly, assume that conception occurred either before or during the existence of my zygote. It follows that if I am not identical to my zygote, then I did not come into being at conception, but rather, sometime after.

Now consider the first disjunct according to which I am identical to my zygote. According to Mills, on this assumption a zygote is a fertilized egg. "A fertilized egg doesn't pop into existence upon fertilization; it exists, unfertilized, before its encounter with the fertilizing sperm" (Mills 2008, 327). It follows that, "if I was once a fertilized egg, then I was once an unfertilized egg" (Mills 2008, 327). But since conception marks the point of fertilization, I did not come into being at the point of conception. Rather, I must have come into being before conception (which is absurd). Therefore, if I

am not identical to my zygote, early abortions would not kill me. And the view that I am identical to my zygote leads to absurdity.

Mills correctly spends most of his time defending the proof stemming from the first disjunct. Of course, the key premise is his claim that the fertilized egg "doesn't pop into existence upon fertilization...." Mills's defense of this claim seems to be as follows:

Review some sex education materials; watch, via microscope, the fertilization of an egg. You see an unfertilized oocyte—the one-celled human egg. A sperm approaches and, after traversing the corona radiata and zona pellucida, contacts the egg's cell wall. The sperm breaches that wall, enters, and dissolves, discharging its contents. The breach in the cell wall is immediately sealed. *The most natural description of these events is that you've watched one egg become fertilized, not the annihilation of one organism and the creation of another.* (2008, 328, emphasis added)

Mills admits to not offering any principle of organismic identity. He suggests that we simply look and see the process of fertilization and upon such an experience we would come to the same conclusion: *the egg* gets fertilized and a new organism does not come into being. He states, "Throughout the process of fertilization, there's just a single living cell relevantly in view. After the absorption of the spermatid material, this cell undergoes rearrangement of its internal parts, and in particular of its genetic material" (2008, 329). And he concludes, "there's simply no basis in ordinary views of cross-time organismic identity for the idea that full absorption of spermatid genetic material extinguishes the oocyte" (2008, 329–30). The riposte to Mills view here is that if the zygote is a fertilized egg, the morula would be a multiply divided fertilized egg, and the blastocyst would be a multiply divided/differentiated fertilized egg and so on. It follows that you and I are very complex, developed eggs. Such

a view is preposterous of course, as Mills would acknowledge. I entertain in the following sections whether Mills has principled resources for blocking this *reductio* argument.

INDIVIDUATING ORGANISMS

Mills happens to be a particularly clear-headed proponent of the view outlined. I argue two points in response to his argument. The first is that he has selected paucious details of the fertilization events and that other details would suffice to show (using his own look-and-see method of identifying organisms) that a new organism comes into being at conception. My second point will be more of a recommendation than a criticism in that Mills cannot endorse his own argument without embracing a specific view of organismic identity. Briefly, the reason is that Mills himself notes in response to certain objections that there come to be “significant changes” (2008, 330) between the egg and the development of the zygote. Clearly, the look-and-see method articulated in the long quotation above is on tenuous ground and an impasse is likely between the critic and Mills. To motivate the view that there is one organism that persists through the “significant changes,” Mills needs give us principled reasons for thinking that the changes that occur at conception and immediately thereafter are not significant enough to conclude that a different organism came into being. Before considering these points, I observe some minor ripostes to certain aspects of Mills’s argument. These replies indicate that there are significant costs to accepting his view, and my main criticisms show that there is nothing to gain.

Minor demurrals

Before considering my first point, there are some ancillary observations of Mills’s

argument that need to be made clear. First, Mills challenges his readers to review the embryology literature to find commitment to the view that conception originates human life. He says, “You’ll look in vain in the embryology literature for any hint that conception is anything other than an important event punctuating—not originating—the life of a single being” (2008, 333). Mills fails to distinguish between punctuating and originating. In any case, the literature quoted immediately below supports the view that human beings come into existence at conception. The following quotations, I hope, will be sufficient to meet Mills’s challenge.²

Almost all higher animals start their lives from a single cell, the fertilized ovum (zygote).... The time of fertilization represents the starting point in the life history, or ontogeny, of the individual. (Carlson 1996, 3)

The development of a human being begins with fertilization, a process by which two highly specialized cells, the spermatozoon from the male and the oocyte from the female, unite to give rise to a new organism, the zygote. (Langman 1975, 3)

Zygote. This cell, formed by the union of an ovum and a sperm..., represents the beginning of a human being. (Moore and Persaud 1993, 1)

Although human life is a continuous process, fertilization is a critical landmark because, under ordinary circumstances, a new, genetically distinct human organism is thereby formed.... The combination of 23 chromosomes present in each pronucleus results in 46 chromosomes in the zygote. Thus the diploid number is restored and the embryonic genome is formed. The embryo now exists as a genetic unity. (O’Rahilly and Müller 1996, 8 and 29)

The term conception refers to the union of the male and female pronuclear elements of procreation from which a new living

being develops. It is synonymous with the terms fecundation, impregnation and fertilization ... The zygote thus formed represents the beginning of a new life. (Greenhill and Freidman 1974, 17 and 23)

Fertilization is a sequence of events that begins with the contact of a sperm (spermatozoon) with a secondary oocyte (ovum) and ends with the fusion of their pronuclei (the haploid nuclei of the sperm and ovum) and the mingling of their chromosomes to form a new cell. This fertilized ovum, known as a zygote, is a large diploid cell that is the beginning, or primordium, of a human being. (Moore 1988, 2)

This should suffice to indicate that Mills has not defended his empirical premise to any extent. The cost of taking up Mills's view is that it conflicts with almost universal agreement by embryologists on when human life begins.

The first response: Cells versus organisms

Now we can consider the event of fertilization and my first point. At issue with Mills's argument is whether or not the sperm or the oocyte alone are different *cell types* from the zygote. To avoid arbitrary decisions on distinguishing cell types, two criteria are used: composition and behavior.³ Cells with different composition will have different genetic composition and gene expression, and different proteins will be produced, and so forth. Behavior refers to the developmental pathway that an organism manifests, which is largely a function of having a different composition. Maureen Condic states,

When cells are classified into specific types, differences in either composition or behavior are the bases for all *scientific*, as opposed to *arbitrary*, distinctions. If, for example, scientists were to propose that during embryonic development a novel cell type exists between a neural crest and

a sensory neural progenitor cell, they would have to *prove* this assertion by pointing to specific material or behavioral characteristics. (Condic 2008, 3)

Different organisms will develop along different developmental pathways and will be composed of different molecular components. Such is the case between zygote and unfertilized oocyte.

Furthermore, we need to distinguish between a human *cell* and a human *organism*. On this distinction Nicanor Austriaco notes that a cell cannot survive on its own and requires a human organism for its existence.

Even when severed from the organism and isolated in a tissue culture dish, the human cell relies upon a human organism, either the scientist or the lab technician, to maintain the appropriate laboratory conditions it needs to live. In contrast, the human organism is self-sustaining and able to survive as an independent entity throughout its lifespan. (Austriaco 2002, 664)

The importance of this second step (distinguishing cell from organism) is that at issue is whether the behavior and composition of the zygote distinguishes it from the unfertilized oocyte *and* whether the zygote is an organism. If you and I are organisms, and the zygote is not, you and I cannot be identical to a zygote. Austriaco's observations however, indicate that the zygote is an organism. In addition to having independent existence and the ability for self-repair, two other important properties that organisms have and cells do not have is growth and development (Richardson 2000). Growth refers to the size and maturation of the organs in the organism itself. Development refers to the organism's ability to have its distinct parts ordered to the end of species-specific maturation. This includes not just survival, but also development of

species typical potencies or powers. This is exactly what we see with the zygote; we see growth and development, not the behavior of a stand-alone cell.

Thus understood, we can see why Mills's description of the events of fertilization is accurate but insufficient. He is right to point out that the sperm and oocyte "contact the egg's cell wall" (Mills 2008, 328). More technically, the membranes of these two cells fuse forming the zygote⁴ which now has molecular material from *both* sperm and egg. The "egg"⁵ now has a different biochemical composition than what it had prior to the sperm dispensing its DNA into the egg. Condic notes that "because the zygote arises from the fusion of two different cells, it contains all the components of both sperm and egg, and therefore the zygote has a unique molecular composition that is distinct from either gamete" (2008, 3).⁶ This new molecular composition initiates a series of changes in the newly formed zygote most notably two: first, chemical modifications are made to the zona pellucida which prevent fertilization by more than one sperm.⁷ The significance of this is that the new zygote loses a key property that the unfertilized oocyte⁸ had, namely the ability *to be* fertilized. Such an ability is a key factor in denoting what the egg is and what the zygote is not. Since the zygote does not have such a property, we are well within our rights to say we have a different organism in virtue of its not having a core potency of the oocyte. Second, the zygote manifests potencies associated with coordinated growth and development, self-repair, and sustained metabolic activity. Each of these behaviors is not indicative of the gametes alone – as previously noted. It is important to note in this regard that the unfertilized oocyte dies within 24 hours, and the sperm dies within 1–5 days; but the new living system may live on for seventy to eighty years. "Clearly,

then, the prior trajectories of sperm and egg have been abandoned, and a new developmental trajectory—that of the zygote—has taken their place" (Condic 2008, 3).

However, suppose Mills demurs and draws my attention to the fact of the sperm breaching the oocyte's cell wall and discharging its contents. Any change that takes place from henceforth is a change *in the egg*. Is it not obvious, he may ask, that *the egg* has become fertilized?

Contrary to Mills, what is obvious to me is that the zygote and the gametes that precede the zygote in time and development are different kinds of things. I believe they are different kinds of things not merely by "watching" the events of fertilization take place, but rather, with reference to the distinct potencies, behaviors, and composition that characterize the respective things—the gametes on the one hand and the human organism at the zygotic stage on the other. As already noted, the first moment in conception involves sperm/egg dissolution according to which the (now) zygote blocks fusion by other sperm. Additionally, the sperm entry point affects the body axis of the embryo later on in development. This suggests that the first few seconds of conception prefigures what happens 24 hours later. Leaving several details aside, other important events include meiosis according to which the zygote acquires a diploid genome. DNA replication occurs "in anticipation of the first division of the zygote that will not occur for another 15 hours" (Condic 2013, 54). Syngamy, according to which the two halves of the zygotic genome combine, is viewed by some as the beginning of human life. However, syngamy is dependent upon the meiosis and DNA replication (among other events) that preceded it, indicating that it is "merely another step in an already ongoing developmental process" (Condic

2013, 56). The full genome of the zygote is present at conception; and although the two halves of the genome fuse at syngamy, they function in a coordinated and unified way prior to that event.

It is hard to say more than this since Mills does not provide any other argument beyond asserting that the most natural description is that the egg becomes fertilized. In my view, this is clearly not the most natural description once we take into account the differences in powers, behaviors, and composition that follow conception.

The second point: Individual organisms - kinds and phases

The point of my response so far is to argue that when we consider a more comprehensive view of embryogenesis, one that includes looking at the distinction in composition and behavior between the gametes on the one hand and the zygote-morula-embryo-etc.; on the other, it becomes clear that the zygote is a stage in the development of a distinct organism, different in kind from the gametes.

A corollary of the idea that organisms grow and develop is that an organism preserves its identity through changes. Thus, there are phases of one and the same entity: zygote, morula, blastocyst, embryo, fetus, neonate, infant, toddler, and so forth. This may be a picayune observation to some, but these are treacherous waters wherein confusion threatens. The confusion concerns levels of identity. Identity is always specific to a sortal or category. I am the same human being as I was, when I was a boy; but I am not identical to the boy (I was) simply because I am no longer a boy. P.M.S. Hacker brings clarity here (2010, 38): "A human being may cease to be a child, while continuing to exist, and whereas the adult Sir Richard Roe is not the same boy as little Dick Roe, since he is not a boy, he *was* once that very boy and *is* the very same human

being as him." The same point applies to human beings earlier on in our development. A zygote is not identical to a morula, a blastocyst, an embryo, and so forth, but one and the same *human being* can develop through the zygotic stage, the morula stage, and so forth.

I go out of my way to mention this clarification because Mills seems confused on just this point. In developing his version of the twinning argument, he states, "there's considerable intuitive pull to the idea that given the similarities between B1 and B2 [the respective blastomeres resulting from the first stage of zygotic division], Z [the zygote] is identical either with both of them or with neither; and since it can't be identical with both, it must be identical with neither" (2008, 335).⁹ He uses the twinning argument to argue that you and I cannot be identical to the zygote. I have addressed twinning arguments elsewhere (Napier 2010) and will not rehearse all of my thoughts here. It will suffice to note that Mills's presentation of this argument is a bit muddled. He begins by noting that the zygote cleaves into two blastomeres (B1 and B2). It is unclear whether this is a case of monozygotic twinning, or if Mills is referring to normal embryogenesis in which the human organism at the zygotic stage experiences rapid cell division (without differentiation of cells into specific cell types). In any case, the conclusion of his argument is that "the organism that is the zygote ceases to exist when the zygote divides, and *each blastomere is a fresh creation*" (Mills 2008, 335, emphasis mine).

Properly understood, I find no intuitive pull to the idea that *the zygote* is identical to either (or neither) blastomeres that result from the first stage of zygotic division (assuming this is not a case of monozygotic twinning). The reason is that one organism is developing through different stages, and the stages are characterized by

cellular division. The zygote is not the same thing as the morula simply because the morula is not a zygote. However, the non-identity of *the different phases* of an organism does not compromise *the identity of the organism* through phases.

Furthermore, Mills seems to suppose that the initial cell division of the zygote destroys the zygote and initiates a new organism. But he can only maintain this view if he gives us an argument for why each blastomere is a different organism from the zygote—his argument from identity fails (see note 9). What is important to note is that the basic features of this explanation cannot be exploited to explain why the unfertilized oocyte is a *different* organism from the zygote since the denial of this latter claim is an essential claim in his argument.

Such an explanation would have to identify essential versus accidental features of organism-types. And this is a project that Mills explicitly avoids doing. Aside from the metaphysical problem just noted, there is an empirical problem with his position. Austriaco observes that

the earliest two-celled mammalian embryo is a two-celled individual and not two individual cells. From the very beginning, there is cooperation among the cells of the embryo, and the embryo manifests an integrity characteristic of intact organisms. It is a single molecular network. (2002, 671)

And long ago, Ludwig von Bertalanffy observed that, “the behavior of an isolated part is, in general, different from its behavior within the context of the whole. The action of an isolated blastomere ... is different from what it is in the whole embryo” (1952, 12). And, he concludes that “the characteristics of life are characteristics of a system arising from, and associated with, the organization of materials and processes” (1952, 12). The point is

simple: cell division by itself is not evidence that *the organism* has divided. Rather, the cells divide and eventually differentiate in order to maintain the survival and growth of the whole human organism.

Another observation regarding the metaphysical importance of development is aptly noted by Devin Henry. “The remarkable ability of a developing embryo to maintain, by itself, a constant trajectory towards its adult form has led many philosophers and biologists ... to see the process of development as being internally directed towards that form as its goal” (Henry 2005, 8). The importance of this observation is this: It is obvious that either sperm or oocyte alone do not have the properties of growth and development. Either alone, does not maintain a “constant trajectory towards its adult form” (Henry 2005, 8), but the human being at the zygotic stage clearly does.

Mills might suggest in response that the transition point from fertilization to human organism is a vague one.¹⁰ Contrary to this, the transition is quite clear keeping in view the trajectory of a new organism.

This brings me to my recommendation. When Mills considers certain objections to his argument, he admits that the oocyte undergoes significant changes but refuses to admit that such changes indicate that the zygote is thereby a different organism.¹¹ In the setting of a more detailed description of the fertilization process as previously outlined, it seems that the look-and-see method is insufficient to motivate Mills’s own argument. Mills needs to argue that differences in composition and behavior between zygote and oocyte are not altered *enough* to justify being different organisms. Or, he needs to tell us that differences in composition and behavior are not relevant for individuating organisms. Either project requires telling us what an organism is, or at least requires

giving us some scientifically valid procedure for distinguishing organisms and different cell types.

I note in the previous section that adopting Mills's view is contrary to the empirical evidence and plausible ontological principles, that is, (1) composition and behavior, and (2) cell versus organism. Is there not a high cost to the view I am espousing? What does the view I endorse say about hydatiform moles or cryopreserved embryos who are not manifesting growth or development?

To clarify my view a bit further, although fertilization initiates what Aristotle would call a substantial change, not all cases of fertilization are successful. That is to say, even if the sperm successfully discharges its DNA into the oocyte, and the zygote begins to develop, this does not necessarily mean that a human being exists. Hydatiform moles, for example, possess human cells in terms of their DNA, but they are clearly not human organisms for the simple reason that they do not develop *any* of the potencies prototypical of human beings. Furthermore, early development of hydatiform moles may look similar to normal embryonic development.¹² But, to use an example from Condit (2011), the "Alphabet Song" and "Twinkle, Twinkle Little Star" are two different songs whose first measure is exactly the same. We do not know they are different songs until the pianist gets to the second measure. But this hardly means that the pianist did not know himself what song she was starting to play. Likewise, we may not *know* that an embryo is a mere aggregate of human cells or a developing human being until several days after conception. But this hardly entails that the developing human being *is* a mere aggregate of human cells. In any case, my rejoinder to Mills remains. Normal human organisms develop through various stages, and we should not confuse the development to more mature stages of

one and the same organism with the creation of new organisms from those that precede it.

I should also note that some normal embryos fail to implant. Now this does not mean that such embryos are not human beings simply because they do not have a long lifespan. The key feature of my view is that they could have a long lifespan had they implanted. Failure to implant for an embryo is similar to failing to eat for an adult human.¹³ Such a failure to survive does not change the kind of thing that suffers death. The same idea applies to cryopreserved embryos. Cryopreserved embryos have their development arrested from without, but this does not change the nature of *that which* is frozen. Freezing an adult human being would arrest metabolic activity,¹⁴ but no one can deny that *what* gets frozen is an adult human being. The only morally relevant difference between a failure to implant and an intentional cryopreservation is that the latter is an intentional act which aims to arrest the development of a human being. As such it is an unjust *action*. The former (failure to implant) is not a case of a human being performing an action, unless the mother intentionally ingests an abortifacient. Some cases of failing to implant, however, are due to severe chromosomal abnormalities such that there is not a human organism at all. Again, not all cases of fertilization are successful.

CONCLUSION

Mills has not established his argument with much plausibility. I have argued that Mills has not considered further important details in the fertilization process, details that clearly suggest that the zygote is the phase of an organism different in kind from the unfertilized oocyte. Furthermore, I have suggested that using Mills's own method in

support of his premise that the fertilized oocyte is organically identical to the unfertilized oocyte (i.e., the look-and-see method) results at best in an impasse. I have argued that the method paired with an accurate description of the fertilization events suggests the very denial of Mills's premise.

NOTES

1. A few pedantic clarifications before proceeding. The term "my" here should not be understood to indicate substantial or numerical identity (or to indicate some notion of "developing out of"). Throughout my presentation of the argument, I follow Mills in using "my" neutrally. Also, the term "identical to" should be understood as "same thing as" to avoid the obvious rejoinder that I am not a zygote; and zygote is understood as a phase of a human being, much like juvenile, adult, and elderly refer to phases of a human being's life.
2. Many of the quotations included here were culled from <http://clinicquotes.com/category/quotes/scientists-speak/>. This site is managed and populated by Sarah Terzo and contains a wealth of important information.
3. The material presented in this section is heavily dependent upon the work of Condic (2008), Condic (2013), and Austriaco (2002).
4. By "zygote" here I mean a human organism in the single-cell stage of development. Understood as a phase-sortal, I effectively dodge Mills's reductio argument outlined on p. 334 ff, which considers the zygote simply as a single-cell organism. Mills's argument attempts to show that the zygote is not identical to the embryo, but rather coexists with it qua single cell. Understood as an organism in the single-cell stage—which it is—dodges the reductio.
5. I put in quotation marks the "egg" because Mills is right that on the view I endorse "eggs never become fertilized" (2008, 328). They can be fertilized, but not become fertilized. By never "becoming" fertilized, Mills means that if a thing is an unfertilized

egg, that same thing cannot survive to be a zygote. To be fertilized, however, merely acknowledges that the oocyte can receive spermatogenic contents. Once the increase in calcium occurs and cyclin-B is dissolved, the organism cannot be fertilized. It loses an essential property of being an egg. The egg, qua egg, does not survive the successful fertilization event.

6. See, also, Vjugina and Evans (2008) and Oren-Suissa and Podbilewicz (2007).
7. See, also, Cox et al. (2002) and Saunders, Swann, and Lai (2007).
8. Following Condic (2008), the language of fertilized egg commits a categorical error. If the egg is fertilized it is no longer an egg. It is correct, however, albeit redundant, to say that the egg is unfertilized.
9. Notice that this last claim commits a logical fallacy. What Mills says here is that the zygote cannot be identical to both B1 and B2, typically symbolized as $\sim(B1 \ \& \ B2)$. But, he concludes that the zygote is identical to neither B1 or B2, typically symbolized as $\sim(B1 \vee B2)$. Why is this a fallacy? It is not the case that both Bill Clinton and Donald Trump are president of the United States (i.e., $\sim(C \ \& \ T)$). It hardly follows that neither of them are president of the United States. What would follow is that either Clinton is not the president, or Trump is not the president (symbolized as $\sim(C \vee T)$). Consequently, if an object O is not identical to both O1 and O2, it hardly follows that O is identical to neither O1 nor O2. Just as in the president example, O can be identical to either O1 or O2. Such as Mills (2008, 330).
11. See Mill's comments (2008, 330).
12. See Austriaco (2002, 667 ff.) for further discussion on this point.
13. See Napier (2010) for a critique of natural loss arguments.
14. See Alcor Life Extension Foundation, <http://www.alcor.org/AboutCryonics/index.html>.

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