

POTENTIALITY, POSSIBILITY, AND THE IRREVERSIBILITY OF DEATH¹

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I

One of the main tenets held to be essential to the definition of death is that it is *irreversible*. Understanding death as irreversible allows one to say that using resuscitative measures to revive a person whose life functions have temporarily ceased is not a case of bringing the dead back to life; rather, a temporary hiatus of one's life functions does not entail that a person has died since this condition is reversible. The application of this tenet in clinical end-of-life cases is challenged, however, by the ability to maintain, through the use of a mechanical ventilator or a cardiopulmonary bypass machine, the vegetative functions of a body which has suffered whole-brain infarction and thus satisfies the widely accepted criterion for determining when death occurs.² A whole-brain dead body, which has been declared irreversibly dead, does not *seem* dead if respiration and circulation persist through the medium of an external device.³ Is the machine, then, reversing the patient's death? A further challenge is the prospect of *cryopreserving* the bodies of persons who have been declared dead, in the hope that future technological developments will allow such frozen bodies to be thawed, repaired, and thereby

¹ I am grateful to Michael Burke and David Hershenov for detailed comments on an earlier draft of this paper.

² The whole-brain criterion for determining death has received legislative approval in several nations, including the U.S.; see President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, *Defining Death: Medical, Legal, and Ethical Issues in the Definition of Death* (Washington, D.C.: U.S. Government Printing Office, 1981). In addition, it has received moral approval from the Roman Catholic Church; see John Paul II, "Address to the International Congress on Transplants," *The National Catholic Bioethics Quarterly* 1 (2001): 89—92; R. White, H. Angstwurm, and I. Carrasco de Paula, eds., *Working Group on the Determination of Brain Death and Its Relationship to Human Death* (Vatican City: Pontificia Academia Scientiarum, 1992). Whole-brain death is distinct from so-called higher-brain death, in which a person is in an irreversibly comatose or persistent vegetative state, such as in the well-publicized case of Terri Schiavo.

³ Many family members have difficulty accepting that their loved one is dead if they see the body's chest continuing to rise and fall; and physicians and nurses may err in telling family members the apparently contradictory statement that their loved one "is dead, but the machine is keeping him/her alive."

reanimated. These challenges prompt careful reflection of how death should be conceptually defined and clinically determined.

This paper offers such reflection from the Aristotelian-Thomistic metaphysical perspective. Aristotle and Aquinas understand a human person to be composed of a *rational soul* informing a living, sentient, animal body. What are the implications of this understanding in light of the above challenges? I have recently addressed the use of artificial technology to sustain a body's vegetative functions, as well as the implications of the view I articulate with respect to cases of prolonged somatic survival after whole-brain death and the practice of non-heart-beating organ donation.⁴ In this paper, I will consider the case of cryopreservation. A central conceptual focus throughout this discussion is the purportedly irreversible nature of death and the criteria by which a human body is considered to be informed by a rational soul.

II

Aristotle defines a soul as the *first actuality*—or *substantial form*—of “a natural body having life potentially in it.”⁵ Aristotle defines three types of soul: a *rational* soul has the relevant capacities for life, sensation, and rational thought, and is the type of soul proper to the human species; a *sensitive* soul has the relevant capacities for only life and sensation, and is the type of soul proper to all nonhuman species of animal; a *vegetative* soul has the relevant capacities for life alone, and is proper to all nonanimal living organisms.⁶ A specific type of soul informs only a specific type of body—one properly *organized* to support the soul's definitive capacities. Hence, a rational soul cannot inform the body of an ant or an oak tree; it can inform

⁴ See Jason T. Eberl, *Thomistic Principles and Bioethics* (New York: Routledge, 2006), 51—60, 121—6.

⁵ Aristotle, *De anima* (hereafter, “*DA*”), trans. J.A. Smith, bk. 2, ch. 1; J. Barnes, ed., *The Complete Works of Aristotle* (Princeton, NJ: Princeton University Press, 1984), vol. 1, p. 656. Compare Aquinas, *Sententia libri De anima* (hereafter, “*In DA*”), bk. 2, lect. 1. With respect to the subject of this paper, I find no apparent disagreement or significant differences in the writings of Aristotle and Aquinas. I will thus refer to both thinkers as representative of a single viewpoint. This does not imply, however, that the overall viewpoint of either thinker is equivalent to that of the other.

⁶ *DA*, bk. 2, ch. 3; *Complete Works*, vol. 1, pp. 659—60.

only a *human* body which supports a rational soul's capacities for life, sensation, and rational thought.⁷ At the most basic level, though, a body is *ensouled* if it is organized such that it is *potentially alive*.

Prima facie, the notion that a soul informs a body that is potentially alive seems to imply that such a body might be actually dead.⁸ As Aquinas interprets Aristotle's definition, however, this is not the case. Rather, by "potentially alive," Aristotle is referring to the fact that a body which receives a soul as its form cannot already be actually alive since the soul is the actuality of a living body. Hence, the "body" that is referred to in the definition of soul is simply matter that is in a state of potentiality to receive a form—in this case, the form received is a soul that actualizes such matter as a living body: "The matter of a living body is that which is compared to life just as potency to act; and this is the soul, the act, by which the body lives."⁹

Having adopted Aristotle's definition of soul and further elucidated a soul's relationship to the body it informs,¹⁰ Aquinas defines a human person's death as "the loss of that union by which a soul is united to a body as form" and "the loss of the operation of life."¹¹ Though he separates two understandings of the term *death*, Aquinas nevertheless considers them united in one and the same event. When the union of a rational soul and its body is dissolved, the dissolution of the body's *unified organic functioning* immediately follows.¹²

⁷ It is conceivable that there may be nonhuman bodies, perhaps on other inhabited planets, which are also suitably organized to support a rational soul's definitive capacities. If so, then such entities, although nonhuman, would nonetheless qualify as rational beings—*persons*.

⁸ It is important to note that, for Aristotle, ensoulment is an *all-or-nothing* affair. Hence, there can be no vague boundaries such that something could be *indeterminately alive* in an ontological sense—for example, Dr. Frankenstein's monster just before the initial shock was applied.

⁹ *In DA*, bk. 2, lect. 1, §222. All translations of Aquinas's texts are my own and, unless otherwise specified, are taken from the Leonine edition of Aquinas's works: *S. Thomae Aquinatis Doctoris Angelici Opera Omnia* (Rome: Commissio Leonina, 1882—).

¹⁰ See *In DA*; Aquinas, *Summa theologiae* (hereafter, "*ST*") I, qq. 75—76.

¹¹ Aquinas, *Quaestiones disputatae de veritate* (hereafter, "*QDV*"), q. 13, a. 4, ad 2.

¹² See *QDV*, q. 25, a. 6; Aquinas, *Summa contra Gentiles* (hereafter, "*SCG*"), bk. 2, ch. 58.

The primary metaphysical criterion that marks a soul's ceasing to inform its body is the body's no longer being *suitably organized* to support the soul's definitive capacities:

Just as form does not come into matter unless the matter is made proper through the requisite dispositions, so, with the cessation of the requisite dispositions, a form cannot remain in the matter. And in this way the union of soul and body is dissolved; if natural heat and moisture and others factors of this sort [that is, vital metabolic factors] are removed, insofar as by these a body is disposed toward reception of a soul.¹³

Aquinas thus defines a human person's death as occurring when the body is no longer able to actualize the soul's vegetative capacities.¹⁴ If death is indeed irreversible, then the soul's separation from its body will be permanent until, according to Aquinas, the miraculous event of bodily resurrection occurs.¹⁵

III

With the above account in mind, we can metaphysically describe a standard case of a human person's death: a person's soul ceases to inform her body once the *living* body, as opposed to the corpse which results, ceases to exist. A *substantial change* occurs in which one substance—a human person—ceases to exist and another substance—a corpse—comes to exist in its place.¹⁶ However, in any ordinary death,¹⁷ there is a brief period during which a body, the

¹³ Aquinas, *Quaestio disputata de anima*, q. un., a. 9, ad 16.

¹⁴ See Jason T. Eberl, "A Thomistic Understanding of Human Death," *Bioethics* 19 (2005a): 29—48; Eberl, *Thomistic Principles and Bioethics*, ch. 3.

¹⁵ See Jason T. Eberl, "The Metaphysics of Resurrection: Issues of Identity in Thomas Aquinas," *Proceedings of the American Catholic Philosophical Association* 74 (2000): 215—30.

¹⁶ This description is somewhat inaccurate insofar as, according to Aquinas, a human person continues to exist after death as composed of her soul alone; see Jason T. Eberl, "Do Human Persons Persist between Death and Resurrection?" in *Metaphysics and God: Essays in Honor of Eleonore Stump*, ed. Kevin Timpe (New York: Routledge, forthcoming). Furthermore, Aquinas does not understand the corpse that remains after death to be a *substance*, properly speaking, but rather as having *dissolved* into the elemental substances which constitute it; see *QDV*, q. 25, a. 6; *SCG*, bk. 2, ch. 58; Gerald Kreyche, "The Soul-Body Problem in St. Thomas," *New Scholasticism* 46 (1972): 472. Nevertheless, the substantial unity of a person's soul and her body ceases at death until resurrection, which is why a corpse is *numerically distinct* from the previously living body constituted of the same matter.

¹⁷ By "ordinary death," I mean a death in which the body remains structurally intact, as opposed to a body that is blown apart, crushed, or incinerated.

vital metabolic functions¹⁸ of which have ceased, may be revived. During this period, while the body is not *actually* alive, it is *potentially* alive.¹⁹ It is reasonable to conclude that a body which may be revived continues to be informed by its soul, even though the soul is in an apparently *quiescent* state until the body returns to a condition in which the soul's capacities for life, sensation, and rational thought may be actualized once again. Thus, in situations where a body is *clinically dead* but is then revived, no substantial change occurs: it is not the case that one substance—a person—ceases to exist and another substance—a corpse—comes to exist in her place, and then the corpse is replaced once again by the person when vital metabolic functions are revived. The person does not, strictly speaking, die and then is brought back to life; her soul never ceases to inform her body while the body's potential for living remains.

Would this conclusion also apply to a cryopreserved body whose potential for living is completely dependent upon the use of external technological intervention to reanimate it at some future time?²⁰ Given the mere *possibility* that a dead body may be cryopreserved and revived at a later time through the application of technology, is such a body still informed by its soul, albeit in a quiescent state? Fred Feldman asserts,

The mere possibility of suspended animation shows that death cannot be defined as the cessation of life. When an organism enters suspended animation it ceases to live, but it does not die ... The analysis of death must be consistent with the fact that not all organisms that enter suspended animation die.²¹

If Feldman is correct, then a cryopreserved body still composes a person and to cease maintaining the body in its frozen state would bring about the person's death. But this would

¹⁸ By "vital metabolic functions," I mean spontaneous heartbeat and respiration required to circulate oxygenated blood throughout the body.

¹⁹ See Robert Pasnau and Christopher Shields, *The Philosophy of Aquinas* (Boulder, CO: Westview Press, 2004), 157.

²⁰ See Bronwyn Parry, "Technologies of Immortality: The Brain on Ice," *Studies in History and Philosophy of Biological and Biomedical Sciences* 35 (2004): 391—413.

²¹ Fred Feldman, *Confrontations with the Reaper* (New York: Oxford University Press, 1992), 62—3. Note that Feldman does not analyze death from within the Aristotelian-Thomistic metaphysical framework. My concern is whether, within such a framework, Feldman's assertion would hold true.

hold true only if death were indeed irreversible by definition and the possibility of a body's being revived entails that it is "potentially alive" in a way that satisfies Aristotle's definition of soul.

So, how should the notion of *potentiality* be understood in Aristotle's definition of soul? Does the mere possibility that a cryopreserved body may be revived indicate that it is potentially alive and thus still informed by its soul? Does it make a metaphysical difference that death, in this case, is reversible only through the application of technology that has not even been invented yet?

After defining a soul as the actuality of a potentially living body, Aristotle asserts, "We must not understand by that which is capable of living what has lost the soul it had, but only what still retains it."²² Aquinas further specifies the relevant sense of "potential" in this case:

For something may be said to be 'potential' in two ways: in one way when it does not have the principle of operation; in another way when it in fact has such a principle, but is not acting by it. Now the body, whose act is the soul, has life potentially, not indeed in the first way but in the second. And so when [Aristotle] calls the body 'something potentially alive'—that is, having life potentially, which is the act of the soul—it is not said to be 'potentially alive' because it has discarded its soul—that is, it is without the principle of life, which is the soul—but because it has such a principle.²³

But the question remains whether a cryopreserved body has lost its soul or retains it while awaiting its thaw and resuscitation, which requires establishing criteria by which to distinguish a body's having a sufficient degree of potentiality to *be* ensouled versus simply being able to *become* ensouled (again).

The relevant criterion is whether a cryopreserved body has an *active* or *passive* potentiality to live again, as Aquinas specifies above. I have argued elsewhere that a being which has an active potentiality for self-conscious rational thought should be considered a

²² *DA*, bk. 2, ch. 1; *Complete Works*, vol. 1, p. 657.

²³ *In DA*, bk. 2, lect. 2, §240.

rationally ensouled person.²⁴ Furthermore, a being has such an active potentiality if it has within itself everything necessary, given its proper *design environment*, to actualize itself in the relevant manner.²⁵ So, for example, a human embryo, due to its genetic structure and the presence of other requisite biological factors, needs only a supportive uterine environment and the normal postnatal environment all of us require, to develop into an actually self-conscious rational being; therefore, it has an active potentiality for self-conscious rational thought and thus qualifies as a rationally ensouled person. A sperm or ovum, on the other hand, has only a passive potentiality to develop into a self-conscious rational being, because each must undergo the radical change that comes about through the process of fertilization, in which each cell ceases to exist on its own and forms a new *composite* substance: a rationally ensouled embryo.²⁶

Another relevant distinction is *strong* versus *weak* potentiality.²⁷ A sperm or ovum, for example, is potentially a human person in the strong sense only if it could come to be a human person while preserving its numerical identity—that is, it remains the *same* substance identical with itself throughout its development from a germ cell to a fully actualized human person. A change, however, from a germ cell to a human person does not appear to be an identity-preserving transformation: a sperm loses its substantial identity when it fuses with an ovum, and vice versa, to form a new substance—a human embryo. Furthermore, Aquinas denies that a vegetative substance—a germ cell—can change into a rational substance—a human embryo—and remain the same substance, because vegetative and rational substances are of distinct metaphysical kinds with quite different substantial forms. The only sense in which a germ cell is

²⁴ See Jason T. Eberl, “Aquinas’s Account of Human Embryogenesis and Recent Interpretations,” *Journal of Medicine and Philosophy* 30 (2005b): 379—94; Eberl, *Thomistic Principles and Bioethics*, ch. 2.

²⁵ I derive the concept of a “design environment” from Alvin Plantinga’s concept of something fulfilling its *proper function*, according to its *design plan*, in an *appropriate environment*; see his *Warrant and Proper Function* (New York: Oxford University Press, 1993), ch. 2.

²⁶ See Massimo Reichlin, “The Argument from Potential: A Reappraisal,” *Bioethics* 11 (1997): 13—17.

²⁷ I am indebted to Michael Burke for bringing this distinction to my attention.

plausibly a potential human person is in the weak sense that it provides the *makings* of a human person. I will argue below that a cryopreserved body is potentially a living human person only in the weak sense that it too provides the material out of which a human person may be composed once that material is once again informed by a rational soul.

It is important to emphasize that the relevant sense of potentiality for something to be rationally ensouled—Aristotle’s concept of active potentiality—refers to something’s capacity to *be* in a certain way, as opposed to merely the possibility of its *becoming* something.²⁸ Of course, something could have an active potentiality to become something different—for example, a standing person has an active potentiality to become a sitting person—but such a case involves the thing in question having “a capacity to produce the requisite changes in itself.”²⁹ A cryopreserved body, however, does not have “its own motive principle”³⁰ by which it is able to reanimate itself. Therefore, it fails to satisfy Aristotle’s conditions for a potentially living body suitable for ensoulment—that is, “one having *in itself* the power of setting *itself* in movement and arresting *itself*.”³¹ A cryopreserved body has been *arrested* through dying and being frozen, and it cannot set itself back in motion through its own power.

Clearly, a cryopreserved body cannot change itself into an actually living body. It thereby fails to satisfy Aristotle’s definition of active potentiality, which is “a source of change in another thing or in the same thing *qua* other.”³² But perhaps the requirement that a cryopreserved body have an active potentiality to be living is too stringent. After all, the mere fact that such a body can *possibly* be reanimated indicates that it possesses some intrinsic

²⁸ See Charlotte Witt, “Powers and Possibilities: Aristotle vs. the Megarians,” *Proceedings of the Boston Area Colloquium in Ancient Philosophy* 11 (1995): 264.

²⁹ Harry A. Ide, “*Dunamis* in *Metaphysics* IX,” *Apeiron* 25 (1992): 4.

³⁰ Aristotle, *Metaphysics* (hereafter, “*M*”), trans. W.D. Ross, bk 9, ch. 7; *Complete Works*, vol. 2, p. 1656. Aquinas uses the term, “proper active principle”; see Aquinas, *In duodecim libros metaphysicorum Aristotelis expositio* (hereafter, “*In M*”), ed. R. Cathala and R. Spiazzi (Turin: Marietti, 1950), bk. 9, ch. 6, §1837.

³¹ *DA*, bk. 2, ch. 1; vol. 1, p. 657 (emphasis mine).

³² *M*, bk. 4, ch. 12; vol. 2, p. 1610.

features that permit effective external intervention to revivify it: “It must be that, for what is capable of being acted upon in some way, to have in itself a certain disposition, which is the cause and principle of that kind of passivity; and this principle is called passive potency.”³³ So, despite the fact that such potentiality will be *passive* insofar as it is wrought by an external agent who thaws and repairs the cryopreserved body, the presence of such potentiality in the cryopreserved body—a potentiality lacking, for example, in a rock or a piece of wood—may be indicative of a dormant soul awaiting external aid for it to actualize its body to live once again. I contend, however, that to infer from such mere possibility that a cryopreserved body is potentially alive to such a degree that it should be considered rationally ensouled invokes, to use John Lizza’s terminology, “the most remote and promiscuous sense of potentiality.”³⁴

In addition to distinguishing between active and passive potentiality, recall the distinction between strong and weak potentiality. For something, *X*, to have a strong potentiality to become *Y*, it must be the case that *X* maintains its numerical identity as it becomes *Y*. There is no reason, however, to consider a cryopreserved body as numerically identical to either the previously living body or to the future living body it may become. Unless one *presumes* that a cryopreserved body is rationally ensouled during the interim period when it is frozen, then, given such a body’s lack of an active potentiality to live, as argued above, it is more plausible to consider it to be numerically distinct from the two living bodies that bookend it.

Hence, while a cryopreserved body has a weak potentiality to become a living body insofar as it provides the material makings of such a body, this is insufficient to hold that a cryopreserved body has an active potentiality to live again and is thereby rationally ensouled. A cryopreserved body is indeed a *corpse* that lacks the requisite potential for life to satisfy

³³ *In M*, bk. 5, ch. 14, §963.

³⁴ John P. Lizza, *Persons, Humanity, and the Definition of Death* (Baltimore, MD: Johns Hopkins University Press, 2006), 105.

Aristotle's definition of ensoulment. A cryopreserved body is thus not ensouled, but rather has been reduced to its constituent elements that are preserved in mere structural unity as a result of being frozen together. This mere structural unity, which differs from the *substantial* unity of an organism that supervenes upon ensoulment,³⁵ gives a cryopreserved body at most a *weak passive potentiality* to become a living being once again: "If from the dead must be made a living animal, it must be that it is returned to prime matter, insofar as a dead body is dissolved into the elements, and from the elements again in due order an animal comes to be constituted."³⁶ If a cryopreserved body were successfully thawed and made to live again, it would truly be a case of *reanimation*—its soul would inform it anew.³⁷

This conclusion differs significantly from Peter van Inwagen's contention that a cryopreserved organism remains alive:

I find it attractive to suppose that the cat's life persists even when the cat is frozen. I would describe the frozen cat's life this way: Before the cat was frozen, its life consisted mostly of chemical reactions and various relatively large-scale physical processes (the breaking and establishing of chemical bonds, the movement of fluids under hydraulic pressure, the transport of ions); when the cat was frozen, its life was "squeezed into" various small-scale physical processes (the orbiting of electrons and the exchange of photons by charged particles.) Its life became the sum of those subchemical changes that underlie and constitute chemical and large-scale physical unchange. But the life was *there*, disposed to expand into its normal state at the moment sufficient energy should become available to it. I, who am fond of oxymorons, would describe the frozen cat as a living corpse.³⁸

Pace van Inwagen, I take the "subchemical changes" that persist in a cryopreserved organism to constitute its persistent structural integrity, but such changes are not equivalent to the vital

³⁵ See Eberl, *Thomistic Principles and Bioethics*, 34—5.

³⁶ *In M*, bk. 8, ch. 4, §1752.

³⁷ Or, at least *a* soul would inform it anew. It remains an open question whether the rational soul that animates a revived body would be the *same* soul that informed that body prior to its death and cryopreservation. Given Aquinas's strong assertion, however, that each soul informs its own *unique* body insofar as it is the body's substantial form, it is reasonable to presume that the physical and psychological similarities between the person before death and after reanimation would indicate the same person having been brought back to life with the same rational soul.

³⁸ Peter van Inwagen, *Material Beings* (Ithaca: Cornell University Press, 1990), 146—7.

metabolic processes definitive of life; mere structural unity is not sufficient for substantial, organic unity. Van Inwagen recognizes that his definition of life may be “contrived and tendentious” and that one may find it reasonable to define life more precisely such that a suspended life is no life at all. He thus distinguishes, for the sake of discussion, two ways in which an organism’s life may cease: by *disruption* and by *suspension*.³⁹ Hence, while the possibility of future revival may be stronger in the case of an organism whose life has been suspended, as opposed to disrupted, it is nevertheless just as dead in either case.

It is worth pointing out one undesirable result of van Inwagen’s first thesis, that a cryopreserved organism remains alive, which he himself would reject. A corpse that is not cryopreserved also possesses persistent “subchemical changes” at the atomic and subatomic levels which will never cease. Even after a corpse has naturally decayed to the point of presenting only a skeleton, the atoms that constitute the collection of bones remain active; otherwise, all there would be is uninformed *prime matter* or inert subatomic particles. Van Inwagen shares the general intuition that the persistent microlevel activity of an unfrozen corpse is insufficient to characterize it as alive. He allows, however, the same level of activity in a cryopreserved body to suffice as the life—and the numerically same life—as the organism before its macrolevel life functions were suspended. The only difference van Inwagen cites to differentiate the two cases is that the microlevel activity of a cryopreserved body is “disposed to expand into its normal state at the moment sufficient energy should become available to it.”⁴⁰ But a great deal turns on how the requisite *disposition* should be defined. If we understand it in terms of Aristotelian *potentiality*, then, as argued above, a cryopreserved body is not sufficiently disposed to be a living (ensouled) organism.

³⁹ Van Inwagen, *Material Beings*, 147.

⁴⁰ Van Inwagen, *Material Beings*, 147.

Another argument in support of considering a cryopreserved body as dead may be based upon the relationship between the body as a whole and its constituent integral parts, and the different relationship a living organism bears to its parts.⁴¹ David Hershenov contends that one could not replace all or even a large number of a cryopreserved body's integral parts without thereby replacing the body with a numerically distinct duplicate.⁴² At most, one could say that it is *indeterminate* whether the cryopreserved body survives such changes as the numerically same body.⁴³

A living organism, on the other hand, does not suffer from *mereological essentialism*. Both van Inwagen and Peter Unger discuss ways in which a living organism is able to “assimilate” new matter that becomes “caught up in the life” of the organism.⁴⁴ Unger denies that a cryopreserved body could assimilate new material constituents as does a living organism. Aquinas also notes that the material constituents of a living organism are in continuous flux. Organisms undergo cellular decay, and food is taken in and transformed by digestion into raw material to generate new cells and other bodily components. As long as there is material continuity, then the same substantial form and the same body persist through such changes in microlevel constituents. Aquinas compares the “ebb and flow” of an organism's constituents to a fire:

When some matter is by itself converted into a fire, then it is said that fire is generated anew; but when some matter is converted into a preexisting fire, the fire is said to be fed. Hence, if all the matter loses the species of fire at once, and other matter is converted into fire, there will be a numerically distinct fire. But if, little by little, as one piece of wood burns another piece is substituted, and so on until all of the first piece is consumed, it will always remain the numerically same

⁴¹ I am most grateful to David Hershenov for raising this supportive argument.

⁴² David Hershenov, “Do Dead Bodies Pose a Problem for Biological Approaches to Personal Identity?” *Mind* 114 (2005): 31—59, esp. 51—2.

⁴³ Hershenov, personal correspondence.

⁴⁴ See van Inwagen, *Material Beings*, 94; Peter Unger, *Identity, Consciousness, and Value* (New York: Oxford University Press, 1990), 147—52.

fire; since always what is added passes into what pre-existed. And the same is understood for living bodies, in which is restored from nutrition what had been consumed by natural heat.⁴⁵

This is indicative of Aquinas's view that *composition is not identity* for human persons: human persons are composed of, but not identical to bodies, which are themselves composed of, but not identical to their material constituents.⁴⁶ While a living human organism can survive a continuous replacement of its constituent parts, a cryopreserved body cannot. This difference supports equating a cryopreserved body with a nonpreserved corpse, which Aquinas conceives of as a collection of elemental substances that are not substantially unified by a single substantial form;⁴⁷ neither is "potentially alive" in the relevant sense to assert that it is informed by a rational soul. In sum, the persistent numerical identity of cryopreserved bodies and corpses appears to involve mereological essentialism; whereas the persistent numerical identity of living organisms does not, but rather involves the relation of composition without identity. Since the numerically same object cannot have distinct identity conditions, based on essentially different part-whole relationships, a cryopreserved body, like a corpse, is not numerically identical to the living organism whose material constituents it may nonetheless share.⁴⁸

IV

If a cryopreserved corpse is not, based on the mere possibility of its being made to live again at some future time, an ensouled human organism or person, then is death *reversible* given the logical possibility of cryopreservation and resuscitative technologies being perfected in the

⁴⁵ *ST I*, q. 119, a.1, ad 5. Compare *ST Supp.*, q. 80, a.4; *SCG*, bk. 4, ch. 81; Aquinas, *Compendium theologiae*, ch. 159; Aquinas, *In Aristotelis libros de generatione et corruptione expositio*, bk 1, lects. 15—16. See also John Chandlish, "St. Thomas and the Dynamic State of Body Constituents," *Journal of the History of Medicine and Applied Sciences* 23 (1968): 272—5.

⁴⁶ See Eleonore Stump, *Aquinas* (New York: Routledge, 2003), 50—1; Jason T. Eberl, "Aquinas on the Nature of Human Beings," *Review of Metaphysics* 58 (2004): 337—8.

⁴⁷ See note 16 above.

⁴⁸ Eleonore Stump notes a similar difference in part-whole relationships that Aquinas holds between natural substances and artifacts; see Stump, *Aquinas*, 58—9.

future? David Cole takes such a logically possible scenario seriously and argues that “irreversibility is not part of the ordinary concept of death.”⁴⁹ David Lamb and John Lizza, however, criticize Cole for appealing to a merely logically possible scenario to criticize the notion that death is irreversible:

we should consider realistic impediments to a patient’s condition being reversed as reasons for holding that the patient’s condition is reversible. Consideration of logically possible states of affairs that could reverse a patient’s condition is irrelevant to determining whether a patient’s condition is irreversible.⁵⁰

Lizza considers his criticism of Cole to be based on “Aristotelian realism” and I concur that, if we look at the actual status of a cryopreserved corpse and the present state of technology, the possibility of death being reversed is a far cry from the more robust potentiality at work in the case of, say, a person in cardiac arrest whose heart may be restarted through CPR.

The considerations I have put forth in the previous section lead to an understanding of death akin to Lawrence Becker’s:

A human organism is dead when, for whatever reason, the system of those reciprocally dependent processes which assimilate oxygen, metabolize food, eliminate wastes, and keep the organism in relative homeostasis are arrested in a way which the organism itself cannot reverse.⁵¹

As I have argued elsewhere, from the Thomistic perspective, the criterion for determining when “the system” Becker describes has arrested is the irreversible cessation of whole-brain functioning.⁵² Without the brain’s regulation of heartbeat and respiration to maintain the flow of oxygenated blood throughout the body, all the processes Becker describes arrest and, unless CPR

⁴⁹ David J. Cole, “The Reversibility of Death,” *Journal of Medical Ethics* 18 (1992): 26.

⁵⁰ John P. Lizza, “Potentiality, Irreversibility, and Death,” *Journal of Medicine and Philosophy* 30 (2005): 53—4. See also David Lamb, “Reversibility and Death: A Reply to David J. Cole,” *Journal of Medical Ethics* 18 (1992): 31—3.

⁵¹ Lawrence C. Becker, “Human Being: The Boundaries of the Concept,” *Philosophy and Public Affairs* 4 (1975): 353.

⁵² See Eberl, “Understanding of Human Death,” 42—5; Eberl, *Thomistic Principles and Bioethics*, 49—54.

or some other form of external aid is applied, the organism will not be able to reverse this state on its own.

Of course, as Hershenov points out, Becker's definition of death would imply that a person who suffers cardiac or respiratory arrest, and is then resuscitated through CPR or some other form of external aid, has died and come back to life.⁵³ As noted above, however, it is consistent with Aristotle's definition of soul as informing a body that has "life potentially in it" that a body may cease to actualize its active potentiality for vital metabolic functions and then actualize that capacity once again with external aid. Being dependent upon external aid to support the actualization of a body's capacity for vital metabolic functions is consistent, I contend, with the body's continuing to be ensouled and thus *alive*, even if some of its vital metabolic functions are temporarily not actualized.⁵⁴

The external aid provided by CPR is not constitutive of a body's vital metabolic functions. CPR simply *jump-starts* such functions; it does not actually *perform* those functions. A mechanical ventilator, on the other hand, does perform a vital metabolic function: it forces air into the lungs, which in turn stimulates cardiac activity. If cardiac arrhythmia or asystole develops, which usually occurs, then additional artificial support must be provided for cardiac functioning to continue. Patients who suffer the cessation of whole-brain functioning require mechanical ventilation and other artificial life-support measures to maintain both respiratory and cardiac activity.⁵⁵

There is an important distinction between a body's vital metabolic functions being jump-started by external aid and such functions being *taken over* by external artificial support. The

⁵³ David Hershenov, "The Problematic Role of 'Irreversibility' in the Definition of Death," *Bioethics* 17 (2003): 99.

⁵⁴ What follows is derived from Eberl, *Thomistic Principles and Bioethics*, 51—3.

⁵⁵ See D.R. Field, E.A. Gates, R.K. Creasy, A.R. Jonsen, and R.K. Laros, "Maternal Brain Death during Pregnancy: Medical and Ethical Issues," *Journal of the American Medical Association* 260 (1988): 818—19.

distinction is in terms of whether the person composed of the body in question has *control* over such functions. A person having control over her vital metabolic functions is, I contend, a necessary criterion for her to have the functional integrity one would expect of an organic substance that is substantially unified. I thereby propose that a person remains alive—ensouled—only if she has the capacity to *coordinate* her vital metabolic functions. If a person cannot actually perform her vital metabolic functions, then she is dead. If a mechanical ventilator or cardiopulmonary bypass machine actually performs a person’s vital metabolic functions, then such functions and the capacity for performing them are no longer attributable to the patient dependent upon such a device.⁵⁶

If, however, a patient’s dependence on artificial life-support is temporary and her inability to perform vital metabolic functions is reversible—for example, a patient who is put on cardiopulmonary bypass while undergoing an open-heart procedure—then her capacity to coordinate vital metabolic functions remains intact throughout the period of time when it is not actualized. Although the capacity in question is not presently actualizable while the patient is dependent on life-support, it remains due to the fact that the patient’s ability to engage in cardiac and respiratory activity *under her own control* can be restored with available technology and technique.

⁵⁶ This conclusion serves as a response to D. Alan Shewmon’s argument that the whole-brain criterion of death is inadequate due to a number of cases of prolonged somatic survival despite whole-brain infarction. See D. Alan Shewmon, “Recovery from Brain Death: A Neurologist’s *Apologia*,” *Linacre Quarterly* 64 (1997): 30—96; Shewmon, “‘Brainstem Death,’ ‘Brain Death’ and Death: A Critical Re-evaluation of the Purported Equivalence,” *Issues in Law and Medicine* 14 (1998): 125—45; Shewmon, “Chronic ‘Brain Death’: Meta-analysis and Conceptual Consequences,” *Neurology* 51 (1998): 1538—45; Shewmon, “The Brain and Somatic Integration: Insights into the Standard Biological Rationale for Equating ‘Brain Death’ with Death,” *Journal of Medicine and Philosophy* 26 (2001): 457—78. In the cases Shewmon presents, it is arguable that the patients are not dead, *per* Becker’s definition, insofar as their bodies continue to “assimilate oxygen, metabolize food, eliminate wastes, and keep the organism in relative homeostasis.” However, such metabolic functions persist only if these whole-brain dead bodies are supported by mechanical ventilation. I contend, *contra* Shewmon, that since these patients no longer exhibit *control* over the primary vital metabolic functions of heartbeat and respiration, they are no longer rationally ensouled. See Eberl, *Thomistic Principles and Bioethics*, 54—60.

A cryopreserved corpse, one could argue, has the same reversible inability to perform its vital metabolic functions. While artificial technology would be required to thaw, repair, and resuscitate it, once resuscitated, the reanimated body would be able to engage in cardiac and respiratory activity *under its own control* once again. While there is this significant similarity between the two cases, there remains a significant difference with respect to the degree of internal change the two types of bodies must undergo in order to live independent of life-sustaining technology. A patient enduring an open-heart procedure, and thus has her cardiac and respiratory functions temporarily taken over by a cardiopulmonary bypass machine, retains a high degree of organic functioning compatible with life and maintains control over *some* of her life functions. Thanks to the external aid provided, there is no period at which vital metabolic functions altogether cease within the body or at which the patient loses *total* control over all her life functions. And, once the external aid is no longer necessary and the patient's own cardiac and respiratory activity is restored, she regains the requisite control over the totality of her vital metabolic functions. A cryopreserved corpse, on the other hand, has undergone a *total arrest* of all metabolic functions; and only the freezing process has prevented its organs and tissues from necrotizing. During cryopreservation, there are *no* life functions and thus *no control* of any life functions. Hence, there is a radical discontinuity in a cryopreserved body's metabolic activity that an open-heart surgery patient does not experience.

V

I have argued that, from the Aristotelian-Thomistic metaphysical perspective, a cryopreserved corpse fails to have "life potentially in it" sufficient to satisfy Aristotle's definition of ensoulment. Therefore, if the possibility that such a corpse may be successfully preserved and resuscitated comes to fruition, one would have to conclude that the person's

rational soul, which had separated from its body at death, has literally reanimated its resuscitated body. Obviously, this conclusion has theological implications that go beyond the scope of this discussion if we regard bodily resuscitation in this manner as a form of technologically induced *resurrection*.⁵⁷

Another apparent implication of my argument is that death loses its irreversible nature. Since a cryopreserved body is no longer ensouled, the person previously composed of that body has indeed died—although she may still exist as composed of her soul alone—and, if the body is successfully resuscitated, the person’s death will have been reversed.⁵⁸ However, in agreement with Lamb’s and Lizza’s criticisms of Cole, the strongest conclusion one could draw is that it is logically and metaphysically possible that death is reversible given possible future technological developments; but death is not reversible *in re*—that is, in reality as presently given.⁵⁹

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⁵⁷ The key question at hand is whether the rational soul that informs a resuscitated body that had been cryopreserved is the *same* soul that had informed that body prior to death.

⁵⁸ This would be true if the same soul informs the resuscitated body, such that the same person comes back to life.

⁵⁹ Of course, it is always open for God to reverse death through a miraculous intervention, which is how Aquinas conceives of resurrection insofar as God must provide matter for a person’s disembodied soul to inform so that the person may exist again with all her proper parts as a rational animal; see Eberl, “Metaphysics of Resurrection.”