TRANSHUMANISM, THEOLOGICAL ANTHROPOLOGY, AND MODERN BIOLOGICAL TAXONOMY

by Travis Dumsday

Abstract. I examine the ways in which the theological and philosophical debate surrounding transhumanism might profit by a detailed engagement with contemporary biology, in particular with the mainline accounts of species and speciation. After a short introduction, I provide a very brief primer on species concepts and speciation in contemporary biological taxonomy. Then in a third section (titled "Implications for Technological Alteration of Species") I draw out some implications for the prospects of our being able intentionally to intervene in human evolution for the production of new species out of *Homo sapiens*. In a fourth section (titled "How Does the Biological Conception of *Homo sapiens* Relate to a Philosophical (or Theological) Account of Human Nature? And Where Does This Leave Transhumanism?") I bring in the debate over the proper relationship between biological and theological conceptions of human nature, laying out the major options available (in light of Ian Barbour's fourfold categorization schema) and considering their possible implications for our understanding of transhumanism. In a fifth section (titled "Potential Applications to Specific Subdisciplines of Theology") several concrete examples are drawn out pertaining to particular subdisciplines within theology (hamartiology, soteriology, and eschatology). I conclude by briefly laying out some suggestions for future work, focusing on tasks that theologians specifically ought to pursue.

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Technological advances raise the prospect of altering human life as we know it in dramatic ways, and not just in the sense of changing the *conduct* of human life (as in the transitions from horse to rail to car), but perhaps also in the sense of changing the very *nature* of human life. Germ line genetic engineering is the most obvious route by which radical biological alteration might be fostered, but other new forms of technology are po-

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tentially relevant here as well, including cybernetics and nanotechnology. They may render possible not merely the correction of human infirmities (comparatively uncontroversial forms of intervention), nor merely the enhancement of our existing human nature (more controversial), but also the active direction of our own evolution and the rapid creation of a new "posthuman" species—or even *sets* of new species.

Such an idea is held out at least as a hope by some members of the so-called *posthumanist* or *transhumanist* movement. Some take these terms as synonymous, while others draw more or less sharp distinctions between them (see Thweatt-Bates 2012, 3–13; Burdett 2015, 3–6 for further discussion). For the remainder of this article, I will employ *transhumanist*.

The transhumanist movement is a diverse one, and not all self-identified transhumanists look favorably on the prospect of leaving human nature behind altogether. Some focus instead on technological means of enhancing *existing* human nature. Yet others unambiguously favor taking the reins of our own evolution and making something genuinely novel. Max More (2013, 4), for instance, writes that "transhumanists want to apply technology to overcome limits imposed by our biological and genetic heritage. Transhumanists regard human nature not as an end in itself, not as perfect, and not as having any claim on our allegiance. Rather, it is just one point along an evolutionary pathway and we can learn to reshape our own nature in ways we deem desirable and valuable. By thoughtfully, carefully, and yet boldly applying technology to ourselves, we can become something no longer accurately described as human." By contrast, theorists like H. Tristram Engelhardt (2000) recoil from such a prospect; still others maintain that moral questions about whether and how to pursue human genetic enhancement are separable from questions about whether such enhancement might lead to the development of a new species. John Harris (2010, 37) argues that "if the gains were important enough (sufficiently beneficial) and the risks acceptable, we would want to make the relevant alterations . . . we would have an obligation to make such changes. . . . [W]hether any proposed changes amount to changes in human nature, or to involve further evolution, seems ethically uninteresting. In particular, whether the enhancements might be judged to involve creating a new species, 'a new breed,' or amount to 'self-evolution' or 'post humanism' or 'transhumanism' are not moral issues."

I do not wish to delve into those normative disputes here (at least not directly). Rather, I would like to examine what exactly is involved in the claim that we are in principle able to "transcend" human nature through the engineering of a new human species. This warrants further discussion, insofar as it is openly acknowledged by some in the transhumanism literature that there remains a lack of clarity as to what exactly this could mean. Gerald McKenny, for instance, writes,

> Most of the literature assumes that it will one day be possible to deliberately alter human functions, traits and capacities by biomedical technology. This assumption is plausible, but it is difficult to determine what implications it has for human nature. Specifically, it is far from clear (1) which interventions would truly alter these functions, traits or capacities (in contrast, say, to having a temporary effect on them); (2) whether human nature itself or only these functions, and so on, would be altered; and (3) if human nature is indeed altered, whether the alteration would be to the human species or only to the individual human beings who have undergone the alteration(s). (McKenny 2013, 19)

Similarly, McKenny elsewhere (2009, 171) asks: "Could some development in biotechnology—in genetic engineering, perhaps, or in neurobiology—alter human nature itself, so that those who undergo the technique or inherit its effects are no longer instances of the same natural kind or members of the same species as those who remain unaltered? Any answer to this question must begin by gaining clarity on what would count as an alternation of nature in this sense." And McKenny goes on to argue that several recent proposed answers to this question fail.

Given this lack of clarity, it might be worthwhile to see what contemporary biology can contribute here. Of course, it is not obvious whether or how current science should impact our philosophical and theological thinking about transhumanism, since the relationship between scientific and philosophical accounts of "human nature" is itself a matter of contention. Certainly it would be controversial to claim that we can simply read a philosophical (let alone theological) account of humanity directly off the biology. Nevertheless, when faced with claims and counterclaims pertaining to the intentional alteration of *Homo sapiens*, it is not unreasonable to think that our best current science of species and speciation could have something important to say. Indeed, on some models of the science–religion relationship, we would be positively remiss in ignoring it. I am not of course the first to look at transhumanism through the lens of current biology—Nicholas Agar (2010, ch. 2), for instance, provides a discussion of how current biological theories of species and speciation intersect with the debate over radical genetic enhancement. But theological discussions of transhumanism have seen relatively little detailed engagement with these accounts.

The remainder of this article is divided as follows. In the section titled "A Quick Primer on Modern Biological Taxonomy," I provide a brief primer on species concepts and speciation in contemporary biological taxonomy. "Implications for Technological Alteration of Species" sees the drawing out of some implications for the prospects of our being able intentionally to intervene in human evolution for the production of new species out of *Homo sapiens*. The section titled "How Does the Biological Conception of *Homo sapiens* Relate to a Philosophical (or Theological) Account of Human Nature? And Where Does This Leave Transhumanism?" then

brings in the debate over the proper relationship between biological and theological conceptions of human nature, presenting some of the major options and illustrating some of their possible implications for our understanding of transhumanism. "Potential Applications to Specific Subdisciplines of Theology" sees the examination of how some of those models find application in different areas of theology (specifically hamartiology, soteriology, and eschatology) and their relationship to transhumanism. Finally, in the concluding section, "Suggestions for Future Work," I briefly lay out some recommendations for future work, focusing on tasks that theologians specifically ought to pursue.

A Quick Primer on Modern Biological Taxonomy

"Taxonomy" refers to the theory and practice of classifying organisms. Looking out at the vast range of organisms in nature, and noting assorted commonalities among them, the taxonomist seeks to categorize these organisms into types arranged in a hierarchy of generality (species, genus, family, and so on). In current biological taxonomy, there is an important divide between two perspectives on classification: *phenetic* versus *phylogenetic*. In phenetic classification, organisms are categorized on the basis of statistically calibrated phenotypic similarities (i.e., similarities in observable characteristics like physical structure, blood type, metabolism, and so on). By contrast, in phylogenetic classification not all similarities are admissible for use in classification; rather, *only those similarities resulting from common ancestry (lineal descent) should count*. There are different schools of thought within phylogenetic classification (e.g., evolutionary taxonomy vs. process cladism), but for present purposes the debates between those subdivisions can be left to one side. (For a thorough yet accessible introduction to the major versions of phylogenetic taxonomy, consult Ereshefsky 2001, 50–79.) However important those debates may be, they involve disagreements the depth and import of which remain comparatively minor when compared to the fundamental split between phenetic and phylogenetic ways of doing taxonomy.

For present purposes, it is important to note that today *the great majority of taxonomists operate in accordance with the phylogenetic perspective*. This is reflective of the centrality of evolutionary theory in modern biology. Organisms are classified in accordance with their location on the evolutionary tree of life. As such, the placement of an individual organism in a certain species requires that that organism find its immediate ancestors in that same species (just as the placement of a species in a certain genus is based on facts about common ancestry, as is the placement of a genus in a family, and so on). This is a substantial departure from pre-Darwinian taxonomy, in which the goal was to classify organisms in accordance with their intrinsic essences. These essences, conceived along broadly Aristotelian

lines as underlying substantial forms, manifested in the outward traits catalogued by anatomists (in fact catalogued in a manner roughly analogous to the cataloguing done by modern pheneticists).

To draw out the contrast: in pre-Darwinian taxonomic theory, a cat, an individual member of the species *Felix catus*, is a member of that species because of its intrinsic essence. That essence manifests itself in the morphological, behavioral, and other features characteristic of members of this species. Traditional versions of intrinsic biological essentialism (INBE) are ahistorical, in the sense that if we travelled to Mars and found organisms identical in all these respects to cats on Earth, we could legitimately take them to be cats. Similarly, if tomorrow God were to create *ex nihilo* an animal with the same sort of intrinsic essence as existent cats, INBE would label them all as members of that species. By contrast, neither the Mars-cat nor the new *ex nihilo* "cat" would count as legitimate cats according to the majority phylogenetic perspective operative in modern biological taxonomy: something is a cat only if it is descended from prior members of *Felix catus*. Lineal descent is a necessary condition on species membership. The Mars-cat may be a very similar organism, and may even be capable in principle of interbreeding with Earth-cats. However, because it does not belong to the same lineage, it is not a member of the same species. "Species" is an irreducibly historical category.

In this respect, Agar's (2010, ch. 2) discussion is somewhat out of step with the current majority position in biology. Agar takes the view that species membership is dependent chiefly on the capacity to interbreed, such that shared lineage seems not to play much of a role, even as a necessary condition. See especially his thought experiment (Agar 2010, 23–24) concerning the transformation of an individual member of *Homo sapiens* into a member of *Homo neanderthalensis.* Such a scenario would in fact be seen as impossible by most biologists: one can radically alter one's physical appearance or even genetic code, but one cannot alter the past historical facts of one's ancestry, and so a single individual cannot join another biological species.

Yet Agar's misstep on this point is entirely understandable; indeed, the conception of species as a historical category can initially seem highly counterintuitive. Many are inclined to think that the hypothetical Mars-cat really would be a cat, if indeed it had the identical type of genetic code, morphology, behavior, and so on. But the historical conception of species is very much entrenched in contemporary biology, in part because of long-standing problems facing traditional versions of INBE. (For discussion of standard criticisms of INBE, see, for instance, Mayr 1959, 1976; Hull 1965, 1978; Sober 1980; Dupré 1981; Ereshefsky 2001, 95–102, 2010; Ellis 2002, 29–30; Stamos 2003.) Of course, as already noted not everyone views taxonomy in this way; pheneticism retains advocates, and there has even been something of an attempted revival of INBE in theoretical

biology and philosophy of biology. (See, for instance, Kitts and Kitts 1979; Wilkerson 1995; Webster and Goodwin 1996; Walsh 2006; Oderberg 2007; Devitt 2008; Elder 2008; Dumsday 2012a, 2012b.) However, even that latter revival is to a degree muted, insofar as some of its proponents argue for a *nontraditional*, moderate version of INBE. On this version, organisms have intrinsic essences, but those essences do not suffice for species membership, with lineage still playing a necessary role in classification. In other words, on moderate INBE species membership is derived from lineage + intrinsic essence, rather than *only* the intrinsic essence (as on traditional INBE), or *only* lineage (as on phylogenetic classification). Devitt (2008) and Dumsday (2012a) incline toward moderate INBE, and arguably so do some other neoessentialists in the philosophy of biology.

The key point for present purposes is that, while there remains some dissent, the large majority of those working in theoretical biology and philosophy of biology (as well as the large majority of working taxonomists) view lineage as *at least a necessary condition* for species membership—and a smaller majority would go even further and identify lineage as *necessary and sufficient* for species membership.

Taking on board the assumption that lineal descent is at least a necessary condition for species membership, it follows that plausible models of speciation (i.e., models of how new species arise) will have to involve branching lineages. Unsurprisingly, the most prominent model of speciation in current biological taxonomy, *allopatric speciation*, works in just that way. Marc Ereshefsky summarizes,

> The allopatric model of speciation is the most prominent account of speciation for sexual organisms. It states that speciation begins when a population becomes geographically separated from its parental species. Speciation is complete when such a population is reproductively isolated from its parental species. The members of a new species, in other words, must acquire reproductive isolating mechanisms that prevent them from interbreeding and producing fertile offspring with the members of its parental species. Reproductive isolating mechanisms come in two forms. Prezygotic mechanisms, such as incompatible sexual physiologies, prevent members of different species from mating. Postzygotic mechanisms stymie the development of viable offspring after mating. (Ereshevsky 2014, 718)

Much more could be said by way of expanding on current conceptions of species and of speciation, but hopefully the preceding bare-bones summary will suffice for our limited purposes.

I should, however, briefly draw attention to three complicating factors I have up until now left aside:

(1) First, the preceding discussion has taken for granted that when we are talking about "species" we are talking about a single, objectively real (in some sense) explanatory factor in nature. And this is indeed how

it is most commonly regarded in biology and philosophy of biology. Species are typically seen as the basic units of evolution, and insofar as evolution is a real process, species are the real elements figuring in that process. Still, this common perspective is not universal; some regard the species category, as understood by most contemporary biologists, as flawed in important ways and not objectively real in the way typically thought. Note that the dispute here concerns how to think about the species *category*, not how to think about individual species *taxa*. Everyone agrees that there are cats and people, such that *Felix catus* and *Homo sapiens* are both real as empirically observable reproductive communities. The question is whether these taxa belong to some single, objectively real overarching category known as "species." Most would say that they do, but a good many others advocate pluralist rather than monist conceptions of the species category, such that they think there are multiple legitimate conceptions of what it is to be a species (with differing versions of pluralism arising partly from further disputes about where the boundaries of legitimacy are drawn), and still others advocate a sort of antirealism with respect to the species category. The stance I have adopted here is the prevailing monist, realist, and broadly phylogenetic perspective. But the presence in the literature of alternative understandings should be kept in mind, and I will have a bit more to say about the possible theological import of these in "Potential Applications to Specific Subdisciplines of Theology" below.

(2) Second, acceptance of the unity and objectivity of the species *category* should not be taken to imply that there is no room left for vagueness or indeterminacy with respect to an individual organism's or population's membership in a species *taxon*. That is, one can adopt a precise understanding of what it is to be a species, while admitting uncertainty about whether some organism or interbreeding community does or does not belong within a particular taxon. Disputes and shifts in thinking need not be taken as undermining the reality and objectivity of the species category, or its important explanatory role in evolutionary theory. In fact, disputes about borderline cases and potentially indeterminate classifications are common in discussions of natural kinds, not just in biology but across the sciences; think, for instance, of discussions in philosophy of chemistry about the status of isotopes or the products of certain complex chemical reactions. (For an accessible entry point to the literature concerning vagueness in the metaphysics of natural kinds, see Hawley and Bird 2011.) That there are such disputes need not be seen as evidence that the species category is lacking in objectivity, or that the question of membership in a particular biological taxon is merely a matter of semantics. On

the contrary, that such disputes are common throughout the sciences (and philosophy of science) indicates that scientists tend to think of classification as aiming at an objective "carving of nature's joints," one worth disputing about precisely because facts about the natural world are at stake.

(3) Third, while I have mentioned higher taxa (genera, and so on), the main focus so far has been on species. This is reflective of the far greater attention given to the species category in the existing literature, both in biology and philosophy of biology, which attention is in turn reflective of the special status commonly accorded species as the units of evolution. It has commonly (though not universally) been held that the higher taxa are mere conceptual abstractions, not real in the same way (or, alternatively, not real to the same *degree*) as species. For instance, Niles Eldredge and Joel Cracraft (1980, 249) write, "That taxa of categorical rank higher than species do not exist in precisely the same sense as do species is crucial. . . . What all taxa, from species up through kingdoms, do share is presumed descent from a single ancestral species. What they do not share are similar reproductive patterns" (quoted in Ereshefsky 1991, 85). A detailed treatment of this issue would take us well beyond the central concerns of this article, but the debate over the ontological status of higher taxa is worth keeping in mind, for a reason that will be made apparent in the section "Potential Applications to Specific Subdisciplines of Theology" below.

Implications for Technological Alteration of Species

A hypothetical transhumanist scientist wishing to produce a new species out of the parental *Homo sapiens* would have at least two available routes: a relatively easy but slow route, or a more technologically involved but faster route. As to the first, she could, for example, isolate a human population from the rest of the species (a Mars colony perhaps?), subject it to dramatically new environmental pressures, and leave it in isolation for thousands of years with the hope that new mutations will gradually alter the isolated population in ways that render its members physically incapable of interbreeding with the rest of humanity (either because of prezygotic or postzygotic incapacity). This method of getting to a new "human" species is relatively easy from a technological perspective (especially, if one changes the hypothetical example from a Mars colony to an Antarctic colony), but also uncertain and lengthy. (Human populations living on remote islands, isolated from the rest of humanity for thousands of years, nevertheless obviously remained part of *Homo sapiens*.)

Another route, more difficult from a technical standpoint, would be to engage in some dramatic germline genetic engineering, thereby producing

a new class of people reproductively isolated from the rest of the human population. Again, there are various ways this might be accomplished—one can, for instance, envisage a scenario in which genetic engineering produces a hyperintelligent subclass, which chooses only to interbreed among its own members, such that, over time, mutations occur unique to that population and eventually they are rendered physically unable to reproduce with the larger population and a distinct lineage begins. That too would be a lengthy process, however. More immediate and dramatic would be genetic interventions to produce directly a class or classes incapable (whether due to prezygotic or postzygotic mechanisms) of reproducing with the larger human populace yet still capable of reproducing among themselves. Such interventions could conceivably involve substantial outward phenotypic alterations (here one inevitably thinks of science fiction examples), but they need not. One can, for instance, hypothesize the creation of a class of individuals largely equivalent in outward appearance to "normal" humans yet capable of reproducing fertile offspring only among other members of that class. I am not competent to comment on the actual feasibility of this prospect given the current state of knowledge in genetic engineering, but it seems difficult to rule out in principle. (Here a referee has helpfully drawn my attention to ongoing work on the human artificial chromosome [HAC], the product of a technique for introducing a new chromosome into a zygote; such a technique has been used successfully in bacteria and yeast for 20 years, and progress toward human trials has been rapid. It is certainly one method by which some fairly dramatic changes might realistically be introduced into the human reproductive process in the near future. For an accessible introduction to the HAC, see Dvorsky 2013.) *Why* one would want to create such a class is of course another question entirely—again, one's mind inevitably turns to science fiction, in this case perhaps Aldous Huxley's *Brave New World*.

From the preceding, we can draw the important conclusion that under the currently prevailing conception of speciation for sexually reproducing organisms, technological intervention to create a new biological species (i.e., a new lineage reproductively isolated from the previous) out of *Homo sapiens* is *both* easier and more difficult than one might suppose at first glance. It need not require substantial changes to outward phenotype, and indeed if one is willing to wait long enough, mere geographic isolation, under certain conditions, could theoretically do the trick. On the other hand, if one wants to bring about the *rapid* formation of a new, isolated lineage, genetic engineering would indeed be required to prompt the relevant changes in reproductive capacity, though again, in theory that need not involve substantial changes to the outward human form.

Of course, a considerable portion of the transhumanist literature is concerned less with the engineering of new biological species out of *Homo sapiens*, and more with the overcoming of biology by way of merging us

with machines, whether *partially* (cyborgs) or *wholly* (uploading human consciousness into a computer, thereby leaving biological life behind entirely). With respect to *partial* merging, if these cyborgs still engage in sexual reproduction and do not form among themselves a new, reproductively isolated lineage, then biologically speaking they remain full members of *Homo sapiens* (however many extra robot limbs and so on they may have acquired). Again, from the perspective of modern biological taxonomy, a new species will be present only if a new lineage is present. While one can certainly imagine scenarios in which this partial merging contributes to the forming of a new species (e.g., a scenario in which cyborgs refuse to mate with noncyborgs, such that over time accumulated mutations result in reproductive isolation), it need not have that result. By contrast, transhumanist scenarios involving complete merger via the hypothetical uploading of consciousness into a computer would take us beyond the realm of biology altogether. If all people left their bodies behind and uploaded into computers, *Homo sapiens* would cease to exist as a biological species.

How Does the Biological Conception of *Homo sapiens* Relate to a Philosophical (or Theological) Account of Human Nature? And Where Does This Leave Transhumanism?

To help us reflect on how the preceding biological account of species relates to philosophical and theological accounts of human nature, and in turn how different models of those relationships might impact transhumanism, I would like first to take a cue from three elements of Ian Barbour's (1966, 1990) well known (though arguably somewhat dated) categorization scheme. His scheme pertained to the major competing views concerning the relationship between science and religion, but it can be translated readily enough into the present context.

Conflict

Consider first a *conflict* model. Here, one might argue that what modern biological taxonomy tells us about the species *Homo sapiens* is both commensurable to what a particular philosophical theory of human nature purports to tell us, and furthermore that they are incompatible. For instance, one might be committed to a version of neo-Aristotelianism according to which any biological species, humans included, are rightly defined by the instantiation of an intrinsic essence (on Aristotle's terminology a *substantial form*), type-identical across all members, and that this substantial form, while capable of destruction (i.e., one could wipe out all members of a certain kind), is not capable of change. This version of neo-Aristotelianism

apparently clashes with a core commitment of contemporary biological taxonomy, namely the latter's commitment to defining biological kinds at least partly (if not wholly) by reference to lineal relations. One might look at this clash and judge that, given the overwhelming plausibility of the neo-Aristotelian metaphysics of living things, contemporary biology must be mistaken, and in time will line back up with intrinsic essentialism. Or, to give another example, one might argue that the theological anthropology at work in St. Maximus the Confessor, with its neo-Platonic roots and commitment to kinds defined in terms of their intrinsic *logoi* (analogous in some respects to Aristotelian substantial forms), is similarly incompatible with modern biological taxonomy, and that in the face of this conflict St. Maximus' anthropology must be deemed unworkable, at least in that particular respect. Thus, where genuine conflict is posited, one can in theory side with the philosophical/theological account of humanity, or with the scientific.

If one adopts the conflict model, transhumanist hopes for genetically engineering new species out of existing *Homo sapiens* could potentially be frustrated, depending on the precise stance adopted. According to the neo-Aristotelian, for instance, it will be far from apparent that *any* amount of genetic engineering could give rise to a new species out of *Homo sapiens*. For the neo-Aristotelian, the human substantial form is unchanging, and is defined most crucially by the characteristic of *rationality*. No amount of genetic engineering that leaves this crucial characteristic intact would be such as to give rise to a genuinely novel species, no matter how bizarre the hypothetical changes to human morphology. A person with wings and a tail and no capacity to interbreed with the wider population (and *with* a capacity to produce fertile offspring upon mating with other winged/tailed persons) will on this version of neo-Aristotelianism still count as full members of *Homo sapiens.* Moreover they will still count as members of the species, not just in some *normative* sense (e.g., in the sense that they would retain the same moral rights as currently existing members of *Homo sapiens*), but in the full *biological* sense as well. By contrast, if one adopts the conflict model but takes the side of modern biological taxonomy, the prospect of engineering new species remains, along the lines noted in the section titled "Implications for Technological Alteration of Species" above.

Independence

On an *independence* model, philosophical/theological accounts of human nature are not commensurable with that of contemporary biology. They cannot conflict because they are not talking about the same thing, and they must each be judged on their own terms. For instance, one might adopt a strict dualism about human nature, maintaining that a person's soul is a wholly distinct substance from his or her body, so distinct that it could

in theory inhabit different biological natures—think, for instance, of the Hindu idea that the soul can reincarnate across different animal species. This is a philosophical/theological account of human nature that in no way overlaps with the relevant biology; whatever the biological story turns out to be, the soul remains above the fray, as it were.

On this model, implications for transhumanism could again vary widely, depending on the specifics of the philosophical/theological accounts at play. But to stick with the present example, consider that if the Hindu account of the soul is accurate, such that the human person really is, fundamentally, something wholly nonphysical and capable of coexisting with any biological organism (or none), then arguably the wind is rather taken out of the sails of the transhumanist. What is the point of radically remaking the human frame, forming new biological lineages out of current *Homo sapiens*, perhaps even with radically altered morphologies (wings, and so on), when we are all liable to transcend humanity in our next reincarnation? Why spend hundreds of millions learning to engineer wings for our offspring when we can already reincarnate as birds?

That example may strike some readers as a bit fanciful, but recall that transmigration of souls is viewed as a real possibility both by Hinduism and by other major world religions past and present, and that the strict substance dualism underlying it remains widely defended in analytic philosophy of mind (though still a minority position there). At any rate, the point is simply that if one adopts the independence model of the relationship between philosophical and biological accounts of human nature, potentially dramatic implications for transhumanism loom.

Integration

Finally, we come to the *integration* model, which views philosophical (or, again, theological) and biological accounts of human nature as at least partly commensurable, and as not wholly conflicting; indeed there is potential for combination and mutually beneficial enrichment. Of course, the notion of combination implies the linking of two initially distinct components; in our context, a different, particularly thorough version of integration would be out-and-out *identification*, such that one simply reads a philosophical account of human nature directly out of the relevant biology; alternatively, one might argue that the philosophical account of human nature *reduces* to the account of *Homo sapiens* presented by modern biological taxonomy, such that the two remain distinct, but the biological account retains priority.

As to implications for transhumanism: If one goes the identification or reduction routes, matters are simplified, such that the prospects for engineering new species out of existing *Homo sapiens* again fall out much as described in the section titled "Implications for Technological Alteration of Species" above. Otherwise, the range of options, and the consequent

implications for transhumanism, is potentially vast. Obviously, there are many distinct philosophical and theological accounts of human nature, and many ways in which these could be partially integrated with contemporary biological accounts of species and speciation. For example, one might attempt to integrate portions of St. Maximus' neo-Platonic ontology of the human person with current biology by proposing that the image of God inherent to the human person, and definitive of the *logoi* of humanity, is variably realizable across at least a limited range of biological substrates (perhaps including a range of reproductively isolated lineages); as such, even a radically altered human form, one in fact constituting a new species by the criteria of current biological taxonomy, could nevertheless retain that image. More radically, if one were to reject the common patristic understanding of this image of God in us as *substantive* (i.e., as realized in part via certain intrinsic properties of human nature, like rationality and freedom) in favor of a theological anthropology according to which the image of God in us is defined in functional or relational terms (i.e., as realized through a divinely ordained vocation or set of defining relationships), this would arguably permit an even wider range of underlying biological variability while retaining that image, and thus retaining the core of our humanity. (For more on the "substantive" vs. "functional" vs. "relational" conceptions of the image of God, see, for instance, van Huyssteen 2006, ch. 3 and Thweatt-Bates 2012, ch. 4. See also Cole-Turner 2016, 154–60 for an enumeration of still further conceptions.)

With those three models laid out, and some examples given of how they might unfold when realized by particular philosophical or theological accounts of human nature, I would like now to examine how some of them could be applied in further theological contexts. As with the preceding material, the aim is to introduce the reader to some novel areas of discussion and neglected points of interdisciplinary interaction; I am not aiming at a complete or exhaustive treatment. Note that some of these topics have received little attention in the existing literature on theology and transhumanism, so hopefully readers will be indulgent of the highly speculative nature of what follows.

Potential Applications to Specific Subdisciplines of Theology

Hamartiology

Within Western Christianity, the dominant understanding of original sin from Augustine up through relatively recent theology had been one involving inherited guilt, guilt transmitted at least instrumentally through lineal descent. (Within the Eastern Orthodox tradition, the history of the understanding of "original sin"—to the extent that that terminology is

even employed—is quite different, and what I will have to say here focuses solely on the Western conception.) Being born with the taint of original sin, inherited ultimately from Adam, entails not only an innate propensity to vice but also an alienation from God that must be corrected through baptism, without which sacrament the infant is subject to possible damnation (hence the development of the doctrine of limbo in Catholicism). Elements of this traditional picture are now much disputed, and large swathes of Protestant theology in particular would reject or radically reconceive it. Still, the basic picture remains widely held and widely discussed, and for those who maintain this understanding of original sin transhumanism raises new questions of considerable importance.

Consider, for example, a theologian working within an integration model of the relationship between theology and science, and who opts simply to identify the "human nature" of theological anthropology with the *Homo sapiens* of modern biological taxonomy. There is, perhaps surprisingly, at least one way in which the latter might shed light on the traditional Western conception of original sin, insofar as its picture of human nature is defined in terms of lineage. For there is of course a longstanding normative question facing that traditional conception: given the disastrous consequences of the Fall for all succeeding progeny (i.e., being born vicious, guilty, and subject to damnation), would it not have been better for God to destroy Adam and Eve right after the fall and begin humanity anew? Would it not have been better to start with a clean slate and run the experiment again, as it were? While many replies might be given here (e.g., perhaps God's surpassing love for Adam and Eve properly precluded their immediate destruction), modern biology points to an interesting and overlooked twist, in that any such new creation would not have been *human*, biologically speaking; that is, they would not have been members of the same species as Adam and Eve, since they would have been the beginning of a wholly distinct lineage possessing no common ancestor with Adam and Eve. If Adam and Eve constituted the whole of *Homo sapiens* and were then destroyed, then that species necessarily and permanently died with them. Now, that fact may or may not have any normative significance; perhaps it still would have been better for God to annihilate Adam and Eve and give a different, morphologically similar species a chance at stewardship over the earth. The point is simply that one cannot properly conceive that counterfactual scenario as one in which God is creating *Homo sapiens* anew. Rather, annihilation of Adam and Eve would have resulted in the permanent annihilation of that species.

Surprisingly (again), a theologian working with this particular variety of the integration model could conceivably have grounds for welcoming the transhumanist project. One might argue that if some future biotechnology project should succeed in creating a new biological species distinct from *Homo sapiens*, the members of that species might be born without original

sin. Bizarre as that suggestion sounds, it is perhaps conceivable on this particular combination of views (i.e., traditional Western understanding of original sin + integration model of the relationship between biology and theological anthropology + the prevailing phylogenetic understanding of species within modern biological taxonomy). For while the first members of this new species would, in a sense, be descendants of Adam (insofar as Adam would be a common ancestor between *Homo sapiens* and *Homo novus*[??]), they would not strictly be *human* descendants of Adam, if by *human* we mean "belonging to the species *Homo sapiens*." And perhaps the transmission of original sin requires not merely a common ancestor but shared species membership. At least, the claim that it requires both could not be dismissed as heretical outright, insofar as no church body has ever officially considered the question, let alone ruled on it. (And that includes the Roman Catholic Church, which arguably retains a commitment to the traditional Western understanding of original sin.)

Of course, a theologian working with that combination of views but uncomfortable with the suggestion that it might imply endorsement of transhumanism could employ various strategies to sidestep the alleged implication. First, she could retain the integration model but pair her theological anthropology with one of the minority nonphylogenetic understanding of species. As noted in the section titled "A Quick Primer on Modern Biological Taxonomy" above, such models still have defenders. By doing so, she could avoid having to admit that what others might see as a new species really *is* a new species.

Second, and relatedly, she could again retain the integration model but pair her theological anthropology with one of the minority, pluralist ontologies of species, and argue that while the majority phylogenetic perspective is a legitimate understanding of species for certain areas of biology, a minority nonphylogenetic perspective is legitimate for others, and likewise for theology.

Third, she could again hold to the integration model, *and* retain the majority phylogenetic understanding of species, but rethink the notion of "human" at play in the doctrine of original sin. Specifically, she might argue that the humanity referenced there is not the human species, but some higher biological taxon, perhaps the genus *Homo*, to which both *Homo sapiens* and other extinct hominid species like *Homo neanderthalensis* belonged. Broadening out the theological understanding of "human" in just that way has already been suggested in other theological contexts—see again the recent work of Ron Cole-Turner (2016, 173–92), who argues that Neanderthals should likewise be seen as part of humanity, unified with us and redeemed along with us by virtue of Christ's incarnation. That too would block the implication that the genetic engineering of a new human species could produce an individual born without original sin. Advocates of such a perspective would, however, have to find a way of addressing the

potential objection arising from the fact that higher level taxa are often treated in biology and philosophy of biology as either unreal conceptual abstractions or at least as having a lesser ontological status. (Granted, that view of the higher taxa is not universal, and there are minority currents of thought in both disciplines that would lend support to a more robustly realist interpretation.)

Fourth, she could point out that even if there was a theoretical prospect of being able to produce through genetic engineering a person untainted by original sin, the *prima facie* normative appeal of this could be countered by a variety of other moral worries—not only the standard concerns about "playing God" that arise in discussions of transhumanism, but others unique to this context (e.g., Roman Catholics might have concerns about the impiety of attempting an artificial immaculate conception; moreover, still further normative complications could arise when aspects of soteriology are taken into account, which we will consider in the next section).

Fifth, she could simply abandon the integration model and adopt a conception of human nature that fits with traditional theological anthropology and either ignores or openly clashes with contemporary biology (perhaps one or another of the models broached briefly in the section "How Does the Biological Conception of *Homo sapiens* Relate to a Philosophical (or Theological) Account of Human Nature? And Where Does This Leave Transhumanism?" above).

Obviously, much more could be said about the ways in which the prevailing account of species in modern biological taxonomy might interact with the traditional Western doctrine of original sin, and how that might in turn impact one's assessment of transhumanism; still more could be said about possible interactions with nontraditional understandings of the doctrine, as well as other areas of hamartiology. As noted above, I am not aiming here at a complete or exhaustive treatment. The really important point for present purposes is to highlight the (neglected) relevance of modern biological taxonomy to the theology of transhumanism.

Soteriology

The most obvious concern relating to transhumanism and the doctrine of salvation has to do with the extension of the efficacy of Christ's atonement. Christians have historically been agreed that the sacrifice on the cross provided for the redemption of all humanity (or, in the Reformed tradition, all the *elect* among humanity). But if a new species is manufactured through genetic manipulation, will the members of that new species automatically fall under the scope of that sacrifice?

If one line of speculation in the section on hamartiology obtained, such that the members of this new species were devoid of original sin, the question of their place within the scheme of Christ's atonement might

initially seem less pressing: if they are born without original sin, they would seem not to require redemption. But assuming that the members of this new species would in fact lack original sin, what if some of them subsequently fell? Then the question of the extent of the atonement would reappear. Some of the dialectic above could then be repeated (e.g., if the relevant sense of "humanity" is broader than the biological species *Homo sapiens* the problem might evaporate). Yet if it turned out that this newly fallen new species was for one theological reason or another excluded from the scheme of redemption, that would of course provide the practitioner of moral theology an additional reason to object to that sort of transhumanist experimentation. (An even worse scenario would be one in which the members of this new species were born with original sin but *not* included in the scheme of redemption—a conceivable scenario if original sin were transmitted through ancestry from Adam with no necessity of belonging to *Homo sapiens*, while the atonement covered only members of the species Christ himself actually belonged to.)

Leaving aside issues arising from the traditional Western understanding of original sin (which, as noted above, is much more controversial today, in particular among Protestant theologians, and which has always been rejected by the Eastern Orthodox Church), further complexities emerge when one considers broader themes employed in soteriology. Consider, for example, the doctrine of sanctification. This is typically understood as a process of becoming more like Christ, being conformed to His image. But Christ is one person in two natures, divine and human. If "human" here means *Homo sapiens*, and *Homo sapiens* is understood in the manner prevailing in modern biological taxonomy, then in what sense could a being belonging to a different species from Christ be fully and properly conformed to Christ? This question would perhaps become more pressing in scenarios in which the new species was dramatically different, morphologically, from us. (Again, one inevitably thinks of science fiction examples—perhaps in this case the animal/human hybrids of H. G. Wells's *The Island of Dr. Moreau*.)

Or consider the Eucharist. In those denominations that affirm some version of the real presence (e.g., Roman Catholics, Eastern Orthodox, some Lutherans and Anglicans, and so on), there would be considerable complications concerning the eligibility of the members of a different species for reception of the Eucharist. Could the member of such a species really become one in flesh with Christ through that reception? For those denominations that likewise affirm the necessity of such reception for salvation (in normal circumstances), that complication would of course have reverberations in soteriology.

The points just made presuppose what was earlier termed a "substantive" understanding of human nature as *imago Dei*. But alternative understandings would not necessarily simplify matters. Consider, for instance, the

so-called "functional" approach, where the focus "is not on human capacities but on our assigned role in the created order. This approach can claim perhaps the strongest Biblical support. . . . When God creates other animals, they are not given any command. Human beings are in the image of God and commanded to exercise dominion, or care of the household, over the rest of creation. That divinely mandated function is what it means to be created in the image of God" (Cole-Turner, 2016, 156). Initially such a perspective might seem to carry less in the way of theological difficulties for the products of transhuman experimentation. After all, it may be that the new species would have no difficulty in sharing in the functional role definitive of "human," however that is specified. On the other hand, one might as easily propose that this understanding would even more decisively cut off the members of the new species from communion with God, insofar as they (unlike us) would not really be the creations of God—they would instead be the products of modern biotechnology. Unlike us, they would not come into the world with a clear divine mandate of any sort, let alone a specific mandate for stewardship over God's Earth. And I would argue that complications of comparable severity obtain for the other major models of the *imago Dei*.

Eschatology

The preceding discussion presupposes that the members of this new species (or set of species) would have immortal souls. This is itself perhaps a controversial claim, though many would argue that rational capacities themselves suffice to show the presence of a nature transcending the purely physical, such that if the members of the new species were rational then that would automatically answer the question. (Recall, for instance, the standard Scholastic arguments for the immateriality of the soul.) Continuing on the basis of that assumption, and adopting as well the traditional Christian understanding of the final universal resurrection of the body, we might wonder how that resurrection would play out for members of these new species, particularly if their earthly bodies were radically morphologically different from our own (and by extension Christ's). Would their resurrection bodies share the same basic form as that of their earthly bodies? Or would their earthly bodies be regarded by God as inherently corrupt, the product of science gone mad? If the latter, would they instead receive a resurrection body much like ours (whatever *that* will be like), by way of healing a defaced nature? But then would that constitute a healing, or a wholescale replacement? And is the latter even metaphysically possible? Normally we think of a thing's intrinsic nature as permanent and essential to it, the stable element that remains the same through nonessential alterations. Here again, transhumanism raises some interesting and difficult ontological questions of clear theological import.

Suggestions for Future Work

That there is considerable work to be done by theologians in this context will be clear from the preceding two sections. And perhaps that material has already sparked some ideas regarding possible lines of further inquiry; that was the primary intention, for I have certainly not done much of anything by way of answering those questions. Still, I will conclude by leaving the reader with a few further suggestions:

(1) Theologians currently in dialogue with the transhumanist movement are already well aware of the variations present in the latter; to restate a point raised in the beginning of this article, some transhumanists favor human enhancement within existing human nature, while others favor the intentional development of one or more wholly new species. In their discussions with transhumanists of that latter stripe, it is especially important to clarify what conception of human nature the transhumanists are working with, and thus what they think they will be leaving behind when the "posthuman" future has emerged. One cannot assume that a particular transhumanist views human nature as identifiable with, or reducible, to the current biological account of *Homo sapiens*. In principle, transhumanism (even secular transhumanism) could be combined with any number of philosophical or theological conceptions of human nature. (Indeed, those transhumanists who think that we will remain human even after uploading our consciousnesses into computers are clearly *not* identifying human nature with *Homo sapiens*.)

(2) Correspondingly, theologians engaged in discussion with transhumanists should have a clear idea of which philosophical/theological account of human nature they favor; moreover, if that account differs from the account put forward in contemporary biology, they should likewise have a clear understanding of how they view the relationship between the two. (Arguably it need not—one could make the case that it is open to the Christian theologian simply to identify human nature with the *Homo sapiens* of contemporary biology.) It would be difficult to overemphasize the importance of these two points, given their potential implications for one's understanding of transhumanism. Of course, this will inevitably involve theological and philosophical complications, insofar as *Christian* theology at least arguably lacks a dogmatically defined, detailed account of human nature; in fact a range of views can be seen across Church history, both across denominations and within denominations. For instance, while some Roman Catholic philosophers and theologians assume that Catholicism has ensconced a version of Aristotelian hylomorphism, this is in fact debatable; moreover, even if true, there are a

variety of importantly different *versions* of hylomorphism—for example, the Thomistic, Scotisic, Suarezian, and so on. Ideally, a Catholic dialogue with transhumanism would (after first clarifying the version of transhumanism on offer) specify carefully the metaphysics of human nature adopted by the Catholic interlocutor—for example, Scotistic hylomorphism—and how that metaphysics relates to the account of *Homo sapiens* presented in contemporary biology. With all that groundwork in place from the outset, mutual understanding between Catholic theologians and secular transhumanists might be more easily achievable, even if ultimate agreement on, for instance, normative questions remains elusive. Although perhaps even the moral debates might be illumined by that careful preliminary work. (For a recent example of how the careful articulation of a specific theological anthropology can contribute to a more productive engagement with transhumanism, see again Thweatt-Bates 2012.)

(3) In the previous section, I brought in another major world religion, Hinduism, to illustrate a conceptual point. That was of course quite a limited and superficial interaction with Hindu theology. Ideally Christian engagement with transhumanism should be informed by an ongoing dialogue with other faiths, and a careful observation of the ways in which scholars from those faiths engage with transhumanism.

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