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An Essentialist View of Biological Sex Remains Alive and Well

A Response to Penner, Cordero, and Nichols

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Abstract: In response to a recent article by Myron Penner, April Cordero, and Amanda Nichols in this journal, this essay offers a critical analysis. Their article makes a case against gender essentialism rooted in biology, drawing from the biology of sex determination. While commending their thorough exposition of the science of sex determination, we argue that most of their anthropological conclusions are unfounded. After reviewing their article, we present several criticisms that undermine their case. In particular, we take issue with the authors' methodological commitments and demonstrate that the evidence they present from the science of human sex determination does not convincingly support rejecting an essentialist view of biological sex. Furthermore, we argue that human sexuality solidifies into a binary and fixed state following sex determination during gestation. Contrary to the original essay, our analysis concludes that the science of sex determination leaves wide open the possibility that some biology-based form of gender essentialism is true.

Keywords: Sex determination; Gender essentialism; Scripture; Biology; Binary

Introduction

In a provocative contribution to the recent special issue of this journal on analytic science-engaged theology, Myron Penner, April Cordero, and Amanda Nichols use a scientific understanding of the biology of sex determination in human beings to make a case against "any biologically based gender-essentialism" (2023, 28).[1] While the authors have laid out the science of sex determination meticulously and helpfully, we will argue that their anthropological conclusions are unfounded and that they have not met their burden of proof.

Our reply to Penner, Cordero, and Nichols will begin with a review of their methodological commitments and their argumentation as self-conscious practitioners of analytic science-engaged theology. Then we will present several criticisms that, we believe, undermine their case. Our objective is not to provide a robust alternative to their proposal, but simply to show that the biological evidence that they adduce leaves wide open the possibility that some biology-based form of gender essentialism is true.

1. Summary of the Essay

Turning first, then, to the issue of methodology, the authors inform us that they are employing a "domain-specific, non-hierarchical version of the Wesleyan Quadrilateral" (29). As they explain it, there are four epistemically authoritative sources for theological reflection—"scriptural texts, reason (including science), experience, and tradition" (29)—each of which is authoritative within its particular domain (hence "domain-specific"), and none of which is more epistemically authoritative than any other (hence "non-hierarchical"). They go on to note that they

> see science-engaged theology as letting science (as an expression of reason) take the lead in providing data to address theological questions that concern the nature and functioning of biological organisms and physical systems. As a result, in order to understand and connect the ways in which biological sex expression is connected to our philosophical and theological understanding of human persons, the place to start for understanding how sex is expressed in humans is biology, not the Bible. (30)

[1] For all subsequent references to the original article (Penner, Cordero, & Nichols 2023), page numbers will be provided in parentheses after the quoted text.

So, the authors turn to consider what the discipline of biology tells us about the determination of sex. It turns out that defining "sex" is somewhat challenging for biologists. As the authors note, biologists do "not operationalize categories of 'male' and 'female' in ways that will satisfy a quest for clear, distinct, and universally applicable definitions" (31). Rather, they connect the notions of sex, maleness, and femaleness with the more fundamental category of reproduction. The authors therefore refrain from offering analytic definitions of "biological male" and "biological female" as applied to human beings. Instead, they say this:

> [I]t does make sense in some contexts, when talking about *Homo Sapiens*, to use 'female' as shorthand for 'members of the species who produce the larger gametes necessary for reproduction,' and to use 'male' as shorthand for 'members of the species who produce the smaller gametes necessary for reproduction' with the preceding caveat about these terms not being fixed and universal across species in view. Moreover, an additional biological caveat when using 'female' and 'male' in reference to *Homo Sapiens* is the recognition that while there are typical developmental pathways involving a range of factors that enable gamete production within the species, there is also a range of non-typical developmental pathways such that in those instances, the convenient shorthand terms do not easily apply. All of this to say that when we use 'male' and 'female' in what follows, we are meaning them as terms of convenient shorthand with the previous caveats in mind. (32)

Thus, throughout their analysis of the biology of sex determination, they treat gamete production as the primary distinguishing characteristic of maleness and femaleness in sexually reproducing species, including *Homo sapiens*.

The authors discuss two interesting examples of other animal species in which sex is contingent in some significant sense—viz. the blue-headed wrasse (a particular species of reef fish) and the red-eared slider turtle. They then suggest that human sex determination shares a similar sort of contingency. Here they note that while typical developmental pathways in humans are followed in the vast majority of cases, resulting in the development of either male or female sex organs and features, there are also nontypical developmental pathways. Penner and his colleagues explore in some depth the two typical sex-determining pathways and then four nontypical sex-determining pathways, two of which are caused by genetic mutations in the embryonic stage, and the other two of which are caused by epigenetic modifications in the embryonic stage.

There is no need to rehearse the details of their lucid biological exposition. What is relevant is how the authors apply this biology to philosophical and theological

anthropology. On the basis of their review of these various pathways of sexual development, they draw the following conclusion:

> Given our understanding of contingency, sex expression for humans is contingent if, and only if, there are possible scenarios in which one's developmental pathway of sex determination differs from the pathway followed in the actual world. With our knowledge of typical and non-typical pathways . . . we can see that sex expression is indeed a contingent, and not essential, property of human beings. This is because for any possible developmental pathway of sex determination, there is a non-zero probability that an alternative developmental pathway could have been followed instead. (43)

The authors deny a kind of essentialism about individuals rather than an essentialism about kinds—e.g., about the kinds "biological male" and "biological female." They are not arguing that there is no essence of biological maleness or of biological femaleness. Rather, they conclude that any given individual human being's particular sex is not essential to him or her. Assuming that the zygote that became Socrates in the actual world followed a typical male sex developmental pathway, nevertheless, "there are possible worlds in which the Socrates zygote—the very same zygote with the numerically identical chromosomal identity—follows . . . a female developmental pathway and develops female external genitalia even though Socrates is XY" (43). By this logic, Socrates might have existed as a biological female even though he had a Y chromosome; hence, Socrates might have existed without being a biological male.[2] Having secured this conclusion that human sex determination is not essential but contingent, the authors then tease out the theological and philosophical implications. Here things get particularly interesting.

In light of the fact that nontypical as well as typical developmental pathways for sex determination exist in humans, the authors claim that "[t]his complex and varied biological landscape undermines any tacit or explicit appeal to biology as the basis for a kind of gender-essentialism based on alleged facts about biological sex" (45). At this point, we should clarify the kind of gender essentialism that they have in mind, what they describe as "a composite of gender essentialist views that are found

[2] We might note here that if the authors are right, then it is causally or nomologically possible—i.e., possible given the scientific laws that characterize the actual world—that Socrates not be biologically male, and not merely metaphysically possible—i.e., such that there are possible worlds in which Socrates exists but is not biologically male—though the latter, weaker, metaphysical sense of possibility is all that is needed for the authors' case here against the particular sort of sex essentialism with respect to individuals that they have in view.

across theological traditions, including Catholic, Orthodox, and Evangelical theologies" (46, fn. 14). Here's how they define it:

> On a strong essentialist view, sex is seen to be (a) universal (every human has a sex), (b) binary (every human is either male or female), and (c) immutable (one's biological sex is deemed to be an essential property of persons and as such, the ideas of sex transition or contingency of sex determination are viewed as category mistakes). Strong essentialists also endorse a tight, normative link between sex traits and gender identity which includes the roles, behaviors, and social spaces occupied by men and women. On the strong essentialist view, gender identity is also deemed to be universal (every human is gendered), binary (every human is either a man or a woman), immutable (part of one's essential male or female nature), with the additional claim that gender identity is (d) biological (necessarily connected to facts about biological sex). (45–46)

While they claim just prior to this definition of "strong essentialism" that the evidence "undermines *any* tacit or explicit appeal to biology as the basis for a kind of gender-essentialism based on alleged facts about biological sex" (45, emphasis ours), the only sort of essentialism that they explicitly address in their essay is this sort that they call "strong essentialism."

In short order, they critically consider sample philosophical and theological arguments for strong essentialism, providing reasons to reject them. Here is the sample philosophical argument (46–47):

(4) Human reproduction requires clear, distinct, complementary, and binary biological roles for males and females.
(5) If reproduction requires clear, complementary, and binary biological roles for males and females, then human society requires clear, distinct, complementary, and binary gendered social roles for males and females.
(6) All humans are either male or female.
(7) Therefore, all humans fit into clear, distinct, complementary and binarygendered social roles.

And their sample theological argument for the same conclusion goes as follows (47):

(8) According to scripture and tradition, males and females have clear, distinct, complementary, and binarygendered social roles.
(9) According to scripture and biology, all humans are either male or female.

(7) Therefore, all humans fit into clear, distinct, complementary and binarygendered social roles.[3]

In addition to contending that the philosophical argument falters with respect to (5), which the authors recognize to be dubious, they note that biologists would reject (6) and (9), which would suffice to undermine both arguments. For the theological argument, this latter criticism is particularly pointed, given the authors' commitment to their "non-hierarchical, domain specific version of the Wesleyan Quadrilateral" (27). As they put it, "[t]he epistemologically salient authority here is biology, not biblical texts" (48).

Despite the common assumption that "universally in nature, sex is biologically hardwired and fixed" (48) so that transitioning from one sex to another is against nature, the authors claim instead that sex transition "is a commonplace, naturally occurring phenomenon among many species that reproduce sexually" (48). They speculate that if more Christians understood the "naturalness of sex transition in non-human species," that would psychologically prepare them "to be more accepting and supportive of sex transition in humans" (50). In turn, they would be less inclined to think of sex expression as locked in one direction only but instead acknowledge that we all have parallel paths with ramps from one path to the other: "the very same individual who follows a typical path in the actual world could have followed the parallel path of sex determination had things gone differently early in development" (51).

Their conclusions are striking. Philosophically, they claim that "the ongoing presence of parallel paths should undermine resistance to human sex transition based on a mistaken concept of humans possessing a fixed, sexed nature" (52). They go further: "Instead of thinking that people who undergo medical or surgical interventions to facilitate sex transition are 'going against their biological nature,' a better way to understand their actions would be to see them as building or repairing the ramps from one path to the other—both of which are part of one's human nature" (52). Finally, they leave us with a theology of the human person suitably refurbished for our modern transgender moment:

> Each human person—a creature who bears God's image—has in their embodied nature the capacity to express traits associated with both males and females. The

[3] A note for non-philosophers: the final proposition, listed as (7), is not a typo. Since the theological argument yields the same conclusion as the earlier philosophical argument, it receives the same designation "7" (rather than "10"). This is standard practice in philosophical writing in the analytic tradition.

> typical path of sex development is not the only pathway available—especially before coming to the developmental "fork in the road." Biological facts of sex difference can be seen not as differences in kind, but rather of degree. This has negative implications for theologically motivated gender essentialism where one's particular pattern of sex expressions is seen as an essential, fixed part of who they are. (52)

Thus, we see that the authors have taken their evidence from biology to justify the claims that human sexuality is not binary but spectral, and that any given human individual's sex is not fixed but potentially changeable.

2. Why We Aren't Convinced, and Why No One Else Should Be Either

What should we make of the authors' case? First, we thank them for providing a very clear and helpful presentation of the science of sex determination, especially within the human species. We also wish to acknowledge that they have presented a rhetorically powerful anti-essentialist case. While we are not convinced and think that others ought not to be either, it seems to us that many readers in our cultural moment will find their case appealing.

Our objections are of two kinds. First, we find the authors' methodological commitments seriously problematic. Second, we believe that the evidence they adduce—i.e., the scientific understanding of human sex determination—does not actually support what they think it does. We'll consider each of these objections in turn.

A. Methodological Issues

Regarding method, we appreciate the forthrightness of Penner, Cordero, and Nichols in laying their methodological cards on the table from the outset. We also commend the methodological consistency throughout their essay. Nevertheless, we find their methodological commitments troublesome.

While we appreciate the epistemic value of all four points of the Wesleyan Quadrilateral—Scripture, reason, experience, and tradition—the authors' refusal to recognize any of the points of the quadrilateral as more authoritative epistemically than the others in the practice of theology is not consistent with any view of Scripture (such as ours) that includes the plenary, verbal inspiration of Scripture and, therefore, takes Scripture in its entirety to be infallible in whatever it asserts, either

explicitly or implicitly.[4] At one point, the authors clarify that their "understanding of theological method involves letting the appropriate domain 'take the lead' in responding to theological questions, depending on the content and the context." That means, methodologically, that "for some but not all theological questions, scripture will have the most normative force. And, for some but not all theological questions, science will have the most normative force" (29). Although they explicitly acknowledge "substantial overlap" between different authoritative sources or domains, and they recognize the relative epistemic equality of all of those domains, they affirm a clear division of labor between them in the practice of theology.

The problem stems from their concept of biblical authority. "[T]he expertise of scripture," they comment, "is to present the experience of a people formed by their interaction with, and response to, the God of the Bible—including the experience of the people formed by their interaction with, and response to, Jesus of Nazareth" (29). Notice that there is no admission here (or anywhere else in the essay, for that matter) that Scripture is *divine* revelation in any robust sense. This endorsement of a merely human authorship of Scripture implies a limited scope of epistemic authority, which lends plausibility to the authors' non-hierarchical or egalitarian approach to the epistemic authority of the four domains of the quadrilateral. It also follows that if and when Scripture makes pronouncements about things that are within the proper domain of the natural sciences, conclusions from the natural sciences take precedence over those of Scripture. However, this approach to the biblical witness does not engender confidence in readers (like us) who, while not denying Scripture's human authorship, recognize Scripture's more fundamental *divine* authorship which gives holy writ superior epistemic authority and thus a broader domain of expertise.

Throughout the essay, a presumed theologically-neutral biology not only takes the lead, but essentially muzzles Scripture. For example, when critiquing the classical Christian position that "[a]ccording to scripture and biology, all humans are either male or female," the authors claim that biologists will reject this (47) and that "[t]he epistemologically salient authority here is biology, not biblical texts" (48). Apparently, even if Scripture addresses whether sex is binary for humanity, its assertions are irrelevant, out-of-bounds, and trumped by modern biology. But disallowing Scripture from speaking to an issue within the domain of biology, especially when Scripture is directly relevant to the conversation, betrays the naivete and reductionism of post-Enlightenment rationalism.

[4] For the record, John Wesley and early Wesleyan theologians held the classical view that Scripture has authority over reason, experience, and tradition (McCall 2016); they would doubtless have rejected the egalitarian version of the Quadrilateral defended by Penner et al.

Relatedly, we note the near-total neglect, if not rejection, of teleology—manifestation(s) of purposiveness or designedness, proper function, malfunction, etc.—in their essay. This follows from prioritizing a supposedly theologically-neutral biology when addressing the question of human sexuality. While the authors want to "present science-informed data" to show how it can "contribute to understanding what it means to be human" (28), they seem to think this can be done without teleological considerations—at least, without teleological considerations that go beyond the purely biological reproductive function of our sexual endowment that we share in common with many other species in the animal kingdom. However, by taking a biology-first approach, and disallowing Scripture, philosophy, and theology from contributing to the conversation, the authors overlook rich *meaning* that is inherent in the physical (biological) facts. This meaning extends beyond the body's mere physical functions and is significant for philosophical and theological anthropology—for example, in determining what is normative for our life as embodied rational agents—and (hence) for ethics. In particular, the authors fail to connect the fundamental biological facts of sex determination with human nature itself and the roles that sexuality is designed to fulfill within it. They also fail to consider how human sexuality is related to our unique imaging of God, though Scripture clearly connects the two in some significant way (Gen 1:26–30). Furthermore, our authors do not consider how human sexuality is ordered to the specific good of marriage. Along these lines, for instance, Melissa Moschella proposes that "the specific aspect of human flourishing that corresponds to the sexual dimension of our nature is marriage, understood as a comprehensive interpersonal union and referred to traditionally as a conjugal union" (Moschella 2019, 198). Recognition of the one-flesh union of marriage as a *telos* of human sexuality is consonant with the view of sexuality and marriage that is presented in Genesis 2. The authors' biology-first approach is a reductionistic approach that fails to recognize teleology, and this is a liability in our judgment. In fact, such blindness to teleology risks treating deviations from the normative as if they were normal.

To be clear, we are not in any way denigrating or attacking the projects of analytic theology, science-engaged theology, or their combination in analytic science-engaged theology. These projects all have significant value as examples of faith seeking understanding. Our worries lie with the approach that Penner, Cordero, and Nichols adopt—their "domain-specific, non-hierarchical version of the Wesleyan Quadrilateral" (29). While we enthusiastically affirm with these authors that reason (including the natural sciences), experience, and tradition all have significant value

for theology, we worry that their particular approach limits—and worse, minimizes or even potentially bars—Scripture's role in the theological task without warrant.

B. Problems with the Case Itself

Before we examine the substance of the authors' case, let's consider how they define the biological sex terms "male" and "female." As we noted earlier, Penner, Cordero, and Nichols refuse to offer any firm definitions and resort to using these terms in highly qualified ways as "convenient shorthand" throughout the paper. Their reticence to own a particular definition of "male" and of "female" is understandable, especially when considering such intriguing animal species as the blue-headed wrasse and the red-eared slider turtle.

Nevertheless, the side-stepping seems unnecessary and perhaps rhetorically motivated. Why not, for example, keep gamete production front and center and construe sex as a matter of "how the body is organized in relation to gamete production," as Abigail Favale puts it in her recent book, *The Genesis of Gender: A Christian Theory* (Favale 2022, 128); or, as Paul McHugh and Lawrence Mayer propose, "an organism is male or female if it is structured to perform one of the respective roles in reproduction" (McHugh and Mayer 2016, 90)?[5] Along these lines, we could define "human male" as *a human being whose body is of the kind that, by virtue of its organization, ordinarily has the potential to produce the smaller gametes (sperm)*, and we could define "human female" as *a human being whose body is of the kind that, by virtue of its organization, ordinarily has the potential to produce the larger gametes (ova)*. Such definitions do not, as far as we can see, beg any of the important questions in this context and they make room for the sorts of nontypical cases that our authors have highlighted—cases in which sexual development proceeds along nontypical pathways. Furthermore, such definitions allow for a human zygote or embryo to lack any particular sex until sex determination occurs beginning around week six of development, which is clearly a concern of our authors.

[5] Similarly, Alex Byrne (2018), while admitting that "[d]efinitions in biology are never perfectly precise," has recommended the following definitions: "females are the ones who have advanced some distance down the developmental pathway that results in the production of large gametes—ovarian differentiation has occurred, at least to some extent" and "males are the ones who have advanced some distance down the developmental pathway that results in the production of small gametes." With respect to human sexuality, and presumably with his proposed definitions in mind, Byrne goes on to note that "there are no clear and uncontroversial examples of humans who are neither female nor male. (A similar point goes for supposed examples of humans who are both female and male, although here things get more complicated.)"

Finally, definitions of this sort can capture the metaphysically and morally relevant senses of those terms in a way that is grounded in biology without reducing sex to a single biological feature. In our judgment, anyone working with the biological data concerning sex determination need not—indeed, ought not—be reticent about providing definitions for sex terms; such biologically grounded definitions are indispensable for philosophical and theological anthropology. While failure to provide such definitions might well be rhetorically useful for a project that seeks to undermine confidence in the traditional view of human sex as binary and fixed, that does not justify such a failure if the project's objective is truth.

So much for definitions; now to the authors' argumentation. Though the fascinating discussion of other animal species is an important part of their case rhetorically, that discussion turns out to have little relevance to the issue of the nature of human sexuality because of a significant disanalogy between human sexuality and sexuality in those other species, coupled with the fact that only the human species is designed to image God and is designed to do so in its sexuality (Gen 1:25–27; 9:5–6). Thus, we simply express our gratitude for their interesting discussion and move on to consider their specific case with respect to human sexuality.

3. Sex as Contingent and Fluid

Let's begin with the case they make for the contingency of human sex determination. Recall the basic argument that the authors present after distinguishing between typical and non-typical sex development pathways: "sex expression is indeed a contingent, and not essential, property of human beings. This is because for any possible developmental pathway of sex determination, there is a non-zero probability that an alternative developmental pathway could have been followed instead" (43). We should pause to consider two apparent assumptions at work here.

First, they seem to assume that the biologist's work should operate by the rules of methodological naturalism. Second, as the authors lay out the biological account of sex determination, they assume causal indeterminism (for example, when they discuss "random" genetic mutation on p. 36). However, indeterminism is a contentious position in metaphysics, hence needs defense, which the authors do not provide.

The combination of these two assumptions is significant. With respect to apparently random genetic mutations, it's one thing to claim that we don't know what causally determines such mutations, and quite another to claim that in fact there is no causal determination in such cases. What if there is causal determinacy

that the biologist *qua* biologist does not (and perhaps cannot) recognize? Such might be missed by the biologist because of methodological restrictions, insufficient sensitivity of instruments, and so on, or because the relevant sort of causal determinacy is in principle impossible for human beings to discover empirically no matter how sophisticated our technology. If, say, some non-natural deterministic effect of the fall was a significant part of the causal story in some nontypical cases of sex determination, then the biologist who adopts methodological naturalism—as our authors seem to—would miss this piece of the puzzle. Penner et al. need to close off such possibilities to make their particular argument for contingency work.

Nevertheless, while we find this combination of assumptions of naturalistic biology and indeterminism worrisome, we recognize that it still might be the case that a human individual's particular sex is contingent for him or her. Given our assumption that sex is a matter of how one's body is organized for the potential production of gametes and that one's sex is not completely determined by genetic code at conception—by the presence or absence of a Y chromosome—a theological determinist *could* accept the contingency thesis. On such a view, God, for example, or some other non-natural causal agent, could have brought it about that Socrates, in the embryonic stage of development, took a different sex-determining pathway, developing into a female rather than a male human being. The metaphysical contingency of sex determination may be admitted, then, so long as there is at least some *metaphysical* possibility, no matter how remote or unlikely, that an individual could be different sexually than he or she is, regardless of whether such sex determination is causally determined. Frankly, this is conceivable to us from our Reformed perspective and enjoys some degree of plausibility based on the scientific evidence.[6] Therefore, in what follows, let's concede that such a metaphysical possibility exists for human individuals, given that there are alternative pathways to sex determination.

Still, what does this mean? Does this undermine a biology-based gender essentialism, and if so, how? The term "essentialism" deserves some scrutiny. As

[6] However, while we are conceding that there is some plausibility to the idea that an individual human being is contingently male or contingently female, it is not intuitively obvious to us that this is the case. Perhaps there are still theoretical options open for exploration that would underwrite the claim that our sex is essential to us. For example, perhaps some sort of Aristotelian story about the composition of the human being as a form-matter composite is correct—a story according to which the human soul functions as the form of the body, controlling its development from its inception. On such a proposal, might the human soul be sexed and control the sexual development of its body? If so, then one's sex would be essential to him or her, after all. Exploration of this or any other such option is beyond the scope of this essay. For now, we are happy to concede the plausibility of the contingency thesis.

John DeLamater and Janey Hyde have noted, "the term *essentialism* is generally used by those who are opposed to it, not by those who practice it" (DeLamater and Hyde 1998, 11). This rings true. Essentialism is a favorite target of derision for feminists and gender theorists, yet it is often not defined either by its detractors or by its supposed proponents, who rarely if ever use the term. Fortunately, our authors give us some guidance as to their target, for which we are grateful.

The authors attack a sort of individual essentialism, according to which Socrates, say, is male in every possible world in which he exists. This qualifies as a kind of sex essentialism, to be sure, but we should note that this is not the sort of essentialism that feminists and gender theorists most often target for rejection. The usual target is *kind* essentialism, according to which a particular gender, say *woman*, is a kind that has an essence. Anyone who has the essential characteristic(s) of womanhood, on that sort of essentialist view, is a woman, and only such a person is a woman.[7]

The sort of essentialism that Penner, Cordero, and Nichols are challenging is very different. They are challenging the idea that human *individuals* are essentially whatever sex they are—necessarily male if male, so that they could not have been female; necessarily female if female, so that they could not have been male. Is this sort of individual essentialism with respect to sex true for human individuals? The authors conclude that the answer is "no" on the basis of how sex determination occurs in human embryonic development. We are inclined to agree, even though we don't share some of the authors' assumptions. There *is* a kind of contingency of sex determination for human individuals that seems to be supported by the biological evidence. Socrates could have been a female had things gone differently at the embryonic stage of his development. In truth, this has been known for a long time—at least since the early 1990s, with the discovery of the SRY gene and its role in sex determination (e.g., see Sinclair et al. 1990; Stévant, Papaioannou, & Nef 2018).

There is an analogous sort of individual essentialism with respect to gender, according to which the actual genders of individuals are essential to them; they are necessary in the sense that those individuals could not exist without their particular genders. Thus, if Socrates' gender is male, then he is essentially male—male (a boy, a man) in every possible world in which he exists. Now, if we couple the idea that gender is ontologically grounded in, or determined by, one's biological sex with the claim that an individual's natal sex is not essential to him or her, then it follows that

[7] For an insightful treatment of gender essentialism that includes a taxonomy of essentialisms, see Witt 2010. In addition to distinguishing between kind essentialism and individual essentialism, Witt draws a significant distinction between two sorts of individual essentialism—unification essentialism and identity essentialism. It is the latter that Penner et al. seem to have in view in their essay. According to Witt, each of these essentialisms is conceptually independent of the others.

neither is the individual's gender essential to him or her. Socrates might not have been a biological male, hence he might not have been a man. Since there are possible worlds in which Socrates is a biological female, there are possible worlds in which Socrates is a woman. So, the evidence from biology that the authors present is sufficient, we believe, to undermine gender individual essentialism of this sort.

Their evidence, however, is *not* sufficient to undermine a view of gender *kind* essentialism that is grounded in natal sex. Socrates is, let's say, contingently male, yet the gender kind essentialist can grant this and still say that given Socrates' natal maleness, his gender is also male—he is first a boy, then a man. (Of course, his being a boy or a man will bring with it all the relevant social perceptions, expectations, norms, and so on, in his particular historical-cultural situation, and some of that is socially constructed. But recognition of this fact is compatible with the gender kind essentialism in view here.) On this sort of view, then, Socrates exemplifies the essence of boyhood (whatever that is) before reaching adulthood, and he exemplifies the essence of manhood (whatever that is) while an adult. How that boyhood is experienced and manifested by Socrates will be, at least to some extent, contingent (since at least much of that is socially derived), as is even his being a boy in the first place (since his being a boy is *ex hypothesi* contingent on his being a human male); *but what it is essentially to be a boy is not contingent on this view*. Precisely the same things can be said with respect to his status of being a man when he is an adult. Given the supposed tie between biological sex and gender on this view, it would be impossible for Socrates to be a girl or woman while at the same time being a biological male. Nothing that Penner, Cordero, and Nichols bring forward in their essay undermines this sort of gender kind essentialism that is grounded in natal sex. This is significant, because, again, gender kind essentialism is the usual target of feminists and gender theorists.

Perhaps the real issue that the authors were concerned about is not so much whether an individual's particular sex is essential to him or her, but rather whether one's sex is *fixed* or immutable. After all, they include immutability as one of the planks in the platform of what they call the "strong essentialist." Recall their definition of strong essentialism: "sex is seen to be (a) universal (every human has a sex), (b) binary (every human is either male or female), and (c) immutable (one's biological sex is deemed to be an essential property of persons and as such, the ideas of sex transition or contingency of sex determination are viewed as category mistakes)" (45). Unfortunately, the authors conflate immutability with essentiality. For one's sex to be fixed or immutable is not the same thing as its being essential to the individual. Obviously, if Socrates' maleness were essential to him, his maleness would be immutable. But to say that Socrates is contingently male is not to say that

he is not immutable with respect to his maleness after a particular stage of embryonic development. Perhaps in all possible worlds in which Socrates exists and is a male, Socrates is a male throughout his entire post-embryonic existence; and perhaps in all possible worlds in which Socrates exists and is a female, Socrates is a female throughout her entire post-embryonic existence. If so, then Socrates' sex is immutable even though contingent. Such is certainly logically possible.

Then again, the authors may think that sex is not fixed for human individuals because it is not fixed or immutable for some other species. At one point, for instance, they suggest this:

> We have said at several points thus far that biologists—particularly those who work in the science of sex determination—tend to not think of 'male' and 'female,' as fixed, universal, binary categories among species that reproduce sexually. These are not seen as fixed categories because there are numerous examples of species where individuals transition from male to female and vice versa. (45)

But this is no reason to think that sex is changeable for *human* individuals. The human species has no members that naturally "transition from male to female and vice versa." That there are some biological species that do is irrelevant. For those species, or at least for their members who can transition sexually, sex is not fixed. However, that is perfectly consistent logically with sex being fixed in the human species, as well as in other species that do not have members that can transition from one sex to the other. We are not blue-headed wrasse or red-eared slider turtles, after all. And if, perhaps, the authors are simply appealing to the way in which many biologists tend to speak about sex, that is still a weak reason for accepting such a claim.

In fact, the authors give us no reason to think that Socrates' contingent maleness is not fixed and unchangeable once it is determined in his embryonic development, and all the evidence presented in their essay, as well as all the evidence of which we're aware, actually points in the other direction—to his maleness being fixed permanently. Once male, he will not naturally switch to being female. There is no reason whatsoever to think that sex is fluid for the human species. The contingency that the authors support with their use of biological evidence simply involves the original determination of a human being's sex, nothing more. Thus, their evidence for contingency does not support the additional thesis that biological sex for post-embryonic human beings is not fixed and hence can be changed.

It might be thought that an individual's sex is mutable since, as the authors put it, "humans possess a degree of genetic infrastructure to express sex differently

throughout lifespan" (28). However, mutability with respect to sex does not follow. The authors' point about the continued possession of genetic infrastructure is correct and is something scientists have known for a long time. Nonetheless, admitting this fact does not logically entail, or even inductively support, the claim that one's sex can be changed after it has been determined in embryonic development.

Against traditional views on the permanency of biological sex, the authors aver that "[s]ex transition is a commonplace, naturally occurring phenomenon among many species that reproduce sexually" (48). Yet this empirical point is irrelevant to the human species. From the fact that such sex transition is commonplace and natural for some species, it does not follow that it is so for others. The authors later claim that "individuals possess the genetic potential, in the right circumstances, to express sex differently from how one is actually expressing sex" (51). But note: that genetic potential is lost early in the developmental process, as the biological evidence the authors present plainly indicates. If so, this potential to develop into a different sex only undermines the claim that there are no possible worlds in which a male in the actual world is a female in some other possible world, which we've already conceded. The real question is whether there are any possible worlds in which a post-embryonic human individual, such as Socrates, successfully changes his or her biological sex. We see no reason to think that there are.

One might still push back and ask whether, under the right circumstances, Socrates' sex could be changed by medical intervention, given that he possesses some infrastructure for female expression. If we're right in thinking of sex as a matter of how an individual's body is organized with respect to its potential role in reproduction, then given the particulars and the complexity of the human sexual system and the depth of its ingression in our physiology, we are inclined to think that genuine sex changes are impossible. (In thinking through this, it might be helpful to consider how much would have to be removed from Socrates in the actual world to render him no longer a male. We won't attempt that here, but we must confess that our gut intuition is that to accomplish that would have the unfortunate consequence of destroying Socrates rather than transforming him sexually. In other words, we are inclined to think that his sex, once determined in the embryonic stage, could not be effectively changed by human intervention. Such change would be at least causally, if not metaphysically, impossible.) The main point to make here is simply that the recognition of some infrastructure for different sexual expression in an individual's body throughout his or her lifespan is not sufficient evidence to support the thesis that sex change is possible, either naturally or artificially.

Furthermore, even if sex transition were possible for human individuals, nothing would follow from that about the *moral* permissibility of voluntarily attempting to

transition from one sex to another. The authors thus overreach in at least two ways when they conclude that human sex transition is a legitimate way to build or repair "ramps from one path to the other—both of which are part of one's human nature" (52).

First, we cannot infer from the contingency of a human individual's particular sex that his or her sex is up for grabs rather than fixed. The mere existence of a "parallel road" (to refer to the favored analogy on p. 51) to sexual development in human beings does not entail sexual fluidity or mutability of one's sexual state once "naturally" determined—since all supposed "off-ramps" are in fact blocked once you're on one road or the other. Again, one's particular sex need not be essential to him or her to be fixed.

Second, even if the natural blockage of some or all of these "off-ramps" could be removed medically (e.g., by hormonal treatments and/or surgical procedures), it would not follow that such would be morally permissible. Following the authors' analogy, there are alternative pathways of development—roads-not-taken in normal cases—leading to blindness, deafness, one-armedness, and any number of atypical genetic conditions.[8] In cases of typical development, would surgical intervention to rebuild the ramps to these atypical pathways be morally permissible? Surely not! In response, one might object that these are not analogous cases, for these atypical kinds of pathways are disordered, but cases of atypical sex determination are not. However, such a defensive maneuver is not open to our authors, for it would beg the question and assume the very teleology that they seem intent on avoiding.

But a Christian approach to biology should not avoid teleology, especially when biology is being used in the service of anthropology and ethics. The question of what falls within the will of God or accords with His sexual design for the human species is a question of Christian moral theology and moral philosophy and cannot be answered by appealing to the biology of human sex determination in a naturalistic mode. Much more than the mere possibility of removing such impediments would be needed to morally justify attempts at sex transition. The authors have not provided such justification. Thus, to suggest that such attempts at sex transition are somehow natural and permissible is to commit a naturalistic fallacy.[9]

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[8] This analogy was suggested to us by one of our former students, John Bush.

[9] Neil Messer (2015, 84) notes that "it is a commonplace that to read normative conclusions off biological accounts is to commit a naturalistic fallacy . . . There is a particular reason why such a move *is* fallacious: since early modern times, the natural sciences have for the most part achieved their extraordinary success precisely by excluding questions of purpose and the good from their purview, limiting themselves to matters of description and cause-and-effect explanation . . . If that is correct, then they cannot by themselves suggest answers to normative questions."

One might still rejoin that the authors have provided justification if they're assuming that whatever is consistent with what is biologically natural with respect to one's body is morally permissible. In reply, we would note that such an assumption is not obviously true, hence requires rational justification. Yet, the authors provide no such justification. Furthermore, their methodological constraints would seem to preclude their providing such justification. We thus conclude that their move from the descriptive to the normative—a move that would open the door for sex transition by choice to be morally permissible for *anyone*, by the way—is unconvincing.

4. Sex as a Nonbinary Spectrum

Penner, Cordero, and Nichols also claim that the biology of sex determination undermines the traditional thesis that for the human species, sex is binary—that one is either a male or a female. They conclude, "Biological factors of sex difference can be seen not as differences in kind, but rather of degree" (52). In other words, sex for the human species is a spectrum of possibilities. Many others have drawn the same conclusion from the science of sex determination.[10] But what exactly is the argument for this? Given the controversial, counterintuitive nature of their claim, justification by way of good reasons is needed.

The closest the authors come to giving an argument is in the following passage:

> We have said at several points thus far that biologists—particularly those who work in the science of sex determination—tend to not think of 'male' and 'female,' as fixed, universal, binary categories among species that reproduce sexually. . . . They are not deemed universal categories because there are individual members of sexually reproducing species who do not neatly fit into the typical male or female subsets of those species. And because they are not universal categories, they are not seen as exhaustive binary categories, either. For human beings, if one focuses exclusively on typical developmental pathways for XX and XY individuals, one

[10] For example, see Grande and Brown (2010, 113); Ainsworth (2015, 290–91); Sloane (2016). Examples of those who have taken biology to support the spectral view of sex can be multiplied, as can examples of other opponents of the binary view of human sexuality who maintain perhaps more conservatively that there are more than two sexes, such as Fausto-Sterling (2002), who claims that there are five. It should be noted, however, that others have considered the same biological data and have not been moved to reject sexual dimorphism in the human species (e.g., see Jelsma 2022, 154; Byrne 2018). As with the opposing view, examples could be multiplied. This is not surprising, as the biological data concerning sexual development taken by itself is simply inconclusive with respect to the question of whether human sexuality is binary—consistent with both answers to that question.

> might be tempted to think that there *is* a sense in which 'female' and 'male' would be exhaustive binary terms—provided 'female' is shorthand for 'typically produces large gametes,' and 'male' as [sic] shorthand for 'typically produces small gametes.' But as we have seen, the typical paths are not the only developmental paths available for sex determination in humans. (45)

As an argument for the rejection of sex as binary for the human species, this falls short. Recognition of alternative developmental pathways of sex determination by itself does not warrant rejection of the claim that sex is binary. Atypical developmental pathways are compatible with there being only two reproductively complementary sexes, male and female. Why think that there is a spectrum on which we perhaps find male and female, and a whole host of sex expressions that are not quite either male or female, at least as typically expressed, and perhaps even a sex expression that is both male and female? Granted, there are conditions that must be satisfied for the determination of one's sex to be either "typically" male or "typically" female, but those conditions *are* satisfied in the vast majority of cases. Why not take those typical cases to be normal and persons with disorders of sex development (DSDs) to be atypical males and atypical females, depending on the general organization of their bodies with respect to the potential for gamete production? This modest position is logically consistent with the biological facts of sex determination that Penner, Cordero, and Nichols have laid out in their essay.

Our authors reach a radically different conclusion because they have tied their hands behind their backs. By adopting a naturalistic stance on biology, and by stifling Scripture and other possible sources of information (including teleological information) with respect to sex determination, leaving only the voice of naturalistic biology, they are left with no way to distinguish defective developmental cases from normal ones. *All* sex determination is thus flattened and rendered natural. This reductionistic approach has the ineluctable effect of *normalizing* nontypical developmental pathways rather than recognizing those alternative pathways and their developmental results as abnormal or defective. As far as we can tell, methodological commitments rather than a substantive argument have led our authors to conclude that sex for human beings is not binary but a spectrum.

The problem is that biological data need *interpretation*, and yet the authors have made methodological choices that prevent them from recognizing the meaning that is carried by the biological facts—meaning that many would take to be obvious. Thus, their appeal to biology is impotent to discover the nature of human sexuality. It has the appearance of grounding conclusions in reason (science, biology), but that appearance is a façade. Their methodological commitments prevent them from

rightly drawing *any* conclusion about the nature of sexuality from the bare biological facts about sex determination. Nevertheless, they do and in so doing commit a naturalistic fallacy, since they are making normative claims solely on the basis of descriptive science. Moreover, by assuming that the biologists they appeal to share the same reductionistic commitments, their authority to adjudicate whether human sex is binary or nonbinary is undermined as well. In short, we have no reason here to accept the counterintuitive claim that sex for human beings is nonbinary.

So, what might tempt someone nonetheless to draw this conclusion? Some might be motivated by a desire to avoid stigmatizing people with various DSDs. Of course, that desire is, in itself, good. However, such a desire provides no justification whatsoever for the substantive claim that sex for humans is on a spectrum. Alex Byrne (2018), a secular philosopher of sex and gender, has claimed "[t]hat sex is not binary is evidently something that many progressives dearly wish to believe, but a philosophically sound case for treating everyone with dignity and respect has absolutely no need of it." We agree.

One might also be tempted by the fact that the biological data are logically consistent with the spectral view that is gaining popularity within society. But mere consistency of data with a view is no justification for accepting that view, even if that view is growing in popularity. In the context of theological anthropology, given the long, stable, and unified tradition of recognizing sexual bivalence, a justified rejection of that tradition requires much more than mere logical consistency of such rejection with the relevant biological facts.

Again, nothing in the authors' case logically entails or inductively supports the rejection of the claim that sex (for the human species) is binary. One can consistently accept the biological evidence that they adduce and at the same time deny that the atypical cases of sexual determination culminate in people who are neither male nor female, or both male and female. That is, one can still rationally take people whose sex determination is atypical to be either male or female, though in some very rare cases it is difficult to tell. To be sure, in genuine cases of sexual ambiguity—i.e., those exceedingly rare cases in which either the phenotype is not easily classifiable or the karyotype is not consistent with the phenotype—identifying the sex of those individual people will be more complicated. But it does not follow that their particular sex is on some spectrum between male and female or that it is some tertiary sex.[11]

[11] We agree with Arbour and Gilhooly (2019, 11), who, speaking of people with certain DSDs, conclude as follows: "We believe these persons possess full dignity as [divine] image bearers, but we deny that these extremely rare cases provide clarity for normative understandings of sex and/or gender. If anything, these conditions are derivative of sexual binary."

5. Attempting to Undermine the Case for Gender Essentialism

Before concluding, we should consider Penner, Cordero, and Nichols' critique of gender essentialism. They begin their treatment by discussing a view that Robin Dembroff (2018) refers to as "the 'identity' view of gender." The identity view, according to Dembroff, is the view that "gender is *identical* to sex, where sex is taken to be determined by one's reproductive features" (Dembroff 2018). Penner and colleagues follow Dembroff in considering and critiquing the following argument for the impossibility of nonbinary genders:

(1) Someone's gender is identical to their set of reproductive features.
(2) There are only two possible sets of reproductive features.
(3) So it is impossible for someone to have a nonbinary gender. (46)

We should note that neither Dembroff nor Penner and his colleagues credit any particular person(s) with promoting this argument. Dembroff presents it as the hidden reasoning underlying the claim that nonbinary genders are impossible based on biology. It seems clear that, for Dembroff, the argument is the product of conjecture. Penner, Cordero, and Nichols claim to discuss this argument "in order to show how the assumption of premises (1) and (2)—key components of the identity view—can be used to support spurious conclusions about gender" (46). This might be so, but we wonder whether anyone actually thinks in this way.

The reader should not think that the authors are scoring a point against gender essentialism in their treatment of this argument. As a putative argument for gender essentialism, or at least for the binary character of gender (which, as we have seen, the authors take to be an element of a "strong essentialist view"), this argument is a straw man. Both (1) and (2) are too strong, and a gender essentialist need not accept either one. With respect to (1), a gender essentialist need not say that one's gender is identical to sex or to any reproductive feature or set of such features. More likely, and plausibly, a gender essentialist would recognize gender as somehow significantly *tied to* or *grounded in* one's sex, hence in one's biology. In other words, the identity view of gender that Dembroff identifies is stronger than is necessary to capture the targeted gender essentialist's view of the relation between gender and sex. With respect to (2), such a gender essentialist need not admit that there are only two possible sets of reproductive features. Rather, for the gender essentialist there are only two sets of reproductive features that are normative in the actual world—and thus, a Christian theist might say that only two sets of reproductive features fully accord with God's design for our sexuality.

What about the authors' critique of what they take to be actual philosophical and theological arguments for gender essentialism? Consider again their sample philosophical argument for gender essentialism (46–47):

(4) Human reproduction requires clear, distinct, complementary, and binary biological roles for males and females.
(5) If reproduction requires clear, complementary, and binary biological roles for males and females, then human society requires clear, distinct, complementary, and binary gendered social roles for males and females.
(6) All humans are either male or female.
(7) Therefore, all humans fit into clear, distinct, complementary and binary gendered social roles.

It isn't clear whether the authors take this to be truly representative of the case that a typical biology-based gender essentialist would make. They describe it as "a philosophical argument one might advance for gender essentialism" (46). Again, we are left wondering whether anyone actually espouses such an argument, and if so, who that is.

Regardless, the argument is another straw man. The authors take issue with premise (5), but the gender essentialist need not accept (5). Why think that a gender essentialist would accept that claim? Use of (5) either assumes the sex-gender identity view developed by Dembroff (which, as we noted, need not be accepted by the biology-based gender essentialist) or ties biological sex to gender roles in a manner that is reductionistic and *ad hoc* (why take gender, if it is not identical to sex, to be *reducible* to reproductivity?).

Taking issue with (5), the authors claim that "[e]ven if one were to grant premise (4), . . . that by itself is no reason to think (5) is true" (47). Well, yes! That's obvious. But the argument doesn't purport to base (5) on (4). After making that puzzling point, the authors deny that there is any reason to accept (5). We agree, and given that a biology-based gender essentialist need not (and ought not) accept (5), we take this argument to be a straw man.

Does the sample theological argument for gender essentialism fare any better? Here, again, is their argument (47):

(8) According to scripture and tradition, males and females have clear, distinct, complementary, and binary gendered social roles.
(9) According to scripture and biology, all humans are either male or female.

(7) Therefore, all humans fit into clear, distinct, complementary and binary gendered social roles.

After rejecting both (6) and (9), the authors then state the key implication of their "non-hierarchical, domain specific version of the Wesleyan Quadrilateral": "questions about the biological features of male and female members of the species, as well as the way the distribution of those features are present in the population, are scientific and empirical questions. The epistemologically salient authority here is biology, not biblical texts" (47). We have already discussed this revealing example of the epistemological assumptions that these authors defend at the outset of the article. The example puts in bold relief the problematic character of this approach for confessional believers. It is also telling that rather than dispute the claim that Scripture supports the universal, binary character of sexuality for the human species, the authors brush Scripture aside as irrelevant to this issue.

Two final comments concerning the authors' attempt to undermine the case for biology-based gender essentialism: First, it is far from clear whether and to what extent their sample philosophical and theological arguments represent the thought of actual proponents of a gender essentialism that is grounded in biology. In the authors' defense, we have searched long and hard, and have yet to find a serious defense of this sort of gender essentialism. So, it's possible that trying to undermine a case for essentialism requires the use of one's imagination in the way that these authors presumably used theirs in framing their sample arguments.

But that brings us to our second comment, namely, that perhaps the reason there are no noteworthy argumentative defenses of biology-based gender essentialism is that people have seen no need for such arguments. The ideas that sex for post-embryonic human individuals is binary, universal, and fixed initially seem, if not obviously true, at least highly plausible. It is the denial of such a view that is wildly counterintuitive and contrary to a stable, unified tradition in theology and human culture more broadly. Hence the burden of proof is borne by those who reject the view. If that is right, then attempting to undermine the case for biology-based gender essentialism actually does little to strengthen the case against such essentialism.

Conclusion

We agree with Penner, Cordero, and Nichols that greater knowledge of the biology of human sex determination at the embryonic stage of development is relevant to theological anthropology. Indeed, the light that biology sheds on human sex

determination is especially useful for Christian philosophers and theologians as they think through moral and pastoral issues facing people—precious bearers of God's image along with the rest of the human race—who suffer various kinds of debilitation due to DSDs. Nevertheless, we find the approach of these authors problematic and their particular attempt to undermine the conventional view that human sexuality is binary and fixed unconvincing. While we are grateful for their clear exposition of the science of sex determination for the human species, they have provided no good reason to abandon the traditional view, and hence no good reason to reject a kind of gender essentialism that is grounded in biological sex.

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