

Finding Form: Defining Human Sexual Difference

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Introduction

WHAT IS THE NATURE of human sexual difference? What is it that defines the human male and female as such? This seems a simple enough question: it is resolved with a glance thousands of times each day by doctors, nurses, and new parents. Yet, the answer is not always so clear. Review of intersex disorders reveals that, at times, even nature herself appears confused as to how to resolve the question of sexual difference. Examination of contemporary literature on sexual difference further manifests layers of complexity that seem to belie the apparent simplicity found in delivery rooms. So, how is one to define the human male and female? Is the essential difference found in genes and genitals? Or is sex itself perhaps a set of societal functions, a “place” in a social discourse, a cultural construct that changes with hem lines and prevailing ideologies? Another way to state the above questions is in terms of form, for questions of identity are questions of form. What is the form through which an individual human becomes male or female? And what is the ontological status of such forms? Are they forms through which a human being has his or her being simply, or are they forms that modify a substance whose existence precedes them? Are they simple forms consisting of a single modification of a substance or, rather, kinds of compositions containing several elements unified in a single quality?

In this article, I will attempt to provide some answers regarding the formal cause of human sexual difference. I will argue that an individual’s sex comes to be through an accidental form, a quality

of the human being that, though an accident, flows from the human essence and, so, merits the name “essential accident.” I will further argue that the forms of male and female do not consist in only one determination of the human substance, but rather are compositions of distinct elements of varying importance, the harmony of which constitutes the completion of these essential identities of the human person.

To reach these conclusions, the general method I will employ is to build my inquiry upon the foundation of the thought of St. Thomas Aquinas, attempting to bring his physics, metaphysics, and anthropology to bear upon the findings of contemporary science regarding the nature of human sexual difference. My goal is not historical, but rather an application of Thomas’s thought to what has been discovered about sexual difference in the centuries since he completed his work.

Sex, Gender, and Gender Dysphoria

When considering the nature of sexual difference, one frequently encounters proposed distinctions between sex and gender: sex is a matter of biology while gender is matter of psychology and social role and function.¹ As with all topics in the realm of sexual identity, there is disagreement as to precisely of what distinctions between sex and gender consist, which is prior to which, and whether these distinctions are valid at all.² Though this article will, perhaps, provide an understanding of human sexual difference that is relevant to possible distinctions between sex and gender, its scope does not directly include the clarification of such distinctions. Neither is its principal purpose to address the question of sexual identity from the perspective of gender dysphoria. Clearly, these are topics of great importance and contemporary urgency. However, while I think the arguments contained in this essay will be relevant to questions regarding the distinction between sex and gender and could provide some basis for further work on understanding gender dysphoria, such matters are not my primary focus.

With the above limitations in mind, the essay will unfold as

¹ See, for instance, Mark A. Yarhouse, *Understanding Gender Dysphoria: Navigating Transgender Issues in a Changing Culture* (Downers Grove, IL: InterVarsity Press, 2015), 17.

² See Charlotte Witt, *The Metaphysics of Gender* (Oxford: Oxford University Press, 2011), 34–42.

follows. I will begin with a brief discussion of the common notions of sexual difference that come to the human mind in virtue of its rapport with reality. This general discussion will provide us with some provisional theses about sexual difference that will serve as starting points for further discussion. With some common ground underfoot, I will next consider whether the forms through which a human being is male or female are substantial forms or accidental forms. Having judged that sexual difference is not a specific difference and, thus, not the difference that defines a substance, but rather one that determines a substance in some aspect of its being, I will next consider which determinations of the human substance constitute sexual difference. Having thus seen the scope of sexual difference, I will then consider challenges presented to our emerging understanding of male and female by the complex realities of the intersex syndromes and, very briefly, the reality of gender dysphoria. Recognizing those difficulties that render simple explanation impossible, I will conclude the ontological assessment of human sexual difference, judging male and female to be essential qualities of the human being that are compositions of many elements unified by their ordering to distinct modes of generativity best summarized as “motherhood” and “fatherhood.”

Common Notions

Our focus is upon human sexual difference, but when considering our common usage of the terms “male” and “female,” it is important to note that these terms are used not only in reference to humans. As such, we are at times perhaps apt to import aspects that pertain to sexual difference in one species into sexual difference in another species. Biologist R. A. Lockshin notes just such a tendency when speaking of the mechanisms that govern sexual differentiation across species: “[A] student’s impression of sex as decided by X and Y chromosomes is a vastly anthropocentric oversimplification. Sex chromosomes are characteristic only of higher land animals. In fish, amphibians, or aquatic invertebrates, sex may be determined by single genes and readily reversed by exogenous steroids or other chemicals; there are even fish that casually switch from one sex to another, and fish in which different races manifest male heterozygosity or female heterozygosity. Reptiles may be parthenogenic, or the sex of the embryo may be determined by temperature.”³

³ R. A. Lockshin, “Gender Differences: the Perspective from Biology,” *Lupus* 8 (1999): 364.

We tend to think of sexual difference as defined by chromosomes: XX is female; XY is male. For human beings, we do so with reason. But, as Lockshin points out, what initiates sexual difference varies significantly from species to species, with sexual difference in some reptiles being determined by temperature, as Aristotle speculated. Even some characteristics that we tend to reliably associate with one sex in most species can be transposed in other species. For instance, there are species of birds and reptiles in which attributes generally associated with males (such as relative size and aggression) are reversed, with females being larger and more aggressive.⁴ Thus, when attending to our simple apprehensions of sexual difference, we must be mindful of that which pertains to human sexual difference in particular and what might rather be proper to another species.⁵

So, what is the content of the simple apprehension made by us all regarding sexual difference? What does our mind naturally grasp of “male” and “female”? I noted earlier that we all seem quite adept at identifying sexual difference when a baby first enters the world. How is it that we understand this difference so easily with only a glance? Clearly, we turn our attention to the organs of generation: one mode indicates a female, while the other a male. Our initial impressions point us toward those realities that constitute the essence of sexual difference: whatever else may be true about it, it is clear that sexual difference centers upon the power of generation. A brief reflection upon this power is in order.

As Aristotle observed, all living things have three fundamental powers: growth, nutrition, and generation.⁶ As nature moves to higher beings, she takes a curious turn: no longer does the living

⁴ See David Geary, *Male, Female: The Evolution of Human Sex Differences* (Washington, DC: American Psychological Association, 2006), 23–25.

⁵ The point just made brings to fore interesting questions regarding the nature of sexual difference across species. The question can be made clear by considering how the predicates “male” and “female” apply across species: when one says “male” of an orchid, an ape, and a human, is the predication univocal or perhaps analogical when applied to diverse species? I have just indicated that there appear to be different characteristics associated with males and females of different species, which would seem to argue for a non-univocal predication. While the question of trans-species predication is not a focus of this article, I think our work will allow us to conclude that there is a univocal basis for the predicates “male” and “female” across species but that, ultimately, these qualities are manifest diversely in different species. I shall return to this point later in this work.

⁶ See Aristotle, *On the Soul*, 2. 2.413a13–414a28.

thing hold the power of generation individually; rather, it is held jointly. No individual member of the species has the power to reproduce alone. Some other is needed for the realization of this essential power.⁷

This fact of division renders the power of generation unique. Imagine this separation was the case for any of the other essential powers of a living thing—for example, the very power to imagine. In order to realize the power of imagination, we do not have to find another member of the human species who possesses the complementary part of the partial power we possess. Rather, we can each exercise the power by ourselves. Generation is unique in that it is divided: the power is only complete, only truly possessed, in the conjunction of two members of the species.

But it is not made whole by the conjunction of just any two members of the species. It is divided non-identically into two ways of partially possessing it—ways that mutually complete each other. Any one individual must find precisely that other who possesses the power in the manner other than his or her own. “Male” and “female” refer precisely to this non-identical way of dividing the power of generation between two members of a species: to be a male is to possess the divided power of generation in one of its modes; to be a female is to possess that power in the other.⁸ Identifying just what defines these two modes now becomes the principal work, but that sexual

⁷ For an illuminating discussion on the division of the power generation by St. Thomas, see Thomas Aquinas, *Summa theologiae* [ST] I, q. 92, a. 1. English translations of *ST* are taken from *Summa Theologica*, trans. Fathers of the English Dominican Province (Westminster, MD: Christian Classics, 1981).

⁸ Though pertaining more to a discussion of final cause, it is worth noting that there is no a priori biological reason demanding that the power of generation be divided at all or that, further, it be divided non-identically. In fact, both moves might appear counterintuitive according to evolutionary logic: if a genotype is adapted to a certain ecology, asexual reproduction, which produces an exact genetic replica of the parent, seems a better mode of reproduction. And, assuming that the power of generation is to be divided, doing so non-identically—into two distinct mating types—by that very fact limits any individual’s potential mates to half of the species, rendering mate selection all the more difficult. Thus, a case must be made for the reasonableness of sexual reproduction. That, however, is a question for another work. For interesting discussions on the counterintuitive aspects of dividing the power of generation and doing so non-identically see, for instance, Bernice Wuerthrich, “Why Sex? Putting Theory to the Test,” *Science* Volume 281, Issue 5385 (September 25, 1998): 1980–82, or Laurence D. Hurst, “Why are there only two sexes?” *Proceedings: Biological Sciences* 263:1369 (April 22, 1996): 415.

difference refers to this non-identical division is clear.

Sexual Difference and Specific Difference

Before exploring exactly how the power of generation is divided, it will be helpful to consider whether sexual difference is a specific difference. Does sexual difference render a new species, thus making sexual difference that quality through which a being comes into existence simply? Are the forms of male and female substantial forms?

These are questions that both Aristotle and St. Thomas addressed.⁹ Their answers should be clear based upon what we just discussed about the nature of sexual difference as a divided power: the power of generation is an essential power of any living thing. But, for all beings that reproduce sexually, that power is only complete in the union of two sexually differentiated members of that species.¹⁰ Thus, if it is only together that they possess an essential power of the species, then clearly, as mutually completing the species, they must be members of the same species. As such, sexual difference cannot be a specific difference.

Though based upon a biological understanding of the determination of sex pertaining more to reptiles than to man, Thomas's treatment of this question merits reflection:

He says that male and female are proper affections of animal [*proprie passionēs animalis*], because animal is included in the definition of each. But they do not pertain to animal by reason of its substance or form, but by reason of its matter or body. This is clear from the fact that the same sperm insofar as it undergoes a different kind of change can become a male or a female animal; because, when the heat at work is strong, a male

⁹ See Aristotle, *Metaphysics* 10.9.1058a29–1058b26, and Thomas Aquinas, *Sent. meta.* 10, lec. 11; English translation of the latter will be taken from *Commentary on the Metaphysics of Aristotle*, trans. John P. Rowan, 2 vols. (Chicago: Regnery, 1964), which is also available at <http://dhspriority.org/thomas/Metaphysics.htm>, last accessed January 26, 2017.

¹⁰ In his *Politics* 1252a 26–28, Aristotle notes that “there must be a union of those who cannot exist without each other; namely, of male and female, that the race may continue”; see Aristotle, *Politics*, trans. Benjamin Jowett in *The Basic Works of Aristotle*, ed. Richard McKeon (New York: Random House, 1941). In the *Politics*, he is not addressing the question of specific difference, but in stating that the very existence of male and female is each dependent upon the other, there is a clear implication that they must be of the same species.

is generated, but when it is weak, a female is generated. But this could not be the case or come about if male and female differed specifically; for specifically different things are not generated from one and the same kind of sperm, because it is the sperm that contains the active power, and every natural agent acts by way of a determinate form by which it produces its like. It follows, then, that male and female do not differ formally, and that they do not differ specifically.¹¹

According to Thomas, it is the very same agent acting by virtue of its form that is responsible for the coming to be of both male and female. But, if the very same agent brings about male or female, depending only upon the accident of heat, clearly sexual difference cannot be due to the presence of different substantial forms. Though the mechanism of differentiation is other than that thought by St. Thomas, the evidence will show that his fundamental point stands: the very same agent causes—mother and father—equally produce female and male. If the same agents acting by virtue of their very same substantial forms equally produce females and males, female and male cannot differ in species. As such, the difference between female and male cannot be a specific difference. Sexual difference must be something that exists within a substance as modifying, not defining it. Humanity is a form that precedes and underlies the forms of male or female. They do not make an individual human being exist simply, but rather indicate some way in which the substance exists.

An implication of concluding that sexual difference is not a specific difference is that it must be categorized as some mode of accidental being. It does not enter into the very definition of what it means to be human. It must refer to some way in which a human exists. And the difference must somehow be attributed to the matter rather than to the substantial form itself.¹² So, let us now look to the elements of

¹¹ *Sent. meta.* 10, lec. 11, no. 8.

¹² St Thomas notes just this point when distinguishing the ways in which accidents can flow from matter: “For some accidents follow on matter according to an ordering they have to a special form, such as masculine and feminine in animals, a diversity reducible to matter, as is said in *Metaphysics* 10”; see *On Being and Essence in Thomas Aquinas: Selected Writings*, trans. Ralph McInerny (London: Penguin, 1998), 228. In fact, St. Thomas here underscores just the point I wish to make: sexual difference emerges from a kind of rapport between the specific form generating the power of generation and a material principle directing that power toward one of two possible modes.

sexual difference to see how it unfolds, to see of what modulations of the human substance it consists. In so doing, the forms of male and female will begin to come into sharper focus.

The Form of Female and Male

Tracking the Agent

We have concluded that sexual difference pertains to the non-identically divided power of generation and that the difference between the sexes is not a specific difference. But of what differences of the human substance does sexual difference consist? As we noted earlier, there seems to be a variety of characteristics associated with sexual difference among species. And, as we shall see later, there is significant variation in such characteristics, even within a species. These variations, in addition to philosophical presuppositions, have led some to conclude that sexual difference exists only in the realm of social construction. Anne Fausto-Sterling observes that “labeling someone a man or a woman is a social decision. We may use scientific knowledge to help us make the decision, but only our beliefs about gender—not science—can define our sex.”¹³ Amid much confusion, how are we to discern of what sexual difference consists? To resolve this question, I propose an exercise in tracking.

We are seeking form. And one way to find form is to look to the agent, for an agent’s activity resolves in form: the builder lays down his hammer when the house is complete and the conductor lowers his baton and the musicians their bows and instruments when the symphony is finished and its form fulfilled. So, one way to discern the extension of the forms of male and female is by tracking the activity of the agents of their becoming. We will be able to discern the nature and extent of the forms of male and female by noting when these agents cease their work.

But if we are to track the agents, we must first identify them. Generally, I will propose three:¹⁴ human nature itself, and then that nature as affected by two material dispositions, the first being genetic,

¹³ Anne Fausto-Sterling, *Sexing the Body* (New York: Basic Books, 2000), 3.

¹⁴ In offering this list, I do not intend to deny that, ultimately, considerations of psychological and cultural factors are necessary for a complete understanding of human sexual difference. My focus here is on modulations of the human substance as they occur in typical human development. I will argue that cultural and psychological agents are important but posterior to the three agents I am proposing as foundational.

the second hormonal. The path is, perhaps, a little longer than might be anticipated, for if we are to employ this method, and if it is to be convincing, we must be attentive in following.

In order to track these agents, I will consider them individually. I will first establish their agency and then provide some idea of the extent of that agency. It will be impossible to give an exhaustive treatment of this agency, since the effects of genes and hormones upon human development remain areas of vigorous and ongoing research and new findings are continually emerging. To give anything approaching an exhaustive treatment of the current research would far exceed the space that is available.¹⁵ I will therefore attempt to provide just enough detail to establish the agents and give a sense of the amplitude of their work.

Human Nature

Considering human nature as an agent—and in fact the primary agent—of sexual difference leads us to look both forward and backward within this work. Looking back, we must recall that sexual difference is inexorably bound to the power of generation. Anticipating our later ontological analysis, we must note here that, though sexual difference is an accidental form, it is what can be called an essential accident or property: it is not that which defines a human being, but it is something that flows from the essence, as opposed to what Thomas refers to as an extrinsic accident that arises from exterior principle. St. Thomas's discussion of the relationship between the essence of the soul and its powers will help us clarify how human nature is an agent of sexual difference:

First, because the substantial form makes a thing to exist absolutely, and its subject is something purely potential. But the accidental form does not make a thing to exist absolutely but to be such, or so great, or in some particular condition; for its subject is an actual being. Hence it is clear that actuality is observed in the substantial form prior to its being observed in the subject: and since that which is first in a genus is the cause in that genus, the substantial form causes existence in its subject. On the other hand, actuality is observed in the subject of the accidental form prior to its being observed in the acci-

¹⁵ For a more complete discussion, see, for instance, Melissa Hines, *Brain Gender* (New York: Oxford University Press, 2004), 22–28.

dental form; wherefore the actuality of the accidental form is caused by the actuality of the subject. So the subject, forasmuch as it is in potentiality, is receptive of the accidental form: but forasmuch as it is in act, it produces it. This I say of the proper and “per se” accident; for with regard to the extraneous accident, the subject is receptive only, the accident being caused by an extrinsic agent.¹⁶

The human being has its being through its substantial form, through its soul. Thomas is making the argument that the act of its *per se* or essential accidents is derived from or caused by the act of the substance.

Sexual difference refers to a way of having the power of generation. In the article immediately prior in the *Summa theologiae* to that just quoted, Thomas notes that the subject of the powers of the soul is either the soul itself (in the case of the intellectual powers) or the composite, as is the case for the power of generation. Thus, he adds, “the composite is actual by the soul. Whence it is clear that all the powers of the soul, whether their subject be the soul alone, or the composite, flow from the essence of the soul, as from their principle; because it has already been said that the accident is caused by the subject according as it is actual, and is received into it according as it is in potentiality.”¹⁷

Essential accidents are caused by the human substance insofar as it is in act. Thus, the human substance, insofar as it is a principle of activity in its nature, is the principle of accidents. As such, human nature is the principal agent of sexual difference. However, as we noted in our discussion on specific difference, sexual difference cannot arise simply from the form of man; there must be some material element. Enter the genes.

Genes

Let us recall Thomas’s observation regarding sexual difference and specific difference: “Specifically different things are not generated from one and the same kind of sperm, because it is the sperm that contains the active power, and every natural agent acts by way of a determinate form by which it produces its like.” Sexual difference cannot be generated only on the part of the human substantial form. Thomas appears to have thought that each individual instance of human nature seeks to

¹⁶ ST I, q. 77, a. 6. See also *On Being and Essence*, ch. 6.

¹⁷ ST I, q. 77, a. 6.

produce a male, for the male possesses the active power of generation, and all living things seek to possess the active power of generation. It is a factor on the part of the matter—the lack of sufficient temperature—that leads to the production of the female.¹⁸ While Thomas's biology is clearly mistaken, the general point holds: sexual difference is not derived wholly from the substantial form. Rather, there is indeed a factor on the part of the matter. In human beings, that material factor is not temperature; instead, the beginnings of sexual difference are genetic.

The human being comes to be through the soul, through its substantial form. But, only a very special matter can take on this form. Part of the character of this special matter is the genetic code that will determine the way in which an individual instance of human nature is determined regarding a myriad of the accidents of his or her being. In addition to directing the production of our principal parts and organs, genes guide accidents, such as how tall an individual will be, skin color, eye color, and so on. Genes are precisely the means by which matter is disposed so as to pass along traits from parent to offspring.¹⁹ A part of this genetic information—in particular, a chromosome inherited from the father—determines the sex of the new human being.

A very brief explanation of human DNA and how it fits into generation will be helpful. Human DNA contains two strands of genetic information, one inherited from the mother and the other from the father. Each strand of human DNA contains twenty-three chromosomes, all of which are the same on the strand inherited from mother and father, with the exception of the twenty-third pair, which is the same in females, XX, but different in males, XY.²⁰ Part of the work of

¹⁸ St Thomas argues regarding an individual nature that the female is, in a sense, “misbegotten”; however, considering human nature in general, the woman is not misbegotten, “but is included in nature’s intention as directed to the work of generation. Now the general intention of nature depends on God” (*ST I*, q. 91, a. 1, ad 1). He will further go on to say that the “diversity of sex belongs to the perfection of human nature” (*ST I*, q. 99, a. 2). We shall soon discuss how it is that even individual human nature intends both male and female equally by virtue of the nature of spermatogenesis. See also *ST I*, q. 99, a. 2, ad 2, for an interesting discussion of the generation of woman.

¹⁹ For a brief summary of the nature and functions of genes, see D. Peter Snustad and Michael J. Simmons, *Principles of Genetics*, 3rd ed. (New York: John Wiley & Sons, 2003), 368–74.

²⁰ See Mark F. Bear, Barry W. Connors, and Michael A. Paradiso, *Neuroscience*:

the power of generation is performing the process of meiosis, which is the dividing the double strand of each parent's DNA into a single strand that can then be combined with the similarly divided DNA given by the other parent.²¹ Both male and female gonads perform this process. However, in the male, a curious consequence follows from the nature of male genetic composition: when the strands of his DNA are divided, one strand will carry the X chromosome inherited from his mother while the other will carry the Y chromosome inherited from his father. Each strand is duplicated and then becomes the nucleus of a sperm cell.²² Thus, the very nature of spermatogenesis ensures that half of a man's sperm will bear the X chromosome and half will bear the Y. Thus, by noting the nature of the process of spermatogenesis, it is clear that human nature equally intends both the male and female.²³ The beginning of sexual difference in a new human being depends upon which of those sperm—the one bearing the X or the one bearing the Y—wins the race to the heart of the awaiting ovum. Thus, the first determination of a new human being as male or female follows from this material disposition and is coincident with his or her first act of existence.

Yet, it is not so much the genetic composition in itself that defines sexual difference as that to which the genotype disposes the new individual. Thus, at the moment of conception, each individual is determined to his or her sex, though not yet possessing that sex in act, much like one with a gene for blue eyes is determined to have blue eyes but does not yet have them in act. We must, then, look to the determinations of the substance that follow upon this genetic difference as the developmental vector of human nature is influenced and directed in one of two paths by the genetic disposition of matter.

At the current state of embryology, embryologists can discern no developmental differences in XX and XY individuals up until the sixth week of gestation.²⁴ Even regarding the organs of generation, both XX and XY fetuses develop the same proto-structures that will become either the male or female genitalia. Of principal importance are what can be called the proto-gonads. It appears that the first six

Exploring the Brain, 3rd ed. (Philadelphia: Lippincott Williams & Wilkins, 2007), 535–36, and Snustad and Simmons, *Principles of Genetics*, 114–17.

²¹ Snustad and Simmons, *Principles of Genetics*, 32–37.

²² *Ibid.*, 38.

²³ This point addresses the question of the intention of human nature discussed in note 12 above.

²⁴ Hines, *Brain Gender*, 22.

weeks of development of both testes and ovaries is indistinguishable.²⁵ It is at the sixth week of gestation that the Y chromosome begins to play a decisive role: it releases an enzyme known as the testes-determining-factor that will cue the forming proto-gonads to form as testicles rather than as ovaries. This marks the first sex-based modulation of the developing substance and imperfect actuality of maleness in an XY individual; for it is the first act through which the power of generation is moved toward one of the two modes it can possess. This new actuality—to be a testicle—then becomes the primary principle of subsequent sex-based determinations in males.

Interestingly, the act of determining the proto-gonads is the most significant direct act of the Y chromosome. It has also been found to play a critical role in spermatogenesis,²⁶ and further effects of genetic difference remain an area of ongoing research.²⁷ But, as we shall see, the greater part of subsequent sexual differentiation depends upon the presence or absence of hormones produced by the gonads.

Hormones

Interestingly, after the initial and dramatic intervention by the Y chromosome in sexual differentiation, the primary agency of distinction is delegated from genes to gonads and the hormones they produce.²⁸ Once formed, the testes begin producing androgens, or male-typical hormones. These hormones begin affecting other cells, most notably those that will become the male external genitalia. Similar to the

²⁵ Though the first six weeks of development appears to be indistinguishable, it does not seem to be correct to say that this newly forming organ stands in equal potency to become either gonad. We shall see when briefly examining the intersex disorders that it is almost never the case that, when gonads attempt to form in a manner contrary to the genetic determination, they result in healthy, functioning organs. Such situations almost always result in sterility. Thus, it is clear that the genetic determination truly disposes the matter for one form over the other.

²⁶ See Daniel D. Federman, “The Biology of Human Sex Differences,” *The New England Journal of Medicine* 354.14 (April 6, 2006): 1513.

²⁷ A recent study arrives at the following provisional conclusions: “Beyond its roles in testis determination and spermatogenesis, the Y chromosome is essential for male viability, and has unappreciated roles in Turner’s syndrome and in phenotypic differences between the sexes in health and disease”; see Daniel Bellott, et al., “Mammalian Y Chromosomes Retain Widely Expressed Dosage-sensitive Regulators,” *Nature* 508 (April 24, 2014): 494.

²⁸ For a summary of the effects of prenatal hormonal activity see Hines, *Brain Gender*, 24–28.

way proto-gonads began their formation in a sex-neutral manner, so also the proto-structures that become the penis and scrotum in males become the clitoris and labia in females. Hormones produced by the testes direct development in the male mode. Thus, through hormones they produce, the testicles become agents in channeling development toward the realization of those organs that will support them and permit them to actualize the power of generation in the mode in which they possess it.²⁹

At this point, we have identified the principal agents of that which is most associated with sexual difference: human nature provides the overarching developmental trajectory. It is modulated by genes that first determine the human substance as male or female and guide the developmental trajectory toward one of two ways of possessing the divided power of generation. Once the Y chromosome has performed its most critical role of determining the proto-gonads as testes, those new testes assume the role of principal agent through their emissaries, male-typical hormones.

It is worth noting that, regarding agents of difference, male and female development are not exactly analogous. We noted that the Y chromosome acts first to modulate proto-gonads towards developing as testes and that the testes themselves then become the agents of modulation by means of hormones they produce that cue forming structures to develop according to the male paradigm. If the situation were analogous, we might expect the X chromosome to somehow cue the proto-gonads to form as ovaries and then for the ovaries to produce estrogens that in turn would become agents of female development. Apparently, however—at least regarding development of the organs of generation—this is not the case: female-typical development does not require the presence of some special gene present on the X chromosome³⁰ followed by the intervention of female-typical

²⁹ In addition to the formation of external genitalia as affected by the presence or absence of testosterone, the testes also produce a hormone called “Müllerian Inhibiting Substance” [MIS]. In order to complete the internal genital organs, the developing fetus first produces two initial structures: the Müllerian Ducts and the Wolffian Ducts. In the presence of androgens, the Wolffian Ducts develop into the organs that link the testes and the penis while MIS prevents the development of the Müllerian Ducts. In female development, in the absence of the MIS allows the Müllerian Ducts to develop into female internal generative organs while the absence of testosterone starves the Wolffian structures, leading to their dissolution (Hines, *Brain Gender*, 24–26).

³⁰ Recall that males also have an active X chromosome.

hormones produced by the ovaries. Rather, it seems that what is most pivotal in female development is the absence of the material disposition to male formation (the Y chromosome) and subsequent absence of exposure to androgens. The developmental trajectory “defaults,” as it were, toward female development unless the active intervention of the Y chromosome obtains.³¹

Perhaps it would not be surprising were the agents of sexual difference to quit their work at this point, having guided the production of the genital organs. Such, however, is not the case. The agents of sexual difference continue their work and so we must continue tracking them. And the next place to which they lead us is the developing, pre-natal brain. We must, therefore, briefly explore sexual differentiation in the brain.³²

For the modern researcher of the brain, that there would be differences in the male and female brain is to be expected: “The existence of sex difference in behavior implies the existence of sex differences in the brain because the brain provides the basis for all behavior.”³³ Beginning literally with child’s play, there are demonstrable differences in the behaviors of human males and females: styles of play; nature of group formation and dynamics; establishment of dominance hierarchies; aggression and risk-taking; communication styles; and behaviors surrounding mate selection, courtship, and sexual behavior.³⁴ Some researchers likewise note reliable difference

³¹ Hines summarizes the research supporting this claim in *Brain Gender*, 24.

³² I must note that sexual dimorphism in the brain is an area of great controversy: it seems that there is scarcely a finding asserted by one author that is not denied by another. On one extreme of the debate are those who tend to reduce human behavior to products of neurological or other physiological difference. On the other are the those who seem to take deconstruction to the point where the material constitution of the human essence becomes little more than the matter from which the conscious, constructing agent—be it individual or societal—creates the reality of sexual difference. Time does not permit us to enter these controversies. For representative sources of those defending the significance of brain differences, see Hines, *Brain Gender*; Louann Brizendine, *The Female Brain* (New York: Three Rivers Press, 2006); and Brizendine, *The Male Brain* (New York: Harmony Press, 2010). For those challenging that research, see Anne Fausto-Sterling, *Sexing the Body* (New York: Basic Books, 2000); and Rebecca M. Jordan-Young, *Brain Storm: The Flaws in the Science of Sex Differences* (Cambridge, MA: Harvard University Press, 2010).

³³ Hines, *Brain Gender*, 65.

³⁴ See, for instance, Eleanor E. Maccoby, “Perspectives on Gender Development,” *International Journal of Behavioral Development* 24.4 (2000): 398–406, and

in some cognitive abilities such as certain spatial abilities, throwing accuracy, verbal memory, and recall of object location.³⁵ Physician and researcher Leonard Sax notes differences in the senses of touch, sight, and hearing between males and females.³⁶ To these sex-based differences in human beings is added the reliable observation of sexual dimorphism in the sub-rational animal brain: experiments on mice and monkeys reveal significant differences in the male and female brain.³⁷ Thus, we would anticipate that there would likewise be some sex-based difference in the human brain. Contemporary research seems to be confirming this hypothesis.³⁸

The study of sexual dimorphism in the brains of animals reveals that, as with differences in the external genitalia in humans, sex-based differences in the brain appear to be primarily due to pre-natal hormone levels rather than to a genetic mechanism.³⁹ Neurological psychiatrist Louann Brizendine writes: “Until eight weeks old, every brain looks female—female is nature’s default gender setting. If you were to watch a female and a male brain developing via time-lapse photography, you would see their circuit diagrams being laid down according to the blueprint drafted by both genes and sex hormones. A huge testosterone surge beginning in the eighth week will turn this unisex brain male by killing of some cells in the communication centers and growing more cells in the sex and aggression centers. If the testosterone surge doesn’t happen, the female brain continues to grow unperturbed.”⁴⁰

Maccoby, *The Two Sexes: Growing Up Apart, Coming Together* (Cambridge, MA: Harvard University Press, 1998). Brizendine also provides useful summaries of brain and behavioral difference in her two recent works: *The Female Brain*, 1–9; *The Male Brain*, 1–7.

³⁵ A ubiquitous text on the subject of cognitive differences is Doreen Kimura, *Sex and Cognition* (Cambridge, MA: MIT Press, 1999).

³⁶ Leonard Sax, *Why Gender Matters: What Parents and Teachers Need to Know about the Emerging Science of Sex Differences* (New York: Doubleday, 2005), 16–24, 67.

³⁷ See Hines, *Brain Gender*, 45–64.

³⁸ Those opposing the significance of sex-based human brain difference will object that, even granting the existence of such differences, the direction of the causal link between brain differences and distinct behaviors and aptitudes is not clear: do brain differences cause different behaviors or do different behaviors, derived from societal expectations, lead to differences in the brain? See Lesley Rogers, *Sexing the Brain* (London: Phoenix, 2000).

³⁹ Hines describes the actions of hormones on the brain in *Brain Gender*, 72–76. The effects of prenatal hormone levels is also discussed by Brizendine in *The Female Brain*, 11–30.

⁴⁰ Brizendine, *The Female Brain*, 14.

Once again, the agency of sexual differences is delegated to hormones produced by the gonads. The genetic difference begins the process, but the primary work of differentiation is carried out by the hormones. These hormones appear to modulate the development of certain parts of the brain in subtle ways as either male-typical or female-typical. Thus, we see the same pattern as witnessed with the external genitalia: the general agency of development comes from the essence of human nature itself, but that development is directed into one of two general developmental paths by the presence or absence of certain hormones originating in the primary organ of generation.

It is impossible to give anything approaching an adequate treatment of the findings of researchers and the criticisms leveled against such findings. Among other findings, researchers claim to have found statistically significant differences in brain size, quantities of grey and white matter,⁴¹ lateralization, and inter-hemispheric connectivity,⁴² as well as in specific parts of the brain: the hypothalamus,⁴³ the hippocampus,⁴⁴ and the amygdala among others.⁴⁵ However, assuming these findings to be valid, it is very difficult to discern the precise consequences of observed differences. What does seem relatively certain is that pre-natal hormone levels affect the brain of the developing baby, thus continuing the agency of sex-based hormones and expanding their efficacy beyond only the formation of the genital organs. The agents' work extends beyond genital organs, indicating that sexual difference, though centered upon differences in the power of generation itself, is not limited thereto.

And the agency of sex-based hormones does not end at birth: Brizendine speaks of a relatively brief period just after birth that she calls "infantile puberty." During this time, infant boys are exposed to androgen levels similar to those of an adult man while infant girls are exposed to estrogens comparable to those of an adult woman. She claims that these distinct hormone levels further distinguish the male and female brain after birth.⁴⁶ Then, roughly a decade after the initial

⁴¹ See Kimura, *Sex and Cognition*, 128.

⁴² See Hines, *Brain Gender*, 191–203.

⁴³ See Kimura, *Sex and Cognition*, 129–31, and Hines, *Brain Gender*, 188–90.

⁴⁴ See Kimura, *Sex and Cognition*, 131–32, and Hines, *Brain Gender*, 199.

⁴⁵ See Kimura, *Sex and Cognition*, 201, and Hines, *Brain Gender*, 198–99. For a brief summary of brain differences, see Simon Baron-Cohen, *The Essential Difference: The Truth about the Male and Female Brain* (New York: Basic Books, 2003), 109–13.

⁴⁶ *The Female Brain*, 18–19; *The Male Brain*, 14.

momentous effects that sexually-differentiated hormones have upon the human child developing in the womb and the young infant, they have a second phase of intense developmental agency during puberty. At this time, it is once again sexually-differentiated hormones that will cue the unfolding of what are known as the secondary sex characteristics. These are well enough known that they do not require exhaustive rehearsal here: greater size, musculature, and angularity in males, and in females, the formation of the breasts, broadening of hips and thinning of the waist, and beginning of menstrual cycle.⁴⁷

We could certainly continue tracking the effects of sexually distinct hormone levels in males and females. Physician and researcher Daniel Federman notes the somatic tissues that are affected by androgens: muscle, larynx, beard, distribution of sexual hair, bone and cartilage, immune system, nervous system, heart, and red blood cells. Those affected by estrogens include breast, uterus, adipose tissue distribution, heart and vascular endothelium, bone and cartilage, immune system, and nervous system.⁴⁸ In addition to studying the roles of androgens and estrogens, researchers are also exploring the possible consequences of distinct levels of the hormones vasopressin and oxytocin in males and females.⁴⁹ As was the case with differences in the brain, it is difficult to discern the exact relation between hormone levels and behavioral correlates. For instance, after noting correlations between testosterone and libido, self-confidence, dominance-seeking, and spatial abilities, Steven Pinker concludes that, though the relationship is complex and even includes a certain level of reciprocity, nevertheless, hormone states do influence psychological states and subsequent behaviors.⁵⁰

To inventory exhaustively all the effects of karyotypes XX versus XY followed by the effects of the distinct hormone environments that follow from the initial genetic distinction would take far more time than is available here. Further, these effects remain an area of ongoing research and controversy. What should be clear, however, is that the agents of sexual difference do not stop simply at the organs of generation: their work extends to the human brain, the development

⁴⁷ For more detailed descriptions of sex-based difference arising during puberty, see Brizendine's chapters devoted to the teenage brain: *The Female Brain*, 31–56; *The Male Brain*, 30–50.

⁴⁸ Federman, "The Biology of Human Sex Differences," 1511 (table 3).

⁴⁹ Bear, Connors, and Paradiso, *Neuroscience*, 460–62.

⁵⁰ Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature* (New York: Penguin Books, 2002), 347–48.

of the secondary sex characteristics, and the possible disposition to action through distinct hormonal environments and dimorphism in the brain. Seeing that the agency of sexual difference extends beyond the sexual organs, some account is needed of this activity to see whether a cogent narrative exists unifying the activity of the agents of sexual difference.

That Which Moves the Agent

To understand the activity of any agent, we must understand that which moves it, which is the end. The agent's proximate end is the form that its work achieves (which explains our current interest in the agent cause). Ultimately, however, we must understand not only what St. Thomas refers to as the end of generation (the act in which becoming resolves) but also the end of the thing generated. Alas, full treatment of the ends of sexual difference must be left for another work, but it is clear that the agents of sexual difference extend their activity beyond the fundamental organs of reproduction. If we are to understand the form of sexual difference, we must seek to discern that which unifies its elements, and so we must, at least in a cursory manner, examine the "whys" of sexual difference. So, let us retrace the path of the agent, briefly underscoring that which is likely moving the agent to its activity.

Throughout this section, I will apply variations of an insight provided by St. Thomas regarding the generative power. It is a kind of "reduction to vanity": those things are necessary to the generative power without which that power would be in vain. Thomas writes: "But man's [*hominis*] generative power would be frustrated unless it were followed by the proper nutrition, because the offspring would not survive if proper nutrition were withheld. Therefore, the emission of semen ought to be so ordered that it will result in both the production of the proper offspring and the upbringing of that offspring."⁵¹ In considering the generative power and the sexual difference that modifies it, we must consider not only the power itself, but also that which allows the power to reach its perfection, that which would prevent the power from acting in vain.

The first act of the principal agent—human nature—regarding sexual differentiation is to generate a new human being with a genetic disposition to either female (XX) or male (XY) and so determine

⁵¹ Thomas Aquinas, *Summa contra gentiles* [SCG] III, ch. 122, trans. Vernon J. Bourke (South Bend, IN: Notre Dame University Press, 1975).

the new human being as female or male. As we have noted, human nature is equally disposed to both. The next steps are quite clear: the genetic influence leads to the formation of either ovaries or testes. But ovaries or testes by themselves cannot bring the power of generation to its realization; supporting organs are needed. Thus, next, either hormones from the testes lead to the generation of organs that support the testes or their absence leads to those organs that support the ovaries, without which organs the testes and ovaries are rendered effectively powerless. The next act of sexually differentiated prenatal agency involves the human brain. Again, it is difficult to discern the precise effects of brain differences. Some of these differences, no doubt, relate to obvious sex-based differences, such as the need to regulate the male and female hormonal systems, which in turn regulate activities such as the woman's menstrual cycle. However, it is likewise clear that simply having the appropriate organs of generation will not ensure the realization of the power of generation. The two complementary modes of the power of generation must be united. And the partial powers must not only be united but also be joined in such a way so that their union is not in vain, which means that the offspring resulting from the union must flourish. These imperatives demand that each sex finds some other of the opposite sex who can complete his or her partial power of generation and whose presence will lead to the flourishing of his or her offspring. Thus, mate-selection and the capacity to ensure the well-being of offspring are essential to the power of generation.⁵² It is not surprising, then, that the brains of the male and the female would be disposed to the successful completion of these necessary aspects of the realization of the power of generation. One would anticipate that the sensory appetites of each sex, which reside in organs,⁵³ would be inclined toward those goods that lead to the fulfillment of the power of generation, which is not only the birth of a new little baby boy or girl but also the perfection of that child. So, for instance, the sensory appetite of the male is moved to the female and vice versa. Sensory appetites, however, are bound to the knowing powers they accompany. Thus, the subject of

⁵² Both mate selection and successful parenting are themes taken up by evolutionary theorists in attempting to explain the evolution of human sexual difference. See David C. Geary, *Male, Female: The Evolution of Human Sex Differences* (Washington, DC: American Psychological Association, 1998), chs. 2–4.

⁵³ *ST I*, q. 77, a. 5.

these powers is not only the soul but also the organs in which they reside, which organs, based upon what we have seen about the development of the brain, could be susceptible to sexually-differentiated hormone environments. Hence, it is reasonable to think that some sex-based differences in the brain could be linked to dispositions of the sensory appetites as they are ordered towards successful mate selection and rearing of children.

Similarly, secondary sex characteristics, such as breasts in women and greater musculature and speed in men, allow both for successful selection of a potential mate and for care of offspring once born. Hence it is reasonable to see the cascading effects of the agents of sexual difference as ordered not only to the acts immediately surrounding reproduction, but also extending in both directions temporally from that central point: both to those things that lead up to act of generation and make it possible—successful selection of a good mate—and those things that flow from the act of generation: successful nurturing and guidance of one's offspring to the fullness of their being. Thus brain and body, apprehension and appetite are altered by the agents of sexual differentiation. The elements of sexual difference are ordered not only to the generation of the child but also to the tribe and city in which those children thrive.⁵⁴

The Final Element

We have tracked the agents of sexual difference and sought out the various ways in which they modify the human male and female. These modifications pertain to the natural principles of the human substance—to its form and matter. And this has been our principal concern: to consider what determinations of the human substance define sexual difference. And so, we have seen a series of differences following from consistent principles according to a cogent narrative. Before considering how, at times, the development of sexual difference veers off course, we must, at least briefly, consider a final element of sexual differentiation: an individual's knowledge of and conscious identification of himself or herself as sexually differentiated. Clearly, this is a topic of great complexity that presumes the resolution of

⁵⁴ This expansion of the generative rapport between male and female, man and woman, is a fruitful field of research, for sexual difference can be seen as generative of the city, as Aristotle notes in the beginning of *Politics*, and in a way, as generative of our knowledge of the very nature of being. These, however, must remain as themes for a future work.

many questions of anthropology, psychology, and the nature of human self-knowledge. As such, it demands dedicated and subtle treatment. In the context of our current project, I can offer only the most cursory remarks. I will thus offer a hypothesis and state some of the suppositions upon which it rests.

Put simply, the point I wish to make here is that, subsequent to the determinations of the human substance of which we have been speaking, the human person, through his intellect, is able to then reflect upon himself precisely as sexually differentiated and thus comes to an awareness of himself as sexually differentiated.⁵⁵ This awareness of oneself as sexually differentiated and judgment regarding that sexual difference become the final element of sexual difference.

In the course of typical development, all the elements of distinction will be consistent with each other and, hence, the knowing individual's judgment of his sex will presumably be consistent with all prior determinations of his substance: if genes, gonads, genitals, appetites, and aptitudes all align with one or the other sex, then presumably one's knowledge and judgment regarding oneself will likewise complete that developmental arc. For instance, if all the elements of sexual difference discussed above align as male, then presumably the individual will come to know himself as male and so identify himself as such.

Implicit in this line of thought, however, are many anthropological and epistemic theses, but I will try to identify the most important. First, regarding human self-knowledge, we must reiterate a basic truth that follows from Thomas's anthropology: in his essence, man is not only his soul.⁵⁶ If man were his soul, then clearly the heart of knowing himself would be knowing his soul. However, because the human being is not simply a thinking thing, for man to know himself means for him to know that self as a unified composite of form and matter. To know himself is to know himself as embodied.

However, we have made it clear that the area of our principal concern—sexual difference—is not part of man's very definition and, so, most strictly speaking, is not part of his essence. Hence, knowledge of man's essence does not, strictly speaking, include knowledge of sexual difference. However, we likewise noted (and will return to

⁵⁵ In order to know oneself as sexually differentiated, the terms "male" or "female," "boy" or "girl," must have meaning. This meaning, though mediated interpersonally, is grounded in the simple apprehensions mentioned earlier in this article.

⁵⁶ See, for instance, *ST* I, q. 75, a. 4.

this point later) that, though sexual difference is not man's specific difference, neither is it simply an extraneous accident; it is, rather, an essential accident inexorably bound to the essential power of generation. Hence, because generation is an essential power of any living thing, the human individual will know herself as she stands toward the divided power of generation; she will know herself as sexually differentiated.

There are myriad questions that must be addressed regarding the nature of human self-knowing in regard to knowledge of oneself as sexually differentiated.⁵⁷ Ultimately, such considerations must include the role of others—both individuals and societal norms—in the formation of judgments about one's sex. Again, such questions fall beyond the scope that I have set for myself in this work. As such, my point here is quite limited: in the course of normal development, the individual comes to a sense of or judgment concerning himself or herself as sexually differentiated when his or her intellect is brought to bear upon the reality of his or her substance as sexually differentiated. It is this judgment to which I am referring as the final element of sexual differentiation.

Intersex Syndromes and Gender Dysphoria

Up to this point, I have been discussing the normal unfolding of sexual difference. However, it is not always the case that all the elements of sexual difference harmonize with each other. It is precisely these variances and, at times, dissonances that render simple defining of sexual difference difficult. Thus, we must briefly consider the intersex disorders and, even more briefly, gender dysphoria.

Melissa Hines notes that most intersex disorders arise from hormonal, not genetic, origins:⁵⁸ they center upon problems either in producing the appropriate hormones or in the body's capacity to

⁵⁷ Therese Scarpelli Cory notes that the most likely interpretation of St. Thomas's position on human self-knowledge allows for a kind of dynamic relationship between an intuitive, general, pre-philosophical knowledge of self and a progressively clearer quidditative knowledge, thus accounting for both the immediacy of self-knowledge and human self-opacity. The tension between certitude and self-opacity is a recurrent theme in Cory's *Aquinas on Human Self-Knowledge* (New York: Cambridge University Press, 2014); see, for instance, 69–91. We shall see, when briefly discussing gender dysphoria in the following section, that the dynamic existing between an initial general knowledge followed by a more precise knowledge could indeed enter into the phenomena of gender dysphoria.

⁵⁸ *Brain Gender*, 28.

respond to these hormones. Having briefly examined the agents of sexual differentiation, we are in a position to understand these disorders in at least a rudimentary way. We will succinctly review two disorders: one most profoundly affecting XY individuals, the other XX.

Androgen Insensitivity Syndrome (AIS) is a disorder that affects a cell's ability to respond to ambient androgens.⁵⁹ Its effects are most profound in XY individuals. The Y chromosome properly cues the proto-gonads to form as testes. As we recall from our discussion of the agents of sexual differentiation, much of the process of virilization is a result of androgens produced by the testes. However, in the case of AIS, though the testes are producing these androgens, tissue that is supposed to respond to the promptings of the androgens is hindered in doing so—and in the case of Complete Androgen Insensitivity Syndrome (CAIS), it is completely unable to respond. Thus, when CAIS obtains in XY individuals, the external genitalia form according to the female pattern, while the internal organs (other than the gonads) fail to form properly according to either paradigm. Presumably, neither is the tissue in the brain able to respond to the promptings of androgens and so it forms in the female-typical pattern. This disorder exists in degrees. When it is partial, ambivalent external genitalia may result. However, when the insensitivity is complete, the individual externally may appear fully female but be both genetically and gonadally male. In these cases, the disorder is frequently not discovered until puberty when menses fails to commence. Interestingly, Hines notes that female secondary sex characteristics will develop in CAIS individuals as nature seems to adapt to the depth of the syndrome. Thus, with CAIS, there are XY individuals with testes who are otherwise phenotypically female and who are raised female and spontaneously recognized by all as female.

While AIS has its most profound effects upon XY individuals, congenital adrenal hyperplasia (CAH) most profoundly affects XX individuals. In its extreme cases, the opposite dissonance from that found in CAIS can occur: an individual can be genotypically female though phenotypically male. In short, this disorder results from a genetic defect that causes the expecting mother to produce androgens that mimic those produced by the testicles of a developing male child. In XX babies, though the gonads are determined as ovaries, the

⁵⁹ I follow Hines's treatment of these disorders in *Brain Gender*, 28–43.

abnormally high level of androgens leads to virilization of the external genitalia. In extreme cases, this virilization is extensive enough such that the XX individual with ovaries is originally assigned as male. Hines notes, however, that this disorder is usually discovered early after birth and the individual surgically assigned as female.

It should be noted that infertility is a common result of the intersex disorders. In the case of CAH, a female who is diagnosed with this disorder can indeed be fertile as a female. She could not, however, be fertile according to the male mode of fertility. As regards CAIS, infertility results: while there are testicles, the body's lack of ability to respond to testosterone appears to prevent the production of sperm.⁶⁰

Again, the point here is not to give an exhaustive treatment of the nature of all the intersex disorders; it is, rather, to make clear the difficulties that are confronted when attempting to discern the formal cause of the human male or female. One might be inclined to reflexively answer with the genotype: to say that if an individual is 46,XX she is female, if 46,XY, he is male. However, how then does one classify the CAIS individual mentioned above? Such cases should keep us from presenting an overly simplistic response to the question of form.

The intersex disorders appear to involve the various levels of determination of the human substance that constitute sexual difference: at times, it can happen that genes and genitals are at odds with each other, resulting in ambiguities that are extremely difficult to resolve practically and pastorally. And finally, we must briefly consider the question of gender dysphoria. As I noted in the introduction, this is a topic far too complex for anything approaching a full treatment here. Psychologist Mark Yarhouse refers to gender dysphoria as "the experience of having a psychological and emotional identity as either

⁶⁰ More recent research has revealed an individual whose karyotype is 93% XY and 6% simply X (missing the Y). This individual is phenotypically female and has had two natural pregnancies, one resulting in a miscarriage but the other resulting in the natural birth of an XY individual who is also phenotypically female. Thus, there is a predominantly XY individual who has naturally brought the generative power to full actuality in the female mode; see Miroslav Dumić, et al. "Report of Fertility in Woman with Predominantly 46,XY Karyotype in Family with Multiple Disorders of Sexual Development: Review of Prismatic Case," *Mount Sinai Journal of Medicine* 75 (2008):168–69, and Anna Biason-Lauber, et al., "Ovaries and Female Phenotype in a Girl with 46,XY Karyotype and Mutations in the CBX2 Gene," *The American Journal of Human Genetics* 84 (2009): 658–63.

male or female, and that your psychological and emotional identity does not correspond to your biological sex.”⁶¹ There is no generally accepted explanation of the etiology of gender dysphoria.⁶² Based upon what we have seen up to this point, however, I will venture to offer a few provisional observations.

We have noted the various levels of sexual difference which culminate in the individual’s self-reflexive knowledge as male or female. As we noted, in the case of normal development, where all the elements of sexual difference are in harmony, there is no basis upon which one would know himself or herself as anything other than the sex to which he or she is determined. But what of the case in which there is dissonance within the various levels of sexual difference? Is there not ample cause for confusion on the part of the intellect regarding which judgment to make? For instance, we noted that pre-natal hormones affect the brain and speculated that this could possibly affect the seats of human appetites.⁶³ It seems at least possible that one’s intellect could be unsure as it is brought to bear upon appetites that are directed one way, and organs of generation that are directed another.

The confusion subsequent to dissonance between the elements of sexual difference would be compounded by the very nature of human self-knowledge: our self-knowledge itself begins in a somewhat confused and undifferentiated manner. The lack of harmony between, for instance, sensory appetite and one’s primary and secondary sex characteristics could perplex the mind as it considers the entire reality of oneself. On one level, an individual’s reason could understand her sex and would experience the inclinations of reason that are the basis of the natural law. Yet, the same intellect could perhaps find her immediate sensory experience of appetites at odds with the judgment of her biological reality, leading to a fundamental experience of dysphoria. And, as the experience of the appetites could seem to the conscious mind even more immediate than the reality of one’s biological sex, the individual might “identify” herself with her appetites as opposed to her biological determination. So, as with the intersex disorders, we see that dissonance can also enter the picture regarding one’s knowledge of himself or herself as sexually differentiated, further complicating attempts to define sexual difference.

⁶¹ *Understanding Gender Dysphoria*, 19.

⁶² See *ibid.*, 61–83.

⁶³ Yarhouse addresses theories regarding brain formation in *ibid.*, 67–74.

Forms of Composition and Order

It should be clear at this point that sexual difference in the human being refers to more than just one determination of the human substance. We have tracked the agents of sexual difference to see the scope of their work and found that it extends beyond the organs of generation. We have likewise noted that, in the human being, the intellect is brought to bear upon the self as sexually differentiated, leading to a final element of sexual distinction. Finally, we quickly reviewed how, at times, the various levels of sexual difference can become confused and dissonant. It now remains for us to look more closely at how the various elements are united in one form. St. Thomas's notion of forms of composition and order provide a key to deciphering the relationship of the parts of sexual difference to the forms "male" or "female" considered as wholes.

The distinction that St. Thomas makes between substantial forms and forms of composition and order is helpful for strengthening our earlier claim that sexual difference is not a substantial form and is likewise a good beginning for our current discussion: "Now the substantial form perfects not only the whole, but each part of the whole. For since a whole consists of parts, a form of the whole which does not give existence to each of the parts of the body, is a form consisting in composition and order, such as the form of a house; and such a form is accidental."⁶⁴

In forms that involve the integration of parts, the relation of part to whole is critical. Thomas is claiming that a substantial form not only perfects the whole—not only gives unity and, therefore, being to the whole—but also perfects the very parts. For example, the substantial form of the human being, the soul, not only unifies the parts into a whole but also brings about the very being of those parts. Man's soul is responsible for the very being of heart, kidney, lung, and so on, not just a principle of their unification into one organism. Thus, the relationship between part and whole is distinct regarding a car and its parts and a human being and his or her parts. And if the form that unifies the parts does not perfect those parts, it is an accidental form and may be called a form of composition or order.

In his *Commentary on the Metaphysics*, St. Thomas distinguishes forms of composition and order: "Now it is characteristic of the notion of this kind of diversity that the composite sometimes derives its species from some one thing, which is either the form (as in a compound) or combination [*compositio*] (as in a house) or arrangement

⁶⁴ ST I, q. 76, a. 8.

[*ordo*] (as in a syllable or in a number). And then the whole composite must be one without qualification.”⁶⁵ Thomas is distinguishing those things that are one without qualification from things, such as a pile of rocks, that are one but only in a way. Of things that are one, some are so by virtue of a substantial form: those things, as noted above, that perfect their parts as well as the whole. Others are one by virtue of either composition—having been composed or placed together, presumably by an intending agent—or the order of the parts (such as letters O, G, and D can form different wholes depending upon their order: GOD and DOG differ in order). It would seem that these latter two certainly do not exclude the other, and thus he conflates them in our first quotation. In the case of a substantial form, the species of the thing is derived from the form—as a human being receives his or her species from the soul. However, some things receive their species from the composition or ordering of the parts.

So, why refer to sexual difference as a form of composition? First, to reinforce what we argued earlier, sexual difference, the forms of male and female, are not substantial forms. They do not perfect their parts. Consider our reflections upon the agents of sexual difference: it is human nature that is the primary principle of the being of all the elemental parts that constitute sexual difference. The Y chromosome does not cause the existence of the testicle; it only channels the developing gonad into one of two possible developmental paths. Thus, it is once again clear that “maleness” and “femaleness” are not substantial forms. But, why call them forms of composition?

From what we have seen regarding the activity of the agents of sexual difference and the reality of the intersex disorders, it seems evident that sexual difference consists of more than one determination of a substance; it is a kind of harmony between multiple parts. It is true that the modality of the power of generation is imperfectly established with the determination of the gonads, but that power is an impotent one without the organs that support it: ovaries that can produce ova but have not the organs to support them, or testicles producing sperm with no other organs to facilitate the delivery of the sperm have no natural possibility of bringing the power of generation to completion. The determination of the gonads sets development definitively upon one path or the other, but the gonads are helpless without those other aspects of the substance that allow for the realization of the act of generation. Similarly, even complete

⁶⁵ *Comm. meta.* 7, lec. 17, no. 26.

systems of organs of generation cannot actualize their particular potencies without successful finding of a member of the opposite sex. And the children of that union will not flourish without the particular contributions of each parent. We have also briefly seen that this generativity extends beyond even just the immediate offspring—for a healthy child in a failing city is not likely to maintain his or her health for long.

St Thomas contrasts forms of composition and order with other compilations that are joined in a sense but are one only in a qualified way: “He [Aristotle] distinguishes one kind of composition from several others; for something composed involves many things in such a way that the whole is one thing composed of many, as a house is composed of its parts and a compound of its elements. But sometimes a composite results from many things in a such a way that the whole composite is not one thing in an unqualified sense but only in a qualified one, as is clear from a heap or pile of stones when the parts are actual, not being continuous.”⁶⁶ Again, the unity of the parts of sexual difference is not the unity of the elements of a compound, joined as they are by a substantial form, but neither are the elements we have noted as associated with sexual difference a mere pile or heap of characteristics. To be composed is to be placed together.⁶⁷ It implies end-directed activity, an agent that places the parts together. We see this in quintessential compositions such as a house, or a musical composition. In these cases, the parts are placed together by an agent acting first for the end of the very composition (the form) and then for the further ends that the composition achieves. As Thomas notes, the composite derives its species precisely from the composition, from the ordering of the parts.

But this appears to be exactly what we find in the case of sexual difference. There are consistent and related agents that are placing the elements of the form into a composition according to an order. The genetic determination functions somewhat like a blueprint or musical score according to which the materials are disposed: for a house, certain wood and stone is procured, or for a symphony, according to the score, certain instruments and players are gathered. Then comes perhaps the most momentous aspect of sexual differentiation: the gonads are determined according to one mode of possessing the power of generation or the other, the production of ova or sperm.

⁶⁶ Ibid., no. 25.

⁶⁷ “Composition” is derived from the Latin *componere*, “to put together.”

Once this is done, all subsequent differences unfold in support of this fundamental difference. This is akin to the setting of the foundation of a house or the first sounding of symphony's theme. It marks the first act of that which is to come to be more and more fully through time as the elements of the form are fit into their places. Thus, the first act is an imperfect act, but one which determines that which is to come. The subsequent elements of the form follow in accordance with it. The various parts are placed by the agent according to what has come before. The form reaches its completion when all the elements are in place, are composed with the foundation being the mode in which the individual possesses the divided power of generation.

Maleness and femaleness are forms that come to be, that come to their perfection, over time as the various elements are brought from potency to act. Not each part is of equal importance, just as in the house, the foundation is of greater importance than a piece of trim, or in a symphony, the theme is more central than ornamental notes that might embellish it. But all have their part within the composition and together constitute the completion of the form.

We could develop the illustration of the house to further the fundamental point that the forms of male and female are forms of composition. Instead of houses, consider two complementary "factories" necessary for the making of bread. One produces all the materials required for the making of the bread and has the equipment and materials needed to produce that bread, but it is lacking only one essential element. The other factory produces that missing but essential element—say, the leaven—and delivers it to the first factory. When all goes well, all the parts of each factory will be consistent with its primary function: in the first, the foundation will be set to support the machinery that produces the flour and the ovens that produce the finished bread; in the other, all will be ordered to the production and delivery of the leaven. The parts of each are ordered to and, in a sense, unified by their ends. This is what transpires in normal development. However, sometimes the composition is not complete, but rather is confused. What are we to do if the plan, the foundation, and the primary equipment are in place for one mode, but then the builders mistakenly construct the supporting structures and exterior of the other? It cannot function fully as either, containing elements of each. Such is the case with intersex syndromes.⁶⁸

⁶⁸ For instance, what is one to say of an individual with CAIS whose power of generation has been fundamentally determined according to the male mode

What seems clear is that the forms of male and female are forms of composition: they are accidental forms composed of many elements that center upon one or the other of two modes of generativity. These modes of generativity extend beyond just the act of generation itself to a kind of creativity that encompasses the very communal of life of human persons.

It is worth noting that understanding male and female as forms of composition allows us to address a question at the beginning of this work and perhaps to address an ambiguity in the use of the words “male” and “female.” I posed the question whether male and female were said univocally across species or perhaps analogically. Having observed the forms of male and female in the human being, we can see that there are root meanings of “male” and “female” that are indeed univocal across species: to be male is to reproduce by means of sperm; to be female is to reproduce by means of ova. Sometimes, this is all we intend by the terms “male” and “female.” In this sense, to be a male dog and to be a male human have the same meaning. However, there is also analogical usage of the terms “male” and “female” across species, for we sometimes intend not only the univocal foundation of the predication but also the composition of all the elements that together constitute the fullness of sexual difference in each species. This, for instance, is what we intend when we use specific terms such as “man” or “woman.” These terms refer not only to the univocal root (that which produces sperm, or that which produces ova) but also to the composition of elements that accompany the generative foundation. Thus, this broader sense of “male” or “female” signifies not only the foundation but also the cascade of elements that follows from the way in which the power of generation is had: it signifies the composition of the elements of sexual difference. These compositions vary from species to species.

Questions of Being

At this point, we have seen that the forms of male and female are not substantial forms and, so, must be accidental forms, and yet further that they are forms of composition. Before concluding, however, we should clarify some possible confusion that could follow from holding that male and female are accidental forms. For it could be thought that, because male and female are accidental forms, they are therefore

by the formation of testicles yet who is phenotypically female? It would seem that the individual is neither perfectly male nor perfectly female.

either of little importance, mutable, or both. In order to address these concerns we must first distinguish essential accidents from extraneous accidents; then, we shall further distinguish essential accidents.

Once again, St. Thomas will help us in confronting the status of male and female as accidental forms. When considering whether the powers of the soul constitute the essence of the soul, an objector argues that the powers of the soul must be included in the very essence of the soul. For, if they are not, then the powers would have to be considered accidents like color or shape. But clearly, the objector protests, the powers of the soul cannot be treated as color or shape.⁶⁹ St. Thomas replies that, if we consider only the division between substance and accident, there is no room for any mean between them, for they are opposing sides of a contradiction: the attribute in question either exists in another or it does not, but rather exists in itself. Because the powers exist not in themselves but in the human substance, they are accidents. In fact, Thomas notes that the powers of the soul are qualities.⁷⁰ But the fact that the very powers of the soul are accidents points to an important distinction: the mere fact that the powers are accidents does not mean they are accidents just like color or shape. For, not all accidents are created equal: “if we take accident as one of the five universals, in this sense there is a medium between substance and accident. For the substance is all that belongs to the essence of a thing, whereas whatever is beyond the essence of a thing cannot be called accident in this sense, but only what is not caused by the essential principle of the species. For the ‘proper’ does not belong to the essence of a thing but is caused by the essential principles of the species.”⁷¹ The powers of the soul are accidents (qualities), but they are accidents that flow from the essence of the soul—“properties” in the classical sense of the term. They are not the essence itself, but they belong to the essence as proceeding from it. As such, they are rightly distinguished from extraneous accidents, which do not possess the same relation to the essence.⁷²

⁶⁹ ST I, q. 77, a.1, obj. 5.

⁷⁰ Ibid., ad 5.

⁷¹ Ibid.

⁷² St. Thomas likewise notes this distinction in *On Being and Essence*: “Whatever belongs to a thing is either caused by the principles of its nature, for example, risible in man; or comes to it from some extrinsic principle, as light to air from the influence of the sun” (ch. 4). As noted earlier, St. Thomas will distinguish, in chapter 6 of the same work, various ways in which an accident can be related to the substance in which it inheres.

So what are we to make of these forms of male and female? Where do they fit into these distinctions? Essential accidents flow from the essence of the substance. But is this not precisely what we have seen regarding sexual difference?⁷³ First, we noted that sexual difference is inexorably bound with the power of generation. This power exists in two independently incomplete modes, which modes define sexual difference. So, if the power of generation is an essential accident and sexual difference determines the mode in which this power is possessed, then sexual difference must itself be an essential accident, flowing, as noted above, from the relation between specific form and matter.

We should note, however, that sexual difference, while bound to the power of generation, is not itself the power. Most immediately, the female possesses the power of generation through the production of ova and the male through the production of sperm. And, as Thomas notes, these powers reside in the soul and the organs of generation. But one is not female because she produces ova, nor male because he produces sperm. Rather, the converse is true: an individual produces ova because she is female, or produces sperm because he is male. A post-menopausal woman does not cease to be a woman when her fertility ends. In this way, the relation of maleness and femaleness to the power of generation is similar to that of the essence of man to the power of reason: one is not human because he possesses the power of reason; he possesses the power of reason because he is human.

St. Thomas refers to sexual difference as a qualitative difference.⁷⁴ Maleness and femaleness are qualities of the human substance. This, too, fits with what we argued about sexual difference. A quality determines a substance according to a certain mode or measure. But sexual difference is precisely that difference of the substance that determines it according to one or the other modes of possessing the power of human generativity. As such, we rightly refer to maleness or femaleness as qualities of the human substance. And, from what we have just argued regarding sexual difference as an essential accident underlying one or the other partial powers of generation, it should

⁷³ I do not wish to imply that sexual difference flows from the substantial form as such. As we noted earlier, if this were true, male and female would be distinct species. However, it is clear from what we have seen that human nature intends the material disposition through which the forms of male and female are realized. As such, the essence is the ultimate source of the difference.

⁷⁴ *Sent. meta.* 7, lec. 4.

likewise be clear that it is a “determination of the substance in regard to the very nature of the thing.”⁷⁵ Thus, we can conclude that sexual difference is a quality pertaining to the first category of quality: “The mode or determination of the subject, in regard to the nature of the thing, belongs to the first species of quality, which is habit and disposition: for the Philosopher says (Phys. vii, text. 17), when speaking of habits of the soul and of the body, that they are ‘dispositions of the perfect to the best; and by perfect I mean that which is disposed in accordance with its nature.’”⁷⁶

In sexual difference, the human substance is determined *in ordine ad ipsam naturam subiecti*: the difference flows from the nature of the subject and regards the perfection of the nature of the subject. In fact, regarding the origin of the word “nature” itself in the word *natus*, sexual difference underpins the very possibility of birth. Without the relative fullness of the forms of maleness and femaleness and the cascading levels of generativity they imply, the human power of generation would be in vain.

Conclusion

So, in the end, what are we to say of human sexual difference? Sexual difference, the forms of female or male, are qualities, determinations of the human substance. They are essential accidents. Their fundamental developmental energy flows from the essence of the human soul but is modulated by material dispositions likewise fashioned by human nature. The determination of the substance, however, does not lie in only one modification, but rather in a series of ordered modal differences that together make the fullness of these forms. Unlike a substantial form, where the parts are given their being by the form, the forms of maleness and femaleness come to be at first imperfectly and arrive at their perfection over time as the agent puts each element of the composition in place. Thus, that which answers to our words “male” or “female” refers to a composition of many elements centered upon one or another way of possessing the power of generation. Ideally, the situation is as Eliot describes for the composition of language:

The end is where we start from. And every phrase
And sentence that is right (where every word is at home,

⁷⁵ ST I-II, q. 49, a. 2.

⁷⁶ Ibid.

Taking its place to support the others . . .
The complete consort dancing together).⁷⁷

The agent moves toward its immediate end, which is the form of female or male, with all its aspects in place, each supporting the other in their complete consort, a dance whose unity impels the end that explains that unity, which end is motherhood or fatherhood—a modally distinct generativity embedded in the very substance of the human person. **N&V**

⁷⁷ T. S. Eliot, *Little Gidding*, lns. 216–23.