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How Sexist Is Aristotle's Developmental Biology?

Devin M. Henry
Department of Philosophy, Talbot College 320, University of Western Ontario, London, Ontario, Canada N6A 3K7
dhenry3@uwo.ca

Abstract
The aim of this paper is to evaluate the level of gender bias in Aristotle's *Generation of Animals* while exercising due care in the analysis of its arguments. I argue that while the *GA* theory is clearly sexist, the traditional interpretation fails to diagnose the problem correctly. The traditional interpretation focuses on three main sources of evidence: (1) Aristotle's claim that the female is, as it were, a "disabled" (πεπηρωμένον) male; (2) the claim at *GA* IV.3, 767b6-8 that females are a departure from the kind; and (3) Aristotle's supposed claim at *GA* IV.3, 768a21-8 that the most ideal outcome of reproduction is a male offspring that perfectly resembles its father. I argue that each of these passages has either been misunderstood or misrepresented by commentators. In none of these places is Aristotle suggesting that females are imperfect members of the species or that they result from the failure to achieve some teleological goal. I defend the view that the *GA* does not see reproduction as occurring *for the sake of* producing males; rather, what sex an embryo happens to become is determined entirely by non-teleological forces operating through material necessity. This interpretation is consistent with Aristotle's view in *GA* II.5 that females have the same soul as the male (741a7) as well as the argument in *Metaphysics* X.9 that sexual difference is not part of the species form but is an affection (πάθος) arising from the matter (1058b21-4). While the traditional interpretation has tended to exaggerate the level of sexism in Aristotle's developmental biology, the *GA* is by no means free of gender bias as some recent scholarship has claimed. In the final section of the paper I point to one passage where Aristotle clearly falls back on sexist assumptions in order to answer the difficult question, "Why are animals divided into sexes?". I argue that this passage in particular poses a serious challenge to anyone attempting to absolve Aristotle's developmental biology of the charge of sexism.

Keywords
Aristotle's biology, Generation of Animals, sexism, monsters, male and female

It is beyond dispute that gender bias is pervasive in Aristotle's *Politics*. From the outset Aristotle sets up a dichotomy between master and slave, on the

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one hand, and husband and wife, on the other, declaring that this is how things "ought to be" (1253b6-8). The husband naturally rules over his wife, as master over slave and father over child (1259a37-b4): "For although there may be exceptions to the order of nature, the male is by nature fitter for command than the female, just as the elder and mature person is superior to the younger and more immature." The degree of gender bias in the *Politics* and its effects on Aristotle's political philosophy requires careful examination. What seems clear, however, is that the way he treats women there is extremely calamitous.

It is generally believed that Aristotle's views about the political status of women are founded on his (mis)conceptions about their role in reproduction. But this idea faces two problems. First, there is no direct evidence to suggest that Aristotle's views about females in the *Politics* are grounded in his analysis of their reproductive roles in the *Generation of Animals*. Although the *Politics* describes the social relation between males and females as "natural", at no point does Aristotle attempt to justify his views by appealing to the results of his study of animal generation. Second, the degree of sexism in the *Politics* is much more severe than anything we find in the biology. While not conclusive, this at least suggests that something else lies behind Aristotle's political views about the inferior status of women. I shall not speculate as to his motivations here. In this paper I will attempt the more modest task of assessing the degree of sexism in Aristotle's developmental biology.[1]

The Charge

The prevailing view among Aristotle scholars is that his developmental biology overstates the role of the male in reproduction and devalues the role of the female. According to Morsink, for example, Aristotle "clearly viewed" an instance where the father reproduces a son that looks like him-

[1)] By Aristotle's "developmental biology" I mean the theory articulated in *Generation of Animals*. This is also the subject of Robert Mayhew's recent book *The Female in Aristotle's Biology* (2005). Mayhew attempts to absolve Aristotle's biology from the charge of sexism completely, something I am not prepared to do. Although I agree with parts of his book, I have substantial reservations about his conclusions and his methodology (some indicated later in this paper). In particular, I find the idea of an 'empirical test' for gender bias highly problematic.

self in every respect as the ideal case.[2] Likewise, Furth argues that for Aristotle the process of development is naturally directed towards producing a male resembling the father.[3] According to Sober, Aristotle held that "reproduction that is completely free of interference would result in an offspring which exactly resembles the father" and that any resemblance to the mother is "a departure from the natural state" produced by "interfering forces (βίαιον) deflecting reproduction from its natural pattern".[4] On Balme's interpretation a "correct reproduction" is one in which the offspring is a clone of the father while everything else is just a "distortion" of this likeness.[5] More recently Katayama has suggested that for Aristotle males of the species have "the complete form" and so "are substances most of all" whereas females have "incomplete forms" and "are substances only in a qualified sense".[6] Freudenthal sums up this standard view of Aristotle's developmental biology when he writes:

> The ideal-type case is that in which the male semen informs the female matter into its like: the offspring is then a male closely resembling the male parent. The condition for this to happen is that the semen carry sufficient vital heat as to enable it to master thoroughly the (relatively cold) female matter (cf. *GA* IV.3, 767b21 ff.; 768a22 ff.): the greatest vital heat thus generates in the matter the most perfect form, that of the sire.[7]

For the purposes of evaluating this interpretation, we can separate out two claims being made here. The one concerns the sex of the embryo: Aristotle thinks reproduction is aimed at generating male offspring while female offspring are a teleological failure. The other concerns family resemblance: Aristotle thinks resemblance to the father is the ideal pattern of inheritance while maternal resemblance is just a distortion of this more perfect form caused by interfering forces deflecting reproduction from its natural course.[8]

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2) Morsink (1982), 136.
3) Furth (1988), 128.
4) Sober (1980), 361-2.
5) Balme (1987), 292.
6) Katayama (1999), 3. This view seems implausible given Aristotle's claim (e.g. *Categories* 5) that one individual cannot be more or less of a substance than another.
7) Freudenthal (1999), 24. See also Gill (1989), 33; Pellegrin (1985), 110.
8) The reason for separating these two claims is that Aristotle himself treats sex (being male or female) and family resemblance (e.g. having the same eye colour or nose shape as the

I shall not evaluate the merits of the second claim here. As several commentators have noted, the theory of inheritance set out in *GA* IV.3 introduces a genetic contribution coming from the mother in order to account for resemblances to her side of the family. Apparently Aristotle's idea is that, like the father, the mother contributes a set of "movements" that somehow transmit the distinctive features of her own form as well as certain features inherited from her ancestors (e.g. *GA* IV.3, 768a14-21).[9] In this paper I shall confine myself to the first claim. I shall argue that the standard texts used to support this claim have typically been misread by scholars. However, I shall also draw attention to one passage where Aristotle blatantly falls back on sexist assumptions: his explanation of why animal species are divided into males and females. This passage is significant, for it poses a serious challenge to anyone attempting to completely absolve Aristotle's developmental biology from the charge of sexism.

The Evidence

There are three main sources of evidence that are typically used to support the view that, for Aristotle, reproduction is aimed at generating males while females result whenever nature fails to achieve this goal. Perhaps the most widely cited evidence in this regard is Aristotle's notorious statement that a female is, as it were, a disabled (πεπηρωμένον) male.[10] To properly evaluate this claim, we need to take a closer look at Aristotle's account of biological sex in *Generation of Animals* Book IV.

The main issue in *GA* IV.1 is the question: In virtue of what property is one animal male and another female? Aristotle offers two candidates for this property both of which, he claims, must be included in an adequate

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mother) as two separate facts. See, e.g., *GA* IV.3, 768a6-8 and 769a1-6. Thus, one of the things Aristotle attempts to explain in *GA* IV.3 is how generation can result in males that resemble the mother and females that resemble the father.

9) I discuss the mechanisms of inheritance in Henry 2006a. Scholars have charged that the introduction of a formal contribution coming from the mother in *GA* IV.3 is inconsistent with the reproductive hylomorphism that dominates the earlier books (the theory that says the mother contributes the matter while the father alone contributes the form). I discuss this problem in Henry (2006b).

10) E.g. *GA* 737a22-34 (cf. 728a17-25). The standard translation of πεπηρωμένον is being "deficient" or "defective". However, the concept of πεπηρωμένον expresses the notion of lacking a capacity of a certain kind. Thus it seems closer to our notion of a disability.

account of the generation of males and females.[11] The first candidate (which most of Aristotle's predecessors neglected) is the obvious anatomical difference. From this perspective one animal is male and another female simply in virtue of having certain parts. However, Aristotle holds that "male" and "female" in the *primary* sense refer to something more fundamental: the ability and inability to produce semen (γονή), respectively. For Aristotle, it is this second, dispositional property that determines an animal's basic sexual identity: it is the presence and absence of this capacity that ultimately makes one animal male and another female. Let me elaborate.

According to *GA* IV.1 an animal is ultimately male or female insofar as it is capable or incapable of concocting its nutriment fully and converting it to semen. Whether or not an animal has this ability, and thus whether or not it is male or female, depends on its source of natural heat. The stronger the animal's principle of natural heat, the greater is its ability to effect concoction and thus produce semen. Since an animal's sexual identity is determined by the relative strength of its natural heat at its source, Aristotle concludes that the source of an animal's sexual identity must ultimately lie in its heart. For that is where its source of natural heat resides:

> If, then, male is a certain origin and cause, and one animal is male in virtue of a certain capacity and the other female in virtue of a certain incapacity, and if what defines the capacity is being able to concoct or not concoct the nourishment (which in the blooded animals is blood and in the bloodless ones the analogue of blood) in the final stages, and if the cause of this is in the first-principle and the part which contains the source of natural heat, then it follows necessarily that a heart must be formed in the blooded animals (and in the other [sc. bloodless] kinds where males and females come to be present, the analogue of the heart) and the offspring will be either male or female. (*GA* IV.1, 766a30-b3)

On this account the differentiation of animals into male and female is ultimately traced to a difference in their hearts and the principle of natural heat contained therein.[12]

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[11] With the following compare *GA* I.2, 716a19-20 where Aristotle says that male and female, *qua* father and mother, differ in virtue of having separate parts and in virtue of having separate capacities.

[12] The heart-based interpretation is also endorsed by Peck (1990), lxvi-lxvii (§68). For an alternative interpretation based on a different reading of the text see Coles (1995) (cf. Deslauriers 1998).

The account of biological sex given here is crucially underwritten by Aristotle's understanding of spermatogenesis, the process in an organism responsible for the production of its reproductive material or "sperma".[13] During nutrition the animal's blood (or "ultimate nutriment") gets distributed from its heart to the various parts of its body where it is absorbed as matter. Sperma is what results from concocting the surplus of undistributed blood left behind in the creature's heart (725a21-8, 726b9-15). Both males and females have the ability to produce sperma.[14] The difference, Aristotle tells us, is that the female is colder than the male – her principle of natural heat is weaker – and so is unable to bring the process of concoction to completion.[15] This inability in turn accounts for the physical condition of her sperma. As a result of being inconcocted, menstrual fluid is colder, greater in volume, and more fluid than male semen (which is fully concocted sperma).[16]

When Aristotle claims that females are "colder" than males, he does not have in mind the ordinary sense of being colder to the touch. Being hotter and colder can also be defined in terms of the relative capacity of a thing to do work, in this case effect concoction (cf. *PA* II.2, 648b25-6). Females are colder than males in this sense.[17] This is the key to understanding the claim that the female *qua* female is, as it were, a πεπηρωμένον male.

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13) There is no suitable English translation for the Greek σπέρμα, and so I shall simply transliterate it. Aristotle uses it for many things: an organism's reproductive material generally (both male and female: e.g. 716a4-13); male semen (technically γονή: e.g. 727b34); and the immediate product of fertilisation (technically κυήμα: e.g. 724b14-18, 728b34-5; cf. 731a2-4). Unless otherwise indicated or qualified I shall use "sperma" to mean the reproductive material of animals in general. This generic use of "sperma" roughly corresponds to "gamete" in modern biology, which includes both female ova and male spermatozoa.

14) Female sperma is explicitly mentioned in several passages (e.g. 728a26-7, b23, 750b4-5, 767b16-17, 771b20, b22-3). Indeed, Aristotle thinks it is because the female produces sperma that she is a "starting-point" of generation (716a11-13). Nevertheless, he insists that what she produces is not *the same kind* of sperma as the male "as some allege" (727b6-7, 728a27-31): she does not produce semen (γονή).

15) See, e.g., 726b30-727a2, 728a18-25, 775a14-15. The connection between the strength of an animal's principle of natural heat and its ability to concoct nourishment is explicit throughout the *GA* (e.g. 725b8-726a16).

16) Cf. *GA* I.19, 726b31-727a2; *Meteorologica* IV.2, 380a4-5.

17) The various senses of "hotter" and "colder" are discussed in *PA* II.2. This sense of being hotter and colder relative to the capacity to do work is close to our concept of heat-energy. I am grateful to Aimee McMillan for suggesting this point.

The Greek word πεπηρωμένον, as Aristotle uses it, implies the lack of a capacity that a thing would otherwise naturally possess: it is a *dis*ability. The capacity in this case is the ability to produce semen (γονή). A female *qua* female is a πεπηρωμένον male, then, in the sense that she lacks the ability to concoct her sperma fully and change it into semen. In the female this capacity is disabled because of a lack of natural heat resulting from a deficiency in heat-energy. By analogy, if the natural work of fire was to produce steel, then an orange flame would be a πεπηρωμένον white flame in this same sense on account of its inability to get the iron hot enough to transform it into steel.

It helps to realise that Aristotle thinks of concoction as a kind of refining process (cf. 728a28: διηττημένη). For example, in several places spermatogenesis is compared to the process of refining fruit (728a26-30, 765b19-35, cf. 725a11-18). As in this process, spermatogenesis begins from a large bulk of material and refines it, gradually removing its impurities (the fluid portion) until what results is a pure form of concentrated seed. From the assumption that spermatogenesis is a refining process Aristotle inferred that menstrual blood, on account of its greater bulk and fluidity, must be a residue of an earlier stage of the process. It is simply a less purified form of sperma that lacks the concentration and potency of the pure seed. This seems to be the empirical basis for Aristotle's view that the female is a πεπηρωμένον (disabled) male: we can see from the state of her sperma that she lacks the degree of heat-energy needed to bring the production of sperma to completion (*GA* IV.1, 765b19-35).

While this view of Aristotle's is a far cry from suggesting that females are mere physical distortions of a more perfect male body type, it does go someway towards establishing that Aristotle's developmental biology views females as somehow inferior to males. After all, Aristotle viewed the production of semen as a *natural* capacity of an animal and so, in a sense, females are imperfect animals. Nevertheless, I shall argue that Aristotle's remarks do not suggest that sex determination occurs *for the sake of* producing males. Unlike (say) vision, whether or not an individual possesses this capacity is entirely the result of non-teleological necessity.[18]

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[18] By "non-teleological" necessity I mean the necessity attached to the interactions between material forces which do not occur for the sake of their end (e.g. when cold air acts on the surface of a pond forming ice). This is distinguished from "conditional" necessity, where something is said to be necessary *for some end*. On the relation between these two types of

In addition to Aristotle's claims about the female being a disabled male, scholars have pointed to two further passages to support the idea that his developmental biology sees the male as the *telos* of reproduction: *GA* IV.3, 767b6-8 and 768a21-8. I shall begin with the latter.

GA IV.3, 768a21-8 is among the most widely misinterpreted texts in the Aristotelian corpus. The relevant passage reads: "Therefore, the most natural course of events (μάλιστα πέφυκεν) is when <the movements> dominate and are dominated both *qua* male and *qua* father together." This text can only be properly understood within the context of Aristotle's broader project in *GA* IV.3. It also requires a proper understanding of the causal mechanisms that underwrite inheritance, including an analysis of Aristotle's spermatic "movements" (κινήσεις).[19] For present purposes, it is enough to say that the movement corresponding to "male" (ἄρρεν) is the genetic factor that transmits the parts of Socrates' sexual morphology while the movement corresponding to "father" (πατήρ; cf. 768a29: "the movement coming from Socrates") transmits those features that make him a unique individual.

Now commentators have traditionally read this text as suggesting that the ideal outcome of reproduction is a male who resembles his father in every respect.[20] But this is not what the text says. Suppose for a moment that by "the most natural" outcome Aristotle does mean the ideal outcome. In that case he would be saying that the ideal scenario is not only when the sire's movements dominate (κρατεῖν) together but also when they *are dominated* (κρατεῖσθαι) together. What this would mean (according to Aristotle's theory of inheritance) is that the ideal outcome is not only a son who looks like his father but also a daughter who looks like her mother. For the latter is what results when the movements for "male" and "father" are both dominated together.[21] So on this reading of "most natu-

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necessity in development see *GA* II.6, 743a36-b18. It is doubtful that Aristotle means to include the capacity to produce semen (γονή) among those capacities of soul that define the species. Aristotle is explicit in *GA* II.5 that males and females have the same soul (see below). Like males, females have the capacity to generate; they simply lack the capacity to generate "into another" (*GA* I.2, 716a13-15). That requires producing semen.

19) See Henry (2006a).

20) See esp. Morsink, Balme, and Freudenthal. (The reference in Morsink to *GA* 769a22 is presumably a misprint for 768a22.)

21) This follows from the principle of displacement (ἔκστασις), which is one of the three "general suppositions" (καθόλου ὑποθέσεις) of Aristotle's theory of inheritance (768b5-10).

ral" Aristotle is saying that ideally we want sex and resemblance to match up, sons looking like their fathers and daughters looking like their mothers.

But that is not Aristotle's point here. By saying this is the most natural course of events Aristotle means that it is something that happens in the majority of cases (τὸ ὡς ἐπὶ τὸ πολύ).[22] The general point of this passage is that the movements responsible for sex and resemblance are linked in such a way that the phenotypic characters associated with each usually get inherited together (ἅμα). This provides the causal mechanism behind one of the phenomena that Aristotle's theory of inheritance is meant to explain, namely, why sons tend to resemble their fathers and daughters their mothers (767b3-4). Aristotle simply uses the movements of the sire to illustrate the point.

GA 767b6-8 is trickier. Typically commentators read Aristotle's statement here as asserting that when the offspring comes to be female (θῆλυ) nature has in a sense departed from the species type (παρεκβέβηκε ἐκ τοῦ γένους). Now whatever Aristotle means by παρεκβέβηκε ἐκ τοῦ γένους, it is important to recognise that the scope of this remark extends only to the offspring's biological sex. He is not talking about looking like the mother but only about being female. One reason for suspecting this is that throughout *GA* IV.3 Aristotle consistently distinguishes "female" (θῆλυ) from "mother" (μήτηρ); the former is never used in connection with maternal resemblances but only biological sex. So Aristotle's point in this passage will apply as much to daughters who resemble their father as it does to those who look like their mother (though *not* to sons who look like their mother). Thus, contrary to the standard interpretation, this text is not suggesting that in a correct reproduction the offspring perfectly resembles the father. At best it can be read as saying that reproduction aims at a generating males as opposed to females, *whichever* parent the offspring happens to look like. However, it is doubtful Aristotle means to suggest even this much. As we shall see, Aristotle's point here is consistent with the suggestion that the process of sex determination is not aimed at producing males but results purely from non-teleological necessity.

The main interpretative challenge here is the phrase παρεκβέβηκε ἐκ τοῦ γένους. Now "departed" is likely an appropriate translation of παρεκβέβηκε,

22) τὸ ὡς ἐπὶ τὸ πολύ can be either be used to refer to what happens in most cases (e.g. 771b1-8) or to what is supposed to happen (e.g. 777a20-2). In the present context it almost certainly has the former sense.

but γένος has to be interpreted more carefully. Most scholars translate this as though Aristotle were saying that the male represents the complete realization of the species form, so that in making the offspring female nature has somehow failed to produce an ideal specimen. There are two main obstacles to reading γένος in this way (as a reference to the species). First, in *Metaphysics* X.9 Aristotle explicitly denies that male and female belong to an animal in virtue of its οὐσία; rather, sexual difference is an "affection" (πάθος) arising from the matter (1058b21-4). Aristotle has to deny that sex is part of the esence in order to avoid the unwelcomed consequence that the division into sexes would result in a division into species.[23] Second, *GA* II.5 insists that males and females have the same soul (τήν αὐτὴν ψυχὴν, 741a7), and soul-functions are what define a species (cf. *DA* II.2, 413b33-414a2). Both of these tell against reading γένος as referring to the species in our text. Although the *GA* theory suggests that the males of the species are responsible for *transmitting* the species form, that doesn't mean the form being transmitted includes the property of being male. For Aristotle, males and females embody the same *sex-less* species form.

I want to suggest that in this context γένος refers to a continuous generation of things of the same kind (*Metaphysics* Δ28, 1024a29-30).[24] The point, then, is that whenever the male semen makes a female embryo there is a departure from a continuous generation of things of the same kind, namely males producing males. The reason why this is only a departure "in a sense" (τρόπον τινά) is that, technically, male *F*s and female *F*s have the same essence (*Metaphysics* X.9). So it is not an instance of generating something of a different species. Rather, a male generating a female is a departure from a continuous generation of like things only in a very loose sense.

But does Aristotle think the process of sex determination is therefore aimed at producing males *as opposed to* females? There is a sense in which Aristotle thinks female births result from the failure of the mechanism that makes the embryo male. However, the idea that this is a *teleological failure*

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23) See Deslaurier (1998), 141.

24) Pellegrin (1985, 111) also takes this reading of γένος but then falls back on the traditional interpretation of the passage, taking the point to be that anything that does not perfectly resemble the father has "strayed from the genetic type". The second meaning of γένος in *Metaphysics* Δ28, the sense of the term that is used in reference to the primary moving cause (e.g. the γένος of Hellenes is named after Helen), is also relevant to the use of γένος in the current passage. For the male sperm is the primary (efficient) cause of sexual difference.

must be read into the text. Aristotle's Greek says females result when the father's semen "is not able to concoct" (μηδέ δὺνηται πέψαι, 766a18-19) the menstrual blood and bring it over to its own distinctive form (it cannot endow it with the level of heat that would make it male). But there is no suggestion that this is a failure to achieve some reproductive goal. Aristotle's remarks at *GA* 767b6-8 do not suggest this either. On my reading, to depart from the γένος is simply to depart from a continuous generation of like things *not* from some ideal standard or type. Since the male semen is the causal agent responsible for determining the embryo's sex on Aristotle's theory, the γένος here will be a continuous generation of males. Female births count as a departure from *this*. Likewise, if the sex of the embryo was determined by the level of concoction effected by the female's contribution instead, then the γένος would be a continuous generation of females. In that case male births would be a departure. It would be an instance of females producing males. The point here is that there is nothing overtly normative about the idea of 'departing from a γένος' when γένος is understood in this way. It is only when we take γένος to refer to some ideal type that it becomes a normative claim. And there is no reason to understand it in that sense.

There are other reasons for resisting the idea that Aristotle thinks reproduction is aimed at producing males. Immediately following our passage Aristotle remarks that the production of females is "naturally necessary" because the species needs to be kept in being (*GA* 767b8-11; cf. 731b35-732a3). This is almost certainly the conditional necessity of *Physics* II.9 and *PA* I.1 (being necessary *for the sake of* some end). In this sense females have teleological value in Aristotle's developmental biology.[25] The standard reading thus saddles Aristotle with the paradoxical view that females are present in the species for the sake of something even though no particular female comes to be present for the sake of anything but is merely an accidental result of a process aimed at generating males. In fact, were it not for the sheer regularity of them, female births would qualify as products of

[25] The μέν… δέ… construction of *GA* 767b8-15 is revealing here. (The μέν at 767b9 is picked up by the δέ at 767b13 rather than the δέ at 767b10.) In that passage Aristotle contrasts the way in which female births are necessary with the way in which birth defects are necessary. Females are naturally necessary – i.e. necessary for some end – while monsters "are not necessary for the sake of anything, that is for a final cause, but are accidentally necessary". *Unlike females*, monstrosities are not means to a natural goal but result from the failure to achieve a natural goal (cf. *Physic* II.8, 199a33-b37).

chance. Like males, females represent a good result, insofar as they make reproduction possible and thus contribute positively towards an end. And (on the standard reading) they are the result of a process that is among those that occur for the sake of something. Yet in this case the result is accidental and not the end for the sake of which the process took place.[26]

One way to reduce this tension is to reject the idea that the mechanism of sex determination operates for the sake of producing males as opposed to females. For Aristotle the *telos* of sex determination is the preservation of the species (*GA* II.1, 731b35-732a3; IV.3, 767b9). To realise that end it is only necessary that each individual animal be sexed, not that it be a particular sex. So the existence of a mechanism that differentiates embryos into sexes has teleological value. But that mechanism need not be designed to make embryos a particular sex; the goal of sex determination does not necessitate that kind of mechanism (and would indeed be counter-productive). In order to preserve the species, it is only necessary for each individual member to be one sex *or* the other not one sex *rather than* the other. On this reading, although being *sexed* is teleologically necessary (it is necessary *for* some end), being *a particular sex* is not. That is the result of simple, non-teleological necessity. It follows necessarily when the matter is acted on in a certain way (*Metaphysics* X.9, 1058b21-5).

If no particular offspring comes to be male for the sake of something, then female births will not count as something that occurs accidentally and not for the sake of anything. Thus, while animal species are divided into males and females for the sake of something, no particular member of the species comes to be one sex as opposed to the other for the sake of anything. The reason why one animal comes to be male and another female is simply the fact that in the one case the concoction of the matter was brought to completion while in the other it was incomplete, owing to a deficiency of spermatic heat.[27]

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[26] See *Physics* II.5, 196b19-25: "Hence it is clear that even among the things which are outside (παρά) what is necessary and what is for the most part, there are some in connexion with which the phrase 'for the sake of something' is applicable. (Things that are for the sake of something include whatever may be done as a result of thought or of nature.) Things of this kind, then, when they come to pass accidentally are said to be by chance." (Hardie and Gaye trans. in Barnes 1995).

[27] The fact that a certain embryo is male or female is not subject to teleological explanation; however, the fact it develops male or female parts is. For once the sex of the embryo has been determined, this conditionally necessitates the development of a particular morphology (*GA* IV.1, 766b18-26).

Gender Bias in the *GA*

It would be a mistake to conclude from this that Aristotle's *Generation of Animals* is completely free of gender bias. For example, no matter how one interprets the word γένος at 767b6-8, Aristotle deliberately refers to the female as "a kind of monstrosity" (τρόπον τινὰ τέρας) in that passage. It is not certain that gender bias lies behind this claim, though. Female embryos result because the male semen is unable to bring the material over to its own distinctive form – which is to say that it fails to make it as hot as itself (766a16-22) – and Aristotle tells us that anything that does not resemble its generator is in a way a kind of monster (767b5-6). But later on Aristotle also calls puppies monsters for this same reason: they are unlike the generator at birth, since they are born blind (770b1-5). And this is surely not a case of *gender* bias. Despite this, it is still hard to excuse the use of τέρας in connection with females.

There is one passage where Aristotle unequivocally falls back on sexist assumptions in order to explain a certain phenomenon. At the start of Book II Aristotle turns to the question of why animal species are divided into sexes. His concern is not why any particular animal becomes male or female. As we have seen, that is a matter of non-teleological necessity. The question is rather why *the division into sexes* exists at all. Why do animals possess a mechanism that divides them into males and females? This is a pressing question.

For Aristotle, the mere existence of male and female principles (ἀρχαί) in a species is explained teleologically by the fact that those principles are conditionally necessary for reproduction, which is itself necessary for keeping that kind of substance in being. However, it is not necessary that a species be *divided* into males and females, for while the sexes are present in plant species, they are not distributed among individuals. In plants, the male and female principles are present together in the same individual.[28] Thus to explain why animal species are divided into males and females Aristotle has to appeal to 'the better'.[29] In the animal kingdom the male and female principles are kept apart because it is better that way:

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[28] There are some notable exceptions to this, for instance the fig and caprifig (*GA* 715b21-5; *HA* 557b31), though Aristotle does not explain why. The only living things that do not contain sexes at all are certain kinds of spontaneously generated animals (though some do have them).

[29] Cf. *PA* I.1, 640a33-b3; *GA* I.4, 717a15-23.

> That is why there is always a continuous generation (γένος) of humans, animals, and plants. And since the principles of these are male and female, male and female will be present for the sake of generation in each of the things that possess them. But the primary moving cause is better and more divine in its nature than the matter, insofar as the definition and the form belong to it, and it is better that the superior cause be kept separate from the inferior one. It is on account of this that (in those species where this is possible) the male is separated from the female. For the source of change, to which the male principle belongs, is better and more divine in those things that come into being, while the female corresponds to matter. However the male comes together and combines with the female in order to perform the function of reproduction, for this is something common to both. (*GA* II.1, 732a1-12)

At first glance this argument seems overtly sexist (though notice the first part of the argument claims that males *and* females have teleological value). For it seems to assert that males are better and more divine than females. But once the argument is spelled out it becomes much harder to isolate its sexist presuppositions.

The purpose of the argument is to explain why, in the case of animals, the sexes exist in separation from one another, that is, why the individual members of animal species are divided into males and females. This is something that needs to be explained, since in plants the male and female principles (the efficient cause and the material cause) are permanently united. Aristotle explains this fact about plants at the end of Book I by appealing to teleology. In any reproducing species the male and female principles must be united in order to execute the function of reproduction. Since plants have no other function beyond this, we should not expect to find the two principles separated. For nature does nothing in vain:

> In all this nature acts like an intelligent craftsman. For there is no other function and action (ἔργον καὶ πρᾶξις) that belongs to the substantial being of plants except the formation of seed. Since, then, this is brought about by the union of male and female, nature has mixed these and set them together in plants so that the sexes are not divided in them. (*GA* I.23, 731a25-9)

Aristotle's reasoning here is intuitive. If an engineer wanted to design a machine whose sole function was to make copies of itself, then she would design one machine containing all the necessary parts for performing this one task rather than two separate machines each containing half the parts. It just makes good sense that way. This is what makes animals so puzzling. If generation requires the unity of male and female principles, then it is

surely a curious fact that nature has separated these principles in animal species (731a21-3): "Indeed, animals seem to be just like divided plants, as though you were to pull a plant to pieces when it was bearing seed and separated it into the male and female present in it." The argument at the end of Book I leaves this curious fact unexplained.[30] It is this explanation that the argument at *GA* II.1, 732a1-12 is meant to provide.

The explanation for why animal species are separated into males and females runs as follows:

1. In those things that come into being the efficient cause is superior to the material cause, since the definition and form belong to it.[31]
2. Wherever possible, it is better (βέλτιον) to have the superior principle (τὸ κρεῖττον) separate from the inferior principle (τὸ χείρονος).
3. The male principle is the efficient cause of generation, the female the material cause.
4. Therefore, the male principle is superior, the female principle inferior. [from 1 & 3]
5. Therefore, it is better to have the male and female principles in separate bodies. [from 2 & 4]

The argument seems to be driven by the idea (stated explicitly at *GA* I.2, 717a15-23) that for any teleological phenomenon it exists *either* because it is necessary for some end *or* because it is better that way. Since the division of animal species into males and females is not necessary for reproduction, Aristotle here tries to show why it is better this way.

The first premise of the argument can be seen to follow directly from Aristotle's causal principle that what is potentially *F* (the matter) can only be made into an actual *F* by what is already *F* in actuality. This means that

30) Although Aristotle does go on to say that animals have, in addition to reproduction, the function of sense perception, it is difficult to see how this explains why the sexes are separated in animal species. Surely the ability to engage in sense perception does not *require* the separation of the sexes (it is not conditionally necessary). Nor is there any obvious causal connection between being divided into males and females and having the ability to engage in sense perception. Perhaps the idea is simply that since animals *do* have other functions besides the production of seed there is no reason why the sexes *shouldn't* be divided among them. Even in that case the fact that animals engage in sense perception does not give us a positive reason why they are divided into sexes.

31) Cf. *Metaphysics* Z17, 1041a28-33.

the productive agent (especially in natural generation) must already bear the form *F* in actuality. And since the matter derives its being from the form (cf. *Metaphysics* VII.17), form will be ontologically prior to matter and in that sense superior. Aristotle also has independent grounds for thinking the male is the efficient cause of generation. This is justified by the assumption that the active ingredient in semen is vital heat (739b21-33), which is in turn justified by the principle that males are hotter than females.[32] For in Aristotle's chemistry heat is the primary agent of change while fluid substances provide the matter (*Meteorologica* IV). In this way the idea that the male is superior to the female would appear to follow logically from premises that are not overtly sexist. To be sure, the first two premises are quite suspect. Normative terms like "superior" and "inferior" really have no place in natural science. However, one *could* argue that neither premise is obviously motivated by presuppositions about sexual difference. Thus, one *could* take the argument strictly at face value and absolve Aristotle of the charge of sexism here.

This is how Mayhew views the argument. According to Mayhew, the relevant premise for evaluating the charge of sexism is premise three.[33] Given Aristotle's hylomorphism, it is understandable (Mayhe argues) that he would divide the parental contributions into matter and form. But (we may ask) why did he believe the male contributed the form – which is superior – while the female contributed the matter – which is inferior? Why not the other way around? Mayhew suggests that this conclusion probably followed from Aristotle's "observations of the facts of generation that were available to him, in combination with the principles of his natural philosophy". Given this, Mayhew argues, it was entirely reasonable for him to conclude that the father contributed the form rather than the matter.[34]

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32) This appears to be a first principle of Aristotle's biology. This is justified on empirical grounds based on the observable differences in the reproductive materials of males and females. We can tell from the character of the menstrual blood (it is colder, more fluid, and greater in bulk) that the female lacks the level of heat-energy necessary to reduce her sperma to seminal form.

33) Mayhew (2004), 38-39. Mayhew unpacks Aristotle's argument somewhat differently, though he sees the basic point as the same.

34) The reasons Mayhew has in mind include those that (as suggested above) form the empirical basis of Aristotle's view that males are hotter than females. However, Mayhew also explains "superior" and "inferior" as equivalent in meaning (here) to "hotter" and "colder", a view that I do not share.

I disagree. First, it is unreasonable to suppose that Aristotle was simply led to his view that the male contributes the form while the female contributes the matter as a result of careful, objective observation. What is more likely is that he began with this hypothesis and then set out to find empirical data that supported it (such as the quantitative differences in male and female sperma). But why did he begin from *that* hypothesis rather than the alternative, that the female contributes the superior form while the male contributes the inferior matter? After all, parthenogenesis showed him that at least in some cases the female is capable of supplying an origin of change without any input from the male (*GA* II.5). But given the prevailing attitudes among Greeks about the status of males and females, I think it is hardly surprising that Aristotle started from the hypothesis that he did. For example, at *GA* I.1, 716a14-18, he writes:

> By 'male' animal we mean one that generates into another, by 'female' one that generates into itself. This is why in cosmology people speak of the nature of the earth as something female and call it 'mother', while they give to the heaven and the sun and anything else of that kind the title of 'generator' and 'father'.

No doubt Aristotle's own views are more sophisticated than this. And he clearly affords the mother a greater role in generation than this hypothesis suggests (and a greater role than many competing theories of reproduction).[35] But the fact is that Aristotle makes no attempt to challenge the gender stereotypes expressed in this passage. On the contrary, they are marshalled in here as support for his definition of male and female parents.

Second, and more importantly, when evaluating the charge of sexism the most significant aspect of the argument has to be step 4. And it is far more plausible to assume that Aristotle's argument *presupposes* an ideology in which males are viewed as better and more divine than females (an ideology clearly endorsed at 716a14-18) than to think that it just happened to follow logically and innocently from gender-neutral premises. After all, what Aristotle really purports to show here is not just why animals are divided into sexes but why the superior male principle is kept apart from the inferior female principle. In doing so, nature is not merely attempting

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35) For example, Aristotle is quite willing to refer to the female as a "generator" (cf. 768a20: (<κίνησις> τῆς γεννώσης). Indeed, *GA* IV.3 even appears to assign her a formal contribution, insofar as she contributes "movements" that account for resemblances to her side of the family.

to separate the two sexes: the aim is to avoid the contamination of the one by the other.

In the end, the argument that the superior genus needs sexual differentiation must ultimately be seen to fail, since it does not sufficiently distinguish animals from plants. If we assume that it *is possible* for plants to have been separated into sexes, then surely it would have also been better to do so according to the argument. This leads me to wonder whether the fact that animals engage in sense perception plays a more significant role in the explanation of the division of the sexes at the end of Book I than Aristotle suggests (see note 30). And yet, if he did think that the reason animals are divided into sexes is that they have sense perception, then the superiority argument is surely superfluous. There would be no further need to claim that it is better to keep the superior male principle isolated from the inferior female principle.

Conclusion

The aim of this paper was to evaluate the level of gender bias in Aristotle's developmental biology while exercising due care in the analysis of its arguments. I have shown that while Aristotle's *Generation of Animals* is sexist, the traditional interpretation fails to diagnose the problem correctly. Aristotle does not portray females as defective *species* members. Nor does he suggest that reproduction is *for the sake of* producing males while females represent a failure to achieve that natural goal. What sex an embryo happens to become is determined entirely by non-teleological forces operating through material necessity. This is consistent with Aristotle's claim that females have the same soul as the male (*GA* II.5, 741a7) as well as his view that sexual difference is not part of the species essence but is an affection (πάθος) arising from the matter (*Metaphysics* X.9). Yet the *Generation of Animals* is by no means free of gender bias, as some recent scholarship has claimed. As we have seen, Aristotle's explanation for why animals are divided into sexes depends on his unfounded (and philosophically unmotivated) assumptions about the superior status of the males of the species. It appears he bought into the standard Greek ideology where males are simply viewed as better and more divine than females. Although this ideology does not infect the majority of arguments in the *Generation of Animals*, it is not a view that just happens to follow logically and innocently from gender-neutral premises.

Works Cited

Balme, David (1987) 'Aristotle's biology was not essentialist', in Gotthelf and Lennox (eds.) (1987), 291-312.

Coles, Andrew (1995) 'Biomedical Models of Reproduction in the Fifth Century and Aristotle's Generation of Animals', *Phronesis* 40(1), 48-88.

Cooper, John (1987) 'Hypothetical Necessity and Natural Teleology', in Gotthelf and Lennox (eds.) (1987), 243-74.

Deslauriers, Marjuerite (1998) 'Sex and Essence in Aristotle's *Metaphysics* and Biology', in Freeland (ed.) (1988), 138-167.

Ereshefsky, Marc (1992) (ed.) *The Units of Evolution: Essays on the Nature of Species*. Cambridge: MIT Press.

Freeland, Cynthia (1998) (ed.) *Feminist Interpretations of Aristotle*. Pennsylvania: Penn State University Press.

Freudenthal, Gad (1999) *Aristotle's Theory of Material Substance*. Oxford: Clarendon Press.

Furth, Montgomery (1988) *Substance, form and psyche: an Aristotelian metaphysics*. Cambridge: Cambridge University Press.

Gill, Mary Louise (1989) *Aristotle on Substance: The Paradox of Unity*. Princeton: Princeton University Press.

Gotthelf, Allan (ed.) (1985) *Aristotle on Nature and Living Things*. Pittsburgh: Mathesis Publications.

—— and James Lennox (1987) (eds.) *Philosophical Issues in Aristotle's Biology*. Cambridge: Cambridge University Press.

Henry, Devin (2004) 'How to Build an Animal: The Metaphysics of Aristotle's Ontogeny', PhD thesis, University of London, UK.

—— (2006a) 'Aristotle on the Mechanisms of Inheritance', *Journal of the History of Biology* 39(3), September, 425-455.

—— (2006b) 'Understanding Aristotle's Reproductive Hylomorphism', *Apeiron* 39(3), September, 257-287.

Katayama, Errol (1999) *Aristotle on Artifacts: A Metaphysical Puzzle*. New York: State University of New York Press.

Kessler, Suzanne J. (1990) 'The Medical Construction of Gender', *Signs* 16(1), 3-26.

Mayhew, Robert (2004), *The Female in Aristotle's Biology*. Chicago: University of Chicago Press.

Morsink, Johannes (1982) *Aristotle on the Generation of Animals*. Washington, DC: University Press of America.

Peck, A.L. (1990) *Aristotle: Generation of Animals*. Loeb Classical Library (Aristotle vol. xiii). Cambridge, MA: Harvard University Press.

Pellegrin, P. (1985) 'Aristotle: Zoology without Species' (trans. Anthony Preus), in Gotthelf (ed.) (1985), 95-116.

Sober, Elliot (1992) 'Evolution, Population Thinking, and Essentialism', in Ereshefsky (ed.) (1992), 247-278.