

BODILY FLUIDS IN ANTIQUITY

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Rebecca Flemming

Seed—*sperma* in Greek (or *semen* in Latin)—was a crucial bodily fluid in the ancient world, generally agreed to be the basic stuff of generation, the substance through which new human beings were produced. The word was shared with agriculture (Totelin 2018). From the beginning it designated both plant seeds and a wider realm of small things with the power to initiate larger processes—like the sparks of fires and ideas—and it always ran alongside nouns derived from the verb *gennaō*, ‘to create/engender’, such as *gonē* and *gonos*, which could signify both the procreative materials and what was generated, that is offspring, within a wider semantic field of begetting and descent. It was also the subject of lively debate from the time the first sustained investigations into the whole business of ‘coming-to-be’—*genesis*—itself were launched by the Presocratic philosophers in sixth-century BCE Ionia onwards. There were differences over the origin, substance, nature, and number of the seed. Did it come from the brain and marrow, the blood, or all of the parts of the body, for instance? What was its physical, causal, and conceptual relationship to the offspring produced? And did ‘females emit seed too?’¹

It was the first two questions, concerning origin and substance (broadly speaking), that dominated Erna Lesky’s pioneering study of ancient embryology—*Die Zeugungs- und Vererbungslehren der Antike und ihr Nachwirken* (1951)—but since then the final query has taken centre stage. The division between what are now usually called ‘one-seed’ and ‘two-seed’ models, between those classical philosophers and physicians who held that only men produced seed and those who held that both men and women contributed seed to the offspring, has become more prominent.² It functions as a convenient organising tool, a way of classifying theories in the doxographic mode, but perhaps also marks an ideological difference; it has been suggested that it speaks to wider issues of gender hierarchy (see e.g. McLaren 1984: 17; Lloyd 1983: 86–111). While this latter idea has been repeatedly called into question and many other complications have emerged with this simple categorisation, both in its classical forms and as it has been applied to or sought out in other historical situations (see e.g. Kessler 2009: 89–126; Flemming 2018), the basic structure has so far remained intact. The notion of a fundamental split between the ‘one-seed’ and ‘two-seed’ camps appears to be entrenched in current scholarship.

The argument here, building on these prior objections, is that the one-seed/two-seed division is misleading in itself. It distorts the ancient debate and directs our

attention away from what was most important within it. Key issues of the nature and role of the substances implicated in generation have been overlooked. The ancient enquiry into whether females also emit seed needs to be followed up with questions about whether that seed is the same as emitted by males, in terms of its production and constitution and, perhaps most crucially, its contribution to the offspring. These are the points which really matter in understanding the theories of generation articulated and contested in antiquity: simple counting resolves nothing. Indeed, it might be claimed that if women and men's seed were to be identical in all these respects, then there would be only one seed involved in procreation after all, just provided by both parents.

Sophia Connell has recently raised the same point in her detailed study of *Aristotle on Female Animals*. She distinguishes between what she calls 'the parallel seed theory', found in the Hippocratic medical writings of the Classical Greek world and in those of the great physician of the Roman Empire, Galen of Pergamum, and 'the differentiated seed theory' of the fourth-century BCE philosopher Aristotle, which is the focus of her analysis (Connell 2016: 95). All, she argues, were 'two-seed theories', but the former version was characterised by the view that the female emits seed at the same time and of the same sort as the male, while the latter was committed to the contrary view, that female seed diverges from that of the male on these scores. This is, of course, to challenge the more traditional location of Aristotle in the 'one-seed' camp—his identification, indeed, as the leader of this theoretical faction—as well as to adopt an alternative analytical approach overall. The two do not need to go together; the distinction between 'parallel' and 'differentiated' seed theories may be a valid and useful one even if Aristotle were to remain outside the two-seed fold. It may indeed be even more helpful to allow for a range of possible differentiations between parental contributions, in which both may provide more or less the same seed, different kinds of seed, or different kinds of contribution all together, with only one being seed.

This chapter will make such an allowance, and it will focus on questions of the nature and role of the substances—fluids—involved in human generation rather than the numbers. Two pairs of reasonably well-known case studies, two sets of texts conventionally cited in this context, will be investigated in this way. The first come from the Classical Greek world of the fifth and fourth centuries BCE, involving Hippocratic medical writings on the one hand and the philosophical works of Aristotle on the other. Aristotle does not engage with Hippocratic notions by name, but these were all clearly participants in the same debate at roughly the same time and indeed were understood as such by later contributors to the ongoing discussion about human procreation in the ancient world. These subsequent engagements included the second pair of authors, located this time in the Roman Empire of the second century CE: that is, Soranus of Ephesus and Galen. Both were born in the Greek East, Soranus perhaps 60 or 70 years before Galen, and spent most of their careers as medical practitioners, writers, and teachers, in the imperial metropolis of Rome. Galen did refer to Soranus in his massive surviving oeuvre, though not specifically in relation to seeds and generation; still, their views on this topic can clearly be seen to be in dialogue nonetheless, and both also call on the conceptual resources and authority of Aristotle and Hippocrates in this and other instances.

Hippocratic and Aristotelian seeds

Many of the works collected into the Hippocratic Corpus—that is, associated with the name of Hippocrates of Cos, the legendary founding father of Greek learned medicine—treat practical issues of fertility and its disruption (see Flemming 2013; King 2018). Female health, as it aligned with procreation, was a key concern. The most sustained discussion comes in *On Generation/On the Nature of the Child* (edition Potter 2012), a pair of treatises which circulated separately and together in antiquity (Hanson 2013) and take the story from the production of seed, through sexual intercourse, conception, foetal formation and growth, and pregnancy, to birth, with various excursions and additions along the way. The aim was to explain everything, how the whole process works, how all the possible outcomes occur, in a coherent and convincing manner.

The key sentence is the opening line of *On the Nature of the Child*:

If the seed (*gonē*) from both remains in the womb of the woman, first it is mixed together, since the woman is not motionless, and it collects and thickens as it is heated.³

Hippocratic Corpus, *On Generation/On the Nature of the Child* 12

This is ‘conception’, the first stage in generation.⁴ The womb has received the seeds, its mouth has contracted in response to the moisture, and closing, holds the two seeds within itself so that ‘what came from the man and what came from the woman’ mix together (*On Generation/On the Nature of the Child* 5). That is the beginning of the process of foetal formation, which will be followed by growth, both phases which require additional resources, mainly blood, from the mother’s body. They are nourished by the material which would otherwise have been evacuated in menstruation.

These seeds, from the man and woman, seem identical in this formulation. They are both essential to and play the same role in conception as it moves towards foetal formation. The comparison was explored a bit more in *On Generation*, in the sequences that build up to this moment. The statement about the manufacture of seed is generic:

I say that seed (*gonē*) is separated from all of the body, from the solid (parts) and the soft (parts), and from all the liquid.⁵ There are four kinds of liquid—blood, bile, water and phlegm—for such are the substances a human being innately has within them.

Hippocratic Corpus, *On Generation/On the Nature of the Child* 3

However, men and women experience heterosexual intercourse differently, in part because of a divergence in the pace and place of seed production and discharge (*On Generation/On the Nature of the Child* 4; and see Dean-Jones 1992). The first and presumably the second is more sudden in men, so their sexual pleasure is shorter and greater than women’s, in any case he always ejaculates externally, whereas she may ejaculate into her own womb or outside, if the mouth of the uterus is too open. His seed adds to her pleasure before bringing it to a close. It is like wine being poured

on to a flame: there is an initial increase of heat and incandescence, then the flame is extinguished.

None of these distinctions are about the seed itself, which is essentially the same in all these circumstances, as is further emphasised by the next part of the productive sequence.

Sometimes what is ejaculated from a woman is stronger, and sometimes it is weaker, and the same for a man. And in the man there is both female seed (*sperma*) and male, and the same in the woman. The male is stronger than the female, and so is necessarily produced from the stronger seed (*sperma*). It works like this: if stronger seed comes from both parents, it becomes male; if weaker, female. Whichever dominates in respect to quantity, that is what it becomes: for if there is much more weaker seed than stronger, the strong is mastered (*kratein*), and mixing with the weak, turned female. But if there is more of the strong than the weak, it masters the weak and turns it male.

Hippocratic Corpus, *On Generation/On the Nature of the Child* 6 (see also Mulder, this volume Chapter 9, p. 148)

The seminal equivalence of the sexes is explicit. Both partners produce seed across the same spectrum of strength and weakness, the uterine contest between them is free and fair, but male is strong and female is weak, weak is female and strong is male. Initially the idea that there is male seed and female seed looks distinct from the assertion that seed can be stronger or weaker, but the terms then collapse into each other.

This equivalence continues as the author moved on to explain parental resemblance, mobilising the same aetiological and narrative resources as before (*On Generation/On Nature of the Child* 8). The seed of both the woman and the man has come from all of their bodies—weak from the weak parts and strong from the strong parts—and the interplay between these strengths and weaknesses will shape the appearance of the offspring. In respect to some parts, the father's seed will dominate, and in respect to others the mother's will, with likeness following domination. Every child will, therefore, share features with both parents, with the precise pattern and balance determined by the seeds as they have been produced by the parental bodies and mixed together in this particular instance. The mechanism is roughly the same as has already decided the sex of the offspring, but the processes are distinct. Overall quantity makes males and females, and then more local seminal interactions within that regulate partial resemblances, a package which has the benefit of both causal economy and of allowing girls to look more like their fathers and boys to look more like their mothers. The fact that this does happen, indeed, that couples can have both male and female children who resemble either parent more or less closely, provides important support for the whole account, the author claimed.

Attention then shifted to non-seminal aspects of generation, especially problems caused by a badly shaped or otherwise faulty womb (*On Generation/On the Nature of the Child* 9–10). This may create weak or malformed offspring, and foetal injuries can also be the result of blows and falls. However, the question of whether the seed itself can be responsible for a less-than-ideal procreative outcome also needs to be addressed (*On Generation/On the Nature of the Child* 11). Although, generally, mutilated or deformed (*pepērōmenos*) adults produce complete seed and whole and

healthy children, disease can affect the four fundamental kinds of liquid—blood, bile, water, and phlegm—leading to flawed seed and similarly flawed offspring. A seminal deficiency of this type in respect to the parental mutilation or deformity will engender that same deformity in the child.

The point is again a gender-neutral one. The seed of either parent could have this effect, and the story after the seeds have been held, mixed, and heated is also one in which the contribution of the partners is entirely indistinguishable. Whether that mixture itself is weak and female or strong and male matters, however, for the former sets and articulates more slowly than the latter, taking forty-two days for all its parts to form rather than thirty (*On Generation/On the Nature of the Child* 18). Maternal blood and breath have provided essential resources for this process—both nourishment and crafting—and they continue to do so throughout pregnancy. Supplies from the mother enable the foetus to grow bigger, become more solid where necessary, and more precisely formed, right through to the somatic extremities—to the fingers and toes. When the hairs and nails have taken root, then the child begins to move, and this occurs at three months for a male and four months for a female (*On Generation/On the Nature of the Child* 21). The male moves earlier because it is stronger than the female, is made of stronger and thicker seed.

So it is the seed which does the real generative work here, which makes a new human life, of either the male or female variety, and in the likeness of the parents, a compound likeness of both parents. Both womb and maternal material play their part too, but in support of the actual engendering, to complete the process of foetal formation and then growth. They are indispensable but secondary in their actions. This is seed from the man and the woman; there is a positive answer to the ancient question of whether the female emits seed too, but it is not at all clear that there are ‘two seeds’, that this is a ‘two-seed theory’. Both male and female produce seed, but it is the same seed: it is formed in the same way in both bodies and it contributes identically to the offspring. Moreover, seminal equivalence does not in any sense equate with gender equality. Weak seed is what makes females, slowly, and strong seed makes males, rather quicker, because females are weak and males strong.

Other Hippocratic texts mention generative seed, usually in passing and mostly in relation to the male contribution.⁶ Female seed may be omitted from the discussion, but its existence was never challenged; there was no debate on the matter. Hippocratic authors held divergent views on many issues—about the number and character of the elemental constituents of the human being, for example, or whether consciousness, the reflective and decision making part of the soul, was located in the head or the heart—but they all seem to have shared the assumption that women emit seed. Certainly the only other surviving treatise in which a theory of generation was expounded reasonably systematically—that is *On Regimen* (edition July 1967; English translation Jones 1931)—shares and builds on that assumption, constructing a model of generation which is structurally very similar to that articulated in *On Generation/On the Nature of the Child*, even if some of the content is very different.⁷

Turning to Aristotle, however, reveals a greater contrast between male and female contributions to offspring, whether or not that contrast is considered to be contained within the domain of the seminal or not. His *Generation of Animals* (edition Drossart Lulofs 1961), composed around the middle of the fourth century BCE, is, needless to say, much more extensive and systematically elaborated than any Hippocratic work,

and it fits into an overall philosophical programme with claims to completeness and coherence. The name of Hippocrates is absent from the text—only the arguments of Presocratic philosophers are explicitly debated—but, as will be clear, Hippocratic ideas are present, refuted in the course of the discussion along with all the others. Aristotle's position has also been subject to much greater scholarly scrutiny than his Hippocratic antecedents, as already noted, and this account takes its cue from the more revisionist recent engagements with Aristotle's theory of generation, as exemplified by Connell (see also e.g. Mayhew 2004; Falcon and Lefebvre 2018).

For Aristotle, 'conception' occurs when the seed (*gonē*) from the male and the menstrual fluid (*katamēnia*) from the female are held and mixed together in the woman's womb (*Generation of Animals* 739a26–b20; 730a32–b2). He referred to the product of this initial phase of generation as the 'first mixture' (*prōton migma*), 'conception' (*kuēma*), or 'seed' (*sperma*) (*Generation of Animals* 728b32–4). As Ignacio de Ribera-Martín (2019) explains, Aristotle used this last term in order to emphasise the encompassing nature of his system, that this was a stage common to plants and all animals, whether they (like humans) have separate sexes or not. He also sometimes labelled other fluids involved as '*sperma*' or '*spermatikos*' (seminal), though in a different sense of seed, and the combination of the distinct notions with overlapping terminology has added to the confusion surrounding Aristotle's theories in modern scholarship. Returning, for the moment, to the first phase of human generation: the man's seed is discharged externally, into the space in front of the mouth of the uterus, and drawn into the womb if it is in a suitable condition, made hot by the collection of menstrual fluid within. The woman may also have emitted fluid during intercourse, but this is not 'seminal' (*spermatikos*) and does not contribute to the offspring, though it may assist with the passage of male seed into the womb (*Generation of Animals* 727b33–728a35; 739a21–5). Once inside the womb, the seed (*gonē*) from the male and the female menstrual fluid move and mix together. The *gonē* is divided up and begins to act on the *katamēnia* like rennet on milk, 'setting it together' (*sunistēsi*). The specific heat of the seed solidifies the purer part of the menstrual fluid, separating it from the more watery part and forming membranes around it, keeping the liquid at bay, while it itself 'dissolves and evaporates' (*Generation of Animals* 739b21–33; 767a1).

Aristotle was explicit that 'in respect to generation the female contributes to setting together along different lines to the male: the male contributes the principle (*archē*) of motion and the female the material (*hulē*)' (*Generation of Animals* 730a25–7). His formulations could be even more programmatic: 'the male provides the form (*eidos*) and the principle of motion, the female provides the body and the matter' (*Generation of Animals* 729a9–11). There is no cross-over between the two. There is nothing material in the male contribution, while the female contribution is solely material: she provides the stuff on which the heat of the male seed acts and gets moving before vanishing from the scene. 'Female, as female, is passive (*pathētika*), male, as male is active (*poētika*)', Aristotle fundamentally asserted (*Generation of Animals* 729b12–13). Such clear and absolute divisions were hard to maintain across his explanatory narrative as a whole, however, at least on the female side. In accounting for all generative outcomes, menstrual fluid turned out to be a quite particular sort of matter that certainly does more than just be acted upon, though it never challenged the male priority and superiority which Aristotle's theory so openly enacts. Still, the female contribution

does possess its own potentialities and movements, to fit with those of the male: it is the right kind of material for ‘setting together’ and foetal formation.

The more active aspects of the female contribution are found, unsurprisingly, in Aristotle’s explanations of sex determination and appearance. The mixing of seed and menses involves ‘movements’ of both, and if the male movements gain mastery (*kratein*), then the offspring will be male, and if they are mastered, female (*Generation of Animals* 766b15–766b28). The young and the old tend to produce female children, for example, for they are lacking in heat in comparison to those in their prime, and other factors may make either fluid more watery and colder than is optimal (*Generation of Animals* 766b28–767a1). There is also a second—individual—dimension to this contest. Usually, if the male movements gain mastery, they do so as both generically male and individually paternal, so that a male child who resembles his father results, and similarly if they are mastered, that usually creates a female child in the maternal mould (*Generation of Animals* 768a21–768b15). The two determinations can separate, however, and, indeed, the movements can relapse, producing boys who look more like their mothers, girls in the image of their fathers, and children who successively resemble their grandparents, distant ancestors, unrelated, generic, human beings, and, eventually, not even that. These outcomes were all decided by the state of the mixture between *gonē* and *katamēnia*, its balance and dynamism (*Generation of Animals* 767a14–35).

The male movements were always the subject of Aristotle’s formulations—they gain mastery or are mastered; the female movements never actually win out, as such—rather the male failure allows their potentialities to come into play. Still, this eventuality, and the possibility of maternal resemblance itself, clearly indicates that there was more to the female contribution than just matter. At a certain level, an equivalence between the male and female role in ‘setting together’ has emerged, and men’s seed and women’s menses also converged in the mode and mechanism of their somatic production. Aristotle spent considerable energy refuting the notion that seed is drawn from all the parts of the body, arguing instead that it (*sperma*) is a ‘useful residue’ (*perittōma chresimon*) derived from nourishment in its final form (*Generation of Animals* 725a1–20; 726a25–8). For blooded animals that is, precisely, blood—in bloodless animals its analogue. So blood, already the most processed stage of the food taken into the body, ready to be directly distributed to the different somatic parts, is then further ‘concocted’ (*pettomenon*) to produce seed (*sperma*) (*Generation of Animals* 726b2–5; 728a17–25). These transformations are all driven by heat, by the innate heat of the living being. Since women are, by definition, less hot than men—they are the ‘weaker’ animal—they are unable to propel this process as far (*Generation of Animals* 726b30–727a2). Still, ‘*katamēnia* is seed (*sperma*) that is not pure but needs working on’ (*Generation of Animals* 728a26–7).

Males are able to transform blood into pure seed (*sperma*), a frothy compound of water and *pneuma*, that is ‘hot air’ (*aer thermos*), as Aristotle says, which has become integrated into the somatic economy (*Generation of Animals* 735b37–736a2; 736a18–21). The hot part is most crucial, for that is where the actual generative power resides. What makes the seed *gonimos* (‘engendering’) is the ‘so-called hot’ (*kaloumenon thermos*), intrinsic to the *pneuma*, the ‘soul-heat’ (*thermotēta psuchikēn*), analogous to the stuff of the stars (*Generation of Animals* 736b29–737a1; 762a18–22). Females are defined by their inability in this last respect. Colder and weaker, they produce

impure seed (*sperma*)—*katamēnia*—which lacks this one vital constituent, the ‘principle’ (*archē*) of soul; thus the female can be considered ‘a deformed (*pepērōmenos*) male’ (*Generation of Animals* 737a27–30).⁸

The tension and interplay between identity and difference in respect to the male and female contributions to generation in Aristotle’s theory are thus very clear, along with the basic hierarchy at work. Both *gonē* and *katamēnia* were produced from blood through the same process and both can be called ‘seed’ (*sperma*) in the sense of being useful residues with essential generative roles; the former was simply the purer, more concocted, superior, version of the latter. The work of the two fluids in the ‘first mixture’ then diverged: one provided form and the other matter, with this division articulated as total—the *gonē*, evaporated in the mixing, initiated the movements and setting together and left without material trace, while the *katamēnia* provided only body, possessed no ‘principle’ (*archē*) of movement or soul. However, as the process of generation proceeded through further stages, it became apparent that the female contribution did have movements and potentialities of its own, was a source of the offspring’s nutritive soul, and helped determine sex and resemblance. It converged on the male in terms of nature and operation, though male priority and superiority was only reinforced as a result. This tension is inherent in the hylomorphism central to Aristotle’s philosophical system as a whole, and which always requires both identity and difference between the form and the matter that constitute all things. The general point has been emphasised in relation to Aristotle’s ‘reproductive hylomorphism’ by David Lefebvre as part of wider scholarly discussions around the problems involved in that pairing (Lefebvre 2016, building on Henry 2006; see also many of the essays in Falcon and Lefebvre 2018).

The question here, however, is how to seminally characterise Aristotle’s theory: was his a one-seed or ‘differentiated’ two-seed model, or perhaps neither, or indeed both? Such an approach does seem to miss the point, to obscure what was important to his account, as it involved both male and female contributions as the same and different. Connell’s distinction between ‘parallel’ and ‘differentiated’ seed theories certainly captures part of the contrast between Hippocratic ideas and those of Aristotle, but all were committed to parallel notions of seminal substance and origins, for example, despite the diversity of views about those origins themselves. All also assumed and reinforced male superiority in their work and shared a wider set of concepts and terminology involved in explaining generation.

Soranus and Galen on seeds

The next period from which a rich array of classical medical texts survive, including treatises which discuss and debate human generation, falls from the late first to early third century CE. This was the world of the Roman Empire, which had absorbed and integrated Greek medicine as it had conquered and incorporated Greek lands. Both of the authors who will be discussed here—Soranus of Ephesus and Galen of Pergamum—originated in the Greek East, from major cities of the province of Asia.⁹ They composed their treatises in Greek, situated themselves in the Greek learned medical tradition, but spent most of their careers at Rome, in the imperial metropolis. That is where they practised, taught, and wrote, because it was the capital of the Empire, the centre of wealth and power, knowledge and authority (Flemming 2007).

On their ways to Rome, both Soranus and Galen passed through Alexandria, still a key centre of medical education under Roman rule, though no longer the preeminent site it had been in the Hellenistic period. It was in the time of the first Ptolemies, in the early third century BCE, that the physicians Herophilus and Erasistratus had practised systematic human dissection and vivisection in the city, with royal support, and set out newly authoritative descriptions of the human body, both male and female, as a result (von Staden 1989, 1992; Flemming 2003). These texts themselves do not survive, but much of their contents was absorbed into later works, explicitly and implicitly, and at least some of the ideas about generation expressed in them can be found in Soranus and Galen, as will become clear. This is more surprising for the former, since as a Methodic physician, an adherent of the method in medicine, Soranus was fundamentally committed to the notion that the knowledge necessary for the medical art was restricted to knowledge of the manifest generalities—of ‘stricture’, ‘flux’, and ‘mixture’—which a physician needed to be able to recognise in any sick individual and to take as, in themselves, indicative of their treatment (see Tecusan 2004). Things learnt ‘from dissection’ are ‘useless’ (*achrēstos*), he stated in the introductory sequence of his *Gynaecology* (chapter 1.5), but contribute to learning nonetheless, so he will provide an account of the female parts which includes information from this source in order to support a more practical discussion of the workings of women’s bodies as they relate to health and procreation in the rest of Book One.

Soranus’ account starts with the womb, its rich nomenclature, its shape, situation, flexibility, and composition. This composition is complex, with nerves, veins, arteries, and flesh all implicated, both in the two layers of the uterus itself and in its connections to the global somatic systems. The nerves originate from the spinal cord, while the veins come from the ‘hollow vein’, and the arteries from the ‘thick artery’, passing through the kidneys, until four vessels—two veins and two arteries—implant themselves into the womb. ‘From these also, one artery and one vein grow into each of the *didumoi*’, literally, ‘twins’, and the term used by Herophilus for the *orcheis*, the ‘testicles’ in men and women (*Gynaecology* 1.11, edition Ilberg 1927; Galen, *On the Usefulness of the Parts* 14.11, edition Helmreich 1907–9; and see von Staden 1989: 165–9). A further description of this anatomical formation follows which continued to draw on the Alexandrian anatomist:

Furthermore, the *didumoi* are attached to the outside of the uterus, near its throat, one on each side. They are of loose texture, and like glands are covered by a particular membrane. Their shape is not longish as in males; rather they are slightly flattened, rounded and a little broadened at the base. The seminal duct (*spermatikos poros*) runs from the uterus through each *didumos* and extending along the sides of the uterus as far as the bladder is implanted in its neck. Therefore it seems that the seed (*sperma*) of the female does not contribute to generation (*zōogonia*) since it is discharged towards the outside, a subject we have discussed in the treatise *On Seed*.

Soranus, *Gynaecology* 1.12

Unfortunately, the treatise *On Seed* is lost, as also his books *On Generation*, mentioned a little later in the sequence (*Gynaecology* 1.14).¹⁰ The positive content of Soranus’ theories on these subjects is, therefore, largely unknown. It seems, however,

that he was committed to the existence of male and female seed, produced in the same anatomical constructions if not through the same process in both cases. Indeed, his parallelism extends to the place where the seminal duct empties, with divergent effects on the what the fluids can then do in relation to procreation. In men, external emission is essential; in women, it entails that their seed makes no contribution to generation. The uterus, in particular its base, is where the (male) seed adheres, however, and ‘it itself brings the seed to completion’ *Gynaecology* 1.15; see also 1.13 and 33). The womb is also the main site of menstruation, which, though not an action beneficial to health, is necessary for child-production (*paidopoiia*) (*Gynaecology* 1.27–9). This necessity appears to be cleansing and nourishing rather than formative, even in an Aristotelian mode. These are the functions Soranus mentioned: *katharsis*, that is ‘purging’ or ‘purifying’ the womb, and ‘*trophē*’, that is food for the embryo (*embruon*) (*Gynaecology* 1.19). He also described the substance involved as ‘pure blood’ in most women, though sometimes a ‘bloody liquid’ or ‘ichor’, as in ‘non-rational animals’ (*aloga zōa*), without indicating that any kind of further processing was implicated (*Gynaecology* 1.19 and 28).

There is a maternal contribution to the offspring which goes beyond nourishment, Soranus stressed. ‘What is generated bears some resemblance to the mother, not only in body but also in soul’ (*Gynaecology* 1.39). The effect seems to be quite a direct one, however, not mediated by seed or menstrual fluid. The state of the soul alters ‘the mould’ (*tupos*) of what is conceived, as demonstrated by women looking at monkeys or beautiful statues during procreative intercourse and producing simian or well-proportioned children as a result (*Gynaecology* 1.39; and see Reeve 1989).

Overall, therefore, much remains uncertain about Soranus’ theory of generation. Clearly, both male and female produced and ‘emitted’ seed, but only the former contributed to generation. That is two seeds, then one seed. The maternal role was, however, not limited to that of carrying and nourishing; she did more than provide a suitable space and sustenance for the embryo. Her soul had some impact on the formation of her offspring as a whole. One possibility would be that Soranus subscribed to something like the later Neoplatonic understanding of generation, in which the male seed passes from the control of the father’s soul to that of the mother, attaching itself to the womb in a process analogous to grafting. That is, in a one-seed model, there is a single, male seed, but as James Wilberding (2017: 1) says, ‘many Neoplatonists identify the female rather than the male as the immediate active cause of reproduction.’ This is speculation, however, and while some of Soranus’ language points in this direction, his conception of the soul was certainly not Neoplatonic in character.

There is no such uncertainty regarding Galen’s theory of generation, expounded a little over half a century after Soranus’ endeavours in the field. His treatise *On Seed* (edition De Lacy 1992) survives and is supported by a host of other extant texts covering the anatomy and physiology of the generative parts, as well as *The Formation of the Foetus*. There is not total consistency across all discussions—emphasis and details shift—but it is straightforward enough to summarise Galen’s views on key topics concerning human procreation, views which he explicitly positions in relation to those already outlined, especially those of Hippocrates and Aristotle (Flemming 2018).

For Galen, ‘conception’ (*sullēpsis*) occurs when male and female seed meet and remain within the woman’s womb. He often cited the formulation from *On the Nature of the Child* to this effect, but his understanding of the process involved diverged from

that of the ‘divine Hippocrates’ in various respects (see e.g. Galen, *On Seed* 2.1.12–13 and 31; *On the Usefulness of the Parts* 14.11). Galen’s two seeds were not completely parallel or identical in their roles, though their divisions were more of detail, a detail born out of the fine-grained narratives enabled and encouraged by Hellenistic anatomy, than of principle.

The female seed was discharged internally into the ‘horns’ (*kerata*) of the uterus, one on each side, and coated them as it passed into the body of the womb and there met the male seed, which had also formed membranes where it touched the uterus (*On Seed* 1.7.1–20 and 2.4.16–22). The seeds ‘mix’ (*misgesthai*) and the membranes ‘entwine’ (*epiplekesthai*), the female seed, being ‘thinner’ (*leptoteron*) and ‘colder’ (*psuchroteron*) than the male, provided the latter with nourishment, and there was a division of labour between the membranes too. That from the female seed (the *allantois*) linked into those—the *chorion* and *amnion*—which enclose the whole seed (*gonē*) and, anchored to the horns, attached itself to other parts of the womb too, allowing further structures to be formed through which foetal nutrition and excretion are organised. Still, Galen was emphatic that both seeds contain two principles—the material and the active—and not just one. Indeed, in *On Seed*, Galen asserted that the menstrual fluid also needs to be considered active in its contribution to the offspring. It is ‘mostly material with very weak power’, but its power combines with that in the female seed, since they are ‘oikeios’ (‘suited’ or ‘congenial’) and together, over nine months, the two can outweigh the initial force of the male seed in certain respects (*On Seed* 2.2.19–24). This only mattered for animal hybrids, however, though there is another kind of third-party involvement in determining the sex of the foetus, one which again complicates the seminal aspects of Galen’s system.¹¹

Seed is made from blood, not ‘a melting’ (*apotēxeōs*) from all the parts (*On Seed* 2.2.16 and 2.5.3). On this point Galen agreed with Aristotle, while passing over any Hippocratic connections to the latter view. In both male and female bodies, arteries and veins descend from the region of the kidneys towards the generative organs, coiling increasingly as they approach the *orcheis* (testicles) (*Usefulness of the Parts* 14.9–10). In these coils blood and *pneuma* are brought together, and the fluid becomes whiter and more concocted as it goes, a process of elaboration that is completed within the testicles themselves: completed perfectly in the larger and warmer male *orcheis*, less well (*ellipesteron*) in the smaller and colder female versions. Seminal ducts then pass from the testicles to the neck of the bladder in the male and into the ‘horns’ of the womb in the female—Herophilus was manifestly in error when claiming otherwise—to deliver the seed of both, as necessary for conception (*On Seed* 2.1.15–26). Less female seed is delivered than male, and of poorer quality, through shorter, narrower vessels (*Usefulness of the Parts* 14.10). Still, the woman’s *sperma* does more than just contribute to generation; it also incites her to sexual activity and opens the mouth of the uterus in intercourse with a man (*Usefulness of the Parts* 14.11; *On Seed* 2.1.32). The male seed acts similarly in relation to his sexual desire, if nothing more (see Ahonen 2017).

Galen’s seminal hierarchy is manifest, but so far it has supported an essential equivalence between the male and female contributions to generation. The female seed vanishes, however, from his explanations of sex determination, a process described

as an interaction between the womb and the male seed (*Usefulness of the Parts* 14.7; see also *On Seed* 2.5.35–8; Flemming 2000: 303–29; Mulder, this volume). A basic somatic asymmetry meant that the right womb and the right testicles were hotter than the left and therefore more likely to produce a hotter, therefore male, embryo. The uterus had the upper hand, being ‘generally better able to make what was conceived like itself’, so that if colder seed from the left testicle fell into the right uterus, it would generally end up male, and vice versa, though this was not inevitable (*Usefulness of the Parts* 14.7). Still, as the Hippocratic aphorism stated: ‘male embryos mostly on the right, females on the left’ (*Aphorisms* 5.48, edition Jones 1931, repeated in another Hippocratic text, *Epidemics* 6 2.46, edition Smith 1994). The forces at work here—hot and cold—are shared between men and women, as also the anatomical patterns that produce the lateral differences, but the matching of womb and testicle, rather than seeds that one expels the other receives and holds, seems to pull the male and female roles apart. In explicating parental resemblance, Galen returned to the seminal encounter, to unevenness in both seeds which resulted in the male dominating (*kratein*) in some parts and the female in others, so that the offspring was always like both father and mother (*On Seed* 2.5.1–6 and 75). He was, however, less interested in this than in general issues of sexual differentiation, in what that difference consists in, and how it is manifest in all aspects of foetal formation and growth, with the quicker development of the male just one way in which superiority is shown (Flemming 2000).

Despite all the complexities, perhaps Galen was operating with a two-seed model of generation. Men and women emitted seed which contributed to generation in distinct ways. The female seed, in particular, was vital in inciting sexual desire and in providing nourishment for the male seed, as well as forming the *allantoic* membrane, while the male seed (mostly) formed the *amnion* and *chorion* and drove the seminal motions. Galen also explicitly argued against those who held that the female did not produce *sperma*, or at least not ‘generative’ (*gonimos*) *sperma*, in which category he located Aristotle, Athenaeus (of Attaleia), the founder of the pneumatic medical lineage, and Herophilus: Soranus was not mentioned but must be counted here too (Galen, *On Seed* 2.1.66 and 2.1.15–26).¹² He understood Aristotle’s *katamēnia* as essentially non-seminal, though he did allow for a blood/menstrual fluid/seed spectrum. However, Galen clearly misconstrued some aspects of *Generation of Animals*, so his interpretations should not be accepted without question, and he himself could be said to be as much of a ‘parallel’ as a ‘differentiated’ seed theorist. What male and female seeds share in his system—the active and the material principles—was fundamental: they were essentially better and worse versions of the same thing. Moreover, given his view of the active role of menstrual fluid, it might be said that there were three seeds in his system, and that is without considering the formative role of the womb, at least in respect to sexual differentiation.

Conclusions

There is much more that could be said about the theories of generation expounded by all of these authors, and this is only a sample of a larger field. The ideas of the Neoplatonists have been briefly alluded to, for example, and would take the discussion

in a different direction. Even from this summary survey, however, the problem with the one-seed/two-seed classification should be clear. What counts as seed; how seminal does a fluid need to be? Does a two-seed model simply require that the female emits seed too? Or does that emission have to be *gonimos*, ‘generative’, and contribute to the offspring? Do the two fluids have to make distinct contributions, play different roles in generation, for there really to be two seeds? In many ways it is this last issue which is the most significant: do male and female make the same or divergent contributions to the process of conception and foetal formation, that is, the crucially creative part of making a new being? Satisfactory answers to this question can really only be provided within the framework of the individual theories, treated on their own terms.

For the cases discussed here, the Hippocratic author of *On Generation/On the Nature of the Child* was the most thoroughly parallel in his approach—there was complete equivalence between male and female contributions—while Soranus appears the most differentiated, despite his two seeds. Between them, Galen’s mix of similarity and difference in female and male roles perhaps put the stress on the former, while Aristotle emphasised the latter, including in his vocabulary. Both, crucially, elaborated complex and compound visions of the generative process, however, and while some kind of female contribution was fundamental to all these authors, the assumption of male superiority was even more basic.

Notes

- * Research for this paper was undertaken within the framework of the Cambridge University Generation to Reproduction Project, supported by a strategic award from the Wellcome Trust (Grant no. WT 088708).
- 1 That is one of the regular questions in standard philosophical doxographies, such as transmitted under the name of Plutarch: Pseudo-Plutarch, *Placita* 5.5. It follows questions about the ‘substance’ (*ousia*) and corporeality (*sōma*) of seed (*sperma*). On these issues, see also Laskaris and Fallas in this volume, Chapters 6 and 7, respectively.
 - 2 Beginning with Preus 1979; Boylan 1984; see also e.g. Laqueur 1990: 38–42; Wilberding 2017: especially 13–32.
 - 3 All translations are my own.
 - 4 ‘Conception’ obviously has a particular modern meaning, but I am going to use it here to label this first stage, whatever the content.
 - 5 What exactly is meant by ‘parts’ of the body here is unclear; presumably the solid parts would include bones and some organs, and the soft parts flesh and other organs. It is external parts of the body—limbs, hair and eyes, for example—that are alluded to later in the treatise, but without textural qualifications.
 - 6 Discussions of generative failure focus on the womb and its ability to receive and retain male seed, for example; see e.g. Hippocratic Corpus, *On the Diseases of Women* 1, 5, 8, 10, 11, 17, 31 and 32.
 - 7 On seed in *On Regimen*, see Bartoš (2009); and for a wider discussion of the text and its key themes Bartoš (2015). Mulder, this volume Chapter 9, also discusses the theory of sexual differentiation presented in it.
 - 8 I translate ‘deformed’ to draw attention to the shared vocabulary between Aristotle and the Hippocratic authors (and, indeed, Galen). Aristotle means something particular here, however; see e.g. Gelber (2018); Witt (2012).
 - 9 On Soranus, see Hanson and Green 1994; on Galen, Hankinson 2008; Mattern 2013. On their gynaecology, see Flemming 2000.
 - 10 Ilberg suggested they were the same text; see Hanson and Green 1994: 1031–3.

- 11 That is it explains why such hybrids—like mules and hinnies—resemble the mother more than the father in terms of their species: *On Seed* 2.1.43–6.
 12 On Athenaeus and the *pneumatikoi*, see Flemming 2012: 75–7.

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