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**Women, Mechanical Science, and God
in the Early Modern Period**

Jacqueline Broad

In 1748, an anonymous work called *Adollizing* appeared on the clandestine literary scene in London. It tells the tale of a depraved young man who designs a life-size mechanical doll to console himself in the midst of bitter disappointment. For the young man, this anatomically-correct doll – created “by new mechanic aid” – represents his perfect woman: mute and inanimate, she is incapable of expressing disapproval, she is “unresisting and complacent still,” and (more importantly, for his purposes) “all obsequious to my wanton will” (Anonymous 2004, 328). With feminist hindsight, we might think that this story – published in the same year as La Mettrie’s *L’homme machine* [*Man Machine*] – provides an apt allegory for thinking about women and the origins of mechanical science. Carolyn Merchant (1980) has highlighted the fact that, in the course of the scientific revolution (from 1500 to 1700), the Renaissance notion of a living, organic nature was reconceptualised as a dead, inanimate machine. Alongside this new mechanical model, according to Merchant, a new worldview emerged that sanctioned the mastery and domination of both nature and women. In some texts of the period, nature was personified as a passive female, completely devoid of mind and volition; in other works, it was depicted as an indocile woman, or an unruly force to be cowed and subdued. In either case, the symbolic connection between

women and nature was obvious: new scientific man was urged to exploit or conquer nature, and women were figuratively associated with what must be exploited or conquered. At its very inception, Merchant claims, modern science was defined as a project to gain mastery over the stereotypically “feminine” categories of nature, matter, and the material body.

Several scholars have examined connections between the Protestant Reformation and this new mechanical science. Building on the work of Robert Merton and Charles Webster (among others), Gary Deason (1986) has highlighted thematic continuities between the Reformers’ idea of God’s sovereignty in nature and the mechanists’ idea of nature as dead, inchoate matter governed by a divine legislator. For Reformers such as Calvin and Luther, according to Deason, God’s radical sovereignty entails that God is the only independent agent or active principle in the natural world.¹ To uphold his Glory, they insist that God does not require the co-operation of lesser beings to bring about his work. During the course of the scientific revolution, this concept of God’s sovereignty was incorporated into the new natural philosophy of the period. The Reformers’ “understanding of natural things as passive recipients of divine power,” Deason notes, “was entirely consistent with the mechanical philosophy” (Deason 1986, 175). According to mechanists, such as Pierre Gassendi, Walter Charlton, Robert Boyle, and Isaac Newton, matter is essentially inert; it does not have an internal power of motion. Every motion in the natural world, they argue, must be attributed to God alone, acting externally on matter according to certain laws. Evelyn Fox Keller (1992) builds on Deason’s analysis by introducing a third term into the vocabulary of God and Nature – Woman. She points out that, in the sixteenth and seventeenth centuries, there was a metaphorical shift in “the locus of essential secrets” from God to Nature, and this shift signalled the rise of a negative, exploitative attitude toward nature. Because the “secrets of Nature” did not have the privileged, sacrosanct status of the “secrets of God,” Keller argues, scientists were thereby granted permission to gain knowledge of nature’s hidden recesses. The personification of nature as a woman

played an important role in this discursive transformation: in the demarcation between Nature and God, inanimate and animate, Woman was placed decisively on the side of deanimated nature, in order to denote those secrets that “*did not belong to God*” (Keller 1992, 59). Keller sees this metaphorical use of Woman and femininity as further evidence of misogyny in the western scientific tradition.

More recently, however, feminist critiques such as those of Merchant and Keller have been called into question. Some scholars suggest that their arguments are based on an outmoded understanding of the so-called scientific revolution. Far from constituting a “clean break with the past,” the early modern period is now thought to represent the point at which the old and new natural philosophies existed side-by-side (Hutton 1997, 11; Osler 2005, 77). In the new mechanical theories of the period, one can still find traces of the ancient “organic” approaches to nature, and the demarcation between science and religion, the rational and the mystical, is far from clear cut. This new historiographical framework complicates those feminist readings in which a woman-friendly worldview was supposedly replaced (wholesale) by a misogynistic approach to a feminised nature; and as a consequence, scholars now call for a revised understanding of the relationship between women and science in the period.

In this chapter, I take a step toward that process of revision by examining the natural philosophy of women themselves in the early modern period.² Despite the fact that they were debarred from universities and formal scientific societies, women did not remain silent at the first inception of modern science: they commented on the theories of their famous male contemporaries, and they developed their own opinions about nature, mechanical science, and God in published works. Their writings provide a small snapshot of the historical complexity of the period, a period in which the mechanical theory of matter in motion was by no means universally accepted, and science and theology were still closely intertwined. In what follows, I focus especially on English women’s responses to Descartes’s work of

physics, *Principia philosophiae* [*The Principles of Philosophy*] of 1644, a classic statement of the mechanical philosophy of the period. In the “Preface” to the French edition of his book, Descartes assures his readers that “those who have learnt the least are the most capable of learning true philosophy,” and that “there is nothing in my writings which they are not capable of completely understanding provided they take the trouble to examine them” (Descartes 1985, 183, 185) – two assurances that were highly appealing to women. Despite the fact that this work was in Latin, a number of early modern women were familiar with Descartes’s “textbook” account of his philosophy. In 1685, one English woman, Damaris Masham (1659-1708), wrote to her friend John Locke:

I can but Think how you would smile to see Cowley and my Surfeit Waters Jumbled together; with Dr More and my Gally Potts of Mithridate and Dioscordium; My Receipts and Account Books with Antoninus’s his Meditations, and Des Cartes Principles; with my Globes and my Spining Wheel; for just in this order They at present ly ... (Locke 1976-82, 759).

Masham’s juxtaposition of the *Principles* with globes and spinning wheels is no accident: this book represents the most mature account of Descartes’s cosmology, or his theory that all the planets (including the Earth) move in giant material vortices around the sun.³ According to Descartes, all natural phenomena, including those of the celestial sphere, can be explained by the movements of tiny invisible particles or “corpuscles.” These material particles consist entirely of geometrical properties (they are extended in length, breadth, and depth); they do not have life, intelligence, or an inherent ability to move themselves. Following one initial divine impulse, these particles generate large, circular whirlpools of matter (the vortices) within a plenum; and the laws of motion governing these whirlpools

are responsible for everything from the circling of planets around central suns, to rainbows and comets.

In the 1630s, Descartes first formulated this heliocentric (sun-centred) theory of planetary motion in a treatise called *Le monde* [*The World*]; but he suppressed the publication following the Catholic Church's condemnation of Galileo's defence of Copernicanism in 1633. In the *Principles*, Descartes defends a version of Copernicanism that does not openly challenge the religious orthodoxy that the Earth does not move; according to Descartes's strict definition of motion, the Earth is in fact at rest in relation to the neighbouring particles within its vortex band. In the late seventeenth century, this theory was still one of the most popular and influential astronomical theories, until its replacement by Newtonian physics in the eighteenth century.

The four Christian women in my study – Margaret Cavendish, Anne Conway, Aphra Behn, and Mary Astell – all address Descartes's *Principles* in various ways in their works. I show that their writings reveal a more positive relationship between science, Christianity, and women in the early modern period than some recent analyses have suggested.

Margaret Cavendish (1623-73)

In 1664, Margaret Cavendish, the Duchess of Newcastle, developed her own materialist philosophy in a work titled *Philosophical Letters: Or, Modest Reflections Upon some Opinions in Natural Philosophy*. In the first section of this work, Cavendish constructs a brief but forceful critique of Descartes's *Principles*. Relying on an incomplete private translation of the text, she begins by challenging the most crucial (and controversial) feature of Descartes's physics: his concept of motion. In the *Principles*, Descartes defines motion as “the transfer of one piece of matter, or one body, from the vicinity of the other bodies which are in immediate contact with it, and which are regarded as being at rest, to the vicinity of other bodies” (Descartes 1985, II.25). Using this definition, he formulates three laws of

motion (or “laws of nature”), which are founded on the immutability of God’s operations “by means of which the world is continually preserved through an action identical with its original act of creation” (II.42). The first law states that a particular body in motion always continues to move (and likewise, a body at rest always remains at rest), unless some external cause intervenes; the second stipulates that bodies always move in a straight line; and according to the third, when one body “*collides with a weaker body, it loses a quantity of motion equal to that which it imparts to the other body*” (II.40). In response to the third law, Cavendish points out that if motion cannot subsist by itself (apart from a body), and yet it can be transferred or imparted to another body, then surely this amounts to saying that motion is both something and nothing at the same time? To dispel the contradiction, she says, we must allow that motion is either a substance or a mode. If it is a substance, then it must transmit part of itself (i.e. some quantity of matter) to the thing with which it collides. In the case of a stick touching or poking at sand, the stick must grow bigger and the sand less. Yet experience tells us that this does not happen. If motion is nothing but a mode, however, then it cannot travel outside of body; motion cannot be separated from body (Cavendish 1664, 117).

To explain the phenomenon of collision, Cavendish maintains that every particle of matter must contain its own internal principle of self-motion. In her view, all material substance is a blend of animate (“sensitive” and “rational”) matter, and inanimate matter; there is no real distinction between material and thinking substances; and “there is no part of Nature that hath not life and knowledg” (Cavendish 1664, 99). When one body, *a*, collides with another body, *b*, *a* is merely the “occasion” for the internal self-motions of *b* to set itself in motion. There is no transference or translation of motion from one body to another; *b* simply “patterns out” or imitates *a*’s motion for itself. In the case of a seal printing upon wax, “the seal doth not give the wax the print of its own figure, but it is the wax that takes

the print or pattern from the seal, and patterns or copies out its own substance” (Cavendish 1664, 105).

Not surprisingly, Cavendish rejects the account of planetary motion that arises from the Cartesian theory of matter in motion. She dismisses the Cartesian theory of divine impulse:

for how can we imagine that the Universe was set a moving as a Top by a Whip, or a Wheele by the hand of a Spinster, and that the vacuities were fill'd up with shavings? For these violent motions would rather have disturbed and disordered Nature ...
(Cavendish 1664, 108).

Because there is already inherent self-motion in every particle of matter, one almighty “shove” from God would in fact bring about chaos rather than order. Instead of three laws of nature, “Nature hath but One Law, which is ... to keep Infinite matter in order, and to keep so much Peace, as not to disturb the Foundation of her Government” (Cavendish 1664, 146). “The Earth turns about rather than the Sun” because Nature “has ordered [the world] with great wisdom and Prudence” (Cavendish 1664, 135).

Contrary to her explicit statements on the subject, Cavendish does not develop this theory of nature in isolation from her Christian beliefs. She begins the *Philosophical Letters* by declaring that she will not mix theology with natural philosophy: “for I think it not onely an absurdity, but an injury to the holy Profession of Divinity to draw her to the Proofs in *Natural Philosophy*” (Cavendish 1664, 3). In keeping with this approach, she dismisses Descartes’s theory of creation on the grounds that “it is but in vain to indeavour to know how, and by what motions God did make the World, since Creation is an action of GOD, and Gods actions are incomprehensible” (Cavendish 1664, 108). But in this same work, she herself explains the orderliness of nature with reference to God’s first decree (see Detlefsen

2009, 431). While nature is co-eternal with God and without beginning, she says, it was nevertheless “a rude and indigested Heap, or chaos, without form, void and dark” (Cavendish 1664, 15) until “the material Servant of God, Nature ... ordered her self-moving matter into such several Figures as God commanded, and God approved of them” (Cavendish 1664, 16). While nature acts independently of God, her orderliness and tendency toward peace and harmony originate with God’s command.

Cavendish puts forward a positive conception of woman-as-nature to illustrate this theory of orderly, self-moving matter. Nature is personified as “a grave, wise, methodical Matron, ordering her Infinite family, which are her several parts, with ease and facility, without needless troubles and difficulties” (Cavendish 1664, 302–303). Nature does not require the direct assistance of immaterial substance in order to move: “For Nature is not a Babe, or Child, to need such a Spiritual Nurse, to teach her to go, or to move; neither is she so young a Lady as to have need of a Governess” (Cavendish 1664, 149-50). In Cavendish’s philosophy, nature is composed of a thorough intermixture of animate and inanimate matter; and God’s original decree has ensured that this matter has an inherent tendency to bring about order in the natural world. It is therefore appropriate that nature should be personified as a mature woman who is perfectly capable of organizing and governing her own affairs. In Cavendish’s works, women and “the feminine” are not called upon to symbolise passive, inanimate bodies; and nor are they symbolically aligned with that which “does not belong to God.”

Anne Conway (1631-79)

In an early correspondence with Henry More, dated from 1650, the Viscountess Anne Conway (née Finch) received some tutoring in Cartesian philosophy with the assistance of More’s own personal translation of Descartes’s *Principles*.⁴ There are only four letters extant from this “seventeenth-century correspondence course” in Cartesianism (Hutton

2004, 36) – three from More, and one from Conway – but they give us a good indication of Conway’s early philosophical response to Parts I and II of the *Principles*.⁵ In particular, Conway appears to endorse Descartes’s claims that there is no vacuum in nature (Descartes 1985, II.16-18), that the material world is infinitely (or “indefinitely”) extended (II.21), and that there are no indivisible atoms in nature (II.20). These same views are incorporated into Conway’s own *Principia philosophiae*, the *Principia philosophiae antiquissimae et recentissimae* [*The Principles of the Most Ancient and Modern Philosophy*], first published posthumously in Latin in 1690. In his “Preface” to the work, More praises Conway as someone who “understood perfectly, not only the true System of the World, call it Copernican or Pythagorick as you will ... but all Descartes his Philosophy” (Conway 1996, 4). In the text itself, Conway affirms that “Descartes taught many remarkable and ingenious things” (Conway 1996, 64), but she explicitly rejects the Cartesian physics of matter in motion. Like Cavendish, Conway points to the difficulty of explaining “how motion can be transmitted from one body to another since it is certainly neither a substance nor a body” (Conway 1996, 69). If motion is only a mode, she points out, then it cannot conceivably pass out of the body in which it inheres and into another body. Motion is instead created through “real production or creation,” “not from itself, but only in subordination to God as his instrument” (Conway 1996, 70). She agrees with Descartes that God gives motion to bodies, but it proceeds from his will at the moment of creation and not from external impulsion.

Conway deduces her own theory of substance from “a serious and due consideration of the divine attributes” (Conway 1996, 44). She considers what God’s attributes imply for his creation – not just the attribute of divine immutability (so fundamental to Descartes’s physics), but also the moral attributes of supreme justice and benevolence. We must see that “since the goodness of God is a living goodness, which possesses life, knowledge, love, and power, which he communicates to his creatures,” then it is not possible for any dead thing to “proceed from him or be created by him, such as mere body or matter” (Conway

1996, 44-45). If the parts of nature did not have life and self-motion, then they would not have the capacity to perfect themselves or to achieve a greater spirituality. But this would be contrary to God's justice and goodness. Conway therefore rejects the Cartesian concept of body or matter as "merely dead mass, which not only lacks life and perception of any kind but is also utterly incapable of either for all eternity" (Conway 1996, 63-4). There is in fact no essential difference between spirit and body: "body is nothing but fixed and condensed spirit; and spirit is nothing but volatile body or body made subtle" (Conway 1996, 61).

Conway's vitalist theory of substance enables her to envisage a positive conception of "mother" nature, working co-operatively with God to achieve the perfection of her creatures:

Thus God has implanted a certain universal sympathy and mutual love into his creatures so that they are all members of one body and all, so to speak, brothers, for whom there is one common Father, namely, God in Christ or the word incarnate.

There is also one mother, that unique substance or entity from which all things have come forth, and of which they are the real parts and members. (Conway 1996, 31)

While this mother is subordinate to God, she nevertheless has her own power to bring about change. Conway's woman-as-nature "is a living body which has life and perception, which are much more exalted than a mere mechanism or a mechanical motion" (Conway 1996, 64).

Aphra Behn (1640-89)

In 1688, the playwright and poet Aphra Behn published an English-language version of Bernard le Bovier de Fontenelle's *Entretiens sur la pluralité des mondes* (1686). Behn's translation, *A Discovery of New Worlds*, introduced English readers to Fontenelle's "popular

science” version of Copernican theory. Presented as a dialogue between a gentleman philosopher and a “*Marquiese*” (a Marchioness), this conversational account of seventeenth-century physics was particularly appealing to female readers with no formal academic training in cosmology. In the fourth discourse of this work, the male protagonist spells out the main principles of Descartes’s vortex theory in non-specialist terms. “Imagine to your self,” he says,

that the Celestial Substance which fills the vast *Tourbillion* [i.e. vortex], or Whirling of the Sun, is compos’d of different Coats, wrapp’d within one another, like an Onion ... every one of the Planets must stop upon that Coat proportionable to its weight, and which has necessary strength for supporting it, and keeping it in an equal Balance.

(Behn 1993, 145)

In this way, the male speaker wins the Marchioness over from Ptolemaic theory to Copernicanism, and to “the Whistlings of Monsieur *Des Cartes*, whose Name is so terrible, and *Idea’s* so agreeable” (Behn 1993, 143). With her translation, Behn actively supports Fontenelle’s project to make the new natural philosophy accessible to lay-philosophers: she clarifies Fontenelle’s account of Cartesian physics by defining a vortex as a “*Tourbillion* of Air, call’d a Whirl-wind, or a Hurricane” (Behn 1993, 143), and she introduces the comparison between the vortex bands and onion layers mentioned above; neither comment appears in the original French text (see Cottagnies 2003, 30). She also refers to Descartes’s measurement of the height “of our Air or Sphere of Activity of the Earth” in the *Principles*, in order to justify a correction she has made to Fontenelle’s text (Behn 1993, 86).

But Behn’s original contributions to the subject do not end there. In a lengthy “Translator’s Preface,” she argues in favour of the compatibility of Copernican theory with Scripture, against the claims of the French Jesuit Andreas Tacquet. In the King James Bible,

Psalm 19.4-5, it is said that in the heavens, God has “set a tabernacle for the sun, Which is as a bridegroom coming out of his chamber, and rejoiceth as a strong man to run a race.” Behn claims that this allegorical passage is open to different interpretations: on the one hand, it might appear to suggest that the sun moves in the heavens, in accordance with Ptolemaic theory; but on the other hand, the words “set in a tabernacle” are highly suggestive of rest and stability, in keeping with Copernicanism. In Joshua 10.12-13, God commands: “Sun, stand thou still upon Gibeon; and thou, Moon, in the valley of Ajalon. And the sun stood still, and the moon stayed.” Again, Behn suggests that this passage can be read metaphorically. To say that “the sun stood still” might mean only that God miraculously brought about a “wonderful stop of Time.” “Time and Nature are always in motion, and this Day was a stop of that Course” (Behn 1993, 84). Behn concludes that the biblical texts are “at least, as much for *Copernicus* as *Ptolemy*,” and on the whole, she favours the view that “the design of the Bible was not to instruct Mankind in Astronomy, Geometry, or Chronology, but in the Law of God, to lead us to Eternal Life” (Behn 1993, 79).

Notwithstanding this view, Behn does not advocate a strict separation between science and religion; while the Bible cannot have any bearing on science, science can have bearing on matters of faith. She criticises Fontenelle because “He ascribes all to Nature, and says not a Word of God Almighty, from the Beginning to the End; so that one would almost take him to be a *Pagan*” (Behn 1993, 77). By contrast, in her preface, she highlights the fact that Fontenelle’s theory of multiple inhabitable worlds gives “a magnificent *Idea* of the vastness of the Universe, and of the almighty and infinite Power of the Creator” (Behn 1993, 77). She herself says what Fontenelle fails to say: the new scientific theory provides evidence of God’s omnipotence at work.

Behn also supports the inclusion of women in scientific discourse. On the one hand, she does not attempt a philosophical defence of mechanistic physics herself: as a woman, she emphasises in “The Epistle Dedicatory,” she is not “supposed to be well versed in the

Terms of Philosophy” (Behn 1993, 72). On the other hand, in her translation, Behn subtly introduces a feminist agenda of her own. Line Cottegnies observes that Behn pointedly alters references to “men” in Fontenelle’s text to “men and women” in her own translation (Cottegnies 2003, 26; Behn 1993, 121, 137). In the preface, Behn also complains about inconsistencies in Fontenelle’s characterisation of the Marchioness: sometimes she displays a profound learning, and at other times she is ridiculously naive. In her translation, Behn corrects Fontenelle’s unrealistic portrayal of a thinking woman by omitting words that suggest an unreasonable naiveté on the Marchioness’s part (Cottegnies 2003, 26).

Mary Astell (1666-1731)

Like Behn, Mary Astell also believes that Scripture determines nothing “between the *Copernican* and *Ptolomean* [sic] Systems” (Astell 1996, 13). Though Astell is not known for her scientific concerns (she is better known as a feminist and political thinker), a manuscript biography reveals that she planned to compile “a Book of Natural Philosophy” with the assistance of female friends (Ballard 1985, 426); and the astronomer John Flamsteed’s journals report that a “Mad[ame]: Astell” was a pupil at the Royal Observatory from 1697 to 1698 (Iliffe and Willmoth 1997, 248, 264).⁶ In keeping with these interests, Astell shows a strong familiarity with the central tenets of Part I of Descartes’s *Principles of Philosophy*. In her *Serious Proposal to the Ladies, Part II* (1697), she explicitly cites his *Principles* definition of clear and distinct ideas: “I call a perception ‘clear’ when it is present and accessible to the attentive mind I call a perception ‘distinct’ if, as well as being clear, it is so sharply separated from all other perceptions that it contains within itself only what is clear” (Descartes 1985, I.45; Astell 1997, 123). These criteria of knowledge constitute the epistemological foundations from which Descartes builds his theory of physics. In her *Christian Religion* (1705), Astell implicitly relies on these criteria to affirm the Cartesian view that the essence of material substance is extension alone. Descartes claims that we can have

a complete (clear and distinct) idea of the mind apart from the body, if each idea can be considered without any reference to, or abstraction from, the other. Astell likewise asserts that if I can have a complete idea of x (a thing with certain “Properties and Affections”) “without any Relation to, or Dependence on” my complete idea of y (a thing with different “Properties and Affections”), then x and y are “truly Distinct and of Different Natures”. But I can have a complete idea of mind as thinking being without “any Relation to, or Dependence on” my complete idea of body as extended being; therefore mind and body are “truly Distinct and of Different Natures” (Astell 1705, 250-51).

Astell uses the Cartesian conception of matter as extension to argue against the view that the world was created by material substance alone. In her last work, *Bart’lemy Fair: An Enquiry after Wit* (1709), she insists that whatever created the world must have the attribute of “self-existence” or necessary existence. This is the case because if there were no self-existent being, then something would have been created from nothing (an impossibility); therefore “Something must necessarily Exist, or else not any thing cou’d be” (Astell 1709, 116). Yet we cannot attribute self-existence to any material being; we can attribute self-existence only to “One Eternal Mind, who is Infinite in all Perfection.” On this topic, Astell recalls Samuel Clarke’s cosmological argument for the existence of God in his *Demonstration of the Being and Attributes of God* (1705) and *Discourse concerning the Unchangeable Obligations of Natural Religion* (1706). Like Clarke, Astell draws on the new Newtonian physics to illustrate her point: if nature consists entirely of material particles in motion, she asks, then how do we explain the phenomenon of gravitation? “Mutual Attraction or Gravitation, is one of the most Universal and Uniform Affections of Bodies; but it is not essential to Matter” (Astell 1709, 117). This force or power in essentially inert bodies,

... can't be a Material One, for that wou'd imply a Contradiction, as supposing a Matter Superior to Matter in general, and such as can give that to another which it has not in it self, nor any sufficient Power to produce. And yet this Mutual Attraction, tho' not essential to Matter, but foreign and superinduc'd by a Superior Being, is so necessary to the very Being of the Universe, in that Form in which we now behold it, or at least to our Solar System ... (Astell 1709, 117-18)

If there were no gravity, then there would be no individuation between material things, all "wou'd crumble into Dust", and every particle would "either remain at rest, or else proceed in straight Lines" (Astell 1709, 118). We must then allow that the universe could neither exist nor continue to subsist "without the Omnipotent Power and Efficacy of its Divine Cause" (Astell 1709, 118).

Despite supporting the Cartesian concept of matter as pure extension, Astell articulates a positive female conception of nature – one that does not sanction the exploitation of natural resources. Astell says that,

We may assure ourselves that Nature has no Malice. Nothing but Ill-Humour either Natural or Forc'd, can bring a Man to think amiss of her. The more we search into and familiarly examine her, we shall be the more convinc'd, that she is the most inoffensive, harmless, sweetest, compassionate, good-natur'd, best sort of a Gentlewoman, that any one can settle with himself a Notion of. (Astell 1709, 102)

Though Astell allows that we might "search into and familiarly examine her," there are constraints on how far we might penetrate nature's hidden recesses. On gold and other jewels, she says that "were they really Good, they wou'd not be such Rarities, our Indulgent Mother Nature, wou'd have bestow'd them on all her Children ... She seems indeed rather

to think them hurtful to us, by the Care she takes to hide them in the Earth” (Astell 1709, 103). This moral interpretation of “mother” nature’s actions is consistent with Astell’s view that God himself constitutes the active principle in matter that ensures nature’s order and regularity.

Conclusion

In a 1713 issue of *The Guardian* (8 September), there is a report on a group of women preserving fruit while one of them reads aloud from Fontenelle’s *Plurality of Worlds*. The women divide their thoughts between jellies and stars, apricots and suns, and Copernican theory and cheesecake. This report illustrates the fact that Fontenelle’s cosmology – and the Cartesian theory on which it was based – was highly accessible to, and tremendously popular with, women. Only a generation earlier, a handful of women came out of the kitchen and published their critical responses to the new mechanical science. Despite their formal exclusion from universities and scientific societies, these women engaged with Descartes’s concept of matter in motion, his Copernican theory of vortices, and his notion of God’s causal role in the universe. Conway and Cavendish argued against the Cartesian mechanisation of nature, and challenged the view that matter is essentially inert and passive; they both called upon God to explain nature’s orderly and regular motion. Behn argued in favour of the compatibility of Copernicanism with the Bible, and admired the new theory for providing evidence of God’s supreme power at work in creation. Astell upheld the Cartesian conception of material substance as inert extension, while calling upon God’s creative activity to explain the phenomenon of gravity. In the process of articulating these views, all four women put forward positive depictions of women, as matrons, mothers, gentlewomen, and thinking beings more generally. The historical union of science and Christianity is thought to have had negative implications for women and to bear some responsibility for the male-biased, anti-feminine nature of the modern scientific enterprise.

But the writings of these early modern women complicate that view: they show that the dialogue between science and Christianity did not necessarily lend itself to the demeaning of women and “femininity” in the literature of the period.⁷

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Notes

¹ Recent scholars, such as Charles Partee and Gerhard Forde, emphasise that the Reformers' views are somewhat more complicated than Deason suggests here. It is by no means clear, for example, that John Calvin maintains that God is the only independent agent in the world from a natural or scientific point of view. I am indebted to Alan Padgett for bringing this point to my attention.

² To be fair, Merchant does examine the views of early modern women in her work (Merchant 1980, 253-274), though she does not reach the same conclusions that I do here.

³ On Cartesian physics, see Garber 1992 and Gaukroger 2002.

⁴ See Hutton 2004, chapter 2.

⁵ For these letters, see Appendix B to Nicolson 1992, 484-494.

⁶ It is not possible to confirm that this student of astronomy was Mary Astell herself.

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