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**Judith P. Zinsser, Ed.** *Men, Women and the Birthing of Modern Science*. De Kalb: Northern Illinois University Press, 2005. viii + 215 pp. Notes, index, and list of contributors. \$38.00 U.S. (cl). ISBN 0-87580-340-7.

Review by Kathleen Wellman, Southern Methodist University.

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This collection of essays intends to challenge conventional interpretations in the history of science and intellectual history, derived from works written in the 1920s and 1930s, by highlighting women's contributions to early modern science. This approach, according to editor Judith Zinsser, "makes evident the intellectual and social consequences of this key reshaping of knowledge and the methods of its validation" (p. 199).

In her introduction, Zinsser contends that over the course of the early modern period, science became less closely associated with a broadly defined natural philosophy and instead narrowed its focus to mathematics, observation, and experimentation. Concomitant with the shifting notion of science was a shift in language and practice. Qualities and roles deemed feminine became both irrelevant and antithetical to new mathematical and experimental understandings of the nature of science and its practice. Thus, Zinsser asserts, women were not explicitly excluded from science, but over time became so.

The articles are grouped into three sections. The first examines the role of three prominent women. The second looks at male natural philosophers and how their use of language affected the relationship between science and gender. The third assesses the roles of women in scientific practices.

The three initial case studies offer highly specific examples of individual women engaged in science. Susanna Åkerman attempts to determine what Queen Christina of Sweden's scientific ideas actually were. She questions the traditional association made between Christina's patronage of Descartes and her presumed support for his scientific ideas.

Åkerman instead traces Christina's scientific ideas through her reading and the remarks of others about her scientific ideas. (Christina wrote very little herself.) Åkerman sees Christina's scientific ideas as originating in Neoplatonism, explicitly through the Leibnizian world soul, and then developing in response to seventeenth-century alchemical writings. Christina was intrigued by the possibilities alchemical theory suggested for perfection, transmutation, and--most importantly--fusion of male and female. Christina's prolapsed uterus, Åkerman contends, gave her hope that a literal transmutation of her sex was occurring. Åkerman wonders whether Christina was just a patron and enthusiast of science or an actual practitioner and uses a tantalizing manuscript fragment to suggest the latter.

Hilda Smith attempts to unify disparate understandings of Margaret Cavendish--from royalist to feminist, from autobiographer to cultural critic--by grounding her scientific writings in the fundamental perspectives underlying Cavendish's political writings, which Smith identifies as utilitarian and skeptical. A strikingly unconventional thinker, Cavendish (according to Smith) nonetheless approached contemporary scientific issues and developments consistently from a skeptical and utilitarian perspective. For example, Cavendish criticized her male contemporaries both for relying on the ancients and for their fascination with new instruments. She questioned explicitly the value of the microscope, ultimately discounting its use "as Boys that play with watery Bubbles" (p. 41). While Cavendish's

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criticism of instruments explains her unenthusiastic response to some aspects of the new science, it may also define her ambiguous position within the history of science.

Zinsser characterizes the Marquise du Châtelet's science as profoundly eclectic. For example, Châtelet used hypothesis to bridge metaphysics and science and geometry as a foundation for metaphysical explanations. As such, Châtelet's science both shared in the great malleability of mid-eighteenth-century science and gained credibility on different grounds. This eclectic application of science separated Châtelet's scientific ideas from any particular faction and, according to Zinsser, led her male counterparts to take her scientific work more seriously. It is not clear whether this was a deliberate strategy on Châtelet's part or simply a fortuitous development. It may well have served not only to exclude her from the positivist tradition in the history of science but also to leave her on the margins in more recent histories of science.

The next section on language, gender, and science begins with Margaret Osler's challenge to one of the first and most original contentions about the role of gender in the scientific revolution. Carolyn Merchant's *Death of Nature* argued that the scientific revolution, by capitalizing on "nature" as a feminine noun and depicting nature as female and subject to the exploration or allegorical rape by the male scientist, made the participation of women in this new science highly problematic.<sup>[1]</sup> Osler dismisses the gender of the noun "nature" as less significant to the understanding of science than Merchant contended; most abstractions are feminine nouns in romance languages, she notes. Osler examines Robert Boyle's use of language as a telling case for the scientific revolution and ultimately concludes that it was gender neutral, in part, because Boyle explicitly rejected the anthropomorphism of nature. Osler does not deny that women were excluded from science but suggests that historians should look not to language but rather to scientific institutions to explain the negative impact of the scientific revolution on their participation in science.

J. B. Shank specifically challenges the conventional understanding of Fontenelle's *Entretiens sur la pluralité des mondes habités* as indebted to Descartes and presenting "Cartesianism for ladies." He first argues that one must de-center Newton from turn-of-the-eighteenth-century scientific culture to get a more accurate sense of its possibilities and range. More significantly, Shank sets his reading of Fontenelle's text into the much broader context of the disputed social and cultural terrain of eighteenth-century French science. Fontenelle, he contends, must be seen as offering an alternative to patriarchy and masculine philosophy and opening up an intermediate terrain for the practice of science between male scientific and female literary culture. While this fluidity gradually disappeared over the course of the eighteenth century, Shank points to numerous venues in which the scientific and the literary and the male and female were mediated—such as the academy of M. de Montmor and Jacques Rohault's "Cartesian Wednesdays" or in the *Mercure Galant* or the "Quarrel between the Ancients and the Moderns." While Descartes, too, appealed to a more broadly defined intellectual constituency than the academic elite, Fontenelle espoused an even broader forum and, Shank insists, his text should be read as both presenting and reflecting such a possibility for eighteenth-century French scientific culture.

Franco Arato explores Algarotti's *Newton's Philosophy for the Ladies* as a significant scientific dialogue that tied—in an especially effective way—literature to science and love to physics in order to cultivate a broader audience for the new science. Arato notes that when Algarotti wrote for women, he was essentially writing for any reader. Arato compares Algarotti's less conventional presentation of Newtonianism to Voltaire's more orthodox text, *Eléments de la philosophie*. Voltaire himself disparaged Algarotti's connection of Newtonianism to more popular writing. Although such writing about science fell out of favor, Arato notes not only that this genre of scientific writing was important in the eighteenth century but also that there has been a modern resurgence of such texts exploring topical scientific issues—most notably artificial intelligence—in literary form.

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The third section tests the view that the new science progressively excluded women by treating the roles women played in the scientific establishment differently. Lynette Hunter offers far-ranging hypotheses for the changing roles of women in science. While women were excluded before the fifteenth century by the dominance of formal disputation in natural philosophy, the period between the fifteenth and the eighteenth centuries, she contends, offered greater opportunities for women to practice science. To explain their exclusion after this period, she points to two crucial features of the scientific practice of the Royal Society, which curtailed options for the female scientific practitioner. First, when the Royal Society privileged public demonstration, it replicated the earlier masculine practice of scholastic and humanist science. Second, the new science also entailed actual experience or experimentation that was carried out in the lab or the kitchen. While this practical application would not have been foreign to female practice, men used different modes of communicating their scientific results. They, unlike their female counterparts, looked beyond local communities and used different methods of communication that—Hunter suggests—reinforced the unification of class and gender occurring in contemporary English society. Thus men of science detailed their findings for men of their social class. Even more compelling as a hypothesis for women's exclusion, Hunter postulates, was the interest of England in a more democratic culture in the seventeenth century. This interest opened up opportunities for a broader swath of Englishmen but led to the exclusion of women from the practice of science in favor of the new, more inclusive, more democratic culture of the male citizen.

Stephen Clucas looks at Joanna Stephen's medical work as an example of the ways women's contributions to science took place in the economy of the household and produced generally accessible texts. He looks explicitly at the ways in which women's medical writing was appropriated by the male scientific establishment, which professionalized and gendered it. In Stephen's case, the increasingly masculine domains of chemistry, surgery, and anatomy recast her medical work in the narrow, male-dominated world of professional science. Clucas notes as well that the exclusion of women from historical narratives of the progress of science is not simply the product of modern narratives but indeed characterized accounts of the Royal Society.

Monika Mommertz also looks to the household practice of science in early modern Europe to add to our knowledge of the women who participated in science. She contends that, although academic science ultimately excluded women, the new more institutionalized science coexisted for a long time with what she terms the "invisible economy" of the household practice of science. Mommertz uses the astronomical observations of Maria Winkelman and her daughters to illustrate the female, household practice of science.

Grigory Tishkin points to the role that Princess Ekaterinia Romanova Dashkova played as director of the St. Petersburg Academy of Sciences as a patron of the sciences and as a supporter of women's equality. He explicitly explores her role in promoting the translation by academy member P. A. Alekseev of Agrippa von Nettesheim's treatise *On the Nobility and Advantage of the Female Sex* and its publication by the academy. This text, Tishkin argues, espouses ideas of female equality considered so radical that Alesska was still being condemned from the pulpit for making it accessible one hundred years later.

Readers will find articles on very specific topics, placed in the context of the appropriate, but narrow historiographical questions each figure poses. The articles have some bearing on the overall question of whether, over the course of the early modern period, women were excluded from the new science. But the collection does not answer this question, and, in many ways, the examples present rather contradictory evidence. The specific cases are drawn from the seventeenth and eighteenth century and rather than documenting a progressive exclusion instead highlight the intriguing but unconventional contributions of these women. The examples of gendered language either complicate the question of the exclusion of women from science or reveal an openness to female practice or mixed gender arenas for

science. The specific examples of women in science show they practiced in new ways and in new venues. The cases of empowered women and marginalized women occur in the same time period, and it would be hard to trace chronologically the exclusion of women or to document that the gendered language of science is demonstrably harsher or more exclusionary later rather than earlier, based on these particular examples. Several of the articles urge historians of science to refocus their attention, notably Olser's advising that one look to institutions rather than language as the source women's exclusion, Shank's broadening of the gendered possibilities for French scientific culture, and Hunter's suggesting that the exclusion of women be considered in the context of a cultural evolution toward democracy. Ultimately, this collection broadens our view of the practice of science, the relationship between women and scientific institutions, and the range of women's practice of science.

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- Judith P. Zinsser, "Introduction"

#### Section I: Women Natural Philosophers

- Susanna Åkerman, "Queen Christina's Metamorphosis--Her Alchemical World Soul and Fictional Gender Transformation"
- Hilda L. Smith, "Margaret Cavendish and the Microscope as Play"
- Judith P. Zinsser, "The Many Representations of the Marquise Du Châtelet"

#### Section II: Shifting Language, Shifting Roles

- Margaret J. Osler, "The Gender of Nature and the Nature of Gender in Early Modern Natural Philosophy"
- J. B. Shank, "Neither Natural Philosophy, Nor Science, Nor Literature--Gender, Writing, and the Pursuit of Nature in Fontenelle's *Entretiens sur la pluralité des mondes habités*"
- Franco Arato, "Minerva and Venus--Algarotti's Newton's Philosophy for the Ladies"

#### Section III: Women, Men, and the New Scientific Establishment

- Lynette Hunter, "Women and Science in the Sixteenth and Seventeenth Centuries--Different Social Practices, Different Textualities, and Different Kinds of Science"
- Stephen Clucas, "Joanna Stephens's Medicine and the Experimental Philosophy"
- Monika Mommertz, translated by Julia Baker, "The Invisible Economy of Science--A New Approach to the History of Gender and Astronomy at the Eighteenth-Century Berlin Academy of Sciences"
- Grigory A. Tishkin, translated by Albina Krymskaya, "Princess Ekaterina Romanovna Dashkova and Women's Issues in Russia in the Eighteenth and Nineteenth Centuries"

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### NOTES

[1] Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco, Cal.: Harper & Row, 1980).

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