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Aileen Fyfe, Bernard V. Lightman, eds. *Science in the Marketplace: Nineteenth-Century Sites and Experiences.* Chicago: University of Chicago Press, 2007. x + 410 pp. $45.00 (cloth), ISBN 978-0-226-27650-2.

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Science for Sale

In 1851, Charlotte Bronte described a visit to the Great Exhibition: "Yesterday I went for the second time to the Crystal Palace. We remained in it about three hours, and I must say I was more struck with it on this occasion than at my first visit. It is a wonderful place–vast, strange, new and impossible to describe. Its grandeur does not consist in *one* thing, but in the unique assemblage of *all* things. Whatever human industry has created you find there, from the great compartments filled with railway engines and boilers, with mill machinery in full work, with splendid carriages of all kinds, with harness of every description, to the glass-covered and velvet-spread stands loaded with the most gorgeous work of the goldsmith and silversmith, and the carefully guarded caskets full of real diamonds and pearls worth hundreds of thousands of pounds. It may be called a bazaar or a fair, but it is such a bazaar or fair as Eastern genii might have created. It seems as if only magic could have gathered this mass of wealth from all the ends of the earth–as if none but supernatural hands could have arranged it thus, with such a blaze and contrast of colours and marvellous power of effect."[1]

Six million people, or about one-fifth of the British population, attended the Great Exhibition, some visiting multiple times. Thomas Cook and his travel service ferried thousands of people from all over the nation to London, where they could partake of the scientific and technological wonders on display. The scene was like a "bazaar or fair," it seemed to Bronte, like a marketplace. In many ways, it was–the organizers had even debated the merits of attaching price tags to the items on display, deciding in the end not to do so. But even though visitors could not purchase the laces, clocks, knives, farming implements, and other objects on display, they were consumers: consumers of scientific and technical knowledge.

As the essays collected in this fine volume demonstrate, the rise of consumer culture and a firmly established mass market in nineteenth-century Britain meant that a wider range of people had access to a variety of commodities, including experiences of science in lecture halls, museums, collections, and exhibitions, but also panoramic shows, private conversations, and social gatherings known as "conversaziones." People were, in an important sense, consumers of scientific experiences, and there were many places they could go to "purchase" science.

In their introduction, Aileen Fyfe and Bernard V. Lightman show that members of the public could choose from a wealth of entertainment options in the Victorian Age: theaters, museums, galleries, private exhibits, freak shows, books, theological lectures, public readings, and more. This enormous range of choices created a "cultural marketplace," in which scientific attractions had to compete. A phrenology lecture might be competing for attendance with an evangelical preacher, a literary reading, a museum visit, or even a book. It was necessary to draw in the public, which often required the skill of the showman as much, or more, than the expertise of the man of science. Even lectures needed to be dramatically delivered, preferably punctuated by electrical experiments producing impressive sparks or ingenious optical illusions.

Much could be learned, Fyfe and Lightman argue, by thinking about audiences: "where might people encounter and interact with the sciences, and what sorts of experiences might they have there" (p. 4)? These questions are addressed in eleven strong essays, ranging over the sciences (botany, zoology, anatomy, phrenology, electricity, and optics are discussed) and across time periods in the nineteenth century. The collection is divided into sections that focus on three ways of consuming science: conversations and lectures, reading, and visiting and viewing.

The first section has essays by James Secord, John

Van Whye, and Lightman. Secord shows that conversation was central to the diffusion of scientific knowledge over the nineteenth century, focusing on the example of William and Mary Somerville, who established scientific reputations mainly by conversational skills displayed in informal associations and discussions. Early in the century, scientific discussions were considered part of acceptable, even desirable, conversation in polite society. However, Secord argues, by the later part of the century, "scientific talk" began to be derided as "shop talk," something to be avoided in polite society. The reason was not, as one might think, that science had become associated with a trade by becoming more professionalized, but rather that high society began to have its own "shop talk," dealing with fashion, social ritual, and the newest sensation (p. 47). Van Whye discusses the way in which the knowledge and practice of phrenology was diffused throughout Britain by public lectures and word of mouth, explaining how a new and even outré science, which had no practitioners in Britain in 1813, became familiar to practically everyone, with thousands of practitioners by 1845. In the course of its diffusion, van Whye shows, phrenology "evolved and diverged into many things for many people" (p. 64).

Lightman's essay examines how lecturers tried to provide their audiences with an entertaining as well as instructive experience. He concentrates on two men: Francis Buckland, whose sense of humor endeared him to audiences (he once joked in a lecture, "'why is the Platypus like a Tailor? Because it is a BEAST with a BILL"' [p. 105]); and John Henry Pepper, whose spectacular optical illusions transformed the Royal Polytechnic Institute into one of the leading London entertainment venues. Pepper drew on Henry Dircks's invention of what we now call "back projection" (where a sheet of glass or half-silvered mirror was angled at forty-five degrees, and light trained on an actor in a pit below the stage, whose image was projected on the stage) to produce ghostly effects, such as the "disembodied head of Socrates deliver[ing] a rhymed speech" (p. 120).

Offering perspectives on print culture, the second section has essays by Jonathan Topham, Ann Shteir, Fyfe, and Graeme Gooday. Topham examines the role of commercial publishers in the development of the printed commodity of "popular science," which emerged (under that name) only in the nineteenth century (p. 137). He finds that it was the "radically altered conditions" of the book trade in the early part of the century that stimulated the emergence of these "popular" works, even as the boundaries between what was considered popular and what was considered learned were "constantly renegotiated" (pp. 162-163). Shteir's paper focuses on accounts of the "Sensitive Plant," *Mimosa pudica* (a plant that responds to human touch by closing or drooping its small leaves when handled) in different kinds of texts: scientific works, literary writing, and popularizing books and periodicals. She finds that, over time, literary and figurative descriptions of the plant were excised from accounts that sought to establish scientific authority.

In the essay by Fyfe, we learn that museums and books were finding new audiences among the middle and working classes in the nineteenth century. But these men and women needed more instructive works to guide them, and more clearly delineated museum displays. She examines first *The Pictorial Museum of Animated Nature* (1844), a book that mimicked the museum-going experience; then the British Museum, and how it was experienced by its visitors; and finally other publications, such as "advice books," which aimed to provide for visitors the narrative and order that the midcentury British Museum lacked (p. 199). Print resources turn out to have been quite important to the experience of visiting a natural history museum.

Gooday's paper examines what he calls a "symbiosis of popular and technical discourses" on electricity (p. 233). In the early days of domestic electric power, popular concerns about the safety of electricity in the home often set the agenda for technical writing. The "experts" were often required to write what they viewed as "propaganda" promoting the efficacy and safety of electricity, especially as compared to gas lighting, and especially in the light of several well-publicized deaths from accidental electrical shock. Indeed, it was the public demand for trustworthy knowledge of electricity that led to the existence of a class of "electrical experts" (p. 263).

In the third section, essays by Victoria Carroll, Richard Bellon, Iwan Rhys Morus, and Samuel J. M. M. Alberti examine cultures of display. Carroll's contribution studies twelve firsthand accounts of visits to Walton Hall, home of the eccentric naturalist Charles Waterton (he had "the world's first nature preserve" on the grounds of his estate) to examine the way in which nineteenth-century audiences viewed exhibitions (p. 294). Carroll concludes that the conventions that governed visiting country houses in this period shaped people's experiences.

Bellon examines the Great Exhibition, showing how the organizers attempted, and largely failed, "to create an enduring communal experience of research and education in the Crystal Palace" (p. 301). The universality central to the rhetoric of the Great Exhibition was never

achieved; it was foiled by the practical reality of filling the space. Contrary to the ideals of scientific collecting, the Crystal Palace was filled with idiosyncratic objects unrelated to each other. (Charles Babbage would later complain that his model Difference Engine–the first general purpose calculator–was excluded, while curiosities like an eighty-blade knife were on display.)

Morus notes that "exhibition was the order of the day," and locates scientific performance within this context (p. 335). Rhetorical, technical, and visual elements all contributed to a successful performance. While in the Renaissance "natural magicians" used optical illusions as evidence of their access to hidden powers, in the nineteenth century, very similar techniques were used to invite the audience to discover the real power behind the illusion, to decipher the "trick" at work (p. 338). He concludes that in the nineteenth century, "any dichotomy between quackery and scientific showmanship is itself an illusion"; whether it was the ghosts appearing on Pepper's stage, or the fishlike tail of P. T. Barnum's Fejee Mermaid, in both cases, the illusions worked to show that the performer knew more than the audience, and gave audiences the impetus to work out how the illusion was done (p. 364).

In his essay, Alberti considers the experience of visitors to natural history collections. Over the course of the nineteenth century, a desire for order and transparency exerted itself, changing museums from "cabinets of curiosity" to sites of education and reverence. Rather than moving from object to object as whim dictated, now the museum-goer was expected to gaze intently on clearly marked displays, moving from one to the next in the preordained order (pp. 381-382). Touching the exhibits was forbidden, speaking was to be in hushed tones. Yet, as Alberti pungently illustrates, it was impossible to limit museum-goers to their sense of sight, because dead specimens "tended to smell" (p. 385). The main responses of visitors to these collections continued to be varying degrees of wonder and disgust.

The editors note that "comprehensiveness is virtually impossible," and that they have purposely avoided topics that have been well treated before (p. 16). This criterion could justify the lack of any essay dealing with one of the major sites of scientific consumption, the meetings of the British Association for the Advancement of Science (BAAS). Still, it would have filled a gap in this book to have such an essay, perhaps discussing the way that women became an important audience for the public lectures of the BAAS–so much so that the sale of "ladies' tickets" became a prime source of income from the meetings, and that speakers for the public lectures were chosen from among those men of science who were also known as entertaining performers.

The editors describe their intention as the exploration of the sites and experiences–the marketplace–of science, and the essays in this volume do this admirably well. But careful attention to the product that was being hawked would have further enriched this project. After all, there *was* a difference between a scientific lecture and a literary reading. In the case of the lecture, entertainment was on offer, but not entertainment alone: it also included some purported knowledge of the workings of nature. Humphry Davy, making sparks with the gigantic voltaic pile in the basement of the Royal Institution, and Buckland, telling platypus jokes, were concerned not merely with packing in the audience, but also with promoting particular scientific theories. This reader, at least, would have liked to hear more about how the content of the product may have shaped the performances.

Nineteenth-century England is well-trodden ground, but the editors and authors of this book have found an innovative and extremely interesting way to approach it. "Exhibitions, lectures, books, periodicals, and museums opened crucial windows on the meaning of the sciences for the British public," the editors tell us (p. 17). And by publishing essays that shed light on these sites of scientific consumption, this book itself opens a window on the experience of science in the nineteenth century.

Note

[1]. Elizabeth Gaskell, *The Life of Charlotte Bronte*, 2 vols. (London: Smith, Elder and Co., 1857), 1:633n.

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