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Review

Reviewed Work(s): Unravelling Starlight: William and Margaret Huggins and the Rise of the New Astronomy by Becker

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**Barbara J. Becker.** *Unravelling Starlight: William and Margaret Huggins and the Rise of the New Astronomy.* xix + 380 pp., illus., bibl., index. Cambridge/New York: Cambridge University Press, 2011. \$110 (cloth).

William Huggins was the son of an English linen draper and worked in the family business in London. Although he did not attend university, he cultivated an interest in scientific matters, particularly microscopy and astronomy. By the time he was thirty Huggins was able to sell the business and buy an estate at Tulse Hill in south London. He constructed an observatory there and devoted his life to the study of astronomy. He is regarded as one of the great amateurs in the history of astronomy, a role that was made possible by his ample means, his scientific connections, and the institutional support of the Royal Society.

Fascinated by work on spectroscopy of the German physicist Gustav Kirchoff, Huggins acquired a spectroscope and used it to examine a range of astronomical phenomena. He worked with his neighbor W. Allen Miller, a professor of chemistry at the University of London. Huggins became particularly adept at analyzing the spectra of starlight. This activity involved comparison of stellar spectra with the spectra of substances burned in the observatory as observations were being made. In 1875 Huggins married Margaret Lindsay Murray, a much younger Irish woman who was keenly interested in astronomy. She became his observatory assistant and collaborated with him up to his death thirty-five years later.

An account of William Huggins's life based on an unfinished work by Margaret was published in 1936. *Unravelling Starlight* is the first major biographical study of Huggins by a historian of science. In 1896 Huggins published an essay titled "The New Astronomy"; it is reprinted as an appendix to Barbara Becker's book. In it Huggins presented his researches of the previous forty years as part of a new program of applying chemical physics to astronomy. The 1896 essay was in fact a rather idealized participant report written many years after the events being recounted. A range of motivations and problems spurred Huggins at different points in his career. For example, his first major scientific discovery, the detection in 1865 of emission-line spectra in planetary nebulae, was prompted by some fairly specific developments in contemporary stellar astronomy. In the early 1860s there was a discussion among several observers concerning the variability of nebular objects. This discussion occurred in both astro-

nomical journals and popular magazines that covered scientific subjects.

In 1868 Huggins used small shifts in the spectroscopic lines of the star Sirius to measure its Doppler velocity along the line joining the observer to the star. A mathematical analysis of this phenomenon was communicated by James Clerk Maxwell in a letter to Huggins in 1867. Huggins printed an excerpt from Maxwell's letter along with a detailed account of his observations in an article published in the *Philosophical Transactions*. Becker shows that there were difficulties with Huggins's measurements and interpretation and that his finding was by no means conclusive. Nevertheless, he brought the phenomenon of Doppler velocity shifts to the attention of astronomers and helped to initiate a major area of stellar research.

Becker points out that modern scientific collaboration occurs in the form of hierarchical groups of investigators composed of theorists and instrumentalists; first, second, and third authors; and so on. By contrast, collaboration in the nineteenth century tended much more to involve the coming together of independent and coequal researchers. Becker believes that the modern hierarchical conception of scientific research has colored historians' view of the joint work of William and Margaret Huggins. William is seen as the primary figure, while Margaret is his able but subordinate assistant. Becker's study of unpublished observatory notebooks has led her to conclude that Margaret played a more important scientific role than has been generally recognized. A theme of the couple's joint research from the beginning was the application of photography to the analysis of spectra. Becker documents the interest of Margaret in astronomical photography and suggests that she was the driving force in the application of the new technology to stellar spectroscopy.

Huggins demonstrated the gaseous character of planetary nebulae using spectrum analysis. Looking back on this discovery over thirty years later, he proclaimed that he had solved the problem of the nebulae. Becker accepts this judgment. She refers to Huggins's "landmark discovery" (p. 65) that produced a "seismic shift in thinking about the nebular problem" (p. 71). She is apparently referring to the contemporary perception of Huggins's finding, rather than to its longer-term status in the history of astronomy. In fact, planetary nebulae are rather special and account for only a small percentage of nebular objects. Most of these objects are what were called white nebulae or spiral nebulae and what are known today as galaxies. Huggins believed (erroneously, as it turned out) that nebulae such

as M31 in Andromeda exhibited the formation of new solar systems following Laplace's nebular hypothesis. While Huggins's spectroscopic analysis of planetary nebulae was a significant finding, it turned out to be something of a false clue in deciphering the riddle of the nebulae.

The print in this book is small, and the quotations and endnotes are even smaller. I would have appreciated a bulkier book in standard readable print. This quibble aside, *Unravelling Starlight* is detailed, well researched, and highly recommended to anyone interested in Huggins, the history of astronomy, and nineteenth-century British science.

CRAIG FRASER

**M. Brady Brower.** *Unruly Spirits: The Science of Psychic Phenomena in Modern France.* xxvii + 202 pp., illus., bibl., index. Urbana/Chicago: University of Illinois Press, 2010. \$30 (paper).

Can the spirit world be policed? Is it possible to get a speeding violation on your way to salvation (or, worse, Gehenna)? These are the sorts of reflections prompted by M. Brady Brower's insightful study of the "science" of the psychic—psychical research (PR)—in modern France. Brower takes us from the late nineteenth century, when PR was initially driven by a focus on ideas of free will and creativity and a challenge to rigid mechanistic determinism, up to its formal institutionalization in the early twentieth century.

Brower rightly sees PR as arising from Spiritualism, before taking on a more secular, scientific, tenor. This view of science differed notably from the scientism of the era, and Brower here sees technocracy as the greatest threat to Spiritualism. He retraces a well-trodden path, finding the origins of PR in Spiritualism, table-turning, mesmerism, and hypnosis. Brower sees a paradigm shift in 1875, resulting from the physiologist Charles Richet's interest in somnambulism and other mediumistic phenomena. He argues that it was Richet who, emerging as a dominant force in the French PR community, introduced the great Jean-Martin Charcot to certain hypnotic and mediumistic phenomena, work that became critical to his investigations of the hysteric.

Drawing the nineteenth century to a close, Brower guides us through a new interest in mediumism on the part of elite scientists. The roots of this curiosity, he claims, lay in an interdisciplinary *mélange* arguably characteristic of late nineteenth-century science—a crossroads of psychology, physics, philosophy, and medicine. Brower further outlines the researches of Pierre Janet, notions of a unitary versus a fragmented self, and the rise of

"experimental" psychology, underscoring how much of the interest in these phenomena was influenced by age-old Cartesian conundrums of matter and mind. PR, Brower suggests, took shape as an idealist response to this dilemma. Institutional issues also feature prominently at the *fin-de-siècle*, and Brower introduces tensions that carry throughout the history of French PR, whose practitioners often found themselves torn between the need for experimental rigor and the desire to popularize the very same experimental findings.

As Brower discusses the researches of Richet in the early twentieth century, particularly those focused on a "bad subject" (the Italian medium Eusapia Palladino), we become increasingly aware of the problems science faced in dealing with the vagaries of psychic phenomenon. Discussing issues surrounding a series of séances at Villa Carmen in 1905, where "ectoplasm" was first observed and described, Brower moves us to consider the nature of genius (and its close other, madness) and the way the controversies surrounding PR pushed the boundaries of traditional gender identities and the culture of late Victorianism. He also points to a growing tendency to focus on materialization—physical manifestations of the psychic—as the definitive mediumistic phenomenon of PR.

In the following chapter, Brower returns to the issue of popularization and explores the meteoric rise and fall of the Institut Métapsychique Internationale (IMI) in the wake of World War I. Europe's losses, the almost countless casualties, became PR's gain, as there was renewed public interest in communicating with the dead—from mothers and fathers who turned increasingly to the science of the psychic for succor and support as they grieved for their fallen sons. The IMI (and PR generally) experienced a dramatic increase in visibility and prestige as a result. And yet, without any clear and overriding experimental program, this growth was short lived.

Brower's reflections on the origins of the IMI show how deeply implanted were some of the contradictions in PR. With the failure of the famed Sorbonne experiments involving the medium Eva C in 1922, PR began a steady decline, even as some of its most enthusiastic supporters, like Richet, became more immersed in research and controversy. Brower's final discussion of the importance of "good faith" as a necessary component of the epistemology of PR, and of the profound subjectivity of the psychic experience, leads him to see PR as a gateway to Freudian psychology, reminding the reader of Freud's deep interest in abnormal psychic phenomena.

In the end, Brower sees PR as one of many pathways to a deeper understanding of the realm