

## Astronomy at Harvard Observatory: A personal account

### Cecilia Payne-Gaposchkin: An Autobiography and Other Recollections

Edited by Katherine Haranumdanis  
269 pp. Cambridge U.P., New York, 1984.  
\$34.50

*Reviewed by Helen Sawyer Hogg*

Three introductory accounts provide the background for the autobiography of Cecilia Payne-Gaposchkin (1900–1979), one of the most outstanding astronomers of the 20th century. The tone of the volume is set by Jesse Greenstein who expertly analyzes the researches of Cecilia Payne against the background of physics and astronomy in the 1920's, when her career began. Peggy A. Kidwell provides a carefully documented historical background of Payne-Gaposchkin's work at the Harvard Observatory, her associations with coworkers and experiences of discrimination against women. The editor, Gaposchkin's daughter Katherine, gives a warm, compassionate account with pleasant touches of humor, family life and extensive travels.

In the autobiography section entitled "The Dyer's Hand," Payne-Gaposchkin traces her life, beginning with illustrious ancestors and early years in England and arrival in the United States for graduate study in astronomy. With her specialty of astrophysics, her career is a series of "firsts," including the first doctorate in astronomy given for work at Harvard College Observatory, and awarded by Radcliffe College in 1925. Her thesis on stellar atmospheres was spectacularly successful. She was among the first to discover the large proportion of hydrogen in stars.

The combination of two brilliant and dynamic individuals, Harlow Shapley and Cecilia Payne, was the spark which brought the graduate school in astronomy at Radcliffe and Harvard into existence.

Helen Sawyer Hogg, professor emerita of astronomy at the University of Toronto, worked with Cecilia Payne from 1926 to 1930 at the Harvard Observatory. Variable stars in globular clusters, the topic of her doctoral thesis, is still the field of her current research.

**Cecilia Payne-Gaposchkin.** Despite initial dissatisfaction, Payne chose to remain at the Harvard Observatory and eventually became the first woman chairman of Harvard's astronomy department. The photograph was taken in 1948.



Her marriage in 1934 to another astronomer, Sergei Gaposchkin, who had left Russia, and the subsequent arrival of their three children rounded out her life. Sergei and Cecilia collaborated on large research projects on variable stars.

Payne-Gaposchkin is a polished and clever writer. Her vignettes of astronomers of the day in England and elsewhere are a delight to read. Frequently her philosophy shines in pithy remarks, such as in this comparison of teaching, which she disliked, and research, which she preferred: "I think that my distaste stems from the inherent conflict between teaching and research. A lecturer must pose as knowing everything about his subject (and some even seem to believe that they do); in research one must continually remind oneself that one knows little or nothing" (p. 157).

In general, the book presents a great deal of factual material—including a

bibliography of 17 pages—and seems accurate; but it contains a few errors. For example, Solon I. Bailey, in his classic work on variable stars in globular clusters never wrote a volume such as that described by Payne-Gaposchkin. Frank Hogg, who was a Canadian, is wrongly identified in the index as a US astronomer.

Two strong emotions influenced Payne-Gaposchkin's life: frustration and jealousy. She felt continually frustrated by the inferior treatment accorded to women scientists. Her jealousy was with respect to Harlow Shapley, who, after he was through with her graduate training, gave more time to "people whom I presume to think less intelligent than myself."

I myself was the first student to produce a doctoral thesis on star clusters in 1931 under Shapley in his own field of research, and I am among those anonymously described in Payne-Gaposchkin's remarks. From the first time



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I met Miss Payne, I considered her intelligence to be vastly superior to my own, and I still do. (Even after her degree, we called her "Miss Payne," but Shapley was always "Doctor Shapley.") However, the reader should be warned that because of this jealousy the autobiography is far from a balanced account of the Harvard Observatory, such as that given earlier by Bailey in 1931, *The History and Work of Harvard Observatory 1839 to 1927*. As a result, many pertinent names are absent from this section. These include Emma T. R. Williams (Vyssotsky), the first woman to follow after Miss Payne for the second Radcliffe PhD in astronomy, in 1930. Though much is written about Miss Annie J. Cannon, the only mention of Margaret Walton Mayall, her devoted assistant, close friend and companion for many years, is in the caption of a group photograph. Whereas Payne-Gaposchkin resents the fact that Harry Plaskett would talk no science with her, but only social chit-chat, she in turn ignores the years of service to Harvard and the Milky Way of the illustrious Bart Bok, and mentions him only as a family man. Katherine Haranumdanis has tried to round out the picture of people at the observatory, but her material is not covered in the index, which is based solely on the autobiographical section.

Nevertheless the reader will find this a stimulating account of the brilliant mind and extraordinary life of an astronomer who was herself responsible for much of the development in 20th century astronomy.

## The Physical Principles of Computed Tomography

**William R. Hendee**  
192 pp. Little Brown, Boston, 1983.  
\$32.50

The introduction of the first clinical x-ray computed tomography machine in 1971 heralded a new era of radiological imaging. The subjects required to understand computed tomography include basic radiation physics, computer science, and imaging science. Past attempts at including the "basics" of these diverse fields in one book on clinical imaging, and at aiming the book at a broad audience including physicians, physicists, engineers and technologists, have failed. Invariably, what one group views as "basics" is considered "advanced material" by another. William Hendee has tried to write a book on the principles of computed tomography aimed at this same diverse audience. He has succeeded in producing a useful introductory text for physicians and technologists but that is of limited use to

engineers and physicists.

Brevity is both the strength of the text, as a survey for physicians and technologists, and its weakness, as a study guide for scientists trying to master new imaging modalities. Hendee can barely cover the vocabulary of computed tomography in the book's 192 pages. His chapters on the history of the new technique, physical characteristics of scanners, reconstruction of the tomographic image and performance evaluation and dose in computed tomography, although easy to read, are too short to serve as texts. Even with the bibliographies (mostly citations before 1981) appended, the material is incomplete for a serious student. However, the restriction in space also affects the book's usefulness to physicians; for example, dose evaluation is given only one page. Effects of various parameters on radiation dose, including table incrementation and slice width, are not discussed in any detail, although they are critically important to physicians prescribing computed tomography studies.

The best chapters of the text are those on x-ray attenuation coefficients of tissues, data acquisition and computers, and data display and recording (all of which, though brief, are fairly complete). The applications chapters on the use of computed tomography in radiation treatment planning and on the quantitative interpretation of data, both of which had more up-to-date bibliographies, also were comprehensive.

Lastly, emission computed tomography, ultrasonic computed tomography and nuclear magnetic resonance imaging, are discussed in sketchy chapters with little physics. They would be better studied elsewhere.

Overall, the text is a useful survey book for physicians and technicians. Physicists and engineers hoping to find a source book with direction to good bibliographies should look elsewhere—perhaps to the book most often cited by Hendee, *Radiology of the Skull and Brain: Technical Aspects of CT*, edited by T. H. Newton and D. G. Potts (Mosby, St. Louis, 1981).

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## A Symmetry Primer for Scientists

**Joe Rosen**  
131 pp. Wiley-Interscience, New York, 1983.  
\$26.95

*A Symmetry Primer for Scientists* consists of two distinct parts. The first third of the book is devoted to an