Being an astronomer, being a woman

Owen Gingerich

Cecilia Payne-Gaposchkin: An Autobiography and other Recollections.

Edited by Katherine Haramundanis.

Cambridge University Press: 1984.

Pp. 275. £19.50, \$34.50.

CECILIA Helena Payne-Gaposchkin was the most eminent woman astronomer of all time. In 1925, while a graduate student at Harvard Observatory, she applied the newly discovered Saha equations to an analysis of the temperatures of stellar atmospheres. Her solution was so thorough that afterwards temperatures of stars essentially became a non-problem, and most astronomers came to believe that the main thrust of her thesis concerned the *composition* of stars. In fact, though the analysis of chemical abundances was originally only ancillary to her study, it turned out to be the most important result: she had demonstrated that the great majority of stars had quite similar chemical abundances and that the widely varying appearances of stellar spectra arose from physical rather than compositional differences.

The Dyer's Hand, which constitutes the main part of this book, is a reflective but all-too-terse autobiographical account written near the end of her life. She brought the richness of an earlier English education to her writing, her book being filled with splendid though often cryptic literary allusions. Indeed, we may well wonder how far to read Shakespeare beyond the title quotation:

My nature is subdued
To what it works in, like the dyer's hand;
Pity me, then, and wish I were renewed.

In the short Part III of her account, entitled "The Dyer's Hand Subdued", she tells of her marriage to Sergei Gaposchkin, a stateless Russian emigré and brilliant variable-star astronomer, and of her own change of career from spectroscopy to photometry.

Payne-Gaposchkin was a modest woman. She firmly believed that scientific discoveries would inevitably be made, if not by one researcher, then by another, and her autobiography is the poorer for this. She lived in an age of heroic changes in our perception of the astronomical universe, and she knew many colourful figures who, like herself, contributed to these advances. However, she always bent toward the side of caution, taking care to include nothing "actionable" in her story. There are, nonetheless, wonderful moments in the book. In describing her undergraduate education in the English Cambridge, she wrote (p. 117):

The stress was on observation. 'One

thoroughgoing experiment,' Rutherford thundered in one of his lectures, 'is worth all the theories in the world — even if those theories are those of a Bohr.' Years later, Eddington uttered the dictum that he would not believe an observation unless it was supported by a good theory. I was an astronomer by that time and knew him well. I told him that I was shocked by his pronouncement. He smiled gently. 'I thought it would be good for Rutherford,' he said.

This edition has been enriched by a trio of introductory essays. Caltech's Jesse Greenstein, who first became acquainted with Payne-Gaposchkin when he was a student at Harvard, fills in the scientific background of her accomplishments. Peggy Kidwell, a professional historian of science who is currently writing a longer biography of Payne-Gaposchkin, presents a carefully documented outside view, especially of Cecilia Payne's early years at Harvard. Here we find, in sharper relief than in the autobiography, some of the difficulties facing a brilliant woman who was competing in a man's world. Finally, Payne-Gaposchkin's daughter, Katharine Haramundanis (the editor and prime mover in the preparation of this volume), gives an engaging picture of life in the Gaposchkin household. Her story significantly strengthens the book, for it fills in precisely where her mother's account is the weakest.

Important as Payne-Gaposchkin's astronomical contributions were, the

interest in this narrative clearly lies in the fact that it was written by a scientist who had an uphill struggle on account of her sex. She tells of teaching and advising Harvard graduate students in a day when no woman could be listed in the catalogue, and she frankly expresses her jealousy of Harry Plaskett, a contemporary astrophysicist whose advancement came so much easier than her own. Eventually Payne-Gaposchkin became the first woman professor to be promoted from the ranks at Harvard, and simultaneously the first woman to become the chairman of a department there. Not until 1977, at the age of 76, did she win the Henry Norris Russell lectureship, the highest honour of the American Astronomical Society, where she bluntly told the audience "Ten, 20, 30, 40, 50 years ago I could have given you news. Today I can offer only a panorama".

Never a militant women's liberationist, she expressed her attitude in her advice to young women (p. 227):

Do not undertake a scientific career in quest of fame or money. There are easier and better ways to reach them. Undertake it only if nothing else will satisfy you; for nothing else is probably what you will receive. Your reward will be the widening of the horizon as you climb. And if you achieve that reward you will ask no other. □

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Part analysis

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Electroanalytical Chemistry.

By Basil H. Vassos and Galen W. Ewing.

Wiley: 1984. Pp. 255. £39.85, \$51.75.

IN their preface, Vassos and Ewing tell us that they set themselves the task of writing a book to include "those aspects of electrochemistry, both theoretical and practical, that a graduate student specializing in analytical chemistry should master". Where they succeed in maintaining this selectivity, the book meets the needs of its intended readership — it contains clear, lively and up-to-date accounts of polarography, linear sweep, pulse and ac voltammetries, stripping analysis and hydrodynamic electrodes. The principles of these methods are well explained without the reader being burdened with excessive mathematics. In particular the sections on instrumentation and practice are excellent.

However the above topics occupy just over half of the book. The rest consists of a whirlwind tour through much of the remainder of electrochemistry. Thus topics such as classical thermodynamic electrochemistry, double-layer theory and electrocapillarity, reference electrodes, ion-selective electrodes, diffusion phenomena

and electrode kinetics all appear in the early chapters, but are treated with such brevity that novices will be forced to turn elsewhere to be able to proceed while the initiated will find little that is new to them. In the last quarter of the book the authors have added discussion of the fractional calculus, semiconductor electrochemistry and coupled electrochemical-spectroscopic methods; again, inclusion of this material seems at variance with the needs of their intended audience.

Overall, the book has the appearance of a textbook on modern electrochemical methods rather than one exclusively devoted to electroanalysis, but I suspect that those seeking such a book will choose either the superbly thorough work by Bard and Faulkner (*Electrochemical Methods*; Wiley, 1980), or the more idiosyncratic style of Albery (*Electrode Kinetics*; Oxford University Press, 1975), to name two textbooks in the field. Nevertheless where the authors stick to their brief the book is very good indeed. It merits the attention of those teaching courses on electroanalytical chemistry, and of analytical chemists in general — although one imagines that a book described on the dust-jacket as "extremely practical", but which contains but 19 lines on microprocessors, will date rather rapidly! □

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