degree was from Radcliffe. Her dissertation, entitled "Stellar Astrophysics" and published as a monograph, was a pioneering work in which she applied Meghnad Saha's ionization theory to determine stellar temperatures and chemical abundances. Appointed to the Harvard Observatory staff, she turned her attention to the spectroscopy of supergiants, Wolf–Rayet stars and variables. These studies resulted in another classic monograph: *The Stars of High Luminosity*, published in 1930.

At Shapley's suggestion, Payne-Gaposchkin then undertook a study of photographic stellar photometry. The time-consuming attention to detail required by the establishment of standard stellar magnitudes and colors caused Payne-Gaposchkin to chafe under this assignment. Although recognizing the value of photometry, she felt it consumed too much of her time. Nevertheless, this work led her to the study of variable stars, the field for which she is best known and to which she devoted so many years. Some of the variable-star studies were in collaboration with her husband, Sergei I. Gaposchkin.

The Gaposchkins were married in March 1934 and embarked on many years of collegial work. Her last book is dedicated to her husband, "that bright particular star." Their first major joint venture, *Variable Stars*, published in 1938, surveyed and organized the subject so effectively that much of it is still valid today. Payne-Gaposchkin wrote the detailed discussion of the intrinsic variables, while Sergei Gaposchkin concentrated on the eclipsing stars. The ability to synthesize heterogeneous material into a coherent whole is well illustrated in this monograph. The book served as a stepping stone, or as Payne-Gaposchkin preferred to think of it, a prolegomena, to the analysis of all known variable stars down to tenth magnitude as recorded in the Harvard Observatory plate collection. The Gaposchkins accomplished this monumental task in the space of about five years. The uniformity of the data allowed for systematic determination of the light curves and related photometric characteristics of some 2000 variable stars.

PAYNE-GAPOSCHKIN (1948)

Payne-Gaposchkin used the understanding of variable stars so obtained to place them in perspective in a larger sense: their distribution in the galaxy as indicators of the structure of the Galaxy, and their relationships to each other, including their role in stellar evolution. She shared this perspective with the astronomical community in two books, *Variable Stars and Galactic Structure* (1954) and *The Galactic Novae* (1957). The explosive variables, the novae, particularly excited her, for they gave her full play to exploit her initial interests in spectroscopy.

Most astronomers will agree with her self-assessment, namely that she was not one to fashion new theories, but contributed by collecting, turning over in her own hands, comparing and classifying the data of astronomy. She did this superbly and energetically for more than fifty years. The fruits of her work are the books already referred to as well as over 150 papers. She wrote two semi-popular books using the theme of stellar evolution, *Stars in the Making* (1952) and *Stars and Clusters*, published the year she died. Her textbook *Introduction to Astronomy* went through two editions, the second in collaboration with her daughter, K. Harumundanis.

Cecilia Payne-Gaposchkin's career at Harvard was marred by the reluctance of the institution to advance her and give her recognition that was her due. Her original ambiguous appointment in 1925 to the Harvard Observatory staff was not clarified until 1938, when she received the title "astronomer." At her own request, this was later changed to Phillips Astronomer. As such she participated fully as a member of the Harvard Observatory Council, including teaching, directing theses, and conducting graduate student examinations. Not until 1956, however, when the directorship of the Observatory has passed into the hands of Donald Menzel, was Payne-Gaposchkin "promoted" to professor and given a salary commensurate with her stature. Not only did she then become professor, she also became chairman of the Department of Astronomy at Harvard University. One can decry the years of injustice or one can rejoice that she was the first woman at Harvard to be appointed to a full professorship not specifically designated for a woman.

Students and colleagues will remember her for her prodigious memory and her way of referring to individual stars, even spectral lines, as familiar and distinctive friends. Many of her books are enriched by apt quotations from the ancient classics and later literature, an outgrowth of her early classical schooling. Her knowledge was encyclopedic, her enthusiasm unbounded. Shy and diffident herself, she tended to hold other renowned astronomers in great esteem, even veneration. This characteristic occasionally led her early in her career to yield to authority even when her own research pointed another way. Mostly, however, she was her own drummer, she stepped "to the music which [she] hear[d], however measured or far away." She may have felt that she had walked with giants; now we recognize that she, herself, was one.

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Norman Hurd Ricker

Norman Hurd Ricker, professor emeritus of physics at Oklahoma University, Norman died on 4 January 1980. He was 83 years old.

Ricker distinguished himself during his sixty-year career with two significant inventions. In the early 1920's, he invented the paper-cone speaker system still used for sound reproduction in radios, telephones and television. Ricker also pioneered a deep well drilling process used in oil-field development.

Rice University granted Ricker a BA (1916), an MA (1917) and a PhD (1920). From 1921 to 1923 he worked in the research laboratory of Western Electric Co (now Bell Laboratories). It struck him one day that the music piped into the laboratory from a nearby concert suffered from poor reproduction. "Music was almost a total loss," Ricker once remarked, "because the existing speakers could not pick up any high or low notes," He cut out several cone-shaped pieces of heavy drafting paper, glued them together and set them up to vibrate as a speaker. The result was a major advance in audio quality.

Ricker headed the geophysical research department of Humble Oil and Refining Co during the years 1923 to 1925. He spent the next 13 years as a consulting physicist for oil concerns and then worked the next 20 years as senior research physicist for the Carter Oil Co. After a year in a similar post at Jersey Production Research Co, he joined the University of Oklahoma. Ricker remained there for six years before he was awarded an emeritus professorship in 1965. □