E. Margaret Burbidge, President-Elect

Vera C. Rubin

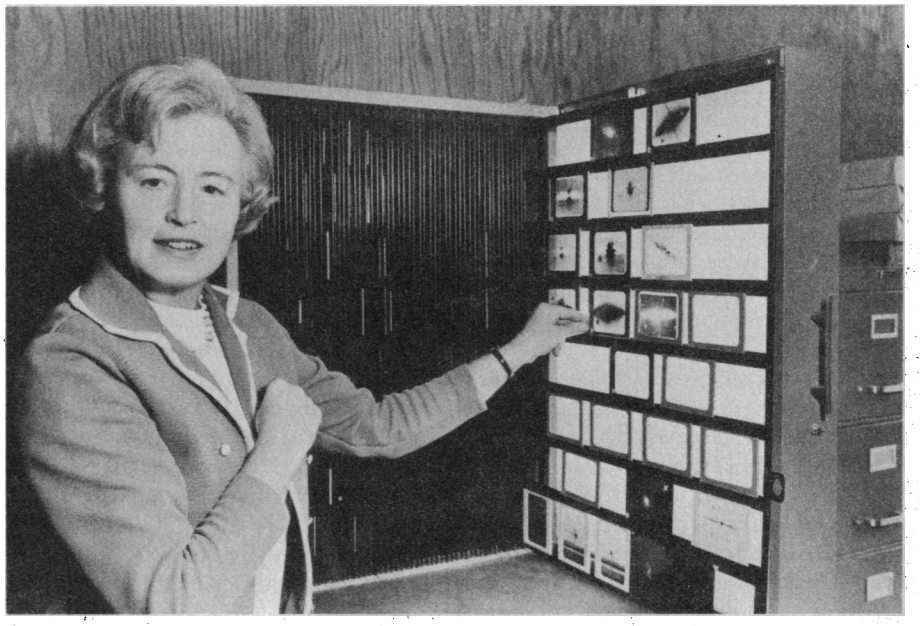
As the next president of the AAAS, Margaret Burbidge will be another in the long line of eminent astronomers who has served in this office, most recently Harlow Shapley (1947) and Walter Orr Roberts (1969). To this office she brings a distinguished career as a brilliant observational astronomer, an astrophysicist, a leader in the drive to observe from space, a spokesperson for the astronomical community, and a strong supporter of women and minorities in science. Her leadership capabilities, obvious in all phases of her career, are combined with a warm and friendly personality, and have made for her a wide circle of friends and colleagues throughout the world.

Margaret Peachey Burbidge, born in England, recalls being interested in astronomy as a youngster, and reading the books of Sir James Jeans, to whom she is distantly related. She attended University College, London, and was surprised to discover that a degree in astronomy was offered. She earned a B.Sc. from University College and a Ph.D. from the University of London Observatory. She remained at the University of London Observatory following the war, as assistant director. Following her marriage to Geoffrey Burbidge, an astrophysicist, she spent several years in the United States and England as a research fellow at the Yerkes Observatory, the University of Cambridge (England), and the California Institute of Technology. Before taking up an appointment in 1962 at the University of California, San Diego (initially in the chemistry department to circumvent nepotism rules), Burbidge spent 5 years in the Department of Astronomy at the University of Chicago. She was director of the Royal Greenwich Observatory (England) in 1972–1973, on leave from UCSD. Burbidge is now professor of astronomy in the Department of Physics at UCSD, and is director of the Center for Astrophysics and Space Sciences there. She and Geoff have a daughter, Sarah, who is a law student.

Margaret Burbidge's earliest research work concerned chemical abundances in stars of various types, and culminated in the now classic work by Burbidge, Burbidge, Fowler, and Hoyle (familiarly known as B²FH) on *Synthesis of the Elements in Stars*. Willy Fowler affectionately recalls a day in 1954 during his sabbatical year at the Cavendish Laboratory when a "wonderful Charles Laughton replica" (Geoff) walked into his office following Willy's colloquium on 3-α reactions and asked "why not work on problems important for astrophysics?" Margaret and Geoff had spent the previous year analyzing the spectrum of α^2 CVn. They concluded that the overabundance of some of the elements in the atmosphere was real and that somewhere, somehow, neutrons were involved. The work required that neutrons be produced in stars, not at the origin of the universe. With Fowler they produced the very attractive hypothesis that all the chemical elements might be cooked in stars, that is, neutron capture, with the neutrons produced in stars by (α, η) reactions. This initial work required the solution of integral equations, done by Margaret on an ancient Brunsviga hand-cranked calculating machine, called by Willy the "Babbage" machine.

Ultimately, B²FH brought eight nuclear processes into recognition: hydrogen burning, helium burning, the α-, e-, s-, r-, and p-processes, and the x-process, x for an unknown but necessary process to produce the especially difficult isotope of deuterium, and also lithium, beryllium, and boron. With this work as the basis, it is now possible in principle to reconstruct the way in which enrichment in heavy element content has proceeded in the interstellar medium, and in successive generations of stars in our galaxy.

As Fowler's return to the United States approached in 1955, he suggested that the Burbidges accompany him to Pasadena, Margaret to Mount Wilson Observatory as a Carnegie postdoctoral fellow, and Geoff as a research fellow at the Kellogg Laboratory at the California Institute of Technology. A letter to the director of the Mount Wilson Observatory elicited the response that the single toilet at Mount Wilson precluded awarding the fellowship to a woman. With their usual adaptability, Geoff, a theorist, took the Mount Wilson fellowship, and Margaret the Kellogg appointment. Not surprisingly, whenever Geoff went off to Mount Wilson to observe, Margaret "coincidently" appeared. Not until 1965 did a woman legally observe at the Hale



E. Margaret Burbidge

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Observatories and not until 1979 was a woman named a Mount Wilson Carnegie Fellow. Margaret Burbidge's concerns for opportunities in science for women and minorities have a very personal basis.

A second major direction of Margaret Burbidge's research concerns the internal dynamics and masses of galaxies. Starting in the early 1960's with observations made at the McDonald Observatory in West Texas (then jointly operated by the Universities of Chicago and Texas), she obtained spectra of spiral galaxies from which were measured the velocities of the ionized gas clouds in their nuclei and disks. She, in collaboration with Geoff and with Kevin Prendergast, ultimately deduced rotational properties and masses for 50 or so spiral galaxies. By 1970 most of the knowledge of galaxy dynamics came from studies by Burbidge and colleagues, and caused at least one scientist to thank the Burbidges in print for "several pounds of reprints" on internal motions in galaxies. Once again Burbidge had pioneered a direction that developed into a fruitful and decisive branch of contemporary astronomy.

For the past 15 years, Burbidge has continued her observational research programs at the Lick Observatory of the University of California, in collaboration with students, fellows, and colleagues worldwide. Redshifts of quasars, absorption lines in quasars, and the distribution of quasars in the universe, all questions at the frontier of our knowledge, occupy her current research interest.

With increasing frequency since the 1960's, Burbidge has acted on her belief that scientists must impart the wonder of science to the public, and must also address the problems of society and of the support for science. She has taken an active leadership role on many committees for space sciences, on setting scientific priorities, and she is now a member of the Committee on Science and Public Policy of the National Academy of Sciences. She is a co-investigator on the team to build the Faint Object Spectrograph for NASA's Space Telescope.

Burbidge's achievements have been recognized with honors, prizes, and honorary degrees. She shared with her husband the Warner Prize in Astronomy in 1959; she served as president of the American Astronomical Society 1976–1978; and she was elected a Fellow of the Royal Society of London in 1964; and to membership in the American Academy of Arts and Sciences in 1969. She was elected a member of the National Academy of Sciences in 1978, the only woman astronomer so honored, and to the American Philosophical Society in 1980.

Throughout her professional career, Margaret Burbidge has met each challenge with intelligence, with originality, with dedicated hard work, and with grace. Members of the AAAS can expect an active leadership during her presidency.

1980 Report of the Executive Officer

William D. Carey

Two events of special significance to the AAAS occurred in 1980. The first was the observance of the 100th year of our flagship journal *Science*, launched shakily by Thomas Edison in 1880 and formally denoted the official publication of the AAAS in 1900. The second event was the first anniversary of our new general readership magazine, *Science 80*, which found an appreciative and rapidly growing audience. Together, the journal and the magazine constitute our principal responses to the respective mandates to advance science and enrich public understanding of science and technology.

Now that *Science 80* (retitled *Science 81* to keep pace with the calendar) has put the AAAS in touch with a prime adult audience estimated to number about 2 million, we must do more than merely celebrate a publishing success. We have undertaken a task that is a difficult one: informing a lay readership about the concepts and methods of basic and applied science across the expanding spectrum, and thereby bridging the distance between science and citizen. It is a large order, calling for both editorial creativity and special regard for the position of the AAAS as the sponsoring organization. These counsels are well understood and followed by the editors and the editorial advisory board.

Beyond our publishing activities, we have a diversified agenda of programs and activities bearing upon science and technology policy, responsibilities and human rights of scientists, intergovernmental relations in science, public understanding, science education, international cooperation in science and engineering, assistance to Congress and the Executive, and opportunities in science and engineering for women, minorities, and the handicapped. While later parts of this report will spell out the scope and directions of these programs, a word is in order here regarding the troubled area of science and engineering education and citizen literacy.

For the past several years, hardly a meeting of the Board of Directors has failed to discuss the mounting evidence of decline in the extent and quality of precollege education in science and mathematics and to search for a stronger and more effective role for the AAAS in reversing the negative national trends. This role may well take the form of advocacy for science education and citizen literacy, taking full advantage of the platform that AAAS enjoys and working through our affiliated societies, to generate an effective public interest pressure for remedial action. It is not too much to suggest that a central preoccupation of the AAAS through this decade should be "advancing science and citizenship through education."

While the Association is displaying vigor in its activities, there are structural and administrative concerns that need to be addressed. Membership continues to grow slowly from year to year, but we are plagued by the annual loss of thousands of members for reasons that are not clear. Economic conditions may be a factor, but one suspects that this is not the whole explanation. The limited opportunities afforded members for active participation in our programs may be part of the problem. The absence of a network of area divisions and chapters of AAAS, together with the sparseness of lively opportunities by our 21 Sections, may be other contributing reasons. The weekly arrival of *Science* and the opportunity to go to the Annual Meeting or the

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