

*At a meeting of the FACULTY OF ARTS AND SCIENCES on December 7, 2021,  
the following tribute to the life and service of the late Arthur Edward  
Lilley was spread upon the permanent records of the Faculty.*

## **ARTHUR EDWARD LILLEY**

BORN: May 29, 1928

DIED: August 1, 2020

Arthur Edward (Ed) Lilley, a pioneer in the development of radio astronomy in the United States, was born in Whistler, Alabama, then an unincorporated town, near Mobile, on May 29, 1928. He graduated from the University Military School, a private preparatory school in Mobile, and entered Spring Hill College in 1946. After one year, he transferred to the University of Alabama and received B.S. and M.S. degrees in physics in 1950 and 1951 respectively. He had an early interest in astronomy but planned to go to the University of Chicago to study radiation physics. Donald Menzel, the renowned Harvard astronomer, visited the University of Alabama for the occasion of a telescope dedication, however, and encouraged Ed to apply to the graduate program in astronomy at Harvard. He was accepted and enrolled in 1951 and received his Ph.D. under Bartholomeus (Bart) Jan Bok in 1956.

Harold Ewen and Edward Purcell made the historic detection of the 21-centimeter wavelength transition of neutral hydrogen in 1951 with an antenna mounted in a window of the Lyman Laboratory of the Department of Physics at Harvard. This opened up a fertile new field of research into the study of gas in the interstellar medium, which was inaccessible to optical astronomy. Bart Bok immediately established an observational program for this purpose in the Department of Astronomy. His first two graduate students were Ed Lilley and David Heeschen, both of whom were critical to building a 24-foot telescope for the task. For his thesis research, Ed made the first measurement of the gas-to-dust ratio of hydrogen in the interstellar medium, a value still cited in the literature. Lilley and Heeschen were the first recipients of Ph.D. degrees in the United States in the field of radio astronomy.

After stints at the Naval Research Laboratory, where he was among the first to measure the absorption of hydrogen in the interstellar medium, and at Yale University, he returned to Harvard as a visiting lecturer in 1959, becoming an Associate Professor of Astronomy the next year and being promoted to full professor in 1963. He reinvigorated radio astronomy at Harvard when he joined the faculty. With his graduate students, he discovered the radio recombination lines of helium and carbon in the interstellar medium. He also studied the astronomical distribution of the molecule OH.

He and Alan Barrett of MIT were the principal investigators for the microwave radiometer aboard the Mariner II spacecraft, the first probe to visit another planetary body in 1962. The probe's measurements confirmed that Venus was a very inhospitable place for life and resolved a long-standing controversy about the disparity in the temperatures of its surface and its atmosphere.

Ed spent much of his effort from 1963 to 1972 designing and promoting a 135-meter radio telescope for general use in radio and radar astronomy at centimeter wavelengths. He was the executive director of the Northeast Radio Observatory Corporation (NEROC), which was formed to design the instrument. (NEROC exists to this day.) Competition for major new telescopes was fierce in that era and the instrument was never funded. The U.S. did not have a large, fully steerable telescope until the commissioning of the 100-meter telescope in 1994 at the National Radio Astronomy Observatory. Ed directed the Agassiz Radio Observatory in Harvard, Massachusetts, and oversaw most of the developments in radio astronomy at Harvard through the early 1980s. When the Center for Astrophysics (CfA) was formed in 1973, he was appointed an Associate Director, heading the Radio and Geoastronomy Division, a post he held until 1987.

In the 1970s he founded one of the early research groups to probe the millimeter wavelength part of the radio spectrum for astronomy. The group identified seven new molecules, which helped found the field of astrochemistry. Among these molecules was ethyl alcohol.

Ed was also interested in the characteristics of the earth's atmosphere that could be probed with radio astronomical techniques. He and his students built special purpose radiometers to study the water vapor and ozone in the earth's mesosphere.

The program in very long baseline interferometry at the CfA began under his stewardship. It has blossomed over the years into a major effort at the observatory. He was the director of Harvard's radio telescope near Fort Davis, Texas, from 1982 to 1994. It was a prototype element for the Very Long Baseline Array built by NRAO, which is still in operation.

Ed was awarded the first Bart J. Bok Prize in 1958, an early career award given annually to an outstanding graduate of Harvard's Department of Astronomy. He was an Alfred P. Sloan Foundation Research Fellow (1958) and a member of the American Academy of Arts and Sciences. He served on numerous advisory committees for NASA, NSF, and DOD.

Shortly after his retirement in 1996, he moved to Fort Davis, Texas, and subsequently to Bradford, Vermont, and Chevy Chase, Maryland. Foremost among his many hobbies was photography. He had earned spending money as a commercial wedding photographer while in high school and college. His early photographs of historic buildings in Mobile were used in Caldwell Delaney's book *Remember Mobile*, published in 1948. He specialized in black-

and-white photography and won many awards in juried shows during his retirement. While living in Fort Davis, he undertook a photographic study of the phenomenon known as the Marfa lights (a.k.a. the ghost lights of Texas). Although they have often been reported as UFOs, they are probably some sort of atmospheric refraction phenomenon involving automobile headlights or other lights on the ground.

Ed lived to the age of 92 even though he had a heart attack in 1965 at age 37. He was mentally sharp until the end of his life but increasingly debilitated by Parkinson's disease. He died unexpectedly and peacefully while sitting in his favorite chair on the evening of August 1, 2020. He had three daughters from two marriages, one of whom died in childhood. He is also survived by his first wife, Margaret Ezell, and by his longtime companion, Jean Andersen.

Respectfully submitted,

Giovanni Fazio  
Irwin Shapiro  
James Moran, Chair

---

Versions of this Minute have been previously published by James Moran as "Arthur E. Lilley (1928–2020)," *Bulletin of the AAS*, 53(2), <https://doi.org/10.3847/25c2cfef.f0f03140>, and "Historical Radio Astronomy Working Group - Biographical Memoir - A. Edward Lilley," National Radio Astronomy Observatory, January 29, 2021, [https://rahist.nrao.edu/lilley\\_bio-memoir.shtml](https://rahist.nrao.edu/lilley_bio-memoir.shtml).