

## **Variable Stars and Constant Commitments: the Stellar Career of Dorrit Hoffleit**

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**Abstract** The career of professional astronomer and AAVSO member Dorrit Hoffleit is summarized, highlighting her myriad contributions to variable star astronomy.

### **1. Early life**

The daughter of German immigrants Fred and Kate Sanio Hoffleit, Ellen Dorrit Hoffleit was born on her father's farm in Alabama on March 12, 1907. According to Dorrit, her father named her Ellen, her mother named her Dorrit, and in her words, "the woman in the house always has her way" (Larsen 2009). After a suspicious fire destroyed the family farmhouse when Dorrit was still an infant, Fred moved the family to New Castle, Pennsylvania, where he had been working as a bookkeeper for the Pennsylvania Railroad. The marriage eventually fell apart and Fred moved back to the farm by himself when Dorrit was nine years old.

Dorrit recounted that watching Perseid meteors with her older brother Herbert was an important step towards becoming an astronomer (Hoffleit 1994). As a child, Dorrit fell into her brilliant older brother's shadow, facing constant comparisons from teachers who were impressed with his natural talent for languages. Dorrit was deeply proud of her brother, who received a Ph.D. from Harvard in Classics at the young age of twenty-one, and subsequently became a professor at the University of California, Los Angeles. However, she later explained that "The contrast between my brother and me is an exemplification of the childhood tale of the tortoise and the hare. Herb learned quickly and achieved early in life. I was slow but deliberate and finally made the grade. It is hard to say whose influence was the greater on our respective students" (Hoffleit 1996).

### **2. Education and first astronomy work**

Dorrit was sent to Radcliffe College by her mother "so that her brilliant son wouldn't be ashamed of his 'dumb' sister" (Larsen 2009). At Radcliffe, Dorrit became a mathematics major as Radcliffe only offered two astronomy courses at the time. Dorrit experienced her first taste of independent research quite by

accident at Radcliffe when, after completing an assigned transit experiment at Harvard's student observatory, she continued to use the instrument to observe the motion of Polaris relative to the crosshairs. For her, it was a valuable learning experience, but she later wrote "I don't think my professor appreciated the educational value of that experiment. I think I got a lot more out of the pole star than I did out of what the thing was intended for. So you see, independence wasn't appreciated even then" (Larsen 2009). Dorrit graduated from Radcliffe cum laude in 1928 and began taking graduate classes at Radcliffe while looking for work. Through a classmate she landed a job as a research assistant at the Harvard College Observatory (HCO) for forty cents per hour, half of a man's salary. She turned down a higher paying statistician job to work there, and several times subsequently turned down other, higher paying offers because of her growing love for the HCO and respect for its Director, Harlow Shapley, whom Dorrit has lauded for encouraging independent thinking (Larsen 2009). Her original position was working as an assistant to Henrietta Swope, daughter of the president of General Electric Company. Henrietta had discovered a large number of variable stars, and her father was so proud of her that he funded the assistant position that Dorrit filled. Dorrit proved herself to be an expert discoverer of variable stars as well, finding approximately 1,200 while at Harvard.

At Harvard Dorrit came into contact with the American Association of Variable Star Observers (AAVSO), an organization of amateur and professional astronomers that had been founded in 1911 by variable star observer William Tyler Olcott in order to help the Harvard College Observatory collect observations of variable stars. Dorrit became an official member of the organization in 1930, and a life member in 1943 (Henden 2006). Of her eventual 450+ publications, her first two (published in 1930) were directly related to variable stars: the first was on variable stars in Centaurus, and the second was a collaboration with AAVSO Recorder Leon Campbell on the color curve of the variable star RV Centauri. Thus began Dorrit's lifelong love for the AAVSO and its members, an organization which she once explained to this author was "my favorite" and "the friendliest organization that I'm aware of, at least in astronomy" (Larsen 2009).

Dorrit completed a M.A. in Astronomy from Radcliffe in 1932, under the tutelage of meteor expert W. J. Fisher, as she put it, "the highest degree for which I felt qualified" (Hoffleit 1992). She continued her work on variable stars during the day and worked on independent research projects at night on her own time. A question that especially intrigued her was the possibility of compiling light curves for meteors (Hoffleit 2002). This led to a pioneering study of the light curves of meteors using the accidental photographs of meteors in the Harvard plate collection. She brought her completed paper to Shapley, who submitted it for publication (Hoffleit 1933) and then called Dorrit into his office, where colleague Bart Bok was also waiting. As Dorrit described it, Shapley said, "'We were wondering why you were not continuing to work for your Ph.D. Go back to your office and think it over.' I had never been particularly bright, and this

was the greatest expression of confidence in my abilities I had ever heard” (Hoffleit 1987). With more prodding from Bart Bok, Dorrit went back for her Ph.D. at Radcliffe, which she completed in 1938 with work on determining the absolute magnitudes of stars from their spectra. Part of this work was published in the *Proceedings of the National Academy of Sciences* (Hoffleit 1937). Her thesis was awarded the Caroline Wilby Prize for the best original work in any department by a student that year.

### 3. Astronomy career at Harvard College Observatory

Dorrit continued her work at the HCO as a research associate and then astronomer with permanent appointment, continuing her research on variable stars and other astronomical objects. She came into contact with some of the biggest names in astronomy and made a reputation for herself as a diligent worker. For example, Ejnar Hertzsprung sent her so many requests for observations of variable stars that Shapley had to finally put his foot down because it was taking too much time away from Dorrit’s Harvard assignments (Hoffleit 2002). However, Shapley did continue to funnel some individual requests for variable star observations to Dorrit. In a classic example of her sense of humor, she immortalized a request from Mount Wilson astrophysicist Rudolph Minkowski, for verification of a supposed nova, in a poem included in the pamphlet *AAVSO Humor* (Hoffleit and Overbeek 1984), which concludes

*On a plate of the given date / This lustrous star did glare at me;  
But when another plate I searched / The culprit from its place had lurched!  
To one old almanac it jolted me / And there the planet Uranus did be!*

At Harvard, Dorrit met and worked with many of the now-famous female “computers” and astronomers, including Antonia Maury, Annie Jump Cannon, and Cecilia Payne-Gaposchkin, all of whom made contributions of their own to variable star astronomy. But her favorite was undoubtedly Antonia Maury, with whom she became good friends (Larsen 2009). After Antonia’s death, Dorrit became a champion for her and the rightful place of her work in astronomical history, and wrote numerous articles about her friend. In her later years, Dorrit frequently reflected upon her experience working with these women, and in works such as *Maria Mitchell’s Famous Students and Comets Over Nantucket* (Hoffleit 1983), *Women in the History of Variable Star Astronomy* (Hoffleit 1993), and *The Education of American Women Astronomers Before 1960* (Hoffleit 1994) illuminated the important role played by women in astronomy. She also began writing popular level articles on astronomy, including work as an unpaid volunteer for *Sky & Telescope* magazine, authoring a column from 1941 to 1956. These short “News Notes” articles on recent discoveries and astronomical events numbered several per monthly issue, with the final total of nearly 1,200 individual items over her run.

During World War II, Dorrit, like many Harvard astronomers, became involved in “war work.” She felt more compelled than most to become involved because of her German heritage, and because during World War I young classmates considered her one of the enemy (Hoffleit 2002). In 1943 she took a leave from Harvard and began work at the Aberdeen Proving Ground in Maryland, preparing aircraft firing tables. There she found herself in a private war against gender discrimination. As an academic with a Ph.D., she was clearly eligible for a professional rating but was instead relegated to a subprofessional class even though she was assigned professional class work. This led to a conflict which Dorrit rates as a defining experience in her career. Dorrit eventually won her “war” with the military, achieved her deserved rank, and after the war returned to Harvard, but continued as a consultant at the Proving Ground until 1961 (see Hoffleit 2002).

#### **4. Dual careers: Yale and Directorship of the Maria Mitchell Observatory**

Dorrit’s life was drastically changed by Shapley’s retirement from Harvard in 1952. As she has described it, his replacement, Donald Menzel, did not apparently value independence and, much to her horror, began discarding sections of Harvard’s unique and valuable photographic plate collection in order to make more office space (Hoffleit 2002). He also played an important role in the AAVSO’s eviction from Harvard, a defining event in the history in the AAVSO. (For a more balanced historical view of these events, see DeVorkin 2006, and Williams and Saladyga 2011.) Dorrit believed its eviction from HCO to be the AAVSO’s “greatest blessing in disguise,” for it led to the AAVSO becoming “an important independent research organization” (Hoffleit 2002).

In spite of having a permanent position at Harvard, Dorrit was forced to follow her conscience and “defected” to Yale in 1956 where she worked on large astrometric catalogue projects and where, to her unhappy surprise, she was not afforded the same independence she had enjoyed at Harvard. In her own words, “when I came to Yale, boy that was a revelation” (Larsen 2009). Fortunately, at the same time, she was offered the Directorship of Nantucket’s Maria Mitchell Observatory. Due to the financial situation of the observatory, she held a split six month/six month appointment between Yale and Nantucket.

Dorrit’s two decades on Nantucket allowed her to encourage a new generation of astronomers through her summer variable star research program for undergraduates. Over the years 102 young women (and 3 young men) conducted research on approximately 650 variable stars, taking and analyzing photographs, identifying variables, and determining light curves. The result was over 200 new or revised periods (Mattei and Saladyga 1999). Dorrit proudly noted in her autobiography that over 100 papers were presented by her students at AAVSO meetings, and many of these presentations were published in the *Journal of the AAVSO* (Hoffleit 2002). In many ways the summer program

modeled a professional research institution, including weekly seminars and invited speakers. The success of this program goes far beyond the number of papers and presentations it yielded, for as Dorrit noted, at least thirty-five of her former students became professional astronomers and in her words “their achievements are a joy to behold” (Hoffleit 1987). To this day, being called “one of Dorrit’s girls” is considered a supreme honor.

One of Dorrit’s most beloved “girls” was Janet Akyüz Mattei, who assumed the responsibility of hosting the October 1969 meeting of the AAVSO on Nantucket at the last minute when Dorrit was unable to travel back to the island due to extreme fog. As Dorrit has often recounted, “my girl Janet had done such a marvelous thing running the meeting for me that when Margaret Mayall [Director of the AAVSO] was looking for an assistant...I got the two of them together again and Margaret of course grabbed Janet...and then when Margaret was ready to retire there were a half a dozen people who wanted her job and [Janet] was unanimously elected to that job, all because of the Nantucket fog” (Larsen 2009). It should be noted that Janet also made an equally deep impression on a young AAVSO member at that meeting, Michael Mattei, who became her husband.

Dorrit remained an untenured research associate and astronomer at Yale (supported entirely through grants—a feat she was especially proud of) even after her “official” retirement in 1975. Her main contributions at Yale include the first paper on the light variability of quasars (Smith and Hoffleit 1963), catalogues containing the proper motions of 30,000 stars (Hoffleit 1967–1970), and the third and fourth editions of the *Bright Star Catalogue* and its *Supplement* (Hoffleit 1964; Hoffleit and Jaschek 1982; Hoffleit *et al.* 1983).

## 5. Career achievements

Over her career Dorrit received numerous awards, including the Graduate Society Medal, Radcliffe College (1964), the Alumnae Recognition Award, Radcliffe College (1983), the Wedgwood Medallion of the Coat of Arms, Yale University (1992), the Glover Award, Dickinson College, Pennsylvania (1995), the Maria Mitchell Women in Science Award, Nantucket Maria Mitchell Association (1997), the George van Biesbroeck Award from the University of Arizona for outstanding service to astronomy (1988), the Annenberg Foundation Award from the American Astronomical Society for “service to the community in education” (1993), and the AAVSO’s William Tyler Olcott Distinguished Service Award (2002). She received honorary doctorates from Smith College (1984) and Central Connecticut State University (1998), and was inducted into the Connecticut Women’s Hall of Fame (1998). Asteroid *Dorrit* (3416) was named in her honor (1987).

Dorrit’s service to astronomy is impressive and wide-reaching; her service to variable star astronomy was perhaps nearest and dearest to her heart. Of her

approximately 450 publications, 41% were related to variable stars, and over fifty were published by the AAVSO (Hoffleit 2002). She served the AAVSO in many capacities, including President (1961–1963) and Council member (1943–1945, 1954–1958, 1977–1981, 1989–1993), hosting five AAVSO meetings while Director of the Maria Mitchell Observatory, and serving on the editorial board of the *Journal of the AAVSO*. She was undoubtedly the organization's greatest cheerleader (Figure 1).

In honor of her lifetime of accomplishments, Yale University hosted special symposia for her 90th birthday in 1997, and for her Centenary year in 2006. She continued to be active in research on topics of her choice until shortly before her death on April 9, 2007, at the age of 100, and often remarked of her later years “I have become as happy and independent as I had been in my youth at Harvard” (Hoffleit 1992). Those who knew Dorrit treasured her for her intelligence, work ethic, loyalty, sense of humor, and her hearty full-body laugh. I once asked her what she liked to do outside of astronomy—she replied without hesitation “eat and sleep,” and then laughed with gusto (Larsen 2009). She was a mentor to many, and a role model to many, many more. She will not be matched, and she is dearly missed.

## 6. Conclusion

I had the honor of introducing Dorrit when she was inducted into the Connecticut Women's Hall of Fame, and nominated her for the Honorary Doctorate she received from Central Connecticut State University. Dorrit liked my introduction of her at both events so much she included it in her autobiography, *Misfortunes as Blessings in Disguise*, and I conclude with these same words:

*It is a basic tenet of stellar astronomy that those stars which burn hottest and brightest and draw the most attention to themselves also burn out the quickest, rapidly becoming nothing more than fading memories. Meanwhile, those unassuming stars which steadily shine in the background, content to diligently produce energy at a more modest pace, continue to influence the universe with their light and heat for many generations to come. Such is the record of your long and amazingly productive career.*

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Figure 1. Dorrit Hoffleit, on left, with AAVSO Director Janet A. Mattei in an undated photograph.