

THE SELECTOR OF HIGHLIGHTS: A BRIEF BIOGRAPHICAL SKETCH OF HARLOW SHAPLEY

Dorrit Hoffleit

Department of Astronomy
Yale University
New Haven, CT 06511

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Abstract

From 1923 through 1956, almost every year at the Annual Meeting of the AAVSO, Harlow Shapley of the Harvard College Observatory listed what he considered the highlights of astronomy for the past year. A brief description of the life and activities of this friend of the AAVSO and of all amateurs is given.

On November 2, 1885, the day before the great supernova was discovered to have burst forth in the Andromeda nebula, twins were born to Sarah Stowell and Willis Harlow Shapley in Nashville, Missouri. One of the twins, Harlow, was destined to become one of the leading astronomers of his day (Bok 1972, 1978; Shapley 1969).

In 1910 Shapley received his A. B. degree from the University of Missouri, and in 1911 his M. A. Then he went to Princeton to study for the Ph. D. under the esteemed Professor Henry Norris Russell. His thesis, on eclipsing binary stars, has remained to this day basic to the analysis of such systems. After obtaining his degree in 1913, Shapley went to Mount Wilson Observatory, where he began his important investigations of globular clusters and was the first to apply the period-luminosity relation to the determination of their distances. Earlier Ejnar Hertzsprung (1913) had provisionally calibrated Henrietta Leavitt's apparent magnitudes in the Small Magellanic Cloud (Pickering 1912) to absolute on the basis of the radial velocities and proper motions of thirteen galactic Cepheids. Although greatly underestimating the distance, he proved that the SMC is an independent galaxy remote from the Milky Way. (Both Magellanic Clouds are our nearest extra-galactic neighbors.) The researches by Hertzsprung and Shapley opened the gates to knowledge of the dimensions of the Milky Way and the distances to remote galaxies (Struve and Zebergs 1962).

While at Mount Wilson Shapley also embarked upon stimulating studies of a quite different nature. A lover of nature in all of its aspects, he became fascinated by the activity he observed at the large ant hills he found during his walks. Thus he discovered that the hotter the day, the faster the ants travel. Shapley's interest in ants remained lifelong and he published a series of technical papers on the physiology of the ant. In about 1950, as a weekend guest at his New Hampshire home, eager to make myself useful, I was given a pair of garden clippers and instructed to "mow carefully" the high grass that had overgrown a precious gigantic ant hill, several feet across!

After seven years at Mount Wilson he was called to Harvard in 1921 to become the fifth Director of the Harvard College Observatory, a post held with distinction until his retirement in 1952. His predecessor, E. C. Pickering, with unexcelled foresight, had established at Harvard a photographic plate collection of vast proportions, covering the sky from pole to pole. There were few problems in astronomy to which this photographic library could not contribute some valuable data. To the new young Director this rich foundation provided stimulus for even greater

growth, and expansion of research projects and facilities was rapid.

Before becoming an astronomer Shapley had for a short time been a reporter. The techniques and habits of that calling he instinctively applied wherever he went: shorthand, quick sizing-up of personalities and situations, an eye and an ear for a scoop. Hence Harvard achievements frequently made news more promptly than could have been possible under a different type of leadership - an asset indeed to an administrator's ever-present need for fund raising. His shorthand he used habitually, and was even so fortunate as to have a secretary who could decipher it.

Shapley's instinct for news-getting led to his close association with Science Service, of which he was president for many years. Through this association he played a major role in the establishment of the Westinghouse-Science Service Science Talent Search, a bold venture, and a successful one for selecting high school students with special aptitudes in science to sponsor their college education. Participation in the selection of the young Science Talent Search prize winners had obviously been one of Shapley's greatest sources of pride and pleasure.

Encouragement of the amateur astronomer was another of his sidelines. In 1924 he helped organize the Bond Astronomical Club (named for the first Director of Harvard Observatory), whose members were laymen eager to keep informed on current advances in astronomy. They continued to meet at Harvard Observatory once a month throughout the academic year. Later Shapley also invited the Amateur Telescope Makers of Boston to hold their meetings and establish their workshop at the observatory. These amateurs proved their worth during World War II by building military optical equipment, and later by helping Harvard build newer instruments. These two groups of amateurs expressed their appreciation and admiration of Dr. Shapley at the time of his retirement at a gala picnic at the Agassiz Station, the observing site of the Harvard College Observatory established under his leadership in 1932. Amateurs have rarely paid more warm-hearted oral tributes to a professional than they did at the gathering of that occasion.

The AAVSO, which until 1953 enjoyed the hospitality of Harvard, had been founded by Pickering and amateur astronomer William Tyler Olcott. It had always been a strong link between the amateur and the professional, and under Shapley the bond was strengthened. Could anyone who attended a prewar AAVSO meeting ever forget the hospitality provided not only for the scientific sessions but also at the social gatherings, especially at the buffet luncheons served by Mrs. Shapley at the Residence or, when weather permitted, on the South lawn? Several older astronomers have confessed that an early moderate interest in astronomy was stimulated to professional endeavor by the contacts made at the AAVSO gatherings at Harvard.

To a leader with such versatile interests, spotting and recording highlights in astronomy was a natural undertaking. Once started in 1923 (but occasionally omitted), the highlights became the regularly anticipated attraction at the October Annual Meetings of the AAVSO. They were cited in reports of the meetings in *Variable Comments* (1924-49), *Popular Astronomy* (1939-1950), and *AAVSO Abstracts* (1954-56). Usually he picked about ten a year. Here are a few examples:

1930 - The Abbé Lemaitre's theory of the expanding universe, according to which the universe would double its radius once every 1400 million years. Milne's theory that white dwarfs are the cores of stars with central temperatures at 100 million degrees, whereby matter is converted to radiation.

1939 - H. Bethe's theory on conversion of hydrogen to helium at the center of the sun at 20 million degrees. The establishment of two new classes of galaxies by Edwin Hubble.

1940 - Praise for Hubble for the "greatest collection of photographs of galaxies ever made." (Shapley's complimentary comments on Hubble's work are in contrast to

his private confession to me that Hubble was one of his greatest enemies!)

1942 - The successful hunt by Science Service for promising young scientists. That year 40 scholarships were awarded to high school youngsters ready for college.

1946 - The Baker-Schmidt telescope for the Southern Station in Bloemfontein, South Africa, would be funded jointly by Armagh Observatory in Northern Ireland, Dunsink Observatory in the Republic of Ireland, and Harvard. (This was Shapley's own remarkable achievement for bringing representatives of two political enemy countries together for peaceful cooperation in research. Shapley, when changing planes at an airport had spotted DeVValera, introduced himself, and on the spur of the moment proposed the scheme for sharing the new telescope. Harvard did not have sufficient funding to keep the telescope running full time. The telescope was then named ADH for Armagh-Dunsink-Harvard.)

1948 - The dedication of the 200-inch at Mount Palomar.

1955 - The first installment of the Palomar Atlas.

With his typical sense of humor Shapley occasionally included a lowlight. For example, in 1939, "the appalling discourtesy of the Martians in neglecting to answer the radio message sent to them from the Amateur Convention in New York in August" (Seeley 1939).

At the 50th anniversary of the AAVSO in 1961 Shapley came back and gave a summary of 19 highlights that had occurred within those fifty years (Mayall 1961). With unprecedented modesty he failed to mention his own important achievements. In particular, it was he, in 1914, who had advocated that the then-prevalent theory that Cepheids were eclipsing binaries be replaced by the proposal that they are pulsating variables, a theory first initiated by August Ritter in Germany in 1873, as Shapley noted in his famous 1914 paper.

A pacifist at heart, Shapley worked ardently to alleviate the lot of refugees both before and after America became actively involved in World War II. Always keenly interested in people, he made a point of entertaining foreign visitors at Harvard. Their presence frequently enriched the regular scientific colloquia held at the Observatory. Through them the students were enabled to learn first-hand about research at other institutions.

None of the formal listings of Shapley's achievements seems to include one which is among his greatest. Before he came to Harvard, the observatory had been strictly, one might say narrowly, a research institution. No graduate courses in astronomy were offered at Harvard and no advanced degree in the field had been awarded. In a short time this was changed: the observatory became rich in student activity and thereby richer in research ideas. The first Ph. D. in astronomy was awarded to Cecilia Payne in 1925 (by Radcliffe College which was closely associated with Harvard University), the second to Frank Hogg in 1929. Thereafter there are few years not represented by at least one Ph. D. In all, fifty were awarded during the thirty years of Dr. Shapley's Directorship. In this period Harvard rose from a non-existent graduate department in astronomy to one of the foremost in the country. Of the fifty men and women who earned the degree, all but seven have remained active in astronomy; twelve later became directors of observatories.

Shapley's interest in students and assistants was not limited to their professional qualifications. While he required hard, serious work, he expected them to have outside interests as well. Parties at the Shapley's were invariably wholesome, gay, and original. They afforded him opportunities to discover whatever latent talents surrounded him. His finding the manuscript of Winslow Upton's "Observatory Pinafore", based on Gilbert and Sullivan but humorously depicting Harvard Observatory of an earlier day, led to an unforgettable performance of the operetta by the observatory staff at a Harvard meeting of the American Astronomical Society in

1932. His annual apple blossom picnic at the Agassiz Station always included baseball in which he took an active part.

Children he always liked. Visitors to his office, age 4 or under, were treated to a ride on his big circular desk. Designed by Pickering to be the equivalent of eight desks, it was pivoted so that any of the eight sections could be rotated to the position opposite his swivel chair. The desk made a marvelous merry-go-round for the youngsters.

In 1914 Shapley had married Martha Betz. As a student she had concentrated in medieval German. She also became a mathematician and did creditable astronomical research, especially on eclipsing binaries and meteors. The Shapleys had one daughter followed by four sons, all ultimately launched in professional careers. The daughter, Mildred Shapley Matthews, is an editor at the Lunar and Planetary Laboratory at the University of Arizona; the eldest son, Willis, who was for a time with the National Bureau of the Budget, is now an administrator at NASA; Alan is a director of NOAA at Boulder, Colorado; Lloyd is a highly gifted mathematician at the Rand Corporation in California; and Carl, the youngest, founded a college preparatory school in Italy, the Shapley School International.

After working many years with Dr. Shapley, I frequently suspected him of some sort of kinship with Shaw's Pygmalion - he seemed so able to transform people for the better. He seemed to have an instinctive appreciation of the potentialities of the young people who worked under him. A socially awkward, shy person, but with a will to work, ultimately found life at Harvard less awkward. A bit of a push here, skillfully directed criticism there, with a little judicious praise, finally converted poor speakers into good teachers or efficient research workers. Under less personally interested teachers, some might have given up too soon, others continued too long where they were unsuited. He had the gift for making a person yield his best.

As in all places where ambitions are great and curiosity about the unknown unlimited and overpowering, but where funds are desperately limited, dissatisfaction with remuneration was bound to occur at Harvard Observatory, at times even to a state of bitterness. Yet it is to Shapley's credit that the very people who complained most were the ones most loath to accept more remunerative positions proffered elsewhere, so intense was the incentive to research at Harvard, which offered facilities not available elsewhere. Somehow "work for the work's sake" was at least as important as the more worldly compensation. This, together with the prevalent feeling of good fellowship during his regime held the staff together throughout many a trying economic year.

Shapley officially retired, first from the administrative duties of the Directorship in 1952, then finally as Paine Professor of Astronomy in 1956. Although he had not taught undergraduate courses at Harvard, he had organized and participated in reading and research courses for graduate students (e.g., see *Harvard University Catalogue* for 1951-52), and provided much tutorial instruction to Ph. D. candidates for whom he was thesis advisor. In his first year of retirement from the Directorship he planned a course on Cosmography for the new undergraduate general education program of the University (Hoffleit 1951). In his first year away from Harvard (1956-57) he lectured at Smith College. He always did foster higher education for women. After retirement he took on a heavy schedule of lectures, many stressing the need to encourage young people in the pursuit of science. He continued to publish - between 1953 and his death in 1972 he published some 90 articles and wrote the following books:

The Inner Metagalaxy, Yale University Press, 1957.

Of Stars and Men, Beacon Press, Boston, 1958.

The View from a Distant Star, Basic Books, Inc., New York, 1963.

Beyond the Observatory, Scribners, New York, 1967.

Through Rugged Ways to the Stars, Scribners, New York, 1969.

Research is instinctive, and without end so long as there is life itself. A particular project may be brought to a close, but others born therefrom are always in the offing. Shapley remained to the end a dynamic and inspiring participant.

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Figure 1. Photograph taken in 1925 of Harlow Shapley (on left) and William Tyler Olcott.