Herbert Hall Turner

The Twenty-Second Bruce Medalist

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1927 Bruce Medalist

(photograph © Royal Astronomical Society, courtesy Peter Hingley)

In 1884 recent graduate H.H. Turner was continuing his studies in mathematics as a Fellow of Trinity College at Cambridge University. One of his examiners was Astronomer Royal William H.M. Christie, who had recently taken over the Royal Observatory at Greenwich and was anxious to modernize that staid institution. Christie offered the 23-year-old mathematician a job as his Chief Assistant, so Turner became an astronomer.

Although he would never be very handy with instruments, Turner was an excellent choice. He was energetic and industrious, and totally unpretentious—he had worked his way through Cambridge winning scholarships and mathematics prizes by day and playing whist all night. He quickly took up his duties, including supervising the large staff of older and more experienced assistants whenever Christie was ill or away.

Three years later, at the Astrographic Congress in Paris, eighteen observatories on five continents agreed to photograph and chart the entire sky to the same scale. Turner at once made a major contribution to the project, and to future sky mappers, by developing a mathematical method of transforming a star's positions on a plate (say x and y) to its true position in the sky, its right ascension (longitude) and declination (latitude). His simple linear method took care of geometry and effects of refraction in the earth's atmosphere as well as errors in the telescope, camera, and photographic plate.

Turner also found ways to speed up the arduous work of measuring each plate twice under high magnification and determining the stellar positions to go into the catalog. He did some observing himself so as to learn everything he could about the methods in use, and he became widely liked among the staff. So stuffy had the observatory been during the long reign (no other word will do) of Sir George B. Airy, that his colleagues were shocked when Turner brought along a banjo on the first of what would be many eclipse voyages.

Meanwhile, the octogenarian Savilian Professor of Astronomy at Oxford, Charles Pritchard, had bravely begun photographing his zone of what Turner called *The Great Star Map*. When Pritchard died in 1893, he left the second best observatory in the city of Oxford, an almost new telescope, one excellent assistant, Frank A. Bellamy, a dismal climate, and the commitment to take 1180 photographic plates, measure the positions of about half a million stars on those plates, convert those measurements to precise positions on the celestial sphere, and see that the resulting charts and catalog were published with as few errors as possible.

Elected to succeed Pritchard, Turner enthusiastically undertook the task. First he spent some time finding ways to make the task more efficient. He found that computing all positions to three decimal places instead of four would reduce the computation time needed by half. (Those were the days when "computers" were lowly employees armed with pencils and tables of logarithms.) He reported that, "at Oxford, under favorable conditions the places of nearly 200 stars (per hour) can be recorded in this way by a single measurer, if he has some one to write down for him the numbers he calls out."

He hired choir boys just out of school to do much of the measurement. One of his assistants was a gardener who measured plates during the winter. One assistant, H.C. Plummer, wrote, "He had a positive genius for exploiting unskilled or semi-skilled labour in the service of science." According to Bellamy and his niece Ethel, "His aptitude for and addiction to scientific work was so stimulating and guiding to others that one could not be long with him without being desirous to help him in his researches, or start some for oneself; in his presence, work and the expansion or trial of ideas seemed infectious, impelling others to think and work. . ."

Turner published some 180 papers in the *Monthly Notices of the Royal Astronomical Society*, many of them statistical analyses of the data obtained in the catalog project. Comparing visual (centered in the yellow) with photographic (mostly blue to ultraviolet light) magnitudes, he suggested in 1908 that limits could be put on interstellar absorption by measuring *interstellar reddening* (shorter wavelengths of starlight are scattered more than longer ones as light passes through the interstellar medium). He was also ahead of his time in explaining "star streaming." According to W. M. Smart, "Turner's suggested explanation, even if it was only of a qualitative nature, appears to have been the first to connect star-streaming with galactic rotation, the latter in the sense of individual stellar orbits described in the same direction around some centre."

Under Turner's lead, Oxford's zone of the Astrographic Chart was completely photographed, measured, and reduced by 1894, but it took many more years to obtain the funding for printing and to see it through the press. He then assisted other observatories which were having difficulties with their zones. Plates taken at the Vatican Observatory, for example, were measured by nuns, and then the measurements were sent to Oxford, where Turner oversaw the reductions and publication.

For years he tried to get the University to build him a house next to the observatory, "to enable the Professor to utilise every hour of clear skies." Most observatories had such houses, but he ran afoul of university politics and the rivalry with the better-endowed Radcliffe Observatory, which was also in Oxford but independent of the University.

Turner suggested that professors in locations poor for observing but with cultural advantages should trade places from time to time with observers in remote spots with better skies. For a time he thought his good friend, George Hale, might succeed in establishing such an observatory in the southern hemisphere, and he was eager to participate.

It was not to be. Turner never got his house, and he never got to work under clear skies. Instead he devoted his later years to organizing great cooperative projects, serving as an officer of just about every scientific society in Britain and the world, and writing and lecturing to the public. He wrote more than four hundred "From an Oxford Notebook" columns for *Observatory* and helped direct an extended education program in which courses were taught in the evenings to factory workers. He is generally credited with coining the term "parsec," for the distance at which a star would have a parallax of one second of arc. And it was Turner who transmitted the name Pluto, suggested by eleven-year-old Oxford resident Venetia Burney, to the Lowell Observatory, where it was ultimately accepted for the newly-discovered ninth planet.

One of Turner's many friends was John Milne, an Englishman who had helped found the emerging science of seismology in twenty years as a professor in Tokyo. On retirement Milne set up a bureau in his own home on the Isle of Wight, from which he collected and organized seismic records from throughout the British empire and beyond. When Milne died in 1913, Turner "temporarily" took over the task. Soon the Bellamys were working on earthquake data. Turner was one of the first to demonstrate that the earth has a liquid core and solid mantle, and at the last meeting of the Royal Astronomical Society he attended he "spoke of very deep-seated earthquake foci that he had elucidated, and their peculiar arrangement around the Pacific Ocean that may be more than accidental." [from an obituary by H. P. Hollis in *Observatory*.]

It was while presiding over the Section of Seismology of the International Union of Geodesy and Geophysics in Stockholm that Turner suffered a fatal stroke. In his will, directed to his many friends, especially in the Royal Astronomical Society Club, he wrote, "I venture to hope there may be some who will care to drink a glass to my memory. . . if anyone should desire to know my preference, then I say, 'let it be strong ale.'"

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