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WILLIAM LEWIS ELKIN

1855–1933

BY

FRANK SCHLESINGER

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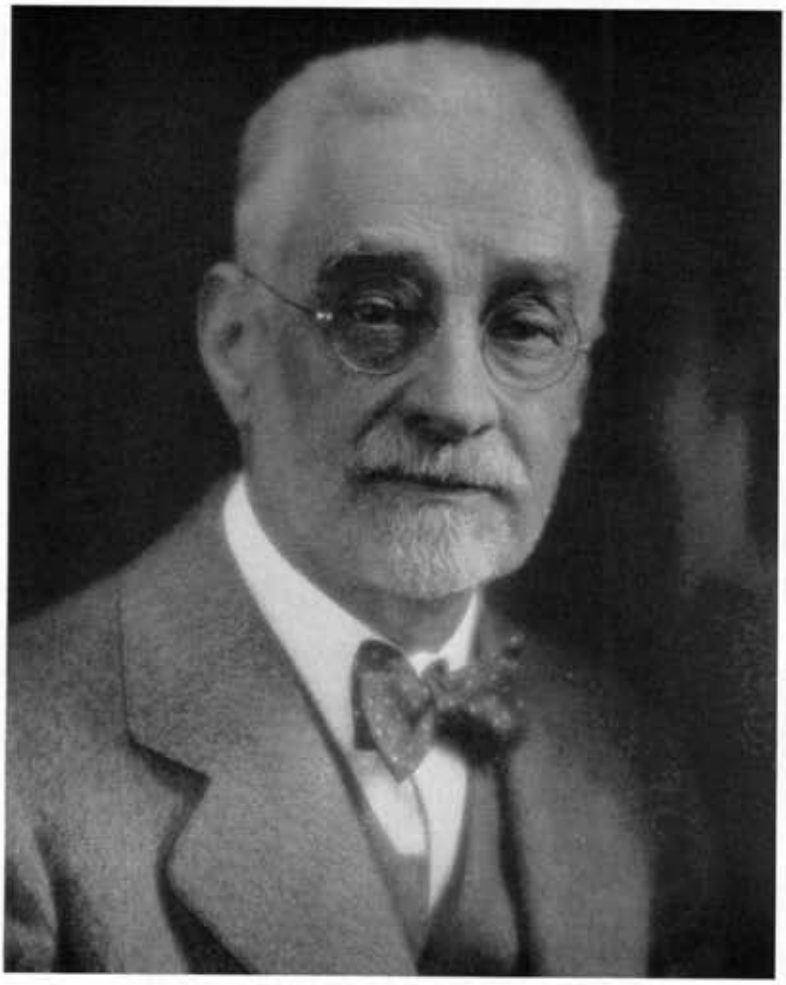

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William Lewis Elkin was born in New Orleans on the 29th of April, 1855. His father, Lewis Elkin (1815-1867), was a teacher and had kept a private school, but at the time of William's birth he was Inspector of Public Schools for the city. Shortly afterwards he went into the business of manufacturing carpets and this proved to be an unusually successful venture. William's mother, Jane (1826-1890), was the daughter of the Reverend John Fitch of Thetford, Vermont. (The name of this village of only a few hundred dwellers is already well known to astronomers as the birthplace in 1838 of S. W. Burnham, the great observer of double stars.) Jane Fitch came to New Orleans with her mother when a young girl, and there she was married to Lewis Elkin in 1846. Five children were born to them of whom William was the third and the only one to reach maturity, the four others having died in infancy.

In 1867 Lewis Elkin was appointed Commissioner for the State of Louisiana at the Paris Exposition. He was preparing to go abroad with his wife and his son when he suddenly fell ill and died within a few days. Close friends who were going to Europe prevailed upon Mrs. Elkin not to change her plans, and accordingly she and William left America for what they thought would be a matter of a few months. She did not return till seventeen years later, and William in this long interval made only two short visits to America. They lived in one country after another in Europe never remaining very long in any one. As a result William's early education was to say the least unusual in its variety. One consequence was to give him exceptional facility in modern languages. He spoke and wrote German and French as well as he did English, and could get along in Italian and Spanish. He also acquired a love and a wide knowledge of the music of all nations, and this afforded him a never-failing source of deep pleasure throughout his life.

In 1870, while they were in Switzerland, the boy (then fifteen years old) had a severe illness, probably dysentery. In after life he used to say that perhaps he never quite recovered from this attack. At any rate during most of the years to follow he was seldom in perfect health, and he was able to accomplish what he did only because of a careful husbanding of his energies, and as a consequence of the watchful care that first his mother and then his wife bestowed upon him.

In 1872 Elkin decided to become a civil engineer and entered the Royal Polytechnic School at Stuttgart in Germany, where he was graduated C.E. in 1876. In the meantime, however, he had acquired a liking for astronomy and decided to take it up as his life work. To this end he spent four years at Strassburg Observatory, then an astronomical center chiefly because of Winnecke, the director, who had the reputation of being the best teacher of astronomy of his time. Five other students who later made their mark in astronomy were at Strassburg with Elkin. They were Julius Bauschinger, who eventually (1909) succeeded Winnecke, and who after 1918, when Strassburg once more became Strasbourg, was appointed director of the observatory at Leipzig, surviving Elkin by only a few months; Karl Friedrich Küstner, discoverer of the variation of latitude, director of the Bonn Observatory; Ernst Hartwig, director of the Hamburg Observatory; Hermann Struve, director of the Berlin Observatory; and Friedrich Ambronn, Professor at Göttingen. Of these six notables the last survivor was Küstner, who died in 1936.

Elkin was graduated Ph.D. at Strassburg in 1880, his dissertation being on "The Parallax of Alpha Centauri." This is a discussion of all the information then available on this interesting system. The material is handled with admirable completeness and judgment, and the paper exhibits the same sterling qualities that Elkin's later work showed in such marked degree.

About a year before Elkin left Strassburg occurred one of those apparently trivial events that so often change the course of a career. This was a visit to Strassburg by David Gill, just appointed director of the Cape Observatory. Gill and Elkin

had both used the heliometer, and both had great confidence in its possibilities. This form of instrument afforded by all odds the most accurate method for measuring large arcs in the sky, and until the introduction of photography presented the only feasible method, though a very laborious one, for attacking the delicate problem of measuring stellar parallaxes. Gill and Elkin spent perhaps half an hour together during this visit at Strassburg. In those few minutes the two men conceived a deep admiration for each other, and laid the foundation for a friendship that played an important part in both their lives, a friendship that lasted till Gill's death thirty-five years later. In that half hour they found time to discuss the future of the heliometer. And most astonishing of all, Gill then and there extended to Elkin, who accepted without hesitation, an invitation to come to Cape Town and to stay there as his house guest for a term of years.

In December 1880, Elkin sailed for South Africa and arrived there early in 1881. A few months later we find Gill writing as follows to Elkin's mother, who was then at Stuttgart: "I had hoped to make your acquaintance when I was in Europe . . . for it seems a pity that I should not know the mother of my friend and companion. . . . Now, about your son: he is a fine fellow, just the man I took him for after my first half hour's conversation with him. He has true astronomical talent, enthusiasm and patience, and I believe will live to be an honour to you and his country. Personally my wife and I are much attached to him—his disposition is so lively and so gentle—his consideration for others' comfort so great that it is quite a pleasure on social grounds alone to have him with us—and he has quite won our hearts. My wife and I make a very Darby and Joan couple—we feared that any one living in our family circle would make some difference and affect our simple home life. We do not find this at all with your son; he understands our ways, and I hope and think he is comfortable. I think too I can honestly say he is looking stronger than when he came out, and you may keep your mind quite easy

about his welfare, till he has completed the important work which brought him here."

Elkin remained at the Cape for three years. In that time he and Gill made a weighty contribution to our knowledge of stellar distances. They measured with the utmost care the distances of nine first-magnitude stars. These were important in themselves, for accurate parallaxes were very rare indeed in the eighties. But still more important was the estimate they enabled the authors to make concerning what a serious attack on stellar parallaxes with the heliometer would be likely to yield with respect to quality and quantity. They concluded that a diligent observer could produce about sixteen parallaxes per annum, each with a probable error of 0″.020.

With the exception of the two heliometers at the Cape all other instruments of this type were at that time to be found in Europe, but when Yale Observatory was reorganized in 1881, chiefly through the efforts of H. A. Newton, the plans included a large heliometer that should be as perfect as it was possible to make it. Such an instrument was made by the Repsolds and was installed at New Haven in 1882. It still remains the only heliometer in the western hemisphere. As was very natural, Elkin was offered an appointment as "Astronomer in Charge of the Heliometer" at Yale. He accepted this office and moved to New Haven with his mother in 1884, remaining there until his death half a century later.

Let us stop for a moment to glance at the condition of American astronomy fifty years ago. This country had by no means attained then the position it now occupies. First of all, the facilities for training students in the sciences were far behind those abroad, as was only natural in a young country that had been chiefly occupied in establishing itself politically and economically. I believe I am right in stating that B. A. Gould (1824-1896) was the only American astronomer older than Elkin who received his training abroad, or indeed whose explicit training, wherever acquired, approximated in character and in thoroughness that represented by the degree Ph.D. Newcomb, Hill, Hall, Pickering, Newton, Langley, Chandler and others

of their stature and their time were all largely self-taught. In that day our great observatories, Lick, Yerkes and Mt. Wilson, were still in the future. In Canada, too, where three great institutions of this kind have since sprung up, there was then no observatory worthy of the name. Gould, after a stormy time at Albany, had gone to South America to establish what was to become the National Observatory of Argentina. Barnard was still at Nashville, discovering an astonishing number of comets. Burnham was at Chicago discovering an equally astonishing number of close double-stars with a small telescope. Pickering had recently come to Harvard and was beginning to make his colleagues a little uncomfortable by the revolutionary character of his work, measuring the brightness of every star he could reach and ascertaining the character of its spectrum. Newcomb and Hill at Washington and Newton at New Haven were devoting their energies to Celestial Mechanics and in that field winning the admiration of their colleagues the world over. Thus, while there was no lack of astronomical activity, the country was far behind in one of its most important branches, the one that includes the problems that depend for their solution upon the precise measurement of the places of stars and other objects, or as we should now word it, upon astrometry.

This was peculiarly Elkin's field, by choice, by training, by opportunity and by performance. Speaking at a meeting in Boston in 1896, Dr. Seth C. Chandler, editor of the *Astronomical Journal* and one of the country's leading astronomers, took this occasion to pay a tribute to Elkin's work. He coupled his name with that of George William Hill, and said:

"The work of each is of the very highest of its type. Both names belong to that small and most select class which any discriminative critic must include in an account of the contributions of the highest class made by Americans to the astronomy of the nineteenth century. Yet the works of both partake, each in its way, of that purely technical character which makes a descriptive analysis of them, for the purpose of securing for them an adequate and intelligent popular appreciation, a difficult task. It is for this reason that work like Dr. Elkin's so little appears in popular books, magazine and newspaper articles.

It contains no theatrical or sensational element. It requires painstaking study on the part of the writer and patient attention on that of the reader."

For his first work with the Yale Heliometer, Elkin decided to determine the relative places of sixty-nine stars in the Pleiades Cluster. This gave him an opportunity to test the heliometer in the measurement of long arcs, up to 6000″. The stars were first referred to Alcyone and then to each of four fairly bright stars removed from the center of the cluster. This constitutes a laborious piece of observing, involving the measurement of some 1400 position-angles and distances. The measures, reduced with all possible rigor, yielded relative places for these 69 stars that remained the standard for many years. By comparing them with the measures made by Bessel nearly fifty years earlier Elkin was enabled to derive the proper motions of 51 of them, and to say definitely which stars really belonged to the cluster and which were merely projected on that region of the sky.

Elkin next made a similar triangulation of the stars near the North Pole of the heavens. At his suggestion similar triangulations were made by other members of the staff of the cluster in Coma Berenices and, for the second time, of the Pleiades.

The work that Gill and Elkin had carried out on the parallaxes of southern first-magnitude stars, was next extended by Elkin to the ten northern first-magnitude objects. They confirmed the general result that these objects are in general not among our nearest neighbors in space and they indicated that large proper motion rather than brightness is a good indication of closeness. Elkin then set on foot and carried out with the cooperation of his assistants, Frederick L. Chase and Mason Smith, a comprehensive parallax survey of stars of large proper motion. Some of these stars were observed often enough to yield parallaxes with probable errors averaging 0″.015. Others were observed on only twelve to sixteen nights, and for them parallaxes were obtained with probable errors averaging about 0″.03; this would now not be considered a high degree of precision, but they were excellent for that day. Altogether 238

parallaxes were determined with the Yale Heliometer. These results constitute by far the most important single contribution to our knowledge of stellar distances up to that time. The writer had occasion to examine these parallaxes critically in 1923 in the course of the preparation of a general catalogue of parallaxes. He found that they were nearly free from systematic error, and that the probable errors assigned by the authors were on the whole very near the true probable errors, a somewhat unusual quality in any series, early or recent.

Beginning in 1888 Elkin once more collaborated with his friend Gill in an important undertaking. Some years earlier, Gill had made a determination of the solar parallax by observing Mars and from the parallax of the latter deducing that of the sun by applying the factor indicated by Kepler's laws. This work was carried out by means of a small heliometer, inferior in several respects to the improved and larger heliometers which could be procured some years later; and so, although the resulting value of the solar parallax was not one of high precision, it indicated the possibilities of the method. In 1888, then, with heliometers of the highest type available at the Cape and New Haven, Gill proposed to Elkin that they should make a new attack on this problem, with the important modification that not Mars but several selected asteroids be observed. Mars presents too large a disc to permit accurate bisection, while the asteroids are ideal in this respect. Elkin accepted this invitation with much enthusiasm and for several years he and Gill and their assistants observed the selected asteroids (Victoria, Sappho and Iris) on every suitable occasion. The results appear in Volumes VI and VII of the Cape Annals. They led to 8″.802 for the solar parallax with a probable error of only 0″.005. This is a great improvement over any determination that preceded it. Perhaps even more valuable than the parallax itself are the by-products of this research: the mass of the moon, the constants of nutation and aberration, the dynamic flattening of the earth, and the lunar equation.

Any one who has had to derive the proper motions of stars from their recorded positions in star-catalogues knows how

laborious an undertaking this is. For even a single object this task may easily consume the best part of a week. It is first necessary to examine scores of catalogues to see which ones contain the star in question and this is rendered difficult by the multiplicity of "equinoxes" to which these various catalogues are referred, making it necessary to compute the precession for each date. For catalogues published before 1900 at least twenty-six different equinoxes have been used. To lighten this work for astronomers, Elkin with admirable public spirit organized an ambitious project and carried it through with very meager assistance. He bound up with appropriate interleaves a complete four-volume set of the Bonn Durchmusterung, and upon these interleaves he indicated what stars appear in every available catalogue. Altogether 175 catalogues were examined in this laborious way and more than 900,000 star positions were indexed. With characteristic thoroughness the whole of the work was repeated independently and the entries made in a second similarly bound set of the Durchmusterung; the two sets were then compared. This Yale Index has played an important part in this branch of astronomy; many astronomers have made use of it and have profited by Elkin's foresight. The Index has recently been partly superseded by the Geschichte des Fixsternhimmels which not only indexes these star positions but actually reprints them reduced to a single equinox; up to the present time, the first 22 hours of right ascension have been published for stars north of the equator. For stars between the equator and declination 23° south the Yale Index continues to be as useful as ever.

There has been at Yale a tradition concerning the observation of meteors that goes back to the early years of the nineteenth century. Olmsted, Twining, Loomis and Newton have all contributed to this subject. Elkin was to continue this tradition. He began experimenting in the early nineties on the photography of meteors and he was so encouraged by these preliminary trials that he applied for a grant of $2,000 (a substantial one in those days) from the J. Lawrence Smith Fund of the National Academy of Sciences, for the construction of an instru-

ment especially designed for this work. The grant was made and the instrument installed on the observatory grounds in 1894. This consists of a long clock-driven polar axis to which any number of cameras could be attached. By mounting six of them at appropriate angles with respect to each other a large area of the sky was covered. The plates record the trails that correspond to their rapid flight across the sky. In order to record their angular velocities a wheel having an opaque sector and revolving at a known rapid rate was mounted so as to interrupt the exposures periodically and so the trails on the plate are series of dashes with short spaces between. In order to get the parallaxes of the meteors a similar but somewhat smaller instrument was set up at Hamden three kilometers to the north of the observatory, and the two sets of cameras were pointed to about the same part of the sky. (This supplementary station was later moved to Whitneyville, also several kilometers to the north of the observatory at New Haven.)

In the course of about fifteen years observing a fair number of meteors were recorded in this ingenious way. But on the whole this number was a good deal smaller than the preliminary experiments had led Elkin to expect, and this was a source of disappointment to him. However, the results actually obtained are of high value. Elkin has published a number of brief papers on this subject. No complete account has as yet appeared, but I am glad to be able to state that such an account is in press, through the kindness and under the editorship of a leading authority in this field.

H. A. Newton had been director of Yale Observatory from 1882 to 1884; during the following twelve years he continued to direct the scientific policies of the institution without stipend, as Secretary of the Board of Managers. The directorship remained vacant for twelve years until Elkin was appointed to it in June 1896, a few weeks before Newton's death.

During the first fifteen years or so of his connection with the observatory, Elkin made an astonishing number of observations for a man whose health was never robust, and with an instrument that is notoriously difficult to manipulate. A modern

heliometer has eight handles that must be operated with the arms held constantly above the head. In the late nineties, however, his health no longer permitted him to observe so steadily and thereafter, much to his regret, he observed only intermittently as circumstances permitted. His time and energy were of course well accounted for by administrative duties and with that large part of the work of the observatory that called for pencil and paper. But Elkin was one of those who maintained that the first duty of an observer is to observe, and his inability to carry out this policy to the letter troubled him not a little. As a result of this feeling he engaged an additional young assistant, trained him to observe with the heliometer, and for a long term of years paid his stipend out of his own pocket. But even this expedient satisfied him only temporarily and in 1910, when he was in his fifty-fifth year, he resigned his directorship. He was then eligible for a retiring allowance from the Carnegie Foundation, but he refused to accept one. He had sufficient means, he said, to satisfy the simple needs of his wife and himself, and he would not wish to deprive some other individual, less fortunately situated in this respect, of the benefits of the Carnegie Foundation. It has been authoritatively stated that this is the only instance in the history of the Carnegie Foundation of the refusal of a pension.

After his retirement Elkin's astronomical work ceased. He was able to keep up his reading in the science and follow newer developments like star streaming, galactic rotation and relativity. But his health did not permit him to indulge in a thorough study of any of these aspects of the science. Even to talk over these matters with former colleagues seemed to distress him, because he never lost his deep enthusiasm for the subject and such discussions soon threw him into a slight fever of excitement. His friends learned to know this and to avoid leading the conversation into these channels.

But he had many other interests that made his later years very full ones. Chief among these was his love of music. He was himself an excellent performer on the piano, often delighting his family and his friends with his improvisations. He lost

few opportunities to hear good music, and though he denied that he was a performer he did admit that he was an expert listener. Color photography, too, claimed his enthusiasm for some years, when the Lumière process was new. Throughout his life he was a careful reader of solid literature in several languages. In his day he had played a good deal of chess and whist (the old-fashioned whist and none of its modern descendants) but in later life he found these too fatiguing and turned to cribbage, vingt-et-un and solitaire. It amused him to keep accurate scores of these games and thus to establish their statistics. He was an expert motorist, understanding the car in all its mechanical details; this knowledge he delighted to place at the disposal of his friends and neighbors who availed themselves freely of it in a day when troubles of this kind were much more frequent than they are now.

One of Elkin's most striking characteristics was the accuracy of his memory and of his statements. This showed in his scientific work as well as in his every-day intercourse. If he was not sure of a thing, he remained silent about it; but if he made any statement concerning it one could rely implicitly upon its being well-founded. A life-long friend writes:

> "That accurate memory, flashing out in fields which should have been more mine than his! But if I was humbled, it was never because he humbled me. His offhand acquaintance with all sorts of subjects was so surprising as to be humorous."

When he withdrew from astronomy in 1910, he was convinced that his life was near its close, but he lived twenty-two years to enjoy his retirement. His wife devoted herself to his care and allowed nothing, however important, to interfere with this first consideration. When the end finally came, on May 30, 1933, it came quickly and without suffering.

He is survived by his widow, the former Catharine Adams of New Haven, to whom he was married in 1896. No children blessed this otherwise ideally happy union.

A number of distinguished honors came to Elkin unusually early in life. At the age of thirty-seven he was elected a Foreign

Associate of the Royal Astronomical Society of London, this honor being limited to fifty astronomers at any one time; at his death he was by seven years the senior associate in order of election. He was chosen a member of the National Academy of Sciences at the age of forty when the membership was limited to one hundred. Among other honors were the Lalande Medal of the French Academy and an honorary doctorate from the University of Christiana.

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