His varied interests were shared to the full by Lady Dyson, and truly may it be said that they both gave generous service—service worth the while—service that will be missed.

He married Caroline Best, daughter of Mr. Palemon Best, M.D.: she predeceased him in March 1937. Sir Frank died on 25th May 1939 whilst on a voyage from Australia to S. Africa, and was buried at sea. They are survived by two sons and six daughters.

And so we come to the end of what we do recall. It may be that we have missed much which might—and should—have been recorded. Time passes—and Greenwich may justly say that with the passing of the ninth holder of the office of Astronomer Royal, the distinction conferred in 1675 at the foundation of the Royal Observatory and the coming of Flamsteed, was handed down undimmed.—P. J. M.

Arthur Stanley Williams

Arthur Stanley Williams was born in Brighton in 1861. With his death on 1938 November 21 there passed from us one of the greatest of amateur astronomers, whose outstanding gifts as an observer, and far-seeing judgment as to the soundness of the methods he employed, will cause his name to take high rank among planetary observers, not only of his own day, but of all time.

Because of his retiring disposition, which led him, when the time came for him to abandon his professional career as a solicitor, to live almost the life of a recluse, one is perhaps too apt to associate Williams' astronomical activities with those of a generation that is gone; yet he remained a greatly valued observing member of our Jupiter Section, and continued his work on variable stars to within a very few weeks of his death. Indeed, it was only about a year previously that he had purchased a 9-inch reflector, which he employed for his most recent observations of Jupiter.

One of the outstanding features of Williams' achievements was the extraordinary modesty of his instrumental equipment. Before he acquired the 9-inch, nearly all his visual observations had been made with a 6½-inch Calver reflector, equatorially mounted, but without clock drive; while, after his retirement to St. Mawes, in Cornwall, the inconvenience of sending the mirror away for resilvering led him to carry on for long periods when, as regards light-grasp, it must have been singularly inefficient. Yet the faintness and difficulty of the planetary detail he recorded place him in a category worthy to share with Dawes the epithet of "eagle-eyed." As an example of his acuity of vision, one may recall that, as a very young man, Williams observed in 1880 the outbreak of rapidly moving dark spots at the south edge of Jupiter's North Temperate Belt; he also witnessed a recurrence of the phenomenon in 1891. When, in 1929, similar spots of a very delicate nature appeared for the third time, it was Williams who recognised their significance, made the preliminary

determination of their rotation periods and was the first to communicate their existence and character to the Director of the Jupiter Section.

The planets Mars and Saturn also attracted Williams' attention. Frequent references to his work are to be found in the Mars *Memoirs* of the Association, while on Saturn he found a continuously decreasing rotation period of the equatorial regions during the years 1891 to 1894 from his own observations of a number of spots on the Equatorial Zone. He also followed Barnard's spot of 1903.

But it is probable that his most valuable contribution to planetary astronomy is the work that he did, mainly on Jupiter, as a pioneer in the practice of making simple eye estimates of the transit times of spots across the central meridian, for the purpose of determining their longitudes and hence the rotation periods of the currents by which their motions are controlled.

It was over his insistence upon the adequacy of this method that a controversy arose with Professor G. W. Hough, Director of the Dearborn Observatory. Even if Hough was right in his contention that measurements made with a filar micrometer give more accurate longitudes than eye estimates, he seems to have entirely missed the point that the greater number of objects that can be recorded in a given time by Williams' method far outweighs any slight loss that the individual observations may suffer in accuracy; nor does he seem to have realised that features that may prove to be of the greatest importance in the revelation of surface currents may yet be so delicate as to be entirely obliterated by the web of the micrometer.

The publication by Williams in *M.N.*, 56, 143 (1896), of a paper entitled "On the Drift of the Surface Material of Jupiter in Different Latitudes," followed by Parts I and II of his *Zenographical Fragments*, was a complete vindication of the method he had advocated; and since the power of the method was immediately appreciated by the Rev. T. E. R. Phillips, the estimation of transit times has formed the most important side of the observational programme of our Jupiter Section from the time when he first became its Director in 1901.

To-day we are all accustomed to speaking of the N. Tropical current, the S.S. Temperate current and so on, on Jupiter. But, whereas the rapid drift of the equatorial markings had long been known, it is to Williams that we owe the recognition of the permanence of the other currents, each in its appropriate latitude.

In the discussion of planetary observations one of the questions that particularly interested Williams was that of possible periodicities. In a study of the colour of Jupiter's two great Equatorial Belts he was able to make out a good case for variation in a period approximately equal to that of the planet's revolution around the Sun. In this, as in his work upon the surface currents, he made a diligent search through the records of past observers, combining these with his own observations. When all the data had been collated, he found a strong indication that maximum redness of one of the belts coincided

with minimum redness of the other, the full period being of the order of twelve years. His conclusions in this field seem, however, to be less secure than are the results of his work on surface currents, and it will be for future observations to show whether the variations in colour that he found are of a truly periodic nature.

In addition to making observations of the planets, Williams gave a great deal of time to the study of variable stars. During a visit to the southern hemisphere in the "winter" of 1885–86 he devoted a considerable amount of time to the determination of visual magnitudes. The results of this survey, in which his only optical aid was a pair of opera glasses, were published in 1889 as "A Catalogue of the Magnitudes of 1081 Stars lying between $-30°$ Declination and the South Pole." It was in the course of these observations that he detected the variability of the now well-known eclipsing binary V Puppis in a period of 1·45 days; and this was doubtless partly responsible for the zeal with which he went on to discover many other variables after his return to England, though it was some years before he could find the time to embark upon a systematic search for these objects, owing to absorption in his planetary studies.

But when, in the year 1901, he decided to undertake such a campaign, he met with the success that comes only to a man of outstanding ability, whose nature it is that he spare no effort to achieve the utmost with the means at his disposal.

For the detection of variability he would compare negatives made with a 4·4-inch portrait lens, which he attached to his equatorial and drove by hand. The suspected stars were then followed with the 6½-inch reflector for the determination of their light curves and periods; and it is characteristic of the man that he did not leave the reduction of his observations to others, but took a pride in deriving the best elements that were possible from his own work, with the result that he has given us periods and light curves of a very high order of accuracy.

Among his discoveries may be mentioned Y Lyræ, a star of the antalgol type, from observations of which he was able to show that the light curves of these stars may change from cycle to cycle; Y Aurigæ, a cepheid with a period of only one day; YZ Aurigæ, also a cepheid, with a period of 18 days; WY Tauri, an eclipsing variable with the extremely short period of 0·346 days; the now well-known irregular star RX Andromedæ and several stars of long period.

When a variable, having a period that is close to one day, is observed at about the same hour each night, the magnitudes, when plotted, may indicate quite a long period. In order to avoid this error Williams would observe newly discovered stars several times during the same night, and it may be that this extra precaution was partly responsible for his success in the discovery of stars of short period.

A chance but valuable record of his camera is the absence of any image of Nova Persei 1901 on a plate exposed from $10^h\ 11^m$ to $11^h\ 27^m$

G.M.T. on 1901 February 20, only about twenty-eight hours before it was discovered at magnitude 2·7 by Anderson at $14^h\ 40^m$ on February 21. He took a keen interest in this star and followed it carefully until 1911. The persistence of its variability led him to stress the importance of recording the behaviour of novæ in their later stages, in the hope that the nature of the variations, which many of them continue to exhibit, might throw some light upon the physical nature of these outbursts.

Williams was an enthusiastic amateur yachtsman and delighted in making long and often solitary cruises in his six-ton yacht *Ben-y-Gloa*. In 1914 he was awarded the Claymore Cup of the Royal Cruising Club, and in 1920 the Challenge Cup for a single-handed cruise from Falmouth to Vigo and back. It was his practice to sail at night and to heave to during the day for sleep. Was this because he loved the company of the stars?

On his retirement to St. Mawes he elected to live on a barge, in which he sometimes went cruising during the summer. Close to her berth in the harbour stood his little observatory. During the last few years of his life his hours at the telescope were necessarily dependent upon the clemency of the night air; and it was perhaps for this reason that about eighteen months before his death he moved his abode and his observatory to Feoch, near Truro, where he might expect to suffer less keenly from exposure.

On 1938 November 25 the steamer *Roseland*, in heavy weather such as in his younger days must often have tested his seamanship and thrilled his yachtsman's soul, bore his body to a point about six miles off Falmouth. Here the engines were stopped, and after a short service, conducted by Rev. L. A. Fereday, pastor of Falmouth Baptist Church, Stanley Williams was committed to his last resting-place in the sea he had loved so well.

He was an original member of the B.A.A. and had been a fellow of the Royal Astronomical Society since 1884. In 1923 he was awarded by the Society the Jackson-Gwilt gift and medal. It is of interest to note from the remarks of the President when announcing this award, that even in 1923 he regarded the medallist's ability to make useful determinations of longitudes on Jupiter without the aid of a micrometer as something of an achievement!

Williams never married; but he is survived by a sister and some nephews and nieces.

For the loan of the photograph that appears in this number the Association is indebted to the kindness of M. E. M. Antoniadi, who writes that he received it from Williams in 1895.