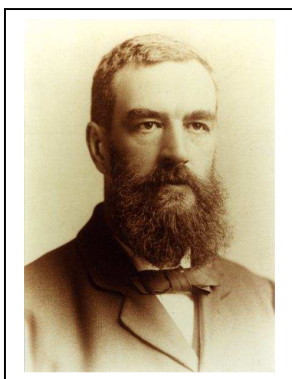


# The Franklin-Adams Telescope

*I.S. Glass (SAAO)*

## Introduction

John Franklin-Adams 1843-1912 was one of a small number of extraordinary (and wealthy!) 19<sup>th</sup> century British amateurs who made important contributions to astronomy, including Nasmyth, De La Rue, Carrington, Roberts and Huggins.



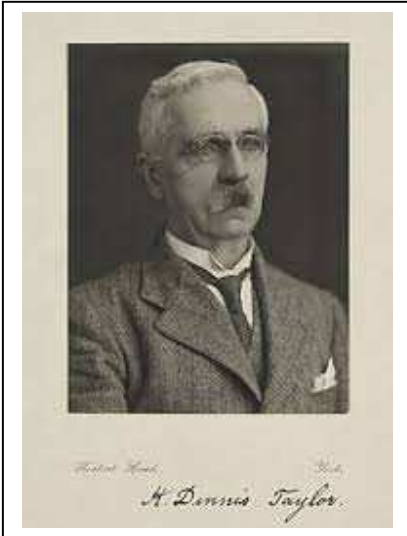
By profession he was a senior figure at Lloyds insurance. He became seriously interested in astronomy quite late in life, around 1890. In 1897 he established his first observatory at his holiday house in Scotland. This was well-equipped, housing a variety of instruments.

*Left: John Franklin-Adams (1843-1912)*

Following discussions with David Gill and other astronomers, he decided that the most useful contribution he could make to astronomy would be to undertake a photographic survey of the Milky Way. He later expanded the project to cover the whole sky, resulting in the *Franklin-Adams Sky Survey*, published in the end by the Royal Greenwich Observatory in 1914.

## Interaction with H Dennis Taylor

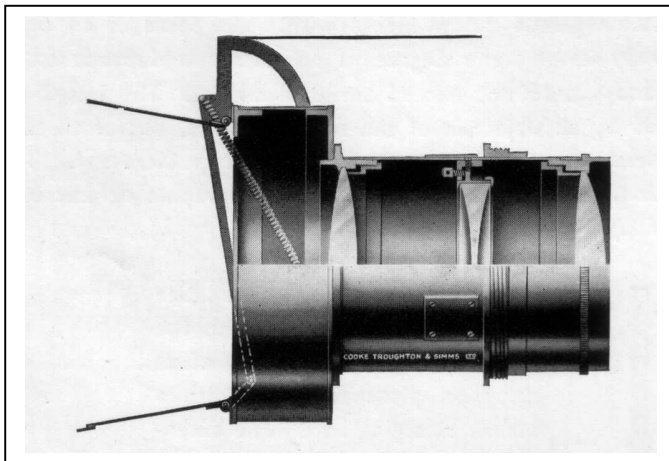
Around 1898 he obtained a 6-inch f/4 wide-angle camera from the Thomas Cook and Sons Company. This was designed by the famous optician H. Dennis Taylor (1862-1943). He was soon, however, dissatisfied and had it reworked to f/4.5 to achieve better performance.



*Left: H. Dennis Taylor (1862-1943)*

Shortly afterwards he got Taylor to design a 10-inch camera which gave good images over 12 x 12 inches, though capable of covering 18 x 18 inches with “fair” images. Its focal length was 44.2 inches. The design of this lens was described in detail by H.D. Taylor (1904) himself. It was delivered in 1903 and weighed 100 lbs (Franklin-Adams, 1904). Its design was highly innovative. No wide-angle lens of such high performance had

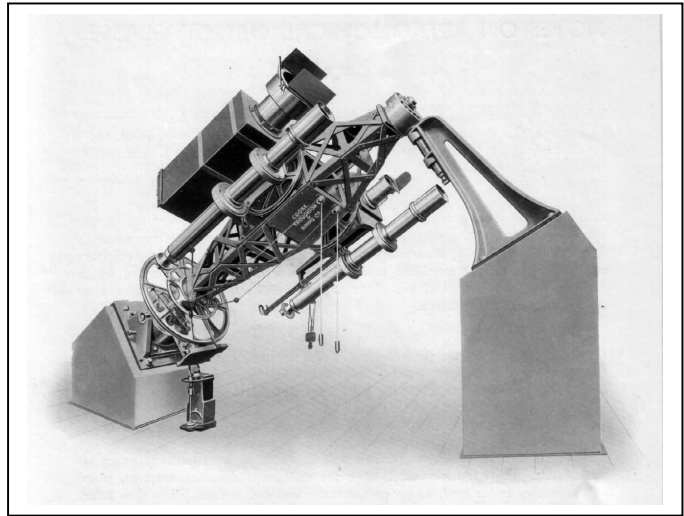
been constructed before.



*Left: The 10-inch photographic objective. The outer components were of barium silicate crown glass and the inner was a flint glass. (From a Cook, Troughton and Simms Catalogue of about 1930).*

He commissioned a rigid English mount from the Thomas Cook company, capable of supporting his 6- and 10-inch lenses and having two 6-inch guide telescopes. It was designed by Alfred Taylor (1904). Unlike most telescopes of the time, this one avoided the use of sectors and had a continuous RA drive worm, 43 inches in diameter with 1080 teeth. The declination axis had a worm wheel 27 inches in diameter, also with 1080 teeth. The RA drive was constructed by Repsold. Another innovation was that ball bearings in swivelling frames were used to hold the RA axis. The mount and lens weighed 2¾ tons.

*Right: Engraving of the telescope from a Cook, Troughton and Simms Catalogue of about 1930. This shows both the 10-inch and 6-inch cameras mounted.*



A wooden building with internal dimensions 12' 6" x 20' 6" was constructed to house the telescope. The walls were erected on a low concrete foundation. A two-piece sliding roof with each piece supported by four rollers ran along rails on top of the walls and extending 10 feet beyond. The roofs could be opened symmetrically or both towards the same side so that all parts of the sky could be observed without hindrance.



*Left: The telescope in its original wooden building, location unknown (from Vermeulen, 2006).*

### **The telescope at the Cape**

At Sir David Gill's invitation, he sent the telescope and building to the Royal Observatory, Cape, in 1902. It was mounted in the NW part of the grounds (the location is shown on old maps of the Observatory). His assistant, Mr G. N. Kennedy came out in 1903. During the dark of Moon, they made 2-hr exposures on 12" x 10" and 15" x 15" plates. Franklin-

Adams, who suffered from rheumatic complaints, would spend the bright of Moon at the warm baths in Caledon.

### **The telescope back in England**

In Spring 1904 the telescope and housing were shipped back to England and re-erected at Franklin-Adams's new observatory, called Marvel Hill, in Hambleton. Here the northern part of the sky survey was completed during the next few years. The 6-inch lens was sent to the Royal Greenwich Observatory, where it seems to have remained.

By 1909 Franklin-Adams had become seriously ill. Further, it was found that the Cape photographs had not been up to standard. The telescope as it had then stood was insufficiently stable and lacked proper means for adjusting the lens and plateholder to make it give its best performance. Thus it was decided that the southern plates would have to be repeated.

### **The telescope in Johannesburg**

In 1909 the telescope was sent to the Transvaal Observatory (later known as the Union Observatory and after that as the Republic Observatory) under the care of an assistant, Mr R.J. Mitchell. Its site is indicated on a photograph in Vermeulen (2006, p. 113). However, Mitchell did not stay very long and Mr H.E. Wood of the Transvaal Observatory took over the task under the direction of R.T.A. Innes. This work started in April 1910.

Wood also took 50 fine photographs of Halley's Comet during its 1910 appearance (Hers, 1987).

The Atlas programme was completed successfully in short order.

Franklin-Adams died in 1912 (Gill, 1912). The plates to be used for the Franklin-Adams Sky Atlas were sent to the Royal Greenwich Observatory and a limited edition of the Atlas was issued in 1914. A copy of this exists

at the SAAO in Cape Town. The Atlas comprises 206 photographic prints. The original plates were 15 x 15 inches square on a scale of approximately 20mms per degree. The reproductions were on a “slightly reduced scale”, and were 10½ x 10½ inches, covering about 17° x 17°. The scale was about 4 arcmin/mm and the stellar images were several arcsec wide.

Wide-angle astrographic lenses such as this one were rendered obsolete by the cameras invented by Bernhard Schmidt (1879-1935) in 1930. The large post-WWII Schmidt cameras such as that at Palomar had fields of 6° x 6° and plate scales of around 66"/mm.

### **Innes's discovery of Proxima**

The most celebrated result from the Franklin-Adams telescope was the discovery of the nearest star, now called Proxima Centauri, by RTA Innes in 1915 (see Innes, 1915).

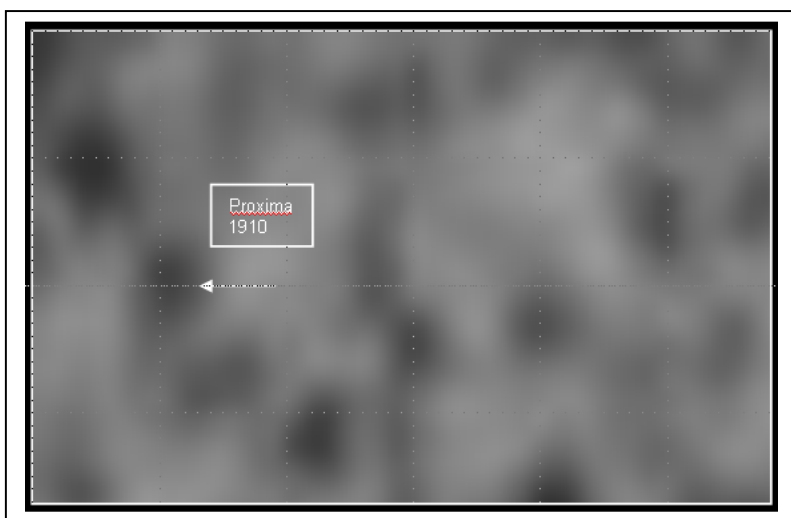
For his first epoch, Innes made use of plate no 20 from the Atlas, taken on 10 April 1910. However, he did not have the original and had to work from a positive print. He remarked that the images of the stars were a bit elongated and swollen, so that that of the star now known as Proxima and another nearby star of similar magnitude all but coalesced.

The second plate of the region was taken on 9 July 1915. By this time, Proxima had moved about 19 seconds of arc. This second plate was blinked against the first one and the change would have been conspicuous. Nevertheless, without the use of the blink technique it is doubtful if he could have found this star. Innes wrote in his paper dated October 5 1915:

“The area swept over was about 60 square degrees and, although the search was not exhaustive, because the character of the images would not justify the investigation of every unusual object, it took about 40 hours. ...

The strain on the eye is pretty severe; actually the 40 hours were spread over a fortnight”

Looking at the Atlas image of the Proxima Cen region one cannot help admiring Innes’s patience! Though the telescope has a very large field, the stellar images are quite large compared with those seen in modern sky atlases made with Schmidt telescopes.

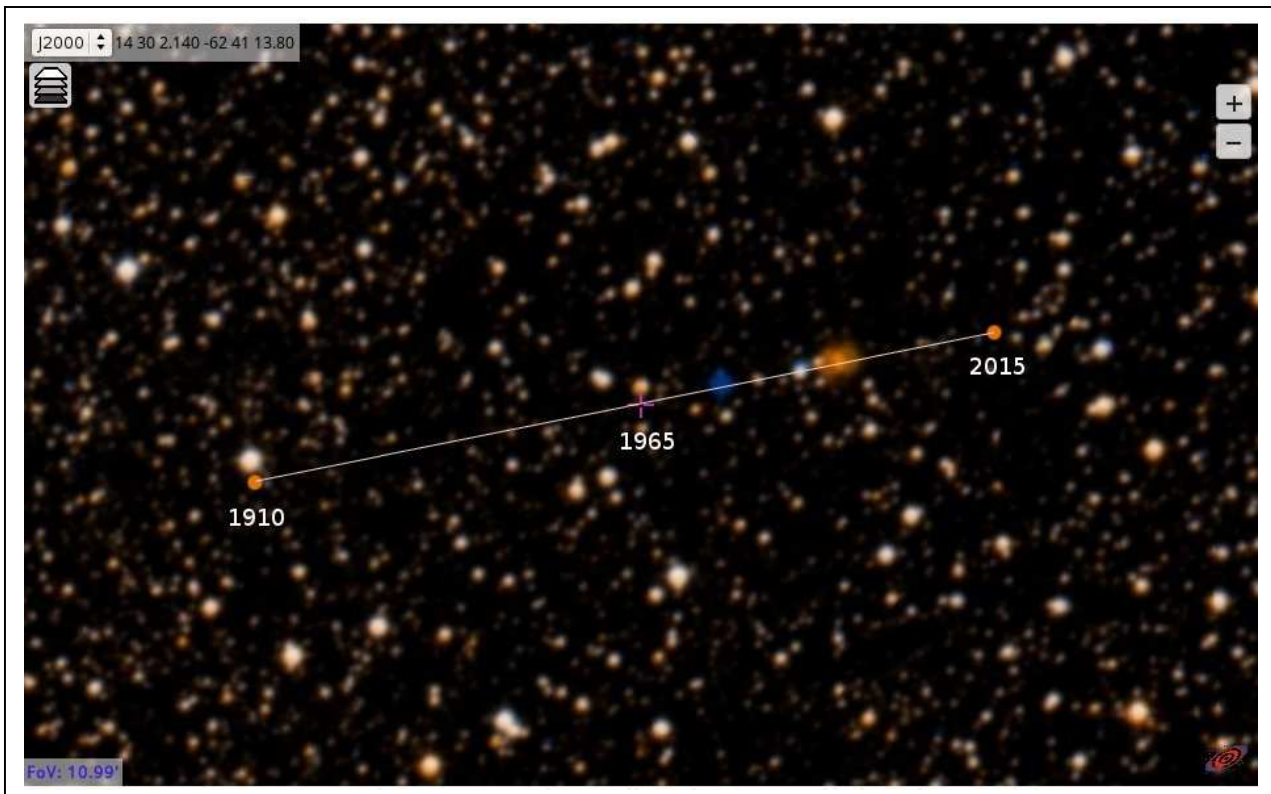


*Left: Approx 120x enlargement of the 1910 Franklin-Adams Atlas image containing Proxima Cen. The area covered is about 10 x 7 arcmin. The size of the stellar image is about 20-30 arcsec across and at this time Proxima was almost on top of another star.*

At this time of discovery, Innes referred to the star as “A faint star of large proper motion”. He did not actually name it “Proxima” until 1917 (see Innes, 1917).

### **Subsequent history of the telescope**

From 1919 to 1938 a new series of 559 charts of the sky south of  $-19^{\circ}$  was prepared by Innes and Wood and published as half-tones. These are known as the “Union Observatory Charts” and, together with the Franklin-Adams Atlas, were the main source of finding charts used by southern hemisphere astronomers before the ESO Schmidt charts became available in the 1980s.



*Above: A composite Schmidt-based colour image of the region of Proxima, showing how it has moved between April 1910 and January 2015. This image (based on CDS Aladin) covers approximately the same area of sky as the previous one but has much higher resolution. The coloured images of Proxima around 1975-1985 show where it was during the ESO and SRC sky surveys. On account of its low temperature, its blue mag is about 13. It is most conspicuous in the red with R mag about 9.5.*

In 1923, Leiden Observatory entered into a cooperative agreement with the Union Observatory. By 1957 they had acquired 12,000 plates with the Franklin-Adams telescope according to van Herk & Kleibrink, (1983).

Vermeulen (2006) mentions that a 10-inch photographic telescope of 92 inches focal length was at one time mounted on the Franklin-Adams mount. This instrument was later in Sutherland, attached to the 30-inch telescope, though little used.



The annual report of the Union Observatory for 1950 (van den Bos, 1950) mentions that the original drive motor was replaced with a synchronous one in 1946.

In August 1954 the Franklin-Adams was moved to its present site in a brick building at Broederstroom, close to the Hartebeespoort Dam. This was an annexe of the Leiden and Union/Republic Observatories. Photographic plateholders were made for 8" x 8" plates (Vermeulen, 2006). A second camera was attached at the time to the mount, with a 3 1/2-inch diameter lens and a focal length of 20 inches. This is no longer on the telescope.

In 1971, the Republic Observatory was merged with SAAO but J.A. Bruwer continued to take plates of minor planets and comets with the Franklin-Adams telescope until he retired about 1978. Subsequently, in 1978, the Broederstroom site was transferred to the Pretoria Technikon, now part of Tshwane University of Technology. It now used for team-building exercises.



David Blane recalls “the last time telescope was used was when a team of us, working with the late Prof. Wargau from UNISA, took a series of plates of SN1987a”.

*Left: Group visit to the telescope at Toppieshoek on 17 April 2015 (photo: Chris Stewart).*

On 17 April 2015 a group of ASSA members – David Blane, Lerika Cross, Chris Stewart and myself, with Hubert Mathebula from SAASTA, visited the Broederstroom site, now called Toppieshoek. We noted that the



Franklin-Adams telescope and the Rockefeller twin 16-inch telescope (formerly owned by Leiden Observatory) appear to be in surprisingly good order in spite of being quasi-abandoned for several decades, thanks to the interest of the Facility Manager, Mr François de Jager.

Note that in 1912, Franklin-Adams also donated a 6/7-inch photovisual telescope to the Union Observatory.

## References

Franklin-Adams, J., 1904. *Mon. Not. Roy. Astr. Soc.*, **64**, 608.

Franklin-Adams, J., 1915. *Mems. Roy. Astr. Soc.*, **60**, 141.

Gill, D., 1912. *Observatory*, **35**, 330.

Hers, J., 1987. *Mon. Notes Astr. Soc. S.A.*, **46**, 17.

Innes, R., 1915. *Union Observatory Circular* No. 30.

Innes, R., 1917. *Union Observatory Circular* No. 40.

Taylor, Alfred, 1904. *Observatory* **64**, 624.

Taylor, H. Dennis, 1904. *Observatory*, **64**, 613.

Van den Bos, W., 1950. *Mon. Not. R. astr. Soc.*, **110**, 155.

Van Herk, G. & Kleibrink, H., 1983. *De Leidse Sterrewacht*, Wanders, Zwolle.

Vermeulen, D.J., 2006. *Living Amongst the Stars at the Johannesburg Observatory*. Chris van Rensburg Publications, Johannesburg.