

## Variable stars in South Africa - An historical review

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Looking through the ASSA records one might well be forgiven for thinking that there were no South African amateur observations of variable stars before 1917.

And this impression would be quite wrong, because in 1882 a young man, Alexander William Roberts, was sent out by the Free Church of Scotland to South Africa to do educational work among the black people at Lovedale College in the Eastern Cape, with the added hope of observing the southern sky as a hobby. He was already well acquainted with Gould's *Uranometria Argentina*, and noting that Gould had discovered 14 southern variable stars he determined, after considerable correspondence with Gould and Pickering, and later with Gill at the Cape, to erect a small observatory at Lovedale for the single purpose of studying southern variables.

In those days Lovedale must have been right in the wilderness, and Roberts had to work under extremely primitive conditions. Accommodation was so cramped that his wife had to do cooking on a tripod out of doors.

In spite of the fact that his days were fully occupied, he worked night after night, often sleeping barely three hours in twenty four, and sometimes no sleep at all. He had no charts of southern variables to guide him – in fact, very few were known – and his first task was to make charts and find variables to observe, initially with just a second hand theodolite of one inch aperture, and a pair of field glasses.

After two years of what he called 'probation' Roberts started work in earnest in 1891 and only stopped in 1897 when over-work made it necessary for him to return to Scotland to recuperate. Here his extensive correspondence with Gill was to prove specially productive as it opened doors for him at the Royal Observatory in Edinburgh.

But soon he was back again in South Africa. In the meantime Gill had been lobbying the University in Cape Town to grant Roberts its first honorary D.Sc. and this was awarded him in July 1899.

Although the one inch aperture was probably quite adequate as only the brighter stars were observed, Roberts found that this measure was seriously affected by position angle errors, i.e. in those cases where the line joining the two stars differs from the horizontal. One would of course in normal cases always try to observe only when the two stars are seen horizontally, but in practice this is not always possible. Roberts therefore made a special study of this problem, trying to devise ways in which it could be minimised.

In 1900 however he was fortunate to receive a special new telescope, of Gill's design, which was presented to him by Sir John Usher. Although of only two inch diameter it had a large rotating prism in front of the object lens so that the position angle could be made adjustable. A system of rotating mirrors for bringing the images of distantly situated stars in juxtaposition was another of his instruments, and the measurements

made by this means were said to have an error of only one two-hundredth of a magnitude. This is something which today's visual observers would find extremely useful.

As time went on Roberts was not satisfied by merely finding and measuring variables, but spent a great deal of time on the mathematical analysis of the results. He gave particular attention to Algol type stars – eclipsing binaries – aiming to derive not only periods but also dimensional data of the stars themselves. That this was not successful in the case of what are today known as Cepheid variables was not clear at the time, but Roberts kept observing a long list of them for their intrinsic interest, and when years later their cosmological significance was realised he was delighted that what was started as a labour of love would turn out to be so very important.

In later years much of his time was spent in public activities, mainly to further the cause of the black people, and he served as member of the Union Senate where he was appointed to represent 'Native Affairs'. The rather severe photograph [*not reproduced here - Ed*] probably dates from this period. It is a typical example of the fact that a great scientist or artist is only photographed or painted towards the end of his life, when his fame is at last recognised, and his physical appearance is somewhat far removed from what it was when he was actually doing the work on which his fame rests.

But variable stars were by no means forgotten and it was only in 1921 that a note appears saying that Roberts had now stopped his observations. In 1905 it was stated that he had made about 250 000 observations, and by the time he stopped the number may well have been double that number. What still remained was the reduction of all that

data, but this was a task which in spite of all his efforts he never completed. However, he remained an active member of the Astronomical Society of Southern Africa, whose President he was in 1928, and it was largely due to his efforts that the Variable Star Section was formed.

Although there is nothing in writing, it is very likely that it was Roberts' influence and active encouragement which, in those early days, started a number of very productive variable star observers on their way. We can mention the following:

#### The nineteen-twenties

*J.F. Skjellerup* (1917–1923, 4 230 observations) Also an active comet observer, discoverer of comet Skjellerup 1920 and re-discoverer of periodic comet Grigg-Skjellerup. Emigrated to Australia in 1923.

*A.W. Long* (1919–1927, 2 030 observations) A member of the original Beaufort West club. He compiled the star atlas which bears his name, and which has been out of print for many years. I bought one of the last copies in 1947. It is well worth being reprinted.

*E. Kramer* (1920, 90 observations) No further details available.

*S. Solberg* (1919–1922, 219 observations) No further details available.

*H.E. Houghton* (1919–1942, 24 465 observations) Came to South Africa from England in 1920 to join the staff of the High Commissioner's Office. Took a keen interest in the affairs of the Society and was its Secretary from 1923 to 1930. In 1936 was elected President. His chief interest lay in the work of the Variable Star Section, of which he became Director in 1934. Co-discoverer of Comet 1932b Houghton-Ensor. "No one has done more

for the advancement and the creation of enthusiasm for the Science as Mr Houghton”.

*W.H. Smith* (1922–1931, 7 229 observations)

No further details available.

*G.E. Ensor* (1924–1938, 16 038 observations) Observer in Pretoria. Together with Houghton found Comet 1932b

Although there is no record of this, it would seem very likely that all the above received their inspiration and active encouragement from Roberts. Very little is known today of these very active observers, What sort of people were they? Any information which anyone might be able to give would be greatly appreciated.

#### **In later years (5000+ observations only)**

*R. P.de Kock* (1940–1974, 146 670 observations) Made all his observations at the Royal Observatory in Cape Town, initially using, as an amateur, the 7-inch heliometer and from 1945, as member of the Observatory staff, but still observing variable stars as an amateur, the 6-inch reflector. Director of the Variable Star Section from 1948 to 1974. Discovered Comet 1941a (de Kock) while searching variable stars in that neighbourhood. An astonishing performance, in spite of being physically handicapped. Looking through de Kock’s records, it is interesting to note that only whole days are recorded – evidently observed long period stars only.

*A.W.J. Cousins* (1936–1947, 6 908 observations) Interested in astronomy from his earliest youth. It is said that he met Roberts as a teenager at a church where Roberts was preaching, and that the latter wetted his appetite for variable stars. How-

ever, as an electrical engineer there were too many other things to be done, and he only started in earnest in 1936. After he joined the Observatory staff in Cape Town he became a world authority on stellar magnitudes. (Obituary in *MNASSA*, 2001, 60, 67–87.)

*T.H. Bicknell* (1945–1965, 8 121 observations) An observer in Salisbury, Rhodesia.

*S.C. Venter* (1947–1965, 7 135 observations)

*M.D. Overbeek* (1951–2001, 289 963 observations)

*T.P. Cooper* (1984–2001, 15 016 observations)

*J. Hers* (1976–2001, 13 378 observations)

*J.A. Smit* (1986–2001, 15 880 observations)

*R.W. Jones* (1988–1966, 5 304 observations)

*L.A.G. Monard* (1995–2001, 25 631 observations)

#### **What about the future?**

It is very unlikely that we shall find someone who could approach Danie Overbeek’s astonishing record, but there are several hopeful developments.

In Fishhoek, by no means the best dark site in the country, Win Jones, one of our active visual observers, found that increasing age was affecting the accuracy of his eyes adversely, and decided to try photoelectric photometry. And in a short space of time he has become, with 506 observations in 2001, one of the most active observers of the AAVSO and one of only two in the southern hemisphere, the other being Fanie de Villiers, with 80 observations, also in the Cape Peninsula.

And in the north of the country Berto Monard has built himself the Bronberg Observatory in a dark sky area 40 km from Pretoria, where he has installed a 12-inch

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telescope with CCD camera. This is now being used for full night runs on cataclysmic variables, snapshot observations of faint CVs, supernova searches and follow-ups on GRB alerts, all going down to about 19<sup>th</sup> magnitude. By this means several new supernovae have already been discovered. This is far beyond what can be achieved by visual observers, and it clear that he is here entering an entirely new field.

It was suggested some years ago that all visual observers should be advised to stop visual observing and graduate to CCDs, but

this would be hardly practical. Many fine visual observers don't have the know-how, time, perseverance and (in this country, not to forget) the money necessary for such a change, where so many new factors have to taken into account to achieve a fictitious 'accuracy'. So while it is quite clear that the future lies in more electronic – and surely also automated – devices, we should never suggest that visual observations are of no value. In many cases it is still all we can get, and we do not want to lose any of our excellent observers.

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