

## **British Astronomical Association Variable Star Section, 1890–2011**

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**Abstract** A summary history is given of the British Astronomical Association Variable Star Section, the longest established organized group of variable star observers whose work extends from the latter stage of the 19th Century until today.

### **1. Introduction**

The British Astronomical Association Variable Star Section (BAA VSS) is the World's oldest currently active amateur association of variable star observers, having been established in 1890. However, it was not the first such group to be formed as that was the Liverpool Astronomical Society Variable Star Section (LAS VSS); the BAA VSS was a direct successor to the LAS VSS that had been active for six years leading up to 1889. This paper is a summary outline of the history of the BAA VSS and was presented at the Centenary Meeting of the American Association of Variable Star Observers (AAVSO) held in Woburn, Massachusetts, on the 5th October 2011.

### **2. Pre-history**

The formation of an association of variable star observers in Great Britain proved to be both a lengthy and difficult task in the 19th Century. As early as 1833 Sir John Herschel advocated that amateur astronomers take up variable star observing but it would not be until the 1850s that Joseph Baxendell, Norman Pogson, and George Knott commenced systematic observations. Baxendell and Knott attempted to form the World's first association of variable star observers in 1863 known as the "Association for the Systematic Observation of Variable Stars" (ASOVS) but were unsuccessful due to general disagreement over the stellar magnitude scale and lack of suitable charts and sequences. Nevertheless the proposed structure of the ASOVS was visionary and elements would be later adopted, but Britain and the World were clearly not yet ready for an association purely dedicated to observing variable stars. However, in 1881 the LAS was formed and it established a VSS in 1883, and this demonstrated that an organized group of variable star observers could be sustained provided it was supported by a large astronomical society. The LAS suddenly collapsed in

1889 due to financial difficulties and political infighting but within a year the LAS had been replaced by the BAA, which was more adequately managed on a sound financial footing.

### 3. 1890–1899

The BAA VSS was formed at the first meeting of the BAA in London on 24th October 1890. Besides the VSS, sections were also formed for solar, lunar, Jupiter, meteors, double stars, coloured stars, and spectroscopic and photographic work. John Gore was appointed Director of the VSS and he brought with him experience of directing the LAS VSS from 1884 to 1889. Gore was a prolific writer and binocular observer who had discovered variables such as W Cyg, X Her, and U Ori. Gore's initial plan for the VSS was to concentrate upon neglected and suspected variable stars but by 1892 he had also introduced a nova search plan (probably inspired by Anderson's discovery of T Aur in January 1892). Although initially unsuccessful the nova search plan did establish the standard method for such patrols by allocating regions of the Milky Way to specific observers to search. In 1891 the VSS had twelve members which included two clergy, two army officers, two persons based in the Colonies, and one lady. Two outstanding members of the VSS in the 1890s were Alexander W. Roberts and A. Stanley Williams. Roberts was based in South Africa and made 65,000 highly accurate visual observations and discovered twenty variable stars. Williams used photography to discover over fifty variable stars including RX And. Gore published three *BAA Memoirs* and prepared summaries of members' observations and reported LPV maxima and minima. Unfortunately Gore's eyesight began to deteriorate after 1900 and he died following being struck by a horse car in Dublin in 1910.

### 4. 1900–1909

Colonel E. E. Markwick (Figure 1) was appointed as VSS Director at the end of 1899 and made an immediate and lasting impact. Previously Markwick had used his binoculars to good effect on military postings and discovered T Cen and RY Sgr from Gibraltar. Markwick had a clear strategy for the VSS that was based upon encouraging systematic quality observations to a uniform photometric system. This meant preparing standard charts based on Hagen's *Atlas Stellarum Variabilium* (ASV) sequences (the first charts for eighteen LPVs were released in 1901) and introducing a fixed program of stars for the observers to concentrate upon. Initially the program covered just twelve stars in 1900 but within a year it was expanded to forty-six stars, the majority being LPVs. In 1904 the program was further expanded to include U Gem and SS Cyg, then classed as irregular variables. In 1904 the ASV sequences were replaced by Harvard photometry although the comparison stars were still

identified on the charts by the ASV numbers. Markwick requested that the members adopt Knott's step method and introduced a standard report form for observations which were to be submitted on a monthly basis. Markwick also introduced *BAA Circulars* for rapid feedback to the members and established a format (including observer codes) for presenting the observations within the *Memoirs*. Markwick's energetic leadership and directives were positively received and soon useful homogenous data were being accumulated. This meant that densely packed light curves could be constructed for the program stars, some of which were published in the *Journal of the BAA (JBAA)* and put on display at the Franco-British Exhibition in London in 1908. Markwick publicized the work of the VSS in *Popular Astronomy* in 1904 and the first meeting of the VSS took place on December 10, 1906. Also in December 1906 the VSS recorded the second brightest maximum (to that of 1779) of Mira at magnitude 1.9. During Markwick's term twenty-seven reports appeared in the *JBAA*, fifty-two *Circulars* were issued, and three *Memoirs* were published. In all 39,940 observations of the program stars were logged (the leading observer was Arthur Brown) and when Markwick's ten-year directorship terminated at the end of 1909 the VSS was firmly established as the model format variable star association.

## 5. 1910–1921

Charles Brook succeeded Markwick as VSS Director on New Year's Day 1910. Brook's strategy was to consolidate and expand on the firm foundation laid by his illustrious predecessor who continued to assist in the management and administration of the VSS. Brook had previously assisted Markwick in this respect and had in 1906 implemented the reduced scatter experiment which involved using uniform instrumentation and eyepieces. In 1911 the observing program consisted of five Algol, nine short period, twenty-seven long period, and nine irregular variables. In 1914 the short period variables were dropped from the program after a summary paper on the data acquired was published. They were effectively replaced by four long period variables that were added to the program in the same year. The Great War (1914–1918) only had a slight impact on the work of the VSS because Markwick (who returned to military duties) had relinquished the directorship and the principle observers were too senior to be called up to the armed forces. During Brook's twelve year term thirty-seven interim reports appeared in the *JBAA* and three *Memoirs* were published. The *Memoir* on DN Gem (nova in 1912) was written jointly with the Spectroscopic Section. Brook was a stickler for detail and the VSS data and publications during this period are a model of high quality. The most compelling fact, however, was that 83,796 observations were logged of the program stars by twenty members (the leading observer was Charles Butterworth), which represented a doubling on the output of the previous decade.

## 6. 1922–1939

Felix de Roy (Figure 2) succeeded Brook as VSS Director on New Year's Day 1922. De Roy, a Belgian national, had been a member of the BAA since 1906 and had taken refuge in Croydon near London throughout the Great War. Now back in Belgium, de Roy directed the VSS with the able assistance of the VSS secretary Arthur Brown (succeeded by William Lindley upon Brown's death in 1934). Brown distributed charts and report forms, received and archived the observations, and dealt with member's correspondence, whilst de Roy analyzed the data and prepared the reports. De Roy attempted to initiate coordination with the AAVSO following IAU meetings. In 1922 he proposed to Leon Campbell that the AAVSO and BAA VSS have separate observing programs to avoid duplicated effort (this was never implemented). In 1932 de Roy was a pivotal figure in the formation of the Joint Committee of Variable Star Associations (JCVSA) which involved the AAVSO, AFOEV, and BAA VSS and was primarily concerned with standardization of sequences. Following this the VSS set up its first chart committee in 1935 tasked to update the VSS sequences in line with the directives of the JCVSA. The chart committee also replaced the comparison star ASV numbers with letters on the charts. In 1928/1929 U Gem was recorded to have spent a record time of 255 days between outbursts. Manning Prentice discovered nova DQ Her in 1934 and the  $\gamma$  Cas eruption in 1936 was well covered by the VSS (including an independent detection by Patrick Moore). During de Roy's seventeen-year term eleven *Circulars* were issued, thirty-five interim reports appeared in the *JBAA*, and four *Memoirs* were published. 147,495 observations were logged (Butterworth again the leading observer) and the program was expanded to cover fifty-two long period and ten irregular variables. De Roy resigned the directorship of the VSS due to ill health at the time of the outbreak of World War II.

## 7. 1939–1958

William Lindley is the longest serving Director of the VSS but he presided over its most difficult period. Lindley's term began positively in 1939 with three interim reports appearing in the *JBAA* and Butterworth becoming the first observer to reach the milestone of 100,000 visual observations. World War II then hit hard as Lindley received his call-up papers and most of the VSS members were soon involved directly or indirectly in the war effort. The annual observations dropped to below 2,000 in 1941 and 1942, having been at 18,000 in 1938. Extraordinary efforts were made by military personnel to continue sporadic observations. Frank Knight for instance recorded the onset of a fade of R CrB from a foxhole on the eve of the battle of El Alamein. By the time the battle was over and the sky cleared R CrB had disappeared from binocular

range. BAA HQ suffered flooding from bomb damage and de Roy died in occupied Belgium just when it seemed he might be the second observer to reach the 100,000 observation milestone. Frank Holborn was the leading observer during this period despite having been inconvenienced by flying bombs in 1944. A backlog of reports soon built up and it would take another twenty years after hostilities ceased for the VSS to generate the numbers of observations being produced in 1938. Despite all this the program was expanded in 1945 to include the dwarf novae RX And, Z Cam, and SU UMa. In 1946 Knight was the first person to detect the second outburst of T CrB but his report to Greenwich Observatory was not acted upon promptly so he did not receive the proper credit for this discovery. Upon the completion of the much delayed final *Memoir* in November 1958 (LPV observations for the years 1930–1934) Lindley resigned the directorship.

## 8. 1959–1971

Reginald Andrews was appointed Director at the end of 1958 and he immediately set about stimulating a recovery of the VSS from the setbacks suffered during the Lindley term with a particular objective to increase the number of active observers from fifteen. One of the first tasks was to resume the work of the pre-war chart committee and 140 charts were issued in 1959 and 1960. Andrews then worked on clearing the backlog of VSS reports with thirty-three interim reports appearing in quick succession in the *JBAA*. In 1959 Holborn wrapped up his four-year campaign to monitor Z Cam when a rise to outburst from a standstill was recorded. The first VSS meeting since 1935 was held on June 23, 1963, and twelve additional stars (dwarf novae) were added to the program in 1964. By 1964 the number of observers was forty-one and they reported 13,000 observations. This enhanced level of activity by the VSS caused some concern amongst BAA council members and a dispute arose about the quantity of VSS papers being published in the *JBAA*. Andrews resigned in 1964 as a result of this dispute. John Glasby assumed the role of Director in 1965 and applied a more sedate approach to managing the VSS which was aligned with the BAA council directives. Ten interim reports appeared in the *JBAA* over five years and the observing program was adjusted (introduction of additional cataclysmic variables) following the IAU congress in 1967. In 1969 the binocular program was established in response to the formation of the independent Binocular Sky Society (BSS) in 1968 and the discovery of the nova HR Del by George Alcock in 1967. Alcock had memorized the patterns of 30,000 stars as they appeared in his binoculars and he also found novae LV Vul in 1968 and V368 Sct in 1970. Brian Carter was the leading observer during this period and Glasby resigned the directorship in 1971.

## 9. 1972–1980

John Isles commenced his initial term as VSS Director in 1972 and his first action was to reintroduce the *Circulars* which had been discontinued in 1935. In 1972 Melvyn Taylor prepared a large number of charts and sequences for the BSS which were adopted for the binocular program. The first results of an eclipsing binary project were published in 1973. There were special observing projects launched on flare stars and supergiant variables following requests from professional astronomers. The BSS merged with the VSS in 1974 and the observing programs were overhauled the same year with several LPVs being dropped. The VSS collaborated with the AAVSO on visual nova and supernova searching in the period 1973–1978. In terms of visual nova discoveries Alcock found NQ Vul in 1976 and John Hosty found HS Sge in 1977 as part of Guy Hurst's UK Nova Patrol managed jointly with *The Astronomer*. When nova V1500 Cyg appeared in 1975 there were multiple VSS observers who discovered it independently with the naked eye. Taylor was the leading observer throughout this period and in 1976–1977 observers reported 27,000 observations. Isles resigned in 1977 owing to business commitments and his successor was Ian Howarth. During the period 1977–1979 Howarth collaborated with Jeremy Bailey to provide improved linear sequences for the dwarf nova on the VSS program. As a by-product of this work Howarth and Bailey also calculated a visual (mv) to V conversion formula. In 1979 X-ray emission from SS Cyg detected by the satellite Ariel V was interpreted by comparison with VSS visual data. Howarth concentrated upon updating the section reports and during the period 1972–1980 forty-three interim reports appeared in the *JBAA*. Howarth was forced to resign due to increasing professional commitments in 1980.

## 10. 1981–1992

Douglas Saw directed the VSS from 1981 to 1987. In 1981 the North Western Association of Variable Star Observers (NWA VSO) was merged with the VSS. The NWA VSO journal *Light Curve* was amalgamated with the VSS *Circulars* and the first AGN's (NGC 4151, Markarian 421, and 3C-273) were added to the VSS program. In 1982 VSS data were used to interpret UV and IR data on SS Cyg and SU UMa at Stavropol Astrophysical Observatory. In 1982 microcomputers were used for the first time to record observations and a digitized database was established in 1991 by Dave McAdam. In 1983 Robert McNaught visually detected an outburst of VY Aqr for the first time. During this period there was success for the UK Nova Patrol team by photographic means with McNaught detecting V842 Cen in 1986 and V4135 Sgr in 1987 while McAdam detected PQ And in 1988. Alcock made his final visual nova discovery with V838 Her in 1991. Jack Ells, Andy Hollis, and Richard Miles produced extensive photoelectric photometry during the early 1980s but could

not reach the output capacity of the visual observers. John Isles began his second term as Director in 1987 and Saw took up the post of deputy Director. In 1987 51,000 visual observations were reported which was a record annual total. Also in 1987 John Toone was appointed Chart Secretary and tasked to standardize all the charts to a new format (this work was still in progress in 2011). In 1988 the VSS held a meeting with professional astronomers at University College London with the object of fostering closer professional-amateur collaboration in the study of variable stars. The immediate outcome was the formation of the Professional Amateur Liaison Committee (PALC) with Roger Pickard appointed as the primary amateur interface point. The centenary meeting of the VSS was held at Crayford on October 19–20, 1991, with a main theme of professional/amateur collaboration (Figure 3). Toone was the leading observer during this period and Ed Collinson reported his last observation in 1987 some sixty-seven years after recording his first.

### 11. 1992–1999

Tristram Brelstaff became VSS Director on 1st November 1992. Brelstaff was previously responsible for the Eclipsing Binary Program and had become a proficient writer with his monthly publication *The Variable Star Observer* in 1991/1992. The Jack Ells automatic photoelectric telescope at Crayford produced extensive photometry of eclipsing binaries during the years 1988–1997. In 1994 the *Circulars*, which had previously been issued at irregular intervals, were fixed at quarterly intervals (March, June, September, and December). Funding was made available from the RAS to support the development of the database which reached one million observations in January 1997. In February 1995 Gary Poyner became VSS Director and immediately introduced the Recurrent Objects Program (ROP) that had previously been an initiative of *The Astronomer*. The ROP proved to be very successful in determining the true nature of many poorly observed cataclysmic variables. Mark Armstrong found the first supernova from the UK by CCD imaging in 1996 and this triggered an avalanche of discoveries by the UK Supernova Patrol team. In November 1996 the VSS web page was set up by McAdam. Poyner was the leading observer during this period accumulating up to 15,000 observations annually and in 1998 became the second VSS member (and only Director) to record 100,000 visual observations. Mike Collins used photography for nova searching and in doing so identified 157 new variables in the Milky Way in the years 1989–1998. These were given *The Astronomer* Variable (TAV) designations and many were incorporated into the VSS program in 2000.

### 12. 1999–2010

Roger Pickard became VSS Director on September 1, 1999, and provided

stable leadership during the transition into the CCD/DSLR era (Figure 4). The PALC was discontinued in 2000 as direct e-mail communication had finally rendered it redundant. In 2000–2002 Toone worked with the AAVSO within the International Chart Working Group to establish guidelines for future visual sequences using V photometry. In 2001 there was a joint campaign with the AAVSO to monitor SU UMa for the University of Leicester who were monitoring X-Ray emission with the RXTE satellite. A mentor scheme was set up by Karen Holland in 2002 and the VSS alert group was launched in 2004 with Poyner as administrator. In 2007 Miles used a DSLR camera to record Mira at V magnitude 2.16 (brightest for 101 years) and undertake daytime photometry of  $\beta$  Lyr. A joint meeting with the AAVSO was held at Cambridge (England) in 2008. In 2009 Tom Boles who had the ability to image up to 1,700 galaxies per night became the world's most prolific individual supernova discoverer (he had a total of 144 confirmed discoveries by October 2011). Robin Leadbeater revived spectroscopic work on variable stars and produced outstanding data during the 2009/2010 epsilon Aur eclipse. A fade of R CrB commenced in 2007 and two years later VSS observers were reporting it to be at a record low level of magnitude 15.0. The first CCD observations were reported in 2003 and by 2008 they had exceeded the quantity of visual observations reported annually. In 2010 there were 30,000 visual and 90,000 CCD observations reported. David Boyd was the leading observer during this period and became the first VSS member to record 100,000 CCD observations by 2009. Other observers reaching milestones during this period were Toone, 100,000 visual observations in 2002; Poyner, 200,000 visual observations in 2007; Tony Markham, 100,000 visual observations in 2008 (all non-telescopic); and Ian Miller, 100,000 CCD observations in 2010. Pickard introduced the “Charles Butterworth Award” for outstanding achievements in variable star research and the first recipients were Arne Henden in 2006 and Gary Poyner in 2008 (Mike Simonsen was the third recipient in 2011).

### **13. 2011 and future plans**

By the end of 2010 the VSS database contained 1,700,000 visual and 340,000 CCD observations undertaken by over 900 observers. A number (perhaps 300,000) of legacy visual observations and all the photoelectric photometry had still to be input and it was planned that the database itself would be accessible online from 2012. It was also planned to introduce online data submission and link the database to the AAVSO International Database in 2013 or 2014. The VSS database has a unique ability to update the data to the current sequences which means that any analyst can be confident about the homogeneity of the data. The sequences themselves are being progressively converted to the V system with a limited color range which aligns with the work of the AAVSO



sequence team. In the long term the feasibility of adjusting the legacy visual data to the V system will be investigated. By October 2011 seven members of the UK Supernovae Patrol team had found 244 supernovae as well as four novae in M31. The primary internal publication remains the VSS *Circular* which is issued quarterly and covers news items and preliminary reports, but the formal refereed VSS papers and annual report are published in the *JBAA*. The Director is supported by a panel of eight officers who are all experienced amateur variable star observers and also by volunteers who assist in data inputting. The Director and officers meet regularly to ensure the smooth running of the section and members' meetings are held annually. The VSS is recognized as the most active and scientifically important of the sections within the BAA. The VSS continues to encourage undertaking all methods of photometry and considers that a national group still has a role to play in promoting the acquisition of systematic data on variable stars.

#### 14. Summary

The BAA VSS was launched in the 19th Century and was the prototype body that set the standard for the variable star organizations that were to be formed in the 20th Century. It was never global in scale but has a long and eventful history which has been summarily recounted in this paper. Today it embraces new technology and techniques for photometric data acquisition whilst at the same time retaining its Victorian standards and values. It is as active in the 21st Century as it has ever been and fully expects to celebrate its bicentenary in 2090.



Figure 1. Ernest Elliot Markwick (1853–1925). Director of the BAA VSS 1900–1909 and president of the BAA 1912–1914.



Figure 2. Felix de Roy (1883–1942; in dark suit, right-center). Director of the BAA VSS 1922–1939. On de Roy’s right is AAVSO Recorder Leon Campbell, and on Campbell’s right is HCO astronomer Donald Menzel. Photographed at the 1932 IAU meeting, Cambridge, Massachusetts. Courtesy Jet Katgert, Leiden University.



Figure 3. Officers of BAA VSS at the centenary meeting of the VSS, October 19–20, 1991. From left are: John Toone, Roger Pickard, John Isles, Melvyn Taylor, Guy Hurst, and Storm Dunlop.



Figure 4. Officers of the BAA VSS, November 5, 2005, with AAVSO Director Arne Henden attending. Clockwise around table, from left: Gary Poyner, Arne Henden, Karen Holland, John Saxton, David Boyd, Andrew Wilson, Roger Pickard, John Toone, Tony Markham, Richard Miles, Guy Hurst, and Melvyn Taylor.