

Arthur Philip Norton (1876–1955): The man and his star atlas

Stephen James

For more than 80 years the star atlas which bears Arthur's name has affectionately become known as 'Norton's'. It can be argued that Norton's has had as much, if not more effect, on the course of English amateur astronomy than the works of Smyth and Webb. Most astronomers, be they professional or amateur, have 'cut their teeth' on Norton's because of its simplicity in use and the wealth of information contained in the handbook section. Even today Norton's has not been superseded.

Arthur Philip was born at the family home, 14 Coldstream Terrace, St Mary's, Cardiff, a small Victorian terraced house that still stands close by the river Taff, on 1876 April 18,¹ the first son of Louisa and Rev. Philip Norton [m. 1871],² a brother for Louise Geraldine [b. 1873] and Florence Margaret [b. 1874].³

Later in 1876 the family moved to Littlehampton, Sussex, where for about a year Philip was minister at the Reformed Episcopal Church. As Philip continued his ministry the family made three more moves, to Birmingham, Halesowen and then Sparkbrook.⁴

Philip was ordained in 1880 and by 1884 the family had moved to Worcester where Philip was Curate at St Nicholas' Church.⁵ There were now seven Norton children, Rose Edith [b. 1877], Maude Isobel [b. 1880], Cecil Herbert [b. 1881] and Ethel Marion [b. 1884] having been added, filling their home at 7 Rainbow Hill Terrace.³

In May 1884 the eight-year-old Arthur entered the King's School, Worcester, as a Scholar not on the Foundation, that is to say he was a fee payer.⁶ The Rev. W. E. Bolland was, from 1879 to 1896, the headmaster. All three of his sons were at the school at the same time as Arthur, including E. W. Bolland who also entered the school in 1884. Obviously he and Arthur knew each other well, there being only approximately 10 boys in each form.

Teaching had taken place in the medieval College Hall from 1561. However, 1884 September saw the start of an extensive restoration and rebuilding project. In fact, during Arthur's time at King's, he was taught in the three-story mansion which dates from the time of Charles II sited across College Green from College Hall.⁷

Arthur left the King's School in 1887⁶ to spend the rest of his school years at Barbourne College, 'a boarding school for young gentlemen' leaving in 1894.⁸ This was probably for financial reasons or because of a possible link between Rev. Philip Norton and Mr W. A. Caldwell MA, the founder and principal of Barbourne

College, Worcester who, with his son A. F. S. Caldwell MA (Trinity College Dublin), ran the school.⁹

Whilst a schoolboy, Arthur's life – long interest in astronomy began when he was given an old but serviceable telescope by his great-grandfather.¹⁰ No doubt Arthur was encouraged by his father who was interested in all aspects of the natural world, especially meteorology.¹¹

Arthur had hoped to take up mechanical engineering. His father expected him to go to theological college and become a minister like himself. As a relative had been seriously injured in an industrial accident. Arthur's mother persuaded him to compromise and become a teacher.³ Arthur took his first teaching post at the Grammar School, South Shields, in 1896.⁸ This was probably the school which stood in the Iolanthe Terrace/Chichester Road area, now demolished.¹²

During the following year Arthur returned home to study for an extension degree. His choice of Trinity College, University of Dublin, perhaps being influenced by the Caldwells. He graduated in 1898 being awarded a BA degree at the Commencements Ceremony in the winter of that year.¹³ This was followed in 1899 by a year teaching at Woodlands Grammar School, Southport, the predecessor of the King George V College.⁸

In 1900 Arthur returned to Worcester and the family home to take yet another teaching post, this time at the Victoria Institute, Deansway, Worcester. Arthur was to teach there until 1908.⁸ However, on 1904 August 13 the Rev. Philip Norton took the post of Rector of All Saints, Brandon Prava, near Wymondham, Norfolk.¹¹ It was here at the Rectory (a fine Georgian country house set now, as then, in its own grounds) that Arthur was able to set up his workshop in part of the stables.¹⁴ It was extensively equipped with instruments, including a foot-powered Drummond lathe.¹⁵ Obviously time in the workshop was limited to school holidays, but a number of different projects were undertaken.

Following the instructions in the English Mechanic,¹⁶ Arthur constructed a four-legged, gravity-escapement clock. Known as the 'tall clock', it ran accurately, well into the 1960s.¹⁷ He also designed and constructed a grinding machine with which a 6½-inch mirror was successfully produced. The mirror was subsequently mounted in a telescope of Arthur's own construction.

Arthur undertook two other major telescope projects, producing a 4½-inch refractor with a Cooke OG and a 10¼-inch Newtonian with Calver mirrors. Both were mounted on clock-driven equatorials of his own

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design and construction. In fact, everything except the optics was made by his own hand.¹⁸

He even invented a forerunner of the ‘Spirograph’ and made various other toys for the amusement of his nieces who were living with their grandparents at the Rectory.¹⁹ Arthur was very shy, especially with ladies and would disappear into his workshop if one should call, unless it was a tennis party or cycling outing. Arthur excelled at these and when in Tonbridge won cups for both.¹⁴

1908 September 16 saw Arthur in a new teaching post, that of Master of Form III(B) at Calday Grammar School, Calday, The Wirral, under the headship of Rev. William Hollowell BA (Trinity College, Dublin). Arthur’s salary was £130 per annum in his first year, rising to £165 in 1912. Arthur’s teaching responsibilities were English, Latin, Mathematics and a share of the supervision of the boarders.⁸

On 1910 January 26 Arthur was elected to the BAA.²⁰ He was then in the final stages of completing his *magnum opus*, the *Star Atlas and Reference Handbook*, published later in 1910 by Gall & Inglis. It was to be used as a companion to Webb’s invaluable *Celestial Objects for Common Telescopes* and Smyth’s admirable *Cycle of Celestial Objects*. Arthur hand drew approximately 6,500 stars and 600 nebulae for Epoch 1920, lettering or numbering each according to 27 different listings (from Bayer’s designation to Variable Stars), using *Uranometrie Generale* of Houzeau and certain of the Greenwich and Cape Observatories catalogues for stellar positions. Magnitudes were taken from the British Association Catalogue down to 6.00.

The maps were drawn on two polar charts down to a declination of 50° and six gores each covering 5 hours of right ascension with declination from 60° north to 60° south.² Arthur devised his own projection, which offers minimum distortion for such a wide area. The constellation boundaries were marked by dashed lines following very closely those in *The People’s Atlas of the*

Stars by the Rev. James Gall Inglis, 1907. Inglis was not just the publisher of Arthur’s great work but was also responsible for most of the *Handbook*, whereas Arthur wrote the section on telescope care and use as well as the notes accompanying the maps. As Arthur was a very competent bookbinder and cartographer he arranged to have each page printed on paper which would remain unaffected by dew and mounted on a separate binding leaf (as R. A. Proctor had done with his *New Star Atlas* (1908) so that none of the map was lost within the binding).¹⁵

Arthur continued teaching at Calday until 1913 December 17 when he left to join the Judd School, Tonbridge, Kent, starting 1914 September.¹⁸ Unlike Calday, Judd did not take boarders and there was no accommodation for staff on the site. Arthur, along with some other staff, lived close by the school at 18 St Mary’s Road and was looked after by a housekeeper, Mrs Hollands.¹⁷

War came, and even though he was 38 years old, Arthur, like many men of his age, volunteered for service. However, he was turned down because he was found to be suffering from a heart defect.³ So he continued in his teaching position at Judd. There Arthur taught both geography and mathematics in his first years as well as being Deputy Housemaster of Alpha house and a form master.¹⁵ Teaching for a shy person²² can obviously be a problem but Arthur overcame this by an assumed air of severity and, when needed, a caustic wit. He suffered from a mild lisp which gave the boys the basis for his nicknames.¹⁵ Over the years he was affectionately known as ‘Lip’ or ‘Lispy Dick’ others would refer to him as ‘appy Norton’ derived from his initials, A.P.

Arthur was a stickler for detail, both in his work and dress. He even used a set of different coloured Stylo pens for corrections, each colour indicating the type of error, be it spelling, grammar etc. Lessons with Mr Norton were always interesting and informative. Often



Figure 1. A. P. Norton with class III B 1909 and Rev. William Hollowell. (Courtesy Calday Grange Grammar School)

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he would offer poems or mnemonics to the class as aids to their memories (common now but not at that time). He had a good sense of humour which showed through the somewhat supercilious voice and manner which he adopted in class. When something amused him he had the most amazing laugh.¹⁵

As a teacher of mathematics Arthur was the obvious choice to get the school's War Savings Association off the ground in 1917 February and he continued running this until his retirement.²³

Judd had a Literary and Debating Society and at its last meeting in 1917 Arthur gave his first astronomical lecture. The subject was 'A Journey into Space'. This lecture was such a great success that in each subsequent year Arthur gave an astronomical lecture with subjects as diverse as 'The History of the Telescope' and 'The Structure of the Universe', sometimes illustrated with lantern slides²⁴ or by using complex arrangements of strings and pulleys to demonstrate planetary motion.²⁵

On 1918 June 8 Nova Aquilae No. 3 brought Arthur's Star Atlas to the notice of the school and the general public, as Mons. Felix de Roy, Director of the BAA Variable Star Section, was widely quoted as using 'Norton's' to plot its position. Norton's form, at that time Vc, then realised why stars featured so much in their geography and algebra lessons.²⁴ Unlike most teaching of that time, lessons with Arthur were not just chalk and talk. He even took the boys outside with home-made surveying equipment to map the school grounds: common today, but almost unheard of then!¹⁵ His father retired from his living in 1919 and moved to Norwich.³ This meant that Arthur had to transfer his workshop to Tonbridge. It was soon in action again for the construction of another clock. It was known as Regulator II based on the previous design but this time featuring a fifteen-leg gravity-escapement.²⁶ Arthur also set up his telescopes in the back garden of his lodgings. They were often in use; even some of the boys from Judd were allowed to use them under supervision.¹⁵

On 1920 April 14th Arthur wrote to his sister Rose, 'I can see with my left eye but everything is distorted and I cannot read even the largest type. I'm afraid there will never be an improvement as it is a case of a clot of blood behind the retina. My right still carries me on. Of course I am handicapped and practical astronomy is for me at an end I fear'. Luckily the condition never affected his right eye but he took to wearing spectacles all the time, no doubt to relieve his presbyopia which would have been exacerbated by the effects of the haemorrhage.

Arthur's interest outside school and astronomy was the study of English cathedrals. He travelled extensively during the school holidays to visit them. He also took a number of tours to Europe especially Switzerland.¹⁷

1927 June 29 saw many astronomers in the north of England to observe the total eclipse of the Sun. Unlike the majority who were clouded out Arthur had a fine view of the entire eclipse. He had returned to the King George V school, Southport, to observe the event. A team led by Professor H. H. Turner set up their

instruments in the school grounds much to the interest of the boys and staff. They all watched the eclipse through a variety of filters telescopes, binoculars etc.²⁷

During 1930 the International Astronomical Union adopted the constellation boundaries which had been proposed by Mons. E. Delporte. As a revision of the *Star Atlas* was long overdue, Arthur took the opportunity of upgrading the maps to include the revised boundaries. All the star-discs were redrawn to indicate half magnitudes, positioned as in the previous editions for epoch 1920. But for this, the 5th edition, he also had the patience to add approximately 1500 more objects, showing stars down to magnitude 6.2 and doubles to magnitude 7.00. For the first time the galactic poles and equator were added as well as the approximate limits of the Milky Way indicated by stippling.

Since the publication of the first edition, the *Star Atlas* had come to the notice of the amateur and professional astronomical establishment alike. Clyde Tombaugh had even used 'Norton's' to plot the areas covered by his photographic plates during his search for Pluto beginning 1929 November.²⁸ So Arthur had no trouble in enlisting some of the BAA Section Directors in helping to expand the notes section as well as in proof reading. Such was the standing of the atlas that Sir Arthur Eddington was happy to contribute notes on bolometric magnitude and Dr E. A. Baker revised the section on spectroscopy. The completed work, the Fifth edition, was published early in 1933.²⁹

The winter of 1933–34 was particularly cold. Arthur, who had followed his fathers interest in meteorology, ran the school's weather station, helped over the years



Figure 2. A. P. Norton's birthplace, 14 Coldstream Terrace, St Mary's, Cardiff.

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by various boys. Reporting in *The Juddian* in the spring 1934 edition Arthur reported, 'The school screen temperature readings reveal the remarkable fact that the temperature has fallen to freezing point on no fewer than 69 of the 102 days between December 1st and March 12th. The lowest temperature recorded in the period was 20°F on January 24–25'.³⁰

At the end of the spring term 1936, Arthur retired from teaching having spent 22 years at Judd. At the presentation to mark his leaving he received a number of gifts including a hall barometer from the school, a cigarette case and a lighter (he was a heavy smoker of both pipe and cigarettes) from his Form IIIb. From the Old Juddian Society he received a gold-pocket watch engraved 'Presented to Mr A. P. Norton as a mark of esteem from Old Juddians March 31 1936'.³¹ A number of letters were received from 'old boys' acknowledging the kindness and sympathy that Mr Norton had shown them whilst at school.¹⁸

At this time a new road and row of houses was being built by a local builder William Cogger of 47 High Street Tonbridge.³² Arthur negotiated for and bought No. 2 Quarry Rise, known as 'Quarryside', a three-bedroomed semi-detached property. His adjoining neighbours at No. 1 were his original housekeepers, the Hollands. Arthur now employed another housekeeper, Miss Alethea Morphett.¹⁷

Arthur took a very detailed interest in fitting out the house, specially the sitting-room, where shelving was put up to accommodate his extensive and meticulously

indexed library containing over 670 volumes.¹⁷ On the mantle-piece was a working brass cannon. Above hung a painting by his father of 'View over Bettws-y-coed with sheep'. Arthur set up his workshop in the built-in garage. The range of tools was impressive, many of them being made by himself. Pride of place went to his lathe. Throughout the house were to be found items made by Arthur including a set of kitchen scales of his own design.³³

Eventually the garden was set out and kept in a very neat and orderly fashion – not a weed to be found! The 10¼-inch was housed in a runoff shed, whereas only the mount and equatorial head of the 4½-inch stayed outside, the tube being stored indoors. A small, tripod-mounted, elbow-telescope, which was originally a gun-sight, was used on occasions as well.³¹

Arthur continued his sporting interests with the Tonbridge Bowling Club, but he never took it too seriously. In his many years with the club his only competition success was winning the pairs with Mr Edwards in 1930.³⁴

With the exception of James Gall Inglis and past masters of Judd, Arthur had very few visitors.¹⁷ Those who did visit were entertained after dinner by Arthur telling ghost stories, poetry reciting, or reading. He could not forget being a teacher and would peer over his reading glasses to check that you were attending, as if you were a pupil! Of course on clear nights the telescopes were uncovered and interesting objects shown to visitors.³⁵

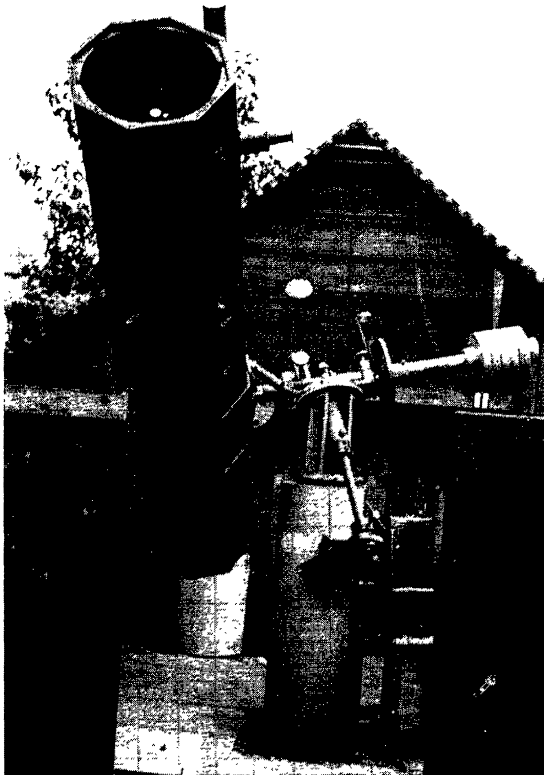


Figure 3. A. P. Norton's 10¼-inch Newtonian with runoff shed at 2 Quarry Rise Tonbridge. (Courtesy G. P. Akrigg)

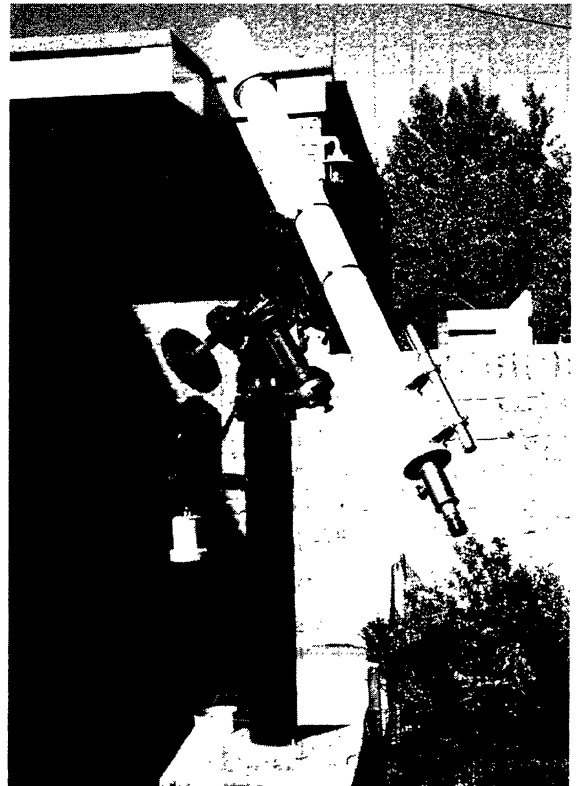


Figure 4. A. P. Norton's 4½-inch. (NB. the mount is not Norton's original.)

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Arthur and his home had some very near misses during the 1939–45 war. In 1941 March an incendiary bomb hit the Hollands home and burnt out the back bedroom before the fire was put out. Then in 1944 January a V2 exploded on the nearby allotments which caused considerable damage to the Judd School but no damage was sustained in Quarry Rise.¹⁷

The *Star Atlas* was again in need of upgrading as the epoch 1920 maps were obviously outdated. Arthur redrew the maps to epoch 1950, this time referring to the Harvard Revised Photometry stars down to a magnitude of 6.35, where shown. NGC numbers were added to all the nebulae shown, with the exception of those with Messier or Herschel numbers. Also, the Milky Way was shown in green. James Gall Inglis, with whom Arthur had collaborated from the first edition, died in 1939. His son Robert Gall Inglis helped rearrange and expand the handbook section of the new (9th) edition first published in 1945.³⁶

Some years later Arthur drew the maps for the *Popular Star Atlas* also published by Gall and Inglis. This atlas was intended for naked-eye observers. Stars down to magnitude 5.5 were shown and only a very few nebulae and clusters were included. The maps are of a deep blue background with objects shown in white. The text is amended extracts from *Norton's Star Atlas*.³⁷

Over the following years Arthur's health slowly deteriorated. He was found to be suffering from a cancer, which at that time was inoperable.¹⁷ He died on 1955 October 13 at his home. The funeral service was conducted by the Canon Russell B. White at the parish church of St Peter and St Paul on 1955 October 24.³⁸ The interment followed at Tonbridge Cemetery, Plot 38, grave No 7593.³⁹

Arthur made a number of bequests in his will to various of his nephews and nieces, as well as bequests to both of his housekeepers. He also left monies to Homes for the Aged Poor. All his books and manuscripts of astronomical or optical nature were left to Robert Gall Inglis.⁴⁰

Of the telescopes, the 4½-inch, its mount and box of eyepieces having been given away to a friend some time before, was subsequently offered for sale to the BAA. They were purchased in 1953 and registered as instrument No. 163.⁴¹ The runoff shed of the 10¼-inch had an ignominious end as a chicken house for a local farmer but no trace of the telescope can be found.

The clocks passed into the hands of Arthur's niece. However, during the late 1960s the wooden cases were found to have an extensive infestation of wood-worm. As the clocks were then not thought to be of any interest, they were destroyed.²²

Acknowledgements

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Address: 4 The Cherry Orchard, Hadlow, Kent TN11 0HU

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