

Coventry's Journey Through Time and Space

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In 2021-2022 the city of Coventry celebrated its status as the UK's City of Culture, and it's now hosting over 800 astronomers and hundreds of schoolchildren and members of the public learning about astronomy at the UK's National Astronomy Meeting. From the middle ages through to the industrial revolution, Coventry has been on the forefront of manufacturing and technological innovation – a tradition now continued by the University of Warwick and Coventry University, both located in the same West Midlands town. Such a forward-looking population has also, from time to time, looked *up* leading to a rich history in astronomy.

Coventry's Watchmakers

Building on its excellent communication links and thriving medieval cloth trade, by the seventeenth century Coventry was emerging as a centre for the precision craft of watch and clock making. From its start, this technology was closely linked with astronomy, both as a vital tool in making accurate scientific observations and in the pressing problem of improving navigation by reference to the stars.

Amongst the first of Coventry's watchmakers, and known for his work on astronomical clocks, was **Samuel Watson** (c.1635-1723). Watson's skill as a watchmaker was sufficiently well known by the 1680s for him to receive two commissions for clocks from King Charles II, and to be appointed "Mathematician in Ordinary" to the king in 1682. The second of these clocks, which survives in the royal collection, is a testament to his craftsmanship. This astronomical clock has five dials, and its mechanism incorporates planetary motion for the five then-known planets, as well as lunar and solar motions and calendrical information. One dial shows the Metonic cycle, with its hand taking a full nineteen years to complete one rotation. He constructed at least two of clocks for Sir Isaac Newton, which are now in the possession of the Clockmakers Company and housed at the Science Museum.

Coventry's skilled watchmaking industry expanded in the nineteenth century. This attracted many with an interest in astronomy – noticeably innovator **Bahne Bonniksen** (1859-1935, FRAS). In 1906, his advertisement in *The Observatory* promoted the use of his designs in observatories, and promised "Sidereal karrusel watches supplied. - Dilatometers of my own design, and small scientific instruments for any purpose made to order."



Two Samuel Watson astronomical clocks. Left, the royal commission, completed 1690, in the collection of Windsor castle (image reproduced from Royal Collections Trust). Right, detail of another example c.1695 in the collection of the Science Museum, London (Image: © The Board of Trustees of the Science Museum, CC Attribution License).

B. BONNIKSEN,
OF
16 NORFOLK STREET, COVENTRY,
is a Specialist in the following Branches:—

- (1st) Watch and Chronometer adjusting; for Kew and Greenwich Observatories, and for all other grades.
- (2nd) High-class Watch repairs and Conversions (only adjusted work).
- (3rd) Compensation-balances for high-class Watches.
- (4th) Nickel-Steel Compensation-pendulums for Astronomical Regulators.
- (5th) Polishing and Spotting of Marine Chronometer Movements, also of Watch Movements.
- (6th) Karrusel Watches (of which he is the Inventor, as well as sole maker of all Movements of the Karrusel construction so far on the Market), a good stock of which is always kept.
- (7th) The "Bonniksen Tourbillon" now in course of construction.

The "Karrusel" has broken all records at Greenwich and Kew.

The Kew Report for 1901 says:—"The watch No. 66,365, a 'Karrusel' Lever Watch, obtained 91.3 marks. This is the first English Lever Watch to reach the 91 marks limit."

Greenwich List of Admiralty Deck-Watches for 1903-4 has 75 'Karrusel' Watches and 29 of other sorts; of the first 50—16 are Karrusels, the top one breaking all records.

The Superintendent of the Kew Observatory writes on 1905, January 4:—"Karrusel watches received from Mr. B. Bonniksen, 1904: Received 46, Passed 46, of which 40 especially good."

Sidereal Karrusel watches supplied.—Dilatometers of my own design, and small scientific instruments for any purpose made to order.

All Goods referred to above are made on the premises.

Victorian Self-Improvers

As the industrial revolution gathered pace, Coventry's watchmaking expertise contributed to its growth as a centre for first weaving and then industrialised ribbon manufacture. By the nineteenth century the population of Coventry had grown in both size and affluence, and new classes of astronomer were emerging – wealthy or clerical individuals with an interest in astronomy as a scientific pursuit, as well as those working men who saw astronomy as a topic for self-improvement. Reports appear in the Coventry Herald and Evening Standard of lectures delivered by several local astronomers, as well as those coming in from outside the area.

The 19th Century university extension movement aimed to extend higher education to those unable to access traditional university tuition. Typically lecturers were provided by a sponsoring university and a local committee could choose a topic of interest. The selected topic of Coventry University Extension Society in the autumn of 1888 was "Modern Astronomical Discovery" with a course of lectures delivered by Mr Arthur Berry FRAS. The Coventry Herald reported that "The lectures will be illustrated by the oxyhydrogen lantern", and that "it was [the lecturer's] intention to take the students out upon clear nights after lecture to some open space in order that they might make observations for themselves".

The class of 1888

The results of the formal examination in astronomy were announced in the Coventry Herald on 15th February 1889. Nineteen out of twenty-one candidates passed the examination. Of these, all but three were women, and two female students of the class of 1888 are reported to have merited "a very special distinction." The students listed as having passed this course provide an interesting insight into intellectually-curious, but middle-class members of Coventry society, each of whom paid a guinea for the course:

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| Manufacturer's daughters: | Florence Steane White (1869-1933), Elsie Mary Anslow (1869-1959), Grace Marion Atkins (1873-1949), Mary (1869-1890), Margaret Edith (b.1871) and Annie Mildred Bill (b.1874), Hilda Cramp (1874-1940), Edith May Hart (1869-1915), Alice Rainbow (1869-1939) and Agnes M Rotherham (1872-1948). |
| Daughters of professional men: | Bertha M Grant (1860-1953), Margaret Lynes (b.1868), Zelig Marie Milner-Moore (1873-1934) and Agnes Hannah Morris (1866) |
| Professional educators: | Edith Jane Sterland (1863-1893) and Laura Emily Flinn (1862-1948). |
| Aspiring young men: | Andrew Edward Firth Henderson (1872-1956, science student), Percy H Howard (1875-1955, clergyman's son), John Bayley Parker (1864-1941, son of a tinsplate maker). |

Above:
Bahne Bonniksen's advertisement in the November 1906 edition of *The Observatory* magazine.

Right: The Coventry Evening Herald reports examination results for the Coventry University Extension class of 1888 (15th Feb 1889)

COVENTRY UNIVERSITY EXTENSION SOCIETY.
The following students—19 out of 21 who presented themselves—have passed the examination on the recent course of astronomy. Those marked with two asterisks have received a very special distinction, one asterisk denoting that they are recommended by the Lecturer, and Examiner, for special distinction:—Elsie M. Anslow, Grace M. Atkins, Annie M. Bill, Margaret E. Bill, Mary Bill, Hilda Cramp, Laura E. Flinn, Bertha M. Grant, Edith M. Hart, Andrew E. F. Henderson, Percy H. Howard, Margaret Lynes, Zelig Marie Milner-Moore, Agnes H. Morris, John B. Parker, Alice Rainbow, Agnes M. Rotherham, ** Edith Sterland, ** Florence S. White. The Examiner reports, "The papers of the candidates from Coventry reached on the average a moderate standard, but some were carefully thought out and well expressed. I observe that at this centre, as well as at the other which I have examined, modern investigations have excited more interest than the portions of the subject which have been long known."

A Twentieth Century Polymath



Figure: Captain Smith-Clarke, from the Journal of Medical Biography

Captain George Thomas Smith-Clarke (1884-1960, FRAS) was a respected engineer and amateur astronomer resident in the Gibbet Hill area of Coventry, close to the current location of the University of Warwick. After serving with the Royal Flying Corps in the First World War, Smith-Clarke became the chief engineer of Coventry-based motor manufacturing company Alvis, and served as chairman of the automobile division of the Institution of Mechanical Engineers. Unusually, Smith-Clarke made substantial contributions in the fields of mechanical engineering and medical technology as well as astronomy.

In 1939 he granted access to his personal telescope to the new Coventry Technical College Meteorology and Astronomy Society and later donated it for relocation. This group later became the current Coventry and Warwickshire Astronomical Society. Smith-Clarke spoke passionately at the inauguration of their new observatory in 1947, advocating the development of Coventry as a university city - a destiny then far in the future.

Smith-Clarke became a member of the BAA in 1934 and Fellow of the RAS in 1945. He was soon contributing to meetings, particularly commenting on the design of telescope mounts and his experience in the area. He donated a spectrohelioscope to be mounted on the 3.7m telescope at Jodrell Bank, as well as an eighteen-inch telescope and its dome (both of his own construction). The 18-inch reflector was used in the 1950s for early work on spectrophotometry, and in 1970 it was donated to the Salford Astronomical Society, where it is still used.

He was a close friend of Sir Harold Spencer-Jones, the Astronomer Royal of this period and in 1952 he contributed to the installation of a new Schmidt telescope astrograph at the Royal Observatory, Edinburgh. He also contributed mount designs for the projected Isaac Newton Telescope in the early to mid 1950s. He later designed an innovative iron lung, saving countless polio victims.

Coventry's history of astronomical investigations provides an interesting insight into the development of astronomy as a discipline over the centuries, and the genuine contributions made by people from many and varied backgrounds.

The thriving Warwick astronomy groups carry this legacy into the future.

A University Town



The campus of the University of Warwick

As Coventry's manufacturing industry declined in the second half of the twentieth century, its information economy grew. Warwick University's Physics Department was one of the founding departments of the University, opening its doors to undergraduate physicists in 1965.

Astronomy became a research focus for the department in 1995 when the Space and Astrophysics Group (later the Centre for Space, Fusion and Astrophysics or CFSA) was founded by Professor Sandra C. Chapman.

A second research group within the Physics Department, Astronomy and Astrophysics, was founded by Professor Thomas R. Marsh in 2003. Both groups have grown rapidly and continue to thrive. The CFSA was one of the first interdisciplinary plasma physics groups in the world, bringing 'blue skies' astrophysics and heliospheric physics to important societal problems such as clean energy, climate change and space weather risk. The Astronomy and Astrophysics group was founded on a key research theme of time variability in astronomical objects which has continued to expand, now encompassing binary stars, exoplanet discovery and extragalactic transients. Astronomy research at Warwick has its eyes fixed firmly on the future, with world-leading facilities including the Gravitational Wave Optical Transient Observer (GOTO), the Next Generation Transit Survey (NGTS) and the upcoming PLATO exoplanet satellite mission all operated by Warwick astronomers, and research themes extending from our atmosphere to the edges of the Universe.

