Journal of Astronomical History and Heritage 1(1):45-59, 1998

Mary Ackworth Evershed née Orr (1867-1949), solar physicist and Dante scholar

Mary T Brück
Craigower, Penicuik EH26 9LA, Scotland

Abstract
Mrs Mary Evershed is principally remembered in astronomical circles as the wife and collaborator of John Evershed, Director of the Kodaikanal Observatory in India in the early part of the twentieth century. Her own independent work on the astronomy of the poet Dante, written under her maiden name M A Orr, remains better known today among Dante scholars than among astronomers. This paper outlines her life and records her contributions to solar observations, to the history of astronomy, and to Dante studies.

Key Words: *solar physics, Moon, Dante, India, Australia*

1 EARLY LIFE

Mary Ackworth Orr was born at Plymouth Hoe, England, on 1867 January 1, the fifth child and third daughter of Andrew Orr, an officer in the Royal Artillery, and his wife Lucy née Ackworth (Thackeray, 1950; Ellison, 1950). The father died when Mary was only three years old and the family went to live with the maternal grandfather, a clergyman, first at Wimbourne and then at a large country vicarage at South Stoke near Bath. Mary and her youngest sister Lucy, the close companion of her childhood, were educated entirely at home by governesses, the last of whom was an exceptional woman who was in charge of them for ten years. When Mary was 20 the sisters travelled abroad to study languages and the arts in Germany and Italy. They spent the years 1888-1890 in Florence where they studied the writings of Dante and where Mary, who from an early age had an interest in astronomy, became fascinated by the astronomical references in Dante's poetry.

2 AUSTRALIA 1890-1895

Following those years of education in Europe the Orr family – mother and daughters – lived from 1890 to 1895 in Australia, with addresses in the vicinity of Sydney in New South Wales, where the eldest daughter appears to have already been living. There the two youngest sisters continued their studies of Dante, and Mary resumed her active interest in astronomy. She was encouraged by the astronomer John Tebbutt (1834-1916), discoverer of the Great Comets of 1861 and 1881 (see Orchiston, 1998 and 1981, respectively), who had a well-equipped private observatory at Windsor, New South Wales, and at the time was Australia's leading astronomer (Haynes *et al.*, 1996). His observatory is now a museum.

Endeavouring to familiarize herself with the southern constellations, Mary Orr found that there existed no simple maps of the southern sky such, as those of James Gall (1866) from which she had learned her way around the northern constellations. She therefore prepared *An Easy Guide to the Southern Stars*, a pocket-sized booklet similar in format to Gall's guide, containing maps of recognizable naked-eye star groups observable from latitude 34° S. Her motive, she wrote to Tebbutt, was

> ... to get people (children and adults) on the track of observing for themselves the movements of the heavenly bodies, to help them recognize and admire the stars and constellations on the Australian skies, and then to interest them generally in astronomy. (Orr, 1895).

The book (Orr, 1897) with a Foreword by John Tebbutt recommending the work of "the enterprising authoress", was published by Gall and Inglis (publishers of Gall's book) after its author's return to England. A second edition was printed in 1911.

In 1891, Mary Orr became a member of the California-based Astronomical Society of the Pacific of which Tebbutt was also a member. The publications of this fast-growing society kept its members – who included women – informed of progress in astronomy worldwide, but especially in the United States. The British Astronomical Association, set up in London in 1890 and also open to women, extended its activities overseas in 1895 with the founding of the New South Wales branch with Tebbutt as President (see Orchiston, 1988). In that same year the Orr family returned to Britain, to a home in Kent, when Mary was able to join the parent Association in London. She also took up the study of mathematics, and decided to acquire a telescope (Orr, 1896).

3 LIFE IN ENGLAND

3.1 The British Astronomical Association

The British Astronomical Association (BAA) offered Mary Orr a very congenial milieu. Its membership included women who were debarred from the all-male Royal Astronomical Society, among them Agnes Clerke, Annie Maunder, and Mary Proctor. These women were well versed in astronomy and interested in its historical as well as in its scientific aspects. Agnes Clerke, 25 years older than Mary Orr, was a recognized authority on the history of astronomy and the foremost commentator on astronomy in the English-speaking world (Brück, 1994). She was also an admirer of the poetry of Dante. Agnes Clerke welcomed and encouraged the newcomer. Many years later, on the centenary of Clerke's birth in 1942, Mary, by then Mrs Evershed, paid tribute to their twenty years' friendship: "As one who had the privilege of knowing her personally since 1895 I can testify that her influence was inspiring to beginners of the science she so much loved." (Evershed, 1943)

Annie Maunder, at 28 the same age as Mary Orr, was the newly-married wife of the astronomer Edward Walter Maunder. Formerly Annie Russell, she had spent 3 years prior to her marriage on the staff of the Royal Observatory at Greenwich and continued to help her husband in his researches in solar physics throughout his lifetime (Brück, 1995). E W Maunder was one of the founders of the British Astronomical Association, and both he and his wife were active in its running: Annie was editor of the Association's *Journal* for thirty years. Mary Proctor, the daughter of R A Proctor, the noted popularizer of astronomy, then in her early thirties, followed her father's footsteps as an amateur astronomer and writer (Chapman, 1998).

3.2 Eclipse Expeditions

The British Astronomical Association became a centre of Mary Orr's life and activity. An early exciting event was the Association's expedition to observe the total solar eclipse in Norway of 1896 August (Marriott, 1991). The central line ran through Vadsö, at latitude 70° on the east coast of Finnmark, chosen as the site of the BAA expedition and of many other groups. The BAA party of 58 amateur astronomers and their friends was led by Maunder. Many of the participants had brought their own instruments; others (like Mary Orr) acted as their assistants. Unfortunately, the crucial morning of August 9 was cloudy. It was, however, a memorable social event for Mary Orr, as it was on this expedition that she first met her future husband John Evershed whom she was to marry ten years later.

The next expedition organized by the BAA was to Algiers, to observe the total eclipse of 1900 May 28 (Maunder, 1900). On this occasion Mary had her own instrument, a 7.6-cm (3-inch) refractor, and was in a contingent of four women who had their observation post on the roof of the British Consul's villa. "Miss Orr [Mary's

sister], high up among the chimneys, watch in hand, gave the time."; Mary reported on the appearance of the landscape during totality, and observed Baily's Beads with her telescope.

3.3 Variable Star Observer

In this same year, 1900, Mary Orr, having lived at various addresses in the Home Counties, settled in Frimley, Surrey, where she set up a little observatory equipped with her 7.6-cm refractor with which to observe variable stars and the Moon. Her instrument and her fields of work are recorded in Stroobant's first list of the world's observatories and astronomers compiled in 1902 (Stroobant *et al.*, 1907). She also, as she wrote to Tebbutt, had begun to study the history of astronomy (Orr, 1898).

Variable stars were the subject of Miss Orr's first scientific paper which shows her as already a competent observer (Orr, 1904). She clearly had an ambition to make a career in this field. In early 1906, Edmund T Whittaker FRS, mathematician at Cambridge and Secretary of the Royal Astronomical Society, who was married to a cousin of hers, was appointed Professor of Astronomy at Trinity College Dublin and Director of Dunsink Observatory outside Dublin. Arrangements were in hand for Miss Orr to go to work with Whittaker in Ireland (Thackeray, 1950) where she would presumably have lived with the family in their observatory residence and worked as a volunteer. Whittaker planned a programme of observation of red stars, many of which were variable, and began a systematic search for variable stars using photographs taken with the 15-inch Roberts reflector at Dunsink (Wayman, 1987), a project which would have well suited Miss Orr's taste[1]. However, by the time Whittaker took up his appointment in 1906 June, Mary Orr was engaged to be married (Evershed, 1906a).

Mary Orr and John Evershed were married on 1906 September 4 at St. Mary's Parish Church, Cloughton near Scarborough in Yorkshire. She was 39; her husband was 42 (Figure 1). They had no children, but their nephew, Andrew David Thackeray (1910-1978), son of Mary's sister Lucy, stimulated by their example, became an astronomer and Director of the Radcliffe Observatory, Pretoria, South Africa (Feast, 1979).

4 THE EVERSHEDS

4.1 John Evershed

John Evershed, who until then had been employed as an industrial chemist, had been interested in astronomy from childhood. In his recollections (Evershed, 1955), written when he was ninety years old, he described his excitement as a small boy at being shown a projection of a partial eclipse of the spotted Sun and how, later, he constructed a spectroscope attached to a small telescope to view prominences at the Sun's limb. In 1891 he read about George Ellery Hale's invention of the spectrohelioscope and set about constructing one for himself. Hale, then only 22 years of age, paid his first visit to Britain that year when he addressed the British Association for the Advancement of Science. On his next visit to London two years later, Cowper Ranyard, a well-known amateur astronomer, introduced Evershed to him. It was the beginning of a lasting and fruitful friendship. Hale declared that Evershed was the only person besides himself to have built a true spectrohelioscope by 1893 (Wright, 1966).

Evershed took part in the British Astronomical Association's eclipse expeditions to India in 1898 and to Algeria in 1900. In both instances, using his own improved solar spectrograph, he obtained ultra-violet spectra of prominences showing the continuum beyond the Balmer limit, the first person to make this observation. The results aroused the interest of Sir William Huggins through whose influence Evershed was offered the post of assistant astronomer at the Kodaikanal Observatory in 1906. He took up duties there in 1907.

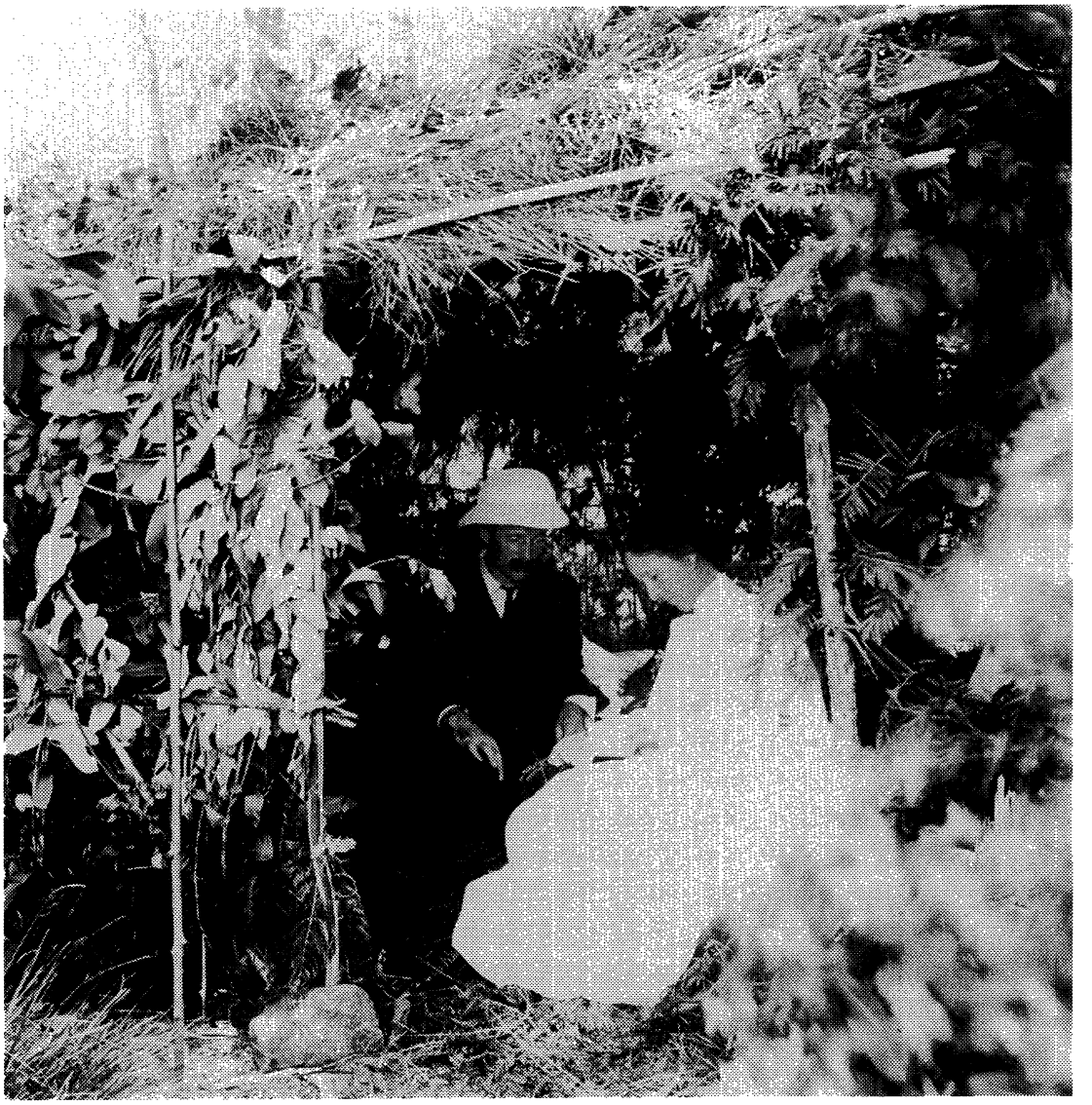

Figure 1. John and Mary Evershed photographed in Kashmir in 1913 (Royal Astronomical Society).

4.2 Visit to Mount Wilson

The Eversheds travelled to India via the United States and Japan, visiting several observatories on the way. Their most important call was at Mount Wilson where Hale had for two years been busy erecting the famous observatory, and where the solar installation with his new spectroheliograph had not long been in operation. The Eversheds spent some weeks at Mount Wilson, "... studying the instruments and methods and the work being carried out under the inspiring direction of Professor Hale." (Evershed, 1955). There was some confusion in the timetable, Hale having planned an extended trip east at about the same time (Brashear, private information, 1997). However, the visitors were well looked after in his absence. "We are both quite well and much enjoy life here. Mr Ellerman and the others do everything possible to make our visit a pleasant and profitable one.", wrote Evershed to Hale (Evershed, 1906b). Ellerman was Hale's major collaborator. Their work, especially the extension of the use of the spectrohelioscope to the red H-alpha line of hydrogen in 1904, was imitated successfully by the Eversheds in Kodaikanal.

5 INDIA 1907-1923

5.1 Astronomy in India

Astronomy in India had a long history. During the early 19th century the principal activities there were classical meridian astronomy. The solar physics observatory in Kodaikanal in the Palani Hills of South India, to which astronomical activity at the existing Madras Observatory was transferred, was opened in 1899 with Charles Michie Smith (1854-1922), a former Director of Madras, in charge (Kochhar, 1991; Kochhar and Narlikar, 1994). The new institution had a variety of instruments including a photoheliograph for daily photography of the Sun and a grating spectroscope, to which were added in 1903 a spectroheliograph, a solar telescope, and a siderostat (Figure 2).

Figure 2. Kodaikanal Observatory today. The building in the foreground was Evershed's laboratory (Courtesy R H Kochhar).

5.2 Evershed's Era

Evershed's arrival at Kodaikanal heralded the observatory's 'golden age' (Kochhar, 1991). He brought the existing spectroheliograph into working order and added his own spectroscopic equipment. He built a number of spectroscopes, and continued his work, begun in England, of sunspot spectroscopy (Stratton, 1957). It was in this latter field that he discovered the radial motions of material in the spots known as the 'Evershed Effect', published in 1910. In 1911 he succeeded Michie Smith as director of the Madras and Kodaikanal Observatories. His staff consisted of his replacement as Chief Assistant, T Royds, and four Indian astronomers. His wife assisted in an unofficial capacity, such as in observing and photographing Halley's Comet "... in the beautiful early dawns..." of 1910 May (Orr, 1914:423), though her name rarely appears in the formal observatory Reports.

In 1915 Evershed was elected a Fellow of the Royal Society. Later, he set up a second spectroheliograph for recording the Sun in the light of the red hydrogen line H-alpha, thereafter taking daily spectroheliograms in both calcium and hydrogen light. He was awarded the Gold Medal of the Royal Astronomical Society in 1918.

5.3 Solar Prominences

For Mrs Evershed, the sixteen years spent in the beautiful surroundings of the mountain-top observatory were the happiest of her life (Figure 3). During the first few years she was able to complete her study of Dante's astronomy (Section 6). At the same time she had the opportunity of learning and practising a new branch of astronomy – solar physics.

Figure 3. The Eversheds' home at Kodaikanal Observatory, now Evershed House, a guest house for visiting scientists. (Courtesy R H Kochhar)

Her special interest was in solar prominences; Evershed refers in his recollections to their studying them together with the fine Kodaikanal equipment. Mary also did her own independent research using the Kodaikanal spectroheliograms, and in 1913 published a substantial paper in which she analysed observations of prominences associated with sunspots made between 1908-10 (Evershed, 1913). She was able to classify the prominences into various active and eruptive types, and to draw conclusions regarding their motions in the fields of sunspots (Figure 4). The work, as Thackeray (1950) has remarked, showing series of photographs of moving prominences was a precursor of prominence cine-photography with the coronograph, a technique then far in the future. The paper, illustrated by 40 slides of spectroheliograms, was read by Mary in person at the meeting of the Royal Astronomical Society on 1913 April 11 (Report in *Nature*, 1913) when the Eversheds were presumably in London on leave.

Mary pursued the same research topic in a joint paper with her husband (Evershed and Evershed, 1917). The actual analysis was principally hers; it was noted in the Introduction that "The Memoir was drawn up by Mrs Evershed under the supervision of the Director ..." with the help of two other members of staff. This substantial piece of work filling 126 pages involved almost 60,000 individual prominence observations over an entire 11 year sunspot cycle. This huge and important sample of data was analysed in great detail using statistics, diagrams, and photographs, clearly establishing a relation

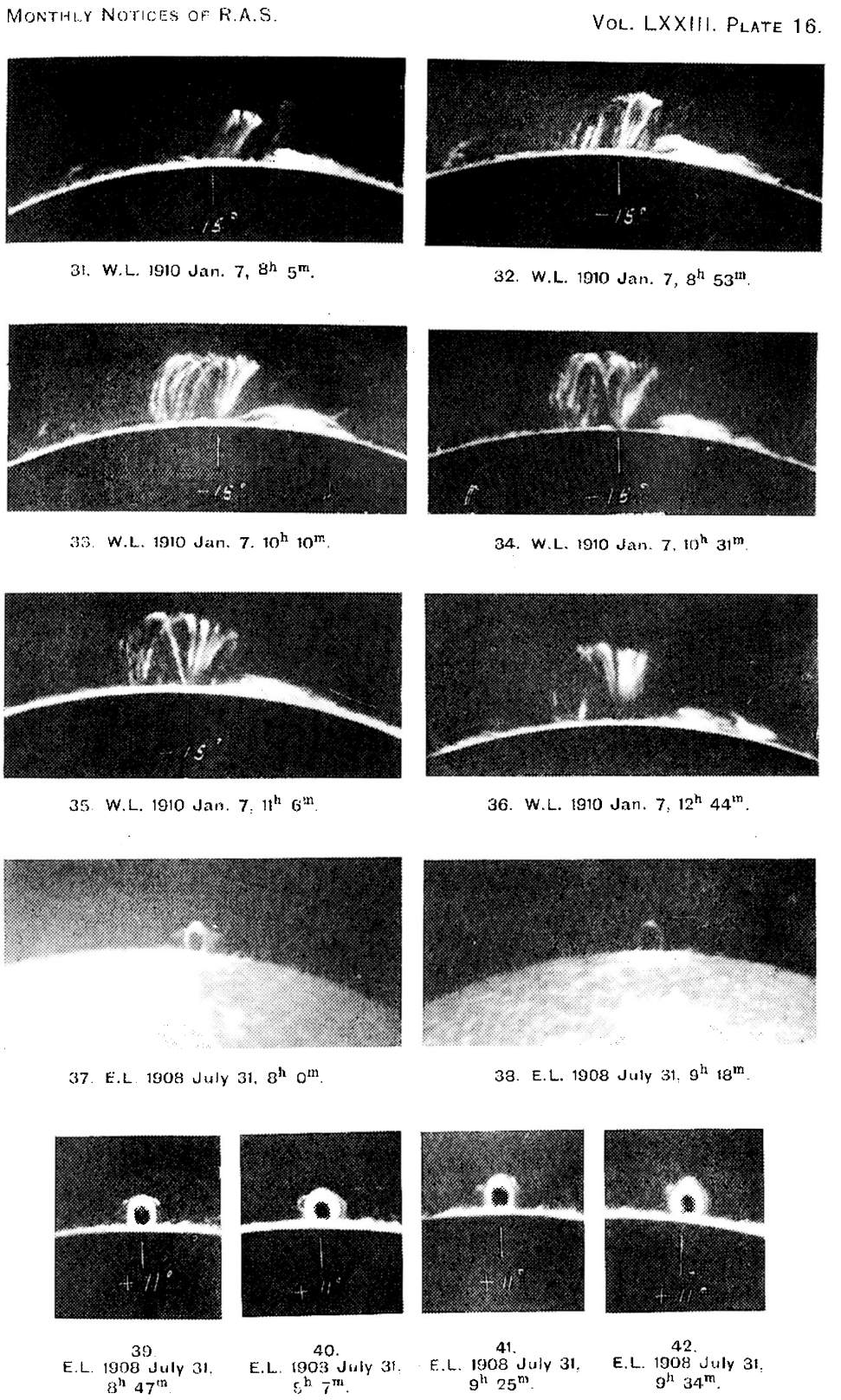

Figure 4. Example of prominence photographs from M A Evershed's paper of 1913. The series of photographs at intervals illustrates the motions of the prominence material.

between prominence types and sunspots (Ellison, 1944). With this, and her earlier paper, Mary Evershed was a pioneer of solar prominence research. She has not always been given due recognition for her contribution to this field.[2]

5.4 Expeditions

The years in India also brought opportunities for travel. These included two site-testing expeditions to Kashmir and one to the South Island of New Zealand, between 1913 and 1915. The total solar eclipse of 1922, their last year in the East, was the occasion of another absorbing journey for the Eversheds who travelled to Wallal, Western Australia, to observe it, but were unfortunately frustrated by the weather. "As the funds available would not admit of a large party to Australia, I was compelled to limit the personel to three only, including myself and Mrs Evershed.", wrote her husband in his official Report (Evershed, 1923). To the end of their Indian years, therefore, Mrs Evershed was her husband's constant companion and collaborator.

6 DANTE AND THE EARLY ASTRONOMERS

6.1 Dante

Mary Evershed's enthusiasm for Dante began, as already mentioned, in her days as a student in Italy (Figure 5). Surviving notebooks indicate that she started to outline her book as early as 1896 (Reynolds, 1956). The labour came to fruition in the tranquillity of Kodaikanal, "... an ideal place in which to write on astronomy and poetry ..." (Orr, 1914, Preface). The book, *Dante and the Early Astronomers* (Orr, 1914), was a study of astronomy as found in Dante's writings, both prose and poetry, but quite particularily in the Divine Comedy. That unique work of poetic imagination narrates the poet's fictitious journey through Hell, Purgatory, and Paradise, finally reaching the abode of God in the Empyrean beyond space and time. The poem incorporates Dante's vision of the physical universe, derived from the cosmology of his day. It also includes numerous references to the positions and movements of the heavenly bodies on the celestial sphere, and the use of astronomical descriptions to indicate date, hour, or passage of time. These references can be baffling to readers not conversant with the elements of spherical astronomy. Mrs Evershed's book was the first, at least in English, expressly written to help readers to understand these references and to appreciate the poetry and symbolism of Dante's allusions to the heavenly bodies.

In her book, Mrs Evershed revealed Dante's considerable knowledge of astronomy by surveying the textbooks which he is known to have used in his studies and which are quoted in his own various writings. Dante's favourite book on astronomy was the *Elements of Astronomy and Chronology* by the 9th century Arab scholar Alfraganus (the latinised name of Al-Farghani), available to him in a Latin translation. Dante's other authority was Aristotle with his doctrine of the four elements. Mrs Evershed could herself consult these works first-hand in Latin editions.

The cosmology of Dante's day was Ptolemy's Earth-centred model with the Sun, Moon and planets each occupying its own sphere and moving in epicycles. Two further spheres took account of the stars and finally, embracing them all, was the Empyrean of the 13th century Christian theologians. "Then arose one of the world's greatest poets and a thousand years after Ptolemy's death, immortalized his work ...", wrote Mrs Evershed, who devoted the extensive first part of her book to the history and development of astronomy from its beginnings up to Dante's day.

6.2 Astronomical Allusions

The second part of the book examined and explained specific astronomical allusions in Dante's writings. In the famous verses in the first Canto of Purgatory, for instance, the poet emerging from the gloom of Hell sees the sky once again:

Figure 5. Dante Alighieri. From a fresco by Luca Signorelli in Orvieto Cathedral. The portrait was used as the frontispiece in M A Orr's book.

The fair planet which inspires love
Was making all the orient smile,
Veiling the Fishes which were in her train.

The planet is Venus; the time of year is Spring when the Sun is in Aries and when the Fishes, the next zodiacal sign, is in the dawn. It is a sight which many astronomers have experienced; Mrs Evershed recalled enjoying it while observing Halley's comet in 1910, an occasion that inspired a paper on Dante's references to comets (Evershed, 1914). The Divine Comedy abounds with such astronomical riddles.

The poet's eight day-long visionary journey takes him through the underground levels of Hell, out again to the island of Purgatory, and finally through the ever higher spheres of the planets to Paradise. Mrs Evershed reconstructed the itinerary step by step

from the astronomical references. In Dante's imaginative scheme, Purgatory is an island in the middle of the ocean in the antipodes of Jerusalem, that is at latitude 32°S, not very different from that of New South Wales. The poet's path through Purgatory was, therefore, of particular interest to Mrs Evershed who produced a map of the heavens as seen from 'Purgatory' before dawn and discussed the question of how much of these skies might have been known in Dante's time.

6.3 The Date of Dante's Vision

The action of the Divine Comedy is set at Easter-time. The imaginary journey had always been supposed, from historical and other clues, to have taken place in the year 1300. The question of whether the astronomical particulars described in the course of that journey conformed to the actual situation in that year was much debated by certain nineteenth century Dante scholars. Technicalities about the calendar and astronomical tables were introduced, and much was made of the fact that Venus was not a morning star in 1300, as described by Dante in the passage already quoted. It was suggested that 1301 would better fit the astronomical data in the Comedy. The matter was fully discussed by the eminent scholar Edward Moore (Moore, 1887) who maintained that the date of Easter 1300 had been chosen by the poet to suit his artistic purpose. "Let us always remember that we are interpreting a poem, not examining a scientific treatise." The matter, however, did not rest there.

The Italian astronomer, Filippo Angelitti (1856-1931), director of the observatory of Palermo, now entered the fray. Struck with failing eyesight, Angelitti devoted much time and energy to astronomical-literary matters (Caldo, 1931). In a series of papers he argued for the date 1301 with an elaborate analysis of the astronomical references in the poem. Mrs Evershed examined the problem in her book, listing the astronomical pros and cons for each date and discussing how the Venus anomaly might have arisen. She was insistent, however, that the astronomy is there for the poetry, not the other way round. "No-one will dispute a poet's right to arrange the skies as he thinks fit.", she wrote. She rejected Angelitti's claim, attractive though it appeared at first sight. Angelitti later (in 1921) conceded that, notwithstanding his earlier arguments, the year 1300 was to be preferred on historical and aesthetic grounds (Gizzi, 1974). The debate has long lost its interest for scholars. Far from being mistaken in his astronomical arrangement, the distinguished Dante expert Professor Patrick Boyde tells us, Dante had deliberately chosen it to represent symbolically an ideal Easter week in an ideal universe (Boyde, 1981).

While the astronomical exposition in *Dante and the Early Astronomers* was its most special feature, Mrs Evershed consulted the works of leading contemporary Dante scholars in English, German and Italian. She is known to have corresponded with G V Schiaparelli (1835-1910) of Milan, an authority on medieval astronomy, though only one letter survives (Schiaparelli, 1909).[3] She does not appear to have communicated directly with Angelliti.[4]

The book was published by Gall and Inglis in 1914. That firm had produced a second edition of *Southern Constellations*, still under the author's maiden name. Mrs Evershed chose to retain the same name for her second book but added her married surname, styling herself "M A Orr (Mrs John Evershed)".

6.4 Expert Opinions

A full page review of *Dante and the Early Astronomers* by J L E Dreyer, the astronomer and historian of astronomy, appeared in *Nature* in 1914 December (Dreyer, 1914). Dreyer approached the book as a popular history of astronomy – which indeed in part it was (his *History of Astronomy from Thales to Kepler* was one of Mrs Evershed's authorities) – and gave it his somewhat qualified approval. He made some criticisms of her historical judgment, but had no fault to find with her assessment of

Dante's astronomical knowledge and considered that she had done good and valuable work. The magazine *The Observatory* in a short note called the book "charming" but did not enter deeply into the subject matter (Review, *The Observatory*, 1914). These seem to have been the book's only notices on its first appearance. The circumstances of its publication were perhaps unfavourable: the author was back in India, cut off by the First World War which broke out in 1914, and students of literature were not likely to come across the catalogue of a scientific publisher. It was to be over 30 years before the book came to the notice of Dante scholars (see Section 9, below).

In Italy, however, it was not so quickly forgotten. On the death of Angelitti in 1931 a tribute in an Italian newspaper to his work on Dante included a reference to M A Orr's "beautiful book" as the only one to treat Dante's astronomy in a complete and logical fashion (Emanuelli, 1931). The writer, Pio Emanuelli (1888-1946), was a respected scientific journalist and broadcaster who began his career at the Vatican Observatory and served as a lecturer at the Universities of Rome and Perugia (Fracastoro, 1948; Maffeo, 1991).

7 RETURN TO ENGLAND

The Eversheds returned to England in 1923 on the husband's official retirement. They settled in Ewhurst, Surrey, where John Evershed continued his researches with undiminished vigour for a further thirty years. He published several papers of which one only, a description of the new solar observatory at Arcetri, Florence, was in collaboration with his wife (Evershed and Evershed, 1932). Together they took part in two further solar eclipses, though unlucky with the weather, in England in 1927 and in Greece in 1936 and attended meetings of the International Astronomical Union from 1928 onwards, John being a member. Mary resumed her participation in the work of the British Astronomical Association and was elected a Fellow of the Royal Astronomical Society, serving for many years on the Society's library committee.

8 HISTORY OF ASTRONOMY

8.1 Historical Section of the British Astronomical Association

Mary Evershed's chief interest in this last phase of her life was in matters historical. Within months of her return to England she contributed a long essay on "The astronomy of Dante" in the Association's *Journal* (Evershed, 1924), which is still worth reading. She curiously made no mention of her book in that essay.

Her most far-reaching piece of work was the foundation of the British Astronomical Association's Historical Section in 1930. The BAA was traditionally organized in Sections, each with its own Director. The Historical Section was set up in the same manner, with Mrs Evershed as Director and with a membership of knowledgeable enthusiasts such as Mrs Maunder. She outlined its aims: "To study the history of astronomy and to co-operate in research, helping to bring new facts to light and unearthing facts now buried in old books and papers." (Evershed, 1930). This placing of research into the history of astronomy on an organized basis was a milestone in the annals of the Association and indeed of astronomy generally. It has to be recalled that 'history of science' was not a formal branch of knowledge in those days and that journals devoted to the history of science did not exist (*The Journal for the History of Astronomy* was founded only in 1970). The Historical Section, which she directed for 14 years, until her health began to fail, throve, and remains active today.

Over the years, Mrs Evershed made her own erudite and charmingly-written contributions to the Section's work and elsewhere with articles covering a range of periods of history: on Arab astronomy (1935), Dante's Virgil (1931a) (i.e. astronomy in the Roman Empire: Virgil was the poet's guide in Dante's Hell and Purgatory), and Flamsteed (1934a). She also reviewed a book about Kepler (1934b).

8.2 Who's Who in the Moon

As head of the Historical Section of the BAA, Mrs Evershed's most ambitious project was a directory aptly named *Who's Who in the Moon* (Evershed, 1938) which identified every person commemorated by name in lunar formations. The Introduction, written by her with her usual thoroughness, traced the history of lunar nomenclature from the map of Langrenus of Brussels published in 1645 to date. A number of catalogues and maps had been published in the 19th century, between which there had been a certain amount of confusion. A collated list drawn up in 1913 by Mary Blagg (1858-1944), a BAA member and Fellow of the Royal Astronomical Society, was followed by a catalogue and map by Mary Blagg and K Muller of Vienna, published by the International Astronomical Union in 1935. Using this catalogue as its basis, Mrs Evershed and her team undertook to identify all 672 names listed there of which 609 were personal names, and to write mini-biographies of these persons. Besides members of the BAA, the team of 30 had outside contributors, including Pio Emanuelli of Rome, already known to Mrs Evershed through studies of Dante. The dictionary was published as a Memoir of the BAA and distributed as a separate booklet. It was – and remains – extremely useful not only in satisfying the curiosity of lunar observers but as a biographical dictionary of astronomers, many of them obscure, who had been honoured in the distant past by places on the Moon. Where else could one hope to find out painlessly about astronomers such as Abraham Abenezra (*c.* 1092-1167) who tops the list, or Rudolf Goclenius (1572-1621)?

Among Mrs Evershed's lesser writings, it is worth recording a note written in 1931 on the subject of women astronomers. It began with the 17th century and ended with "... one young astronomer, of English birth and parentage, trained in Cambridge, [who] is now working at the other Cambridge across the seas.... Astronomers confidently await further important results from Cecilia Payne." (Evershed, 1931b).

9 "A DANTIST NO LESS THAN AN ASTRONOMER"

9.1 Dante Rediscovered

A happy occurrence in the last years of Mrs Evershed's life was the discovery of her *Dante and the Early Astronomers* by those for whom it had been principally intended – readers of Dante's poetry (Reynolds, 1956; see also Brück, 1997). It came about when the Italianist and Dante scholar Dr Barbara Reynolds, at Cambridge, came across the book by chance in the University library. "From then on," she wrote, "I was able to explain the astronomical references to my students, instead of saying, as T S Eliot did, that they don't matter and you can skip them." Soon afterwards she met A D Thackeray, the author's astronomer nephew, then at the Cambridge Observatory. In the summer of 1949 she visited the Eversheds, conversed with Mrs Evershed who was already seriously ill, and was shown round the observatory by her husband. Mrs Evershed died a few months later.

After Mrs Evershed's death, Dr Reynolds wrote an Obituary Notice together with a retrospective review of *Dante and the Early Astronomers* (Reynolds, 1950). She was warm in its praise. The author, she said, had come to the rescue of non-scientific readers while never losing sight of the fact that "... the Divina Commedia is a poem and not a scientific treatise." The admirable clarity of the author's style and her use of excellent diagrams and illustrations had made the history of astronomical ideas intelligible and attractive to the layman. The writer Dorothy L Sayers, who was engaged in translating the *Divine Comedy* and to whom Dr Reynolds introduced the book, described it as "...quite the best guide available to Ptolemaic Astronomy and to Dante's handling of celestial phenomena." (Sayers, 1955). Dorothy Sayers died in 1957. Her work was brought to conclusion by Barbara Reynolds who translated the last 13 cantos of the Paradise and wrote all the commentaries on that volume (Sayers and Reynolds, 1962). The translators recommend M A Orr's book to their readers in their bibliography.

9.2 Second Edition of Dante and the Early Astronomers

A new edition of *Dante and the Early Astronomers* – the first being long out of print – was prepared by Dr Reynolds and published in 1956 (Orr, 1956). The fate of this edition was the reverse of that of the first: it was welcomed by students of Dante but went largely unnoticed by astronomers, even in the book pages of *The Observatory*. A review by A C Crombie, the philosopher and historian of science, predicted that on the main theme of Dante's astronomy "Mrs Evershed's book has been and is likely to remain a standby for a considerable time." (Crombie, 1956). In this he has proved right. His own monumental study of medieval science (Crombie, 1994) lists M A Orr's book among references to Dante's astronomy. So does Boyde's comprehensive examination of Dante's philosophy and science (Boyde, 1981). In a recent study of astrological references in the Paradise (Kay, 1994), the author points out that M A Orr's book is still the only one in English devoted specifically to Dante's astronomy. Dr Reynolds' description of Mrs Evershed in her Introduction to the second edition as "a Dantist no less than an astronomer" is indeed justified.

10 CONCLUDING REMARKS

Mary Evershed died at her home in her 83rd year, on 1949 October 25. Fifty years after her death one may look back at her not inconsiderable legacy to astronomy: her collaboration with John Evershed in the establishment of Kodaikanal Observatory as a major scientific institution; her contributions to solar physics; her work on Dante that has helped readers enjoy that great poet's view of the universe; and her enthusiasm for history of astronomy which still bears fruit. She did not work for money or prestige, but out of pure interest, and was remembered by those who knew her for her willingness to enlighten and her unfailing courtesy (Obituary in *Nature*, 1950).

11 ACKNOWLEDGEMENTS

I should like to acknowledge very specially the kindness of Dr Barbara Reynolds, the custodian of Mrs Evershed's notes on Dante, who has shared her memories of her with me and helped me with references. I am also most grateful to Professor Patrick Boyde whose *Dante Philomythes and Philosopher: Man in the Cosmos* I have found a marvellous source of illumination on medieval science. For practical help I should like to thank Professor R K Kochhar and Dr W Orchiston for material about India and Australia, respectively; and also those who searched archives on my behalf: Drs R Brashear of the Huntington Library, San Marino, California, I Elliott of Dunsink Observatory, L Pastori of the Observatory of Brera-Merate, and Donata Randazzo of Palermo. Finally, as always, my thanks go to my friends Mr A MacDonald and Ms S MacEachern at the library of the Royal Observatory Edinburgh.

12 NOTES

1. There is no reference to the plan in the Dunsink archives. A student, perhaps a substitute for Mary Orr, helped for some time as a volunteer.
2. Sir H Spencer Jones (1951) for example, in his popular textbook *General Astronomy* attributes the original classification of prominences into quiescent and active to John Evershed alone.
3. Schiaparelli was by this time retired and some of his correspondence may have been kept in his home. This may explain why no correspondence with Mrs Evershed has been found in the archives of the Observatory of Brera-Merate. I thank Dr Livio Pastori for this comment.
4. Dr Donata Randazzo, librarian, Historical Collections at the Observatory of Palermo, has failed to find any trace of letters to or from Mrs Evershed among Angelitti's correspondence.

13 REFERENCES

Boyde, Patrick, 1981. *Dante Philomythes and Philosopher, Man in the Cosmos*. Cambridge University Press, Cambridge.

Brashear, R., 1997. Private communication of information culled from the Hale archives, Huntington Museum, San Marino, California.

Brück, M.T., 1994. Agnes Mary Clerke, chronicler of astronomy. *Quarterly Journal of the Royal Astronomical Society*, **35**:59-79.

Brück, M.T., 1995. Lady computers at Greenwich in the early 1890s. *Quarterly Journal of the Royal Astronomical Society*, **36**:83-95.

Brück, M.T., 1997. M.A.Orr (Mrs John Evershed), astronomer and Dantist. *Astronomy and Geophysics*, **38**(3):9.

Caldo, L., 1931. Obituary of Filippo Angelitti. *Astronomische Nachrichten*, **242**:31.

Chapman, Allan, 1998. The female touch. *Astronomy Now*, **12**(1):43-47.

Crombie, A.C., 1956. Book Review. *Italian Studies* **11**:98-100.

Crombie, A.C., 1994. *Styles of Scientific Thinking in the European Tradition.* Volume 2. Duckworth, London, p. 720.

D[reyer], J.L.E., 1914. Dante's astronomy. *Nature*, **44**:359-360.

Ellison, M.A., 1944. Sunspot prominences – some comparisons between limb and disk appearances. *Monthly Notices of the Royal Astronomical Society*, **104**:22-32.

E[llison], M.A., 1950. Obituary. *The Observatory*, **70**:30-31.

Emanuelli, Pio, 1931. Notice in the Milan daily newspaper *Corriera della Sera*, February 3; quoted by B. Reynolds in the Preface to M.A. Orr (1956), *Dante and the Early Astronomers*.

Evershed, J. 1906a. Letter to George Ellery Hale, dated June 28. Huntington Museum, Department of Manuscripts, San Marino, California.

Evershed, J, 1906b. Letter to George Ellery Hale, dated October 25. Huntington Museum, Department of Manuscripts, San Marino, California.

Evershed, J.E., 1923. Report of the Indian Eclipse Expedition to Wallal, West Australia. *Kodaikanal Observatory Bulletin* No. 72.

Evershed, J.E., 1955. Recollections of seventy years of scientific work. *Vistas in Astronomy*, **1**:33-40.

Evershed, J.E. and M.A, 1917. Results of prominence observations. *Memoirs of Kodaikanal Observatory*, **1**(2).

Evershed, M.A., 1913. Some types of prominences associated with sunspots. *Monthly Notices of the Royal Astronomical Society*, **73**:422-430.

Evershed, M.A., 1914. Dante and Halley's Comet. *Journal of the British Astronomical Association*, **24**:362-363.

Evershed, M.A., 1924. The astronomy of Dante *Journal of the British Astronomical Association*, **34**:314-321.

Evershed, M.A., 1930. Historical Section, *Journal of the British Astronomical Association*, **40**:203-205.

Evershed, M.A., 1931a. Dante's Virgil. *Journal of the British Astronomical Association*, **41**:32-34.

Evershed, M.A., 1931b. Women astronomers. *Journal of the British Astronomical Association*, **42**:48-49.

Evershed, M.A., 1934a. The birthplace of John Flamsteed. *Journal of the British Astronomical Association*, **44**:390-391.

Evershed, M.A., 1934b. Book review. *Journal of the British Astronomical Association*, **44**:398.

Evershed, M.A., 1935. Arab Astronomy. *The Observatory*, **58**:237-243.

Evershed, M.A. 1943. Centenary of Agnes Clerke's birth. *Journal of the British Astronomical Association*, **53**:43.

Evershed, M.A., and Evershed, J., 1932. Recent work at Arcetri. *The Observatory*, **55**:254-256.

Evershed, Mrs John (ed.), 1938. *Who's Who in the Moon.* (Memoirs of the British Astronomical Association), Edinburgh.

Feast, Michael, 1979. Obituary. *Quarterly Journal of the Royal Astronomical Society*, **20**:216-220.

Fracastoro, M, 1948. Pio Emanuelli. *Memorie S.A. Italiani*, **19**:229-230.

Gall, James, 1866. *Easy Guide to the Constellations*. Gall and Inglis, Edinburgh.

Gizzi, C. n.d. [1974]. *L'Astronomia nel Poema Sacra*. Two Volumes. Loffredo, Naples.

Haynes, R., Haynes, R., Malin, D., and McGee, R., 1996. *Explorers of the Southern Sky*. Cambridge University Press, Cambridge.

Kay, Richard, 1994. *Dante's Christian Astrology*. University of Pennsylvania Press, Philadelphia.
Kochhar, R.H., 1991. The growth of modern astronomy in India 1651-1960. *Vistas in Astronomy*, **34**:69-105.
Kochhar, R. and Narlikar, J., 1994. *Astronomy in India, a Perspective*. Indian National Science Academy, New Delhi.
Maffeo, Sabino, 1991. *In the Service of Nine Popes*. Vatican Observatory, Vatican City State.
Marriott, R.A. 1991. Norway 1896: the BAA's first organised eclipse expedition. *Journal of the British Astronomical Association*, **101**:162-170.
Maunder, E.W (ed.), 1900. *The Total Solar Eclipse 1900*. Knowledge Office for British Astronomical Association, London.
Moore, Edward 1887. *Time References in the Divina Commedia and their Bearing on the Assumed Date and Duration of the Vision*. David Nutt, London.
Obituary of M.A.Evershed. *Nature*, **165**:98 (1950).
Orchiston, W., 1981. Illuminating inicidents in Antipodean astronomy: John Tebbutt and the Great Comet of 1881. *Journal of the Astronomical Society of Victoria*, **34**:78-92.
Orchiston, W., 1988. Illuminating incidents in Antipodean astronomy: formation of the New South Wales Branch of the British Astronomical Association. *Journal of the British Astronomical Association*, **98**:75-84.
Orchiston, W., 1998. Illuminating incidents in Antipodean astronomy: John Tebbutt and the Great Comet of 1861. *Irish Astronomical Journal*, in press.
Orr, M.A., 1895. Letter to John Tebbutt, dated July 5. In *Tebbutt Letters*, Mitchell Library, Sydney.
Orr, M.A., 1896. Letter to Tebbutt, dated March 12. In *Tebbutt Letters*, Mitchell Library, Sydney.
Orr, M.A., 1897. *An Easy Guide to the Southern Stars*. Gall and Inglis, London and Edinburgh; Second Edition 1911.
Orr, M.A., 1898. Letter to Tebbutt, dated May 31. In *Tebbutt Letters*, Mitchell Library, Sydney.
Orr, M.A. 1904. Variable stars of long period. *Journal of the British Astronomical Association*, **15**:129-132.
Orr, M.A. (Mrs John Evershed), [1914]. *Dante and the Early Astronomers*. Gall and Inglis, London and Edinburgh.
Orr, M.A. (Mrs John Evershed), 1956. *Dante and the Early Astronomers*. Revised Edition. Allan Wingate, London.
Report in *Nature*, 1913. Report on RAS meeting. *Nature*, **41**:180.
Review, *The Observatory*, 1914. *The Observatory*, **23**:332-333.
Reynolds, B., 1950. Obituary notice and retrospective review. *Italian Studies*, **5**:72-75.
Reynolds, B. 1956. Preface in M.A. Orr, *Dante and the Early Astronomers*. Allan Wingate, London.
Sayers, D.L., 1955. *The Divine Comody 2: Purgatory*. Penguin Books, London.
Sayers, D.L. and Reynolds, B., 1962. *The Divine Comedy 3: Paradise*. Penguin Books, London.
Schiaparelli, G, 1909. Letter to Mrs Evershed at Kodaikanal, dated August 7. In the possession of Dr Barbara Reynolds.
Spencer Jones, H, 1951. *General Astronomy*. Third Edition. Edward Arnold, London.
Stratton, F.J.M., 1957. John Evershed. *Biographical Memoirs of the Royal Society*, **41**:41-51.
Stroobant, P., Delvosal, J., Philippot, H., Delporte, E. and Merlin, E., 1907. *Les Observatoires Astronomiques et les Astronomes*. Observatoire Royal de Belgique, Brussels.
Thackeray, A.D., 1950. Obituary. *Monthly Notices of the Royal Astronomical Society*, **110**:128-129.
Wayman, P.A., 1987. *Dunsink Observatory 1785-1985*. Royal Dublin Society and Dublin Institute for Advanced Studies, Dublin.
Wright, Helen, 1966. *Explorer of the Universe, the Life of George Ellery Hale*. New York, Dutton; reprinted, American Institute of Physics, New York, 1994.

Mary Brück, now retired from her post as Senior Lecturer in Astronomy at the University of Edinburgh, takes a particular interest in women astronomers of the 19th century. She is joint author with her husband, H A Brück, of *The Peripatetic Astronomer*, a biography of Charles Piazzi Smyth (1988).