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Summary:

The popularizer of astronomy Mary Proctor was well-known in her days but has been little remembered since. A prominent lecturer and author, Mary Proctor was trained in the craft of science writing by her father, Richard Proctor. She 'held the very first place in the profession as a woman' and promoted the role of women in science throughout her career. Her life illuminates many themes. Mary Proctor spanned the period between entrepreneurial science popularizers and professional science communicators. I suggest that one of her most important legacies is as an early pioneer of the practices of science journalism in the early twentieth century when the relations between science and society were in flux. Yet her legacy has been largely overlooked. A study of Mary Proctor's life reveals multiple interests, diverse opportunities and the way that people are differently remembered.

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Mary Proctor: an astronomical popularizer in the shadows

Introduction

In her days (1862–1957), the British-American popularizer of astronomy Mary Proctor attracted several epithets. 'The children's astronomer' reflected on her breakthrough at the 1893 Chicago Exposition's Congress of Women and 'the little lady of the stars' on her diminutive stature.[1] Neither do justice to her varied career. One of many at the Congress, Mary Proctor was nonetheless unusual as a scientific lecturer and in that capacity 'held the very first place in the profession as a woman'.[2] Her books were used in New York public schools. She pioneered science journalism at the *New York Times* with columns republished across the United States of America. Mary Proctor travelled to Norway, Spain and Canada on eclipse expeditions and was well-known in New Zealand and Australia in the campaign to establish the Mount Stromlo Observatory. Her reputation preceded her, as the daughter of the most prominent public scientific writer in the Anglosphere in the late nineteenth century.[3]

Proctor had faded from public view already in her own lifetime and is not discussed extensively in recent literature.[4] There are only short treatments of her life and work. The most substantial of these are by Prosser and, in a short work, by Altschuler and Ballesteros.[5] There are a number of entries in encyclopaedic works.[6] Perhaps the best of these is the entry in Creese's magisterial *Ladies in the Laboratory*.[7] Proctor is mentioned in passing in a number of monographs focussing on friends and colleagues.[8] Saum has a beautifully detailed account of some of her early adult life in the USA including correspondence from her father, the astronomer Richard A. Proctor (1837–1888).[9] Mary Proctor would seem to be too American to appear in Brück's *Women in Early British and Irish Astronomy*.[10] A correspondent to several astronomical journals, a member of national and international committees, an influential sponsor of research projects, a global proponent of research funding, an extended account of Proctor has fallen between the cracks.

Mary Proctor's life and work illustrates several themes. She was a female science lecturer and writer in an era when this was still unusual. Her life circumstances are singular, as one of the very few science

popularizers raised, by Richard Proctor, into the profession in a craft tradition.[11] I argue that Proctor is a transitional figure between the entrepreneurial science popularizers of the nineteenth century and the professional science communicators of the twentieth. Drawing on the resources that her father provided for her, Proctor's literary instincts long remained those instilled in her childhood and youth.

Richard Proctor (Figure 1) played a role in his elder daughter's life as character, setting and content. Mary was 'reared in the lecture atmosphere' and clearly learned much of her craft from him.[12] Mary Proctor's career was launched by her father's sudden and unexpected death in New York on 12 September 1888 at the age of 51. One of her first public addresses was to the Congress of Evolutionists on her father's legacy as a 'hero of evolution'.[13] Decades after his death, with Proctor in her fifties, she was still introducing herself to astronomers as the daughter of Richard Proctor, dedicating books to his memory and expounding his theories. This is a testament both to reputation, and the kinds of authority available to Mary. She did not simply reflect her father's career – she forged her own, with unique voice, expertise and areas of specialization.

Mary Proctor responded to the opportunities provided by different media forms than her father had experienced in order to advance her interests. In particular, the 'new journalism' had changed the media landscape since the 1870s by focussing on presenting news and opinion from a personal perspective and within a stylistically coherent newspaper, rather than the older style of a patchwork of facts, verbatim transcripts and copied reports. The organisation of astronomy, too, had changed since Richard's day. The rise of the astrophysical branch of the science had led to the construction of both observatories and professional networks. The elder Proctor could still imagine a field of independent scientists (but not amateurs); the younger's career operated within one dominated by professional government- and university-employed astronomers. Mary Proctor built on the legacy of her father but did so in a different environment. Her responses to these changes were both innovative and old-fashioned.

Mary Proctor had been born into the profession

The details of Richard Proctor's life are told elsewhere.[14] Salient aspects for Mary's biography include the following. Richard's Cambridge studies were, successively, delayed and derailed by the deaths of his father and mother. Before graduation he had met and married the Irishwoman Mary Mills; Mary Proctor was born in Dublin in April 1862. Richard Proctor turned to astronomy after the death of Mary's elder brother in infancy and then concentrated on entrepreneurial astronomy for financial reasons. As a serious astronomer, Richard Proctor spent the bulk of his subsequent time writing and lecturing.[15] Subsequently, Mary Proctor 'took up the study of art' and was 'ambitious to be a painter'.[16] Throughout her subsequent career, Proctor would draw her own images, for lectures or her books. However, when her mother, Mary Mills, died in 1880, with Mary was not yet seventeen, she was not yet considering an astronomical career.

In the aftermath of Mill's death, Richard Proctor embarked on a highly successful lecturing tour of Australia and New Zealand. At the conclusion of his antipodean tour, Richard Proctor founded the journal *Knowledge*, and by 1885 Mary Proctor, under the pseudonym 'Stella Occidens', was writing a series of articles about Indigenous North American myths of astronomy for it. Another significant event following Richard's tour down-under was his marriage in 1881 to the recently widowed Sallie Crawley.[17] The couple moved initially to London, but in 1884 the family relocated to Sallie's hometown, St Joseph, Missouri and moved in with Sallie's parents. Mary had already completed her education in Britain, but the younger children transferred their schooling to the USA.[18] As well as writing for *Knowledge*, in St Joseph Mary assisted her father with his papers and libraries, was involved in society events, played the organ at the Episcopal Church and chaired the local art committee.[19] Figure 2 shows Mary around this time. Table 1 summarises the biographies of the children of Mary Mills and Sallie Proctor (née Crawley).

Richard's death was a turning point

Three deaths in quick succession – Richard and both of his children with Sallie – threw the family into emotional and financial turmoil. Soon after, Mary and her two brothers took a flat in downtown St

Joseph, with Mary keeping house while Richard Jr worked, and John looked for employment.[20] They were joined by their younger sister Agnes, when back from Baird College in nearby, Missouri, where she was still a student. Agnes would go on to be a musician and music teacher of some note; newspaper columns from St Joseph report on Agnes as a society favourite.[21]

Richard Proctor Jr was particularly strained: he cared for William in his illness and then immediately found work to support the family.[22] This was too much for him and he spent a short time in the state asylum before escaping – with the assistance of his brother John – and headed west.[23] During his brief confinement, it had been reported that Richard Jr's original 'antipathy to Mrs. Proctor' had disappeared and 'he now talks more against his sisters than anyone else'.[24] This presumably refers to his stepsisters, although, in any case, by 1894 he was back on good terms with Mary. John followed Richard Jr out west, and was reported as living in Portland, Oregon, and then in California. In 1908, John Proctor returned to London where he died unexpectedly in 1911.[25]

The twice-widowed Sallie Proctor also swung into action in the wake of Richard's death. She fulfilled Richard Proctor's lecturing engagements in Britain and lectured on astronomy for some years afterwards, both in the United States and Britain. Across her life, Mary's relationship with her stepmother, just seven years her senior, was somewhat fraught. Both women had been involved in campaigns to preserve Richard Proctor's memory.[26] However, Sallie's interest waned after her remarriage, and both public statements and private correspondence from Mary reveal irritation about this and other aspects of Richard Proctor's legacy.[27] Nonetheless, Mary continued to be involved with both stepmother and her family. Proctor visited Sallie in Ireland in 1940, escaping London during the height of the Blitz, shortly before Sallie's death in 1941.[28] Mary wrote Sallie's obituary for the *Monthly Notices of the Royal Astronomical Society*.[29]

Mary Proctor was ambitious to follow the tradition

In the period after Richard Proctor's death, Mary prepared herself to earn an income. He had long since given Mary an astronomical education. Later in life, Mary had many stories about this period in

her life. She claimed an earlier uninterest in the subject was overcome when ‘my father took me up nights with him to the observatory and let me look through the big telescope, telling me all the time such wonderful things about the stars’ and she gained a particular interest in mythology of the stars.[30] Richard Proctor also taught his daughter about professional writing; as a teenager she was ‘correcting the proof sheets of his books’.[31]

She returned to her father’s work and ‘found comfort in reading his books all over again’.[32] More than just comfort, Mary now started to emulate her father through popular writing. In January 1889, an article by Mary Proctor, writing under a pseudonym, appeared in the Children’s Magazine *St Nicholas*. On 1 March, another Stella Occidens article appeared in *Knowledge.* This time, it also used her own name. In October, an article of hers from the *St Louis Republic* newspaper was reprinted in several other papers. This early writing was not an idle pastime—the St Joseph *Daily Gazette* described her as ‘one of the most ambitious young ladies in the city’.[33] Writing not yet providing enough of a living, in September 1889 Mary advertised classes for children in ‘painting, music and French’.[34]

Over the next few years, Mary expanded her writing, while continuing to teach in St Joseph. In August 1891, Mary had her widest exposure to date with an editorial feature in *Frank Leslie’s Illustrated Magazine*, then approaching the height of its popularity under the management of Leslie’s widow, the then notable and later suffrage campaigner Miriam Leslie. Soon afterwards, Mary began to write more regularly for the St Joseph newspapers. In 1892, a book review by Proctor, of the Smithsonian Institute’s Annual Report, appeared in *Science*. This contribution is the first time that Mary addressed herself directly to a scientific audience, rather than a general readership. Perhaps unsurprisingly, the review is rather cautious, presenting as a summary of the Annual Report instead of as commentary. Other publications that Mary wrote for in this period include *Goodform*, *Open Court*, *Lakeside Syndicate* and *Popular Education,* as well as an expanded range of newspapers.

Mary’s public breakthrough came in 1893

Mary Proctor was one of nearly two hundred female lecturers to present at the Women's Pavilion at the Columbian Exposition in Chicago in 1893. This was no small matter. Although the previous worlds' fair in America, in Philadelphia in 1876 had also had a women's pavilion, this was to be a grander affair. Legislation to establish the self-managing by a board of women was passed by the national Congress. Maxwell argues that this 'was the first moment in American history that women had a formal, institutionalized role in the planning and execution of government tasks; to serve as a member of the Board of Lady Managers was to participate in a singular moment in American women's history'.[35] Lecturers were expected to present a respectable version of women's work to the Congress. Mary Proctor's astronomy was evidently suitable.

Accounts of how Mary Proctor came to lecture in Chicago vary. Although Mary stressed in most interviews that she was invited to lecture by Bertha Palmer, President of the Board of Lady Managers, it appears clear that Proctor had herself responded to an advertisement for lecturers. Initial contact was through Ellen Henrotin, National President of Womens' Clubs and Vice President, Women's Branch of the World's Congress Auxiliary [36]. Howsoever the arrangements were made, the result was a success. As Proctor retold the story of her initial lecture:

> I took great pains to prepare a talk that I thought the children would understand, and be interested in. But when I reached the building, I found an audience, not of children, but of men and women. There was hardly a child in all the assembled one hundred people. It would never do to give them the childish talk I had prepared, and as it was my first attempt to talk from a platform, you can imagine my state of mind. I was determined, however, that my first effort should not be a fiasco, so I stepped out upon the platform and talked about the things that had most interested me in my father's books and conversations. [37]

Mary Proctor delivered several more lectures between 10 and 20 July. Her primary lecture, 'The Poetry of Astronomy', was a version of Richard Proctor's main lecture 'Life and Death of a World'. The version of Mary's lecture printed in the written record of the Congress shows this similarity,

including the final quotation from Jean-Paul Richter. Mary's version had longer literary quotations and a more conventional religious framing but contained the same themes of the history of astronomy as a history of thought and appeals to the astronomical sublime, the sense of the insignificance of humans standing before the cosmos.[38] The polish of this lecture—'Well Written' according to the *St Joseph Herald*—suggests that rather than extemporising, Mary arrived at the Exposition with both children's and adult's lectures prepared, and switched versions at the last minute. As well as the science of astronomy and the craft of professional writing, Mary may have learned from her father how to embellish reputations through the media. Proctor gave at least two other lectures, 'Wonders of the Depths' and a 'A Legend of the Stars', as well as a short talk to teachers on how to teach astronomy in the kindergarten.[39] Presumably the children's lecture that Proctor had intended to deliver on her first appearance, titled 'Brownies of the Sky', was also given at least once in Chicago; this lecture would certainly be a feature of her subsequent lecturing.

Following her success at the Congress, Proctor was engaged by James Burton Pond, the veteran lecture manager who had organised Richard Proctor's first tour of North America some 20 years previously. The Pond Bureau would continue to represent Proctor throughout her North American career, first under James Burton and then, from 1903, his son James Jr. Writing in *Eccentricities of Genius*, his reminiscences of the speakers he had managed, the elder James described Proctor as waking after here inaugural lecture 'the next morning to find herself famous'.[40] It was Pond who described in this work Proctor as holding 'the very first place as a woman'. Like others – including Proctor herself – Pond made much of the family connection to Richard. He also described a personal friendship with Proctor; he was at least close enough to the Proctors to later attend Agnes' wedding.[41] Under agreement with Pond, Mary started her first season in October 1893 after participating in a number of activities concerning her father's reputation. The experience management of the Ponds no doubt enhanced Proctor's oratorical gifts in contributing to her success. Figure 3 shows a handbill from Mary Proctor's early lecturing career.

Proctor had an unusual but not unique position as a female popularizer of science

The tradition of women science writers in the nineteenth century was, by its end, well-established, going back at least as far as Jane Marcet, the British author of the 1805 work *Conversations on Chemistry*, which famously inspired Michael Faraday to turn to science and was "one of the most influential nineteenth-century textbooks in Britain and the United States" that "earned the praise of more than one eminent scientist for the clarity and thoroughness of its exposition".[42] At the same time as Mary Proctor was writing in *Popular Astronomy*, other writers included: Mary Byrd, Director of the Observatory at Smith College; the amateur astronomer Rose O'Halloran; and, of course, Charlotte Willard, assistant editor of *Popular Astronomy* itself. The career of Agnes Mary Clerke, author of *A Popular History of Astronomy during the Nineteenth Century* also partly overlapped Proctor's. Lightman describes how in the latter part of the nineteenth century such women writers were 'indicative of continuing efforts of marginalized groups to be a part of the scientific world'.[43] Other motivations for such work, described by Shteir, include the need to earn an income and desires to use science as part of social or moral reform.[44] Certainly both the urge to be a part of the science community and the prosaic need for financial support were ever-present for Mary. Indeed, this latter aspect was especially important. Like others such as Marcet, Clerke, or the mid-century science writer Mary Somerville, Proctor had become interested in scientific matters through her family environment. Unlike them, however, she had little by way of financial security, and depended entirely on her popular work for an income.

On the oratorical front, women lecturers were less common, but not unprecedented. Recent scholarly work women's public speech in nineteenth century USA, has shed light on female activists in the abolitionist movement, like the Grimké sisters, and even earlier lecturers like Anna Laura Clarke.[45] There were at least half a dozen women other than Proctor engaged in professional lecturing in the eastern United States in 1898, although Mary was unusual as a scienific lecturer. In any case, seeing Proctor's utilisation of her opportunities as a woman is an important lens on her career. She was able to get her start thanks to the emerging organised women's movement and would use her platform to

advocate for the role of women in science throughout her life with columns such as ‘Women Who Study the Stars’, one of her most frequently reprinted articles.[46]

Mary’s public prominence rose steadily after 1893

In the wake of the Chicago Exposition, Mary Proctor’s public profile quickly grew in stature. Her first season with the Pond Bureau, starting in October 1893, saw her lecturing in New York, New Jersey, Illinois and several New England states. Mary returned to St Joseph in March and although she lectured in the neighbourhood, she evidently considered herself back to stay, as she advertised for more students in music and French, but it would not be for long. In early August she was summoned by Pond back to New York for another season, in which she would also be added to the National Lyceum Course in Washington DC and travel to Canada, as well as lecturing in previous locations. In January 1895, the New York Board of Education announced that year’s series of thirteen ‘free public lectures for the people’ and Mary was only one of two women on the slate.[47] This arrangement with the Board of Education would continue for several years, and Proctor soon made New York her home.

Through this period, Proctor continued to expand the range of her writing. She was penning regular columns on astronomy in newspapers like the *World* and the *Boston Post* as well as the *St Joseph Herald*. The *Arena* magazine was another she contributed to with an article on the astronomy of Shakespeare taken from her father’s notes, and appearing under Richard Proctor’s name, but evidently provided by Mary. Building—and building on—his legacy remained important to her throughout her life, but it was in taking advantage of the new media environment and the opportunities that it presented that she built her own name.

By late 1894 Mary Proctor’s career in print was developing further as she was sought out by reporters for comment on astronomical subjects, such as the possibility of signals from Mars. She was also asked to edit regular columns in a number of publications. From January 1896 she edited ‘Popular Astronomy’ a new department within *The Observer*, the magazine produced by the Agassiz Association, the national network of nature-study clubs, although the journal soon folded, as its

predecessors had. One of her first acts in this role was to write to a number of observatories, asking if their astronomers would provide material for a series on 'How I became an astronomer'.[48] Mary also wrote a number of articles for her own department under pseudonyms, including a fictitious elder brother Edward, and her real, but recently deceased, younger brother Henry. Following this, in 1897 she contributed a regular series of 'Evenings with the Stars' for the *Popular Astronomy* journal. From 1901, Proctor started writing for *Scientific American* and over the subsequent decade would contribute eleven articles to that journal. In these years from the mid-1890s, Mary's career trajectory was on an upwards path and her profile was increasingly national.

Stories of Starland **was a culmination of her early career**

Mary Proctor's first book, *Stories of Starland*, appeared in 1897. This book was quite successful, not least because it was picked up for use in schools as a supplementary reader by the New York Board of Education. That it sold 'thousands of copies among schoolchildren in New York, Philadelphia, Washington and elsewhere' bolstered Mary's finances as well as her reputation.[49] *Stories of Starland* was apparently written in a week:

> The publisher came to me one Saturday and told me he would like a children's book on astronomy. I devoted all my days to it till the following Saturday night, and on Monday morning took the completed manuscript to the publishing house. They seemed very much surprised that it should be finished so soon; but as a matter of fact it was not much more than the manual labor of writing out the manuscript that I did in that week. *The little book itself is the result of ten years' thought and study*.[50]

Stories of Starland had the framework of a conversation between Mary, her younger brother Harry, and their cousin Nellie, with poems on astronomical themes also set throughout the book. Harry particular likes hearing his sister's story as he is disabled, and unable to walk. The book ends by foreshadowing the tragic death of Harry. The autobiographical elements of this arrangement are

obvious, and the book is dedicated to Henry Proctor. (See Figure 4 for Proctor's depiction of 'Harry' in the book. Other illustrations in the book are also presumably drawn by Mary herself.[51]) An example of this dialogue comes when, Harry's request, Mary is beckoned by the nurse:

> So she called his sister Mary, who hastened at once to his room, and brother and sister were soon far away on a ramble in starland.
> "We shall go on the moon this evening," she began, "and find out what a queer old world it is."
> "Old?" asked Harry; "why do you call it old, when it looks so bright and new? See, sister, how it seems to be looking right into the window and watching us. I wonder if it knows what we are saying about it. Now what would it think if I heard you calling it old?"
> "But it is," said Mary, laughing; "and very old indeed. Its face is wrinkled and scarred, and is just like that of the old dried-up apple we found in the orchard the other day."[52]

This reprises elements of her father's Spencerian views on cosmic evolution (and the famous image of the withered apple from Nasmyth and Carpenter's *The Moon: Considered as a Planet, a World, and a Satellite* which Richard Proctor used in his lectures).[53] Spencer held a teleological version of evolution in which the progress of things was from simple to complex and then decay. This 'law' applied not just to biological species, but at all levels from the cosmic, through organisms to society and even individual human development. Richard Proctor was a strong admirer of Spencer, and one of the themes of his lecture 'Life and Death of a World' was that planets started as young worlds, developed to a point where they could sustain life, and then became old.

> The whole of the solar system of the planets and the great central sun itself have been fashioned by a process – a process that may be termed growth, since it is as much growth as the growth of a tree, and as you can understand how a tree grows after its planting, so by the aid of science you can be taught to see how a world will run its course through burning childhood, fiery youth, manhood, old age and decrepitude, to the final stage – that of death.[54]

In Richard Proctor's framework, the Sun was in the youngest stage, Jupiter waiting to develop life, Earth in its prime, Mars too old to sustain life and the Moon an example of a dead world.

The dialogic form of *Stories of Starland* reflects the 'most commonly-imitated form for children's science books in the early nineteenth century' as this format was thought, at that time, to be especially engaging for children and effective for education. [55] Joyce's *Scientific Dialogues,* Aikin and Barbauld's *Evenings at Home*, and Marcet's *Conversations on Chemistry* were just some of the most well-known examples from this period. By the middle of the nineteenth century, however 'third-person narrative was beginning to overtake conversation as the dominant style for children's science books' and by the end of the century it was quite uncommon.[56] Proctor's use of the dialogic form for her first book harks back to a style that was already out-of-date in her childhood and thus perhaps reflects the influences of her father's tastes as much as it does her own. *Stories of Starland* would, however, also be the last time Mary would use this format in print.

Proctor's second book, *Giant Sun and His Family,* published in 1906 is a more patchwork affair. The book has the same title as one of Mary's regular lectures and reads accordingly. However, the narrative is interrupted with a long account of her eclipse expeditions in 1896, 1900 and 1905. The book was described in the press as a 'children's book' although the descriptions of the eclipses sit oddly in this respect. The primary framework expressed is in the progress of science—the various credulities of the French public of the eighteenth century, African Americans in the southern USA and 'eastern fortune tellers' are contrasted unfavourably with scientific knowledge. Altogether, this second book reflects a more uncertain literary style than either her first or her later works would show. Although she would not finish another narrative work for another twenty years, when she returned it would be with a far greater command over the format.

Proctor developed strong relationships with the research community

Proctor's relationships with the research community were developed throughout her career. As suggested above, in the time since Richard Proctor's career, astronomy had both expanded and professionalised. Rather than deploying personal contacts – and conflicts – as her father had, Proctor engaged with the community as a professional communicator, while nonetheless taking every

opportunity to remind them of her family connections. Mary wrote often and made a point of visiting astronomers in their observatories to learn the details of their work.

Proctor's approach was evidently successful. She was particularly warm in her recollections of Edward Barnard's support but was in contact with astronomers at all of the major observatories in the United States. Proctor developed a close relationship with Harold Jacoby and others at Columbia University when she undertook a special course in astronomy in 1897, and which was another institution pioneering the employment of women 'computers' in astronomy. In return, Proctor was well-enough thought of within the research community to be invited to speak at the opening of the Flower Observatory at Pennsylvania University in 1897.[57]

Mary drew on her networks frequently to obtain photographs and slides for use in her books and lectures, and to arrange details of her visits. In such requests Proctor could be demanding. On one trip to the Lick Observatory, Proctor requested changes to her arrangements three times in the space of five days.[58] Nonetheless, she was received well by most astronomers. Jones and Boyd note that Pickering 'not once in all his correspondence with her showed the slightest impatience, questioned her right to any Harvard material or information he could give, or treated her with condescension'.[59] This response was not entirely universal. Astronomer Royal Frank Dyson's response to Proctor's request to be considered for membership of the Royal Astronomical Society in 1915 was somewhat frosty in tone, and references about Proctor in correspondence about the Cawthron Observatory project described above were not entirely complimentary.[60]

Eclipse observations provided Mary Proctor an opportunity to make original observations

Although Mary Proctor always downplayed any sense of being a practising astronomer, solar eclipses were one phenomenon for which she saw the opportunity to make useful observations. Proctor viewed three total solar eclipses in her early career and another three later in her life. As often, Proctor told an origin story relating to her father: her interest in astronomy was kindled 'at the age of nine years when she viewed a total eclipse of the sun through her father's twelve inch refractor' and she described her

first solar eclipse as transforming her life.[61] Yet, again, she would develop on Richard's interests in new ways as an early promoter of astronomical tourism.

This first solar eclipse Mary viewed was in 1896 when both she and Agnes Proctor were invited to join a sight-seeing expedition to Norway.[62] In return, Mary gave regular astronomical talks on board the ship. Unlike the two scientific expeditions from the United States, organised by Lick and Amhurst Observatories, the tourist party enjoyed a fine view of the eclipse.

The second was in Virginia, for the eclipse of 28 May 1900. This time Mary Proctor organised her own expedition, a party of all-female astronomers (plus two male students) from Columbia University, where she had recently studied astronomy, and Swarthmore College. Mary used newspaper interviews regarding this eclipse to again promote the role of women in astronomy. At this eclipse, Mary made special preparations to study shadow bands.[63]

Mary would be even more entrepreneurial for her third eclipse, of 30 August 1905, as she organised a tour group from the United States to travel to Burgos, Spain for the event, including 'a trip through Italy, Switzerland, Germany, the Rhine, Belgium, and France' and 'a few days sojourn in England, Ireland and Scotland' on the return.[64] Unlike her first two eclipses, clouds threatened to obscure the view from Burgos, but at the last moment they parted. Like all of her eclipse expeditions, Mary made careful records of the timing of contacts, and wrote them up. Also at Burgos were the astronomer John Evershed and his wife Mary, Proctor's future friends and collaborators.

Mary Proctor was an early science journalist

At the turn of the twentieth century, Proctor was still coming out of her father's shadow. In April 1901, she wrote an article in *Scientific American*, on 'The Government Eclipse Expedition'. She had previously contributed short pieces on the mythology of stars, but this was a major story, on a scientific subject, appearing with her by-line. It would be the first of eleven appearing in the journal over the next decade.

Proctor's public exposure increased further in 1905 when she started writing columns for the *New York Times*. The first article to appear with Proctor's by-line was 'Seek to Solve Problem of an Intra-Mercurial Planet' in the Sunday Magazine section of the *Times* on 12 February 1905, describing a plan to use the upcoming solar eclipse to search for the hypothesised planet Vulcan.[65] Two months later, Proctor's column on Mars appeared as a major feature in the middle spread of the Sunday magazine, over 2000 words long and lavishly illustrated with star maps, images of the red planet and diagrams of its supposed canals. Between 1905 and 1909 Proctor wrote at least 24 columns for the *Times'* Sunday Magazine, primarily on astronomy, but including pieces on volcanoes and genetics. Figure 5 gives an example of one of these columns and a typical presentation of them within the newspaper. The opening paragraph of this article exemplifies the point-of-view approach of the 'new journalism', a modern style in distinct contrast to Proctor's old-fashioned approach in *Stories of Starland*:

> The astronomer who watches, during the close approach of Mars, the slowly rotating lands and seas of the planet, can scarcely, however unimaginative he may be, avoid the thought that contests such as have raged upon our earth for the possession of various regions upon its surface may be in progress out yonder in space.[66]

In her *New York Times* columns Mary Proctor emphasised current research in astronomy. Most of her earlier columns involve interviews with particular astronomers – again emphasising her role as a personality reporter – from the Lick Observatory, Henrietta Leavitt at Harvard, Charles Young from Princeton and Robert Ball in Cambridge.[67] Significantly less reliant on poetry or myth than her earlier newspaper writing, Proctor nonetheless emphasised the broader context of this astronomical research. In her article on Leavitt's work with variable stars in the Magellanic Clouds, for example, Proctor described the colours of stars as they strike the casual observer on Earth, hypothetical observers on distant planets as well as their significance for contemporary research.

In 1910, Proctor was especially prominent as special correspondent for the paper for the return of Halley's comet. This involved watching for the comet—seen in the pre-dawn skies—throughout the night from the tower atop the *New York Times* building, every night from 1 May. Between late April and May, Proctor contributed twenty articles on the comet, and was interviewed by staff reporters for several others. These articles described the location and appearance of the celestial visitor, and the history and scientific nature of comets in general. Proctor was particular keen to downplay the potential hazards of the comet, a literary trope that was still common at the time.

Proctor started writing at the *New York Times* just after Carr Van Anda took over as managing editor in February 1904. Van Anda, who had studied physics and astronomy at Ohio University, was probably the most scientifically literate newspaper editor in history. There is a famous story of him spotting a mistake in an equation of Einstein's that appeared in one of his journalist's stories, and after his retirement Van Anda wrote a scholarly paper in *Science* on the origin of the solar system.[68] Van Anda infused this interest within the pages of the *Times*. He was one of 'the first modern editors to recognise the value of science news' and 'to give it any considerable newspaper space'.[69]

Appearing in the paper as prominently as they did, Proctor's columns must have reflected Van Anda's vision for science content. However, this earliest period in science journalism in the USA has been largely ignored. Previous studies on this topic have tended to make the foundation of the Science Service by Edward Scripps in 1921 or the formation of the National Association of Science Writers by George Gray and William Laurence in the 1930s the pivotal moments.[70] Despite the importance of the first decade of the twentieth century in the relations of science with society there has been little study of science journalism before the 1920s, and 'literature on Van Anda as a significant figure in the development of science journalism is scarce'.[71]

Nonetheless, it is clear that in her professional practices, Mary Proctor's *New York Times* columns pioneered modern science journalism. She exemplified how to work with the 'long-standing tension between scientists and journalists' by changes in 'the entire practice of how scientists and journalists

related to each other'.[72] Lewenstein details some of these practices: 'checking copy with reporters, visiting laboratories and offices, playing down sensational aspects of technical reports, and having special education in science'. There is no evidence that Scripps, Gray, Laurence or others explicitly modelled themselves on Proctor's example to any extent. Yet the *New York Times* was an early exemplar in science journalism, and Proctor was an early example.

As a consequence of the changing organization of astronomy and the rise of the professional personalities of reporters within the 'new journalism', the relationship between these two institutions was also involving. Nall has demonstrated how, in the 1890s and 1900s, astronomers used multiple genres of media to buttress their claims to authority and thereby shape the practices of astronomy suggesting, amongst other things, the 'impossibility of separating out the popular from the professional'.[73] Similar claims about the intertwining of popular media and professional interest have been made by Karnfelt.[74] The flip side of this argument is that Mary Proctor is an actor who never claimed to be more than a popularizer, yet explicitly sought to shape the practices of astronomy. In any case, this was the new environment that Mary Proctor faced and negotiated skilfully.

One role Proctor saw herself as playing within the astronomical community was through seeking funding. The most substantial example was her role in a project to establish a solar observatory in New Zealand, during her Australasian tour of 1912-1914. I have told this story in detail elsewhere.[75] Briefly, following a lecture of Mary's in Nelson, New Zealand, Thomas Cawthron, a wealthy philanthropist offered to fund the solar observatory being suggested for Australia or New Zealand, However, he died in 1915 before the deed of trust was signed and the Cawthron Observatory was never built. An important aspect of this project was the involvement of John Evershed, then director of the solar observatory in Kodaikanal, India.

Proctor also solicited funding for a new telescope at Mount Wilson on her 1928 trip to the USA, although when such a project was later funded by the Rockefeller Foundation, they were quick to disavow any involvement of Mary's.[76] On this trip she also claimed credit for the observatory that had

been opened at Wellesley College in 1900, although it is not clear how much credit is warranted here.[77] Sarah Whitin, the benefactor of the Observatory, Sarah Whiting, the first Director, and Mary Proctor had a close relationship after this time, so it is possible that Proctor helped connect Dr White, the original owner of the telescope, with the College, but this is far from certain.[78]

Proctor's career continued between the wars

After Mary Proctor's seemingly successful tour of New Zealand, she travelled to Britain to report her results to the British Astronomical Association, where she was already a member, and to the Royal Astronomical society where she was not. This must have been a high point in her life. Soon afterwards, both she and Sallie were elected in the first tranche of female Fellows of the Royal Astronomical Society.[79] With strained finances following her Australasian tour, the war saw her unable to return to the USA, and by the end of it she was living permanently in the UK. Proctor managed by working for the Censorship Office and then lecturing under the auspices of the YMCA for the Army of Occupation. Although she never reached the prominence in Britain that she had in the USA, Mary continued her commercial lecturing and her remarkable literary production for two more decades.

Proctor particularly returned to book writing in the 1920s, after she was sixty years old. Her increasing age did not mean any slowdown in output. Indeed, in the course of a decade, Proctor published a remarkable nine books. This included two 'Legends' titles (*Legends of the Stars* and *Legends of the Sun and Moon)*, which focussed on her earlier interest in astronomical mythology, two night sky guides (*Evenings with the Stars* and *Night Sky Wonders)*, and four 'Romance' titles (*The Romance of Comets*, *The Romance of the Sun*, *The Romance of the Moon*, and *The Romance of the Planets*), which blended historical perspectives with scientific information about solar system objects. Nor was Proctor's output simply a mark of quantity. Her 1924 work, *The Children's Book of the Heavens*, despite its intended juvenile audience, was probably Proctor's most sophisticated combination of astronomical information with history, literature and mythology.

Proctor continued her engagement with the astronomical community through the war years and 1920s. She was an early woman member of the Royal Astronomical Society along with her stepmother, now Sallie Proctor Smythe. Mary was strongly involved with the British Astronomical Association as well. In 1925, Proctor was part of the International Astronomical Union (IAU) subcommittee that regularised the list of recognised constellations for the IAU's Cambridge meeting.[80] Befittingly, Proctor was interested in new media forms: she was an early board member of the Television Society; in 1929 she was "full of the Planetarium idea".[81]

In the 1920's Mary saw her first total solar eclipse in over two decades: the 'British' eclipse of 1927. \ She would then need to wait only five years later for the next, from Canada on 31 August 1932, one from Canada. For both events, Proctor would appear once more in her role as innovator. For the former of these eclipses, she was one of the first people to observe the event from an aeroplane. Photographs from this event would be a feature of Mary's subsequent lecturing in the form of lantern slides, some of which survive in the Royal Astronomical Society's collection.[82] She was supposed to be aerial again for the latter eclipse, live broadcasting the eclipse for NBC radio stations, however she had signed an exclusive deal with the *Daily Telegraph* to cover the event and she was forced to withdraw.[83]

The trip to Canada was evidently a stretch for Mary's finances and at this point Proctor's peregrinations were slowing. In December 1930 she had appealed to her cousin, Edward Proctor Mullins, who worked for the Bank of London, to guarantee a loan for her. He stiffly refused, telling Mary that she had to stop wasting her money on tickets.[84] Proctor had returned to North America several times between the wars, including a lecturing trip in 1928. (Figure 6 shows a photograph of Proctor during this trip, just before her 66th birthday.) However, the 1932 eclipse expedition appears to have been her final visit to her stepfamily in St Joseph and her sister Agnes, now married and living in Washington DC. Mary's final overseas trip for an eclipse was to Greece in 1936.

Although her work slowed in the 1930's, it did not stop. Proctor wrote four more books after she turned 70 and planned at least two more. Two of these books were updated star guides – one each for the British and the North American market. The final two books, however, were substantial contributions. In her 1939 work, *Everyman's Astronomy*, Proctor develops a more sustained treatment of her subjects than in almost all of her other works, with developed essays on single topics rather than the more episodic treatment of earlier works. In personal terms, Mary's final book, 1940's *Comets, Meteors and Shooting Stars*, is perhaps her most significant of all. In a letter to William Wright, Director of the Lick Observatory, Mary described how the last section of her father's final manuscript was destroyed after his death. Richard was believed to have died of yellow fever and the manuscript was in his possession at the time. As a result, it was treated with disinfectant that left the pages perforated beyond use. Mary had spent years trying to reconstruct this section of the manuscript from Richard's other writings and regarded *Comets* as 'actually the missing section of Old and New Astronomy, by my father, brought up to date'.[85] To the end, promoting her father's legacy was an important goal of hers, although Prosser notes that neither here nor elsewhere was Mary a slavish exponent of his theories, and describes some of the differences.[86]

Another literary project in the between-wars career of Proctor's was as a major contributor to the 1938 work *Who's Who in the Moon*, the first Memoir of the Historical Section of the British Astronomical Association, produced under the direction of Proctor's friend, Mary Evershed. Proctor, of course, was not just contributor but also a subject, having had a lunar crater named after her. When the researcher tasked with the Proctor biography mistakenly returned an entry for Richard Proctor, Evershed had to correct it: 'No! The daughter'.[87]

Proctor was obscured to public memory during and after WWII

By this time, Proctor's activity had virtually ceased. Her last lecture was apparently in Ireland in 1938 at age 75, having operated for 45 years.[88] During the war, as well as publishing her final book, Mary Proctor again gave astronomical lectures to service troops, but her public lecturing was over and she

had no further 'hope for anything in that direction'.[89] Although she continued to write for herself, she accepted that her publication prospects were also behind her.[90]

Absence from public memory would only grow. In 1943, Proctor received a civil list pension from the British government.[91] An impressive list of the scientific establishment supported her application. Her case was brought to the attention of the Prime Minister's Department by D'Arcy Wentworth Thompson; amongst others to add their names to her cause were: Astronomer Royal, Harold Spencer Jones; Presidents of the Royal Society, the Royal Astronomical Society and the British Astronomical Association, Henry Dale, Edward Milne and Frederick Hargreaves, respectively; and, for good measure, Arthur Eddington and James Jeans as well.[92] That Mary Proctor was remembered by the elder generation of British astronomy was clear.

However, this elder generation's time was passing. Of the seven eminent sponsors of her pension application, four would be dead within the decade; only Dale and Hargreaves would substantially outlive Proctor. From the changed guard in science and science communication – and there clearly was a substantial change in both fields after the war – there was little memory of this elder innovator. There are passing references to Proctor's writing, but they are few and far between.[93] There are no newspaper accounts of Proctor in Britain, North America or Australasia after 1944. By contrast, Richard Proctor was still being considered for publicly celebration in an astronomical display at the 'Festival of Britain' in 1951.[94]

Mary Proctor died 11 September 1957, aged 95, having outlived her sister Agnes by two years and her stepsister Rachel by one. Around 1947 she had moved from a lodging house, where the landlady was no longer willing to have her because of a fear Mary 'might set fire to the house', to a Catholic operated nursing home in Maresfield Gardens, where she spent the remaining decade of her life.[95] Proctor bequeathed all of her belongings to the local Catholic parish.[96] Her death was noted in lists of recently deceased members of several associations and the *Observatory* recorded a one sentence

obituary.[97] Nothing more substantial was forthcoming in any of the journals or newspapers to which she had contributed.

Conclusion

Mary Proctor's life and long career spanned remarkable changes in science communication practices, from the era of the entrepreneurial popularizer of science with lantern shows, through the rise of the 'new journalism', the era of radio and television broadcasting, and into post-World War 2 mass media. Proctor was a participant in all but the last of these. It is remarkable how some of her work was old-fashioned even as it was produced, such as the dialogic form of *Stories in Starland*, yet she was also an innovator with respect to science journalism, television and radio. Not only did Proctor live a long life, she managed to integrate genres from a wide sweep of time into her practices.

The most significant aspect of Proctor's work may have been her embrace of the role of the science journalist in the changing media environment. The growing reach of media meant the eclipse not only of the entrepreneurial model of the public scientist championed by Richard Proctor but also the attempts to directly shape media reporting of the protagonists described by Nall. For the best part of the next century, professional journalists would be an essential component of the public communication of science. While there is no evidence that her example was influential, there is evidence that Mary Proctor was amongst the first to realise this position and exemplify the norms of the emerging field. The kinds of point-of-view reportage based on personal connections with researchers pioneered by Proctor would be a staple of science journalism to the present day.

In understanding these trends, Mary Proctor's biography is far from usual. Hence it has the capacity to provide an important lens on many of the practices of her times. Seeing her as someone raised in the profession allows us to consider these practices of popularization as a craft, a rarely adopted perspective. She worked at a time when women's opportunities were severely constrained, yet there was also a strong tradition forged by Marcet, Somerville and others. Many of these women had received encouragement, inspiration and support from fathers or husbands; this speaks to the

boundaries placed on women than to the beneficence of individual men. Mary was inspired and encouraged by her father Richard Proctor, although not so much supported. Unlike others here, Proctor engaged with these practices on a professional basis, with few other options for support.

Such observations are surprising, perhaps, only if we have an uncomplicated view of biography. Proctor's identities were far from unitary.[98] Always keen to advance the collective cause of astronomy and of women in science; Mary Proctor readily promoted herself as an individual. She drew on her father's memory throughout her life and went well beyond it. Family was important, yet she spent most of her life alone. She downplayed any role as a research astronomer while enjoying observing eclipses. Proctor espoused moderate Protestantism in the USA, was ready to defend her father's reputation as a Freethinker, and returned to the Catholic church late in life. With a wide grasp of history herself, by the end of her life Mary Proctor had been nearly forgotten. The life of this promoter of science offers insights into the opportunities available to her, the networks of knowledge generation and the uneven distributions of memory.

Figure captions

Figure 1:

Carte de Visite of Richard Proctor by William S. Warren, Boston, c. 1870.

Figure 2:

Carte de Visite of Mary Proctor by J. W. Graham, St Joseph, c. 1885.

Figure 3:

Handbill of Mary Proctor's lecture series, c. 1895. Source: The Museum of American Magic Lantern Shows

Figure 4:

'Harry', frontispiece of *Stories in Starland*, probably by Mary Proctor, 1897.

Figure 5:

'Mary Proctor Writes About Mars, Planet of Romance', *New York Times*, 16 April 1905.

Figure 6:

Photograph of Mary Proctor from 'British Astronomer Would Place Largest Telescope on Mount Wilson', *Los Angeles Times*, 23 March 1928.

Table captions

Table 1:

Biographical details of the children of Mary Mills and Sallie Thompson.

Notes

[1] 'Women's world. Children's astronomer' *Perth Amboy Evening News,* 8 November 1909, p.1; '"Little lady of the stars" receives a signal honor', *St. Joseph News-Press,* 20 August 1944, p.1.

[2] James B. Pond, *Eccentricities of Genius,* (London, Chatto & Windus, 1901), p. 180.

[3] Joshua Nall, *News from Mars: Mass Media and the Forging of a New Astronomy, 1860-1910,* (Pittsburgh, University of Pittsburgh Press, 2019), p. 23.

[4] I throughout use both 'Proctor' and 'Mary' unmarked to refer exclusively to Mary Proctor. Richard Proctor and Sallie Duffield Proctor-Smyth will be referred to with first names at least.

[5] Daniel R. Altschuler and Fernando J. Ballesteros, *The Women of the Moon: Tales of Science, Love, Sorrow, and Courage,* (Oxford, Oxford University Press, 2019), pp. 173–81; Siân Prosser, 'Making a career from outreach', *Astronomy & Geophysics* (2016) **57**:5, pp. 5–19.

[6] e.g. Patrick Moore, 'Proctor, Mary', in T. Hockey, V. Trimble, and T.R. Williams (eds.), *Biographical Encyclopedia of Astronomers,* (New York, Springer, 2007).

[7] M.R.S. Creese, *Ladies in the Laboratory? American and British Women in Science, 1800-1900: A Survey of Their Contributions to Research,* (Lanham, Scarecrow Press, 2000), pp. 237–38.

[8] T. Daugherty, *Dante and the Early Astronomer: Science, Adventure, and a Victorian Woman Who Opened the Heavens,* (New Haven, Yale University Press, 2019), p. 169; C. Brian, *Physics And Culture,* (London, World Scientific Publishing Company, 2017), p. 149; M.G. Smith, *Rockets and Revolution: A Cultural History of Early Spaceflight,* (Lincoln, University of Nebraska Press, 2014), pp. 149, 217; Bessie Zaban Jones and Lyle Gifford Boyd, *The Harvard College Observatory: The First Four Directorships, 1839-1919,* (Cambridge, Harvard University Press, 1971), pp. 416–17.

[9] Lewis Saum, 'The Proctor interlude in St. Joseph and in America: astronomy, romance and tragedy', *American Studies International,* (1999) **37**:1, pp. 34–54. There are errors in this article deriving from inaccurate newspaper reports that Saum relied upon; see note 19 for details.

[10] M. Brück, *Women in Early British and Irish Astronomy: Stars and Satellites,* Netherlands: Springer, 2009.

[11] The Walkers, who operated the Eidouranion over two generations spanning more than 60 years are another notable example of a family of scientific lecturers, albeit operating in a more theatrical context.

[12] Thomas Hunter and Grace H. Dodge, *What Women Can Earn: Occupations of Women and Their Compensation,* (New York, Frederick A. Stokes, 1899) p. 72.

[13] 'Personal', *St Joseph Daily Herald*, 13 August 1893. Another of Mary's early public appearances was the reburial of her father, Richard Proctor, on 3 October 1893, with a special monument. Mary had secured funding for this from the philanthropist George Childs, arranged the speakers for the event, and supplied newspapers with required copy, including the correspondence noted by Saum. She ensured that a memorial to Mary Mills was included. See 'Prof. Richard A. Proctor', St Joseph Daily Herald, 4 October 1893, pp. 5-6.

[14] Bernard Lightman, 'Marketing knowledge for the general reader: Victorian popularizers of science," *Endeavour* (September 2000) 24:3, pp. 300–307; Martin Bush, "The Proctor-Parkes Incident: Politics, Protestants and Popular Astronomy in Australia in 1880," *Historical Records of Australian Science* (May 8, 2017) **28**:1, pp. 26–36; Nall, op. cit. (note 3), pp. 24–31.

[15] Richard Proctor believed that earning a living from popular writing as he could do was a preferable model for research scientists than government-funded employment. At the same time, Airy, Lockyer and others used Proctor's popularization as a reason to denigrate his standing. Much of the division between 'true' scientists and 'mere' popularizers comes from this time. Nall, op. cit. (note 3), strongly makes the case that Proctor was practising 'imaginative astronomy and that seeing him only as a popularizer gives a distorted view of his career.

[16] '"Science of the stars". A young woman's success as a lecturer on astronomy', *Topeka Daily Capital*, 3 October 1894, p. 5; Orison Swett Marden, *How They Succeeded*, Lothrop Publishing Company, 1901, p. 89.

[17] A number of errors have crept into the literature about the death of Mary Mills and the circumstances under which Richard and Sallie met, based on a newspaper interview given by Proctor in St Joseph shortly after the marriage. A number of the details provided by Richard Proctor in this interview are bald-faced lies, presumably to protect Sallie's reputation. Unfortunately, these lies were taken up in the otherwise excellent article by Saum and repeated elsewhere. Later accounts from St Joseph give the correct version of events. See 'Timely Observations', *St Joseph News-Press/Gazette*, 8 May 1940, p. 8 for a particular (otherwise unverified) anecdote about Richard and Sallie's meeting.

[18] 'Prof. Proctor's arrival at St. Joseph', *St Louis Globe-Democrat*, 15 July 1884, p. 2. John and Agnes also spent two years studying in Munich, from 1885-1887.

[19] 'Equestrienne party', *St Joseph Gazette-Herald*, 6 July 1885, p. 7; 'Society Notes', *St Joseph Gazette-Herald*, March 5, 1885, p. 3; 'Exposition Notes. The Decorating and Art Committees at Work', *St Joseph Weekly Gazette*, April 7, 1889, p. 8.

[20] 'Notes', *St Joseph Daily Herald*, 14 April 1889, p. 6.

[21] 'The Charity Concert', St Joseph Daily Herald, January 10, 1892, p. 10.

[22] 'Wandered Away', *St Joseph Daily Herald*, July 4, 1890, p. 3.

[23] ‘Escapes from the Asylum’, *St Joseph Daily Herald*, February 11, 1890, p. 3.

[24] ‘Richard Proctor Improving’, *St Joseph Daily Herald*, September 30, 1890, p.4.

[25] ‘John M. Proctor Dead’, *New York Times*, March 26, 1911, p. 15.

[26] Sallie Proctor-Smyth, herself a remarkable woman, had promoted a proposed observatory at San Miguel, California, to be named in honour of her late husband. At least one newspaper article confuses Sallie Proctor and Mary Proctor here. See Jeff Smith, ‘Gilded shams: Observatory on San Miguel mountain (part one)’, *San Diego Reader*, June 9, 2007.

[27] ‘The plan has lapsed. No observatory will commemorate the work of astronomer Proctor’, *Brooklyn Daily Eagle*, 13 December 1894, p. 9; ‘Letter, Mary Proctor to Algernon Charles Gifford, 6 August 1937’, A C Gifford - Inward correspondence - N to P, Turnbull Library, MS-Papers-0259-019.

[28] ‘“Little lady of the stars” receives a signal honor.” op. cit. (note 1).

[29] ‘Obituary Notices: Fellows:- Proctor-Smyth, Sallie Duffield”, *Monthly Notices of the Royal Astronomical Society* (January 1942) 102, pp. 73–74.

[30] ‘“Science of the stars”. A young woman’s success as a lecturer on astronomy’, op. cit. (not 16.)

[31] ‘Mary Proctor’, in *The National Cyclopaedia of American Biography*, New York, NY: James T. White & Company, 1899.

[32] Marden, op. cit. (note 18), p. 89.

[33] ‘Notes and Personals’, *St Joseph Daily Gazette*, 24 February 1889, p. 6.

[34] ‘Notes’, *St Joseph Daily Herald*, 1 September 1889, p. 10.

[35] Lauren Alexander Maxwell, ‘Constructions of Femininity: Women and the World’s Columbian Exposition’, Honours Thesis, Butler University, 2009, p. 10.

[36] ‘About Mary Proctor. The astronomer’s daughter makes a place for herself in the scientific world’, *St Joseph Herald*, 11 February 1897, p. 3.

[37] Marden, op. cit. (note 18), p. 90.

[38] See Bush, op. cit. (note 16), for a discussion of these themes in Richard Proctor's lecture.

[39] ‘Miss Mary A. Proctor. She delivers a well written address in the woman’s building,” *St Joseph Herald*, 13 July 1893, p. 1; ‘Seeking the truth’, *Daily Inter Ocean*, 22 July 1893, p. 8.

[40] Pond, op. cit. (note 2), p. 179.

[41] ‘A Day’s Weddings. Lewis-Proctor’, *New York Times*, 6 September 1900, p. 7.

[42] Saba Bahar, 'Jane Marcet and the Limits to Public Science' *The British Journal for the History of Science* (2001) **34**:1, pp. 29–49.

[43] Bernard Lightman, '"The voices of nature": Popularizing Victorian science', in *Victorian Science in Context*, (ed. Bernard Lightman), p. 205 (Chicago, University of Chicago Press, 1997).

[44] Ann Shteir, 'Elegant recreations? Configuring science writing for women', in *Victorian Science in Context*, (ed. Bernard Lightman), pp. 246–48 (Chicago, University of Chicago Press, 1997).

[45] S.H. Browne, *Angelina Grimke: Rhetoric, Identity, and the Radical Imagination*, Michigan State University Press, 2012; Granville Ganter, 'Mistress of her art: Anne Laura Clarke, traveling lecturer of the 1820s', *The New England Quarterly* (2014) 87:4, pp. 709–746.

[46] 'Women Who Study the Stars', *Burlington Free Press*, 10 July 1907, p. 3. See also fn. 62.

[47] 'Free Lectures to the People Again', *New York Times*, 9 January 1895, p. 16.

[48] Mary Proctor, 'Letter, Mary Proctor to Edward Holden, 6 February 1896', Series 1 Correspondence, UCSC Special Collections, Box 115, Lick Observatory Records.

[49] 'Miss Mary Proctor the astronomer', *Deseret Evening News*, 13 April 1901.

[50] Marden, op. cit. (note 18), p. 93.

[51] Mary claimed to design and colour her own lecture slides at this time; See 'She Sees Stars. Mary E. Proctor, Daughter of the Astronomer', *Brooklyn Citizen*, 14 October 1894, p. 13.

[52] Mary Proctor, *Stories of Starland*, (New York, Potter & Putnam, 1898), pp. 49-50.

[53] Bernard Lightman, *Victorian Popularizers of Science*, (Chicago, University of Chicago Press, 2009), p. 314; James Nasmyth, and James Carpenter, *The Moon considered as a Planet, a World, and a Satellite*, (London, J. Murray, 1885), p. 30; 'Mr. Proctor's Lectures', *Australian Town and Country Journal*, 28 August 1880, p. 7.

[54] Richard A. Proctor, 'The Life and Death of a World', *R. A. Proctor's Lectures*, 1 (Sydney: Carmichael & Co., 1880), pp. 3–4.

[55] Aileen Fyfe, "Tracts, classics and brands: science for children in the nineteenth century" in *Popular Children's Literature in Britain*, 1700–1900, (ed. Julia Briggs, Denis Butts and M. O. G. Grenby), pp. 209–228 (Aldershot, Ashgate, 2008).

[56] Fyfe, op.cit. (note 49).

[57] C. L. Doolittle, 'The Flower Observatory-University of Pennsylvania', *Popular Astronomy* (July 1897) 5, pp. 122–25.

[58] Mary Proctor, 'Letter, Mary Proctor to Robert Grant Aitken, 1 May 1911', Series 1 Correspondence Box 115, UCSC Special Collections, Lick Observatory Records.

[59] Jones and Boyd, op. cit. (note 6), p. 417.

[60] Frank Dyson, 'Letter, Frank Dyson to Mary Proctor, 18 November 1915', Papers of Frank Dyson, Correspondence on the Royal Astronomical Society, Cambridge University Special Collections; Frederick Giles Gibbs, 'Letter, Frederick Giles Gibbs to Edmond Grove-Hills, 30 June 1914, Letters and papers of Edmond Herbert Grove-Hills (1864–1922)", Manuscripts, Royal Astronomical Society, pp. 1-3.

[61] Memor, 'Types of Citizen. A Universalist. Miss Proctor, Astronomer', *Evening Post*, 17 May 1913; 'She Has Been a Chaser of The Sun for Over 42 Years', *Ottawa Citizen*, 14 January 1939, p. 22. Presumably the eclipse was the total lunar eclipse of 1870, as no total solar eclipse was visible from Britain until the 1927 eclipse.

[62] 'To see the eclipse. Misses Mary and Agnes Proctor will go to Norway next month', *St Joseph Gazette-Herald*, June 24, 1896, p. 5.

[63] Shadow bands are an effect caused by refraction in the Earth's turbulent atmosphere of the thin slit of sunlight that is created just prior to totality, but whose cause was unknown at the time see eg A. Lawrence Rotch, 'Eclipse Shadow Bands' *Nature* (1 July 1905) **72:**1865, pp. 307–8.

[64] Mary Proctor, 'Eclipse Expedition in 1905', *Popular Astronomy* (August 1904) 12, pp. 468–69.

[65] It is highly likely that an earlier column, 'Harvard's Women Astronomers' of 23 October 1904, written by a *New York Times* 'correspondent' on a subject of particular interest to Proctor, was also one of Mary's.

[66] Mary Proctor, 'Mary Proctor Writes About Mars, Planet of Romance', New York Times, 16 April 1905, p. SM4.

[67] Later columns, from around 1909, were increasingly based around book reviews. Some of these contain the most opinionated commentary that Proctor ever put into print.

[68] Wafa Unus, 'Carr V. Van Anda and the advancement of science news coverage', *Southwestern Mass Communication Journal* (2018) 33, p.2.

[69] Meyer Berger, *The Story of the New York Times, 1851-1951*, Simon and Schuster, 1951, p. 251.

[70] Bruce V. Lewenstein, '"Public Understanding of Science" in America, 1945-1965' (PhD Thesis) University of Pennsylvania, 1987; James C. Foust, 'E.W. Scripps and the Science Service', *Journalism History* (1 July 1995) **21**:2, pp. 58–64; Cynthia Denise Bennet, 'Science Service and the Origins of Science Journalism, 1919-1950' (PhD Thesis) Iowa State University, 2013.

[71] Unus, op. cit. (note 61).

[72] Bennet, op. cit. (note 63), p. 3.

[73] Nall, op. cit. (note 3), p. 13.

[74] Johan Karnfelt, 'The Popularization of Astronomy in Early Twentieth-Century Sweden: Aims and Motives', in *Popularizing Science and Technology in the European Periphery*, 1800-2000, (ed. F Papanelopoulou, A N Galán, and E Perdiguero), pp. 175–94 (London, Routledge, 2009).

[75] Martin Bush, manuscript under consideration.

[76] 'Seeks $12,000,000 for big telescope," *New York Times*, 15 March 1928, p. 11; "200-Inch telescope due to Prof. Hale" *New York Times*, 30 October 1928, p. 12.

[77] 'To spy on Mars with huge telescope-mirror', *Sunday News*, 3 June 1928, p. 16.

[78] Mary Rosa, 'Letter, Mary Rosa to her mother, 19 November 1911', Mary Rosa letters, Wellesley College Archives.

[79] Mandy Bailey, 'Women and the RAS: 100 Years of Fellowship' *Astronomy & Geophysics* (1 February 2016), **57**:1, pp. 1.19-1.21.

[80] 'Astronomers at Cambridge', *The Times*, 23 July 1925, p. 8; 'International Astronomical Union, Cambridge, 1925 June 14-22', *The Observatory* (August 1925) 48, pp. 241–61.

[81] Mary Proctor, 'Letter, Mary Proctor to Robert Trumpler, 14 November 1929', Series 1 Correspondence, UCSC Special Collections, Box 115, Lick Observatory Records. 'Activities of Women', *Evening News*, March 22, 1928, p. 13.

[82] Prosser, op. cit. (note 9).

[83] 'Eclipse Broadcast Plan Miscarries' *Gazette*, 29 August 1932, p. 9.

[84] Edward Proctor Mullins, 'Letter, Edward Proctor Mullins to Mary Proctor, 2 December 1930', Richard Ford (Private Collection), 15544.11.

[85] Mary Proctor, 'Letter, Mary Proctor to William Wright, 2 May 1939', Series 1 Correspondence, UCSC Special Collections, Box 115, Lick Observatory Records.

[86] Prosser, op. cit. (note 9).

[87] 'Proctor, R. A. (1837-1888)', 5: Loose notes for 'Who's Who in the Moon', Evershed Papers, Royal Astronomical Society Archives.

[88] 'Proctor, Mary' in *Who's Who, 1955*, (London, A. & C. Black, 1955), p. 2405.

[89] Mary Proctor, 'Form for Application for Pensions or Grants from the Civil List Funds, November, 1943', PREM 5/271 RC3313707, The National Archives of the UK. Mary Proctor, 'Letter, Mary Proctor to Anthony Bevir, 15 January, 1947', PREM 5/271 RC3313707, The National Archives of the UK.

[90] Mary Proctor, 'Letter, Mary Proctor to Anthony Bevir, 15 January, 1947', PREM 5/271 RC3313707, The National Archives of the UK.

[91] '"Little Lady of the Stars" Receives a Signal Honor', op. cit. (note 1).

[92] Mary Proctor, 'Form for Application for Pensions or Grants from the Civil List Funds, November, 1943', PREM 5/271 RC3313707, The National Archives of the UK.

[93] e.g. E. Bergaust and E. W. Seabrook Hull, *Rocket to the Moon*, Van Nostrand, 1958.

[94] 'Annexure 2: History of Astronomical Discovery', Papers on the Festival of Britain, 1949 - 1952, GBR/0180/RGO 16/338/16, Cambridge University Library.

[95] Anthony Bevir, 'Letter, Anthony Bevir to M. Gordon, 14 April, 1947', PREM 5/271 RC3313707, The National Archives of the UK. By coincidence, the Maresfield Gardens home was in the house that folk-music collector Cecil Sharp had owned. A heritage plaque marks his occupancy of the site; Mary Proctor's heritage remains obscure.

[96] 'Mary Proctor', 16 October 1957, Principal Probate Registry.

[97] 'Report of the Council on the work of the session 1957 July 1 to 1958 June 30 to be presented to the members of the Association at the Annual General Meeting, 1958 October 29', *Journal of the British Astronomical Association* (October 1958) 68, pp. 283–98.

[98] For a discussion on non-unitary biographies, see Jan Golinski, *The Experimental Self: Humphry Davy and the Making of a Man of Science*, (Chicago, University of Chicago Press, 2016).