# Thomas G. E. Elger – a Victorian populariser of selenography

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This paper provides a biographical sketch of the first Director of the Association's Lunar Section, Thomas Gwyn Empy Elger (1836–1897). His diverse contributions to lunar studies are placed in context and reviewed against the backdrop of developments and advances in the subject during his lifetime. The methodology he consolidated and developed for amateur selenographical work during his Directorship is also discussed in relation to current studies.

## Introduction

'I noted a prolongation of [the cleft]... towards the East, beyond the terminator in the form of a faint narrow line of light… the same phenomenon has been seen on two subsequent occasions… As to its cause, may it not be due to some kind of exhalation, overlying the cleft, illuminated by the rays of the rising sun?'– 1896

Modern day readers may find the above quotation somewhat bizarre; the particular observation which led to this statement is discussed elsewhere in this *Journal*, however for the current discussion the above serves to illuminate what follows.

We are fortunate in the present time to be in a position to carry out our lunar observations against the backdrop of detailed spacecraft imagery, results from modern CCD cameras, and of course 400 years of telescopic scrutiny. The Moon as we have come to know it is essentially a dry and dusty inactive remnant from the very beginnings of the solar system. However, strange as it might seem today, the above statement could be regarded as something of a microcosm of how selenography was viewed, in terms of its hypotheses and possibilities, in the late 19th and early 20th centuries.

Since the invention of the telescope astronomers have tried to interpret the new wonders that were revealed by lens and mirror. The concept of an active lunar world was born of continuing reports of strange phenomena detected at the eyepiece. Before the Space Age astronomical investigation was only possible by proxy, via the eyepiece of the telescope; it was therefore only natural to try and explain those observations by comparison with similar phenomena experienced on our own planet, our singular point of reference. It was perhaps inevitable therefore that volcanism as an active process became the leading hypothesis to explain the morphology of the lunar surface. Similarly, due to certain appearances observed mainly under grazing light at the poles of the Moon, the existence of a lunar atmosphere had also been postulated. This supposed atmosphere, influenced by extreme temperature differences experienced at the lunar surface, was invoked to explain the apparent 'fogs' and 'mists' which telescopic observers had often reported.

In the latter years of the 19th century astronomers postulated on the range of temperatures that the lunar surface might endure between the deep freeze of the lunar night and the baking heat of the lunar day. It was envisaged that when the warm sunlight first touched the frigid surface, releasing its features from the freezing temperatures endured during the long lunar night, conditions would be most favourable for any potentially active regions. The sudden rise in temperature, even by a few degrees, would be enough to vapourise volatile materials, sending gaseous clouds expanding over the lunar surface. The apparent effects of these sudden bursts of activity were naturally associated with features such as rills and valleys, channels and conduits to regions below the lunar crust which would harbour gases frozen out during the lunar night, and so while carrying out their nightly observations many observers often reported strange mists and clouds along the lunar terminator.

W. H. Pickering (1858–1938) was convinced he witnessed such an effect in 1891 while observing the region around the 'Cobra Head' at the mouth of Schroeter's Valley in the northwestern region of the Moon. Following his initial observations carried out from Arequipa, Pickering reported that 'Dense clouds of white vapour were apparently arising from its bottom and pouring over its south eastern wall in the direction of Herodotus'; in 1904 he published a series of drawings depicting the phenomena.[1] Pickering was observing under high illumination, and at such times the lighter streaks overlying the darker lunar terrain often appear to undergo changes in their appearance. In fact Pickering was pioneering an alternative way of observing the Moon, working at the eyepiece far from the lunar terminator. Perhaps then in this strange and unfamiliar territory it was inevitable that he would invoke surface activity as a means to explain what his instrument apparently revealed.

*The First Men in the Moon* (1901), by H. G. Wells (1866–1946), one of the most celebrated authors of the period, was a novel often referred to by subsequent writers as one of the classics of science fiction. Wells however preferred to call it a 'scientific romance', terminology which implies something which has a sound scientific basis rather than a mere work of fiction. Wells was certainly knowledgeable when it came to current developments in the astronomical world. In his article, 'The visibility of changes in the Moon', published in *Knowledge* in 1895,[2] Wells freely discussed the current state of selenography and the evidence for possible changes on the Moon due to volcanic activity. Not unfamiliar with the telescopic appearance of the Moon, as a young man Wells reconstructed an old Gregorian telescope which he used to observe the Moon from his bedroom window.

Wells conveyed his appreciation of current selenographical theories in *First Men in the Moon* and left us with a dramatic portrayal of one aspect of lunar studies at the turn of the 20th century. Describing the advent of sunrise on the lunar crater in which the lunar explorers Bedford and Cavor had landed, Wells writes, 'The distant cliff seemed to shift and quiver, and at the touch of the dawn a reek of grey vapour poured upward from the

crater floor, whirls and puffs and drifting wraiths of grey, thicker and broader and denser, until at last the whole westward plain was steaming like a wet handkerchief held before a fire'.[3] Wells was able to blend his literary talents with knowledge of current scientific hypothesis, and describe phenomena which were considered wholly conceivable in the context of the period.

Against this backdrop it is perhaps not so surprising that the hypothesis of lunar surface activity could be made in what is a relatively brief, almost commonplace manner, without too much sensationalism being attached. But who was it who felt qualified to make such a statement? Today we might suppose a novice observer or perhaps someone unfamiliar with the telescopic appearance of the lunar surface. On the contrary this was an amateur astronomer who in 1895 the celebrated French selenographer C. M. Gaudibert (1823–1901) described as '...no tyro. He has had more than thirty years experience in selenographical observations with two good instruments. He cannot but be a safe guide, and, so far as he goes, the student may have full confidence in his teachings'.[4]

The opening quotation was penned in 1896 by Thomas Gwyn Empy Elger, and formed part of a long series of 'Selenographical Notes' which appeared in *The Observatory*.[5] Little did he know that his entry dated 1896 December in relation to Cichus and its environs would be one of his last to be published. Not being in the best of health in his later years, suffering from a heart condition, according to his obituary he was taken ill after 'calling on his good friend Mr.Hurst to wish him a happy New Year'. During the following few days he appeared to make some improvement, but took a turn for the worse and died at Beaumont House, Shakespeare Road, Bedford at twenty past one on the morning of 1897 January 9.[6]

T. G. E. Elger was without doubt one of the most important figures in the history of selenography, and a guiding light in the early years of the British Astronomical Association, helping to lay the foundation of today's society.

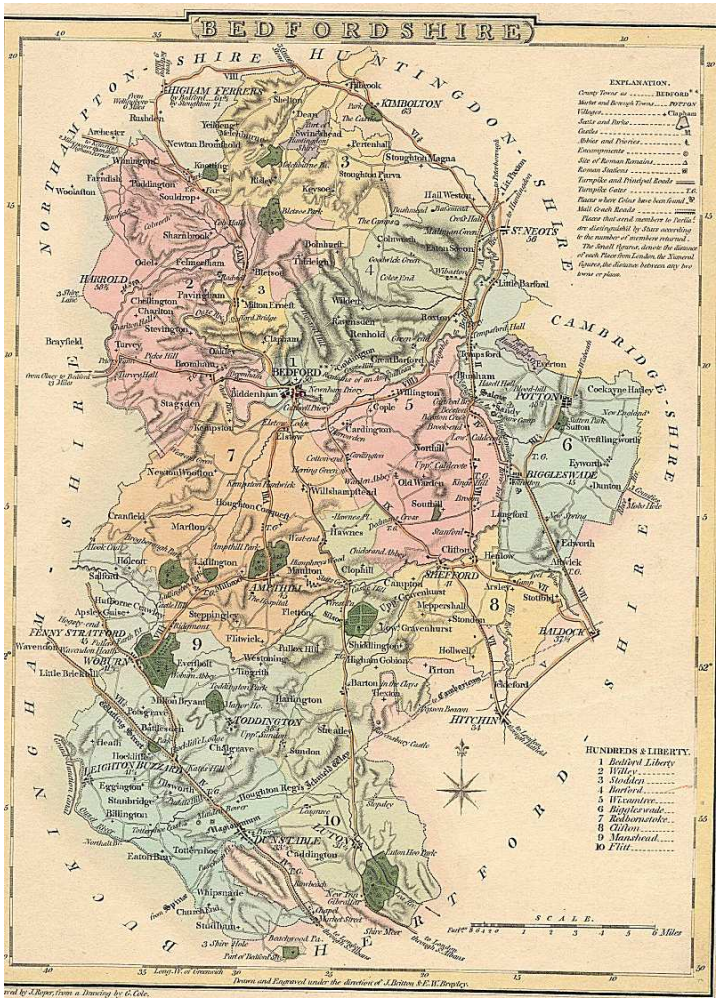


**Figure 1.** The county of Bedfordshire in 1804.

## Elger's early life

Thomas was born on 1836 October 27, son of Thomas Gwyn and Emily. Elger's father and his brother John appear to have started out in life as builders. John made a large fortune from property speculation in London after the Great Exhibition of 1851, and there is evidence to suggest Elger's father was involved with property and land transactions acting on behalf of John when the latter was resident in South Street, Middlesex.[7]

The Elger family originated from Norwich. However already by 1836 they had been connected with the town of Bedford for some time. Elger's grandfather, Isaac, a carpenter by trade, was Mayor of Bedford in 1802, a year before the construction of the Bedford Infirmary, a gift of the Duke of Bedford in 1803. Elger's own father held the position of Mayor of Bedford in the year 1830, at which time the Bedford subscription library was founded, and was elected Mayor again in 1835 and 1838. The Bedford Gas Company first brought piped gas supplies to the town in 1832/1833; prior to this the streets were said to be '...un-illuminated except by sperm oil lamps at infrequent corners and its houses were lighted by oil lamps and candles'.[8]

Elger's father was closely involved with the creation of a number of Bedford's more notable buildings, such as Harpur School and the Bedford Assembly Rooms; the latter was built in 1835, his second mayoral term. He had long established connections with the Bedford library and Scientific Institute, the original library being situated in the upper rooms of the house next door to where Thomas lived as a boy. Another family member, Isaac, a surgeon by profession, was also a prominent well-connected local figure, residing at 58 St John's Street, apparently better known as 'Elger's row'. He sat on the Town Council for a number of years and also took an active role in the promotion of various railway schemes which benefited the town. George Stephenson visited Bedford in 1844, and the Bedford and Bletchley railway line opened in 1846.

It was written that Thomas Gwyn Empy 'inherited the fortune of a good name and position',[9] and that the Elger family were key figures in the development of the town of Bedford during the early Victorian period. There are many letters in existence referring to transactions and property developments carried out by members of the family, notably in connection with the leasing of land and laying new roads between 1839 and 1844. Therefore we can surmise the family was well provided for in financial terms by the time T. G. E. Elger was born, and had established strong connections and ties with the town of Bedford. Their story conveys that of a family who made a small fortune through their own endeavours, and were able to make the most of the opportunities which presented themselves.

Elger's father died of typhus on 1841 April 8, and until the age of 12 Thomas was taught at the Bedford Grammar School. By the time he was 14 he was living at 46 Cauldwell Street with his mother

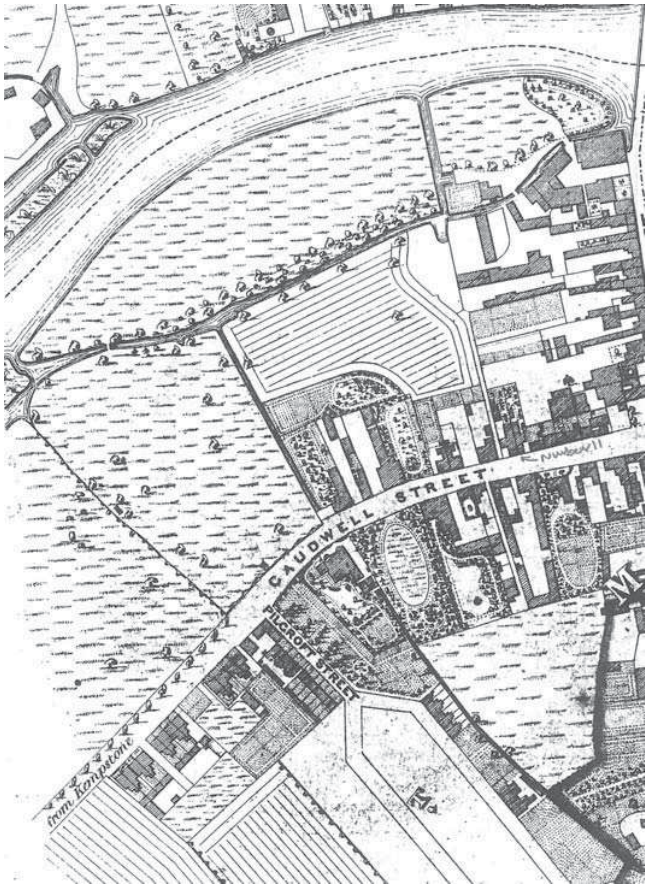


**Figure 2.** Extract from 'Map of the town of Bedford 1841', indicating Cauldwell Street (spelling 'Caudwell' on the map) where T. G. E. Elger lived at no.11 *(courtesy the Bedford & Luton Archives and Records Services).*

and his brother William Henry.[10] After grammar school Elger was placed with a private tutor at Hartford Blue Coat School, following which he went on to complete his education at Kings College, London where he excelled in mathematics.

Elger studied civil engineering, securing a post at the offices of John Fowler, later Sir John Fowler, Past President of the Institute of Civil Engineers, and of underground railway fame.[11] Elger was appointed head of the drawing school, and the practice oversaw many large projects, Elger being involved with new railway lines in the south of England and sections of the London Underground, surveying the Severn Valley Railway, and engineering works connected with the Menai Bridge. His involvement in heavy engineering continued when he established his own practice and acted as engineer

**Figure 3.** Part of the former Bedford Grammar School which Elger attended as a young boy, photographed in 2006 August.

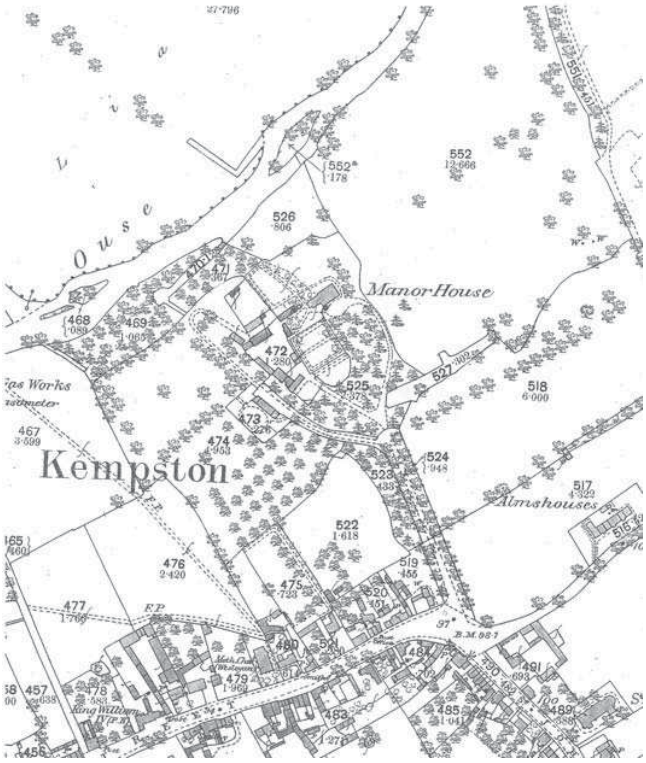


**Figure 4.** Extract from the Ordnance Survey map of Kempston, 1884, indicating Manor House. The cottages to the south west of the Manor House are perhaps the best candidates for Elger's residence in the early 1880s *(courtesy the Bedford & Luton Archives and Records Services).*

for contractors engaged in laying railroads in Holstein, Denmark. His involvment however was brought to a premature end by the outbreak of war and the Austro-Prussian invasion in 1864.[12]

## T. G. E. Elger in Bedford and his society influences

Elger returned from Denmark to reside permanently in Bedford, living for a number of years with his mother at no. 11 Cauldwell Street, where County Hall now stands.[13] His name appeared on the books of the Central Library in 1867.[14] Around the time of his relocation to Bedford he was said to have '…relinquished the active pursuit of his profession, and devoted himself more fully to scientific studies'.[15] We can confidently say that from this time onwards Elger was

**Figure 5.** Cauldwell St, where Elger lived at no.11 when he returned from Denmark in the mid-1860s. There has been much redevelopment of Cauldwell St, but properties on the left hand side of the road appear to be remnants from Elger's days, being buildings he may well have been familiar with. Photographed in 2006 August.

in the enviable position of a self-supporting 'Victorian gentleman', but he was still a young man of around thirty years of age.

Elger was described as a 'most capable and energetic man of business; adverse to talking for talking's sake, he contents himself with saying in precise terms, precisely what should be said'.[16] However, in light of his family background, it was perhaps inevitable that he would move into local politics. Elected councillor for the Bedford West ward in 1874, he was narrowly beaten as a candidate for the town council Eastern Ward in 1877. However in 1878 he took up the position held by his father on three occasions before him when he was elected Mayor of Bedford. In his capacity as Mayor he showed '…admirable spirit in declining to wear the meaningless municipal gown, or to appear in any other garb than that of an English Gentleman'.[17] Perhaps these two statements give us an insight into Elger's character and how later in life he would apply himself more fully to astronomical work. After his three year term he retired, but during his time in office he oversaw many improvements to the town, his background in engineering standing him in good stead.


**Figure 7.** Caricature of T. G. E. Elger from the *Bedford Bee*, 1879 April 30. The smaller figure at the lower right recounts 'Ere's a Mayor wot wont disguise 'isself in red togs – wot'll become of the glory of old Hingland now'! *(courtesy of the Bedford & Luton Archives and Records Services).*

On 1880 April 4 Thomas married Miss Fanny Edith Gissing, the daughter of a local solicitor, and in 1881 they were living at Cauldwell Street along with two servants, a cook and a housemaid. At the time Elger's occupation is described as 'JP Borough of Bedford' (Income derived from house property and dividends).[18] However he was soon to relocate to Manor Cottage, which was situated in a wooded area of Kempston, a district not far from the centre of Bedford. Elger's two sons Gwyn and Murray were born in Manor Cottage in 1883/1884. Within six years, and certainly by late spring 1890, he had moved again and was living at Beaumont House, Shakespeare Road, Bedford.

This property represented a newly constructed family residence and was built alongside similar properties fronting the recently laid out Shakespeare Road, on the outskirts of the town. The 1901 Ordnance Survey plan indicates the houses along Shakespeare Road are in the main fine detached Victorian style villas. Perhaps Elger's residence was of a similar size and no doubt the area was considered somewhat exclusive in terms of the nature of the properties and their location.

The land upon which Shakespeare Road and other adjoining new roadways were laid out is shown as a vacant area of land on the town plan of Bedford dated 1887, and lying in the parish of St Paul's, a name which occurs frequently in the early land and property dealings of the Elger family. Beaumont House, no. 43 Shakespeare Road, was described as 'a characteristically handsome and convenient residence'.[19]

By 1891 T. G. E.Elger's occupation was recorded as 'Magistrate living on own means',[20] living at Beaumont House with his wife Fanny Edith and two sons, both aged seven and at school by this time. In addition there is a niece, Christine Master, Elger's father-in-law, a cousin and three servants, one of whom, Elizabeth, appears to have been with the family since they resided at Cauldwell Street.

Elger's interests were many and varied, and it was not only to amateur astronomy that he devoted his time and efforts; in this regard his influence on the intellectual development of the town of Bedford cannot be overlooked. It was said he was somewhat of an expert in archaeology, and was '…often consulted when objects of antiquity were discovered in the borough'.[21] He was consulted


**Figure 6.** Extract from the Ordnance Survey plan of Shakespeare Road, 1901, where Elger's final residence comprised a newly built property alongside the recently laid-out road. The potential location of 'Beaumont House' is coloured pink on the plan, however over the years several properties took on the name and it is difficult today to pinpoint the exact location, as many of the original houses have been demolished to make way for new development *(courtesy the Bedford & Luton Archives and Records Services).*

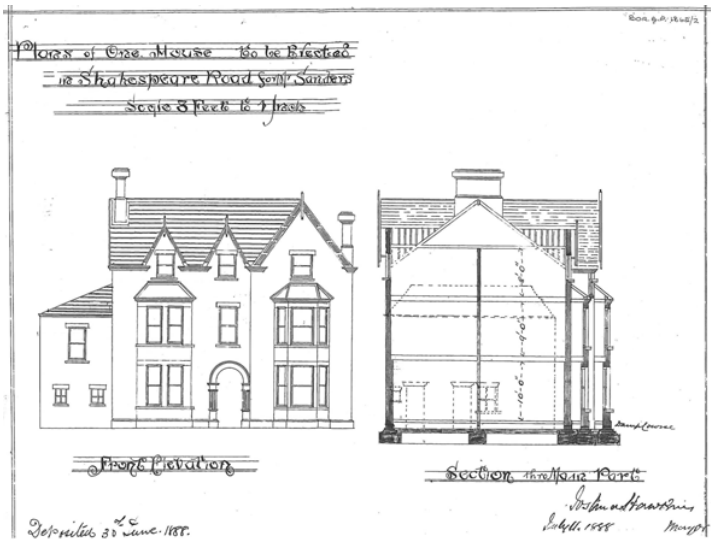


**Figure 8.** Elevational drawings and cross section of a property to be built on Shakespeare Road for a Mr Saunders. The drawing is dated 1888 and perhaps reflects the general style of houses being built at the time *(courtesy the Bedford & Luton Archives and Records Services).*

**Figure 9.** Shakespeare Road, showing newer properties at the far left. However properties further along the road are typical of those large Victorian villas which would have been constructed in Elger's time. Photographed in 2006 August.

by the Corporation in relation to the formation of a proposed Town Museum. The Old Priory was eventually adapted for this purpose, but unfortunately Elger did not live to see its completion.

Elger's knowledge extended to encompass the geology, flora and fauna of the county. He formed connections with the local Archaeological Society, and compiled reports and drawings of his archaeological discoveries for the Society of Antiquities. His large collection of ancient flint tools, and Celtic, Roman and Saxon pottery was displayed at Beaumont House, which was said to be '…the best museum in town'.[22]

In 1875 Elger founded the Bedfordshire Natural History Society, amalgamating it with the Archaeological Society. Perhaps typical of how Elger would later develop his astronomical interests, this merger was instigated by him when interest in the society appeared to be dwindling. He was the Society's first and only Hon. Secretary, he gave the opening address, and for ten years the Society aroused considerable interest. The Society was eventually amalgamated into the Literary and Scientific Institute. As a result of his natural history studies Elger became an expert in the use of the microscope and spectroscope, and in his capacity as President he delivered many papers on a wide range of subjects such as pond life, the weather, and of course the inevitable astronomical topics.

Elger devoted a great deal of his time to the Bedford General Library. His father and uncle were members of the first committee, and Elger was a council member for the whole of his time in Bedford, holding the Presidency on several occasions. His position enabled him to influence the choice of books for the library, and because of this the library was said to be 'one of the most valuable institutions in the country'.[23] He was Director of the Bedford Rooms Company from 1868 until it was wound up on the purchase of the building by the Library company in 1884. Elger was also President of the last Debating Society in Bedford, which met in a side room of the library.

In addition to his involvement with intellectual and literary societies in the town, Elger practically founded the bell ringing society of the Bedfordshire Change-ringers Association. He also took a prominent part in the restoration of the bells of several churches in the area, and held the position of Treasurer of the association.

It was said of his leisure and family life that 'by the present day standards Mr. Elger's travels were not considerable',[24] however, he toured Denmark, Sweden and Norway in 1869. In later years he appears to have spent family holidays in southern England and Wales, his 'water colours of the Bristol Channel and other coasts show that he was not merely a self-taught sketcher, he was a nature taught artist'.[25]

Befitting a man of his stature his funeral in 1897 was attended by the then Mayor of Bedford, members of the council, representatives from the numerous societies, public and private bodies with which he was involved, and many members of his family and friends. A final rather telling remark from his obituary and memoir reads that 'the fourth carriage of the procession carried the household servants, their floral tribute bearing the message, 'in memory of a dear master, from Elizabeth, Agnes, Kate and George'.[26]

At the time of his death the town of Bedford was said to be an 'up-to-date, picturesque, well built town, standing on both sides of the river Ouse with a population of 33,000 inhabiting 6,000 houses. There are 20 miles of streets, eight miles of main roads, and five miles of private roads. The rateable value of the borough is £128,281'.[27] Elger's death, at a relatively early age even for the period, was a blow to the town, the devotion of his leisure time to the pursuits of several branches of learning would be sadly missed. 'He was an antiquary of considerable repute, and one thoroughly imbued with the modern scientific spirit, the love of accuracy and

**Figure 10.** Bedford General Library or 'Bedford Rooms' as it was known prior to 1884, photographed in 2006 August.

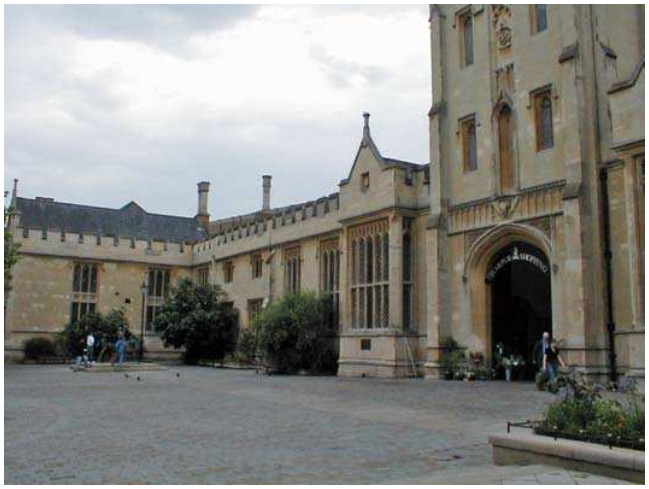

**Figure 11.** Harpur Schools opposite the 'Bedford Rooms', photographed in 2006 August.

truth for its own sake'.[28] One wonders what the town might have been without the influence of the Elger family.

## Astronomical work

Elger constructed his first telescope, a 2¼-inch (57mm) aperture refractor, in 1855; however his initial forays into the subject are not well documented, and it may have been something of an early curiosity. It was perhaps his move back to Bedford in 1864, coupled with his ability to relinquish his career as an engineer, which gave him the leisure time to pursue his astronomical interests. He acquired a 4-inch (102mm) Cooke achromatic in 1866[29] and in the following year he was reporting lunar observations to the Astronomical Register. On the evening of 1867 April 9 he noticed a 'spot on the dark side of the Moon's disc, nearly equal to a star of 7th magnitude'. He followed the feature for an hour or so, but returning to his observatory half an hour later he could '...scarcely perceive any trace of it'.[30] As many had done before him he attributed the appearance to that of Aristarchus seen in earthshine.

The astronomical community was shaken in 1866 when J. F. J. Schmidt (1825–1884) reported observations of suspected changes in the lunar crater Linné. Initially describing his observations in correspondence to the noted English selenographer W. R. Birt (1804–1881), the following year a full report regarding the conditions under which the observations were made and the conclusions drawn appeared in the report of the British Association for the Advancement of Science (BAAS), 1867.[31] Whilst earlier attempts by Birt under the direction of the BAAS to map the lunar surface on a grand scale were continued for a while, it is now clear, probably as a result of Schmidt's report in relation to Linné, that the focus of selenographical activity was changing. Emphasis was shifting towards mapping lunar features with a view to establishing, or otherwise, the possibility that changes on the Moon's surface could be observed telescopically.

In 1871 W. R. Birt submitted a report at the BAAS meeting which focused on the floor of Plato and the numerous light and dark spots which seem to appear and disappear as the sun traverses the lunar sky.[32] Within this report, some 40 pages or so in length and a monument to painstaking observation and record making, Elger appears as a substantial contributor, Birt's notes suggesting he was developing into a careful and diligent observer. Therefore we might surmise that Elger's deeper interest in lunar observation, like many others, was sparked by the Linné controversy. The work undoubtedly brought him into contact with Birt. Mr Gledhill and Mr Pratt are also names which feature in the report along with Edmund Nevill Neison (1849–1940), so by the early 1870s Elger was already moving within a circle of respected selenographers of the day.

At the Working Men's Institute in Bedford in 1871 Elger gave a talk on 'The Physical constitution of the Sun'. It was later said that whilst 'scientific lectures do not seem to present much attraction to popular audiences', in this instance 'Mr. Elger... succeeded in throwing around his subject a charm and freshness which are generally foreign to dry philosophical details'.[33] In the same year he was elected a fellow of the Royal Astronomical Society (RAS), his first communication being a 'short note on the colours and components of the double star Gamma Delphini' in 1872,[34] followed by observations of Venus in 1873.[35] He delivered a further paper in relation to the Sun to the Bedford Natural History Society in 1876 entitled 'Some of the results of recent solar observations'.[36]

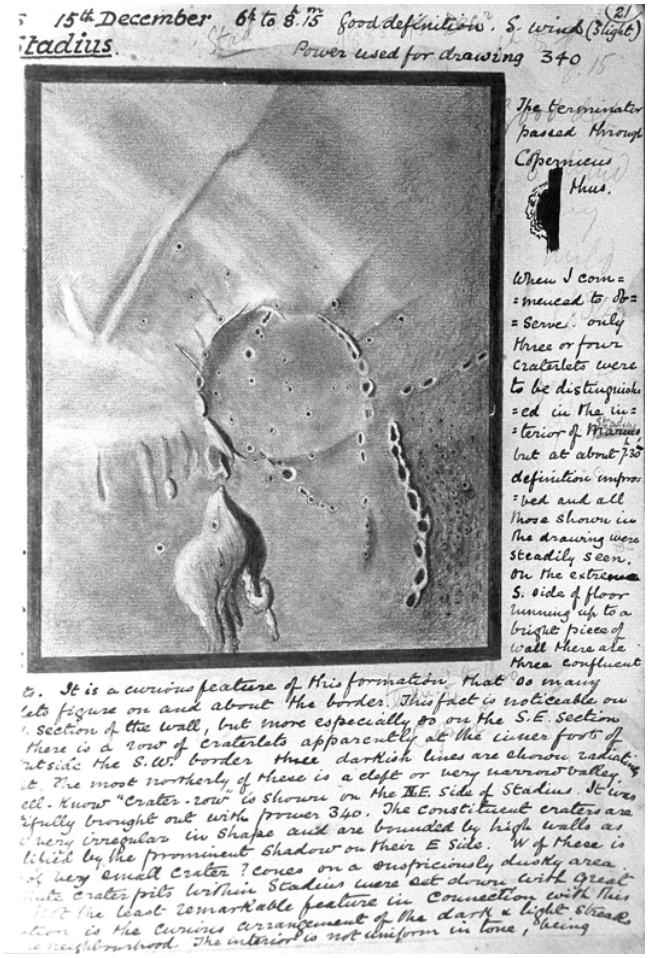


**Figure 12.** Photograph taken by Alan Heath of a page from Elger's notebooks recovered from the basement in the Bedford Public Library in the summer of 1955. The notebooks were passed to the then Director of the BAA Lunar Section H. P. Wilkins, and now reside in the BAA Archives.

It is clear that Elger had developed general interests in astronomical subjects. Some ten years after the controversy which surrounded Linné, Neison wrote, 'The great questions in connection with the physical condition of the Moon were generally regarded as finally solved'.[37] Further many astronomers now considered '...in general no change in Linné had taken place'.[38] However, if nothing else, the events of 1866 reinforced a realisation that contemporary lunar charts were lacking in detail in a great many areas. And so it was that selenology turned down an avenue from which, unbeknown to its main proponents at the time, a unified lunar theory could never be the final outcome.

The idea of a grand collective endeavour to complete the most detailed lunar chart which had ever been compiled was exhausted with the withdrawal of support for Birt's efforts by the BAAS. Schmidt's fine chart of the Moon appeared in 1878,[39] along with the long-awaited publication of Lohrman's maps.[40] However these remained the efforts of private individuals subject to all the constraints of time scales, individual instrumentation etc. W. R. Birt wrote in 1864 '…although Beer and Mädler in their 'Der Mond' have arranged the descriptive part of their work in quadrants... it embraces only the most conspicuous objects; numerous features, some even of large extent, are entirely passed over, and indeed those which have been noticed by Beer and Mädler form a very small portion of the objects that may be detected with a telescope

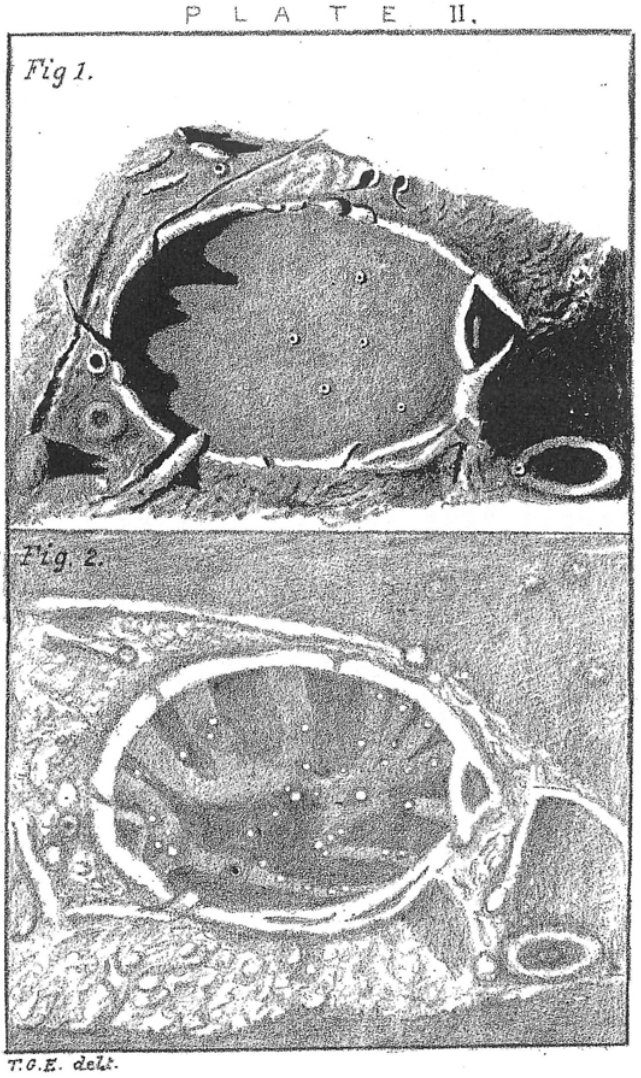


**Figure 13.** Drawings of the lunar crater Plato by Elger, which illustrated his paper titled 'The Present Condition of the Moon's Surface' read on 1882 Feb 9 at the meeting of the Bedford Natural History Society *(courtesy the Bedford & Luton Archives and Records Services).*

of small aperture or an object glass of two or three inches diameter'.[41] The detailed observation and mapping of individual and selected areas of the Moon became the mainstay of selenography during the ensuing years. Observing targets shifted as individual observers reported strange and unrecorded features at the eyepieces of larger, more refined instruments.

Hence Elger took up observation of selected lunar features in an endeavour to provide a basis for a common and collected approach to selenography. When in early 1878 Birt posted a notice in *The Observatory*, suggesting the formation of a new society, to be named the Selenographical Society, it was perhaps inevitable that Elger became '…one of the most active members'.[42] Initially the aims of the society were to continue the work instigated under the British Association and prepare a map of the Moon 200 inches (508cm) in diameter. For a while the Selenographical Society flourished under the directorship of Birt and its journal editor Neison, and its work was published in five small volumes of the *Selenographical Journal*, now exceedingly rare.

Elger acquired his 8.5-inch (216mm) Calver reflector[43] at around the time he moved to Manor Cottage in Kempston. It is not clear just what type of observatory Elger might have set up; however, the Calver reflector was reputed to be '…one of the best telescopes in the Midlands'.[44] From this time the Moon seems to have engaged Elger's close attention, his skill as an engineering draughtsman standing him in good stead in terms of depicting the lunar surface with accuracy and realism. However he also continued to devote some energy to general astronomical subjects. In 1880 he delivered an address to the Bedfordshire Natural History Society and Field Club entitled 'Recent observations of the planet Jupiter'.[45] Following the rise to prominence of the 'Great Red Spot' in 1878, the feature dominating the planet from 1879 to 1882, Elger made 50 drawings of the planet between August and November 1880. He was described as '…a most devoted planetary observer', contributing a series of observations of Saturn, giving special notice to the peculiar appearances of the crepe ring of the planet to the RAS *Monthly Notices* in 1887 and 1888.[46]

There is no doubt however that his underlying interest was in selenography. In 1882 he delivered a paper to the Bedford Natural History Society on 'The present condition of the Moon's surface'.[47] The paper is a clearly written, concise summary of how the lunar surface was viewed at that time. In his lecture Elger returned to the matter of Plato and whilst describing the myriad of tiny features which had been recorded on the floor of the crater, and the occasional obscuration which had been reported, he indicated that these features could certainly be the result of minor volcanic activity. However, he was keen to point out that whilst volcanic processes comparable to those on Earth might account for some of the smaller lunar features, it was difficult to envisage a situation where such forces could be instigated as the cause for the creation of the larger scale features such as the great craters themselves. In fact Elger was fully aware and very conversant with the scale of lunar objects, and made great efforts to point out that surface features, which to all intents and purposes appeared tiny in the eyepiece, were in reality large structures whose appearances should not be confused with the small features we see on Earth resulting from familiar natural forces.

In 1882 December Neison retired as editor of the *Selenographical Journal* when he took up the post of Government Astronomer at Natal, South Africa, and following the death of Birt, the society's leading light, the group soon ceased to exist.[48] Elger's contributions to the work of the society helped to focus and further his reputation in the field of lunar studies; in addition he submitted numerous lunar notes and observations to the *English Mechanic* in this period. However perhaps one of his greatest contributions was his 'Selenographical Notes'. It appears as though he initially took up where W. R. Birt had left off in the *Astronomical Register,* following which his notes appeared in *The Observatory* between 1883 and his death in 1897, and comprised almost 200 editions. These, according to E. E. Both are '...perceptive descriptions of lunar features based on observations with an 8.5-inch reflector'.[49] Fortunately these 'Selenographical Notes' are now available via the NASA Astrophysical Data System website, and still have a great deal to impart.

Between 1886 and 1890 Elger compiled a series of articles entitled, 'The Moon Surveyed in Common Telescopes', for the *Journal* of the Liverpool Astronomical Society.[50] The LAS became a leading light in the world of amateur and professional astronomy in the latter stages of the 19th century, and Elger edited their *Journal* for a time. The society was truly international; at the Annual General Meeting of 1886–1887 it boasted over 400 members worldwide. This meeting was held, not in Liverpool, but at the headquar-

ters of the Royal Astronomical Society in London, and T. G. E. Elger among others suggested ordinary meetings should be held in different towns and cities throughout the country.

Elger took over the Presidency of the Liverpool Astronomical Society from W. F. Denning (1848–1931) for the 1887–1888 session, but all was not well. Criticisms were being levied at the organisation and running of the society, budgets were being exceeded, and by 1889 the society's finances were in serious trouble. Moves were already afoot which would change the organisation of amateur astronomy in England. At the instigation of members of the LAS, via correspondence published in the *English Mechanic* followed up by E. W. Maunder (1851–1928) of the Greenwich Royal Observatory, requests were made for the formation of a national society, based in London. This desire was fulfilled in 1890, and out of the troubled Liverpool Astronomical Society the British Astronomical Association was founded.[51]

Observing Sections and their Directors were transferred to the newly formed BAA and Elger naturally took over directorship of the Lunar Section. His experiences with various societies in his home town, his already prolific lunar reports, and the editorship of the *Journal* of the LAS, meant that the BAA Lunar Section would benefit from the best possible start. Elger had moved into Beaumont House by the time the BAA came into existence, and it was there he set up his two instruments, his 8.5-inch Calver reflector with the 4-inch (102mm) Cooke achromatic riding on the same declination axis.[52] He made his first lunar observations there on 1890 May 24 when under a cloudless sky but with definition which was '...very variable', he sketched the crater Beaumont with a power of ×284. Using these two relocated instruments Elger began to compile a programme of observation for the Section.

During his seven years as Director of the Lunar Section Elger produced three numbers of its *Memoirs*[53] in which, according to his successor Walter Goodacre (1856–1938), 'the results of many amateur observers will be found, and their content should not be overlooked by anyone taking up the study of the Moon'.[54] Anyone who has been able to examine these early *Memoirs* will undoubtedly agree with Goodacre's comments. The work of the Section focused on selected areas of the lunar surface, in an attempt to compile a detailed picture of certain features. Individual features for observation were initially suggested by the Director; however the closing pages of the *Memoir* were always devoted to 'miscellaneous observations'. These were features of particular note observed by members; others would then turn their instruments to these features, and further notes and observations then appeared in subsequent *Memoirs* and Section Reports. This format, instigated by Elger, is the solid foundation from which Section activity has evolved.

In addition to the time and energy he devoted to the early years of the BAA Lunar Section, Elger also found time to compile a small, very well regarded, guide book to the Moon. In early 1894 he had agreed terms with the publishers, George Philip & Son for a lunar map and a book.[55] Twelve months later Elger dispatched the last batch of proofs and seven weeks later he received half a dozen copies of his book, *The Moon: A full description and map of its principal physical features* (1895). As Elger had agreed with the publisher, his book contained an outline map of the Moon at a scale of 18-inches (45cm) to the lunar diameter, divided into four sections. This map was later updated by H. P. Wilkins (1896–1960), and reissued in 1959.

In addition to an introductory essay outlining current hypotheses on the nature of lunar features, the main body of the book contained topographical descriptions of the principal features of the surface. It has been said that the book '…was a lesser work than he [Elger] might have produced' and that may be so when compared to the weighty tome Neison created in 1876. However Elger's slim volume was intended to be, and still makes an excellent telescopic companion. The work is small enough to be used at the telescope, and while it is true to say the outline map lacks the detail which can be detected in larger instruments, it is adequate for the user of smaller telescopes and for the location of the salient features and perhaps by being so encourages a more detailed study of the individual formations.

Elger's descriptions of some lunar features might be considered a little poetic, even fanciful, by modern readers, but there is an overwhelming feeling that, drawing upon his experiences in other disciplines such as natural history, geology and archaeology,[56] he is able to convey the appearance of these features in a way that is understandable to the amateur astronomer and layperson alike. Written as a basic guide to the Moon for contemporary readers, Elger's book is now ranked, alongside Neison and Goodacre, as one of the 'English Classics' on the subject, and is still relevant to today's observers and historians. Second-hand copies are now rather difficult to find.

Elger's drawings, observational reports and letters also appeared in the early volumes of the BAA *Journal*, and from the outset in 1890 November he was producing outline charts to '…encourage systematic observation of the Moon's surface'. His paper in the 1891 March *Journal*, 'The lunar walled plain Ptolemaeus',[57] running to no fewer than eight pages, formed the basis of the early work of the Section. This resulted in a detailed chart, along with a lengthy catalogue of its salient features, being published in the third Section *Memoir*. It was intended that the chart should be used at the telescope and '...the necessary additions and corrections inserted', thereby ensuring that a detailed account could be made of Ptolemaeus and its environs.

Elger also discussed Ptolemaeus in a paper, 'Lunar work for amateurs', in *Publications of the Astronomical Society of the Pacific* (1891).[58] The content is aimed at those who wanted to submit something of lasting value in lunar studies and observers were '...strongly recommended to devote …attention to some particular lunar formation'. Further reinforcing the issue of the scale of lunar objects visible in the eyepiece, he writes 'Some little experience is needed in order to appreciate the true character of lunar details... and realise the actual size of the objects examined'. In closing he warns against 'Preconceived notions... often apt to bias observations and to warp the judgement', and instils the importance of '...patient, systematic observation' which will '...teach the observer to estimate the value of current hypotheses and will satisfy him that very much more intimate acquaintance with lunar details is needed before many vexed questions, relating to the actual condition of the Moon's surface, or its history in the past, can be regarded as approaching solution'.

The techniques for observing the Moon which Elger promoted were nothing new. He simply reinforced and consolidated the methodology instigated by W. R. Birt and others. However despite his observing methods being firmly rooted in the past, he embraced the possibilities afforded by new developments in the field of photography, which was being used to greater effect towards the end of the 19th century to image the Moon. In his 'Selenographical

Notes', 1892,[59] he discussed with some enthusiasm the latest crop of lunar photographs taken at the Lick Observatory. Negatives had been sent to Dr Weinek (1848–1913) in Prague who subjected sections of them to enlargements of up to 20 times and furnished Elger with copies of at least two renditions for comment.

Elger was able to describe these enlargements in some detail, and the minute surface features they revealed. He presciently admitted in his opening paragraphs that '...selenography may be said to have made a new departure'. According to him the ultimate results of advances in the photographic process would '...tend to modify the commonly received notions as to the character and condition of the lunar surface ...and will furnish, it may be, a clue to a feasible explanation of the causes which have operated in producing many of those details of structure which have hitherto hopelessly puzzled all who have attempted to account for them'. Little did Elger know that it would be the intriguing 'patterns' of features noticed by Ralph Baldwin (1912–2010) on photographs of the Moon in the Alder Planetarium that would eventually lead to the now widely accepted theory that the sculpting of the lunar surface was the result of meteoric impacts.[60]

The BAA held a meeting on 1893 April 26 at Barnard's Inn Hall, Holborn, at which Elger delivered a paper to the society 'On the Configuration of Lunar Formations'.[61] In this short address he points out the irregularity in the outline of a great number of lunar ring-plains, such as Walter, Ptolemaeus and the like, based upon detailed observations made using his telescopes. He suggests that it is difficult to explain their polygonal shapes using the volcanic hypothesis, as the formation of the features by an eruptive process should produce a regular circular outline. Elger goes on to make quite a significant statement: 'In almost all lunar hypotheses the operation of the same causes is assumed, but is it not probable that there has been a similar diversity of operations on the Moon, as we know is the case on the Earth, though the nature of these operations may have been very different?' He goes on to say 'No one contends that the great terrestrial crater-lakes were formed in the same way as the ordinary volcanoes, or that the mountain ranges owe their origin everywhere to agencies of a similar kind. Hence surely we cannot assume that the great walled plains of the Moon were built up in the same fashion as the ring plains and hosts of other objects of a like class or that these again represent the action of forces merely differing in degree from those which caused the crater cones, minor depressions and other features'. It is notable that Elger is careful not to advance the virtues of either the volcanic or meteoric theories of lunar formations, but it has been said he was a supporter of F. P. Gruithuisen (1774–1852), who advocated the impact theory.

The proposal that different scenarios were required to explain the varied lunar terrain was of course not a new theory. G. K. Gilbert (1843–1918), one of the most respected American geologists of his generation,[62] had laid the foundations for the theory in his paper 'On the Face of the Moon' (1893),[63] but at the time his work was largely ignored. The hypothesis was again proposed and revised by N. Shaler (1841–1906) in 1903; however, he borrowed heavily from the work of Gilbert. Based on our current knowledge the work carried out by these two men is strikingly modern when compared with the work of their contemporaries. What is significant is that Elger seems to have grasped the fact that an alternative and unified theory was required to explain the diverse features observed on the lunar surface. It is interesting to note that despite these previous attempts to propose an alternative theory, astronomers tended to pledge allegiance to one or the other hypotheses. Even at the time of the *Ranger* space probes in the 1960s the vulcanists and the impact theorists were arguing that the detailed images being returned vindicated their own favoured explanation for the formation of the lunar features.

The BAA Lunar Section flourished under Elger's direction, and it is clear he devoted a great deal of time to the work of the Section. His correspondents were numerous and varied, including those from far afield such as E. S. Holden (1846–1914) at the Lick Observatory and, as already mentioned, Dr Weinek of Prague. The *Transactions of the Astronomical and Physical Society of Toronto* (1897) suggest that Elger corresponded with the Canadian group, and the society used his book as a guide to lunar work.[64] The Section members' lists during the period of Elger's

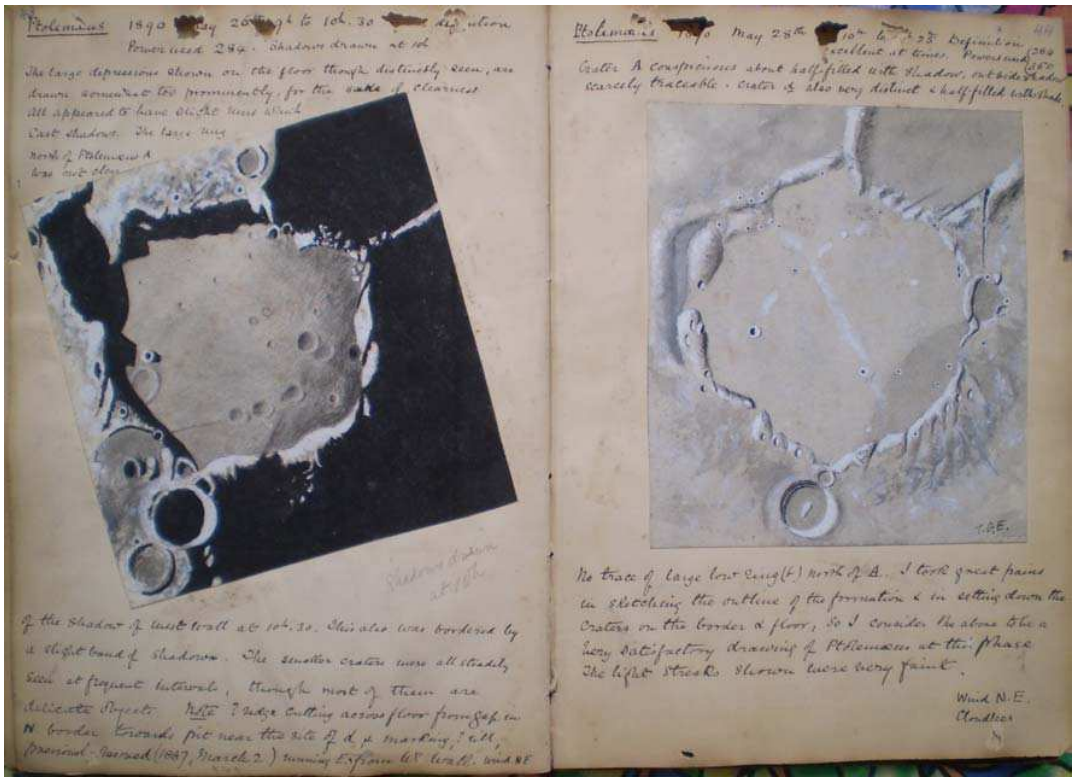


**Figure 14.** Extracts from Elger's lunar notebooks. Two renditions of 'Ptolemaeus' under sunrise and high sunlight conditions, typical of Elger's methodical approach to lunar observation *(extract from Elger notebook No. 5, courtesy of the BAA).*

tenure include such illustrious names as Arthur Mee, H. Corder, P. B. Molesworth, and his eventual successor in the post, Walter Goodacre. However his work was in no means confined to the BAA, as his name also appears from time to time in the *Cambrian Natural Observer*, published by the Astronomical Society of Wales.[65] While the society was based in Wales, it included several members from the old Liverpool Astronomical Society and the newly formed BAA. Elger also illustrated several books, and in 1889 indicated that he prepared the '...Moon pictures and map' for Robert Ball's *Atlas of Astronomy* (G. Philip & Son).

Following Elger's death in 1897 Walter Goodacre took over Directorship of the BAA Lunar Section, and was to hold the post for some 40 years, being fortunate to be able to build upon the solid foundations laid by his predecessor. Further it could be said that Elger helped to develop a methodology upon which serious observation of the Moon was to continue. Lunar observations were carried out by a small number of dedicated observers, and to a large extent that still seems to be the case today. While it is probably true to say that the notion of a Golden Age of amateur lunar studies is a somewhat romantic one, on the other hand one cannot help but feel the period of T. G. E. Elger's, and latterly Goodacre's, tenure at the Lunar Section reflects a real high point of amateur selenographical study in England.

## Legacy

Born shortly before the coronation of Queen Victoria, Thomas Gwyn Empy Elger died in the year of her Diamond Jubilee. We might therefore regard him as a Victorian amateur astronomer in its truest sense and meaning. As Allan Chapman writes in his book of the same title,[66] quoting M. A. Ainslie, Elger might be considered as one who took up '...practical observing as distinct from the study of theory, to constitute a body of people with different objectives from either the old Grand Amateurs or the contemporary professionals'. Elger succeeded in a career demanding in technical precision, and in later life he was fortunate to have the leisure time and the financial backing to devote much of his efforts to his personal interests. His final residence, Beaumont House, was said to be something of a museum with displays of ancient artefacts, and we can imagine his collection as being meticulously catalogued, referenced and displayed. As his Obituary recorded, '…there is probably no one in our community who possessed his tastes, sympathies, abilities, and leisure for arranging a repository of science and local antiquities, and classifying the contents'.[67]

A '…careful and indefatigable selenographer',[68] Elger's artistic skill eminently qualified him for the task. His objectives were clear from the Introduction in his little book *The Moon*, '…to learn as much as possible as to the present condition of the surface', further he suggested, '…this cannot be achieved by roaming at large over the whole visible superficies, but only by confining attention to selected areas of limited extent, and recording and describing every object visible thereon, under various conditions of illumination, with the greatest accuracy attainable'.[69] He placed great importance on accurate records, his philosophy echoing through the membership of the BAA Lunar Section, and under his Directorship the Section produced some of its better work. Elger's influence undoubtedly led his successor, Walter Goodacre, to eventually produce the most detailed record of the lunar surface since Neison. Wilkins followed suit with his own monumental efforts, which, as many have said, were a rather confused attempt at lunar mapping, but again had their roots firmly embedded in the remit set in place by Elger many years before. It also cannot be denied that Wilkins' work, like Elger's before him, was the catalyst for many new observers to develop lunar studies.

## Inheritance

The title of this paper unashamedly reflects a recent publication by B. Lightman entitled *Victorian Popularisers of Science*,[70] a fine work which is commended to anyone interested in the growth of scientific interest in the mid to late 19th century. Lightman describes how scientific developments of the day were presented to an ever-growing and more literate population interested in scientific matters in general. Within the astronomical sphere, reference is made to familiar names such as Sir Robert Ball and R. A. Proctor among many others, and the way in which, through lecture tours, or articles in popular magazines and books, these men were able to reach a wider audience. In the same way, but admittedly within a narrower compass, Elger was able to disseminate current information relating to the Moon to audiences with wide-ranging abilities. He was a prolific writer, and a clear and concise speaker.

Lunar work post-1866 is often portrayed as a relentless quest for evidence to prove that the lunar surface is not the dead inactive world postulated by Beer & Mädler. This may indeed be the case and there is no doubt that Schmidt's observations of Linné were the catalyst for a renewed interest in lunar studies in the late 19th century. Selenography of this period, wrote E. E. Both, '…lost itself in the trivialities of drawing ever smaller areas of the lunar surface without really attempting to create a new unified whole'.[71] 'Superficial' was how Philip Fauth (1867–1941) referred to the work of Elger and several other observers in his book *The Moon in Modern Astronomy* (1903).[72] But Fauth was a vociferous critic of other observers, especially non-Germans, according to Chuck Wood, and even Fauth had to admit that previous lunar mapping had done little to explain the '....processes which have left these traces on the surface of our satellite'. However he still felt compelled to refer to the work of Mädler, Lohrmann and Schmidt as being of great value and carried on charting the lunar surface, in ever finer detail, until his death in 1941.

Elger never produced a finely detailed chart of the whole lunar surface, just a very useful broad outline map to accompany his little guidebook, and in scientific terms, we can say that he never made a major contribution to our understanding of the forces which shaped the lunar surface. It was said of him however that he was no 'lunar theorist', and that he '...wisely resisted the temptation to theorise upon the many vexed questions regarding the origin of the features of the lunar surface'.[73]

In light of our current knowledge of the Moon, largely gained by robot explorers and surface landings, Elger's contributions, like those of many of his contemporaries, become much more difficult to assess. It has to be admitted that what might be termed the 'holy grail' of selenology, a complete understanding of the Moon's development, its history and how the lunar surface was sculpted into its present form, actually means little to the average amateur lunar observer. In simple terms it provides background information, an interesting aside to explain the breathtaking rugged landscape which reveals itself and beguiles the observer stationed at the eyepiece. One does not need to know how the Himalayas formed

to appreciate their stark and forbidding beauty.

Often under such circumstances reference to how others have viewed the Moon, and their interpretations of its surface features, become of greater importance. Today the methodology employed in the mid to late 19th century can be viewed as being fundamentally flawed in its attempt to understand the lunar surface, and one might assume those countless reports, observations and drawings from the period are of no value today.

Whilst clearly not opposed to the notion of changes taking place on the Moon – the idea was relatively commonplace – Elger felt, as did W. R. Birt, that this matter could only be truly investigated once a through knowledge of the lunar surface had been obtained. Perhaps then the work he advocated as Director of the Lunar Section and that of many of his contemporaries should not be viewed as a failed attempt at furthering our understanding of the Moon, but as it was partly intended: a systematic study to record all that was visible in order that any suspected changes in the future could be properly catalogued against a reliable observational database. It is that database which is our inheritance; strip away its original motivations, and we are left with a vast archive of careful records and observations which Elger and his fellow observers entrusted to us. It is up to us to use these records wisely. Elger perhaps did more to popularise lunar observation than anyone else had done before him, and it is clear he made a lasting impression on the subject. His influence is still felt today in the way the visual observer goes about the craft.

A 21km crater on the southern borders of the Palus Epidemiarum is named in honour of Thomas Gwyn Empy Elger. The name was first proposed by Johann Nepomuk Krieger (1865–1902) and formally adopted by the IAU in 1935.

## Acknowledgments

I would like to extend my sincere gratitude to Richard Baum for reading through early drafts of this paper and more importantly for freely sharing his ideas about the origins of H. G. Wells' fiction. I would also like to thank Alan Heath for supplying photographic copies of drawings from Elger's observing books. Much of this paper could not have been written without the help and assistance of the Bedfordshire & Luton Archives and Records Service. Finally I would like to thank my wife Denise and my daughter Sarah for sacrificing their time on a weekend stay at Bedford in 2006, during which I was able to carry out further research and visit some places of relevance to T. G. E. Elger.

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## Notes and references

In the main the biographical information used as references for this paper has been gathered from information supplied by the Bedfordshire and Luton Archives and Records Service. Two records in particular have been used comprising 'Our Public Men, T. G. E. Elger Esq., Mayor' from *The Bedford Bee*, 1879 April 30, and 'The Late Mr. Elger', a full obituary from the *Bedfordshire Times and Independent*, 1897 January 15. As these two documents have been extensively consulted I have referenced information from them as '*Elger 1*' for the former and '*Elger 2*' for the latter. In addition Bedfordshire County Council online records and 1881–1891 Census records have also been consulted.

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**GLOVER** Derek George, Harlow, Essex
**GRANT** Andrew, Stenhousemuir, Stirlingshire
**GREENHALGH** Angela, Florida, USA
**GUNN** Peter John, Telford, Shropshire
**HADDRELL** Trevor, Bristol
**HALLORAN** Matthew D., Havant, Hants.
**HARRIS** David George, Croydon, Surrey
**HARRIS** Geoffrey David, Grantham, Lincs.
**HARTLEY** Richard, Kingston, Surrey
**HAY** Felix Nathaniel, Leamington Spa, Worcs.
**HAY** John, Durham
**HEASMAN** Stephen, Aylesbury, Bucks.
**HEATON** Barrie, Huddersfield, West Yorks.
**HIBBERT** James Downie, Dunfermline, Fife
**HOLMBERG** Gustav, Lund, Sweden
**HOLT** Christopher Cecil, Bampton, Oxon.
**HOPTON** Jeffery Edward, Walsall, W. Mids.
**HYMERS** Martin, Stockport, Cheshire
**JAMES** Paul, Woburn Sands, Bucks.
**JARMAN** John Howard, Aspatria, Cumbria
**JOHNSTON**, Brian, Tonbridge, Kent
**JORDAN** Daniel, Turriff, Aberdeenshire
**KACEREK**, Richard, Ash Vale, Surrey
**KNOX** Arthur, Glasgow
**LIPTROT** Steve, Warrington, Cheshire
**LYON** Rodney Trevelyan, Helston, Cornwall
**MARGREE** Sarah Anne, Mileham, Norfolk
**MATHER** Geoffrey Alan, Wigan, Lancs.
**MAY**, Florence Mavis, Cottingham, E. Yorks.
**MCCRACKEN** Dave, Skellingthorpe, Lincs.
**MICHEL** Ory, Jura, Switzerland
**MILES** Philip, Queensland, Australia
**MORRIS** Philip A., Windermere, Cumbria
**MURRELLS** Christopher R.D., Woking, Surrey
**NADOLNY** Linda Valerie, Southampton, Hants.
**NICKLIN** Keith William, Mickleover, Derby
**O'FARRELL** Paul, Edinburgh
**OLDHAM** Kevin, Long Eaton, Notts.
**OWEN** Barry, Stafford
**OWEN** Yvonne, Stafford
**PARRY** Stacey, Bishop's Waltham, Hants.
**PAWSEY** John, Langtoft, Peterborough
**PEDERSEN** Per Bo, Viby J, Denmark
**PETER** Michael, Burnley, Lancs.
**PILOT** Sylvia, Swindon, Wilts.
**PLEWS** John Geoffrey, Boston, Lincs.
**PRICE** Raymond Dennis, Sutton Bridge, Lincs.
**PULLEN** Clive, Bargoed, Mid-Glamorgan
**RANDLE** Richard J. L., Doncaster, S. Yorks.
**REEVES III** James B., Grantsville, Md, USA
**RYAN** Kevin, Reading, Berks.
**SANDERFORD** Per E.M., Vastmanland, Sweden
**SANDERSON** Helen Provan,Wirral, Cheshire

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