Short Paper

Franz von Paula Gruithuisen (1774–1852) and the 'Lost City in the Moon'

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In the early hours of the morning of July 12 in the year 1822, Franz von Paula Gruithuisen (1774–1852) turned his small telescope to the Moon. What greeted him at the eyepiece, in the environs of the crater named Schroeter, was nothing short of a revelation. The jumbled terrain, caught under raking illumination, coalesced into a regular arrangement which convinced the astronomer he had discovered evidence that the Moon was inhabited. Two years later Gruithuisen published a lengthy paper in which he presented many evidences to suggest this. However, it was his initial discovery in 1822, an episode which became known as the 'City in the Moon', which has become his most published account. This short paper outlines a similar feature recorded by Gruithuisen and revisited by T. W. Webb (1806-1885) in his *Celestial Objects for Common Telescopes*. Conclusions are drawn from Webb's account which suggest why this episode, similar in general terms to the 'City in the Moon', is not more widely known.

Discovering the 'Lost City'

In the first edition of *Celestial Objects for Common Telescopes*, published in 1859, the Rev. T. W. Webb (1806–1885) describes the lunar crater Rhaeticus thus:

'…an irregular crater, marks exactly the Moon's equator, and is one of the few spots to which both the Sun and Earth may be vertical. In its interior Gruithuisen [Franz von Paula Gruithuisen] detected one of those regular formations of which he said so much: his figure in the *Astronomische Jahrbuch* for 1828 represents a somewhat curved line with a little crater at one end and a mound at the other, crossed by four shorter straight lines; as he blamed its inaccuracy, it is not worth copying, but the object should be looked for, especially as its site is so convenient;'

Webb revised the text in later editions with a footnote appended to his description of Copernicus.[1] Here Webb corrected and clarified his entry relating to Rhaeticus as follows:

'Hevel [Johannes Hevel, 1611–1687] has figured 3 contiguous round dark spots under the name of 'Lacus Herculeus'. Of these the N.W. was named by Riccioli [Giovanni Battista Riccioli, 1598–1671] 'Dominicus Maria', the S.W. 'Stadius' and the E. 'Rhaeticus'. B & M [W. Beer (1797–1850) & J. H. Mädler (1794–1874], puzzled in identification, owing probably to there being Full-Moon markings (though easy ones), dealt summarily with his nomenclature; ignoring Dom.Maria, notwithstanding its claim of neighbourhood to the site 111 [Stadius]; transferring Stadius across it without any intimation, per saltum, to that position; and removing Rhaeticus to 104 [its current location on modern lunar charts] at some distance. The latter transposition led to a mistake in the first edition, which Knott has enabled me to rectify. It is this original Rhaeticus, not 104 [Webb's reference number on his map of the Moon which accompanied the book], in which G. [Gruithuisen] discovered one of his curious 'rampart-works', and I should have given a copy of his figure in *Astr. Jahrb.* 1828, had he not himself condemned it'.

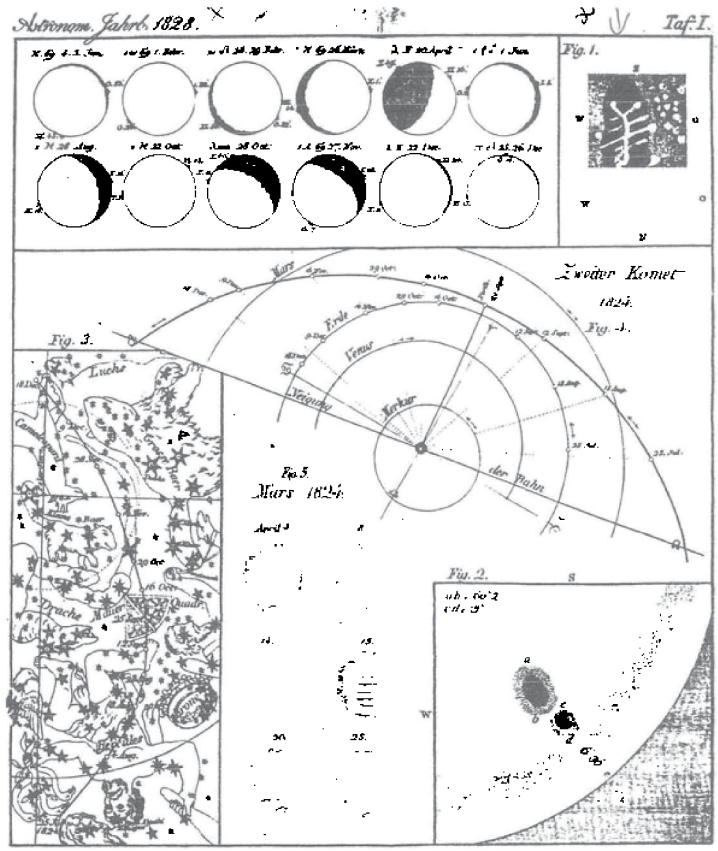

Figure 1. ***Astronomisches Jahrbuch*, 1828, Taf 1. Figure 1 at the top right of the image compares well with Webb's description in *Celestial Objects*.**

Riccioli's nomenclature was scattered about the lunar surface when W. Beer & J. H. Mädler compiled their great map of the Moon, published between 1834 and 1836. They relocated a number of Riccioli's designations when they failed to recover identifiable features in the positions originally indicated. Therefore, the Rhaeticus of today is an irregular crater, (43×49km) situated on the 'southern shore' of the Sinus Medi. But what became of the 'rampart work' figured by Gruithuisen in Riccioli's Rhaeticus, and referred to by Webb in the first edition of *Celestial Objects*?

One of the great pleasures of researching astronomical history is coming across, often quite by accident, a minor piece of information which makes a connection to a wider topic of interest or sheds light on an otherwise lost episode. I have long held an interest in the lunar work of Franz von Paula Gruithuisen, and in particular his careful and aesthetic renditions of the lunar surface. This interest has recently culminated in gathering together many of his lunar drawings which have seldom seen the light of day since their publication in the mid-19th century. These drawings have been published in a paper titled 'Citadels, Selenites and Small Telescopes – the lunar drawings of Franz von Paula Gruithuisen (1774–1852)' which forms the latest edition of *The Moon*: *Occasional Papers of the Lunar Section of the British Astronomical Association,* vol. 4, 2017 March, and is available as a pdf document from the Lunar Section Director.

Figure 2. An extract from the photographic plate of Gruithuisen's drawings imaged by Ewen Whitaker and sent to Harold Hill in the late 1980s, showing a clearer picture of the figure described by Webb.

Gruithuisen's description, in 1824, of a feature located near the crater named Schroeter which he interpreted as evidence that the Moon was inhabited, became known as the 'City in the Moon' and will be a story only too familiar to students of selenographical history. Reproductions of Gruithuisen's observational drawings of this feature, and those by others, have featured in many publications. However, this was not the only example of regularity which attracted the attention of this diligent selenographer. Many examples of similar features are reproduced in the 'Occasional Paper', which deals with identification of one particular drawing, later confirmed by Ewen Whitaker (1922–2016).[2]

With limited surgical training the young Gruithuisen served in the Austro-Turkish War (1787–1791). His fortunes changed however in 1801, when patronage enabled him to enrol at the University of Landshut from where he obtained a medical degree in 1808. He taught medicine for a while but his real passion was for astronomy. Publication of his lengthy paper, in 1824, outlining 'The Discovery of many distinct evidences of Lunar Inhabitants…' led to a brief spell of notoriety for Gruithuisen and in 1826 he was appointed Professor of Astronomy at the University of Munich. Relieved of all administrative duties Gruithuisen was then able to concentrate on his research. However, in wider scientific circles he became an increasingly marginalised figure due to his continued adherence to the doctrine of an inhabited Moon. During the later years of his life he was beset by ill health, and he died in Munich on 1852 June 21.

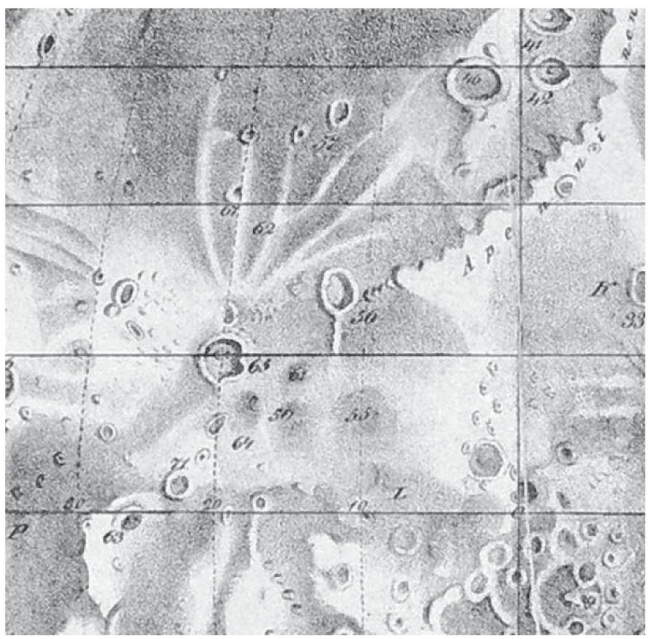

Figure 3. An extract from Gruithuisen's *Map of the Moon*, 1821, showing the region around Copernicus. Numerical references are: 56, Eratosthenes; 65, Copernicus; 61, Dominicus Maria; 64, Rheaticus. The latter designations represent the 'dark features' named by Riccioli.

Gruithuisen was a prolific author and produced many drawings of the lunar surface. His work attracted the attention of his scientific contemporaries, and many later writers have reassessed his contributions. Whilst I was researching my paper into Gruithuisen's drawings Richard Baum (1930–2017) kindly passed on material he had collected over the years in relation to the selenographer's work. Among those papers was a photocopy of Table 1 from the *Astr. Jahrb*., 1828. The reproduction is not the best quality, but in the top right hand corner of the plate (Figure 1) there is a small drawing of an object displaying a certain regularity typical of the lunar features sought out and depicted by Gruithuisen. Could this be the representation of the 'rampart-work' Webb referred to in the first edition of *Celestial Objects* and as a footnote in later editions?

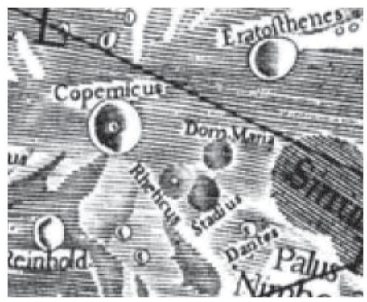

Figure 4. Extract from Giovanni Battista Riccioli's *Map of the Moon*, 1651, showing the area around Copernicus and Riccioli's original nomenclature.

Whilst Webb expanded his note with an additional couple of lines in *Celestial Objects*, he provides a clearer more comprehensive description of Gruithuisen's drawing in a paper published in the *Intellectual Observer*, Vol. 12 (1868),[3] where he writes;

Figure 5. An extract from one of the lunar charts prepared by Johannes Hevel showing the area around Copernicus, and with his nomenclature 'Lacus Herculeus' as referred to by Webb (the crater Copernicus is delineated as a ring of mountain peaks seen in partial profile).

'It is in this ancient Rhaeticus that we look for one of the curious 'rampart-works' discovered by Gruithuisen. His sketch, in the *Astronomisches Jahrbuch* for 1828, represents a comparatively regular white figure in a longish grey area, consisting of one vertical stripe, bent to the left at the top, where it terminates in a small hill casting a shadow; ending in something like a crater, with internal and external shade at the bottom; and crossed at an angle of about 60 degrees by four similar bright streaks; the figure might have been worth copying, but that he [Gruithuisen] complains, in the next

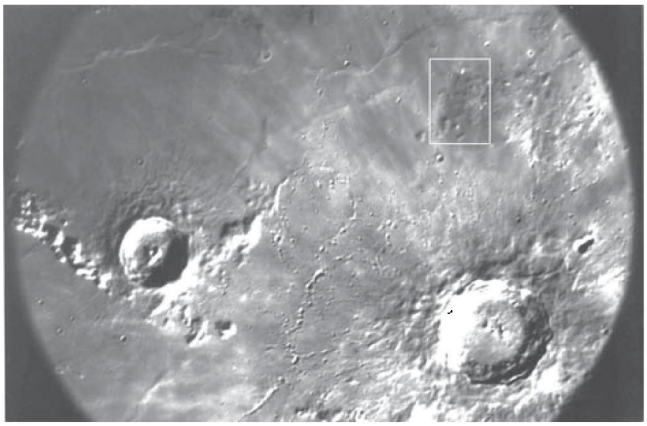

Figure 6. Original image of the area around Copernicus from the archive of Harold Hill (1920–2005) used in *Atlas-Guide Photographique De La Lune*, Georges Viscardy.[5] The location of Riccioli's Rhaeticus is outlined. Oriented with North at the bottom of the image to match Gruithuisen's drawing.

Figure 7 *(left)*. Enlarged view of the area outlined in Figure 6. It is possible to pick out the general pattern of Gruithuisen's depiction of his 'rampart-work' in this extract image. The 'Y' shaped arrangement of features at the top of the image appears to compare in general with the same in Gruithuisen's drawing, along with the general 'right to left' alignment of the hilly terrain. However, it is difficult to reconcile the 'vertical stripe' as described by Webb. Viewing the image at 'arm's length' helps to replicate the view as it might have appeared to Gruithuisen in his small telescope under less than perfect seeing conditions.

volume, of its inaccuracy, there being one transverse line too many on W. side, and all of them being too bright'.

Webb's description bears more than a passing resemblance to the photocopy of the relevant plate from the *Astr. Jahrb.* (Figure 1). However, a clearer picture emerged when I was compiling Gruithuisen's drawings for publication. One of the images displayed a much more detailed rendition of the same feature, reproduced here as Figure 2. From Webb's description, and material supplied by Richard Baum and Ewen Whitaker, it appears possible to piece together a clear indication of the 'rampart-work' figured by Gruithuisen in the dark patch, named Rhaeticus by Riccioli,[4] located South East (IAU) of Copernicus. Had it not been for Gruithuisen's dismissive treatment of his own depiction his drawing may well have appeared in the first edition of Webb's *Celestial Objects*.

Even if we consider the above provides conclusive confirmation we might ask why this feature, similar in general outline and arrangement to his celebrated 'City in the Moon', is not better known? Here we must refer yet again to Webb. In both his footnote in *Celestial Objects*, and his paper in the *Intellectual Observer*, he writes that a year later Gruithuisen '…complained that it had been greatly obscured 'selenospherically' and seldom visible'.

A suggestion for further investigation

Successive observers often experienced difficulty in recovering the features which Gruithuisen so boldly defined. It has become apparent that in the main lighting conditions are critical in ensuring repeat observations. Therefore, at certain times, it should be possible to recover the 'rampart-work' figured by Gruithuisen located in Riccioli's Rhaeticus as described by Webb. I have to date been unable to carry out an extensive visual search of the region, and found little confirmatory photographic evidence, other than a tentative representation in section 11 of Georges Viscardy's Lunar Atlas.[5] This image, of the Copernicus-Eratosthenes region, Sun's colongitude 180°.8, is reduced in contrast in the original publication, but it is just possible to discern the general pattern of the feature figured by Gruithuisen in the dark region south of Copernicus (Figures 6 and 7). Taken in 1982 the image displays none of the sharpness modern day CCD cameras provide. However I suspect, as with recovery of much of Gruithuisen's work, it will be important to resort to lower resolution imagery; or perhaps visual observers using small to moderate-sized instruments as Gruithuisen would have done, might be more successful?

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Notes and references

1 Rev T. W. Webb, *Celestial Objects for Common Telescopes*, 4th edn, Longmans Green & Co., London, 1881; footnote to p. 106
2 R. M. Baum, personal correspondence with the author, 2006 May 10
3 Rev T. W. Webb, A.M., F.R.A.S., 'Gruithuisen's City in the Moon – Jupiter's satellites – Occultations', *Intellectual Observer* **12**, 214–223 (1868)
4 The nomenclature of Riccioli would have been familiar to Gruithuisen, and was used by him for his own map of the Moon dated 1821 – see Figure 3.
5 Georges Viscardy, *Atlas-Guide Photographique De La Lune*, Association Franco-Monegasque D'Astronomie, 1985

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