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Leonard Horner in Bonn 1831–1833, finding loess and being incorporated into Lyell's Loess Legion

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Abstract

Leonard Horner (1785–1864) was a pioneer in the study of loess. His 1836 paper on the geology of Bonn contained detailed descriptions of loess in the Rhine valley. He identified and presented loess as an interesting material for geological study. He investigated loess in the crater of the Rodderberg with Charles Lyell in 1833. He presented the first significant paper on loess in Britain in 1833, but it was not published until 1836. With the assistance of G.A. Goldfuss and J.J. Noegerath he conducted early studies of the Siebengebirge and published the first geological map of the region, and the first picture of loess, at Rhondorf by the Drachenfels. He became the eleventh person to be included in the list of loess scholars which Charles Lyell published in volume 3 of the *Principles of Geology*. These were Leonhard, Bronn, Boue, Voltz, Steininger, Merian, Rozet, Hibbert in 1833, Noeggerath, von Meyer in 1835, Horner in 1837. Horner arrived after the publication of his studies on the loess at Bonn in 1836.

Key words: Bonn, Siebengebirge, Rodderberg, loess first documentation

"The mountains and valleys which I have grown fond of as my home and through the games of a golden boyhood have been reshaped, they were exposed anew when I began to walk through them almost every day and in all seasons, searching for life in each of its residents, who as acquaintances greeted me on all paths and in all forests".
Heinrich Georg Bronn, 1830

1. Introduction

Between the beginning of 1831 and the end of 1833 the Horner family spent about two years in Bonn or nearby. Mr and Mrs Horner and daughters Mary, Frances, Susan, Katherine, Leonora and Joanna settled in Godesberg but quickly moved to an apartment in Bonn on 6 September 1831. During the Godesberg period Charles Lyell visited the family and became engaged to Mary (Smalley 2017). In 1831 Godesberg was just Godesberg but in 1925 it became Bad Godesberg.

Leonard Horner (Fig. 1) was escaping from his administrative post with the nascent University of London where his relations with various professors had proved very vexatious. His health was badly affected and he went to Bonn to recuperate. There ensued his only two years of unrestricted geology. He had long been interested in geology and had joined the Geological Society of London in its foundation year 1808, and he went on to be secretary in 1810–14 and twice president, in 1845–47 and 1860–62. In Bonn he associated with geologists and his geological studies flourished. He was particular-

Fig. 1. Leonard Horner (1785–1864) – Fellow of the Royal Society, Fellow of the Royal Society of Edinburgh. From a crayon portrait by Samuel Lawrence

ly interested in the region of the Siebengebirge – the seven hills beside the Rhine, very convenient for field excursions from Bonn. His eye was caught by the local loess deposits, he was one of the first investigators to express a clear interest in loess. He was in fact the first person to present material on loess at a geological society meeting in England. He gave a paper on the geology of the Bonn region in 1833, but it was not published until 1836 (Horner, 1836). This gained him admission into the *Principles of Geology* and Lyell placed him in the Loess Legion (a group of loess scholars he had identified) in the 5th edition of 1837. He joined his friend Noeggerath as one of the late comers, he was in fact the last of the eleven to be chosen. Lyell did not call his group of loess scholars the 'loess legion' this was a collective term coined many years later but it is a convenient epithet for the persons of interest (Smalley et al., 2017).

Horner was relieved and delighted to have arrived in the Rhine region. Horner wrote to Charles Lyell (Godesberg 16 August 1831): "I arrived here with my two companions (*daughters Susan and Katherine*) all well yesterday… We started yesterday at six from Cologne, got to Bonn at ten where I hired a carriage and drove up to this door at half-past eleven. What a place this is! It exceeds all my anticipations. What a view from the Castle! We walked there last night. What delicious peacefulness, and *no University!*" (K.M. Lyell, 1890, p. 255, Horner's italics).

K.M. Lyell added some commentary about this period: "After spending some months [*weeks*] at Godesberg, beautifully situated opposite the Seven Hills, Mr. Horner took an apartment in Bonn where his family moved on the 6th September" (K.M. Lyell, 1890, p. 257). Lyell visited and stayed with the Horners in July, an initial few days during which he became engaged to Mary, he then left for his famous six day excursion to the Eifel (Smalley, 2017), returning to Godesberg and thence back to England. They were fortunate at the lodgings, the area of Bonn where they settled was replete with academics. K.M. Lyell again: ".. at the lodgings. Among the professors August Wilhelm von Schlegel, the venerable Ernst Moritz Arndt, Dr Mendelssohn, Professors Windischmann, Brandis, Harless, Noeggerath, Goldfuss, Treviranus, Sack, Nitsch and others- all men of wide reputation". And not just general reputation, two of them, Goldfuss and Noeggerath were noted earth science professors from the University of Bonn. They became friends of Horner and facilitated his relationship with the local landscapes (and are particularly acknowledged in the 1836 paper).

By mid-1832 Horner had become very interested in (fascinated by) the loess. Horner wrote to Mary Lyell (Bonn 24 July 1832): "How very extraordinary that Loess is? It has not been half attended to. I saw it today in great abundance, and at a considerable elevation between Muffendorf and the Rotherberg *[= Roderberg = Rodderberg]*, and I found a bone in it about three inches long, and one and a half broad which appears to me to be a portion of a rib of an animal as large as a horse." (K.M. Lyell, 1890, p. 271).

2. The Siebengebirge

Horner to Charles Lyell (Bonn 28 August 1832): "We slept at Konigswinter, and the next day I spent entirely in the Sieben Gebirge… I have seen much that was new to me, and much that interested me greatly. The Loess covers the Basalt columns of Unkel, at an elevation of at least three hundred feet above the Rhine, and here it contains large calcareous concretions- compact limestone, with the land shells enclosed. I found loess again at Orsberg, on the right bank of the Rhine, exactly opposite to Unkel, covering the brown coal beds, in which the frogs were found at an elevation of not less than five hundred feet. At Obercassel, I found regular blue and yellow clay of the brown coal formation, containing peaty matter, inclosing the same shells as the loess- thus

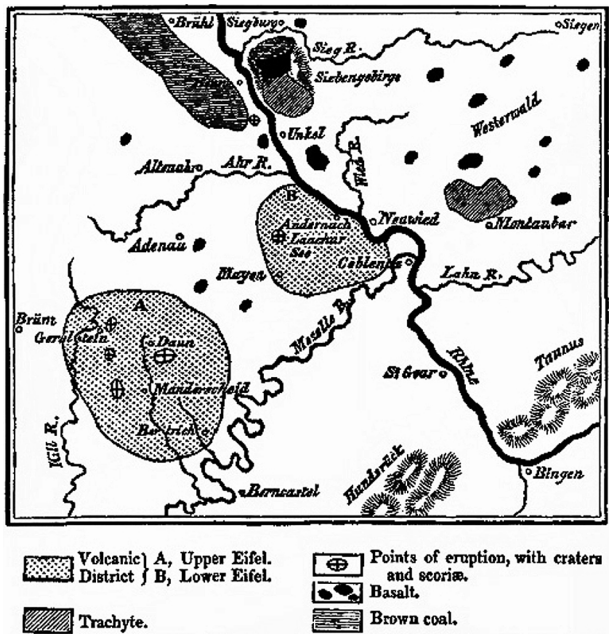

Fig. 2. The region near the Eifel in the Rhineland. A sketch map, by Horner, used by Charles Lyell in the Principles of Geology vol. 3

one part of the brown coal is younger than Noeggerath supposes. Sassenberg [*described by Horner as: the intelligent guide of the Siebengebirge at Ober-Dollendorf*] found out this place very lately, only mentioned it to me by chance, making no account of it; Noeggerath has not seen the place. I have seen the grauwacke covering trachyte, and loess over both, a most capital section." (K.M. Lyell, 1890, p. 273).

The Siebengebirge are a hill range of the German Central Uplands on the east (right) bank of the Middle Rhine, south east of Bonn, opposite Bad Godesberg, with seven major peaks: Grosser Olberg (460 m), Lowenberg (455 m), Lohrberg (435 m), Nonnenstromberg (335 m), Petersberg (331 m, formerly Stromberg), Wolkenburg (324 m), Drachenfels (321 m a.s.l.). The region of the Siebengebirge has been shown very approximately by C. Lyell in *Principles of Geology* (Fig. 2). Lyell has utilized a sketch by Horner to illustrate the region of the Eifel, the region of Tertiary volcanism which had first drawn him to that part of the country.

3. Goldfuss and Noeggerath

Georg August Goldfuss (1782–1848, Fig. 3) and Johann Jakob Noeggerath (1788–1879, Fig. 4) were professors involved in the administration of the Natural History Museum of the University of Bonn, friends and neighbours of Horner, and acknowledged for their help and guidance in the 1833 paper. Schwarz (2014, p. 60) wrote: "Horner was friends with Noeggerath and Goldfuss, who helped him with this paper". Schwarz (2014, p. 146) also wrote a brief history of investigations of the Siebengebirge; he put Noeggerath and Horner together: "Noegger-

Fig. 3. Georg August Goldfuss (1782–1848). Professor of Zoology and Mineralogy at the University of Bonn

Fig. 4. Johann Jakob Noeggerath (1788–1877). Professor of Mineralogy and Mining Science at the University of Bonn

ath, a student of Nose, published a treatise on the minerals of the Siebengebirge in 1808. He tried to use new terms and classifications to bring order to the hitherto chaotic terminology. His exact mineral descriptions became the basis for many of the following works." Horner published in 1836 'Geology of the Environs of Bonn'. He was the first to recognise that the rock referred to as a trachyte conglomerate is actually trachyttuff. He created the first map of the Siebengebirge (Schwarz, 2014).

4. The 1833/1836 paper

Horner presented his paper 'On the geology of the environs of Bonn' to the Geological Society of London on 13 March 1833. It contained a summary of his two years of observations in the Siebengebirge, on the Rodderberg volcano and in the vicinity of Bonn. At the time the Geological Society was experiencing problems with the publication schedule and as a result the paper was not published until 1836. This gave Horner the chance to add some extra material and it also offered an opportunity for an appreciation of the Carl Thomae book on the Rodderberg (Thomae, 1835). Horner's 1833 presentation was probably the first presentation on loess in English, at a British geology meeting. Lyell published his paper on loess soon after (Lyell, 1834). "The district about to be described lies on the Rhine, from the mouth of the Sieg, below Bonn, to the town of Linz, a distance of about eighteen English miles, and extends nearly five miles inland, on both sides of the river… The substance to which this name is applied is a sandy calcareous loam of a yellowish brown colour, slightly coherent, and absorbing water with great avidity. It is a deposit which has been generally considered to be peculiar to the Rhine valley, and it is found, to a great extent, at detached points on both sides of the river, from Basle to Bonn. It has not been noticed by previous writers on the district described in this paper with the attention to which its geological importance entitles it." (Horner 1836, p. 460). Horner suggested that one of the more adequate descriptions of loess was that due to Bronn (1830): "The Loess is recently deposited and it appears in the Rhine mountain regions to have a very general and random distribution. It can be found on the front of the mountain range that encompasses the Rhine region from Basle to Bingen and beyond, then in the side valleys and on the lower slopes themselves, but mainly only where they protrude from the higher hills, either south or east and where the mountains provided shelter, either because of more slowly moving flood, or because of later river waters whose flow was impeded." (Bronn, 1830, p. 168). Let's read Horner's publication again: "A very extensive deposit of it (*loess*) may be seen at the Bruckersberg, near Rhondorf, immediately south of the Drachenfels, where it forms an irregular mass from three to twenty-five feet thick, and covers trachyte and grauwacke, as represented in the woodcut." (Horner, 1836, p. 440) (Fig. 5). "It is found at Quegstein in the valley of Konigswinter, covering trachyte tuff, and near Poffroth and Ober Dollendorf, on the slope of the Petersburg, covering grauwacke... It is seen on the north-western slope of the Kreuzberg, in the valley between Kreuzberg and Venusberg, in a valley behind Godesberg, near Marienforst; to a considerable extent near Lannesdorf, where very deep clefts are cut into it; and it skirts the northern and eastern sides of the volcano of the Rodderberg" (Horner, 1836, p. 461).

The expedition with Lyell to the Rodderberg (Fig. 6) took place in 1833: ".. the Roderberg, a hill above the village of Mehlem, on the left bank of the Rhine. From a distance, and even near at hand, one would not suspect that the hill had anything volcanic in its nature; it is not conical but looks like a smooth rounded prolongation of the adjoining hills that belong to the brown-coal formation. But at the beginning of the ascent from Mehlem loose black

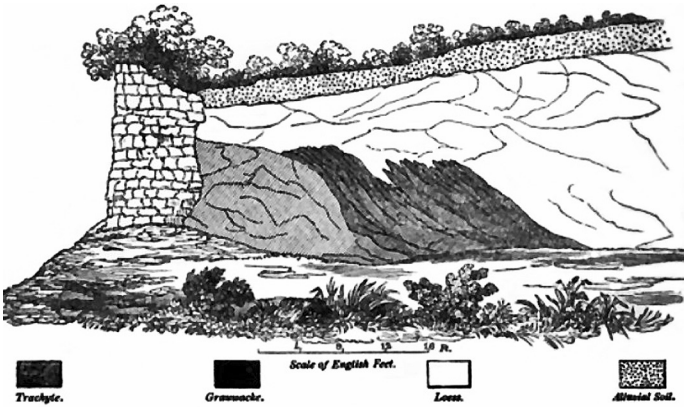

Fig. 5. Illustration from Horner (1836) showing loess and trachyte at Bruckersberg, near Rhondorf by the Drachenfels. Possibly the first picture of a loess exposure in the literature

Fig. 6. The Rodderberg. The volcano with a loess deposit (and a farm) in the crater. This is the frontispiece from Carl Thomae's (1835) book on the Rodderberg, which was referenced in Horner (1836)

cinders appear, and on arriving at the summit there is found a circular depression of about a hundred feet deep, and a quarter of a mile in diameter, once the crater of a volcano, but now occupied by cornfields surrounding a farmhouse." (Horner, 1836, p. 447). In 1832 the farmer dug the well and revealed the thick loess which Lyell and Horner examined in 1833, and separately reported on (Lyell, 1834; Horner, 1836). They noticed the fossils occurring there. "The following are the shells which I have found in it in this district: they were named by Professor Goldfuss. *Helix pomatia, H.nemoralis* Linn., *H.arbustorum* Linn., *H.hispida* Linn., *H.pulchella* Drap., *H.incarnatu*, Drap., *H.glabella* Pfeiff., *Lymneus nunatus* Drap., *Pupa muscorum* Linn., *P. unidentata* Pfeiff, *Bulumius radiates* Dra., *Clausilia obtuse* Pfeiff." (Horner, 1863).

The 1836 paper contained a rousing call to action; the sentiments still echo and the statements are still valid. "To give a history of loess in the valley of the Rhine, by a careful examination of its composition, organic remains, its form of deposition and levels, and to trace it, if possible, to its source, would be a most interesting subject of inquiry, and should not fail to provide a valuable contribution to geological science." (Horner, 1836, p. 470).

5. The Loess Legion

We see clearly now the importance of Lyell and Horner as loess scholars and pioneers. Hitherto their loessic roles have been obscured by the overwhelming importance of the *Principles of Geology* and the dedicated life's work on industrial welfare. The roles of many of the Loess Legion scholars have been obscured by history, simply by the passage of time and it is hard to see any specific contribution they made. Leonhard contributed definition, Lyell offered dissemination and publicity, Horner offered interest and enthusiasm. The Loess Legion (1 Leonhard, 2 Bronn, 3 Boue, 4 Voltz, 5 Steininger, 6 Merian, 7 Rozet, 8 Hibbert, 9 Noeggerath, 10 von Meyer, 11 Horner) have been grouped together and identified as early loess scholars mentioned by Lyell in the *Principles of Geology* (1–8 in the first edition of 1833, then 9 and 10 in 1835, and Horner 11 last in 1837). Horner was the last to be selected and it is assumed that he gained admission after the publication of his material on the loess near Bonn (Horner, 1836).

Ami Boue (#3) certainly deserves further investigation, his studies on 'Turkey' included travels in Serbia and Bulgaria and Romania. Regions of the East European loess were studied by Boue, and, possibly because the regions studied were referred to as Turkey they have not been appreciated. There are early Danubian studies by Boue that deserve to be noticed. In fact, Horner and members of the Legion were interested in Danubian studies and discussed Danubian observations. An initial study of the history of Danube loess research has been made by Markovic et al. (2016), this will perhaps be augmented when some of the more obscure studies by members of the Loess Legion come to light.

In 1847, Horner, as president of the Geological Society of London, presented the Wollaston Medal for that year to Boue and in his presentation speech he remarked that he first knew him "as a student at Edinburgh, where, in the lecture room of Professor Jameson, and in sight of the interesting geological features of the neighbourhood of that city, he first imbibed a taste for our science." (Horner, 1847, p. 1).

A. Boue was making interesting observations at a very early date. He was corresponding with Jameson about these in 1823 and a full account appeared in the *Edinburgh Philosophical Journal* (Boue, 1823). Some of the material referred to should be

loess. "The alluvial matters are very abundant upon the base of the Pyrenees. They are divided into older, very much above the level of the present rivers; and into modern; and consist of pebbles, sand, rolled masses, marls with land-shells, like those found in Austria, and various tuffaceous calcareous rocks. … Great alluvial deposits, and accumulation of marl with land-shells, accompany the Rhine, and hide, at the base of the Kaiserstuhl, a basaltic group." (Boue, 1823). Boue's 'marl with land-shells' sounds like loess. Różycki (1991, p. 12) claimed that Boue (1836, 1838) established the presence of loess in the drainage basin of the lower and middle Danube. In 1837 Boue was writing about loess in Serbia and neighbouring regions: "Another considerable basin, also higher than that of the Morava, extends from Turkish Banja, near Nissa [*Nis*], to Bulovan, and along past the course of the Morava and Topolitza. South of Nissa it is alluvial as well as tertiary, having marls and molasses with sands above, and lastly alluvial loam or loess." (Boue, 1837, p. 263).

Much material is gathered and organised in Boue (1840). He certainly influenced Hibbert (#8) on the topic of loess: "The latest tertiary deposit which appears to have characterised the valley from Mayence to Basle has been properly considered by Boue as the product of a great fresh water sea that filled the whole basin of the Upper Rhine. It has been described under various names, of which the one most adopted is that of Loess." (Hibbert, 1832, p. 185).

6. Circumlocution

It appears that there was more loessic activity by British geologists in the early 1830s than has been appreciated; Hibbert was not alone. Horner (1836, p. 460) commented on an excursion by Sedgwick & Murchison (1832): "In the synopsis of the successive deposits in the basin of Vienna, given by Mr Murchison, the uppermost is described to be alluvial loam, called Loess, with terrestrial shells of existing species ... mixed with bones of elephants of extinct species. The average thickness of this deposit is about 60 ft but at some places the thickness is much greater. Further it is generally expanded near Krems and St.Polten, reaching occasionally the thickness of 140 ft, and having, near these places, the exact appearance of the old alluvial hillocks in the valley of the Rhine, which have been described by M. Voltz."

Lyell to Sedgwick (23 July 1835): "I am reading you and Murchison on the Eastern Alps, as I am going so near your section. Your elaborate joint paper is now quite a treat. Boue has given me many Gosau fossils. He is going to live four years in Vienna, and next year to do the Balkan"

Horner cited (very inexactly) some works by Rozet (1830) which almost certainly connect to Boue, and perhaps to Voltz. Horner is quite sound on references to books and monographs but can be vague in references to the periodical literature. This was a time when periodical literature was first making its appearance in the world of geology and the bibliographical constraints were slack. Rudwick (1990) has commented on Lyell's use of the literature (in an appendix to the Chicago edition of vol. 3 of the *Principles of Geology*). Lyell, in common with all scholars of the day, was relatively inprecise in his use of the periodical literature, which was only then becoming more widespread and widely used. Leonhard and Bronn were pioneers with the *Jahrbuch der Mineralogie*. The *Journal de Geologie* started in France in 1830 and was the source of some early loess material. There are certain elements of reconstruction in the presentation of these works by Rozet and Boue but these probably influenced Lyell and Horner. The *Journal de Geologie* appears to have only survived for three issues, in one of which Rozet published material noticed by Lyell. There has to be some bibliographical comment about the *Journal de Geologie*. Despite its title it was not really a journal, this is essentially a book of essays by Boue, Joubert and Rozet. A book in three volumes not a journal with three issues. The title is misleading. However, the Rozet (1830) reference is important, this appears to be the item that placed Rozet among the elect of the Legion.

After the marriage of Charles and Mary in July 1832 the Lyells set out on a tour to the south. The first person visited was von Meyer in Frankfort. Wilson (1972, p. 364) in describing this encounter gives Meyer all his names, but substitutes Friedrich for Erich (a strange error). Von Meyer was about the same age as Lyell and probably shared a great interest in conchology. There is no doubt that the multitudes of land shells in the loess fascinated Lyell, and von Meyer was a faunal expert. If the qualification for entry into the Legion is the publication of work on the Rhine valley it is hard to find an entry point for von Meyer. Some are fairly straightforward: Steininger 1822, Noeggerath 1822, Rozet 1830, Hibbert 1832, Voltz 1828, but Meyer is elusive.

In 1833, in vol. 3 of the *Principles of Geology* Lyell published the first list of loess scholars. Leonhard had first place, Bronn was second, Boue was third. In the fourth edition, in 1835 (see Smalley, 1986), the order has changed slightly and Bronn is first and

Leonhard is second. It seems logical to place Leonhard first since he named and defined the loess (Leonhard, 1824; Jovanovic et al., 2013). Possibly by 1835 Lyell felt more influenced by Bronn; he was quite close in age to Bronn whereas Leonhard was older and perhaps more distant. By 1833 Horner had identified the Bronn account of loess as the most accessible (Bronn, 1830). The most considerable scholar of the group (including Lyell) was probably Bronn. He was identified as the leading palaeontologist in Germany and he eventually translated the *Origin of Species* into German and added some controversial comments of his own (Gliboff, 2008).

7. Commentary

Karl Caesar von Leonhard named and defined the loess in 1824 (Leonhard, 1824, p. 722; Jovanovic et al., 2013). Samuel Hibbert offered the first discussion of loess in English in his study of the volcanoes of Neuwied in 1832 and Horner identified loess as an interesting topic of geological research and study in 1836. Horner's two year stay in Bonn enabled him to make this contribution to loess investigation. It was aided, of course, by having his eldest daughter married the leading geologist of the day, and one who was, for a few years also interested in loess. Horner and Lyell in the crater of the Rodderberg in 1833 launched vast efforts and many years of study on the topic of loess. They were both convinced that it was sedimented from a vast flood or lake which had somehow covered the Rhine valley region in the Pleistocene, they put in place the first loess formation paradigm which was subsequently displaced by the aeolian deposition proposals of von Richthofen and Obruchev (see Smalley & Markovic, 2019). Boue and Hibbert also both believed in the great flood. Darwin believed in the great flood – it was a well-established paradigm and it served as a starting point for all subsequent studies in loess sedimentology.

Before the Legion there was no semblance of organised loess scholarship. Loess gained occasional mentions in books of local geography and geology. After the Legion there were the beginnings of focussed loess scholarship; Horner held the glass, he focussed the rays, he lit up the topic, he was the first loess enthusiast, he identified the loess as a worthy topic of geological research and investigation. And he is now receiving some recognition, in a recent study of the history of loess scholarship Ding et al. (2019) gave some prominence to the role of Horner and included a portrait and a reproduction of material from Horner (1836).

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