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Charles Lyell from 1832 to 1835: marriage, Principles, 2 trips to Heidelberg, snails and loess

Review Article

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Abstract: Charles Lyell, on his way to becoming a famous geologist, married Mary Horner in Bonn in July 1832; volume 3 of his 'Principles of Geology' was published by John Murray in London in May 1833. Between these two dates Lyell encountered the loess of the Rhine valley. The loess impressed Lyell and he included mentions of it in the Principles, first in 1833 and then, with some revised ideas, in volume 4 of the 4th edition published in 1835. Twelve editions of the Principles were published between 1830 and 1875 and it became one of the most important works in the development of geology, and made a major contribution to the worldwide spread of loess awareness. It is possible that Lyell was drawn to the loess because of its high molluscan content, he was particularly attracted to the study of shells.

Keywords: Charles Lyell • loess in Rhine valley • Lyell marriage to Mary Horner • Principles of Geology • loess awareness • shells in loess

1. Introduction

Charles Lyell had an important part to play in the early history of loess studies; he is credited with spreading the word about loess, delivering an awareness of loess into every part of the world where his best-selling book the 'Principles of Geology' penetrated. As far as we know the first description of loess in English was in volume 3 of the first edition of the 'Principles of Geology', published in 1833. Lyell first encountered loess in 1832, and this encounter was due to his being married in Bonn and then heading down the Rhine valley to Switzerland for his honeymoon. He talked to Professors von Leonhard and Bronn in Heidelberg and they directed his attention to the loess, and probably suggested a short digression to see an accessible deposit. Bronn and Von Leonhard had been talking and writing about loess and it seems likely that it was a well-known material in the Rhine valley, but Lyell took this local knowledge, and terminology, and spread it throughout the World.

There are various reports and discussions of Lyell's life and works [1–3]; this paper focusses on the Lyell-loess interaction and considers the critical loess related events in the years 1832 to 1835. Lyell had an immense enthusiasm for all things geological and it is easy to see why he might be fascinated by the loess, in particular the loess

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as an abode of snails, a matrix for fossil shells.

2. Marriage

Mary Horner was married in Bonn on 12 July 1832. She was the daughter of Leonard Horner, a noted geologist and one-time secretary of the Geological Society of London, and she married an even more notable geologist, Charles Lyell of Kinnordy in Scotland. The Horners had only lived in Bonn since 1831. In the years immediately prior to that Leonard had been Warden of the University of London (later University College London) but he resigned in 1831, apparently because of ill health, and moved to Bonn. The Horners stayed in Bonn for two years, and in that interval Charles and Mary were married. They headed south for a honeymoon in Switzerland. The wedding was a relatively complicated affair [2] made somewhat awkward by the requirements of German law. The first ceremony was a civil marriage before the Burgomaster of Bonn. Their wedding trip took them up the Rhine to Mainz and thence to Heidelberg.

On 18 September 1832 the Lyells reached Scotland. It was Mary's first visit to Kinnordy and first introduction to Lyell's family. A few days later Charles and Mary were married again at Kinnordy by Dr.Easton, the minister of Kirriemuir. Lyell was anxious that there should be no doubt about the validity of his marriage.

3. From Heidelberg to Karlsruhe

Heading south from Bonn to Heidelberg brought them into the orbit of several important geological people, and they stayed and socialised in Heidelberg for a brief time. Wilson [2] has described an outing, made with von Leonhard, to examine the loess: "He.. went on a field trip with Leonhard to examine the superficial deposit, peculiar to the Rhine valley, called loess. Lyell found that the loess contained many of both land shells and freshwater shells as fossils." Wilson puts a reference to loess as appearing in Principles vol.3 (pp.151-154).

This will have been Lyell's first sight of loess, but he encountered it again on the drive from Heidelberg to Karlsruhe, as he describes in a letter to his sister Eleanor:

> Axhern (near Strasburg 20 July 1832)
>
> My dear Eleanor: I hope to send this letter from Strasburg to-morrow, and shall first take up the diary from Heidelberg, which we stayed at on the 18th.
>
> Leonhard [*Prof. Karl Caesar von Leonhard*] was very attentive, showed me part of his collection, and begged his wife to take mine to a fine view from a neighbouring hill; then went with us to the castle, showing me by the way some geological sections, which, added to my short excursion to the Felsenmeer, have enabled me to obtain something like a fair notion of the Odenwald, both its scenery and geology.
>
> I then introduced Mary to Bronn [*Prof. Heinrich Georg Bronn*], Professor of Natural History, and learnt some geology from him of the country in a different department from Leonhard's.
>
> Next day, the 19th, to Carlsruhe [*sic*], making a delightful detour on the road, up a small valley leading from the plain up into the Odenwald hills, where I went to see a singular deposit, called 'loess' provincially, filled with recent species of land shells, and which is peculiar to the Rhine valley, found at Bonn, Strasburg, and hundreds of intermediate places.

4. Principles

Volume 1 of the 'Principles of Geology: Being an Inquiry how far the Former Changes of the Earth's Surface are referable to Causes now in Operation' was published in January 1830 by John Murray at Albemarle Street in London, and was an immediate success. The second volume appeared in January 1832. When the third volume, which mainly dealt with stratigraphical and palaeontological matters, appeared in May 1833, second editions of the first and second volumes had already been published. Charles Darwin took volume 1 with him on the 'Beagle' and volume 2 reached him in Montevideo.

In 1834, the whole work was reprinted in four smaller volumes, and called the third edition. The fourth (1835) edition quickly followed the third, in the same four volume format, and it is from volume 4 of the 4th edition that the Loess Letter pamphlet was reprinted [4]. This was the critical moment in the Loess/Principles story, this discussion of loess in volume 4 of the 4th edition was the best detailed description of loess in English, and in a widely-circulated publication.

5. Commentary

Three aspects of the Lyell/loess story might benefit from some comment and discussion:

- The initial encounter needs some slight clarification; the letter to Eleanor causes some confusion.

- The publication of the initial observations in the Principles is rather confused, but there is no doubt that the first mention, the great announcement, was in vol.3 of the first edition, published in 1833, soon after Lyell's first view of the loess in 1832. Modifications and details in vol.4 of the fourth edition.

- The 1834 paper is described by Thackray [5] as appearing in the Proc. of the Geol. Soc. but that appears to be a short version with the full length version appearing in the Edinburgh journal. Parts of the Edinburgh version were reprinted in the Benchmark collection [6].

Lyell had a long and satisfactory relationship with the Geological Society of London [5]. He presented 42 papers between 1824 and 1854; Thackray [5] has discussed three of these at length; one of these was the paper on loess which Lyell presented in 1834, based on fieldwork carried out in 1833, which, in addition to appearing in the Proceedings [7] was also published in Edinburgh [8]. Lyell reports, with some pleasure, discovering that Jon Jacob Berzelius the famous Swedish chemist had a copy of the Edinburgh journal (popularly called Jameson's Journal).

"In the summer of 1833, I collected several hundred shells, which were exposed on the margin of the Rhine...and on comparing them with a still larger collection obtained from the loess, the two groups proved to be referrible (*sic*) for the most part to identical species, and in both the terrestrial predominated numerically over the aquatic species. The genera most abundantly represented in each were Helix, Pupa, Limnea, Paludina, and Planorbis." [4, 8].

Lyell made two very useful trips to Heidelberg, in July 1832 and July 1833. The loess observations from 1832 were incorporated into vol.3 and the loess observations of 1833 were reported in the 1834 papers and vol.4 of the 4th edition [5]. His views on loess changed; Wilson [2] reports: "He also announced that he had changed his opinion concerning the origin of the loess formation of the Rhine. Lyell had previously thought that this seemingly unstratified deposit had been 'thrown down suddenly from the muddy waters of a transient flood'. During his visit to Germany the previous summer [1833], however, he had found in deep gravel pits outside the Mannheim gate of Heidelberg loess interstratified with gravel. 'Here,' he wrote, 'more than one bed containing land and fresh-water shells rests upon and is covered by, a stratum of gravel, showing the effects of successive accumulation."

Lyell was very perceptive about the loess noting, in particular, the disconnection between the loess and the ground material immediately below it, and the way the loess blanketed the landscape. Thackray [5] has described the evolution of opinions on loess over the 1832-1835 period:

"In April 1834 Lyell read a paper on the loamy deposit called 'loess' in the valley of the Rhine, which was based on fieldwork carried out the previous year. Among the distinctively Lyellian features of the paper are the use made of the modern sediments of the Rhine to deduce the environment of deposition of the loess, and the emphasis laid on the considerable geographic changes that must have taken place since the deposition of this geologically recent deposit, and yet with no sign of violence or catastrophe. The paper was published in the Society's Proceedings in 1834 [7], and the observations and ideas it contained were incorporated into Lyell's discussion of the Newer Pliocene in the fourth edition of the Principles of Geology [4, 9], where it helped to emphasize the similarities between the world of today and the world of the geological past." [5].

This is somewhat misleading; it obscures the fact that an extraordinary event - the widescale aeolian deposition of loess material, completely determined the nature of the loess landscape. The Lyell description is a perfect portrayal of an aeolian deposit:

"The loess is found reposing on every rock, from the granite near Heidelberg, to the gravel of the plains of the Rhine. It overlies almost all the volcanic products, even those between Neuwied and Bonn, which have the most modern aspect; and it has filled up, in part, the crater of the Roderberg; at the bottom of which a well was sunk, in 1833, through seventy feet of loess. Here, as elsewhere, it is a yellow loam with calcareous concretions, and has not the character of a local alluvium.

It is remarkable, indeed, that the loess is scarcely ever affected by the nature of the rocks which underlie or immediately surround its site, but wherever it occurs appears as if derived from one common source." [4, 8].

Before 1832 Lyell knew nothing of the loess, and 1832 was a year of revelation. After 1835 he did not contribute significantly to loess research but, via the widespread distribution of the Principles of Geology (12 editions up to 1875), ensured that knowledge of loess became universal [9]. The lucky chance that took Lyell to Heidelberg in 1832 meant that loess rapidly became a material of interest and loess scholarship expanded immediately. Loess scholarship began in the Rhine valley, the signal originated in Heidelberg and the Oberwald, and Lyell transmitted it all over the World.

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