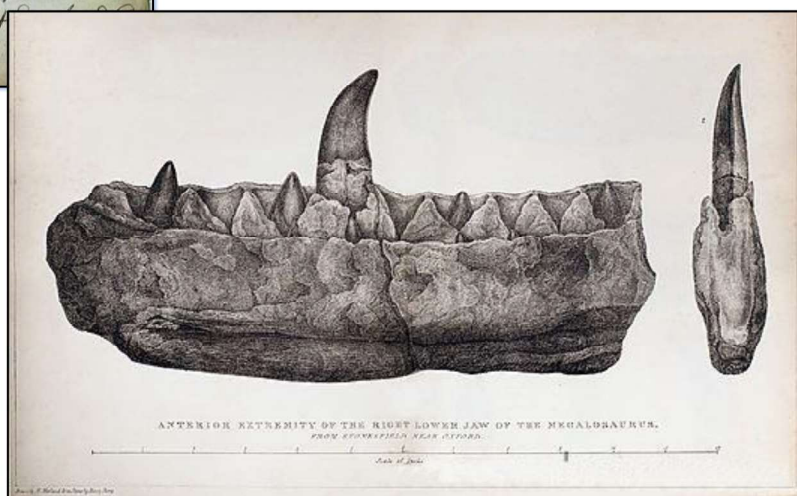
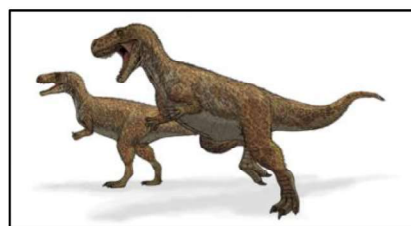
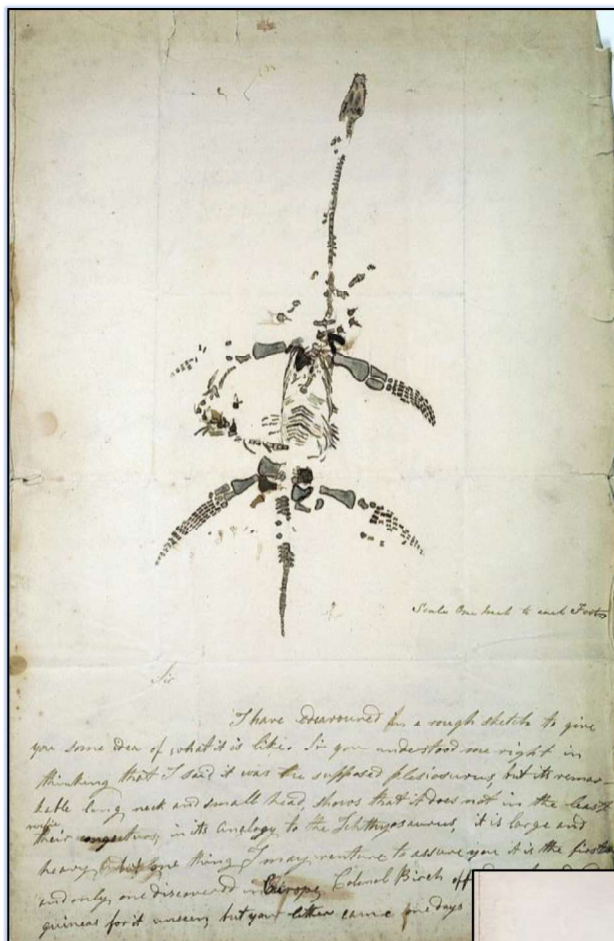
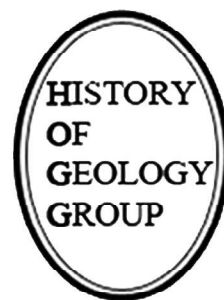




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The geological peregrinations of Robert Townson

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Robert Townson (1762–1827) and his geological peregrinations in 1793 in the Northern Carpathians (Tatra Mountains and the Wieliczka Salt Mine)

Robert Townson (1762–1827) (Fig. 1) flashed like a meteor across the firmament of early geology. He was born in Richmond, Surrey, the illegitimate son of London merchant John Townson. When he was just 11, his father died and the family moved to Shropshire (Torrens, 1999). Between 1776–1783 he served a mercantile apprenticeship in Manchester before realising that his future lay in other fields. In 1783, he set off on his travels, first to France and then Italy. In 1787–1788 he studied at the prestigious École des Mines in Paris, before



Figure 1 Robert Townson (1762–1827) portrait by Augustus Earle

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moving to the University of Edinburgh, where, despite failing to graduate, he matured his interests in natural sciences, including mineralogy and geology. In 1791 James Hutton proposed him for Fellowship of the Royal Society of Edinburgh. That same year, having failed in a bid to become a government naturalist in Canada, he enrolled at the University of Göttingen, from where he did graduate in natural sciences in 1795, despite having taken a year off in 1793, to travel—largely on foot—across the vast area that covers parts of the present-day Hungary, Romania, Slovakia and Poland. During this journey he gathered materials for his famous opus magnum *Travels in Hungary with a short account of Vienna in the year 1793*. This work was first published in English in 1797 (Fig. 2), and then, due to its high popularity, also in French (2 editions in 1799 & 1803) and in Dutch

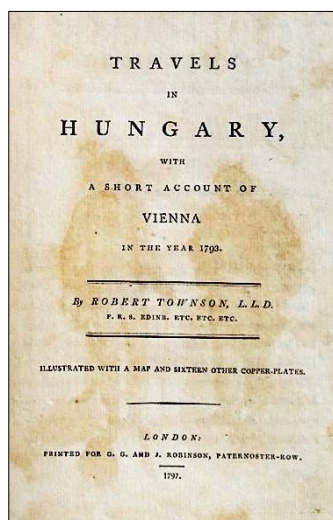


Figure 2 Title page of first edition of Townson's "Travels in Hungary with a short account of Vienna in the year 1793" published in 1797 in London

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(1800). Based on this book, in 1796 Townson was awarded his doctorate from University of Edinburgh.

At around this time Townson also published an interesting but rather underappreciated textbook *The Philosophy of Mineralogy* (1798), as well as *Tracts and Observations on Natural History* (1799), a volume of papers on the natural sciences, mostly geology and mineralogy. He also contributed to *General View of the Agriculture of Shropshire* published in 1803.

But then, in 1806, he disappeared from the scientific scene. Following his older brother, John, who had been in New South Wales since 1790, he had emigrated to Australia, where he spent the rest of his life—focused entirely on farming and wine growing—a surprising move for so learned and respected a natural scientist. When he died, twenty years later in 1827, he was buried in Parramatta, west of Sydney.

Townson's *Travels in Hungary* contains a wealth of information about the vast area he visited, including the northern part of the Carpathians as described in this paper. One of the first English publications demonstrating a knowledge of the northern Carpathians was *Otia Imperialia*, written about 1212, by scholar and priest Gervase of Tilbury. In the 16th century Scottish merchants, who settled in Poland and maintained trade contacts with Hungary, travelled through the Carpathian passes and the foothills of the Tatra Mountains. English alchemists, such as John Beguin, John Baptist Merin, and John Dee (who spent several weeks in Kraków in 1584), were also interested in the mineral riches of the area. Scottish and Irish mercenaries fighting for Poles, Russians and Swedes in Europe in the 17th century occasionally found themselves in the area and, in the 18th century, the number of British travellers in the Carpathians began to increase—one being the English author and politician Nathaniel William Wraxall who described the Tatra Mountains, seen from afar in 1778, in his *Memoirs of the courts of Berlin, Dresden, Warsaw and Vienna in the years 1777, 1778, and 1779* (1800).

Few works containing geological information on the northern Carpathians had been available before Townson's book was published. They included Jean-Étienne Guettard's papers *Mémoire sur la Nature du terrain de la Pologne et des Minéraux qu'il renferme* and *Mémoire sur les mines de sel de Wieliczka en Pologne* (1764), *Geschichte des Steinsalzes und der Steinsalzgruben im Grossfürstenthum Siebenbürgen* (1780) by Johann Ehrenreich von Fichtel, and, first of all, 4 volumes of the *Neueste physikalisch-politische Reisen ... durch die Dacischen und Sarmatischen oder Nördlichen Karpathen* (1790–1794) by Belsazar de la Motte Hacquet.

Townson travelled anticlockwise, from Vienna to Sopron, Budapest, Eger, Debrecen, then to Oradea and back to Debrecen, Košice, Kežmarok, Pribylina (including a detour to Kraków and Wieliczka), Banská Bystrica, Bratislava and back to Vienna. His book covered numerous topics, including botany, entomology, and geology. He is also

Robert Townson (1762–1827)

credited with the first recorded ascents of several peaks in the Tatra Mountains, located in the northern segment of the Carpathian arc (now in Slovakia and Poland). His book is beautifully illustrated, with several vistas of the Tatra Mountains, plates of plants and folk costumes, and plates with geological illustrations from the Wieliczka salt mine. It also includes a large, hand-coloured geological map entitled *A New Map of Hungary particularly of its Rivers & Natural Productions*, by In^b. Math^w. Korabinsky. *Petrography and Post Roads added by the Author*.

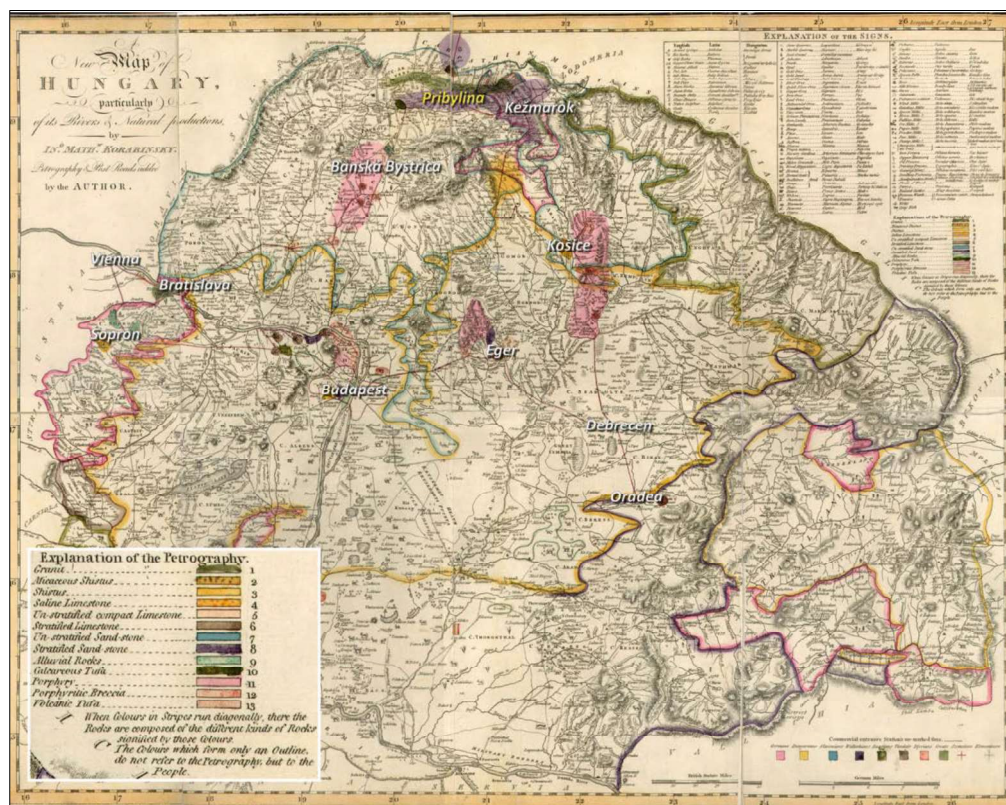


Figure 3 Townson's *A New Map of Hungary particularly of its Rivers & Natural Productions*. By In^b. Math^w. Korabinsky. *Petrography and Post Roads added by the Author*

An enlargement of Townson's petrographic rock description is shown in the lower left corner. Recent names of key cities visited by Townson are also shown.

This map of the entire Carpathians should undoubtedly be regarded as the very first modern geological map of this part of Europe (Fig. 3). Amongst other things it contains information on hogs, vultures and vineyards, all inherited from Korabinsky's original background map. It also shows the distribution of several rock types. Townson followed the Wernerian classification scheme based on presumed succession of deposition, from the oldest rocks (granite) to the youngest (alluvium) (cf. Kázmér, 1999). Townson's own line of travel is reflected in his map as he charted the geology of the areas he visited.

Townson did not set out to travel across the Tatra Mountains to Wieliczka and Kraków (located in southern Poland but then, after the partition of Poland, in the Galicia province of the Austro-Hungarian Empire). However, while in Važec (now in Slovakia) he was informed that '...at Probilini which was only a stage distant, there was a passage through the

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mountains into Galicia, and that from thence I might easily reach the famous Polish Salt Mines in a couple of days'. Lured by the fame of these salt mines, he quickly determined to sacrifice several days of his journey to see them: 'Who amongst men that has heard of Solomon's being the wisest man, and Samson the strongest, has not heard of these mines? Where, according to some accounts, there are subterranean towns, and subterranean republics'. On the 29 August, at Pribylina, Townson turned towards the north, crossed the Tatra Mountains and eventually, via Witów, Czarny Dunajec, Rabka, and Myślenice, he reached Wieliczka.

Salt production from the saline springs in the Wieliczka region dates back to the Neolithic times, with underground mining starting in the 13th century. For centuries this was a major source of income for the Kingdom of Poland. So far, only one brief description of Townson's visit in Wieliczka salt mine has been published, by Székely & Wójcik (1999). However, their claim that he visited the mine more as a tourist than as a scientist-naturalist is not really true at all. Although Townson's description did include detailed accounts of all the 'touristic' wonders: the very large chambers, the underground chapel carved entirely in salt, etc., he also detailed the rock types encountered in the mine, including various types of salt, as well as certain elements of mining technique and

equipment. It should also be stressed that the description of the Wieliczka salt mine is the only part of the book to contain geological illustrations.

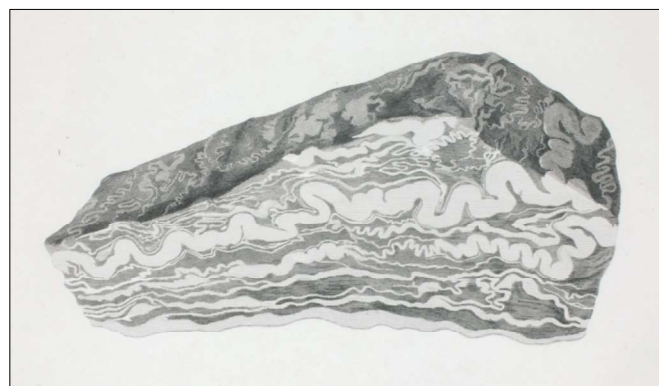


Figure 4 Illustration of enterolithic anhydrite

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Robert Townson (1762–1827)

Townson included two plates that illustrate enterolithic anhydrite (*kreosteín, pierre de trippes*) i.e. strongly contorted anhydrite layers, deformed due to inclusion of water and progressive transformation to gypsum associated with increase in volume (Fig. 4). He even sent a sample of enterolithic anhydrite (from the nearby located Bochnia salt mine, but given to him in Wieliczka) to the famous chemist and mineralogist Martin Heinrich Klaproth, who proved that it was indeed anhydrite and not barite as postulated by some other researchers. There is also a folded plate containing the very first published geological cross-section of the Wieliczka mine (Fig. 5). It is of course simple but is also actually rather accurate as it depicts the internal structure of the deformed Miocene evaporitic series formed by three main tectonic slices (slivers).

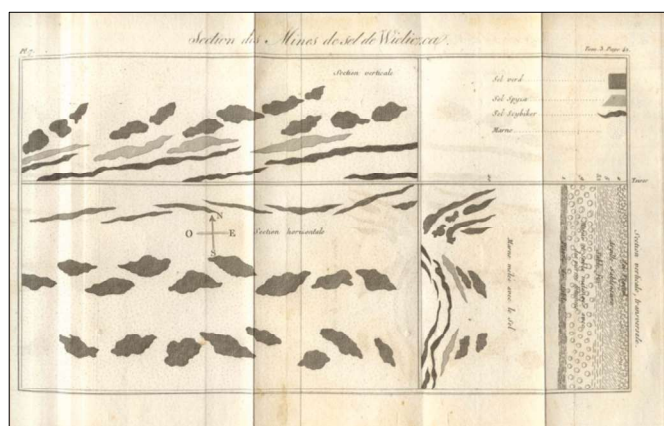


Figure 5 Plate with vertical and horizontal cross-sections and lithological types of salt from French edition of Townson's Travels in Hungary published in 1800 in Paris
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The most detailed part of Townson's map encompasses Tatra Mountains and their surroundings. For that area he distinguished 4 main lithological types: (1) '*granit*' i.e. magmatic and metamorphic rocks within the core of the Tatra Mountains, (2) '*un-stratified compact limestones*', i.e. Eocene & Jurassic limestones, (3) '*stratified sand-stones*' i.e. sandstones of the Podhale and Liptov basins and Outer Carpathian flysch, and (4) '*stratified limestone*' i.e. limestones of the Pieniny Klippen Belt. The geological information was mostly gathered by Townson on his way back from Kraków (where he spent a few days after visiting Wieliczka) to Pribylina: '*An hour after leaving Witthof (Witów), in the neighbourhood of which I had observed sand-stone strata, I came to a lime-stone rock full of petrifications*' – '*sand-stone strata*' are flysch sandstones of the Podhale basin, and '*lime-stone rock full of petrifications*' are Eocene nummulites. In the high ranges of the Tatra Mountains Townson studied crystalline rocks: '*The lime-stone at last disappeared, and I saw then nothing but granit. ... At the top the granit became schistic, and passed into Micaceous Schists*'. Comparison of Townson's map of this part of the Carpathians with modern geological maps proves the high quality of his pioneering geological mapping of this area. Without any doubts this map should be regarded as the very

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first modern geological map of the Tatra Mountains and their surroundings.

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Some later geological (and royal!) adventures in salt mines (appended by the editor)

In the summer of 1820, William Buckland and his friends, George Greenough and Count August Breunner of Vienna, visited Cracow, where, having descended the famous salt mine, they were shocked to find themselves herded into a net to be thrown 'one upon another like salmon in a drag' in order to be hauled back to ground level. Although Buckland thought that this 'mode of ascending is rather uncouth', he thought it 'nothing to the strange manner adopted at Hal [sic] in the Tyrol for descending from one level to another'. Here they had had to grasp a rope in one hand and a candle in the other as they slid down astride two parallel wooden poles, an undertaking that Buckland felt to be positively dangerous; 'the eclat however wh might have attended us for intrepidity was considerably diminished on our discovering that a great name, Queen Caroline, had accomplished the same feat when she was in the Tyrol.' (J.H.Newman's notes on Buckland's 1821 Mineralogy Course, as transcribed in Patrick Boylan's 1984 PhD Thesis, Vol. 2.)

George IV's estranged wife, Caroline of Brunswick, visited the mine at Hallein near Salzburg during her exile from England between 1814 and 1820. A detailed account of her slippery descent into the mine is given in: John Adolphus' *Voyages and Travels of Her Majesty, Caroline, Queen of Great Britain: Including Visits to Various Parts of Germany ... &c. &c.* published, 1821. p.733ff. Today, intrepid visitors to this ancient mine are still able to experience the 64-metre-long slide for themselves (<https://www.salzwelten.at/en>).