Goethe's Second Swiss Journey

Preparation

As Goethe approached his thirtieth birthday (on 28 August) during the summer of 1779, he began to make tentative plans for another escape from his busy life at the court of Weimar. Already serving on the Duchy's Mining and Highway Commissions, in January of that year he had taken on additional duties by allowing himself to be appointed to the War Commission. The latter role made him responsible for the recruitment of soldiers for Weimar's army, a task he approached with resolute objectivity.[1] During his four week recruitment tour of the Duchy in early spring, he felt a strong empathy[2] for the candidates as he weighed up excuses from the able bodied and newly married, and pleas from the unemployed and unsuitable. *The selection process is not particularly enjoyable; cripples would like to serve, but the able bodied are often about to get married*, he wrote to Charlotte von Stein on 6 March.[3]

Somehow, he still found time to dictate the first scenes of a new prose drama he was working on, *Iphigenia in Taurus*.

The decision to remain in Weimar which he had made on the Brocken only eighteen months earlier was beginning to wear thin. He strongly felt the need for a renewed sign from heaven to find the clarity of soul he needed to continue. His responsibilities at court did not leave him with enough time for writing, and his relationship with Charlotte von Stein was as complicated as ever. In addition, he hadn't seen his parents for almost four years, and he wanted to see them again.

As poet and dramatist, Goethe was of course also expected to provide entertainment for the ladies and gentlemen of the court. In April he completed *Iphigenia in Taurus*. It was performed the same month to huge acclaim. With this success behind him, and with the threat of war between Prussia and Austria at least temporarily lifted during the early summer, Goethe sensed a window of opportunity

The Duke, who would turn 22 on 3 September, also needed a break. He had been carrying the responsibilities of governing the Duchy since his eighteenth birthday. He had not found it easy to take on his ducal duties, and his main interest in life continued to be hunting. It occurred to Goethe that he might well benefit from a *Bildungsreise*, an educational journey into the wider world, particularly into the middle-class world where he himself had his roots.

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1 During his tenure on the War Commission Goethe was able to reduce the number of active troops by half, thereby saving the Duchy a considerable sum of money.

2 "*With these people, I live, I talk, and let them tell me* (their stories). *How differently a situation appears compared to when it percolates through the filter funnels of official dispatches.*" Letter to Charlotte von Stein, 4 March 1779.

3 Letter to Charlotte von Stein, 6 March 1779. Quotations from letters to Charlotte von Stein up to and including the one dated 6 November have been translated from http://www.zeno.org/Literatur/M/Goethe,+Johann+Wolfgang/Briefe/1779. All translations are my own.

With some resistance from the Privy Council, but with the blessing of Carl August's mother, the Duchess Anna Amalia, (who had met Frau Goethe in Frankfurt the previous year, and had been favourably impressed), a plan was agreed. Goethe and the Duke would spend some time in Frankfurt, and then travel down the Rhine as far as Düsseldorf, where Goethe felt duty bound to renew his friendship with Friedrich Jacobi. At the Jacobi's Carl August would be able to experience for himself the relaxed literary milieu in which his close friend, mentor, Councillor, and court poet, had written the works which had made him famous.

On 7 August Goethe wrote a longer than usual entry in his diary, in which he took stock of his life, searching for clarity. *Tidied up at home, went through my papers, burnt all the old crusts. Different times, different worries. Quiet reflection of my life. . . . One shouldn't complain about constant headaches, and drink too much wine every evening. May the idea of purity, which includes the morsel I take into my mouth become, ever clearer in me.*[4]

On 28 August he received a unique birthday present. Carl August informed him that he intended to promote him to full Privy Councillor, the highest rank in the Duchy's hierarchy. Goethe was overjoyed; two days after the official ceremony on 5 September he wrote to Charlotte von Stein*: I am amazed that at 30 years old, I enter, as if in a dream, the highest honour it is possible to achieve in Germany.*

On the Road

The following week, on 12 September Goethe and Carl August left Weimar on horseback in the company of Goethe's secretary (Philip Seidel), his personal servant (Christoph Sutor), the Duke's chamberlain (Moritz von Wedel), his servant (Konrad Wagner), a groom for the horses (Johann Blochberg), and a huntsman (known only as Hermann). The summer of 1779 had been a good one, and the harvest promised to be bountiful. They rode past orchards with apples and pears ripening under clear blue skies, golden fields where harvesting was in full progress, vineyards with grapes swelling in the autumn sun. As a first introduction to the *Bildungsreise*, they stopped briefly in Kassel to visit the art gallery.

Just before reaching Frankfurt, there was a change of plan. Instead of touring down the Rhine, taking in the sights as far as Dusseldorf, they would now travel up the Rhine to Switzerland. In Weimar the court was taken aback. Carl August too expressed surprise: '*I am sorry that you are unable to believe my word, and think that I made a secret about our journey*', he wrote to his mother, the Duchess Anna Amalia. '*I must repeat though, that it was only decided halfway between Friedberg and Frankfurt; that's where I and the others first came to know about it, by inspiration from the angel Gabriel*'.[5] What he did not tell his mother was that the angel Gabriel was Goethe.

A journey to Switzerland had probably been Carl August's and Goethe's plan all along; the subterfuge was felt necessary to get around the objections of the Privy

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4 Goethe's diaries can be found at http://www.zeno.org/Literatur/M/Goethe,+Johann+Wolfgang/Tagebücher/1779/August.

5 Translated from Rüdiger Safranski (2013) *Goethe, Kunstwerk des Lebens*, Carl Hanser Verlag, München, p269.

Council – Carl August was an impulsive young man, and his safety was paramount. Could Goethe, whose own behaviour in Weimar had been more than a little wild, be trusted to keep the hereditary leader of a tiny state safe in republican Switzerland? Whatever might have been discussed between the two before the journey commenced, in his letter Carl August declared himself delighted with the new plan.

It so happened that Goethe's friend Merck was also in Frankfurt. His wife was Swiss, and he had visited the country several times. He not only encouraged the plans for Switzerland, but also gave Goethe a letter of introduction to the geologist Samuel Wyttenbach[6] in Bern.

Goethe was relieved. His plan was going to work out. He had upset Jacobi earlier in the year with a thoughtless and insensitive act, and was not relishing what was likely to be a difficult reunion. He much preferred travelling South, to bring closure to two intimate friendships still haunting him from his past – with Friederike Brion, whom he had deserted while a student in Strasbourg, and with Lili Schönemann, to whom he had been briefly engaged before moving to Weimar. He also wanted to visit his nieces whom he had never met, and to whom he had given little thought since the death of his sister Cornelia in June 1777. There was an additional motive however, of which not even the Duke was aware, as we shall see.

The royal party arrived in Frankfurt on 18 September, stayed for four nights at the house of Goethe's parents, then headed South. At Speyer they crossed the Rhine, from where, on 24 September while waiting for the ferry, Goethe wrote to Charlotte von Stein: *I am recapitulating the whole of my past life, seeing all the old acquaintances again. God knows how it will all turn out. The Duke is well, and Wedel is in his element. Switzerland lies before us, and we hope with the support of the heavens to roam amongst the great formations of the world, and to bathe our spirits in sublime Nature.*

A Clear Conscience

The following day he rode to Sessenheim where he was warmly welcomed by the Brion family. Friederike was still single (and would remain so the rest of her life) but there were no recriminations. He was invited to stay the night, and returned to Strasbourg the next morning. That afternoon he visited Lili Schönemann (now von Türckheim) where he stayed for supper. Here too, he left with a clear conscience. Lili had a young daughter, a nice house, a husband with a considerable income, in short *everything she needed.* The next day the party crossed the Rhine again, and made their way to Emmendingen where they stayed with Goethe's erstwhile brother-in-law Johann Schlosser (who was now married to Johanna Fahlmer, an acquaintance from his Frankfurt days). He was delighted with his nieces, and spent some time reminiscing at Cornelia's grave. On 28 September he wrote a long letter to Charlotte von Stein reporting in detail about these three visits.

From the letter it becomes apparent that Charlotte had been unaware of Friederike's existence until now, but he was able to reassure her that *he would*

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6 Jakob Samuel Wyttenbach (1748 – 1830) was a Swiss protestant theologian and natural philosopher; also active as a doctor and herbalist.

henceforth be able to think of this corner of the world with contentment, and live in peace with the spirits of those with whom he had been reconciled. Towards the end of the letter, he felt that . . . *there arise now in my soul, unclouded by limited passions, the relationships to people which will endure.*

This experience of reconciliation with his past, of cleansing from his soul all *limited passions*, was another important preparation for his first geognostic experience the following week.[7]

They reached Basel on 1 October, where they again viewed an art gallery, and from where the grand tour began in earnest two days later. They spent the first few days sightseeing around Lake Biel, including a visit to St Peter's Island in Lake Biel, where the philosopher and author Jean Jacques Rousseau's (1721 – 1778) had been forced to seek refuge. Although Rousseau had only lived there for two months in 1765 before he was forced to move on again (this time to England) the house had already become an important attraction for travellers on their grand tour. Goethe noted that the estate manager and his wife were the same couple who had hosted Rousseau fourteen years earlier. The grape harvest was in progress, and they ate enough grapes for three years, he wrote to his friend Merck (in a letter dated 17 October).

First Impressions – the Birs Gorge

On their first day of travel, on the road South from Basel towards Moutier[8], they passed between the steep limestone formations of the Birs gorge in the Jura mountains. Goethe was more than impressed, he was deeply moved. In his first ever detailed field observation, he described not only the rocky cliffs he saw in front of him, but also his experience of them – revealing at the very start of his geognostic work, indeed of his scientific work overall, his inner approach, the mental disposition (*Geistesart*) he considered essential for a scientific study of Nature. In a long letter to Charlotte von Stein written on Sunday 3 October he reported:

Among the ridges of the broad and lofty range of mountains, the Birs, a smallish river, found, of old, a channel for itself. Necessity soon after may have driven men to clamber wearily and painfully through its gorges. The Romans, in their time, enlarged the track; and today you may

Letters from Switzerland

After his return to Weimar Goethe collated the letters he wrote to Charlotte from Switzerland, together with his diary entries and several entries from Carl August's diary. The collection was read aloud by Goethe in a small circle of Anna Amalia's friends. In 1796 Schiller edited a shortened version, and published them in eight instalments in his literary magazine *Die Horen* ('The Hours'). Goethe published the complete text in 1808 as *Briefe aus der Schweiz, Zweite Abteilung* ('Letters from Switzerland, Part Two'). Part One consists of fictitious letters, ostensibly written by Werther (the protagonist of *The Sufferings of Young Werther*, the novel which made Goethe a celebrity), before he met Lotte (the one in the book, not Goethe's friend in Weimar); a kind of prequel to the novel, which Goethe for reasons still unknown, wanted included in his 'Letters from Switzerland'. An English translation of both parts can be found on https://en.wikisource.org/wiki/Page:The_Works_of_J._W._von_Goethe,_Volume_12.djvu/43.

7 In eighteenth century Germany 'geognosy' was the study of rocks and minerals, before it was replaced by 'geology'. Goethe always thought of himself as a geognost.

8 Goethe used the old German name 'Münster'.

comfortably travel along a well-made road. The stream, rushing over boulders, and the road, run side by side; and, except at a few places, these make up the whole breadth of the ravine, which is hemmed in by cliffs. The tops of these are easily discerned by the eye. The mountains gently rise behind them; the summits, however, are veiled in mist.

Here walls of rock rise precipitously one above another, there immense strata run obliquely down to the river and the road; here, again, broad rocky masses lie piled one over another, while close beside stands a line of sharp-pointed crags. Wide fissures cleave upwards; and blocks the size of a wall have detached themselves from the rock face. Some boulders have come crashing to the bottom; others are still suspended, their position appears alarming, as likely at any moment to also come toppling down.

The rocky ridges are now round, now pointed; now overgrown, now bare, often, high above them a single bare summit boldly looks out over the rest; while along the perpendicular cliffs, and among the hollows below, weathered crevices snuggle into the rock.

Bird's eye view of the Birs ravine. The road Goethe's party rode along was already used by the Romans

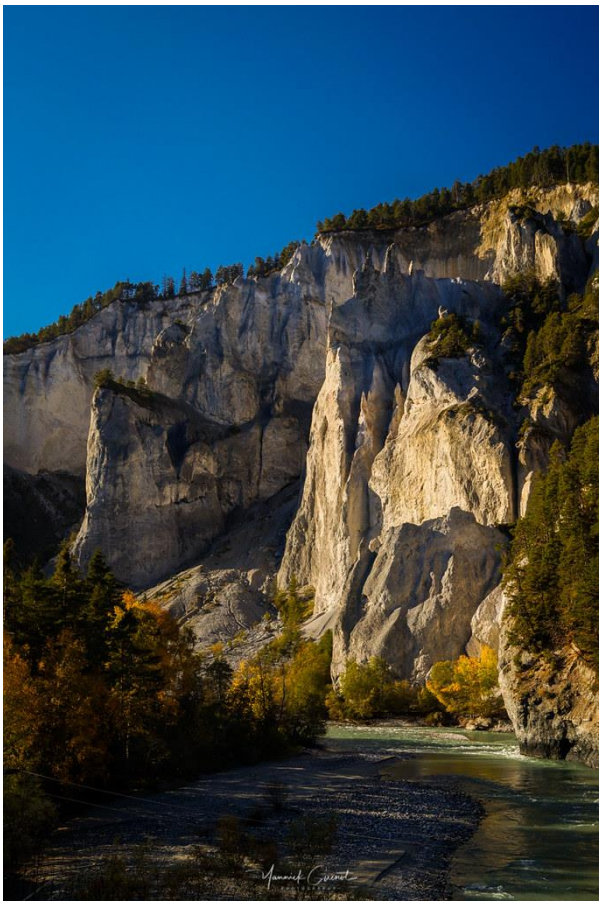
The journey through this defile raised in me an elevated but calm emotion. The sublime (*das Erhabenen*) *produces a wonderful calmness in the soul, which, entirely possessed by it, feels as grand as it ever can feel. How glorious is such a pure feeling when it rises to the very highest, without overflowing! My eye and my soul were both able to take in the objects before me; and because my mind was clear* (da ich rein war)*, and nothing falsely counteracted their impression, their effect was as it should be. When we compare such a feeling with worrying about insignificant matters, giving ourselves no end of trouble about some trifle, straining every nerve to gain as much as possible from it, to stretch it out, only to provide joy and nourishment to the mind from its own creation, only then we notice what a poor contrivance the latter is. . . .*

After reaching the end of the gorge, I alighted, and went back part of the way. I thus called forth another profound feeling - one by which the attentive mind may expand its joys to a high degree. One darkly intuits the origin and the life of these singular forms. It may have happened when and how it may: these masses must, according to their weight and the similarity of their parts, have assembled themselves grandly yet by simple means. Whatever revolutions may subsequently have upheaved, split, and separated them, these were only single convulsions; and even the idea of such mighty commotions gives one a deep feeling of eternal stability. Time, too, bound by the everlasting law, has had here greater, here less, effect upon them.

Internally, they seem to be of a yellowish colour, but the weather and the atmosphere changes the surface into a grey-blue, so that the original colour is only visible here and there in cracks and newly formed crevices. Slowly the rock itself

crumbles, rounding itself off at the corners as the softer patches are worn away; and so there appear small cavities and holes, with curious effects where their sharp edges and tips meet.

The vegetation asserts itself. On every ledge, flat surface, or crevice, spruce trees take root; moss and similar plants fringe the rocks. One feels deeply convinced; here is nothing random, (but) *everything according to a slowly moving eternal law. Only the convenient road along which one passes through this extra-ordinary region is by the hand of man.*



With a clear conscience about his past relationships with the three most important women in his life until he met Charlotte von Stein, Goethe was able to give himself over completely to the cliffs of the Birs ravine. He felt pure, his *mind was clear,* and he was able to receive the impressions given by his senses with no stray thoughts or other obstacles in his mind to "*falsely counteract their impression*".

The details of the cliffs he describes to Charlotte, the mood of their genesis and emergence, are an expression of Goethe's approach to Nature; an approach based on an Imagination of a slow, tranquil development of the Earth's rocky surface - an approach he would adhere to for the rest of his long life, and which would later give rise to his strong disagreement with the catastrophic theories of the next generation of geologists.

Given the "*wonderful calmness*" in Goethe's soul, and his intuition about "*the origin and the life of these singular forms*", why do "*revolutions*" threaten to disturb his peaceful imagination of a primal world? To answer this question we need to leave the tourists, and go back twenty years to Leipzig, where between

1765 and 1768 the young Goethe studied law. We will meet up with the royal party again in Bern.

Lunches in Leipzig

It was customary at German universities for small groups of students to have their lunch at the home of a professor. Goethe found himself having his lunch at the home of Councillor Ludwig[9] with a group of medical students, well advanced in their studies, In *Poetry and Truth* he wrote: "*The only conversations I heard during these hours were about medicine or natural history, and my powers of imagination were pulled in quite a different direction* (from his law studies). *I heard the names of Haller, Linnaeus and Buffon mentioned with great reverence, and even if occasional disputes arose because of errors these men were thought to have made, agreement would be reached in the end, in acknowledgement of the abundance of their achievements. Many names and a wide-ranging terminology gradually became known to me. . .*"[10]

The three natural philosophers mentioned by Goethe were all giants in their field. Albrecht von Haller (1708 - 1777) was a Swiss poet, naturalist and physiologist, considered by many to be the father of physiology. He had been a mentor of Samuel Wyttenbach. Carl Linnaeus (1707 – 1778) was a Swedish botanist, zoologist, and physician who formalised the modern system of naming plants and animals (the binomial nomenclature). He is known as the father of modern taxonomy. Buffon would have a lasting effect on the development of Goethe's geognostic ideas, and it is to him we must now turn.

Georges-Louis Leclerc, Comte de Buffon

Count de Buffon (1707 – 1788) was a natural philosopher, mathematician, and *encyclopédiste*. His works influenced several generations of natural historians, including Lamarck and Cuvier, and in Goethe's younger days he was considered the father of natural history. He was for many years director (*intendant*) of the botanical gardens (*Jardin des Plantes*) in Paris.

The first three volumes of his encyclopaedic work 'Natural History, in General and in Detail' (*Histoire naturelle, générale et particuliére*) were published in 1749, and he was able to complete (with assistance) a total of 36 volumes before his death in 1788. The *Histoire naturelle* was the first modern attempt in any language to systematically present all existing knowledge in the fields of natural history (geology, biology and zoology), and anthropology. Buffon wrote in a clear and accessible style, and was read by every educated person in Europe, including the medical students at the University of Leipzig, as we have seen.

The second volume of the *Histoire naturelle* was dedicated to the 'History and Theory of the Earth' (*Histoire et Théorie de la Terre*). It outlined a geologic history of the Earth with little or no resemblance to the account of creation given in Genesis. It therefore came as no surprise that his ideas were condemned by the Faculty of Theology at the Sorbonne in Paris. Buffon published a retraction, but was able to continue publishing the offending theories without any change.

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9 Christian Gottlieb Ludwig (1709 – 1773), professor of medicine and botany.

10 *Poetry and Truth,* Book 6, final paragraph.

Buffon proposed a startling hypothesis about the origin of the solar system. He suggested that the Sun was struck by a large comet (he believed, with Newton, that the nucleus of a comet was very dense), and that the material torn from the Sun by the impact formed the planets. It was soon pointed out (by Leonard Euler), that this hypothesis did not respect the laws of celestial mechanics, but it is nonetheless the first cosmogony of Newtonian inspiration which ranged further from theological orthodoxy than even Newton was prepared to go.

Buffon did not think of this as a violent event. Having explained that comets do on occasion pass very close to the sun, '*it is inevitable that some fall in obliquely, and on furrowing the surface, throw material that has been put into movement by the impact, out before them*.'[11] Buffon then explains in detail his thoughts on how this material condensed to form the planets.

But Buffon was more than a theorist. He also did practical experiments. He assumed that the molten Earth first solidified, 'fused', into a kind of primal glass, which he named '*matières vitrescibles*' (vitreous matter). He heated metal spheres of different sizes to temperatures close to their melting point, which he believed approximated those of the hot vitreous matter, and measured the time it took them to cool. This was determined by a woman (women's fingers being considered more sensitive than those of men) being able to comfortably touch the spheres.[12] He then extrapolated the results to what he believed to be a cooling Earth.

He arrived at an estimate of 75000 years for the time it took the surface of the Earth to cool from a molten state to today's ambient temperatures. This was more than ten times the age of the Earth generally accepted at the time.[13] This was as far as he was prepared to go publicly, but he privately believed, based on his study of the slow accumulation of sedimentary rocks, that the age of the Earth should be reckoned in millions, rather than thousands of years.

Buffon had also studied the marine fossils found in sedimentary rocks, and concluded that the formation of terrestrial relief (mountains, hills and valleys) was due to the action of a marine environment. The water of the oceans acted on the 'primal glass', breaking it down into crystals and small particles, which provided nourishment for the creatures in the ocean, including molluscs and crustaceans. Their hard shells and other debris, including the products of erosion, were deposited on the ocean floor. Buffon's suggestion that the physical-chemical action of water was the origin of all crystalline and calcareous rocks and minerals is an idea which Goethe held to throughout his life.

In 1778 Buffon published *The Epochs of Nature* (*Époques de la nature)* and the *Natural History of Minerals,* offering a detailed synthesis of his ideas. It is the first specifically geological history of the world, ranging from the Earth's origins to its predicted end. In seven epochs (a nod to the biblical creation story and the theologians at the Sorbonne), he outlines the main features of an evolving Earth,

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11 Georges-Louis Leclerc, le Comte de Buffon (1778) *The Epochs of Nature*, translated and edited by Jan Zalasiewicz, et al., University of Chicago Press, 2018, p 26.]

12 Ibid. p xxvi. The first accurate thermometer was invented by Daniel Fahrenheit in 1714. Perhaps Buffon did not have access to one.

13 Bishop Ussher (1581-1656) had determined that the earth was created in 4004 BCE, a date which only began to be seriously questioned in the 19th Century.

from the hard primal vitreous matter, to the upper-most sedimentary layers, and describes the minerals and fossils found within these layers. The work covered volcanoes, earthquakes, and the rise and fall of sea level. Of particular interest to Goethe were the third and fourth epochs. (See box.)

The '*matières vitrescibles*' making up the primitive Earth formed on the cooling and solidifying planet during the second epoch.

The formation of the mountains, hills and valleys making up Earth's varied landscapes, are a result of powerful currents in the primal ocean during the third and fourth epochs.

Buffon 'guesstimates' (rather wildly) the length of time required for each epoch. The physical changes taking place within each epoch he refers to as 'revolutions'.

'*One can envisage the immense quantities of matter of all kinds that were then transported by the waters. How many sediments of different natures were then deposited one above another, and by consequence just how much of the face of the Earth was changed by these revolutions?*'[14]

Buffon's Epochs

1. The Earth (and the other planets) took their form.
2. The hot fluid matter consolidated, and formed the interior rock of the earth, as well as crystalline rocks such as granite.
3. The primal ocean covered all the Continents.
4. The waters receded, and Volcano's began to act.
5. Elephants, and other animals of the South, inhabited the Northern regions.
6. The Continents were separated from each other.
7. The power of Man assists the operations of Nature.

Today cosmic collisions of any kind are imagined as extremely violent affairs, an inevitable result of the advance of CGI (computer generated image) technology, as well as the fact that catastrophes always make for good headlines. [Thus modern cosmologists believe that the moon was separated from the Earth by the catastrophic impact of an object the size of Mars, and (some) palaeontologists believe that a lesser terrestrial catastrophe 'wiped out the dinosaurs'.] But Buffon remained convinced that the revolutions moulding the face of the Earth after her initial formation, involved slow and gradual change, and he consistently rejected the catastrophic theories proposed by other geologists.

In 1780, immediately after his return from Switzerland, Goethe acquired a copy of *Les époques de la nature*. On 7 April he wrote an enthusiastic letter to Merck: *The second Buffon is excellent.*[15] *I am in full agreement, and don't mind if some call it a hypothesis or a novel* (*Roman*). *It's much easier to say this than to prove it. Such people should withhold their comments, unless they're able to produce a better and more coherent whole. For me the book is less of a hypothesis than the book of Genesis.*[16]

The Epochs of Nature

14 Georges-Louis Leclerc, le Comte de Buffon (1778) *The Epochs of Nature*, p 66. For more information on Buffon see https://www.geolsoc.org.uk/Geoscientist/Archive/April-2018/Buffon-the-geologist and http://www.annales.org/archives/cofrhigeo/buffon-sciences-terre.

15 The first was *Histoire et Théorie de la Terre*, which Goethe had met in Leipzig.

16 Letter to Merck, 7 April 1780.

The opening paragraph of 'The Epochs of Nature' (1778) reads as follows:

'In civil history, one consult documents, studies old medals, deciphers ancient inscriptions, to determine the epochs of human revolutions, and to establish the dates of moral events. Likewise, in natural history, one must rummage through the Earth's archives, pull ancient monuments from the bowels of the Earth, reassemble their remains, and put together in a body of evidence all the indications of physical change that can allow us to reach back into the different periods of Nature.'[17]

On the next page we read: 'How many changes and different states must have succeeded each other, since those antique times . . . How many things lie buried; how many events have been entirely forgotten; and how many revolutions have taken place beyond the reach of human memory!' [Ibid, p 4.] The revolutions described by Buffon are not sudden, fast acting events bringing about radical changes, but slow and gradual, taking place, Buffon thought, over tens of thousands, possibly millions of years. Buffon was the first natural historian to extend the age of the Earth beyond the 6000 years calculated by Archbishop Ussher in 1650. He used logical reasoning based on actual observations rather than data provided by the Old Testament and the interpretations of the Church Fathers, a procedure Goethe entirely agreed with.

Here we find the source of the *revolutions* mentioned by Goethe in his letter to Charlotte von Stein; revolutions which he accepted, because he intrinsically understood that these were non-violent. He considered them as subordinate events, as mere *single convulsions,* which, because they happened so long ago, gave him a *deep feeling of eternal stability*. Contemplation of the rocky gorge, which had existed for thousands, if not tens of thousands of years awoke in him, however indistinctly, a sense for geological processes, processes which were not arbitrary, but evolved towards a definite goal; i.e. Buffon's seventh epoch, where the ingenuity of humankind assists and augments the works of Nature.

Goethe experienced the jagged limestone cliffs not as a result of random weathering and rockfalls, but as an expression of an overarching order in Nature. With the help of Buffon's ground-breaking perspective, the looming precipices and chaotic jumbles of rocks became for him evidence of a sublime (*erhabenen*) and eternal order. *Erhaben* is a word Goethe often reached for when face to face with the grandeur of Nature on this, and other journeys. It signifies a transcendent state of consciousness, in which one is awed by the mystery and enormity of what one contemplates.

The question may be asked whether Goethe, with his uncanny sense for formative processes, somehow felt arise within him an imagination of the processes by which the rocky *masses* had *assembled themselves.* Are today's geologists able to confirm the *grand yet simple means* Goethe imagined for the formation of the Jura limestone mountains? In Goethe's day there was no concept of geologic time, and an understanding of mountain forming processes over long periods of time only began to be developed towards the end of his life. He would have been delighted with the discoveries of modern geologists.

In 1831, following a visit to Weimar by his friend Alexander von Humboldt (1769 - 1859), Goethe dictated a short piece, *Geological Problems and an Attempt at*

17 Georges-Louis Leclerc, le Comte de Buffon (1778) *The Epochs of Nature*, p3.

their Solution, which brought together the main points of their discussion. Goethe could not accept the uplifting of entire mountain ranges as proposed by von Humboldt and others, believing, given the short space of time in which they were supposed to have taken place, that such major events were extremely violent and catastrophic. Upheavals of any kind went completely against his nature.

In his dictation, in which there appear to be gaps, Goethe stated:

The business may be as it will, but it must be written that I curse this damned lumber room of the new world creation, and there will surely be some clever young man who has the courage to resist this insane consensus.[18]

Unknown to Goethe, his confident prediction had already been fulfilled the previous year. In 1830 Charles Lyell (1797-1875) published his 'Principles of Geology', a book which freed itself completely from the constraints imposed by the theological requirements of a young Earth In three volumes the 'Principles of Geology' develops the idea that the Earth was shaped entirely by slow-moving forces still at work today, acting over very long periods of time.]

Before we rejoin the tourists in Bern, we take a brief detour back into geological time, to look at the formation of the Jura.

The Jura Mountains

During a tour of the region in 1795 Alexander von Humboldt recognized the limestone rocks of the Jura Mountains between France and Switzerland as a separate formation that had not been included in the stratigraphic system he had been taught at the Freiberg Mining Academy (see next chapter), and he named it "*Jura-Kalkstein*" ('Jura limestone') in 1799. The **Jurassic Period** of geologic time was named early in the 19th century, by the French geologist and mineralogist Alexandre Brongniart (1770-1847). It covers rocks formed between about 200 to 145 million years ago. The sedimentary rocks and the marine fossils of the Jurassic Period indicate a time when much of Europe was submerged under shallow tropical seas.

In the UK the best known location is the Jurassic Coast World Heritage Site in Dorset in southern England, and in southern Germany the so-called late Jurassic 'Lagerstätten' (sedimentary deposits containing extraordinary fossils with exceptional preservation) of Holzmaden and Solnhofen are world famous, not least because a fossilized feather, later a complete fossilized skeleton of the earliest known bird, *Archaeopteryx*, was discovered at Solnhofen in Bavaria.

At the start of the period, the breakup of the supercontinent Pangaea had already begun. Laurasia, the northern half, broke up into North America and Eurasia. Gondwana, the southern half, began to break up during the mid-Jurassic period. The eastern portion - Antarctica, Madagascar, India, and Australia - split from the western half - Africa and South America. New oceans flooded the spaces created between the continental blocks.

The oceans, especially the newly formed shallow interior seas, teemed with diverse and abundant life. Giant marine crocodiles dozed on sandy beaches, long-necked plesiosaurs, sharks, and rays cruised the deeper waters. Fishlike

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18 In *Geologische Probleme und Versuch ihrer Auflösung*, a collection of notes written in 1829.

ichthyosaurs, squid-like cephalopods, and coil-shelled ammonites were abundant. Coral reefs grew rapidly in the warm waters, and sponges, snails, and molluscs flourished. Organisms dwelling in these shallow seas such as oysters, clams, mussels and coral, used calcium carbonate ($CaCO_3$) dissolved in seawater to create their shells. As they died, their shells settled on the sea floor, and were broken down by wave action. The particles accumulated imperceptibly, millimeter by millimeter. Over millions of years they were compacted by the pressure exerted by slowly accumulating overlying layers, and thick beds of limestone were the result.

On land, the plant-eating sauropod *Brachiosaurus* stood up to 16 metres tall, stretched some 25 metres long, and has been estimated to weigh more than 80 tons. *Diplodocus*, another sauropod, was 90 feet (27 meters) long.

The earliest known bird, *Archaeopteryx*, took to the skies in the late Jurassic, most likely evolved from an early dinosaur. *Archaeopteryx* and its descendants gradually replaced pterosaurs, the flying reptiles that had been airborne since the late Triassic Period. Various insects such as leafhoppers and beetles evolved, and many of Earth's earliest mammals scurried around the feet of the dinosaurs.

Berner Oberland

The tourists have arrived in Bern, where they bought a printed tourist guide describing the Berner Oberland by Samuel Wyttenbach, which they used to plan the following week's touring.

They arrived in Lauterbrunnen on 9 October. The Lauterbrunnen valley is today recognised as a typical U-shaped glacial valley cut into the folded rocks of the Alps some 25000 years ago. Goethe didn't know this of course, but he was

Limestone and the Jura Mountains

The formation of the **Jura Mountains** was part of the same movement of continental 'plates' that formed the Alps. Pressure from the Southeast caused by contact of the African plate against the Eurasian plate led to a buckling of the Earth's crust, uplifting the region now known as the Jura. The mountain building process took place in two separate phases; forming first the outer, French chain of ridges, then the adjacent, higher, inner ranges in Switzerland. Geologists estimate that this took place during the Pliocene Epoch (about 5.3 to 2.6 million years ago).

Once exposed to the atmosphere rocks begin to weather, in the case of limestone by chemical changes. Limestone decomposes as a result of a chemical reaction between calcite (the main mineral present in limestone), and water and gases in the atmosphere (carbon dioxide and sulphur dioxide).

Rainwater is naturally acidic because it contains dissolved atmospheric carbon dioxide forming weak carbonic acid. When this weak acid comes into contact with calcite, it begins to dissolve. The weathering process is as follows:

- Droplets of rain water (H_2O) in the clouds dissolve carbon dioxide (CO_2) in the atmosphere.
- When combined, these form carbonic acid (H_2CO_3).
- The slightly acidic rain then falls onto the ground.
- The rain soaks into the soil or flows over the exposed limestone ($CaCO_3$).
- A chemical reaction takes place when the rain (i.e. carbonic acid) meets the limestone (i.e. calcite) to form calcium bicarbonate. [$H_2CO_3 + CaCO_3 = Ca(HCO_3)_2$.]

In other words, calcite is converted to calcium bicarbonate, which is soluble and is washed away by rain. Goethe was familiar with this process, because he had witnessed the formation of stalactites and stalagmites in the Baumann Cave during his first Harz journey [See previous essay.]

The prevalence of limestone, alternating as it does with softer layers of marl, results in great permeability and consequent deficiency of surface water. Lake Joux has an underground outlet reappearing as a river, the Orbe, about 3 km farther down. Similar underground streams are numerous, and include the Birs river.

enchanted by the result. The Staubbach (literally 'spray stream') drops down a 300 meter precipice from an overhanging rock. Goethe was transfixed. He saw water spirits gliding by in the white spray, heard strange murmurings about the destiny of the human soul in the rippling waters of the pool below the falls. That same evening he wrote to Charlotte von Stein:

"*We really did arrive here at half-five, and everything is as I wished for. We saw the Staubbach for the first time in good weather; there were patchy clouds in the upper atmosphere, and the blue sky shone through. Clouds formed against the rock walls, even the precipice where the Staubbach comes down was lightly veiled. It is a most sublime* (*sehr erhabener*) *view. And as with everything majestic, as long as it is an image, one does not quite know what to do with it. It is not possible to make yet another picture, those you have seen all look more or less the same; but when you are below (*by the pool*), where one can find neither more pictorial content, nor more words, only then is one in the right spot*."

He wrote down some of the "*wonderful stanzas which the spirits sang into his soul*", and sent them to Charlotte von Stein. We know the poem today as the *Song of the Spirits over the Waters*.

Lauterbrunnen valley on an autumn day with the Staubbach falls visible in the background

Higher up in the Lauterbrunnen valley, near the Tschingel glacier, Goethe saw his first Swiss granite; "*here the rocks, all granite*" he noted in his diary on 10 October. This granite normally lies under thick limestone layers, but is exposed in the upper reaches of the valley. It is not clear whether

Song of the Spirits over the Waters

The human soul
Is like the water:
It comes from heaven,
It returns to heaven,
And down again
To earth must go,
Ever changing.

Flowing from the high
Sheer rock face,
The pure stream gushes,
Sprays its delicate breath
In billowing clouds
Towards the smooth rock;
And lightly received,
It flows gently veiling,
Softly soughing
Down to the deep.

But where jutting cliffs
Oppose the plunging waters,
It foams, displeased,
Stepwise,
Into the deep.

In a flat bed
It slides down the meadowed vale,
And in the smooth pool
The stars
Peruse their reflections.

Wind is the wave's
Lovely suitor;
Wind stirs from the depths
Surging waves.

Human soul,
How like to the water!
Human destiny,
How like to the wind!

at this stage of his geognostic development Goethe believed granite to be a secondary product of Buffon's 'vitreous matter', formed during the second epoch. He later believed (unlike Buffon, and following Werner) that granite had precipitated directly from a primal ocean.

Goethe had walked past the sheer granite walls of the Schöllenen Gorge on his way to the Gotthard Pass on his first Swiss journey four years earlier, but had only experienced them as a "*terrible grey mass*". Although surrounded by granite on the summit of the Brocken in December 1777, he gave the rocks no further thought, mentioning only the "*unexplored bowels*" (Buffon again!) of the mountain in his poem *Winter Journey in the Harz*.[19] Many years later he would make the remark: "*One only sees what one already knows and understands*".[20]

From here the tourists travelled up to the Oberhornalm (2200 meters), past the Grindelwald glacier, along the Grosse Scheidegg mountain pass (1960 meters), down the Hasli valley to Brienz. All the while Goethe was making notes and writing (or dictating to Seidel) letters to Charlotte von Stein. ". . . *in Grindelwald, both glaciers, indescribable days over the Scheideck pass into Oberhasli valley, back down via Meyringen. Greatest possible clarity of the sky, warm days and cool evenings, green everywhere, and colours on distant trees in full leaf.*" From Brienz they travelled by boat to Thun. After riding through the Aare valley, they arrived back in Bern on 15 October.

Here they stayed for five days. Carl August was kept busy negotiating a loan for the Duchy[21], while Goethe studied the geological specimens in the collection of Daniel Sprüngli, and spent time learning more about the rocks and minerals he had come across in the Berner Oberland. He also used his letter of introduction from Merck to arrange a visit to the pastor and geognost Samuel Wyttenbach (whose tourist guidebook they had been using). Goethe was impressed by his knowledge, and wrote to Merck on 17 October: "*I've spent all of three hours with Wyttenbach, he is very instructive. He has collected rocks from all the mountains and the ends of Switzerland. He is a very agreeable man*." Wyttenbach gave suggestions for their further itinerary, and wrote a letter of introduction to Horace Benedict de Saussure in Geneva.

On to Geneva

On 20 October the company left Bern. Their next port of call was Geneva, but they visited several places of interest along their route. Before reaching Lausanne they stopped to look at two historic "*poorly preserved Roman mosaics. The Swiss treat this sort of thing like swine."* Goethe wrote a letter to the landowner asking him to take better care of them. It was a warm day, and Carl

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19 In the original version. In the revised version known today he changed *unexplored bowels* to *unexplored bosom*.

20 *Man erblickt nur, was man schon weiß und versteht,* in a conversation with Chancellor Friedrich von Müller on 24 April 1819, as recorded in von Müller's diary. The complete note reads:"Then he spoke of the art of seeing. One only sees what one already knows and understands. Often one does not see for many years an object constantly in front of us, which only a more mature knowledge and experience enables us to see."

21 Wolf von Engelhardt (2003) *Goethe im Gespräch mit der Erde*, p 55.

August and Goethe (and possibly one or two others) went for a swim.[22] On 22 October they first saw Lake Geneva, "*the master of all lakes*".

They rode along the shore of Lake Geneva, via Lausanne to Rolle. From Rolle they made an excursion through the Vallée de Joux, high up in the Jura mountains. The valley is almost 1000 meters above sea level, and holds a lake 10 km long. Here Goethe believed he saw evidence of Buffon's primal ocean, imagining "*the remarkable valley to be carved by Nature, or rather washed out, because on these limestone heights, the effects of the primeval waters are visible*", he wrote to Charlotte von Stein on 28 October. The descriptions he gave of the landscapes they had passed through since leaving Bern in this, the longest letter he wrote from Switzerland, are another indication that Goethe was not only taking in the *grandeur* and *sublime* beauty of the landscape, but was also continuing to think about the processes by which the mountains and valleys might originally have been formed.

Lac de Joux

On 26 October Goethe and the Duke climbed up the 1680 meter high La Dôle, the second highest point in the Swiss Jura: "*There are no words to express the grandeur and beauty of this view. One is scarcely conscious of seeing; one does but recall the names and appearance of well-known towns and landmarks, and rejoices in the stumbling recognition that these are the white dots which one sees far below.*" The Duke had become more and more interested in the geology of the landscapes they had passed through, and it was this view across the lake which sparked in him the desire of a journey through the Alps of Savoy. Two days later he describes to Charlotte von Stein the Alps seen across Lake Geneva

Again and again the glowing snow-capped mountains drew the eye and the soul back towards themselves. The sun was inclining towards evening, and lit up their icy surfaces. The black rocky ridges, toothed with towers and ramparts, rising up from the lake, forming wild, vast, impenetrable forecourts! Rising higher towards the purity of the clear sky! Standing there immaculately in their diversity - one willingly gives up all pretensions of the infinite, because one is not even able to comprehend the finite, neither in vision nor in thought.

Before us we saw a fertile populated plain. The ground on which we were standing, a high, bare mountain, nevertheless still produced grass, feed for cattle, from which people draw benefit. This the conceited worldly lord may claim as his own; but those mountains are like a procession of holy virgins, which the spirit of heaven retains, in eternal purity, for itself alone in inaccessible regions.

We tarried awhile, challenging each other, in turn, to try to discover towns, mountains, and regions, now with the naked eye, now with the telescope; and did not begin to descend until the setting sun allowed the mist to spread its evening breath over the lake.

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22 Letter to Charlotte dated 20 October, but with later additions.

Goethe's relation to Nature had changed completely since his first Swiss journey. Instead of *drawing nourishment from the world*, as he had written in a poem four years earlier, now it is *the glowing snow-capped mountains* which *drew the eye and the soul back towards themselves.*

The company arrived in Geneva on 27 October, where they stayed for a week following a hectic social schedule. They made two visits to Ferney, where the French author and philosopher Voltaire had designed and constructed his château. Voltaire had died in Paris the previous year at the age of 84, and his château was already an important attraction on the itinerary of any well-planned grand tour. They visited several well-known natural historians, among them the entomologist Charles Bonnet, whom Goethe had met on his first trip. Carl August wrote in a letter to his mother that he had been particularly impressed by Bonnet's knowledge and expertise.

They studied the natural history collection of Guillaume Antoine de Luc (1729-1812), who together with his brother Jean-André (1727-1817), had surveyed the mountains in the Mont Blanc area between 1765 and 1772.[23] Again, Carl August was impressed. He wrote in his diary: '*They have made tremendous expeditions, surveyed the mountains, and ascended the Buet, one of the highest glaciers*.'[24] Bankruptcy had forced Jean-André to move to England in 1773, where he was appointed reader to Queen Charlotte, a position which gave him ample time to pursue his scientific work, and which he held until his death forty-four years later. Jean-André first began to use the term 'geology' in 1778.[25]

Goethe would continue to distinguish between 'geognosy' (descriptions of the Earth based on observations) and 'geology' (theoretical descriptions of Earth history based on what he considered speculation, although there were a growing number of observations to support the slowly developing theories as the eighteenth century progressed). But most important of all, they also paid a visit to the well known geologist and geognost, Horace de Saussure.

Horace Bénédict de Saussure

De Saussure (1740-1799) was a Genevan geologist, meteorologist, physicist, mountaineer and Alpine explorer. He believed the Alps to be the key to a true understanding of Earth's formation, and his mountaineering skills gave him the opportunity to study geology in a manner never previously attempted. He carefully studied the nature of the rocks, the inclination of their strata, their fossils and their minerals. He was also an early user of the term "geology" (French 'géologie').[26]

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23 The collection can be seen today in the Geneva Natural History Museum.

24 Mont Buet, altitude 3096 meters, is located near Chamonix in France. It is one of the peaks which drew Carl August to explore the Alps cross Lake Geneva.

25 In England the word 'geology' had been in use since the end of the seventeenth century, derived from the Latin 'geologia', which had been in use for much longer.

26 In the "Discours préliminaire" in Volume I of '*Voyages dans les Alpes*' published in 1780.

His geological observations made him a firm believer in the existence of a primal ocean. He regarded all rocks and minerals as deposited from either aqueous solution or suspension. His work with rocks and fossils, and the agents of weathering and erosion, also led him to believe that the Earth was much older than generally thought, and his ideas later gave important support to Darwin's theory of evolution.

De Saussure had a thorough knowledge of the chemistry of the day and applied it to the study of minerals, water, and the atmosphere. Like Goethe he was a keen observer of weather conditions in an age when meteorology was still in its infancy

The meeting with de Saussure came about because Carl August had set his mind on exploring the Savoy Alps around the Chamonix Valley at the foot of Mont Blanc, to investigate the glaciers, and to see the Sea of Ice (Mer de Glace). De Saussure had thoroughly explored the region, (and was in fact the third person to reach the summit of Mont Blanc in 1787). He had recently completed his book '*Voyages dans les Alpes*' (published in January 1780), in which he outlined his geologic discoveries, and was the best person to approach for information and advice about the proposed expedition.

De Saussure explained to them the underlying structure of the Alps, and the nature and occurrence of granite. The highest Alpine peaks consist of granite with subsequent strata resting steeply against this primal formation, becoming more and more horizontal the further away they are from the central mountain chain – a simple but basically correct description of a folded mountain range after weathering, and one which had a ring of truth for Goethe.

There was another reason for their visit to de Saussure. Although the autumn weather had been unusually mild, November was approaching, and there were 'old aunts' (Goethe used the word *Basen*, = 'cousins') who, having nothing better to do, tried to persuade the tourists from attempting a journey through the high Alps at the approach of winter, which they described as a journey through the gates of hell. As Goethe explained to Charlotte on 2 November:

"*They wanted to prevent the Duke from going on the expedition to the Savoy mountains, which he had planned himself and from which he anticipated much pleasure, with the most serious protests. They wanted to make it a matter of politics and of conscience, so that we believed it would be best if we sought the advice of an experienced person. We therefore compromised on Professor de Saussure and undertook to do only what he would advise, whether for or against. Someone from the opposing party came along, and after a simple explanation he decided to our great pleasure that we could make the journey at this time of year as safely as in an earlier season, and without the least danger or worry. He explained to us what it would be possible to see during the short days, what route to follow, and what precautions we should take. He spoke about the route as we would explain to a stranger the way to Buffart castle or to the Ettersberg quarry.*[27] *These are the people, it seems to me, that one should ask if one wants to get ahead in the world.*

We are prepared for some discomfort, but if it is possible to climb the Brocken in December, these gates of horror should let us pass in early November. I hope to be

27 Two locations in Weimar.

able to tell you about our experiences step by step as we progress. The journey has been described better (in travelogues), *but not our fate. Adieu beloved. Greet Stein* (Charlotte's husband) *and the others. I imagine you are all in town.*

Not very encouraging words for those waiting at home. He also warns her that for the next 14 days it will not be possible to send any letters, and that she would not hear from him for four weeks from the date of this letter (2 November).[28] Goethe was confident they would reach Lucerne by 16 November, where they would rendezvous with the equestrian party, and from where the next letters would be sent. The tourists did in fact arrive safely in Lucerne on 16 November, but not by following the route de Saussure had suggested.

Up the Arve Valley

Reassured by de Saussure, and with a safe route to follow, Goethe, Carl August and huntsman Hermann set off up the Arve Valley on 3 November. The others, with von Wedel in charge, travelled on horseback along a lowland route skirting the lake, then followed the Rhône upstream as far as Bex, where the company reunited three days later.

The threesome travelled by coach as far as Cluse, where the valley narrows, and where they spent the night. The narrow valley at Cluse reminded Goethe of the Birs ravine, and he thought again about the formation of such narrow gorges. In his notebook he wrote *Take note Buffon's Langres*[29], referring to the steeply cut valleys in the limestone plateau surrounding Langres in France. Buffon had reasoned that these were the result of erosion by strong drainage currents as the world ocean receded during the fourth epoch.[30]

The following day they hired a mule and driver for their baggage, and went further on foot. They stopped to explore a limestone cave near Balme. They estimated the depth of a crevice inside the cave by dropping stones. Goethe reported that they could easily count to seventeen or nineteen before a stone "*with varying echoing jumps, finally reached the bottom*."

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28 On 17 November Goethe dictated to Seidel a long letter to Charlotte von Stein, based on the notes he had made on route between 3 and 6 November, and which he dated *middle November*.
Quotations from letters dated after 6 November are my translations from *Briefe aus der Schweiz* (Letters from Switzerland), http://www.gutenberg.org/cache/epub/2402/pg2402-images.html.

29 Quoted in Margrit Wyder (2013) *Gotthard, Gletscher und Gelehrte: Schweizer Anregungen zu Goethes Naturwissenschaftlichen Studien,* p42. Zurich Open Repository and Archive.
https://www.zora.uzh.ch/id/eprint/91863/1/Wyder_Goethe.pdf.
Goethe is referring to the limestone plateau of Langres in central France, whose deeply cut valleys Buffon had explained as a result of erosion by the receding waters of a primal ocean.

30 Georges-Louis Leclerc, le Comte de Buffon (1778) *The Epochs of Nature*, pp 77-82.

The waterfall at Nant d'Arpenaz (on the way to Sallanches) also attracted their attention. The curved strata surrounding the waterfall are difficult to explain as sedimentary, and would eventually lead de Saussure to propose the first theory of a folded mountain range (as indeed the Alps are). On 4 November Goethe described the scene as follows: "*We saw a beautiful waterfall like the one at Staubbach. It was neither very high nor very voluminous, but because the rocks surrounding it form a round niche into which it plunges down, and because the limestone layers are turned into themselves, forming new and unusual shapes, very interesting.*"

The waterfall at Nant d'Arpenaz

It wasn't just rocks and waterfalls which drew Goethe's attention. As they ascended into the high Alps, he became more and more interested in cloud formations, their sudden appearance and disappearance, their breezy lightness and their threatening darkness. As he relaxed on an Alpine meadow after lunch one afternoon, he noted the sky "*flecked with fleecy clouds, of which I want to make a special comment. We have seen them rise before, from the Bernese ice mountains, as beautiful and even more beautiful, on a bright day. Here again it appeared to us as if the sun drew from the highest snowy peaks the lightest evaporations, whose delicate vapours were combed through the atmosphere by a gentle zephyr breeze.*" He could not remember ever seeing such lightly woven transparency in the atmosphere, even during the height of a Weimar summer, he wrote to Charlotte on the same day.

He felt no need to mention in his diary or in his letters, the rocks de Saussure had told them to look out for, with one important exception. Between St Gervais and Chamonix, where limestone and mica schist (metamorphosed shale) merges into gneiss (shale metamorphosed at higher temperatures and pressures), he noted that "*the masses become larger and larger. Nature has here begun to prepare the enormity (das Ungeheure) with a gentle hand.*" In the same letter he told Charlotte that he experienced a "*feeling of approaching closer to sacred surroundings*" as they approached Chamonix. This is the region where gneiss and mica schist merges into plutonic granite.

The Aiguilles du dru

Next day, accompanied by two guides, and "*furnished with food and wine*", they hiked to Montenvert, and stepped onto the glaciers of the Mer de Glace. From the window of a primitive

hut jokingly referred to as the castle of Montanvert[31], they took in the scene across the glacier.

"*The enormous masses of ice press forward from a deep valley, as seen from above, into an almost flat expanse. There is a pointed mountain towards the back, from both sides of which rigid waves of ice crush into the main stream. There was not the least bit of snow on the jagged surface, and the blue crevices shone out beautifully*."

Goethe remembered what de Saussure had told him, and wrote to Charlotte on 5 November:

"*The peaks of the rocks opposite us and into the depths of the valley, are very jagged, because they are made up of a type of rock, whose layers shoot into the Earth almost perpendicularly; if one* (layer) *weathers more easily, the other remains pointing into the air. Such jagged peaks are called needles, and the Aiguilles du dru is one such noteworthy peak, directly across from Montanvert*."

De Saussure believed (wrongly) that the highly creviced granites of the Aiguilles were marine sediments, as unlike Buffon, he did not assume an originally hot fluid Earth. The question which concerned him was whether these layers were precipitated in their present slanted position, or were originally horizontal, and had subsequently been pushed into steep angles. Questions such as these eventually led him to propose a first tentative theory of mountains folding themselves into place.

Clouds, Waterfalls, and Hot Mineral Water

As they crossed divide between the Arve and the Rhône valleys, Goethe again stopped to admire the clouds. He was fascinated by their playful moods and their dependence on the wind.

"*Even more remarkable is how the spirits of the air appeared to pick a quarrel with us. We had no sooner stopped for a while to enjoy the view, when a hostile ferment seemed to arise in the mists, which suddenly sped upwards and threatened to envelop us. We climbed higher to escape, but they overtook us and enwrapped us again. We kept on climbing, and soon a headwind from the mountain itself came to our assistance. It swept through the saddle between the two peaks, and drove the fog back into the valley. This wondrous dispute was repeated more than once, and finally we arrived on the Col de Balme happy and content.* [Charlotte, 6 November.]

They were now in the Rhône Valley and stayed at an inn in Martigny. The following morning, they walked down the Rhône Valley to meet the equestrians coming up from the lake at St Maurice. They examined the granite and gneiss boulders on the way, "*which in their differences, all appear to be of single origin.*"[32] They stopped to admire the Pisse de Vache waterfall of which Goethe wrote a wonderfully detailed description:

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31 Montanvert is the name of one of the three glaciers making up the Sea of Ice.

32 Although they have completely different origins, gneiss does at times look like a banded granite.

"*Quite high up a strong stream bursts forth from a cleft in the rock, falling flaming into a pool, where it drifts in foam and spray, carried far and wide by the wind. The sun came out, and made the scene even more lively. Below in the spray, wherever you walk, you have a rainbow directly in front of you. If you go higher up, you see an even more beautiful phenomenon. The airy foaming pulses of the upper stream, as it passes through the line of vision at which the rainbow appears, assume a flamelike hue, without giving rise to the continuous form of the bow; so that at this point you have before you a constantly varying, fiery movement.*" (7 November)[33]

That evening the reunited company arrived in Martigny, and on 8 November they all continued up the Rhône Valley to Sion. Unhappy with the state of the inn in Sion, which Goethe described as *disgusting* (*abscheulich*), he and the Duke walked on as far as Sierre (Siders), where they arrived late that night.

The following day the twosome made an excursion to the spa village of Leukerbad at the foot of the Gemmiberg. Goethe claimed that the path was not dangerous, that it *"only looks terrifying. It descends across the front of a steep cliff and is secured from the chasm by a low plank along the outer, righthand edge.*"

Goethe was interested in the hot mineral water, "*which spring from the Earth with great force in several places, and is contained in clean reservoirs. Beyond the village, toward the mountains, there are said to be still stronger ones. The water has not the slightest smell of sulphur. Neither at its source, nor along its channel, does it make the slightest deposit of ochre, or of any other Earth or mineral, but, like any other clear spring-water, it leaves not a trace behind*. (9 November)"[34]

"*The fine weather we have enjoyed has made us completely forget that we are in November: As they predicted in Bern, the autumn here is delightful. But the early evenings, and the clouds, harbingers of snow, remind us that it is late in the year.*

Brief History of the Alps

Geologists tell us that the Alps were born 770 million years ago. An upheaval of the Earth's crust raised a mass of schist, gneiss and limestone to form their underlying foundation. Towards the end of this upheaval, around 300 million years ago, intrusions of granite (plutons) in the Western sector of these ancient mountains brought with them metamorphic rocks which together formed the base of what we know now as the Mont Blanc and Aiguilles Rouges Massifs.

Following extensive erosion, and inundation by the sea when sedimentary rocks were laid down, this part of the Alps underwent a new phase of elevation about 55 million years ago, as the imperceptibly slow movements of the African and Eurasian continental plates against each other produced the great mountain creases in the Earth's crust we know as the Alps today.

The formation of the Mont Blanc Massif was completed towards the end of the Tertiary Period, about 15 million years ago. Glaciers formed during four successive Ice Ages during the Quaternary Period sculpted the present profile of the Mont Blanc range, and excavated the Chamonix valley. At one point during the Ice Ages Chamonix was buried under a huge expanse of ice, 1000 meters deep, which stretched as far as Lyon.

As the climate became milder, during the last 10,000 or so years, the glaciers retreated to higher altitudes. This is the period we are living in now.
http://www.autourdumontblanc.com/en/index.cfm/geomorphology.html

33 From this point on my translations are taken from *Briefe aus der Schweiz*.

34 Ochre is a natural clay Earth pigment which is a mixture of ferric oxide and varying amounts of clay and sand. It ranges in colour from yellow to deep orange or brown.

Blown about by surprising breezes this evening, they were extra-ordinarily beautiful. As we came back from the foot of the Gemmi mountain, we saw light mists come up the ravine from Inden, moving at great speed. They continually changed direction, going forwards and backwards. At last, as they ascended, they came so close to Leukerbad, that we realised we had to double our steps, if we were to avoid being enveloped in cloud before nightfall. Luckily, we arrived back safely, and as I am writing this, it is snowing in earnest. This is the first snow we have had. and when we call to mind our warm ride yesterday, from Martigny to Sion, through leafy vineyards, the change is indeed sudden. I have been standing at the door, observing for a while the look of the clouds, which are beautiful beyond description.

Modern Leukerbad trail

"*Actually, it is not yet night, but from time to time clouds veil the whole sky and make it quite dark. They rise from deep ravines, reaching the highest summits; drawn to these they appear to thicken, and, taken hold of by the cold, fall down as snow. It is an inexpressible solitude up here. . .*" (9 November)

He also took note of the destruction caused by flash floods the previous year: "*Such fast-rising streams wash away everything within hours, cover with stones and gravel, fields, meadows and gardens, which are slowly and painstakingly, if at all possible, restored by the people, and perhaps buried again after a few generations.*"[35]

Goethe instinctively rejected violent events of any kind. He considered them superficial, and he tended to relativise them into a larger more harmonious scheme. In a discussion with Carl August he interpreted the destructive power of water as formative, who noted in his diary:

"*Goethe has an interesting idea about the emergence of the wide valleys such as in Wallis, Chamonix etc. He means that they would otherwise be narrow gorges, but during the course of an astonishingly long time, were gradually filled by water* (carrying sediments). *Therefore, by the fact that* (their levels) *rose higher between the mountains, and have approached them more, have attained the width. On most of the rocky mountains around here, you can clearly see it. Under these same mountains good earth has been deposited, which has been washed away from them, and they stand bare.*"[36]

Here Carl August (and Goethe) seem to be aware that geological processes act slowly, over long periods of time. In their discussion they followed ideas first proposed by Buffon, who had drawn attention to the difference between headwaters higher up a stream or river, and their lower course. That the Chamonix valley was eroded by glaciers during the Quaternary Era, which began

35 Quoted in Margit Wyder, op. cit. p45.

36 Quoted in Margit Wyder, op. cit. p45.

about 2.6 million years ago would have been unimaginable to them – as indeed it is to is today.

After a flea-bitten night at an inn in Leukerbad, "*plagued by a swarm of jumping insects, who, ravenous for blood, had fallen upon the newcomer*", they carefully walked back down the "*terrifying*" path to Leuk, where they met up with von Wedel and the others on 10 November.

Another Change of Plan

The next morning a major decision was made. So far they had followed the advice of de Saussure to the letter, and had they continued to follow his suggested route, they would have travelled on to Brig, and from there over the Simplon Pass, continued via Domodossola, Lake Maggiore, and Bellinzona, to approach the Gotthard pass from the South (through Tessin). Although this is a considerably longer route, it is suitable for horses, and safe in winter, which is why de Saussure suggested it for the inexperienced tourists.

However, Goethe had a different plan in mind, which he now revealed. He had probably discussed it with the Duke the previous day while they were in Leukerbad. Although he made it sound as if the suggestion came from von Wedel, who suffered from vertigo (which is why he had earlier taken the lowland route to Martigny), and mentioned a lack of oats for the horses higher up the Rhône Valley, there can be little doubt that the angel Gabriel had again inspired a change of plan.

With one exception, the grand tour so far had been everything Goethe or Carl August could have wished for, but for Goethe one wish had not yet been fulfilled. He wanted to return to the top of the Gotthard pass, where he had turned his back on Italy four years earlier, to receive again a sign from heaven as powerful as the one he had experienced two years earlier on the snow covered summit of the Brocken. What better way to challenge fate than to hike through thick snow up to the Furka Pass, even higher than the Gotthard, ignoring the safe route for travel on horseback even at this time of year, which de Saussure had shown them? Goethe rightly pointed out that if the company were to take the long route, it would have taken them up to three weeks to reach Lucerne, without mentioning that he had already committed himself (to Charlotte) to be in Lucerne by 16 November.

His plan was straightforward enough. With von Wedel in charge, the five equestrians would ride back down the Rhône Valley to Bex, then through Vevey, Lausanne, Freiburg and Bern to Lucerne. The three hikers, Goethe, Carl August and huntsman Hermann, would walk up the Furka Pass, then down to Realp. From there they could (weather permitting) make a day trip to the top of the Gotthard pass. Then they would walk down the Schöllenen Gorge, and take a boat across the Vierwaldstättersee to Lucerne, where they would all meet up again a week later.

This was exactly the sort of ill-advised adventure the counsellors in Weimar (and the 'old aunts' in Geneva) had been worried about. The first snow had fallen at Leuk, a mere 730 meters above sea level. What would conditions be like at the top of the Furka Pass, 2400 meters above sea level, or at the Gotthard Pass, at 2100 meters? After several weeks of hiking and trekking through the Berner Oberland, supported by good food, good wine, and plenty of rest along the way,

Goethe and Carl August were remarkably fit, as they proved to themselves on 28 October when they left their horses at Saint Cergue, and hiked the remaining 6 km to the summit of La Dôle, a vertical ascent of 600 meters. But these relatively easy walks did not acclimatize them to high altitude walking in sub-zero temperatures.

In making this decision Goethe was taking a serious risk not only with his career at the Weimar court, but also with the future of the Weimar dynasty. Carl August did not yet have any sons, and although his younger brother Friedrich Ferdinand (1758-1793) would be able to take over the responsibilities of the Duchy, he was not popular at court. There was no telling the consequences if Carl August had met an untimely death in an Alpine blizzard, but Goethe would certainly have lost his position. He therefore kept a close watch on the weather conditions, noting them in his diary, and relating them in detail in his letters to Charlotte von Stein.

Yet, ever the optimist Goethe wrote: *Our friend* (von Wedel) *is gone, and our valises packed on the back of a mule which we have hired, and so we are now ready to set off, and make our way on foot to Brig. The sky has a motley appearance: still I think that the good luck which has accompanied us, and enticed us so far, will not abandon us at the very point where we have the most need of it*." (10 November) Indeed!

Up to the Furka Pass

They reached Brig that evening, and on 11 November they set out to Münster, a distance of just under 20 miles following the Rhône, with a demanding ascent (from 700 to 1400 meters). They hired two horses and a donkey plus driver. Hermann had to walk, but along the more precipitous sections of the track Goethe and Carl August considered it prudent to dismount from their unfamiliar horses, and walked as well. It was a cold day, and the temperature decreased with increasing altitude. There was more and more snow and ice. Goethe noted his misgivings in his diary: "*Uneasy apprehensions, damned feeling of a wild goose chase. Snowed during the night, which we reached higher up. Afternoon, East wind, very cold, and hope remains for the Furka, in Münster / Annoying misgivings. Recollection narrow defile, bad feelings of suffocating in a sack, hope and trust*."

By late afternoon they arrived safely in Münster. During the evening, they kept "*going to the window, watching the weather, and were close to offering a prayer to the wind and clouds.*"

There was nothing to be done except wait for daybreak when destiny would make her decision. Goethe confessed that he would be highly annoyed if they should be forced to retrace their steps. But with luck on their side they should be able to cross the Furka, and reach Realp by evening the following day. If not, there were two possible routes for a retreat. Either back through Valais following the equestrian party, avoiding the Gotthard altogether, or the route de Saussure had recommended in the first place. Neither appealed to Goethe.

"*To be sure, for us it is of the greatest importance. Tomorrow will decide whether our courage and confidence in a successful outcome, or the prudence of a few people who tried to forcibly dissuade us from going this way, will prevail. But in either case, both prudence and courage must recognize luck* (as the final arbiter).

After we had once more examined the weather, noted the cold air, saw the sky clear with no disposition to snow, we went calmly to bed." (11 November)

Here he was being disingenuous. The 'old aunts' in Geneva knew nothing about his plans for a November hike up the Furka Pass, and it is extremely unlikely that de Saussure, an experienced Alpinist, would have advised a party of eight inexperienced tourists on horseback to attempt the Furka pass this late in the year.

The next day they rose early, and set off at dawn. At Oberwald, a small village at the foot of the Furka Pass, they stopped at an inn to ask for guides. Two strong men, "*with the strength and boldness of a horse*", appeared, who agreed to take them to Realp, and carry their valises. They paid off the mule driver, who took the mule and horses back to Brig. From here on they would walk. They "*ate some bread and cheese, drank a glass of red wine, and were cheerful and in a good frame of mind*."

The five men set off, and were soon within sight of the Rhône glacier.

"*It is the most enormous* (glacier) *of which we've had a complete* (panoramic) *view. It occupies all of the very wide saddle of a mountain, and descends continuously to where the Rhône flows out at the bottom of the valley. At this outlet, people tell us, it has been retreating for several years; but that is as nothing against the unbelievable extent of the mass of ice. Although everything was covered with snow, the steep ice ridges, where the wind clears it away, were visible with their vitriol-blue*[37] *crevices, and one could clearly see where the glacier stops, and the snow-covered rocks begin.*" (12 November)

The route from Oberwald to the pass summit is about 10 miles, and involves an ascent of just over 1000 meters. A modern hiker would expect to take about four and a half hours for this stretch in good conditions. The threesome and their two guides completed the ascent in the same amount of time. Taking into account the deep snow, they did exceptionally well. They took no rest, and even declined the offer made by their guides to stop for lunch, because it was so cold. Walking through deep snow without snowshoes for any length of time is strenuous, but they were fortunate. Their guides led the way and tramped down the thick snow, making their progress much easier.[38] As the unacclimatized hikers climbed higher, they would have noticed the air getting thinner, and their progress becoming more arduous.

"*After four and a half hours we reached the saddle of the Furka pass. We now hoped for an easier descent, but our leader announced even deeper snow ahead, which we soon found. We continued in single file, and the leader who tramped down the snow was often in it up to his waist. . . . Hunter Hermann assured us that he had experienced such deep snow in the Thüringen forest, but in the end admitted that the Furka was a bastard.* (*Schindluder*, lit. a flayed wretch.) *A bearded vulture flew overhead with unbelievable speed; it was the only living*

37 Blue vitriol is another name for copper sulphate.

38 The mountaineering details in this and the following paragraph are from http://figures-of-speech.com/2017/09/goethe-2.htm, which describes the journey more from a human relationship perspective.

creature we came across in this desolation. In the distance we saw the mountains of the Urseren valley bathed in sunshine." (12 November)

Carl August wrote in his diary that it was the '*toughest thing'* he had ever done.

From the top of the Furka Pass to Realp is 7 miles, and involves a descent of about 900 meters. In good conditions a modern hiker would expect to complete this stretch in about three hours. Goethe reported that they took four and a half hours, an indication that they were increasingly tired, and must have arrived in Realp in a state of exhaustion. Goethe expressed his relief at their safe arrival, and wrote, or rather dictated (on 17 November, safe in Lucerne):

"*We arrived here at nightfall. We made it, and the knot which entangled the way for us is cut in two. Before I tell you where we are quartered, before I describe to you the nature of our hosts, give me the pleasure to follow the way back in my thoughts, which we saw lying before us with apprehension, and which we have happily, but not without difficulties, put behind us.*" This is followed by a detailed description of the day's journey. Goethe considered himself fortunate that he had managed the route "*without excessive hardship*", but admits that it hadn't been a stroll (*Spaziergang*). He praised the easy-going nature of their guides, but neglected to mention their remarkable endurance. They had tramped down deep snow without a break for nine hours, all the while carrying Goethe's and Carl August's baggage. The latter wrote in his diary that it was the '*toughest thing'* he had ever done.

"*After nine. The fathers, the gentlemen, the servants and the guides all sat around one table; only the brother who was doing the cooking appeared at the end of the meal. Out of eggs, milk and flour he had produced various dishes for us, which we, one after the other, ate with relish.*

"*The porters, who liked to talk about our successful expedition, praised our unexpected hiking skills, and assured us that they would not have done this with just anyone. They now admitted, when we approached them this morning, that one of them had first looked us over to establish whether we looked like we would be able to keep up with them. . . This acknowledgement broke the ice, and now one after the other told stories of difficulties and accidents on mountain journeys, which for the people living here are an elemental reality, so that they talk about misfortunes, to which they themselves are daily subjected, with the greatest calmness.*" (12 November)

Here, besides a blazing fire, high up in the mountains, under the glittering stars of a frozen night, their common humanity broke through the protocols of courtly life, and the men sat down to a simple meal and a conversation, as equals. We know from his letters to Charlotte von Stein during his Harz journey that Goethe preferred the company of simple folk to that of the Weimar court, and the fact that he specifically mentioned the occasion here, indicates that he was more than a little proud of putting the Duke in a situation where rank and birth right no longer dictated human relationships.

"*The Summit of our Journey*"

"*13 November, at the top of the Gotthard pass. Ten in the morning.*

At last we have successfully reached the summit of our journey! Here, it has been decided, we want to pause, and turn again to the fatherland. I feel marvellously

strange up here, where four years ago I spent a few days in a different frame of mind, with quite different concerns, plans and hopes, and at a different time of year. Completely unaware of my future fate, moved by I know not what, I then turned my back on Italy, and went unwittingly towards my present destiny.

. . . . "

"*You will realise, from a brief geographical description, how remarkable the location in which we find ourselves, is. Although the Gotthard is not the highest mountain in Switzerland - in Savoy Mont Blanc is considerably higher - yet it can claim to be a royal mountain over all the others, because the greatest mountain ranges come together here, and recline against it. Yes, if I'm not mistaken Herr Wyttenbach from Bern, who has seen the peaks of the other mountains from the highest summit, told me that they all appear to incline towards it.*

"*The mountains of Schwyz and Unterwalden, chained to those of Uri arise from midnight* (from the North). *From morning* (from the East) *the mountains of Graubünden, from noon* (the South) *the Italian Vogteien arise, and from evening* (the West) *the double range enclosing Wallis presses towards it through the Furka.*

"*Not far from here are two small lakes, one of which feeds the Tessin river running through gorges and valleys to Italy, the other in a similar manner feeds the Reuss running down to the Vierwaldstättersee. Not far from here is the source of the Rhine, which flows towards the morning* (East), *and if one adds the Rhône, which arises at the foot of the Furka and flows towards the evening* [West] *through Wallis - we are here at a crossing point, from which mountains and rivers flow towards all four cardinal points of the compass.*" (13 November)

At this point Goethe's ends his account, as told in *Letters from Switzerland. Part Two*.

The following day the three men descended the Schöllenen gorge. Their winter descent would have been more spectacular (and more dangerous) than the summer hike Goethe had undertaken with Passavant four years earlier, when the romantic attractions of cataracts cascading down the narrow gorge and the crossing of the Devil's Bridge, had held his interest. But he made no notes, and made no mention of the descent in his letters. Nor did he tell Charlotte any more about his feelings on the Gotthard pass summit. His quest had been crowned with success, and whatever personal thoughts and emotions he had as he stood on the pass summit for the second time, he kept to himself.

Standing, as he imagined, at the centre of a cross of mountains and rivers etched into the surface of the Earth, he was full-filled. On his return to Lucerne he dictated to Seidel in a letter intended for Charlotte von Stein, dated 9 November: "*In every human being, even the ordinary, important traces remain when they have been present at a grand and unusual event; they feel uplifted by it, and speak about it again and again. They have in this way won a treasure for the whole of their lives. This is how it is with the person who has seen and become familiar with the grand phenomena of nature. Those who manage to preserve these impressions, and to combine them with other thoughts and perceptions arising within themselves, have, assuredly, a supply of spice with which to improve the*

less tasty parts of life, and to give a pervading relish to the whole of their existence."[39]

Although it would be another eight weeks before the company arrived back in Weimar, Goethe turned for home with a deep feeling of thankfulness, at peace with himself and the world. He had again challenged his destiny, and received a positive answer. His *sublime* Alpine experiences had become part of his *Geistesart*. He had looked into his soul, and had discovered there the means and wherewithal to experience, and begin to understand, the grandeur of Nature. Besides his natural scientific studies, which he was soon to begin in earnest, he was, for the next couple of years, able to give his full attention to his numerous ministerial duties. But he felt strong. The past no longer had a hold on him.

In Lucerne, they inspected a relief model of Central Switzerland. It was created by Franz Ludwig Pfyffer von Wyher (1716-1802), and was the first of its kind. The large three-dimensional model enabled a visual orientation of the region, that was not yet possible with a two-dimensional map. It was considered essential viewing for visitors to Switzerland. Goethe regretted that he did not meet the creator of the model during his visit. Pfyffer was a good friend of de Saussure in Geneva, and Goethe would have learned much in conversation with another Alpine specialist. In a letter to Karl Ludwig von Knebel suggesting various touring routes through Switzerland, he wrote: "*There you visit General Pfyffer, who made the remarkable model of the surrounding area, whom you can greet from the Duke and me, and assure him that we were very sorry not to make his acquaintance.*"[40]

The company spent two weeks in Zurich, where Goethe stayed with his friend Lavater. They returned to Germany through Constance, saw the falls of the Rhine, and visited Stuttgart, where on 14 December they attended a ceremony at the Württemberg Military Academy. It just so happened that on this day a prize was awarded to a young cadet who was destined to become his best and greatest friend, Friedrich Schiller.

After dropping in at the courts of Karlsruhe, Mannheim and Darmstadt, they arrived back in Weimar on 13 January 1780.

Maarten Ekama Spring 2021

39 *Briefe aus der Schweiz*, 9 November

40 Letter to Knebel, 4 June 1780. Knebel was the tutor of Prince Frederick Ferdinand Constantin, Carl August's younger brother (who did die prematurely in 1793 of dysentery during the war against France).