

*Goethe wrote his first piece on granite in 1784. His interest in geology had been sparked by a 'grand tour' of the Swiss Alps during the autumn of 1779, and after many local excursions in the hills of Thuringia during the following years, he finally had an opportunity to undertake a geological field trip into the Harz mountains during the summer of 1783. During the following January he felt confident enough to put his thoughts on paper.*

## **Granite as a Foundation for all geological Formations (Granite I)**

Johann Wolfgang von Goethe, 1784

Since we want to talk about rock formations in the order in which we find them on and next to each other, it is natural that we start with granite.

For all the observations, so many of which have recently been made, agree that it is the deepest lying rock of our Earth, that all other rocks are found on and next to it, but that it does not rest on any other, so that, although it does not make up the entire core of the Earth, it is at least the deepest crust known to us.

This noteworthy type of rock differs from all the others in that it is not homogenous, but consists of visible parts; however, a first glance shows that these parts are not bonded by any third means, but only exist adjoining each other, and mutually holding each other in place. We name these parts, which are easily distinguishable from each other, quartz, feldspar, and mica, to which is sometimes added tourmaline.

If we look closely at these components, it seems to us as if they did not exist, as one must usually think of components, before the whole. They do not seem to have been put together separately, but emerged together with the whole. Although only mica often appears in a six-sided, sheet-like crystallization, and quartz and feldspar have insufficient space to take on their own forms, one can clearly see that granite was created by a lively crystallization process, inwardly very crowded together when it originated. – Allow us to draw some conclusions about its origin, and about the substance from which it arose.

Since man only sees such effects that arise from great commotion and violent forces, he is always inclined to believe that nature needs brutal means to produce great things, even though he could daily teach himself to the contrary by means of the same (observations). Thus the poets have fashioned a quarrelsome, disjointed, raging Chaos for us.

Enormous masses have supposedly been siphoned off from the body of the Sun, and hurled into the void, thereby creating our solar system.

My spirit has no wings to swing into such primordial beginnings (*Uranfänge*). I stand firmly on granite, and ask it if it wants to give us occasion to think about how the body (*Masse*) from which it came into being was constituted.

*The following summer (1784) he went on a second field trip into the Harz mountains, and returned with the firm conviction that he had uncovered Nature's secret of rock formation. The following essay (his longest piece of geological writing) was probably intended as the introduction to an extended treatise on Earth's origins, along the lines of Buffon's 'Epochs of Nature', which he had read while a student in Leipzig, and reread with great enthusiasm on his return from Switzerland.*

*Goethe wrote this essay in 1785, but left it untitled, and did not publish it. It was discovered more than 50 years after his death by Rudolf Steiner while he was editing Goethe's scientific writings for the Weimar edition of Goethe's collected works. Steiner gave it the title 'On Granite' (Über den Granit). Recent research into Goethe's legacy showed that it was in fact the second piece he wrote about granite, hence the title 'Granite II'.*

## On Granite (Granite II)

Johann Wolfgang von Goethe, 1785

Even in antiquity granite was recognised as a mineral worthy of note, and it has become even more so in our own times. The ancients did not know it by this name; they called it syenite after Syene, a town on the border of Ethiopia. The enormous masses of this stone inspired the Egyptians with the idea of creating monumental works. Their kings erected obelisks of it to honour the Sun, and because of its variegated red colour it was soon named as Fiery-Coloured. The sphinxes, the statues of Memnon, and the enormous columns continue to amaze travellers, and in our own time the powerless Lord of Rome is raising up the remains of an ancient obelisk, which his omnipotent predecessors brought intact from foreign lands.

Because of its granular appearance, this type of rock was more recently given the name by which it is known today. In our own day it was subjected to a brief period of humiliation before it rose to the reputation in which informed natural scientists now hold it. The tremendous masses of the obelisks, and the extraordinary variations in their granularity misled an Italian scientist into believing that the Egyptians had moulded them artificially from a fluid mass.

But this view was soon abandoned, and the dignity of this rock was finally secured by the excellent observations of many travellers. Every journey into unknown mountains reaffirmed the longstanding experience, that the highest and deepest lying rock is granite; now better known, made easier to distinguish from others, it makes up the very foundation of our earth, upon which all other mountains were laid down. It lies unshaken in the deepest bowels of the earth, its high ridges ascending to summits which the surrounding waters have never reached. This much we know of granite, and little more. Composed of familiar materials, assembled in mysterious ways, its origins can be traced back neither to fire nor to water. Highly diverse in the greatest simplicity, its components intermingle in an infinite variety. The location and relationship of its components, its durability, and its colour, vary from mountain range to mountain range, and the rocky masses of each range often exhibit variations every few paces, although the whole always remains consistent. And so anyone who knows the fascination natural mysteries hold for man will not be surprised that I have departed from my usual field of observation, and turned with passionate fervour to this one. I do not fear the accusation that it must be a contrary spirit which has led me away from my contemplation and depiction of the human heart, the youngest, most diverse, most versatile, most fluctuating, and most vulnerable part of creation, to the observation of the oldest, firmest, deepest, and most unshakable son of Nature. It will happily be conceded that everything in Nature stands in precise relationships with each other, and that the questing spirit resists being denied what it can attain. Yes, grant me, who has suffered much, and suffers still, from the inconstancy of human sympathies, from their sudden changes in myself and others, that sublime serenity afforded us by the solitude and silence of vast soft-spoken Nature. Whoever has a sense of this, follow me.

Filled with these sentiments I approach you, most ancient and worthiest monuments of time. Sitting high up on a barren summit, and overlooking a wide area, I can say to myself: Here you rest directly on ground which reaches down into the deepest regions of the earth, no newer strata, no accumulation of alluvial debris has been deposited between you and the solid foundation of the primal world. You do not pass over a perpetual grave as in those beautiful fertile valleys, these peaks have never given birth to anything alive, and have never engulfed anything alive; they were before all life, and are above all life. At this moment, when the inner attracting and moving forces of the earth have as it were a direct effect on me, and the influences of heaven float closer about me, I am attuned to higher reflections of Nature, and as the human spirit brings life to everything, here too a parable is stirring within me, the majesty of which I cannot resist. This mood of solitude, I say to myself, as I gaze down from the barren heights, and barely discern in the distance below a faint patch of low growing moss, this mood of solitude I

say, will affect all who desire to open their souls only to the oldest, original, deepest feelings for the truth. Yes, he can say to himself, here on the oldest and everlasting altar, raised directly on the ground of creation, I bring the being of all beings a sacrifice. I feel the first and most enduring origins of our existence, I survey the world with its harsh and gentle valleys, and its distant fertile meadows. My soul is exalted beyond itself and over all the world, and yearns for heaven which is so near. But soon the burning sun will call back thirst and hunger, his human necessities. He will seek out the valleys over which his spirit has soared; he envies the inhabitants of these more fertile plains with their abundant springs, who have built their happy homes on the debris and rubble of error and opinion, scratching open the dust of their ancestors, and quietly meeting the meagre needs of their daily existence within their narrow bounds. Prepared by these thoughts, the soul penetrates into past centuries, recalling all the experiences of careful observers, all the assumptions of fiery spirits. This cliff I tell myself, rose more craggy, more jagged, and higher into the clouds, when its summit still stood as an island encircled by the ancient waters. Around it surged the spirit brooding over the billowing waves. In the vast depths the higher mountains were formed from the rubble of the primeval mountains, and from their debris and remains of its fossil denizens the later and more distant mountains. Already the moss begins to spread, now the shelly inhabitants of the sea start their decline, the water ebbs, the higher mountains become green, everything begins to teem with life.

But soon this life is countered by new scenes of destruction. In the distance, raging volcanoes rise into the air, they seem to threaten the world with extinction. but the bedrock on which I rest remains secure and unshaken, while the inhabitants of the distant shores and islands are buried under the faithless land. I turn away from these far-ranging contemplations. and look at the rocks themselves, whose presence lifts my soul and makes it safe. I see their masses, here standing upright, there inclined, intersected by complicated cracks; here arranged in an orderly manner, there thrown into intricate piles one on top of the other. At first sight I am almost driven to exclaim: Here nothing is in its first, original condition, here everything is rubble, disorder, and destruction. This is exactly the opinion we will meet when we turn from direct observation of these mountains into the library, and open the books of our predecessors. Here we find it asserted on the one hand that the primal mountains are an indivisible whole as if cast in a single piece, on the other that they are separated by fissures into layers and benches which are crisscrossed by innumerable veins in all directions. Sometimes it is said that this rock is not stratified, but occurs as individual masses irregularly separated in a completely random fashion, at other times observers claim to have found strong stratification alternating with muddled confusion. How do we unite all these contradictions and find a guideline for our further investigations?

This is a task which I presently intend to undertake. Should I not be as fortunate in this as I would wish and hope, my efforts will nevertheless give others the opportunity to go further; for in observations even errors are useful, by drawing attention to themselves, and giving the sharp sighted opportunities to hone their skills. Here however a caution may not be unwarranted, more for foreigners if this treatise should come to them, than for Germans: Learn to clearly distinguish this rock type from others. To this day the Italians confuse a fine grained granite with a type of lava, and the French confuse it with gneiss, which they call foliated or second order granite. Yes, even we Germans, conscientious as we usually are in such things, have until recently confused granite with a conglomerate of quartz and varieties of hornstone chiefly found among layers of schist, as well as with the greywacke of the Harz mountains, a younger mixture of quartz and schist.

Goethe also wrote four shorter pieces in 1785, probably intended as preparatory notes for his intended treatise, two of which are translated below. The other two pieces are lists of key words in which it is difficult to find the thread of his thoughts. He wrote nothing more about granite until he began to bring order to his papers in 1820.

In 'Epochs of Rock Formation' he most clearly expresses his view (against that of Buffon) that cracks and crevasses in granite are due to crystallisation, not due to cooling. The original 'liquid' was not a molten mass of magma, but neither was it water in which the mass was dissolved. Goethe finds a middle ground by postulating a solution held by an inner fire. This solution gradually cleared as gneiss, schists, slate, and shales precipitated.

## Theory of Rock Formations

*Zur Theorie der Gesteinslagerung* (1785)

When one sees how intimately Nature unites, one can deduce the intimate solution in which it must have held the substances before they became firm and solid. How difficult it is for analysis to separate what Nature has united, and how much is lost in each separation. Would one therefore stray far from the goal if one imagined all known and unknown Earthly substances or simple Earthly qualities, in a universal solution within the first Chaos? What we roughly refer to as elements, ores and other solids, were once intimately conjoined (*innig verbunden*).

This was all the more possible and necessary, since one element combined with another dissolves more of a third, and so forth, that a general solution seems as possible as essential.

## Epochs of Rock Formation

*Epochen der Gesteinsbildung* (1785)

When our Earth formed into a solid body its mass was in a more or less liquid state.

This mass was not simple, but its constituent parts were intimately (*innigst*) dissolved.

The solution was brought about by an internal fire, or rather the mass was kept in an equilibrium solution by an internal fire that cannot be compared to a melting fire.

The core of the Earth crystallises itself, and is probably the heaviest mass.

The outermost crust of the core is granite.

It is likewise crystallised, in its innermost . . . [gap]

The different parts of the mass have drawn together and stayed together. Quartz, feldspar, mica.

In its external aspects, because it shows itself in regular forms.

What has been observed.

Cracks and crevices due to crystallisation, not due to cooling.

The internal fire appears not to have had such an enmity with the water as that which stemmed from it (*das Entbundne*).

The water helped keep the first groundmass (*Grundmasse*) in solution; it covered all the mountains of the world.

From this general solution granite was the first to precipitate, it crystallised itself first. But the enormous ocean was still a long way from becoming clear and pure.

All the parts that make up granite, with many volatiles, still clouded the water; the most fleeting hovered in the atmosphere above the waters, alternating from time to time (with the dissolved volatiles)

The first epoch of granite is simple and widespread all over the world.

After granite the next formation to precipitate was a tremendous mass of clay and mica, (appearing as gneiss and slate) which everywhere covers the granite to a certain height. This was also very widespread but not as simple.

This precipitation took place in water. It happened right after the granite had crystallised itself, because we find this type of rock grown into the granite, even alternating with it. Gneiss is the granite which precipitated from the water after the first base foundation, hence its banded appearance.

German original texts in

<https://www.xn--gedichteundzitatefralle-tpc.de/2020/01/jwvgoethe-schriften-zur-geologie.html>

Translations by M C Ekama, Spring 2022.