

# THE ALPS.

---

---

## CHAPTER I.

### THE FABRIC OF THE ALPS.

THE Alps are amongst the sublimest proofs of the majesty of the creative power.

A thinking man must have already been astonished at the wonderful manifestations of the powers of production, preservation, and dissolution in nature. Daily and hourly before his eyes, she is forming what is new by her universal laws of organisation, imparting life and motion to that which already exists, and using up what has done its work as the source of new materials or new modifications in the vast cycle of creation, and thus giving him some measure of the never-resting, all-grasping, all-embracing activity of the great Spirit which penetrates the universe. Still he will stand in astonishment before that giant edifice of the Alps, built up by powers, whose origin and action can indeed be described, and whose relation to other powers can be set forth according to the laws which the natural sciences have won from phenomena, but whose whole extension and boundaries in the universe human knowledge can only dimly suspect.

There are but few men who know the real and full majesty of the fabric of the Alps. It unveils itself least

of all where the broad military roads stretch over passes and mountain "saddles," or where the trivial employments of daily life are swarming round the footstools of this wonder of creation. You must penetrate into the secrets of the hidden world of mountains, into the solitude of the closed gorges and valleys, where man's power of cultivation sinks powerless as he comprehends the weakness of his efforts against the majesty of Nature in the Alps. You must climb above the ruins of a primeval world, and press through labyrinths of glacier and wastes of ice into the temple sanctuary where it strikes up freely and boldly into the sky before your wearied eyes. Then you will encounter the indescribable splendour of the Alpine world in all its vastness, till you are ready to sink under the thought of its awfulness; and when you have recovered from your first impression,—when, in sight of the gigantic masses, you have opened your heart and prepared it to receive still nobler revelations,—then question boldly those mausoleums of immemorial time: ask them what hand raised them from the depths of eternal darkness into the kingdom of light; consult the rocky leaves of this stone chronicle for the history of their creation and the end of their existence. The vast dead masses will become alive for you, and a view will open for you into the endless cycle of eternity.

The Alps stretch in a vast semicircle through Southern Europe, a limb of that colossal skeleton of the earth which, under the name of the Pyrenees, Apennine, Tschardagh, and Hæmus, gives internal support to the Spanish, Italian, and Grecian peninsulas, as they stretch out into the Mediterranean Sea. They are the results of the crystallisations and deposits of many hundreds of thousands of years in primeval oceans. Then, in different epochs, followed elevations and depressions, repeated floods and new deposits, till at last the fiery products of the great

Cambridge University Press

978-1-108-06121-6 - The Alps: Or, Sketches of Life and Nature in the Mountains

Hermann Alexander Berlepsch

Excerpt

[More information](#)

## THE FABRIC OF THE ALPS.

3

melting furnaces of the earth's interior burst through these manifold superimposed layers.

Who could have witnessed those convulsions and outbursts, when in the central Alps, the very inmost kernel of the gigantic mountain fabric, the granite, gneiss, and crystalline schists were forced up from the depths of the earth's crust, pierced by the sharp masses of the hornblende rocks, and spread out like a fan? How powerless would be the wildest natural convulsions that we know,—how insignificant the earthquakes, storms, volcanoes, and landslips of the present time, by the side of that catastrophe, when the Alps took their present shape! Our understanding has absolutely no standing-point from whence to form a conception even faintly answering to those moments when a world was shattered. If we multiplied a thousandfold the most frightful uproar of the wildest thunderstorm that our fancy can paint,—if we could think of all the artillery which has ever been available for human warfare, as gathered into one place and discharged at a single command, the disturbance would be as nothing by the side of that moment when millions upon millions of cubic fathoms of the solid rock of the central Alps were torn up crushed from their bed, and sent up as high as heaven, or pitched over and over into heaps.

It is highly probable in itself that most of the processes which formed the earth were developed with exceeding slowness. It may be granted indeed that during the great periods of revolution the rock formations were far less hard and consolidated than now; so that the two factors which always go furthest to determine the shape of the earth, the centrifugal or mechanical force of the earth's rotation, and the expansive force of gases or the pressure of water from within, might have operated more steadily

and effectively than now. But it is just as certain that other physical laws, to which matter must always have been subject, — the laws of gravity for example, — must have induced moments in the history of the external formation of the Alps, which belong to the most fearful that the human mind can conceive. A thousand marks show this on a nearer observation of the mountain forms, such as the picturesque, sharp-cornered lines and clefts of the dolomite mountains, which neither get rounded off nor break away in splinters — the strange zigzag ornaments and marvellous fantastic forms in the limestone Alps, when not concealed by masses of snow, or by more modern overlying rocks. The same truth is proved by the deep gorges and rents of the valleys, such as those in the Via Mala, the valley of Tamina, the defile of Trient, the gorge-shaped openings of most of the southern lateral valleys in the Valais and Engadine, both of which show in their rock-walls the traces (even to the minutest details) of the broken surfaces passing over each other. It is proved again by those vertical walls of rock in which all the successive layers are shown in a transverse section, whilst the massive counterpart in which they were once continued has sunk into the abyss, *e. g.* the walls of the Churfirst chain on the Wallensee, the rocky front of the Frohn Alp Stock on the Lake of Lucerne, &c.

If we go on to consider those majestically aspiring masses which rise free and bold into the clouds like gigantic obelisk spikes, — as the bare and inaccessible Matterhorn (14,705 feet in height\*), the dazzling snow pyramid of the Dent Blanche (14,322 feet), or the nine-pointed diadem of the Monte Rosa (15,217 feet), which never can have been protruded through the earth's crust in their present shape, and can be nothing but isolated ruins

\* The heights are given throughout this work in English feet.

of the primeval mountain fabric,—what fearful ages of destruction must there have been, to allow the intervening masses, now vanished, to be torn away, and to sink, probably, into the depths whence they rose? For a number of proofs show that no influence of weather on these towers of rock can ever have so modelled and gnawed them down.

In no other mountains of Europe are proofs of elevation, levelling, and reconstruction to be seen so close and in so marked a degree as in the Alps. In sublimity of form, and variety of the cleavage and splintering of their beds, they are excelled by none of our continent.

Moreover, no other mountains of this quarter of the globe can show such richness in minerals, or such an instructive scale of the processes of formation. Indeed, the geologist may find perfectly insoluble riddles in the inversions or perfectly abnormal interchange of strata, in the insertion of sedimentary beds amongst the crystalline rocks, and in opposing stratifications, which open the door to the most hazardous conjectures.

To form an approximately right idea of the internal construction of the materials, and of the series of formations in the Alps, let us suppose that a primeval sea, during long periods of creation, deposited layers of mud, such as we may still see on a small scale on the banks of rivers after floods. Each of these periods engulfed wholly or in part the plants and animals which had been developed on the then existing islands or continents, and buried them in the beds deposited. Whole generations of organisms, which no longer exist in our time, perished with them. These enclosed witnesses of the different epochs of organic life (still found as fossils or impressions of plants in the mountain beds) became the marks by which the science of geology arranges its history of creation. Their sequence, where it has not been dis-

turbed by force, is the same over the whole surface of the earth. Thus the oldest sedimentary deposits must be the lowest, and those which followed later must be above them. Thus it is also throughout the Alpine land.

A journey south from Germany brings us through the geological formations of all the chief epochs, and is well calculated to show their principal elements and mutual connection.

The great cultivated Bavarian plains between the Danube and the Inn, the levels of Nuremberg, Ulm, Augsburg, Munich, up to the neighbourhood of Passau, belong to the most modern deposits, or alluvial formations. Wherever a spade is struck into the earth through the upper soil, we come upon gravel and deposits of mud or peat. Below these the diluvial formations appear in stratified or unstratified beds, hence called erratic strata. Stone quarries are so rare that in the villages in many parts, wooden boundary-stones are used. A step further south brings us to the mountainous plateau, to the Bavarian highlands, to the Allgau, to the Lake of Constance, and into the broadest and largest valley of Europe, to the Swiss "Middle-Land" (between the Jura and the Alps) where are placed Zurich, Berne, Freiburg, and Lausanne. Meadow and forest alternate with agricultural districts; the landscape takes more distinct colours and shapes; the rivers and streams hurry at a swifter pace, and collect into deep lake-basins at the foot of the outlying mountains. Gently swelling forms of leaf foliage\* still crown the heights and valleys. Far away the hill-sides are still marked with scattered houses. Villages and towns still swarm with a quickly-beating, struggling, trade-loving life. It is the "molasse" formation, which shows itself by the shells enclosed in it to be partly a saltwater and partly a freshwater deposit, and

\* Opposed to the "needle" foliage of the pine forest.

Cambridge University Press

978-1-108-06121-6 - The Alps: Or, Sketches of Life and Nature in the Mountains

Hermann Alexander Berlepsch

Excerpt

[More information](#)

## THE FABRIC OF THE ALPS.

7

consists principally of blue sandstones, beds of marl and clay, freshwater limestone, muschel-sandstein, and great banks of conglomerate called "nagelfluh." The mountains of this region are in rounded hill-like forms; in Switzerland they rise in rather more decided lines to a height of 6500 feet. Taking another step towards the mountains, we reach Salzburg, Sonthofen, the Austrian Vorarlberg, the cantons of Appenzell, St. Gallen, Glarus, Schwyz, up to Sarnen in Unterwalden, and the beautiful Lake of Thun. Agriculture disappears more and more, the landscape becomes more Alpine, the leafy forest retires, and the "needle-wood" (pine) forest appears in its stead; the people are principally engaged in tending cattle. The dazzling colours of the red-tiled roofs and whitewashed houses disappear. Silver-grey upon green, the pale shingle roofs on wooden houses in the midst of swelling meadows, are now the characteristic features. The "molasse" disappears; another formation rises to the surface which is older, and extends through the whole of Southern Europe, far away towards Africa and Asia.

It is the eocene formation, which, under the division of flysch and nummulite, occurs sometimes as slate and sandstone, sometimes as limestone, in respectable mountain-chains and steep façades of rock. It is to be understood that the whole mass of the mountain does not consist of this formation, but that it constitutes either the principal mass—as in the noble pyramid of the Niesen (7790 feet) near Thun, where the beds of flysch attain a thickness of near 5000 feet—or the uppermost portion where its rocks are raised to a giddy height, as in the Schratzenfluh in the Emmenthal, or in the splintered Ralligstock (which has visibly been depressed into itself), or in the Niederhorn in the Justithal on the Lake of Thun, where nummulitic limestone forms the highest crests. The well-known

Faulhorn also, the object of the summer excursions of tourists, consists of rough red slates of the flysch period, whose decaying (“verfaulende”) stone has caused the mountain’s name. Still further up, to heights of 10,000 or 11,000 feet, flysch or nummulite sand has been raised to the highest summits of the Clariden and Tödi. There it covers, as though with a housewife’s cap, the very top of the aged mountain, the mass of whose mighty body is formed of crystalline rocks (gneiss).

But acquaintance may be formed with these rocks without ascending such heights. They are found in the valleys also. The black, ever-moist walls of rock of the Tamina gorge in which lies the source of the medicinal springs of Pfäfers, the crumbling rocks around the baths of Fidis in the Prätigau, the immediate neighbourhood of the baths of Stachelberg in the valley of Glarus, are all flysch. We stand here at the limit of one of the great epochs of the creation of the earth; for with the eocene period is concluded the great series of the tertiary formations. All below them,—all mountains which rise towards the Alps before us are older, and belong to earlier times. They are classed as the secondary formations. The whole region in which these rocks appear must have already existed as firm land when the molasse was deposited, and have risen above the primeval ocean. This continent was far greater than now appears. The great group of the chalk formations which rests below it has in many places broken through and cast aside its covering of flysch. This appears most strikingly in the Vorarlberg Alps, especially in the chain of Säntis and the Churfirst mountains, and again in the Alps of Schwyz, where, for example, the Mythenstock strikes up like teeth through flesh, in the Nidwalden Alps, in the jagged Pilatus, in the Schaaftmatt, the Sheibengütsch, the Brienzer



Cambridge University Press

978-1-108-06121-6 - The Alps: Or, Sketches of Life and Nature in the Mountains

Hermann Alexander Berlepsch

Excerpt

[More information](#)

Rothhorn, and many other mountains of the Bernese Oberland. By the designation "chalk formations" we must not understand white writing chalk; it includes all rocks which contain the same fossils and organic remains as the chalk, and therefore belong to the same periods of deposition. It is an exceedingly extensive formation, and, for example, covers in North America an area of 120 by 300 miles (geographical).

The cliffs and crests of this formation rise more roughly and boldly, and with more strongly marked outlines, than those of the flysch. They often form picturesquely pointed rock-façades, with surprisingly beautiful details. All the sublime decorations of the shores of the Wallensee, the Lakes of Lucerne and Brienz, with their pillar-arcades and buttresses, their niches and angle-columns, whose grouping and arrangement is so marvellously beautiful, belong to the chalk formation. There we see already grand Alpine forms in grotesque masses, like outposts of the imposing army of summits, which has placed its camp behind them. The chalk rocks seldom attain a height above the snow boundary, *i.e.* of more than 7000 or 8000 feet. In this formation science again distinguishes four different kinds of rock. The lowest is that of the "Spatangkalk" or Neocomian chalk, so called from *Neocomium* or Neuchâtel, in which neighbourhood it is best developed. Upon it lies the Caprotino-kalk, of which more will be said in the description of the "Karren" fields. Above this again is the gault, a sandstone very rich in fossils, and, finally, above this the most modern deposit of the "Seewerkalk."

In a great district of the Bernese Alps, that, namely, between the Rhone and Aar, the cretaceous formations disappear, and a more ancient one, the Jura chalk, with many fossils, takes their place. Here we enter the high Alps. We stand upon the lowest step in the ascending

staircase of the great Alpine valleys. Through every gap of the lofty masses the fields of névé and snow-covered summits shine down. From them the waterfalls, scattered into foam-flakes, roar over the steep walls of rock, which sometimes, like the Giessbach and Reichenbach, dash down to the valley like broad full sheaves of water, or, spreading out into sparkling dust, stream down in waving veils like the Oltschibach, Staubbach, and the others at the head of the Valley of Lauterbrunnen. The population no longer lives in rich groups of villages spread far and wide over mountain-slopes and heights. It has taken refuge lower down in the valley, where the narrow path allows of communication, and the dwellings are sheltered from the climate; only during the summer the inhabitants lead a nomadic life with their cattle in the high pasturages. The powers that raise mountains and shape Alps have here worked energetically. It becomes evident that we are approaching the central craters of elevation. Like the ring of mountains with a steep inclination inwards which runs round the hearth of a volcano, one, two, or even three limestone chains turn their steep and lofty rock-walls, which sometimes rise above the snow, towards the granitic mountains. The stratification of the limestone Alps is always inclined outwards, a proof that at the formation of the Alps these upper strata were burst by the granite masses rising from the depths of the earth, and lifted into an oblique position.

As the high Alps did not yet exist in their present wild bold forms, when the limestone rocks formed only flat scattered islands rising from the ancient sea, a gigantic vegetation must then have flourished on them, and grisly monsters swarmed in the deep.

It is the former home of the ichthyosaurs and plesiosaurs, those mongrel monsters, fifty feet in length, half