

**Narrative of an ascent to the summit of Mont Blanc, August 18th, 1822 :
with an appendix, upon the sensations experienced at great elevations / by
Frederick Clissold.**

Contributors

Clissold, Frederick.
Royal College of Surgeons of England

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NARRATIVE

OF AN

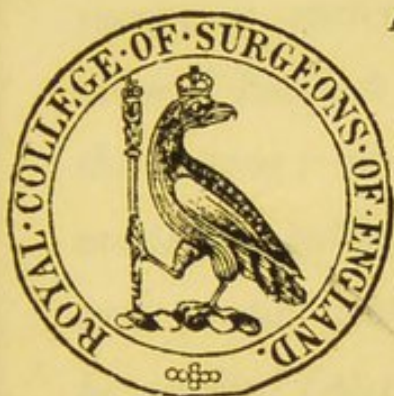
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ASCENT

TO THE

SUMMIT OF MONT BLANC,

AUGUST 18TH, 1822.



WITH AN

APPENDIX,

UPON THE

SENSATIONS EXPERIENCED AT GREAT ELEVATIONS.

BY FREDERICK CLISSOLD, ESQ.

THE PROFITS OF THE SALE TO BE APPLIED TO THE BENEFIT OF
THE GUIDES OF CHAMOUNI.

LONDON:

PRINTED FOR RIVINGTONS AND COCHRAN,
IN THE STRAND.

M.DCCC.XXIII.

NARRATIVE

OF THE

ASCENT ADVERTISING

TO THE

The following Narrative would not even have been written, much less published, but for some statements which have appeared in the English and Foreign Journals, respecting the ascent; and the only reason why it has been thought of a distinct pamphlet, is, that which may arise from its sole being published, at the discretion of Professor Pictet, in the hands of the General Chamberlain, in this apology, it is presumed, will be deemed sufficient; especially as there is known the character of the



THE PROPERTY OF THE COLLEGE OF SURGEONS, LONDON.
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ADVERTISEMENT.

THE following Narrative would not even have been written, much less published, but for some incorrect statements, which have appeared in several English and Foreign Journals, respecting the ascent; and the only reason why it has been made the subject of a distinct pamphlet, is, that any profits which may arise from its sale may be applied (at the discretion of Professor PICTET) to the benefit of the Guides of Chamouni. This apology, it is presumed, will be deemed sufficient; especially by those who know the character of the Guides.

London, March 1st, 1823.

NARRATIVE.

FOR a short time previous to the following tour, my imagination was often directed to the sublimities of Mont Blanc, by a small lithograph which graced my mantelpiece; and as I appreciated the opportunities, afforded by mountain scenery, of investigating the mind, when called into energies of a nature as new as they are noble, I resolved upon attempting the ascent, which is the subject of the present narrative.

I was, in some measure, prepared for the critical circumstances attending mountain excursions; having frequently ascended Snowdon, and always without guides; climbed most of its rugged elevations, and once passed securely over the snows which covered the highest third of its acclivity.

Having left London on the 18th of July, I arrived at Mori, a village upon the Jura, July 27. The next morning, I started, with an attendant from the inn, for St. Cerq, a village upon the brow of these mountains, and fronting the Alps. As I was leisurely proceeding, I accidentally glanced

his late celebrated father had worn, in crossing the snows and glaciers ; and I procured a similar pair ; but was informed, that they never had been adopted by any but Saussure ; though they appear far preferable to crampons or to shoes of any other description.

I was much interested with the extensive model belonging to Monsieur Gaudin, who lives at a short distance from Geneva, upon the borders of the lake. This model is twenty-four feet long and nineteen wide ; exhibiting the whole line of the Jura, the Alps, and intermediate country. The traveller will find the information to be derived from Monsieur Gaudin highly advantageous.

During my stay at Geneva the weather became unfavourable ; but as soon as it promised fair, I departed for the Vale of Chamouni. Lowering clouds, however, still obscured every elevated object, and the vale, as I entered it, was overhung with a storm, which continued till I arrived at the Union, an excellent hotel, on the evening of the 2d of August.

Early next morning, I inquired for Joseph Marie Coutet and Matthieu Balmat ; but Coutet only was then at Chamouni, and with him I arranged the ascent, giving him directions to select five other guides. Information was now received of the intended arrival of M. Selligie,

of Paris, an intelligent gentleman, who purposed ascending Mont Blanc, in order to make philosophical experiments. The weather still remaining unfavourable, I took opportunities of making excursions, for a trial of my strength. With Marie Coutet I went to the Jardin, when we travelled upon glaciers, from ten to twelve miles, without my using a baton or making a false step; and we completed the route in the shortest known time. An excursion was also made with David Coutet to the summit of the Breven, a mountain opposite Mont Blanc, and about five thousand feet above the vale of Chamouni. Our progress was gentle, but without a moment's rest; and we gained the summit without much fatigue in two hours and a half. Here the skies were still obscured; but each moment glaciers and snowy cliffs seemed starting through the mist; and once, through a vista, the parting clouds disclosed to us the colossal front of Mont Blanc.

On our return, I provided myself with a wide-brimmed straw hat, to shelter me from the rays of the sun; as well as two veils, the one black and the other green. I procured, also, a preparation of Burgundy pitch, to be placed upon my chest and between my shoulders, in order to defend my lungs, which are naturally weak, from the sudden changes of temperature. Monsieur

Gourdon, an artist of Geneva, had been kind enough to lend me a Fahrenheit's thermometer, which he kept to correct those he made; but I could not procure, either at Geneva or Chamouni, a barometer suitable to the elevation of Mont Blanc. Dr. Paccard obligingly offered me the use of some philosophical instruments; but I was anxious to burden the guides as little as possible, and to avoid carrying any thing which might distract their attention. I was desirous also, to remove, for the sake of others, the groundless apprehensions excited by the last unsuccessful attempt; and this was another motive, which induced me not to take any thing, particularly philosophical instruments, which might retard our progress;—indeed, had we been detained, during our ascent, but a very short time, the course of the narrative will show what, in all probability, would have been the result.

On the 16th, the atmosphere grew clearer, and we expected the arrival of Monsieur Selligue*. Snow had not fallen upon the mountain, for several

* On my return through Paris, I had the pleasure of seeing M. Selligue, who informed me, that he had been detained by his engagements;—but he still expressed a determination to ascend Mont Blanc the first opportunity; when it is his intention not only to make scientific experiments, but to take a panoramic view from the summit with a camera-lucida.

days *; and I therefore agreed with the guides to commence our ascent on the 19th, should the weather continue fine; in the mean time, I expedited every arrangement, in order that we might not experience any disappointment, arising from uncertainty of weather, which had frustrated so many previous attempts. Upon inquiry I found, from the number of hours requisite to reach the summit, that I had upon other occasions experienced a degree of labour, equal to that which now awaited me; and as Saussure and his guides had twice slept under a tent upon the snows of Mont Blanc, and Balmat had passed the night, previous to his arrival on the summit, upon the snows of the Grand Plateau, (an elevation of 12,710 feet above the sea) I proposed to Marie Coutet, to commence the ascent on the night of the 18th; in order that we might reach the summit, the next day, in time to descend to the Grand Plateau. Coutet, however, as well as the old guides, assured me, that, upon the summit, the weather for the next day may be infallibly predicted. I therefore proposed to sleep upon

* Notwithstanding the distance of the summit from the vale, the guides can determine the state of the snows. Balmat *le Mont Blanc* always takes the appearance of the summit as his barometer; the various winds, which prevail there, are indicated by the drifting snows, which appear from the vale like fleecy clouds sweeping along the mountain.

the summit, if the signs of the weather did not render it indiscreet; — a plan which Dr. Paccard as well as the old guides and Marie Coutet approved. On the 18th also, two English ladies, (Mrs. and Miss Campbell) celebrated for their extensive and courageous excursions among the Alps, started at mid-day, with eight guides, from the Priory at Chamouni, with the intention of traversing the Col de Géant, and of descending into the opposite vale.

Marie Coutet now informed me, that Matthieu Balmat, who was an only son, refused to accompany us; being dissuaded by his father, who had lost his other son in the expedition of 1820. Coutet and his brothers made two ineffectual attempts to induce the other guides to adopt my plan of ascent; and twice requested, upon their behalf, the usual arrangement, of sleeping upon the rocks of the Grands Mûlets, and of gaining the summit the day after. Knowing, however, that my plan was approved by Dr. Paccard, the old guides, and Marie Coutet, (so far as it presented the least hazard by lessening the time requisite to the ascent) I resolved, rather than change it, not to make any attempt; feeling convinced, that, as the weather had been so variable, the usual time occupied in ascending would, in all probability, cause a disappointment.

At length the reluctant guides, by the exhort-

ations of Marie Coutet, gave their consent; and now we collected in sacks provisions for three days, consisting of wine, spirits, vinegar, several kinds of meat, and other necessaries. Ropes of from ten to twelve feet long were also procured, for the purpose of tying us together, when we were to pass over hazardous ground; and each person carried a baton or pole, about six feet long, armed at the end with an iron spike: an axe was also fastened to one of the poles, that steps might occasionally be cut in the ice and hardened snow.

My intention of ascending had become generally known, since my arrival at Chamouni; yet no one now seemed desirous to accompany us, although the signs of the weather, at sun-set, afforded us the happiest prospect, and I had often expressed the pleasure I should receive from having a companion.

On the night of the 18th of August, at half past ten, I started on foot with six guides*.

* Viz. Joseph Marie Coutet (<i>Captain</i>) had made	} 5 times.
the ascent to the summit	
David Coutet (brother to Marie)	4 ditto.
Pierre Marie Favret	2 ditto.
Jacques Coutet (brother to Marie Coutet)	} had never ascended to the summit.
Simon Jean Baptiste	
Matthew Bossonet	

None of us had taken previous rest; the air continued perfectly clear, and was not unpleasantly cold; but there was no moon, so that we provided ourselves with a lantern. The guides, who had so reluctantly agreed to ascend, now merrily joked upon our novel situation; and for myself, I felt so strong and so delighted, that I wished it were Chimborazo I had to climb. As the night was dark, and our path wandered over rugged ground, and through a pine-forest, we proceeded but slowly. After an hour's march along the valley, we commenced our ascent, to the east of the glacier de Bossons. About midnight we reached the cottage of old Favret — one of the guides of Saussure, and father of Pierre Favret, by whom I was accompanied. The old man, as soon as he saw us, burst into a hearty laugh, excited, as he said, by the drollness of the scene. We procured of him a few thin pieces of wood to serve as the bed, on which we were to repose at night, and then departed; but as old Favret continued his laughter, we could not refrain from joining in the merriment, till his jovial notes gradually died away in the distance. When we arrived half-way to the place where we had to enter upon the glaciers, I obtained possession of the sack of Pierre Favret, whose lot it was to carry the lantern, so that I enabled him to proceed

more speedily, and inspired my guides with a confidence in my strength, which encouraged them to their greatest exertions.

We had now to ascend the steepest heights of the mountain, and were soon upon a narrow path, strewn with loose stones, and winding along the side of a precipitous declivity, which shelved down, upon our right, in one plane of smooth rock, to the depth of 1000 or 1500 feet. At half past three in the morning, we arrived near the base of the Aiguille du Midi, and were as near the glacier de Bossons as our safety permitted. I now returned the sack to Favret, and we all lay down near a large fragment of rock, which shielded us from the masses of ice, stone, or snow, which might accidentally have rolled from the cliffs above. My guides soon fell asleep; but I watched the slow advance of twilight, disclosing the strange prospect. The glaciers, distantly stretching down to the valley, glowed with a silvery and feeble lustre; a gleam, reflected from the waters of the Aarve, just stole through the obscurity; no clouds overshadowed the vale, or gathered along the cliffs, whose pinnacles were seen branching confusedly above us; while their barren and rugged elevations smiled with the rosy lights, reflected from the horizon.

At four, the guides were summoned to depart; and as we had now to enter on the glaciers, I

wore my spiked shoes, and the guides tied on their crampons. They had left behind the ladder, which was usually brought for crossing the crevasses, having been informed that the glaciers were unusually favourable to our passage. For some distance we travelled along the foot of the Aiguille, from which frequently roll masses of snow, ice, and rock; — a danger which was now little to be feared, as the frost, which always occurs at these heights, had not yet been resolved by the heat of the day.

We now arrived upon a long plain of ice, intersected with crevasses, which ran in parallel directions, and at right angles with the straight line of ascent. These chasms were seldom more than ten feet wide; but varied considerably in their depths, which are generally proportioned to those of the ice; the depths of the ice varying as the irregularity of the surface over which it runs. The crevasses are supposed to be, in some places, several hundred feet deep; and their sides generally assumed the light blue tints of the sky. From the glaciers which we now traversed, two other glaciers, called Bossons and Tacconay, descend in two distinct channels into the valley, but being thawed by the heat of the earth, and the warmth of the lower strata of air, they are dissolved generally in proportion to their advance. The width of that part of the vast

field of ice, which was seen from our line of ascent, is perhaps half a mile ; the whole length of the field is about two miles ; and where it approaches the line of perpetual congelation, or separates into the channels running into the valley, the masses of ice are worked into the most strange and irregular forms.

Fronting us, rose the summit of Mont Blanc, more than 7000 feet above the height upon which we stood ; while on our left, a range of numerous Aiguilles soared above us more than 4000 feet, stretching eastward from below the summit, with outlines mellowed into aerial softness. Sometimes they presented fissured declivities, clothed with glittering mantles of ice ; and sometimes clusters of sun-gilt spires, pinnacled on roofs sparkling with snow. On our right, and of about the same height with the Aiguilles, rose the white Dôme du Gouté, which derives its name from its form, and is joined to the western shoulder of the summit by a rising narrow ridge. Nearly in the midst of the snowy vale, between the Dôme and the Aiguilles, was seen a line of rocks, called the Grands Mûlets ; the nearest and highest of which is elevated about 300 feet above its surrounding glaciers. This vale rose at an angle of 30° , and was crossed by three successive plateaus, elevated one above the other, at right angles with our line of ascent : —

the highest, which is also the largest, is called the Grand Plateau; from which abruptly rises the summit of Mont Blanc to an elevation of about 3000 feet; appearing, at a distance, inaccessible.

We were now advancing to the rocks of the Grands Mulets, and as my shoes enabled me to walk the glaciers with greater speed, I left my guides. Following, therefore, a shorter line of ascent, over an eminence on my left, to avoid the usual circuitous route, among other forms worked into the most fantastic wildness, I came to a perfect column or tower of smooth blue shining ice, pierced, as it were, with elegant lancet windows, supporting an overhanging roof, and almost leaning over its centre of gravity. It was about five and thirty feet high, and four feet in diameter. I gazed, for some moments, on this beautiful structure, which had all the appearance of being artificial. Pursuing the path, I next caught a glance of an icy forest of miniature pinnacles and spires, still freezing in the morning air. However elegantly these fairy structures may be formed, they successively dissolve in the warmer atmosphere, and being hardened again by the nightly frosts, are perpetually starting into new objects of wonder.

Having to pass a small gulph, I attempted to leap it, but fell in, and lost my baton; thus having

reason to repent that I had left the guides. I soon, however, rose, and ascending an eminence, descried the guides, afar off to my right; when one of them advancing to me, recovered my baton, which he found thrown to a distance, under a glacier. This incident is mentioned, in order to caution travellers never to deviate from the track, but implicitly to follow the route of the guides.

Upon resuming our journey, our progress was obstructed by crevasses; so that in general we had either to wind along their sides till we came to one of their extremities, or to leap their narrowest widths. The most terrific manner of passing them was by a descent into the chasm, some feet below the brink of the opening; then by landing upon a narrow ridge in its middle, whence we had to climb the opposite side; which each of us effected without ropes or assistance. As we approached the line of congelation, we passed through labyrinths of most irregular masses. Our path was here seldom seen more than a few yards before us, and sometimes appeared to be suddenly lost; leaving us locked up, as it were, in chambers of ice and congealed snow. One or two of the guides, mounting the most elevated pinnacles, explored the direction of our road; while the rest of the party awaited their call. The most perilous office of the guides is to make these surveys; it requires men of the

greatest expertness and intrepidity; and Marie Coutet was possessed, in these respects, of marked pre-eminence.

On our arrival near the Grands Mûlets, we found it necessary to climb almost their whole height; as the irregular masses of snow and ice, on our right, were impassable. These rocks are very precipitous, and, in climbing them, we had generally to tread on loose stones. As soon as we approached their summit, we had to cut in the ice a path, leading horizontally along their sides to the distance of about thirty paces. A smooth broad sheet of ice covered the whole of the declivity (which was at an angle of 45°); while far below us, at its foot, were huge masses of ice and snow, worked into the most capricious and terrific forms.

At half past seven, we arrived at the usual place of rest, without having required the use of ropes or other assistance; a circumstance which inspired us with confidence in our ultimate success. We now sat down to partake of a hearty breakfast, when we beheld several avalanches, some near us, and some in the distance, falling like cataracts down the rugged rocks of the mountain. The thermometer* in the sun was at 70° , and the

* Whenever observations were to be made upon the thermometer, it was suspended about three feet high upon a baton

state of the weather excited the liveliest hopes of success. At nine, the guides arranged for our departure : we all put on our veils, as a protection from the heat and light ; at the same time taking as plentiful a supply of water from the rocks, as our means afforded. We had now to traverse the regions of eternal snow, and as this part of our journey was more dangerous than crossing the glaciers, we were secured, in pairs, by ropes ; eight or nine feet of rope being left between each forming the pair ; and I chose for my fellow the guide, that appeared the strongest. Though we had to pass but few visible crevasses, yet many were concealed by the snows, and we therefore followed in the steps imprinted by the leading guide.

We travelled in the straightest possible line of ascent ; our path leading sometimes among rude piles of snow, many of which we scaled, though at an angle of 50° . The crevasses, we here saw, were often of greater width than those of the glaciers : some of them opening twenty feet wide, though they were seldom of great depth. Their sides appeared of a light blue tint, and were sometimes hung with pendant and dripping icicles ; presenting the most splendid spectacle.

fixed into the ground. The observations were made by myself ; and likewise, before the instrument was removed, by Marie Coutet.

As the day advanced, we heard many avalanches fall from the rocks ; the heat was oppressive ; our thirst rapidly increased ; and our stock of water was exhausted. I therefore proposed bottling the snow ; expecting it to thaw by the sun or the heat of the body, an expedient which afforded us many a hearty draught. Some of the guides mixed wine, and some vinegar, with snow ; the latter being a cooling and agreeable beverage ; others found great relief from dissolving loaf sugar in their mouth : but, with regard to myself, I generally used lemons, and partook abundantly of raisins, which proved a good substitute for other food. Sometimes I satisfied my thirst with snow : for, having upon other occasions tried the experiment, even during the highest state of perspiration, I found, by first dissolving the snow in small quantities, and moderately warming it in the mouth, that although it has sometimes been followed by a slight inflammation of the mouth and throat, yet it has never produced serious injury. Our thirst now became excessive ; and if we had not satisfied it, effects might have been experienced worse than those occasioned by taking the snow. Our faces suffered from the heat of the sun, as well as the powerful reflection of light ; but to relieve us from these unpleasant effects, I had provided myself with a preparation of cold cream, of which the guides gladly partook. Soon

after we left the Grands Mûlets, my fellow guide detached himself from me, on account of his great exhaustion. I was, therefore, secured between two others, and was surprised that I felt so little fatigue; but the cold surface we trod prevented those inflammatory effects in the legs, which are experienced when walking upon common ground. Another guide, from exhaustion, soon fell into the rear; and as we approached the Grand Plateau, all, except Favret and myself, were severely affected with lassitude and difficulty of breathing, which they ascribed to the rarity of the air. Rest was their only means of relief; and this soon restored them. We reached the Grand Plateau at two o'clock. Marie Coutet suffered considerably in his respiration, and looking me in the face, "*Diable,*" cried he, "*vous n'êtes pas fatigué du tout!*"

From the heights of the mountain, which precipitately rise above this Plateau, immense avalanches often descend; and we had to effect a passage directly under the summit, whose sides threatened to roll down the impending masses, with which they were burthened. A rapid progress is here the best means of safety; but though the chances are greatly in favour of the cautious traveller, yet, as will be seen in the course of the narrative, the danger in this place defies precaution.

Being now released from the ropes, since there were no more crevasses to intercept our route, we rested a short time ; some of the party reclining among the scattered ruins of former avalanches ; while near us, entombed in a crevasse, slept the three brave guides who perished in the year 1820*.

The thermometer in the sun was still at 70°. After a short repose, we commenced our last stage. All my guides had arrived except one ; and he was lying down at a considerable distance, in a state of exhaustion. Our cheers, however, soon roused him ; he advanced a few paces, and then fell ; so that it was expected he would be obliged to return to the Grands Mulets. Having crossed the plateau, we followed a serpentine course towards Mont Maudit, the eastern shoulder of Mont Blanc. The surface of the snow was of so firm a consistence, that steps were cut with the axe for many hundred yards, — a most laborious employment, in which the guides relieved each other every ten minutes. The whole party now preserved uninterrupted silence ; here was our greatest danger ; — a false step might have swept us below into an immense crevasse.

While detained by the cutting of steps, I felt a strong inclination to sleep, and feared lest I

* See account of an ascent upon Mont Blanc in the New Monthly Magazine, — May and April, 1821.

should drop down ; but, by maintaining a watchful position, and exciting my thoughts, the inclination gradually subsided. After some hundred feet of ascent, we found ourselves opposed by a parapet of congealed snow, about eight feet high, and of the hardness of ice. This we scaled, by means of steps, cut as before, and in the vicinity found a dead bee.

We had been so much retarded by difficulties, and waiting for wearied guides, since we left the Grand Plateau, that it was nearly six o'clock before we came in view of the Rocher Rouge, a rock on the eastern side of Mont Blanc, about 800 feet below its summit, and facing the valley of Chamouni. As Marie Coutet requested leave for some of the guides to return to the rocks near the Grands Mûlets, it is probable they felt a little alarmed at the idea of sleeping so near the summit. Our path leading to the eastern shoulder, now became far less dangerous than that we had just travelled ; the Rocher Rouge was surveyed ; and the guides, who were before inclined to return, now selected this as our place of abode for the night. We arrived here three hours later than we had expected ; and it being half past six, it was considered too late now to venture to the summit, since we could not have reached it till after dusk. Continuing a little to the right, and then to the left, in order to gain an eminence for

witnessing sunset, we came to a plateau behind the Rocher Rouge, in view of Chamouni; and now mounting my handkerchief upon a pole, a soft breath of wind spread its folds, and floated it gently in the air, as the signal to the Priory of our happy triumph. I had expected to reach this spot early enough to hail the ladies, referred to in the former part of the narrative*, as they passed the Col de Géant, about 4000 feet below us; but, as they have since informed me, their passage over this part of the mountain was effected some hours previously.

My anxiety to gain the summit this evening having increased, I walked on till I approached a rock, called by the guides the Petit Mûlet, about 700 feet below the summit, and upon the south side of its eastern shoulder. Here I proposed to Marie Coutet, that he should now go with me to the summit; to which he immediately assented; but, together with his brother David, represented the dangers which would arise from the increasing cold, as well as from the approaching darkness: the sun being now near his setting, and there being no moon. These arguments

* *Mrs. and Miss Campbell.* These ladies have shown how female intrepidity may finally surmount danger, where even the experience of guides may fail. Previous to my arrival at the Priory, they had expressed a determination to ascend the summit of Mont Blanc, at the next season of their return to Chamouni.

induced me to remain in our present situation ; but as there were neither avalanches nor crevasses to be feared, I should instantly have proceeded to the summit, had I not predetermined to abide by whatever advice the guides might seriously give.

The sun was now sinking, and gave us assurance of his cloudless return. A circle of thin haze, about the depth of his orb, marked dimly the limits between heaven and earth ; no sound from the one disturbing the stillness of the other. The snow-topped Apennines presented an appearance of low scattered clouds : we discerned some of the waters of the lake of Geneva ; our eyes glanced over the Jura into the empire of France ; while the loftiest Alps completed the majesty of the scene. This vast and varied solitude was now slowly changed by the sun, in one continued progression “ from glory to glory.” The western arc of the misty circle kindled, from a rosy to a deep reddening glow, skirting the horizon with a streak of dark fire. The glassy pinnacles of the surrounding Alps mirrored the varying lights of the hemisphere ; some melting their outlines in the softer tints of evening ; and some vying with the brightness of the western horizon.

We now retraced our steps to the Rocher Rouge, which, I was soon convinced, had, only by necessity, been selected as our place of abode for the night. This rock is seated upon the verge of

a precipitous eminence, and runs back into an embankment of drifted snow, so as to have a small area adjacent to its western side. This area is so detached from the rock, as to leave a crevasse running along its base; the lower part of the embankment is also so detached, as to form a covered passage, winding over this end of the crevasse, and under the embankment. We found a semicircular cavity, which, opening into the crevasse, upon its near side and close to its brink, appeared to have been occasioned by the sinking of the snows underneath. Into this cavity the poles were thrust down, to ascertain whether it was undermined by a continuation of the chasm, and we judged it was not. The cavity was only about twenty feet from the verge of the eminence, which consisted chiefly of indurated snow, that frequently rolled down in avalanches; but we all contented ourselves with this situation, being too much in need of rest to be troubled with any idea of danger.

Every guide had by this time arrived, so that we immediately set about guarding the cavity, upon that side which opened into the crevasse, by means of cross poles fastened into the snows; we then strewed its floor with the few pieces of wood brought from old Favret, and spreading over them a blanket, we all crowded together into this little cell. The guides now partook of a

moderate supper ; but I had no appetite, and my mouth and throat suffered from the snow and lemons I had eaten. Wine was too strong for me, and our expedient of thawing the snow had failed, since our departure from the Grand Plateau ; so that I neither ate nor drank. I now changed my shoes ; putting on the pair with which I had ascended to the glaciers. I changed also my stockings, and dressed in an extra pair of hose, and a spencer, which had been put up, by the kind attention of Monsieur Charlet, *le maître d'hôtel*. Before we started, I understood that charcoal would be provided ; but none now appeared, and I was resolved not to complain. The guides used for pillows, and for enclosing their feet, the sacks which had contained our provisions, — an accommodation they offered to me, which I declined ; as I had brought extra clothing, and was resolved to share in their hardships. A travelling fur cap defended my head, which being reclined on the snow, I had only to open my eyes to behold above me a firmament of stars.

The thermometer was at 26° ; and we were extremely cold, being sheltered only with a thin linen cloth. It was eight o'clock before we became settled. In the night arose light gusts of wind, drifting the snow upon us ; and as they generally occasion avalanches, my thoughts were

naturally directed to the possible instant precipitation of us all 2000 feet down the steeps of the mountain. I had but little sleep through the night, and with our thin cloth we were but half covered; so that I was in frequent watch for day. At length I perceived a lambent light, which had stolen from the eastern horizon, feebly illumining the summit, till it glowed softly with a planetary lustre, and seemed insphered, as it were, in the dark blue firmament; when, as twilight brightened into a cloudless morning, it blushed like a rising harvest-moon. Now, therefore, I roused the guides; but cold and dangerous as was our resting place, half of them were loath to leave it; neither were they required, as we had now no dangers to encounter. I omitted to look at the thermometer; but Marie Coutet, who had been in the habit of attending to it upon great elevations, afterwards told me that he considered it had not descended lower than 18° *; our lemons, however, and a bottle of the best hermitage, were frozen.

As we advanced, the rising sun kindled the summit, as it were, into a lamp of burning gold; — a scene which inspired us with new animation. Favret and myself were the only persons not

* In this respect, I was misunderstood by the editor of the *Bibliothèque Universelle*, (in his Number for September, 1822,) Coutet's remark being confined to this particular night.

subjected to severity of suffering, particularly in regard to the breath:—as to the rest of the party, some lay down, and though others kept their standing, yet they were obliged to bend their bodies, and hang down their heads, to obtain easier respiration. I have used greater exertion, and suffered greater fatigue upon low mountains, than my ascent had now cost me; but I then travelled faster than our present journey permitted; and though my pulse varied of late from 100 to 150, according to the degree of labour to which I was subject, yet this rapid circulation is usual with me upon all steep mountainous ascents; so that upon the whole I did not experience feelings, upon the present occasion, differing from those to which I had before been accustomed.

Having, as we supposed, walked about twenty-five miles since our departure from the Priory, at half-past five the whole party reached the summit; but coldness, fatigue, little rest for two nights, an incessant attention to our footsteps, and that state of equanimity which had been requisite in surmounting so many dangers, rendered us incapable of fully enjoying the grandeur which was now displayed around us. I again raised my standard, which, I afterwards learnt, was perceived through a telescope, by the inhabitants of the Priory.

I still had no appetite ; my principal beverage was snow : the wine continued frozen, and its taste was unpleasant ; but I found a few spoonful of a spirituous syrup very agreeable. The warmth of the atmosphere rapidly increased, and we were greatly refreshed by a slight involuntary slumber upon the bare snows. The thermometer in the sun was at 70° ; yet our expedient of bottling the snow continued ineffectual.

The summit presented a much larger area than Coutet had ever before seen, although this was his sixth ascent. It is supposed, therefore, that a portion of the previous altitude of the mountain had fallen ; and hence, as Mont Rosa differs in height from Mont Blanc only about one hundred feet, it is probable that they may sometimes approach nearer to equality of height than is often considered *. Buonaparte had a column of wood raised, respectively, on Mont Blanc, Mont Rosa, and Mont Buet, for the purpose of facilitating surveys : these columns were erected several years since ; but as they are now invisible, it is supposed they have been swept away by avalanches.

The plane of the summit was triangular, and

* Coutet states, that the traveller requires only three or four guides for the ascent of Mont Rosa, as its summit may be gained with comparatively little hazard and labour ; indeed, one of the monks of the convent of Grand St. Bernard related to me, that one of their order ascended Mont Rosa, with only one guide.

almost equilateral ; declining from its north side, which was nearly horizontal, parallel to, and facing the valley of Chamouni ; the distance from the middle of this side to the opposite angle being not less than five or six hundred feet. The plane declined from the horizon about 200 feet, and was intersected by a fissure, which ran parallel and near to the side next to Chamouni, presenting in appearance the formation of a crevasse. As an example of the little effect produced upon my respiration, at so high an altitude, I felt not the least ill consequence from running a considerable way down the plane ; while one of the guides, who was only walking, became so greatly affected, that he was obliged to lie down. Saussure, too, relates, that Balmat *le Mont Blanc*, when running upon the summit, toward a rock, to procure stones, suffered so greatly, that he fell and remained down for some time, to recover his respiration.

I sat upon the head of the pinnacle, which rises at the angle next to Cormayeur, and looked down a vast uninterrupted rocky precipice, retreating perpendicularly several thousand feet into a declivity of ice and snow, which slanted down to other cliffs, overshadowing the vale. From the top of this pinnacle, with the assistance of my guides, I collected specimens of rock *.

* The rocks, from which these specimens are taken, are considered by Professor Pictet to be the same with those from

The air was perfectly still ; the sky of a deep cerulean tint ; and the contrast of this richness and solemnity of shade magnificently increased the splendour of the sun. We descried only two or three small travelling clouds ; but these foreboded a gradual termination of our fine weather. A thin hazy circle skirted the horizon, dimming all objects in the extreme distance, or, it was thought, the Mediterranean might have been discerned. All distant low land, as well as the waters of the Genevan lake, were slightly obscured ; but the extreme range of the Alps rose clearly in view, from which Mont Rosa “ upheaved its vastness,” pre-eminent in majesty and splendour. Amid this wildly varied immensity,

which Saussure's specimens came ; and are a portion of that formation, which has been described by Brochant, (in a paper, in the *Annales des Mines*, of 1819, on the granitoid rocks of Mont Blanc) as newer than the granite ; and composed of felspar, hornblend, chlorite, talc, and a very little quartz. On the surface of several of these stones, are vitreous bulbs, varying in their hue, from a light to a very dark green ; and the larger the bulb, the darker is its colour. One of the specimens, thickly covered with these vitreous bulbs, is composed principally of chlorite and talc. The bulbs on this specimen are larger than those on any of the others, and the largest of them is one-eighth of an inch in diameter. Another specimen has upon its surface a long furrow, in which the same vitreous substance lies longitudinally, void of the bulbous form. These appearances lead many to suppose the vitrification to be the effect of fusion by lightning.

the distant Shreckhorn dwindled into a diminutive peak ; while, of all the magnificence which was stretched around us, the sublimest spectacle was presented by the monarch upon whose crown we trod ; for over a tract of seven miles in breadth, and five and twenty in length, were seen, crowded together in confused perspective, hundreds of rifted pyramids, boldly towering over tremendous and most resplendent glaciers : but a range of aiguilles upon the southern side of the mountain rose with a still more subduing sublimity — some of them soaring seven thousand feet almost perpendicularly above the vale, and refulgent with vast accumulations of ice and snow. — Here, I felt a silent regret, that I stood not alone, and undisturbed. Without their natural associations, even scenes like these are but useless display. The extraordinary effect produced upon the mind, by the immensity and strangeness of this spectacle, was to me a subject of the deepest attention. In this voiceless solitude, and on so vast an elevation, above our common abodes and concerns, the mind acquires enlarged views of its existence, and naturally connects eternity with time. Hence we perceive the true value of life, and the equality of all mankind in their relation to a future state ; the pure and exalted affections of humility, and universal charity, are excited ;

and "we feel, as it were, the Spirit of the universe upon us *."

Having remained upon the summit three hours, we commenced our descent at half-past eight. I had previously surveyed the mountain, and was convinced that the usual line of ascent was the only one now practicable. We intended to descend by the eastern side of the Rocher Rouge; but as there was no visible support to a vast bridge of snow, over which we must have crossed, we retraced our footsteps. Having halted at the Rocher Rouge, we found that our articles which had been frozen were now moistened by the heat. The descent of all precipitous places is far more dangerous than the ascent; and we had, therefore, to fear mostly the declivities leading to the Grand Plateau. Marie Coutet tied a rope round my waist, holding one end in his hand; and in my attempt to descend the parapet of congealed snow we before had passed, I fell †; Coutet

* The Album of the London hotel contains the following sentence, written by a Parisian lady, and bearing a striking resemblance to a passage in Rousseau:

"Si j'étois reine, je déposerois ma couronne au pied de ce mont; tant je trouve les vanités et les grandeurs du monde petites & périssables auprès de ce monument de la puissance éternelle."

† The fall was occasioned by the bending of the iron spike affixed to my baton; a steel spike is therefore recommended.

saved me with a rope; and I further secured myself by striking my baton into the ice. At this instant Coutet let fall the rope; — the least slide would now have been fatal; since at the foot of the declivity opened an immense crevasse. Fearing the result of any attempt to descend to me for the rope, I succeeded in throwing it up to Coutet; but the moment I gained the foot of the parapet, he also fell, and threw me down: having, however, previously fixed my baton into the ice, and receiving the assistance of a guide, who had now arrived, we were both saved. Near this place we found a bee, which lay upon the snows; but, one of the guides keeping it for some time in his hand, it revived, and flew away.

On our arrival at the Grand Plateau, the ropes were again fastened round us, in the same manner as when we ascended, and in this way we rapidly advanced to the Grands Mûlets; the guides, who had suffered so severely during the ascent, now easily keeping pace with the rest of the party. Placing ourselves in a sitting posture, we slid down, with great velocity, several embankments of three and five hundred feet in the line of descent. This expedient was not attended with danger, as there were no visible crevasses; and our velocity would have carried us over any which might have been concealed. In some places, our foot-

steps left a hole in the snow, and once my foot sunk into a deep cavity; so that we probably passed over some hidden abyss, which was sometimes suspected by a long water-coloured streak. If, in these cases, the traveller throws himself down, and holds his baton horizontally, and at right angles with the crevasse, he will add greatly to his security; since crevasses, whether visible or invisible, are generally at right angles with the line of ascent. We had not rested since we left the summit; and my guides wished to repose awhile under the cool shade of an overhanging mass of snow; — a pleasure I declined. We arrived at the Grands Mûlets at half past one. The guides made a hearty dinner; I still had no appetite, but drank freely of the clear water, which rilled down the rocks. During nearly the whole of my stay, I was occupied in taking a parting leave of the scenery around me; and whilst our dangers were forming a subject of merriment, suddenly a sound as of reiterating peals of the most tumultuous thunder, or the roar of the ocean, bursting its boundaries, and hurling in its progress vast fragments of rock, struck the guides mute with astonishment; and at the moment, a cloud was seen resting upon the summit. We afterwards learned, that an avalanche had fallen upon the Grand Plateau, burying beneath its ruins much of the path we had

traversed. It was perceived through a telescope at the distance of ten miles by a party on the Col de Balme. I was informed, by the monks of the convent of Grand St. Bernard, who had heard of my intended ascent, that some of them, supposing it was commenced at the usual time of day, had gone upon the neighbouring heights, to view us on the summit, and had discovered the cloud, which induced them to conjecture that we were unsuccessful. The fall of the avalanche, and presence of the cloud, proved that my plan had been timed nearly to the hour; for after this period, we had a series of lowering weather, and the heights of the mountain continued to be obscured.

The thermometer in the sun was here at 70°. We left the Grands Mûlets at three o'clock, and had still to encounter several dangers. In passing down its rocks, a guide dropt his baton into a crevasse, and my rope was attached to him, by which two of us held him during his descent. His passage was to be effected under a huge fragment of ice, which lay upon the mouth of the chasm, and was so slightly supported, that by the mere strength of the arm it might have been dislodged. The present insecure state of the glaciers, produced by the heat of the day, required our most cautious advance; indeed, their general appearance was so changed, as to be scarcely recognized. Thousands of rivulets, intersecting each other, mingled

around us their murmuring tumults ; while, at intervals, heavy piles of loosened glaciers crumbled down the rocks.

At half past five we quitted the ice, and all our dangers being over, the guides again regaled themselves ; but, for myself, I had still no desire for solid food. At a short distance from this spot, we found a cloth, neatly spread upon the ground, and an earthen basin of milk for each, brought hither by an interesting peasant girl. I partook but slightly of this repast, being anxious to reach old Favret's cottage, where we soon arrived. The old man was quite astonished and overjoyed at our success, giving us the most hearty welcome ; and feasting me on brown bread and delicious cream, while his son went forward to announce to the villagers our safe return. We soon after rapidly descended the rest of the mountain ; the peasants anxiously waited our arrival ; and hailed, as we passed them, the happy fortune of their companions. — We again pursued our route through the woods, in darkness, and completed the expedition by gaining the Priory at half past seven, after an absence of two nights and two days. Although the old guides had admitted the advantages attending the execution of my plan, yet they had deemed it impracticable, on account of the requisite labour ; and those, who accompanied me, afterwards observed, that they were originally of the same opinion.

Upon our arrival, we found that we had been the cause of much anxious solicitude to the visitors of both hotels; from which we were glad to release them. It was the general opinion, that a happier ascent had never been made*; and that

* My guides informed me, that some of their associates had made the ascent of Mont Blanc twelve times, and that the following is a correct statement of the travellers, who have succeeded in the attempt:

1. Dr. Paccard (*and Jaques Balmat, guide,*) August 8, 1786
2. Saussure ——— 3, } 1787
3. Colonel Beaufoy } (*English*) { ——— 9, }
4. Mr. Woodley } ——— 5, 1788
5. { Baron Doorthesen (*Courland*) } ——— 10, 1802
- { Mr. Forneret (*Lausanne*) }
6. Mr. Rodaz (*Hamburgh*) Sept. 10, 1812
7. Count Matezeski August 4, 1818
8. { Dr. Rensselaer } (*American*) { July 12, } 1819
- { Mr. Howard }
9. Captain Undrell, R. N. (*English*) August 13,* }

One traveller should engage, for the ascent, not less than six guides; since exhaustion frequently prevents their all keeping together, and it is impossible to predict who may fail. For each additional traveller, should be engaged two additional guides; and of whatever number the party may consist, each traveller contributes his share to the sum of forty-five francs and provisions per guide.

Of the six guides who attended me, Marie and David Coutet were the most active and intelligent, and Favret the strongest; but all of them were men of the greatest prudence and intre-

* See Captain Undrell's account in the *Annals of Philosophy*, — May 1821.

none but Saussure had been so favoured by circumstances. The ascent occupied twenty-two hours; the descent, eleven; the latter only being more rapid than usual. Saussure's expedition employed him four days; he was, however, retarded by his baggage, his philosophical instruments, and experiments. Other travellers completed the undertaking in three days; but as, upon the first night of ascent, they all slept upon the mountain, our night-march gained over them the advantage in time.

I rose at five the next morning, in a state of general fever, and with a blistered face occasioned by the little use I had made of my veil; and in a few days lost the skin of my fingers and toes. David Coutet's right foot had been frozen, and one of the guides, who had naturally weak eyes, became blind for a few days; but, afterwards, perfectly recovered. The alarm, which had of late been excited by the idea of any ascent of Mont Blanc, now disappeared; yet as the labour necessary to the attempt has, perhaps, been generally magnified, so I fear, lest its dangers may be undervalued; I have therefore minutely detailed them. Any plan of sleeping,

pidity. Marie Coutet is now in possession of the best portable barometer and thermometer, made expressly for use upon the highest mountains.

either upon or near the summit, certainly appears too hazardous ; although there is no danger, if the weather continue favourable : but the question is, whether any one ought to venture his life, upon any presumed infallibility of the signs of the weather, observed from the summit.

Inclemency of the season detained me at Chamouni till the 28th of August. On the following day the shifting of the clouds seemed to indicate their speedy departure ; and I, therefore, quitted the Priory about eight o'clock in the morning, accompanied by David Coutet, for the Grand St. Bernard, by way of the Col de Balme. Flying mists, however, soon coursed along the mountains, from one height to another ; stormy vapour was breathed from every clefted rock ; and I left the valley obscured in tempest, and filled with the echoes of swelling torrents. Thus I bade farewell to those scenes, which awaken new sentiments and new feelings ; and must ever live in the memory, to hush the disquieting emotions of life, with the most calm and exalted associations.

APPENDIX.

SINCE little has hitherto been written upon the sensations, experienced by travellers during their ascent of great elevations, the insertion of the following details may at least be interesting; and if any of them shall induce the traveller to investigate the subject more fully, and thus to remove any groundless apprehension, respecting the ascent upon mountains, the object proposed will be fully answered.

		Feet above the level of the sea.
Heights of the	{ The highest peak	25,749 }
Himalaya Mountains.	{ Jamnautri, or Jumnotree }	21,155 }
Andes	{ Chimborazo	21,451 }
	{ Pichincha	16,014 }
Passes travelled	{ Bamsaru †, or Bamsooroo Pass, 15,447	
Himalaya.....	{ Of the Nitee Ghaut †.....	16,814 }
	{ Two over the Himalaya into }	17,598 }
	{ Chinese Tartary	18,871 }
Andes	{ A road over the Andes, }	near 16,000 }
	{ made by the Incas.. }	
	{ On the Quindiu	11,500 }
Table Land.....	{ Lowest plain of Thibet	14,924 }
	{ Plain of Quito, near Pichincha }	9,600 }
	{ Plain of Tapia, near Chimborazo }	9,700 }

* These heights are now finally determined. See Asiatic Researches, Vol. XIV. Calcutta Edition, 1822.

† *Asiat. Research*. Vol. XIV. p. *334.

† " On the 21st of August, when Captain Webb was upon the highest ridge of the Ghaut, taking admeasurements by the means of four barometers, at 3 p. m. the mercury stood at 16.27 inches. On the same day and hour, and the two preceding and following days, the state of the

		Feet above the level of the sea.	
Lines of perpetual congelation	{	Of the Himalaya (lowest on the north side)	17,000 *
		Of Chimborazo	15,746 †
		Of the Alps	8,300
Height of	{	The loftiest peak of the Himalaya above the level of the lowest plain of Thibet	10,800
		Chimborazo above the plain of Tapia ..	11,700
		Pichincha, above Quito	6,400
		Mont Blanc, ditto, vale of Chamouni	12,300
		Feet above the sea.	Above the line of congelation.
Ascents made	{	The highest upon the Hima- laya, by Lieutenant Ge- rard	19,411 .. 2,400
		Upon Chimborazo, by Hum- boldt	19,374 .. 3,600
		To the summit of Mont Blanc ..	15,662 .. 7,300
		By Gay Lussac (in a balloon)	23,040 .. 16,300 †

The sensations, complained of while ascending great elevations, relate principally to respiration, fatigue, and coldness; upon each of which a few observations will be offered.

The following are a few cases, relating chiefly to fatigue and difficulty of respiration.

barometer at Dumdum, about fifty feet above the sea, was 29.46 to 29.65 inches. From which the Nitee Ghaut above Dumdum must be 16,764 feet, and above the sea 16,814 feet."—*Quarterly Review*, Vol. XXII.

* Meyang La, in Chinese Tartary, is 17,700 feet above the sea,—but when Captain Hodgson and Lieutenant Herbert crossed this ridge, there were only a few traces of snow; though it was in the month of October. Lat. 31° 48' 29". See *Asiatic Researches*, Vol. XIV. p. *339.

† In the summer, neither the Andes nor the Himalaya (A) mountains have any glaciers.

‡ By Leslie's table.

(A) Fraser's Journal, p. 63.

“ At some distance below the Nitee Ghaut, which is 16,814 feet above the sea, there was (according to Mr. Moorcroft) a small village of the same name. Near this village, his breathing quickened, and he was obliged to stop every four or five paces. He also complained of giddiness, and a sense of fulness in the head. In ascending the Ghaut, the difficulty of breathing increased, accompanied with great oppression on the heart; and when on the point of falling asleep, he experienced a sense of suffocation, and sighing became frequent and distressing.”—*Asiatic Researches, Vol. XII.*

“ On approaching this pass, Captain Webb experienced the same difficulty of breathing, which occurred to Mr. Moorcroft; from the influence of which, (he says) neither horses nor yaks* are exempt.”—*Quarterly Review, Vol. XXII.*

“ In a route through the Bamsooroo pass, over a shoulder of Jumnotree, we passed (says Captain Fraser) over much snow, and experienced severe fatigue, oppression of the chest, and sickness at the stomach, on account of the rarity of the air.”—There was a cold and raw wind, and he had been travelling several days. *Fraser's Journal, p. 449.*—He also says, that persons in his suite, who were from the plains, traversed the mountains more easily than the mountaineers themselves; and that the Europeans were even superior to those of the plains. *p. 435.* We may thence inquire whether energy of mind may not operate in inducing a more decided energy of body.

Captain Hodgson says, that upon some considerable

* Bulls of Thibet.

elevations, he experienced a faintness, caused by the effluvia of plants; which is what the natives call poisoned air: but that on the highest snow, he never complained of faintness, but only of an inability to go far without stopping to take breath.—*Asiatic Researches*, Vol. XIV. p. 111.

Humboldt made an ascent upon Chimborazo, on the 23d of June, 1797; but his progress to the summit was prevented by a chasm 500 feet wide. He was here surrounded by a thick fog, and greatly incommoded by the extreme tenuity of the air, which was also felt intensely cold and piercing; respiration was difficult, and blood oozed from his eyes, lips, and gums.

“When we came (says Saussure) near the summit of Mont Blanc, I could not walk fifteen or sixteen steps without stopping to take breath; and I frequently perceived myself so faint, that I was under the necessity of sitting down from time to time; and, in proportion as I recovered my breath, I felt my strength renewed. All my guides experienced similar sensations, in proportion to their respective constitutions. The circulation of my blood increased, and we were all in a feverish state. While I remained perfectly still, I experienced but little uneasiness more than a slight oppression about my heart; but, on the smallest bodily exertion, or when I fixed my attention on any object for some moments together, and particularly when I pressed my chest in the act of stooping, I was obliged to rest and pant for two or three minutes. My guides were in a similar condition. Although I did not lose a single moment, I was not able to make those experiments in four hours and a half, which

I have frequently done in less than three on the sea side.”
— *Saussure's Travels in the Alps*.

In the first of the two following examples, though a variety of sensations are experienced, nothing is said with regard to respiration; and in the second, the difficulty of respiration does not appear to have been serious.

“Lieutenant Gerard ascended the Himalaya heights 16,921 feet, 18,493 feet, 19,411 feet above the sea, respectively, at three different times. In each instance, the ascent was upwards of 7000 feet above their encampment. During these journeys, his party felt extreme fatigue, debility, and severe head-ache. In one of their descents, their servants passed the night without fire, at a great elevation, and the next day few could move; owing to the soreness of their feet. Previous to these ascents, the party had been travelling, for several weeks, ten and twelve hours per day.” — *Transactions of the Geological Society, New Series, Vol. I.*

“The parties, who made the expeditions in the month of August, 1745, to Pichincha and Pambamarca, suffered extremely from the cold and impetuosity of the winds: difficulties the more painful, as they had been little used to such sensations. The party, which ascended Pichincha, built on its summit a hut, which was soon covered with ice and snow. The ascent from the place where the mules could come was so craggy, that it could be climbed only on foot; and to perform it, cost four hours continual labour and pain, from the violent efforts of the body, and the subtilty of the air; the latter being such as to render respiration difficult; — an inconvenience which was produced also by the thickness of the clouds when they rose from the lower parts of the mountain.

The door of their hut was fastened with thongs of leather, and on the inside not the smallest crevice was left unstopped; besides which, it was very compactly covered with straw; but, notwithstanding all their care, the wind penetrated through. Though their hut was small, and crowded with inhabitants, yet, notwithstanding this and the heat of lamps, the intenseness of the cold was such, that every one of them was obliged to have a chafing-dish of coals. Their common food was a little rice, boiled with flesh or fowl; and instead of fluid water, their pot was filled with ice. While they were eating, every one was obliged to keep his plate over a chafing-dish of coals, to prevent his provisions from freezing. The same was done with regard to the water. At first they imagined, that drinking strong liquors would diffuse a heat through the body, and consequently render it less sensible of the painful sharpness of the cold; yet they felt no manner of strength in these liquors, nor were they any greater preservatives against the cold, than common water. Notwithstanding these sufferings, the party continued on the summit till September 6, — that is, twenty-three days." *Encyclopædia Britannica*, Art. "Andes." — "The party did not make any complaint of a general difficulty of respiration." — *Encyclopædia Britannica*, Art. "Atmosphere."

It appears that both Dr. Heberden and Humboldt make no mention whatever of difficulty of respiration, in their ascent of the Peak of Teneriffe, which is 12,358 feet above the sea; and with regard to myself, I have no doubt that I could have ascended several thousand feet higher than the summit of Mont Blanc; since my respiration was not materially affected, nor did I experience that

lassitude usually felt during the ascent. Many travellers, no doubt, might have been equal to the same task, as I have weak lungs, and no unusual degree of strength.

Perhaps these examples are not so remarkable, if we consider that "the lowest part of the Table Land, or plain of Thibet, is 14,924 feet above the level of the sea. Through this rolls the Sutledge; and it abounds in the finest pastures, and myriads of quadrupeds. Considerably above this part of the bed of the Sutledge is situated the town of Daba, which appears to be tenanted in all seasons;" and Captain Webb states, that at this elevation, the finest crops of a grain called ooa, were gathered, from which the natives make their bread. — *Quarterly Review*, Vol. XXII.

"Captain Webb encamped at the elevation of 14,434 feet; and he supposes the post in Chinese Tartary, whence the Mandarin came over the mountain, to be equally elevated; and thence assumes, that this part of the Table Land of Central Asia does not differ widely from 14,500. — Upon that ground, the Chinese Tartar station of Taklakote, and the monastery near the Lake of Manasarovar, are set down by him in his abstract at that elevation, and in positions settled by approximations." *Journal of Science and the Arts*, Vol. VI. — The altitude of Daba is 5000 feet above that, at which some guides fall down from exhaustion, in ascending Mont Blanc. There is a temple of stone*, on the road from Tashigang to Nakô, in Chinese Tartary, 12,807 feet above the level of the sea. — Nakô itself is 11,975 feet.

* Lat. $31^{\circ} 50' 15''$, and Long. $78^{\circ} 39' 20''$. — *Hodgson's Survey in Asiatic Researches*, Vol. XIV. p. *339.

Having concluded the examples, relative to fatigue and difficulty of respiration, a few brief and general remarks will be offered upon their causes.

Saussure attributed some of his sensations to the presence of carbonic acid gas, which he discovered, when upon the summit, by a pellicle which formed upon lime-water. *Voyage dans les Alpes, Tome VII. p. 323.* — But it has been ascertained, that this gas, though it does not generally exceed a thousandth part of the atmosphere, yet is always one of its constituents. One of the finest experiments upon this subject was made by Gay Lussac, who ascended in a balloon to the height of 23,040 feet above the level of the sea, (the greatest height ever yet attained by man) and brought down air, which, upon analysis, was found to furnish the principles of oxygen, azote, hydrogen, and carbonic acid gas, in the same proportion as at the surface of the earth. *Hutton's Dictionary, Art. "Aerostation."* — Monsieur Garnerin, too, in one of his aeronautic excursions, brought air from the height of 4280 feet above the surface of the earth; which, upon analysis, afforded, also, carbonic acid gas." — *Hutton's Dictionary, Art. "Atmosphere."*

In general, the air of any place, or altitude, above the surface of the earth, is found, upon analysis, to be of the same constituents; let the state of the atmosphere be what it may. — *Hutton's Dictionary, Art. "Atmosphere."*

Lastly, "Mr. Dalton found that the air in an assembly, in which 200 people had breathed for two hours with the windows and doors shut, contained about one part of carbonic acid gas in every one hundred parts of the atmosphere. A similar result was obtained by Gay Lussac and Seguin." *Murray's Chemistry, Vol. II., p. 57.*

— So that this gas exists, in a greater proportion, in the corrupted air of confined and crowded rooms, than at a great elevation.

Since, therefore, we have no reason for assigning the presence of an increased proportion of carbonic acid gas in the atmosphere, as the cause of those sensations experienced during high ascents, there remains the probable conclusion, that on account of the increased circulation of the blood, its carbon requires an increased quantity of oxygen, of which only a diminished portion is necessarily presented by the air, on account of its increased tenuity. From twenty-eight to thirty inches of the barometer there is more oxygen in the atmosphere, than is consumed by one inspiration. This diminishes the distressing effects, produced by breathing the same air more than once; and, in some degree, facilitates ascents to considerable elevations. And it will be evident to every one, that the power of expanding the lungs exists in a much greater degree than is commonly exercised. Therefore, the higher the ascent, the respiration will be probably quickened; and there will be a greater expansion of the lungs to inhale a greater bulk of atmosphere. The same kind of effort is made by persons when the lungs are particularly distressed for want of air: a sensation to which Captain Fraser frequently assimilates his sufferings.

Another cause of increased rapidity of respiration appears, that when the muscular power is considerably enervated, the lungs cannot be fully expanded; and to obtain the required quantity of air, the rapidity of respiration is increased; and we know that the fulness of inspiration varies in persons of the same age breathing placidly.

Hence the difficulty of respiration, experienced during

high ascents, appears to be greatly connected with the power of the constitution to support a greater or less degree of labour. Perhaps we may, in some measure, explain upon this principle the reason why my strongest guide appeared no more affected than myself, during my ascent; and yet, upon a previous occasion, suffered considerably (as I am told) 5000 feet below the summit of Mont Blanc; indeed, there are many instances, among the natives of the Alps, of the sufferings of the same person commencing at different elevations.

Perhaps, also, upon these principles we may partly account for the absence of any effect upon the respiration of Humboldt and Heberden, during their respective ascents of Teneriffe, which required little bodily exertion, since mules may be rode up a great part of the acclivity.

Allowing the truth of these observations, we may in a great measure account for many of those sensations, supposed to be produced by the tenuity of the air, upon the principle of mere labour; particularly as cessation from labour so quickly alleviates the difficulties of respiration. It will be remembered that Saussure says, at the elevations where he endured the severest sufferings, while he remained perfectly still, he experienced but little uneasiness more than a slight oppression about his heart. It is true that he observes, that he could not perform upon the summit in four hours and a half the experiments, which he might have completed in three hours by the seaside; yet the completion of those experiments, within any period approaching four hours and a half, was as great an exertion as could have been expected even by the seaside, after a labour equal to that of gaining the summit of Mont Blanc.

Indeed, with regard to three or four of my own guides, if we consider the inclination of the acclivity which they ascended, when approaching the summit, the slipperiness of the paths, and the consequent difficulty of maintaining a footing, notwithstanding the spikes of shoes or crampons, it appears that they experienced but few sensations, which may not have been caused by labour alone; especially as they proceeded fifty or a hundred paces without stopping; — which is equal to the advance, generally made without rest, on low and very steep mountains.

In further illustration of the effects upon the system, produced by great labour, it may be observed, that the miners of the copper-mine on Snowdon have informed me, that they experience more fatigue from ascending the mountain than from a day's labour in the mine. Indeed all the sensations referred to, have been experienced, in some degree, by other persons on low mountains.

The connexion between respiration and the degree of labour, experienced in climbing mountains, as well as the effects, produced by a rapid transition from one degree of rarity of air to another, may be illustrated more fully by those examples in which great ascents are made without bodily exertion, — as in the case of Aeronauts.

In the month of September, 1804, “ Gay Lussac ascended in a balloon from Paris, 23,040 feet above the level of the sea. He says, that, at this extreme elevation, he began to suffer from excessive cold. His hands became benumbed by continual exposure; he felt a difficulty of breathing; his pulse and respiration were much quickened; and his throat became so parched, by in-

haling the dry attenuated air, that he could scarcely swallow a morsel of bread. He had been affected, the whole day, by a slight head-ache, brought on by the want of sleep and fatigues, preceding his ascent. His head-ache, however, was not increased by the ascent; nor did he suffer any inconveniences, beside those which are here mentioned." — *Supplement to the Encyclopædia Britannica*, Art. "Aeronauts."

In aeronautic excursions, the system has not time to accommodate itself to the increasing rarity of the air, on account of the rapidity of the ascent; but, there is a freedom from bodily exertion: on the other hand, in ascending mountains, great bodily exertion is experienced; but the system has some time to accommodate itself to the increased tenuity of the atmosphere. If we compare the different sensations consequent upon this difference of circumstances, it will be found, in the present case, that the effects produced upon Gay Lussac were far from being so severe as those produced upon Saussure.

"In regard to the condensation of air, we feel little or no change in ourselves, except when the alteration occurs suddenly; as in very rapid changes of the weather, or descending to great depths in the diving-bell, &c. For example, whenever Mr. Spalding descended in the diving-bell, he proceeded very slowly, resting at intervals before he went farther: as he descended, he felt an uneasiness in his head and ears, which increased, till he was obliged to stop at the depth of five or six fathoms, where the density of the air was nearly doubled. Having remained there awhile, he felt his ears give a sudden crack, and was then soon released from any uneasiness in that part; and it seemed as if the density of the air was

not altered. In this way he continued to descend, till the air became of triple density, and so on."—*Hutton's Mathematical Dictionary, Art. "Atmosphere*."*

The human frame has such a power to accommodate itself to the diversity of circumstances, to which it is subject, that, where there is time for the exercise of this power, men will live in fumes and atmospheric varieties, which would destroy those suddenly introduced to them. In the hovels of wintry regions, where the inhabitants crowd together with their animals, and exclude the fresh air, there must soon be less oxygen left, than in an equal volume of air, upon the highest mountainous elevations. And there is every reason to suppose that there are many, who, though not able to endure the fatigue of an ascent up Mont Blanc, might yet accommodate themselves, without much inconvenience, to an atmosphere still more attenuated than that upon its summit.

There are "instances† of pulmonic disease, in which one of the lungs has been almost completely destroyed, without any considerable inconvenience;" indeed, the lungs have been known to be so diseased, that one-fourth of them only has been in use, and yet the patient has lived a considerable number of years: but the cases

* "The density of the air above the surface of the earth decreases in a geometrical ratio, as the height increases in an arithmetical ratio.

"At the height of $3\frac{1}{2}$ miles, the atmosphere is 2 times rarer.

..... 7 ditto 4 ditto."

Therefore the height of Mont Blanc being about three miles, the air on its summit is nearly twice as rare as our common atmosphere: the height of the loftiest peak of the Himalaya being about five miles, the air on its summit is about three times rarer than the common atmosphere; and an ascent has been made within half a mile of this elevation.

† Parr's Dictionary.

appear in one respect to be the same, whether an individual with healthy lungs live in an atmosphere of one-half the common density, or in the common atmosphere with half his lungs in use.

We are enabled, by analogy, to reason in favour of this power of accommodation, from the examples afforded by the condor and eagle. The eagle is well known to ascend to very great heights; and in regard to the condor, "Humboldt, during his ascent of Chimborazo, beheld one soaring at an elevation where the barometer must have been lower than ten inches, and consequently the height about 30,000 feet. This bird prefers habitually an elevation where the mercury of the barometer sinks to about sixteen inches."

In regard to the inflammation of the eyes, and blistering of the face, occasioned chiefly by the sun's heat, and reflection of light from the snows, they may in a great measure be prevented by the use of a black gauze mask, and a veil of black crape;—but green spectacles are the best protection for the eyes. The great dryness in the mouth, and much of the loss of strength, arise probably from the increased evaporations from the body, caused by the attenuated air. From the general fever produced by an ascent, it is probable that a little previous depletion, light living, and abstemious diet, with the free use of warm baths after the descent, may be greatly beneficial.

The last sensation to be mentioned is that of coldness, which is experienced at all great elevations. The traveller, if he have to sleep upon the snow, should pay great regard to the dryness of his skin, and particularly of his feet; and if he be not provided with a tent, a cavity in the snow, four or five feet deep, and well defended from

the outer air, will protect him even from severe weather *. The best preservative, in respect to clothing, is a woollen wrapper. A blanket is often the only protection against cold, for many of the natives when travelling on the Himalaya.

In illustration of the little effect upon the constitution, produced by intense coldness, it will be remembered, that the younger order of the monks of the Great St. Bernard live in their monastery throughout the year, though it borders closely upon the line of perpetual congelation †.

Saussure remained seventeen days upon the snows of the Col de Géant, 2000 feet above the line of perpetual congelation. He also slept with his guides, during two successive nights, on Mont Blanc, upon snows at the heights respectively of 3000 feet and 4000 feet above the same line. Balmat *le Mont Blanc* remained all night upon the latter height unsheltered; and my party slept without fire nearly 6500 feet above the line of congelation; so that there appears to be little reason why the loftiest of the Himalaya may not be ascended, (especially as the climate is unusually fine,) if recourse be had to gentle and easy stages, by sleeping upon the snows ‡.

* Winds increase the severity of all the sufferings.

† The highest inhabited spot on the Andes is the hamlet of Antisana, 13,500 feet above the sea;—but the town of Daba, on the plain of Thibet, is situated at a height of from 15,000 to 16,000 feet above the sea; and is, therefore, the highest known inhabited spot on the globe:—yet the convent of the Great St. Bernard, although only 8038 feet above the sea, is perhaps the highest inhabited spot, if we calculate in reference to the line of perpetual congelation.

‡ It was not even reported, that any serious effects had ever resulted from any painful sensations, experienced upon Mont Blanc. Though

In conclusion it appears, then, that the state of the atmosphere, at great elevations, does not present that obstacle to the ascent of mountains, which is generally apprehended. It appears, also, that the sensations, produced by great labour, may in some measure be prevented, or remedied; and that the traveller (if he use due precaution) has no reason to anticipate that inconvenience or danger from coldness, which should deter him from making the ascent of high mountains in the proper season.

the distressing sensations of my guide, who suffered most severely, commenced at 5000 feet below the summit; yet his persevering and enduring spirit attained it, and no serious effect ensued.

THE END.

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