In the second instance, the very worst house-surgeon inflicted on a public hospital, was the highest prize-man in his college, and was elected on the strength of his prizes. His abilities were excellent; but he had devoted with diligence all his powers to the acquisition of *words* from books, and broke down in an appointment which demanded a knowledge of *things*.

The system has been to blame, not the student; and we thank the University of London for having begun prominently to adopt a more scientific mode of examination, and for thus giving us the promise of a more capable set of junior practitioners.

ORIGINAL COMMUNICATIONS.

ON THE NATURE AND CAUSES OF THE PHYSIOLOGICAL PHENOMENA

COMPRISED IN THE TERM "MOUNTAIN SICKNESS"; MORE ESPECIALLY AS EXPERIENCED AMONG THE HIGHER ALPS.

By STANHOPE TEMPLEMAN SPEER, M.D.

It is, I believe, very generally admitted, that when an individual habitually residing at a moderate elevation above the level of the sea, attains in a short space of time a considerable altitude above such level, he will in all probability experience certain deviations from his ordinary condition of health, sufficiently marked to constitute, for the time being, a state of actual indisposition, if not of disorder.

Now, in examining the narratives of those who have been most qualified from personal experience to investigate the subject, we find much discrepancy existing; not merely in relation to the nature and intensity of the phenomena in question, but even as regards their very existence.

Having however experienced on several occasions, to a certain extent, the effects of a rarefied atmosphere, upon some of the loftiest Pennine Alps, I venture to offer a cursory view of the subject, in reply to the three following queries, which it naturally suggests.—1st. As to the actual occurrence and nature of the physiological phenomena alleged to be experienced at great heights? 2nd. Are these felt by all persons alike and at the same height? 3rd. What are the causes, and whence the explanation, of such phenomena?

A reply to the first of these inquiries, that which refers to the actual existence of an abnormal condition of the body at a great elevation, is to be sought for by reference to the somewhat scattered accounts here and there afforded by those, who, whether from curiosity or for scientific purposes, have scaled the loftiest summits of the great mountain chains of Asia, America, and Europe.

It need scarcely be said, that the information to be derived from those in whom somewhat more than curiosity constitutes the stimulus of enterprise, is by far the most valuable; not but that the courageous though unreflecting explorer of the Higher Alps may occasionally be heard to complain on his return, of having experienced certain disagreeable sensations to which he had hitherto been a stranger; the rapid subsidence of which however, on regaining the usual level, would render them (in his estimation) merely worthy of a passing remark.

Various circumstances combine to produce that diversity of opinion which is to be met with, relative to the phenomena in question. In the majority of instances, the ascent of a lofty mountain is undertaken as a pleasure excursion without any definite object; it may have been prompted by a love of *éclat*, or, what is more to be admired, by a thirst after the beauties of nature, and a wish, in spite of danger and peril, to approach as near as possible to her noblest works; and as a rule, with but few exceptions, the feelings elicited on such occasions are totally opposed to a

careful and impartial examination of facts, for sensations, which under every-day circumstances might be dwelt upon in detail, are now almost disregarded and absorbed in sentiments of a higher and less corporeal nature.

Another cause for the above-mentioned discrepancy relative to the subject in question, arises from the peculiar circumstances under which the ascent of a lofty mountain is usually made. The majority of those who undertake such an enterprise, are comparative strangers to mountain scenery and mountain exercise. They spend a day or two at the foot of these mighty masses, and forthwith proceed at once to attempt to scale the object of their ambition. Here everything is novelty of the highest order. The succession of wonder-striking scenes which they now behold, it may be for the first time, the rapidity with which marvel succeeds marvel, the bewildering sensation experienced, when first encountering those extraordinary objects of which no description can give an adequate idea, the glaciers, the feeling of dread occasioned by the ghastly aspect of their gaping crevices, the thrilling sensation momentarily produced by the dreaded sound of the falling avalanche, and last, not least, the all-absorbing sentiment of triumph, resulting from the safe and successful termination of an attempt, the accomplishment of which may have been, for some time previous, the object of thoughts by day and dreams by night; these circumstances, I repeat, are sufficient to burden and embarrass the mental perceptions of the tourist. His memory becomes crowded with a variety of souvenirs and facts, which ere long, by their very number and intensity, destroy one another. On his return to the ordinary dull routine of life, the thrilling events of the past stand out in still bolder relief to the monotony of the present: his imagination outruns his bewildered memory, and he pictures to himself and others, scenes and circumstances which he may conceive to be correct, but which not unfrequently, upon close inspection, bear the evident imprint of fancy preponderating over fact. Viewed in this light, it can be no matter of surprise, that he should either forget the corporeal annoyances he may have experienced, or that he should make light of them, and throw doubts on the veracity of others more keenly susceptible to physical impressions than himself, and more bent upon the calm appreciation of certain facts, than upon the enjoyment of the most exciting gratification. It is not unreasonable to suppose that, in the case of many Alpine ascents, the individual (unless completely prostrated), resembles the soldier on the field of battle, the pain of whose wound, if not sufficient to disable him, is unperceived until the engagement be at an end; so with the Alpine tourist, his physical sensations, unless strongly marked, being swallowed up in the interest of the moment, are thus not only disregarded during their actual existence, but from their rapid subsidence on returning to an ordinary level, are excluded from a prominent place in his after recollections.

In the records, however, of such travellers as Humboldt, Boussingault, d'Orbigny, Zumstein, Saussure, Pictet, and others, there are to be found many valuable and accurate references to the sensations experienced at great heights, more especially among the Andes and the Himalaya; for while the region of the higher Alps is that to which the present remarks have chief reference, the superior elevation of the two afore-mentioned chains would naturally lead us to suppose, that the attempt to scale their loftiest summits should have afforded marked examples of those functional modifications to which I have alluded.

The celebrated Humboldt ascended the peak of Teneriffe, without experiencing dyspnoea or any unpleasant sensation whatever. This was also the case with his travelling companion. When among the Andes he determined to attempt the ascent of Chimborazo, one of the loftiest of the whole chain: he had previously resided, for a certain length of time, on the table-land of Quito; from thence he proceeded with Bompland and Montufar to the plain of Tapiri, and having slept at Calpi at an elevation of 9,471 feet above the sea level, they began to surmount the inferior terraces of

which the mountain is composed; at a height of 13,155 French feet, they saw snow that had lately fallen, and at length attained a height of 16,724 feet without material inconvenience. The Indians, however, who accompanied Humboldt, had, with one exception, turned back at a height of 15,201 feet, alleging that they suffered far more than their employer. The following is Humboldt's description of the sensations which he at this moment perceived: he says, "after attaining an altitude of 16,724 feet above the level of the sea, we continued to ascend for another hour, during which we all became by degrees much distressed: a constant desire to vomit, together with vertigo, were the most prominent symptoms, and proved far more trying than the difficulty of breathing which we likewise suffered from. An inhabitant of San Juan who had accompanied us, although robust, was still more affected. In all, the blood started from the lips and gums, while the conjunctiva, covering the eye-ball, was in each of us distended with blood. On the Antisana, Montufar likewise experienced a certain amount of hæmorrhage from the gums. All these phenomena however differ essentially, according to the age and previous habits of the individual, to the thinness of his skin, to the amount of muscular exercise to which he has been accustomed, etc. They however serve to afford, each one, a sort of measure of the rarefaction of the air, and of the altitude attained. In the Andes, they manifest themselves when the barometer stands at from 0 min. 379, to 0 min. 428. We continued to ascend for three hours and a half beyond the limits of perpetual congelation, and, in spite of the rarity of the atmosphere, we had not found it necessary to take any repose." The greatest height which Humboldt at length reached was 17,634 feet.

In traversing that portion of the Andes which separates Arica de la Paz from upper Peru, M. d'Orbigny first perceived the effects of diminished atmospheric pressure; this was at a height of 13,500 feet, upon the summit of Cachu. On the Col de Tacora, which is still more lofty, though within the limits of perpetual snow, he suffered from a violent and constant headache, together with considerable distress in breathing, and the whole party were unable to proceed upwards of thirty yards without halting. M. d'Orbigny thus speaks of his sensations upon this occasion. "I felt in an extreme degree the rarefaction of the atmosphere, in the shape of violent pain about the temples, together with those peculiar sensations at the præcordia, which characterise sea-sickness. I breathed likewise with difficulty; on making the slightest movement, I experienced violent palpitation, and a general uneasiness and depression, to overcome which all attempts were unavailing. Towards evening a smart fit of epistaxis produced temporary relief; I nevertheless passed a miserable night, inasmuch as I suffered, in addition, from exposure to a sharp biting cold, without shelter." During the few days which he of necessity spent at this elevation, the same symptoms continued with unmitigated severity.

The guides who accompanied D'Orbigny, informed him that they had lately conducted a Spaniard across the chain by the same pass, that he was so susceptible to the rarefaction of the atmosphere, as to have suffered on the first day of their journey from most alarming symptoms, and that being unable to continue his journey, or even to return, had died on the second day, without any alleviation of his sufferings. They also related several other instances in which the travellers with whom they had crossed the Andes, had suffered most severely from what they designated as the "*soroche*". This term, given by these men to what may be denominated mountain sickness, is derived from the fact of their attributing the effects which are in reality produced by the rarefaction of the atmosphere, to the emanations arising from mines of antimony, which they believe to exist in the neighbourhood: the Spanish term for antimony being *soroche*.*

The traveller Jacquemont, speaking of the ascent of a portion of the Himalaya range, says, that at an elevation

of 7,845 French feet above the sea level, he perceived nothing unpleasant; but that after ascending for two hours above the limits of perpetual congelation, it was found extremely difficult to traverse the soft snow, at a height where "the rarefaction of the air rendered the respiration difficult and hurried, and necessitated a halt at about every thirty paces." Jacquemont here refers to the case of an English physician, who in the same locality suffered severely, and lost several of his suite from similar causes; Jacquemont himself, having spent some time at various heights on the range of the Himalaya, appears to have at length become thoroughly habituated to the effects of a rarefied atmosphere.*

Two English writers likewise, Moocroft and Fraser, agree as to the physiological phenomena observed on the Himalaya. The former, in ascending the Niti Ghati, suffered from a feeling of fulness in the head and giddiness, and fearing an apoplectic stroke, lay down; this produced a temporary alleviation of the symptoms, but all attempts to proceed were fruitless, inasmuch as they immediately recurred with increased severity. In descending, he suffered but little; but on encamping for the night and retiring to rest, he had a return of the attack, together with much oppression of the chest, relieved only by taking deep inspirations.†

In *Fraser's Journal* we find a confirmation of the preceding account. At a height of 11,300 feet upon the Col de Bamsourou in the same range, the writer felt a trembling of the knees, with nausea and vomiting. His retinue likewise suffered, some in one way, some in another; one complained of severe pain in the head, another of oppression of the chest, a third of gastric derangement. Many of them were overcome with sleep, and could scarce be kept awake for a moment.

To revert to the writings of M. d'Orbigny, it appears that in the vicinity of Cocha Bamba, at a height of nearly 15,000 feet, he experienced great difficulty of breathing. At La Paz, 11,151 feet above the sea, he felt suffocated in his room at night; at the slightest ascent, he was forced to stop every ten paces from the occurrence of palpitation and dyspnoea. He could neither converse with rapidity, nor indulge in the natural dances of the country, without being obliged almost immediately to desist, and this from similar causes. These sensations lasted during his entire residence at La Paz.

La Condamine and his fellow-traveller Bouguer have also furnished some details relative to the sensations which they experienced among the Andes; although, as was previously stated, their appreciation of them differs somewhat from the previous accounts of Humboldt and d'Orbigny. Bouguer and La Condamine ascended the Pinchincha, one of the loftiest of the Peruvian Andes, in company with a Spaniard. The latter was seized during the ascent with a strong syncope tendency, which rendered it necessary to remove him to a neighbouring cave or grotto, where he passed the night. La Condamine, however, does not appear to have suffered much, for, at an elevation of 14,750 feet, he and his companion constructed a tent, where they remained for three weeks, during which time he experienced no difficulty of breathing, but merely a slight bleeding from the gums, attributed by Bouguer to a scorbutic condition of the blood, the result of cold.

The latter traveller, speaking of the sensations experienced on this occasion by his attendants and himself, says; "At first we found ourselves much annoyed by the rarefaction of the air, those among us whose lungs were rather delicate, felt the difference proportionally greater, and were even liable to slight attacks of hæmorrhage. As regards myself, I cannot affirm that the inconvenience became greater, when (at a subsequent period) we attained an increased elevation. This probably arose from the fact of having become inured to the locality and its atmosphere. Some of our party, however, when in the act of ascending, were seized with sudden syncope, together with nausea and

* D'Orbigny, *Travels in South America*, vol. ii.; and Lepileur, *Phénomènes Physiologiques*, etc.

* Jacquemont, *Correspondence*, vol. i, p. 252-275.

† Asiatic Researches, vol. xii.

vomiting. I conceive, however, that these symptoms were rather the result of lassitude, in proof of which I may remark that they were not felt if the ascent were made on horseback; nor on attaining the summit, where nevertheless the air must have been still more rarefied. I do not however deny that this rarefaction materially augmented the sense of fatigue and exhaustion, inasmuch as the respiration became much embarrassed upon making the slightest exertion.

In his attempt to reach the summit of Chimborazo, M. Boussingault experienced the effects of the rarefaction of the atmosphere to such a degree, as to be under the necessity of halting after every three or four paces.

Additional references might here be made; but it is sufficiently evident, from the above extracts, that those travellers who have ascended the higher peaks and passes of the Andes and the Himalaya mountains, have with few exceptions experienced sensations to which they were strangers when at an ordinary level; and that these have varied in character and degree in different individuals, according to circumstances; thus explaining any apparent discrepancy in the various accounts given, as to the intensity of such phenomena and to the exact height at which they occur. It is clear moreover from these narratives, that absolute accuracy on such points was not regarded as a *sine quâ non*; a minute attention to their own individual sensations forming certainly no part of the objects which such intrepid explorers as Humboldt, Boussingault, etc., had in view.

It is, therefore, chiefly among the higher Alps that the phenomena, attendant upon a considerable elevation above the level of the sea, have been perceived and described with accuracy; and by none more fully than by De Saussure, in his celebrated *Voyages dans les Alpes*.

Before attempting to scale the loftiest of European mountains, De Saussure in 1778 ascended the Buet, in company with Professor Pictet. This mountain is the highest of a chain which runs parallel to that of the Mont Blanc, and is about 10,000 feet above the level of the sea. In his account of the expedition, he mentions the fact of having experienced a great degree of muscular debility and exhaustion, rapidly subsiding, however, upon abstaining from the exertion attendant upon a steep and perilous ascent; he likewise mentions a strong tendency to sleep, as another prominent symptom. His fellow-traveller Pictet appears to have suffered considerably, even at a height of 7,100 feet, from a general feeling of indisposition which he does not very clearly describe, together with a certain amount of nausea. The guides who accompanied them were obliged to halt for breath every few hundred paces, while De Saussure himself, who suffered less than the remainder of the party, was yet forced to rest repeatedly, on attaining the snowy cupola which forms the crest of the Buet. The elevation attained on this occasion was upwards of 10,000 English feet above the level of the sea.

As, at present, the object in view is to ascertain what are in truth the physiological phenomena observable at great altitudes, and by what physical sensations they are revealed, I trust the accusation of egotism may not be laid to my charge, if I compare the accounts given above, with my own personal experience, when ascending this mountain at the latter end of the autumn of 1845, a period so unfavourable to the attempt, that the Genevese journals declared the mountain to be no longer accessible. In company with three guides, we ascended the chain of which the Buet forms the culminating point, to a height of 7,000 feet, encamping for the night at about the level of perpetual congelation. Apart from a shortness and shallowness of the respiration, I perceived no unpleasant sensations, save those resulting from the cold. Early in the morning, upon resuming the ascent, my companion, a German lawyer, complained of much muscular debility in the lower limbs, as if they were about to give way from under him, but without the peculiar sense of fatigue which at an ordinary level usually accompanies this condition. I ere long was sensible of the same; and on reaching a height of 9,000 feet, we experienced

that uneasiness at the epigastrium which is so common at sea, together with such a shortness of breath as to render it necessary frequently to halt, and turn our faces away from the slope of snow we were ascending. I moreover noticed in my companion an unusually livid colour of the countenance, resembling the early stage of cyanosis, which subsided upon taking a few minutes' repose. On reaching the summit, none of our party, while abstaining from movement, found much to complain of; except that, in my own case; I felt a sensation which can be most appropriately compared to that perceived in a swing, when having attained its utmost stretch it prepares to return on itself, or to what is felt at the bow of a steam-vessel when elevated on a lofty wave which immediately recedes from under it.

Having read the account of De Saussure's ascent, previous to my own, I casually alluded to the sensations of which he speaks, in presence of the mountaineers who accompanied us, but I soon perceived that their bluntness of perception, together with their habit of living at various heights, precluded any attempt at obtaining information upon the subject. I resolved therefore to trust to my own feelings, and to those of my fellow-traveller, and these it will be seen tallied more or less with those described by De Saussure.

It has been however, upon the hoary monarch of the Alps, that the phenomena attendant upon a great elevation, have been most markedly felt and described; and while the above indefatigable explorer was one of the earliest of those who could boast of having scaled his summit, succeeding accounts have only served to ratify the truth and accuracy of his statements, a short outline of which may at present not be amiss. In describing the encampment of himself and party on the grand Plateau, at a height of 11,484 feet, he says: "At this time my guides, (men of strong constitutions, to whom seven or eight hours of previous exertion had been as nothing), could barely remove a few shovels full of snow, before they found it impossible to continue their task. One of them who had returned from a short distance, in order to collect some water which he had noticed in a crevice, was taken suddenly ill and passed the night in considerable suffering; I myself, though accustomed to the mountain air, and enjoying better health than when in the plain, felt exhausted to the utmost, simply from arranging and examining my meteorological instruments; we all of us, moreover, suffered from a constant but indescribable uneasiness, anxiety and thirst, while some of the guides were attacked during the night with nausea and vomiting.

"At the Petits Mulets, a height of 13,500 feet, the above symptoms became aggravated; and from thence to the summit, we found it impossible to take more than twelve or fifteen paces, without halting, while the greatest amount of nausea was felt about eight or ten seconds after doing so. The only relief I could obtain, was by turning my face to the north wind, which was blowing strongly, and swallowing large draughts of air. When arranging my instruments on the summit, and observing their indications, I found it necessary to rest frequently in order to gain breath. If I remained perfectly tranquil, I felt a tendency to sickness and indisposition; but if I attempted to direct attention to any particular object or to stoop for any purpose, so as to compress the thorax, I was forced to rest and gasp for some minutes. Similar sensations were experienced by my guides; they had no appetite, and cared nothing for wine or brandy, having discovered that such fluids served but to increase their uneasiness; cold water alone appeared palatable and productive of relief."

During the ascent of this mountain by Auldjo, an account of which was published in the year 1828, it appears that the first effects of a rarefied atmosphere were perceived at an elevation little short of 12,000 feet. The chief symptoms experienced by the narrator were considerable constriction of the chest, with difficulty of breathing, a frequent pulse, with a sensation of fullness in the head, and thirst. As the party continued to ascend, the individuals composing it almost all suffered from exhaustion and difficulty of

breathing, with violent headache and palpitation of the heart. At a height of 13,506 feet, Auldjo himself was attacked by a sudden and irresistible inclination to sleep, and felt himself completely overcome, cast down and disconcerted; while, on approaching the summit, which was only attained with the utmost difficulty by himself and guides, he was incapable of taking more than fifteen steps at a time. On reaching the highest point, he immediately fell asleep, and upon waking, the headache and pains of the limbs were found to have ceased, but he still suffered from thirst, difficulty of breathing, and rapidity of the circulation, while the sight and odour of food sufficed at once to produce nausea.

On the 19th of June, 1819, Dr. Reusseler and Mr. Howard attained the summit of the Mont Blanc. One of the guides was unable to proceed beyond the Grand Plateau; from this to the summit, the strongest of the party were unable to take more than fifteen steps in advance without halting. Howard himself was so severely indisposed, as to render it doubtful whether he would ever reach the summit.

In the month of August, 1825, Captain Sherwell, and Dr. Clark, likewise ascended the Mont Blanc. The former, on leaving the Grands Mulets, suffered much from thirst, cardialgia, and nausea; at a height of 9,600 feet, he was almost overcome by somnolence, and barely able to advance above a dozen steps without stopping. At the summit, the travellers felt much indisposed; Dr. Clark in particular was much oppressed in breathing, even while at rest, and experienced a sensation within the chest analogous to that which precedes an attack of hæmoptysis, to which when young he had been liable.

The following observations were made at different heights upon the Mont Blanc, by Dr. Martin Barry; they refer exclusively, as will be seen, to the physiological phenomena in question.

At a height of 11,001 feet he noticed a dry rugose condition of the integuments, lividity of certain parts of the body, tension of the surface, intense thirst, and gradual failure of the appetite.

At 13,640 feet, the symptoms were the same, with total loss of appetite, but without much fatigue.

At 13,713 feet, fatigue was perceived, with difficulty of breathing, relieved by halting and taking deep inspirations.

At 14,372 feet, there was tendency to syncope, increased dyspnoea, great prostration and indifference.

It is somewhat singular, that on one occasion during the ascent of this mountain, a dog, belonging to one of the guides, likewise suffered severely; he stopped continually, then fell down and slept immediately. At a height of 12,000 feet he vomited frequently, but nevertheless attained the summit, in company with his master.

M. Zumbstein, in attempting to reach the highest peak of the Monte Rosa, appears to have suffered from the rarefaction of the atmosphere sooner than usual. At a height of 4,128 feet, he experienced so great a degree of anxiety and oppression, as to be unable to sleep during the night; after attaining an elevation of 10,800 feet, he and his companions were forced to halt repeatedly, and one of them fainted for some minutes. In ascending the pyramidal cone which constitutes one of the summits of the Monte Rosa, a chamois hunter of the party lost all consciousness.

Additional quotations might here be adduced, tending to confirm the statements of those observers, to whom allusion has already been made; I prefer, however, passing over these for the sake of brevity, and referring to the very accurate and detailed account which a French physician, Dr. Le Pileur, has given, relative to the phenomena of the mountain sickness, as noticed by himself, his companions, and guides, during successive attempts to reach the summit of the Mont Blanc. Speaking of his own sensations on attaining an elevation of 12,000 feet, he says: "I now experienced, after a few minutes exertion, a certain amount of fatigue, with dull contusive pains in the lower extremities. On counting my steps, I found that I could still take about a hundred without halting, the last twenty being performed

with much difficulty; after resting, the pain in the limbs ceased, and on resuming the ascent, the first few paces were comparatively easy. At a height of 13,350 feet, I perceived a slight degree of perspiration, lasting for a few minutes only. Prior to reaching the last rocks, situated near the summit, I became conscious of a most singular but indescribable uneasiness while in motion. There was no headache, no palpitation of the heart, nor any discomfort about the precordial region, but a general sense of great exhaustion and *malaise*, and I seemed in fact to have barely sufficient strength to execute the necessary movements of locomotion for a given period, after which I felt that any attempt to proceed would be fruitless. I could moreover advance but in one posture, namely, with the head inclined forwards, and the chin nearly touching the sternum. Each individual member of the party appeared to adopt this attitude, and I remarked that the act of halting and taking breath was similarly performed. A tendency to somnolence was also noticed; and what tended materially to increase the general sense of discomfort, was the dry, parched condition of the mouth. At a height of 13,580 feet, we were assailed by a violent north-west wind, which added to our suffering, more especially in my own case, inasmuch as a feeling of impending suffocation, with giddiness and nausea, was the result. This lasted for upwards of a quarter of an hour, during which it was necessary to exert all the moral courage I possessed, to continue the requisite exertion; I advanced indeed mechanically, without reflection; none spoke, and but one thought appeared to pervade the minds of the whole party, that of still accomplishing a few more paces in an upward direction."

The narrator proceeds to describe the sensations experienced by himself, his companions, and their guides after attaining the summit. These, as might be supposed from the absence of exertion, were less marked than during the ascent, and consisted for the most part in a tendency to somnolence, loss of appetite, thirst, slight nausea, and in one instance vomiting; he notices also the whiteness of the tongue, as occurring in every one of the party, together with a considerable acceleration of the pulse.

Upon a previous occasion, M. Le Pileur had been baffled in his endeavours to reach the summit of the mountain. At a height of 9,300 feet, one of the principal guides was suddenly seized with the "mountain sickness" and obliged to descend immediately. His countenance was bloodless, but covered with moisture, and he could but just take a few steps in advance; he recovered however upon descending about 600 feet.

At the Grand Plateau, another of the guides, Ambrose Coutet, was seized with nausea and a tendency to immediate syncope upon assuming the upright position.

A third guide, Simon, was similarly affected while M. Le Pileur was in the act of feeling his pulse, and had but just time to extend himself upon the snow, to avoid complete syncope.

In the year 1845, after residing three years in a perfectly level country, and with consequently no opportunity of becoming inured to mountain exercise, I spent some months in Switzerland; and on visiting the valley of Chamouni, proceeded at once with the assistance of two guides to attain the highest point on the Mont Blanc, capable of being reached without entailing the necessity of spending a night on the mountain. Beyond the ordinary fatigue and excitement, unavoidable upon such occasions, I felt nothing unusual until we had arrived at a height of 9,000 feet; here a sense of fullness in the head, and throbbing of the carotids, with palpitation of the heart, became evident. I had but little relish for food, and felt considerable thirst. At a height of 10,000 feet, I experienced a constriction of the chest, together with increased rapidity of the respiration, and this independent of the influence of severe exertion, inasmuch as the necessity for extreme caution, among the frightful labyrinth of crevices in parts of the glacier of Bossons, rendered the actual amount of exertion very trifling. For some time I had perceived the

taste of blood in the mouth, and this I found to be owing to a slight oozing from the gums. These peculiarities were, it is true, elicited at a comparatively early period of the ascent, which I attribute to the fact previously mentioned.

In the year 1846, when living among the Bernese Alps, I had still further opportunities of ascertaining the effect of great altitudes upon the body. In conversing at the hospice of the Grimsel, with some of the chamois hunters and attendants, who spend a large portion of the year at a height of 6,000 feet and upwards, I learned that habit had a great effect in doing away with those unpleasant effects which a rarefied atmosphere would produce upon an inhabitant of the plain. This I found to be actually the case during the ascent of one of the loftiest of the Bernese Alps, the Wetterhorn, or Peak of Tempests*. In scaling this hitherto untrodden summit, I was accompanied by three men, one an inhabitant of the plains, (although accustomed to ascend the lower and more accessible mountains in the neighbourhood), the two others habitually living at an elevation of between 6,000 and 7,000 feet, and inured to daily exertion of a severe nature. In these two men I could at no time detect aught that was unusual, save a shortness of breath, and a necessity for frequent halting during the ascent of the terminal ice-bound peak. The inhabitant of the plains however, evinced symptoms of distress at a very early period, and complained of nausea, thirst, oppression of the chest, and throbbing in the head. In my own case, the departure from the ordinary condition of health was but trifling, owing to having become somewhat accustomed to the atmosphere of lofty regions, and familiar with the species of exertion required to reach them. Occasionally, at some of the steepest and most dangerous parts, a feeling as if all power had been suddenly abstracted from the lower limbs, together with that sensation before described as experienced at sea or in a swing, necessitated a halt, and this sufficed to banish all unpleasant feelings. I may also add, that the whole party experienced a complete distaste for food, almost indeed amounting to loathing, and a wish rather for fluids. These we found to be very palatable and refreshing, when taken in small quantities. On arriving at the summit, I again felt the same peculiar sensation, previously noticed when on the Buét, together with increased rapidity of the respiration. The chamois hunters appeared but little inconvenienced; I remarked, however, that their distaste for food was as great as my own, while the guide who had accompanied me from Interlachen evidently suffered considerably from the effects of the elevated position upon which we stood; he appeared overcome by sleep, complained of throbbing in the head, nausea, difficulty of breathing and great thirst, and was utterly incapable of appreciating the stupendous panorama spread out before our eyes.

During the descent, comparatively few complaints were made by any one of the party, although the effects of the exposure to the reflection of an unclouded sun from the pure unsullied snow were very severe, and lasted for several days, producing vesication of the face, and in the chamois hunters an attack of ophthalmia; they having omitted to wear blue glasses during the ascent.

From these observations I conceive that, as a tolerably satisfactory answer to the first question proposed, it may be stated that at great elevations there actually do occur certain modifications in the natural functions of the body, in no way to be accounted for, but by admitting the existence of influences to which at an ordinary level it is not exposed.

[To be continued.]

CASE OF FIBROUS TUMOUR OF THE UTERUS, IN CONJUNCTION WITH PREGNANCY;

LACERATION OF THE PERITONEUM, AND HÆMORRHAGE INTO THE ABDOMEN.

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(Read before the Royal Medical and Chirurgical Society, Jan. 14th, 1851.)

CASE. In October, 1840, I was requested to attend a tradesman's wife, æt. 40, in her third confinement. I learnt that she had recently moved into her present residence, and that she had greatly exerted herself in cleaning it; that all through her pregnancy she had been much oppressed with flatulency, and had had misgivings about the result, having felt differently from what she had done on previous occasions; that four days previously she had slipped down four stairs, from which she did not experience any inconvenience; and that on the same day she caught her foot against a chair, which caused pain in her left hip, which she had at times felt since. I first saw her at noon; the membranes had broken eight hours previously. The pains had been frequent and regular. The external parts were relaxed. The os uteri was so far back that it could scarcely be felt, and was open to the size of an eighteenpenny piece; the vertex was presenting. She was at this time very much troubled with flatulency, for which warm gruel, with a little ginger, was given with relief. The pains continued strong and regular; the os uteri gradually dilated; and the child was born at four o'clock in the afternoon. It was large, blue, and almost dead, but recovered. The placenta was thrown off naturally shortly afterwards; the uterus contracted firmly; there was no hæmorrhage. I left her to all appearance well, an hour after her confinement. Her pulse was seventy-two in a minute; the urine had passed freely; the bowels had been opened five times that morning, and five times the day before.

About five hours after her confinement, I was called to her in haste. She had been allowed to remain undisturbed for two hours, when she was taken with cold chills; and upon being put to bed, she was seized with sickness (the flatulency still continuing), and she was very faint. Upon visiting her, I found her quite pale; her countenance shrunk, and very anxious; her lips pallid; the skin cold and clammy; the tongue very pale. She was conscious, but so faint that she could scarcely whisper. The pulse was all but imperceptible at the wrist; there was a very slight draining from the uterus; the breathing was slow and natural; sickness was constant; the abdomen was much distended, particularly below the umbilicus, and evidently tympanitic. The uterus could not be felt by the hand applied to the hypogastric region, neither did kneading pressure make it more apparent, or produce uterine contraction. Fearing that there might be internal uterine hæmorrhage, and not being certain about the state of the uterus, I introduced my hand with great facility, and found it somewhat large, empty, and flaccid. Thinking that relaxation of this organ might have had something to do with the symptoms present, I kept my hand steadily where it was, and, by means of an assistant, had pressure made externally upon the uterus; brandy and laudanum being at the same time administered. Finding but little good from these means, I tried the effect of cold. Wet cloths were first applied, and then a plate immersed in cold water, to the lower part of the abdomen; neither of which produced much effect. Cold water was therefore poured from a height upon the abdomen. This produced a slight shock upon the system, more decided uterine contraction, and more pulse. The uterus, however, again relaxing, it was necessary again and again to resort to the cold affusion. After each application, there were decided uterine contractions, more pulse, and a less anxious state of countenance. After an hour's trial of this plan, the uterus had contracted sufficiently to allow of my withdrawing my hand. Two

* A detailed account of this ascent was published in the *Athenæum* of Nov. 1st, 1846.