

having occupied seven years. But the tokens of the great dead awake remorseful memories in the queen, and she dies of a broken heart.

It is clear that our hunter is not climbing on any very elevated *niveau*. There is no allusion to snow or ice. The ascents were apparently conceived to have been effected in some region abounding in gorges or small dolomitic ranges. As a pure piece of rock work they seemed to me not so bad, especially when the amount of ironmongery the man carried is borne in mind—worthy to rank him next to Alice's White Knight. But there must have been a goodly number of 'stanchions' expended on those descents, unless there was such an Oriental profusion of that leather rope as would have put to the blush the yards exacted by Dolomites and the Aiguille du Géant. Anyway he seems to have managed the unwinding less like a spider than an Alpinist, since he is not said on descending to make it a *corde fixe*. I do not gather that he wore putties, but the leather shoes—without nails—suggest a kind of moccasins as effective on the rock as *passi di gatto*. The resort to a parachute seems almost prophetic of new departures in Alpinism!

I am, dear Sir,

Yours faithfully,

CAROLINE A. (FOLEY) RHYS DAVIDS.

PROCEEDINGS OF THE ALPINE CLUB.

A GENERAL MEETING of the Club was held in the Hall on Tuesday evening, February 12, 1901, at 8.30, the Right Hon. James Bryce, *President*, in the chair.

The following candidates were balloted for and elected members of the Club:—Messrs. W. Pelham Burn, H. K. Corning, J. Davidson, G. T. Glover, C. A. Hasler, G. W. Nettleton, H. Simms.

The PRESIDENT: 'I wish, in informing the Club that this meeting was postponed till this day in consequence of the calamity which has befallen the nation, to ask the members to pass a resolution expressive of our grief at the loss of our beloved Queen, together with one which shall convey our condolences to the King and the Royal Family, and shall at the same time express our sentiments of loyalty and attachment to him on his accession. Never in our history has the loss of any Sovereign so stirred the feelings of the nation. Seldom, indeed, in modern history has there been such an expression of genuine and deep sorrow from a whole people, sorrow which has evoked countless marks of sympathy from all parts of the world. When we recollect the long and glorious reign and the character of the life that has now closed we shall not be surprised at a manifestation of sorrow so unexampled, because in our Queen public virtues and excellences, which had been subjected to the test of a reign of sixty-four years, and had come out of that test recognised and admired by the whole world, were united with all the virtues that adorn private

life. All her tastes and predilections were for things noble and of good report. We here may remember with special pleasure that there was nothing that she loved better than nature, and in particular the grandeurs and the beauties of mountain nature, and nothing that she enjoyed more than poetry and art. We have hardly yet begun to realise how much we owe of our nation's peace, concord, and contentment to the admirable way in which she performed her functions as a constitutional monarch for so many years, to her conscientious assiduity in the discharge of the work which came daily, and indeed hourly, before her, to her tact, to her sound judgment, to her careful abstention from anything like political partisanship, and to the genial kindness which enabled her to associate herself with all the joys and sorrows of her subjects. These made her an important factor in the peace and well-being of the constitutional system of England, and we can form no better wish for her successor than that he may walk in the path marked out for him, and find that the Throne is never so firmly placed as when it rests upon the affections of the people. In such a resolution of condolence we may include the expression of our loyalty to the King and of our best auguries for a happy and peaceful reign for him. He has always shown himself courteous, warm-hearted, and sincerely interested in the well-being of the people, and his declarations published a few days ago were eminently worthy both of his own position and of the traditions which he has received from his mother. He enters on his reign with all good auspices, and we earnestly hope that it may be a long and prosperous one. As I gather that you are disposed to favour this suggestion I will move that an address of condolence on the death of her late Majesty, and one expressing our loyal attachment to King Edward on the occasion of his accession, be transmitted to the King.'

MR. C. T. DENT: 'But few words are needed from me in seconding the proposal that has just been made from the chair. In the first place the President has admirably voiced what I believe to be the feeling of the Club, and, further, no arguments are necessary in support of a resolution that will assuredly commend itself not only to those present to-night but to every member of the Club; and I do not forget that we number in our ranks many who are not our own countrymen. Diverse as are the professions and occupations of our members, various as are their views, their aims and objects in life, outside these walls, it is yet absolutely safe to assume that the expression of our condolence will be as unanimous as our congratulations to his Majesty the King on his accession will be sincere. I venture to suggest that the President and the Honorary Secretary be requested to draft a suitable address and forward it, on behalf of the Club, to the proper quarter.'

The motion was unanimously carried.

On the motion of Dr. SAVAGE, seconded by Mr. PICKFORD, Mr. C. Schuster was elected a member of Committee in place of Mr. A. L. Mumm, who had been elected Hon. Secretary.

Dr. TEMPEST ANDERSON read a paper on 'The Grand Cañon of the Colorado River,' which was illustrated by lantern slides.

Mr. SHEA thought that the colours of the Cañon region were finer than any in the Dolomites. In Colorado 500 square miles of territory were over 13,000 ft. in height, and there were more than one hundred peaks over 14,000 ft., though none up to 15,000 ft. The number of unclimbed peaks was still very large. There was not much first-class climbing, but a great deal of interesting climbing.

Professor KENNEDY said that the Cañon formation replaced what are valleys with us. As regarded the colours, he thought them hideous, and that they would be most uncomfortable to live with, as they were crude and strong.

The PRESIDENT conveyed to Dr. Anderson the thanks of the Club for his paper, which showed that the true alpine traveller had his eyes open for everything. The cañons of the Rocky Mountain and Sierra Nevada regions were the features of Western American scenery which possessed most grandeur and beauty, for the peaks were seldom of striking form and, as they often rose from elevated plateaux, those of the Rocky Mountains did not make any great impression on the eye. The gorges, however, were very remarkable, and quite unlike anything in the Alps or the Pyrenees, though in the Sierra Nevada one was sometimes distantly reminded of some of the valleys of Norway. As regarded the colour, the country described by Dr. Anderson was most striking and peculiar, but it was a country to visit rather than to live in. Nor, indeed, was it likely to be ever thickly peopled, for the climate was too dry to allow of any extensive agriculture. Further N. the scenery was far more noble. Mount Tacoma, as seen from Puget Sound, was a magnificent object. Rising over the deep waters, and towering up from amid the forests, this splendid peak, streaming with glaciers, afforded a prospect which (though to be sure, owing to fogs and the smoke of forest fires, it was often concealed from the eyes of disappointed travellers) was among the most superb mountain views in the world.

With a hearty vote of thanks to Dr. Anderson the proceedings terminated.

A GENERAL MEETING of the Club was held in the Hall on Tuesday evening, March 5, 1901, at 8.30, the Right Hon. James Bryce, *President*, in the chair.

In submitting the accounts for the year 1900 Dr. WILLS said—

'I beg to submit a statement of the Club accounts for the year 1900.

'On the side of receipts I have to note an increase of two guinea subscriptions by nine, a decrease of one guinea subscriptions by seven, and a diminution of three in the number of entrance fees, as compared with 1899.

'It is most satisfactory that the letting of the hall has brought us in 68*l.* 18*s.* this year, as against only 8*l.* 8*s.* last year. As large a

sum, or slightly larger, will come to us from this source in 1901. Against these receipts for the hall we must put the expenses of lighting, heating, and cleaning, which reduce the actual net receipts to about 60*l.*

‘On the expenditure side there is little that is fresh to remark.

‘Firing has increased 5*l.* 4*s.* 6*d.*, a natural result of the greater use of the hall and the increased cost of coal. There is an apparent increase of nearly 20*l.* in the electric lighting. This is made up of an increase of 5*l.* in the current bill for the first quarter of 1900, when the hall was let for a month, and 15*l.* for some very necessary alterations to the wiring. In this connection I may mention that at last a very serious fault has been discovered in our wiring, which had escaped detection by careful testing, and which, I expect, has existed for a long time; this fault is probably also the cause of the melting of the main fuses, which on several occasions plunged the hall into darkness at the most inconvenient moments. I hope, therefore, that Mr. Mumm may be spared much worry which fell to the lot of Mr. Wicks and myself from the insecurity of our lighting arrangements.

‘Furnishing is, of course, much less this year, as last year we bought new bookcases, and would not be as much as it is if it were not that when I wanted to put in the new stove in the hall the District Surveyor insisted on an enormous monument being put up in commemoration of the London Building Act, quite useless from a practical point of view, but very expensive. I regret that there has been such difficulty in getting the stove to burn efficiently. The fault was entirely due to the carelessness of workmen in fixing, and has now, I believe, been got over.

‘The library catalogue was produced at the economical rate of 114*l.* 5*s.* 1*d.*, including compiling, which does not all come into this year’s accounts. I regret that its great merits have only been recognised by members to the extent of 13*l.* 11*s.* 1*d.*

‘Exhibitions have cost about 35*l.* less than last year. There have been refreshments three times instead of five.

‘I feel an apology is due to the Club for my having supplied the Assistant-Secretary with a typewriter, but the Club must be progressive, if anything. So at least Sir Martin Conway thinks.

‘As to the “Alpine Journal,” the actual cost of the four numbers for 1900 was 281*l.* 0*s.* 11*d.*, against which must be put receipts for advertisements and sales of those four numbers 130*l.* 5*s.* 6*d.*, leaving a balance of cost of 150*l.* 15*s.* 5*d.*, which is further reduced to 117*l.* 0*s.* 10*d.* if the sales of the back numbers (rather less than last year) be taken into consideration. Last year the cost of the “Journal” was 156*l.* 7*s.*

‘Thus our total expenditure amounted to 1,111*l.* 17*s.* 9*d.*, and our receipts to 1,191*l.* 7*s.*, leaving a credit balance of 79*l.* 9*s.* 3*d.*, which I hope may be considered satisfactory.

‘We must remember that there has been exceptional expenditure on library catalogue and typewriter of nearly 100*l.*, but then there always is exceptional expenditure on some object or other.

There have also been exceptional receipts, or rather, I hope I may say, receipts over and above the ordinary Club income, of 68*l.* 18*s.* for hire of the hall. Without this there would have been a very small balance.

‘From the point of view of strict finance it would no doubt be more satisfactory if we could place our entrance fees and any such exceptional receipts as those obtained from letting the hall to a reserve fund, to meet the increased rent which we shall have to pay in some ten years’ time, and the depreciation of our decorations and furniture, even though it is true that the proportion of our two guinea subscriptions is rising, and the membership of the Club has increased nearly 100 in the last ten years.

‘Never having been able during my treasurership to reach this pitch of administrative excellence, I can only conclude by recommending the plan most heartily to my successor, Mr. Mumm.

‘As the particulars of the Ball’s “Alpine Guide” account were referred to at length at the December meeting I merely lay the summary before you now, without reference to any details.’

The accounts were then unanimously adopted, and a hearty vote of thanks accorded to Dr. Wills for his services as Treasurer.

Mr. J. E. S. MOORE read a paper on ‘The Ruwenzori Mountains,’ which was illustrated by lantern slides.

Mr. FRESHFIELD asked whether Sir Harry Johnston’s more recent explorations had thrown any further light on what there was for mountaineers still to do on the range. He also wished to know what time it took to get to the range from London. He thought it interesting that glaciers were found in the tropics at so low a level as 18,000 ft., for in Sikkhim this was the lowest at which they were found.

Sir MARTIN CONWAY asked if the flora was similar to that on Kenya, whether the glaciers were dry, whether or not considerable streams came from them, whether the range generally was easy of access, whether carriers were easy to be found, and whether they objected to going to high altitudes.

Mr. DENT asked whether there was any sign of the glaciers having been at a lower level in the past.

Mr. BRYCE wished to ask whether there was any zone of herbage corresponding to the pastoral alps in Switzerland, and whether there was any herbaceous alpine flora; whether the glacier ice showed the same characteristics as observed by Mr. Mackinder on Kenya.

Mr. MOORE, in reply, said that he thought that Sir H. Johnson had ascended to about the same point as he had himself. As regarded time, it took two days on the Uganda Railway, and then a march of only twenty days thereafter. With regard to the flora, much was very like, if not identical with, that on Kenya. The surface of the glaciers was very dry indeed, of a very peculiar green, hard and difficult to climb, and with very small streams coming from it. The height of the snow-line was much lower than he had expected to find it. Snow was found as low as

12,000 ft., and permanent snow at 13,000 ft. The Ruwenzori range was isolated, and thus produced a great atmospheric disturbance. Nearly every day rain fell on the mountains. It was perfectly easy to get porters and mules, and the porters did not object to going up the mountains. There were many peaks, some very easy, and some very difficult—so steep that no snow could lie on them. The natives were very friendly; and though there were many elephants there was no danger of attack by them.

The proceedings terminated with a hearty vote of thanks to Mr. Moore.

A GENERAL MEETING of the Club was held in the Hall on Tuesday evening, April 2, the Right Hon. James Bryce, *President*, in the chair.

Messrs. J. Annan Bryce, F. W. Hill, G. F. Turner, J. H. Vince, and Sir H. W. Lawrence, Bart., were balloted for and elected members of the Club.

The PRESIDENT announced that an acknowledgment of the Club's letter of condolence and of loyalty to the King had been received from the Home Office.

The PRESIDENT intimated that Mr. Valentine Richards had agreed to be the general editor of the second volume of Ball's '*Alpine Guide*,' and that, as most of the sections had been taken up by members, the work would now be proceeded with. He also informed the Club that Professor Bonney had presented to the Club a pencil sketch by Elijah Walton of Jean Tairraz, taken in 1866. A hearty vote of thanks was accorded to Professor Bonney for his gift.

The PRESIDENT then, on behalf of the Committee, laid before the Club the question of accommodation at the winter dinner. The number of members attending the dinner was yearly increasing, which was a very agreeable fact, but it had the corresponding drawback that it had not for some years been possible to accommodate all in the principal room of the *Hôtel Métropole*. The Committee felt that, as members had a prior claim to any guests to be in the principal room, some means must be devised of limiting the number of guests. The Committee were in difficulty as to how to deal with the matter, especially in connection with Rule X., which gave members the right to bring any number of guests, and therefore they wished to lay the matter before the Club to take the general opinion. There were only two rooms in London that were larger than the Whitehall Rooms, and, as far as the Committee could make out, in neither of them did it appear that so good a dinner could be obtained at the price as at the *Métropole*.

Mr. DENT moved: 'That in the opinion of this meeting, in order to prevent overcrowding and the use of an "overflow" room, the number of guests at the ensuing winter dinner should be limited, the right to introduce a guest being determined, if necessary, by ballot.' He had no prejudice in favour of any one of the plans. If matters were left as they were, with the steady increase in the numbers attending the dinner, there would this year be no convenient

sitting room for those who dined in the overflow room when, after dinner, they came into the principal room. He considered that members had an absolute right to a place in the principal room. He desired also to lighten the work of the Hon. Secretary. He thought that a ballot would work very satisfactorily. There were many objections to its use, but there were more to going to another room.

Mr. WITHERS seconded the motion.

Dr. WILLS was strongly of opinion that the Club should continue at the Whitehall Rooms. He thought it necessary to emphasise the fact that the dinner was primarily a dinner of the Club—'that members shall dine together,' in the words of the rule—and that the introduction of guests was only a secondary consideration. Any move, therefore, should be in the direction of limiting the number of guests, and giving preference in seating to members who did not bring guests. But there would be great practical difficulty in carrying out any such plan, and in persuading members to send in their applications soon enough. The members who came to the dinner were by no means the same as those who attended the meetings, and many of them had so little knowledge of what went on in the Club that they would probably pay little attention to any notice requiring early application. He proposed that preference in the principal room be given to those members who came without guests, and that power be given the Committee to withhold the right to bring guests, if necessary, from members elected in future until they have reached a certain seniority.

Mr. FOA suggested that another room might be tried.

Mr. ARKLE and Mr. NEWMARCH were strongly of opinion that the present rooms should be adhered to.

Mr. WILLINK also felt in favour of remaining at the Whitehall Rooms. He wished to support Mr. Dent's proposal, chiefly because it was limited to the current year. It was in the nature of an experiment, and if found not satisfactory some other plan, such as that of Dr. Wills, might be tried. The Club was growing, and this would in ten or fifteen years become a burning question. It would be difficult, even if legal, to make any distinction among present members. He was opposed to leaving things as they were, as there was a great burden on the Secretary, and the difficulty was not lessening as time went on.

After some further discussion Mr. Dent's motion was declared carried.

Mr. DENT then moved: 'That the Committee be requested to formulate regulations for carrying out the above scheme, and to submit them to the General Meeting on May 7,' and this motion was also carried.

Dr. HEPBURN read a paper on 'The Influence of High Altitudes in Mountaineering.'

The Hon. SECRETARY read the following on behalf of Sir Martin Conway, who was unable to be present :—

SOME OBSERVATIONS ON DR. HEPBURN'S PAPER.

By SIR MARTIN CONWAY.

The greatest difficulty a student of this recondite question has to face is that of obtaining accurate observations on which to base his reasoning. Most men suffer from a curious false pride in face of mountain sickness. They are unwilling to admit any weakening or illness till nature renders their abnormal condition obvious to others. They fight against their symptoms. Further, when the climb is over and they have returned to lower levels, they forget what their sensations actually were. They think they felt less discomfort than they did feel. Therefore I always mistrust every one's memory as to mountain sickness. Notes written on the spot and at the time are those alone which have any scientific value whatever. My own notes have always been so made. Their plain statements differ greatly from my memory of what my feelings were.

There are two effects of elevation on the human frame which ought to be plainly distinguished from one another. I call them mountain sickness and mountain lassitude respectively.

1. Mountain sickness closely resembles sea sickness. I have only experienced it in an acute form twice, both times in the Alps, at altitudes of about 12,000 ft. In other regions I have always found that, for the first day or two, at about 14,000 to 16,000 ft., all the members of the party who have come from low levels suffer serious discomfort, especially when taking violent exercise; but sooner or later they become acclimatised, and suffer thenceforward less or not at all. This sickness is, I think, due to a purely nervous derangement which tends to upset the stomach. It arises from a call upon the body to adjust itself to new conditions, and to the body's slow response to that call. It affects a man in bad condition more strongly than one in good condition, just as sea sickness does—in fact it bears a close analogy to sea sickness. I have seen hundreds of cases of this kind of mountain sickness in various parts of the world, notably in crowded railway trains in South America, which cross passes of about the same altitude as Mont Blanc. In the case of such rapid ascents, of course, the symptoms are more violent, but they are almost as plainly apparent in the case of slow ascents made on foot or horseback. These symptoms are not 'due to fatigue alone,'* as stated by Dr. Hepburn. They often appear after a good night's sleep, and when the change of altitude on the previous day produced scarcely any noticeable effect. I have seen two violent cases of mountain sickness in the Alps at an altitude of about 5,000 ft. within half an hour of starting after a good night's sleep.

2. 'Mountain lassitude' is a term invented by Major the Hon. C. G. Bruce, who has had better opportunities of observation than any other intelligent climber. It is best described as a diminution in the strength of a man due to diminished atmospheric pressure. So far as I have been able to observe, weakness is the only symptom, weakness physical, intellectual, and of the will power. This weakness is progressive, but very difficult to test. It begins to affect horses between sea level and 2,000 ft. above the sea, the effect being just sufficient to be perceptible in a race. Dr. Hepburn speaks† of 'powerlessness to perform any voluntary movement.' I have never experienced more than strong disinclination—for example, to wind up a watch or turn over in bed from side to side. In the case of infants the effect of altitude is more marked than in healthy adults. I have known

* P. 377.

† P. 379.

of an infant seriously indisposed at the Riffelalp, and immediately made well by being taken down to Zernatt. The same child was ill at Saas Fee and well at Saas Grund.

Only years of acclimatisation produce much effect in the direction of diminishing mountain lassitude. I suspect that the lungs have to be enlarged in capacity, and all the breathing apparatus structurally developed to adjust a man for long and hard work at heights of 17,000 ft. and upwards. Once a man's diet and lungs are set I do not think he is capable of any but a trifling development in power to endure mountain lassitude. He may bring himself into stronger and better condition at high levels, just as he can at low levels, but mountain lassitude will always subtract a definite fraction, or perhaps a constant quantity, from his strength, whether it be great strength or little strength. Lassitude, I think, varies directly with the supply of oxygen. It is as obvious in starting in the morning as it is at the close of a day's work. If for any reason there should be a local diminution in the supply of oxygen, independent of level, the effect will be felt in increased lassitude. Thus on snow one feels worse than on rock, worse still if the air be stagnant and the oxygen supply steadily diminished by contact with snow; yet worse again when the sun shines hotly than when the temperature is low. In all the high regions of the world traversed by caravan-routes certain spots are known where the effect of altitude is more felt than at neighbouring spots of equal or higher elevation. This fact is as certain as it is important.

It is worth notice that on every occasion on which I have taken caravans to high altitudes the unpleasant effect of altitude has been felt at a lower level on the descent than that at which it was encountered on the ascent. This was true (in the Himalayas) in the Bagrot valley, on the Hispar Pass, and on the Baltoro glacier. It was likewise true (in the Andes) on Illimani, on Mount Sorata, and on Aconcagua. It was as true at the beginning of a season as at the end.

The temptation is to write on this matter at a length that would doubtless be unkind to the Club; I therefore refrain. One correction of fact, however, must be added. Under the heading, 'Time of Day' * Dr. Hepburn records observations that mountain lassitude is more painful at night than by day. I have never found it to be so either in the case of my companions or of myself. I have slept in all six nights at altitudes of approximately 20,000 ft., and I have always had tolerably good nights, and often slept as well as at sea level. Sometimes great fatigue has interfered with the perfection of my sleep, but I don't think altitude had anything to do with it. I feel convinced that I could sleep well at 23,000 ft., and doubtless higher. The only trouble is to keep warm, and I have always succeeded in solving that problem. People who have suffered during their night's rest at very high altitudes have probably suffered from cold and consequent lowered vitality.

Dr. Hepburn concludes his valuable and most interesting paper with an encouraging paragraph. He does not see why we should not be able to climb Mount Everest. As to this hope I express no opinion, and never have expressed one. On the two occasions when I have been at 23,000 ft. I have felt that I could have climbed further, and that if I could have slept there I might have climbed much further. The problem of climbing Mount Everest will be complicated by two main difficulties—politics and finance. If the Government of India would persuade the Government of Nepal to let the Alpine Club try, and if about 10,000/.

* P. 391.

were forthcoming, and a good party with an ample supply of porters could devote two or three consecutive years to the attempt, there would be some chance of conquering the peak. To reach the highest point on the earth's surface, however, will be as difficult a feat as to reach the North Pole, and Peary's method will have to be applied in both cases, for the two problems are not essentially dissimilar.

Mr. DOUGLAS FRESHFIELD did not think that the term 'mountain sickness' should be confined to discomforts experienced above 16,000 feet. The same, or similar, symptoms were often observed at much lower elevations, and there medically attributed to altitude. Mountain sickness depended very much on the individual. Comparatively very few members of the human race had as yet been experimented upon. In the Himalaya he and his party of fifty had twice slept at 20,000 feet with only slight difficulty and no real discomfort. About 10 per cent. felt no serious effect, and 10 per cent. were thoroughly ill and incapacitated. The latter were, with one exception, porters who carried heavy loads. An English official who accompanied him, and who usually lived at 7,000 feet, showed no signs of sickness at 21,000 feet. The feeling of lassitude produced by fatigue, and, in his case, by days of wading through soft new snow, was distinct, but difficult to separate from the effects of altitude. He thought that there was encouragement in the fact that at above 21,000 feet his party were less affected than at 14,000 to 16,000 feet; in the last 5,000 feet they found no increase of difficulty.

Dr. COLLIE said that there was no doubt that symptoms might be produced by fatigue at the sea level which were the same as those of mountain sickness. Nearly the whole of such symptoms were explained by the presence of carbonic acid in the blood and fatigue of the muscles. Few people understood how much work was done in going up a mountain. He had himself been mountain sick at the sea level, at 3,000 feet or 4,000 feet, at 7,000 feet, at 11,000 feet, and at 18,000 feet. In every case he had been out of condition, and was poisoning himself therefore with carbonic acid and other products produced by the combustion of the body, which were thrown into the blood. The same symptoms could also be produced without work by going up in a balloon. If, therefore, the same symptoms could be produced both by fatigue and by diminution in pressure, it was very difficult to differentiate in the case of mountaineers what their so called mountain sickness was due to. In the case of diminution of pressure there came in the question of the gases in the blood. At high levels carbonic acid was much more readily thrown off than at lower levels. As regarded the absorption of oxygen, part obeyed the ordinary law of the diffusion of gases, but most of it formed a definite chemical compound irrespective of ordinary pressures. In the air at sea level there was five times as much oxygen in an inspiration as was required by the lungs. At 30,000 ft. there was still enough oxygen and to spare. A great deal had been said of fatigue of the legs, but the arms also were fatigued, as any one would find who tried step-cutting at

19,000 ft. In fact the whole system was affected by fatigue, and the question was one of the chief items in the symptoms, but what was due to diminished pressure and what to fatigue was at present uncertain.

Mr. LONGSTAFF thought that as a great deal of carbonic acid was formed by muscular exertion to make up for this it was important while actually ascending to consume small quantities of carbohydrates, especially sugar.

Dr. BUCKMASTER assumed as one condition that the individual was in proper training. The body responded in a very remarkable way to diminished pressure. The lungs become more distended, so that the actual area of the surface of these organs, where the interchanges between the blood and the gases of the air occurs, becomes increased. The type of respiration is deeper, but not necessarily more rapid. The rate of blood-flow through the lungs also increases as the atmospheric pressure diminishes. At the sea level the organism is luxuriously supplied with oxygen—indeed, with more than is necessary for life. About 18 volumes per cent. of this gas exists in arterial blood, but experiments have shown that 5 volumes per cent. are sufficient to maintain life. He had seen that in an atmosphere of 90 per cent. oxygen animals can withstand a diminished pressure equal to 130 mm. of mercury. This corresponds to an altitude of at least 2,000 feet above the highest point on the earth's surface. Under diminished pressure there is an undoubted increase in the colouring-matter of the blood, more than could be accounted for by any numerical increase of blood corpuscles.

Mr. BRYCE was struck by the fact that the data in the whole matter were still very imperfect, which was strange when it was considered how many persons were now living at high altitudes. It was desirable that such persons should in future provide themselves with apparatus for making more exact observations, and that they should have hints from scientific authorities to enable them to direct their observations. The matter would be solved by the experiments of the physiologist taken not at high altitudes combined with the accurate observations of those who reached high altitudes. There were great differences between different countries and different mountains as regarded liability to mountain sickness. In some cases the phenomena, at any rate of lassitude and difficulty of breathing, occurred at 8,000 feet, while in other countries they did not occur at 15,000 feet. He thought that the result of the discussion was cheering with regard to the future. Dr. Hepburn, Dr. Collie, and Dr. Buckmaster had shown that the difficulty as regarded oxygen was not insuperable. The fact that we were still in the infancy of the inquiry was strange, seeing that the phenomena had been noticed three hundred years ago.

The proceedings terminated with a hearty vote of thanks to Dr. Hepburn for his paper.

Gifts to the Alpine Club.

Mr. W. R. Rickmers has presented to the Alpine Club the photograph by him of 'Conglomerate Mountains in Bokhara,' exhibited at the Club Hall in May last year.—Professor Bonney has presented to the Club a pencil sketch by Elijah Walton of Jean Tairraz, taken in 1866 (see p. 436).

Addendum, Page 438, Line 9.

The forests of Colorado were not so striking as those of the western slope of the Sierra Nevada, where trees were found over 300 ft. in height.