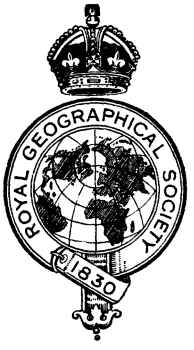
THE GEOGRAPHICAL JOURNAL



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MOUNT EVEREST

Brig.-General the Hon. C. G. Bruce

Read at the Meeting of the Society, 8 November 1920.

I DO not think that the exploration and attempted ascent of Mount Everest have ever before formed the exclusive subject of a paper at the Royal Geographical Society. This does not mean that the Society has never before interested itself in the Mount Everest group as a possible field for exploration—very much the opposite—but that never before has its exploration on a great scale been seriously taken in hand. It is probably known to all here that an ascent of Mount Everest and the exploration of the northern slopes of its massif, form the object, probably, and with luck, of the next great undertaking of this Society.

The history of all previous attempts to explore this region has been disappointing to its promoters. Political difficulties on each occasion have stood in the way.

It is necessary to give a short account of previous attempts. I believe the very first time such an expedition was mooted was in the following circumstances: but I must of course point out that I do not now refer to the immense attention which had before, and has since, been paid to the great mountain, its measurements, the arguments over its name, and its visibility from different localities; I refer strictly to proposals to get on to the mountain itself, and on to its satellites.

In 1893 I took part in a mission which was sent to Chitral from the Gilgit agency, to place a new ruler on the throne of that turbulent state. The mission was under the leadership of Sir George Scott Robertson, the explorer of Kafiristan, and later the defender of the Chitral fort. Its second in command was Sir Francis Younghusband. I had lately joined the Gilgit agency as Special Service Officer from Sir Martin Conway's expedition to the Karakoram. We talked over numerous projects, the most favoured and most sporting being an attempt to reach Lhasa *viâ* the headwaters of the Yarkand River, under the leadership of Sir George Scott Robinson and Macartney from Kashgar.

The second proposal was one that particularly appealed to myself, and I think also to Sir Francis—the Everest group. It is a far cry from Chitral to Eastern Nepal and the Tingri Maidan, but had not Sir Francis

himself come all the way from China through the howling Gobi Desert and over the Mustagh Pass in the Karakoram to boot? What is distance, anyhow? I think we finally attached our Everest expedition as a fitting end to the Lhasa expedition, but am not quite sure on this point. At any rate, after sympathetic letters had passed from Simla, all our plans were stopped for the usual political reasons. Subsequent exciting times on the Frontier and the exigencies of the service separated the leader and his humble and junior assistant.

Before the next proposal for an expedition was made there was a very big gap—no less than from 1893 to 1907—and in the interval the Tibetan expedition had taken place; Lhasa had been reached by British troops; and Colonel Ryder's and Major Rawling's magnificent journey up the Brahmaputra had been made. Our knowledge of the north side of the Himalayas had been vastly increased. Of course, this expedition is inseparably connected with the name of Sir Francis Younghusband. Curiously enough I found myself in Chitral again at that very time, and I think the President will remember an urgent appeal from Chitral to join him. I actually received an answer that I was too far off.

The next attempt was mooted in 1906. In that year I was at home, and suggested to Mr. Mumm one evening when we met at the Alpine Club that he should really come out to India and see the Himalaya. If the Himalaya, why not Everest? Dr. Longstaff was approached, but I fancy the idea had already attracted him, although at that time he was mightily occupied with his favourite Garhwal. We soon formed ourselves into a committee of three, and elected each other as the sole members of this expedition. I must say that it would have been entirely due to the generosity of my companions that the expedition was rendered possible.

We then naturally approached the Geographical Society, and were in every way most enthusiastically treated by Sir George Goldie, the then President. Not only did the Society make us a liberal grant, but the President took infinite personal trouble to obtain for us the sanction of the Secretary of State for India. From the Government of India itself we also received every encouragement, and were informed that if we could obtain the sanction of the Home Government, the Government of India was prepared to assist us in every way. There is no doubt that we could have counted on assistance for supplies from the Nepalese Government, although at that time it would have been impossible to have proposed passage through Nepal territory.

Our project was precisely the same as that now proposed, and I will roughly indicate it: to cross into Tibet to Kampa Dzong, and then proceed *viâ* the Tingri Maidan to the north of the Everest group, and thence make our attempt to climb Everest by the northern slopes. We should probably not have succeeded, but we should have gained experience which would have been of value to subsequent expeditions. This route has now been clearly shown to be the most convenient, for it must be

remembered that we then wished, and now hope, to establish a base as high as possible, and as near as possible to Everest itself, and that that camp should be replete with every mountaineering comfort. After all the route to it is but 120 miles from Kampa Dzong, and our main interest should be the avoiding of all unnecessary exertion and difficulty until that camp is established. After that time the intensely interesting country, including the gorge of the Arun River, and mountains east and west of Everest could, I hope, also be explored.

We had certain advantages. We had engaged the two Brocherel brothers, than whom no better guides have ever travelled abroad. They had both been with Dr. Longstaff in Garhwal and Tibet, and had undoubtedly with him reached 24,000 feet on Gurla Mandhata, which, if they had had facilities for measurement, would in all probablity at that time, and until the date of the Abruzzi Karakoram expedition, have been the highest point attained, its only rival being the unproved but probably correct ascent of Kabru by Graham. We also had a good train of Gurkhas already ear-marked. What we had not understood, however, was the necessity for a full preliminary exploration, which is now amply made clear.

It was not to be, however. Lord Morley, the then Secretary of State, was averse to our entering Tibet at all, as being contrary to the lately completed treaty with Russia.

Owing to the kindness of Lord Minto, this expedition was directed to British Garhwal, and resulted, among other things, in the climbing of Trissul by Dr. Longstaff, the two Brocherels, and Subadar Karbir Burathoki (5th Gurkhas).

In the following winter I found myself the guest of Colonel Manners-Smith, the Resident in Nepal, and had several talks with the Maharajah, the Prime Minister and Marshal of Nepal, who was very much interested in our last attempt, and, after much talk, himself proposed a joint Anglo-Nepalese expedition, which should enter Nepal *viâ* Hanuman Nagar and march *viâ* the valley of the Dudh Kosi. Naturally I was overjoyed, and, with the assistance of Colonel Manners-Smith, approached the Government of India on the subject. Correspondence ensued.

I must mention that previous to this the Nepalese Government had given leave to the Government of India to send a surveyor of the Survey Department to explore the upper Dudh Kosi, and, I believe, determine if possible whether Mount Everest was actually in Nepalese or Tibetan territory. This is still a doubtful point. But the two passes, the Pangu La and the Popti La, respectively 20 miles west and east of the mountains, are claimed by the Nepalese. Beyond that, the report of his explorations would have been of the very greatest assistance.

I must mention that Maharajah Sir Chandra Shamsher Jang, the Prime Minister, though by far the greatest force in Nepal, is not an autocrat, and that he has to be just as careful of public opinion as any

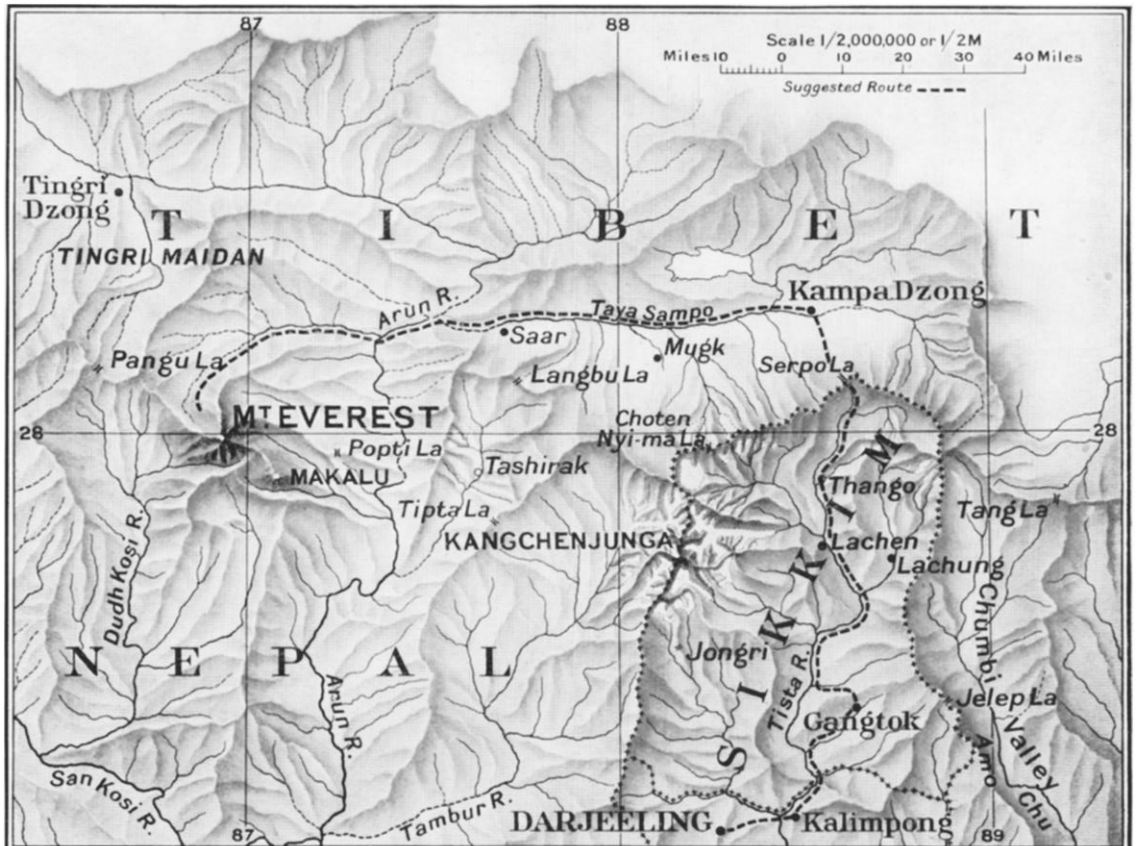
one else in a similar position. The result was that, as my preparations proceeded, so was the scope of the expedition cut down, until I was finally reduced to a three months' rush across the frontier, and a maximum of twelve coolies. My original proposals had naturally been for a sufficient though, knowing what to expect, not an ample outfit. I promptly accepted, hoping to get at least a photographic record of the greatest interest, but seeing that I was not to be put off, a final telegram came saying that the expedition was unadvisable.

Public opinion in Nepal means that of the Kshettriya nobles, and cannot be despised; and even though the Maharajah himself was in favour of it, it would have been quite impossible for him to have gone against the ingrained prejudices of his Darbar; of that I am certain. But so long had been the negotiations, and so many times had I cut down my requirements, and yet so near was the date for my start, that I was actually waiting with my modest camp packed when the final telegram arrived. An outlet was required, so I cut down something else, to wit my leave, could take only a month, and hastened to Jongri in Sikkim at express speed in the vain hope of seeing some of the glaciers that descend from Kabru and Janu. But my luck was out that year, and not for a moment did the mist lift or the snow and sleet stop.

Our present proposal is based on the same plan as that of the 1907 project, but we intend to go much more thoroughly into it. It is hoped to make a thorough reconnaissance of the upper Tingri Maidan and of the country surrounding the northern slopes of Everest. There are certain ridges to be crossed. The upper course of the Arun River must also be crossed, and our whole outfit and main base established as near the great mountain massif as is possible. We also have to organize our transport, both men and animals, and it is hoped to train a team of porters for the exploration of the upper snows. In some ways the country enjoys a great advantage, in that it is in all probability not too difficult for yaks. We hope by their help to carry our main camp, or from the main camp to push higher ones, to over 20,000 feet, from which point we must depend on men; and that is one of our most serious difficulties.

We hope to be able to sufficiently interest the Government of India, so that they will place aeroplanes for reconnaissance at our disposal. Whether it would be possible for aeroplanes to land safely, and having landed, to rise again, must be left by mé for experts to decide. Naturally, if this could be done our whole arrangements would be simplified mightily.

I am pretty certain that Nepal would be willing to help us by sending grain and food, either over the Popti La, or the Pangu La, or up the Arun River. Before they could arrive we should have to make very careful arrangements for meeting them. There are however known passes into Tibet through the Nepal Himalaya, and therefore no great



SKETCH-MAP OF THE NEIGHBOURHOOD OF MOUNT EVEREST

MOUNT EVEREST FROM SANDAKPHU, 16 MILES WEST OF DARJEELING

Tele-Phot. by Mr. J. Burlington Smith, Darjeeling

difficulty should be experienced in communicating with them, especially with the help of an aeroplane service. The whole of these questions will be gone into thoroughly, and tested during the preliminary reconnaissance.

It does not by any means follow that during the reconnaissance ways and means of approach, camping grounds, aeroplane service, landing grounds, establishment of depôts, etc., will be the only work to be done. We must also thoroughly train and test our teams, and we must also test our men. As much as possible of the lower slopes of Mount Everest itself should be thoroughly explored, and also, if possible, the final line of advance actually determined. We should see how far we could expect to push our camps. We have a good deal to go into in all this, but not too much by any means. We know that in not too difficult ground sufficient equipment can be carried to 22,000 feet, because it has been done more than once; but against that we know that on the Duke of the Abruzzi's highest climb the pace of a very strong party, to wit that of the hardiest Italian guides, and the Duke himself, was near 250 feet per hour. We want to push camps to at least 25,000 feet, or higher, if possible. Now no one can say that the Duke's party was overworked. It was a splendidly fitted out expedition with ample means, and therefore with ample porterage and the best of food—two most necessary conditions if great things are to be done well. Therefore the members were not worn with much preliminary toil, but should have been at their best when the final test came. Yet we see how slow their progress was. His actual rates were as follows: from 23,000 to 23,450 the rate was 396; between 23,450 and 24,250 it was 273; and the last stretch to 24,600 was at the rate of 160 feet per hour.

Our task is to put camps higher than the highest already attained by unladen men, and to produce our climbing party at the top of its form at these camps, and it is for this reason that we must take the greatest care to have adequate carrying power, well clothed, fed, and trained.

When one looks at the north ridge of Mount Everest, it appears not too steep, but one must also take into consideration the climate of Tibet. Sir Francis Younghusband tells me that in the height of the monsoon season the northern face was nearly always clear. The climate of Tibet is notoriously dry, and the sun notoriously strong. The result of that combination is that the face will almost certainly be largely ice. It will be very lucky if it is not so. That will be a very great difficulty, as ice invariably means hard work, and that is the one thing we do not want. What we want is continual fine weather and firm snow. Our other great danger is too much wind; that also may possibly be a serious difficulty.

One of the most important tasks for the reconnoitring party to undertake will, of course, be to find the easiest way which leads from Kampa Dzong and over the Tingri to the foot of Everest. We are not quite clear how far to the north the great gorge of the Arun river extends, but we

do not want to be involved in the hard work of crossing high ridges and descents, when probably by travelling further to the north we could advance on much easier ground direct to our objective. From the map we now have it seems as if to avoid the ridges it will be necessary to pass well to the north, and the easier our route is, the longer we shall be able to do without man carriage and to employ our yaks. It might even be worth while to carry a certain amount of fodder for the yaks, if the scanty herbage on which they seem to thrive gives out, and if the ground is still possible for them. Naturally, having pushed our yaks to the greatest extent, a base would be formed and the yaks would return to feed, and to get into condition again for further efforts, or to return for further supplies.

In order to make the most of our British climbers, we must have, as I have said before, a properly trained team of porters. This is a very important part of the expedition, and therefore it would be well to review the subject of Himalayan porters in general and the work that they have done for numerous expeditions. Almost always one finds, on reading accounts of Himalayan travel, that difficulties have arisen over the coolies. Some well-known explorers have apparently met continuous difficulty. One exploring party invariably has done so, and I am afraid not without reason. Here is an extract from one of their works which speaks for itself. "We were told that as the natives had been starved for two and a half years they were anxious for work; but this does not appear to be the spirit at all." Starvation certainly does seem an excellent preparation for about the hardest work a human being can do.

Naturally, if the Himalayan is to be explored at all, assistance must be given in obtaining porters. The result is that every able-bodied man from the local villages is usually roped in by the civil authorities, and more or less obliged to go, nearly always against his will, certainly against the will of the majority, to carry loads up into the snows at a stated and quite inadequate remuneration, for a more or less protracted period, according to the locality. If, however, the traveller confines himself to well-known passes, and holds out hopes that his men will be back home in a few days, and, above all, if he requires few men, there is usually very little difficulty in obtaining sufficient, especially for non-ambitious journeys.

I will give an illustration of what I mean. The village of Askoley in Baltistan, which is the last village in the direction of the Biafo, Punmah, and Baltoro glaciers, is emptied by every explorer in succession completely, and usually the villages a little lower down as well. Eighty per cent. of the inhabitants loathe going on to the ice. They are indifferently clothed, have to live over-hard, even for them, and if there is bad weather have a miserable time; there is naturally no incentive that they would care twopence about. Naturally they do everything possible to lighten their work and get away. Mr. Montagnier of the Alpine Club gave me

an amusing account of his arrival in 1903 or 1904. The whole village took to the hill on his arrival, and refused to come down, and from this elevated spot showered stones and abuse on him and his emissaries. "Here is another infernal traveller on his way to the ice."

The Balti is a hardy, very simple, but a rather low-couraged and depressed specimen of humanity. For their trouble they have received very little besides abuse from any one. But it is really wonderful what has been got out of them. Dr. Guillarmod, in his excellent book on his exploration of K_2, states that his Balti coolies served him well, although many of them were barefooted; they made boots out of raw sheepskins for glacier work. He apparently had little difficulty during the five to six months that he employed them.

It has been the same all through. The porter difficulty has required right handling. When their employers have done their own obvious duty by their coolies the men have played up in a wonderful way, and, considering that they have little interest and small reward, have often shown themselves good sportsmen. But the view that on a climber's arrival in a Himalayan village, all the young men, most of the old, and some of the boys, will shout, "Hurrah! here's another chance of sleeping on the ice and eating chupatties a week old," should be eliminated.

With regard to the resistance of Himalayans to cold, the average can stand greater exposure with his scanty clothing than the average European under the same conditions of clothing. Tibetans undoubtedly can. But great cold, night after night, reduces condition and vitality, and we are out to produce our carrying train at great heights at the top of their form.

May I quote an extract from a book I wrote on Himalayan travel to show my views on the subject?

"We had our special outfits, the best of clothing, sleeping-bags, thermos bottles, and boots and light tents, and even then we all suffered considerably from cold. How could the wretchedly clad local man be expected to lie out at 18,000 feet in the snow on May the 20th, and, even if he survived, be worth anything the next day? I have on many occasions seen natives sleep in the snow with the one blanket that they carried with them as their only coverlet, but not at such a height nor so early in the year. I have also been on expeditions in which our numerous coolies slept packed together in a tent with no more cover, and lived on the lightest food; but such exposure would take it out of the strongest and best-nourished man. I believe there have been several criticisms on the local men by Europeans and other travellers, who have been hurt and disappointed because the natives failed them after several days of this sort of thing, 'although,' as they said, 'we provided them with tents.' In fact, when I creep into my Mummery tent and take my boots off and pull on a pair of special long sleeping-socks over my dry stockings, and put on a dry shirt and pull down my Balaclava cap, and then creep into my swan's-down sleeping-bag and finally have a nice hot pull out of my

thermos bottle, I have often wondered myself why the coolies should complain of feeling unwell in the morning."

Properly treated, real good men can be got anywhere, and, if we take the trouble, no better than from Eastern Nepal and Sikkim; but it must be made worth their while. Good men must be got, well clothed, well fed and trained, and above all made to take an interest in the proceedings. It must be thoroughly understood that invariably the local superstition about the mountains will play its part. I have had it said to me on several occasions that Kangchenjunga always claims his man, and that after that its explorers are all right and are safe enough. Kangchen naturally has its especial god. You can see pictures of him in any Sikkim monastery.

Now I have travelled with every conceivable porter in the Himalaya and Hindu Kush, from Kalash Kafirs to Tibetans, and I must place first of all Hunza-Nagaris and Kanjutis, and Tibetans of whatever class I have employed, Sher Pas especially, for high expeditions; but I have had excellent experiences with many other types as well. If one gets the right men, and above all gets their confidence, one can get together splendid teams of carriers in almost any part of the Himalaya, but one must accept them as one finds them, and not expect them to immediately fall in with one's own views about everything. They will try one's patience, that is a certainty. Their food arrangements will come at the wrong time, and irritate. All sorts of things will irritate, and will have to be borne philosophically.

Now what we want is a full team of specially picked Tibetans or Bhotias. I am all for getting a team of Sher Pa Bhotias. The Sher Pa is usually a Nepalese subject, and inhabits largely the high southern slopes of the Himalaya; there are many of them settled in Sikkim, and numbers working in Darjeeling. The advantage of the Sher Pa is that one has a greater hold over him than over the other Bhotias, with the exception of the Sikkim Bhotia, the Deng Jung; and I have always found him a sportsman. Many speak usually their own Tibetan dialect, and Nepali and Hindustani occasionally. These men should be directly in charge of their own sardars, but should have besides two or three young Gurkhas, N.C.O.'s of our Gurkha regiments, who would really be in charge of them. These N.C.O.'s should be of certain particular classes, besides being specially chosen for physique and cheerful dispositions. They should belong to the Low Church Party, not the High Church. I know at this moment three or four who would do admirably.

The Sher Pa team should be well clothed and booted, and among their duties the N.C.O.'s would have to interest them in the objects of the expedition, and awake an *esprit de corps*. The men must come back from their reconnaissance the first year, ready and willing to return and complete their work, and feeling keen and anxious to meet again the

members of the expedition, part and parcel of which they must feel themselves.

I know this can be done, and I give you one instance. In 1909, when I went to Jongri, nearly all my men were those who had been employed by Messrs. Rubenson and Monrad Aas. Now although we had awful weather and continual discomfort, these men were as keen as possible, and kept on urging me to go on; they said they were quite ready at any time to go up into the Himal. They were almost without exception Sher Pas, and came from the upper waters of the Dudh Kosi. All this speaks well for their previous experiences with Messrs. Monrad Aas and Rubenson.

Here is another way in which the Nepal Government could undoubtedly help. If we found difficulty in Darjeeling itself or from Sikkim in getting suitable men, they would probably be able to find us, and possibly pick for us themselves, a limited number of known good men. We must be liberal, however, in terms and outfit. After all, we don't want a very big team. The fewer permanent men we can get on with the better.

Take another instance, Dr. Kellas' Bhotias. No one could speak more highly of his companions than he does, and further he gives them credit for wonderful powers at high altitudes. He states that his coolies above a certain height, 22,000 feet, even with light loads, were 30 per cent. better than himself even without any load at all. Now these coolies were often obliged to put up with very short commons of indifferent food, and yet they stood the cold down to 29 degrees below zero Cent. without harm. I wonder how many times they have come back to him. Not only did they travel with him in their own country, but the only time I met him, on his way to Nanga Parbat, which lies on the Indus in the Gilgit agency, and is, as every one probably knows, the actual western extremity of the Himalaya proper, they were with him then, very very far from their own country. Now Dr. Kellas does not travel luxuriously, and he makes his men work, and work mighty hard. But he does it correctly, and his especial men he develops in a wonderful way.

We have greater attractions to offer, and bigger aims, and if during the reconnaissance our carrying team is well run, when called upon for the actual attempt it should be more than willing, well-trained, and reliable; and we should ourselves feel that at any rate we shall be able to establish and ration camps as high as it is humanly possible to place them. Looking back over the record of the greatest heights at which climbers have had camps established, we find that on a few occasions camps have been carried to over 22,000 feet.

Having now more or less disposed of one of the important elements of the expedition, let me proceed to examine the chances that the climbers will have of actually reaching the summit of the great mountain itself. We really know very little of its geography. We have a distant picture

of its northern ridge, far the most promising part of the mountain that has yet been seen. It however causes one to think; there are evidently portions of it which are steep, and we have to think out our camps. Very much will depend on what that ridge usually is. Will it be ice, or firm snow, or soft snow? This last is terrible at great heights. It is what stopped the Duke of the Abruzzi.

Let us review what has already been done. First and foremost, as being in my opinion the feat of the greatest endurance that has yet been accomplished, and which leaves us full of hopes: not the climb of the Duke of the Abruzzi, but Dr. Longstaff's attempt at Gurla Mandhata in 1905. To begin with, I am convinced that 24,000 feet was to all intents and purposes reached, and may have been passed. The height of the mountain is probably 25,850 feet. They had had a week or more of the hardest work, during which they had twice reached at least a height of 22,000 feet, the last time carrying their own camp to at least 20,000 feet themselves. On the day when they made their final attempt they got on to some treacherous snow which gave way and carried them down in a great avalanche for 1500 feet, successfully jumping two small cliffs. Finally, by a supreme exertion of strength on the part of one of the Brocherels, they managed to extricate themselves. After a little time, having recovered, they proceeded with their attempt, and found a better route, spending a night in a hole in the snow with a minimum of food and naturally no extra clothing. They continued the ascent next morning, and only owing to extreme fatigue and to headache, induced by the loss of at least two hats, were then compelled to give up, having, according to their rather modest computation, reached to within 1500 feet of the summit, and hit on the exactly correct route.

Now this is not the right way to prepare one's self to conquer a great peak. I am certain that, if they had been fresh, had had ample time and provisions, instead of having to travel hard to catch up their main camp, they would have succeeded in reaching the actual summit of Gurla Mandhata, and have established a record which would have remained to the present time.

As a matter of fact Dr. Longstaff was travelling hard, being attached to Mr. Shering's mission, and, in my opinion, not prepared from that point of view to tackle a mountain of the first class, and not at all prepared with food, from what one might call a professional trainer's point of view. Further, nearly the whole of their reserve of strength must have been expended in those marvellous moments on the avalanche, and during that terrific night. I place their performance as the one which gives us most hope, but we must take care to eliminate the little jokes they indulged in, and have a more normal outlook.

Our model should be the next on the list, the Duke of the Abruzzi's: a model from any point of view, whether of reaching a great height, or of scientific observations, or of dealing with the natives. Remember I

merely say a model. I do not say that it was necessarily economically carried out, or that the over-payment of the Balti did not make it difficult for more humble travellers who followed after, but a model for Mount Everest, in that it was completely and well equipped, was composed of first-rate men only, whatever their business on the expedition was, and that no effort was spared to render everything adequate to obtain the required end.

Again Alexis Brocherel was of the final party. They reached a height of 24,600 feet, and this is up to the present time well the highest measured point attained. Further, they took native porters up to a height of 22,500 feet, and their men remained there under very adverse conditions of weather for many days. They themselves were terribly hampered by bad snow. Given a fair chance, with a fortnight's good weather, and in consequence good going, and there is no doubt a much greater height would have been reached. Possibly even Bride Peak itself would have been climbed. It is well and often said that the easiest mountain may be rendered impossible by bad weather, and soft snow is one of the greatest possible enemies at a great altitude. It will be seen that their pace was slow, about an average of 250 feet per hour. They were evidently nearly at the end, and had little chance owing to the softness of the snow: a possible, though not so likely, condition that may also be found on Everest. Here we have an expedition run on entirely different lines from Dr. Longstaff. Their food had been packed in special tins. Each tin contained a balanced diet for so many people, as should be done by us as well. They had not been, or ought not to have been, worn out by too much hard carrying of their own camp at high altitudes. Their route also was not too difficult; it is almost certain it was due to snow conditions that they did not attain a much greater altitude.

Next I place bracketed the climbing of Trissul (23,400 feet), Messrs. Rubenson and Monrad Aas on Kabru at 23,800 feet, and Dr. Workman's climb of 23,400 feet on a ridge above the Chogo glacier in Baltistan.

On the first great climb there were again Dr. Longstaff, the two Brocherels, and Subadar Karbir Burathoki of the 1/5th Gurkha Rifles, who had been with Sir Martin Conway's Karakoram expedition and his journey in the Alps "from end to end." A high camp had been made at 20,000 feet, but a hurricane confined the expedition for thirty hours to their bivouac tents, and obliged a descent to 17,400 feet, and a re-ascent for the climbing party from that comparatively low elevation. I do not include hurricanes in my preparations for a model expedition, or as a training adjunct: hurricanes sap the strength, and don't improve it. This one compelled a descent and re-ascent, also undesirable. Finally the climbing party ascended from about 17,500 feet, climbing over 6000 feet in a day at a great height, a notable performance. The condition of the snow was good. Messrs. Monrad Aas and Rubenson's attempt on Kabru

was probably as noteworthy. There was no professional assistance, and only a scratch but very successful team of Bhotias. Kabru is immensely fatiguing, but not difficult. This climb is noteworthy by reason of the amount of baggage taken high, and the cheerful and willing co-operation of the Sher Pa Bhotias.

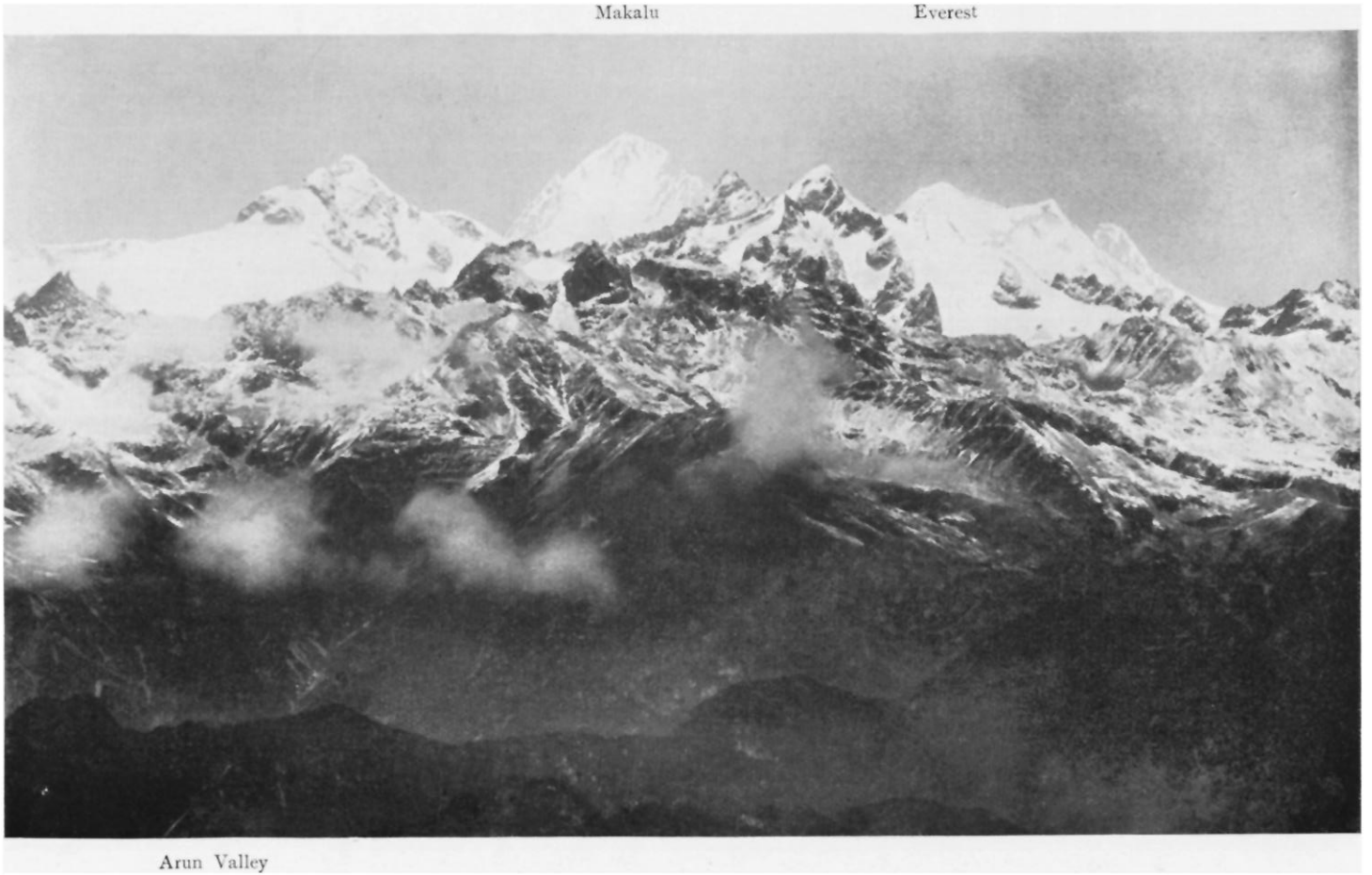
There have been other noteworthy high explorations which give us hope, and also point their particular lessons. Such is Slingsby's attempt on Kamet. He reached a very great height under the most adverse conditions, with unwilling and frightened Marcha Bhotias and bad weather. It must be admitted that the Marcha Bhotias' foot gear is the very worst for the mountains I have ever seen, giving no hold in the snow, nor any protection. From the point he reached, Kamet would probably have been climbable by a fresh party; but Slingsby was quite played out, and did not recover for a year afterwards. He was a complete enthusiast, and a thorough sportsman in the highest sense. Himalayan exploration suffered a very great loss by his early death, and that of his cousin, Major Todd, of the 5th Gurkha Rifles.

Dr. Kellas' innumerable Himalayan expeditions are as important as any—notably his ascent of Pawhunri in northern Sikkim—and no one has done better work than he, or knows more about the effects of high altitude on the human frame. He has just lately been making a second visit to Kamet, and the result of his explorations and physiological tests will be of the utmost importance to the Mount Everest expedition, both in making its preparations and in its subsequent conduct.

We have also the climbs and explorations of Mrs. Bullock Workman and her husband. No one has travelled more consistently, but I do not think there is much in their experiences which will be of special use to us in our contemplated expedition.

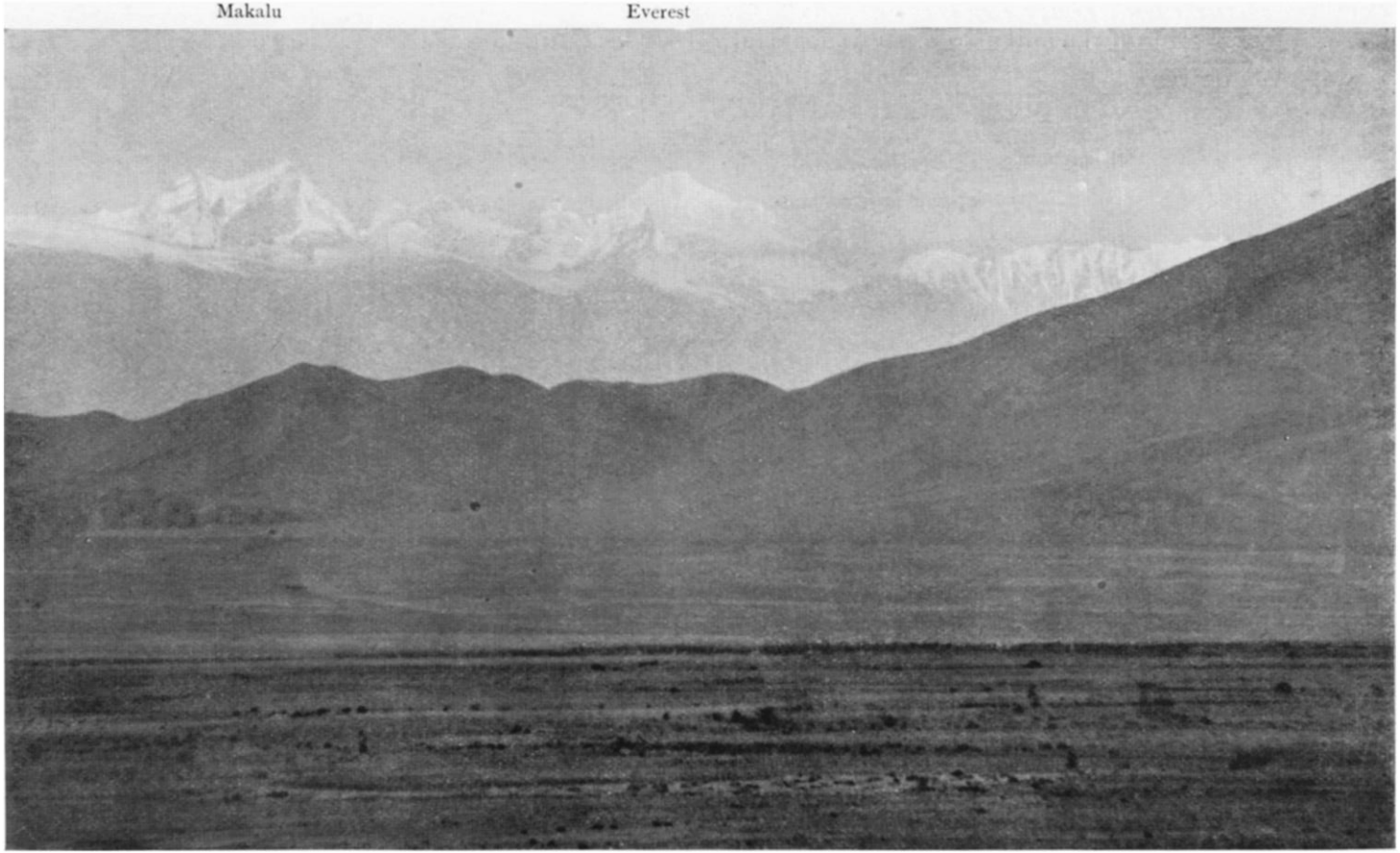
Such was the position when I finished writing this paper, but during the last two days the following information has been received. The saddle reached by Mr. Meade during his explorations and attempts on Kamet in 1914 has been officially measured by the Indian Survey Department and turns out to be no less than 23,500. Mr. Meade fully established a camp at this point, and this camp is by far the highest yet made, and it is also by far the highest point at which an explorer has passed the night. This comes from an officer of the Survey of India, who writes that this year Dr. Kellas with Major Morshead reached this same col, but was unable to get his coolies to the col itself, and therefore was unable to camp there. Since this information was sent Dr. Kellas has made yet another attempt to climb Kamet, and let us hope a successful one.

Two other performances to me are as important as any, not so much from the actual height obtained as for what it gives us a right to expect. First comes Mr. Mummery's final attempt on Nanga Parbat by its W.N.W. face. For forty-eight hours he and the Gurkha, Ragobir Thapa,



MOUNT EVEREST FROM CHUNJERMA LA, 15 MILES SOUTH-WEST OF KANGCHENJUNGA

Tele-Phot. by Sign. Vittorio Sella on Mr. Freshfield's expedition to Kangchenjunga, 1899



MOUNT EVEREST FROM KAMPA DZONG

Tele-Phot. by Mr. J. Claude White on the British Mission to Tibet, 1903.

were engaged in the most terrific rock climbing it is possible to imagine, and finally reached a height of 21,000 feet. The most desperate gymnastics hour after hour at this great height were a prodigious exertion. I put the difficulty of the climb as quite the equivalent of another 5000 feet of elevation on better ground, and I know I am not exaggerating at all. The second example includes two climbs by Major Todd, with Heinrich Führer, a Swiss guide, and the Gurkha Chandra Sing, on a mountain of the curious name of Mewakundini, which is just under 20,000 feet, which again entailed the very hardest gymnastics on both rock and ice; and another unnamed peak of about 21,000 feet, of less difficulty, but which they accomplished in rough weather at a pace which would compare favourably with the ordinary pace on a 10,000-foot Swiss peak. In my opinion both were remarkable athletic performances.

I give these instances as I know well the places where each was accomplished, and am able to judge. I consider it gives a very fair line on which to judge what we can expect from probably still better men, properly trained and taken care of, as our final climbing party should be on Everest.

Now we come to the constitution of the proposed expedition. It is to be a combined Geographical Society and Alpine Club party.

The Alpine Club members are to organize and carry out the actual climbing of the mountain. The Geographical Society undertakes the scientific side, and hopes for the co-operation of the Survey of India. There is of course great hope that functions may overlap, but it is also necessary that the climbing members should treat themselves seriously from their point of view, and whatever other work they undertake must, in their case, be to them a side show. The Geographical members may, and it is hoped will, assist in the climbing, but their side show should be the climbing.

There should also be a base commandant, who would be responsible for food supply for the porters, arranging for camps, etc., in fact a general utility man. He should also be general interpreter, and might with advantage be an officer of a Gurkha Regiment. I know, however, of one Indian civilian in particular who would fill the post very well.

Again speaking of our Alpine party, I am convinced that as few nights as possible should be spent at great heights. It is much better to come down as far as possible for a good rest, and re-ascend when fresh, than to try and recover from fatigue by lying up at a great height. The height itself is against recovery. It might, even if several attempts were necessary, be right to get the party back to such comparatively low elevation as 15,000 feet. Dr. Guillarnod's expedition passed, I think, a greater number of nights without descending than any other expedition, and were certainly badly affected by so doing.

I will bring this lecture to a close by referring once more to the name of Mount Everest. It would be a great misfortune if the present

beautiful and suitable name were ever changed, even although it is actually the name of a late and honoured Surveyor-General and not a native name. At the same time there is no harm in speculating on what the native name may be. It is doubtful if the actual peak has one at all. Colonel Wood has clearly shown that the name Gaurisankar belongs to another group, and there are no backers for Brian Hodgson's Deva Dhunga.

It is not true, though, that natives of Nepal have no names for single peaks, for any Gurkhas from Central Nepal are familiar with the names of Macchha Puchri, Dhaulasiri—or Giri, Chibchibia, and Gosainthan, and others. My Sher Pas from the Dudkosi, whenever I have questioned them, gave the name Chomolungmo for the Everest group: I thought at first for the actual peak, but I think now for the group. They also, and unshakably, called Makalu "Kamalung," except Darjeeling men, who knew Englishmen used the former name for the mountain. In fact, I have never discovered any one else who knew the name of Makulu. Mr. Freshfield quotes the name Chomo Kankar, probably also for the group, and there is no reason that shouldn't be right. His authorities were Colonel Waddell and Chandra Das. Major Noel also obtained what he believed was a local name, probably also quite correct. He obtained this on his journey in 1914 to find a short and direct approach to Everest from the east and south-east *viâ* Tashirak, an exceedingly ambitious project. It was a real bit of exploration, and I believe he traversed country not before crossed by an Englishman, and of intense interest.

There is a river in Nepal, one of the affluents of the Trissul, which I called the Dharmdi. I was told I was wrong, and that its name was the Dharmkhola. Di is the Maggar word for river, and Khola the Nepali. I give this instance to show how very easy it is to confuse local names.

Even if this proposed expedition finds its real name written clearly on the mountain, I hope it will take no notice, as I am sure you will agree that no name is so beautiful and suitable as Mount Everest. May the 2 feet never be cut off its 29,002! Luckily the loss is now rendered more difficult, as the latest computation credits the mountain with 140 more.

One final word. I am sure that whoever takes part in this proposed exploration will join with me in regretting that the late General Rawling does not form one of the party, for I believe it was his life-long ambition, and that in all probability if he had lived he would have been himself one of the actual leaders.

Before the paper the PRESIDENT said: In my Presidential Address this year I stated that the Alpine Club and our Society were interesting themselves in plans for the ascent of Mount Everest. Since then the Secretary of State for India has been good enough to receive a deputation from our two Societies

and to express his sympathy with the project. Colonel Howard Bury then on our behalf—though we acknowledge with gratitude at his own expense—visited India to explain our wishes to the Government. He was cordially received by the Viceroy, who recommended him to visit Sikkim and talk the matter over with the local officer. Unfortunately it has been decided that for political reasons the present is not a propitious moment for actually commencing operations. But in the meanwhile till the political horizon clears we may well occupy ourselves in reviewing the whole project, for it will never be eventually successful unless it is planned out with particular attention beforehand. Utmost care in detail must go hand-in-hand with boldness, and the ascent of Mount Everest, one will realize, requires boldness in the extreme.

First let me say a few words about the general idea of climbing Mount Everest, for I want to get the idea enshrined in the very heart of this Society. I have never myself been a peak climber or acquired the art of Alpine climbing, but I have had ample evidence of the practical value of mountain climbing. When exploring a new route across the Himalaya in 1887, I came to the Mustagh Pass. What carried me over was the remembrance of the deeds and example of Alpine climbers. As I looked down the awful precipice I had to descend, I confess I felt terror, and if I had lived a hundred years ago I should not have dreamed for a moment of attempting the passage. I should have assumed as a matter of course that it was impossible, but with the recollection of what Alpine climbers had done in Switzerland, and what sportsmen do in India, I pulled myself together, took the plunge, and got over all right. And having, through the example of the Alpine Club, successfully negotiated the Mustagh Pass, I was able in subsequent years to tackle many other unknown passes in the Himalaya. And having become accustomed to Himalayan passes, I did not hesitate to advise the crossing of the Himalaya even in the depth of winter when I was leading a mission to Tibet in 1904.

The high spirit of the Alpine Club thus percolates downwards till it reaches us lowly geographers, soldiers, and political officers, braces us up, and enables us to carry out enterprises we should, but for their example, never have attempted. The ascent of Mount Everest will have the same effect to an increased degree. Our forefathers were terrified of mountains, and called the most ordinary peak inaccessible. Nowadays we refuse to admit that the highest mountain in the world cannot be scaled, and the man who first stands on the summit of Mount Everest will have raised the spirit of countless others for generations to come, and given men a firmer nerve for scaling every other mountain.

A further good result will follow. The ascent of Mount Everest will be preceded and followed by ascents of numerous other Himalayan peaks, and as we pit ourselves against them, we shall get to know them better, and as we get to know and understand them, we shall finally rid ourselves of the ridiculous idea of the littleness of man in comparison with mountains. We shall realize that man is incomparably greater than any mountain, but at the same time we shall see a beauty in these mountains which only those who have wrestled with them ever see. The beauty of the Alps was never properly appreciated until men climbed them, and it will be the same with the Himalaya: as we climb the Himalayan peaks and get to know them properly, we shall begin to enjoy their beauty, and the enjoyment of their beauty is the second result, and one of inestimable value, which will follow from the ascent of their highest summit. I have said that the first man to ascend Mount Everest will raise the spirit of countless others. Much also to raise it was done by the first man bold enough to conceive the idea. That

man—as I told the Society three years ago—is General Bruce. General Bruce has climbed in the Himalaya for nearly thirty years, and is known from one end of these mountains to the other. What is more, he is known not only as a great climber, but also as a great companion; in any party he joins he is the most loyal member of it. A further recommendation to us is that he is a son of one of our most distinguished Presidents, the first Lord Aberdare. On all these accounts we welcome him most warmly among us.

General Bruce then read the paper printed above, and a discussion followed.

The PRESIDENT: We are fortunate in having the Alpine Club well represented here this evening, by its President, Prof. Norman Collie, and two ex-Presidents, Mr. Freshfield and Sir Martin Conway. I call upon the President of the Alpine Club, who was one of Mummery's party to make the attempt on Nanga Parbat, and who can appreciate what mountain climbing in the Himalayas means.

Prof. NORMAN COLLIE (President of the Alpine Club): As you have heard, this expedition to Everest is to be a joint expedition of the Geographical Society and of the Alpine Club. Two things of course naturally have to be determined about Everest. Firstly, it is of the very greatest importance that we should know something more about that part of the world out of which springs this very highest spot on the globe, Mount Everest. At present we know practically nothing. No white man has ever been within 40 or 50 miles of Everest, and all the country round it is unknown. Secondly, people can be sent who are capable of showing how it will be possible to get to the top of this mountain. Naturally, I think it is a great prize for the Geographical Society to have almost within their grasp, this most interesting part of the world as yet unknown and unexplored, and I wish it was as easy for the Alpine Club to say that the winning to the top of Everest was as easy. It will need an immense amount of work, an immense amount of labour, and it will be a most difficult thing indeed to climb to this highest point in the world's surface. The President and the Geographical Society have taken a very great deal of trouble in order to make this expedition successful, and I certainly hope it will be started next summer. The first expedition will necessarily not have much to do with the climbing of Everest. The way there will first have to be found; then, having got to the bottom of the mountain, a possible route up to the peak might be suggested. This will take quite the whole of the time of the first year's expedition. In the second year's expedition there will have to be a properly equipped climbing party. They will probably find that the suggested route may not be successful, and may have to change it; that will mean that they will not have time to change their route in one year, but will have to come back another year, and therefore it is not one expedition, but many, which will have to go to Everest before anybody is likely to set foot on the top. One other thing: most certainly if any expedition is allowed to go into this unknown and forbidden land round Everest, the expedition ought to be a British expedition; under no conditions whatever should the British Government allow other people to go there before us. After having waited so long for leave to approach Everest, I think we really have prior claim to any one else to go into that country. Moreover—and now I speak from the Alpine Club standpoint—it is the Alpine Club which has taught the way to climb mountains. Every other Alpine Club in the world, and most of the climbers of mountains, have been followers of the first members of the Alpine Club. It was the members of the Alpine Club that

first began serious climbing in the Alps, although De Saussure first went up Mont Blanc, and it was fifty years almost after that before any other big mountain was ascended, and even then no one really took up climbing as a serious recreation. The members of the Alpine Club first made climbing in the mountains a successful venture, and therefore I think under those conditions it ought to be not only English people, but members of the Alpine Club, who must have the first say in the matter of climbing Everest, the highest mountain in the world.

The PRESIDENT: I will ask Mr. Douglas Freshfield, who made that wonderful climb round Kangchenjunga some years ago, if he would address the meeting.

Mr. DOUGLAS FRESHFIELD: It is a great pleasure to me to see an expedition to climb the highest mountain in the world, which I have dreamed of for at least fifty years, carried into effect. I had hoped, but for the unfortunate interruption by the war of all our normal activities, that it might have happened during my own Presidency, but it is now a consolation to me to find it undertaken by a President who can bring more influence than I could bring to bear to overcome the initial difficulties—the official obstacles. I hope most heartily it may be during our present President's term of office that the summit of Everest is reached. I will condense what I have to say as far as possible. First as to season and weather. The shortness of the interval between the end of the monsoon and the first heavy snowfall is a very serious hindrance to mountaineering, at any rate in the Eastern Himalaya. Is it possible that in the early summer, before the monsoon, the ice and snow might be found in better condition? Again, it is doubtless true that on the north side of the range there is far less mist and snow than on the southern slopes; but Tibet is far from immune from summer snowfalls. The great storm of September 1899 covered the whole district north of Kangchenjunga about a yard deep in snow and put a stop to any high climbing—nearly put a stop to all exploration; and this year Mr. Raeburn, a noted climber who went out to Kangchenjunga, has, I hear, been similarly hindered. As to the effects of altitude up to 21,000 feet: few members of my party were seriously affected. I myself at the age of fifty-five experienced no more than a sensation of lassitude, just as if I had taken up a heavy knapsack. Dieting is very important. Improper food was one of the principal causes of the great suffering in the High Alps amongst the early pioneers—sufferings we hardly ever hear of to-day.

As to transport, my experience may be to the point. Our party carried the baggage of over fifty men, including provisions for a fortnight in advance, and heavy photographic apparatus over a pass of 21,000 feet, in the worst conditions, after a heavy snowfall which had spread from 2 to 3 feet of soft snow over the whole range. With all that General Bruce has said with regard to coolies I agree, but they have one regrettable failing: they hate getting up early in the morning, and are eager to have a hot breakfast before they start. The consequence is they often have to wade in snow which would have been hard a few hours earlier.

My next point is local topography; the nature of the approaches to Mount Everest. In the Eastern Himalaya on the southern slope you come to a point where glacial protection has ceased and erosive action by water and ice has had full play. In the Teesta valley this point is well marked; below it the river flows in a deep gorge, higher up through an open valley. There is probably a similar point in the Arun basin. Its situation should be easily ascertainable by aeroplane. Machines could fly up from the plains of India and back

again in the day: they might also be used for telephotographic purposes, and even possibly for dropping provisions at high bivouacs. As to the character of the climbing on the great peak, I have seen it nearer than most people, and I should be sorry to commit myself to any prophecy. The ridge from its northern shoulder to the top is, it is true, not steep, resembling seen from a distance that from the Aiguille du Gouter to the Dôme on Mont Blanc, but we know nothing of the middle part of the mountain, which in the Himalaya is apt to be the worst.

Last, as to nomenclature. I adhere firmly to the general principle that it is a mistake to affix personal names to great mountains. We should all have been sorry if Mont Blanc had been called Mont Paccard or Mont Saussure after its early climbers; and when the individual has no claim to connection with the peak the case is stronger. But I do not propose to reopen to-night an old controversy in this particular instance of Mount Everest. For I recognize there comes a time when the inconvenience of any change may more than counterbalance other considerations.

The PRESIDENT: We have heard of Captain Longstaff's wonderful climb. If he could give us the advantage of his experience we should be very grateful.

Captain LONGSTAFF: It has been naturally a great delight to me to listen to this paper of General Bruce's; it reminds me of a most happy six months with himself and Arnold Mumm, who was then Secretary of the Alpine Club, when we went to console ourselves with Trisul to celebrate the jubilee of the Alpine Club in 1907. We had hoped to go to Everest, but the lack of sympathy with geography of the Secretary of State for India prevented it. I am sure that every climber of experience agrees with General Bruce's thesis. There are many things one would like as a climber to say on these most interesting subjects, but there is not time, and there are others who have greater experience than I have. There are also many questions of great geographical interest involved. General Bruce objects to my slapdash methods of mountaineering. I will remind him of the crossing of the Bagini Pass in 1907, which I think bears a very fair comparison with the sort of thing he accuses me of. He will remember all about it. Of course, seriously, General Bruce is perfectly right. There can be no question but that with a mountain like Everest you must adopt Polar methods. The dashing at the first thing you see is a very pleasant pastime for youth, but it is not the way to get up any very high mountain. We must adopt these Polar methods. We must divide our work into at least two years; we must find out whether there is what we call an easy route up Everest. If there is no easy route we shall not get up it! Therefore it is most important—I wish, Mr. President, to make this point strongly—that in the first year, when the reconnaissance party is to go out, this party should include as many experienced climbers as possible, not with a view to climbing the mountain, but with a view to finding the route; without mentioning names, there are two members of the Alpine Club who are both officers of the Royal Engineers, both members of the Survey of India, both of the right age, who have both extremely good experience—varied experience of mountain work—and I think it would be a thousand pities, considering that you have two men like this in India, if they were not permitted to accompany the expedition, because we want trained topographers with mountain knowledge to tell us mountaineers at home whether a route is possible or not. Without there being any idea of these particular men doing the climb we must have as many trained topographers with mountaineering knowledge in the first year to give us some idea of what the mountain is like. Having done that, I agree with General

Bruce. We must have a gang of trained coolies. The best men I ever had were Bhotias from the north-west corner of Nepal; and in Tibet on Gurla Mandhata they did splendidly. I do not think it is necessary to give high wages, but you must feed them well, and sleep them well, and blanket them well, and shoe them well, otherwise you cannot expect to get anything done. When you have found your route and got your porters together, then I think you must make a base camp as low as you can on Everest, say about 16,000 feet. Then with your team or teams of porters you have got to turn to Polar methods and lay camps ready for the actual climbers—say a camp between 21,000 and 22,000 feet for the climbers; the coolies that make that camp may take two, three, four days, or longer, but the actual climbers will have to climb from 16,000 to 22,000 in a day, and the next day from 22,000 to 26,000 in a day. If they cannot do this, they won't get up Everest! I am convinced, and my friend Meade too, I know, who has climbed higher than Trisul with guides and with native porters, will tell you he agrees with me, the longer you stay above 20,000 the weaker you are going to get. We do not believe in acclimatization in that way. Do not stay up—go up as often as you like, and then come down. There is only one cure for mountain sickness, and that is to come down. If they are going to take longer than three days' actual climbing they won't get up Everest! I believe that the reason why the Duke of the Abruzzi went slowly on his final climb was that they spent too many days over 18,000. I can only refer to my own experience. On our ascent of Trisul, on the last day the successful party did 6000 feet in ten hours, 600 feet an hour. They came down 7000 feet in three hours. It is perfectly easy to come down—anybody can come downhill. Graham made the same progress on the ascent of Kabru. There is no reason, I believe, why climbers who have the necessary physiological attributes, not necessarily mere physical strength, if they are carrying no weight, if they have not to carry their food and tents on their backs, should be unable to climb at the rate of about 500 feet an hour. If they are not going to be able to climb at that pace they won't last out the cumulative trials of low pressure. But even in this case, the geographical results alone would be a full and sufficient reward for this most necessary venture.

The PRESIDENT: Colonel Wood was sent to decide whether there was any higher mountain than Everest at the back of the Himalaya. He found there was no higher mountain. He has seen Everest, I think, nearer than any one else, and we should like his account of what it looks like from the northern side.

Colonel H. WOOD: I was fortunate enough to be sent up in 1903 to investigate the nomenclature of Everest, and I was able to see the mountain for a short time then, and again with Colonel Younghusband, unofficially, I went, along with Ryder and Rawling, up the Brahmaputra, when we saw it from the north. It is fifteen years ago, and my memory of it is rather faint, but it certainly is a most stupendous undertaking to attempt to climb it. The gorges are very great, and I do not think there will be anything very easy in the route there, and therefore the reconnaissance is most necessary. Of course the geographical side is more interesting to me than the other, although I wish I was younger and able to attempt the climb myself. I am sure the Survey of India will give any assistance wanted. I hope, also, the Survey will be considered in the climbing, and one of our younger members will be allowed to go up. Prof. Norman Collie says it should be an English party, but I think a Survey of India one, as it is named after our original Surveyor-General. I

have been asked to say what I remember of the mountain from the northern side. It was generally rather cloudy, and there was a great deal of mist about, but there is no doubt it stands up a most enormous peak. It is, I think, on a spur about 20 miles to the north of the main range. You see it with all the big Himalayan peaks as a background, and it stands out by itself—an absolute giant.

Mr. C. F. MEADE: I am afraid I can claim only a very limited experience. I know only the district which Capt. Longstaff was first referring to. I agree very heartily with what he says, and especially about the speed of coming down. I may say that the thought of the rapidity with which, if necessary, one can come down again, is a perpetual comfort and inspiration. One has that great advantage over Polar expeditions in being able to come down again. I am afraid I cannot claim to have reached any much greater height than my camp on Kamet. We succeeded in camping at 23,500 feet, but the sequel is not very brilliant. We passed the night there and were ready to start the next morning, but the previous day we had had about 100 steps to cut in very hard ice, and I think no one who encounters much step-cutting at great heights has a fair chance of doing much. Another thing I have always found in June is that the snow has always been in a powdery condition, and this is extremely exhausting, and in my opinion likely to be prohibitive. I notice that Dr. Kellas and Capt. Morshead, who have just made their recent attack on Kamet, have reached the same saddle, though their coolies could not get the camp up to it. They had decent weather and did not find the snow bad. This may be due to the effect of the season, September, and I think September instead of June may be a more favourable month.

The PRESIDENT: The time is getting on and I must bring this interesting discussion to a close, but I should like, if I may be permitted, to make a few observations. General Bruce said that I told him we could see Mount Everest from Kampa Dzong during the months of July, August, and September. I remember perfectly well seeing Everest at a distance of 100 miles, and to my remembrance I could see it nearly every day, and I asked Sir Henry Hayden of the Geological Survey, who was there in September, and his recollection is the same. Nearly every day, certainly at the time we were there, Everest could be seen. That means to say that the monsoon did not fall upon Everest as it does upon Kangchenjunga and upon other Himalayan peaks. The fact is, as Col. Wood has said, Everest stands well back from the general line of the great peaks, and it has in front of it (and this is a very important point) two peaks of 23,000 and 24,000 feet which serve as a buffer in between it and the full brunt of the monsoon. That is rather a favourable point, for it means that it may be possible to climb Everest in the hottest months of the year, July and August. I want to say, and to say it with emphasis, that I concur with General Bruce that a very great deal can be made of these Himalayan people if they are properly treated. He referred to the Baltis and mentioned especially the village of Askoli. It so happened that the guide who showed me over the Mustagh Pass was a Balti and was from this very village. I engaged him in Chinese Turkestan, where he had lived for twenty-five years. He certainly was not pressed into the service, but came entirely of his own accord. When we came to a very nasty part where he might quite well have given up, he said "No," he had undertaken to show me over, and would not go back until he had carried out his undertaking. The Duke of the Abruzzi's experience was precisely the same as General Bruce's and mine, that an immense amount can be got out of Himalayan people if they are treated well, given a thorough interest

in the expedition, and, as Captain Longstaff has said, clothed well and shod well. If these matters are looked after, I am certain amongst these Himalayan people there can be got together a party of well-trained men who will form a carrying party for the expedition. As regards survey. One would very much hope that a member of the Survey of India should be the first to climb Mount Everest. There is no reason why that hope should not be combined with the President of the Alpine Club's suggestion that the climber of Everest should be a member of the Club. As Captain Longstaff has said, there are two very fine Alpine Club climbers already in the Survey of India, and the more members of the Survey of India who join the Alpine Club the better. Lastly, I should like to corroborate all General Bruce has said as to the Duke of the Abruzzi's expedition having been a model one. We could not do better than model our own expedition for Everest upon the model of the Duke of the Abruzzi's K_2 expedition. Now I will ask you to join with me in giving a very hearty vote of thanks to General Bruce for his valuable paper. General Bruce is one of those men who have explored most in the Himalayas, and all his observations upon the treatment of the people are of special value because he belongs to a Gurkha regiment, and no man knows how to handle people of the Himalayas better than he does. It is known probably to most of you that in the Gallipoli campaign his presence alone was considered worth a whole Brigade.

TOPOGRAPHY OF THE GOLD RANGE AND NORTHERN SELKIRKS, BRITISH COLUMBIA

Howard Palmer

ALTHOUGH the valley of the Columbia River north of Revelstoke, British Columbia, has been a route of travel for a century, and fifty years ago it was the scene of a full-fledged "gold rush," there is available no adequate account of its physical features. Bordered on the east by the outlying foothills of the Selkirks and on the west by the Gold Range, both of which occupied practically unmapped territory, it promised to well repay geographical investigation. The present paper aims to report briefly the results of a month's reconnaissance of the region made by the late Major Robert H. Chapman and the writer.

From Revelstoke on the Canadian Pacific Railway there extends northerly along the river for 117 miles "The Big Bend Trail." This is maintained by the Government for fire patrol purposes, and affords practically the only land communication with the district embraced within the great northerly loop of the Columbia. A ferry near the tip of the Bend enables connection to be made with another section of the Government trail that strikes the railway again at Donald. We were told that branch trails gave access to some of the lateral valleys, and by these we planned to penetrate into the Selkirks and make a plane-table survey of as much of the new ground as we could. We expected to extend the author's earlier surveys of the lofty Mount Sir Sandford district westerly

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THE MOUNT EVEREST EXPEDITION

AT the meeting of the Society on 10 January 1921, the President made the following announcement:

"At the meeting of November 8 I stated that there were then political obstacles in the way of our proceeding with preparations for the expedition to Mount Everest. Those obstacles, I am glad to say, have now been removed. Colonel Howard Bury, who went to India last summer on our behalf, was able to put our proposals before the Government of India with such persuasiveness that Mr. Bell, who is now in Lhasa, was instructed to ask from the Tibetan Government permission for us to send an expedition to explore Mount Everest. And we have just heard from the Secretary of State for India, who throughout has been most sympathetic to us, that the permission has been given.

"The political obstacles are therefore removed, and the Alpine Club and our Society will now organize an expedition which will have as its object the ascent of the highest mountain in the world—a mountain to which even the approaches are as yet unknown to Europeans. Such an expedition must be essentially a great adventure. High risks will have to be run and severe hardships endured—risks from icy slopes and rocky precipices and such avalanches as buried Mummery's party on Nanga Parbat twenty-six years ago; and hardships from intense cold, terrific winds, and blinding snowstorms. In addition there will be the unknown factor of the capacity of a human being to stand great exertion at a height more than 4000 feet higher than man has as yet ascended any mountain.

"The expedition will therefore, as I said, be a great adventure. But for the consolation of those who are never happy unless they can dub an expedition 'scientific,' I may add that it will be in the highest degree scientific also. For we may take it as certain that the summit of Mount Everest will never be reached unless we have first explored with the greatest care all the approaches to it through country at present entirely unknown; and then examined, mapped, and photographed the mountain itself in fullest detail. We must know all we can about the country around Mount Everest, about Mount Everest itself, and about the climatic conditions which prevail in that region. Our geography of it must be complete.

"In the present year the Alpine Club and our Society propose to organize a reconnaissance party to acquire this geographical knowledge. Next year we will send to Tibet a climbing party to apply it in a great effort to reach the summit.

"We hope that the reconnaissance party may cross into Tibet when the passes open, about the end of May, so that all the best part of this year may be available for their preliminary work. The final plans will then be made for the full assault upon the mountain in 1922.

"We have been assured of the cordial co-operation of the Government of India and more particularly of the Surveyor-General, who by great good fortune happens to be Colonel Ryder, who was chief surveyor officer with the Tibet Mission in 1903–4 and has seen Mount Everest at a lesser distance than any other European. With this assistance and with the aid our two Societies can give we believe that this expedition will start under better auspices than have favoured any other attempt to scale a high Himalayan peak. We mean to secure the very best men to be had; give them every advantage we can; then trust them to pioneer the way to the loftiest summit of this planet. And when that has been reached man will have taken a further big step towards the mastery of his surroundings."

A joint committee of the Royal Geographical Society and the Alpine Club has been formed to organize the expedition. Lieut.-Col. Sir Francis Younghusband (President), Mr. E. L. Somers Cocks (Treasurer), and Colonel E. M. Jack represent the R.G.S.; and Prof. J. Norman Collie (President), Captain J. P. Farrar (Past President), and Mr. C. F. Meade, the Alpine Club. The President R.G.S. will be President of the Committee for the work of the first year, and the President A.C. for the work of the second year. The Secretaries R.G.S. and A.C. will act as Secretaries to the Joint Committee.

At the meeting of the Society on January 24 the President announced that the Joint Committee had appointed Colonel C. Howard Bury to be Chief of the Expedition, and Mr. Harold Raeburn to lead the mountain reconnaissance this year.

The paper read to the Society by Brig.-General the Hon. C. G. Bruce, and published in the January number of the *Geographical Journal*, with the discussion following the paper, gives a full account of our present knowledge and lack of knowledge of the mountain, and indicates the lines upon which the reconnaissance will be made and ascent will be attempted. In the present number we publish some observations by Lieut.-Col. Howard Bury on the approaches to the mountain; and all further news of the organization and progress of the expedition which it is possible to give will be published from time to time in the *Geographical Journal* and the *Alpine Journal*. Brief announcements will also be made by the President

R.G.S. at meetings of the Society, and by the President A.C. at meetings of the Club. These will be communicated to the Press in advance, so that all newspapers may have an equal opportunity of publishing authentic information on the morning following any such announcement. No exclusive arrangements will be made with any newspaper or magazine, and no information will be given in any other way either by the Joint Committee or by individual members of the committee or of the expedition. The Committee will, in short, use their utmost endeavour to secure that the chronicle of the expedition shall be well considered and accurate; and no credence should be given to any statements other than those published by their authority.

A first estimate of the cost of the expedition shows that it will be necessary to raise a sum of not less than £10,000 to provide for the work of two years, and the President appeals to Fellows for subscriptions.

A VISIT TO BOKHARA IN 1919

Major F. M. Bailey

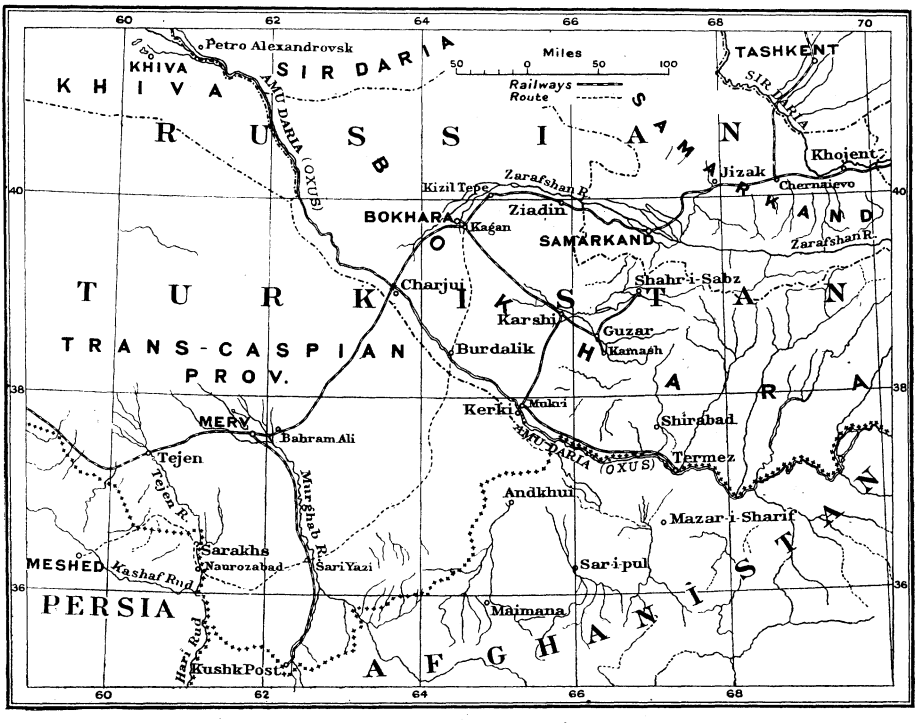
Read at the Meeting of the Society, 22 November 1920.

IN August 1918 a mission was sent by the Government of India to the Soviet Government of Turkistan, who were then suspected of coming under German influence. An account of this mission has been given elsewhere. We are now concerned with a visit to Bokhara which was the sequel to this mission.

The position of Bokhara was similar to that of an Indian Native State. The Russians had complete control of the railway lines. The main Transcaspian line passes through Bokhara territory from Charjui to Ziadin, and at each station was a small Russian colony. There was also a railway line from Kagan to Termez on the Oxus *viâ* Karshi, while there were some Russian garrisons at Termez and at other places along the Northern Afghan frontier. There were also a number of Russian business people in Bokhara city. The population of Bokhara consists of Mohammedans, with a few Jews in the cities. The population is entirely monarchist. When the Bolsheviks first came into power they imagined that they could revolutionize the whole of Turkistan. There was a small band of ruffianly Bokharan subjects, most of whom had been forced to leave the country, who styled themselves the "Young Bokhara Party." These people got into touch with the Bolsheviks and led them to believe that they had a large following in Bokhara. Flushed with their first success, the Bolsheviks imagined that their ideal of World Revolution was at hand and decided to lend a helping hand to their neighbours.

In February 1918 Kolisoff, a former oiler on the railway, and at that time Chief Kommissar, who has I believe since been shot for embezzling

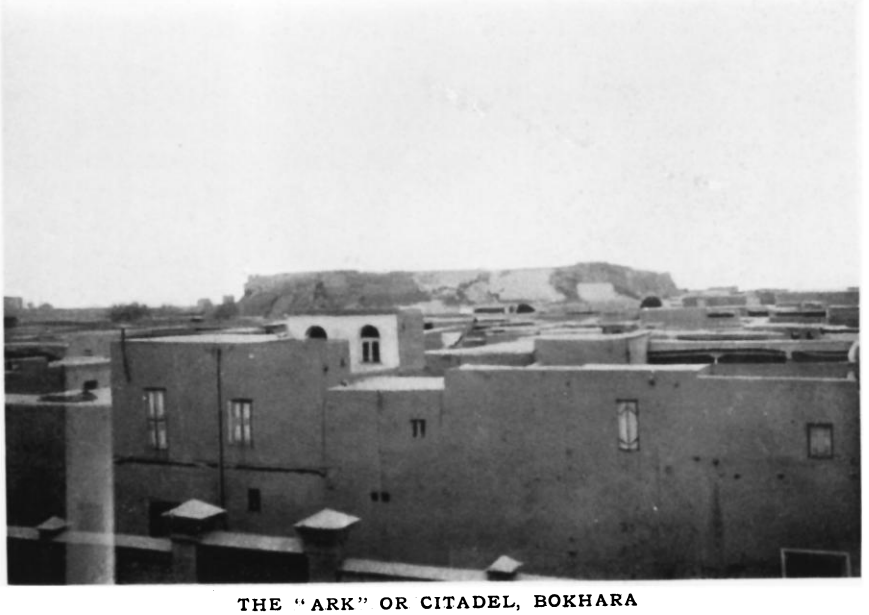
money, took a force down the railway from Tashkent to Kagan, the railway station for Bokhara distant about 10 miles from the city. From here he sent an ultimatum to the Amir requiring him to accede to the demands of the young Bokhara party within twenty-four hours. The Amir, whose foreign relations had always been in the hands of the Russians, had no idea how to deal with such a situation, but sent some equivocal reply; Kolisoff remained with his force at Kagan, but sent some delegates to discuss the matter with the Amir. The next day a disturbance broke out near Kagan between the Red troops and some Bokharan subjects in which lives were lost. The news of this rapidly reached



Sketch-map of Russian Turkistan

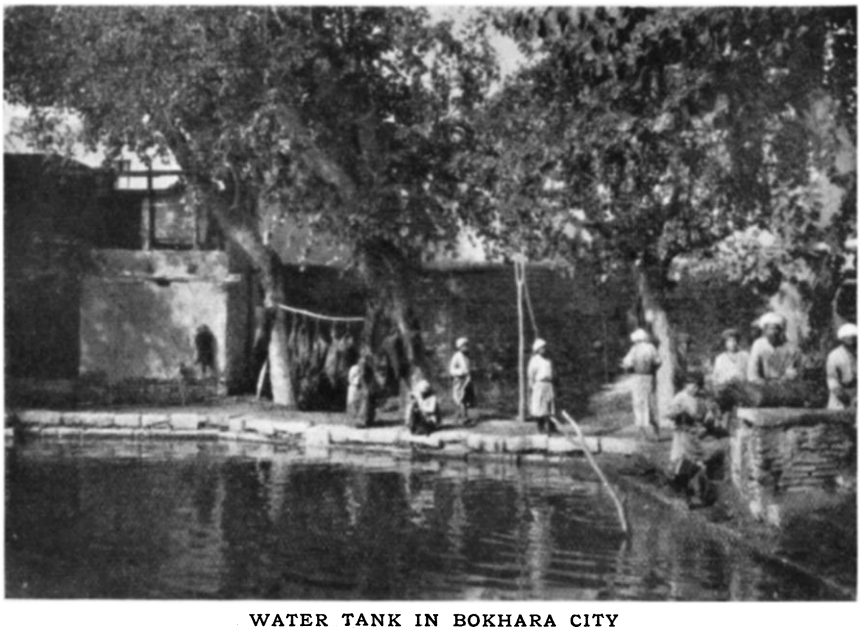
Bokhara city, where the people rose and massacred all Russians in the city, including of course Kolisoff's delegates. The trouble then spread throughout the State, and all Russians along the railway lines and some of the small garrisons on the Afghan border were killed. The railway lines were taken up, and the lines to Karshi and Termez have never been repaired. The Bokhara army is of the most inferior quality, and it has always been a puzzle why Kolisoff did not at once move on Bokhara instead of retiring to Kizil Tepe station some 17 miles off. Here a treaty was signed by Kolisoff and the Amir's reprentatives on 25 March 1918, by which the Bolsheviks recognized the complete independence of Bokhara.

BOKHARA CITY, WITH THE TOWER FROM WHICH CRIMINALS WERE THROWN



THE "ARK" OR CITADEL, BOKHARA

CITY WALL OF BOKHARA



WATER TANK IN BOKHARA CITY

This success on the part of Bokhara made them over-confident that the Bolsheviks were afraid to attack them; and their whole dealings with the Soviet Government of Turkistan reflected this success, whereas the real reason that the Bolsheviks did not attack Bokhara was the fear of arousing a *jehad* among the Mohammedan population of Central Asia.

From this time the Russians maintained a residental at Kagan in the same way as before the revolution, the chief difference being in the personality of the resident. Instead of the old-fashioned Russian official who never was out of uniform, the agent (a man named Pechatnikoff) had in pre-revolutionary days made a living by hawking lamps in Bokhara city. The Bokharan Government kept a representative in Tashkent, but the Bolsheviks were very desirous that he should have nothing to do with foreigners.

The situation between the Bolsheviks and Bokhara was naturally always very uncertain. The Bokharan monarchy feared that another attempt would be made to install a revolutionary government; while the Bolsheviks, who were fighting against their enemies in Transcaspia, always had a feeling of insecurity with the possibly hostile State in their rear and on their lines of communication. What exasperated them most was the certainty that a very small force acting with determination could polish off Bokhara, and the only thing that deterred them was the fear of rousing hostility among all the Mussulman inhabitants of Central Asia, including Afghanistan, who all look with some veneration on the fanatically Moslem state of Bokhara.

The whole of the north of Bokhara is desert and steppe, with the exception of the oasis watered by the Zarafshan river, which flows through Samarkand and finally loses itself in the sands west of Bokhara city. The position of Bokhara is very much dependent on the neighbours upstream, who by damming up the river and flooding the area between Samarkand and Bokhara, could rapidly starve the city and oasis and force the government to accept any terms demanded.

The hilly south-eastern part of Bokhara is thickly populated and could make a long stand, but it is probable that with the loss of the city the prestige of the government would suffer such a blow that the State would break up. We shall soon see whether this is so, as the latest news is to the effect that the city has been captured by the Reds.

After having lived a year in Tashkent, in the autumn of 1919 I decided to leave, and succeeded in getting employment in a branch of the Bolshevik Secret Service. The Bolsheviks were very anxious to get accurate information about affairs in Bokhara, and had great difficulty in doing this, as their spies were frequently caught and drastically dealt with. One man brought them information that a whole regiment of Indian troops was hidden in a village surrounded by a cordon of Bokharan soldiers, whose duty it was to prevent the news of their presence leaking out. My duty was to obtain news of this and other matters.

We left in a goods-wagon one morning and reached Samarkand in something under forty-eight hours. Near Samarkand the train passes through a gorge where Tamerlane in the 14th century caused an inscription to be carved. The Russians on their conquest of the country also carved an inscription surmounted by an Imperial Eagle. The Bolsheviks have destroyed the Russian memorial as being too reminiscent of their Imperial days, but have left Tamerlane's inscription. In Samarkand we were told that our train would go on at 9 a.m.; but knowing a little about Soviet Russia I calculated that we should be quite safe to leave the train till 10; this gave us time to pay a hurried visit to the ruins of Tamerlane's capital, and we rushed round with a camera and took a few photos, but the early hour with the low sun and the necessity for secrecy forced us to take views frequently from unfavourable points of view. One of the large minarets in the Registan is in danger of falling and is held up by wire. I found that we had hurried quite unnecessarily, and our train did not go on till the evening.

Our travelling companions on this part of our journey were a party of Afghans, three small traders and three soldiers who were taking messages to the Governor of Mazar-i-Sherif and to the Afghan Consul in Bokhara. These men called themselves an Afghan Mission, and bluffed the railway authorities into giving them special accommodation on the train. They told us that the Afghan troops had occupied Peshawar, Attock, Lahore, Delhi, and were approaching Bombay.

We reached Kagan, the station for Bokhara, in the early morning. Bokhara city is about 10 miles north of the main railway line and connected to it by a light railway, which however was not running. I was here in the character of a Bolshevik secret agent working against Bokhara, and it was necessary for me to obtain permission from the Bokhara authorities to enter the town—a very difficult matter had I been a genuine Bolshevik. I had provided myself with a private letter saying I was a poor Austrian prisoner who wished to go to Bokhara city to make some purchases, and the true Bolsheviks considered me very clever to be able to get this permit in their interests.

We went to an hotel at Kagan, but it was full. While there a typical incident of life under the Bolsheviks occurred. A party of Red Guards from the secret police arrived, and removed a man from one of the rooms; we found out that he was himself a spy but had told some friends so, and this had got round to his employers, who would doubtless deal severely with him.

Stopping in the hotel was Mahendra Partab, a noted Indian revolutionary who had been living in Berlin most of the war. I had a long and interesting talk with him in German. He believed I was an officer prisoner of the Austrian army who had been captured early in the war. He made a curious statement regarding our rule in India. I asked him how it was that when we had the English nearly beaten in the war we

received no help from the 300 million oppressed people of India, on whom we had counted for considerable support; not only this, but we gathered that these Indian troops were fighting valiantly for the English on all fronts. He replied that that was a matter which he had often been asked to explain. The fact was that a victory of the central powers would have resulted in a Mohammedan Empire of some sort being established to replace the British, as Germans and Austrians were not people who had much success in such matters, and this would have been more oppressive for 220 million of the population than the present rule. I then asked him if no Mohammedan troops had fought for the English. He said that there were a few from the ignorant and uncultured frontier tribes.

A curious thing happened in Kagan. We received a telegram in cipher from Tashkent asking us to make careful inquiries about "Colonel Bailey of the Anglo-Indian Service." To this we sent a reply calculated to put the Bolshevik authorities off the scent.

After one night in Kagan I left for Bokhara, driving the distance along an execrable road. I had great difficulty in entering the city gates, and was kept some hours waiting in a tea-house at the gate.

I lived in Bokhara for about two months. Many Russians and some Austrians who had fled from the Bolsheviks were also living there. There were also some of the chief Mullahs from Tashkent and other places who had been obliged to fly from the atheistical Soviet Government.

The bazaars are most interesting. There is a special Jewish quarter and a Hindu Serai, where about twenty-five Hindus were living. They are all small traders and moneylenders, and are found in most large cities in Western Chinese Turkistan, and at Osh, Andijhan, and several cities of Russian Turkistan besides Samarkand and Bokhara, but they do not go as far north as Tashkent. They all come from Shikarpur in Scind; they have suffered great loss under the Bolsheviks, as they are typical "speculators." Once when I was waiting in a chemist's shop two Mohammedans came in who talked in Punjabi; but I could not, of course, speak to them or find out who they were. The Hindus and Jews are not allowed to ride a horse or in a carriage in the town, and are obliged to wear a string round their waist outside their cloaks, and may not carry arms. I talked in Russian with some of the Hindus, but could not say who I was or let them know that I could speak their language.

Russians, when in Bokhara, wear the brilliantly coloured *khalat* or robe over their own clothes, and on their heads the small *sart* skull-cap, or in winter a fur cap of the Russian pattern. The Mohammedans wear large white turbans. Nearly every one in Bokhara speaks Persian, and even when talking Turki, I noticed that the traders often used Persian numbers.

Since the disturbances in Russia the traders have been obliged to go to India for their wares, and large caravans arrived frequently from Peshawar through Afghanistan. One enterprising man brought a quantity

of ladies' boots, clothes, and hats, which by now doubtless adorn Komissars' wives. One occasionally saw some old Bokharan brass money, but the chief currency was Russian and Bokharan notes. Only the old Imperial paper money and that issued by the Kerensky government was accepted in the city, but the Turkistan Bolshevik money could be exchanged at about 10 roubles to 1. When purchased in paper roubles everything was very expensive. For instance, a pound of Indian tea cost 180 roubles, or about £18 at the pre-war rate of exchange; cheap cigarettes ("Scissors" was a favourite brand) cost 10 to 12 roubles for a packet of ten. I was obliged to pay 9 roubles each for 5-grain quinine tabloids. I was offered 200 roubles for a 10-rouble note, and 1600 for a 100-franc gold piece, and no doubt, had I really wished to sell and had bargained, I could have obtained more.

At one time during my stay there was very serious trouble between the Turkistan Soviet government and Bokhara. The Turkistan government used to purchase a good many things from Bokhara, mostly goods of European manufacture imported through Afghanistan. As Bokhara refused to accept their local currency, payments were made either by exchange of cotton oil or by payment in Kerensky or Imperial money. Kerensky's government had issued some 250 and 1000 rouble notes properly numbered and controlled, but also some 20 and 40 rouble notes entirely uncontrolled. When Bokhara asked for Kerensky money the Bolsheviks sent this uncontrolled stuff down, and the bazaar was full of people carrying about large rolls consisting of sheets of twenty or thirty of these notes. Twenty-five million roubles of this paper was sent to Bokhara in a few days, when naturally the traders became suspicious of it, though they had been quite prepared to take small quantities as change. The Bolsheviks then accused the Bokharans of breaking their promise to accept Kerensky money.

The Amir of Bokhara lives in a palace, Sittar Mahassar, about 2 or 3 miles outside the town, and nowadays never enters the city. He is always attended by the Kaznachei, or finance minister, who is the minister who has the greatest personal influence with him, while the Khush Begi, who lives in the Ark or fortress in the city, has chief executive power in the State. The Government, although absolutely autocratic, is very much in the hands of the Mohammedan clergy, and as a matter of fact the Amir is very far from having unlimited power. An important officer is the Kazi Kalan, or chief justice, who was frequently seen riding in the streets with his spare horses all gorgeously clothed following behind him, and preceded by a man on horseback carrying an axe as a sign of office. Official couriers also attracted attention by carrying their passport bound in their turban for all to see. Troops could be seen marching through the streets; they gave the impression of extreme inefficiency coupled with complete confidence. The officers wear Russian badges of rank. I once saw a captain playing a fife in the band. The generals are

invariably respectable-looking old men with long white beards, and are preceded by about a dozen mounted men carrying white wands. All ranks are plastered with numerous medals and decorations. The troops always sing as they go; a favourite song is begun, "Amir Baba, the Amir is our father." Another which they used to sing in Russian in Kagan, while the Bolsheviks from the town looked on and laughed, was "Our General is a brave man and does not fear the Bolsheviks."

Bokhara city has always been famed for its fanaticism, and at the gates of the colleges and mosques may always be seen students arguing (in loud tones for the benefit of the passers-by) about knotty points of their religion.

Every one in the city must be in their houses at dusk, and the streets are paraded at night by patrols of police, who carry a drum which they beat as they go along to scare away thieves and robbers. The city is surrounded by a ruined but still strong wall about 7½ miles in circuit. One day when going for a walk on the wall I was arrested by the police on suspicion of being a Bolshevik spy, inspecting the city's defences, but I was released when I met a man in the street who knew me, though of course the police had no idea who I really was. Photographing in the city was forbidden, but from the roof of my house I managed to take a few pictures, and also some on the city wall. The houses of the city are very densely packed together, and there are no open spaces or gardens, except for a patch of reeds near the city wall, in which one day I put up a pheasant. A curious thing about Bokhara is the absence of sparrows. It is the only large city that I know where this bird is never seen, though it is of course common in the surrounding country.

The weather was quite hot in the daytime in October, but at the beginning of November frost began, and we had a fall of snow. Life in Bokhara was pretty dull after the novelty had worn off. We used frequently to go to eat *Shashliks;* these are similar to the Indian *Kabab* —small pieces of mutton on iron skewers, which are cooked while you wait, over a trough containing charcoal which is kept glowing by a hand fan. They are eaten with bread, onion, and a little pepper and salt. Another diversion was the bath. You enter a large upper room, very much open to the sky, where you undress and wrap yourself up in towels and descend to the hot underground room like a Turkish bath. Here, after waiting a few minutes, you are taken to another room less hot, and a man massages and pummels you and cracks all your joints, and finally stands on your back, which he slowly massages with his feet, using his full weight. It is hard not to laugh at what one must look like, but the solemn white-bearded Sarts treated it like a religious ceremony.

One day I visited the prison and gave some money to the prisoners. I had heard a great deal about this prison, but the men I saw seemed as happy as they should be, and were sitting on nice dry clean mats. The damp dungeon where Conolly and Stoddart were kept in 1840 to be

devoured by sheep ticks is, I believe, still in use, but I was not allowed to see it.

During my stay in Bokhara several large parties of Austrian prisoners arrived, who had travelled on foot from Kokhand, taking three months on the journey. The Soviet government would not allow the prisoners to return to their homes, and some of them had not seen their families for more than six years, having been captured by the Russians in their big successes in Galicia in 1914. They were in an absolutely destitute condition, having no money and insufficient clothing, while many were suffering from wounds received in the war and frostbite contracted in Turkistan. Although I could not disclose my identity to them, I visited them and helped those who were sick. It was impossible to assist all, and the Bokharan government refused to do anything for them. They are doubtless still there. One was a Serbian sixty-seven years old, who told me that the Austrians mobilized *all* their Serbian subjects, as they were afraid of disturbances in the districts inhabited by Serbs.

Preparations for departure included the purchase of horses for the long ride across the desert. The purchase of a horse in Central Asia is done with great ceremony. The would-be purchaser rides the horse up and down the bazaar to test the paces; he then dismounts, and the dealer and purchaser sit opposite each other on the ground, while the friends of both parties gather round. They then hold hands under their long sleeves and bargain by making signs with their hands, so that the spectators cannot tell what prices are being named. This system is also followed in Tibet. When a price is agreed on the parties rise, and all their friends congratulate them.

For food we carried Russian *sukhari*. This is ordinary leavened bread dried in the oven. It keeps indefinitely, and though very hard can be eaten when soaked in tea. We also carried salt, tea, sugar, and raisins, and a little fresh meat for the first day or two. Later a Persian showed us how to fry lumps of meat in fat with a good deal of salt, which kept good a surprisingly long time. Each man carried a leather water-bottle hung on the pommel of his saddle, but we carried no water for the animals.

Having purchased our horses and collected our food, we left one night after dark. We had to cross two danger zones. First, the main Trans-caspian railway near Kagan, and secondly, the Khushk–Merv line and the Murghab river, which was in Russian territory. There was also the possibility of meeting Red Guards on the Persian frontier.

Although the area of Bokhara State is large, some 85,000 square miles, a good deal of this is desert. The central part near Karshi is the more thickly populated, while the oasis surrounding Bokhara City itself and the banks of the Zarafshan river also contain large numbers of hamlets; but the western districts, except for the banks of the Oxus, are uninhabited desert and steppe.

Our party consisted of about twenty all told, including guides, but we only had seven rifles. We all wore the large Turkoman sheepskin hat, and threw over our clothes a Turkoman cloak, our object being that if seen in the distance we would be taken for a wandering party of Turkomans, though of course a closer inspection would have revealed that we were not what we seemed. Our first night was spent at the edge of the oasis. The next day we started on our monotonous passage of the waterless steppe. We had to cover some 40 miles to the first well, and evening came on with heavy clouds and complete darkness when we were still 4 miles off the well. It was impossible to travel over the desert in the dark, and we soon lost the track, and sat down to await daylight, without water. Very soon, however, rain began, and we all spent a thoroughly miserable night in the open. At daybreak we found that we were actually on the road all the time, and we followed it to the well and watered our thirsty horses. The second day we only covered 26 miles, as we had spent some considerable time drying and feeding at the well. The third day brought us to the town of Burdalik on the Oxus.

Here we remained a couple of days. The people were very good to us and cooked sheep in our honour. The oven was peculiar: a high mud cone in which they burnt brushwood to heat it. This was then taken out and the whole sheep hung in it on green willow withes, and the top covered over. In a short time it was cooked and given to us.

There is a Beg at Burdalik who is Governor of the district. Once a day, in the morning, all the heads of the different branches of the administration have to report to him, being ushered in by officials with white wands. We were told that a similar ceremony is performed daily in the palace at Bokhara when all officers have to report to the Amir. We looked into the lock-up where a few prisoners were sitting on the ground with one leg in a stock which passes down the middle of the room, while their necks are all chained together. Two of the prisoners were to be executed the next day.

The population is Turkoman, who for the most part live a nomadic life in their round felt tents. They are so accustomed to this form of abode that when they adopt a more sedentary life they build reed huts of the same shape and size as their tents. They keep large flocks of the Karakul sheep, from which is obtained the skin we call astrakhan. The ordinary sheep of the country is fat-tailed, but the Karakul has a long thin tail. The price of these lambskins in Bokhara was 100 roubles a piece, though very much larger sums are paid for specially good skins.

On leaving Burdalik we were told that at that time of the year—December—we should find people camped at all the wells, who would sell us grain for our animals and help us to draw water. This would mean that we could travel without camels, which are very slow. The ropes to reach the deepest wells weigh so much that a pony cannot carry them. We were for the first few days disappointed in this, as we found all wells

deserted, and at one time the position appeared serious, as our guides confessed they were lost and we had brought insufficient food for ourselves and our animals.

At one place we had passed a deserted encampment where we found rude shelters made of saxaul branches, with, to our delight, grass wedged in to keep out the wind. This gave our animals an unexpected treat. I had tried to keep a rough reckoning of our route, and calculated that we were about 60 miles from the Murghab river, the only certain place of obtaining water, and I feared that some of our animals would fail to reach this without water. Having lost the track we travelled across the desert, when we came on a path crossing our direction at right angles. One of our Turkoman companions said he could now take us to a well, though he did not know the way to the Murghab river from there. We followed him, and after 26 miles we reached a well where we were fortunate enough to find inhabitants. The water was pulled up in a leather sack by two camels, and I paced the length of the rope and made it 256 yards, and the well must have been over 750 feet deep. The two camels took about 9½ minutes to lift a skin full of water. Had we reached this well to find it unoccupied as had been the case with all the others, we could not have obtained a drop of water as we had no ropes either long or strong enough. Most of the wells we had used were between 60 and 100 feet deep, and these comparatively shallow ones always contained bitter water. This frequently becomes so bad as to be quite undrinkable when the well is abandoned. The deep ones invariably contained beautiful clear fresh water. A flock of three thousand Karakul sheep had just arrived to water, and were driven out the same afternoon; the man took three camels, a donkey and a dog, the camels carrying water to last the whole party about ten days, with the exception of the sheep, who were to get nothing.

On January 1 we had a blizzard, which deposited about 5 inches of snow, but luckily we had a hut to stop in. Usually we simply lay down on the ground at dusk and got up at daybreak, when it was bitterly cold with a hard frost. This snow was very fortunate for us, as it made us independent of wells and we were always sure of fresh water instead of the usual ration of brine, though it was unpleasant to sleep in the snow at night. About this time of year snowstorms sweep over the desert, but the hot sun soon melts the snow, and as if by magic small shoots of grass appear. It is for this grazing that the Turkomans bring out their enormous flocks of sheep. Later in the year when this grass is dried up the desert is absolutely deserted. The flocks are taken away from the well for about twenty days if there has been rain or snow, which will give the sheep an occasional drink. If the desert is quite dry they are obliged to return for water after eight or ten days.

The desert through which we travelled was covered with small bushes called *saxaul*, which thrives with very little water. It burns very well, and

PARTY OF TURKOMANS IN THE DESERT NEAR THE RIVER MURGHAB

THE HORSE MARKET, BOKHARA

WELL IN THE DESERT EAST OF THE OXUS

CROSSING THE OXUS AT BURDALIK

was the chief fuel supply for the railways of Turkistan when they were cut off from the Baku oil. The appearance of the desert was that of a stormy sea frozen solid, the waves or hillocks being 10 to 20 feet high in most places, and the distant horizon appearing absolutely flat.

Animal-life there was none at this time of year, but further to the west in the neighbourhood of the Murghab river there were numbers of gazelle and a few larks and many rats or marmots, while the shells of tortoises everywhere testified to their presence, though at the time of our journey they were hibernating. We also saw a few sand-grouse, and on the Oxus river were geese and ducks and pheasants in the bushes on the banks. At Burdalik we met a hawker who had just killed two pheasants.

The desert is infested with bands of Turkoman robbers, but our party was large enough to be safe from attack, though had it been known that we were mostly unarmed we should probably not have been unmolested.

All travellers agree that the Turkoman is the most persistent robber. He rides about his desert from well to well on his wonderful pony and attacks and plunders all he meets. The ponies are really marvellous. They have several well-recognized breeds, but the quality which they require and which all possess is that of being able to carry a light weight for very long distances without food or water at about 5 or 6 miles an hour; in other words, they would be ideal for mounted infantry work, provided that the soldier does not insist on too many comforts and can travel light. In Bokhara they told me of a Turkoman who had just killed a Bokharan official at Karakul and had fled to the desert. I said it would be easy enough to catch him, as they had only to watch all the known wells and they must get him soon. They said that this did not follow, as he had trained his pony to live on mutton fat, and if this is done a pony can go two months or longer without water. Although one cannot believe all one hears, we had experience of their wonderful endurance. After watering, Turkoman horses are always galloped for two or three minutes even after the longest and most tiring march. If this is not done they say they get ill and frequently die. I bought eight ponies in Bokhara for 35,000 roubles which carried us through to Meshed, a distance of close on 600 miles.

The whole nomad Turkoman population lives in constant fear of robbers of their own race. This was exemplified on several occasions. We were a party of about twenty-five, and on approaching one well we noticed a man riding hard a mile or two on our left. He was soon hidden by a fold in the ground, and presently we came in sight of the well a mile off. A single man rode out to meet us, and we sent one man on to speak with him. It turned out that the man we had seen thought we were a party of robbers and rode in to warn the people at the well. They, on receiving the news, loaded their rifles and lined the walls of the enclosure and prepared to resist, but sent one of their number forward to make sure before any blood was shed. We sent their envoy back, and presently he

signalled that it was all right and we rode up. We then discovered that the people at the well were themselves noted robbers, but the size of our party frightened them. We, however, divided the night up into watches, and took it in turn to have three of our number watching all night. These people had some fine Persian greyhounds which they use for catching gazelles. They told us that they can only catch gazelles when they are thin, as when fat they cannot get a grip with their teeth.

On another occasion, after crossing the Murghab river, when we were very short of food we came to a well at dusk and found one Turkoman drawing water. We asked where his camp was, and after some prevarication he said it was about 2 miles off. We were very short of food, so made him lead us to them in the hope that they would sell us something. When we got in sight of the camp fires he made our party halt while I and an interpreter accompanied him. When about 50 yards off he asked us to stop while he went forward to explain. The Turkoman then shouted that we must move further off as they were afraid, and they would then send a man to us with food. They then called out that they would give us nothing, and that they had loaded their rifles and would fire if we did not go off at once. We were obliged to comply, and the next day we met a man who said that they were a party of robbers, who, thinking we were another party who would attack them, had moved off that night as soon as we had left.

Later we came on a camp of Turkoman shepherds. We had had practically nothing to eat for several days except the ponies' food, which we either parched or boiled according to the individual taste. They were terrified at seeing such a large party, and thought that the worst had happened. However, they soon saw that we meant no harm. These men sold us three sheep, which we ate on the spot, cooking *shashliks* on the cleaning rods of our rifles. They also made us some good fresh bread by laying the unleavened cake on the hot earth after scraping away the fire and covering it with glowing ashes. This was cooked in about twenty minutes. We asked these people to sell us some flour, but they excused themselves, saying that they had only enough left for their own use, but that at a well some 9 versts on we should find all we wanted. We left them, and on approaching the well we found to our dismay that it was quite deserted. We found out that the people at the well had seen our large party ride up to the men who were out grazing their flocks, and, thinking we were a gang of robbers, they had decamped to a man, and intended to live some distance off in the desert and not return to the well until we had moved off. The above incidents will show the continuous dread of robbers in which the Turkoman lives.

We crossed the Murghab river at night. We were in danger of being intercepted by Bolsheviks here, as they patrol the Khushk–Merv railway line which runs near the river. We found the river about 20 yards wide, with steep banks, and our ponies were forced to swim. We were now well out of Bokhara territory.

The western Bokharan frontier is an undefined line in the desert some 5 or 10 miles to the west of the Oxus, but Bokharan subjects graze all over the desert between the Oxus and Murghab rivers, and the control of the Russians over their subjects in the Murghab valley is very loose.

From the Murghab river we had several days more of desert travelling to the Persian frontier, where we had a brush with a Bolshevik patrol, and it was with a feeling of overwhelmlng relief that we trod on the soil of Persia and were free from the tyranny inseparable from Soviet rule.

The PRESIDENT: We have listened to a long list of Fellows who have been elected, but there was to have been one elected whom I am sorry to say, since he was proposed at our Council meeting a fortnight ago, we have heard has died during a journey on the China-Burmese frontier. I allude to Mr. Reginald Farrer, and we do greatly deplore the loss of this traveller, because he was a man of exceptional refinement and culture, who minutely observed and very carefully recorded and described the natural features of the countries through which he was passing. He also had a peculiar knack of getting on with all kinds and conditions of people, including Government officials, and overcoming those human obstacles which are often the most serious obstacles with which a traveller is confronted. Only a fortnight ago I had a letter from Mr. Reginald Farrer dated from the borders of Burma and China in which he described his present two years' journey upon that frontier, and outlined another travel on which he had set his heart, and in which he had asked my help so far as I could give it, and that was to go to Lhasa in Tibet. We very much regret his loss, because I looked upon him as the forerunner of a new type of traveller, who, taking advantage of the pioneering of his predecessors, would have brought back to us those cultured descriptions of the beauties of Nature and of plant, animal, and human life in the countries through which he was travelling, which I consider are the very flower of geographical knowledge.

Our lecturer this evening is Major Bailey, whom we all know, and we are specially beholden to him, because for many years past he has been suffering ome very severe hardships and strain. He was wounded in the battle of Ypres and in both legs in the Gallipoli campaign. He served afterwards in Baghdad, and from there he went to Central Asia, and was in hiding and eventually escaped from the clutches of the Soviet rule in Turkistan. He is, therefore, well entitled to a good holiday, but he has come here this evening to give an account of his experiences in Bokhara, and we are glad to welcome him.

Major Bailey then read the paper printed above, and a discussion followed.

The PRESIDENT: Sir Michael O'Dwyer, the distinguished Governor of the Punjab, is present. To him is due as much as to any living man that the Provisional Government of India of which we have heard never came into actual being. He has been to Bokhara, and knows something also of this great Indian Prince who was to rule in India, and perhaps he will very kindly give us some remarks about the lecture.

Sir MICHAEL O'DWYER: To-night I have had the honour of being the guest of the Geographical Club, and in that moment of enthusiasm which follows a good dinner I rashly promised the President to say a few words on the subject of the lecture. The President's request was based on the fact that I was once in Bokhara; that is many years ago—as far back as 1896, and one's memory of

those times is getting blurred. But the admirable lecture which we have just listened to, and the excellent slides we have seen, recall a few associations of the days when I was in Bokhara. The memory which stands out more vividly than any other is this. I remember on a summer's evening early in May 1896 being on the railway station at Kagan, close to Bokhara, where there was a brilliant crowd assembled. The Emir of Bokhara was departing in a special train with a splendid retinue to attend the coronation of the Tsar of all the Russias at Moscow. A few months afterwards, being in Moscow, I had the opportunity of seeing again, not only the Emir, but the Tsar at the Coronation ceremonial, and now the two are associated in our minds with the same tragic fate which both have met at the hands of the Bolshevists. The Tsar has lost his Empire, life, and all near and dear to him, and the latest news of the Emir of Bokhara is that he is a fugitive from his capital, that his kingdom is in the hands of the Bolshevists, and the great city of Bokhara, which was the centre of Islamic civilization and culture and the great trade emporium of Central Asia, has now become a prey to rapine and bloodshed. One regrets the downfall of a great city like Bokhara. One hopes it may shake off the blight of Bolshevism and recover its pristine glory, which has won for it the title of Bokhara the Noble (Sharif). Most of us here in England may say it is a long way off and does not particularly interest us; but apart from the political significance of the events which have made the Bolshevists dominant in Bokhara, events which cannot but react on Persia, Afghanistan, and India, this downfall of the Emir and the native Government has also very considerable economic importance. Bokhara is the great mart of Central Asia, and was a great outlet for British and Indian trade. The few days I spent in its bazaar I was astonished at their great wealth—to my mind, far superior to anything in India. The products of Persia, Afghanistan, of Northern India, of Western China, of Europe were all collected there and were being freely exchanged under conditions of order and security; for the Bokharan Government, to its credit be it said, during all the centuries during which it maintained its independence, was conspicuous for two great things. In the first place, it always protected trade and travellers, and, in the second place, it maintained a reliable gold currency which had never been debased, and which was accepted with confidence in every market from Nijni Novgorod to Kabul and Kashgar, if not Further China. When you note these two facts, the great protection given to travellers which attracted traders from every quarter of Central Asia, from India, Turkey, and Russia to Bokhara, and the stability of the coinage, you have the explanation of the wonderful success of Bokhara as a commercial capital. Major Bailey has told us of the great number of Jews and Hindus there. When I was in Bokhara I went to see the Indian bazaar. I found a large colony of Indians, quite happy and prosperous, and they were very glad to meet one who could speak their language. Directly I appeared they produced the Anglo-Indian national drink—whisky and soda! I believe at that time it was the only place in Central Asia east of Baku, if not of Tiflis, where you could get a whisky and soda; but my Indian friends at once produced it and the Russian cigarettes. It was interesting to note where they came from. There were a good many Peshawar Mohammedans amongst them, but the great majority were Hindus from Shikarpur in Sind, and there were a certain number of Sikhs and other Punjabis. I got into conversation with one fine Sikh and asked him how long he had been there. He was a little reticent about answering, but in the end I succeeded in getting from him that he came from a village near Amritsar and had been twenty-two years in Bokhara. I said, "Have you

no desire to go back?" All the others return every four or five years. He shook his head, and finally said, "Tell me, is Warburton Sahib still there?" Mr. Warburton was a famous Punjab police officer whom you find immortalized in 'Kim' and others of Kipling's books. I met Mr. Warburton some years later in India and explained how his name and fame resounded in distant Bokhara, and it turned out this Sikh was one of the men who organized in 1873 the murder of the Mohammedan butchers because they killed the sacred cow. Mr. Warburton got to the bottom of the conspiracy, and some were hanged, but this man got away and never dared to return.

Major Bailey has explained very clearly how Bokhara is dominated from Russian territory. It lies between the Transcaspian province on the west and the Turkistan province on the east. One means by which Bokhara is throttled lies in the railway which runs through those provinces and Bokhara being entirely controlled by Russians, and the other (and, so far as I could ascertain, the more effective method) of strangling Bokhara is the possession by Russian Turkistan of the headwaters of the Zarafshàn, which means "The Gold Scatterer"—that is, the waters of this river are so fertilizing that they produce the magic effect of gold. It brings down from Russian territory enough water for the irrigation on which Turkistan and Bokhara depend, but the Russian authorities control the upper waters and the supply below, and they sometimes say, "We want all this water for our own territory." Bokhara is particularly dependent upon the waters of this river, because so far as I could see the soil was in places steadily deteriorating. Wherever you watered from wells the water was brackish. The result was that the ground was covered with salt, and the only way of working off this was by copious inundations of river water. As I have hinted, Bokhara was the meeting-place not only of men engaged in honourable business, trade, and commerce, but also the refuge of some rather shady customers, criminals and political conspirators, and Major Bailey has told you of one of these who, though passing as an Indian prince, was plotting against the British Government. I saw something of the other side of the movement in the Punjab, and I do know that the information which Major Bailey brought back as the result of his thrilling adventures has been of enormous value politically as throwing much light, not only on the doings of the Bolshevists, but on the intrigues of all the various anti-British factions which are gathered under the wings of Bolshevist Russia in Bokhara and elsewhere. This man Mahendra Partab was perhaps the most important of those plotters. He is a man who owned very large landed estates—now sequestrated—in the United Provinces. He is married to the sister of one of the ruling princes of the Punjab. In his early days he developed a dreamy idealism which characterizes a certain number of the Indian revolutionaries. He read everything Tolstoy wrote and adopted those notions of Tolstoy's which to my mind have prepared the way for Bolshevism in Russia and indirectly for a similar movement in India. When he left India his sole idea was to bring about the downfall of the British Government, and prepare the way for the restoration of the mythical golden age of Hinduism. To do this he got into touch with the Germans at Berlin. He was introduced to the Emperor, I believe, as a representative of the Indian princes, and made a member of the Council in Berlin which during the war dealt with Eastern affairs. It was through him, and another man of the same kind, an Indian Mohammedan named Barkatullah, that the Germans endeavoured to foment rebellion in India. There were several other seditious Indians helping the Germans, but these two men had a certain amount of influence in India, and they deluded the Germans in Berlin into believing they could bring about

a rising there. You will be glad to hear, as showing the spirit of loyalty among the Indian princes, that whenever Mahendra Partab sent letters to his wife, who is the sister of an Indian prince, this prince at once took possession of these letters, and without opening them sent them on to Government. He also insisted that his sister and her family should leave the estates of and sever all connection with this disloyal rebel, and soon after that I think his property was confiscated. One other sidelight on Bolshevist methods came to my notice before I left the Punjab. The Bolshevists having established themselves at Bokhara sent their agents down to Kabul. A notorious Bolshevist leader appeared there named Bravin. It was interesting to see how clever they were in selecting the right man for the work. Bravin had been attached to the Russian Consulate in Calcutta for many years and made himself very well known there, and when the Bolshevist movement spread he was one of the first selected for special service in the direction of India. When the Afghans invaded India last year on the invitation of the Indian sedition-mongers and threatened all our North-West Frontier, their Generalissimo, Nadir Khan, had a big force at Thal in our territory which was smashed up by General Dyer. The Generalissimo fled in hot haste and left a lot of his papers behind him, including a very detailed plan prepared by Mahendra Partab and Barkatullah for the provisional government of India. As far as I remember, it got over the sectarian difficulty mentioned by Major Bailey of Mohammedan domination by sharing the position of the President of the Indian Republic between one Hindu and one Mohammedan! I do not know that there is anything else except I am sure we all hope that the old historic capital of Central Asia, which has filled so large a part, not only in the political but the commercial world, may be raised again to its pristine greatness. Bokhara has always had a keen demand for the best kinds of English goods. When I was in Bokhara the Russians had brought the Bokharan state within their trade system and imposed very heavy taxation against all goods of non-Russian origin. The Bokharan is as particular about his clothes, especially his head-dress, and cultivates the latest fashions in headgear, as an English or Parisian lady. The Russians had hoped to exclude English goods by putting on a very heavy tariff, but the Manchester muslin was of so fine a quality that no Russian loom could approach it, and the Bokharans at that time were paying fabulous prices for Manchester muslin smuggled in through Afghanistan, because they found it much finer than anything they could get from Russian sources. Bokhara under Bolshevist rule is, I believe, now entirely cut off from British and British Indian trade, and the Indian press reports that the city has been completely looted, and the merchants have all fled. Let us hope that this is only a temporary eclipse.

The PRESIDENT: Sir Aurel Stein, who made those wonderful journeys in Central Asia and more particularly Chinese Turkistan, is here, and we should be very glad if he would give us a few words.

Sir AUREL STEIN: It is a great honour to be called upon to offer any remarks after this fascinating lecture which we have heard from Major Bailey, telling us of wonderful adventures such as one expects to read of only in distant history, and after the most striking observations which my old chief and friend Sir Michael O'Dwyer has just given us on what is a very recent past in India and Bokhara. It is true I have been in Bokhara territory. But though it is only five years ago that I travelled through the whole length of the mountainous part of its territory, I feel as if it were old history. Four years ago there was still the Imperial power of Russia smoothing the way for

me in the service of the Indian Government, making things in Bokhara as easy for me as in any Indian native state; and now we have had to learn of the wholly different conditions under which Major Bailey had to do his work.

I was travelling there in 1915 for scientific purposes. I wanted to see as much as I could of a very important ancient passage land which had once seen most of the intercourse between the classical West and the Far East. Sir Michael O'Dwyer has been rightly putting special stress upon the important fact that Bokhara from the earliest times has been one of the great commercial centres of Asia. This must impress any experienced observer of modern conditions in Bokhara itself. If reference to ancient history were needed, I have only to mention that Sogdiana (which was the old name of the territory which you have so often seen here on the map between the Oxus in the south and the Sir-darya or Yaxartes in the north) was a chief place of interchange between three great civilizations. I mean the Hellenistic civilization of the Near East which had penetrated through Persia; then the civilization of India which had spread northward with Buddhism; and thirdly, the culture, trade, and organized power of China, which for more than one century before and one century after the time of Christ, and again in the seventh and eighth centuries of our era, had maintained a dominating influence over great portions of Central Asia.

I shall not attempt now to give you indications of the many interesting facts we know about the part which Bokhara had played in the history of innermost Asia. I shall mention only one fact which will be of interest to you as students of geography: it illustrates how physical conditions determine the character of the population far more than race or language. We have heard here interesting accounts, and have seen too on the screen glimpses, of the present Turkomans, who have now happily resumed that rôle of nomadic robbers which the beneficent repression of the quondam Russian government had denied to them for a short period. In that very territory, long before the Turks had appeared on the stage of Central Asia, there had lived a people wholly distinct in language and race, but doing exactly the same things. They were those tribes of Iranian speech but nomadic habits whom the peaceful settled population of Persia knew and dreaded as "Turanians." Considering their ancient reputation it was quite amusing to me in Bokhara City to have to put up in a kind of hotel which called itself the "Turanski Numer." It was evidence how the term *Turan* had been brought to life again by the sort of Pan-Islamic propaganda that went on long before the war.

The historic rôle of Bokhara, I am sure, has not changed in essentials since those days when it witnessed the interchange of Persian, Chinese, and Indian civilizations, and I believe, whatever misfortunes that great city has recently undergone, geographical facts will re-establish its importance within a not very distant period. But I also believe that no change in the controlling power will ever dispose of the facilities which the desert, of which you have seen so many photographs, offers to people on its borders. The same Turkomans who now have taken again to the part of robbers had since the Russian occupation of Transcaspia in the seventies of the last century been obliged to content themselves with making plentiful money by cotton cultivation and the production of wool. Yet that period of some forty years of peaceful prosperity has not killed the ancient fascination of another and more congenial life which such ground must foster.

I wonder whether the present conditions will continue long enough for us to see demonstrated afresh the wonderful performances of the Turkoman

pony. When I was passing down the Perso-Afghan border in 1915—under conditions which, I may note in passing, were not quite those of peace—I had the good fortune to fall in with three Turkomans of the old type, then in the service of the British Consulate-General at Meshed. These men were employed to look after the Indian mail-bags passing through Afghan territory. They told me interesting details as to how those raids which once brought bands of Turkoman raiders right down to Seistan, some 400 miles off, were planned; how the ponies used for them had been trained, etc. I regretted then not to have had enough time for collecting more information on the subject. If conditions continue as at present, it may soon be possible to hear similar stories of modern raids.

There is one more matter with regard to which ancient history can be studied afresh on the same ground. Bokhara is a typical "terminal oasis," to use the proper geographical term, and such oases which derive their irrigation from the terminal course of a river are particularly dependent for their prosperity upon the maintenance of a firm government, not only in their own areas but also higher up. Whenever political troubles or similar disturbances lead to the neglect of, or interference with, the irrigation system at the canal head a terminal oasis is bound to undergo a great crisis, which, on such ground as Chinese Turkistan offers, may eventually result in complete extinction.

I have often been asked for my views as to how those ancient oases of the Tarim basin, now buried in drift-sand, which I had the good fortune to explore, had originally come to be abandoned. In reply I have always emphasized the limitation of the available archæological evidence. This could indeed prove within which period those oases were abandoned, what kind of civilization once flourished there, etc. But archæological indications in the absence of historical records do not suffice to show what was the direct cause which first started abandonment.

The human factor is a very complex one and liable to be affected by changes correspondingly varied in character. Among the possible causes leading to the abandonment of oases the theory which attributes it to "desiccation" also deserves careful consideration. It has found much favour since Prof. Huntington's very stimulating publications have made geographers and others familiar with the idea of pulsatory changes of climate leading to far-reaching historical effects.

It may be safely assumed that since those oases in Chinese Turkistan were abandoned to the desert the climate has become more arid, or anyhow the amount of water available for irrigation much reduced. But this does not prove that it was "desiccation" itself which caused abandonment in the first instance. A *post hoc* does not necessarily mean a *propter hoc*. I am unable to accept that assumption as a "working theory," because I realize the peculiar complexity of the human factor, and also because it is impossible to test such a "working theory" by experiment. This may be unfortunate; but in this respect geography, like history, differs from exact sciences.

If then we cannot have experiments, it must be of additional interest to observe that our own time supplies evidence that the area of Central-Asian oases like Bokhara can be affected very closely by political changes. From reliable information I received, it appears that the maladministration attending the present Soviet *régime* in Russian Turkistan and the consequent neglect of the canal system has led in Farghana to the abandonment of much land in the lower portion of the hitherto rich and closely cultivated tracts. Now, I suppose if I came back myself to that ground after two thousand years and found there

archæologically datable remains of settlements abandoned at the present period it would be so easy to come to the conclusion that this abandonment must have been due to climatic change bringing about increased aridity. Suppose that no records of the present period survive two thousand years hence, and it will be impossible then to prove that this conclusion was wrong and that the abandonment had been the direct result of a great political upheaval. Whether any scientist is prepared to explain the present period of upheaval on this globe of ours as due to increased aridity, I do not know. Anyhow, here is a case where the history of our own time aptly illustrates the difficulty facing the critical student when he is expected to judge of the causes of past events in the absence of actual records.

I wish only to add that all Major Bailey has told you and shown on the screen is indeed most instructive, not only to the geographer and the student of Eastern humanity, but to the historian as well. In geography we cannot make experiments; but here contemporary developments strikingly show us how historical changes affect all the aspects of human life with which geography is dealing.

The PRESIDENT: Colonel Yate was engaged thirty-five years ago in delimiting the boundary between Afghanistan and Russia in that part over which Major Bailey escaped.

Colonel C. E. YATE: I have never been in Bokhara myself, but I well remember coming to the frontiers of Bokhara and being received by a Bokharan Court of Honour, and I must confess I can endorse what Major Bailey has said when he described the Bokharan soldiers as giving the impression of extreme inefficiency. I never saw such an extraordinary collection of men in their yellow leather trousers over long top boots and most extraordinary arms and weapons; the music and band and whole turn-out were a sight I shall never forget. I know the part of the country south of Bokhara stretching from the Oxus to the Persian frontier, where I spent several years in the delimitation of the Russian and the Afghan frontier. After some two years in the country with the Afghan Boundary Commission under General Sir Peter Lumsden, I was finally sent out to build up all the boundary pillars in that whole tract of country. I followed Major Bailey's journey across the desert with the greatest interest. I remember when, after travelling through the desert, we came to the end of our journey on the banks of the Oxus, the Russian officers and ourselves embarked on a boat and floated down that river till we got to the railway, and then went on to Merv, and so home. We had a wonderful time travelling down the Oxus, and we never stopped day or night. I remember we had certain food in tins with us to eat, but the Russians had nothing to eat but a sturgeon, and that we found so good that we all fed for days on it and never touched the other things. When Major Bailey described his crossing of the Oxus I was wondering how he would get across. We saw the picture of the boat he crossed in, and apparently, I understand, they rowed the boat across. At Kilif I remember seeing a similar ferry-boat to the one shown, but that boat was drawn by a couple of horses. They were harnessed to the boat and went into the water, and a man stood in the bows with a whip, and those horses swam across. It was a curious instance of what horses can do. I never dreamt till I saw it that a couple of small horses could take a big, heavy boat across such a deep and swift river nearly half a mile in breadth. I had to demarcate the boundary from Meshed to the Oxus, and had to construct all the pillars as marked on this map. Every one who has travelled in these regions has vivid recollections of the bitter water and salt wells referred to by Major

Bailey. I had to live for a fortnight once on a well of Epsom salts, and I well remember it! Another thing that I sympathized with Major Bailey in was the snowstorm he told us of. I remember starting one April day with thirty camels laden with water out into a waterless tract of desert. That night a most awful blizzard came on, and by the morning there were a couple of feet of snow. The muleteers had left the corn for the mules behind because the young spring grass was up, and the animals would look at nothing else. The snow came down in this awful blizzard, and though the horses and mules tried to get down through the snow to the grass, they could not do it, and were very near starving. There it was that I came to realize what a splendid guide a Turkoman is. He seemed to know every well and road in the country, and carefully guided us through the storm to a place where we could find wood, light a fire, and get some food both for man and beast. I have ridden hundreds, I may say thousands, of miles with these Turkomans, and they never once failed to guide me right. Sir Aurel Stein has told us of the Turkomans who were on the mail line between Meshed and Herat. They were there with me when I was Consul-General at Meshed. All those Turkomans refused to go back to service in Russia when Panjdeh was taken by Russia in 1885, and asked to become British subjects. These men, I believe, are still in the British service, and employed on the same postal duty between Meshed and Herat, and I can only say they have always been most extraordinarily faithful followers of the British Government. They were robbers, it is true, and I suppose when the opportunity occurs they always will be robbers. They used to raid the whole of the Persian frontier in olden days, carry off slaves, and keep them. Whether this will break out again, as has been suggested, I cannot say, but we on the Afghan Boundary Commission found them capital fellows, and I certainly have the most pleasant recollections of them all. While on this frontier we found a most beautiful species of pheasant. When Colonel Peacock of the Engineers and myself were demarcating the boundary, we used to go out with the Turkomans and ride these pheasants down, as after two or three flights they used to hide in the snow, and their tails betrayed them. We brought home half a dozen, and they were declared to be a new species and named *Phasianus Principii*, or Prince of Wales' Pheasant; but it was found that they would not breed in captivity. They were magnificent birds. I was at Panjdeh at the time when the Russians drove out the Afghans. Within the last few days we have heard that the Afghans have now some troops in Merv, but what is going to happen there we none of us can say. Although the Afghans are in Merv, we hear that the Bolshevists are in Kushk, to the south of it, and consequently I do not think that Merv can be now the frontier of Afghanistan, as I have heard said, because whatever Government is in power in Russia, their hold on Central Asia depends on that one line of the Transcaspian railway, and I cannot think any Government in Russia will allow the Afghans to cut that line. I was at a lecture the other day by a very well-educated young Afghan. He dwelt on the advantages of a Mohammedan federation in Central Asia between Afghanistan, Persia, and Bokhara. Now what has become of the Emir of Bokhara none of us know; he has been driven out by the Bolshevists, and is in flight. There is no love lost between the Usbegs of Bokhara and the Afghans as a rule, but whether they will join up now under the terrible threat of the Bolshevists is a question that has still to be settled. There is also no love lost between the Afghans and the Persians. The Afghans overran Persia years ago—they may do it again. We hear a great deal now about the defence of Persia from the Bolshevists, and the few troops we have in North-West Persia

What will happen there none of us can say. Whether the Persians will accept our agreement or not none of us know. I cannot help thinking that if we do come to a Mohammedan federation in Central Asia it would conduce to stability in those regions, but none of us can say what will happen there. We can only hope that the Afghans will see wisdom, and that they will turn to the British instead of to the Bolshevists, and that we shall not have any fresh trouble with them as we had last year, when they so outrageously and wantonly attempted to invade India.

The PRESIDENT : I am sure we should wish to congratulate Major Bailey upon his wonderful escapes and the great resource which he showed in dealing with critical situations. He is the most remarkable man I know of for getting himself into nasty situations and getting himself out of them again.

MODERN DEEP-SEA RESEARCH IN THE EAST INDIAN ARCHIPELAGO

Prof. G. A. F. Molengraaff, of Delft

Read at the Meeting of the Society, 7 June 1920. Map following p. 152.

SUBMARINE topography all over the world is much simpler than the topography of the subaerial portion of the globe. This is, at least near the continental borders, evidently the consequence of the covering or blanketing influence of continuous sedimentation on the relief of the sea-bottoms contrasting with the carving and sculpturing influence of never-ceasing erosion on the land surfaces. Wherever this rule does not hold good the submarine topography, not yet being obliterated by sedimentation, must be of recent date. A bold relief of the sea-bottom is therefore, at least near the continents, apt to indicate portions of the Earth's crust which either have been warped in recent geological time or still continue to be orogenetically active, and thus continually rejuvenate and remould the sculpture of their surface. In this paper the latter alternative will be discussed for the Australasian seas.

One of the major results of deep-sea research, a branch of science of modern date, has been the statement of the fact that the so-called mediterranean seas are, as compared with the grand oceans, characterized by a bold and diversely developed submarine topography.

Mediterranean seas are, as the name indicates, seas which separate continents one from the other; in a somewhat narrower sense the name is given to those mediterranean seas which separate the great continents of the northern hemisphere from the southern continents, viz. the Caribbean Mediterranean between North and South America, the Mediterranean Sea in the strict sense between Europe and Africa, and the Australasian Mediterranean sea between Asia and Australia.

One of the peculiarities of the topography of the mediterranean seas proved to be the existence of basins, often of great extent, separated from

to-night a great deal, which has been most interesting, but I think something else also both from the paper of Dr. Molengraaff and from the speech of His Excellency the Netherlands Minister, and that is that people in Holland speak our language extremely well. Do you think there are many Englishmen who could get up and deliver a lecture like that without looking at his notes in good consecutive Dutch? There are very few. Is not that rather a good lesson for us? It has been my privilege to spend two and a half years in Holland, and nearly all the Dutch speak French, English, German and probably Italian as if these were their own languages. I should like our educational authorities to bear that in mind, and see if it is not possible to improve us a great deal in this direction. I should like to second the vote expressed by the Dutch Minister that the British and Dutch people get to know each other better. I came away from Holland with a determination that I would do what I could to further the bettering of good relations and good understanding between the Dutch and English. I do not wish to say any more except to ask you to allow me to express in your name our most grateful thanks to Dr. Molengraaff for his most admirable lecture, to which we have listened with so much interest.

The PRESIDENT: I am sure you would wish me to second what has been been said already by His Excellency the Netherlands Minister and Sir Walter Townley. We have listened to a most valuable and interesting lecture delivered in our own language with perfect fluency, and the Professor has put before us an extremely complicated subject in an exceedingly clear manner. We shall all wish to thank him for having taken the trouble to come over from Holland and for the way in which he delivered this lecture.

SOME OBSERVATIONS ON THE APPROACHES TO MOUNT EVEREST

Lieut.-Col. C. Howard Bury

DURING the summer of 1920 I was in India, on a mission from the Society, interviewing the various authorities concerned and trying to get permission for an expedition to Mount Everest. Unfortunately I was unable to get back in time to hear General Bruce's most interesting lecture on the various projected attempts to approach Mount Everest, and the discussion that took place afterwards.

As he pointed out, the chief and in fact the only obstacles that lay in the way of an approach to the mountain were political difficulties; there were questions that arose in different years between the Indian, Tibetan, Nepalese, Chinese, and Russian Governments, and these had to be settled first. At last, however, these difficulties have been smoothed away, and permission has been granted by the Indian and Tibetan Governments for an expedition to proceed to Mount Everest. There is thus every prospect that in the year 1921 the secrets that surround and veil the highest mountain in the world will be uncovered.

The mountain can be most easily approached from the northern side, and the road from Darjeeling to Phari over the Jelep La, and then viâ

Kampa Dzong and Tingri Dzong, would appear to present the fewest difficulties.

The direct road to Kampa Dzong viâ Gangtok and the Teesta valley, though it may be a day or two shorter, has many disadvantages. It is very little used by pack transport, and the path for several days follows the bed of the hot and feverish Teesta valley, where the rainfall is always heavy and where leeches abound. In places below and above Chungtang, where the path cut out of the solid rock overhangs the Teesta and Lachen rivers, there is hardly width sufficient for pack transport, and the loads would have to be taken off the mules and carried across these places. Whereas by going over the Jelep La the zone of the leeches and the heavy rainfall is soon crossed, and once in the Chumbi valley the climate is excellent, and there are no difficulties for pack transport. This is at present the main trade route into Tibet, and every day great numbers of mules and pack-ponies cross over the Jelep La, and in consequence grain and fodder can be obtained without any difficulty. From Phari to Kampa Dzong there are no obstacles; there is a regular trade route taking from three to four days and crossing over open and undulating country.

From information that I was able to obtain, the road from Kampa Dzong to Tingri Dzong presents no difficulties, and takes about seven days; from high ground north of the Naku La I could overlook several days' marches along this road, which appeared to follow along broad valleys about 15,000 feet above sea. There seemed to be no obstacles, or high passes which it would be necessary to cross.

Mount Everest I saw on several occasions in September, but always in the mornings or evenings. During the daytime heavy monsoon clouds would work up the Arun valley and into the side valleys, penetrating a certain distance into Tibet before they finally disappeared. From this it would appear that though Mount Everest lies out of reach of the main strength of the monsoon, yet clouds and snowstorms are frequent round its summit, especially in the afternoons. It lies, however, in a far better position with regard to weather than does Kangchenjunga, which seems to attract to itself all the heaviest storms.

I do not think that there are any advantages to be gained by making use of the lower Arun valley or of the Popti La and the Pangu La. Permission might be given by the Nepal Government, though they would not be enthusiastic about it. The paths through Nepal are bad and very fatiguing, and in the long run would prove to be no shorter, and would not be suited for pack transport. On the other route viâ Phari and Kampa Dzong pack transport of mules, ponies, or yaks can be used the whole way. There is a daily post to Phari, and letters only take three days from Darjeeling. There is also a telephone and telegraph line from Darjeeling to Gyantse, so that communication with the outer world can be kept up the whole time.

Aeroplanes would be of no use in Tibet, for though there would be

many places where it would be possible to land, yet owing to the density of the atmosphere at those heights being only half what it is at sea-level, it would be impossible for the present type of machine to rise again off the ground.

It would have been very interesting to have made a reconnaissance of the southern slopes of Mount Everest by flying up the Arun valley from the plains of India. This would have been probably feasible with a D.H.9a, but would have necessitated our providing at our own expense an aerodrome at the foot of the hills, the nearest permanent aerodromes being at Allahabad and Calcutta. The Air Force in India would have been very glad to help, but they have been limited in their own expenditure and would not have been able to devote any of their small budget to a side show, though they would be prepared to lend us a machine, pilot, and photographic apparatus.

The Air Force have had but little experience of flying in the hills, and the experiment would have been an interesting one for them. Where they have flown over hills, as on the North-West Frontier, they say that the air is full of bumps and air-pockets, necessitating their keeping their machines always at least 2000 feet above the level of the ground.

Beyond this reconnaissance from the south, I do not think that aeroplanes in Tibet could be of much use to the expedition: the general height of the country precluding any active co-operation on their part.

In Tibet ponies and yaks are the universal means of transport, and no one walks if he can help it, so that all the fatigues of long marches at high altitudes can be avoided by riding. The ponies are quite acclimatized to the height, and the European who comes into the country will find that after a fortnight's residence at 15,000 or 16,000 feet, he will be able to do far more and with less fatigue than when he first arrived. At greater heights than this the vitality becomes lower and sleep at night becomes more difficult, but acclimatization for Europeans is quite possible up to 16,000 feet.

Yaks will probably be the chief means of transport: they are very hardy animals, and seem to be able to live and to thrive on the scanty herbage that appears among the stones. They do not mind altitude, and though they are very slow yet they are surefooted, and it should be possible to use them for transport up to at least 20,000 feet. The snow-line on the north side of the Himalayas is often at 20,000 feet and over, and owing to the lesser denudation these northern slopes are far less steep than those on the south side, as can be seen on Pawhunri, Chomiomo, and Lhonak peaks, where in every case the south side is a series of precipices, and the north side is a comparatively gentle snow-slope. We may hope that this will also prove to be the case with Mount Everest.

The Sherpa Bhotias will probably prove to be the best coolies for high mountain work, and young men should be picked out for this particular duty. The Bhotia too from the high villages in Sikkim, such

as the Lachen villages, people who pasture their flocks at high altitudes on the Tibetan frontier, should also prove useful. They are both of a sturdy race of mountaineers, not so independent as the pure Tibetan, and should prove amenable to training. They have also the merit of being hardy and accustomed to cold and the biting winds of the country. They should be in charge of their own sirdars, and I am rather doubtful as to the advisability of having Gurkha N.C.O.'s over them. A good cook with the expedition is of great importance, as it is most necessary to keep the digestion in good order at these altitudes.

DR. KELLAS' EXPEDITION TO KAMET

IN the course of General Bruce's paper on Mount Everest, published last month, it was announced that Dr. Kellas and Major Morshead had succeeded last autumn in reaching the saddle of Kamet (at 23,500 feet), but that transport difficulties had prevented the formation of a camp at that height, or any further advance.

Dr. Kellas had planned the ascent of Kamet with special reference to the physiological effects at high altitudes and the use of oxygen. The Oxygen Research Committee and the Medical Research Committee, under the authority of the Department of Scientific and Industrial Research, undertook to supply the necessary scientific equipment, which was forwarded by the Indian Stores Department to Kathgodam. Dr. Kellas had left for India in March, and the equipment had to be got together and forwarded to him. Some unavoidable delay occurred owing to the discovery that the very light oxygen cylinders, which passed their tests when newly made, lost strength rapidly and were not safe. It was therefore necessary to send heavier cylinders. Further delay was caused in the transport to India by certain shipping restrictions in the carriage of gas cylinders and chemicals; and finally there was some unexplained delay on the Indian railways, so that the start of the expedition from Kathgodam was considerably late, and to this one must attribute any want of complete success in the investigation. The preparations of the Oxygen Research Committee were made under the disadvantage that owing to ill health Dr. Kellas had been unable to attend to them in the preceding winter, and had to leave instructions for execution after his start. The Society must gratefully acknowledge the value of the contribution to the Mount Everest problem thus made by the Committee in difficult conditions.

Dr. Kellas, who has remained in India with the intention of making another attempt on Kamet next summer, has sent us a copy of the report he has made to the Oxygen Research Committee; and in view of its immediate importance to the Mount Everest expedition, we assume his permission to print the following extracts from it:

At the end of the first week in August part of the expedition started from Kathgodam, and on August 19 joined Major Morshead at Chomoli, about 150 miles to the north. The permanent members of the expedition included Major Morshead and his transport officer, with eleven attendants—the latter being intended chiefly for survey work, and also for transport at high altitudes—and myself with two servants. There were about eighty-three coolie loads.

From Joshimath, 29 miles north of Chomoli, transport work was difficult, and repeated unvoidable delays occurred. Four bridges had been washed away in the Niti valley by floods, but the Deputy Commissioner of Garwhal, Mr. P. Mason, made such arrangements that we had only to build one bridge over the river Dhauli.

On August 29 we started from Niti, the highest village on the route (12,000 feet approx.), with about twenty-one yaks and forty coolies (each yak carrying two coolie loads), and on August 31 reached a base camp at the end of the Raikana glacier at an altitude of 15,380 feet.

Above this point the route was very rough, and all baggage had to be carried by coolies. Carriage of wood, which could be obtained about a mile below the camp, became of special importance. Even at this base camp (No. 1) want of acclimatization to altitude began to be evident in certain cases, and incidence of malaria was also troublesome.

On September 3 an advance was made along the east Kamet glacier—which was found to be quite incorrectly given on the map—and a camp formed at about 16,800 feet. This camp was on fine sandy detritus on a bank above the glacier, and was generally regarded by the coolies as the last comfortable camp. A delay occurred here due to difficulties in connection with transport of wood, and it was September 8 before Camp No. 3 was formed at 18,500 feet on rough glacial detritus above ice. This third camp was near the base of Kamet, which rose in a series of rock precipices to the north-west, forming a comparatively sharp peak. Between this peak and the ridge of east Ibi Gamin (24,170 feet), to the north-east there was a snowy saddle of altitude about 23,500 feet, which obviously indicated the route to the summit. The increase of height between this third camp and the saddle—namely, 5000 feet—consisted firstly of 2500 feet of sharp ascent, chiefly steep scree, but partly débris-covered glacier, then came 1000 feet of precipitous rock, and finally about 1700 feet of snow and ice. From the configuration of the mountain it seemed likely that the tops of these three "pitches" would necessarily represent positions for camps 4, 5, and 6. At this third camp my chief servant became so incapacitated—he had been accidentally benighted on the glacier along with Major Morshead's servant—that he had to be sent back to Niti.

On September 11 we moved up to a camp above the screes—camp No. 4—our tents being pitched at 21,000 feet (approx.). Here the transport was unsatisfactory, and we were detained about a week. At this camp it became evident that our remaining servants would be unable to go higher. Both seemed to have reached the limit of their acclimatization powers, in spite of being adequately protected, and suffered from the cold—approx. 0° Fahr. during the night—while my servant again had attacks of malaria.

On September 19 we climbed the rocks, and formed a camp on snow at approximately 22,000 feet. After a day at this camp to allow acclimatization to take place, we ascended to a little above the saddle along with three coolies from the village of Mana, starting at 9 a.m. and reaching the saddle at 3 o'clock. At 3.30 we had attained about 23,600 feet, our maximum altitude,

but the coolies declined to attempt Ibi Gamin (24,170 feet), which seemed feasible, or to ascend further on Kamet. Starting back at 3.45 p.m. (approx.) we descended rapidly, and reached our 22,000-feet camp about 5 p.m. The wind was cold, and the three coolies with us suffered more than Major Morshead or myself, and complained of headache. A considerable amount of step-cutting was necessary, which was shared.

Next morning Major Morshead unfortunately had to descend, as his period of leave had expired, taking all the coolies with him. The coolies refused to entertain the idea of moving a camp up to the saddle, alleging that the winter storm was due, and that we would be snowed up. The threatened incidence of this winter storm had been their continual complaint since reaching Camp No. 3, but otherwise the men from Mana village (10,000 feet), some of whom were coolies who had been with me previously in 1911 and 1914, behaved very well, and indeed were the mainstay of all the hard work carried out. On three occasions at Camp No. 4 we had about a couple of inches of fresh snow, the bulk of which quickly evaporated.

At the base camp I tried to get coolies to come and pitch a camp on a pass between the Raikana glacier and the Ganeshganga valley to the north, from which one could carry out experiments with the oxygen cylinders and Prof. Hill's rubber bag on a beautiful snow-peak 21,700 feet high, which evidently could be climbed. Even a heavy snowstorm could have been weathered in such a position, but the coolies refused to obey the transport officer, and would not even transport wood a distance of 3 miles to a base camp below the Ganeshganga peak mentioned. In addition to this, when on two consecutive days the yakmen had driven off their yaks unloaded, and men had to be sent after them to bring them back, it was evident a retreat was necessary.

We therefore made a double march to Niti on October 1, and on the following day reached Malari, a large village about 10 miles to the south. I had not agreed to the retreat from the Raikana glacier until the transport officer had promised to try and make an arrangement at Malari to visit the Bagini glacier to the south-east, and form a high camp on a suitable mountain for carrying out experiments, and I had fixed upon Dunagiri Peak (23,184 feet), the finest mountain of that region, for the purpose.

On October 3 we moved south from Malari, and on the 5th reached Dunagiri village (11,150 feet), about three days' march from the mountain of the same name. It soon became evident, however, that the Dunagiri men were somewhat inefficient coolies and knew nothing of snow work, so that the idea of forming a camp at 20,500 feet on Dunagiri was abandoned, and a camp formed at 18,000 feet on a more accessible mountain about 21,000 feet high to the north-west of the Bagini glacier.

About a week's work was carried out at this high camp, and Dunagiri was regained on October 16. From there continuous travel *viâ* Joshimath, Karuprayag, and Ranikhet brought us to Kathgodam on the 5th, and thence to near Darjeeling on November 9, after an absence of four and a half months.

I. *Experiments with Cylinders of Compressed Oxygen.*

On testing the weight of the oxygen cylinders at Kathgodam it became evident that they were almost certainly too heavy for high altitude work.*

* They are nearly three times the weight of the cylinders previously shown to me, and had I known that these alone were available I would have cut down the number requisitioned from seventy-two to twenty-four. I quite recognize, however, that everything was done that was possible in the circumstances.

Their weight (16 lbs. approx., or with pressure regulator, etc., nearly 20 lbs.) is as much as most coolies care to carry as a load even at 20,000 feet. Preliminary experiments at 21,000 feet on Kamet confirmed that they were unsuitable, but no opportunity of working out systematic experiments occurred until after reaching the camp at 18,000 feet, near the Bagini glacier.

Experiments were carried out over three different courses: (1) a long course involving an easy snow ascent of 3000 feet (approx.) and return; (2) a medium course involving an ascent of 600 feet over rough snow, and return by a rock scree; and (3) a short ascent along a stony arête of about 200 feet.

In a typical experiment over the long course coolies took 2½ hours without oxygen cylinders, and 3 hours 40 minutes using oxygen cylinders, the use of oxygen being stopped at the summit.

Most of the experiments were carried out on the medium course, and the results were consistent. In one typical case 39 minutes were required with an oxygen cylinder, and 28 minutes without it, and a different man took 43 minutes with a cylinder and 30 minutes without.

On the short course typical results were 8 min. 20 sec. without cylinder, and 10 min. 30 sec. with it; and 8 min. 20 sec. without, and 11 min. 20 sec. when using one.

The conclusion from above results must obviously be that the cylinders are too heavy for use above 18,000 feet, and below that altitude they are not required. They would be quite useless during an attempt on Mount Everest.

It would seem advisable in the circumstances to carry out experiments with cylinders of double the capacity filled to half the pressure, so that a light cylinder similar to that shown to me in 1919 by Colonel Stewart could be safely employed. A volume of 140 litres (*i.e.* 5 cubic feet) of oxygen might be helpful, if the weight of the cylinder were not above, say, 7 lbs.

II. *Prof. Leonard Hill's Rubber Bag and Oxylith.*

Two sets of experiments were carried out. In the first set the subjects breathed oxygen from a freshly filled bag containing strong solution of caustic soda for about five minutes, shaking the bag from time to time to promote absorption of carbon dioxide. They then immediately started up the short course mentioned above—the stony arête—and returned to the starting point, the time required being noted. After about fifteen minutes a repeat experiment was carried out without breathing from the bag.

As a rule the times were practically identical, so that it seemed that no benefit accrued from breathing oxygen while resting, and that the excess amount in the lungs at starting was of negligible value in promoting ascent.

Such a result might be expected from theoretical considerations. In the experiments of the Anglo-American Expedition on Pike's Peak (14,100 feet), it was found that about 345 c.c. of oxygen * per minute was required by the body when standing erect, and that nearly six times as much (1940 c.c.) was required when ascending a gradient of 1 in 4. The healthy body at rest would therefore probably have little difficulty in providing itself at 18,000 feet—and probably even up to 30,000 feet—with the necessary oxygen; but it is obvious that the great increase required immediately an ascent is started would be practically uninfluenced by any small residue of oxygen in the lungs.

* This is substantially the same as the values found by Haldane and by Zuntz for near sea-level.

The second set of experiments were carried out while breathing continuously from the freshly filled bag during the ascent. The apparatus was carried under the arm, which was inconvenient.

In this case the gain while using oxygen was quite decisive, the advantage being up to 25 per cent. This again was to be expected, and clearly indicates that the light oxygen cylinders suggested above might be of considerable value as regards increase of rate of ascent at high altitudes. It is also evident that if such light cylinders cannot be obtained a modified form of Hill's bag, of considerably increased capacity—say, 150 to 200 litres—might be of use. Such a bag should preferably be made so as to tie on the back, the mouthpiece being brought over the left shoulder. The absorption of the carbon dioxide by caustic soda should be adequately arranged for.

It might therefore be recommended that bags of the type indicated above should be tested next year on the expedition to Kamet. Only two such bags would be required.

III. *Observations on Mountain Sickness.*

Contrary to the author's observations in previous expeditions, mountain sickness, in one form or another, was not uncommon. Two reasons explain the difference. In the first place, in previous expeditions picked hillmen were employed, whereas in this case several men from near the plains were present; and in the second place, most of the coolies in preceding expeditions were Buddhists, who can vary their diet, whereas on this occasion the men were Hindoos, and handicapped by a comparatively rigid diet which in some respects is unsuitable for high altitudes, unless under special conditions, difficult to arrange for. As it is extremely difficult to cook the nitrogenous vegetable foodstuffs above 16,000 feet, fresh mutton should be supplied.

IV. *Acclimatization to High Altitudes.*

Satisfactory acclimatization to the maximum altitude reached was attained by only two members of the expedition, namely, Major Morshead and myself. This is probably in some measure well shown by pulse and respiration rates, which were always taken at rest while sitting.

The time spent at the highest camp (22,000 feet), however, two and three nights respectively, was insufficient to arrive at definite conclusions as to the completeness of our adaptation to that altitude. In connection with the projected ascent of Mount Everest (29,141 feet), it is obvious also that capacity for acclimatization should be tested at higher altitudes, and next year the author hopes that it may be possible to camp for a week just below the Kamet saddle, at an elevation of about 23,400 feet.

A few cases of Cheyne-Stokes breathing were observed, although as a rule at least twenty-four hours were allowed for acclimatization to take place before making observations.

V. *Suitable Diet for High Altitudes.*

In previous expeditions it had been observed that a depreciation of appetite seemed to occur after residence for some time above 20,000 feet. As it was possible that this might have been due to the diet, which had consisted entirely of tinned foods, chiefly cold because of difficulties regarding fuel transport, an attempt was made on this occasion to get an approximation to the diet usually taken at sea-level as already mentioned. Fresh mutton and

vegetables were used at the higher camps, and the food varied as much as possible. The effect was distinctly good, and no diminution of appetite was observed, even at the 22,000-feet camp; but, as already indicated, the time spent there was too short to form a definite opinion as regards completeness of acclimatization.

During the ascent to the saddle our appetites seemed good, but we had little time for halts, because of the amount of step-cutting necessary, and there was also a very cold wind. As liquid refreshment, we had a large Thermos flask filled with hot Bovril.

As a rule when camped on snow the fuel used is petroleum or methylated spirit, generally the latter, and in conection with the proposed ascent of Mount Everest we wished to find out whether a Primus lamp could be used above 21,000 feet. We had two Primus stoves with us of somewhat different constructions, and both worked well at 18,500 feet. At 21,000 feet the better of the two was fairly satisfactory, but at 22,000 feet we could not get it to work at all, and had to fall back upon a lamp burning methylated spirit. Next year, by employing flat slabs of stone as hearth, it might be possible to utilize wood at the camps on snow.

VI. *Experiments with Major Flack's Mercury Manometer to test any Variation of Strength and Energy with Increase of Altitude.*

Major Flack's apparatus can be so easily employed, that it was intended to carry out experiments with it even on the summit (25,447). The difficulties regarding transport already detailed, however, prevented results being obtained above 21,000 feet.

Observations showed that the expiratory force does not seem to vary at all with altitude up to 21,000 feet, but, as was to be expected, the capacity for sustaining a 40-mm. column of mercury rapidly diminishes as one ascends. The times during which the breath can be held at different altitudes were also taken: they should probably be approximately comparable with those for the 40-mm. column. The nose was held or clipped during the latter experiments, a procedure which experience shows to be absolutely necessary.

The results show clearly that the expiratory force is about the same at 21,000 feet as at 1600 feet. As a large proportion of the trunk muscles are involved in the expiratory effort, their tone and capacity for exerting force for a short period is apparently unaltered, and therefore probably the same is true for all the muscles of the body. If, when at high altitudes, however, one tries to keep the column of mercury at its maximum height, fatigue appears to supervene much more quickly than at sea-level, presumably because the oxygen supply to the muscles and brain is less; there is, however, a fairly rapid recovery.

One would not, of course, expect the time of maintenance of the 40-mm. column or the time of holding the breath to be the same at different altitudes, and the Table of Results showed a rapid diminution of capacity in both cases. One might reasonably suppose that the normal times in each case would be approximately proportional to the alveolar oxygen pressures, but the time of support of the 40-mm. column would be less than that of holding the breath for various reasons, perhaps more especially because the muscles in action would be using more oxygen, and the oxygen of the "dead space" would have less chance of being utilised.

SUMMARY OF VARIATION OF ALVEOLAR OXYGEN PRESSURE AND TIMES OF HOLDING THE BREATH WITH ALTITUDE.

Place.	Altitude. Feet.	Calculated normal alveolar * oxygen pressures, mm. of mercury.	Times of holding the breath in seconds.		
			Morshead.	Kellas.	Sobhan Singh.
Kathgodam	1,600	95·5	—	82, 85, 93	—
Chomoli	3,620	87·5	50	—	—
Juma Gwar	8,250	71·0	60	67	50
Raikana Glacier ...	15,380	50·7	31	46½	26
Camp No. 3	18,500	43·2	25	42	25
Camp No. 4	21,000	37·9	—	33	23

VII. *Rate of Ascent.*

The times of holding the breath, and the alveolar oxygen pressures at different altitudes, are obviously connected with the possible rates of climbing, and it could be shown that, assuming 1000 feet change of altitude per hour on easy ground to be an average rate of ascent at the summit of Mont Blanc (15,780 feet), the rate at 23,000 feet would be about 600 feet per hour. On this occasion, excluding halts, our speed was only a little above half that value, viz. 320 feet per hour, but, considering the amount of step-cutting necessary, this was about what would have been expected. On previous expeditions the author has found that his rate of ascent on easy snow at 23,000 feet approximated to 600 feet per hour, agreeing with Longstaff's experience on Trisul. On such a basis, the calculated rate of ascent for the last 1000 feet of Mount Everest would be between 250 and 350 feet per hour. Possible rates of ascent may be further tested and elaborated in next year's report.

VIII. *Variation of Minimum Temperature with Altitude.*

Raikana Glacier.

Base Camp No. 1	15,380 feet	31–8–20	Min. 30° Fahr.
2nd Camp	16,800 ,,	4–9–20	,, 23° ,,
3rd ,, ...	18,500 ,,	9–9–20	,, 15° ,,
4th ,, ...	21,000 ,,	12–9–20	,, 4° ,,
5th ,, ...	22,000 ,,	19–0–20	,, −15° ,,

THE DEATH OF MUNGO PARK

WE are indebted to Viscount Milner, Secretary of State for the Colonies, for the communication of the following despatch from Sir Hugh Clifford, Governor of Nigeria :—

Government House, Nigeria,
3 May 1920.

MY LORD,

I have the honour to bring to your notice some interesting facts which appear to fix with reasonable certainty the date of the death of the explorer, Mungo Park, at Boussa. I enclose a note on the circumstances of Park's death in so far as they are recorded in the published account of his travels. From this it will be seen that the last recorded date in his journey down the Niger is the 19th November 1805, on which day he left Sansanding. The fact that he afterwards met his death at Boussa is established by the narrative of Amadi Fatouma and confirmed by native tradition. The story

* Calculated from Miss M. P. Fitzgerald's values, *Phil. Trans. B.*, 5, 203, p. 359.

who has now for seven years been exploring the country, speaks of it modestly as but a first approximation to exactitude. But, as he adds, it gives a general idea of the region, the distances to be covered, and the difficulties to be encountered. It still has many blanks—the Juf, the Tanezruft, and other regions remain unknown. Africa has not yet yielded up all her secrets.

FRANK R. CANA.

REVIEWS

EUROPE

The Russian Almanac, 1919.— Compiled and edited by **N. Peacock.** Pp. 209. Published for the Anglo-Russian Trust by Eyre & Spottiswood London. *Price 5s. net.*

PUBLICATION of the Russian Year-Book was suspended in 1917, and now Miss Peacock, its editor, has undertaken the difficult task of compiling a work of reference on Russia as it is to-day. The volume includes some survey of Finland and Siberia, as well as all the European territories which formed part of the late Russian Empire. Russian statistics were never noted for trustworthiness, and now they are practically unobtainable. In many cases figures of the past era in Russia are given for want of more recent information. Making allowances for these difficulties, we have found the information accurate and useful. A short list of books on Russia might be amplified by a note on maps. The addition of a few maps would enhance the value of this volume. The lack of an index is a serious omission. R. B.

ASIA

Annals and Antiquities of Rajasthan.— **Lieut.-Colonel James Tod.** Edited with Introduction and Notes by **W. Crooke, C.I.E.** In 3 vols. Oxford: University Press. 1920. *£2 12s. 6d. net.*

On its first appearance this well-known work was noted by a sympathetic reviewer as standing out, in form and matter, from its contemporaries "in an age of duodecimos." Glancing from the lordly quarto which has delighted several generations of students of Indian life to the handy octavo in which it is here presented, the comparison suggests itself between the opportunities afforded by the spacious times of the author's service in India and those which now fall to the lot of his more migratory official successors of to-day. Tod was in India from 1798 to 1822, without a single day's leave, and all but the first seven years were passed in the tract of which he writes. It was in a state of anarchy and transition, and for the greater part of his sojourn there his life was "a tissue of toil and accident." Nevertheless, his intensive study of the region and its peoples was unflagging. He was steeped in grain in the traditions, customs, and balladry of the chivalrous and romantic communities of whose interests he was in charge, so that "wherever his eye fell, it filled his mind with images of the past." His great work is not, of course, without shortcomings, of which some must be ascribed to the author himself, but more to the time in which he lived, when the systematic study of ethnology, epigraphy, and social life generally was in its infancy. Taking the Annals as a whole, however, it may be said of them, as has been said of Macaulay's two Indian Essays, that inaccuracy in facts is apt to be taken as venial in the enjoyment of their literary charm.

The work, then, is well worth the tribute of being brought up to date in regard to the subjects of which our present knowledge is substantially the

result of research maturing within the last thirty years. This task could not have fallen into hands more capable or more sympathetic than those of Dr. Crooke, the leading authority upon the ethnology, folk-lore, and historical literature of Upper India. He deals faithfully, as he was bound to do, with his author's too facile endorsement of the authenticity of bardic effusions, as with his frequent and rash pursuit of analogy—that Will-o'-the-Wisp of anthropological and linguistic research. He is careful to point out, however, that Tod was here not sinning against the light of his age, and refers to questions of far-reaching importance on which his author was the first to form, or at least to indicate, conclusions which modern investigation has amply confirmed—for instance, the Scythic origin of the leading Rajput clans, and, again, the contrast between the beliefs of the Hindu masses and those of the Brahmans. Dr. Crooke does full justice, as is to be expected of him, to the vivid descriptions Tod gives of the chief religious festivals and ceremonies of Rajasthan, with the tradition of their respective origins, and dwells upon the unique value of the picture here given of a state of society which, within a generation or two after he had placed it on record, had passed away. In conclusion, the editor deserves commendation for the tactful way he has interpolated unobtrusively his numerous essential corrections and additions, without interfering with the enjoyment of his author's more voluminous footnotes. In this way, and by his scholarly introduction, he has gone far to add a new lease of popularity to what he entitles justly the most comprehensive monograph ever compiled by a British officer, describing one of the leading peoples of India.

J. A. B.

The Diary of a Sportsman Naturalist in India.— E. P. Stebbing. Pp. 298 + xvi. *Illustrations.* London: John Lane. 1920. £1 1*s.* 0*d. net.*

This is a volume of rambling reminiscences of many years' big-game hunting in Indian jungles. Mr. Stebbing has a lively style which makes his volume good reading, and he is well versed in his subject and has a genuine love of the wild life whose ways he faithfully records. To a sportsman the book will be enthralling from cover to cover, but the naturalist also will find much to interest him. The chapters on jungle lore are of special value. The last part of the book is devoted to questions of game protection and the provision of sanctuaries for the preservation of the Indian fauna. Here Mr. Stebbing takes a wide outlook, and pleads not only for animals of sporting and economic values, but also for the faun ı generally. He discusses at length the scanty measures that have been taken locally and the Indian Wild Birds' and Animals' Protection Act of 1912, which he shows is woefully deficient in its scope and powers. The greatest enemy of wild life in India is the native poacher, whose diabolical ingenuity Mr. Stebbing describes. The law at present seems to have little power to touch him. To save many large and small forms of animal life from extinction permanent sanctuaries are required. Areas of primeval forest untouched by man must be left in their original condition. The depredations of sportsman and native poacher and even the felling of trees or other waste must be prohibited if these sanctuaries are to fulfil their purpose. Some excellent photographs and many thumb-nail sketches add to the interest of the book.

R. B.

The Harvest of Japan.— C. Bogue Luffmann. London: T. C. & E. C. Jack, Ltd. 1920. 12*s.* 6*d. net.*

This book is a volume of very unequal value, its chief recommendation being the interesting information gathered by the author with regard to such

denominate the summits of Olympus which protect them from the north wind.

Thus, to sum up, the High Olympus is constituted by two ranges, which, though not parallel, run generally east and west. The northern range is that of Kokkino-Vrako, the southern, that of Bichtes. A high rocky barrier running north and south contains three "stones," three "pipes," or three "brothers," quite separated from each other, the Tarpeian Rock in the south, the Throne of Zeus in the north, and in the centre the Venizelos peak, the highest of the three. The point of junction between this barrier and the northern range is the St. Elias. The joint which unites the central peaks with the southern range is more complicated. It includes the Skolion, which forms the counterpart to the St. Elias on the opposite side of the Megali-Gurna, and the Isto-Cristaci more to the west. The St. Anthony and the domes of Stavoïdia link these two summits to those at the western end of the southern range, of which the Sarai is the most important.

I may conclude with the hope that the geographers of the future may not have to correct at too many points the imperfect sketch here traced of the high abode of the gods.

REPORT ON THE EXPEDITION TO KAMET, 1920

Major H. T. Morshead, D.S.O., R.E., Offg. Deputy Superintendent, Survey of India

The following extracts from Major Morshead's report to the Surveyor-General of India are published by permission of the Surveyor-General to supplement the brief narrative given by Dr. Kellas in his report to the Oxygen Research Committee, of which a summary was published in the February Journal.

THE mountain known in India as Kamet and to the Tibetans as Kangmed * or Abi Gamin—the 30th in order of magnitude of the known high peaks of Asia and of the world—is in lat. 30° 55′ and long. 79° 36′, in the Garhwal district of the United Provinces, just south of the Tibetan border. Rising to a height of 25,445 feet, it forms the culminating point of the Zaskar range—a northern bifurcation of the Great Himalaya—and, though forming a conspicuous landmark from the Tibetan province of Ngari Khorsum on the north, yet from the south, owing to its position behind the Great Himalayan Range, its appearance is so modest that till 1849 it remained unnoticed and unmeasured, though but 250 feet lower than the king of the Kumaon Himalaya, Nanda Devi.†

* Kangmed = "the lower snows," as distinguished from the higher snows of the Kailas Range, culminating in Mount Gurla Mandhata 100 miles to the E.S.E. The name has, I think erroneously, been spelled Kangmen in N. Frontier ¼-inch Sheet No. 9 N.E., and on the R.G.S. map of Tibet.

† Burrard and Hayden, 'A Sketch of the Geography, etc., of the Himalaya Mountains.' Kamet now shares the 30th place on the world's list of high peaks with Namcha Barwa, the mountain of identical height overlooking the big bend of the Tsangpo river in the Assam Himalaya, which was discovered in 1912.

The earliest attempted ascent of Kamet was made in Jnne 1855 by the brothers A. and R. Schlagintweit, who reached a height of 22,240 feet on a mountain which they called Ibi Gamin, and believed to be identical with Kamet. Subsequent investigation has, however, tended to the belief that the mountain on which they actually climbed must have been the satellite known as E. Abi Gamin, or Strachey's peak (24,180 feet).

During the succeeding half-century the only recorded adventurers on the mountain are the members of the Great Trigonometrical Survey who triangulated and mapped the area in the years 1872–75. It was near here in the latter year that the late Mr. I. S. Pocock made what remains to this day one of the world's highest plane-table fixings—setting up his board at 22,040 feet.*

In recent times numerous attempts have been made on the mountain. The approaches both from the east and the west were reconnoitred in July and August 1907 by Messrs. Bruce, Longstaff, and Mumm; but serious climbing was prevented by the onset of an unusually violent monsoon. Mr. C. F. Meade, accompanied by Alpine guides, made three strenuous efforts to conquer the mountain in 1910, 1912, and 1913. On the latter occasion, approaching *viâ* the Raikane valley he succeeded in reaching the col ("Meade's saddle," 23,500 feet) between Kamet and E. Abi Gamin, when his party succumbed to mountain sickness just as success seemed within their grasp.

The late Captain A. L. Slingsby twice attacked the mountain unsuccessfully from the western side, while Dr. A. M. Kellas also reconnoitred the western approaches in 1911 and again in 1914—the expedition in the latter year, which had for its special object the scientific investigation of the effects of high altitude on the human body, being summarily cut short by the outbreak of war.

On the conclusion of peace Dr. Kellas resumed the experiments cut short in 1914, and further arranged for the loan of oxygen cylinders and other scientific apparatus from the Oxygen Research Committee in England, for its despatch to Bombay through the agency of the India Office Stores Department, and for the assistance of the Survey of India in taking delivery of the apparatus in Bombay and transporting it by rail and coolie *viâ* Kathgodam to the base of the mountain beyond the extreme Himalayan village of Niti.

I was fortunate enough to be deputed for the latter task, together with Mr. Laltan Khan of the Survey of India Upper Subordinate Service.

It was hoped that the apparatus might have arrived from England by the end of June, so as to enable Niti to be reached by easy stages on about August 7. This would allow of the remainder of the month of August being devoted to laying out advanced depôts of oxygen cylinders, firewood, etc., as far forward as climatic conditions admitted, with a view to utilizing the first fine weather after the monsoon for the final climb, before the arrival of the winter snow. These plans were unfortunately frustrated by a very serious delay in the shipping of the oxygen cylinders—due, apparently, to the unexpected decision of the shipping authorities in England to classify the cargo as "high explosives." Consequently it was not until early August that the kit reached Kathgodam—whence, after hastily repacking the cylinders into loads suitable for coolie transport, the expedition started in pouring rain on August 8.

This unfortunate delay at the start involved the complete abandonment of Dr. Kellas' plans for comparative observations on acclimatization *en route*, and the paramount consideration now became that of pushing forward with all

* 'General Report on the G.T. Survey of India during 1874–75.' I have searched the original plane-table sections of this area in vain in the hope of discovering the exact site of this fixing.

possible speed in the endeavour to reach the high ground before the onset of winter conditions; leaving the comparative observations for the return journey. Travelling *viâ* the rolling hills and fertile stuffy valleys of Kumaon, we reached Joshimath on August 22, and Niti five days later. Here we halted for a day to arrange for food supplies and for permanent coolies and yaks for our further progress.

Resuming our journey on the 29th with a retinue of twenty-four yaks and forty coolies, we encountered our first obstacle on the following day in the shape of the unfordable Dhauli river, which separated us from the Raikane valley at the confluence of the latter river. This necessitated a day's halt while the coolies constructed a cantilever bridge, the timbers for which had to be fetched from the tree-zone below Niti.

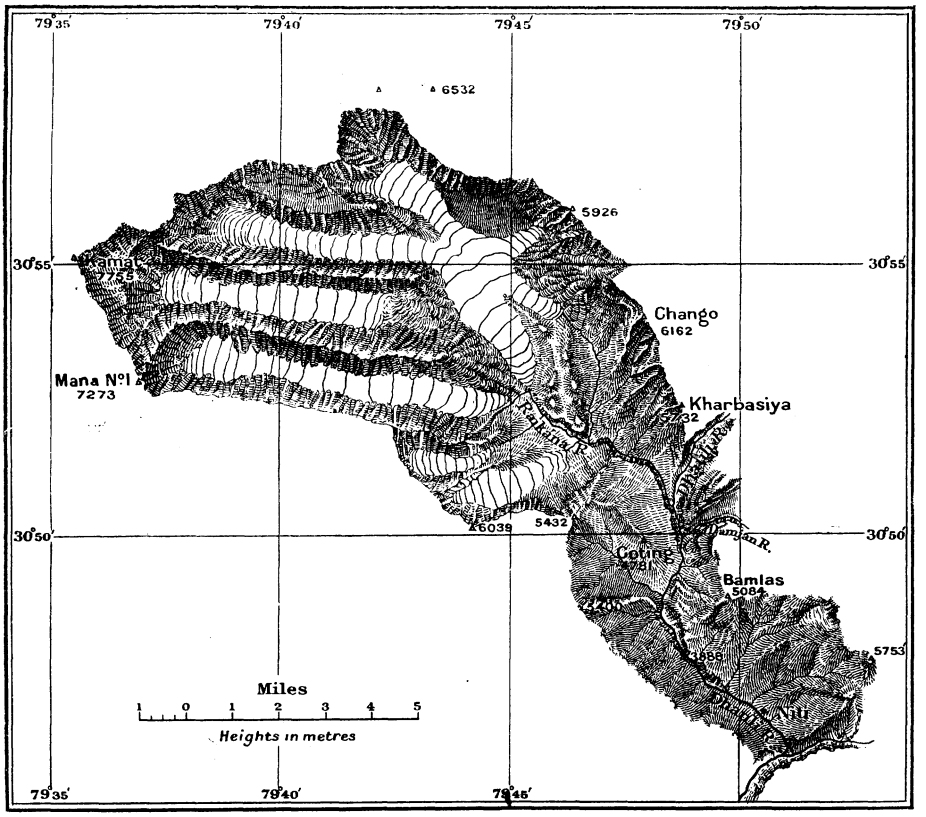
The foot of the Raikane glacier was reached on September 1. Dwarf juniper scrub (*bhitaru*) grows plentifully in this neighbourhood and forms an excellent fuel, which can be pulled up by hand by the roots without the use of an axe, and burns with a pleasant aromatic odour. Above this point no further fuel occurs, nor is the valley passable for yaks. We accordingly made this our base camp (15,380 feet), and determined on a brief halt, in which survey operations and scientific observations could be carried on, while the coolies collected a reserve of fuel for our needs on the mountain. The yaks meantime returned to Niti for fresh supplies of provisions.

Marmots abound in the Raikane valley, and some excitement was caused on our first arrival at the base camp by one of my khalasis catching a tailless "mouse-hare" in his hat. The alpine flowers on the hillsides made a striking and memorable display in their brief autumn glory—edelweiss, fleshy-leaved saxifrages, blue cranesbill, yellow and orange ranunculus, and dwarf primula being among the commonest and most conspicuous.

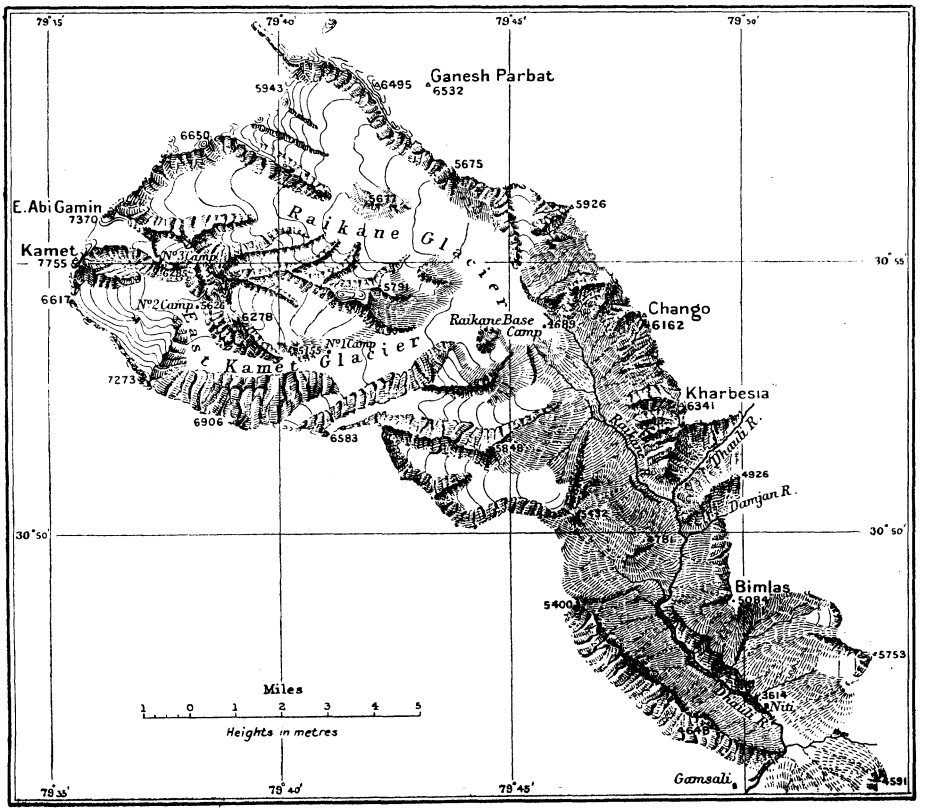
The thermometer at this altitude usually registered 6 or 8 degrees of frost each night, while the morning spectacle of a powdering of fresh snow covering the hillsides down to 16,000 or 17,000 feet served to remind us that winter was at hand, and that our sojourn on the higher slopes must perforce be brief.

From the Raikane base camp our route was identical with that of C. F. Meade in 1913, and led over the moraines and crevasses of the east Kamet glacier for a distance of 10 miles. Frequent and terrific avalanches from the steep southern and western faces of the valley are a feature of this portion of the route, and form a danger to incautious travellers; safe camping sites may be found, however, here and there on the opposite side of the valley. We were fortunate in having with us some of Meade's old coolies, whose knowledge of previous camping-grounds proved invaluable, and I am glad to take this opportunity of acknowledging our indebtedness to his gallant pioneering. Profiting, however, by Meade's experiences of mountain sickness after a series of long and rapid marches, we decided on adopting a programme of short and easy stages with frequent days of halting for acclimatization, which latter incidentally enabled the coolies to return for further supplies of much-needed fuel and provisions. Advancing in this manner, on September 10 we reached a camping-ground at 18,460 feet, beyond which the route leaves the main glacier and ascends a steep side valley.

The only incident worthy of mention in this portion of the trip was the loss of two live sheep by slipping through the thin mantle of snow which concealed one of the numerous large crevasses of the glacier. Two and a half days later we managed to lower a coolie by a rope 40 feet into the crevasse, whence he succeeded after half an hour's work with an ice-axe in releasing the two sheep,



The Kamet Glaciers from Sheet 19, 1 inch to mile, Survey of India, 1878



The Kamet Glaciers as surveyed 1920 by Mr. Laltan Khan

3. THE SUMMITS OF OLYMPUS AND THE TRANI GURNA FROM SALA TULA
G : Pic Jacques Philippe ; H : Skolion ; J : Tête noire. Other points as in Plate 2

4. SKOLION FROM THE BREACH AT K, PLATE 2

5. SAINT ELIAS, THE PRAIRIE DES DIEUX, AND THE PORTA (X) FROM POINT G

which were hauled to the surface—one still alive, and one reduced to frozen mutton.

On September 11 we advanced a further 2 miles and pitched a light camp on rock at a height of 20,620 feet. The majority of the coolies showed signs of distress and complained of violent headaches on arrival at this altitude; we accordingly sent them back to the last camp, keeping only two as guides for the 600 feet of rock climbing which lay ahead. After a day's halt for acclimatization we successfully reconnoitred the rock face on the 13th, finally emerging at the top on to a smooth dome of glassy ice, up which we had time to cut forty-five large steps before returning to camp—a delightful day of real mountaineering.

Next morning the thermometer recorded 28 degrees of frost, while the small patch of rock around our tents was white with freshly fallen snow. Both Kellas' and my own servants were at this period completely *hors de combat* from the effects of the cold, and we had the greatest difficulty in preparing ourselves any cooked food. The daily convoy of provisions and firewood ceased to function in the absence of responsible superintendence at the various posts on our line of communication, and this in turn reacted on the spirits of our coolie guides, who became extremely despondent regarding the prospects of any further progress at this late season of the year.

Our position was manifestly too precarious to warrant any further advance pending an overhaul of the line of communication, and this I accordingly undertook at once. Retracing my steps down the valley on the 15th, I installed my own private servant, who now showed signs of convalescence, as commander of the Raikane base camp, with orders to institute a regular system of *chalans* or invoices notifying the daily number of loads of fuel and stores despatched. Dr. Kellas' servant took charge of the forwarding arrangements at No. 1 camp (16,915 feet), and Mr. Laltan Khan at No. 2 camp (18,460 feet).

This accomplished, I rejoined Dr. Kellas at camp No. 3 on September 17, and found that he had meanwhile got his two coolies to complete the thirty-five more ice-steps required to negotiate the difficult ice at the head of the rock-cliff. After waiting one day to ensure the arrival of the minimum necessary reserves of supplies, we advanced with very light kit and pitched our small single-fly tent on snow at 22,000 feet. Owing to sickness the number of coolies was now reduced to eight, who consequently had to descend again for the night to camp No. 3, returning next day with a second tent (for themselves) and a small supply of ready-cooked food. It was impossible to get firewood carried up the difficult rock-face which separated us from the camp below; both we and our coolies were dependent on food sent up ready cooked from below, aided by such cooking as could be done by a spirit stove in the shelter of the tent. The thermometer next morning registered a minimum night temperature of 15° below zero on the surface of the snow, and our blankets were as stiff as boards where one's breath had congealed on them. Rising from our beds on the snow was consequently more than the work of a moment. However, after heating ourselves a tin of soup on the spirit stove and thawing sufficient snow to fill the thermos flask with bovril, we started forward at 9 a.m.—our two selves and three coolies on the rope. Taking the lead in turns, and steering a winding course to avoid the giant crevasses, we gradually emerged on to the wide flat valley which separates Kamet from E. Abi Gamin. On our left the summit of Kamet showed clearly 2000 feet above us, connecting with the valley by two well-defined arêtes of easy slope, either of which must have been easily climbable had time permitted. It was now 3 p.m., however, and our coolies were dead beat, so after

a brief halt for food and a round of photographs we had to turn regretfully homewards from Meade's col, in order to avoid being benighted. The view from this col is magnificent, comprising the whole Tibetan portion of the Sutlej valley to the north, while 100 miles to the east-south-east the stupendous *massif* of Gurla Mandhata towered head and shoulders above the intervening army of lesser ranges.

Had we been able to induce the coolies to carry our camp one march further forward to the flat open *névé* near Meade's col, it is hard to believe that anything could have prevented our reaching the summit. Lack of properly cooked food, combined with the intense cold, had however undermined the stamina of the coolies, who absolutely refused to carry forward any further loads. My period of deputation had nearly expired, and realizing with regret that the season was now too far advanced for further efforts, I reluctantly bade good-bye to Dr. Kellas on September 22 and turned my steps towards home, reaching Dehra Dun by double marches on October 15—precisely two months from my date of departure.

Dr. Kellas, with Mr. Laltan Khan, remained a further month in Garhwal, and succeeded in completing the essentials of his scientific work, which form the subject of a separate report.

The fact that neither Dr. Kellas nor myself suffered the slightest discomfort at any time from mountain sickness, seems to indicate that our method of attack by a process of gradual acclimatization is correct. That it is essential also to avoid undue fatigue is shown by the fact that our coolies who were carrying daily loads suffered considerable discomfort from the effects of altitude.

It may be profitable to discuss briefly the reasons of our failure to reach the summit of the mountain. Undoubtedly the first and foremost cause was the lateness in the year, due to the unfortunate and unforeseen delay in the arrival of the oxygen cylinders from England.

A second cause lay in the failure of the Survey khalasis, recruited from the middle Himalayas, to stand the climate and altitude of the higher ranges. I had enlisted a dozen strong Garhwali khalasis, with the double object of forming a *corpus vile* for the scientific observations of Dr. Kellas, and of providing a *corps d'élite* of porters for the higher altitudes. With the latter object in view they had been lavishly equipped with warm clothing on the arctic scale. Unfortunately, one half of their number succumbed to mountain sickness at 15,000 feet, while the other half proved so extravagant of our precious firewood that they had to be sent back to the base camp, and their places taken by the hardier Bhotia men of Niti and the neighbouring villages. The provision of boots and warm clothing for the latter on the spur of the moment was however a matter of difficulty, and proved a direct contributory cause of our failure.

A third cause of failure must be traced to the inadequacy of our arrangements for cooking at the higher altitudes. I was unaware until too late that the large Primus stove, on which I had been relying, would not work in the rarefied atmosphere of 20,000 feet, beyond which point methylated spirit is the only possible fuel; while Dr. Kellas had only one small spirit stove which took an hour to thaw sufficient snow to fill a teapot. Had our equipment included a dozen large spirit stoves and two or three two-gallon petrol-cans full of methylated spirit, both our own and the coolies' cooking would have been assured.

I have nothing but praise for the Bhotia coolies of the higher Himalaya.

On rock they can climb like goats, while on ice they readily learn step-cutting. It appears very doubtful if the present-day expense of importing Alpine guides can ever justify their employment in future Himalayan exploration.

The oxygen apparatus forms the subject of a separate detailed report by Dr. Kellas. Neither of us felt the slightest need for artificial stimulants in the form either of oxygen or alcohol up to the highest point reached, and my impression is that one could have gone several thousand feet higher without distress of breathing, had other conditions admitted. On the other hand, the handicap of 15 lbs. additional weight of oxygen cylinder on one's back, supported by a system of tight belts and straps, proved more than I for one could cope with.

I obtained a special blue print on drawing-paper of the old 1-inch to the mile Sheet No. 19. This was mounted on a light 20″ × 20″ plane-table for Laltan Khan's use, 115 square miles of country were revised and contoured in modern style, disclosing considerable discrepancies in the old reconnaissance surveys. Roads, streams, and watersheds were found sometimes as much as ¾ mile in error, while the original surveyors had evidently never visited the upper portions of the Raikane and Kamet glaciers.

It only remains to express my gratitude at being privileged to serve my apprenticeship in mountaineering under so experienced a hand as Dr. Kellas. Failure is often more instructive than success, and I can only hope that this expedition, on which I shall always look back with feelings of pleasure, may be the prelude to other more successful future efforts in the same genial company.

DE SAUSSURE: REVIEW

The Life of Horace Benedict de Saussure.— Douglas W. Freshfield, D.C.L., with the collaboration of **Henry F. Montagnier.** London: Edward Arnold. 1920. 8vo. Pp. xii., 465. *Portraits, Illustrations and Sketch-map.* 25*s. net.*

IT is remarkable that, although we have endless lives of minor men, the life of de Saussure awaited a biographer; for de Saussure was by no means either a minor man or a man whose activities would appeal only to a special public. A great mountaineer, a distinguished scientist, an educational reformer, the central figure in a distinguished society in Geneva during the last half of the eighteenth century, and finally a kindly gentleman—the life of such a man, if sufficient material has survived, should be interesting reading. Fortunately, the material has survived and been collected, and Mr. Freshfield has produced a book of which he should be proud. For many years he had contemplated writing the life of de Saussure. From time to time, however, he was deterred by the difficulty of collecting all the material necessary, for researches had to be made among the family papers and public archives in Geneva and elsewhere. This difficulty was at last overcome by the kindness of Mr. H. F. Montagnier. "Mr. Montagnier, finding himself resident in Switzerland and debarred from active service during the Great War, has at his own suggestion employed his leisure in ransacking public libraries and obtaining access to private collections in quest of material bearing on de Saussure's career—scientific, Alpine, political, and social."

Mr. Freshfield's life of de Saussure is the result of many years' study. It has been written because he was keenly interested in the subject, and he has taken every care that it shall not be merely a collection of facts. As one

THE MOUNT EVEREST EXPEDITION: ORGANIZATION AND EQUIPMENT

By Members of the Expedition and of the Committee

Addresses delivered at the Meeting of the Society, 7 March 1921.

The Object of the Expedition.

Lieut.-Colonel Sir FRANCIS YOUNGHUSBAND, President of the Committee.

WIDESPREAD interest has been aroused by the announcement that the Alpine Club and this Society are organizing an expedition with the object of ascending Mount Everest. From many different countries came applications to take part in it. But yet I am also being continually asked, What is our object in climbing the mountain? What shall we do when we get to the top? What do we expect to get there? Who will be a penny the better for our having reached the summit? I was even asked on the telephone by an enterprising journalist to tell him for the benefit of his paper "what good there would be to the general mass of humanity in the ascent of Mount Everest."

I had better once again answer such questions, for it is important that people should have no doubt or misgivings in their minds as to the good which will accrue, even to the general mass of humanity, from the ascent of Mount Everest.

A porter on an underground railway may be considered as about as representative as any we can find of the general mass of humanity. The other day I heard of one who laid it down as an absolute certainty that we could never reach the top. He had been with us in Tibet and had seen these Himalayan peaks. And "they might take it from him that the top of Mount Everest would never be reached."

Now if the human race had always acted in the spirit of the general mass it would never have emerged from the primeval forest. We should be still timid uncultured people hiding in caves and the forest depths. Fortunately, however, there were always daring leaders who struck out ahead of the general mass. They ventured out into the open plains, on to the rivers, on to the sea, even up into the air. And it was an uncommonly good thing for the general mass that they did. The leaders with spirit and imagination showed the way. The herd were glad enough to follow after and pick up all the benefits. But the mass would never have had those benefits if there had not been leaders to give the lead. Very often these leaders did not survive. The fittest to survive were those who stayed at home. But they led the way, which is a good deal better than surviving. And men must always look for leaders who will venture as they did.

Now the human race does not like to leave any spot in this little planet of ours unvisited. And for thirty years, at least, that is since General

Bruce first put forward the idea, men have had the ambition to ascend the highest point on the Earth. It is a very natural and praiseworthy ambition; General Rawling and many of the Alpine Club have entertained it. Lord Curzon also intended to further this ambition and suggested, when he was Viceroy of India, that this Society and the Alpine Club should take the matter up together. And the advantage that will come from ascending Mount Everest is this—that once the highest peak has been climbed men will pluck up courage to ascend all manner of other mountains. Even to the obtuse mass of humanity it will then be evident that men are capable of higher achievement than they had ever imagined.

As to the advantages of mountain climbing in general a Frenchman a few days ago bore striking testimony. Speaking here in London at the Institut Français, M. Léon Bérard, Minister of Public Instruction, told how his countrymen had shared with Chateaubriand a dislike of mountains, but that the example of the English cured them of their prejudice and revealed to them in a new way the beauty of their country. M. Bérard was referring more particularly to his own part of France at the foot of the Pyrenees.

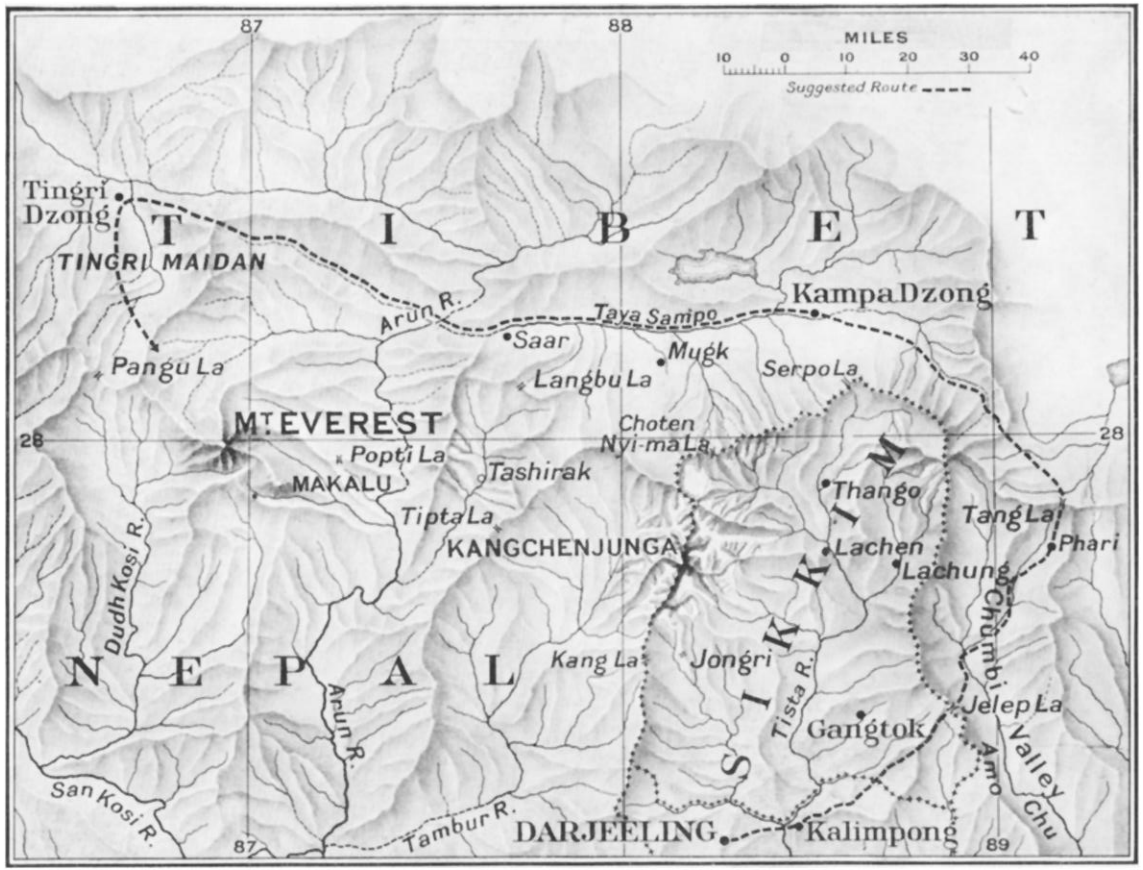
We acknowledge with gratitude the graceful compliment of the Frenchman. But we shall not be so immodest as to appropriate to ourselves alone the credit of discovering beauty in mountains. For others besides ourselves—and those others include many a Frenchman—have made the discovery that by going in among great mountains, climbing them, getting to know them thoroughly, entering into their spirit, there are beauties to be found in mountains of which the plainsman never dreams.

So the ascent of Mount Everest, by stimulating mountain-climbing in general, will bring more beauty to light. And beauty is one of the world's richest riches. We cannot expect that on the instant the general mass of humanity will suddenly derive good from the ascent. But we can be perfectly sure that in the long run even porters on underground railways will find their blood stirring more quickly with the sense of high achievement, and will feel life richer for the new beauties which have come into it.

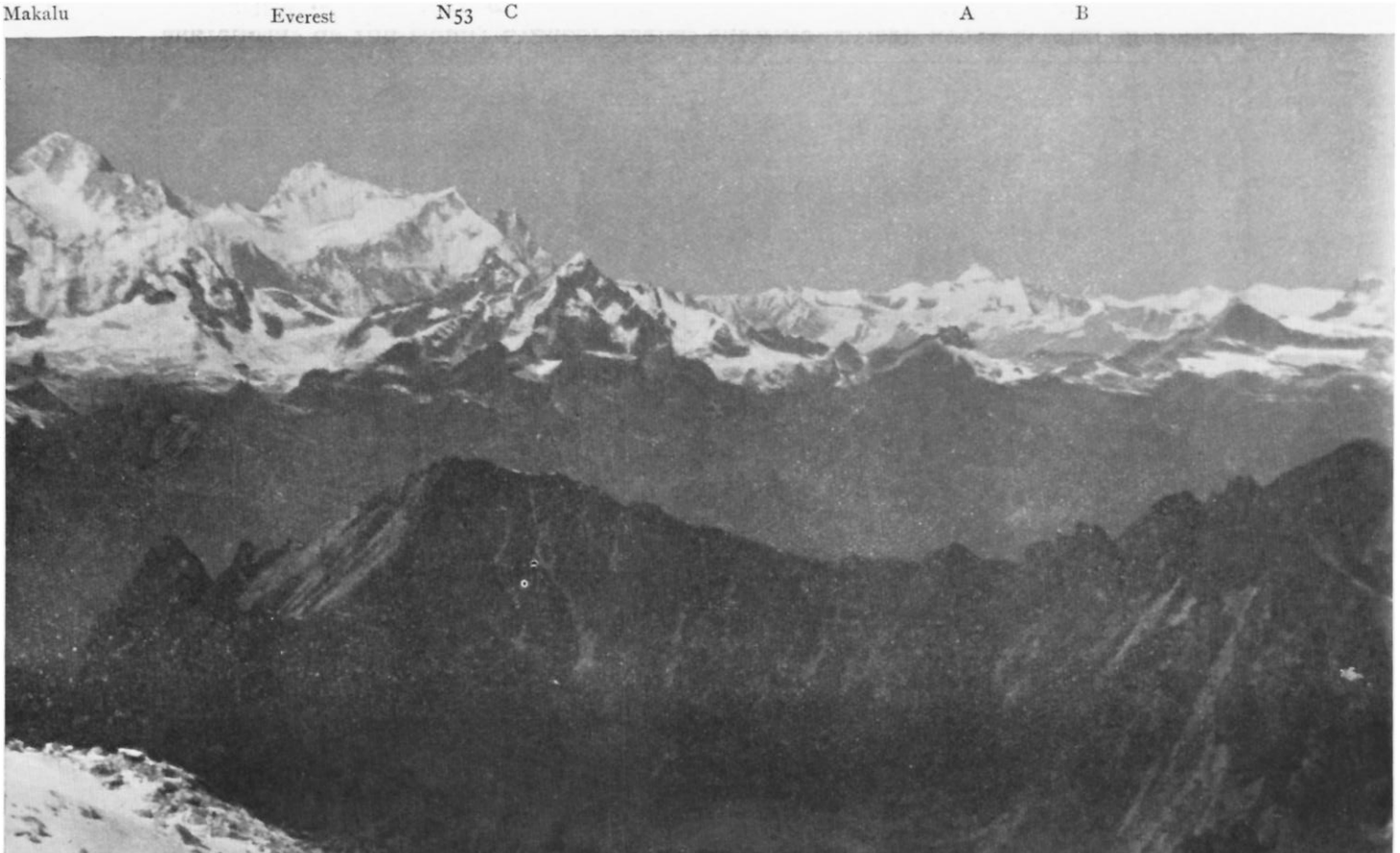
The Approach to the Mountain.

Prof. NORMAN COLLIE, President of the Alpine Club.

Before I say anything about the reconnaissance I should like to supplement what the President has said about the uses of this expedition. The expedition will have to explore new country of the highest importance, not only high because it is high above the sea-level, but because it holds the finest mountain range in the world. Geologically, it is necessary to know how the rocks and the strata are lying round this great peak Everest. Then, botanically, there is no doubt that a number of Alpine plants that grow at very high altitudes—18,000 to 20,000 feet—will be brought back. The authorities at the Natural History Museum have assured us that if the expedition will only catch all the small mice,



SKETCH-MAP OF THE MOUNT EVEREST REGION SHOWING REVISED ROUTE OF THE EXPEDITION



MOUNT EVEREST AND THE MOUNTAINS TO THE NORTH, PHOTOGRAPHED BY DR. KELLAS IN DECEMBER 1920 FROM A HEIGHT OF 16,350 FEET NEAR THE KANG LA

Note: the peak B has been retouched by the engraver and made much too prominent.

rats, and other rodents that they find on these high plateaux, at least sixty per cent., and possibly more, will be new to science. I do not think a more interesting expedition could possibly be made, and it is to be carried out at a cost much smaller than that of any big expedition I know; therefore I think the public should recognize this and support it. It does not matter how much they give, in one way, as long as they give something. Five thousand pounds is easily made up by ten shillings each from those interested.

Proceeding now to the reconnaissance of Mount Everest; I thought first it would be moderately easy. At the meeting when General Bruce addressed you in November, Captain Longstaff said you have to find Everest first, and I thought it rather an unnecessary remark: a mountain of 29,000 feet could not be mistaken. But from information that has been sent by Dr. Kellas, I am beginning to think there is more in what Captain Longstaff said than at first appeared. The expedition will start from Darjeeling into the Chumbi valley, and over the passes thence into Tibet. Between Kangchenjunga and the great mass of Everest and Makalu is the great valley of the Arun river, draining all the country at the back of the mountain. Undoubtedly there is a route up the Arun valley over to Tibet, and the higher up you join the main route the better.

Prof. Collie then discussed some telephotographic pictures of Mount Everest and the mountains to the north taken by Dr. Kellas in December 1920 *from the neighbourhood of the Kang La on the ridge running north from Darjeeling, with an approximate identification and location of the various peaks attempted by Dr. Kellas. These photographs were taken from the point to which Mr. Freshfield directed attention in his account of his Kangchenjunga expedition, as a point from which the Survey of India should photograph the country. From this material Prof. Collie concluded that there are two principal valleys running up to Mount Everest, one on the north, and one on the north-east, and that the approach must be by one of these, the western side being apparently very steep.*

The Plans of the Expedition.

Colonel HOWARD BURY, Chief of the Expedition.

The expedition is to start shortly, and during the last few weeks we have been busy in making preparations and trying to collect stores and equipment. Part of the expedition may have to live at great heights for a considerable time, and one has been experimenting with small details such as primus stoves to burn at over 20,000 feet. You cannot keep fit unless you have good and hot food. It is of the very greatest importance to have food easily digestible, which can be easily warmed up at very great heights. The expedition has been organized by Sir Francis Younghusband, and to him has been practically due the fact

that it has been brought into being. His energy here and his work with the various authorities have brought the expedition into being. The main object of the expedition is the ascent of Everest. But besides that, as Prof. Norman Collie has said, there are some very important subsidiary objects to be attained. The whole country to the north of Everest is completely unknown. The maps we have are all very problematical, and where you see a range of mountains marked in the map you may find it is a valley or lake, and as we go along we shall have to map our way. The Government of India have very kindly given us the loan of two officers of the Survey of India, both accustomed to mountain survey, and with them we shall have to work and map the whole of that country to the north of Everest, as well as the Mount Everest group; this alone would furnish a full summer's work. With these officers will be assistant surveyors, and a great deal of work has to be done. The Arun valley is probably quite wrongly mapped, and we are very doubtful as to the exact position of those ranges of mountains marked to the north of Everest. The draughtsman who compiled the map told me they were put in to fill up! Now Mount Everest is becoming known, like many other places at one time unfamiliar, as the island of Yap came into prominence a few days ago. I heard two ladies discussing the expedition recently, and at last one said to the other, "And where is Mount Everest?" "Oh, somewhere in Iceland"! Another remarked to me, "Oh, how very interesting your going to Everest! I hope you may get to the top, and then you may bring back a piece of wood from the Ark." We have a good botanist and naturalist, and there is every probability of our discovering many new flowers; but that very much depends on how far the monsoon currents penetrate up the Arun valley. It is extraordinary on those dry plains, which look so barren in the photographs, what beautiful flowers there are—most lovely rock plants, blue poppies, primulas, and all kinds of delightful flowers. There is also the geological work. We are probably getting either an officer or assistants from the Government of India for making a geological collection. We know there are a large number of animals up there. You get Ovis Ammon, one of the largest sheep in the world; possibly an antelope, certainly a gazelle, and partridges, and there is a great field for a naturalist. Some of the members of the expedition are leaving very soon, and we all hope to collect in Darjeeling in the middle of May, and to leave by the 14th. The Government of India is kindly giving us the loan of 100 mules for the expedition. This will be of the very greatest assistance to us, and we know now we shall have no difficulties with the transport. Lord Ronaldshay, the Governor of Bengal, is extremely interested in the expedition, and we are lucky in having him there. Colonel O'Connor is Political Agent in Sikkim, and his duties carry him right up into Tibet. He was with Sir Francis Younghusband in the expedition of 1904. It is, therefore, a specially favourable time for us to make this expedition, with so many

friends who will be quite ready to help us. There is a very elaborate photographic equipment going out with the expedition, so that we hope to bring back many records. Unfortunately the camera cannot reproduce the extraordinary beauties of colour there are in Tibet—greens, and reds, and orange, under a brilliant blue clear sky. It is a wonderful expedition, full of interest of all kinds, and when we come back I hope we shall have a very interesting tale to tell you.

The Mountaineering.

Mr. HAROLD RAEBURN, Leader of the Mountain Party.

Seeing that the political difficulties in connection with this expedition have been so happily overcome, we shall hope that difficulties of approach, that Prof. Norman Collie has described as very great, will also be successfully overcome owing to the careful organization of the transport, which is really the secret of getting a large party up there. There remain the mountaineering difficulties, and these will undoubtedly be extremely great. No one has ever seen the real approaches to Everest, because its lower slopes have been always concealed by the shoulders and slopes of its mighty neighbours. I do not think the northern ridge will prove at all possible, because I do not think anybody can live at such enormous elevations for such a long time as would be necessary. I was privileged last year, by very kind permission of the authorities of India and Nepal, to make a reconnaissance of Kangchenjunga, and I think in studying passages and probable conditions, we can, to a large extent, depend upon analogy. Great snow mountains are great snow mountains all the world over. These two great constellations of peaks, Everest and Kangchenjunga, at no great distance apart, are separated by an enormous river valley, the Arun, but probably conditions are very much the same. I think it very unfortunate indeed that for political reasons alone we are precluded from taking the easiest route from the south. We must find some sheltered face route, and I believe that the north east will be the most favourable, for this reason, that the north-west is probably much steeper, and it has the cold aspect. Now altitude and cold are the two great things we have to struggle against. If we can get on the north-eastern side we shall be much more likely to have sun early in the morning. As regards the actual mountaineering, everything will depend upon the training of the coolies, for I do not believe that Europeans can carry at these heights. Above 21,000 feet one has to have really well-trained and young active men, and support them in every way. We may take it that this year will be reconnaissance first of all, but there is no doubt we shall try to get as high as we can, for Italians and Norwegians are ahead of us at present in altitude records. We intend anyway to do our very utmost to explore this great mountain so far as may be possible, and to justify Sir Francis Younghusband's keen interest and able generalship which has rendered it possible.

Mr. Raeburn then showed and described some pictures taken on his reconnaissance of Kanchenjunga in 1920.

The Scientific Equipment.

Colonel E. M. JACK, Member of the Committee.

After all the interesting news you have heard I shall not bore you with a long list of scientific instruments that are being taken, but just tell you shortly what is being provided, with one or two points of interest in connection with the apparatus. We have taken, and are taking, every possible precaution to ensure that the best possible apparatus is obtained. Every precaution that critical examination and report by competent authorities can give is being taken.

We are sending one George mercurial barometer, with spare tubes. The only special point is that as it will not come into action until the expedition gets to high altitudes, we are having it made in a special form, with a much shorter column than usual. The aneroid barometers have, of course, to read to a great altitude. It is not convenient for an aneroid to read for more than 8000 feet in one revolution of the hand. Therefore they are being made in pairs, one to read from 15,000 to 23,000, and the other from 22,000 to 30,000. Small pocket aneroids are being provided for the climbers, and a larger pair as a reserve. The ordinary equipment of maximum and minimum thermometers and of boiling-point apparatus is being taken. Another instrument is a black bulb solar radiation barometer. We asked the views of the Meteorological Office about this black bulb thermometer, how high it should be graduated. The Meteorological Office gave it as their considered opinion that it ought to be graduated up to 220°. Later on Mr. Hinks met an official of the Meteorological Office, and was rather taken back by being told that in his opinion nobody but a fool would take a black bulb thermometer at all; so you see expert advice sometimes has its drawbacks. The optical instruments are one good telescope of new form, the micro-telescope, a good equipment of binoculars, and one or two monoculars. The photographic equipment consists of three stand cameras—one $7\frac{1}{2} \times 5$ and quarter plates—provided with tele-photographic attachments. The National Physical Laboratory, I should say, are giving every possible assistance in the selection. They have been very good in advising us and making a critical examination of the lenses we are sending them, and we shall be guided by their advice. A certain number of hand cameras are being provided: a quarter-plate hand camera, and a panorama camera, and small vest-pocket cameras. The vest-pocket cameras are for the high climbers. We are providing dark room equipment and the usual outfit in that way. I should mention that the plates for the expedition are being given very generously by the Imperial Plate Company. One word about survey. We are not providing any survey equipment at all, because the Survey of India have made

themselves responsible for all survey. It seems a peculiarly favourable opportunity for employing photographic methods. There are three principal ways in which they can be used to supplement the ordinary survey processes. The first is by photographs from the air: that method we shall not be able to use on this expedition, because it would have entailed the formation by the expedition of a special aerodrome, and the funds could not run to it. The second method is by the taking of individual photographs from fixed points on known bearings. That means the employment of a rather special form of camera. This has been used a good deal in Canada, and as Captain Wheeler, who is one of the survey officers, is a Canadian and we have heard he is getting apparatus in Canada and is an expert in photographic methods of survey, there is no doubt that that method will be employed on this expedition, mainly as a supplement to the ordinary method of survey. The third method is that of stereoscopic survey. Photographs are taken in pairs, on parallel lines at the ends of a measured base. The objects represented are slightly displaced in relation to each other, and by measuring the amount of displacement, and with your knowledge of the length of the base and the direction from which the photographs are taken, you can obtain the position and heights of the objects photographed. That is a very suitable method. Whether the Indian Survey will employ this method I do not know at present. An Indian Survey officer has employed the method in India, but he is not to be on the expedition.

Stores and Equipment.

Mr. C. F. MEADE, Member of the Committee.

The most natural thing to do in discussing the equipment is to compare this with a Polar expedition, and there are one or two important differences. First of all, perhaps the most important enemy we have to contend with is the sun, and the sun at high altitudes is a very formidable enemy indeed. To cope with this we are having sunproof material to put over the tents, and we are using Whymper tents, with a double fly, which have been proved to be the best tent for high altitudes. Another great difficulty is that at the same time you are suffering, as it were, from chronic sunstroke you are undergoing danger of frostbite, and the boots, therefore, are by no means the least important item in the equipment. The pattern of ski boot is the best, as it gives plenty of room for the feet and for circulation. Covers are used over the boots to prevent them from coming into direct contact with the snow. One of the most encouraging pieces of news I have had is the account of Captain Morshead and Dr. Kellas, who reached the saddle of 23,500 feet on Kamet this year without any suffering whatever, and with normal appetites and pulses, which I think is a very exceptional performance indeed, and is most encouraging. The Bhotias are certainly some of the finest climbing material in the

world. Unfortunately they are not Buddhists, but very strict Hindus, and are limited by their religious prejudices about diet, which makes them difficult to cater for on the mountain. The question of food for the coolies is very important. Invalid diet is the best way to feed them: a diet suitable for convalescence, nourishing and appetizing.

Mr. Meade illustrated his remarks by pictures taken on his ascent to the saddle of Kamet in 1913.

The Natural History.

Dr. A. F. R. WOLLASTON, Surgeon and Naturalist to the Expedition.

It would be more easy to talk about the natural history of this expedition after we come back. It would have been much more easy to talk about it earlier in the evening. Prof. Collie has killed all my rats; Col. Bury cut most of the flowers; and Mr. Raeburn dug up the rhubarb; so there does not remain much for me. Both Mr. Raeburn and Col. Bury know the Himalayas very well, so that they are not so excited at the prospect of seeing the flowers as I am. Some of the most stolid of travellers have become quite lyrical in their descriptions of the flowers we are going to see—those fields of all sorts of beautiful things. I think, as a matter of fact, some of the most interesting natural history observations we shall bring back will be about the members of the expedition themselves—about their minds and bodies: their minds particularly. I have been told when you get above 16,000 feet the temper becomes very short. What it will be like when they have been to 29,000 feet remains to be seen. In a medical capacity I hope I shall have very little to do, so far as the members of the expedition themselves are concerned. They are a very sturdy, tough lot. In the matter of the natives of the country one may be permitted to hope that they may occasionally be in need of my professional assistance. Often it happens in these escapades that a few grains of calomel, a dose of castor-oil, or some quinine, will make you good friends who will provide natural history specimens, or even more welcome things such as mutton and goats. I ought to have begun by saying that the Director and others of the Natural History Museum are taking a great interest in this expedition, and through their help we hope to engage one or two native collectors and skinners from the north of India. The specimens will mostly, I suppose, go to the Natural History Museum, and such plants and seeds as we bring home are going to other people in consideration of subscriptions to the funds of the expedition.

The High Climbing.

Mr. GEORGE FINCH, Member of the Climbing Party.

Those of us who have been selected by Sir Francis Younghusband to make, under the leadership of Mr. Raeburn, the attempt to climb the highest mountain in the world, do not conceal from ourselves the fact

that we may expect to have to face great difficulties and dangers. I have heard a comparison drawn between this expedition and Polar expeditions. Such a comparison I have not found easy to draw. The Polar expedition is a long drawn-out struggle of several months. On this expedition remarkable difficulties are not likely to be met with below 20,000 feet. The ascent, however, of the remaining 9000 feet to the summit of Everest will, if at all, be carried out in ten days or even less, and it seems to me those days will be replete with concentrated effort and strain such as no other expedition has ever demanded. I do not fear our inability to piece out an ultimate route up the mountain. By possible route I mean a route which is not only climbable, but where we are more or less safe from the danger of snow, ice or rocks falling upon us. The risk of our falling ourselves I hope may be eliminated. The question is whether the conditions will allow us to follow the route selected to the summit. On a mountain of such an enormous scale we shall be able to avoid difficult rock climbing. But I think every one of us will have to call up all he ever knew about snow conditions. These, to my mind, will prove one of our main difficulties. I do not mean we need fear avalanches coming down on us, for no good mountaineer recklessly ventures in their path. The great danger will be that at altitudes such as we hope to reach, we may meet with conditions of snow such as none of us have ever seen, of such a dry and powdery nature that all our previous experience of the angle at which snow may be ascended, still less crossed diagonally, may go for nothing. As to the question of altitude, Mr. Meade actually camped at 23,600. Dr. Kellas and Captain Morshead reached the same place last year without feeling any inconvience. Indeed, Captain Morshead goes so far as to say he could have gone several thousand feet higher. I earnestly hope it may be my good fortune to be one of Captain Morshead's companions in overcoming the 6000 feet still to be made. Dr. Kellas has recently carried out a valuable series of temperature observations at altitudes varying from 15,000 to 22,000 feet. By a process of extrapolation one can calculate from these data that temperatures of $-60°$ F. are quite likely, indeed highly probable, on the summit of Mount Everest. In other words, the cold on this expedition will in all probability be Arctic in its intensity. That in itself may not at first be considered a very serious matter, but it must be borne in mind that at high altitudes which must be attained the rate of evaporation of moisture and the loss of heat from the human body will be far greater than at sea-level. One other question, and one which, as far as I am aware, was first recognized by Mr. Meade, is of great importance, and that is the effect of the exposure of the body to ultraviolet light. At high altitudes there are large quantities of ultraviolet light not kept back by the atmosphere. At low sea-level we are protected. Ultraviolet rays impinging upon the skin literally burn it, and the burning is followed by a feverish condition which hardly seems to me to be conducive to health and well-being.

Mountain Photography.

Captain NOEL.

I think that all the people who go out to the mountains can be divided into two classes, the real climbers we have heard talking to-night, and the others. I am only a mountain traveller. My journeys were prompted only by the love of the mountains in order to see and photograph them—to see their grandeur, and to bring back a photographic record. Now the real success of the mountain photographer depends largely upon his equipment. The portability of his instruments is a very important consideration. I myself favour the quarter-plate size camera, because with the modern lenses you can get the same definition as with the large old-fashioned cameras. Another point you have to consider is the provision of various lenses, so that you can get a photograph large or small without altering your view point. The problem in photography of snow mountains is this, that you have very large contrasts of light to cater for: the very bright blue sky, the white snow, and the clouds. You must use a yellow filter, to reduce the ultraviolet light, a slow plate of very great latitude, and give a long exposure. Then you have to use a developer which will give you a slow building up of the image. The last point the mountain photographer must consider is his position. A photograph may show correctly the sky, snow, and foreground, but lack atmosphere. The photographer has to turn the ordinary photograph into something more—a picture—and that is left to his individuality to try and accomplish. But on this point of composition I think you come against the limits of photography. I recognize that photography has its limitations, and in order to do full justice to the beautiful mountains in the Himalayas, and bring back a record of the wonderful colours and scenery, you really need an artist and his palette.

The PRESIDENT.

That brings our interesting discussion to a close. Before I close the meeting altogether I should like, in the first place, to disclaim the credit which has been so very generously given to me as regards the organization. All I have done myself is to crystallize an idea which has been in the minds of both the Alpine Club and this Society for many years past—this great idea of ascending Everest. We have heard a number of men of great experience and expert knowledge this evening, and I think you will have gathered that they are thoroughly aware of the enormous difficulties and dangers which they will have to encounter, but I hope you will see that we are making every possible preparation to discount all we possibly can by forethought, arrangement, and organization beforehand; and I hope you have also gathered that there is in the members of the expedition the grit, courage, and determination upon which success will ultimately depend. I do not altogether share these doubts about their being able to find Everest. I think they will find it

easily enough. Colonel Ryder at the close of our mission to Tibet went up to the north, and both he and Major Rawling described it as rising up by itself, and well away from its neighbours, 9000 feet above anything near it. On the one side was Makalu, about 14 miles off, but Everest stood up clear, and from it they described how lesser mountains gradually came away towards Tingri. I do not think personally they will have much difficulty in finding Everest. I agree with Prof. Collie about the extraordinary intricate nature of the actual approaches to the mountain when they get near to it. That is where the mountain party this year will find their difficulties, and where we depend upon them for making a thorough reconnaissance. You can depend upon these younger men to ascend as far as they can. I know you would all like me to thank Prof. Collie and the members of the expedition for the very interesting account they have given us this evening.

Note on the photograph taken by Dr. Kellas from a point about 16,350 feet near the Kang La.

In 1883 Graham climbed a peak in the neighbourhood of Kabru, from which he had somewhat the same view as that shown in the photograph. He described a snow peak and a rock peak as clearly seen "towering far above the second and more distant range," and "showing over the northern slope of Everest." These may have been two of the cluster of lofty peaks north-west of Everest numbered T 45, T 57, B 782, T 42, and B 783, which have been located by the Survey of India but are not visible in the photograph. On the other hand Graham may have meant that the peaks appeared over the northern ridge connected with Everest, and his peaks may be the two shown in the photograph and lettered A and B.

The snow peak A is perhaps over 25,000 feet, and the splendid rock peak B rising behind the further range may be even higher than A, as it is considerably further off. Through the telescope it appeared as a magnificent wedge of light-coloured rock flecked with snow.

The photograph also shows a snow ridge connecting the south-eastern arête of Mount Everest with Makalu through a great rock peak lying between the two. This peak is not in Burrard's List of Summits, though it is about 25,000 feet and is clearly seen from Sandakphu. An unknown snow peak about 24,000 feet with a peculiar crater facing north-east, is seen on the ridge connecting Makalu with the peak N 53. It seems that the whole eastern face of Mount Everest must drain to the Arun through a glacier passing north of N 53.

From other photographs taken on the summit of a peak of 17,400 feet a considerable prolongation of the nearer range is shown, and the cessation of high peaks immediately north of this seems to indicate that most of the unsurveyed lofty mountains lie north-west and north of Mount Everest. Behind the magnificent rock peak lettered C, north-west of peak

N 53, there appears a prolongation of the Mount Everest ridge running to the range that leads to A, which peak seems to be less than 25 miles north of Mount Everest. It may be that this is the "rounded dome" seen by Sarat Chandra Das from about the Semo La and mistaken for Mount Everest. The black rock peak C is the peak seen by Mr. Freshfield and photographed by Signor Sella from the Chunjerma La, but it seems to be east of Mount Everest and not north-west as they supposed. Immediately to the right of this peak the photographs show a fairly low col in the ridge leading to A (the lowest for a long distance), and beyond the col is a precipitous very lofty ridge which must be connected with the cluster of great peaks north-west of Mount Everest mentioned above. The snowy peaks of moderate elevation to the right of the photograph reproduced appear easy to climb and readily accessible from the north; they cannot be far from Tingri.

Dr. Kellas does not name the valleys. That in the immediate foreground would seem to be one of the eastern affluents of the Tambor, the deep valley in the middle distance the main valley of that river. The gorge of the Arun lies beyond the next range of peaks close under Makalu and N 53. In examining this photograph one must remember that it was taken in December, and that the country between Mount Everest and Tingri through which the Mount Everest expedition must advance will probably not carry so much snow in June or appear so formidable as in this photograph.

SIR RICHARD FRANCIS BURTON

Born 19 *March* 1821.

IT is difficult for me to realize that more than thirty years have passed since the death of my old friend Sir Richard Burton; his powerful personality and aggressive vitality seem but a thing of yesterday. Nature, in fact, had intended for him a much longer span of life; but even his iron constitution was not proof against the hardships of exploratory travel and reckless disregard of his own health. I remember his telling me that when, after parting from Speke, he arrived, wounded, starving, and deserted, at the first depôt which had been provided for the explorers, he found there nothing but a few bottles of spirits of wine for a lamp, and in his desperation he swallowed the whole of the contents of one of them.

He was one of the most learned men I have ever come across. Naturally it was more especially in the Oriental field that he was a sort of living encyclopædia. Here there were few questions to which he could not give more or less of an answer. But anthropology, archæology, even Etruscan inscriptions all alike interested him. It was not only

to some figure approaching 40° without increasing the average error. The errors of all polyconics increase with the square of the longitude from the central meridian. By securing approximate orthomorphism, however, we get nearly rid of the error of bearing round a point, and we obtain the further advantage of being able to employ a scale factor, thus reducing scale error. Since the errors in the common rectangular polyconic are both positive and negative, the application of a scale factor would introduce no improvement.

The PRESIDENT: I am afraid I cannot pretend to have understood every single word uttered this evening. There have been some very ugly words uttered by Mr. Hinks; but I dare say he viewed them with repugnance. We all of us grasped Sir Charles Close's idea, and also have realized the practical value of it if it could be translated into effect, and we all wish to thank these gentlemen for having brought forward this subject of projections.

MOUNT EVEREST EXPEDITION

WHEN the President announced on January 10 that permission had been received for the Expedition to enter Tibet this year, he said further that the passes would be open about the end of May; and it was afterwards planned that the Expedition should assemble at Darjeeling towards the middle of May with the intention of moving on the 14th, or some day closely following, according as the news might be good or bad of the condition of the Jelep La, the pass leading into the Chumbi Valley. There had been some fear that delay in the passage of the ships carrying one or two members of the Expedition might interfere with the punctual start. It is, however, satisfactory to learn from a Reuter's telegram that the main expedition was to leave Darjeeling on May 18 and 19, within four days of the earliest possible. The surveyors had left a few days before with the intention of proceeding by the Tista Valley, and were to join the main party at Kampa Dzong.

The Surveyor-General of India is very anxious to make a strong connection between the triangulation of India and the surveys to be executed north of the range on the upper waters of the Arun and on Tingri Maidan. It would seem that the Tista Valley provides a straighter connection for this triangulation, as indeed it would have provided a shorter route for the whole expedition. But the road in the Tista Valley is so bad that it was judged preferable to take the main party a longer as well as a much healthier way round.

The Expedition this year has always been spoken of as a reconnaissance, and it is important to make clear at the start that it is hardly expected that the climbers will reach the summit, or any extreme height on the mountain in the present season. The instructions to the Chief of the Expedition, after laying down that the aim of the expedition is the attainment of the summit of Mount Everest, and that all activities should be made subordinate to that supreme object, proceed as follows: "For the

present year the main object is reconnaissance. This does not debar the mountain party from climbing as high as possible on a favourable route, but attempts on a particular route must not be prolonged to hinder the completion of the reconnaissance." In other words the climbers will go as high as they can provided that they are thoroughly satisfied they are on the best route to the summit, but it is essential that by the end of the present season there should be no doubt which is the best route. When one considers that the surroundings of the mountain are completely unknown, it is pretty clear that the complete reconnaissance is likely to occupy very fully the whole of the present season, and that only exceptional good fortune, and rather easier conditions than are probable, can allow the leader of the mountain party to rest satisfied that of any possible routes he had chosen best, and still to allow time for a serious attempt to reach the summit this year.

There is, however, excellent ground for hoping that at least two new records may be established. The highest camp yet made is Mr. Meade's on the saddle of Kamet, about 23,500. The highest point reached by any climber is about 24,600 by the Duke of Abruzzi and his guides on Bride Peak. It would not be over-sanguine to think that in the course of this year the Mount Everest Expedition will have a camp higher than Mr. Meade's, and have reached a point higher than 24,600. For no expedition has ever before worked in conditions that promise so well, or with a party so thoroughly organized.

In view of the desire of all members of the Society and of the Alpine Club to receive the earliest possible and fullest information during the recess, when there will be no meeting at which announcements can be made, the Committee have arranged that long cablegrams and news letters shall be dispatched as occasion allows every week or ten days for publication in the *Times*. These cablegrams are the copyright of the Mount Everest Committee, but may be copied twenty-four hours after publication with the usual acknowledgments. It is hoped also that a considerable number of photographs will be received by mail from the expedition, and a selection of these will be made available for the illustrated papers. All the photographs as they arrive will be shown in the photograph room of the Society; and in the map room a map will be displayed showing as far as possible the progress of the expedition. The topography of the whole region being almost unknown, there is likely to be considerable doubt at first in the interpretation of cablegrams, but it is hoped that in the course of the summer preliminary copies of the maps of the survey party will be received, and these will be shown as they arrive.