

- HINDLE, 1917. *J. Geol.*, **26**, 135.  
 HÖGBOM, 1908. *Bull. Geol. Inst. Upsala*, **9**, 41.  
 „ 1914. *Ibid.*, **12**, 255.  
 HOLMSEN, 1913. *Norsk. Geogr. Selsk. Aarb.*, **24**, 1.  
 LEFFINGWELL, 1915. *J. Geol.*, **23**, 635.  
 „ 1919. *U.S. Geol. Surv. Prof. Paper*, **109**.  
 MARTONNE, 1920. *La Géogr.*, **34**, 255.  
 MATTHES, 1900. *21st Ann. Rep. U.S. Geol. Surv.* 1899–1900, 167.  
 MEINARDUS, 1912. *Ztsch. Ges. Erdk. Berlin*, 1912 (4).  
 MIDDENDORFF, 1867 (quoted by Högbom, 1914). ‘Reise in der aussuster Norden u. Osten Sibiriens,’ 4, St. Petersburg, 1864–7.  
 MIETHE, 1912. *Ztsch. Ges. Erdk. Berlin*, 1912 (4).  
 NANSEN, 1921. ‘Spitzbergen.’ Leipzig, F. A. Brockhaus, 1921 (German translation of En Ferd til Spitsbergen. Kristiania : J. Dybwade, 1920).  
 RESVOLL-DIESET, 1909. *Norsk. Geogr. Selsk. Aarb.*, **20**.  
 RESVOLL-HOLMSEN, 1911. ‘Resultats des Campagnes Scientifique du Prince de Monaco F. xlv. Exploration du N.O. du Spitzberg par la Mission Isachsen.’ 5<sup>e</sup> Partie.  
 SCHIMPER, 1898. Pflanzengeographie.  
 SUMMERHAYES AND ELTON, 1923. *J. Ecol.*, **11**, 214.  
 TARNUZZER, 1911. *Petermanns Geogr. Mitth.*, 1911 (2), 262.  
 TREVOR-BATTYE, 1921. *Geogr. Journ.*, 1921.  
 WALTON, 1922. *J. Ecol.*, **10**, 109.  
 WRIGHT AND PRIESTLEY, 1922. ‘Glaciology.’ British (*Terra Nova*) Antarctic Expedition, 1910–1913. London: Harrison & Sons, 1922.  
 WULFF, 1902. *Akad. Abhandl. Lund*, 1902.  
 „ 1903. ‘Mésure d’un Arc de Méridien, Mission Suedoise,’ Tome II. X<sup>e</sup> Section.

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## THE CONQUEST OF MOUNT EVEREST

Douglas W. Freshfield

THE departure from our shores of the third party of climbers bent on the exploration and ascent of the highest mountain in the world seems to afford a suitable occasion for recalling some of the circumstances which led to the conception of the Conquest of Mount Everest and for tracing the stages through which a proposal—held at first by most competent judges, including men of science and experienced mountain explorers, extravagant and unrealisable—has been converted, in the opinion of the same experts, into a practical problem which depends for a happy solution mainly on the weather. But good luck in this important matter will need to be supported by the exhibition not only of a firm belief in success and of indomitable pluck—of the latter there is no question—but of sound judgment and of the most meticulous care, a care on the part of the climbing party and its leaders that holds no detail of organization or equipment trivial or unessential. For any remarks I may venture to make on these topics I may plead as an excuse that what I write is largely the result of my own experience in five

mountaineering expeditions among distant ranges. Of these three were to the Caucasus, one to Ruwenzori, and the fifth to the Tibetan-Sikkim-Nepal frontier where the conditions are very similar to those encountered in the approach to Mount Everest.

As I have already reminded the reader, the answer given in the years before the War to the question "Can the highest mountain in the world be climbed?" by the large majority of those qualified to pronounce an opinion was in the negative. Many brilliant climbers had recently attempted Himalayan heights in vain; in vain in so far as that they had been repulsed in their efforts to attain their goal, or to reach any peak of over 25,000 feet. Most of these repulses, it is true, were inconclusive, since to the physical drawbacks incident to exertion at great altitudes had been added serious mountaineering difficulties. There remained, however, one instance which seemed decisive, that of the Duke of the Abruzzi's party in the Karakorum. In that case climbers inured by much past experience on mountains and in Arctic temperatures, and provided with every advantage in the way of equipment that princely resources could procure, were, at an altitude just under 24,600 feet, defeated by difficulty of breathing on an easy snowslope. It seemed therefore reasonable and almost inevitable to infer that about 25,000 feet would prove the limit accessible to mankind, and that the summits exceeding that height might boast permanently of their serene inaccessibility.

There remained, however, a few dissenters from this popular verdict. Of these the most competent and in my own mind the most influential was my friend and former companion in the Caucasus, the late Clinton Dent. Dent, I may remind the general reader, was a distinguished surgeon (at the time of his death he was Senior Vice-President of the College of Surgeons). He was also a brilliant climber, a former President of the Alpine Club, and the Editor of the volume on *Mountaineering* in the Badminton Series. He had seriously studied the physiological problem in question, and his conclusion was put in these words, "I believe most firmly it is humanly possible to ascend Mount Everest, and further I feel sure that even in our own time, perhaps, the truth of these views will receive material corroboration."

For myself I had full confidence in Dent's judgment, despite the apparently formidable array of opinion that could be brought forward on the other side. And I was anxious, before it was too late for me, myself to add another to the list of experiences of high altitudes. In 1890 I discussed with Mummery a joint visit to the Western Himalaya. The project fell through; but nine years later, at the age of fifty-four, I was able to carry out my ambition so far as to spend four weeks at heights varying between 14,000 and 20,000 feet on the northern and western shoulders of Kangchenjunga. The prodigious and exceptional storm of 23 September 1899, which produced a rainfall of 27 inches in

thirty-eight hours at Darjeeling, buried our camp at 15,000 feet on the Zemu Glacier under 40 inches of fresh snow. It obviously put an end to my hope of further testing the limit of human endurance on a great peak. Even to wade across a pass of over 20,000 feet through soft snow of that depth required a serious effort on the part of our fifty coolies, who had to carry besides their own food for three weeks the camp equipment and rations of six Europeans. Only one of the latter felt any serious effects of altitude. We all slept fairly well at about 19,000 feet. The late Dr. Kellas, in subsequent years and under ordinary conditions, ran backwards and forwards over this pass, the Jonsong La, as if it had been the St. Theodul. So far as they went, therefore, our experiences were the reverse of discouraging: the sickness level had for the average man been lifted some 8000 feet from the days of my own boyhood and the early climbers of Mont Blanc. But of course they did not go far, or add any fresh evidence to the controversy. They do however lend marked support to the conclusion of the expedition of 1922, that acclimatization of the human frame to altitude is at least up to 20,000 feet steady and progressive.

During my visit to India Lord Curzon, my former colleague on the Council of the Royal Geographical Society, was Viceroy, and I had opportunities of privately discussing with him the possibilities of Himalayan exploration and the prospect of the political obstacles to any approach to Mount Everest being overcome in the near future.

Six years later, in 1905, Lord Curzon, still Viceroy, wrote to me in London telling me that he believed there was at last some hope of the reluctance of the Nepalese being overcome, and asking me to interest the Royal Geographical Society and the Alpine Club in organizing a Mount Everest expedition. Unfortunately, the Nepalese Durbar subsequently vetoed the proposal, and our relations with Tibet at the time not being of a character to admit of any application in that quarter, all hope of any approach to the great mountain had to be indefinitely postponed.

The war supervened, and it was not until 1919 that the suggested expedition was again considered and seriously taken in hand. The immediate occasion was the discussion following on a paper read by Captain Noel to the Royal Geographical Society on a recent journey in which he had penetrated a short way beyond the Anglo-Tibetan frontier in the direction of Mount Everest. Sir Francis Younghusband, in the first chapter of 'The Reconnaissance,' has described in detail what took place at the Meeting, and I need not repeat the story. The result, in brief, was that the Royal Geographical Society and the Alpine Club agreed to send a deputation to the India Office. There it was sympathetically received by the Secretary of State and referred to the then Viceroy, Lord Reading. In these circumstances, Colonel Howard-Bury most kindly undertook to go to India and personally recommend

the scheme to the Viceroy ; and the latter, after some discussion, consented to place our request before the authorities at Lhasa, through the British Resident in Sikkim, Sir Charles Bell, who was instructed to pay an official visit to the Holy City. At Lhasa he was most cordially received by the Dalai Lama, and our request met with the immediate and cordial assent of the Tibetan authorities.

If I have referred in the preceding pages to my own part in the inception of the assault on Mount Everest, it has been mainly in order to furnish a reason for my having at the request of the Mount Everest Committee come forward at the present moment with an estimate of its prospects of a successful issue, and a suggestion, or rather an insistence, on some of the means by which in the opinion of the Committee success may (weather permitting) be reasonably anticipated. In dealing with these and in referring to matters connected with climate, acclimatization to high altitudes, diet, equipment, and general organization I may find occasion to refer to my own experiences twenty-four years ago in a region, the great spurs of the Kangchenjunga group, separated by only 70 miles from the eastern outliers of Mount Everest.

The business of the 1921 Expedition, led by Colonel Howard-Bury, was to investigate the country round Mount Everest and to ascertain the possible approaches to the mountain and the character of the difficulties to be anticipated in climbing it. On these subjects our ignorance was almost complete. General Rawling had reported that seen from a distance of 60 miles to the north the summit did not look inaccessible. Visitors to Sandakphu, near Darjeeling, had observed the final north-eastern ridge and noted its relatively gentle inclination. Signor V. Sella had while travelling with me photographed it from Chunjerma. But this was all ; of the configuration of the group, of the relations of its valleys and glaciers, we knew nothing.

The first party carried out successfully their appointed task. Except on the south, where the Nepalese frontier formed for the most part an impassable barrier, their feet encircled the great mountain and penetrated to the inmost recesses of its glaciers. There was but one mischance in the campaign. The climbing party on the Main Rongbuk Glacier, misled by the smallness of the stream—a common feature in the western Himalaya—issuing from a glacier in an eastern side-glen, failed to realize the extent and importance of the névé that gave it birth. Consequently it was not until too late for any practical purpose in that autumn that the upper region of the East Rongbuk Glacier was reached by a circuitous route over a pass from the Kharta Valley. It was thus ascertained that from its head the gap, immediately under the flank of Mount Everest, in the ridge between it and the North Peak that separates the Main and East Rongbuk Glaciers, was accessible by mounting 1000 feet of broken but moderately inclined snowslopes, safe in ordinary conditions if liable at times to avalanches. As it had

previously been observed that the face of the mountain above the gap was a rock-slope offering no insurmountable obstacles, the main object of the Reconnaissance had been effected—a way had been found for a serious assault in the succeeding years.

The party brought back, however, from their meteorological experiences an unexpected and somewhat surprising conclusion. They argued that the early summer, the period before the monsoon, was likely to be a more favourable season than the autumn for mountaineering in the western Himalaya. In this they went, on the whole, against the practice of earlier climbers in Sikkim, most of whose successes had been won in the later period of the year. My own experience was remarkable. I have mentioned the phenomenal snow-storm of 23 September 1899. For the following weeks up to the end of October the weather was continuously fine and the forenoons as a rule cloudless, while we enjoyed complete absence of wind. But there seem to be few Septembers without snowfalls, such as may make the highest peaks for a time dangerous or inaccessible. Moreover, the photographs taken by the second party show convincingly that rockfaces laden in autumn are mostly bare in early summer. This may prove a decisive argument for the earlier season. And there is also the relative degree of cold to be considered; in summer the frost is less intense. The Norwegians on Kabru in 1907 at a height of 22,600 feet suffered a temperature 23° below zero Fahr. At the fourth camp Mr. Mallory records at 25,000 feet one of 7° F. above zero; at my camp at 19,767 feet the temperature was by day 32°, but at night inside the tent 5° F.

From the story of the two assaults on the mountain in 1922 told by Mr. Mallory and Captain Finch their successors may gain many suggestions and some warnings. Mountaineers climb on the shoulders of their forerunners as on stepping-stones:

“The many fail, the one succeeds.”

But his success is the fruit of the lessons gathered from the efforts, and sometimes from the omissions or mistakes, of those who went before him and reduced the problem to be solved to more manageable proportions:

*Νικᾶ δ' ὁ πρῶτος καὶ τελευταῖος δραμών.*

The foremost fact established by the climbers of 1922 is that Mount Everest presents for the most part what in the Alps would be held an easy rock climb. There are few great Alpine rock peaks so safe that an indisposed man can be safely sent back alone. Telephotographic views have revealed to us not only the character but the details of the northern rock face. We can estimate the relative advantages of striking at the ridge directly from the Chang-La or of keeping on the face below it on the line taken by Finch and Bruce. The former course in calm weather is probably preferable. The ridge rises gently and the breaks—low cliffs—in it look manageable. It has been pointed out

that if the slope of the final cupola were found hard ice, step-cutting at 29,000 feet might prove beyond human powers. But the photographs show a horizontal ledge running round on the right to rocks that seem to conduct directly to the summit.

I must now venture some remarks on a delicate subject: The discipline and control of the climbing party; they are founded in great part on my own experience. Free discussion in camp of the various problems that come up from day to day is stimulating and exhilarating. So long as it does not assume the warmth that the high and thin air is apt to generate, it helps to pass long hours. But when the time for action comes the discipline should be military, and the decision of the chief once framed should be carried out unreservedly. So long as the summit of Mount Everest is gained, who cares whether it is with or without the use of oxygen? One might as well claim merit for going up the Matterhorn without a rope or an ice-axe, in dress-shoes or shirt-sleeves. A more tragic parallel may be found in the unfortunate prejudice against the use of sledge dogs shown by British parties in the Antarctic.

The leader of the climbing party should have the general plan clearly set out in his own mind and organized in every detail of equipment and provisionment. First he will need to establish Camp 4 on the Chang-La as an efficient base, well stored with available wraps and provisions and means of cooking them, and habitable for a sufficient gang of porters who would be relieved from time to time. One of his more important duties will be the arrangement of these parties of natives, whose business it will be to prepare the highest camp. The leaders of these parties should be Europeans who have nobly renounced the glory of the *first* ascent. The members of the small storming party should be sent up as little exhausted as possible to a camp made as enduring as forethought can make it, and suitably provisioned. This is the most essential matter of all.

Next he will consider the number of climbers to undertake the last assault. How many climbers should be chosen is, I am aware, a much-debated question. With all due deference to a younger generation, I gravely doubt the expediency of sending a party of two. No doubt two move somewhat more quickly, especially on difficult rock climbs. But on a long and great and relatively easy ascent a party of three has obvious advantages. If one is disabled two can more easily render assistance than one; again, one can hurry for further aid while the other remains with the sick or injured man. I believe three to be a suitable number; but if this opinion does not prevail I would venture a further suggestion. Why should not two separate parties, two in each, be sent off simultaneously? One party would assist the other in case of any accident or sickness, and three or two climbers could go on as might seem best. The chances of success would be greatly increased. On the other hand it may be argued that the highest camp would have to

be doubled, that is, to consist of two tents in place of one and proportionate wraps and provisions. It would be well if a system of signalling were established between the final camp and that on the Chang-La. This highest camp must not be under 27,000 feet. If the climbers can make 400 feet an hour above this elevation (and more than this is doubtful), it will take them five hours to get to the top. Building a stone man is apt to be exhausting work at any elevation; they should carry a pole and a flag to set upon the summit.

Let us now turn to details of equipment and diet. There were far too many casualties from frost-bite in the last expedition. Other climbers and many polar explorers have endured lower temperatures without so much serious suffering. By a universal adoption of something resembling arctic equipment, it ought to be possible to avoid such disastrous experiences as those recorded. With more carefulness in avoiding exposure of hands and ears, and by the universal use of wind-proof garments, the disabling of a party at a critical moment may, we must hope, be prevented. Boots, it need hardly be said, should be placed under the head at night, where they may escape being frozen. Hot-water bottles and air cushions are light to carry, and great helps to comfort on cold nights on hard rocks. The only drawback to the indispensable sleeping-bag is the difficulty of getting yourself and your porters out of it in a low temperature. But as early a start as possible should be insisted on. The days are short near the tropics.

Lastly as to diet. Digestions may differ, but there is a general assent as to the nature of the foodstuff that is most palatable at great heights, and the expedition is sure to be provided with every suitable luxury. It would be impertinent to go into details. Is there not the Badminton volume on Mountaineering? In my experience the one essential is that the meals, or snacks, should be *frequent* and light, but I am impelled by certain passages in the "Assault on Mount Everest" to deprecate, after laborious climbs, Gargantuan feasts such as are there recorded. I may quote what Clinton Dent wrote in the volume mentioned: "When the entire body is in need of rest before anything else, it is injudicious to throw on it the labour of digesting a heavy meal." It is, in fact, an indulgence calculated to impede the recovery to normal health and powers. On the other hand the risk of starvation such as befell Captain Finch and Captain Bruce must be most carefully guarded against. That in all the circumstances they accomplished what they did is one of the most surprising and bravest feats of mountaineering on record.

Before putting down my pen I take the opportunity to make a suggestion from the point of view of a geographer. It is, of course, most desirable that no risk should be run of offending the sensibility of the Nepalese statesmen. But we have learnt that the frontier of Nepal and Tibet in the Chomolungma group runs for the most part not along

the watershed but across the southern gorges. A parallel instance may be noted in the Teesta Valley in Sikkim, where Sir J. Hooker had pointed out to him the frontier of China at the Zemu bridge close to Lachen, and many miles south of the watershed. It would seem to follow that there should be no obstacle or objection to our mountaineers exploring any of the southern glaciers and upper valleys that are in Tibet. We have learnt that they are accessible from the north by much-used passes. It would be a most interesting addition to knowledge to extend our map to the region in question and to obtain photographs of the great southern cliffs of Mount Everest that are so conspicuous an object in the distant views from the spurs of Kangchenjunga. May I, in conclusion, since I have been led to mention that magnificent mountain, express my earnest hope that, after the conquest of Mount Everest, some members of the party may have time and energy to reconnoitre the north-west flank of Kangchenjunga from one of the heights above Pangperma at the head of the Kambachen Valley—the only quarter that seems to afford some prospect of a possibly practical line of attack?

In this connection I would add, in the interest of future travellers and mountain-lovers, a modest petition to the local authorities, or the Government at Calcutta, whichever it may concern. Since my visit in 1899 the pony paths up the Teesta valley have been improved and repaired, and—though they were not thought good enough for the heavy transport of the Mount Everest parties—Lord Ronaldshay found it possible to ride up the gorges past Lachen to the Tibetan frontier. But no path has so far been made up the 10 miles of the side valley that leads to the Zemu Glacier. The ground is not difficult, and it would be relatively a small matter to clear a track through the rhododendron jungle to the bare pasturages beside the great ice-stream. Here at a height of about 15,000 feet the traveller comes on the Green Lake Plain, a large meadow of Alpine flowers at the very base of the fluted snow-cliffs of Siniolchum and the gigantic precipices and soaring ridges of Kangchenjunga itself. This spot will in future be counted among the sights of the Himalaya and the wonders of the world. To make it reasonably accessible by a track, and by erecting a rough stone hut of the type common in the Alps, or even like that at Jongri, would be an undertaking that would earn the gratitude of posterity. Until this is done the Himalayan traveller, even if he be a Lieutenant-Governor, will run the risk of missing by a few miles one of the most superb spectacles on the face of the globe. The local conditions will perhaps be rendered more clear to the majority of my readers if I remind them of a parallel case. How many generations of travellers passed Visp on their way to the Simplon without realizing that the Matterhorn and Monte Rosa lay but a short day's walk up the valley on their right?

It may perhaps be said that this suggestion has no connection with



the Mount Everest Expeditions. I hold the contrary. Whether or not the highest mountain in the world falls this year to our assault there is no doubt that a strong stimulus will have been given to the exploration and climbing of the Himalaya, and that one of the first regions to be explored in detail must be the ranges of Sikkim, since they are both politically accessible and conveniently close to a great hill station, Darjeeling. The day cannot be far off when in India as in Europe the truth of the eloquent eulogy of the physical and moral benefits to be derived from mountaineering lately put forth by a very high authority will be recognized and acted on. For the benefit of those who ask the use of the assaults on Mount Everest I may conclude by quoting a portion of Pope Pius XI.'s recent letter to the Bishop of Annecy on the occasion of the thousandth anniversary of the birth of St. Bernard of Menthon, the founder of the hospices on the two passes that bear his name :

“ Of all the exercises which afford us a wholesome distraction there is—for a man who knows how to avoid rashness—none more serviceable than Mountaineering in promoting both health of body and vigour of mind. In his laborious effort to attain the mountain tops, where the air is lighter and purer, the climber gains new strength of limb ; while in the endeavour to overcome the various obstacles of the way the soul trains itself to conquer the difficulties of Duty : and the superb spectacle of the vast horizons which from the highest crests offer themselves on all sides to his eyes, raises without effort his spirits to the divine Author and Sovereign of Nature.”

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## THE ROSS DEEP

Lt.-Comm. R. T. Gould, R.N. (retd.).

A SINGLE deep-sea sounding, and an erroneous one at that, which produces for sixty years afterwards a most definite and extensive effect upon the views of geographers and oceanographers, may justly be considered an almost unique phenomenon ; and such is the famous sounding of “ 4000 fathoms, no bottom,” which Sir James Ross believed that he had obtained, during the third year of his famous Antarctic voyage, in lat.  $68^{\circ} 34' S.$ , long.  $12^{\circ} 49' W.$

Ross's well-deserved reputation as a scientific navigator and explorer, and the attention which he devoted during the voyage to the technique of deep-sounding, combined to obtain general acceptance of this result, with the result that the “ Ross Deep ” in this position became a familiar feature on bathymetrical and other charts, and that the hypothetical outline of the Antarctic Continent in this region was plotted, as after events proved, a long way too far southward. For example, the late Sir John Murray, in the course of a paper on the scientific advantages