

REVIEWS.

Mountains, their Origin, Growth, and Decay. By Prof. James Geikie.
Published by Oliver and Boyd, Edinburgh, 1913. Price 12s. 6d.

THE publication of this admirable work will, we feel sure, be welcomed by all members of the Club. It is a plain and straightforward story of the causes which have produced the present surface relief of the earth's crust. In this volume we are introduced to that fascinating branch of the realm of nature occupying the borderland between geology and geography, and the author occupies himself not so much with the scenery of mountains as with their architecture and origin, thus supplementing in many respects the late Lord Avebury's volume on the Scenery of Switzerland. 'Sentimentalists,' the author remarks, 'have sometimes expressed the fear that a study of the structure or anatomy of mountains may diminish one's appreciation of scenery, but surely it ought rather to lend an additional interest to our contemplation of Nature'; and we think that any mountain-lover, after reading this book, will agree with him.

As regards the definition of a mountain the author takes a very catholic view; no protuberance on the earth's surface is considered too humble to be included under the word, and perhaps a very serious mountaineer might be tempted to remark that the author had occasionally made mountains out of mole-hills. Hills and mountains are considered under two great divisions—'Original or Tectonic,' and 'Subsequent or Relict.' Under the former we have descriptions of the elevations due to piling-up of material at the surface; these include volcanic cones among the larger features and glacial accumulations and sand dunes among the smaller excrescences.

But the chapters which will appeal most forcibly to the members of this Club are those which deal with the origin, architecture, and denudation of the Alps, in which the author has brought together the most recent observations and conclusions of the Swiss and French geologists. Few scientific opinions have undergone so thorough a change as those concerning the true structure and mode of origin of the Swiss Alpine Chains, and de Saussure would indeed stand aghast were he to be 'personally conducted' round his old haunts by Messrs. Schardt, Lugeon, and Heim, and shown how the great crust folds which were formed on what is now the south side of the chain were urged forward like breaking waves over the present site of the Alps and actually translated for many miles to the north, until they were dumped down on the plains of Switzerland to form the present foot-hills or Pre-Alps of Switzerland. No fewer than four such translated rock-sheets or 'Decken' have now been traced by Swiss and French geologists, and to these the names 'Helvetian,' 'Lepon-tine,' 'East Alpine' and 'South Alpine' have been given.

The first, the Helvetian sheet, originated in the southern border of the Aar Massif, between Chur and Martigny. Here certain geological strata were folded on themselves and driven over the northern continuation of the same formations, giving rise to two zones of similar rocks, between the Todi and Balmhorn, one occupying its original position to the north, but covered in places by a second folded mass of the same rocks translated from further south. The second series of folds appear to have developed to the south of what is now the St. Gotthard range and to have crept over the surface of the Helvetian sheet, forming the 'Lepontine' sheet. This includes certain southern types of rocks which are absent from the Helvetian sheet.

The third fold from the south next appeared as the East Alpine sheet, originating still further south and advancing over the 'Lepontine' sheet, while the fourth or 'South Alpine' mass came from still further south, from the district now occupied by the North of Italy. The time required for these movements to take place was probably a long one, and the author remarks: 'If it took millions of years to bring together materials for the construction of the Alps, long æons were required for the process of building, for piling up rock-sheet upon rock-sheet. Crustal movement had begun before the close of Eocene times, was continued throughout the subsequent Oligocene and Miocene periods, and had apparently not quite ceased before the advent of prehistoric man, if indeed it has even now completely died away. In a word, the movement of compression must have extended over several millions of years.'

These movements seem to have been succeeded by a period of comparative rest, during which conglomerates up to a thickness of 6000 feet were deposited along the south shore of an inland sea, the pebbles being derived from the denudation of these folded rock-sheets, and are now exposed in the Rigi and elsewhere between the Lake of Constance and the Lake of Thun.

Following this quiescent period new movements took place on the site of the Alpine Chains, and the Massifs of the Aar, Gotthard, Aiguilles Rouges, and Mt. Blanc bulged upwards, forcing forward the denuded remnants of the northern rock-sheets in great folds over the depressed area to the north, doubling back and incorporating the Miocene conglomerate and crumpling up the Mesozoic rocks of the plains beyond, to form the present Jura and Säntis Ranges.

Such is now generally considered to be the origin of the Alpine Chains, but denudation has since not only exposed the crystalline core of the Alps, but has also isolated fragments of the translated rock-sheets, so that these now form outliers of older Mesozoic fragments resting on newer Tertiary rocks. The name 'Klippen' is given to these isolated masses, and they are characterised by having no 'roots.' Examples are seen between the valley of the Rhine and the Lake of Thun in the well-known Mythen, Stanserhorn, Gisweiler Stock, and others now forming peaks upwards of 6000 feet high.

After a clear exposition of the foregoing views the author next considers the denudation which the Alps have undergone, and deals generally with mountain forms, showing the relation of their present outlines to their various geological components and to the original lines of weakness traversing the rocks.

Then follows a brief sketch of the development during three successive epochs of folded mountains in post-Cambrian, post-Carboniferous, and post-Eocene times, known respectively as 'Caledonian,' 'Hercynian,' and 'Alpine' periods of movement. A description of 'Block' mountains or 'Horsts' and mountains due to the intrusion of massive igneous rocks follows; the former are well illustrated in Europe by the Vosges and Black Forest, between which the depression of the Rhine Valley has been faulted down, and in America by the Great Basin Ranges, while good examples of the latter occur in the Henry Mountains of Utah and in this country in Goatfell and the Coolin Hills.

In Chapter 10 the author discusses the various theories which have been advanced to account for the forces which have produced tectonic mountain chains. Thus Hall, in America, developed the theory that the materials of which folded mountains are composed were accumulated in shallow depressions of the crust, and as these strata may be (as in the case of the Appalachians) 40,000 feet thick, he considered they must have been deposited on a gradually subsiding sea-floor, the sagging being due to the increasing weight of sediment. The increasing pressure would, he thought, cause wrinkling and folding such as we find in mountain chains; but while it accounted for this, it left the elevation into mountain chains still unexplained—it was in fact a theory of mountain-formation with the mountains left out! Studer and Dana, on the other hand, considered that the accumulation of a thick series of shallow-water sediments was due to the sinking of the crust beneath them, and that the sinking was not due to the accumulation; according to Mellard Reade the folding has resulted from the dilatation of the rocks due to heat which has been generated by the accumulation of thick masses of sediment and also by that due to the intrusion of igneous rocks, the subsequent contraction of the strata on cooling causing the foundering of portions of the crust, other portions being wedged up between.

Several objections to this expansion or thermal theory have been advanced, and the theory of 'mountain-making' which finds most favour to-day attributes the origin of folded mountains to the sinking of the crust upon the cooling and contracting nucleus. The most unstable areas of the crust appear frequently to have coincided with lines where continents and oceans meet, and it is precisely here where sedimentation will always be most active. The coincidence, therefore, between thick deposits of sediment and mountain ranges pointed out by Hall is rather what we should expect.

The final effects of denudation in shaping the present mountain forms are treated in the last chapter, where the reader will also find

an account of the isolated portions of plateaux now appearing as 'relict' mountains due to the same causes. The book is lavishly illustrated throughout with admirable photographs and diagrams, which have been very carefully selected by the author to elucidate the text, and both author and publisher are to be heartily congratulated on the evident care with which the book has been produced.

E. J. G.

The Conquest of Mount Cook and other Climbs. An Account of Four Seasons' Mountaineering on the Southern Alps of New Zealand. By Freda Du Faur. Allen & Unwin, London, 1915. Price 16s.

MISS DU FAUR has written one of the best and most comprehensive books dealing with the New Zealand Alps that have yet been published. Climbing in New Zealand has now reached the stage when the first pioneer days are over, at all events in the Mt. Cook district; the huts in the neighbourhood of the Hermitage allow of a number of climbs to be made without the interminable carrying and tent work which took up the time and wasted the energies of the earlier climbers; and the route up a number of peaks is now sufficiently known, so that ascents and fine weather are for the climber in a somewhat similar ratio to Switzerland. There is, however, plenty of new work even near the Hermitage; apart from Mt. Cook only three of the bigger peaks have been climbed by more than one route. Miss Du Faur was fortunate in coming to the Southern Alps when she did, and in being able to devote two or three months for four seasons to climbing, but the climbing world is equally fortunate in having someone who could write as brightly and vividly as she has done of her climbs there. The book ought to spread some of the writer's enthusiasm for a climber's paradise with the added charm of untrodden forest and distant seascapes.

Miss Du Faur is an Australian who was simply drawn to the hills and eternal snow by that longing which the true climber knows so well but finds so hard to explain. Chapter 2 is an interesting piece of self-analysis written after some remarkable climbing had been done, but while the first impressions were not too distant to be blurred. Miss Du Faur was fortunate in finding a mentor like Peter Graham, who, instead of rushing her up the highest—and the highest tariffed—mountain, set to work to train and instil some of his own craft and skill. In this Miss Du Faur had a great advantage over the average person who begins in Switzerland. It is difficult to pick out passages for special mention, but the author has managed to convey the charm of the Franz Josef Glacier when the rata tree is in flower, a charm that is only rivalled by its neighbour the Fox.

The ascent of Mt. Tasman will always be a climb of first-class importance, and Miss Du Faur's account of her ascent is well worth reading; this is only the second ascent of Tasman. The ascent of Mt. Lendenfelt by the col between Lendenfeldt and Haast from the

Big Plateau—the first ascent by this route—is a glacier expedition that has few rivals; unfortunately, there is not a photograph showing the line of ascent. The traverse of the three peaks of Mt. Cook was a magnificent expedition and one that will be repeated but seldom, as it depends upon perfect conditions. This was a first traverse, as was that of Mt. Sefton. Sefton had not been climbed from the Hermitage since the first ascent by Mr. Fitzgerald in 1895, and will always be a difficult climb, if not a dangerous one. Bad weather set in on the descent to the west, and the difficulty of finding the one way down from the upper Douglas and the subsequent adventures in the bush must be read in full. The book is very well illustrated; some of the photos have already appeared in the 'A.J.' Those who are tantalised by the absence of names on the panorama at the end of the book will find a small reproduction with names on p. 228. The book is one of the most interesting that have been published for some time; it recalls the freshness and the enthusiasm of fifty years ago, when the Alps of Switzerland were young to climbers, and it will be a classic in the mountaineering literature of the New Zealand Alps.

Norsk Fjeld Sport.

In most so-called civilised countries there has been of late years a notable development of the sport of mountaineering. Nowhere is this more evident than in Norway.

The remarkable achievement, the ascent of Kabru, by our fellow-member, C. W. Rubenson, in the year 1907, undoubtedly gave an additional stimulus to Norsk mountaineering and awakened an enthusiasm which led to the formation of the 'Norsk Tinde Klub' in the spring of 1908. Though fully recognised by, and on the best of terms with, the grand old club, the 'Norske Turist Forening,' which, since the year 1868, has been the great agent in creating and fostering a genuine love of mountains amongst the people of Norway, the Norsk Tinde Klub is entirely independent of, though in many ways indebted to, the parent Club. In fact, the Norsk Tinde Klub is to all intents and purposes an Inner Circle, the admission to which demands at least as stiff a mountaineering qualification as does the Alpine Club.

In the August following the formation of the Club, my second son—now serving his King and country in Belgium—and I had the honour and pleasure of dining as guests of the newly formed club at Holmenkollen near Christiania. A most enthusiastic and a jolly gathering it was indeed. Nor did it end there, as we supped at Frognersøter.

Since the birth of the Club several of its members have scored notable mountaineering successes of difficult peaks, especially within the Arctic Circle in Norway, as well as in other countries. As it has been deemed eminently desirable that a tangible record of these ascents should be preserved, the Club has, this year,

published a book of 218 pages under the title of 'Norsk Fjeld Sport.' Every contributor was a member of the Club.

It is most refreshing in these days to turn for a while from the all-absorbing newspapers, magazines, and books full of war news, military, naval, and political matters, to the accounts of grand mountain ascents and to the beautiful illustrations with which enthusiastic mountaineers have enriched 'Norsk Fjeld Sport,' and it is none the less satisfactory to note that several of the views are from photographs by our own members—Woolley, Collie, Priestman—as well as Rubenson himself.

Though, with one exception, the papers are all in Norsk—a language unfamiliar to most of us—I, for one, can testify that each paper in Norsk affords delightful reading. In all respects this remarkable book reflects great credit upon the editors, and is not only worthy of its subject, but ought to find a place on a shelf in the library of every British mountaineer who is at all interested in Norway.

By the courtesy of the N.T.F. the editors of the 'Norsk Fjeld Sport' were allowed to reproduce a paper which appeared in the 'N.T.F. Aarbok' for 1911. Undoubtedly this new addition to mountain literature will still further encourage the votaries of a noble sport and lead more and yet more of the sons and daughters of Norway to take their pleasures upon the mountains. This is all to the good. Whether it will lead to an awkward precedent or not by causing the readers to expect, at an early date, another book of equal interest, is a question which we in this country can safely leave to our friends in Norway to decide.

There is a short introductory chapter by the President, the enthusiastic Rubenson. It contains, not only golden truths and maxims concerning mountaineering in general, but picturesque and poetical descriptions as well. Only eight pages, but every sentence is worthy of the subject, and worthy of the man. One of the illustrations in this introduction, of the Grand Moulin on the Mer de Glace, with the Dent du Géant and its companions in the background, is one of the most artistic photographs of this well-known view I have ever seen. It is by Finch.

Rubenson has also contributed a paper on Kabru. It is, of course, in Norsk and written in that most happy strain which he gave us a few years ago in the Alpine Club. The illustrations accompanying the paper are some which he showed us at the Alpine Club, and they are excellently reproduced.

One paper has a peculiarly melancholy interest. It describes a grand rock climb of some 4000 ft. on Skagastölstind which was made by the late Kristian Tandberg and his friend Rostrup. It entailed seven hours of hard work on exceptionally steep and difficult rocks, and took the climbers from the glacier at its northern base up to the very summit. It is one of the grandest, if not the very grandest, great ascent which has been made in the range of the Horungtinder, and none but men of the calibre of Tandberg could

lead on an expedition of such severity. Tandberg was probably the greatest and the noblest of all who have mountaineered in Norway. In every sport in which he engaged he was the best of all his companions, notably was this the case with ski-jumping. Bold as a lion, he was prudent also. Possessed of all the finest qualities of his race he was in life beloved, and mourned in death, by all who knew him. He died after a lingering illness which he endured with fortitude.

His friend Gröndahl has contributed a beautiful memoir in 'Norsk Fjeld Sport,' which should be read by all who can understand Norsk. The world can ill spare men like Tandberg.

H. Heliessen describes the ascent of a remarkable rock needle near Göschenen. No one who sees the accompanying photograph, with a man on the top of this slim rock, can express surprise when told that it was a first ascent. The paper also includes a description of the first winter ascent of the Tödi.

The honorary member of the Club was commanded to write in English, for the benefit of English readers, a paper on 'The History and Development of Norsk Mountaineering.' He obeyed. The illustrations are the redeeming feature of the paper.

The subject of one of the papers is that of a very successful winter mountaineering tour in Corsica by the genial Alf. Bryn. This, too, is beautifully illustrated.

The mountains within the Arctic Circle have, during the last few years, attracted several parties of the Norsk Tinde Klub. The successful outcome of these visits is shown in the papers which appear in 'Norsk Fjeld Sport.' Fortunately on each of these expeditions the weather was exceptionally good. Ah! It has not always been so.

'Med Norsk flag i Nordland' is the title of the first. Strange though it may appear, the translation of the first line is 'It was away in Westmorland one evening in the spring of 1910.' Yes, my friend Ferdinand, it is a delightful paper, and the illustrations, —some of Woolley's, some of Collie's, some of Rubenson's, and some of your own—are exactly what they ought to be. It is well worth a second appearance and does credit, not only to the N.T.K., but also to the maternal N.T.F. and to yourself. Yes, it has been reviewed once before, and by me.

H. Tönsberg has enriched the book with two first-rate papers. The first is a detailed description of the magnificent ascents made in 1913 within the Arctic Circle, both in the Lofoten Islands, and on the mainland, by S. Saxlund, W. Eger, R. Löchen, and himself. They formed a strong party; they accomplished much. They vanquished the hideous monster Husbyviktind, and alas! they had read in 'A.J.' vol. xxvi. p. 467, where I made a statement connected with this mountain that 'there is in Norway one grand peak which is absolutely unassailable and invincible.' Of course they went for the peak, and having been well tutored by the seven-year-old bare-legged laddie Lars, on a rock in Lofoten, the leader Löchen

ascended the one really bad place barefoot. The moral to be deduced is this :

Never say that a rock face is impracticable when merely studied from the front. Always see it in profile.

I can, however, say something more about this mountain, but not now. Meanwhile, I heartily congratulate the party on their success, but, at the same time, I heartily regret that I do not now know any mountain in Norway or elsewhere which I can say is 'invincible.' This paper will recall to several Alpine Clubmen many happy days spent in Lofoten with genial companions.

Tönsberg's second paper is a masterly review of the growth of mountaineering as a sport in Norway, in which he fills up many of the gaps left in the paper on 'The History and Development . . . ' which latter he had presumably seen in manuscript, and in doing this he is merciful, and very flattering to the writer of this English paper, who ought to be duly grateful. Tönsberg is especially qualified to write with authority on the sport, owing to the fact that he is not only a first-rate rock climber, but is also an adept in the higher branch of mountaineering—snow-craft—and is a prudent and capable leader.

He points out the fact that as his countrymen were rather late in the field, the principal peaks in the Horungtinder and other fine ranges in Central Norway had already been ascended by their obvious lines of least resistance before the N.T.K. came into being and that, consequently, new expeditions meant usually new and often very severe routes up mountains, on which for years the inevitable cairns had been built. This led to very difficult ascents and sufficed for a while. Lastly, it became fully realised that in Arctic Norway there was still a host of noble peaks which had yet suffered no desecration from the human foot.

The list of new ascents, and ascents of great severity too, which have been made by this small Club from 1908 to 1913, and which appears at the end of the book, clearly shows the activity and versatility of its members.

WM. CECIL SLINGSBY.

PROCEEDINGS OF THE ALPINE CLUB.

A GENERAL MEETING of the Club was held in the Hall, 23 Savile Row, W., on Tuesday, February 2, 1915, at 8.30 P.M. The Rt. Hon. Lord Justice Pickford, *President*, in the Chair.

Mr. Reginald Graham and the Rev. John Pearce were balloted for and elected members of the Club.

The PRESIDENT said: I need only interpose between the Club and the Lecturer for two or three minutes, as I have few matters