route up the Grande Casse from the Refuge Félix Faure (it could also be done from Pralognan), and gives most impressive views of the magnificent N.W. face of the Grande Casse and its '800-metre ice slope.' The route is the same as that for the Col de la Grande Casse as far as the Col, then turning at once to the right the arête—more strictly perhaps the edge of the N.W. face of the Grande Casse—is followed to the main arête, reached about half an hour from the summit. If covered with plenty of snow in good condition no difficulty whatever should be encountered, but as a rule this face will probably be icy, in which case it will be best to keep as near the edge as possible, and avail oneself of the assistance of the rocks. These are of shale and disagreeably loose and treacherous.* It is also necessary to cut across the tops of a number of exceedingly steep ice couloirs, running down to the Grande Casse glacier, and the route is not one to be recommended to any one likely to be subject to 'le vertige.' The following are the times taken on the traverse of the Grande Casse, ascending by the N.W. arête:—

On August 1, 1904, Messrs. Harold Raeburn and C. W. Walker, without guides, left the Refuge Félix Faure at 2.25 A.M., traversed the débris-covered tongue of the Grande Casse glacier towards its right side, and then walked up it to the Col (4.25–4.45). The main arête was gained at 8.45 (halts totalling 25 min.) and the summit 35 min. later. The summit ridge was a beautifully sharp snow arête, corniced in places, and it was not possible to place more than one foot on the actual highest point, and not advisable to do that without the second man well anchored some way down the slope. (This is mentioned *à propos* of the discussion raised after the first ascent.†)

The return was made by the ordinary route down the Glacier des Corridors. The glacier was quitted by steep rocks on its right bank, in 2 hrs. 50 min. going time from the summit to the Refuge. There were some steps cut here, though very badly, or the descent, without crampons, would have taken longer.

REVIEWS AND NOTICES.

Mountain Sickness and its Probable Causes. By T. G. Longstaff, M.A., D.M. (London: Spottiswoode & Co. 1906.) Pp. 56. Price 1s.

IN this brochure (pp. 56), presented by Dr. Longstaff as a graduation thesis for the degree of 'M.D.'—letters which, with all due respect to the University of Oxford, sound more academic than the somewhat ambiguous inversion 'D.M.'—the subject of mountain sickness is for the first time treated in a methodical and scientific

* C.A.F. *Annuaire*, 1900, pp. 52, 67. The actual French is 'absolument désagrégée,' 'affreusement décomposée.'

† *Alpine Journal*, vol. viii. pp. 101 and 225-6.

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manner. Very little fault can be found with the author's scheme of arrangement; and, whatever may be the eventual outcome of research into this matter, his physiological summary will be referred to by all future workers, while the statistics gathered together in his earlier pages must remain as a valuable collection of the actual experiences of mountaineers.

The body of Dr. Longstaff's work, prefaced by a short 'introduction' and terminated by a shorter 'conclusion,' is divided into three parts. In part i. we find the testimony of mountaineers, with appended notes on the highest inhabited regions, on balloon ascents, and on experiments in the pneumatic chamber. In part ii. the author records his own experiences and those of his companions in the Alps, the Caucasus, and the Himalaya. In part iii. the character and causes of mountain sickness are subjected to a systematic inquiry under eight headings:—section (1) dealing with the symptoms, (2) the effects of low atmospheric pressure, (3) certain changes in the atmospheric condition at high altitudes, (4) the diminished supply of oxygen, (5) changes in the blood, (6) the diminished supply of carbonic acid, (7) the effects of acclimatisation, and (8) the influence of fatigue and exhaustion.

The readers of these pages will find in them a mine of interesting record, much food for thought, and some grounds perhaps for criticism. Most climbers will recall experiences of their own or of their friends which do not at first sight appear to be accounted for by the conclusions which Dr. Longstaff draws. More careful reading of the physiological data he adduces will, however, tend generally to bring apparent anomalies into line with his argument. The fact that it is possible to work for hours at the rate of about 3,000 foot pounds per minute (p. 50) gives some idea of the enormous expenditure of energy which mountaineering may involve, and shows how readily the ordinary symptoms of fatigue, which are practically identical with those of mountain sickness, may be evoked. The work of Haldane and Priestley, alluded to on p. 47, showing that human respiration below 10,000 ft. (21·7 inches mercurial pressure) depends on the tension of carbonic acid gas in the lungs, and is consequently automatic, whereas above that height it depends on the deficiency of oxygen and becomes more or less a voluntary action, is of far-reaching importance: and the conclusions of Zuntz, Schumberg, and Loewy, cited on p. 51, showing that the consumption of oxygen on mountain heights is greater than at the sea-level, while the supply is less (p. 42), goes far towards explaining the slow rate of progress almost invariably noted at great heights. Indeed, the question is suggested whether rapid climbing in the higher ranges is a possibility. Mr. Freshfield saw Gurkhas 'going uphill very fast at 20,000 ft.' (p. 21); and Mr. Mummery's party were able to accomplish 6,000 ft. of difficult climbing to a culminating point of 19,000 ft. at the rate of 1,000 ft. per hour (p. 17). But the uniform rapid climbing of Mr. Graham's party in the Himalaya in 1883 (p. 15) stands alone; and, while Dr. Longstaff accepts these records frankly, it is perhaps not unfair to recall the existence of

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those (not all of them 'interested parties') who have been inclined, on other grounds, to accept them with some reserve. But if rapid progress at great heights *is* possible the problems yet unsolved may prove simpler than seems likely. At any rate Dr. Longstaff's pages furnish no reasons for concluding that the highest mountains of the world may not be climbed, though the proportion of individuals to whom such a feat would be a physiological possibility is probably a small one.

'Acclimatisation' is a question to which most of us have been accustomed to attach importance; but strong grounds are given for believing that prolonged residence at great heights increases, rather than diminishes, the liability to mountain sickness, and reduces the powers of the human organism to withstand fatigue and cold. The data adduced refer mainly to the Andes and Himalaya, but our author pertinently remarks (p. 55) that 'guides have a much greater objection than amateurs to spending several consecutive days at low pressures even in the Alps.' The effects of 'training' are far different, and much of what has been usually ascribed to acclimatisation is doubtless due to training.

On the question of the treatment of mountain sickness Dr. Longstaff says practically nothing, and it will be noted that his title-page absolves him from this obligation. His note (p. 54) on the value of sugar as a food for mountaineers is, however, a useful hint both as to prevention and cure, while Sir Martin Conway's allusion (p. 16) to the beneficial effects of small doses of brandy also suggests the value of rapidly assimilable carbohydrate. The various allusions to brain anæmia point to the usefulness, referred to by several writers, of placing a sufferer with the head in a lower position than that occupied by the rest of the body.

Whether the last word has been said on the subject of mountain sickness may be questioned, but Dr. Longstaff is to be congratulated on the piece of admirable work which has led him to his simple conclusions. 'Mountain sickness,' says he, 'consists of two elements—firstly, mountain lassitude' (Major Bruce's term, p. 17), which, though felt by many at lower heights, 'can be escaped by few at altitudes of over 19,000 ft.' This condition is due to imperfect oxygenation, but above the altitude referred to it does not appear to increase in severity up to the greatest heights yet reached. 'Secondly, we have the symptoms of fatigue and exhaustion, which are more likely to occur during the ascent of mountains than under any other conditions to which the human economy is exposed' (p. 55). It seems pretty certain that most of the ordinary cases of the disorder occurring in the Alps are due mainly to this second cause, though it is probable that those individuals who succumb most readily are those who find a natural difficulty in accommodating their respiration to the conditions of low atmospheric pressure, where voluntary effort has to a large extent to replace an automatic reflex, and that in such subjects imperfect oxygenation may play a minor and a predisposing *rôle*.

C. W.

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The Bernese Oberland. Vol. iii. 'Climbers' Guides' Series. By H. Dübi. 32mo. Pp. 136. (London: T. Fisher Unwin. 1907.) 10*s*.

It may seem at first sight rather quaint that vol. iii. of a work should deal with a district that topographically links on to vol. i. and not to vol. ii. But this apparent anomaly is explained by the first words of the author's preface, which state that this volume deals with the 'West Wing' of the Bernese Oberland. Thus vols. i. and ii. describe the main or central mass, extending from the Gemmi to the Grimsel, while the work before us forms as it were an appendix, and is devoted to the region stretching from the Dent de Morcles (above St. Maurice), the most westerly snowy summit of the range, to the Gemmi. It thus includes the Dent de Morcles, Grand Muveran, Diablerets, Wildhorn, and Wildstrubel groups, the loftiest summit described in these pages being the Wildhorn (10,709 ft., misprinted 10,609 ft.). It is not a country that is much visited by English climbers, though it is well adapted for exploration early or late in the season. It does not boast of any very difficult climbs, save the wrong routes up the Dent de Morcles and the Grand Muveran, but clamberers will find in it several short rock scrambles that may attract them, such as the Pierre Cabotz, the Tour St. Martin, and the Tschingelochtighorn. The book is written on the lines usually adopted in this series, a full account of the Club huts of the region being prefixed, while a very useful index is added. The text seems clear and accurate, though it must have been difficult to prepare, owing to the multitude of routes (often joining or crossing each other) that may be taken up all the more important summits. It is surprising how many peaks are enumerated in these pages of which the bare names are unknown to most climbers, who can thus make up for their previous ignorance. As might be expected, the author has paid special attention to the history of the names &c. of the various peaks and passes. Thus we note that the Dent de Morcles is mentioned as early as 1716, though not climbed till 1788, that the name of the Diablerets is older than the great landslip of 1714, and that both the Wildhorn and the Wildstrubel are mentioned on Schöpf's map of 1577–8. The historical notices of the Gelten Pass and of the Engstligengrat–Rothe Kumme route are well worked out. The author may be congratulated on having brought together much interesting information of various kinds, practical, topographical, and historical, and has once more deserved well of the Alpine world, which looks eagerly every year for the Swiss 'Jahrbuch' that he has edited so conscientiously for a great number of years.

The Yorkshire Ramblers' Club Journal. Vol. II. No. 7. London: T. Fisher Unwin. 2*s*. net.

This number of the 'Ramblers' Club Journal' shows no falling off from the high standard set by its predecessors. The first article takes us to Norway. In it Mr. Erik Ullén relates 'Some Reminiscences of Skagastölstind,' the first ascent of which was made

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by Mr. W. Cecil Slingsby in 1876. The narrative is distinctly interesting, and is illustrated by two excellent pictures; the former of these, 'The Skagastölstinder from the Dyrhangsridge,' will make all climbers who see it wish to try it. There are ridges on it almost as formidable as its name. 'An Old Rambler' tells us of the 'Joys of the Open Fell.' And then a capital photograph, which at first sight suggests a tug of war, attracts us to 'Further Explorations in Gaping Ghyll Hole,' by Mr. A. E. Horn. A plan of Gaping Ghyll Cavern and Passages is given, and details of a visit for surveying are supplied by Mr. J. H. Buckley. Mr. F. Botterill is the author of 'The North-West Climb—Pillar Rock' (there are two full-page photographs to illustrate the narrative), and also of 'Over the Strahlegg Pass by the Rocks.' Dr. A. R. Dwerryhouse writes of 'Limestone Caverns and Potholes and their Mode of Origin,' and Mr. Charles A. Hill of 'Scoska Cave, Littondale.' A plan of the cave is given, as well as three illustrations of the skull which was found in the cave. It is that of a female Celt (about forty years old) of the Bronze Age. This is followed by an 'In Memoriam' notice of the late C. E. Mathews, and the 'Proceedings of the Club.' The numbers of the Club are increasing.

PROCEEDINGS OF THE ALPINE CLUB.

A General Meeting of the Club was held in the Hall on Tuesday evening, April 9, at 8.30, the Bishop of Bristol, *President*, in the chair.

The accounts for 1906 were presented by the Hon. Treasurer, who pointed out that there was an excess of income over expenditure of 492*l.* 17*s.* 7*d.* He reminded the Club that the lease of the Club premises expired in the early part of 1910, and stated that they were promised by their landlords that the question of the renewal of the lease should be settled in March 1908.

Some discussion took place as to whether the assets of the Club were sufficiently described, and, on the motion of Mr. R. W. Lloyd, seconded by Mr. G. W. H. Ellis, it was agreed that a short statement of the Club's property, such as the Library &c., should be included with accounts in future.

Mr. J. H. Clapham read a paper entitled 'Dauphiné in 1906: a First Visit,' which was illustrated by lantern slides. Mr. Werner said that he had found it difficult, on the Pic de Neige Cordier, to find a way across the schrund. It was very wide, and there was no apparent way across. It had taken about 1½ hr. The view from the top, he considered, deserved everything that had been said of it. The position of the mountain was unique in being the joining point of three ridges, and the Ecrins and the Meije formed respectively the central points of the view towards the S. and N.W. A hearty vote of thanks was accorded to Mr. Clapham for his paper.

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