de huit louis et quart. No. 6, Carte pétrographique de la vallée de Chamonix et des montagnes avoisinantes. Cette carte coloriée indique la nature des différentes montagnes et vallées qu'elle représente, ainsi que les endroits où se trouvent les diverses pierres de la collection.

'Outre la nomenclature des fossiles de chaque collection, MM. van Berchem, Struve et Exchaquet donneront une description détaillée des caractères extérieurs et chimiques de ces fossiles, dans un ouvrage qu'ils se proposent de publier sur le Saint-Gothard.

'Les personnes qui désireront un ou plusieurs des objets ci-dessus indiqués s'adresseront à M. Struve le fils, professeur honoraire de chimie à Lausanne. L'expédition se fera aux frais des commettants. MM. les amateurs étrangers peuvent remettre aux personnes indiquées ci-après la valeur des objets qu'ils désirent, et envoyer le reçu à M. le professeur Struve, à Lausanne, lorsqu'ils lui feront la demande.'

The maps, the advertisement goes on to state, were to be procured at Leipzic, Frankfort-on-the-Main, Naples, Venice, Rome, Florence, and Milan.

THE LIBRARY.—The following additions have been made since January 15, 1893:

Wundt (Theodor). Die Besteigung des Cimone della Pala. Ein Album für Kletterer und Dolomiten-Freunde. Illustrated. 4to. Stuttgart, 1892.

A Handbook for Travellers in Switzerland, Savoy, and Piedmont. Small 8vo. Map. John Murray. London, 1838. (The first edition: See Coolidge, Swiss Travel and Swiss Guide-books, p. 75.) Presented by the Hon. Librarian.

Bibliographie Nationale Suisse. Fascicule IIa: Géodésie et Cartes de la Suisse, des Régions et Cantons. Fascicule IIb: Cartes de Parcelles plus ou moins grandes du territoire suisse. Fascicule Vb^{ter}: Architecture, Sculpture et Peinture. 8vo. Berne, 1892.

Svenska Turistförenings Årsskrift, 1893. Illustrated. 8vo. Stockholm, 1893.

Bonney (Professor T. G.). Petrological Notes on the Euphotide or Saussurite-smaragdite Gabbro of the Saasthal. Reprint from the 'Philosophical Magazine' for March, 1892. 8vo. pamphlet. (Presented.)

Duparc (L.) et Mrazec (L.). La Structure du Mont-Blanc. Reprint from 'Archives des Sciences Physiques et Naturelles.' 8vo. pamphlet. Genève, 1893.

The Sierra Club Bulletin, No. 1. Illustrated. San Francisco, 1893.

Richter (Prof. Dr. E.). Die Erschliessung der Ostalpen. Parts 7 to 10. Berlin, 1893.

Martel (E. A.) Les Cévennes et la Région des Causses. Paris, 1892. (Presented by the author.)

REVIEWS AND NOTICES.

The Land of the Cliff Dwellers. By Frederick H. Chapin. (Boston: 1892.)

This is a charmingly got-up little volume by the author of 'Mountaineering in Colorado.' As its name implies, it deals chiefly with a subject more nearly related to archæology than mountaineering; but, in the course of his narrative, the author gives a description of an ascent of Mount Snaefel (14,240 ft.), a fine point of view near the little

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mining town of Ouray, which, from having originally been christened 'Snaefell,' has become 'Sneffels,' and is likely, so Mr. Chapin thinks, to be still further degraded into 'Sniffles,' the inhabitants of the valley having 'a strong tendency towards this pronunciation!'

Some of the illustrations, which are reproductions from the author's own photographs, such as the views of Mount Snaefel, Potosi Peak, and the Uncompahgre, give an excellent idea of the character of the San Juan scenery, but what no photograph can convey is the charm of colouring in sky and landscape, the purity of atmosphere, the glory of those western sunsets.

As regards the origin of the mysterious race which built its homes amidst the caves and cliffs of the cañons, the author advances no theory—indeed, he modestly disclaims all desire to put forward any—and he inclines to the old idea that the cliff dwellers were ancestors of the Pueblo tribe of Indians who have since wandered further south. There is seemingly nothing to show that these ruins have not stood for 1,000 years and more. Whether the civilisation of the former inhabitants was superior to that of the modern Indian, whether the evacuation was gradual, or hurried by war, is also matter for speculation. The author and his friends made many interesting discoveries of pottery and implements of various kinds. Human remains were also found, and in some instances under circumstances which seemed to show that a somewhat objectionable habit prevailed of burying departed relatives beneath the floor of the dining-room!

But, even though the author can throw no new light upon the subject of this lost race, his book is instructive, and the illustrations alone make it an attractive addition to any library.

P. W. T.

Les Cévennes et la Région des Causses. Par E. A. Martel. (Paris: Delagrave.)

'I first saw the Lozère,' says M. Martel, 'after twelve summers spent in the Alps and three in the Pyrenees, among glaciers and snowy peaks. I might have been expected to be somewhat *blasé* with regard to mountain scenery; yet the gorges of the Tarn so astounded me that I went back to them five years in succession, and enjoyed them more the fifth year than the first.' And in order that his readers may have the same advantage of comparison, he gives views of a cañon in the Rocky Mountains, of Monte Cristallo, of the precipices in the Vallée d'Arras, to serve as a standard by which to gauge the wonders of the region described in the book. Strictly speaking, it is a region rather of valleys than of mountains. In the Mont d'Aigoual the ground rises to something over 5,000 ft., and in the Montagnes de la Lozère, about the headwater of the Tarn and the Lot, to 5,550, and the 'Causses' generally are from 3,000 to 4,000 ft. above sea-level; but these are bare and monotonous tablelands, and the interest of the country begins where the streams have cut deep gorges in the dolomite rock of which they are composed. Here we find cañons of a thousand feet in depth, and not more than half-a-mile across; or wild rock-forms which, as at Montpellier-le-Vieux and Mourèze, simulate ruined cities of the giants. The former of these seems to be the culmination

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of all the wonders of the Causses; but as M. Martel warns all whom it may concern to see it before reading anything about it, we need not quote his description of it here. Possibly we may, without feeling that we have taken any of the mystery off it, go so far as to mention that, in order to give an adequate notion of its character, he is forced to compare it with the music of Schumann, the painting of Rembrandt, and the Eiffel Tower.

Besides these above-ground wonders, there are, as might be expected, caverns hardly to be matched elsewhere in Europe. M. Martel quotes the example of the Austrian Alpine Club and its exploration in the St. Canzian caves and elsewhere as a precedent for treating 'grottisme' as a kind of 'Alpinisme' turned inside out. It would appear that with the aid of a collapsible boat a tour among the caverns combines all the pleasures of a mountain and a river excursion.

The author estimates two months as a fair time to allow for a thorough investigation of the beauties of the Cévennes. Outside of the limestone region there is much interesting country, especially where the Cévennes proper join the volcanic district of the Ardèche; and from the top of Mont Mézenc (1,854 m. = 6,080 ft.) a view may be had, under favourable atmospheric conditions, of the Pelvoux group.

The book is copiously illustrated with 'process' cuts, which, if not of first-rate artistic merit, indicate the characteristic features of the country quite clearly enough to stimulate the reader's desire of seeing the originals.

Bollettino del Club Alpino Italiano. Anno 1891. Vol. XXV. Turin: 1892.

The present volume of the 'Bollettino' is as varied in contents as most of its predecessors. The Italian tendency towards scientific speculation is gratified by articles on the theory of cyclones, on the phenomena of hearing in mountain regions, on mountain observatories, and so on, which are sandwiched with great regularity between the papers dealing more specially with 'mountain adventure.' Even in these latter, however, the attraction exercised by statistics on the Italian mind comes out. Thus Signor Brentari's paper on the Western Dolomites of the Val Fassa is, in fact, a complete monograph, orographical, historical, geological, bibliographical of the district, containing one-fourth more words than an average number of this journal, and illustrated by three useful if not highly ornamental views, and an outline map. These maps, indeed, or 'topographical sketches' as they are here called, are a very useful feature of the publication. They show the direction of mountain ridges, the position of peaks, passes and glaciers, the course of streams, and the height of important points, by a method which any printing-office can carry out.

Other mountain papers are characterised by the same thoroughness. Of course, careful examination will detect slips in detail. Thus, a comparison of the orography of the Grivola, as given in Signor Bobba's paper, 'Grivola e Gran Paradiso,' with the map of that district which is contained in the present number (and which may safely be regarded as embodying the latest lights on the subject), will show sundry dis-

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crepancies. Again, in the same paper, it would have been well if the author had made up his mind whether to adopt French or Italian forms. 'Denti del Breuil' and 'Punte del Broglio' on the same page look awkward. But these trifling matters reduce inappreciably the value of the careful descriptions of careful work contained here and elsewhere in the volume. Would that all writers on Alpine matters possessed as fully the faculty of knowing where they have gone, and imparting the information to their readers.

In 'Val Grosina' Signor Cederna takes us to a district which, lying as it does midway between the great groups of the Bernina and the Ortler, has been far too little visited. The recent erection of the Capanna Dosdè * on one of the chief passes leading from Val Grosina to Val Viola renders an interesting (though not the culminating) portion of the group more accessible than heretofore. Both in this and in Signor Brentari's paper, already mentioned, a curious feature are the appeals which both writers make to their countrymen to do a patriotic duty by visiting these 'Alps which shut Italy in,' the last named even implying that Val Fassa is part of Italy, which it assuredly is not by any test save that of the watershed.

In the 'Prealpi Clautani,' described by Signor Ferrucci, we really are in Italy. This is the eastern part of the section commonly known as the Venetian Alps, and contains the fine limestone peaks which travellers on their way to Cortina from Venice see away to the right as they approach the mountains. Their highest point, the Cima dei Preti, falls a little short of 9,000 ft., and judging from the illustrations to the paper, which, by the way, are the best in the volume, climbers who have exhausted the Campitello and Ampezzo Dolomites will find it worth their while to cross the Piave and see something of this only slightly inferior group. It is curious to find that Captain Utterson Kelso's ascent of Monte Duranno in 1874† was, when the writer visited the district in 1890, regarded by the inhabitants as fabulous. Fortunately in these days the evidence of first ascents does not rest upon the testimony of the natives; but this sceptical frame of mind may well have defrauded many early explorers of minor peaks of their due honours.

Signor Prudenzini's paper on the Baitone group, west of the Adamello, is another complete account of the district with which it deals. Incidentally he raises the question of *collo* or *colle*, pointing out that, except in the Western Alps, the latter word means 'a hill' and not 'a pass.' But are not passes often called 'hills'? Two papers dealing with 'natural curiosities,' a cavern, and some remarkable limestone 'potholes' in the Apennines, and one on 'Alpinism in Sicily' —which, as might be expected, especially when Ætna is excluded from consideration, does not occupy much space—together with the scientific articles mentioned above, complete an interesting volume. In writing of mountain-railways Signor Pini has not mentioned the line from Clermont to Nîmes over the Cévennes, crossing that range at a height which must have made it, before the Brenner was opened, the most elevated railway in Europe.

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* See vol. xv. p. 557. † See vol. vii. p. 157.

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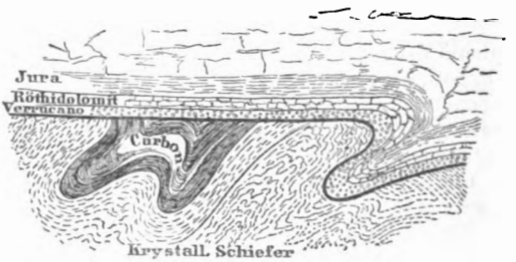
Scenerie der Alpen. Von Dr. Eberhard Fraas. Leipzig: T. O. Weigel Nachfolger (Chr. Herm. Tauchnitz), 1892.

The title of this work is a little misleading. Among its illustrations, no doubt, are some representing—and this very well—certain aspects of Alpine scenery, such as the gorge in the 'porphyry' of the Eggenthal, near Bozen, or the view of the Schlern; but the book is essentially a work on the geology of the Alps and does not say very much as to the connection of the two subjects. Regarded from the latter standpoint, it is open to some criticism. Defects, however, are not numerous, while there is much to praise. Commencing with the former, we would suggest that in any future edition some special explanations be added to Plates VII. and VIII. (maps respectively of the extent of the Jurassic sea, and the leading lines of the Alpine system), for it is not easy to ascertain from the text either the significance or the connection of certain parts. Regarded as a geological treatise, the book is slightly lop-sided, the Eastern Alps receiving much more notice than the other divisions. No doubt the former often furnish better and more complete sections than the latter; still we cannot help feeling occasionally that the districts in which the author has himself worked are treated differently from those which he may know only from books. We feel inclined to take exception to the assumed existence, in early tertiary times, of a frontier range composed of crystalline rocks, running parallel with, and just on the northern border of, the present Alpine system (*i.e.* crossing the Lake of Constance rather south of the middle and the Lake of Geneva about half-way down). Such a range would be a great help in explaining certain difficulties, but would give rise to others, and some hint should have been afforded as to the nature of the evidence by which this hypothesis is supported. But the most seriously defective part of the book is that which relates to the crystalline rocks of the Alpine system. The author states, rightly enough, that these are generally very ancient, and may be classed with the Archæan series, but he adds that in some places both the older Palæozoic and the Jurassic rocks have become crystalline from the effect of pressure. If this be so, then, so far as concerns the former, we fail to see on what grounds the existence of any Archæan rocks can be asserted in the Alps; for, as a rule, all that can be said of their crystalline schists is that they are older than some of the later Palæozoics; but as regards the latter—the Jurassic schists—Dr. Fraas's statement is merely the repetition of an assertion the accuracy of which has been absolutely denied. We thought that if a German author took pride in anything it was in his knowledge of 'the literature of the subject.' These, then, are Dr. Fraas's words, when speaking of the trough of sedimentary rocks which is infolded on the south side of the St. Gothard range and runs from the Lukmanier across the Val Piora and Val Canaria over the Nufenen Pass into the Canton Vallais: 'Das Gestein dieser Mulde trägt ein durchaus krystallinisches Gefüge und gleicht einer Varietät der Glimmerschiefer viel mehr als irgend einem jungen Sedimente, und doch haben die Funde von Belemniten in diesem strahlsteinartigen Glimmergestein, das sich durch ein Reichthum an Granat,

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Staurolith und Disthen auszeichnet, mit voller Sicherheit bewiesen, dass wir nur umgewandelte mesozoische Schiefer vor uns haben.' Does Dr. Fraas really not know that the statement on which he is relying met with the following answer: (1) that the truly crystalline schists, containing garnet, staurolite, and disthene are proved to be much older than Mesozoic times by the occurrence of some of them as fragments in a deposit universally admitted to be Triassic; and (2) that the so-called garnets and staurolites which occur with belemnites, are not these minerals, but only certain hydrous silicates, the occurrence of which is of little importance? That is to say, this 'discovery' of great theoretical importance has no better foundation than a blunder in mineralogy, and that one from which a very elementary knowledge of this subject would have saved its author. These errors were exposed, not in some obscure periodical, but in a paper published in the 'Quarterly Journal of the Geological Society of London' full three years ago, so that it ought not to have been overlooked by Dr. Fraas. Or does he hold, in common, apparently, with some of his countrymen, that no good thing in science can come from England?

But we turn from criticism to the more pleasant task of praise. Dr. Fraas' remarks upon the effects of mechanical movement on the rocks of the Alps, both on a small and on a large scale, are very valuable—though we think that sometimes he suffers a little from the 'pressure on the brain' which is now a geological epidemic; but he presents us with some excellent illustrations of the flexures, little and big, and the relations of the effects of earth movements at different dates. The



On the Biferten Grat (Tödi).

latter are well displayed in the annexed diagram, which proves that great flexures of the crust must have occurred in the interval between the Carboniferous and the Triassic periods, for it shows beds of the latter or of a slightly earlier age, resting upon the upturned edges of a mass of carboniferous rock which is infolded in the still more ancient crystalline series. His account also of the beds of the former age in the Gailthal is very clear and interesting, and indicates that marine conditions were more prevalent in the later than in the earlier parts of the period: the reverse of what happened in North West Europe. So also is that of the older Palæozoic strata in the Eastern Alps, and the description of the volcanic and other igneous rocks of Permian and Triassic age on the southern side of the watershed. Comparative tables of the succession of strata in each of the greater

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geological systems are given, which add greatly to the lucidity of the general descriptions. Woodcuts in the text are numerous; such as the one annexed, indicating the relation of the Rhætic and Liassic deposits near Bergen (Bavaria) with the effects of mechanical dis-



LIAS IN THE ACHEN VALLEY.

(The ravine marks the end of the Rhætic beds.)

turbances and of denudation on the less durable beds. The author also succeeds in giving an intelligible account of the Flysch, and shows very clearly that it represents a special 'facies' of a group of strata, rather than a deposit of exactly one age; for its horizon (if the term be permissible) alters somewhat as it is traced through the Alps along its outcrops. For instance, on the most eastern side of the Northern Alps the Flysch begins in the later part of the Cretaceous and ends in the Lower Oligocene, while nearer to the western side of Switzerland it does not begin before the Middle Eocene. Dr. Fraas, however, is not able to add much to our knowledge of the source and mode of transport of the singular erratic blocks, which are abundant in the Flysch at certain localities. It would be easy to mention other matters, handled clearly and well, but it may suffice to say that, subject to the criticisms made above, which after all affect only a very few pages, the book indicates much care and research, and will be found useful by all who desire information on Alpine geology clearly expressed and in a convenient form.

PROCEEDINGS OF THE ALPINE CLUB.

A GENERAL MEETING of the Club was held at the Club Rooms on the evening of Tuesday, February 7, 1893, Mr. Douglas W. Freshfield, President, in the chair. The following candidates were balloted for and elected members of the Club:—Harold Anthony Beeching, John Norman Collie, Marmaduke J. Dixon, Henry Selby Hele-Shaw, William Richard Lester, Frank Loftus Littledale, A. D. McCormick, William Wilson Naismith, George Stallard, Rev. Walter Weston.

The HON. SECRETARY and TREASURER presented the accounts for the year 1891, which were unanimously passed.

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