

THE
ALPINE JOURNAL.

VOL. V.

MAY 1870 TO MAY 1872.

LONDON: PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET

A FRAGMENT OF THE JAKORSHAVN ICE-STREAM.



THE
ALPINE JOURNAL:

A RECORD OF MOUNTAIN ADVENTURE

AND

SCIENTIFIC OBSERVATION.

BY MEMBERS OF THE ALPINE CLUB.

VOL. V.

MAY 1870 TO MAY 1872.

EDITED BY LESLIE STEPHEN, ESQ.



LONGMANS, GREEN, READER, AND DYER.

1872.

PL. 2017. 5

CONTENTS.

	PAGE
Accident on Mont Blanc, the late. <i>By J. Stogdon</i>	193
Aiguille du Midi. <i>By G. E. Foster</i>	145
Alpine Accidents in 1871	372
Alpine Bibliography, 1869-72	378
Alpine Club, Proceedings of the	336, 396
Alpine Flowers. <i>By T. W. Hinchliff</i>	97
Alps, the, and Consumption	271
Ascent of Mont Colon, the. <i>By G. E. Foster</i>	350
Ascent of Snæfell Jokull, Western Iceland. <i>By Tinley Mason</i>
Botany of the District of Bornio, Notes on the. <i>By John Ball, F.R.S.</i>	177
Chanoine Carrel, of Aosta, Memoir of. <i>By R. H. B.</i>	270
Cimon della Pala, the Ascent of the. <i>By E. R. Whitwell</i>	111
Dauphiné in 1870. <i>By W. A. B. Coolidge</i>	128
Dolomites of Val Rendena. <i>By D. W. Freshfield</i>	249
English Lakes in Winter, the. <i>By J. Stogdon</i>	34
Exercise, effect of, upon the Bodily Temperature. <i>By T. Clifford- Allbutt</i>	212
Fatal Accident on the Lyskamm. <i>By W. E. Hall</i>	23
Glittertind and Uledalstind, the, in Norway. <i>By T. L. Murray Browne</i>	154
Graian Alps, Excursions in the. <i>By F. F. Tuckett</i>	171
Greenland. <i>By E. Whymper</i>	1
Heights, Determination of, by the Thermo-Barometer. <i>By F. F. Tuckett</i>	218
Italian Alpine Club, the	269
Lys Joch and Zumstein Spitze, the, Fifty Years ago. <i>By F. F. Tuckett</i>	136
Matterhorn, Ascent of the, from the South Side. <i>By C. E. Matthews</i>	259
Matterhorn, Professor Tyndall's Attempt on the, in 1862. <i>By E. Whymper</i>	329
Moss Flora of St. Moritz. <i>By T. Howse</i>	273
Mountaineering on the Pacific. <i>By E. T. Coleman</i>	357
Mountains and Mountaineering in General. <i>By H. Russell</i>	241
Norway, Excursions in. <i>By J. R. Campbell</i>	49
Observations on Mr. Matthews's Account [of his Theory of Glacier Motion. <i>By Canon Moseley</i>	40
Passage of the Sesia-Joch from Zermatt to Alagna by English Ladies	367
Papaver Alpinum, the. <i>By C. Packe</i>	76
Petermann Spitze in East Greenland	266
Race for Life, a. <i>By F. F. Tuckett</i>	337
Round Mont Blanc. <i>By L. Stephen</i>	289
Serra da Estrella, the, and its Records. <i>By Charles Eden</i>	122
Swiss Dolomites. <i>By D. W. Freshfield</i>	200
Travellers and Guides, Comparative Skill of. <i>By F. C. Grove</i>	87

	PAGE
Variations on the High Level Route. <i>By A. W. Moore</i>	309
Weisshorn, the, from the North. <i>By J. H. Kitson</i>	305
Winter Expeditions in the Alps. <i>By A. W. Moore</i>	62
ALPINE NOTES	45, 143, 186, 230, 274, 373
Adamello District, the	186
Aiguille du Midi	44
Aiguille du Trelatete	143
Bietschhorn	277
Breithorn from the North	44
Caucasian Exploration	376
Col de la Tour Ronde	230
Col 'dit infranchissable'	277
Dent Blanche	277
Dr. Güssfeldt and Piz Roseg	373
Eiger and Eigerjoch	276
Fluh Pass	144
Fusshorn	276
Italian Alpine Club, the	374
Jungfrau, the	374, 377
King of Italy, the, and Mr. E. Whymper	375
La Salle and Mont Pleureur	276
Last Winter in the Alps	375
Matterhorn, the	277
Model of the Graian Alps	375
Mont Blanc, Accident on	188
Mont Blanc, by Balloon	377
Monte della Disgrazia	46, 284
Piz Quaternals	279
Piz Zupo and Pass	280
Pointe de Mountet	274
Riffelhorn, from the Gornier Glacier	376
Sesia Joch	143
Silberhorn and Jungfrau	277
Tarasp and Piz PISOCH	281
Tiefenmatten Joch	275
Tinzenthor	284
Val Bevers	283
Weisshorn	274, 277
Winterjoch	143
REVIEWS :—	
Beiträge zur geologischen Karte der Schweiz	191
Hours of Exercise in the Alps. <i>By J. Tyndall</i>	285
Scrambles amongst the Alps. <i>By E. Whymper</i>	234
Mountaineering in the Sierra Nevada. <i>By Clarence King</i>	388
The Mountain. <i>By J. Michelet</i>	386
The Switzers. <i>By W. H. Dixon</i>	384

LIST OF ILLUSTRATIONS.

	PAGE
A Fragment of the Jakobshavn Ice-Stream	<i>Frontispiece</i>
The Mörkfos	<i>to face</i> 49
Final Kamm of Cimon della Pala 113
Cimon della Pala, and Cima di Vezzana 113
Descent of the Aiguille du Midi	<i>to face</i> 145
Glissading—'But what is this?' The Grand Pelvoux de Val	
Louise—The wrong way to use a rope	,, 234
A Cannonade on the Matterhorn	,, 237
'He probably owed his life to his coolness'	,, 241
The Aiguille du Géant from the north-west	,, 289
Outline of the Eiger	,, 337

THE
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MAY 1870.

GREENLAND. By EDWARD WHYMPER.

IN the present paper I am going to speak of a land that enjoys a glacial period, which compels its inhabitants to live near the sea and upon what they can obtain from it; of a treeless country, without corn, where the scanty vegetation, pressed down by almost perpetual snow, creeps along the soil upon which it can hardly subsist. A land where none are rich, and where all are equal; where murders are unknown, and quarrels rare; where there is neither organ-man or wife-beater, and where children are allowed to do just as they like; and, *more* remarkable, a land without debt or taxes, criminals, soldiers, or policemen.

This land is Greenland; a country that stretches from 60° to beyond 80° N. latitude; that, in its widest parts, extends over forty degrees of longitude. It is entirely and completely covered by glaciers, with the exception of a narrow margin or belt of land upon the coast.

The country was not always covered by glaciers. In a modern geological period (the lower Miocene) the Greenlander, if he had then existed, could have sat under his own vine and under his own fig-tree, and after dinner could have taken walnuts and hazel nuts with his wine; he could have had a shrubbery of no mean order, and seen stately oaks and sequoias, which vied perhaps in magnitude with the 'big trees' of California.

This is not the language of parables. Leaves of all these trees have been found in a fossil state, and of more than seventy others, at places a little to the north of Disco Bay. Altogether about 140 species of trees or shrubs have been

obtained in a fossil state, none of which now grow in the country ; from which it is evident that at an earlier time the climate of Greenland was at least temperate and mild, if not semi-tropical.*

All my readers are, no doubt, perfectly aware that the name Greenland has not only been applied for several centuries to the islands of Spitzbergen, Jan Mayen, and Iceland, as well as to Greenland proper, but that those engaged in northern trade still use it in this manner.† The practice doubtless arose from the supposition that these lands all formed part of one great mass. It has long been known that these islands are all separated from Greenland by many leagues of sea, but the extent of the continent itself remains a great and perhaps an impenetrable mystery. Its early history is both interesting and romantic.

Soon after Charlemagne had eaten up Germany, and about the time that the Danes, in their turn, were trying to do the same to England, about the time that King Alfred burnt those memorable cakes, there was a disturbance in Iceland, in which some were killed. It was signified to one Eric, the red-head, who was concerned in this affair, that he must take up his quarters somewhere else for the space of three years ; and he, instead of going to Scandinavia, steered boldly to the west in search of new land. The result was he discovered Greenland. He gave to it its name. A very plucky fellow he must have been ; but one's opinion of him is lowered when we learn that after all he was only a species of ' promoter.' At the end of his three years Eric appeared again in Iceland, and represented, with the absence of exaggeration for which promoters are so noted when getting out their preliminary prospectuses, that

* Sir Charles Lyell delivered an admirable address upon this subject, after the reading of a paper by the writer, upon Greenland, at the Norwich meeting of the British Association in 1868. Several of the species from the Miocene beds of North Greenland are identical with those found at Bovey Tracey, in Devonshire ; which latter were described by Mr. Pengelly and by Prof. Heer of Zurich, in a paper communicated to the *Philosophical Transactions* several years ago. A paper by Prof. Heer, upon the new species obtained by the author and his assistants in North Greenland in 1867, has just appeared in the same publication.

† A paragraph is usually seen every year in our newspapers, towards the end of April, headed ' The Greenland Fishery.' The *fish* are seals, and they are not caught, as the uninitiated might suppose, off the coasts of Greenland (or, indeed, anywhere near it), but somewhere between Iceland and Spitzbergen.

the land was A 1; abounding with pastures, wood, and fish, and would prove a first-class investment. Twenty-five shiploads of Icelanders, it is said, took shares; but of these only fourteen arrived: with the others it seems to have been a case of 'small profit and quick return.'

Many other Scandinavian colonists arrived as time went on, and at length a considerable portion of the coast was settled. The colonies were known by the name of the East and West settlements. In the former there were two towns, 190 farms, eleven churches, and a cathedral; and in the West settlements there were 100 farms and four churches. Bishops—Roman Catholic bishops—were regularly appointed from Europe, and for several centuries resided among their people; and the grateful people used to send large tribute to the Pope, in the shape of walrus tusks.

For a considerable time all seems to have gone well with these Norse colonies; the Scandinavians do not appear to have come in contact with the Eskimo. It is doubtful, indeed, whether the Eskimo lived in the country at the time of which we speak. But at length they appeared; dwarfs, it is said, in comparison with the burly Norsemen, who contemptuously called them *Skrellings* (a Danish word that signified weak or puny); but the *Skrellings* showed themselves a match even for the Norsemen, and did not come off the worst in encounters that took place with them.

Where these Eskimo originally came from who thus came down upon the Scandinavians is unknown. They are the ancestors of the Greenlanders of the present time; and it is traditionally asserted among themselves that they travelled down the east coast. If they did so, they must have travelled over land unknown to us.

These Norse colonies continued to prosper for several centuries. Trade was carried on between Greenland and Europe, and appears to have been profitable; anyhow, Queen Margaret, who ruled Scandinavia towards the close of the fourteenth century, seems to have set up some claim to a share in the gains, and to have stopped free trade. About the same time a good many vessels were lost by shipwreck, the trade gradually dwindled down, at the beginning of the fifteenth century entirely ceased, and Greenland was left to its own resources. The subsequent history is very dubious; there is a long period about which nothing is recorded. It is said, however, that the colonies were not in a flourishing state, and that the Eskimo had destroyed many of the settlers.

The last we hear of them is from a certain bishop; who,

some say, wanted to land, but could not, on account of the ice. He could see the people, the pastures, and the cattle, but he could not come to shore, and so went to Iceland.

I have often thought that this, if not a myth, is one of the saddest events recorded in history. This poor bishop could see endless fat cattle, but was not able to take any tithes; he could see his people, but was not able to excommunicate them; and he—who might have been converted by an Eskimo if he had not been destined to remain in the errors of Christianity—was compelled to return to the country from which he had set out.

At the next time that Greenland was visited, the Norsemen had disappeared, and Greenlandic Eskimo, of the appearance of those now existing, were alone seen; but whether the remnants of the Norsemen were slaughtered by the Eskimo, or whether they simply married among each other until the original, fair-haired Scandinavians became merged into the swarthy Eskimo, we are entirely unable to say. Traces of the Norsemen remain, however, to the present day. They are spread over the coast from Cape Farewell to near Upernivik (a distance of 900 miles), but they are chiefly found in the south. Near Upernivik a stone was discovered some years ago bearing an inscription to the effect that so-and-so and so-and-so cleared the place and erected the stone on April 18, 1135. The stone was sent to Copenhagen, and was considered so precious that it was placed in a conspicuous part of the Ethnographical Museum, enclosed in a sham gold case. The case appears to have demoralised some one; for one day case, stone and all vanished, and no one knows any more about it.*

The first account of Greenland we possess which is not dimmed by medieval fog, is that of our countryman Frobisher, and succeeding him, a long list of worthies, of many nations, tried at intervals to land upon the coast, either east or west. But whilst explorers on the latter coast gradually crept up Davis' Straits, on the former they uniformly met with disappointment. At this period, during the sixteenth and seventeenth centuries, it became the fashion to import natives from Greenland, as we now should do the walrus; and it is not wonderful that they (who were described at first as 'very humane and civill') became both dangerous and treacherous.

* The buildings of the Scandinavians can be distinguished from those of the Eskimo, from the fact that the former almost always dressed their stones. The latter people invariably build with rough stones and turf.

All these voyagers, however, only sailed along the coast; they did not attempt to form settlements, or to explore the fiords or the interior; and it was reserved for a man in humble circumstances to plant the seeds of the present Danish colonies, and to bring the uncivilised natives under the influence of Christianity. I refer, of course, to the distinguished missionary Hans Egede. A new era commenced in Greenland from the time of his landing in 1721, and, one by one, settlements were formed along the west coast, until they stretched, as they do now, from Cape Farewell to beyond lat. 73° north.

Egede settled down at a place he called Baal's River, which is the Gothaab of the present time. He had many difficulties to contend with; not merely from imperfect means and the language, but from those with whom he was unfortunately associated. The traders who went out and settled there were by no means excellent examples of morality. One need only mention their manner of conducting the trade. Blubber was the article in which they chiefly dealt: there was a tariff of course; so much for a barrel of a certain size. But, after the price was agreed upon, they got into the way of knocking the bottom out of the barrel and standing it over a hole made in the ground, and then required the natives to fill it up to the brim as before. They didn't like it, but they did it. It is said they remarked, 'Well, it will get filled at last.' Not only on these accounts had Egede difficulty. When he came to speak on religion, and on future rewards or punishments, there was much trouble, particularly about the latter. He described, in glowing terms, a fiery place of torment, and the natives listened attentively to him. But he found that the little wickednesses he was endeavouring to get rid of, were only practised still more, and he at length discovered that that which he was holding up as a deterrent had no horrors for them—that eternal fire was an extremely agreeable idea. It must not be supposed that in saying these things I wish to depreciate Egede. He was a worthy man, who did much good to the natives, and his memory still lives in the country.

The great ice-covered interior plateau of Greenland can be seen a long way off if the weather is clear. Its summit is almost a dead level from north to south. But when one comes nearer to the coast it is concealed by the hills which are on its outskirts.

The whole of the land on the Greenland coast is mountainous, and although the hills scarcely ever, if ever, exceed a height of 8,000 or 9,000 feet, they effectually conceal the inner, or

glacier-covered land. This latter is at a distance from the coast, varying from ten to sixty or more miles, and, when it is reached, there is an end to land: all is ice, as far as the eye can see. Great as the mass of ice is which still envelopes Greenland, there were times when the land was even more completely covered up by it; indeed, there is good reason to suppose that there was a time when every atom of the country was covered, and that life was hardly possible for man: that the native, if he existed, far from being able to sit under his vine and fig-tree, could hardly have found a spot whereon he could rest. With the exception of places where the rocks are easy of disintegration, and the traces of glacier action have been to a great extent destroyed, the whole country bears the marks of the grinding and polishing of ice; and judging by the flatness of the curves of the *roches moutonnées*, and by the perfection of the polish which still remains upon the rocks, after they have sustained many centuries of extreme variation of temperature, the glacial period which produced such effects must have vastly exceeded in duration, or severity, the 'glacial period' of Europe; and the existing great interior ice-plateau of Greenland, enormous as it is, must be considered as but the remnant of a mass which was incalculably greater, and to which there is no parallel at the present time, excepting within the Antarctic circle. This remnant, although it appears to be continuing to shrink, still sends forth icebergs out of several fiords in Danish Greenland; and the accompanying plate, which represents a fragment coming out from one of these fiords, will serve to give some idea of the prodigious size of the glaciers even in their shrunken state.*

When you approach the shore you will look in vain for towns or villages. One can almost tread upon a Greenland settlement without observing its existence; for the houses,

* In South Greenland, near Frederickshaab, there is a glacier which comes down completely into the sea, with a width of sixteen miles; and nearer Cape Farewell there are several glaciers which give birth to bergs. Between the 63rd and 69th parallel of N. latitude I am not aware that there are any which do so. The Jakobshavn ice-fiord, between 69° 10' and 69° 15' N. latitude, gives off a great number. It is about five miles wide at its mouth, is always completely choked with bergs which extend usually into Disco Bay, as an almost continuous mass, for a distance of seven or eight miles. Although the water off the mouth of the fiord is 600 to 700 feet deep, these bergs are constantly grounding.

being only built of stones and turf, are very difficult to perceive.

On the arrival of a ship, the natives, naturally, flock out to see it; and the first thing that strikes a stranger is that they seem to be all men and boys, and on closer approach it is still not easy to distinguish men from women. This is almost as much the result of physiognomy as of dress. Dirt does something, dress does something, and physiognomy the rest.

They dress almost entirely in seal skin, and the same in summer as in winter. The males' dress is composed of a tunic of the shape of a blouse, fitting closely around the neck and wrists. This is termed an 'anarak,' and it has commonly a hood, which serves for a covering to the head. Sometimes they wear a double anarak; one with the hair inside, and the other with it towards the exterior. Their trousers, also of seal skin, differ but little from the European style, and fit tightly in the leg, going underneath the boots. The boots are formed of two cases. The exterior one, of seal skin with the hair removed; the interior one, of dog skin with the hair turned inside. The soles and the strings by which the boots are tightened around the ankle are usually made of the skin of *Phoca barbata*, which is stouter than that of other species. It should be observed in regard to boots, that European ones are entirely unadapted to Greenland. The country has been so completely worn and polished in former times by glacial action that it is all but impossible to walk in other than native ones. Their soles have not the stiffness of ours, and they consequently allow one to walk over surfaces on which it would otherwise be impossible to keep on one's feet. Soil is extremely scanty, always shallow; when there is soil, it is usually in a rocky hollow into which the water produced by the melting of snow drains. When soil is found it is therefore swampy; and it is not only necessary to have waterproof boots, but to have high ones. The native boots meet all these requirements, and they are light and warm.

The dress of the women is similar to that of the men. The anarak is less tight around the neck and wrist, and is usually without the hood: they occasionally wear underneath it a shirt of thin flannel, or sometimes, one of linen. Captain Graah*

* The whole of the east coast of Greenland, from Cape Farewell to N. lat. 65° 10', is laid down on the sole authority of the late Captain Graah, of the Danish navy. This officer was sent out from Denmark, in the year 1828, to search for remains of the lost Scandinavian colonies; and, in pursuit of that object, made one of the most extraordinary boat voyages that has ever been accomplished, up the east coast of Greenland.

says :—‘ Fashion and vanity have, even here, done their best to make the dress of the women more unsuitable to the climate than it originally was. Formerly their seal-skin jackets reached a good way down over the hips, thus covering the whole body. Since shifts, however, came into use, they have been so much curtailed as to reach now only to the waist : the linen of the ladies would not else be visible.’ As a matter of fact, few women wear the shirt, but all, now, wear the anarak very short. The trousers or drawers of the women are also short, but their boots are much longer than those of the men. They are elaborately embroidered with small square pieces of dyed seal-skin on the front and on the sides, and the upper portions of them are frequently enclosed by a covering of linen. The most material distinction between the dress of the men and of the women is in the top-knot worn by the latter. This, in common with other ‘chignons,’ is sometimes of the natural hair of the wearer, but is frequently stuffed with tow, rags, and all kinds of rubbish. The condition in life of the wearer is indicated by the ribbon with which the top-knot is bound round. Thus young girls, or unmarried women, wear a red ribbon ; married women blue, widows black, and others green. There is a certain significance in these colours, and the custom is one of great convenience to males.

The Greenland women prefer the skin of the common seal to any other for the ornamentation of their persons, and Capt. Graah says that the women who went with him, to row his boats, did so chiefly because of ‘ their expectation of procuring on the east coast, some of those variegated skins of the Kasiniak (*Phoca vitulina*) with which they so much love to adorn their persons on Sundays and holidays ; and which are said to be found there in greater plenty than in the rest of Greenland, and to be purchaseable at a cheaper rate, being held there, in fact, in less esteem than other sorts of seal skins.’

The anarak of both males and females formerly had a kind of tail hanging down both before and behind, but this pattern

His means were insufficient, and he suffered great hardships ; but, nevertheless, during the years 1829–31 he acquired a large amount of information, from which, as above stated, our present maps profit. His voyage was made in an ‘oomiak,’ that is, a seal-skin boat. An account of his journey was published in Danish, and was translated into English by order of the Royal Geographical Society. It may be observed, that all the accounts we possess of Greenland are translations ; excepting an article in Brewster’s *Edinburgh Encyclopædia*, by C. L. Giesecke, there is not a single original description of the country in our language.

has gone out of fashion: they have learnt that not only is it wrong for human creatures to wear tails, but that it is deemed improper to think that they ever had them.

Out of the 2000 males in North Greenland about one-third (630) can catch seals. This is done in the summer time exclusively by means of the kayak. In the winter they have other ways of catching them, which I will explain presently.

The form of the kayak is so well known that it is not necessary to describe it minutely. It has a framework of wood, which is covered by seal skin. It is pointed at both ends and draws less than a foot of water; it is so light that a man of ordinary strength can tuck it under his arm, and, but for its awkward form, could carry it easily.

The pace that a Greenlander can paddle in his kayak, and his skilfulness in it, have been greatly exaggerated. I found, from timing their pace, that it was not ordinarily more than three or four miles per hour, and that the maximum speed of a first-rate kayaker, paddling his hardest, was scarcely more than eight miles an hour. It has often been stated in regard to their use of the kayak, that they can turn completely round in it; that is to say, go under the water and come up the other side. But few natives can accomplish this, and to do it they must wear their especial kayak dress, which is in three pieces, in addition to those already mentioned. First there is an extra anarak, with a hood which can be drawn tightly round the face by means of strings; there is a second article, which is circular, and fits at the lower part closely round the ring of the kayak, and at the upper part underneath the arms. This is also tied down tightly. Thirdly, they have gloves, over which the wristbands of the extra anarak are tied. Thus equipped, *some* natives can perform the feat; but a much greater number cannot do it. Some of the most accomplished natives, however, have performed wonderful exploits in the kayak. I have seen a man—one Timotheus David—who once upon a time harpooned a seal, but the coil of walrus hide attached to his harpoon, managed somehow to pass round his head: he was overturned, and dragged down under the water. Notwithstanding, he managed to extricate and to right himself, to kill his seal and to bring it home. This worthy is still living. His education was rough, but it seems to have been efficient. His father, instead of taking him out in a boy's kayak, by the side of his own, and instructing him in the mysteries of paddling, made him carry his canoe to the top of a little cliff and get in, and then pitched him neck and crop into the sea; remarking as he did it, that if he could not learn to right himself after that, he

would be certain to come to grief sooner or later. This man, Timotheus, has become so expert that he has been known to bring to shore in one day no less than twenty-three seals and a white whale.

There is a tradition that the kayak, instead of being closed at the top, as it now is, used to be an open canoe. It is said that when natives went out in those times, others would stay by the shore to watch the sea-weed, and, when it became agitated they would shout to those on the water, who immediately returned. But, in course of time, seals became scarce, the natives had to pursue them to a greater distance, beyond the point to which the shouts of the watchers could be heard; and thus, unwarned, many who were out in kayak were surprised by storms and perished. The origin of the kayak is attributed to a Greenland mother who had an only son, whom she loved much; and, fearful for his safety, she addressed him one day in the following words:—‘Oh my son! thou who bringest me blubber and seal meat, look out for squalls!’ The rest of her speech it is unnecessary to mention: the result of it was that skin was sewed over the top of his canoe, and it thus formed the pattern of the present kayak.

Nothing but necessity takes the Greenlander out in his craft. There are many young and middle-aged men who shirk using it, and who prefer to idle about and live by the catching of others. It is one of the features of this people that such men do not seem to be despised or to be held in any less esteem than those who do the work.

It is a curious sight to see the kayak at sea. If there are only *small* waves, the canoe itself will be almost hidden, and the man will seem as if standing in the water. They used to puzzle the earlier voyagers a good deal, and some came home and swore that they had seen mermen. One author says:—‘The first of these monsters (or mer-men) had the likeness of a man, as to the head, face, nose, and mouth: save that its head was oblong and pointed like a sugar-loaf. It had broad shoulders and two arms without hands. The body downwards was slanting and thin. The rest below the middle, being hid in the water, could not be observed.’ This description clearly refers to a kayaker.

When a native goes out seal-catching he takes his kayak down from a stage where it has been placed to keep it out of the way of the dogs, bottom up, to keep out rain or snow. He carries it down to the water, and then secures himself as I have described. He sets up a little piece of calico in front, so that he can only just see over it. This is supposed to make the

kayak look like a bit of ice. He paddles away to a likely place, and looks out. When he sees a seal come up to take air, he ducks his head behind the screen, and, directly the seal goes down, paddles forward desperately for a few seconds. If he is near enough to the seal the next time that it comes up, he endeavours to strike it with the harpoon. This is a very ingeniously contrived weapon. There is a flat piece of wood, a kind of handle, which is detached from the shaft, and which is left in the hand when the harpoon is thrown. There is, secondly, the shaft, also of wood, with an ivory point; and, thirdly, there is the harpoon head, of bone, tipped with iron, which is placed on the ivory point attached to a walrus-hide line, but which becomes immediately detached from it when the seal is struck. When the harpoon is thrown the man at once puts the handle or 'harpoon-steerer,' as it is termed, into a place of safety, and then paddles forward to pick up the shaft, which remains floating on the water. If he has struck a seal, he can watch it by the movements of a seal-skin bag, inflated with air, which was fastened to the other end of the walrus-hide line; and, if he has struck one, this same bag will sooner or later exhaust or kill the animal, which naturally endeavours to escape under water. If, on the other hand, he has failed to strike the seal, he has only to pick up the line and the bag, and to try again. They fasten the seals, when caught, to the side of the kayak; and, when two are caught, they usually return to shore: but it is no uncommon thing to see a man come in with a seal on each side, and with another towing behind, or laid upon the hind part of the canoe.

We will now suppose the man has got to shore with his seal. If he is a married man, his wife, or, if not, his mother or sister, run down to meet him; drag the seal at once upon the rocks, and take off the skin and blubber. If it is fat, that is to say, has a thick coating of blubber, many will be their exclamations of delight. 'Oh, see what lovely blubber!' or words to that effect, will be echoed all around. The meat, skin, and blubber are then dragged up by the women to the man's house. But in the mean time the dogs will have collected, and some will most likely run through the legs of the women and upset them; while others run off with the food. If this occurs there will be a tremendous hullabaloo. The women tear their hair and howl, the men throw sticks and stones at the dogs, while the children pull the dogs' tails, or batter their heads. I have several times seen a seal carried off in this manner, and nearly devoured or pulled to pieces before the owner could recover the remnants of his property.

When these little difficulties are overcome, the meat goes at once to the pot and is eaten. If there are two or three seals, representing at least ninety or a hundred pounds of meat, it will still be the same. It is certainly correct on the whole to say, that whatever number of seals a man brings to land, every morsel of the meat will be eaten in three or four hours' time. The blubber is for the most part sold to the Danish traders: only a little is reserved for the lamps. The skins are not bought from the natives until they have been cleaned, and a considerable number are retained by them for their own use.

Seal meat may not be at all bad eating, but for my own part I would not eat it if I could get anything else. With the natives, it is just the contrary; they will not eat anything else if seal meat is to be had. I tried them with preserved ducks and green peas, but they shook their heads and said they very much preferred pussy meat, which is a sort of nickname for seal meat. They live, in fact, almost exclusively upon it: vegetables of all kinds they despise. There is no doubt that seal meat is very nutritious, and if it is well stewed, it bears a close resemblance to beef. An extract is made by boiling it down that is almost precisely the same as Liebig's in taste.

In winter the seals are obtained in other ways. Some they catch by nets, but more commonly they drive out with their dog-sledges, and endeavour to come upon them when they are lying upon the ice; or else to find holes at which they are coming up to breathe. For stalking them the natives use a little sledge upon which a calico screen is set up; the dogs are trained to stand still as the Greenlander wriggles along the ice, pushing the sledge before him; and directly he fires they rush up and make for the seal.

But the easiest way of getting a living in the winter is by looking out for one of the holes in the ice at which seals, narwhals, and frequently walrus and whales, may be found endeavouring to get air. The crowding together of the sea animals to one opening in search of air is called 'sarps' by the natives. Giesecke* says, 'The poor animals try to escape from

* Charles L. Metzler von Giesecke, to whose account of Greenland I have referred at p. 8, was born at Augsburg, in April 1761. His father was a wine merchant, but the son was educated with a view to the Church. The idea was changed, and he studied law; but this too was abandoned, and he took to mineralogy. He became acquainted with Schiller and Goethe, and it is supposed that association with them caused him to turn his attention to dramatic literature. Anyhow, he did so, and subsequently joined the company of a small Bavarian theatre. He performed various parts with the company until it came to grief,

death by suffocation, instead of which they are killed in a much more cruel manner. We ate some pieces of "makkak," or skin, which the Greenlanders had cut from a live whale which had come up to take air. I saw pieces they had cut out more than one yard in length.*

I have lingered thus over the seals because they are all-important to the Greenlander; without them he would cease to exist. Five species are found on the Greenland coast, two of which, the *Phoca barbata*, or bearded seal, and *Cystophora cristata*, or hooded seal, are only caught occasionally; while another pair, the *Phoca Grælandica* and *Ph. fœtida* occur in such numbers as almost to defy calculation. It is not uncommon for forty, fifty, or sixty thousand skins to be sold in one year to the traders. This by no means represents the whole number caught. Each native probably uses for dress, for coverings to boats, and for other purposes, or wastes, at the very least, five or six skins per annum; so there is no

and then C. L. Metzler, disgusted with his reverses, changed his name and assumed that of Giesecke. He then studied for some time under the celebrated Werner, and afterwards joined the Austrian army, but, receiving a severe wound, he was obliged to retire. He next went to Copenhagen, and was there when the city was bombarded by Nelson. A few years afterwards he was sent to Greenland by the Danish Government to report upon the resources of the country, a work which occupied him nearly eight years. He travelled completely down the west coast, from about 74° N. lat. to Cape Farewell, and made very extensive collections of rare and valuable minerals; but his usual ill-luck pursued them, and a great portion of them were lost to him; being captured by a French ship, when on their way to Europe. The French ship was taken by an English frigate, and poor Giesecke's collections were turned out at Leith Custom House and sold for the nominal price of 40*l.*, to Mr. Allan, of Edinburgh. They were subsequently purchased for a very large sum for the British Museum, where they at last rest in peace. Another of his mineralogical collections is at the University Museum at Copenhagen, and fills forty-five drawers, and a third is at Frankfort-on-the-Maine. Giesecke finally settled down at Dublin, as Professor of Mineralogy, and died there in 1833. He was rewarded by the King of Denmark with the Order of the Dannebrog, and upon the strength of this has been frequently called Sir C. Giesecke. His journal of his residence in Greenland is well known, but it has never been published, although several copies have been made of it. It is from one of these that the above extract is made. I am indebted for most of these particulars of the life of Giesecke to my friend Mr. R. H. Scott, Director of the Meteorological Office, formerly Professor of Mineralogy at Dublin.

* Whale skin is both wholesome and palatable. In taste and in crispness it bears a considerable resemblance to filberts.

doubt that more than 100,000 seals per annum are caught in Danish Greenland alone.

This quantity, large as it is, is necessary for the existence of the natives under their present circumstances. The whole of the meat they obtain from other sources amounts but to a fraction of that which they obtain from seals, and they could not increase this extra supply to any great extent. When the seal becomes extinct in Greenland, the natives will probably follow.

Commercially these seals are most valuable for their blubber, the skins are not worth much; 3s. to 8s., according to size, is about their present market price. It is unnecessary to observe that the fur seal is not found among the five species.

A more agreeable pursuit than seal-catching is fishing for sharks. The Greenland shark may literally be said to swarm in the deep waters of Disco Bay. They are so numerous that you have only to let down a hook to the bottom to catch one. A few small boys will go out in a boat for a mile from the shore, and come back in less than a couple of hours with their boat surrounded by sharks of seven or eight feet length. There is no particular sport in this kind of shark-fishing, but it is the results which are so agreeable. These sharks have fine livers full of admirable oil, and all that the natives have to do when they come to the shore is to take out the livers, put them into a cask, and sell them to the Danes. The wretched sharks, left ripped open on the shore, are often partially eaten by the dogs before they are thoroughly dead.

These sharks frequently grow to a length of twenty feet and upwards, and a single liver will sometimes yield a Danish tun cask (about twenty-seven gallons) of oil. It is commonly said that this oil is the cod-liver oil of commerce; I cannot say whether this is the case, but I can state from my own knowledge that it has *not* a very disagreeable taste, and that it is excellent as a lamp oil, giving little smoke and a brilliant white light. The following statement will give an idea of the quantity of sharks, and of the ease with which the oil may be obtained. In the month of July 1867, during which time there was great sickness, and consequently few people at work, nearly 2,000 gallons of shark-liver oil were brought in by the natives at the settlement of Jakobshavn alone. This was chiefly obtained by children, and was probably the result of about 500 livers.

After the seals, the sharks are perhaps of more importance to the Greenlander than any bird, beast, or fish which he has the opportunity of slaying. But this fishery is not encouraged

by the Danes; the natives can earn money so easily by it that it makes them inordinately lazy, and troubles result. Fish are plentiful on most parts of the Greenland coast, particularly cod, hálbut, and salmon. But, although their quality is little, if at all, inferior to the best we can obtain in this country, the Greenlander does not care for them; he will eat them, and does eat them, but he will seldom do so unless there is great necessity. Seal meat is usually the alpha and the omega of a Greenlandish dinner; if it is present all the rest can be spared, if it is wanting, they think the times are very hard indeed. Yet *we* should not grumble if, transplanted to Greenland, we found it wanting! while ptarmigan, eider-ducks, the glaucous gull, and the Greenland falcon were to be had. The last-named bird is superb eating; it is superior to the partridge, and possesses the great merit, when in fair condition, of yielding plenty of meat. All of these varieties of food the Greenlander has, and frequently has in abundance; but it is to be doubted whether he could obtain a sufficient supply to support life from these sources at all seasons, and it is certain that in his heart of hearts he cares for none of them as food. Let us now give a glance at a Greenlander's home.

The Greenlandish house, it has been already said, is built of stones and turf; few of them have doors, and they are entered by a sort of tunnel of the ordinary Eskimo kind—lowest at the entrance and widening as you advance. Now-a-days most of the floors are planked, but the furniture is remarkably limited. A low bench serves as bedstead, and a few dog skins and seal skins for coverings. Some exceptional natives have bear skins or eider-down coverlets, but these are not often seen. Two or three pots, which are used indiscriminately for every purpose for which pots *can* be used, and a few bone implements, which serve as spoons, or pot scrapers, or skin scrapers, will be almost all that you will see; but it will not be all that you will smell, and perhaps feel.

The houses remain, upon the whole, very much as they were formerly; not at all because the natives have not the means or the opportunity of bettering them, but simply on account of their natural indolence. The price that a Greenlander receives from a trader for the skin and blubber of one seal is seldom less than five or six shillings; it may be much more, and it is not difficult for an industrious man to catch several seals every day throughout the year. Planks, stoves, and almost every article of general utility can be bought at fair, fixed prices at the Danish stores, but the natives spend very little of their

money upon such things, and chiefly get rid of it over what may be considered luxuries or superfluities. So their houses remain very much as they were formerly.

The Greenlander of the olden time, on the contrary, was thrown almost entirely on his own resources. Timber he had none, except such as drifted to the coast. Of iron he had none, except what he could get from foreigners.* He used bone chiefly in place of wood, and stone combined with bone in place of iron. These old tools were in common use and manufactured to within a century and a half from the present time. The elder Egede saw them in use and brought some to Copenhagen. After the colonisation of the country they were superseded by superior tools, as the Danes brought wood and iron sufficient for all the wants of the natives. The old tools and weapons were cast on one side, despised, and the knowledge of the means by which they were fabricated passed away. At the present time it would be as difficult to find a native who could make a stone arrow-point as it would be to find a cockney who could make one. But although the knowledge of the means by which their implements were made may be said to have entirely died out, it is not so in regard to their uses. Though the native uses new materials, he retains in some cases the same form—in harpoon and in lance-points, for example. But in place of bows and arrows, the scrapers for skins, and the flakes, he now uses rifles and knives of different kinds. Bone he still uses for numerous purposes, but stone, except for blubber lamps and for weights to fishing lines, has no economic value. The aboriginal Greenlanders, like most uncivilised peoples, had a great objection to use the property of persons deceased, and placed all their possessions in or around their graves. The stone and bone tools and weapons were disposed between the chinks of the stones forming the tombs, or were sometimes enclosed in a small wooden box, neatly fastened at the corners by little pegs of bone. This has, of course, been extremely convenient for European collectors; and so thoroughly have the graves been denuded of these interesting (although not prehistoric) remains for the Scandinavian museums, that it is rare to find one which has not been rifled.† A search among the *débris* in the interior of a single ruined native house of the proper age is likely to produce more results than an examination of twenty graves, and the best

* Meteoric iron is occasionally, although rarely, met with.

† I refer to the northern districts, but, for aught I know to the contrary, the observation is true in regard to the whole country.

places to examine are the little groups of houses (one can hardly term them villages) which have been abandoned since the formation of permanent settlements by the Danes. In such places, after the turf has been removed, stratum below stratum, floor below floor, of accumulated filth will be found, composed of fragments of bones of seals, whales, and reindeer, scraps of all kinds of skin, and of animal matter more or less decomposed. Amongst this one finds the old stone tools and implements, lance and harpoon-points, arrow-points with highly polished sides, carefully barbed, or frequently elaborately dentated on the edges, scrapers which were used to prepare the skins, and drills of stone for drilling holes in stone. Those found in the centre of the floor are usually broken, or more or less imperfect, and were probably cast on one side; and the most perfect are almost invariably found by the sides of the walls, or between the stones with which the walls were built. The natives, in the absence of cupboards, seem to have been in the habit of placing their points and tools in the nooks and crannies, to take care of them, and frequently put them away so carefully that they could not again find them. Amongst other things, one will sometimes find old Dutch beads, which were doubtless obtained by trade with the early whalers,* or a rudely carved imitation of the female form, with top-knot and pendulous breasts, made probably by some fond father for his dusky darling. Such suggestive discoveries serve to lighten one's labour; for it is both laborious and tedious to extract these interesting relics of a past age. Each lump of dirt, each mass of putrid matter, has to be crumbled into small fragments before anything will be found, and usually, when something hard is met with which seems to be promising, its envelope of dirt has to be washed or scraped away before its true character is revealed.

The juveniles are invaluable for this work. They grub admirably; they cram the lumps of filth into their little mouths, and thoroughly masticate the dirt, to see if they cannot obtain anything hard among it; and, in this respect, they are much superior to their elders, who are above doing such things. Peppermint lozenges and raisins are most certain producers of stone implements by this process. The implements themselves are made of flint, chert, chalcedony, agate, jasper, rock crystal, greenstone, hornblende, and clay-slate. Many of them are excellently finished, and show that the

* They have not been obtained from the Danes, and are found deep down in the *débris*, which is a proof that they are of considerable age.

natives had attained high proficiency in this branch of art. Some of the scrapers are identical in form with those obtained in France from caves of great age, and some of the other varieties can be matched with implements found in Yorkshire, and also in Ireland. A few forms are characteristic of Greenland; but, for the most part, the types are similar to those which have now been discovered all over the world—from Britain to Japan.

I have reserved to the last a description of the Greenlander himself. The population of Greenland amounts, almost exactly, to 10,000 persons; of these, 4,000 inhabit the northern districts, and the rest the southern ones. The whole number is divided very equally between males and females. Rather more than one half of the people in Greenland are known half-breeds. In height the Greenlander of the present time is rather below the average height of Europeans. He can be exceeding ugly, but he is frequently not ill-looking. The complexion varies greatly. He is not long lived; out of the whole population but 11 per cent. are above forty-five years of age, and sixty years is considered a great age to arrive at.

Children are spotted at birth,* and are slow to be weaned. Examples have been known, who, up to the age of seventeen or eighteen, have behaved in the manner of infants. In their marriages and burials they have adopted Danish customs, and polygamy is practically unknown.† The former practice of burying their dead under a pile of stones is now abandoned; they are for the most interred with the ceremonies of the Lutheran Church. They have also given up placing the property of persons deceased in the grave; but they still exhibit reluctance to use anything that has belonged to one who has died, and they refuse altogether to wear their clothes. In former times, when troubled by fancy or in reality, they used to 'consult their medicine men, who were termed 'angekoks,' and who were a convenient combination of priest, doctor, and conjuror. These angekoks seem to have been the only persons distinguished from the general mass of the natives,

* I am informed that they have the usual colour of newly-born infants, but that there is one spot of dusky colour upon them, which afterwards gradually spreads over the whole body.

† Egede says: 'Commonly they are contented with one wife. There are some, but very few, that keep two, three, or four wives; but these pass for heroes, or more than ordinary men, in that, by their industry, they are able to subsist so many wives and children.' Now there are no heroes. Mormonism has not yet taken root in Greenland.

and they had many privileges. The Danish pastors and missionaries believe that the angekok is extinct. Publicly he appears to be so, but the natives are known to hold secret meetings, about which, strange to say, none of the Danes are able to learn details; and at these, it is believed, angekokism is still practised.

The profession, as already said, included spiritual affairs, medicine, and jugglery. An important part of the income of the profession was derived from raising good winds and calming bad ones, and this branch of the business seems to be still carried on. My interpreter, who had lived several years in the country, told me of a case in point. He was travelling along the coast in a boat when a bad wind set in, which continued for many days; he wanted to go on, but could not, the wind being contrary. After several days a native came to him and said, 'I am angekok; I can get you good wind.' My interpreter, being a man of the world, said, 'How much?' The answer was prompt and business-like: 'Two glasses of brændeviin, two dollars, and *you must not tell the priest.*' 'Very well,' said my interpreter, 'when you get the wind I will pay you.' 'No,' the other quickly replied; 'it is strong work to make wind, and I must have the brandy first.' So he had it, and then commenced operations. He obtained a stick, then some tar, and smeared the stick with the tar; then, going to the top of the highest ground near at hand, he stuck in the stick, and selected from his person one of those small insects that plagued the Egyptians, put it in the tar, and watched its strugglings; he stood above it and waved his arms, muttering unintelligible incantations. The wind, it is said, came, and my interpreter went on his way. I relate this story as it was told; it will serve to show the ridiculous arts practised by the angekoks.

The Greenlanders are not apt to express either pleasure or displeasure. It is rare to see an angry person, and even the sulky stage is seldom witnessed. Gratitude for gifts must not be expected. If you have property, it is considered right and proper that you should give; you are not obliged to give, but if you once stop before all is exhausted, you will produce difficulties. These facts must be considered at the same time as another, namely, that all property with the Greenlanders themselves is common. If you have nothing to give, or if you have clearly exhausted all your resources, that is nothing: it is a state the Greenlander is accustomed to, and understands. But, inasmuch as the Greenlander may be said to possess no property but that which is eatable, and all such property is by

long usage common to all, he cannot be got to understand when a gift is made that he is in any way indebted for it.

The Greenlander has a great aversion to soap, and is never known to use it, except to wash the bodies of persons deceased. Great as is their dislike to soap, it is surpassed by their dislike to corpses. Hence, when a person is taken seriously ill, the relatives or friends will visit the Danish stores to lay in soap; and it is remarked that whenever soap is purchased there is sure to be a death. The soap, perhaps, hastens dissolution; whether this is so or not, I am unable to determine. But on all hands it is agreed that the Greenlander does no murder—the crime is unknown in the land.* Of the remaining Commandments he observes about seven, but scarcely more. Envy, hatred, and malice are less common than in more Christian lands; honesty is scarcely a virtue with him, it is a habit.

The Greenlanders exhibit a strange mixture of boldness and timidity. In their canoes they will perform feats that would be trying to most Englishmen, but in their nervous fancies they show a weakness that would disgrace a child. An angry look, a gesture, is sufficient to terrify them, or to fill them with the gravest apprehension. They are haunted by fears of imaginary wild beasts, and shudder at the very idea of their unknown ice-covered continent. They hesitate to venture out of sight of the districts with which they are acquainted, and show the greatest repugnance to go alone with a stranger. In these matters the adults seem to be more childish than the children.

The last topic upon which I will speak is the Administration. The country is colonised by the Danes, and the trade carried on is directed by a separate department at Copenhagen. With the exception of the mineral cryolite, it is a strict monopoly. No one is allowed to settle or to trade in the land, except such persons as are appointed by the Direction at home. The trade is not carried on under ordinary commercial principles; it is conducted for the benefit of the natives—not with any idea of making a profit. I confess to having been sceptical about this when I found the paternal Government buying bear skins worth 5*l.* apiece for 4*s.* 6*d.*, although they did

* No murder is known to have occurred in Greenland for many years. At the same time, one may observe that it would be more easy to commit murder without detection than in a more densely-populated country. It is possible that some of those who are returned as 'lost in kayak' may have fallen victims to the enmity of others. Anyhow, the Danes are so unaccustomed to the crime, that they declare they would not know what to do if one occurred.

supply priest and doctor for nothing ; but I have now reason to believe that they do carry on trade, to the best of their ability, for the benefit of the natives, and that it yields a remarkably small profit.

The prices are low that are paid to the natives for their commodities ; but, paradoxical as it may seem, it is probable that if the traders paid very much less the natives would be proportionately better off ; for this reason—the Greenlandish creed is, ‘ take no thought for the morrow, eat, drink, and be merry.’ So long as they have any food to eat they eat ; they have no idea of laying up for a rainy day. If a man catches three seals in a day—as one can very easily most of the year—he has 60 or 70 lbs. of meat to consume, and he will receive from the Danes for skins and blubber about 18*s.* or 20*s.* The native passes from the blubber-house to the shop, and lays out the greater part of his money at once in coffee, tobacco, gunpowder, and lavender water. He gets a great quantity for this money, for, by the regulations of the trade, coffee and tobacco are supplied to him at European prices. This is one way in which the profit goes. But do not suppose that there is any difficulty in his getting through the amount : all property, you remember, is common ; the neighbourhood flocks in, and quickly consumes it ; hence, the more a man gets the worse he is off ; the more a neighbourhood has, the more gluttonous, intemperate, and idle it becomes. The cream of the joke is, that those who do the catching do not get the smallest credit for it ; the others consider **THE FOOD**, purely and simply, without any reference as to how it has been obtained. It will be understood from this that any endeavour to compel the natives to work would most probably turn out a failure. The Danes do not attempt it, and they have not a single policeman, soldier, or magistrate in the land. What the natives will sell, that they buy, paying for it in money.

The colonies or ‘ districts,’ as they are termed, are thirteen in number, and are divided into two ‘ inspectorats.’ The inspector of the northern districts resides at Godhavn, and of the southern ones at Godthaab. The chief place of each district has usually a principal and an assistant trader, a Lutheran pastor, and a cooper. These are all the Europeans ordinarily found at the principal settlements. Each district has, on an average, five smaller trading posts, at each of which a solitary Danish man, or perhaps a half-breed, resides.

The Danish establishments are very small ; they are frequently short-handed and in need of assistance. But how can assistance be obtained from the natives with the state of things

described? They have so few wants, and can supply them so easily that there is no inducement to labour. No ordinary pay would be an inducement! The mystery can be explained in one word—'schnaps.' Schnaps in Greenland does not mean exactly that which it does in Europe. It means something hot, tasty, and piquant; dilute sulphuric acid, mixed with cayenne pepper, would be considered a very superior schnaps. Petroleum would also represent schnaps. What the Danes do is this. When a native works for a day, he gets ten pence in money, and three glasses of very inferior brandy, or, if rowing, perhaps four. This is how Greenland is ruled; the post is carried on by this means, and the ships are loaded, unloaded, and towed out of harbour.

This powerful agent would of course become of none effect if unrestricted communication were allowed with the world, or if spirits were sold by the Danes themselves. No spirits, therefore, are sold, with one curious exception. Lavender water is sent out from Copenhagen to the traders, under the impression that it will find favour with the ladies; so it does, but they do not, however, apply it externally, but drink it, because it makes them comfortable. This is the only spirit that can be purchased, and it is in great request. A century ago brandy was disliked, refused, by most of the natives. They called it 'the maddening drink.' But *now* the lust for spirits which has been developed is altogether horrible; the demand for them is unceasing, and it is not too much to say that in Greenland all things are possible to a man who has a cask of brandy, so long as it lasts. It is impossible to describe how revolting this incessant demand for spirits becomes. Fortunately for the natives, the amount they can obtain is very small, and, even if it were otherwise, their interiors, from being so well coated with grease, might allow them to do with impunity that which would be fatal to others.

I must conclude with but one word about the language; and, indeed, if the space at my disposal were greater, I should have some difficulty in doing justice to that sententious dialect of the Eskimo tongue. A single word frequently embodies an idea; but then the word has no deficiency in length. It will readily be understood that a language which can boast a word like 'savecenaarreatoresoaratlaromaronatetok'* presents

* Words of twenty to twenty-five letters are common in the Greenlandic-Eskimo dialect. That quoted above is said to mean, 'You must try much to get a good knife,' and I am informed that the meaning of this sentence cannot be expressed in a shorter manner.

some perplexities, both in construction and pronunciation, to the beginner, and it is possible that there is not a man living who could intelligibly describe the principles upon which this and their other equally magnificent words are built.

In these slight sketches I have endeavoured to present some of the least disagreeable features of Greenland and the Greenlanders. In several respects the native of the present time is an advance upon his forefathers, but in others he has decidedly retrograded. The policy of the Danes, although far from perfect, is perhaps as good a one as can be devised for this peculiar people; and, although it is impossible to express any particular admiration for a system of administration which governs a country by means of brandy, it must be admitted that it is a very easy thing to point to natives who have been treated in a far more objectionable manner. At no time since the Danes have had possession of the land has there been any interruption to the good-will which has prevailed; and the indigenous population, instead of being exterminated by different processes, is, and has been for a long time, steadily increasing.

THE FATAL ACCIDENT ON THE LYSKAMM. Read before the Alpine Club on Tuesday, March 29th, 1870. By W. E. HALL.

IT is, I trust, unnecessary to say that the following paper has not been lightly undertaken. Under ordinary circumstances, to review after some months the sad remembrance of an Alpine accident would be as painful to the Club as it would be useless and unjustifiable. None of us would wish that the way in which a relation had died should be made a subject for public remark; and fortunately it has been very rarely that an accident has occurred of such kind that any good purpose would be served by dwelling upon its incidents. It has in most cases been easy at once to see that rashness or incompetence on the part of the victims, or of one of them, has been the cause of disaster; and until in some new order of things rash men listen to the words of prudence, and incompetent men are willing to be persuaded of unfitness, it is best that criticism should be silent, and that we should each draw morals for ourselves alone. If, then, I speak to-night, it is because in the particular instance the circumstances are not ordinary—because, in fact, they are such that it has become a positive duty to direct to them the attention of the Club.

At four o'clock in the morning of the 15th September last Mr. Chester left the Riffel to make the ascent of the Lyskamm. At a little before ten o'clock in the evening of the same day his guides, Johann Taugwald and Johann Kronig, returned with the news that he was dead. A few minutes after their arrival Mr. Rigby and I saw them. They were lying down in the guides' room, professedly in great pain, and professedly also unable to speak without difficulty. We were, in consequence, unable to extract from them a full account of what had happened; but the one, speaking in German to Mr. Rigby, and the other speaking in French to myself, gave separately an outline of the circumstances of the accident. According to their stories, which, though meagre, were consistent with each other so far as they went, the party had reached the summit at 2.45. The hour was late; they had, therefore, almost immediately to commence the descent. In coming down, Mr. Chester, being very tired, had stumbled several times, but he had got to the end of the narrow part of the arête without, as it would appear, an actual fall. At this point he insisted upon going to the edge—I am unable to understand of what—in order to look for traces of a dog which he had taken with him, and which had disappeared during the ascent. In going towards this edge he had fallen forwards on his face, and the spot being peculiarly easy, and the guides consequently not being alert at the moment, they had been dragged off their feet by his fall. The whole three had immediately bounded over an ice-cliff, and at last, after slipping down a slope estimated by the guides as being some eight hundred to a thousand feet in height, had lodged on the Grenz Gletscher beneath. The guides had both suffered great pain, and one was afraid that he had sustained grave internal injury. Mr. Chester had never spoken after the fall, but had lived for about five minutes. On this last point they were very clear. The fall had taken place at about four o'clock in the afternoon.

Such was the tale which fell in morsels from the lips of Taugwald, and which Kronig, though seemingly unwilling to speak at all, to a certain extent confirmed. Shaken, terrified, and in pain as they seemed to be, we refrained from pressing them for further particulars, and turned to make our arrangements for the recovery of Mr. Chester's body.

Most fortunately two other members of the Club, Mr. Fowler and Mr. Porter, were at the hotel, and about three o'clock A.M. they, Mr. Rigby, I, Peter Perrin, and nine porters started for the scene of the accident. The topographical indications afforded by the guides had led me to expect that

we should find Mr. Chester at the upper end of the base of that part of the mountain where a small hanging glacier and long snow slopes separate two rocky ribs partially covered with snow, one of which marks the termination of the arête proper. It was not without surprise that after vainly scanning the spot where I expected to see him, I at last saw a small black object much farther up, close to the point at which the route commonly taken in the ascent of the Lyskamm enters on the steep slopes to the right of the glacier. The slope is there not more than five hundred feet high, and at the top a cliff of ice of some sixty or seventy feet forms the pedestal, on which is supported a fan-like expansion of the arête, so broad and so easy that a party of which I was a member, in descending the mountain in 1861, glissaded down the slope from which Mr. Chester fell.

We found him lying on his back, his legs straight, with one arm much twisted, but with his head only slightly bent backwards, notwithstanding that the neck was broken. It was obvious that he had merely slipped, and had not rolled over and over in falling along the slope which stretched down from the ice cliff. The abrupt fall at the commencement would fully account for the fatal injuries which he had received, and the subsequent slide had tended rather to compose his attitude than to contort it further. But it at once occurred to me that three bodies falling together, and connected by a rope, must have rolled one over the other. It is barely conceivable that, when affected by the irregular impetus necessarily given to bodies of different weight falling one after another through a space of sixty feet, three men should afterwards have glided down a slope side by side with even motion. On looking to see whether anything existed on the face of the snow slope to confirm or to modify the suspicion which I had already conceived from this and from other matters which I will presently mention, I saw a single trough marking the line of Mr. Chester's fall, and extending about a third of the way up the slope. Above, the snow was too hard to allow of marks having been made. The trough was clean and narrow; no other trough existed on either side, and no irregular dents suggested the improbable hypothesis that the guides might have tumbled while Mr. Chester glided. The local evidence seemed therefore to point to the probability of Mr. Chester having fallen alone.

We already had knowledge of a fact which, though not unimportant in itself, acquired a value altogether new when looked at in conjunction with these local appearances. The rope—a new one—which had been used by the party had been

shown to me immediately after the arrival of the guides at the Riffel. I of course took possession of it, and afterwards put it into the hands of M. Clemenz, the district judge, in a condition identical with that in which I received it. Fastened at some yards from one end of this rope was a belt of webbing which showed signs of having been pierced by the buckle; somewhat farther on than the middle of the rope was another belt which had never been so pierced; two-thirds of the way between the second belt and the other end of the rope a loop which had been made for the hand still remained; the rest of the cord was loosely twisted so as to prevent it from trailing. It is eminently improbable that men whose nerves had been shaken by such a fall as that which killed Mr. Chester should have undone a waist-loop, and should have substituted for it a useless hand-loop, especially when they had before them a snow-journey, part of which had to be made in the dusk. I am driven to believe that the hand-loop existed before the fall. No traveller, especially if he were one so tired or weak as to stumble, would attempt to use a hand-loop, nor would he be permitted by his guides to trust himself to so inefficient a guarantee. I may assume that Mr. Chester was either in front or, as the guides themselves say, in the middle. In the former case he was attached firmly to a rope from which both guides could disengage themselves in a moment; in the latter case, he was liable to be thrown out of his belt by any sudden jerk. In either case, according to the appearance presented by the rope, it was probable that he had fallen alone.

It was not till later that we became acquainted with a third reason for distrust, the negative character of which ranks it with those which I have already mentioned. While we were away in search of Mr. Chester—that is to say, within twelve or fourteen hours after the return of the guides—an English doctor, who happened to be at the Riffel, surgically examined Kronig and Taugwald. He found that they both were much bruised and slightly cut about the face, but that, with the exception of a very slight bruise on the inside of the knee of one of them, and an equally slight bruise on the shoulder of the other, they were absolutely unhurt in any other part. Of internal injury there was no trace. They were not scratched nor rubbed; and their clothes were unorn. It would be sufficiently strange that two men should fall over an ice cliff 60 feet high, and should then tumble or glide for 500 feet more, without being seriously hurt, without even being bruised elsewhere than on the face; but it is so strange as to be hardly explicable that these two men falling unhurt for so far

should have been bound by a rope to another man whose neck and whose arm were broken, whose thigh was dislocated, and who presented other evidences of the violence with which he fell. The bodily state of the guides was such that, had it not been for the death of their companion, they would have been supposed to be guilty of gross exaggeration in saying that they had fallen even 100 feet; no one, however facile of belief, would have conceded the possibility of such a fall as that which they claimed to have undergone.

Yet another fragment of evidence of even more immediate significance we gathered upon the ground itself. Between two and three hundred feet higher than the body, and at a distance of about 400 yards in a diagonal direction up the slope, were a bottle and two handkerchiefs belonging to the guides. These things were of course not in the line of fall; neither were they in the line of ascent usually taken. On the contrary they were further removed than the body from that line; they were on a part of the mountain where under ordinary circumstances no one would go, because the slope is steep enough to demand longer time for its ascent than is required for the more circuitous route; but they were just on a straight line between the point where the ice-cliff could be turned and the highest point on the glacier which could be reached by men too hurried in their descent to wish to cut steps. The natural inference is, that the guides passed by this spot after the accident took place, and as they would certainly not have mounted again gratuitously after falling to a lower level, the discovery of the handkerchief and bottle adds greatly to the importance of such unfavourable inferences as may be derived from the facts which I have already mentioned. It is impossible to take refuge in the supposition that the wind may have blown the things from some point on the line of fall to that at which they were found. Putting aside the difficulty that the handkerchiefs and the bottle must have parted company in the beginning, and that so curious an accident cannot be assumed as that they should rejoin just at the beginning of the softer snow, when the impetus acquired by the bottle must have been considerable,—there remains the fatal objection that the things were found at a place nearer to Zermatt than that at which Mr. Chester lay, that the wind was blowing up glacier all night, and that the existence of any local draught was disproved by Mr. Chester's body being partially silted up on the side nearest to Zermatt, and being clear of snow on the other. It is needless to say, that had the wind changed he would have been silted up on both sides.

Connected with these grounds for believing that the guides did not fall with Mr. Chester is another matter, meaningless no doubt until a high probability is obtained that their story was untrue, but significant so soon as the facts about which I have already spoken have been allowed the weight which seems to me to be due to them. On our return to Zermatt, Kronig, in speaking with Mr. Rigby on the subject of the accident, expressed anxiety to hear whether Mr. Chester had been found with his head or his feet downwards. Obviously he was ignorant in which position the body was lying at the moment of their departure. If the guides actually fell with Mr. Chester, nothing is more likely than that they should have been far too dazed to notice anything with precision for some time afterwards. But if they were so far capable of observing as to know that he lived for five minutes after his fall, it is very hard to understand that they should have remained ignorant of his attitude. They must have spoken to him, they must surely have touched him, they cannot have left him till convinced by long and anxious watching that it was death and not a swoon that possessed him. Yet these men, with their wits collected enough to mark the exact moment of death, are unaware of the fact, far more easy to observe, that Mr. Chester lay with his feet downwards, and this too, notwithstanding that if all fell together they must have unfastened from his waist the rope which they brought back to the Riffel. I do not weigh upon the difficulty of believing that Mr. Chester can have lived for five minutes with his neck broken. I am informed that it is possible for a man to live under such conditions for such a space of time; although his neck was too much twisted backwards for me to think that his was one of these exceptional cases, I am bound, as no medical man saw him before he was moved, to give to the guides all the benefit that this possibility may afford.

One point more and I have done. It will be remembered that it was part of the story of the guides that Mr. Chester fell in looking over an edge to find traces of the dog which he had taken up with him, and which had fallen during the ascent. If it was known that the dog had fallen about a particular time, the place of his fall must also have been approximately known; and it may be presumed that Mr. Chester would not have looked for him at a spot, not only distant from, but unconnected with that where the poor animal was lost. Now the dog was still alive when we went up next morning. We could not see him, but his piercing cries came, as we all agreed, from that hanging glacier of which I before spoke, and which under-

lies the upper part of the arête. The place where he fell must have been an hour's climb higher up and along, than was that where Mr. Chester met his death. I must frankly say that I believe the incident of the dog was invented as a means of accounting for the occurrence of an accident at a place where the guides must have known that an accident would be looked upon as impossible by anyone acquainted with the ground. It is a place where one man might hold up two with perfect ease. That two guides would fail to hold up a single traveller, or that, failing through momentary carelessness to hold him up, they should be unable to arrest his tumble, is, to my mind, a marvel which I cannot readily accept.

I may be allowed to say parenthetically, that we were forced, to our great sorrow, to leave the poor dog to his fate. He was at a part of the mountain which it would have required longer time to reach than to get to the top; and not only was the morning somewhat advanced by the time that our arrangements for taking down Mr. Chester were completed, but bad weather came on so immediately afterwards, that a party which was detached under Mr. Porter to go to the point from which Mr. Chester fell, in order to examine any marks which might remain, and if possible to go on to the dog, were obliged to return without reaching the foot of the arête.

I have now stated frankly, and I hope simply, the facts and reasonings which lead me, I am grieved to think, irresistibly to disbelieve the story of the guides. Let me recapitulate in a few words. Mr. Chester fell either at a point in the natural line of route, or at one to which he diverged for the purpose of getting more easily down to the glacier. If he fell at the former point, he did so on snow of such gentle inclination that no traveller could have carried off two guides, however carelessly they were walking. If he went to the latter place, an act which I have shown from the position of the dog to be in itself improbable, he was standing on the edge of a perpendicular cliff. Is it conceivable that two guides would have stood in utter carelessness behind a traveller who had already stumbled several times, while that traveller was crossing over a precipice? Whether Mr. Chester slipped at some distance from the precipice or tumbled from its brink, he fell so far that his injuries are natural and the safety of the guides is unnatural. Arrived at the bottom, the guides, if their story be true, must have taken the rope from the body without noticing whether the feet or the head were downwards; and yet, dazed as they were by the fall, and insensible to obvious facts, they can fix the time during which Mr. Chester

lived. They must then, for no object whatever, have mounted for a considerable distance along the slope to the point where the bottle and the handkerchiefs were found, and have then again descended to the glacier. Finally, it must be remembered that there were marks of the fall of one body along the snow, and that there were no marks of the fall of more than one; also that the condition of the rope was such that it was unlikely that all three would have been sufficiently attached, and very likely that two would have been able to retain their footing while the third slipped out.

Against all this there is nothing to put but the assertions of the guides, which I have proved, meagre as they were, to be in some respects inherently doubtful, and two statements—one made by Peter Perren, the other by him and all the Zermatt men who went with us to recover the body. Peter Perren, three days after the accident, declared that he had seen three marks immediately under the ice cliff, such as would be made by three heavy bodies having fallen over it. He gave as his reason for not having mentioned this discovery at the moment, that he wished to spare our feelings. As we were in presence of Mr. Chester himself, such extreme consideration might seem to have been superfluous. He also said that he had noticed these marks at the moment when Mr. Chester's body was first seen. As it was I who first discovered him at a distance so great that it was with difficulty that Perren was able to see the body when it was pointed out, the marks, if they existed at all, must have been extremely conspicuous. Nevertheless, neither Mr. Rigby, Mr. Fowler, Mr. Porter, nor I saw any indication, however slight, of bodies having fallen on the slope beneath the cliff. For my own part, I looked carefully, and I came to the conclusion that the snow, almost ice as it was, was too hard for some distance to show any traces, whether of one or of three bodies. Perren had been told beforehand to direct our attention to anything noticed by him which could bear on the circumstances of the accident. I therefore dismiss his story as a clumsy attempt to shield his fellow villagers and fellow guides from the blame which he found had come to be attached to them.

The other statement made by Perren, in common with all the Zermatt men, is less material. It was to the effect that Kronig's hat was found close by Mr. Chester. This of course would only at most prove that the guides had at some time been with the body; but it is curious that the hat was immediately put into a knapsack without being shown to us, that neither we nor the one Oberland man of the party saw it in

the snow; nor were any of us except him shown it till after our return. I do not say that the hat was not found on the spot, but I have a right to say, that if it was found there, its discovery was very infelicitously used.

Perhaps I may be asked what story I propose to substitute for that of the guides. In a matter of this kind, the important point is whether or not the guides did their duty; and as it is possible that men might put themselves into a false position by telling an untruth, which seemed to them to be plausible, and incur through mere nervousness an undeserved blame in their very efforts to escape from it, it is only right to see whether the facts allow that such a loophole shall be presented to Taugwald and Kronig. I regret to say that I do not think that their conduct is susceptible of any such explanation. Mr. Chester, I have some reason to believe, was not a good walker. His pluck must have been very great, but though, as I am informed, naturally strong, he was too old a man to be able to make long expeditions with safety, and I have no doubt that he was always much more fatigued than he cared to acknowledge to himself. I think it very probable that he did in fact stumble in the arête. On the supposition most favourable to the guides, Mr. Chester at the moment of the accident may have cast off the ropes for some purpose, and may have fallen while walking alone. In this case they would have been greatly to blame for allowing a man who had shown shortly before that he was unsteady to be alone in any place where a slip could possibly have a serious result. But I am afraid that the non-perforation of the middle belt necessitates belief in a worse carelessness. When fresh in the morning, Mr. Chester would certainly have taken care that his own belt was properly fastened; one of the guides must therefore have been in the centre, and Mr. Chester must have been behind; that guide must have been guilty, for some reason or other, whether from mere carelessness or from distrust in Mr. Chester, of putting himself in the rope in a manner which he must have known to be useless. When turning to come down, either Mr. Chester himself put on his belt—which, according to the story of the guides, was then the middle one—or it was put on for him. In the former case, if he did not fasten it sufficiently, he must have been exhausted, and the guides were to blame for not taking care that the buckle was driven properly home; in the latter case they must have known that the belt was not perforated, and consequently that he was not safely attached to them. I am loth to suppose the last alternative to represent the truth, because I should then have to think that the guides

deliberately took precautions to prevent themselves from being killed in the event of an accident occurring. But whatever way the facts are looked at, whatever the cause of Mr. Chester being inadequately fastened, and whether he fell when apparently tied to the guide or not, it is impossible to avoid believing that their carelessness at the very least, and perhaps their cowardice, was the cause of the accident. Nor is there any doubt that they told an untrue story in order to cover whatever was blamable in their conduct.

When we returned to Zermatt an investigation was held by M. Clemenz. Our evidence was taken, as well as that of the guides, and of the men who went up with us to fetch Mr. Chester. M. Clemenz promised to me—and when Mr. Chester's brother arrived at Zermatt, to him also—that his decision and the grounds of it should be fully communicated to us. For a long time expectation that M. Clemenz would fulfil his promise naturally and necessarily closed our mouths. But when more than six months have gone by, and when a date, fixed after several letters as that in which the decision should arrive in England, has been passed by nearly eight weeks, it becomes necessary, if any good effect is to be produced during the coming summer by the publication of the truth, that the dilatory courtesy of M. Clemenz should no longer be waited for. I have no wish to express any opinion as to the conduct of M. Clemenz. I am content that my action should be sufficiently justified by the fact that like promises were made after the accident on the Matterhorn, and that they were never fulfilled. But I cannot refrain from saying that, whatever be the motive of his silence, whether indolence, or the forms of Swiss law, or desire to help the guides, its effect on the supposition of their innocence must be singularly unfortunate. We refrained for obvious reasons from cross-examining them, as we otherwise should have done, because we knew that an official inquiry was going to be held; we could not of course afterwards carry on an amateur investigation side by side with one which was legally instituted. The guides therefore might now say with some truth, that they are being condemned without sufficient opportunity for explanation having been afforded to them. I do not myself think that any explanation could seriously affect the facts upon which I ground my conclusions, but other cases may readily arise to which the result of explanations would be to exonerate at once an apparent culprit; and I cannot help uttering a protest, however useless it may be, against the secrecy which the character of M. Clemenz or that of Swiss law has imparted to the judicial inquiry.

Note by the Editor.

A discussion took place upon the above paper, in which several gentlemen took part, and various opinions were expressed. Dr. Liveing expressed his strong belief that it was highly improbable that Mr. Chester could have lived for five minutes, or indeed for any appreciable time, after the accident took place. Mr. Rigby generally confirmed the accuracy of Mr. Hall's account; and gave additional details of his interview with Kronig after the accident. It was generally agreed, and it will, I think, be impossible for any reader of Mr. Hall's very clear narrative to doubt, that the story told by the guides is simply incredible. We have no reason to suppose that they fell over the cliff; and the discovery of the bottle and gloves seems to prove decisively that *after* the fall they passed by the spot where those articles were discovered; or, in other words, that they took the quickest line of descent towards Mr. Chester's body, going far enough aside to turn the cliff over which he had fallen. So far the case seems to be clear. Is there any reason for attributing to them anything worse than the negligence which led to the accident, and the telling of a false story afterwards to conceal that negligence? Two causes of suspicion seem to be alleged. Mr. Hall says that under certain circumstances he 'would be obliged to think that the guides deliberately took precautions to prevent themselves from being killed, in the event of an accident occurring.' I ventured to express at the meeting my belief that this suspicion was gratuitous. Carelessness in fastening ropes is unfortunately so common, that it is quite unnecessary to impute any deliberate intention to men who may be guilty of it. The point is one which, from the nature of the case, can never be cleared up; but the most obvious hypothesis seems to me to be, that the guides feeling themselves to be perfectly secure, as two guides with a single traveller would naturally feel themselves, either allowed Mr. Chester to fasten his own belt without taking the trouble to inspect it, or did it in a hurried and thoughtless fashion. I have constantly witnessed such carelessness, and though blameworthy, it is not in any way surprising.

Secondly, the conversation with Mr. Rigby is supposed to indicate that Kronig cannot have gone to Mr. Chester's body after the accident, as he apparently did not know the position in which it was lying. Mr. Rigby suggested that Kronig may have probably asked the question, from having told the story to other persons, and being not unnaturally anxious to hear it confirmed. It is clear that it would be very unfair to press any such inferences too closely. The presumption derived from the relative positions of the body and the articles dropped by the guides, seems to point strongly in the opposite direction. The articles in question, if dropped by the guides on their descent (as seems to be certain), show that they must have passed within a very short distance of the body; and it seems to me to be all but inconceivable that they should not have gone to it. They could not be certain, in fact, that Mr. Chester was dead; and their anxiety to reach him was, probably, the cause of their dropping two or three articles without noticing the loss. Why, then, should they not have gone to him? The only suggestion made was, that they might be afraid of avalanches. Anyone who has observed how careless guides generally are about such dangers,

and who will try to realise the state of extreme excitement under which they must necessarily have been, will, I think, be slow to accept this suggestion. If they had really felt such an alarm, they would have gone round by the usual route, instead of taking the short cut downwards. I fully believe that they went to Mr. Chester, and that Kronig's rather singular question may be accounted for in fifty ways, without imputing to them an act of almost inconceivable stupidity or inhumanity. I will venture, then, to suggest that the true story was probably as follows:—Mr. Chester went towards the edge of the cliff to look for his dog, or for some other reason. He slipped, and either fell out of the belt, which had been improperly fastened, or, as seems more likely to me, removed it himself. In either case, especially in the latter, the guides were highly to blame for their carelessness; and probably assumed very thoughtlessly that they were on a safe place. Mr. Chester then fell, and was instantaneously killed. The guides rushed down towards him by the quickest route, dropping the gloves and bottle on the way, and found that he was already dead. They then returned to the Riffel, composing a very improbable story on the way. In all this I see gross carelessness, and think that Messrs. Hall, Rigby, and Parker deserve our gratitude for the clearness with which they explained the circumstances. I cannot, however, agree with Mr. Hall in thinking that there is any serious ground for further suspicion. At all events, I fully agree with him that it is highly desirable that the result of the official investigation should be made public; and this is the point which it is now important to press upon the Swiss authorities. If gentlemen who are not accomplished mountaineers are to venture into the high Alps, the guides should use additional precautions; but as far as we can see at present, Kronig and Taugwald appear to have neglected the precautions which are in all cases most imperative.

THE ENGLISH LAKES IN WINTER. A Paper read before the Alpine Club on March 29th, 1870. By J. STODDON.

DURING a short visit to the English lakes last Easter, it had struck me from a look down Helvellyn towards Red Tarn, over steep snow slopes falling away into dense mist, that the mountaineering capabilities of these hills in winter had hardly been duly recognised. So last winter, having a few days at my disposal, I found myself with a friend whom I will call X, installed in rooms at Elterwater, in Great Langdale, belonging to another friend, Y, in the house of one Tyson, who subsequently turned out to be the cousin of almost everybody in the valley. Elterwater is chiefly remarkable for a large powder-mill, which caused us much profitable speculation on the explosive force of gunpowder raised in our minds by a violent thunderstorm, during which one specially brilliant flash seemed to hang just over the mill. The weather up to the time of our arrival had been clear and frosty, but the day

we came the frost broke up, and the rain fell in a way peculiar to the lakes, that is, it rained for about eight days almost without stopping. Our first expedition was up Wetherlamm, from Green Burn. The crags above the old mine works were wonderfully beautiful, as the water which trickles over them had become changed into ice, coating the crags for some 200 feet with tier above tier of icicles. The climbing among these required care. Carrs was wonderfully fine from this point, its cliffy face seamed with several steep and narrow snow couloirs. We were soon in dense mist enlivened by a sharp wind, so that we had some trouble in finding our way down again. The next few days were spent in getting wet and studying waterfalls. Colwith swollen with flood was grand, and Elterwater Tarn was almost as large as Grasmere. The first day the weather gave us a chance we climbed the highest of the two Langdale Pikes from Dungeon Gill. Even in a scramble straight up there was no difficulty except a little caused by a glaze of ice on the rocks. The view was very wild, the whirling mist was dashed against us from the Bowfell side, and the clouds were lit up with a strange lurid sunset light which did not promise good weather. On the Stickle Tarn side we found a great deal of snow, and a good glissade landed us in a very short time a little way above the water's edge. Next day a stroll under Bowfell in thick mist disclosed, when the mist lifted, the base of a wide couloir, which shot up steeply into the clouds. Darkness and vile weather came upon us before we reached it, but we were determined that this attempt should not be our last. On the next Sunday the wind changed to the north, and before sunset the clouds were all swept away, and a clear evening gave us our first look at Bow glittering in fresh snow. Our couloir sloped steeply down towards Langdale, a little distance on the Rossett Gill side of the summit.

Monday morning was brilliant and a sharp frost; we set off somewhat later than we need have done, intending to climb Bowfell by the great couloir, and if possible cross Scawfell Pikes into Wasdale. We kept well under Green Band till we were just beneath the summit, then turned straight up towards a short but steep grass slope called, I believe, Green Nose, above Grunting Gill; a little way above which, after some steepish rocks, our couloir began. The rocks gave us a little trouble, owing to a thin glaze of ice, but the snow soon relieved us from that, as it was soft and up to our knees. The sky was perfectly clear, and the blue colour in the holes made by our sticks was very marked. A mass of black crag rose from the snow at the base of the couloir, which now rose steeply

straight above us, with the summit of Bow on the left. The snow was at first in capital order, and the angle (by klinometer) 30°. As the angle gradually increased the snow got gradually harder, till on reaching about 45° it became necessary to cut steps. The slope got steeper and steeper, steps were always necessary, and at last after having come up 350 feet or more, we found ourselves within a few feet of the top on a slope of 63°, with an overhanging cornice of ice above us, and the snow nearly up to our waists for a few feet below the top, which I could just reach with my ice axe. The next few minutes must have been pleasant to my friends below me, as the cornice was gradually tumbled upon their ears in a shower of icy fragments. Then I pulled myself up by my hands on to the level snow field above, and a short run up easy slopes soon brought us to the top. The view was perfect; not even in Switzerland do I remember any sight of mountains with more delicately beautiful outline, relieved against the clear winter sky. Blen-Cathra and Skiddaw on one side, with their ridges falling away in the tenderest snow-moulded curves, were a wonderful contrast to the ruggedness of Scawfell on the other side. The Scotch Hills lined the north-east horizon, and the sea on the Lancashire coast gleamed like polished gold. It was voted too late for Scawfell, so we made straight running for the top of Great End; the snow being sometimes so soft that we sank almost to our waists, at other times so hard that if the gradient was at all steep, a step was necessary here and there. As we reached the top the few clouds there were were just reddening with the setting sun, but a glance downwards made us somewhat prematurely sanguine about an easy descent into Wastdale. The mountain side was very steep, covered with snow for some 500 or 600 feet below us, with the rocks cropping out in irregular masses. A long slope was, after a little inspection, selected for a glissade, and we skidded down towards it. I tried it carefully for a few yards down, but it soon became so hard that an hour's stop-cutting could not have taken us down to the bottom; so we skirted along the top in the direction of Scawfell, through snow much above our knees. We soon came to another slope leading very steeply downwards; X was some 20 feet in front of me, got on to the slope, which partook of the couloir character, and sank nearly to his waist in the soft snow. I could see from where I was that it was in good order for some 30 feet down, and X, who could see much further, said that the rocks below were not too steep, so I shouted to him to go, and he began sliding down, meantime floundering to the top of the slope. The moment we appeared there we heard a startled shout from X, saw him flung upon his back, utterly fail to stop his motion,

then gliding swiftly downwards. The slope we saw had changed from snow to hard ice, and the gradient must have been at least 45° . Some big rocks cropping out of the snow came next, down which he fell head over heels, and then head first down another slope towards an ominous break in the continuity of the mountain side, which might mean a precipice of 100 feet. We watched in horror for the time when we should see him disappear. A little before the brink the gradient slackened; he never lost his head for a moment, grasped at a fragment of rock which struck him from his course, then at another which lay most providentially just at the right place, and his motion was brought to a stand. He lay quite still where he was on the snow quite 100 feet below us—I should say more; and I followed carefully down the slope in his tracks. When I reached the point where he had lost his footing, I almost followed him, the snow which was resting on hard ice suddenly thinned off, and before I was aware of it I felt one foot going. Fortunately I had an axe with me, otherwise it would have been impossible to get down to X, and many a weary step it cost me to reach him. In about three-quarters of an hour we came to him terribly shaken and almost frozen, with his clothes very much torn and his right leg almost unable to move. The next three hours were not pleasant; every step had to be cut for a considerable time, and X's feet to be put into them. A great piece of bread somewhat revived him, and we struggled slowly on under fast-increasing darkness. Exercise brought back the use to his leg and the steadiness to his limbs in a way that I could not have believed possible after such a fall. Fortunately the moon came out, and by its help we managed to find our way down to Wastdale, and appeared at the hospitable door of Ritson about 8.15 P.M. We found the family had been spending the day in airing the beds, which, considering the time we arrived, was lucky. We discussed sundry plans about getting to Windermere by rail, but the next day X, with wonderful pluck, declared himself ready to face Rossett Gill. A snow-storm came on before we reached Sty Head Tarn, and between there and Sprinkling Tarn several inches of snow must have fallen in a wonderfully short time. I never saw a storm to compare with it, the wind was so violent that we could hardly keep our feet at all, and sight, except at intervals, was quite out of the question. About a mile beyond Sprinkling Tarn we found our difficulties increasing fast, from our decreasing knowledge of the country and the utter disappearance both of path and landmarks. The result was, that after much scrambling we emerged from the snow in Borrodaile. Just as we reached Rosthwaite a glorious break

in the clouds saved us the misery of the many miles of turn-pike road to Ambleside. We faced about and crossed the Stake Pass in deep snow. This was our last expedition. We had had at any rate one most glorious day, which had fully atoned for all the waiting and the rain, as full of interest and beauty as almost any I remember in the Alps. I am sure that any one who will make the experiment of a winter expedition for himself will find most ample reward. The mountaineering on the higher summits is everything that can be wished, crevasses excepted. The only thing is, it has to be sought to a certain extent. I suppose Bowfell might be ascended by Green Band as easily in winter as in summer, but anyone who is not *blasé* of steep hard couloirs, without the excitement of falling stones, may get them in the lakes in perfection, if he cares to look for them, and have them too, which is a great point, without a single intrusive soul to disturb him.

ASCENT OF SNAEFELL JÖKULL, WESTERN ICELAND.

By TINLEY MASON.

MY original idea in going for a yachting cruise to Iceland was to use the yacht as a base of operations for exploring, with the help of the Rev. H. B. George, the still unknown ice-region of the Vatna Jökull. This, however, was found to be impossible, owing to the whole southern coast being unapproachable by a vessel, and without a single harbour; so the party was given up, and my plans were changed. Still, while in Iceland, I was determined to make an attempt at Snaefell, or, as it is termed throughout the land, '*the Jökull*,' being *par excellence* the noblest, though not the highest, of their ice-mountains—for it is at the very extremity of the promontory that divides the noble Breidi and Faxe Fjords, and rises up alone in the splendour of its white mantle direct from the sea. I had heard that all the known attempts had been made from the northern side, so I determined to try it from the south, and accordingly made for the trading place of Budir, where there is fair anchorage except with a SW. wind. Here the merchant told me the ascent was impossible, owing to the crevasses, but kindly offered me ponies to go the 10 miles of rough coast-walking leading to the base. However, there is a fishing village called Stappen close to the foot of the mountain, where also there are the most wonderful basaltic formations in the world; so leaving the yacht in the cutter at 4 P.M., we sailed to this place, and found the caves and cliffs far more curious than we could possibly have imagined, the pillars twisted and contorted in the most marvellous ways, and

withal the whole scene so beautiful as alone well to repay a visit to Iceland. My party for the mountain consisted of myself, a lady whose walking powers and pluck had been often previously tested, one of my sailors who had asked leave to go, and an Icelander who had been lent to me by Lloyd's agent at Reykjavik to act as a gillie as long as I should remain in the country. We started at 9 o'clock, and a couple of hours' stiff clambering among the lava blocks brought us to the snow level. Here my sailor gave in, but as for the Icelander, with nothing on his feet but a sandal of skin, and this his first attempt at mountain work, he was like a goat, and appeared to enjoy the work; so we left the sailor to await our return, and soon after getting on to the lower glacier, were compelled to rope. The Icelander brought up the rear, and so immediately understood what had to be done, that I went on in perfect confidence. We went due north until we got to the shoulder of the mountain, and met with no difficulty of any moment; but on turning NW., leading became very heavy work, as the surface of the snow, which, from its appearance through the glass, I had judged would be impassable during the day, was now frozen enough to bear the foot until just as the full weight came upon it, and then in you went up to the knee. However, we at last arrived at the crevasse which stopped Hender-son's party in 1815, and found it an awkward place, as it was broad, and the upper wall was several feet higher than the lower. Fortunately I was just able to reach across and cut two good coal-scuttles, and getting safely across with a jump, soon had the other two over, and after some stiff step-cutting we got to the top at 2.20 A.M., and were well repaid by the most glorious view I have ever seen. On the N. side lay the noble Breida Fjodr, with its countless islands, and beyond it mountain after mountain, stretching away as far as the eye could reach, to a distance of about 150 miles, the whole bathed in a flood of golden light from the sunset sun, which merely touched the horizon. On the other side all was in a mysterious blue shade, but still we could see every mountain round the Faxa Fjodr for full 100 miles, with Skagen Point—the other extremity of it, and 70 miles away—standing clearly out from the sea. The descent to the first rocks took about 2 hours, and after rejoining our sailor, we descended by another valley running in the direction of Budir—to which place I had sent the boat back—and then had a stiff ten miles' tramp across country. It was about 9 o'clock when we got back on board the yacht, and by that time the old Jökull, as though vexed at having been conquered, had completely hidden himself in clouds. We found no inconvenience from any derangement of the magnetic needle

during our ascent, though we had read that on this mountain it refused to act. The aneroid simply confirmed the previously ascertained height of the peak.

The whole excursion was a most charming one, both from the magnificence of the panorama spread beneath us, and from the wonders and beauties of the scenery more immediately surrounding the Jökull. Though the actual height above the sea level is small compared with the Alps, yet the mountain rises direct from the sea, there is all the novelty of traversing new ground, and after mountaineering in any other district you have the pleasant change of tent life, and a *cuisine* entirely and amply supplied by your gun, if you care for sport. The people are most hospitable, and if tents, a cooking apparatus, and sea biscuits are taken from England, everything else that one can want is quite as well, and in many instances more cheaply procured at Reykjavik, where a steamer goes once a month.

OBSERVATIONS OF CANON MOSELEY ON MR. MATHEWS'S
ACCOUNT OF HIS THEORY OF GLACIER MOTION.

THE phenomena of glacier motion belong, it seems to me, rather to mechanical philosophy than physics. It is therefore from the point of view of the former science that I have endeavoured to investigate them.

It is a well-known principle of mechanical philosophy, that to give motion to a body, or system of bodies, the aggregate *work* of the forces which tend to move it must exceed the aggregate *work* of the resistances opposed to its motion. If, therefore, a glacier descend by its weight only, the work of its weight in descending through any space must equal the aggregate work of the shearing, crushing (if any), and friction which its mass undergoes while descending through that space. It is of course impossible to represent these conditions mathematically in respect to an actual glacier having an irregular channel and a variable slope and direction; but in respect to an imaginary one having a constant direction and a uniform channel and slope, it is possible. I have so represented them,* and have calculated in respect to a glacier of the same uniform rectangular section and slope as the Mer de Glace at Les Ponts, and moving with the same uniform velocity, the aggregate work of its weight in a given time, and the aggregate work of the resistances which oppose themselves to its descent in the same time. And I have found that the work of the weight so determined, instead of being greater, is only about $\frac{1}{3}$ th as great as

* *Phil. Mag.*, May 1869.

the work of the resistances ; so that it is impossible the glacier should descend by its weight only, with those resistances opposed to its descent.

The imaginary glacier to which this computation applies differs from all actual glaciers in these respects, that the actual glacier is not straight or of a uniform section or slope. In all these respects, the resistance to the descent of the actual glacier is greater than to the imaginary one. But, this being the case, since in the imaginary glacier the weight is found to be insufficient to cause it to descend, much more must it be so in the actual glacier. This conclusion, if it be valid, is fatal to every theory which attributes the descent of a glacier to its weight only. Mr. Mathews has quoted, with reference to it, a saying of Professor Huxley, to the effect that 'the flour produced by the mathematical mill depends mainly upon the grain put into it.' The mill, in reference to my argument, is, I suppose, the mathematical formula at which I have arrived, the accuracy of which has not (so far as I know) been impugned ; the wheat represents the conditions of the problem or its data, which, if they be true, being substituted for the symbols of the formula, yield a true result, as good wheat yields good flour. Now the data of the problem are the velocities of different points in the surface ice, observed by Professor Tyndall at Les Ponts, and the velocities at different altitudes of the side ice observed by him near the Tacul. There can be no question as to the accuracy of the first set of observations, but the second were made under circumstances of considerable difficulty and some danger. It is most desirable that they should be repeated at more leisure than Professor Tyndall could command and with more precautions. It is, moreover, desirable that at whatever point the velocity of the side ice* is observed, that of the surface ice should also be observed. No conceivable error in these data can, however, account for the enormous disproportion which is shown to exist between the amount of the force of gravity which has hitherto been supposed to cause glaciers to descend, and the resistances that force has to overcome.

Among these resistances I have reckoned those of the sides and bottom of the channel to be as great as though the ice were frozen to them ; and, considering what are the obstacles in the actual glacier from projecting rocks, bends in its direc-

* The velocity of the deep ice in the centre of the glacier might perhaps be found if a boring were made there and filled at different depths with stones of different kinds. If these stones could be found again afterwards, the distances they had travelled would show the motion of the glacier at the depth at which each was deposited in the interval.

tion, and frequent throttlings, the assumption of a resistance of the imaginary channel equal to that of the ice being frozen to it, is not perhaps unreasonable. The result is not, however, practically affected by throwing the resistances of the bottom and sides of the channel wholly out of the computation. If they be conceived to be perfectly smooth, and if the ice be assumed not to adhere to them at all, the work of the weight will be found* still to be only $\frac{1}{4}$ th of that necessary to overcome the work of the resistances. The fact is, that the *differential* motion of the glacier is by far the greatest part of its motion ($\frac{1}{4}$ ths according to Forbest), and the aggregate work of the forces opposed to the differential motion is by far the greatest part of the work.

Neither will any possible error in my assumed value of the unit (75 lbs.) of shear in ice affect (as Mr. Mathews thinks possible) the general result at which I have arrived. If the unit of shear were only one-tenth that my experiments gave, the force of gravity would still be less than one-fifth of that necessary to bring the glacier down. My first experiments on shear were made in a high temperature of the air. I have since repeated them in a low temperature. I could detect no perceptible shearing of a prism of ice when subjected through the whole of a cold night to a pressure which in the heat of the day would readily have sheared it across. As the temperature of glacier ice is not above freezing, we may therefore conclude that its unit of shear is higher than that which I obtained by experiments on a hot day. Mr. Mathews seems to think it necessary to the descent of a glacier on my theory, that luminous heat should not only enter it to a greater or less depth, but penetrate to its very bottom. That is not, however, the case. In the same way as by injecting a stream into a quiescent body of water motion is communicated to the whole of it, so it is ascertained by the experiments of M. Tresca, that by putting in motion parts of certain solids (and ice among the number) differential motion is communicated to other parts more or less distant from them. It is sufficient, therefore, that the ice of a glacier should be put in motion for a certain depth (greater or less) below its surface, to communicate a differential motion to the whole of it. The luminous rays need only penetrate to that depth, whatever it may be. I must have imperfectly explained myself, or Mr. Mathews would not have arrived at the conclusion that on my theory the density of the ice of a glacier must be increased 400 times for it to descend by its weight only. It

* *Phil. Mag.*, May 1869. By making U_2 and U^3 in formula 9 each = 0.

† 'Occasional Papers,' p. 74.

would, in point of fact, so descend by its weight alone, if its density were increased fifty-five times.*

Some experiments which I have made on the modulus of elasticity of rods of ice in a freezing temperature show it to be exceedingly elastic but exceedingly brittle, and to have (as Mr. Osler found it) a great tendency when deflected to take a *set*. But if (on what seems to be Mr. Mathews's hypothesis) we are to explain the differential motion of a glacier by this experiment, we must assume the bending of successive subjacent layers, parallel to the surface, to take place in the planes of those layers. That Mr. Osler's experiment might offer an analogy to the bending of these layers, his plank of ice should therefore have been placed on its edge, and not flatwise, between its supports. Indeed, looking at the proportion of the length to the width of a glacier, and considering that the bending (if there be any such bending) must, to make the analogy complete, be in the direction of its length, the plank of ice should rather have been placed vertically on its end than on its side edge, and its deflexion have taken place in the direction of its length, and exhibited itself in lines curved downwards like the dirt-bands in glaciers. And all these phenomena should have continued to exhibit themselves when the plank of ice resting on its end was inclined from a vertical position to an inclination of $4^{\circ} 52'$; and, lastly, it should be possible to be shown that the resistances overcome by the weight of the plank (which include with longitudinal resistances of shearing other transverse ones proper to bending) satisfy the inexorable condition that the aggregate of their work in deflecting is less than the work of the weight of the plank; which it is impossible they should, as the work of the shearing alone exceeds it.

In concluding these remarks on Mr. Mathews's paper, I am desirous to acknowledge very cordially the ability and courtesy with which he has placed my theory before your readers. There are some points, however, in my theory to which I attach much importance, which he has not yet stated. I enclose therefore a paper read at Christmas last before the Bristol Philosophical Society, in which I have endeavoured to state it under a popular form, and which contains incidentally my answers to other objections of Mr. Mathews than those to which in this paper I have adverted.

* By referring to my paper (*Phil. Mag.*, May 1869) it will be seen (Equation 10) that the unit of shear which would allow a glacier to descend is 1.3489 lb., whereas the actual unit of shear ice is 75 lbs. The density of ice whose weight would be sufficient to cause the descent is thus shown (Equation 8) to be $\frac{75}{1.3489}$, or 55 times that of ice.

ALPINE NOTES.

AIGUILLE DU MIDI.—In consequence of observing in the 'Alpine Journal' of November an ascent of the Aiguille du Midi, made by Messrs. Horace Walker and Foster in 1869, mentioned as the second ascent of that mountain, I am anxious to add to the records of the Alpine Club an ascent of the Aiguille du Midi made by me, with Jean Balmat and Édouard Cupelin, of Chamouni, on the 29th of August, 1865.

As I had not the honour of being elected a member of the Club until the following year, I did not send a notice of my ascent to the Editor of the Journal.

Leaving Chamouni early on the morning of the 28th, we proceeded up the Glacier du Géant, and after passing Les Rognons, turned to the right up the glacier descending from the Col between Mont Blanc du Tacul and a ridge of the Aiguille du Midi, until we reached the hut erected by some Courmayeur guides to facilitate the ascent of Mont Blanc from the southern side. This we found half full of snow, and two-thirds of the roof and the door blown away.

After passing a bitterly cold night there, we started at daybreak for the final climb, but lost the first hour and a half by attempting to reach the summit by an impracticable ridge running towards the south-west from the main peak.

Retracing our steps along the ridge, and proceeding along the glacier until we were apparently immediately below the Aiguille, we recommenced our ascent by mounting a steep snow slope, in the middle of which we found a bergschrund. Crossing this, the slope became much steeper, and at the top of the slope we found a couloir, which we mounted. Above the couloir we had a very steep ice-slope, and rock work of a very difficult nature, by which we successfully arrived on the summit of the Aiguille du Midi in four hours from the time we left the hut, including the time lost on the impracticable ridge. The summit we found to be very sharp, and in consequence of the cold wind blowing we only remained on it a quarter of an hour—a sufficient time, however, to erect a small flag, which was blown away on the following evening, and to be seen by several persons at Chamouni, who were on the watch for us. Our descent to the hut occupied two hours and a quarter, in consequence of the difficult nature of the rocks, although we used as much expedition as we dared prudently to use. The conspicuous position which the Aiguille du Midi holds in the view from Chamouni and the Brévent, and the fact that no account of an actual ascent has been published, makes me hope that Messrs. Horace Walker and Foster, who have so recently made the ascent, purpose to write some account of it in the 'Alpine Journal.'

D. J. ABERCROMBY.

ASCENT OF THE BREITHORN FROM THE NORTH.—On the 14th of September, 1869, Peter Knubel, Gregory Rüppen, and I were returning to the Riffel Hotel, after having attempted without success to ascend

the Lyskamm. A bitter north wind was blowing, which by its intense cold had made the final arête impracticable. As we sat sunning ourselves on the rocks at the foot of Monte Rosa, sheltered from the wind by the ridge of the Gorner Grat, Gregory proposed that next day we should try to ascend the Breithorn from the Riffel. While we returned to the Hotel we examined the northern slope of the mountain, and laid out the route which next day we followed. The morning of the 15th of September was still and clear. At 4.30 we set out by the path for the Theodule, till we got on the Gorner glacier, when we went straight across it, for the grassy slopes called in the Federal Map, Triftje. We reached there at 6 o'clock, and ascended along the grass and rocks at the edge of the Breithorn Glacier till we came to the snow, when we stopped for breakfast; then turning a little towards our right, continued the ascent by the slopes of snow and ice which come down to the Triftje, from a small level glacier lying under the final slope of the Breithorn. A good deal of step cutting was necessary, but we met with no difficulty, and worked straight up till we reached the glacier I have just spoken of. It supplies at each end the glaciers of the Breithorn and the Kleine Matterhorn, and was divided by two very large crevasses running parallel to the ridge of the Breithorn. These we turned by descending a little towards our right, down the slope at the head of the Kleine Matterhorn Glacier, and when we had passed the crevasses, went to our left, being separated from the final slope of the Breithorn by a bergschrund of no great size, which diminished almost to nothing at the place where we crossed it, at the foot of a snow couloir, or rather hollow in the snow formed by the angle between the main ridge and a spur that runs out towards the Triftje. Here for a few minutes we had an impending cliff of frozen snow just over us, from which blocks had lately fallen, and were perhaps for a little while in some danger. This might have been avoided had we crossed the bergschrund sooner, but at a wider place. However we soon were free from the cliff, and at the top of the snow valley which I have before mentioned stopped to eat, and to rest the guides, who were tired with step-cutting. While they had been hard at work I had had plenty of time to look about me and admire the glorious view; the sky was cloudless, every peak stood out distinct and clear, and though we were on the northern side of the mountain, it was not cold. When we started again, a little step-cutting brought us to the arête which runs east and west and leads towards the summit. Turning to our right we walked along it. It is narrow, but the slopes on each side are not very steep, and for a while it was nearly level; it then rose somewhat, and Knubel had to cut a few steps in the ice on the northern slope. At a quarter past 12 o'clock we reached the well-known rounded snowy summit of the Breithorn. The view was superb; and after enjoying it for an hour, we returned by the ordinary route of the Theodule Glacier, and reached the Riffel at 5 o'clock. The ascent of this mountain from the north had not been before made; I can recommend it as an interesting and not very long or difficult excursion, combining magnificent scenery with the varied excitement of rock, snow, and ice-slopes, and an ice arête at the end.

ROBERT FOWLER.

MONTE DELLA DISGRAZIA.—*To the Editor of the 'Alpine Journal.'*—
 DEAR SIR,—IN a paper by Herr Siber-Gysi, describing an attack on the Disgrazia, which appeared in the third volume (1866) of the 'Jahrbuch' of the Schweizer Alpenclub, the attainment of the final peak of that mountain by Messrs. Kennedy and Stephen, as narrated by the former in the first number of the 'Alpine Journal,' was called in question. Having myself effected a successful ascent in 1867, in company with Melchior and Jakob Anderegg, I was requested by my friends to confirm the accuracy of their statement so far as my experience enabled me to do so. I accordingly appended to a short notice of my own expedition in the 'Alpine Journal' for May 1868 (vol. iv. p. 49), some remarks in the sense desired, but the erroneous inference of Herr Siber-Gysi having been subsequently embodied—at least by implication—in a passage at page 17 of the fourth volume of the 'Jahrbuch,' I was requested by the committee of the Alpine Club to endeavour to procure the insertion of a rectification in a future volume of that well-known and admirable publication, by privately representing the case to some of my fellow-members of the Schweizer Alpenclub. The result was a protracted correspondence with my friend Mr. Ph. Gosset, of Bern, as well as between the section to which he belongs and that of Zurich, the editor of the 'Jahrbuch,' the Central-President of the S. A. C., &c. which for some time failed to bring about a satisfactory settlement of the question at issue. However, in a letter which I intended to be final, after summing up the points at issue, I concluded in the following words, with the hope of imparting a conciliatory tone to the controversy, in which, I am happy to say, I was not disappointed.—'If satisfied of the correctness of our reclamation, I think that the editor (Professor Theobald) can hardly object to insert a correction of this sentence (at page 17, vol. iv. referred to above) at least, in the forthcoming volume—a course which would, I believe, satisfy Messrs. Kennedy and Stephen, since it would remove the sort of editorial and official sanction apparently given to the erroneous statement of Herr Siber-Gysi. As respects the latter gentleman, if the reasons I have already urged do not suffice to convince him that he is mistaken, he cannot be expected to withdraw his imputation, and it is useless to prolong the discussion with him; but if, whilst admitting their cogency and his own error, he is of opinion that the *manner* in which they were first brought forward by me in the "Alpine Journal" precludes his making an amende without loss of dignity or self-respect until I meet him half-way, I can only say, in all frankness and friendly feeling towards himself and the Schweizer Alpenclub, of which we are both members, that I regret that there should have been anything in the tone of my remarks calculated to hurt his feelings;—that I fear I may have expressed myself somewhat sarcastically under the influence of annoyance at the implied doubt of the statements of a personal friend;—and that I tender to him my apology for not perhaps sufficiently bearing in mind that truth and not triumph should be our object in every controversy. He will, I am sure, believe that I had no other aim than to maintain the accuracy of the claim of my friends, Messrs. Kennedy and Stephen, to have completely effected the (first) ascent of the Disgrazia, and that I should

not have put myself forward in the matter at all, *but for the failure of a previous attempt* (addressed to the editor of the "Jahrbuch") *by Mr. Kennedy himself*, and at the special request of the committee of the Alpine Club, who agreed with me in thinking that the case was one which could be more quietly and pleasantly settled by a private negotiation between members of the respective clubs than by formal communications of an official character. As it is, I fear that much trouble and annoyance have been caused to yourself (Mr. Gosset) and my other good friends at Bern, as well as to distinguished members of the S. A. C. elsewhere. I trust that the course I have now taken with a view to remove all personal annoyance on the part of Herr Siber-Gysi, may be met by him in the same spirit, and the internal harmony of the various sections of the Schweizer Alpenclub, as well as the pleasant relations which have hitherto subsisted between its members and those of the English Alpine Club, be restored and maintained.

The letter, from which the foregoing is an extract, was I believe submitted, or at any rate its purport communicated, to Herr Siber-Gysi, and produced on the part of this gentleman an admission of the incorrectness of his inferences, and a promise that a rectification should, if possible, be inserted in the next volume of the 'Jahrbuch.' This promise has been fulfilled in the following notice, which appears at page 652 of the recently published vol. v. (1868-69); and, in finally taking leave of the matter, and thanking Herr Siber-Gysi for his loyalty in redeeming his pledge, I desire to renew to him through this more public channel the assurance, already conveyed in my letter to Mr. Gosset, of my regret that I should originally have expressed myself in a manner trying to his feelings, and calculated in his opinion to render more difficult, rather than to facilitate, the step he has now taken, with which I trust that all parties will rest satisfied.

It is far from my wish to prolong a controversy which has thus, let us hope, been finally and amicably disposed of, but as a paragraph, signed, 'DIE REDACTION,' which follows Herr Siber-Gysi's explanation, would lead it to be supposed that the particular summit of the Disgrazia reached by the guides Jenni and Flury, in 1866, was not the same as that attained by Messrs. K. and S., and subsequently by myself, I must be allowed, in the interests of topography, to point out that this is not the case. The peak ascended by the well-known Engadine guides is clearly identified by the *steinmann* which they erected, and I, at least, can speak to finding this, whilst Melchior Anderegg, who accompanied Messrs. Kennedy and Stephen as well as myself, most positively assured me that on both occasions the same point was attained, and appeared perfectly familiar with the details of the Kamm, of which it is unquestionably the highest tooth.

Apologizing to yourself and the readers of the 'Alpine Journal' for the length of this somewhat personal explanation, of which, however, I must particularly beg the insertion,

I am, dear Sir,

Yours very truly,

F. F. TUCKETT.

Frenchay, near Bristol: April 7, 1870.

MONTE DELLA DISGRAZIA.—[Translation].—“The readers of the Year-book of the Schweizer Alpenclub will perhaps remember that in my description of the ascent of this mountain (p. 229, &c. of the Year-book for 1866), I expressed doubts whether Messrs. Kennedy and Stephen of the English Alpine Club, whose footsteps I had proposed to follow, had really reached the highest summit, and founded my doubts in the very first place upon this circumstance, that it was *not possible* to reach the highest summit from the Forcla di Pioda in $1\frac{1}{2}$ hr. as Mr. Kennedy would have it; that is, in about the same time as that which I had employed in returning from the second highest summit at quick time along a carefully prepared way. I was strengthened in this supposition by the circumstance that I found and saw no trace of a cairn upon the summit reached by me, nor from it (which was not impossible), upon the neighbouring and higher summit, and that my observation was right was confirmed by the guides Jenni and Flury of Pontresina in October 1866.

In presence of experienced climbers such as Messrs. Kennedy and Stephen, I expressed my doubts both in form and substance so as to prepare a way for an understanding. A correction however was only conceivable, if the depression distinguished by the Englishmen as Forcla di Pioda was different from, and lying nearer, to the highest summit than mine. Where the nomenclature is so perplexed as in the Italian Alps, where too the question concerns a ridge of remarkable roughness and dislocation, it might well be that my Forcla di Pioda was a different one from that of the Englishmen, and that as soon as this could be proved my conclusions would fall with my premises. It is now a pleasant duty to me, after the correspondence which has taken place with the interested persons, to be able to establish that the point which Mr. Kennedy describes as the Forcla di Pioda, must be another depression lying nearer to the summit (the description must at all events be topographically inaccurate), which might well allow him and his companions to reach the summit in the short time assigned by them, and I therefore do not hesitate to admit with much pleasure their priority in ascending the highest point, which at the same time, I never claimed for myself.

“G. SIBER-GYSL.”

‘To end this history definitively, it is remarked that the notice as to the ascent carried out by Flury and Jenni on October 21 was received as it was reported from the Engadine, without the slightest suspicion that anybody would be aggrieved at it. The summit of the Disgrazia is a tolerably short ridge, consisting of three or four rocky pinnacles of nearly equal height divided by narrow depressions and a few minor points. As nobody has yet said that he has been upon all of these, we are very willing to believe that they too were first upon theirs, as well as the other gentlemen, each on his own special point. If the Engadine men believed that theirs was rather higher than that of the Englishmen, that is their affair. In such cases mistakes are easy, and in order to be quite certain all the points would have to be measured again.’

‘DIE REDACTION.’



THE MÖRKFOS.

FROM A SKETCH BY CAPT. J. R. CAMPBELL.

THE
ALPINE JOURNAL.

AUGUST 1870.

EXCURSIONS IN NORWAY. By J. R. CAMPBELL.

1. *Torghatten.*

TORGHATTEN is a small island on the coast of Norway, being one of that long belt which forms a fringe along the Arctic coast, and is observable by all travellers in the weekly steamers between Thronhjøm and Hammerfest, as they thread the narrow channel, or sound, which divides it from the mainland. It derives its name, Torghatten, or 'the hat of Torg,' from a supposed resemblance it bears in shape to a colossal 'wide-awake,' resting, brim downwards, on the sea. Who Torg was I don't know. The island is chiefly remarkable from there being a great hole right through it. This occurs about half-way up a mountain which corresponds, as it were, to the crown of the hat. Viewed from the steamer the opening appears small and insignificant; you may, however, generally notice a ray of light shining through it as you pass.

From the few words in Murray's hand-book, and scanty information derived from other sources regarding it, I had a great desire to explore this natural wonder; and, being in the summer of 1868 in Norway, embarked for that purpose in the weekly Hammerfest-bound steamer from Thronhjøm. These steamers leave Thronhjøm every Wednesday for the north, stopping at numerous 'Stations' *en route*—depôts for merchandise, passengers, and mails.

A very curious accident occurred as we were steaming out of the Thronhjømsfjord, about 2 P.M. An open fishing-boat, with sail set, was observed bearing down towards us on our left, and the ship's course was slightly altered to give her more

room. Had there been anyone steering the boat, a collision would have been impossible; but there was not. Her crew, consisting of two men and a girl, were, it turned out, asleep, and the consequence was she did not *quite* clear us. Her mast caught a boat hanging out on the port-davits; there was a cracking of spars, screams from the ladies on deck, and then we saw the little craft dragged over; and, as the water rushed over the low gunwale, she rapidly turned keel uppermost. There was immense excitement. The steamer had, of course, been stopped, and not a moment was lost in getting a boat out to rescue the unfortunate crew. Before this was launched, however, we saw the head of a man—I believe he was the father of the two others—rising, apparently, from under the wreck, and followed by his shoulders and body, as he contrived to creep up and get astride of the keel. A second or two later and the younger man did the same; and there they sat shouting lustily for assistance—their boat being now floating in our wake. The girl was not to be seen; it was supposed she was under the boat. On reaching it our sailors at once applied themselves to raise the gunwale, but so long a time elapsed before they succeeded in doing so, and getting hold of the girl, that I, at least, began to have little hopes of her life. However, out they brought her at last. It appeared to me about seven minutes from the time of the capsize when they hauled her into their boat, where her companions already sat. Then, amidst universal joy, all three were brought on board the steamer—had brandy given them, and were put to bed. We got the fishing-boat righted, and took it in tow. It had sustained very little damage; even some loose boxes, and other articles the party had with them, floated and were fished in; and, when we reached the station near where they lived, there we left them—not likely ever to forget their adventure of that day.

It would appear that the boat turned over so rapidly as to incase under it a quantity of air. This the girl breathed during the time she was entombed, and it acted as a cushion in preventing the boat from pressing her head below water. The others, I was told, called to her through the planks, asking her how she was getting on. '*Meget godt,*'* she replied, adding that she hoped a boat would be sent from the ship to save her.

I left the steamer next day at a station called Brönösund, a solitary house on the mainland, some miles north of Torghatten, but the nearest point of disembarkation for that island. 1

* 'Very well.'

doubt if even tolerable accommodation could be procured at this post- and boat-house; but there are several dwellings within a mile or two of it, mostly belonging to merchants and traders in cod-fish, where lodging may sometimes be obtained—though only by favour. I was fortunate in meeting on board the steamer two sons of the clergyman of Brönösund going on a visit to their father, and they very kindly gave me an introduction to the house of a Mr. Edward Quale, trader and ‘Landhandler,’* where I found every comfort during the few days I remained in the neighbourhood. There are, however, many private houses nearer to the hole than Sælhuus, where he lived.

About Brönösund the coast is generally flat, and, to a great extent, wooded with birch. The inland horizon is backed by a range of mountains feeble in outline. The islands are mostly long flat strips of rock, with bare grass-land on the top; here and there you see stacks of *clip* fish drying in the sun. Torghatten is an exception to the rule, as are also some distant islands—Vegen, for example, whose high peaks rise like crisp blue clouds in the offing farther north. But Norway’s splendid coast scenery does not fairly begin for about 100 miles north of Brönösund.

After waiting two days on account of weather, I visited Torghatten on the 28th, in company with my host, two of the clergyman’s sons, and another man. We had to pull all the way from Sælhuus—about 7 English miles—but got the wind in coming back.

Our landing was in a little bay on the east coast of the island. There are three farmhouses (‘Gaards’) on it—one called Torge giving the name to the place. The island may be roughly computed at about 3 miles from north to south by 1 from east to west. A mountain some 900 feet high forms the main bulk of it; this, in parts around the base, is skirted by grass and some cultivated land, and there is a little scrubby birch on the slopes. The entire formation is gneiss, very nearly approaching to granite. Indeed, the whole coast of Norway, for hundreds of miles, is of the same geological character.

The tunnel—I prefer that word to cavern—runs NE. and SW.; and the NE. entrance, to which we climbed (after paying a short visit to one of the farms near the landing-place),

* A ‘landhandler’ is a country merchant who keeps a general store. The traders ply in curious vessels called ‘Jagts’ (whence our word ‘yacht’?), between the Lofoden Islands and Bergen, with fish.

lies at the head of an incline of *débris*—fallen, I imagine, for the most part, from the rock outside, which is indented, presenting somewhat the appearance of a quarry in the face of the mountain. The *débris* descends in a rough steep slope from this point into the body of the tunnel—a colossal gallery, some 200 yards long, and varying in width from 15 to 20 yards. It is quite straight, with smooth vertical walls and a jagged roof. The height of the roof over the NE. portal may be about 70 feet, but above the centre and towards the opposite end much more—probably from 100 to 120. The length we measured, *roughly*, by means of a fishing-line; but none of the above dimensions must be taken as more than rude approximations to the true ones. The great difference in altitude between the two ends arises partly, I think, from the presence of the *débris*, which seems to occupy a huge portion of the original NE. portal; indeed, the floor, if I may so term it—there 500 feet above the sea level—is 80 feet higher than it is at the SW. end. From the foot of the descent the floor continues in a succession of stony waves to the farther opening.

As may be expected, the view from the crest of *débris* under the NE. entrance is very remarkable. It is impressive in the extreme. You look downwards right through this grand natural hall, faintly illuminated by a flood of light pouring in from the other side of the mountain, whilst the distant aperture forms a rocky frame to a small bright picture—a patch of green meadow (lying at the base of the hill), and the blue sea studded with islands, above it.

The tunnel is easily traversable, and the approaches are void of any difficulty. It is used as a common communication between the farms, one of which is situated on the SW. shore.

Without attempting any long geological enquiry as to the formation of this singular place, I will merely suggest that it probably owes its existence to the destruction of a vertical slice of rock cased between walls of a harder nature than itself; indeed, it is noticeable that the blocks fallen from the roof are of a more rosy tint than that of the stone found in other situations. It is possible that whilst disintegration was proceeding to the greatest extent, the island may have been submerged to a point considerably above the present floor, and that the detached fragments were borne away by the action of strong currents. The surfaces of the layers, forming the roof, appeared to dip towards the south; and save where a little water trickled from it, near the SW. extremity, the tunnel was very dry.

After exploring the ‘hole,’ some of us scrambled, by follow-

ing a ridge, on to the top of the mountain above. I made the height to be about 900 feet. The view did not strike me much, having seen the same kind from higher elevations. At the foot of the large dome-shaped mound which contains the tunnel, there are numerous lower heights approximating to it in form, reminding one of bosses or cupolas of rock. There are also several cracks or horizontal perforations, which appear to be imperfectly developed tunnels, all of them parallel in direction to the great hole. One of these I went into. It was a groove, like a narrow railway cutting, extending many yards and terminating in a small cavern. It lay almost vertically under the grand hall.

We returned in the evening to Sælhuus, and next day I took the passing steamer back to Thronhjem.

N.B.—The boats going south pass Brönösund every Monday.

2. *Fjærland.*

Few parts of Norway contain more of the stern, impressive scenery, so characteristic of that country, than the district of Fjærland, including the Fjord and the valleys to which it forms the approach.

The neighbourhood has an advantage over many others, possibly of equal grandeur, in being within easy reach of the ordinary tourist route—the Sognefjord; for most pleasure travellers persist in following one another like a flock of sheep, and I have rarely encountered one in Norway who was not pressed for time. Now during the height of summer there are two steamers a week that make the tour of this great Fjord, of which Fjærlandsfjord is a northerly branch, running at right angles to it. A station called Balholm, where the steamers will land you, is close to the junction of the waters. Here there is a tolerable little inn, containing perhaps some three or four bedrooms—few Norwegian houses have more.

Ten minutes' walk from the inn and you come to the Essefjord, also an offshoot from the main channel, but small and lake-like. It is wild in character, and worth exploring, should you have time.

Once a month a Bergen steamer not only touches at Balholm but goes up the Fjærlandsfjord and back. Information about this is given in the published steamer routes. She only stops a few minutes at the end of the Fjord, so there is no time to go ashore and return with her, but it is convenient to avail oneself of this steamer either in going or coming back. The general way, however, is to hire a row-boat and three men from Balholm direct to Fjærland—a cluster of houses with a

church, near the end of the Fjord, distant $17\frac{1}{2}$ English miles. The boats carry a sail when the wind is favourable.

As you progress up Fjærlandsfjord—a dark groove-like passage, walled in by savage and often unscalable precipices from 3,000 to 4,000 feet high—the boatmen will point out Rommehest, a towering peak above the margin on the right. I walked to the top of this during my stay in the district in 1868, having slept the night before at a ‘Sæter,’ or summer cheese-farm, high up among the mountains in a side glen called Rommedal, from which a ridge is easily gained leading to the summit. The view was a glorious one. I looked down upon the long valley of water with its wild torn cliffs, and there was a nearly complete belt of snowy mountains encircling the panorama, broken by glaciers here and there. 4,030 feet was the height indicated by my aneroid, but I learnt afterwards, from an officer on the trigonometrical survey now going on, that this was a little more than the true one. In the present Norwegian survey most of the heights are computed from vertical angles taken with a kind of theodolite, base lines being obtained with sufficient accuracy from the plans of the low ground.

There is no inn at Fjærland; however, lodging may generally be obtained at one or other of the farmhouses in the village or dotted round the head of the Fjord. My sleeping-place was at a Gaard called Mundal, near the church, where the people—as usual in Norway—did what they could to make me comfortable.

Three valleys radiate from the low tract at the end of the Fjord, a few minutes’ row from the church, of which Suphelledal and Bojumsdal are the most noticeable. I saw both the day after my arrival, but now much regret not having devoted more time to them. Two or three days might well be spent in the neighbourhood. Peter Asmunden, son of the farmer at whose house I lodged, acted as my guide. He was a very intelligent lad of eighteen, who had been educated by the clergyman; and though working as a wood-cutter and about the farm, Peter told me he knew something of Latin, could construe the Greek Testament, had studied elementary mathematics, and acquired some knowledge of German and French. The weather, I may mention, was brilliant, but extremely hot.

Our first walk was up Suphelledal, a long narrow gorge, gloomily grand, framed between craggy heights which appear almost *mural* viewed from the opposite side. This is thoroughly Norwegian in character. A tolerable road leads up it for some miles, two or three times crossing the large glacier stream. The only awkward parts of the excursion are the bridges which

occur in series, the stream in many places being split into two or three. They are formed of two barked and roughly squared trunks laid close together, side by side, with their ends supported on rude stone piers. There is just room for one foot on each; but what with the narrowness of the way, the spring in the birch stems, the fact that there is often no railing, and your having your eyes resting on the roaring white current below, some steadiness of head is required for a safe transit, may be, of 20 feet or more. The Norsk girls, of course, think nothing of going over such places—in summer with a big bundle of hay on their backs; for the people mow every green speck it is possible to scramble up to, so great is the difficulty in procuring sufficient hay for the winter months.

About 4 miles' walk took us in front of the Suphellebræ,* the first of the glaciers in this valley. It is a broken-off structure of ice at the foot of a lofty wall of bare rock, fed by avalanches from a glacier above. This latter glacier, of which you see the jagged edge overlooking the crag, is one in direct connection with the so-called Jostedalsbræ—a vast field of ice and névé extending with hardly a break over the entire range between the Sognefjord and the Nordfjord.† During our short halt there, we saw numerous small avalanches splintering down. I had not time to go all the way to the second Bræ, called the *Lille Suphellebræ*, some 2 or 3 miles farther on. It is said to be a continuous stream from the plateau above, and remarkable for the purity of its ice. Perhaps the finest view of this valley is got from a point just before you enter it.

In our walk we had to cross the fast decaying remains of a recent spring avalanche which covered the road, and had passed unpleasantly near to a Gaard. The road was through a wood at this spot, but now only the tops of the alder-trees were visible protruding above the snow. All had been borne down in the direction of the flow. Every leaf was gone, the bark also to a great extent, and the ends of the twigs were frayed just as though they had been pounded between two stones. In Norway, as in other high-mountain countries, yearly avalanches—one or more in certain valleys, but generally pursuing the same course—fall every spring. When, however, there is an unusual accumulation of snow on the highlands, as there was during the winter

* *Bræ* always signifies glacier.

† All the glaciers pouring into the many valleys which penetrate this range or *block* of high land, as Brixdalbræ, Nigaardsbræ, &c., have their origin in this field. Its extent is as yet hardly known. *Probably* the area may be between 7 and 10 Norsk square miles (?).

of 1867, extra falls—often of enormous volume—occur, tearing downwards by the least expected routes, and many were the sad stories I heard of entire households having been destroyed a few months back. Indeed the spring of 1868 seems to have been marked in Norway by a train of fatalities such as one rarely, if ever, hears of in Switzerland. One avalanche, happily unaccompanied by loss of life, is worth mentioning on account of its size. It fell into Fjærlandsfjord from the mountains on the west shore, and the snow formed a floating bridge, for a time, across the water—at that place nearly a mile in width—over which people walked. This I heard from several, or should hardly have believed it.

Bojumsdal, the valley I next visited, lies westward of Suphelledal—a mountain singularly bold in outline, separating the two glens at their junction. The slopes are very precipitous, but to a great extent clothed with birch—as indeed are those along the Fjord. The grandeur of this second valley bursts upon you all at once as, turning a bend, you come in sight of the great glacier streaming down its end. From a green strath between towering rocks rises the crevassed swell, which has a gentle incline on the top for some hundreds of yards, and beyond this the main body of the flow rears itself—a steep colossal bank of ice, purely white, without moraines and apparently 3,000 feet high! This is the Bojumsbræ, about the most striking glacier I know in Norway. The terminal *débris* occurs in lumps and short segments fronting the base. In approaching it I crossed a stream by a snow bridge, in the absence of which it *might* be difficult for ladies to arrive at the ice; otherwise the excursion to this glacier, distant some 5 or 6 miles from the Fjord, is one they might easily make.

Professor Sexa of Christiania, a gentleman who has devoted some time and attention to the observation of glacier phenomena, was staying at a Gaard above Fjærland, and I had the pleasure of meeting him during my rambles. He told me some curious facts relative to the temperature of the ice *below* the surface, derived from certain experiments made by him on a glacier of the Folgefond in Hardanger. It would appear from his investigations that, whatever be the temperature of the superincumbent atmosphere, that of the ice not directly exposed to its influence remains about the same throughout the year, being constantly near upon freezing point. I understood the Professor to say, he had bored three holes in the surface of the glacier and sunk a minimum thermometer in each. The lowest temperature of the air in the valley during the winter he assumed to be -14 Réaumur. The thermometers re-

mained in the ice all the winter, and on his examining them the following summer, the first, which had been buried 4 Norwegian feet, was found exposed by the melting of the surface; it registered -1° R. The second, which had been sunk to a depth of 8 Norwegian feet, indicated a minimum temperature of $-\frac{1}{2}^{\circ}$ R., and the ice had thawed down to it. On digging out the third, originally placed at a depth of 12 or 14 Norwegian feet,* it was found broken, and therefore gave no result.

I forgot to mention, that you can go in less than a day from Fjærland to Veitestrand, another wild valley with two glaciers in it, by crossing a snow pass at the head of Suphelledal. From Veitestrand an easy pass takes you over into Jostedal. Vide 'Travelling in Norway,' in number for May, 1868, of this Journal. (Vol. iv. No. 21.)

3. *The Mørkfos.*

In order to visit this remarkable waterfall, the easiest way is to disembark at Aardal,† on the Sognefjord, one of the stopping-places of the weekly steamers, from which it is distant 16 or 17 English miles (according to local belief somewhat less), up a wild valley, and just beyond a farm called Vette.

Aardal station, at the head of Aardalsfjord (a short branch of the great Sognefjord), stands, surrounded by grand scenery, on a neck of green land about a mile square, called Tangen. This neck divides the Fjord from Aardalsvand, a freshwater lake, and has dotted over it a number of farms, besides a parish church and Præstegaard (manse). Close to the station is a comfortable little inn kept by Jens Klingenberg and his wife. Jens is a good specimen of a Norwegian mountaineer; I found him a capital companion and guide. Should any future traveller require a man conversant with the high and hardly known mountains of this district, there is also a certain Dominicus 'to be heard of there,' who appears an intelligent fellow, and who told me he had accompanied one of the government officers on a recent trigonometrical survey.

Jens and I started for the Fos on the morning of August 25, 1868. Weather beautiful until the afternoon, when it broke and continued showery all that and the following day. Tangen is intersected by a wide river leading from the lake into the

* A Norwegian foot = 1.029 English.

† Sometimes spelt Aurdal. Vette is also sometimes written Vetje. In these and countless other cases of names of places there is much uncertainty with regard to the orthography.

sea, and both the river and Fjord are said to abound with large sea trout. I mention this simply as a report, not being a fisherman myself. We had two extra hands to pull us up the lake, which is about 5 miles long, and one of the grandest bits of freshwater I ever saw. Mountains—little else than piles of crag, with a green speck here and there—rise in many parts 4,000 feet abruptly along its shore. Most of these verdant patches, however, are mown in summer—often at the peril of people's lives.* One precipice, the Stigeberg, overshadowing the lake on the right, is singularly bold. The side springing from the water is a crag wall some 800 feet in height, but this is the lowest portion, for the precipice continues round the foot of a gill (which enters the lake beyond), and is developed into an unbroken face, as vertical as possible, and *apparently* 2,000 feet high. On the opposite side of the lake, also, the mountains are very wild, torn by deep corries, and seamed with numerous cascades; and in the smooth vertical rock flanking one of the gills, there occurs a curious network of quartz veins. Farther on the traces of an old copper-mine may be observed high above the shore.

From the head of the lake where we landed, pretty nearly all the way to Gelle, a distance of about 5 miles, the valley is a meadow with numerous farmhouses and patches of grain. A wide river courses through it, which was on our left all the way to the fall.

In this (first) portion of the dale there is a spring which is said to be so warm in winter as to melt the surrounding snow, whilst during the hot weather in summer it is always encrusted with ice. This I heard on respectable authority. I should have visited it on my way, but it lies on the left of the river, and there is no bridge for miles. At several of the houses on our route Jens made a call; he was evidently a great man in the valley, and (chiefly, I fancy, on his account) we were more than once hospitably entertained, especially on our journey back. At Svale (next day) we were regaled with coffee, cakes, and liqueur—any hint at payment for which would have been an affront. Moen, a Gaard crowning the brow of a sandhill, appeared to me one of the best houses, and where lodging might probably be procured if required during a day or two's

* A girl haymaking on the rocks above Aardalsfjord, lost her life by a fall only a few days before my visit to the neighbourhood; but, on the whole, such accidents are rare. Many of the peasants wear shoes called *Snaakopper*, which are merely upper-leathers formed into bags for the feet. They afford a wonderful amount of grip on smooth rocks.

exploration of the vale.* Just beyond Gelle (where a noticeable cataract tears down the mountain side), there is a spur projecting nearly across the glen, and the river boils through a groove at the base of its overhanging crags. You climb the spur, and from the top follow a path skirting a steep slope, down into a narrow, somewhat dreary defile called Uttlidal, which is simply a continuation of the main valley. For the remainder of the way the river is a boisterous torrent of white water, generally roaring at the bottom of an inaccessible groove. It is seldom more than 100 feet wide, and at Gelle only 60. There, there is a picturesque wooden bridge leading to the farms on the other side of the vale. A well-defined track undulates along a strip of debris descended from a range of crags all the way up Uttlidal. Now and then a stone avalanche † *might* occur about this part; indeed, I noticed the trace of a small one in returning next day.

Farmhouses perched high among the rocks on some narrow terrace, or looking down from the plateau above—*human nests*, as it were, often hardly accessible to any but a mountaineer—are very common in Norway. You see one in going up Uttlidal above the precipice on the left. The place is called Afdal, and the way up to it is a queer one—at any rate towards the top, where in more than one case vertical crags cross the path. Here shelves 2 or 3 feet wide, formed of tree-stems, are supported in front of the rock, and they constitute the road, which must be far from a pleasant one in winter. A doctor, whom I know, had once a rather narrow escape in descending one of these places after a professional visit at the farm. There was snow—he slipped, and came down into a sitting posture, with his legs dangling over the edge of the shelf. Stigegaard, above Aardalsvand, is another such nest, only to be reached by a ladder; and there is a Gaard in Aurland, built so close to the brink of a precipice, that (it is said) they ‘hobble’ the legs of the young children, to prevent them strolling too near the edge! When death occurs at farms so badly connected with the world below, and where (as is often the case) it would be difficult to prepare even a shell, the corpse has the backbone broken in order that it shall ‘pack better,’ and is borne in a basket on a man’s shoulders down to the quiet churchyard—or, more probably, to some valley-farm, where a coffin awaits it. There is a story, but I will not vouch for its truth, that in certain cases where the route is a horse-path (and a Norwegian horse is equal to almost

* A pass leads from near there over to Nystuen on the Fillefjeld.

† ‘Steenskred’ in Norsk.

any *track*) the body has been lashed astride a pony, and made to *ride* down the crags to its last home. Near Ronnei is a Gaard on a slope above a curtain of crags which overlook the Fjord; and once, when they were about to take a corpse down to the valley church, the coffin containing it was accidentally upset, and, thus started, continued rolling over and over until it cleared the brink of the precipice, whence it plunged hundreds of feet down into the sea below. Many of the mountain farms are 20 or even 30 English miles from a doctor, and when the attendance of one is *essential*, his fee amounts to 1l. or more, owing to the distance he has to come. Now this is defrayed out of parish funds, in cases where the family is too poor to afford it—an admirable plan, I think. Much doctoring, however, is done without medical help, or with the assistance only of a 'Jordemoder,' who is a professional nurse educated at a hospital, and who can bleed, cup, and attend confinements (for which in Norway doctors are rarely called in). Every parish, I believe, has such a woman, and she acts *under the doctor*. They are an excellent institution, and it would be well if we had them for our own poor.

Uttlidal widens out on your rounding the base of another spur, on which are some patches of cultivation, and you then come in sight of Vette. The farm reposes on the brow of a little mound (also an offshoot from the high cliffs which flank the valley on the right) 950 feet above the lake. Coming from the sombre ravine I had just traversed, it looked rather a cheerful place; there are a few aspen-trees about it, two or three cottages for *pladsmænd*,* and some fields of barley. The Mörkfos is on the same side of the river as the farm, but farther up the valley. It leaps from the edge of the mountain plateau, which appears to extend for many miles above the precipices of the main chain, and both the top and bottom of the fall are accessible—neither point being more than 40 minutes from the Gaard. I saw it from the valley below on the evening of my arrival, and next morning (after sleeping at Vette) had a view from the top, looking down it from the corner of the brink.

To reach the base of the fall, the way is over the brow behind the farm, and by a steep descent down to the river. An old farmer we took with us from Vette made holes for our feet with a pick in coming down this slope, but they were hardly needed. You then have to coast the river bank for

* *Pladsmænd* may be roughly described as tenant labourers on a farm.

some distance, and here, for perhaps 100 yards, a little caution is required in skirting a strip of large *débris*, as if one of the stones slipt it *might* hurl you into the deep swift flood, from which there would be little chance of escape. This past, you mount a gentle rise, partly wooded with scrubby alders growing amongst large blocks of stone, and you then get a front view of the Mörkfos—the base of it being some 200 yards off. It is a fall of *about* 1,000 feet, and comes down in *one* plunge from the top, presenting the appearance of a feathery tail of foam suspended in a wild black framework of crags, more resembling a sharply-cut *bay* than a *cleft* in the mountain side. Nearly everywhere the rocks are vertical, and those flanking the lip on the left overhang. Certainly it is one of the two or three finest falls in Norway, and I, for my part, prefer it to either the Rjukan or the Vöring. At the same time, viewed from this point, it hardly looks by 200 feet or more its real height. The stream, carrying its waters down to the river, is a hasty torrent split into several threads by islands of shingle and *débris*. The upper portion of the valley running for several miles beyond the fall is inaccessible.

A zigzag track leads from Vette on to the plateau above the fall. This is a large district called Vettesmarker, and there are peaks rising from it which (it is said) command good views of the stern Horungtinder range. The track, I ought to mention, is the commencement of a horse-path from Vette to Gelle. There are Sæters on Vettesmarker, and at one of them is a bridge leading over the stream which supplies the fall. This stream—nothing more than a mountain 'beck' in point of size—rustles, with many a little tumble in its course, through a wood of birch and Scotch fir. At the lip or edge over which it rushes, the breadth can hardly be more than 14 feet, but it is tolerably deep. Gazing down from this point, one is struck with the extreme wildness of form among the crags round, or rather below, the brink of the fall; and the valley itself is a grand feature in the scene, for on the opposite side the precipices are almost mural; there is also a cascade bounding down nearly in front of you, making a succession of long white jumps—which in any country, Norway excepted, would draw a summer stream of tourists to the vale.

Had the weather been fine (it rained all the time I was on the plateau), and I had not been somewhat pushed for time in order to catch a steamer, I should much have liked to have spent a day or two in the neighbourhood. It is a district worth exploring, and as yet almost if not quite unknown to English travellers.

The people at the farm, Anfin Jorgensen and his wife Johanna 'Iversdatter,' had never, or certainly not for the last eleven years, received a visit from an Englishman. I found them nice, kind people, who did their best to make me comfortable. Of course, theirs is but a homely dwelling, and far too out of the world to afford the luxuries that some 'Norwegian tourists' might vainly enquire for. It is a very old-fashioned looking house inside, and, as is so frequently the case in Norway, there are sacred verses carved or painted on the panels and doors. Here is one which I give literally as it stood:—

'Naar vi gaar ind, naar vi gaar ud,
da tænk paa os, O milde Gut.'

(Trans.) 'When we go in, when we go out,
then think on us, O merciful God.'

Note.—From aneroid observations taken below and at the top of the fall, I made the height of the Mørkfos about 1,040 English feet. I was told that an ordnance-survey officer in 1867 computed it at 986 English feet; measurements by two other gentlemen have given it as 1,100 and 1,029 English feet respectively. I saw the Fos when there was comparatively little water in it; early in the summer, during the melting of the snows, it must be twice as fine.

ON SOME WINTER EXPEDITIONS IN THE ALPS.

By A. W. MOORE.

(*Continued from No. 26.*)

THE comparative ease with which, in the winters of 1866 and 1867, passages previously considered impracticable at such a season had been effected, naturally suggested that, under equally favourable conditions of weather, even more considerable expeditions might be tried with fair prospect of success, and that, in particular, there was no reason why Mont Blanc itself should not be accessible. The extent of snow to be traversed would not be very much greater than on the double passage of the Strahleck and Finsteraarjoch in 1866, while there would be no rock difficulties such as had been successfully overcome on the Brèche de la Meije in 1867. The idea, at any rate, took firm hold of Mr. H. Walker and myself, and when last winter approached, having secured the co-operation of Messrs. G. E. Foster and T. S. Kennedy, we determined to make an effort to carry it out.

However little of actual difficulty might be encountered, the expedition would undoubtedly be both long and laborious. In addition, therefore, to calm and clear weather, there were two other essentials to success—moonlight and good condition of body. The first of these the almanack showed to be obtainable in the week from the 15th to the 22nd of January, while a few days' walking would suffice to secure the second. For a variety of reasons, Chamouni did not commend itself to us as a desirable training-ground, and we finally resolved to locate ourselves at the little inn of Schwarenbach, near the top of the Gemmi Pass. Our choice was influenced by the fact of the inn being kept by our trusty ally Melchior Anderegg and his two brothers, who could be relied on to make us comfortable, and also by its position within easy reach of the Altels, Balmhorn, Rinderhorn, and Wildstrubel—four mountains which seemed likely to be particularly accessible at the season. We hoped to ascend them all on successive days, then cross the Gemmi to Martigny, and thence to reach Chamouni by the Tête Noire. Our whole programme, it will thus be seen, was an ambitious one, and I can expect nothing but scorn from my readers when I confess, as I do at the outset, that of it we accomplished in full only one single item, and that one the least important,—the passage of the Tête Noire. This is therefore a narrative of failure, but of failure from which we derived more enjoyment than from many of our summer successes in past years.

Walker and I left England in advance of our friends, and on the afternoon of the 9th January arrived at Kandersteg, where Melchior and Peter Anderegg were awaiting us, Andreas, the third brother, having gone up to Schwarenbach to prepare for our reception. The weather during our drive up from Thun was warm, cloudy, and altogether dismal, and, even as high as Kandersteg, everything was in a state of slush eminently unromantic and disagreeable. The morning of the 10th was misty and unpromising, but we started off for the upper *Æschinen* Alp, more for the sake of exercising our legs than in expectation of seeing much. Snow soon began to fall, and continued more or less throughout the day, but not heavily enough to inconvenience us. Moderately bad weather is indeed far more tolerable in winter than in summer, a walk in snow being very much less disagreeable than one in rain, while every flake which falls adds to the beauty of surrounding objects. The *Æschinen* See was entirely frozen over with ice a foot thick, almost bare of snow, and painfully slippery, as I found to my cost when, in a moment of weakness, seduced by

Walker's graceful movements into trying a slide. At the lower alp the snow began to be really deep, and there was ice enough on the steep rock staircase which conducts from it to the upper alp to make the ascent rather troublesome. The huts on the upper alp were almost buried in snow, and had a most curious appearance. Just as we reached them the blue cliffs of the Blumlis Alp Glacier, close at hand, showed themselves for a few moments, but the fog soon settled down again. There was no object in going farther, so, having found a hut less blocked with snow than its neighbours, we with some difficulty effected a burglarious entrance, lit a fire, spent an hour or so pleasantly in lunching, and then retraced our steps. While we were skirting the lake on the way down, the top of the Doldenhorn was clear for a brief space, and, as usual under such circumstances, appeared to our wondering eyes to be at least as lofty as, and a good deal more inaccessible than, Kinchinjunga. The vision, momentary as it was, put us in good spirits, and we regained our comfortable quarters at the 'Victoria,' well satisfied with the day's work.

Snow fell heavily during the night of the 10th, but the next morning broke without a cloud. Foster and Kennedy arrived early, and were in a state of speechless delight at the beauties which had been revealed to them during their drive up from Frutigen. Certain photographic operations in which Walker had been engaged were abruptly concluded, and we set off at once for the Schwarenbach, a walk of four hours. The forest through which the first part of the ascent lies was in a condition of perfect beauty after the night's snowfall, and the only drawback to our enjoyment of the wonderful effects presented to us at each step was the exceeding slipperiness of the path, which required the exercise of constant care in order to avoid making as much of the ascent on the hands and knees as on the feet. On the way we had a fine example of a phenomenon described by Professor Tyndall, in his 'Glaciers of the Alps' (p. 178). Looking up, a cluster of pines on a snow-covered brow, behind which the sun was just rising, shone with the brightness of silver as they stood out against the intensely illuminated sky. The appearance was new to all of us, but in the course of the next few days, we had other, though less perfect illustrations of it. The ordinary path above the Gasteren Thal is not followed in winter, the old track more to the right being preferred; but we diverged from it for the sake of getting a view down into that wonderful ravine, at all seasons the *ne plus ultra* of desolate grandeur. The walking across the plain at the foot of the Altels was

heavy, and round the Schwarenbach itself the snow, as might be expected at a height of 6,775 feet, lay deep.

The exterior of the inn is not particularly inviting, but the accommodation inside is comfortable enough, and we, at any rate, had no reason to complain of either our quarters or our fare. A man resides in the house throughout the winter to afford help, if required, to anyone crossing the Gemmi; his only companions are a very fine dog of the St. Bernard breed, and a goat, the three living together in 'happy family' style. The dog appeared to us to be a most amiable monster, but Melchior assured us he could be fierce enough upon occasion, and that a thief would fare badly if the animal once got hold of him.

The hopes which had been raised in us by the extreme fineness of the day of our ascent from Kandersteg were doomed to disappointment, as, during the period of our stay, the weather proved unfavourable for high expeditions, though enjoyable enough for ordinary excursions. One day, indeed, resembled another in a most remarkable way. Early morning, everything was hidden in clouds, with slight snowfall, and the prospects of the day seemed hopeless. At about 8.0 there were signs of a clearance, and by 10.0 the sky was nearly cloudless, but with so violent a wind raging in the upper regions that ascents seemed out of the question. This lulled towards evening, and by sunset there was a comparative calm, but invariably at about 10.0 at night the melancholy southing of the wind was once more heard, the outside shutters began to rattle, and in the morning fog and snow again prevailed. On the 12th, failing anything more exciting, we went to the top of the Gemmi, and were rewarded by a fairly clear view, which, however, is one of a class seen to less advantage in winter than in summer; the charm of contrast between the green alps and pinewoods and the snowy chain is wanting, and the effect of the universal mantle of snow is to dwarf the great peaks and reduce them to the level of the minor ranges. Far more striking than the distant view were the atmospheric effects close at hand, as the light vapours blown over the pass from time to time were illuminated by the sun's rays, producing such gorgeous effects of colour as I have never seen at any other season. From the pass we climbed to the east for about a thousand feet to the top of one of the lower points of the Plattenhörner, but were more than once nearly brought to a stand by the smoothness of the slabs of rock beneath the snow, which was itself too powdery and incoherent to give footing.

We lay basking in the sun until the wind, which seemed temporarily to have gone to sleep, woke up to the fact of our presence, and by a spiteful gust, which seemed to freeze the very blood in our veins, drove us down helter-skelter to a more sheltered position. Both in ascending to and returning from the pass we had the satisfaction of going straight across the Dauben See, which was, of course, hard frozen with about five feet of snow on the ice.

On the 13th we made an attempt on the Balmhorn, but met with a smart repulse, the spirit of the mountains thinking it time, I suppose, to gird up his loins against such audacious intruders. The early morning having, as usual, been uninviting, we did not start till 10.15, and at 1.20 reached the lowest point of the ridge connecting the Balmhorn and Rinderhorn, close under the latter peak. So far all went well. The Zagen Glacier, though much changed in its upper regions since I had last seen it in 1866, presented no difficulty, and the wind did not trouble us. But the latter enemy had only been reserving himself, and, as we stepped on to the exposed ridge of the mountain at a height of about 10,000 feet, burst upon us with all his fury. We crouched down for a few minutes on the Leukerbad side of the ridge, to swallow a few mouthfuls of food, but the powdery snow was blown over us in clouds, and, although in brilliant sunshine, we were quickly so benumbed that it was impossible to remain still. The appearance of our party was startling; our hair and beards were masses of ice, which had been generated in an incredibly short space of time, and our faces perfectly bloodless, Peter Anderegg and Foster looking specially ghastly. The ridge of the mountain is broad and easy, so we started along it at a trot, but had not gone many yards when Kennedy announced that his hands were frost-bitten; he therefore turned back with Peter and descended to comparative shelter, where, after much thumping and rubbing with snow, the circulation was restored. The rest of us, led by Melchior, still pushed on, but Walker's feet soon became so affected that he also was compelled to give in. We then determined to persevere no further, as, although at the moment neither Foster nor I was suffering severely, we felt that we could not hope to hold out during the two hours which would be the least time requisite to reach the top of the mountain, from the whole upper part of which the snow was blowing away in grand style. Once off the ridge the descent was very pleasant, and we strolled leisurely home, amusing ourselves in freeing our hair from icicles—an operation which, unless conducted with discretion, resulted in violent contortions of coun-

tenance and language to match. Although the experience of the day was rather severe, we did not regret it, as it brought home to us thoroughly how absolutely essential to success in such an expedition at such a season is a calm state of the air, though indeed such a wind as that to which we were exposed might have been hard to struggle against, even in the height of summer.

The 14th we spent in an excursion to the Engstligengrat, or ridge overlooking the Engstligen Thal, which runs from Adelboden up to the base of the Wildstrubel. We first climbed in $1\frac{1}{2}$ hour, through very deep snow, to a broad depression in the range of the Felsenhörner immediately behind the inn, and then keeping round the head of the Ueschinen Thal, a wild glen which drains into the Kander just above Kandersteg, ascended to the ridge in two hours more. Up aloft the wind still raged, but for such a walk the weather was perfect, and the view from the point which we gained close under the Tschingellöchlihorn, a remarkable mass of crags like an uplifted hand, was unexpectedly fine. In addition to the Altels, Balmhorn, and Rinderhorn, immediately in front, we had, in one direction, a very picturesque view of the Weisshorn, seen as an isolated peak between two smaller points near at hand, and, in the other, of the Wetterhorn and Wellhorn, while beyond the two latter in the far distance the Lake of Lucerne could be clearly distinguished. On the 15th we walked down to Kandersteg in order to make arrangements for porters to carry our baggage over the Gemmi to Leukerbad, and returned in the evening. The day had been exceedingly fine, but snow fell heavily all night, and on the morning of the 16th was still falling, accompanied by a violent wind. The porters did not arrive till 9.0, having left Kandersteg early in the night, and had great difficulty in struggling against the storm. After dropping many hints, Melchior at length proclaimed that he did not think it would be prudent to try the Gemmi, as the path on the Leukerbad side would be completely obliterated, and after so much snow 'Staub-lawinen' were to be feared. At the same time he was willing to go if we wished. The odds were, of course, greatly in favour of our getting over without accident, but after such an expression of opinion from our leader, on a point upon which he was eminently qualified to pronounce, we did not feel justified in running the chance. Moreover, the porters, while willing to cross with us to Leukerbad, if we so determined, refused flatly to return the same way, and insisted on being sent home by railway *via* Lausanne and Bern! The disturbance of our plans

was serious, but it was soon agreed that we had no alternative but to make for Bern and get from that place to Martigny by rail. So, after copious libations of champagne poured forth by Melchior at the last moment as a stirrup-cup, we once more descended to Kandersteg, tramped on to Frutigen in pouring rain, and, driving down to Thun, managed to catch the last train to Bern, where, in the enjoyment of the numerous luxuries of the Bernerhof, we scarcely regretted the disappointment of the day.

On the 17th Kennedy left us to return to England, but the remainder of the party started for Martigny by the afternoon train, and arrived there at 9.30 P.M. After a dubious morning the weather cleared, and as the train skirted the upper end of the Lake of Geneva the full moon was shining in a cloudless sky. The view, looking across the lake towards the snowclad peaks along the south shore and the Dent du Midi, was of most exquisite beauty, and so excited us, that during the brief halt at Lausanne we seriously planned to walk across the Tête Noire during the night, without halting at Martigny. But before we arrived at that place our enthusiasm had time to evaporate, and finding that, clear as was the sky, there was still much wind, we discreetly turned for the night into the Hôtel Clerc, which was the only inn open. At 8.25 on the 18th we set off with three porters and Melchior. There was a great deal of ice on the lower part of the path, and progress along it was made more difficult by the quantity of timber, in course of transport from the upper hill-sides, with which it was encumbered. We were surprised, and by no means sorry, to find the inn on the Forclaz open, as, although the day was brilliantly fine, the cold was intense, so that we were glad to take refuge inside for half an hour and warm ourselves with more glasses of Curaçoa—inferior, but, under the circumstances, seductive—than I now care to count. The view of the Bernese Alps was extraordinarily clear, and we were able to identify a number of peaks—notably the Finsteraarhorn, Aletschhorn, and Jungfrau—which we had not before known to be visible, and which, I suspect, are in fact very rarely distinguishable in summer, when the distance is frequently hazy. We reached Chamouni at 6.25 P.M., and took up our quarters in the pension of Couttet Baguette.

The 19th was again a cloudless day, but we were obliged to pass it in idleness in consequence of Foster having unexpectedly to return to England. He left in the afternoon, and Walker and I, who were thus left to end our expedition as we had begun it—alone, then strolled up nearly to the chalet of

La Para on the way to the Pierre Pointue. The snow effects in the lower part of the wood were finer than any we had seen this year, and, from above, the view down into the valley, which by that time was almost in darkness, was very striking. The arrangement of our future proceedings was a matter of some difficulty. The unavoidable delay in our arrival at Chamouni, the absence of Kennedy and Foster, and the still unsettled appearance of the weather, combined with the following circumstances to make us give up the attempt on Mont Blanc. We found it impossible to agree with the two Devouassouds, whom we took into council, as to where it would be best to sleep before making such an attempt. Our own plan was to make a two days' affair of it, sleeping the first night at the Grands Mulets, but to this they seemed to have insurmountable objections, and urged us in preference to pass the first night at the Pierre Pointue, a second at the Grands Mulets, and make the actual ascent on the third day. To this we would not consent, as the whole experience of the last fortnight had gone to show that, in this particular season, three consecutive fine days were not to be relied on, and we had no inclination to indulge in a costly failure. To reach the summit from the Pierre Pointue and return in a day was quite out of the question in the then state of the moon, as from 6.0 P.M. till midnight there would be absolute darkness. So, as before said, we gave the thing up, and finally resolved to be content with an excursion to the Jardin, and, perhaps, one to the Grands Mulets, sleeping at the Pierre Pointue before the latter.

Accordingly, at 6.30 A.M. on the 20th, we started for the Jardin with Melchior and François and Henri Devouassoud. The morning was not very promising, and we had small hopes of reaching our destination, but were anxious for a walk, and determined, at any rate, to see something. For a certain distance there was a good sledge-track, and we got on rapidly, but when it ceased the work became hard, the snow being both deep and soft. After crossing the channels of two torrents which were filled from side to side with avalanche débris, we had to traverse a broad open slope bare of trees. I certainly thought this part of the route dangerous, though it is hard to say what gave rise to the impression, as the inclination was not excessive, and the snow was smooth and unbroken. From whatever cause it proceeded, we had an unpleasant feeling of insecurity at every step, and this was specially the case when, at one place, it was necessary to abandon our transverse course across the slope, and turn straight up its face. The danger

was perhaps imaginary, but I have since referred to Professor Tyndall's account ('Glaciers of the Alps,' p. 202) of his expedition in the winter of 1859, and find that he was similarly impressed at what reads like the same spot, so that I am inclined to think there is something peculiar in the winter condition of this particular slope. Be this as it may, we walked very gingerly, taking every precaution to avoid breaking the snow more than was necessary, and so, without accident, reached the Montanvert at 10.0. Clouds veiled the Aiguille Verte and the Jorasses, and the weather in the valley momentarily grew worse; we were anxious however to get a little farther, so went on after a short halt. We had rather expected to find the glacier entirely snowed over, and that we should be able to descend on to it at once and keep under its left bank, thus avoiding the usual passage by 'les Ponts.' But this proved impracticable, the quantity of snow, though considerable, being insufficient to make such a smooth highway as we had calculated on. We therefore followed the regular route, skirting the hill-side without difficulty as far as 'les Ponts,' but found that passage by no means in its usual simple state. The slabs of rock, though of no great height, are exceedingly smooth and steep, and the curtain of snow which covered them was too powdery and lay at too high an angle to give footing. It was clearly impossible to cross, but, after many attempts at different points, we managed to 'wriggle' down just on this side of the usual passage, and so gain the glacier.

At 11.10 we halted on the moraine to lunch and take counsel. It was by this time snowing heavily, and we could not see many hundred yards in any direction; much discussion therefore was not required to arrive at the conclusion that no good purpose would be served by further progress in the direction of the Jardin, and that it would be better to return to the Montanvert, cross the glacier to the Chapeau, and so regain Chamouni. After half an hour's halt we accordingly retraced our steps to the point where the passage is generally made in summer, and, having put on the rope, crossed without the least trouble, the quantity of snow on the glacier being, as before observed, very much less than we had expected. The Mauvais Pas itself was very icy, and looked in consequence more worthy of its title than usual; but we avoided it by passing below, and at 2.0 reached the chalet at the Chapeau, where we remained some time, the weather having improved, the sun shining brightly although snow continued to fall. The ever-changing atmospheric effects arising from the com-

bination of snow, cloud, and sunshine, were of the most wonderful character, and, with the exquisite view across the Glacier des Bois, free from the dirt and impurities which more or less spoil it in summer, amply repaid us for our labour. We were back at Chamouni by 4.0, and, encouraged by the success, so far as our own pleasure went, of a rather unpromising day, finally made up our minds for the expedition to the Grands Mulets, as to which we had in the morning been still hesitating.

We set off at 12.30 on the 27th, with the same attendants ^{21st} as before, and Sylvain Couttet, the proprietor of the châlet at the Pierre Pointue, who went up to open the house for us. As far as La Para we had our tracks of two days before, but, beyond that, new ground had to be broken, and the work became very heavy. The snow on the long slope of comparatively open ground between the forest and the Pierre Pointue was enormously deep, and it was at some points a matter of the greatest difficulty to get through. But although the snow was deeper and the slope steeper than during the ascent to the Montanvert, yet the feeling of insecurity, which was so irrepressible on that occasion, was now entirely absent. There was nothing in the 'feel' of the snow to suggest the least danger, and progress was a mere question of labour. At 4.15 we reached the châlet, which is at a height of 6,723 feet, and was as nearly buried in snow as its position on the brow of a steep cliff would allow. On gaining admission it was found that, in spite of the tolerably substantial building of the house and secure fastenings to the windows, a good deal of snow had contrived to find its way inside. Matters, however, were soon set straight, and we made ourselves comfortable round the small stove, the smoke-pipe of which, passing through a hole in the outer wall, kept us constantly on the alert by getting red-hot at intervals of half an hour or so, and threatening a general conflagration, to stave off which it was necessary to go outside and apply masses of snow at the point of contact between the wood and iron. During the evening we had a grand display of magnesium torches, to the great delight of Chamouni, where people were on the look-out; but, so far as we were concerned, its effect was thrown into the shade by the view which we got, just before retiring for the night, of the snowy crests of the hills behind Sallanches lit up by the first beams of the moon, whose light did not reach us for some hours.

We rose betimes on the 22nd, but there were more than the usual delays, and we did not get off till 5.0 upon a cloudless

morning. The moon was high in the heavens, and, though five days past the full, gave ample light. A casual survey on the previous evening had satisfied us that to reach the Pierre de l'Échelle by the ordinary route would be very difficult, if not impracticable, owing to the icy state of the track, which is at no time very pleasant going. We therefore struck up the slopes immediately behind the châlet towards a little peak locally known as the Aiguille du Tour, getting on the way most charming views, backwards towards the Brévent, and down, to the right, of the whole length of the Glacier des Bossons. Bearing to the left from the Aiguille du Tour, we got on to a small glacier at the base of the Aiguille du Midi, and, crossing it, descended slightly on to the Glacier des Bossons, which we struck, at 7.20, rather above the usual point. Anyone at all acquainted with the locality will at once understand that at any other season this route could not have been followed, as the small glacier which we traversed with such equanimity is the first recipient of the stones which fall almost incessantly from the Aiguille du Midi, and which, shooting down it, finally land on the Glacier des Bossons. There was now not the slightest danger from this source, and the most doubtful part of the route was the passage on to the last-named glacier, which had to be effected between and beneath some big séracs in a very shaky state, some of which actually fell before our return.

The snow on the glacier, though not excessively deep, was 'tough' enough to make our advance slow; and my total disappearance in a concealed crevasse was rather a welcome relief to the monotony of the way, which, however, diminished as we approached 'the junction.' Often as all of us had crossed the Glacier des Bossons, we had never seen the ice pinnacles, for which this part of it is famous, in so wonderful a state as now. Not only did they appear more colossal in size and more eccentric in shape than we had ever seen them in summer, but their whiteness and purity were quite dazzling. The isolation, too, of the most monstrous and fantastic masses was more than usually remarkable, defying conjecture as to how they got into the positions they occupied. The passage of 'the junction' was a little awkward, and some ingenuity was required to hit off the exact point at which it was possible to get through the labyrinth of crevasses. Above, there was no difficulty beyond what arose from many of the slopes being very bare of snow, necessitating a good deal of step-cutting, and consequent detention, which a cold but not violent wind made unpleasant. We reached the Grands Mulets at 10.40 in 5½ hours from

the Pierre Pointue, but, having plenty of time at our disposal, we had not hurried. In alluding to the view from the Gemmi, I spoke of it as less remarkable in winter than in summer; but, with regard to the prospect from the Grands Mulets, the exact converse is the case. The ranges of low hills between the Valley of Chamouni and the Lake of Geneva gain enormously both in apparent height and in picturesqueness of form by a covering of snow, while the effect produced by the distant chain of the Jura, delicately capped with snow, sweeping round in the background, is most peculiar and exceedingly striking. Upon this particular day the clearness of the air was something marvellous, and along the whole horizon not a single cloud marred the distinctness of the panorama. The wind, though perceptible enough, had for once moderated both its force and keenness, so that it was impossible to avoid regretting that we had not, as originally proposed, passed the previous night at our present position, instead of at the Pierre Pointue. Had we done so, I have not a shadow of a doubt that we should have reached the top of Mont Blanc. Starting by moonlight at 1.0 A.M., twelve hours at most would have taken us up, and the descent could have been effected as rapidly as in summer, so that Chamouni would have been reached soon after night-fall. It was, however, useless to indulge in vain regrets; and, having deliberately abandoned the larger plan, we could only congratulate ourselves on the success of the smaller undertaking.

The door of the cabin was securely fastened, but we managed to half open one of the windows and squeeze through—an operation which required a good deal of management, especially on the part of François, whose proportions are considerable. A fire was lit, some hot wine brewed, and we made ourselves comfortable until 12.15, when we commenced the descent, of which I need say very little. We got off the ice at 1.30, and, leisurely retracing our morning's route, reached the Pierre Pointue at 2.50, remained there half an hour, and then, floundering down through the soft snow, entered Chamouni at 4.40, amidst an amount of gunfiring which made us speculate as to what would have been the expenditure of powder had our original programme been carried out. The sunset that evening, the last of our stay at Chamouni, was one of the most gorgeous I ever remember, and, as we gazed at the wonderful hues which lit up the snowfields of Mont Blanc and the long line of precipitous Aiguilles, we were sorely tempted to postpone our departure. But the weather kept up its character for variability to the last, and when we started down

the valley on the morning of the 23rd, there was a dense fog, which, on its disappearance, revealed a cloudy sky, in marked contrast to that of the day before. To this same fog, nevertheless, we were indebted for yet one more illustration of the beauties of the Alps in winter. There had been an intense hoar frost during the night, and the result was—on every object a coating of rime half an inch thick; every rock and every tree was delicately carved in ice, and the numerous groves which stand alongside the road offered glimpses of fairy-land surpassing in loveliness the wildest dreams of the most imaginative of artists.

Of our homeward route *viâ* St. Gervais, Annecy, and Geneva, I need say nothing, except that the country between St. Gervais and Annecy is probably a good deal more picturesque in summer than in winter, and that the suspension bridge of La Caille, on the road between Annecy and Geneva, is well worth seeing, even in these days of engineering wonders.

I have purposely reserved till the last such few general observations as the incidents of our daily life suggested at the time. Naturally, the temperature was a subject which was most constantly forced on our attention; and, with regard to this, what chiefly struck us was the moderate degree of cold at considerable elevations, compared with what might be expected. The following table gives readings of Fahrenheit's thermometer on different days at various places, and it will be seen from it that upon not one single occasion did the mercury sink to zero.

Date.	Place.	Reading at 9.0 A.M.	Minimum previous night.
January 11	Kandersteg, 3,839 feet	—	20°
" 12	Schwarenbach, 6,775 "	20°	8°
" 13	Do.	13°	11°
" 14	Do.	30°	9°
" 15	Do.	23°	22°
" 16	Do.	26°	18°
" 19	Chamouni, 3,425 "	10°	—
" 20	Do.	—	9°
" 21	Do.	15°	10°
" 22	Pierre Pointue, 6,723 "	10° at 4.0 A.M.	7°

The temperature above indicated is of course not absolutely tropical, but the readings are not lower than are often recorded in England in frosty weather, and moreover give, even as it is, an exaggerated idea of the average cold during the day or night. At the Schwarenbach, for instance, between the hours of

11 A.M. and 3 P.M., the mercury was rarely more than two or three degrees below freezing point, even in the shade; in the sun it was many degrees above it. After 3 P.M. the fall was rapid, but the minimum temperature was usually reached comparatively early in the night, before 10 o'clock, the hour at which, as mentioned elsewhere, the weather generally changed. The coldest night during our tour was certainly that of January 18th, at Chamouni, during which the thermometer was not exposed, owing to the late arrival of our baggage. The instrument was carried up to the Grands Mulets, but there met its inevitable fate, being accidentally knocked over and smashed before it had been exposed many minutes, or any observation had been taken.

With regard, also, to the quantity of snow on the high Alps, the actual state of things appeared to us different from what is ordinarily supposed. The winter snow only lies at all deep at the lower elevations, where in summer there is either none or very little; the higher peaks are comparatively bare. For instance, the Altels, from the foot of its glacier to the summit, was a pillar of ice, up the whole length of which steps would have had to be cut; while in the wood below it, and on the hill-side between the glacier and Schwarenbach, the snow was many feet deep. So, again, more step-cutting was required to reach the Grands Mulets than I ever remember to have been the case in the least snowy summer, while the quantity of snow on the smooth part of the Glacier des Bossons, below the 'junction,' bore no comparison with that between La Para and the Pierre Pointue, far lower down, or on the path to the Montanvert. The violent wind which prevailed in the upper regions during the whole of our stay was, perhaps, sufficient to account for a specially marked deficiency in this particular year, the powdery snow being blown away as soon as deposited; but we observed the same fact on the Strahleck in 1866, so that the condition of things is probably usual, to a greater or less extent, in most seasons. The state in which we find the higher peaks and glaciers in summer would seem, therefore, to be less dependent on the midwinter snowfall than on that of the spring, which, owing to the higher temperature at that time of year, perhaps descends in a less powdery state, and is therefore not so liable to be affected by wind.

Of the general attractions of the Alps in winter, and of the vast amount of pleasure afforded by a tour at that season, I have spoken in my first paper; and of what I there said, I have not a word to retract. The comparative failure which attended our high mountaineering on this last occasion only

brought more strongly than ever before us how absolutely unessential to enjoyment in winter high mountaineering is. I shall not for a moment be suspected of undervaluing the benefits both to mind and body of a summer tour; but, personally, I think that a greater amount of mental pleasure and a fuller store of bodily health are to be obtained in winter, with fewer drawbacks, and very much less labour and weariness. That many persons, unless they have tried the experiment, will agree in this opinion, I do not expect. I trust, however, that sceptics will not be content with simple derision of my views, nor believers with passive assent to them; but that both parties will take the earliest opportunity of going and judging for themselves.

THE PAPAVER ALPINUM. By Mr. CHARLES PACKE.
Read before the Alpine Club by the Secretary.

THE plants which have been selected by the great botanists and first mountain explorers to be associated with their own names are not probably the same as would be chosen by a member of the Alpine Club. The *Linnaea borealis*, *Wulfenia carinthiaca*, *Ramondia pyrenaica*, and *Saussurea alpina*, are all plants more or less rare, of exquisite beauty, and of a very distinct generic character; but, with the exception of the last, they are none of them strictly alpine. I may remark by the way, that Ramond has been thus far more fortunate than De Saussure in his selection; that his plant is exclusively confined to the Pyrenees, while that of the Swiss naturalist is not restricted to the Alps, but is found also in the Central Pyrenees, as well as in Norway, Britain, and high arctic latitudes. Now I feel quite sure that when those ardent mountaineers, M.M. Tuckett and Stephen, shall be driven by infirmity of years and declining powers to have recourse to botanical science, they will unlock their herbarium, and set before our admiring eyes some unknown plant of an order at least as exclusively alpine as the Androsaces, with which they intend to transmit to posterity their names, hitherto only associated with the barren peaks and spitz.

I am not going here to speculate what manner of plant this will be. No two observers, even in the same range of mountains, would probably name the same plant as that which they had met at the greatest elevation.

It would be difficult to find what constitutes an alpine plant. Some—for example, the *Linaria alpina* and *Hutchinsia alpina*

—while occurring on our European mountains at an elevation of 3,000 mètres and upwards, among the very highest of phænogamous plants, descend not unfrequently to comparatively low levels; while others, as the *Saxifraga grænlandica*, *Artemisia mutellina*, *Eritrichium nanum*, and *Campanula cenisia*, are only found in company with Lichens and Carices at the last borders of vegetation. Others again, though excessively alpine, and found only on the highest mountain-ranges of temperate regions, do not extend into the arctic circle. The *Soldanella*, so constant to the brink of the melting snows in the European mountains, and the *Swertia*, found in the highlands of the Alps, Pyrenees, and also Himalaya, do not extend into the polar regions. Indeed, the entire families of the Gentians and the Primulas, though so abundant, and so evidently alpine in their habits, are all but unrepresented in the extreme north. Of the 760 phænogamous plants that have been found to exist north of the arctic circle, only about 50 are confined to the arctic latitudes; the remainder, as far as their southern dispersion is concerned, may be referred to two classes—one consisting of plants widely diffused over the plains of Northern Europe, Asia, and America, of which there are upwards of 500; and of these the common dandelion (*Taraxacum officinale*), and the ladies' smock (*Cardamine pratensis*), may be taken as types; the other comprises plants more or less confined to the mountain-chains of these countries, and still more southern regions, of which there are only about 200.

Among the last, if there is one more than another calculated to arrest the attention, it is the alpine poppy. Even the non-botanical mountaineer at once recognises in the four broad petals of the flower, the pendulous bud, and the upright capsul, the family of the field-poppies—*Papaver rhæas* and *P. argemone*—and marvels how it has become thus far removed from the cultivation with which he has seen its congeners associated. I think we may assume that all the forms of the alpine poppy have the nearest affinity with the *Papaver argemone* of the plains, as shown in the elongated hairy capsul, with comparatively few stigmatic rays; though in the filaments of the stamens, which are tapering and not dilated, it is more assimilated to the *P. rhæas*.

Throughout the whole extent of the boreal regions circumjacent to the North Pole, comprised between the arctic circle and the 78th degree of latitude—that is, in Lapland, Spitzbergen, East and West Siberia; in arctic North America, where it is found as far north as Melville Island, in latitude 77°; and again in Greenland, and on the northern coast of

Iceland, we find growing a small dwarf poppy, of a very hairy habit, with bright sulphur-coloured flowers—the *Papaver nudicaule*.

On the Alps of Europe, the Dovre-feld of Scandinavia, the Carpathians, the Pyrenees, and Sierra Nevada; on the high mountain-chains of Western and Eastern Asia, the Caucasus, Altaï, and Himalaya, as well as on the Rocky Mountains and ranges of North America, under some form or variety, a dwarf poppy recurs very similar in general habit. This poppy is always found growing at a considerable elevation in the Alps and Pyrenees, at from 2,400 to 2,900 mètres, a zone corresponding pretty nearly in mean temperature to that of the lowlands within the arctic circle up to latitude 75°. All these varieties of alpine poppies have been classed under the general name 'Papaver alpinum;' and the question naturally arises whether all these varieties are to be ranked each as a distinct species, or whether they may all be considered as mere modified descendants from one common ancestor, the 'Papaver nudicaule' of the arctic regions.

My attention has been drawn to a paper by Professor Kerner, in Vol. iv. of the 'Jahrbuch' of the Austrian Alpine Club (pp. 296–308), in which he does me the honour to allude to a note which I wrote on this subject in the 'Alpine Journal' for 1865. Since then I have had many opportunities of studying the alpine poppy of Central Europe, not only in various parts of the Pyrenees, but also on the Sierra Nevada, and on the Alps; and as, in a great measure, though not entirely, I agree with Professor Kerner's distribution of the different species, perhaps I may be allowed first to state Kerner's arrangement, and then my own personal observations, and the conclusions that appears to me most in accordance with them.

After balancing the respective merits of what he calls the lumping and the splitting schools of botanists, Professor Kerner at last settles down to three distinct species of alpine poppy in the mountains of Central Europe. He distinguishes them as follows:—

1. The fine-leaved poppy (*Feinblättriger Mohn*), *Papaver alpinum* of Linnæus, *Papaver Burseri* of Crantz.—The fine-leaved poppy he describes as rather a stately plant, with the leaves bi-tripinnate, divided into narrow lineal segments, resembling those of the fumitory and scandix. The flower is large, with the petals overlapping when in full bloom, and somewhat broader than long, their length being 20 to 30 millimètres. The filaments of the stamens are longer than the capsul, and the stigmatic rays decidedly project. The flower-

ing peduncle attains to a height of 10 to 25 centimètres, but is rather decumbent (*geschweift*) at the base. The leaves are furnished with a few scattered hairs, and those of the flower-stalk are upright and applied.

This poppy, according to Kerner, is wanting in the Pyrenees and Apennines, and is restricted to the Alps and Eastern Carpathians. Its most western situation is Mont Trelod, in Savoy; and the most eastern the Kuhorn and the Butsets, in Transylvania. Towards the borders of this widespread district the plant is rare, and in Savoy, Switzerland, and Transylvania only found in patches here and there. On the contrary, in the centre of this region—that is, in the Eastern limestone Alps—it appears in great quantities in the ravines and on the shady slopes; and in Styria and Upper Austria descends into the valleys, carried down along the torrent-beds. In the north-western portion of this region—that is, Savoy, Switzerland, Styria, and Austria—it is only found with white flowers; in the south-eastern portion—that is, Carinthia, Carniola, and Transylvania—principally with a yellow flower. It grows both on the schist and limestone soil: on the first more seldom, and always yellow; but on the limestone principally, if not exclusively, white.

2. The broad-leaved poppy (*Breitlappiger Mohn*), *Papaver pyrenaicum* of Linnæus, *P. aurantiacum* (Loisel).—Of this the leaves are simply pinnate, with the indentations not deeply penetrating, but the segments broad and lanceolate, or terminating in 2 or 3 broad lance-like lobes. Like the last, the petals are somewhat broader than long, and overlapping. The *P. pyrenaicum* (*Breitlappiger Mohn*) is of a more depressed growth than the *P. alpinum* (*Feinblättriger Mohn*). Its leaves are less finely divided, and much more hairy, and the peduncle is shorter, more upright (*weniger geschweift*), and much more abundantly clothed with hairs, which are erect and not applied.

This poppy is wanting in the Carpathians, but widely extended over the high mountains of the Pyrenees, Alps, and Apennines. Its most western stations are the Sierra Nevada, Pic du Midi, and Mont Perdu. The most eastern stations are in the Northern Alps, the Solstein chain, near the source of the Iser; in the Central Alps, the Katschthal and the Malthathal, in Carinthia; in the Southern Alps, Raibel and the Wochein Alps; and in the Apennines, Monte Cornu, Monte Costone, Monte Amaro, and Monte Velino. In the Northern limestone Alps the flowers are only found white; in the Central Alps and Pyrenees, both on the limestone and mica schist, the flowers are only yellow; in the Southern Alps and

Apennines, both on the limestone and schist, the flowers are generally yellow, but sometimes also white.

3. The small-flowered poppy (*Kleinblutiger Mohn*), *Papaver suaveolens* of Lapegrouse, *P. pyrenaicum* (Willd).—Flowers small; the petals at the time of full bloom not overlapping, but somewhat narrower than long, their length being 10 to 16 millimètres. Stamens not so long as the capsel; the stigmatic rays not projecting beyond the capsel. In fine, says M. Kerner, the *Papaver suaveolens* (*Kleinblutiger Mohn*) is a small plant, whose leaves resemble in their cutting those of the *P. pyrenaicum* (*Breitlappiger Mohn*), but are generally furnished with much coarser hairs; and the peduncle is shorter by half, roughly hairy, with erect bristles.

This plant is wanting in the Carpathians, Alps, and Apennines, and is confined to the high parts of the Pyrenees and the Sierra Nevada. In the Pyrenees it is found with golden as well as with brick-red flowers (*ziegelrothen*); on the Sierra Nevada only with brick-red flowers.

In considering whether the different alpine poppies of Central Europe are to be referred to one of these three forms (I purposely avoid the debateable word, species), into which they have been distributed by Professor Kerner, I will describe the varieties which I have myself met with, and specimens of which I have carefully examined. De Candolle and others have shown that plants which have very wide ranges generally present varieties; and this might have been expected, as they become exposed to diverse physical conditions, and as they come into competition (a still more important circumstance) with different sets of organic beings. If we are to accept as a distinct race any collection of individuals which continue to produce their like so long as they are under the same physical conditions, I think we may admit as many as six, or perhaps seven, distinct forms of alpine poppy on the mountains of Europe. In my herbarium I have at least that number, that I could at once pick out, however they were intermingled, and assign to each its locality. This question, however, cannot be fully decided till experiments have been made in raising plants from seed under cultivation, when the various races may be produced under the same external conditions of soil and climate. I have more than once tried to do so, but it is no easy matter; and I have hitherto not succeeded. I have also trusted to nature, and sown seed upon the mountains in situations apparently the most favourable, but could find no trace of them the ensuing season. I may here remark that, unlike the poppy of the plains, which is an annual, the *Papaver alpi-*

num in all its varieties, as well as the *P. nudicaule*, is perennial, or at least biennial—an essential condition of their existence in so rigorous a climate; for, with an annual plant, if one single season it fails to ripen its seed, it must necessarily disappear from that locality.

I do not think that the distinction founded by Kerner, on the cutting of the leaves into fine or broad lobes, is sufficiently constant, though undoubtedly, as a rule, his No. 1 *P. alpinum* has the leaves most finely cut. He is quite right in excluding this form from the Pyrenees and Sierra Nevada. I have only seen it growing below the peak of the Esel, on the north side of Mont Pilâtre, at about 2,400 mètres, where I found it in full flower on the limestone débris in the middle of August.

In the Pyrenees form, No. 2 *P. aurantiacum* (Loisel), with bright yellow flowers, is found on the Pic du Midi, on the slaty schist, on the north side, at a height of 2,870 mètres. It is also found on the Alps of Dauphiné, and is very abundant on Mont Ventoux. The buds of this last are much more round than those of the alpine poppy, which are rather oblong; and the stigmatic rays and parietal divisions of the capsels in this and the following varieties are 5 to 6 in number, while in the alpine poppy they are only 4 to 5. In the seeds of the different kinds, even with the microscope, I have been unable to assign any difference. Some are slightly more rugose than others, but that seems to depend upon the age at which they are gathered. On the Pic de Salette, above the Port de Cambiel, in the Pyrenees, and also above the Port Vieux d'Estaubé, in both localities, only on the north side of the mountain, there is another variety of this poppy, with the flowers white and rather less hairy. It grows on the schist débris, at an elevation of about 2,700 mètres. The plants much resemble stunted specimens of the alpine poppy; but, as this is excluded from the Pyrenees, perhaps Kerner would refer them to his second variety, though their flowers are not much like the bright yellow blossoms of the plant from the Pic du Midi. Under some of the sheltered rocks at the Port d'Estaubé I have found a dwarf variety almost entirely glabrous; the flowers white; and the leaves very glaucous, cut into small, almost circular, entire segments. I have not been able to meet with a plant resembling this in any other spot, or in any other collection.

But perhaps the most characteristic of the Pyrenean forms is Kerner's No. 3, the *Papaver suaveolens* of Lapeyrouse. Of this poppy there appear to be two quite distinct varieties, though in neither of them can I perceive any odour to justify the epithet 'suaveolens.'

a. A plant with a small flower, but of which the petals are at least as broad as long, so as to overlap when in full bloom. Their colour when fresh is of a vivid crimson, but when dried this changes to a deep brick-red. The leaves are for the most part simply pinnate, with the terminal segment more or less incised. The stamens are shorter than the capsel. The whole plant is very hirsute, and the peduncles and little globulose buds are completely covered with erect and not adpressed hairs. These hairs, when examined by the microscope, appear rough, as though formed of a series of ducts of unequal length, placed side by side. The plants growing in the most exposed situations and at the greatest elevation are almost always the most hairy. The use of these hairs may be twofold—partly to protect the plant against a vigorous climate, but partly also to regulate evaporation, absorb moisture, and enable the plant to resist extended periods of drought. Be this as it may, the plants growing under the shelter of a rock, or in a moist position, are always the least hairy.

β. A plant with a flower of about the same size, but with the petals decidedly longer than broad, so as to give to the open blossom the shape of a Maltese cross. The colour is of a lighter red, more approaching scarlet, on the schist rocks; on the limestone it is generally of a vivid orange. The leaves are rather more finely cut. The buds are not quite so globular, but rather oblong. The plant is hairy, but the hairs on the peduncle are applied and not erect.

Var. *a.* was first discovered by Lapeyrouse, who describes it as growing on the rocks of the Port de Plan, where I have since gathered it. On all the high mountains in Spain, immediately south of the Maladetta, this poppy is almost sure to be found on the red ferruginous schist, at a height of 2,700 to 2,900 mètres. On the summits above Castanéza and Malibierne it is quite abundant. In all this region the soil is strongly charged with iron, and as, where this is the case, I have never been able to find a poppy of any other colour, may we not suppose that the iron had something to do with the colouring of the plant? The alpine poppy is absent from all the mountains of Central Spain which are not sufficiently high to favour its growth; but this same form, *P. suaveolens*, reappears on the Sierra Nevada, but only in one locality, on the Pic de Mulhahaçen, quite close to the summit, on its north-west slope, facing the Veleta, at a height of 3,500 mètres.

Var. *β.* is pretty abundant on the high summits of the Eastern Pyrenees, where I have gathered it on the Pics Carlitte and Cambredase at the end of July. It is found a

little lower than the poppy of the Central Pyrenees, at an elevation of from 2,500 to 2,700 mètres; and in the bed of the stream, at the head of the Valley d'Eyne, it grows lower still; but there it seems rather to assimilate itself, except in its colour, which is red, to the *P. alpinum*.

In company with this red-flowered poppy we invariably find two other plants growing on the same schist, though often descending rather lower—the *Viola cenisia* and *Galium cometerrhizon*. On the Sierra Nevada we again find plants of the same orders—*Viola nevadensis* and *Galium pyrenaicum*—associated with the same poppy. It is worth noting that neither of these orders are strictly arctic, and to this I shall presently allude.

It is quite evident that the existence of the alpine poppy, or indeed of all other alpine plants, on isolated mountain-ranges, has to be accounted for in one of three ways. Either each variety of the plant has been specially created in the situation it now actually inhabits—in which case there must be a special centre of creation for each separate locality; or it is merely a modified form of the allied species in the surrounding plains, which have been forced up the mountain-side in the struggle for existence with other species; or it has been left, as it were, in a citadel by a receding arctic flora. Under both these last-mentioned conditions the plant would have to adapt itself to a new climate, soil, and nourishment, as well as to contend with new and hostile species; and all this would in time produce considerable change and modification.

The theory of separate centres of creation for each isolated plant or group of plants on a mountain, may, I think, at once be dismissed as untenable, and we shall then have only to decide between the two last hypotheses—are they the outcasts of an arctic flora, or have they been dispersed upwards from their congeners on the plains?

Without adopting extreme views, it may be considered as proved that there was a period, at the close of the Pliocene, when the mean climate of the countries adjacent to the 45th parallel was much colder than at present; when glaciers of giant dimensions poured down the mountains, eroding and polishing the rocks, and carrying boulders and drift, and with them probably seeds, and even living plants, to considerable distances from their native habitats; when an arctic flora and fauna occupied Europe, Central Asia, and the northern half of America; and when at length returning warmth drove the ice backward, here and there little patches of northern vegetation, detached from their families, took refuge among the mountains,

gradually ascending their sides; where they still remain on the Alps, Apennines, and Pyrenees, on the Alleghanies and Himalaya, like beleaguered towns cut off from their friends, and hemmed in by a host of more favoured races.

But this is not all that we have to take into account. There is evidence sufficiently strong, if not quite so conclusive as that for the Glacial epoch, that at an earlier period, at the close of the Miocene, a period subsequent to the upheaval of the mountain-ranges, the temperature of Central Europe was considerably warmer than at the present day.* Professor Heer's researches in the arctic Miocene flora pretty clearly establish that, at that period, the beech, chestnut and oak grew as far north as the 70th degree of north latitude; that the magnolia, walnut, and even two species of vine, grew in Greenland, and a large-leaved lime and an alder in Spitzbergen.

When the climate of the arctic regions was sufficiently raised to admit of such a vegetation, it requires no great stretch of imagination to conceive what must have been the state of things in the temperate zone, where there must have been a corresponding advance of temperature, though not perhaps to the same extent.

At that period a luxuriant, perhaps tropical, vegetation must have overspread the lowlands, and many of the plants now confined to the plains had been able to ascend the mountain summits, then strangers to snow and ice.

Let us follow the changes as this period passed, and the glacial climate slowly came on; in its turn also gradually to pass away, and be succeeded by the climate of the present day. I must be allowed to quote from the effective description of Mr. Darwin:—'As the cold came on, and as each more southern zone became fitted for arctic beings, and ill-fitted for their former inhabitants, the latter would be supplanted, and arctic productions would in a great measure take their place. Many of the original inhabitants of the temperate regions would travel southwards, unless stopped by barriers, in which case they would perish; but a large proportion, especially of the hardier forms, would long linger in their native haunts, and maintain a fierce struggle with the arctic invaders, over which they could not but exercise a modifying influence. The

* In a paper recently addressed to the French Academy of Sciences, M. Alphonse Milne Edwards describes certain researches of his in the tertiary formations of the Bourbonnais. From the fossil remains of parrots, and other tropical birds of the species, he concludes that there must at one time have been an African climate in that part of France.

mountains would become covered with snow and ice, and the former alpine inhabitants would descend to the plains. By the time that the cold had reached its maximum, we should have a uniform arctic fauna and flora covering the central parts of Europe as far south as the Alps and Pyrenees, and even striking into Spain.'

The now temperate regions of the United States would likewise be covered by arctic plants and animals, and these would be nearly the same with those of Europe; for the present circumpolar inhabitants, which we suppose to have everywhere travelled southward, are remarkably uniform round the world, though at the same time, as remarked by De Candolle, they are eminently liable to variation.

As the cold passed away, the arctic forms in a body would retreat northward, closely followed up in their retreat by the productions of the more temperate regions; but as the snow melted from the base of the mountains, the arctic forms would seize on the thawed ground, gradually ascending higher and higher as their brethren pursued their northern journey. Hence, when the warmth had fully returned, the same arctic species, which had lately lived in a body together on the lowlands of the Old and New Worlds, would be left isolated on mountain summits (having been exterminated on all lesser heights) and in the arctic regions of both hemispheres.

'The arctic forms during their long southern migration and re-migration northward will have been exposed to nearly the same climate, and having kept together in a body, will have had their mutual relations little disturbed, and will not have been liable to much modification. But with their alpine brethren left isolated from the moment of returning warmth, first at the bases, and ultimately on the summits, of the mountains, the case will have been somewhat different; for it is not likely that all the same arctic species will have been left on mountain-ranges distant from each other, and have survived there ever since; they will also, in all probability, have become mingled with ancient alpine species, which must have existed on the mountains before the commencement of the Glacial epoch, and which, during its coldest period, will have been driven temporarily down to the plains; they will also have been exposed to somewhat different climatal influences. Their mutual relations will thus have been in some degree disturbed; consequently they will have been liable to modification.'

In this supposition of an arctic invasion, modified on its first appearance by the temperate forms of vegetation which

receded before it, and yet further modified when its scanty garrisons were besieged on the mountains by those same forms on their return, I think we have the true cause to explain alpine vegetation.

On the distant ranges many of the species are identical, some present varieties; some are ranked as doubtful forms, some as distinct, yet closely allied species.

To take the example of our alpine poppy on two occasions, once in its advance, and again in its retreat, the *Papaver nudicaule* must have come into close contact with cognate forms of a more temperate climate. The struggle must have been severe, and would leave its impress on the prevailing race; and when, in their turn, the arctic forms were forced to recede, many of the hardier plants from the plains would have followed them up the mountain-sides, and exercised a further influence before they became extinct. That the temperate forms did so ascend, we have further evidence in the plants with which the alpine poppies are now found associated in their mountain homes. Many of them, such as the *Violas*, *Galiums*, and *Artemisias* are not arctic species or genera, but are merely modified forms of families that grow on the surrounding plains. With these the struggle was less severe, for they had no more favoured cognate species to contend against, and so they have succeeded in making good their footing on the mountain outposts of the arctic flora.

But with the poppies the case was different. The more temperate forms from the plains must have gradually succumbed to the more favoured northern race; and, once conquered, they went lower and lower, till at last they settled down in the fields where they now exist.

A wide zone of elevation, though partly bridged over by the kindred form of the *Meconopsis*, now separates the field-poppies, *P. rhæas* and *P. argemone*, from their alpine kindred; but, in spite of this, I think we can see that they once must have exercised considerable influence on each other, and that there is good reason for believing that the various races of the alpine poppy, on distant mountain-ranges, are but modified descendants of the *Papaver nudicaule* of the arctic regions.

THE COMPARATIVE SKILL OF TRAVELLERS AND GUIDES.

By F. CRAUFURD GROVE. Read before the Alpine Club on June 13, 1870.

SOME years ago a member of this Club was ascending a small and easy peak in company with a famous Oberland guide. Part of their course lay over a snow-field sinking gradually on one side, sharply ended by a precipice on the other. The two were walking along, not far from the edge of this precipice, when the Englishman, thinking that an easier path might be made by going still nearer the edge, diverged a little from his companion's track. To his considerable surprise the guide immediately caught hold of him, and pulled him back with a great deal more vigour than ceremony, well nigh throwing him down in the operation. Wrathful, and not disinclined to return the compliment, the Englishman remonstrated. The guide's only answer was to point to a small crack, apparently like scores of other cracks in the névé, which ran for some distance parallel to the edge of the precipice, and about fifteen feet from it.

The traveller was not satisfied, but he was too wise a man to spend time in arguing and disputing, while a desired summit was still some distance above him. They went on their way, gained the top, and the traveller's equanimity was restored by a splendid view. When, on the descent, the scene of the morning's incident was reached, the guide pointed to the little crack in the névé, which had grown perceptibly wider. 'This marks,' he said, 'the place where the true snow-field ends. I feel certain that the ice from here to the edge is nothing but an unsupported cornice, hanging over the tremendous precipice beneath. It might possibly have borne your weight in the early morning, though I don't think it would. As to what it will bear now that a powerful sun has been on it for some time,—why, let us see.' Therewith he struck the névé on the further side of the ice sharply with his axe. A huge mass, some twenty or thirty feet long, immediately broke away, and went roaring down the cliff in angry avalanche. Whereat the traveller was full of amazement and admiration, and thought how there, on an easy mountain with smiling weather, he had not been very far from making himself into an avalanche, to his own great discomfort and to the infinite tribulation of the Alpine Club.

Now, was not this an instance of the knowledge of mountains which a man has whose life has been passed amongst them, and

which the traveller, who only roams amongst them at long intervals, can never hope to equal? This one case I have described may, I think, be taken as typical of many. I believe that most of those members of this Club whose experience is considerable, can recall occasions on which, notwithstanding their greatest care and best exertion, they would have fared ill had it not been for some Swiss, to whom 'the snows and rocks and clouds speak by signs which we are unable to read,' to use the language of Mr. Leslie Stephen. As it is with knowledge and judgment, so it is with the purely physical powers required for climbing. What Swiss traveller cannot recall many occasions, when he has seen a guide overcome difficulties which to him, the traveller, if unaided, must have brought utter and hopeless defeat?

I wish, if possible, to avoid exaggeration on this subject. I know that there has sometimes been a tendency shown to elevate the skill of guides into something almost supernatural, and a short time ago a writer in the 'Spectator,' obviously well acquainted with his subject, spoke of those writers in newspapers who seem to regard a guide as a kind of fetich, under whose protection nothing can miscarry, no evil can happen. Newspaper writers here, as in other cases, exaggerate a feeling which undoubtedly exists, but I must say that I think this feeling on the whole founded on good sense and long experience. I will even take the expression used. If any one says that my guide is a 'fetich' to me, may I not answer, 'That is only a figurative way of saying that I have thorough confidence in a man of courage and matured skill when he is engaged in following his own craft'? Let us imagine the same feeling in other things, and even this 'fetich' idea does not seem so very absurd. If three or four Englishmen are going down the rapids of a Canadian river, what is the skill of the boatmen but a 'fetich' to the passengers, who would inevitably be drowned if they tried to go over the course by themselves. What is the skill of an Indian hunter in finding a track but a 'fetich' to a less-experienced man who follows him.

I insist thus on the skill of the professional mountain guides, on their great superiority even to the strongest and most active amateurs, because I think that a disposition to underrate the power of guides, and, as a necessary corollary with enterprising men, a desire to undertake difficult expeditions without them, are likely to lead to practical results of a very serious nature. A gentleman of exceptionally large experience has recently written a work to prove that the greater number of Alpine expeditions may safely and enjoyably be

made without guides. I believe myself that he is mistaken, and I hope he will forgive me if I say that I think that anything like a general belief in his doctrine will probably bring some of his followers to perdition—in an earthly sense. On this work I shall have some remarks to make shortly. I would venture to offer briefly some general considerations first.

I maintain—to put what I have to say in a formal way—

1. That to be a good mountaineer is a very difficult thing, quite as difficult as to excel in any of the great athletic sports.
2. That men who make difficult glacier expeditions without being good mountaineers themselves, and without taking good mountaineers with them, run more or less into danger.
3. That some of the Swiss, living in a mountain country, do acquire very great skill, but that this cannot in the nature of things be attained by Englishmen living in England, any more than a Frenchman living in France can become a good cricketer.

With regard to the first matter, that mountaineering is a difficult thing. At the risk of being accused of a *petitio principii*, I must, having some regard for the time of those present, take this for granted when addressing the Alpine Club. I think that men who have made many expeditions in the high Alps are well nigh unanimous on this subject. Indeed, one has only to consider the remarkable union of qualities which is required for a first-class mountaineer. He must have some power of determining from below the best way up a mountain, or to the top of a col, a thing requiring a long-practised eye and considerable judgment. He must be able to see his way through the complicated entanglement of an ice-fall; to tell from a distance whether rocks are likely to be practicable or not; to follow his line of ascent down again with certainty over a wilderness of rock, where footsteps have left no trace; few know how difficult this is until they try to do it for themselves. He must be able to judge rapidly and surely whether snow is in a dangerous state, and whether séracs are likely to fall; must be strong and enduring, able to undergo the severe labour of making steps in the snow, or cutting steps in the ice, and, most important of all, must have that singular combination of strength with activity matured by long practice, which makes a man a good iceman and a good cragsman. I think it will hardly be said that this is an exaggerated description of what is required for a really good mountaineer, or that excellence is easy of attainment in an athletic pursuit where these qualifications are required. Now as to my second statement—that there will always be danger in glacier expeditions made by men who are not good mountaineers.

Here again I shall be brief. I am sorry to say that there is at hand a proof only too cogent and decisive. I need only point to the sad list of fatal Alpine accidents. Let me observe that these have not by any means been confined to expeditions of great difficulty, but have occurred on all kind of mountains, from the Matterhorn down to the tiny and mule-trampled Monte San Salvatore, where an unfortunate young Englishman was killed not long ago. It would be a waste of time to examine again at length cases which have been handled by critics far more competent than myself. The general opinion of experts has been, that these mishaps have been caused by neglect of the precautions which good mountaineers take and enforce, or, in other words, that there has been, in each case, a want either of skill or knowledge. I think, then, that I may fairly assume that there is some danger even in moderate glacier expeditions, unless fairly good mountaineers are of the party, and that there is considerable danger in great and difficult expeditions when undertaken without the leadership of first-rate mountaineers.

And now as to the other point—the question whether Englishmen can ever attain to some such degree of skill as I have endeavoured to indicate above. An opponent might admit all that I have hitherto said, and still urge that the English are quite as strong a race as the Swiss; that young Englishmen of the middle and upper classes excel in those sports which require a combination of strength with activity and power of endurance; that there is no reason why they should not excel in mountaineering, be it as difficult as may be, if they work at it enough. I should answer, that is in my opinion perfectly true, that the English are quite as strong and capable a race as the Swiss; indeed, that they probably surpass them. For instance, the Swiss are fond of wrestling, but I think that their wrestlers would have small chance against men from the north and west of England; but that, nevertheless, the Swiss are often good and sometimes first-rate mountaineers, while the Englishmen never are, for the very simple reason that they never have an opportunity of properly learning the work. Excellence in any difficult athletic pursuit can only be attained by the man who begins young and practises continuously, and how, with regard to mountaineering, any Englishman is to fulfil these conditions, it is beyond me to discover.

Let me compare the amount of training which a good Swiss guide receives with that which is undergone by a persevering and energetic traveller, and then let me, by way of illustration, attempt to show what hope of excellence in other work such an amount of training as the latter gets would give him.

The Swiss is on the mountain from his earliest childhood. When very young, if he is a strong and plucky boy, he begins to acquire surefootedness and a mountaineer's activity by having to follow about and watch over those enterprising and over-audacious creatures, goats, whom he constantly has to rescue from the dangerous places into which their bold greediness has led them. After some years of this and similar work, the Swiss, if ambitious and anxious to rise above his fellows in the village, takes to chamois hunting, which he begins probably just at that happy time of life between boyhood and early manhood, when skill in a difficult athletic pursuit is best attained. For year after year the Swiss passes his winter in this arduous sport, not unfrequently poaching in the summer besides, until, after many days, he gains the reputation—not easily earned in a Swiss village—of being a bold and skilful gems-jäger, and is an authority on all the adjacent glaciers and ridges. Travellers employ him, and he gets known by degrees. By the time when his reputation is established as a capable and trustworthy guide, he has probably been for eight or nine years constantly on the high mountains. Let me now see what sort of training a traveller gets. He goes to Switzerland probably at about two-and-twenty, that is, 'after the time at which athletic sports are best learnt,' to use again the language of Mr. Leslie Stephen. He spends probably some six weeks in the country, and makes on an average, if blessed with fine weather, about three expeditions a week. After this he comes back to England, and for more than ten months never sees glacier or mountain. The next season comes round. He again goes to Switzerland, again seeks the glaciers. Again a long period of inactivity follows, and so on for five years or so. At the end of such a time he would fairly be considered as a practised traveller. And what manner of chance has this practised traveller, after such late beginning and intermittent work as I have described, of vieing with or even approaching the skill of a man who has trod the mountains from childhood, and whose skill comes from practice of a lifetime? Let mountaineering be put out of question for the moment, and some other difficult sport or exercise taken. What would such an amount of training as I have described be worth? Take cricket for instance. Suppose a man beginning at two-and-twenty were to practise three times a week for six weeks, then not to touch a bat for ten months, then to have six weeks' practice again, and so on for five years. What sort of power would he have in the game? And what manner of cricketer would he be as compared, not with great players, but small professionals or

modest amateurs? Let a similar amount of work, begun as late, and broken by such periods of idleness, be done in boating or in cross-country riding, and where would the aspirant be, as compared again not to first-class, but to moderate oars and to fairly good sportsmen? I do not think there can be much doubt as to the answer. Well, mountaineering, as I have already said, is an athletic exercise or sport, differing, it is true, from those I have mentioned just as they differ from each other, but having one thing in common with them as they have one thing in common with each other—to wit, excessive difficulty; and I venture humbly to maintain that there is no reason for supposing that the difficulty of becoming a good mountaineer can be more easily or rapidly overcome than those difficulties which have to be vanquished in order to attain excellence in other great athletic exercises, and that therefore, for the reasons above stated, Englishmen can never hope, save in cases so exceptional as not to come within the scope of any general argument, to equal even second-rate guides, or to be anything but awkward tyros by the side of bold and experienced chamois hunters, such as those whose names are written in that *libro d'oro* which is to be found in Mr. Ball's 'Alpine Guide.'

Perhaps it may be said of what I have ventured to advance, that it is but killing the slain; that experienced travellers in the high Alps are agreed almost unanimously that in mountaineering the difference between the amateur and the professional is very great, indeed greater than in other athletic sports; and, moreover, that the Alps are quite dangerous enough to render expeditions undertaken by amateurs alone matters of more or less risk. Perhaps it is so. If the members of the Alpine Club are generally of this opinion, then, as I humbly think, so much the better. But is it absolutely so? Has not the unfounded self-confidence which led to the accidents of 1865 re-appeared? Last year we heard of the death of an Englishman of rare activity and strength, who was killed because he thought that he could do even as the guides do. The other day we heard of the death of a man in the flower of youth and strength, an athlete amongst athletes I understand, who was killed because he tried to make his way in the dark over the slopes of a very small mountain. And to add to these the testimony of one who, I am glad to say, is living, a book has appeared to prove the possibility of making in safety a large number of Alpine expeditions without guides, and to show the pleasure thence accruing to all concerned.

The Rev. A. G. Girdlestone, the author of the book in question, is a gentleman whose qualification to write on the subject

no one can dispute, and before briefly examining his account of his expeditions, I hope I may be permitted to pay my tribute of respect to his exceedingly pleasant and well-written narrative. Some admiration is also due to the graphic drawing with which the volume is adorned. I should say, by the way, that this drawing is the cause of the remarks I now venture to submit. It represents a stalwart young Englishman, who has contrived to get into such a position on the face of a cliff that he cannot go downwards, except in one fashion, or upwards or sideways at all, and cannot possibly hold on long where he is. A sympathetic head below is apparently receiving the last injunctions. When I first saw this engraving and read on the corresponding title-page that the work was called 'High Alps without Guides,' I thought that it was written to advocate the doctrine which I have endeavoured to maintain, and that the picture forcibly represented the sort of fix into which an Englishman gets when he goes into high places without his proper Alpine pastors and masters, and how, if he exalteth himself, he shall be most unpleasantly abased. When I discovered my mistake, and found but an Antipope where I expected infallible authority, I was moved to attempt a refutation and to appeal to the Alpine Club to confirm me. I have striven to show deductively, if so large a word may be allowed, why Englishmen cannot hope to rival or even approach guides. By a brief examination of Mr. Girdlestone's records of his expeditions, I will now attempt to show what mountaineering without guides is, as described by one who advocates it.

Twenty-one glacier expeditions made without guides are described or mentioned in the work, but it should be noted that these twenty-one are selected from a much larger number. The writer mentions at p. 57 that he has made more than seventy expeditions without guides. It may fairly be presumed that he has chosen the most successful ones, and that in the remaining forty-nine he did not consider himself fortunate. Bearing this in mind, let us see then what the selected twenty-one were like.

Four of these—to wit, the attempts on the Orteler Spitze, the Aletsch Horn, the Buet, and the writer's first attempt on the Wetterhorn, were complete failures. Four failures out of twenty-one are, however, no great number. Bad weather had something to do with them. How as to the seventeen successful ones?

Well, on one of them, the Weissthor, Mr. Girdlestone got off the right track in ascending, was in consequence exposed to a shower of falling stones, and had, to use his own words, 'to run for his life,' finding his way ultimately by the tracks

of another party. On another, the Sella Pass, he mistook the way down, and he and his companion had in consequence to pass the night out, sitting for eight hours on a narrow ledge of rock slanting downwards, their legs dangling in the air and stones falling close to them. The danger of being frozen to death was not inconsiderable. On another, the Oberland Trift Joch, Mr. Girdlestone began to cut steps on a snow-bridge too weak to support him. The bridge gave way; down went Mr. Girdlestone and his friend, falling twenty feet and alighting on their heads; after them playfully bounded a huge block of ice, but about this let me quote the writer's words: 'My coat was held firmly down under an immense block of ice by the elbow and right pocket. Had the block fallen an inch nearer, my right elbow must have been crushed, and we must have laid there and died.' That is, he and his companion must have died by one of the most horrible deaths which it is possible to conceive. Thus in three expeditions out of seventeen the writer and his companions had three narrow escapes, two caused by want of local knowledge which any common local guide would have supplied; the third by a mistake as to the tenacity of an ice-bridge, which probably no decent iceman would have made.

With respect to the fourteen remaining expeditions, I would observe that on four of them, the Tschingel, the Clariden Grat, the Alphubel, and the Col d'Herens, Mr. Girdlestone found his way in part by the tracks of others. Now of course he was perfectly right to take a track when he found it, but he can hardly say when he has done this that he has crossed a pass without guides. On some passes, the Alphubel and Tschingel for instance, the only function of a guide is to be a guide in the literal sense of the word, and to show the way. If a man crosses by the aid of the tracks which another man's guides have made, he has gone over by having the advantage of other men's work. It is noticeable that on two of these four passes, the Tschingel and Alphubel, Mr. Girdlestone lost his way after leaving the glacier when the tracks ceased. There remain then, out of twenty-one expeditions, ten in which Mr. Girdlestone succeeded without having a narrow escape, and without being aided by the tracks of others. These were the Adler, the Brunni Pass, the Ofen Fuorcla, the Löttschberg, the Löttschen Lücke, the Sursura Joch, the Strahl-eck, the Col du Tour, the Col du Mont Tondu, and the Wetterhorn, on which last, after one failure, Mr. Girdlestone succeeded by a second and most gallant effort. I gather from the writer's account that, out of these, four, although glacier

passes, were exceedingly easy, not more difficult apparently than the St. Théodule, and, if so, they would hardly come into the category of those expeditions which in the opinion of most Alpine men it would be imprudent to undertake without a guide. Be this as it may, there can be no doubt that some of the expeditions mentioned must have involved very considerable difficulties for men without professional aid, and that the ascent of the Wetterhorn especially was a remarkable feat. Indeed, I think that no one who reads Mr. Girdlestone's book can doubt that, on every expedition described, he did everything that could be done by courage, determination, and such skill as an amateur can possess. That skill I have endeavoured to show must, in almost all cases, be very small.

The net result, then, of mountaineering without guides in the present instance appears to be this:—that in twenty-one expeditions selected out of seventy for description, the traveller failed absolutely four times; was in great danger three times; was aided in finding the way by the tracks of other men's guides four times; succeeded absolutely without aid of any kind ten times on expeditions, four of which were very easy, three of moderate difficulty, and one very difficult. Making excursions without guides is no doubt a bolder and harder thing than making them with guides; but mountaineering, however bold and hardy or not, is after all a sport not a duty. Whether in going without guides the game is worth the candle, Mr. Girdlestone has, as it appears to me, given us a very good opportunity of judging.

Before concluding this paper, I would say that I feel that some apology is due from me to the Alpine Club for bringing forward a subject which many members of Alpine experience very much greater than mine are infinitely better qualified to treat than I am. Unfortunately for this matter, the men who are most active in the Alps are often when at home the most active in the work of life, and have little time to spare for the writing or reading of papers. I have therefore ventured to speak on the subject in the hope that the Alpine Club may pronounce an opinion against mountaineering without guides, a practice which I believe to be fraught with danger, unless the most extreme and elaborate precautions are taken. I would then fain finish according to a good old-fashioned formula, by saying that if the opinions elicited from leading members of the Club by this paper are the means of preventing any enterprising young gentleman from knocking himself into little bits, breaking his back, rubbing his head off, or enshrining himself in a glacier, then these humble lines will not have been written in vain.

NOTE BY THE EDITOR.

A discussion followed the reading of the above paper, in which Messrs. Ball, Wills, W. Mathews, Ramsay, Foster, Freshfield, Hudson, and Stephen took part. The opinions expressed were generally in accordance with those defended by Mr. Grove. It was agreed, on the one hand, that it was impossible to lay down any rigid principles upon the use to be made of the assistance of guides. The skill of the travellers, the difficulty of the mountain, the state of the weather, and various other conditions must be taken into account before the prudence of undertaking any expedition without guides can be precisely estimated; and as no exact measure of the degree of difficulty can be obtained, the question must be left in each case to the judgment of the persons concerned, with, of course, a general presumption in favour of the more prudent decision. On the other hand, it was agreed with entire unanimity, that the expeditions described by Mr. Girdlestone by no means justified that gentleman's inferences. It was the general opinion that he had not taken proper precautions, and that, if his example should be generally followed, the result would be a frightful increase of accidents. Mr. Wills called special attention to the extreme impropriety of taking inexperienced travellers upon expeditions, which can never be free from a certain amount of danger. By such a course the risk is enormously increased, and almost every fatal accident has been due either to the non-observance of this rule, or, though more rarely, to a neglect of the well-understood precautionary measures by more experienced men. Nothing can make mountain expeditions, whether in the higher or in the lower regions, entirely free from risk; but it was agreed, without a single dissentient, that it is highly desirable that it should be known to be the settled opinion of the Alpine Club, that, whilst the danger may be reduced to an insignificant amount by proper care, the neglect to take guides on difficult expeditions, and especially the neglect to take them when the party is not exclusively composed of practised mountaineers, is totally unjustifiable, and calculated to produce the most lamentable results. Whilst it is impossible to give a formal code of rules upon the subject, or to give effect in any other way to the general opinion of the Club, it was desired that their opinion should be recorded in the Journal in the most unequivocal terms.

THE
ALPINE JOURNAL.

NOVEMBER 1870.

ALPINE FLOWERS. By THOS. W. HINCHLIFF.

OUTSIDE scoffers have often accused the members of the Alpine Club of being mere climbers, semi-lunatics, who through the whole summer live in an atmosphere of self-imposed peril, ready at any moment to risk their lives for the empty pleasure of scrambling where nobody else has scrambled before, and without a particle of intelligent interest in anything that they may happen to see by the way. This may be the case with some, but a glance at the list of members will abundantly testify to the fact that some of the most enterprising and successful climbers have found time also for doing good service in geology, botany, surveying, and glacial science, the last of which especially would have had very small chance of advancement without the labours of those who, at the time, were probably classed among the unprofitable and aimless lunatics. The mountain world is well known to afford the highest possible interest to the scientific student of natural history; and even the humblest lover of nature may derive infinite pleasure from cultivating his favourite pursuits among the most apparently desolate regions of the High Alps. There is no small gratification in a successful hunt for crystals in the rocky fastnesses above the Col du Géant or the unfrequented precipices behind the Aiguille Verte; and great as is the pleasure of ascending the moderate mountains of 11,000 feet or 12,000 feet above the sea, the pleasure is very greatly increased to a lover of flowers, if he can find a blooming bunch of the purple saxifrage or *Ranunculus glacialis* on its topmost rocks. Those who undertake the longest and most arduous expeditions have certainly a good excuse wherewith to defend themselves

from the charge of not making use of their eyes ; they may say with the utmost truth that they have no time for making use of anything but their hands and feet. The whole success of such expeditions depends upon all the party progressing like one man steadily towards the object in view ; and the interruptions and delays caused by any one hanging behind or straying to the side would, in many cases, entail failure for all, and dismal objurgations upon those who caused it. The scientific mountaineer must, however, remember that in all probability no one would ever have cared much to investigate the little mountains if it had not been for the big ones. To our ancestors and predecessors, from Ovid downwards, a mountain was a mountain, and a snow mountain, large or small, was simply a thing to be avoided and accursed. It is only in very recent days, amidst the general thirst for new experiences and fresh fields of knowledge, as well as of pleasure, that men were tempted to investigate the awfully mysterious peaks which pierced the blue of distant skies, and seemed to offer a universal challenge which generations after generations had declined to accept. It was the view of Mont Blanc from Geneva that first tempted De Saussure, the father of mountaineers, to break through the fears and evil auguries of his contemporaries ; and let it never be forgotten that this first enthusiastic climber was also eminently distinguished in the fields of natural science. The more of our modern mountaineers who can be found to imitate his example, the better it will be for themselves as well as for the rest of the world.

Admitting that the longest and most arduous mountain expeditions give little or no time or opportunity for the careful examination of anything but rocks, snow slopes, and crevasses ; admitting further that we number among us certain youthful enthusiasts who will not condescend to feel the smallest respect for anything in the mountain world except the most difficult peaks, passes, and glaciers to be found, and who would rather toss and tumble in their beds than waste their time in the pleasures of a quiet walk : admitting all this, I cannot but think there must be a large number of the somewhat less ambitious order, who find the pleasures of each favourite Alpine haunt very considerably increased by a taste for the more or less scientific scrutiny of the natural objects which surround them. In addition to those who may from various causes be unable or unwilling to enrol themselves among those worshippers of the Alps, who will sacrifice upon none but the loftiest altars, there are many who, after having performed their share of reverence in that particular form, still retain their old veneration for the mountain world,

though satisfied with less elevated shrines. For my own part, I can very confidently say that the attractions of the Alps increase in number and intensity every year that I find myself among them. Memory is too weak to retain the whole splendour of scenes which each year seem in reality to surpass the expectation; and those who have a general knowledge of the mountains, will find an ever-increasing pleasure in the examination of their details.

For the present moment, I have no concern with glacial theories or the many stupendous questions which present themselves to the consideration of those who have time and inclination to use their eyes and their brains while climbing among the recesses of the High Alps; but my thoughts have been induced to wander among ferns and flowers by a perusal of Mr. Robinson's book * of 'Alpine Flowers,' in which the author strives, not unsuccessfully, to prove that the greater part of the beautiful plants which contribute so largely to the beauty of the mountains may be cultivated in an English garden, and that, if the English Mahomet cannot go to the Alps, the Alpine Flora can be brought to Mahomet.

The title of the book is very attractive to those who are equally fond of mountains and of flowers, and find one of the highest forms of happiness in the combination of the two. I had hoped to find accounts of many wanderings in highways and byways, in rich valleys and rocky glens, and of the rare and beautiful plants that are to be found in particular localities, and at different seasons of the year. It was therefore with no small disappointment that I found only forty-two pages devoted to what is very properly called 'A Little Tour in the Alps.' The little tour consists of a trip on the Salève; a walk through the valley of Saas in such weather that no flowers were visible till the snow was shaken off; the passage of the Moro; and the descent of the Val Anzasca from Macugnaga. The rest of the book is a gardener's manual rather than a traveller's companion, and the few illustrations of mountain scenery have, so far as I can see, no relation whatever to the places described in the text. We must not, however, forget that the term 'Alpine,' when applied to plants, is by no means exclusively connected with the Alps of Europe; and in the list of plants described by the author, and recommended for cultivation, are many that hail from Asia Minor and the Rocky Mountains, from Mexico and the Himalayas.

* 'Alpine Flowers for English Gardens.' By W. Robinson, F.L.S. (Murray.)

If we are disappointed at its not being a practical mountaineer's book, we ought to remember that it makes no pretension to be so; a very few pages are sufficient to assure us that 'it contains no exciting account of attempts to mount any peaks that happen to be a few hundred feet higher than those of comparatively easy access.' It may, nevertheless, be hoped, that Mr. Robinson will have other opportunities of being more fortunate in weather, and seeing more for himself how glorious are the Swiss flowers under favourable circumstances. If he could have spent a summer's day at Saas, and climbed up the wild slopes below the Weissmies, or scrambled about the sides of the Findelen Glacier, he would never have insulted such a gem as *Senecio uniflorus*, by saying that 'its flowers are poor, and should be removed, as tending to weaken and disfigure the plant.' This treatment may, perhaps, be applied with propriety to such specimens as can be produced in botanic gardens or artificial rockwork; but no one who has seen the flower in its native purity can fail to designate such a proposal as blasphemous in the extreme.

Though the author of this book has evidently as yet had few opportunities of seeing the flowers of a true Alpine country in their natural state of uncivilised beauty, it is equally clear that he has a true love for them, and a thorough practical knowledge of the best means of cultivating them. His remarks about the construction of rock-gardens are admirable, and he has by the aid of very careful illustrations pointed out in the clearest possible way what should be done and what should be avoided by those who aim at the successful reduction of these wild beauties into a state of domestic slavery. He has, as it were, dissected out many of them from their stony homes; and found that, though they may apparently have little or no means of subsistence, yet they are in fact nourished by masses of fine roots which push their way far into clefts and fissures, diving into a congenial soil at such a distance from the surface as to render them comparatively independent of changes in weather and temperature. Thence he clearly shows the principles that must guide us in the construction of places adapted for their artificial growth. It is not enough to pile up a heap of stones and brickbats and scatter a little earth at hazard on the top of them; there must be a proper depth of soil for the nourishment of the plants, and well-arranged apertures between the stones or rocks for the protection of the roots from the extremes of climate and temperature. Good drainage is perhaps more necessary than any other of the precautions to be taken. In

addition to the consideration of requisites, due weight should be given to matters of taste, and in this respect also there is probably no better guide than Mr. Robinson.

There is, of course, no doubt that very many of our established garden flowers are essentially Alpine in their origin; and every year is adding to the number of species which can be safely introduced from the upper regions of vegetation. Some of these, with even the most moderate care, may be maintained in all their natural perfection; others struggle feebly for a few seasons, and then perish; others, again, succeed very fairly, though with some diminution of the peculiar brilliancy which is the inheritance of so many children of the Alps. I have, for instance, for several years cultivated the yellow Alpine Foxglove; it proves itself a true perennial, and in a mixed bed it is a great ornament, particularly in combination with our own red and white varieties; but though it throws up abundance of very strong flower-stalks, yet the size of the blossoms and the depth of the colour are inferior to those which may be seen in the Hasli Thal or by the side of the St. Gotthard road. Anybody can grow the *Gentiana acaulis* or the Alpine Rhododendron with perfect success, but he may consider himself fortunate indeed if he can reproduce the dazzling blue flowers of the *Gentiana verna*, which is the chiefest ornament of the High Alps.

Many who have time and opportunity, in addition to a favourably situated garden, will doubtless find great pleasure and interest in endeavouring to raise many of those plants which are commonly supposed to be altogether dependent upon mountain air for their existence; the experiment will be laborious and expensive, besides being too frequently disappointing, but he who is prepared to open his purse to Mr. Backhouse and his ears to the counsels of Mr. Robinson, will have as good a chance of success as can be expected in a world of uncertainties. I leave the Alpine horticulturist safely in their hands, and am not going to infringe upon their peculiar province. Admitting my own devotion to the charms of horticulture, I must remember that the pages of the 'Alpine Journal' are not so much intended for gardeners as for practical pedestrians and mountaineers—men who would be more easily tempted to scramble over stony places in search of plants during the summer months than to bother themselves with their cultivation through the remainder of the year.

Considering the extreme beauty and immense variety of the Alpine flowers, it seems surprising that such a small proportion of our mountaineering fraternity ever pays the slightest

attention to them, or thinks it necessary to know anything beyond the difference between blue gentians and Alpenrosen. They lose a very great and lasting pleasure—a pleasure which not only greatly increases the enjoyment of each particular walk, but which throughout life will adorn and beautify the mountains as they appear before the memory. Hundreds of balmy openings in the forest, and dark glens among the rocks, instead of being merged in the vague mass of general beauty, become fixed for ever in the grateful remembrance of him who can associate them with the discovery of some unusually fine specimen of a flower or a fern. The habits of observation acquired in the course of his pursuit enable him to understand a host of details which escape the notice of those who only condescend to open their eyes when they get upon a glacier, and who shut them up again when they take off their spectacles on the return. He learns the art of adding an accurate and beautiful foreground to the magnificent pictures of the mountain world. He can feel no sensation of dullness, even in solitude; every sunny bank and every fern-nourishing stream speaks to him by the way, and he knows that even the dreariest spots may at any time produce some of his choicest treasures.

If plant-hunting in general is a delightful and instructive pursuit, it becomes doubly so in a mountain country. Not only are most of the Alpine flowers particularly beautiful in themselves, but the variety of elevation and consequent temperature enables us to study many of them under very different circumstances. Many others refuse altogether to modify their habits, and evidently declare that they will only live at a particular height above the level of the sea, or in one particular kind of situation; and it is a matter of no small interest to watch for and determine these very differently regulated plants. The *Gentiana acaulis*, for instance, whose dark blue trumpet-shaped flowers are well known in our gardens, seems exactly the same in size and colour at the level of the sea as in its native Alps, from 5,000 to 7,000 feet higher. Here, in Essex, where I am writing, we had in the spring about fifty blossoms at the same time on a plant one foot in diameter. The *Gentiana campestris*, on the other hand, has a much wider range of elevation, but varies in proportion. On the Riffelberg and Eggischhorn—i.e., from 7,000 to 8,500 feet—it appears in myriads during August and September, but is seldom more than two inches above the ground; in the Lower Alps it may be seen somewhat earlier about six inches high; but in the woods of Baron Rothschild, near Tring, in Hertfordshire, I have seen it of double that size, and with far finer flowers. The

common Alpine roses, *Rhododendron ferrugineum*, may be roughly said to range through elevations of from 4,500 to 8,500 feet without any diminution of their size and luxuriance, but in certain unfrequented rocks of the Riffelberg I have found them covered with bloom two or three weeks after the disappearance of the last blossoms in the neighbourhood of Zermatt. Thus, while some flowers give a kind of barometrical indication of their situation by the season at which they bloom, others tell the same tale by their stunted or luxuriant proportions. The same remarks of course apply to all hill regions, and I have been equally interested among the Organ mountains of Brazil in watching the gradual diminution of the magnificent bamboos, from 60 or 80 feet in height to about a third of the size as we ascended a few thousand feet above the hot and teeming forests of the lower land.

So also with respect to ferns. The Swiss Alps contain, I believe, no species of fern that is not occasionally found in Great Britain; while, on the contrary, after many years of looking through most parts of Switzerland, I have never there found a single specimen of *Scolopendrium* or *Asplenium Adiantum-nigrum*. If, however, we include the Alps from the Adriatic to the Mediterranean, we soon add to the British ferns several which, like *Pteris cretica* and *Nothochlæna marantæ*, require protection in an English winter, as they do not frequent great heights above the sea. But some of the hardier species which are common to both England and the Alps, have a very great range of elevation among the latter; and those who collect them will be much struck by observing the difference of appearance imposed upon them by a difference of conditions. Take, for instance, the holly fern, *Polystichum lonchitis*. The finest specimens I have ever seen of it were in the Creux des Champs, at the foot of the Diablerets, where the fronds rose in magnificent crests, some of them being 2 ft. 4 in. in length. About a third of the way up the Faulhorn from Grindelwald, they are almost as fine, and far more numerous; at the base of the Fée Gletscher Alp, and on the lower slopes of the Weissmies, the diminishing process may be seen; while hidden in the interstices of a group of loose rocks not far from the foot of the Riffelhorn, at a height of about 8,600 feet, I know of a few specimens which, though very interesting in respect of the elevation at which they contrive to exist, are scarcely larger than those for which the Keswick guides endeavour to extort fabulous prices. Close to these, and concealed by the same friendly stones from all but the most inquisitive eyes, may be found a few tufts of *Asplenium viride*, with fronds of about

half the usual length, but double the usual number—evidently the very best arrangement that could be devised for their protection at such an unaccustomed altitude. *Cystopteris fragilis*, in the same place, is not only dwarfed, but much beaten about by weather. About 100 yards further, however, in the recesses of a cave facing the Görner Glacier, and entirely protected from the possibility of a chilling blast, it may be found in thick bunches of delicate green fronds, as perfectly developed as if they were at the bottom of an Italian valley.

Very different from this audaciously ubiquitous fern is the beautiful and comparatively rare *Cystopteris montana*, which confines itself exclusively, as far as I know, to one level. I have never found it except on the northern side of the central chain which extends from the Wetterhorn to the Diablerets. It is to be found within a five minutes' walk from the Rosenloui Inn; it is close to Kandersteg, at the foot of the Gemmi, and in an exactly similar situation at the foot of the parallel Rawyl Pass; and it is found again in a scramble among the lower rocks on the north side of the Diablerets. All these habitats have much the same elevation, and I have never found a single specimen more than a few hundred feet higher or lower.

With the exception of the *Woodsias*, by far the rarest fern in a Swiss collection will probably be the beautiful *Asplenium fontanum*. I have carefully examined banks, and hollows, and rocky clefts, in almost every part of Switzerland, and have never found a specimen of it except, strange to say, by the side of the carriage-road from Aigle to Sépey, where it is in great perfection and abundance, but *only within an area of a few hundred yards*. It is said to exist still upon the Salève, near Geneva, but I have never been there. One of the most interesting objects of search is the *Adiantum capillus Veneris*. In spite of the assertion of a too enthusiastic lady, that she had found plenty of it in the Gasteren Thal, it may be pretty confidently stated that this fern does not exist in Switzerland proper, north of the main chain of mountains. Everybody who has been in Italy knows how universally it ornaments each shady rock from the Borromean Islands and the Grotto of Egeria to the extremities of the Two Sicilies. Where, then, is the natural frontier or barricade of climate beyond which the universal favourite cannot pass? In the course of crossing almost all the highways and byways from Switzerland into Italy, I have always kept an eye open for the first traces of this fern; and, for the benefit of anyone who may like to look for it in the same place, I may say that the point where I found it nearest to the great mountains is among some small

rocks about half-way down between Valtournanche and Châtillon. Here, thanks partly to the protection of a magnificent chestnut tree, it contrived to maintain a precarious existence; and I was greatly interested in seeing this luxurious child of the South reduced by starvation and unfavourable circumstances to the very edge of its grave. The tender little fronds were in no case more than 2 inches in length, and were almost destitute of the branching form. They looked so small and frail, so frightened perhaps at having got comparatively near the Matterhorn, that I thought one night of extra severity might destroy them so completely that the 'place thereof should know them no more.'

These are but a few samples of the circumstances of climate and situation which may give additional interest to the search for, and observation of, particular plants; the whole subject is full of attraction to anyone who has made the first start in it, and has found that 'Ce n'est que le premier pas qui coûte.' One fact cannot be too strongly impressed on those who wish to worship at the shrine of Flora Alpina—they must, if possible, visit the country between the latter end of June and the first week of August, after which time not ten flowers out of a thousand remain to be seen; it may be said pretty safely, that those who cannot leave home till the fashionable season, have no idea whatever of this peculiar glory of the Alps. The lower elevations should, of course, be chosen first for examination; Saas, Zermatt, or the Eggischhorn will keep for a week or two after such a warm corner as the Diablerets. Suppose we pay a visit to the latter at the end of June or the beginning of July. It would be difficult to find a more beautifully-placed high-road than that by which we wind up to Sépey from the valley of the Rhone. Rather more than half-way up, where steep rocks on the left look down into the profundity of the forest-clad valley on the right, there, as I have said, you may find to your joy the *Asplenium fontanum*. Feast your eyes upon it, for you will see it no more. As you turn to your right from the pretty village of Sépey you will see the tall stems of the large yellow foxglove, with long spikes of apricot-coloured blossoms, and make a note to bring home some of the seeds if you pass by any of them in the autumn. As to the Hotel of the Diablerets, it is then a house surrounded by a sea of flowers. As the peasant makes play with his slashing scythe, we wonder what kind of hay he expects from a crop which consists chiefly of geraniums, polygonums, orchises, purple salvias, and gigantic dandelions. In front is the magnificent cirque-like amphitheatre formed by the mighty rocks

of the Diablerets, down the sides of which leap half-a-dozen waterfalls, to form the stream which rushes by your feet, after twisting for a few miles through the pine forests which descend from both sides to overshadow it. These woods, and the wild open space near the base of the mountain, are a magazine of flowers and ferns. Here are masses of our garden columbines and *Aconitum anthora*, the yellow monkshood, mixed with exquisite clumps of the *Thalictrum aquilegifolium*, waving long pendulous bunches of lilac fringe. Inside the woods, the ground is in many places carpeted with the delicate white blooms of the *Maianthemum bifolium*, younger cousin of the lily of the valley, which is itself to be found in a few places higher up. Near the side of the stream, the *Pyrola media* is accompanied by groups of *Pyrola rotundifolia*, whose tall spikes of white flowers and orange stamens would do credit to the most refined of nosegays. Yet a little further in the wood, and at first singly, then in sheets of white, come the lovely blossoms of *Pyrola uniflora*. The white wax-like stars of this gem of flowers, which for a few days scent the air around them with a delicate oriental perfume, would alone be worth going far to see.

Emerging from the pleasant shade upon the open Creux des Champs, you fancy you see golden curtains hanging from ridges of brown rock, and festooned among the deep green branches of the pine forest. What a combination of colour! Scramble up through beds of oak fern and groves of that splendid *Spiræa* which waves its huge white crests before the breeze. Look up presently, and you will find what the golden curtain is made of. It is a magnificent laburnum, the *Cytisus alpinus*, whose roots are buried between the rocks above, while a thousand tails of yellow blossoms hang down in clusters before your delighted eyes. Farther on, in openings among the slanting woods, may be found the pure white blossoms of *Anthericum liliago*, one of the most conspicuously beautiful among the early flowers of the Alps.

In front of the rocky fortresses of the Diablerets is a kind of island, each side of which is swept by the streams that descend in long waterfalls from the mountain. The trees here lie strewed about the ground and torn to pieces in such numbers, that the place must be a very temple of the wintry winds; but among the battered remains may be found many a good example of a natural fernery. Not far from one of these streams, on a broken, rocky slope, partly covered with bushes, I found no less than fourteen distinct species of ferns within a few yards of one another. They were all in remarkable perfection, and

among them were many holly ferns more than two feet in height. A little lower down is a small colony of lilies of the valley; and a little higher up, close to the first opening rhododendrons, we found, among other treasures, the great *Aquilegia alpina*, before which all other columbines must hide their diminished heads. I know of no flower which may be found in more unexpected places than our old friend the lily of the valley. Once upon a time, rather late in the season, as I was coming down the last part of that curious path from the Engge of the Wetterhorn, I observed some of the leaves of this plant, and made a mental note to come and look for the flowers at a more convenient season. Seven or eight years afterwards, being at Grindelwald during the first half of July, I went straight to the place, and found thousands of them in the beauty of their early bloom. Only a very few hundred yards from the well-trodden route of the Great Scheideck, the huge unpromising slopes of loose stones and débris at the foot of the avalanche-shoots were literally covered with beds of these lovely flowers, varied by the lilac tufts of *Globularia nudicaulis* and the tall snow-white blossoms of *Anemone alpina*. A splendid blackcock, rising from some rhododendron bushes close by, testified to the normal quiescence of a spot which would probably be more visited if the sojourners at Grindelwald had any idea of the treasures in store for them at the cold foot of the Wetterhorn. The beautiful yellow anemone, *A. sulphurea*, is considered only a variety of the white *A. alpina*, but as far as my observations go, it often inhabits separate localities—a subject on which I should like to have further information. In the Grindelwald valley, for instance, I found that on the southern or shady side, the white form was universal; while on the sunnier slopes of the Faulhorn the yellow variety prevailed.

This was exactly the time for settling down into residence at the ever-beautiful Grindelwald. Everything was perfect either for high mountaineering or botanising, or a mixture of the two. The long midsummer days tempted us to stay out till the latest of late dinners, and then who shall describe the splendour of the scene as we sat in the balcony of the Adler Hotel, and saw the edge of the Eiger, and that great white wall of the Viescherhörner shining like polished silver in the light of a full moon, which was still hidden from us by the gloomy rocks of the Mettenberg? The house on the top of the Faulhorn was opened on one of the first days of July. The heat in the valley was tremendous; the upper third of the mountain was still covered with snow, but the middle region was a

garden of flowers, dotted here and there with patches of still unmelted snow. A long half hour's pull up the usual path from Grindelwald lands us on a tolerably level part of the mountain, where dark blue beds of *Gentiana acaulis* are close to some luxuriant specimens of a great variety of ferns. The yellow anemones are as perfect as can be seen, scattered on all sides in little groups and clusters among oak-ferns and rhododendrons, and the white clumps of *Maianthemum bifolium*. Moist places are gay with tall purple orchis, and the edges of a little stream are fringed with the delicate heads of *Primula farinosa*. Up among the rocks on the left of the waterfall, a short scramble will be rewarded by a good boxful of flowers, conspicuous among which I there found the best specimens of *Anthericum liliago* that I have ever met with. A little higher than this, as the snow patches become more frequent, we came upon abundance of *Primula viscosa* in full bloom. There is hardly a district in the Swiss Alps where, during the full summer and autumn seasons, you will not see scores of rocky ledges covered with the stout leaves and slender seed-stalks of this plant and several species closely allied to it. In spring and the earliest summer these primulas are in all their glory. The rocks are in all directions fringed with row upon row of their exquisite clusters of lilac and magenta-coloured blossoms, every vestige of which will disappear before the popular Swiss season has begun. The *Primula auricula*, a lovely flower of the purest yellow, is to be found only at or about the same time; but, as a rule, in very different situations. The *Primula viscosa* generally frequents the cool clefts of shady rocks; the *P. auricula* I have always seen at its best among grassy slopes, with its face towards the mid-day sun. It is frequently in company with our old English friend, the oxlip, as for instance, by the foot of the Blumlis Alp Glacier, where, near to the châteaux, I have seen them both in perfection, and almost touching blue cushions of *Gentiana verna*, about a foot in diameter of solid bloom.

I have lately been talking of flowers which for the most part appear only some time after the melting of the snowy covering which has protected them through the winter. But on the Alps in early summer we have the opportunity of seeing much more impatient and uncontrollable flowers than these. On such Alps as those of the Faulhorn there are acres of blue and white crocuses in full blossom under the snow; and as the fierce midsummer sun daily diminishes the size of the snow patches, thousands of their blossoms emerge and gradually lift up with thankfulness their oppressed heads.

If you raise a few handfuls of rather deeper snow, you will find hundreds more of them lying almost flat upon the ground and anxiously waiting for their share of the great warmth-giver. A few feet only from the retiring snow, where the soil is still soaked with its melting, the purple bells and drooping fringe of the *Soldanella alpina* spring as by magic out of ground which is yet brown from its burial during six months of wintry sleep. Lovely indeed is this waking from slumber, this melting of death into life. On one of those bright first days of July we ascended the Männlichen, a grassy mountain about 7,500 feet high, which forms the angle between the two Lutschine rivers, and thus commands the valley of Lauterbrunnen on one side, and that of Grindelwald on the other. The collection of flowers grew rapidly as we moved upwards. Pink rhododendrons and purple columbines were supplemented by yellow anemones and blue gentians; then came the white crests of *Anemone narcissiflora*, beautiful to behold; then crocuses, blue and white, and beds of the lilac-belled soldanella on the margin of the snow. In open places upon the top was an abundance of the delicate *Lloydia serotina* and *Myosotis alpestris*, which far excels all other forms of forget-me-not. I made a large snowball, and bored a hole in the middle of it with my finger; into this I put the bright cluster of Alpine beauties, and made a bouquet whose effect could scarcely be surpassed. It was worthy of the scene.

The Riffelberg, which from the second week of August is about as bare as the South Downs, is in July an almost continuous carpet of flowers, and it would be a good summer's work to botanise this district alone. Half way up the path from Zermatt, in addition to the usual anemones, there is an abundance of the purple *Anemone Halleri*; and higher up comes the small but elegant *Anemone baldensis*, and some of the rarer ranunculuses, such as *R. pyrenæus* and *R. rutefolius*. But it is impossible here to speak of these floral legions excepting in a general way. One fact is particularly worthy of observation. The higher we get among the Alpine flowers the more clearly we see what may perhaps be called the concentration of nature. Larger leaves and coarse stems gradually disappear with every upward step we take. The resources being so small, they are made the most of. There is no time for stalks and leaves in the short summer of the High Alps, so the whole energy of the plant is thrown into the flower and the consequent means of reproduction. The most beautiful gentians are almost entirely blossom; so is the brilliant yellow *Aretia vitelliana*, the *Androsaces*, the higher saxifrages, and a

hundred other inhabitants of such places as the G6rnergrat. Eminent among them is the true *Myosotis alpina*, which, instead of wasting itself in straggling stalks, like our English species, forms close tufts of blossoms, massed together like a bunch of turquoises. Still more exquisite as an example of this is the *Eritrychium nanum*, whose dense blue clusters are scarcely raised above the ground, and I ought not to forget the ubiquitous *Linaria alpina*.

The Engadine is the beginning of that Eastern Alpine district which presents us with many plants which are seldom, if ever, found in other parts of Switzerland. At Pontresina, in August every rock and boulder in the woods is covered with the delicate and sweet-scented *Linnaea borealis*. The *Polemonium c6eruleum*, our Jacob's ladder, is very abundant, together with various lilies; and before reaching the Rosegg Glacier, anybody of the most ordinary observation can scarcely fail to gather the Alpine daphne, and inhale a perfume which he is never likely to forget. The banks of the stream which rushes under the bridge at Pontresina are festooned with the lilac blossoms of the *Clematis alpina*; and the yellow *Papaver alpinum* may be found in abundance among the d6bris near the two lakes at the top of the Bernina Pass.

A word with regard to drying and preserving plants. People are often found to complain of a herbarium as being merely a collection of dead flowers that give no idea of their original and living beauty. This is certainly true of a great many among the finest of them, unless good fortune is added to great care on the part of the collector. With proper attention, he need never despair, particularly if he remembers that some of the most delicate flowers which would lose their colour in absorbent paper can often be preserved in full beauty by pressing them in an ordinary glazed sheet from the letter-case. Apart, however, from the interest of making and possessing a good collection, the system may be defended as the best way of obtaining a knowledge of plants. The processes of gathering them, handling them, laying them out, cleaning their roots, and carefully examining them at each change of the drying papers, all combine to give an accurate elemental knowledge which is easily increased and improved by the concurrent study of books. A plant that has been properly examined and preserved is so fixed in the memory that it ought never to be forgotten. But I must say no more. I have avoided all mention of the science of botany, knowing well that he who once adopts a taste for flowers will soon proceed to learn something more about them than that which merely

pleases the eye at first. He will soon find an increasing interest in the revelations of his pocket-lens and the extension of his herbarium. I have only mentioned a few of the typical flowers of the Alps and their abodes, in the hope of inducing some of my friends to search about for themselves. The pursuit will enliven many a dull walk, and lead them into many fair places that they would not otherwise have seen. In all countries they may visit, in all climates and in all weather, they will carry about with them a constant companion, and a distinct pleasure to be added to any which they may have previously enjoyed. The more countries that they see, the more they will enjoy the study of each separate Flora. He who has hunted up all the ferns and flowers of Devonshire lanes and Cumberland mountains is so much the better prepared for examining the botanical treasures of the Alps. So much the more is he disposed to enjoy the same pursuits in Southern Europe. The mountains of Greece and the Ionian Islands, for instance, will show him forests of gigantic olives with clusters of sweet cyclamens about their feet, and groves of myrtles still in fullest bloom, while clumps of snowdrops round their outer branches tell the approach of what we should call a premature spring. Still more will he be delighted if his happy fortune takes him into tropical regions, where old hothouse friends welcome him in wild luxuriance; where huge ipomeas and scarlet passion-flowers twine round the green bamboos; where cactuses fill every cleft among the granite rocks, and gorgeous orchids hang from the branches of a virgin-forest. And the more he sees and knows of each and all of them, the more compelled he will be, in reverential happiness, to think of those noble words, 'Consider the lilies of the field; they toil not, neither do they spin; yet I say unto you that Solomon in all his glory was not arrayed like one of these.'

THE ASCENT OF THE CIMON DELLA PALA.

By E. R. WHITWELL.

WHEN I read in Mr. Stephen's entertaining article on the Peaks of Primiero, which appeared in the February number of this Journal, that the Cimon della Pala and the Palle di San Martino were generally considered to be inaccessible; and further, Mr. Stephen's devout and almost pathetic wish that such might prove to be the case, an immediate desire took possession of me to see these peaks, and if possible attempt

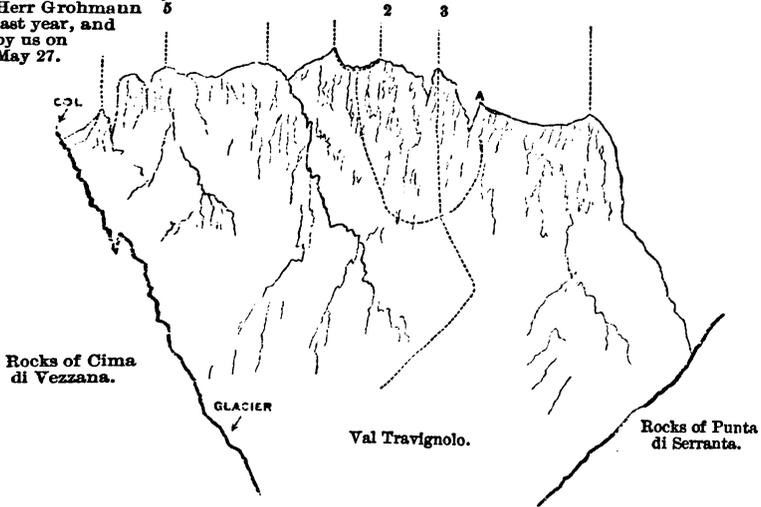
their ascent, which Mr. Stephen had not had the opportunity of doing. Mr. Tuckett had already asked me to join him in an excursion among the Dolomites early in the summer, and it was therefore with a thrill of pleasure that I noticed in our programme, which he was good enough to prepare, the names of both these mountains among those whose ascent we might hope to accomplish. It was, however, rather damping to my hopes to receive a letter at the same time, repeating that in his opinion the prospect of our reaching the summit of either was very small. Like Mr. Stephen, he had never himself attempted their ascent; so that when we left England in the middle of May, I had pretty much regained confidence that with good weather we should be fortunate enough to bag the top of at least one of them—an opinion founded chiefly, I fear, on that pleasing self-conceit that is engendered by entire ignorance, although I had the comforting reflection that nearly every difficult peak had been declared inaccessible until the reverse has been proved.

Up to the time of our first attempt on the Cimon della Pala I had had no experience of the more difficult Dolomite mountains; but when, on the 28th of May, after an easy walk from Feltre over the Monte Pavione to Primiero we took up our quarters for the night at San Martino di Castrozza, I was enabled to view the kind of work which we had before us, and I confess I was not quite so sanguine as to the success of our expedition, as we were able to realise the character of the arête by which we hoped to make the ascent. We knew that there would be no great difficulty up to a point perhaps 300 feet lower than the summit; but here the arête became cut up into huge teeth, one of which especially, apparently about 300 feet high and nearly vertical, looked peculiarly unpromising. Still we hoped to be able to pass round this in some way, so reaching the main arête again, which from below did not look hopeless.

It is needless to waste too many words over this attempt which proved unsuccessful. It at least initiated me into the character of the Dolomite mountains, and forcibly brought home to us the knowledge of man's inability to go wheresoever he wished—at least where mountains of this description were concerned. Accompanied by Christian Lauener, of Lauterbrunnen, and Santo Siorpaes, of Cortina d'Ampezzo, as guides, we had reached the point seen from below at the foot of the final arête, by means of the Passo delle Cornelle, a long tramp over snow slopes, and a short and easy scramble up some rocks on to a small peak, on which we found Herr Grohmann's cairn,

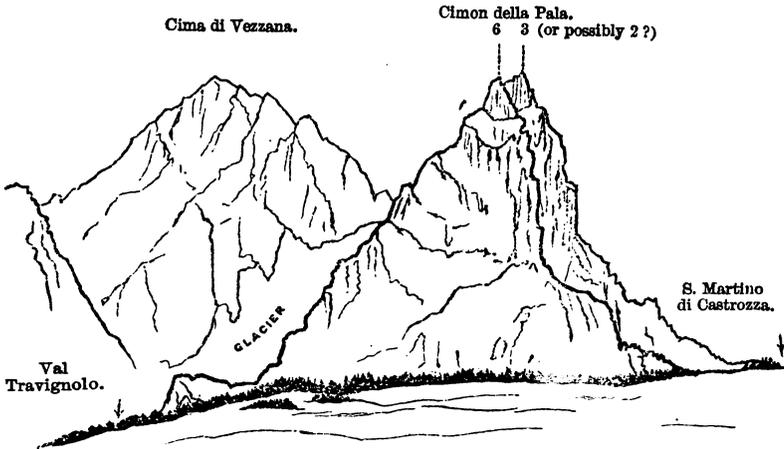
situated nearly E. [or ESE.] of the highest peak, and about 300 feet below it. The spot on which we were standing

Aiguille reached by Herr Grohmann 5 last year, and by us on May 27.



Final Kamm of Cimon della Pala, as seen through telescope from grass slopes at foot of Left Saso.

was separated by a deep cleft from the strange aiguille or terminal buttress before noticed, which now rose nearly perpen-



Cimon della Pala, and Cima di Vezzana from slopes behind Paneveggio.

dicularly before us, but evidently ascendable by a difficult
VOL. V.—NO. XXXI. I

climb if the first 30 or 40 feet could be accomplished. But this seemed more than doubtful, as a portion of the face had already fallen, leaving a crumbling, overhanging mass which I believe would prove utterly insurmountable; besides, even if it were possible, we had no means of judging whether the arête could be followed further. There was, however, still the chance of our being able to pass round it in some way if we could reach the col that separated it from the tooth on which we were standing; so with this object we descended as far as we could, but, alas! found that there was still about 30 feet to be accomplished which fell sheer away in a smooth wall of rock. Having only one rope, it was impossible for one of us to remain behind so as to let down the rest of the party, as we did not clearly see how we were to rejoin our companion again were we to take the rope (and going further without one was obviously out of the question); so that we were obliged reluctantly to give up the attempt for that day, but not without noting that a glacier led up to a considerable height on the north-east of the peak (between it and the Cima di Vezzana), from which the ascent might possibly be made; besides, there was just the possibility of attacking the mountain successfully along the NW. arête which we had not yet seen, but which could be reconnoitred from Paneveggio, where we hoped to be in the course of a few days.

The appearance of the peak from Paneveggio did not prove very encouraging, as the rocks seemed to fall away in much steeper precipices even than from any other point of view, and it was with small hopes of success that I determined to make the attempt from the glacier which we had noted in our previous trial, and which proved to flow into the Val Travignolo. Mr. Tuckett was suffering from the effects of an old strain, and not caring, under the circumstances, to try again what would doubtless prove a difficult ascent (even if it were possible), reluctantly decided to content himself with a stroll up one of the lower summits of the neighbourhood, from which he felt sure there would be a magnificent view.

On the afternoon of June 2nd, accompanied by our guides, Lauener and Siorpaes, I started for the foot of the glacier, where we intended to pass the night. The mist which had been threatening all day finally settled down, enveloping us in its thick folds, so that nothing was to be seen of the peak when we reached the col separating us from the Val Travignolo, and we had to pause for a while in order to take our bearings. We had not to wait long before the mist lifted for a moment, disclosing one of the most magnificent scenic effects

that I have ever witnessed. The higher part of the mountain was alone visible, just tinged by the glory of the setting sun and surrounded by a halo of mist, which imparted to it the most gloriously impossible appearance conceivable, as the enormous aiguille, too steep for a particle of snow to cling to its sides, towered up before us, glorying in its appearance of utter inaccessibility, and seeming to mock any attempt that man could make to reach its summit.

It was disclosed only for a few moments, however, before we were once more surrounded by the impenetrable mist; but we had ascertained our direction, and soon reached the foot of the glacier, where, to our surprise, we found a ricketty little hut, which proved most acceptable, as rain was already beginning to fall. It was not long before we had a capital fire, and after cooking some soup and smoking the evening pipe, with many mental misgivings as to the weather, retired between our blankets, hearing as we fell asleep the ominous rain beating over our heads.

Our forebodings were not to be realised, however, for when we turned out at 3 o'clock the next morning, there was not a cloud to be seen, and, what was equally important to the success of our expedition, a very decided sharpness in the air told us that it was already freezing hard, giving promise that the rocks and snow would be in excellent order. The fire had continued burning all night, so that a few minutes sufficed for the cooking of the ever-useful 'Liebig' (with which the guides will, I think, always be cheerful and contented, no matter under what circumstances they may be placed!), and by 3.30 we were fairly on our way.

After following the glacier for about an hour we took to some easy rocks, surmounted by a small hanging glacier on the north-eastern face of the mountain, and by 5 o'clock reached the main cliffs, which rose from this point to the summit in a broken wall of rock, with hardly a speck of snow visible on its steep face. We stopped here for a few minutes to ascertain the best line of attack, or rather, to determine which was the highest point of the long, deeply-serrated ridge which forms the summit of the mountain. It is divided into what may be called six huge teeth of nearly the same height, the one to our extreme right appearing from where we stood to claim pre-eminence. I had, however, grave misgivings on the subject, having examined the mountain from the hill behind Paneveggio, and pretty much determined that the highest peak must be one of those more to the left; but as the guides seemed

confident that such was not the case, and appearances were certainly in their favour, I yielded to their opinion.

After a little more than three hours' steady climbing over very steep, but not really difficult rocks, we gained the arête on the left, or SE. of our peak, at a point where it would have been easily reached; but, as I had feared, the peak immediately on our left rose about 50 feet above us, whilst we were already as high as the point at which we were aiming, so thoroughly had the perspective deceived us. The higher peak was separated from us by a deep chasm, with nearly perpendicular and perfectly smooth sides, so that there was nothing to be done but retrace our steps for about 300 feet, so as to discover some way up it. The other side was equally impracticable, so that only one way remained, and that was to climb up what looked little more than a crack in the otherwise almost unbroken surface of the north-eastern face. It rose at such a steep angle that in two parts the rock actually overhung, and even Lauener's great climbing powers had once to be aided by the timely assistance of an ice-axe, by which we were able to shove him up till he could get a slight foothold, which, however, proved sufficient to get Santo and myself over the difficulty. The ascent of this aiguille required throughout the utmost care, as there was more than one place where a slip of one must inevitably, I believe, have landed us all with undue haste on to the glacier lying so temptingly beneath us. Fortunately, however, we did not try the experiment, and by soon after 9 o'clock we were on the top—at least one of us was there, for there was not room for more on the sharp point which formed (as we had hoped) a truly ideal summit—when, to our disgust, we discovered another unquestionably higher by a few feet, still further to our left, and of course utterly inaccessible from that which we had just climbed with such praiseworthy perseverance.

We erected a cairn, as this is I believe the highest point seen from Paneveggio, and once more began to descend. It seems needless to repeat what has been so often asserted, that the descent of really difficult rocks requires much greater care than the ascent, and we found this peak no exception to the rule. At one point, indeed, I had the pleasure of finding myself astride of a peculiarly sharp, semi-perpendicular rock, with but little hold for the hands, and still less (from Lauener's uncertain position) from the rope, feeling vaguely for several seconds for a crack into which to insert a foot, and having the agreeable sensation of seeing the glacier far beneath as apparently the nearest stopping place; but this part, like others,

was safely accomplished—Lauener letting himself down by hanging a rope over a convenient ledge; and three-quarters of an hour in all sufficed for us to reach the foot of the aiguille.

We had still to descend a little more in order to skirt the base of the next peak, and again began to mount, this time by a steep ice-couloir, covered with about 6 inches of loose powdery snow, through which each step had to be cut; and as the ice was not in some places more than 3 and 4 inches thick on the rock, the greatest precaution had to be used. We had not a clinometer with us, but I should judge the inclination to be at least as steep as that of the last slope of the Wetterhorn, which is estimated, I think, at 58°. After reaching the top of the couloir, a few minutes' climb over easy rocks landed us upon our peak, which proved to be slightly inferior to one some yards still to our left, in the form almost of a huge boulder-stone, that appeared so nicely balanced on the narrow arête, that it looked as if it would not be difficult to send the whole mass crashing down into the valley beneath! It was, however, easily reached in a few steps from where we were standing; and at eleven o'clock exactly we were at last on the 'Höchste Spitze.'

The effect was the most startling that I have ever seen, as it seemed as if one bound would carry one either on to the glacier on one side, or the green valley on the other, lying 5,000 feet beneath us. The sky was almost cloudless—only behind the Ortler group, and extending some little way on either side, a few clouds were gradually forming, so that our hope of recognising any of the well-known forms of the Swiss mountains was doomed to disappointment.

Unfortunately we were all of us so unacquainted with the Tyrolese mountains from this aspect that only a few of the perfect sea of peaks that surrounded us could be recognised; but it was pleasant to feel that the Marmolata alone of the Dolomites could claim pre-eminence in height. The Cima di Vezzana, on the opposite side of the Val Travignolo glacier, is but slightly inferior to the Cimon (being thus doubtless the third in height of the Dolomites); and I much regretted that we had not ascended it a few days before, as it appeared perfectly easy of access, with perhaps an hour's climb, from where we had passed on our return from our unsuccessful attack on the Cimon from the Passo delle Cornelle. It may be of interest also to state that a fine pass might be made from Paneveggio to Garès by the Val Travignolo glacier (combining with it the ascent of the Vezzana), but it would be best

to attempt it from the Paneveggio side, as rather a steep ice-wall has to be surmounted.

We dared not stay long on the top, as such snow as there was lay in some places at a very steep angle on the rocks, and we all of us feared what might be the result if the very slight footsteps cut in the last ice-couloir should become softened to any serious degree; so after building cairns on the last two summits, leaving our names in a tin box upon the highest, and smoking half a pipe, without which ceremony no peak could be said to have been satisfactorily ascended, we commenced to descend.

We found the snow and ice in much better order than we had dared to hope, as during our halt the sun had passed round to the south, so leaving the side by which we had come very much in the shade; but the descent of the ice-couloir occupied a whole hour, as every precaution had to be used, and I think we all breathed more freely when this part was safely accomplished. Two hours and a half more of steady going brought us to the hut, where we stopped for a hearty meal, having taken very little since we left it twelve hours before.

A little more than an hour over the easy grass slopes sufficed to bring us to Paneveggio, where an *einspänner* was waiting to take us to Predazzo, to rejoin my friends, after one of the most delightful expeditions that I have ever made.

It may be of interest to add to the above a short description of an attempt I made, under somewhat unfavourable circumstances, to reach the summit of the *Palle di San Martino*, another of the *Primiero* peaks, to which allusion has already been made both in this paper and in that of Mr. Stephen. It is about 500 feet lower than the *Cimon della Pala*, and indeed inferior in height to some others of this group, but second only to the *Cimon* in grandeur of form. Mr. Tuckett had in a previous year reconnoitred it from a favourable position on the north-west, and declared it to be in his opinion—which was shared by Melchior Anderegg, who was with him at the time—inaccessible from the serrated *arête* on that side; and that consequently, from his knowledge of the peak, the southern cliffs alone would offer any chance of success.

We left *Primiero* at 2.45 on the morning of the 1st of June, and by 7.30 reached, by means of the *Val Pravitale*, the singular valley described by Mr. Stephen—too late, however, to allow of our taking up time by reconnoitring the top portion of the mountain from any high point opposite. Mr. Tuckett decided to make sure of at least one good peak in that neighbourhood

by ascending the Cima di Fradusta, a snow-peak about equal in height to the Palle, but capable of being reached under ordinary circumstances without difficulty. So he left us for his solitary climb up the Fradusta, whilst the guides and I proceeded to attack its more formidable neighbour which rose up above us in a series of giant buttresses, crumbling and weather-worn, but of extreme steepness. A snow-couloir led up to the left of what appeared to be the highest, to within about 500 feet of the top, and this we decided to follow as far as possible before trusting ourselves to the broken and distorted rocks, up which we knew progress must necessarily be slow.

The couloir increased in steepness as we advanced; and after a little more than two hours' steady going, further progress was stopped by the débris of a huge stone avalanche, which had at some time fallen, completely blocking up the way. Its further course had been prevented by the jamming of some large boulder-stones between the narrow walls of the gully, thus forming a kind of cave perhaps 40 feet high. As we approached this obstacle, we became more and more despondent, for a glance at the rocks on each side of us sufficed to satisfy us that no outlet was to be gained by their means, as for the first 50 or 60 feet they were practically perpendicular, and worn perfectly smooth. There was nothing to be done, therefore, but to retrace our steps, unless, as Lauener faintly hoped and as a glimmer over the boulder-stone forming the arch-piece at the entrance seemed to show, there should prove to be a hole over the mouth of the cave, through which we might contrive to creep, reaching a point from which we could get on to the top of the débris, and thus continue our course. To ascertain this, he was speedily doing his utmost up one of the sides in the interior of the cave, exhibiting really splendid climbing powers, as such slight hold as there was, was of a most unstable character, and covered with a thin glaze of ice. It was with much relief that we saw him get a firm footing on the boulder-stone (still, of course, on the *inside* of the cave), as, had he slipped, the rope which we were holding could not have prevented a serious fall on to the hard frozen snow at our feet, though it would of course have stopped a fatal slip down the couloir; and we were delighted to hear him announce that he thought the hole might be made large enough to answer our purpose. A series of stone avalanches of an alarming character followed; and, after much wriggling, the pleasing apparition of Christian's legs and boots met our gaze on the other side of the hole, and shortly afterwards the rest of him

emerged over our heads, though in a painfully dishevelled condition! He could not, however, see farther, he said, unless we came also, as the rope was not long enough to admit of his examining thoroughly, and nothing could be done unroped. I accordingly secured myself to the end of the rope, and was soon struggling on the slippery rock-face, congratulating myself more than once on the thought that Lauener's position was sufficiently good to prevent any very serious consequences, if some of the very insecure supports on which I had to rest were to give way. A miniature Staubbach rained pleasantly on us all the way up; so that by the time we had forced ourselves through the hole, we were torn and wet enough to satisfy even Lauener, who, I strongly suspect, had induced us to come more for the purpose of making us in as wretched a condition as himself, than from any expectation of being able to get up any farther!

When we emerged from the hole we of course found ourselves looking down the couloir which we had been ascending, but our view in the other direction was decidedly limited, as it was bounded by an overhanging boulder-stone, separated from the one on which we were sitting by such a short distance that our heads were unpleasantly forced between our knees! This we should have borne philosophically enough, but, try as we would, we could not get into a firm enough position to be sure of being able to hold Lauener, were he to make a bad slip. We did the best we could, however, whilst he slowly raised himself up to a standing position, and peered about in the hope of finding some way of further advance; but it was of no use, and we were obliged to descend, having spent much valuable time in our fruitless efforts. When about half-way down the wall, I had the opportunity of testing practically the value of the rope, as the mass of rock, on which I was incautiously resting all my weight, suddenly gave way, and went crashing down the steep snow-slope, where I must have inevitably followed if I had not been securely held. As it was, my position might have been pleasanter, as the rope was stretched at a considerable angle, and it was only a slight hold with my fingers on a peculiarly slippery rounded piece of rock that prevented my swinging altogether in mid-air. For several seconds I hardly knew what to do, as I had soon explored in vain every crack within reach on which to gain the slightest foothold; but I at length discovered a ledge a little to the left, which, by means of swinging pendulum fashion from my hands, I finally reached, and got down without further adventure. The guides naturally avoided my route, Lauener, being the last, securing

himself against accident by hanging the rope over the one secure support there was, and half an hour more sufficed for us to reach the bottom of the couloir.

After following the mountain still farther to the north-east, and discovering that, even if we had been successful in our previous attempt, we should have only reached an inferior summit, we again commenced to ascend—although it was already 1 o'clock—this time straight up the face of the next buttress to that which we had just attacked in flank. So much care had to be used, owing to the intense rottenness of the rocks at this hour of the day, that after an hour's steady climbing we had reached but a small height; and I was obliged at last to acknowledge that there was no possibility of attaining the summit that afternoon, or, at all events, were we so far to succeed, we should have to make up our minds to pass the night there, a course which certainly would have had the charm of novelty—to me at least—but nothing else to recommend it. A thick mist, too, was fast enveloping the upper part of the mountain, and Mr. Tuckett, having satisfactorily accomplished his peak, was already waiting for us to join him; so we at once turned our faces homeward.

Unsuccessful as was this expedition, I have little doubt, from the experience we had subsequently on the Cimon, that this mountain may also be ascended, and probably by some such route as that last tried by us, as we had to turn back simply on account of the mist and the lateness of the hour, and in no way on account of any special difficulty. There seems no doubt that the only means to secure success would be to sleep out at as high a point as possible, having first reconnoitred the mountain from some high point on the Cima di Fradusta; and I think with good weather, and a probably somewhat difficult climb, the summit could be undoubtedly reached.

Lauener's character as a guide is too well known to require further commendation; and I need only say here that, during these and other expeditions, he fully justified the high opinion that is formed of him; but Siorpaes is not so well known, and it may be of service to him to say that, from the experience of a five weeks' tour in his company, during which I have ascended two other new peaks—the Popena and the Gaisl, or Rothewand—Mr. Tuckett and I can speak in the highest terms of him, both as a guide and a pleasant companion. He is thoroughly good either on rocks or snow, and we think may be safely trusted to lead any expedition in the Dolomites.

THE SERRA DA ESTRELLA AND ITS RECORDS. By
CHARLES EDEN.

WHEN Alpine climbers have thrust their stocks through the crest-wave of every peak in Europe, and trampled the edge off every arête; when not only the Alps, but even Iceland and the Caucasus are exhausted; nay, the Himalayas and Andes have not one virgin spot of snow to offer, will glacial pioneering and discovery be no more? For those who live at the juncture of two infinities, fortunately not. Although we shall have done all we can, as at present organised, within the one called space, we shall still have a long tether to run within the other, Time. Those glaciers of the past are by no means all traced out. Much is doing; and, from the time when Agassiz first set the ball rolling among the mountains of Helvetia to when he gave it a last kick on the red hills of Tijuca in Brazil, much has no doubt been done. We have our ancient glaciers of Scandinavia and Russia, of Britain, of North and South America, India, &c.; and lastly, we have our tropical glaciers of South Brazil.

. . . Quid nos dura refugimus
Ætas?

Among the mountains which in 1864 had not been explored for traces of these great glaciers defunct, was the Portuguese Serra da Estrella, that lofty waste of white granite, the reservoir of the Mondego and the Zezere, between which streams it lies for a long stretch.

There is something refreshing in the notion of ice, even though it be older than the cave-bear, in a climate like that of Estramadura, and an additional zest was added to my expedition by rumours of an inaccessible peak.

The peak was said to be like a pitcher, and near it were lakes with legendary bottomlessness, while the surrounding wilderness was infested with wolves and haunted by witches. I am all the more willing to shadow forth the marvellous wonders of the expedition at this early stage, that the peak proved perfectly accessible and very unlike a pitcher, and that no more fearful beast than a rabbit ever crossed my path. Only with respect to the witches and the waters is there still room for doubt, and consequently for enquiry. I neglected to seek for a bottom to the lake, and the witches neglected me.

At Coimbra the Mondego ripples over white sands, or foams from under the shadow of sombre cliffs, or glides away majestic under lines of whistling poplars; but our business rather lies

in the recesses where an oozy morass is all the life-spring of the impetuous stream. At Coimbra monument after monument of departed taste or historic interest rise above each other, from the convent of Santa Cruz among the sedges to the battlemented church, of Moorish fame, and the university upon the topmost crag; but the monuments we have to seek are older yet, grander yet, of yet larger import. If one stands in some old archway and glances down upon the town, ghost after ghost of stalwart men of mark—an Affonso Henriquez, a John I., a Pedro—shade upon shade of fair women, such as an Inez de Castro, or a Maria Teller de Menezes, victims of a cruelty such as might wring tears from the very stones, seem to move once more through the shadowy streets where they triumphed and suffered so long ago. But the scene we would rebuild is older than the very race that built Coimbra, a solitude without a breath of life, architecture grander yet.

It is not easy to tear oneself away from the old capital of Portugal, but it must be done would we explore the Serra; for though the mountain is indeed coming to us where we are, as may be seen by a glance at the sands of the Mondego, still its massiveness suffers decidedly in the process, and we have scarcely time to wait so long.

We, for I had a companion, had splashed through the ford, and ridden through the heather for an hour or two before I detected in the pale distance, the grey mass of the Canariz, the highest point of the Estrella, rising 7,000 feet or 8,000 feet above the sea, but as yet many a stout league away.

Limestone hills of rich colour and considerable elevation, on whose aromatic highlands the myrtle often alternated with the heather; where at intervals the great clump pine slept above its own shadow, double blots in the sunny space—stretches of fir wood, tortured and stunted on the heights, majestic and free in the lowlands—dells of rock, fragments, and gnarled chestnut trees beside rippling water—such is the country through which wound our track to the bridge of the Rio Alva, sister stream of the Mondego, into which it falls. The Serra da Estrella is an ancient and important manufacturing centre, and yet 'track' is the best epithet I can give to the rude way which connects it with Coimbra, and along which merchandise, for the most part, passes only on human heads. There is, indeed, a magnificent macadamised high road, along which we rode for some miles, but like a marble breakwater in mid-ocean, it has no connection with the shore at either end—and so it may yet be for long in the sunny, insolvent south.

The country itself is a lovely wilderness—innocent, in the

main, of husbandry as Helvetia on the coming of the monkish Scots. There are, indeed, fazendas, aldeas, villages, but with new-world intervals of waste between. And very peculiar, and peculiarly sad, is the type of these hamlets in the district between Coimbra and Vendas Gallinas. If I call it *stercopagan*, there will be no fear of the *inhabitants* feeling hurt by the expression, and it best describes their speciality. Roughly built of the dark stone of the neighbourhood, the hovels are huddled together literally on a dung-heap. This latter is composed of heather several feet thick, which lies rotting in the streets, with whatsoever streams into, or is cast out upon it. The windows have no glass; the rooms, beyond a saint or two, little or no furniture; and the inhabitants nothing to eat. And yet in this ordure live people that would not accept a dump for a glass of water—no, not for anything.

Once clear of the limestone hills the road runs pretty straight along the valley, on a terrace of broken gravel or *débris*, somewhat above the plain to the left or north. First the material of this terrace, and (just where we left it to diverge—to the right to S. Romão) a succession of peculiar elevations in it, which looked to me very like moraine terminations one behind the other, struck me as partial evidences of former glacial action. There was perhaps nothing that might not be accounted for otherwise; but still, as far as they went, the phenomena were those one would expect if the flat ridge or terrace along which we had lately ridden, owed its origin to glacial accumulation.

When we turned off to the right, the rocky course of the Mondego was below us to the south, and beyond rose the rounded outworks of the Estrella, now close by. Before reaching S. Romão, a cloth-making village at the foot of the mountains, I noticed a number of large detached rock fragments perched on the slopes along which we passed. These might very well have been transported to their present position by ice from the heights in front. As I was pressed for time, and my companion was ill—my companion by the bye always is ill—I did not examine them closely. I thought if my ice expectations, now strong, were to meet with full confirmation, I should find plenty of boulders further on in the Serra, while the highest summits of the ridge would, on the other hand, in all probability be bare and smooth.

Oddly formed and tumbled fragments of the hills may often be met with in granite countries in positions which they have occupied without assistance from glacial or other violent agencies. Sometimes, as at Cintra for instance, disintegration at high

elevations has resulted in the precipitous fall of huge masses, which have ceased rolling when and where they might; at others, the blocks can hardly be said to have occupied their present positions, in any active sense, at all; the position has rather been dwindling away, like butter in the sun, from around them, slowly but surely, ever since the rock of which they form a part was first exposed. The most perishable stone has yielded, sometimes in masses, sometimes in veins or débris, and downfall and ruin, whether slow or sudden, has been the sure result. The less corruptible block nucleus or nodule remains for a time perched, as it were, in lonely isolation.

One consideration that must guide us not a little in determining the agency to which we should look to explain such phenomena, is the chemical composition and mineral character of the rock. The Cintra granite, as the gneiss of Rio de Janeiro, is often so soft that you may thrust a stick a considerable distance into it. The felspar contains apparently a large admixture of potash, the potash has a great affinity for the moisture of the atmosphere, hence the facile dissolution.

Now the Estrella granite is the very reverse of this, and with its large crystals of milky felspar, clear quartz, and speckly mica, is a perfect picture of the material of which mountains with any pretensions to permanency should be made. It is not easy to attribute the position of perched and strangely-placed boulders of this substance, especially when existing in any numbers, to disintegration through atmospheric influences in the way above alluded to.

St. Romão is somewhat better off than the villages of the stercopagan district, but poor and miserable in the extreme; the only solace in the place is the geniality and kindness of the inhabitants, and the well-woven blue cloth that falls from the handlooms. All the wool which the Estrella can produce is worked up in the belt of villages at its base, and is not sufficient to supply the entire industry, so that raw material is imported into the district from a distance. Larger factories exist, and water power is here and there made use of; but the bulk of cloth is, as far as I saw, produced by small handlooms in private houses.

A ride through wastes of white granite, bare, or but scantily covered with heather, coarse grass, and patches of rye, intersected by brisk, but at this season far from torrential streams, with here and there a morass, brought us by set of sun to the blue gorge in which lay Manteigas. From its edge we descended through fine chestnut woods—the more striking after the barren northern slopes—to the beautiful little valley and

the dark village huddled together in its shadow. But distance does a good deal more than 'robe the mountains;' and, after splashing through the village brook, the charm of dreamy expectation had to yield to the disappointment of reality.

It would keep us too long from our ice to tell of the hopeless darkness, paralysis, and squalor of that sad place; the sordid, crumbling houses merged in the oozy street, alike in colour and filth; the squalid, haggard inhabitants hanging round them, and the one solitary bullock-cart groaning on among them. It seemed as though at some remote period of the past, a landslip had carried the village into a quagmire, moral and physical, there to remain for ever and a day. And yet a *hidalgo* of fair name—a *Senhor*, I know not what—de Portugal, lords it in a *château* up above, and from the *miasma* so close beneath his gentle nose, suffered, it would seem, no sort of inconvenience. Two things saved our tired souls alive—the village shop contained in its dingy hollows some popular remedies; a villager had shot a partridge. My sick friend consumed the former, I the latter; and the next morning saw us once more in the saddle, en route for the inaccessible peak.

Our information respecting it had, of course, been contradictory. The peak was impracticable, and a goatherd had been up it after one of his flock. I now know one of these statements to be wrong, and I doubt the other.

The name of the most interesting crag is the *Lean Pitcher* (*Cantaro magro*), that of a craggy buttress in its neighbourhood, the *Fat Pitcher* (*Cantaro gordo*), and that of the highest part of the ridge, the *Canariz*. The latter is a huge dome-like mass terminating the *Serra* to the west, some 7,000 to 8,000 feet high, and capped by one of those hideous stone constructions in which engineers apparently delight.

Having once more attained the higher level of the chain, we rode on in the direction of these culminating points. Rabbits, red-legged partridges, wolf-dogs, sheep, goats, and a few human beings seem to compose the fauna of the *Serra*. The flora appeared as poor; near the top we found juniper bushes clinging like gnomes to the lee-side of rocks. The stones, on the other hand, fully merited the attention they soon attracted. There were cairns, stonehenges, perched boulders, worn fragments of varied shapes and size. At length we came to a part where the backbone along which we advanced, narrowed considerably, sloping away abruptly on the right to a lake, and on the left dropping into a deep gorge which contained a dark tarn, while on the edge of the chasm overhanging the abyss,

rose the crags known as the Pitchers. Immediately in front was the bald mass of the Canariz, the naked rocks leading to the summit having a rolled out, crushed appearance, one layer occasionally overlapping another, much like a pile of pancakes. All was smooth and bare, and utterly free from the boulders so numerous a little way lower down.

Somewhere hereabouts we came upon thin puddle-ice. At the base of the last rocks we dismounted, and ascended the steep but not abrupt slopes to the summit of the Canariz. From here the descent to the west looks fairly precipitous, and the view (do not be alarmed, I am only going to allude to so much of it as touches upon my subject), though hazy, extended; we thought we saw the Atlantic, and did see the Serra of Penamacor. To the north the broad valley, close on this side of which runs the Mondego, was bounded by the lofty Serra de Viscu; away to the west it was blocked by the high limestone hills, over which we had come from Coimbra, and among which the Mondego joins the Alva, and, thus reinforced, forces a passage to the sea; on this, the south side, lies the huge rampart on whose culminating point we stood—only towards Spain did the country seem somewhat more open.

It was difficult to sit long looking at the scene without summing up the phenomena with which we had met in the last two days—the terrace of débris—the boulders at the base of the mountain—those still more numerous and striking within its recesses—the absence of such fragments on the highest levels, and, in their place, that bald and rolled appearance of the rocks. Still more difficult was it not to see, on such evidence, the pink hills and tawny waste below change to a white arena, in which glacier after glacier streamed from the side-valleys laden with materials for the construction of that elevated back, along which, for some distance, our road had passed the day before, and which I now looked on as a central moraine. In descending to examine one of the lakes, another testimony in several places attracted my attention, in the shape of sharp scratches on the rock.

I humbly submit my belief in the traces of glacial action in the Estrella to better men than I, to disprove or affirm. They will have no cause to regret either the draught of air they will get on the free heights which defied even Cæsar and the Roman eagles, and the dreamy sauntering they may afterwards enjoy through that labyrinth of romance—old Coimbra.

We found the Lean Pitcher very far from an inaccessible peak. It rises in a striking manner from the gorge before described, being only connected to the central mass or sides of the hollow

by a narrow neck, and descending precipitously to the dismal tarn on all its other faces. Its craggy look and steep sides quite galvanised my sick friend, who set to with a will, and, after a short, amusing scramble, we reached the top, where the invalid, in a transport of delight, set to pirouetting on one leg for the edification of the guide, who had, of course, deserted us on the brink of the abyss. When we once more reached him, he said: 'When I beheld the pirouetting (no me ficou uma pinga de sangue no corpo), I had not a drop of blood left in my body.' 'I thought,' he added, 'if one of you came down, what would become of me.'*

DAUPHINÉ IN 1870. By W. A. B. COOLIDGE.

THE accounts we had read of the magnificent scenery of Dauphiné, together with the knowledge that several of the highest peaks remained unascended, and that the district was rarely visited by tourists, induced us in forming our plans for this summer to include a visit to its mountains. Accordingly, we left Paris at 8.40 P.M. on June 21, and next day about noon reached Culoz, where we met our guides, Christian Almer and his son Ulrich, and Christian Gertsch of Grindelwald, our reason for engaging the latter being the dearth of good porters in Dauphiné. We went on to St. Michel, and that evening walked over the low Col de Valloires to the village of the same name, where we spent the night at a very rough country inn. The meadows glowed with Alpine flowers, usual at that early season, far surpassing any we had ever seen before. Clouds obscured the view from the Col, to our great regret. Next morning, the 23rd, we were only able to get off at 8.10 A.M., rather too late an hour for the Col des Aiguilles d'Arve, which we proposed to cross. Our party consisted of my aunt, myself, the three men, an extra porter, a mule to carry our tent as far as possible, and our dog Tschingel. We left the track of the Col de Galibier where it crosses the stream, and turned to the right towards a narrow defile in the distance. After mounting some way, we gained our first view of two of the Aiguilles d'Arve, which remained before us till we reached the Col. Traversing beautiful pastures, we halted for an hour at the last châlet by a stream, and lunched. The Valloires porter tried to persuade us to cross a Col north of the third Aiguille d'Arve,

* Those who may wish to ascend the Lean Pitcher must remember to go at once to the right after passing the connecting causeway.

often traversed by the country people, but we remained firm in our plans. Resuming our course, we were soon obliged by the broken rocks to send back the mule with the man who had accompanied us for that purpose. We soon began to see the third *Aiguille d'Arve*, which does not yield to its neighbours in ruggedness. Mounting stony slopes, we reached a snow-covered glacier, ascending by which we attained the summit of the Col at 5 P.M. The wind was blowing and the mist rising. Almer immediately went to explore the couloir by which he had descended six years before. He first reported that it was very difficult if not impracticable. We had almost given it up, when Almer, who had had himself let down by a rope to explore, decided that we might try it. We hastily packed up our tent, which we had begun to pitch, and proceeded to the summit of the couloir. It was here that we first began to feel the want of snow, which rendered many peaks and passes more difficult than usual in June and July. On the previous passage, the couloir had been found to be entirely filled with snow, but now the upper half of it was quite bare, and consisted of precipitous rocks. The Valloires porter declared that nothing would induce him to descend the couloir, but that he would hold the rope until we were all down, if we would hurry, as he wished to return to the *châlets* that night. We commenced the descent between 7 and 7.30 P.M., and found it exceedingly difficult, but in about an hour and a half we were all (luggage and *Tschingel* inclusive) on the snow, down which we ran till we came to stony slopes, ending in a grass plateau. Here we determined to encamp, as it was now 10 P.M., and succeeded with some difficulty in pitching the tent in the dark. Next morning, *Midsummer-day*, was beautiful. In thirty minutes we reached the *châlets* of *Rieublanc*, and in thirty minutes more those of *La Sausse*. We had intended to have crossed to *La Grave* by the same route as Mr. Moore's party, but it was now late in the morning, and Almer could not exactly retrace the way which he had taken before. So we determined to cross the Col de *Martignare*, which we reached in rather less than three hours from the *châlets de la Sausse*, by tedious slopes of grass and shale. On reaching the summit of the pass, we gained our first view of the *Meije*. The appearance of this magnificent peak was so unpromising that we entertained but slight hopes of succeeding in attaining the summit. The descent from the Col over grass slopes was easy. We passed *Chazeley*, and reached *La Grave* in a heavy thunderstorm in less than three hours from the Col. We found the inn, visited by Mr.

Moore's party, had changed hands, and had greatly fallen off. Next day, Saturday, the 25th, the men went off to reconnoitre the Meije. They succeeded in attaining a point slightly below the saddle between the Meije and the Bec de l'Homme, and reported that a bergschrund at the foot of the final peak could be reached without serious difficulty, but that the rocks above were too distant to judge of their practicability. Our hostess had told us that Meije was the patois for *femme*. Thus the Meije corresponds to the Bec de l'Homme. She pronounced Meije, Mege, sounding the first *e* like *a* in mate. Sunday was spent in the woods by the Romanche. Monday, the 27th, we left La Grave, and, following the high road till just before the tunnel, turned down a path on the right hand side, which led us over the Romanche, past some châteaux up steep grass slopes. These grass slopes ended in a bad moraine, over which we reached the Glacier de la Meije in less than four hours from La Grave, walking leisurely. Thence, twenty minutes over the glacier sufficed to reach the narrow shelf of rock on the right bank of the glacier which the men had chosen for our bivouac on Saturday. Tschingel accompanied us to this point, where it was thought best to leave him. Next morning, Tuesday, June 28, we left our encampment at 4.20 A.M., and, ascending the glacier, which is here much crevassed, reached the highest point attained by the men on Saturday at 6.35 A.M. and the saddle at 6.57 A.M. On our way up we had caught sight of Mont Blanc glittering in the sunshine far away, and now we began to gain a view of a sea of peaks to the south. We halted thirty minutes for breakfast in a snow valley near the saddle, and then started off again, turning to the right. By this time we had come in sight of the highest peaks of the mountain. There are three distinct summits rising out of the same ridge. The west one is the magnificent pinnacle seen from La Grave. The east peak we at once perceived to be inferior in height to the two others. The central summit we thought rivalled, if it did not surpass, the west one, and after some deliberation we decided to attempt it. A very steep ice-slope interspersed with rocks led us to the notch between the east and central peaks, whence a stone would fall sheer down to the Glacier des Étançons. The final rocks now rose precipitously over our heads. As Almer said, they resembled the rocks of the Matterhorn on the Italian side without the ropes. We reached the long wished-for summit at 12.10, but what was our horror to find that the west peak slightly overtopped us. We had some thoughts of trying it, but Almer pronounced it utterly impossible for any human being to reach the summit,

as it was sheer on all sides. We tried in vain to console ourselves with the lines—

And the rapture of pursuing
Is the prize the vanquished gains.

We afterwards found that the French État Major give ~~N~~ 17 ? mètres (nearly 253 feet) as the difference between the west and central peaks, but the true difference does not probably exceed 12 or 13 mètres (39 to 43 feet). From our summit we enjoyed a splendid view of Mont Blanc, the Grandes Jorasses, the Aiguille du Géant, and a crowd of other peaks, including one magnificent summit to the east, which we could not then identify, but which we now think must have been Monte Viso. Our attention, however, was chiefly directed to the Pointe des Écrins, which we hoped to ascend. We could see that the great bergschrund at the foot of the final peak was so wide that it would hardly be possible to cross it, even with the aid of a ladder. We could also see that the rocks on the south side of the Brèche de la Meije were denuded of snow, and our late experience on the Col des Aiguilles d'Arve being fresh in our minds, we gave up the wish which we had entertained of crossing that pass. At length, at 12.40, we turned to descend, and, after meeting with some difficulty on the rocks and ice-slope, regained the *sattel*, whence we descended to our bivouac at 5.45 P.M., by the same route which we had followed in the morning.

Tschingel came to meet us on the glacier. He had slept in the tent all day, and was delighted to see us again. We decided to stay here another night. The whole expedition thus occupied twelve hours' slow walking. Next day, the 29th, we leisurely descended to La Grave in three hours and three quarters. We found that the whole village had watched our ascent the day before, and had seen us arrive at the summit. Thursday, the 30th, it rained all day. We drove over the Col de Lautaret in three hours and a half to Monestier, chez Armand, where we dined. We had intended to cross to Ville Vallouise by the Col de l'Échanda; Monestier had been burnt almost to the ground about a week before, and the inhabitants were very much depressed at the losses which almost every one of them had sustained. Passing through Briançon and La Bessée, we reached Ville Vallouise, chez Giraud, in five hours and a quarter, driving from Monestier. None of us having previously visited the Glacier du Sélé, whence we hoped to ascend the Ailefroide on July 1, I and the guides and Tschingel walked up to that glacier by the Combe de Sapenière and the left bank of the glacier in four hours. The path mentioned in Mr. Ball's

'Western Alps' is certainly *not* a chamois-track. We spent about two hours and a half in examining the summit which we hoped to reach. The Ailefroide consists of a ridge running nearly due east and west, from which rise three summits. Of these the east one is much inferior in height, but the west peak and the central one are nearly equal. The central peak, however, appeared inaccessible, so we decided that the west summit should be the object of our assault. We returned to Ville Vallouise by the right bank of the glacier in three hours and a quarter. We rested the whole of July 2, but on July 3, I and the guides walked up very leisurely to a bivouac near the Hôtel Tuckett *en route* for the Pointe des Écrins, and started at 3.32 A.M., July 4, for that mountain. Mounting steep slopes of débris, we reached the upper plateau of the Glacier Blanc, and followed that glacier and the Glacier de l'Encula to within fifteen minutes of the Col des Écrins. Turning up the broken snow-slopes to the left, we reached the great bergschrund at 8.20 A.M. We had not brought a ladder, preferring to run the risk of being turned back to the labour of bringing one, but we luckily found a bridge, which we crossed. Here began the real work. We had intended to make for the arête, by which Mr. Moore's party descended, and follow it to the top. We, however, decided to ascend by the great ice-slope, which forms the north face of the peak, as it was entirely free from snow, and consequently there would be no danger of avalanches. It cost nearly 500 steps (most of which were cut in pure ice) to reach the arête, which we followed for thirty minutes to the summit, which we reached at 10.50 A.M., just two hours and a half from the bergschrund. Our route would probably be practicable only in a season when there is but little snow. We had a splendid view of most of the highest peaks of this district, and could even distinguish our stone man on the Meije. The storms of six winters had destroyed all traces of the only previous ascent in 1864, as it seemed as if no human foot had ever trodden the summit of this, the loftiest peak of the Dauphiné Alps. We left the top, after erecting a cairn, at 11.57 A.M., reached the bergschrund at 2.10 P.M., and our bivouac at 4.50 P.M. The expedition occupied thus eleven and a half hours' actual walking. We spent a second night in the tent, and next day, July 5, walked leisurely down to Ville Vallouise. I and the guides again started July 6, by the now well-known path to Ailefroide, and, traversing the Combe de Sapenière, reached the Glacier du Sélé by its left bank. Shortly before reaching the glacier, we found the skeleton of a chamois, which had probably been killed by an avalanche.

Almer pronounced its horns to be the finest he had ever seen ; and this opinion has been since confirmed by other chamois hunters. We carried them off as a *souvenir* of Dauphiné. In fifty minutes from the time we reached the ice, we found a small hollow high up on the left bank of the Glacier du Sélé, above its junction with the great Glacier de l'Ailefroide. Here we resolved to encamp under the shadow of the Ailefroide, which towered up grandly above us. We had a fine view of the Col du Sélé, Crête du Pelvoux, and Crête des Bœufs Rouges. We left at 4.39 A.M., July 7, and mounted stony grass slopes to the left bank of the great central glacier descending from the Ailefroide. Ascending this glacier, which gradually became more and more crevassed, we finally left it on the right bank about two and a half hours from our encampment. Slopes of débris, varied by steep but short rock couloirs and patches of snow, led at 8.58 A.M. to the summit, a short ridge of snow rising into peaks at either end. Nothing could be easier than the ascent of the hitherto deemed inaccessible Ailefroide. The French État Major give 3,925 mètres (12,878 feet) for its height. The central peak is slightly lower. It was a warm day, and clouds obscured all peaks except those in the immediate neighbourhood. We left the summit at 11 A.M., and, following the same route, reached our encampment at 2.15 P.M. The expedition occupied thus not quite seven hours' actual walking. We intended to have encamped that night near Mr. Tuckett's bivouac on the Pelvoux, and actually started by the right bank of the glacier, when a heavy thunderstorm came on, which obliged us to wait half an hour under a projecting rock. The rain ceasing, we made another start, and reaching the stream of the Sapenière, or Celce Nière, crossed it, directing our course towards what appeared to be a boulder, some distance higher up on the side of the valley, where we contemplated pitching our tent. To our amazement, when we reached the boulder (two and a quarter hours' actual walking from our bivouac), it turned out to be Soureillan, or the Cabane des Bergers de Provence. The latter name was particularly applicable at that time, as we found there a 'berger de Provence' who had arrived ten days before with his flock and faithful dog Pied-blanc. We passed a comparatively comfortable night, the boulder being built round with stones, so as to afford shelter ; and the berger lent us several sheep-skins. July 8th, it rained, and we spent the whole day at Soureillan, talking, sleeping, and playing 'binocle.' July 9th, we left at 4.28 A.M., climbed the rocks directly above Soureillan, on the left of a snow couloir, which we crossed and ascended for some dis-

tance, exposed to falling stones. Turning to the left, we made our way through some séracs, and gained the snow plateau. The Pic de la Pyramide rose immediately in front of us. Keeping it to our right, we traversed the plateau, which abounded in concealed crevasses, and at length came in sight of a beautiful snow cone, the true summit of the Pelvoux. This we reached at 9.13 A.M. Mists prevented our seeing much besides the Meije, Pointe des Écrins, and Ailefroide. The day was warm and cloudy, like the one on the Ailefroide. We were glad to see our stone man on what was palpably the highest peak of the Ailefroide, thus putting an end to any doubts which we might have had on the subject. We left at 10.30 A.M., and returned to Soureillan at 1.35 P.M. The expedition thus occupied six and three quarter hours' actual walking. The berger at Soureillan astonished us by refusing to take any money in return for the use of his sheepskins. An easy walk of two and three quarter hours (including a halt of twenty minutes at the spring of water at Ailefroide) took us down to Ville Vallouise that afternoon. Next morning, we bade adieu to Dauphiné, drove to Briançon, gaining a splendid view of the Ailefroide, Pelvoux, &c., from the high-road; and that night crossed the Mont Genève to Susa and Turin.

I took two observations on the Ailefroide and Pelvoux with a boiling-point thermometer, but, having neither time nor the materials necessary to work them out, I think it best to record them in the pages of the 'Journal':—

Ailefroide, July 7, 10.30 A.M.—Boiling-point thermometer + 185½° Fahrenheit. Ordinary thermometers in the shade, Centigrade + 7°; Fahrenheit + 46½°.

Mont Pelvoux, July 9, 10.30 A.M.—Boiling-point thermometer + 181° Fahrenheit. Ordinary thermometers in the shade, Centigrade + 2½°; Fahrenheit + 37°.

Correction to be applied to boiling-point thermometer, as determined by comparison with Kew:—At 180° + 0.15; at 185° + 0.25.

We have to acknowledge our obligations to the minute descriptions and excellent map in Mr. Ball's 'Western Alps.' Nothing remains to be added except that we hope some time or other to revisit this beautiful district, the mountain scenery of which far exceeded our utmost expectations, though the accommodation did not.

DAUPHINÉ.

Meije, June 28.—Mr. W. A. B. Coolidge, accompanied by a lady, with Christian Almer and his son Ulrich, and Christian

Gertsch, left a bivouac, four and a quarter hours from La Grave, at 4.20 A.M., and, mounting by the Glacier de la Meije, turned to the right and attained a pinnacle of the Meije, forty feet lower than the 'Allehöchste Spitze,' which appeared impracticable at 12.10. The party left at 12.40, and returned to their bivouac at 5.45 P.M. allez /

Pointe des Écrins, July 4.—Mr. W. A. B. Coolidge, with the same guides, left Hôtel Tuckett at 3.32 A.M., reached the bergschrund at 8.20 A.M., and attained the summit by the great ice-slope on the north face at 10.50. Leaving at 11.57, they passed the bergschrund at 2.10 P.M., and returned to Hôtel Tuckett at 4.50 P.M.

Ailefroide, July 7.—The same party left a bivouac above the Glacier du Sélé five hours from Ville Vallouise, at 4.39 A.M., and, mounting slopes of débris, ascended the Glacier de l'Ailefroide for some time. Quitting it on its right bank, they mounted more slopes of débris, and steep but short rock couloirs, to the summit, which was reached at 8.58 A.M. They left at 11, and regained their bivouac at 2.15 P.M.

MONT BLANC DISTRICT.

The same party, on July 15, left a bivouac one hour below Mr. Moore's, on the Glacier de la Brenva, at 2.45 A.M., reached the summit of Mont Blanc without making the détour to the Corridor at 5.35 P.M., left it at 5.40 P.M., and reached the Grands Mulets at 9.10 P.M. A longer time than on the first ascent was consumed, owing to the want of snow, the Glacier de la Brenva requiring four hours for its passage.

The same party also made the second passage of the Col de Talèfre. The couloir by which Mr. Whymper ascended being filled with fresh loose snow, the ascent was made chiefly by the rocks on its left side, requiring two hours of perilous climbing, owing to falls of stones. The party halted two and three quarter hours at the foot of the couloir to avoid avalanches. Owing to the want of snow, the ascent of the Courmayeur side of the Col de Miage was made by easy rocks, which abounded in fine crystals, in two hours.

MONTE ROSA DISTRICT.

In crossing the Biesjoch from Randa, July 30, the same party found a small lake entirely frozen over, at the summit, which does not appear to have been previously noticed. As the pass is 11,644 feet in height, this lake must be one of the highest in the Alps. They again noticed the lake, September 22, on an ascent of the Brunegghorn, from the Gruben side of the Biesjoch.

THE LYS JOCH AND ZUMSTEIN SPITZE FIFTY
YEARS AGO. By F. F. TUCKETT.

THE first expeditions to the Lys Joch on record date back as long ago as 1778, 1779, and 1780, when seven chasseurs from Gressonay, led by Herr Vincent, arrived at the watershed; again, on July 13, 1820, Zumstein, in the course of his five attempts (of which this was the second) to reach the summit of Monte Rosa by the Lys Glacier, gained the crest of the pass at a point which he calls the 'Entdeckungsfels' (see Zumstein's narrative in Von Welden's 'Monte Rosa,' pp. 122-138). As his narrative is of great interest, and has never, I believe, appeared in an English dress, a translation of the most important portions may be new to some of the readers of the 'Alpine Journal,' Mr. King's excellent *résumé* of Zumstein's different expeditions necessarily omitting many details which are worth preserving.

I must explain that Zumstein's earliest attempt, although unsuccessful, having convinced him of the practicability of the ascent, he resolved to renew it the following year (1820). The Academy of Sciences at Turin, desirous of securing some trigonometrical observations, provided an ample supply of instruments and an engineer, Molinatti, to conduct the survey. The first attempt, on the 26th July, was frustrated by the weather, but, nothing discouraged, the attack was resumed a few days later, and this time with better success. After describing his and Molinatti's bivouac at the Indren Huts, close to the glacier of the same name, he states that they started at 4.30 A.M. of the 31st July, 1820, and entered at once upon the glacier. After three hours, what he calls the 'second plateau' (below the Vincent Pyramide) was gained, and having traversed it, a halt was called, to allow the porters to come up and an observation to be taken. The height was 11,310 Paris, or 12,054 English feet. The narrative then proceeds as follows:—'Collecting my instruments, which the careful Jäger, Moritz Zumstein, assisted me to carry, we slowly traversed extensive snow-fields having an inclination of 15° to 20°. The unvarying monotony, and the fact that the sun had struck us and softened the snow, rendered the ascent laborious; the reflection from the glittering surface caused inflammation of the eyes, and two of our guides, the Tyrolese, were soon compelled to return, having already become blind.

'After two hours' march we at length reached the watershed (*Gränzscheide*) which extends along the great western

Kamm (Lyskamm) to the SE. summit (Parrot Spitze), and separates Piedmont from the Vallais. Here is also the entrance to the "*Krone*" or depression of the upper "*Eismeer*." In the view of Monte Rosa from Turin, it is clearly distinguishable. On the ridge near the western *Kamm* (Lyskamm) a tooth of rock pierces the snow. I shall name it the rock of discovery (*Entdeckungsfels*). From this rocky prominence a view is obtained to the NE. into the valley of Zermatt.

'In the years 1778, 1779, and 1780, seven chasseurs of Gressonay, led by Herr Nicolaus Vincent, father of my present comrade, and a respected inhabitant of the valley, came as far as this point. During three consecutive years they renewed the expedition, each time under the persuasion that they had discovered a new valley. The original source of this error was an old saying which, as the late Herr Vincent has himself often told me, is said to have existed amongst the old archives at Saas. According to this report, an alp, Hohenlauben by name, which formed a narrow valley, had in former times been overwhelmed by the union of two glaciers. In the last attempt only three of the party reached the "*Entdeckungsfels*," and these were at length convinced that the imaginary buried valley was in reality an inhabited Vallaisan pasturage.

'Here we halted, and casting a glance at the lost valley, I was at once satisfied that it was the Matter- or Niklaus-Thal with its surrounding glaciers. We were thus able to contradict the long-prevalent, hitherto so mysteriously obscure saying, as well as the suggestion of De Saussure, who observes: "I am convinced that the valley which they saw was that of the Pedriolo Alp, where we passed two nights on our ascent of the Pizzo Bianco." Even this *savant* could not unravel the topography of this little-known region. The Pedriolo Alp lies to the eastward, and the valley which the chasseurs professed to have discovered is in a westerly direction.

'Here we rested whilst waiting for the others. Herr Molinatti reached us, but in a very exhausted state. We remained a quarter of an hour, and refreshed ourselves with liqueur and good vinegar, which was later of essential service to us. Several porters were busy transporting in pairs a portion of our effects which had been left behind. We soon resumed our progress over the firm snow, and, though laborious, it was free from danger. No more crevasses showed their fearful edges. Only the eternal uniformity rendering all measures of distance by the eye utterly fallacious, and the increasing softness of the snow, caused us annoyance and increased the fatigue of the ascent. The two Herren Vincent and I first reached the

centre of the surrounding plateau. After a few minutes' rest, I set up the barometer and observed it carefully. Its reading gave a height of 13,230 Paris (or 14,100 English) feet, for the plateau on which we stood. The sky now began to cloud over, and mists drew up towards the summits from the gloomy depths around. My friends turned back to fetch Herr Molinatti. I remained alone in this solitude, still as death. For two full hours I wandered about this chaos in order to find a spot where we might conveniently pitch our tent and pass the night. A bare rock was nowhere to be seen beneath which we might hope to find shelter from the approaching tempestuous weather. My eyes long wandered around, but at length, on the northern slope of the great plateau, caught sight of a depression, to which I hastened. It was a crevasse which appeared to have a firm bottom at the depth of 10 *Klafter* ($62\frac{1}{4}$ English feet). I fixed upon this somewhat fearful chasm for our night-quarters, and returned joyously to the summit level of the plateau. The entire party had not yet arrived, and I had thus time to cast a glance at this world of eternal winter and to gaze at the numbness of nature. I also made use of the time to secure a hasty sketch of the scene. I saw myself surrounded by a semicircle of summits, of which I will by and by speak in greater detail. Three "Steinkrähen" hovered around one of the peaks. I remarked with pleasure that the summit which was our goal seemed to all appearance to be accessible. The great "*Eismeer*," the surface of which was unbroken by a single crevasse, was throughout its extent of the most spotless purity; not a withered leaf, some of which are usually met with on lower glaciers, transported thither by storms, flecked the beauty of the snow-plains. I nowhere observed the red snow formerly so frequently met with, and which often covers large tracts.

Meanwhile my friends arrived with some of the porters, who deposited their loads and then returned to help those behind. Herr Molinatti, after a short rest, hastened to set up his theodolite beside my instruments; but his labour was all in vain, for scarcely was it erected when the clouds closed over us and concealed alike near and distant summits, of which latter Mont Blanc, previously so distinctly seen, especially attracted our attention. To our great regret he could attempt nothing more with this splendid instrument, the transport of which had cost us so much trouble, as even some of the peaks of Monte Rosa which surrounded us were now concealed.

Night approached, and still no signs of our porters. A large portion of our effects, including the tent and firewood,

were still behind. We became alarmed, and the increasing cold added to our perplexity. It was 6 P.M., and the thermometer stood at -7° (no doubt Réaumur = 16.25° Fahr.). So rapid a change in the temperature, amounting to 15° (33.75° Fahr.) in so short a time, produced such an effect on me that I was already in a state of complete prostration. I had besides committed the imprudence of clothing myself too lightly, because on my former expedition I had suffered from the heat. Already the cold so penetrated me that my companions perceived I was growing pale. I lost all energy, and an irresistible drowsiness stole over me. The experienced chasseur, Joseph Beck, feeling anxious about me, began to shake me to warm my blood and restore defective circulation, by which means he soon set me to rights again. Meanwhile the cold continued to increase, and our perplexity was extreme. Our feelings may be imagined. At a height of 13,000 ft. (14,100 English) above the sea, with 10° of frost (= $22\frac{1}{4}^{\circ}$ of frost Fahr., or at 9.5° Fahr.), which was still on the increase, without any means of protection; without fire, on the eternal ice, and beneath the open sky; exposed besides to every description of stormy weather only too often encountered in these elevated regions. Only one acquainted with the upper ice-world can appreciate the danger to which we were exposed. We had already determined towards nightfall to beat a retreat, although there was no moon to light us, when at length the long-wished-for porters arrived, dragging their heavy burdens—tents, coverings, and wood. Imagine our joy! Light of heart, we collected everything together, and hastened to the crevasse selected for our night-quarters.

‘From the N. edge of the chasm a snow-slope, descending at an angle of about 25° , led down into its depths. Joseph Beck, the old chasseur, the boldest of the party, was the first to effect the descent, by means of about forty steps which he cut in the surface. After a careful examination he assured us of the solidity of the bottom, which indeed consisted of snow heaped up by the wind, and so the rest of us followed him. We were all penetrated by the most fearful cold, I half numbed, quite unable to observe the instruments, and not even capable of assisting in the erection of the tent, which the dauntless chasseur, Joseph Zumstein, raised with marvellous rapidity in the bitterest cold, whilst Marty set about preparing a cheerful fire, in which he succeeded after much difficulty.

‘Some capital soup was cooked, and served out all round, but eaten with little relish. We were eleven in party under the tent, and lay on our right sides, covered with blankets and

skins, and packed close together in a row, to prevent being frozen during the night.

‘ Thus we slept peacefully, resigning ourselves to our fate. In the middle of the night I was seized with fearful palpitation of the heart, and felt almost suffocated. I made my way outside, to recover breath, and the feeling of oppression having passed away in a few minutes, squeezed myself again between my companions, and slept till morning.

‘ At 3 o’clock we were awaked by a furious gale. Marty went out to light a fire and prepare some soup for breakfast, but at once encountered so cutting a blast, whirling the dry snow in clouds into the crevasse and upon our tent, that he was obliged to withdraw under its shelter. About 6 the wind fell, the intense cold diminished, and the pleasant sun greeted us in our *gîte*. All were now in movement, and we quitted the tent. None complained now of the discomforts of the night; only the two who had lain at the outside of the row suffered more or less from the frost.

‘ Whilst preparing to resume our progress, I observed the barometer and various thermometers, and deduced a height of 13,128 Paris (= 13,991 English) feet above the sea—about that of the Jungfrau in the Bernese Oberland (in reality more than 200 feet higher), and 1,158 feet (1,234 English) higher than De Saussure’s bivouac on Mont Blanc. So far as I know, therefore, no human being has ever passed the night at so great a height in Europe. The crevasse in which we slept was 5 *Klafters* (= 31 English feet) broad, and runs N. and S.; its upper margin is about 10 *Klafters* (= 62½ English feet) in width, and the depth is about the same. There was a fearful glimpse into a blue ice cavern at the SE. end. I entered it in order to observe more closely the strange spectacle, and went as far as was safe: the danger, as the sequel will show, being by no means small. The eastern wall of this crevasse descended perpendicularly to a fathomless depth, and was intersected by bands of various shades of colour and three to four inches broad, running from N. to S. The annual stratified deposits of eternal snow which these beds indicate were discernible to the number of 100, till the strata were lost to sight in the abyss. In the midst of this fearful vault glittered the most wonderful masses of snow in every conceivable fantastic form—cubes, rhomboids, triangles, columns, &c. These hung threateningly above us, so that we fancied every moment that we might be buried under their ruins. Beneath and around us lay the débris of geometrically formed pyramids, giving evidence of some strange disturbance. The reflection of the blue

ice made us all appear so deadly pale that we could not look at one another without a shudder. Chills seized us, so that we were compelled at once to quit the cavern, in which we should otherwise have liked to linger. We had penetrated about 200 paces and, from the rise of the superincumbent mass, had probably at the farthest point not less than 40 *Klafters* (249 English feet) of ice above us.

‘It was half-past 7, and all was ready for the start. I sent back some of the porters with a portion of our baggage. The rest followed us. For about half an hour we traversed undulating snow-fields, sloping gently towards the Vallais beneath the eastern summits of the Ludwig’s Höhe, Parrot Spitze, and Signal Kuppe, and then, ascending for about the same time, reached at length the base of the sharp pyramidal summit which we proposed to climb.

‘Herr Molinatti, exhausted by the rarity of the atmosphere, rested a little from time to time. The two Vincents, on the contrary, carried away by the utmost enthusiasm, hastened forwards to be the first to reach the top. I followed, panting, about fifty steps behind them. At length we stood at the foot of the snowy arête leading to the pyramidal summit. A snow saddle falling away sharply, stretched, as it appeared to us, in a SE. and NW. direction. The climb began, and the active chasseur Castel went ahead to cut steps with his axe in the ice to prevent us from slipping. The younger Herr Vincent followed him step by step. His brother and I soon overtook them, as the labour of step-cutting delayed their progress. Farther up, as we climbed the narrow ridge overhanging the Macugnaga Thal, the hard snow disappeared, and was succeeded by a coating of ice, which it required the utmost caution to traverse. Had we slipped, we should have fallen 8,000 feet sheer. It was fortunate, however, that neither of us was seized with giddiness. About ten paces below the summit we came upon rock much weathered, its cavities filled with ice, and, climbing over this with greater facility, we at length gained the summit. The younger Vincent was the first to set foot on it. He shouted, “Long live our King! Long live all patrons of science!” We took up the words, so descriptive of our feelings, and proceeded to plant a banner in the ice. It was just past 10 A.M. Two barometers were at once set up for the sake of comparison, and after a quarter of an hour read off by me with the utmost care. At length we saw Herr Molinatti approaching with some of the guides, and I sent back the chasseur Castel to assist him. As a precaution, a rope was fastened round his middle. Castel went first, having the rope

wound round his arm, and the brave Marty, holding him by the left hand, cleared out the steps for him. Thus, more dragged than walking, he at length reached us in safety.' Zumstein then describes how he observed that the summit they were on (the Zumstein Spitze) was not the highest of all. At 3 the descent was commenced; at 7 they regained the first plateau, and arrived just before nightfall at the huts. It will be seen that he gives 13,230 Paris, or 14,100 English feet as the height of the middle of the great plateau or 'Krone,' to which he continued to ascend from the Col. The plateau is clearly that bounded by the summits of the Zumstein Spitze, Signal Kuppe, Parrot Spitze, and Ludwigshöhe, and its elevation does not certainly much exceed that of the Col itself. There appears, however, to have been some error in Zumstein's mode of calculation, since he deduces for the Zumstein Spitze a height of 15,092 feet, whilst Delcros, recalculating his observation, reduced it to 14,980 feet, and the Federal surveyors give it as 15,004. Assuming that these last are correct, we get an error in excess, or a correction, of 88 feet, and, deducting this from 14,100, the height of the plateau, which is about the same as that of the Col, comes out 14,012.

A careful barometrical observation of my own, calculated by comparison with the St. Bernard (which, by the bye, probably gives more accurate results than when Geneva is taken for the lower station, as explained by Plantamour in the interesting memoir with which he has enriched our library) gives for the Lys Joch, by the tables of Delcros, a height of 14,053 feet, whilst the mean boiling point of two excellent thermometers by Casella, whose readings differed only by $\cdot 15$ of a degree Fahrenheit, converted by Regnault's tables into terms of barometric pressure, varied from the barometer by the small amount of 0.4 millimètres, or 0.016 inch, reducing the height to 14,028 feet. I refer to these results, although already quoted by Mr. Mathews in his paper on the Lys Joch ('Peaks, Passes, and Glaciers,' 2nd series, vol. i. p. 381), because it is a little singular that in the case of so frequented a pass, so few hypsometrical observations have been made, and even the Federal Map and the still more accurate and minute 'Excursion Map' of the Swiss 'Alpenclub' convey no information on the subject.

ALPINE NOTES.

SEZIA JOCH.—It may interest your readers to hear that the Sesia Joch was crossed on August 12, 1869, from Zermatt to Alagua. This is the first time that the passage has been made from the Swiss side, as it had been considered by Mr. George to be impossible ('Western Alps,' p. 334). We were greatly favoured by weather; and it was doubtless owing to the intense cold that we were free from falling stones. We started from the Riffel at 3 A.M., and slept at the châteaux of Vigne, in the Val Sesia. Two ladies were of the party. Guide, Jean Martin de Vissoie (guide à Sierre). A. P.

WINTER JOCH, June 27.—Messrs. A. W. Moore and H. Walker, with Jakob Anderegg and Hans Baumann, left Geschenen Alp at 3 A.M., and, ascending by the Winter Glacier, reached the foot of the wall at the head of the Damma Firn at 8. They then crossed a large bergschrund, and climbed the second couloir south of the Rhone Stock, which led them at 10.50 to very nearly the lowest point of the ridge between that peak and the Tiefen Stock, above the Rhone Glacier. The couloir, though only 700 ft. in height, proved far more difficult and dangerous than it had appeared to be from below, and, unless its condition should be more favourable in another season, the pass is one to be avoided by everyone who values his neck. The descent on to the Rhone Glacier by broken rocks was quite easy, and the party reached the Grimsel at 4.40. The name 'Winter Joch' has been selected in order to distinguish the pass from the 'Damma Pass,' made by Herr Hoffmann-Buckhardt in 1867, and which lies north of the Rhone Stock, between it and the Damma Stock. The couloir ascended by Herr Hoffman is the most conspicuous of the many by which the ridge is marked, but, as a route to the lower part of the Rhone Glacier, it is very much more circuitous than that followed by us, not to mention a snow or ice cornice which, this season at any rate, would have been troublesome to get through. Neither pass, therefore, is much to be recommended, but anyone trying either should prefer the Damma Pass if bound to the Trift Glacier and Gadmen Thal, and the Winter Joch if his destination is the Grimsel. A. W. M.

AIGUILLE DE TRÊLATÊTE, July 23.—Messrs. A. W. Moore and H. Walker, with Jakob Anderegg and Johann Jaun, left the Pavillon de Trêlatête at 3 A.M., and at 7.30 reached the col 'dit infranchissable,' at the extreme head of the Glacier de Trêlatête, looking down upon the Glacier de Miage. To reach the latter glacier from the actual col would certainly be impracticable, but, from a point to the right, it seemed possible to effect a very disagreeable descent over shaly rocks to a deserted miners' hut, which is some height above the Miage Glacier, and, no doubt, accessible from it. After 45 minutes' halt, the party retraced their steps for a short distance, and turned up a steep lateral glacier, much exposed to falling stones, by which they regained the ridge above the Miage Glacier at a much higher

point. The arête—at last very sharp—was then followed to the summit of the northern Aiguille de Trélatête, which was reached at 10.45. The height, according to the French map, is 12,810 ft., or 92 ft. lower than the central peak ascended by Mr. Reilly's party in 1864 from the side of the Allée Blanche. It would have been quite possible to have passed on to that peak, but the distance is considerable, and nothing was to be gained by doing so. The northern aiguille is a perfectly distinct peak, and well worthy of being climbed on its own account. The view of Mont Blanc is simply marvellous. The descent to the Pavillon occupied 3¼ hours. A. W. M.

FLÜH PASS.—This easy and attractive snow pass does not appear to be recorded, and as a useful alternative with the Gemmi, or as part of a direct route from Lauterbrunnen by the Tschingel to Leukerbad and the Rhone Valley, it deserves to be generally known. From Leukerbad a good and gently ascending path leads in 3 hours' easy walking to the pastures of the Flüh Alp and the base of the Flüh or Dala Glacier. Mounting a little to the right, the glacier is attained and traversed from extreme right to left between two diminutive icefalls, and steep snow-slopes lead thence in three-quarters of an hour to the fine sharp snow-ridge which forms the summit of the pass, and which curls over in a beautiful corniche towards the Lötsch Glacier. The descent is made at a point of the ridge very considerably to the right of that at which it is mounted, very near to the cliffs of the Lötsch Grat, which rises perpendicularly from the pass. The slope is for a few steps very steep, and requires a little cutting, but may soon be glissaded down to the ordinary route of the Lötsch Pass, which is followed down to the châteaux at the head of the Gasterenthal, whence Kandersteg is reached in 3 hours. Nine hours' easy walking suffice for the whole distance between Leukerbad and Kandersteg. The views from the top of the pass, which appears to be very nearly on a level with the Tschingel Pass, are very fine, embracing the Oberland group on one side; on the other the Simplon range, Mont Blanc, and the St. Bernard range. Below the summit, on the Lötsch Pass, the Monte Rosa range appears. H. T. MENNELL.



DESCENT OF THE AIGUILLE DU MIDI.

THE
ALPINE JOURNAL.

FEBRUARY 1871.

THE AIGUILLE DU MIDI. By G. E. FOSTER.

IN a sceptical age like this, when all things sacred and profane have to submit to a criticism more free than reverent, it cannot excite surprise that even the Alpine Club, with its elevating aims, should find vile detractors ready to write down its members and their objects, while every accident that occurs, no matter how clearly shown to have arisen from neglect of the most ordinary rules of prudence, gives rise to fresh howls from our ignorant critics, who cannot lose the opportunity of showing how little they know on the subject.

At the same time, that there are risks to be run in climbing, as in every other amusement delighted in by Englishmen, cannot be denied; and those who like to take the trouble to read this account will see how, by no fault of our own or our guides, we narrowly escaped adding to the list of alpine accidents by a smash of our whole party, which consisted of Horace Walker and myself, with our old guides, Jakob Anderegg and Hans Baumann.

I can scarcely tell what first turned our thoughts towards this peak, but believe that when descending from the Aiguille Verte with Mr. Reilly, in July, 1869, we were anxious for some expedition to wind up a most successful tour, and appealed to his wonderful knowledge of Chamounix to furnish us with one suitable. Many were mentioned and rejected, and, after due weighing of pros and cons, the merits of the Aiguille du Midi came into the discussion. It had only been ascended twice before, and was said to be passably difficult, must command a fine view; while, by descending, if possible, to the

Glacier des Bossons, a new high-level route from the Montanvert to Chamounix might be effected. The last argument was most irresistible, and the expedition was determined on.

The form of our aiguille must be familiar to all visitors to Chamounix, standing, as it does, at the angle where the Glacier des Bossons falls into the valley, and being the last of the long line of rocky peaks which the tourist gazes on as he arrives from Martigny before his eye traverses the snows of Mont Blanc itself. Towering up in tier after tier of rocky precipices, thousands of feet above the valley, it is at length topped by a narrow ridge of snow, the edge of the vast plateau on the other side; while its true summit is a pyramid of rock overhanging the corner at the Glacier des Bossons. This an enthusiastic young lady described to me as 'Nature's lighthouse, erected to guide travellers over the snowy plains of Mont Blanc.' To my less romantic eye it resembles more nearly a sentry-box, or one of those huge pepper-casters one sometimes sees in country inns. The reader may adopt which simile he likes best, only not forgetting that its Chamounix face is perfectly inaccessible.

On leaving the Hôtel de Londres, on Friday afternoon, July 30, the civil landlord expressed his fear that we did not find his beds comfortable, as, of three nights, but one, and that of the shortest, had been spent there. Stiffing our indignation as best we could, that our alpine zeal should be mistaken for a low anxiety for better beds, we consoled him by ordering indispensable provisions, and promising to return on Saturday night. Little did we think how narrow an escape we should have of breaking our word. However, the strictest moralist never much blamed a broken promise when it was caused by a broken neck, so let us hope we might have been forgiven.

We were starting for the Montanvert, but not in our usual good spirits. In the first place, we missed the pleasant company of Mr. Reilly, whose injured knee forbade him to try another hard day's work after his exertions on the Aiguille Verte. In the next, the weather looked very threatening, culminating in a violent storm over the Mer de Glace. Then, again, we did not feel certain as to our reception at the hotel, as in descending from the Verte we had found it necessary to pass the old bear of a landlord's bill under the taxing-master, and he had not taken kindly to the process. As usual, troubles bravely met passed away. The weather cleared, and the landlord received us as civilly as was possible to his currish nature.

About 2 o'clock on the morning of the 31st, we started off, resolving, as we were all perfectly ignorant of the way, to

ascend the Col du Géant as far as the top of its icefall, and then turn to our right. Had we kept to this programme, we should have saved ourselves much trouble. Bright as was the moon, the path along the Mer de Glace was unpleasant walking. Rough at all times, in the deceptive moonlight we found it particularly so, and both shins and temper suffered. Nor did the glacier prove better, as the rain of the evening before, having frozen as it fell, the whole surface was as slippery as ice can be. The passage of the ridge and furrow of the waves, from which the Mer de Glace takes its name, was especially disagreeable. The ascent of each ridge demanded a really ridiculous amount of exertion, while to descend on the other side without falling was a feat worthy of Blondin. Indeed, Walker, who with commendable spirit took a path of his own, fell, barking his hands somewhat severely. As we drew nearer the icefall, and the slope became steeper, steps had to be cut where usually they are not thought of, and we thought that we lost a good hour through this state of the ice. To our left the fall was clearly the easiest; but as our peak lay to our right, we resolved to try that side, and I should be sorry to say how much more time the resolution cost us, though still more sorry *now* to have lost the experience we gained. The first part of the icefall was decidedly nasty. At all times, jumping crevasses and walking along knife edges is an operation demanding care, but the present state of the ice rendered the difficulty really formidable; and not possessing Walker's capabilities for balancing, I was unfeignedly glad to find that higher up things improved, probably from the rain not having reached so far. On the other hand, the intricacies of the way became more bewildering, and on reaching the foot of the first great rognon, where a branch of the upper glacier joins that of the Géant, the prospect ahead was so unfavourable that we resolved to try this new route, which appeared to lead in the right direction, while its smooth slopes promised an easy path, though as they fell in a bellying curve we were unable to see far up. Our minds made up, we gained the slopes without much difficulty, close to the rocks of the rognon, and were thus led into mistake number two, number one being our choice of the wrong side of the glacier, and it being now six o'clock halted for breakfast.

The view from this spot was very striking, looking over the frozen torrent of the great icefall on to the cluster of aiguilles beyond; but our attention was concentrated on the huge Aiguille du Géant opposite, which is still unclimbed, and, as far as we could see, is likely to remain so.

On starting again, Walker, Baumann, and I put on the rope, Jakob preferring to remain unattached, as more convenient for a pioneer. The slope was at first steep, but not much crevassed; but as we mounted higher, and turned the curve enough to see what lay before us, we found the glacier broken by huge parallel crevasses, with an utterly impracticable icefall beyond, cutting off all access from the upper snowfield, beyond which we believed our peak to lie. Still we persevered, zig-zagging among the crevasses as they offered negotiable bridges, till having left the rognon behind, and still seeing nothing of our peak, the guides became somewhat sceptical of our being in the right direction. At length Jakob broke out,

‘Herr Walker, where do you think the Aiguille is?’

Walker, somewhat vaguely, and pointing straight up the fall, ‘I think it is somewhere there.’

Jakob, not unnaturally dubious, ‘Don’t you think we had better try some other point? What do you think of the Aiguille du Plan?’

This, however, did not suit us, so the good fellows set about trying to find a way in the direction proposed. Straight up the fall was out of the question. We therefore resolved to turn to the left, and, passing at the back of the rognons, attempt to reach the comparatively unbroken snow slopes between the further one and the Mont Blanc de Tacul, where we had originally thought our way must be. We were the more induced to this, as the entire distance between the Aiguille du Plan and the Mont Blanc de Tacul was occupied with an enormous icefall, forbidding all direct access to the upper névé.

At first, our new move seemed successful, as we passed with ease parallel to the main system of crevasses; but we were suddenly brought to a stand just behind the rognon by a regular fault in the glacier, which sank abruptly 40 or 50 feet, presenting a wall impossible to descend. The fall to our right terminated in a similar face, so that the frozen lake below was bounded by two precipices at right angles to each other, their junction being broken by tremendous séracs. We stood near the corner thus made, and at first thought we must execute a strategic movement to the rear, but careful investigation showed a part of the face along which it seemed possible to pass. Telling us to stop where we were, Jakob volunteered to go forward and pioneer. Cutting a series of shallow scratches for his feet, he passed along the face, and mounting a huge sérac beyond, disappeared behind it. As he did not return, Baumann resolved to follow, and, carefully improving Jakob’s scratches, led us along the wall and up the sérac. Here we

found a long narrow ridge, bounded on the right by a crevasse some 30 feet across, and its bottom lost in blue profundity, while on our left was the wall sinking straight down to the glacier below. The irregularities in the ridge hid Jakob from our view, but following his footsteps we found him standing at a point where a bend in the crevasse brought its sides within a couple of feet or so of each other, but with the top of the upper one some 30 feet above our heads. After a good deal of hesitation, and a short consultation with Baumann, he determined on making the attempt. Rejecting the rope, lest a jerk should upset his balance, he beat the snow firm on our side, and cut a gash in the wall opposite; then holding his axe close to the head, as no step-cutting in the ordinary way could be done, pecked out foot and finger-holes, and climbing as we do up a too steep ladder, reached the top. We followed, but, in spite of all he had done, found it by no means easy to preserve our balance. How he had kept his while cutting the steps is to me a mystery. A variety of similar work brought us to another ridge, by which we reached the débris strewn the glacier below. Unwilling to descend further, we passed close under a range of tremendous séracs, which threatened at any moment to add to the mass of ruin we were on. Facing due east, the sun had been on them for some hours, and seldom have I seen guides so uneasy in any similar position. Looking back, I cannot but think we ran an unjustifiable risk; but 'all's well that ends well,' and half-an-hour saw us clear of the séracs and on the longed-for slopes beyond.

After our exciting work, the quiet plodding up these gradually-ascending slopes was an agreeable change. We could now look about us and indulge in conversation, the chief topic of which was wonder as to where our peak could be, while Baumann confided to me his opinion that the passage we had just effected resembled the Jungfrau Joch, a remark which showed that he at least had not regarded it as child's play. As we slowly mounted, we saw that we were still cut off from the upper snowfield by our old enemy the icefall. To the extreme left, under the rocks of the Mont Blanc de Tacul, the crevasses, however, were partly bridged by some friendly avalanches, but on reaching them we found unexpected difficulty from the softness of the snow. In one place, Baumann, who was leading, went through no less than three times, and each time had to be pulled back before he could try again. Perseverance, as usual, conquered, and at 10 o'clock, after eight hours' hard work, we stood on the snowfield which had so long defied our utmost efforts to reach.

Our first feeling was one of astonishment at its vast size, as

from its height it is rarely visible, and then only from a distance which scarcely allows it to be appreciated; our next one of satisfaction, as for the first time that day we caught sight of a rocky pinnacle, which we at once recognised as our aiguille. Breakfast number two would have been welcome, but was put off till we reached the rocks, and it may give some idea of the size of this lofty plain to add that we thus unwittingly postponed the longed-for meal for nearly an hour, though we walked fast.

On reaching the ridge visible from Chamounix, we descended some feet on the Chamounix side, to be out of the wind, and having hung out a red flag in the shape of Walker's handkerchief, to give notice of our arrival to all whom it might concern, sat down on the snow and satisfied our appetites. After a pleasant half-hour, we turned to the serious work of the day—the ascent of the last rocks—which foiled the traditional French Count, who is said to have made the first attempt on this, as on almost every other Chamounix peak. Opposite us their height was not more than 200 or 300 feet, but as they rose in one unbroken slab, it was clear a way must be sought elsewhere; so wheeling to our left, we turned their flank, and found a very steep couloir which seemed more promising. To reach it we were forced to descend, and thus had a climb of about 700 feet to the summit. Baumann's verdict was that, though steeper than the Matterhorn, they afforded better climbing; but this will account for our not finding them altogether easy. Their main fault was a tendency to run into large, rather rotten slabs, taxing Walker's and my length of limb to the utmost, and exciting wonder as to how Baumann's shorter legs managed them at all. Upwards and onwards steadily overcame our difficulties, and at 12 o'clock we stood on the summit, a broken table large enough to hold us all comfortably. Our usual good fortune through the summer clung to us. The wind had sunk, and although an extended view was lost from heavy clouds which hung about, we passed an hour of intense enjoyment.

The view of the vale of Chamounix was striking, with its large hotels looking like children's toy houses at our feet, while Mont Blanc, with its well-trodden route, was visible to near its summit, where a tourmente was raging, and we were not surprised to learn afterwards that a party whom our guides discovered descending had suffered from frost-bite on the top.

At length it was time to descend, and leaving our names at the foot of a flagstaff planted by our predecessors, we packed up and started. The descent of the rocks I found more diffi-

cult than the ascent had been, the lowering oneself down the long slabs to an uncertain footing being more trying than the corresponding effort in mounting. Still, with the exception of a single slip, where some footsteps in a patch of snow on ice gave way, it was without any special incident.

I have mentioned that our object was, if possible, to descend to the Glacier des Bossons, and from the summit we had looked down an enormous couloir straight on to the glacier, some thousands of feet below. We had even thought of descending by it, but ultimately decided that the rocks we had mounted offered a better route, and we could then strike into the couloir lower down. Bearing more to our right than we had done in ascending, we reached the foot of the lighthouse or sentry-box, which you please to call it, and found ourselves at the head of the great precipice overhanging the glacier, and the rocks presenting no great difficulty beyond their steepness, struck straight down them. Some few hundred feet down a buttress to our left attracted us, and we passed straight along the face of the cliff to gain it. Jakob was leading, Walker next, I followed, and Baumann brought up the rear. Only one was moving at a time, and everyone had the rope as taut as possible between himself and his neighbour. Jakob was crossing a narrow gully, when suddenly, without any warning, as though he had trod on the keystone of the wall, the whole face for some 30 or 40 feet above him peeled off, and with a crash like thunder, hundreds of tons of rocks precipitated themselves on him. In an instant he was torn from his hold, and hurled down the precipice with them. Fortunately, Walker was able to hold on, though the strain on him was something awful. As the uproar ceased, and silence even more impressive succeeded, we looked in one another's faces with blank dismay. From our position it was impossible to see what had become of Jakob, and only the tight rope told us that his body at least, living or dead, was still fastened to us. In a voice singularly unlike his own, Walker at length cried out 'Jakob,' and our hearts sank within us as it passed without response. 'Jakob! ach Jakob!' Walker repeated; and I trust none of my readers may ever know the relief we felt when the reply came back, 'Ich lebe noch.'

From where I was I could not see him, but Walker craned over a rock, and then turned round, 'I see him. He is awfully hurt, and bleeding frightfully.' I then contrived to shift my position, and saw that he was indeed hurt. His face was black with blood and dirt, the skin torn from his bleeding hands, while his clothes in ribands threatened worse injuries still un-

seen. After a moment, he managed to recover his footing, and then untied the rope with trembling fingers, and crawled along the face of the cliff to the other side of the gully, where some snow offered means to stanch his wounds.

As soon as he was safe, Baumann called to us to stand still, and clambered carefully over the spot where the rocks had given way, our only road lying there. I followed, and then Walker, knotting up the rope to which Jakob had hung, crossed last. With Jakob below us, care was necessary in climbing so as to send no more loose fragments on his head, but we at last reached the spot where he was standing. Thanks to the snow, the bleeding had already stopped to a great extent, and with the aid of some sticking-plaister Walker had with him, and some torn strips from a pocket handkerchief, we bound up his wounds as well as we could. He had had a marvellous escape; no fragment had struck him fully, the rock that had grazed his face having missed knocking out his brains from his presence of mind in throwing back his head. Fortunately, no bones were broken, though he was badly bruised all over, and after a quarter of an hour's rest and a good pull at the brandy-flask, he said he was ready to start again.

On taking hold of the rope to tie him on again, we were awestruck to find all its strands but one had been severed, so that his whole weight had hung literally on a thread. Strange as it may appear, the rock that had done this had probably saved his life by jerking him out of the line of fire. Still, all honour to Messrs. Buckingham for their good workmanship, to which, and Walker's holding powers, we owe our escape from a miserable ending of our day's work. As it was, poor Walker's ribs had suffered sadly, and with two wounded men we recommenced our descent.

Naturally, our trust in the rocks was gone, and we took as soon as possible to the steep snow of the couloir. This, however, lay so thin on the ice, that we found we had only exchanged one danger for another. Baumann led and we followed, driving in our axe-heads at every step, but were soon forced to descend into a narrow gully, cut by avalanches, where the snow was deep enough to give better footing. The sides of this were above our heads, and the bottom not more than a foot wide, so that the danger from avalanches was very great, but for a time we descended safely. Then a startled shout from Walker warned me something was wrong, and driving my axe desperately into the side, I found myself up to the neck in a snow avalanche. For a moment, I thought all was up, but held on to the best of my powers. Then finding the stream did not

stop, I looked back, and found Walker and Jakob had contrived to get out of the gully. With a shout to Baumann, I gave a desperate struggle, and followed their example, and instantly saw the snow I had held up surge over Baumann's head. For a moment he held on, and then climbed out on my side. We waited till the avalanche had passed, two of us on one side of the gully and two on the other, and then Walker and Jakob jumped into it with a groan, as it shook their bruised bones, and climbed up to our side, and with an occasional look for Baumann's hat, which the avalanche had carried off with it, pursued our way down.

So long and steep was the couloir, so thin and treacherous the snow layer on the ice, that a good hour elapsed before we reached the bottom, where a formidable bergschrund cut off access to the glacier. Only at one point could we find a bridge, and that was where our old enemy, the avalanche gully, terminated, choking the crevasse with its snows, and spreading in a fan-like mass below. With some hesitation, as our recollection of it was not pleasant, and it was here all hard ice, Baumann cut his way down into it. We were scarcely all fairly in it, when we heard a tremendous crash above. Clearly, another avalanche was descending, this time composed of rocks. As it was 2,000 feet above us, and would take some time to clear the distance, a short race for life ensued. Baumann cut steps with amazing rapidity. Fortunately, some half dozen only were necessary. With one eye on him and one keeping a sharp look out for the advent of the unwelcome stranger, we hastened down, crossed the bridge, scampered down the slope of débris, and merely stopping to pick up Baumann's hat, which turned up here, got out of the way just in time, as an enormous mass of snow and rocks dashed over where we had stood not a minute before. Somewhat hardened by our previous adventures, we merely observed 'a narrow squeak,' and turned to discuss our future proceedings.

Though on the glacier, a most formidable-looking icefall intervened between us and the usual route used in descending Mont Blanc. There were three ways to choose, and as it was now past 4 o'clock, and a storm was brewing in the valley below, our time for deliberation was cut short. First, Walker and I proposed to cut a way across the icefall towards the Grands Mulets, where we hoped to join the ordinary route. This our guides did not approve of, for the simple reason they thought it impossible. Then Jakob suggested taking a way down close to the rocks. This we disliked, having a lively recollection of the fate of a Chamounix guide killed by a falling

stone somewhere in that direction; and lastly Baumann proposed we should descend the fall as best we could. This was formally carried, but though we were now tolerably reckless, the difficulties in our way nearly beat us. Three times we tried, and thrice in vain, though knife edges of the most revolting description were passed, and crevasses of fabulous width and depth jumped or got over as seemed best. Again and again we were forced to return. At length, when we were almost in despair, a way was found, and at 6.30, drenched by the storm which by this time had burst upon us, we reached the little hotel at the Pierre l'Échelle, and after a short halt for some refreshment, regained our hotel at 8.

Here we found some dry clothes which Mr. Reilly had most thoughtfully and kindly sent in for us, and after a good dinner retired to bed to sleep the sleep of the justly wearied, after eighteen hours of the most exciting work I have ever done in the Alps.

One word more, and I have done. To those about to follow in our steps—don't. The risk from overhanging séracs in our ascent is not to be despised, while the descent to the Glacier des Bossons, with its treacherous rocks and avalanches, is hardly likely to be passed a second time without serious accident; and even in our case I do not think either Walker or Jakob got their bruises in a hurry.

THE GLITTERTIND AND ULEDALSTIND IN NORWAY.

By T. L. MURRAY BROWNE.

DOES the untravelled reader know where Rösheim is? If not, it may be sufficient for the present purpose to say that Rösheim lies in Bæverdalen, in the parish of Lom, near the watershed of Norway, and in close proximity to some of the finest mountain scenery of that country. We, i.e. my brother, Mr. W. R. Browne, Mr. J. F. H. Saunders, and myself, drove into Rösheim in the afternoon of Thursday, August 25. We rested at the hospitable abode of Ole Halvorsen Rösheim, a well-known guide, whom we were anxious to engage. A disappointment met us, so to speak, at the door. Ole was from home, and was not expected back for some time. This was a blow, especially as Ole speaks English, and our Norsk was not our strongest point. My brother was the only one of us who knew any; and his Norsk, though sufficient for ordinary travelling purposes, was subjected to a severe trial when it

became necessary to enter into complicated explanations with guides unaccustomed to mountaineering tourists. However, there was no help for it. We engaged one Eilif Aasen, an active mountaineer, and spent Friday in a sort of *reconnaissance en force* half-way up Galdhopiggen, a lofty but easy mountain which rises just above the village. The weather on Friday was very bad; nevertheless we resolved to devote Saturday to an attack upon Glittertind. This mountain, which is 7,860 ft. high, is described by Captain Campbell as a 'most remarkable mountain, of great height, and exceedingly spire-like.' It is also mentioned by Professor Forbes and others as one of the principal mountains of Norway. Eilif did not know the mountain; but it appeared that a farmer in the village, by name Hans Slaten, had been up it with Herr Wergeland, a Norwegian engineer officer connected with the Government survey of the district. The mountain had not, previously to our visit, been ascended by Englishmen, the only two previous ascents having been made by Norwegians for the purposes of this same Government survey. The survey in question has resulted in the production of the Amt map of the district, which all intending travellers will do well to procure.

Accordingly, on August 27, we prepared for a start. We wanted to get off at 5, but the guides came late, and Hans especially, very late. Various consequential delays ensued, and the result was that we did not fairly start till 6. Our guides were by no means accoutred in accordance with Swiss ideas. Eilif had a species of alpenstock, which I believe to have begun life as a hayfork, and having had one of its prongs broken off, to have been hammered into its present shape. As it was, it made a very fair *bâton*. Hans' get-up was of a very singular character—a rusty black frock-coat, black cloth trousers to match, no gaiters, and low shoes instead of boots. He carried in his hand nothing but a common walking-stick. Our route lay up Visdal, a mountain valley which debouches into Bøeverdal at Rösheim. The path, which was well marked, ran up the left side of the valley. We passed upwards through fields and pine-woods, having the river flowing in a deep rocky gorge on our right. The clouds were low, and precluded any distant view, but the valley itself was fine. We soon left houses and fields behind us, and entered a wild and picturesque pine-wood, broken by rocks, and opening here and there into lovely forest glades. We walked on for miles and miles; the rotting trunks of fallen pines encumbered the ground, no signs of life were seen, and we indulged in the belief that for the

first time in our lives we were in a real primeval forest, untouched by the hand of man. Such visions were rudely dissipated by the unexpected sight of a saw-mill and a charcoal-pit. Soon after this we came in sight of Sidheim Sæter, on the opposite side of the river, and halted at 9 o'clock for a second breakfast on the banks of the Glitra, a rapid stream which here falls down the mountain on the left to join the main river. Glittertind, I may mention, is clearly the peak of the Glitra, and has no connection with snow glittering in the sun, or any other suchlike simile.

Having finished our meal, we turned sharp to our left, without crossing the Glitra, and, quitting the valley, took right up the mountain—and, alas! simultaneously into the cloud. We mounted through pine-woods till, on our right, we came into sight of a fine waterfall—a dark semi-circular chasm of black rock composed of perpendicular cliffs some 80 ft. high, over which the Glitra fell in one long shoot of silver. A little above the fall we turned to our right, and crossed the stream. By this time we had surmounted the first steep slope by which the mountain descends to the valley, and had reached ground of a somewhat more level character. We had also passed out of the region of trees, and had fairly entered upon that of *stones*, in which we continued for the greater part of the ascent. These same stones are so marked a feature of the country that it is impossible to pass them over without notice. Conceive a whole tract of country completely covered with loose stones of all sizes and shapes, heaped together in wild confusion, without the slightest regard to the convenience of a pedestrian. The only mode of walking under such circumstances is to step from one stone to another, and continue that process until you come to your journey's end. I consider these stones a very serious drawback to a mountaineering tour in Norway. In making this statement, I expect to be laughed at. Indeed, before I went to Norway, I remember having laughed myself at similar assertions. Nevertheless, I entertain a strong belief that if any of my readers will go to Norway, and try to do any walking there, he will come round to my opinion. No one who has not been in Norway knows what stones are. To the remainder of mankind I can only hope to convey a faint idea of the reality by means of tropes and similes. Norwegian stones may be likened to a Welsh scree multiplied to the n th, or the top of the Glyder Vach extended over the whole of North Wales. There is nothing like them in Switzerland, unless it be a moraine. Conceive, then, the worst and most disagreeable moraine in the Alps continued for some twenty miles; and

conceive yourself condemned to walk along it for that distance. You will then have some faint conception of Norwegian stones. These stones cover all the high valleys of Norway, and all the mountains, except where there are actual precipices or snow. They even extend to a considerable extent throughout the forests of the mountainous country, in fact everywhere except in the main valleys. The great Norwegian Fjelds—the Fille Fjeld, the Ymes Fjeld, &c.—lying above the limit of forest and below that of perpetual snow, are composed almost entirely of these stones—little or no grass—nothing but stones, stones, stones, and a little reindeer moss. The stones give an aspect of extreme sternness and ruggedness to the country; but to the pedestrian they are a most serious nuisance. Not to mention the chance of a sprained joint (which was subsequently my fate), they make the walking very fatiguing, as the traveller spends the whole day in balancing himself on the top of large stones in a state of uncertain equilibrium. Moreover, you can never look at the scenery while you are walking, since your eyes must be constantly fixed upon the ground immediately under your nose, on pain of a tumble. Matters become still worse when, as is sometimes the case, the stones are partially covered with loose snow. Under such circumstances, or when the traveller is very tired, the stones become as trying to the temper as they are to the toes; and if they do not break your heart, are at all events uncommonly likely to break your shins. The famous Gloucestershire song, ‘George Ridler’s Oven,’ begins, as my readers, I hope, remember, with the words:

‘They stwuns, they stwuns, they stwuns, they stwuns.’

I feel convinced in my own mind that the line in question has been derived from some ancient Norwegian Saga, and furnishes a proof of the Norse ancestry of the English people. But to return to the Glittertind. Over stones such as these we painfully pursued our way. We could not see fifty yards for the mist, and it snowed at intervals; but our advance was enlivened by the appearance of a flock of snow-buntings. Before long we crossed another depression or hollow in the mountain-side; on the opposite side of which was a bed of snow, scarcely deserving the name of a snow-field. This we crossed without difficulty, and so arrived at the crest of a long rocky shoulder, clear of snow, sloping gradually upwards to the base of the final peak. Bearing to our left, we turned up this shoulder, which was broad and perfectly easy, and marched along it for a very considerable distance, with no other impediment than was

afforded by the exceedingly rough and stony nature of the ground. In this manner we reached the base of the final cone, which was composed of snow, some inches deep, lying over ice. This might in some seasons necessitate step-cutting, in which case the job would be a long one; but on the present occasion the snow, though soft, was deep enough to give tolerable footing, and as the slope was not excessively steep, and there were no crevasses, the ascent was free from serious difficulty. As a measure of precaution, we proposed to put on the rope; but the guides objected, saying it was not necessary; and, as this appeared to be the case, we acquiesced. However, about half-way up, the guides halted, and saying something about a cornice at the top, proposed to rope. We then found that they wanted us to hold the rope in our hands. To this we demurred; but as the rope was hardly long enough for five people, I agreed to try the guides' plan and hold the rope in one hand, the other four being properly tied. It was the first time I ever tried that method of using the rope; and it shall certainly be the last. I do not think I was ever so uncomfortable on a snow-slope before. The result of holding the rope with one hand, and the axe with the other, appeared to me to be that I was entirely precluded from using either the one or other to any useful purpose. However, it really mattered little or nothing what we did in this respect. At 2.40 we reached the summit. It was Saunders' first experience of mountaineering, and we therefore drew back, and resigned to him the honours of being the first Englishman on the top of Glittertind. By rights we ought to have drunk somebody's health; but we had nothing to drink it in, and were therefore obliged to content ourselves with giving three cheers to celebrate the achievement.

The view reminded me forcibly of a view which I had had two years before from the top of the Galenstock. It was limited, but possessed one great advantage—it was easily described. It consisted merely of some ten square yards of snow and surrounding mist. It is a curious circumstance, but strictly true, that I have seen exactly the same view (barring the snow) from a number of Welsh mountains of my acquaintance. Under these circumstances, we did not stop more than 10 minutes at the top. We put on the rope again to descend, though the guides did not consider it necessary, and soon reached the rocks. Here at last the clouds broke, and we got a view. It was but an imperfect one; but it was a mountain view; and in my opinion a mountain view is, under all circumstances, worth more than all the views from valleys that ever

were seen. A noble group of glaciers and snow-clad mountains came into sight to the south, in which direction the peaks of Leirhö and Memurutind were especially conspicuous. The peak of Glittertind itself was also visible—a fine cone of snow. We perceived that instead of ascending Glittertind by the long stony shoulder which we had traversed, it would be possible to get on to the snow at a much earlier point, and mount by it throughout. This would, I think, be a better route, at least in descending; but the guides did not seem very fond of snow, and obviously preferred to keep on the rocks whenever they could—a taste in which I by no means agreed with them.

We descended by the same route which we had followed in the ascent, till we reached the point where we had crossed the Glitra. From thence we shortened our return home by keeping straight away in the direction of Rösheim, over a shoulder of the ridge, and coming down through the pine-woods, till we rejoined the path not far from the saw-mill. We thus cut off the angle which we should have made had we followed the course of the Glitra. Eilif led us down through the pine-woods in fine style, and we followed at a great rate, leaping from ledge to ledge of the descent in a fashion which illustrated the value of the alpenstock in a very signal manner. We had a somewhat dreary tramp homewards along the valley, and reached Rösheim about 8.30. Our ascent of the mountain was decidedly slow. It might have been made, I should think, in less time by an hour.

We had now to decide upon our future course. I had had the advantage of some communication with Captain Campbell, to whom I am indebted for much valuable information, most kindly and courteously given. Under his advice, we resolved to attempt the ascent either of Knudstoltind, between the Bygdin and Gjendin Lakes, or of Skagstoltind, one of the Horungerne range. Both peaks had some pretensions to rank as the highest mountain in Norway, though that pre-eminence is usually supposed to belong to Galdhopiggen. The last-named peak had been repeatedly ascended; but Captain Campbell informed us that neither Skagstoltind nor Knudstoltind had been ascended. Hans Slaten, however, averred that Skagstoltind had been ascended more than once, though the rest of the Horungerne peaks were still untouched. In this uncertainty we decided in favour of an attack upon Knudstoltind, which was clearly a virgin peak *sans reproche*. This decision involved the necessity of making a pass of three days in length, from Rösheim to Nystuen in the Fille Fjeld. The

pass, though little known, is practicable for horses, as are most of the known Norwegian passes. It leads, however, over some of the wildest parts of the Fille Fjeld; and as there were no resting-places except miserable sœters, or châteaux, somewhat extensive preparations were necessary. The sœters at which we were to rest for the night would furnish milk, butter, cheese, and the coarsest and worst description of *flad brød*. We took with us bread, eggs, tea, a little meat (we could not get more), and an additional supply of cheese and *flad brød*. Besides this, we borrowed some coverlets for sleeping, and a couple of towels, which last proved very useful for our matutinal baths. We had also our knapsacks, and therein a small quantity of brandy and some concentrated meat. Of concentrated meat we had two sorts—Liebig's and Whitehead's. The latter I can confidently recommend. It has an advantage over Liebig's in being more portable. It is not a paste, but consists of a number of little hard cakes. There is therefore no difficulty in carrying it after it is once opened. Indeed, it would be perfectly easy to take a cake or two in the waistcoat pocket, if convenient. It makes a soup like Liebig's, and we thought it fully as good. To carry these several articles we arranged to take a horse with us, and proceeded to engage guides. Hans Slaten was to come, and we intended to take Eilif Aasen also, but unfortunately he could not leave Rösheim. We unwisely left it to Hans to engage another guide, and discovered, when it was too late, that he had saddled us with his son, a lad of about sixteen, and lazy to boot, who was not of the slightest use throughout the expedition.

The distance from Rösheim to Nystuen is generally done in three days, the resting-places being, for the first night, Visdal Sœter; for the second night, the sœter at Eidsbod, at the head of the Bygdin Lake; and for the third night, Nystuen itself. This makes one short day (the first) and two very long ones; but the work cannot be better equalised. We, however, were compelled to vary this programme, and give more time to the expedition, in order to enable us to attempt the ascent of Knudstoltind *en route*. We therefore arranged to sleep at the Visdal Sœter the first night, and at the Gjendin Sœter, at the head of the Gjendin Lake, on the second night, designing to attack Knudstoltind on the following day.

We got off about 10.30, on Monday, August 29, quitting Rösheim, and its most excellent and comfortable inn, with regret. Our route lay up Visdal by the same path which we had traversed on our way to Glittertind. We crossed the Glitra, stopped at Sidheim Sœter at 2, for lunch, and, still

keeping the stream on our right hand, arrived after about two more hours' walking at Visdal Sæter, where we were to sleep. This sæter is not marked on the Government map, but is situated on the right bank of the stream, nearly opposite to the foot of Stygehö. We slept on the floor of the dairy, on a bed of reindeer moss, which we gathered ourselves.

From Visdal Sæter, three routes, all passing through very fine scenery, lead to the head of the Gjendin Lake. They run together for several miles, and then fork. The first of these is the easiest route, but the most circuitous. Turning sharp to the right at Bukkehullet, it runs underneath the Kirken or Church (which is a mountain, not an edifice), and thence by Leir Vand and Lang Vand to Gjendin. The second route, which was the one ultimately followed by ourselves, keeps right up Uledal, a valley which runs into the upper part of Visdal. At the head of Uledal it crosses a pass which, though lofty, is below the snow-line; and leaving the peak of Simletind to the left, joins the first route a little below Lang Vand. The third route, which was not traversed by any of our party, coincides with the second as far as the top of the Uledal Pass, but then turns to the left up a snow-slope, enters another valley, and descends to the Gjendin Lake, leaving Simletind to the *right* instead of to the left.

We started from the Visdal Sæter at 6.15, the next morning, intending to go by the direct route up Uledal. We had proceeded for some distance when Hans declared that the pony could not go over the Uledal Pass; and, moreover, that it would take two men to get it over the circuitous route by the Kirken—one to lead the animal and the other to steady the packs, as the pony made its way over the stones. This decided our course. My brother and I announced our intention of going over the Uledal Pass by ourselves, while Saunders went round with the pony and the Norsemen. A Swiss guide would probably have raised some objection to this proposal, but Hans fell into it at once. We put some cold reindeer and *flad bröd* into our packets, took the rope and our ice-axes, and, bidding farewell to the rest of the party, continued our course up Uledal, while they turned to the right in the direction of Kirken. This was about 8 o'clock; there was little or no track up the valley, and we wandered on, enjoying the scenery, which was of a very high order. The view up the valley leading to the Kirken showed a very fine amphitheatre of snow-peaks and glaciers. The Kirken itself is a remarkable mountain, a sharp conical peak of black rock, reminding me much of the Eiger, as seen from some points of view. It has never

been ascended, and looks very difficult. In front, the view up Uledal was also magnificent; Simletind in particular presenting from this point of view one of the finest peaks I have ever seen—sharp as a needle and scarped on its eastern face into one unbroken precipice, rivalling that of the Finsteraarhorn, which it somewhat resembles. Simletind has been ascended, according to Hans, by an English gentleman. It looked very difficult from the lower part of the valley; but as we got nearer, we came into sight of a shoulder, from whence the ascent might apparently be made without great difficulty.

Meanwhile we were keeping a sharp look-out upon Uledalstind, a mountain to our right. We had long had a scheme floating in our heads, as to trying a peak to-day by ourselves, as we had failed in persuading Hans to take to the notion. We finally decided in favour of the Uledalstinder. These are in number two. (I should mention that 'tind,' the plural of which is 'tinder,' signifies a peak. The Uledalstinder are therefore the peaks of Uledal—the dale of Ule.) The two peaks constitute distinct mountains, bounding between them the whole of the western side of Uledal. Of these, the southernmost, i. e. the peak which lies nearest the head of the dale, and which we ultimately ascended, is distinguished by a sort of sharp rocky tooth, which constitutes the summit. The other, or northernmost peak, is a round-topped mountain of the ordinary Norwegian character. We selected the southernmost, or peaked, Uledalstind as the object of our attack, moved thereto by the consideration that it was the nearest to the summit of the pass, and therefore the more conveniently placed for our purpose.

About 9.50 we reached two lovely little lakes in Uledal; and here my brother proposed that we should quit the valley and commence the ascent of the mountain. As a preliminary measure, we sat down by the side of the lake and discussed a second breakfast. The scene was very impressive. Dark clouds were driving overhead. The narrow valley was wild and barren to a degree; scarce a blade of grass was to be seen, and not a sign of human or animal life. On our right towered the bare rocky peak of Uledalstind; on our left a lofty ridge, powdered with snow, and seamed with parallel couloirs, rose steeply out of the valley. In front, above the low 'col' which marked the head of the dale, the keen peak of Simletind shot into the air, thousands of feet over our heads, glittering with new-fallen snow, and sharp as the spear-head of a Titan. The enjoyment of the scene was enhanced by the absence of uncongenial attendants, and by the sense of reliance upon our

own unassisted exertions. The meal over, we addressed ourselves to our task. It was now 10.15. The mountain rose steeply upwards from the very point at which we were standing. Two snow-couloirs seamed the face of the mountain for the greater portion of its height. Between these, and about half-way down the mountain, lay a large patch of snow, with some rocks in the middle of it. Beyond both couloirs, and not far from the col at the head of the valley, lay another patch of snow of considerable extent, not wholly undeserving to be called a snow-field. The rest of the mountain was bare rock, terminating in a jagged and broken ridge, which stood out against the sky and constituted the final arête. We struck boldly upwards, mounting for a length of time over steep but broken rocks, which presented no important difficulty. Our general direction was towards a sort of little col or depression in the highest ridge just to the left of the actual summit. At length we reached the nearest or northernmost of the two snow-couloirs. It consisted of ice as hard as iron, without a particle of snow to cover it, and uncommonly steep. I proposed to cut steps across it, keep below the patch of snow with the rocks in the middle of it, and so reach the other snow-couloir; then keep up the side of that to the final arête. This route we had to some extent examined from below, and, as it turned out, we should have done wisely to take it. Its advantages, however, were not equally apparent at the moment; and, at my brother's suggestion, we agreed to keep up the side of the couloir beside which we stood, working along between the rocks and the ice, till we came to a good place to cross. It was a queer sort of a place—a deep narrow gully, filled with a sort of frozen stream of ice, very steep and slippery; rocks on each side, also very steep and slippery, and coming right down to the ice like a wall. Progress was difficult. Sometimes we had to cut steps in the ice, which was in places so hard that the axe-head left its mark as it would in a piece of wood, without the ice chipping away at all. The task of step-cutting was rendered the more difficult by the cramped position in which we stood, without sufficient room to use the axe properly. At other times, we contrived to crawl along the rocks. These were of the most unpleasant character, always shelving *towards* us, and never having anything to lay hold of in the right place. At last we reached a spot where the ice-couloir was so narrow, that by cutting a single step, we managed to cross it, and reach the rocks on the other side. We got on to these pretty easily; but soon found that the worst of the work was still to come. The rocks were arranged in succes-

sive shelves or steps, some 6 or 7 ft. high; each step being perpendicular, and all possessing the same unpleasant peculiarity—namely, that the ledges all sloped *towards* us; the consequence of which, of course, was, not only that we were more likely to slip, but also that we never could find a good angle to get hold of, while the ledges exhibited a marked tendency to project over our heads. This latter feature was exhibited in a conspicuous manner a little farther on. After some awkward scrambling, my brother, who was leading, proposed to take up a low cliff some 7 ft. high, which much resembled the wall of a house, having, moreover, certain rocks on the top of it which projected over our heads, like the wide eaves of an old-fashioned thatch-roof. There was, indeed, a certain gap or opening in the said projecting eaves, through which it was possible to introduce a head and shoulders; but inasmuch as this feat required a good deal of wriggling and twisting, and there was very little to hold by and nothing to step upon, I mildly remonstrated against the proposed attempt. Nothing heeding me, my brother essayed the rocks; but slipped in the middle and came down with a run. I then tried another place, a little farther to the right, but that turned out to have a roof over one's head too, and after balancing myself on my toes for some time, without getting any higher, I gave up the attempt. I now thought that we should have been obliged to go round; but my brother, making a fresh try at the original place, succeeded in some mysterious manner in getting up it. I followed, and also got up, much to my own surprise. This proved to be the worst place of the whole lot. Thenceforward the rocks, though rather queer in places, were decidedly easier. We came upon a rock couloir, which helped us for a bit; and, finally, climbed straight up the rocks till we came out upon the edge of the final arête, and saw the valley on the other side of the mountain lying at our feet. For a moment I thought that we might by good luck have hit the very summit, and have no farther to go. But my rising hopes were dashed to the ground, and were succeeded by a feeling akin to despair, as I saw the actual summit some way to the right of us, and separated from us by a deep and precipitous gap, cut as it were out of the ridge. A further examination, however, showed that the passage of the gap was practicable enough. We descended a little way on the side by which we had ascended, worked along the face of the mountain till we were clear of the gap, and then climbed up again on to the topmost ridge. At this point I happened to be leading. The ridge proved to be a narrow arête of rocks, exceedingly wild and broken.

In the excitement of the moment, I clattered along it merrily, though afterwards when descending I thought it by no means pleasant going. The summit was soon reached. It was the wildest mountain-top I ever saw, being merely the highest point of the arête, very narrow, and composed of broken and shattered rock, which looked as if it might fall at any moment, and on either side. The view was very far from perfect. It had been snowing at intervals for some time, and as we stood on the summit, cloud after cloud came driving past us successively, wrapping us in their folds. At times everything except the wild rocks on which we stood was blotted from our sight. At other times, the mists opened, and we could see, now here, now there, the peaks and glaciers around us. It was a wild view. Not a tree was in sight, much less a house or a field—scarcely even a blade of grass. Rock and snow and a little reindeer moss constituted the component elements of the scene, nor was a single living creature visible. And ever and anon the snow-storms came driving up again and blotting out all. I will try to describe some of the most striking features of the view as we saw it. To the right and left, beneath each of our feet, as we sat astride of the ridge, lay two blue lakes. They must have been some 3,000 or 4,000 ft. below us: yet it seemed as if I could have kicked one shoe into one lake, and one into the other. One of these two lakes was the tarn in Uledal, from whence we had commenced the ascent. The other lay in a deep and narrow valley on the opposite side of the mountain. It was a wild and beautiful lake of the most exquisite blue, with a snowy glacier sweeping down upon it and terminating in a fine ice-cave overhanging the blue water. The mountains in the direction of the Gjendin Lake were especially conspicuous. Close at hand rose the sharp peak of Simletind, which I have already mentioned. Beyond it were the mountains between the Gjendin and Bygdin Lakes, Knudstoltind and the neighbouring group of the Svartdalpiggene. Together they constituted a peculiarly noble and imposing mass of mountains, of very varied outline. Knudstoltind itself, to which our attention was especially directed, appeared as a very noble peak, clothed from head to foot in snow. Its ascent appeared to be practicable, though not very easy, on the side of the Gjendin Lake. The other side of the mountain seemed steeper.

We had reached the summit at 12.45, and stayed there half an hour. The height of the peak has not been ascertained; but by comparing it, while at the top, with neighbouring mountains whose height was marked on the map, we estimated it at about 7,300 ft.—a very respectable height for Norway.

At 1.15 we commenced the descent. Our object was, not to return to the point whence we had started, but to work along the face of the mountain, slanting downward in a southerly direction to the head of the pass, which lay immediately beneath the mountain. We should thus save both time and distance, as we must necessarily pass this point in order to reach our quarters for the night. We soon quitted the arête, and again took to the face of the mountain by which we had ascended. The rocks were easy, and we met with no difficulty worth mentioning until we reached the second or southernmost of the two snow-couloirs, which I have mentioned before. This it was necessary to cross. I delegated the task of step-cutting to my brother, in consideration of my having a sprained wrist, and placed myself as firmly as I could upon the rocks, while he proceeded to cut the steps. We were roped together, and I payed out the rope gradually to him as he advanced, being always prepared for a strong pull and a long pull, in case he should slip. The couloir was of hard ice, about 40 ft. broad, and inclined at an angle of say 45 degrees, and although Mr. Carter's axes did their work well, some time necessarily elapsed before the steps were cut. At length my brother, having completed his task, reached the other side, and then in his turn planted himself upon the rocks, and held the rope while I crossed. The rope (50 ft. long) was just long enough (after allowing for the portion tied round our respective waists) to prevent the necessity of our both being upon the ice at the same time. Some more rock-work followed, and we then reached the upper edge of a small snow-field, which had to be crossed. I went first, with the rope round me, and at first advanced somewhat cautiously, keeping a sharp look-out for crevasses. But it was all safe. Snow, some inches deep, lay over ice, and there seemed to be no crevasses; so we were soon across it. I may mention, by the way, that this arrangement of snow lying over ice seemed to be characteristic of all the snow-fields which I was on in Norway—the only exceptions occurring where there was ice and no snow at all.

After crossing the snow-slope we made our way without difficulty to the head of the pass leading from Uledal towards the Gjendin Lake. Here we rejoined the regular route, and the ascent terminated. This was at 3.50, so that the descent from the summit to this point had occupied 2 hours 35 minutes.

On reviewing the above account, I fear I may have depicted the difficulties of the ascent as more serious than they were in reality. They were nothing that a Swiss guide would have thought worth consideration; though they were sufficient to

cause some pleasurable excitement to us, engaged as we were in the task of finding our own way without assistance. I have, moreover, to defend myself against the more serious charge of disregarding a recent solemn resolution of the Club, levelled against mountaineering without guides. In the principle of that resolution, as applied to the Alps, I entirely concur; but the Norwegian mountains are certainly easier. Their height is of course comparatively insignificant, and independently of this, both rocks and snow seem to me to be easier in Norway than is generally the case in Switzerland. At the same time, it must be remembered that my experience is limited. There may be, and I believe there are, mountains in Norway, such as the Romsdalthorn, which are difficult enough.

We had reached the bottom of our mountain, and the top of our pass. The descent from the pass was a trifle, but the difficulties of the day, as far as I was concerned, were by no means over. The rough work had renewed an old sprain, or rather two old sprains, and my left knee and right wrist were crying out sadly. My knee had given me some pain in descending from the peak, and induced me to wonder whether a lame man had ever gone up a virgin peak without guides in a snow-storm before. Now, however, my knee grew worse, and in a short time I was very lame. There was little or no track, and the entire valley was completely filled, as is the custom in Norway, with one of the interminable fields of stones which I have already attempted to describe. It is not particularly pleasant to walk for hours upon the tops of big stones, even if you are not lame; but the unpleasantness is decidedly increased if you happen to have a sprained knee, which was my case. However, there was no help for it, and I tramped on as best I could down the valley. My brother gave me all the assistance in his power; but this was but little. I consoled myself for some time with the hope that as soon as I got into the regular track from the Kirken, by which the pony was coming, the walking would be better; but when I did at length reach the desired path, I found it, to my disgust, rather worse than the ground I had been on already. Hours passed away. I fortified myself with some brandy, but was obliged to make but a sparing use of this, as we were short of brandy, and were anxious to reserve our slender stock for future emergencies. At last I persuaded my brother, much against his will, to leave me, and push on to the sæter to which we were bound, there to prepare for my arrival. He was soon out of sight, but the distance proved to be much greater than we

imagined; and, to make matters better, it got dark. In the next place, I lost the track in the increasing darkness, and wasted much valuable time in trying to find it again. At last I gave up all hopes of recovering the track, and resolved simply to keep straight on down the valley till I got to something. As usual, that something seemed to get further off, the further I walked. It grew darker and darker. I limped painfully on, steering my course by such imperfect light as the night afforded me, and stumbling over stones and rocks and all sorts of impediments in my path. A torrent roared on my right, the mountain rose steeply on my left; I began to speculate on the possibility of breakers ahead in the shape of awkward rocks; and altogether was not ill-pleased when I heard in the distance a faint shout. I answered lustily, and in a few minutes was met by my brother. He, finding the distance so considerable and the night coming on, had not waited a minute at the sæter, but immediately returned to meet me, bringing with him Hans. The point at which we met was still half an hour from the sæter; and as we marched on in the dark, I was struck with the skill and sagacity with which Hans contrived to keep the track. No doubt he knew its general direction, but he could not have travelled it *very* often; yet he never strayed from it once, though it was quite indistinguishable in the darkness to *my* eyes. He seemed to do it almost as much by feeling as by sight, working his feet along in the narrow track which ran in and out among the stones. We did not reach the sæter until about 10 o'clock at night, having occupied six hours in descending from the top of the pass. We had been, of course, greatly delayed by my lameness, which lengthened our walk, I should think, by at least two hours.

The sæter, when we got to it, was a miserable hut. It consisted of but one room; for the dairy was a mere closet. It was most inconveniently small for our party of five, in addition to the woman who lived there, and her two or three children. The walls were built of mere rough stones, without mortar; and the wind whistled merrily through them. The floor was merely earth trampled flat; and such little furniture as the hut contained was of the roughest description. We were anxious to husband our small remaining store of meat; and, accordingly, contented ourselves, after the day's exertions, with Liebig soup, milk, cheese, and *flad brød*. Supper concluded, I prepared for the night by putting on my second shirt and second pair of trousers over that which I was wearing at the time. I then lay down on the floor with a rug—a sort of horse-cloth—

under me, and the rope for a pillow. My brother and Saunders slept on a sort of bench, with their legs stretched under a kind of shelf which served as the only table. The woman and her children occupied the only bed; and Hans and his son slept, like myself, on the floor. Before long it got very cold. I soon pulled the horse-cloth from under me, and put it over me; then rolled about on the floor in an uneasy manner, half asleep, till I came against something warm, and stopped there. In the morning I found myself and the two guides packed into one close mass, by the operation of that species of mutual attraction which warm bodies appear to possess for one another on a cold night. I may mention that both the Glittertind and Uledalstind appeared to be composed of gneiss—the common material of Norwegian mountains.

We were up early the next morning. My knee forbid my thinking of Knudstoltind; but I was anxious that my brother and Saunders should not be disappointed of the ascent. For about ten minutes I thought they were going to try it, and began to wonder how I should contrive to pass the day at the *søter* by myself; but Hans pronounced the weather to be too bad, and the attempt was abandoned. I believe Hans was right, but at the same time I do not think he was very keen about the ascent.

I shall say but little about the remainder of the expedition. A pass which is practicable for horses is clearly unworthy of the prolonged attention of the Alpine Club. We left the Gjendin *Søter* at 7, passed the new hotel at Eidsbod, on the Bygdin Lake, and reached the new hotel at Tornehang, on the Tien Vand, at 4.30, where we slept. These new *hotels*, as the peasants call them, are liable, by their imposing title, to mislead travellers. They are mere huts erected for the convenience of sportsmen, and are more like new and good *søters* than anything else.

In 1870, the Bygdin Hotel was abandoned and locked up in the latter part of August, and the Tien Hotel was also by way of being closed. The latter contained no furniture except a stove; and we slept on some shavings, which remained from the original erection of the building. I cannot say what accommodation these huts may afford to travellers in the season; but it cannot be much. We left the Tien Hotel the next morning at 7, and reached Nystuen at 2. So ended the expedition.

The country which we had passed through is probably one of the wildest in Europe. We had travelled straight ahead for three days and a half without seeing a fence, and scarcely

a bird or a tree. I may add, for the benefit of future travellers, that we paid a specie-daler (about 4s. 6d.) per day to each guide, and the same for the pony; but no return fare.

Here this paper ought properly to terminate; but a few words in addition upon the important subject of guides may be useful. It must be remembered, however, that my experience of Norwegian guides is very limited. My impression is that although of course Norwegian guides are by no means equal to Swiss, yet they are not to be despised. They are aware of the value of the rope, and are not unacquainted with step-cutting. No regular system of guides exists; and the best men can only be discovered by enquiry at the different villages. Their charges are very low. A specie-daler (4s. 6d.) a day is the usual charge, even for an ascent. Our men asked a specie-daler and a half for Glittertind; but they rather apologised for doing it. This contrasts pleasantly with the 50 francs which are expected of a traveller in the Alps. Nevertheless, I think the best plan for Norway would be for two or three good mountaineers to join together and make their ascents generally without guides. Caution would of course be necessary; but with caution Norway seems to me to be exactly the country in which mountaineering without guides may be safely indulged in.

As to individual men, we were not much taken with Hans Slaten. He is dreadfully slow, and he certainly stuck us in saddling us with his son, who was entirely useless for our purpose. I should be inclined myself to try Eilif Aasen, who is a much brisker and more active fellow. Hans, however, knows the mountains better, having accompanied the Government engineers when they made the survey of the district. At the same time I should certainly take Eilif for any mountain which he knows, such as Galdhøpiggen or Glittertind, neither of which requires more than one guide. Hans Andersen Boium, of Boium, in Fjærland, is, I should think, a first-rate guide, but we were prevented by bad weather from trying him upon snow. Physically, he presents one of the most magnificent combinations of strength and agility which I have seen anywhere, and he has had considerable experience in his own district. Of other men I know nothing.

EXCURSIONS IN THE GRAIAN ALPS. June and July, 1862.

By F. F. TUCKETT.

A WEEK of uninterrupted wet weather had frustrated all my plans of mountaineering in the neighbourhood of Chamouni, and, quitting my friends Messrs. C. E. Mathews and R. J. S. Macdonald in despair, I pushed over the St. Bernard with Michel Croz and Peter Perrin, in search of blue sky and sunshine. Into these we suddenly burst out of a dense fog only a few hundred yards beyond the Hospice, and for nearly a month they were our almost constant companions. Arrived at Aosta, on June 24, the following day was devoted to the repair of my barometer, broken at St. Remy—an operation which, thanks to the kindness, skill, and perseverance of my excellent friend the late Chanoine Carrel, was satisfactorily effected in his kitchen after five hours of steady work. On the 25th I crossed the Col d'Arbole (or d'Arpisson) to Cogne, M. Carrel accompanying me as far as Comboë, the height of which comes out 2,138 mètres (7,014 feet), the mean of previous observations by MM. Carrel and Favre being 2,134 mètres. The barometer reading on the col gives an altitude of 2,868 mètres (9,408 feet); M. Favre having previously made it somewhat less, or 2,847 mètres. At Cogne I first called on M. Chamonin, the *curé*, and after arranging for a supply of provisions, proceeded with him to the house of M. Guicharda, in order to compare my barometer with an excellent one in that gentleman's possession. On my return I found that Jacquin, the '*caporal*' or *chef* of the whole body of *gardes-chasse* in the district, who accompanied M. Chamonin in his successful ascent of the Grivola in 1861, had arrived, and having arranged with him to take part in my meditated expedition, we started, a party of four, for the *châlets de l'Ours*, the highest inhabited at the time, though considerably below those of the Pouçet. Our various preparations occupied, as usual, so much time that we did not get away till eight, and a walk in the dark amongst the pine-woods, where, without Jacquin's skilful piloting, we should have been utterly lost, was the result. The group of *châlets* at length reached (about 9.15), we found no one stirring at so dissipated an hour, and it was not without some trouble that our guide at length succeeded in unearthing a troglodyte-looking personage, who proffered us such accommodation as a hole about eight feet square might afford. There were no seats of any description, and the floor was reeking with moisture; but luckily some loose planks were at hand, and on the softest

of these I stretched myself, whilst my companions distributed themselves as best they could round the fire. Four hours of troubled repose were a poor preparation for an early start, but a little before three in the morning of the 27th we were again *en route*. It is not my intention to give a minute description of an expedition with which mountaineers are already more or less familiar. An easy ascent of $1\frac{3}{4}$ hour brought us at 5.45 to the ridge of the Pouçet, the height of which, deduced from a barometer observation taken on my return, comes out 3,275 mètres (10,746 feet), agreeing therefore very closely with my previous determination in 1859 of 3,270 mètres. Here we halted an hour for breakfast, and then traversing diagonally the upper plateau of the Trajo Glacier, reached the base of the final peak of the Grivola at 7.30. The rocks presented no serious difficulties, though the work was sufficiently arduous to give a zest and excitement to the climb, and as we were much encumbered by the theodolite, barometer, boiling apparatus, and provisions, whilst there was no occasion for hurry, $2\frac{1}{2}$ hours were consumed in the ascent, which, under ordinary circumstances, might easily be accomplished in two. The weather even before our arrival appeared to be on the change, and ere long, as the masses of cloud surged up from the neighbouring valleys, peak after peak was enveloped, and the perfection of the panorama so seriously impaired that theodolite observations were rendered impracticable. I therefore devoted myself to barometer and boiling-point readings, and the depositing of one of Casella's mercurial minimum thermometers in the cairn originally erected by Dayné, who accompanied Mr. Ormsby, and afterwards improved by M. Chamonin's party. The mean of two barometer observations taken at 11 and 12 o'clock and compared with Geneva, Turin, Aosta, St. Bernard, and the instrument of M. Guicharda at Cogne, gives a height of 4003.6 mètres (13,135 feet), or nearly 40 mètres in excess of the trigonometrical determination of the Sardinian engineers as stated by M. Carrel. My friend, the Rev. T. G. Bonney, who, with Mr. W. Mathews, Jun., ascended the mountain a few weeks later, and used one of Secretan's aneroids, informs me that its reading (corrected) gives a result absolutely identical with that arrived at by me; but as no horary correction was applied by either of us, and Mr. Mathews' theodolite observations from Mr. Emilius reduce the height to 3,971 mètres, or very nearly that assigned by the Sardinian engineers (3,964 mètres), I am inclined to think that this last may be accepted as not far from the truth. The mean of boiling-point observations with two thermometers was $188^{\circ}.7$ F., or $87^{\circ}.05$ C., which,

according to Regnault's Table, corresponds with a pressure of 469·17 millimètres. Now the mean of the simultaneous barometer readings was 468·8 mill., showing a difference of only 0·37 millimètres—a result which is very satisfactory. The reading of the aneroid (one of Secretan's) was 465·6 mill., or 3·2 mill. too low; but as its error was almost precisely the same (3·3 mill) when compared with the barometer at Cogné on the previous day, it does not appear, on this occasion at least, to have been affected injuriously by the diminished pressure.

Finding, after a stay of $2\frac{1}{2}$ hours, that the weather, instead of improving, assumed a more threatening appearance, we thought it most prudent to return, and at 12.30 quitted the summit. $1\frac{1}{2}$ hour sufficed for the descent to the Glacier de Trajo, and at 2.35 we once more stood on the ridge of the Pouçet. An hour was now devoted to observations, a second dinner, and a pipe, and at 3.30 we started for Cogné, which was reached in two hours *viâ* the châteaux de l'Ours and the village of Crétaz. We made a slight détour to the latter place in order to see a young bouquetin, one of several recently captured by the *gardes-chasse*, and destined for Turin. A call on M. Chamonin occupied the evening, and at 8.30 I retired to my chamber in the old tower, nothing loath, having had less than four hours' sleep for the two previous nights.

The weather still continuing unsettled, I had almost come to the conclusion that it would be necessary to abandon my intention of effecting a new pass direct to Ceresole, and proceeding thence to Turin *viâ* the Crozette (or Crocetta) Pass and Val di Lanzo, and adopt instead the more expeditious route of the Val d'Aoste. With plans in uncertainty, whilst bed offered unusual attractions, it was 7 o'clock before I turned out to be unexpectedly greeted by a most brilliant morning. A council of war was at once held, and, in spite of the lateness of the hour, the probability of a bad state of the snow, and our ignorance of the *terrain*, it was resolved that an attempt should be made to reach Ceresole by the Combe de Valnonte, the Glacier de Grancrou, and the ridge at the head of this last connecting the Rossa Viva with the Grand Paradis, which last is, by the bye, the Becca di Montandeni of the Sardinian map. The preparation of provisions and a consultation over maps with the worthy *curé* occupied so much time, that it was 9.30 when we got off, accompanied by Jacquin, whose duties took him as far as the châteaux of Vermiana. A pleasant walk up the Val or Combe de Valnonte (along the path leading by the Col de la Combe de Cogné to Val Savaranche), which forms the SW. branch of that of Cogné, brought us to Vermiana, where we

bade adieu to Jacquin, and pushed forward for the glacier, the left bank of which was reached at 11.45. The route over the ice must vary according to the character of the season and the time of year, and I do not think the direction selected by us was quite the best; but as it ultimately led to our goal, I will give a few necessary particulars. Proceeding up the left or NW. side of the glacier, we skirted the foot of a very fine ice cascade which comes tumbling in from the W., and having passed it, struck off diagonally to the left and made for the séracs of the arm of the main Glacier de Grancrou, which descends on the Paradis side of a jutting mass of rock capped by a moraine. Before reaching the more dislocated portion of the ice, we found the remains of a bouquetin spread over a large surface, and evidently destroyed some time previously by an avalanche. The horns, which indicated an age of ten years, were much bleached by long exposure, but we secured them as an interesting souvenir of the expedition, and then assaulted the séracs. These proved exceedingly formidable, and more than an hour was consumed in forcing a passage through the few hundred yards over which they extended. Once clear, however, uniform slopes of snow and névé, with a single *bergschrund*, alone separated us from the col, and though for the last 400 or 500 feet the ascent was extremely rapid, no serious difficulty was encountered. It may not be useless to remark that the ridge is more easily gained at a spot not far from the Rossa Viva than at its lowest point, which may afterwards be readily reached by descending slightly in the direction of the Paradis. Owing to our late start, and the delay caused by the séracs, it was already 4.20, and our chance of reaching Ceresole the same evening appeared small. The guides produced our provisions whilst the barometer was being set up, and having secured a reading, from which the height of the col comes out 3,363 mètres (11,034 feet), a hearty meal was despatched with as little delay as possible. Mr. Mathews' theodolite observation from Mont Emilius reduces the height of the col to 3,301 mètres (10,830 feet), which is possibly more correct. The scenery hitherto had been exceedingly fine, and though *brouillard* partially concealed the view on the side of Val d'Orca, the range of the Pennine Alps from the Velan to Monte Rosa was strikingly seen, and made ample amends for the occasional eclipse of the Levanna and its train.

At 5 we commenced the descent, of the facility of which we had already satisfied ourselves on our arrival. Working down a by no means difficult couloir, we found ourselves on the gently-inclined névé of a moderate-sized glacier, which we

traversed diagonally, keeping away to the right, till a small lake came into view. Bearing to the left of this, the slope became more rapid, and in a few minutes a lateral moraine was reached, at the foot of which a precipitous descent put a stop to further progress in that direction. There was, however, no difficulty in turning this obstacle by keeping away to the W., and we soon reached the left-hand moraine of a second glacier, descending from the S. side of the Paradis, which here forms a very striking feature in the view. Following this moraine, the slope of which is considerable, to the point where it joins that from the left-hand glacier whose névé we had traversed, we found ourselves on a plain scored by torrents, and presenting the appearance of a deserted lake-bed. Making the tour of this on its W. side, we soon struck a track which led over a low rocky shoulder in front, and then down into a second and somewhat similar level space, surrounded by the most fantastic and weathered crags. Into this plain, or rather the head of the savage valley opening up from it to the N.W., came a glacier from a fine snowy summit, apparently the Cocagna of the Sardinian engineers, which is so striking an object from the Croix de l'Aroletta in the Val Savaranche. The ice was much crevassed, but we thought it would be possible to gain the snow-fields above, and in this case a passage might probably be effected with little difficulty into the Val Savaranche, descending by the Glacier de Moncorvé. Another col probably exists still nearer to the Paradis, and at the head of the glacier whose left moraine we had so recently descended. A second low shoulder was now traversed by the path, which is here a large one, rejoicing in the title of '*Strada Regia*,' and constructed for the king's use when on his hunting expeditions, and by a series of zigzags through scenery of the grandest description we reached the alp and châteaux of Novaschetta at 7.45. The stream, formed by the drainage of the glaciers at the head of the valley, descends considerably to the left of the path, through a succession of ravines, in which it is mostly lost to sight. A draught of fresh milk proved very acceptable, and after making enquiries of the civil *berger* as to the best and quickest route to Ceresole, we started off at a rapid pace, still keeping to the right—the one especial rule for this pass—and winding round the mountain-side, sometimes ascending and sometimes descending gently. Soon a branch was passed, leading down on the left to Noasca in the Val d'Orca, the bottom of which could still be distinguished far below, in spite of the increasing gloom and masses of *brouillard* which occasionally enveloped us and blotted out everything

beyond a radius of a few yards. The path gradually narrowed, the obscurity became deeper, and various intersecting tracks made it difficult to maintain the direction. At length, however, a dog's bark guided us to the little village of La Varda, and a peasant having shown us the way down to the valley at a point not far from the '*Scalare di Ceresole*,' with which I was already familiar, we determined to push on and endeavour to reach Ceresole, our original destination. Somehow or other, however, we contrived to miss the path, and soon got hopelessly entangled amid a succession of precipitous slopes, where persistence would have been rash, and very reluctantly it was decided to return to La Varda, and throw ourselves on the hospitality of the inhabitants. Our former friend made us welcome to a bed on some delicious fresh hay in a neighbouring *grange*, as well as to the use of his fire for supper, and after a substantial meal of bread and portable soup we turned in on our fragrant couch and slept the sleep of the weary.

The morning of the 28th was lovely, and a pleasant walk of $1\frac{1}{2}$ hour through charming scenery brought us to the inn a little below Ceresole, with which my expedition of 1859 had already made me familiar, though I am sorry to say it had sadly deteriorated in the interval. Under ordinary circumstances, 5 or 6 hours would amply suffice for the ascent from Cogne, and about 5 more for the descent to Ceresole; and I can assure those who may be inclined to follow in my steps that they will be amply rewarded by the beauty of the scenery on both sides. The pass will also, I hope, prove a useful one, as furnishing the means of reaching Ceresole direct from Cogne in a single day.

The 29th, being Sunday, was spent quietly at Ceresole, and on the 30th I crossed the ridge dividing the Val d'Orca from the N. arm of the Val di Lanzo by the Col della Crozetta to the E. of the Levanna. The height is 9,179 feet according to the barometer; but I feel some uncertainty as to the correctness of the observation, and should be disposed to adopt a lower estimate. There is a good mule-track the whole way, and the views of the Levanna and Paradis from the summit (which is marked by a stone pillar) are fine, though in our case considerably marred by *brouillard*. The ascent from the inn below Ceresole occupies little more than 2 hours, and the descent from the col to the level of the Val Forno about $1\frac{1}{2}$ more. The scenery of the latter is extremely picturesque, the upper portion of the valley backed by the snowy mass of the Levanna being especially fine. The mountain-sides are richly wooded, and the level ground well cultivated, whilst an ex-

cellent path leads down through a succession of villages, the first of which is Bonzo, about 25 minutes below the point where the track from the col comes in. 2½ hours farther is Ceres, beautifully situated at the junction of the two arms of the valley. Here we halted at 1.30, and, while a *voiture* was being got ready to take us to Lanzo, partook of a thoroughly Italian dinner at a decent-looking inn. A really fine carriage-road had recently been constructed between Ceres and Lanzo, and down it we rattled in 1½ hour, through the most charming scenery, to Lanzo, situated at the point where the mountains subside into the great plain of Piedmont. We found an omnibus starting at 4, which took us to Turin by 8, and a more amusing ride I have seldom had. The country is like a garden; the harvest was just being got in, picturesque groups gave animation to the scene, and a throng of omnibuses and other vehicles indicated an amount of activity that quite astonished me, whilst the whole was lit up with the rich colouring of the close of a glorious Italian day.

F. F. TUCKETT.

NOTES ON THE BOTANY OF THE DISTRICT OF BORMIO.
By JOHN BALL, F.R.S.

IT is a matter of curious enquiry to ascertain why certain districts of the Alps possess a far more varied vegetation than others. Some of these have long been known to botanists, and acquired a certain celebrity even before modern scientific requirements led to the minute investigation of mountain regions and the careful record of observations. The Mont Cenis, the neighbourhood of the Col di Tenda, the head of the valley of Zermatt, the Monte Baldo and the Monte Sumano are instances which will occur to most Alpine botanists; and since the chain of the Alps has been almost everywhere traversed by naturalists, the number of such districts has been largely increased.

This is not the place to enquire into the causes which may have led to the exceptional richness of certain local floras, beyond the remark that one important, though by no means exclusive agency, must be sought in the varied mineral structure of the district; but it seems not out of place in a periodical devoted to increasing our knowledge of the Alps, to give from time to time such information as may be available respecting the vegetable wealth of districts not yet very com-

pletely known, and as to which scanty details are available even in professedly scientific works. Should the present experiment be received with favour by the members of the Alpine Club and other readers of this journal, I shall be happy to contribute from time to time notes of a similar character having reference to other districts. For the present, I select one with which I am tolerably familiar, and which offers especial attractions from the fact that several species, whose home is situate in widely different regions, find here the extreme limit of their dispersion.

I speak of the district of Bormio, including the four or five short valleys whose torrents unite below that quaint but rather dismal little town to form the main stream of the Adda.

The most considerable of these torrents is the Frodolfo, which originates in the great Forno Glacier, receives close to Santa Catarina another glacier torrent which drains the Val Gavia and the slopes of the Tresero, and lower down, near Bormio, is joined by another tributary which issues from the wild Val del Zebbru.

Next in importance to the Frodolfo is the torrent that flows in the opposite direction, and enters the valley of Bormio from the west, a little above the town, just under the comfortable establishment opened of late years at the Bagni Nuovi. This drains Val Viola, with several short tributary glens, but is not fed by any considerable glacier.

The least considerable of the three streams that unite at Bormio is that which preserves the name Adda, because both its branches lie near to tracks long frequented by travellers passing from Lombardy to Switzerland or Tyrol; while till lately Val Furva and Val Viola were little known, save by name, to Alpine geographers. About three miles above Bormio the traveller following the great road of the Stelvio looks down on the junction of two torrents. That which he is to follow in his ascent to the Stelvio Pass is the Braulio, slender and clear in the morning, but full and turbid in the afternoon, when swollen by the melting of the extensive Vitelli Glacier and the snow-fields that clothe the flanks of the Cristallo. The western stream which joins the Braulio is the Adda, which here descends from the Val di Fraele. The popular fancy has fixed upon a copious flow of water that bursts abruptly from the limestone rock at a great height above the stream as the true source of the river; but recent maps indicate some small swampy pools some five miles farther from the junction as the proper sources.

Of the valleys here named, that of the Frodolfo (called Val Furva) and Val Viola are almost altogether enclosed by mountains composed of schists and sandstones, often semi-crystalline in structure and containing little lime. These belong apparently to the verrucano and the Trias. The mountain mass rising north of Bormio, which is deeply excavated by the Braulio and the head-waters of the Adda, consists, on the other hand, exclusively of limestone, which exhibits the characteristic features of that rock—lofty mural precipices with steep slopes of débris, dear to botanists, but destructive to the boots of the traveller. The Val del Zebro, which offers the most striking scenery of this district, is a very deep trench dividing the calcareous rocks of the Cristallo range from the schistose mass of the Monte Confinale.

The botanist who wishes to explore this district, and who is unable to traverse the ground in the expeditious style usual with other Alpine travellers, is fortunate in finding convenient head-quarters within a moderate distance of all the most attractive spots. The new Baths of Bormio offer excellent accommodation, and the courteous and accomplished Swiss gentleman, Dr. Levier, who acts as medical director of the establishment, is also a good botanist, thoroughly acquainted with most of the localities. The establishment open in summer at the mineral spring of Santa Catarina also supplies fair accommodation and good food, when not overcrowded in the height of summer. For the purpose of exploring thoroughly the upper part of the Stelvio Pass and the surrounding heights the botanist may find night quarters and tolerable food at the cantoniera of Santa Maria, on the summit of the Wormserjoch, at the extraordinary height of nearly 8,300 ft. above the sea.

The least conveniently accessible of these valleys is Val Viola; and its tributary glens, Val Elia, Val di Verva, and Val di Dosdé, especially the latter, are too distant from Bormio to be carefully examined in a day's walk. My own acquaintance with the valley is very slight, being confined to a single rapid walk, in which I kept nearly to the main path.

In this paper I merely propose to indicate the localities of the rarer and more interesting species found in this district, for anything like a complete account of the vegetation would be out of place. To save trouble, I may say that I adopt the nomenclature of the third edition of Koch's '*Synopsis Floræ Germanicæ et Helvicæ*,' except where the name of the author is affixed to the species.

I shall commence with Santa Catarina, which may best be

visited during the first half of July, though many plants of the upper region are better gathered in August. Close to the establishment may be seen a few sparse specimens of *Echinosperrum deflexum*, a curious plant, less rare in the Alps than is commonly supposed, but never seen in any abundance. The hooked bristles of the fruit cling to men's clothing and the skins of animals, and it is thus carried into unexpected places. It is seen here and there in waste ground about Bormio, and sometimes in stony places up to a height of 7,000 ft. The botanist's first stroll from Santa Catarina will probably be through the woods that clothe the slopes behind the establishment; and when he has ascended some three or four hundred feet he will be sure to perceive, in shaded mossy spots, the delicate lilac bells of the graceful *Linnæa borealis*, often associated with *Pyrola uniflora*, and occasionally with *P. minor* and *P. secunda*. Very rarely the little alpine orchid *Listera cordata* is seen in the tufts of moist moss. The slopes opposite to Santa Catarina, on the N. side of the valley, are more bare, and do not produce much of interest. A *Thalictrum* with much divided glandular leaves is the *T. pubescens* of Schleicher, by some supposed to be a hybrid between *T. fœtidum* and *T. minus*. Many *Umbelliferae*, of which the least common is *Laserpitium hirsutum*, may be collected.

The inevitable excursion for all visitors, botanists or not, is that to the Forno Glacier. It is a charming walk, and the ardent mountaineer, thirsting for snow-fields and ice-fringed mountain ridges, who hurries over the track before daylight in the morning, or at dusk after his hard day's walk, knows little of its attractions. The larch and Siberian pine (*Pinus Cembra*), rooted among huge blocks, or on the verge of overhanging rocks, are not so close together as to shut out the glistening peaks of the Tresero, and allow occasional glimpses into the dark trench in which the Frodolfo roars below. A few plants of interest are seen by the way. The always graceful *Atragene alpina* casts wreaths over the rocks and bushes; *Draba frigida* may be noticed here and there in a cleft; *Senecio abrotanifolius* lights up the slopes of *Arctostaphylos* and *vaccinium* with its flaming orange glow; while the exquisite *Gentiana nivalis*, growing with unaccustomed luxuriance, lifts its starry eyes to the sky, and reflects a tint equally pure and equally intense.

But the feast for the botanist begins when he reaches the grassy slopes that surround the lower end of the Forno Glacier, especially if he arrive before the hay is cut. Many not common alpine plants here flourish luxuriantly, but the rarest

species are *Sempervivum Wulfeni*—very like the common house-leek, but with yellow flowers—and *Koeleria hirsuta* of Gaudin, more properly known as *Festuca hirsuta*.

The ascent of Monte Confinale, strongly recommended for the sake of its admirable panorama, does not much reward the botanist. The chief object of interest that I noticed was a filled-up tarn, whose level sandy floor was one sheet of *Eriophorum Schenckzeri* waving in the passing breeze.

Of much more interest to the botanist is the excursion to the Gavia Pass. Instead of following the track along the flank of the Tresero, he should ascend rather steeply a few hundred feet towards a small hanging glacier, conspicuous from Santa Catarina. Here, at a height of about 8,200 ft., the crevices of the rock produce a plant of extreme interest. It has as many aliases as a veteran pickpocket, but I follow Koch in calling it *Alsine aretioides*. This is one of the characteristic species of the highest dolomite peaks of the Eastern Alps, nor was it ever seen elsewhere till the Abate Carestia found a variety of it at a height of about 10,000 ft., on the south side of Monte Rosa. The same variety is that which I found on the Tresero.

Returning to the track the traveller crosses the Ponte della Preda, close below the impending tongue of the Gavia Glacier, and then follows the broad upland valley that terminates in the Gavia Pass. On its nearly level floor, the rivulets descending from the snow-fields and smaller glaciers break up into mere trickling runnels, and the entire soil over a large space is soaked with water that can be but one or two degrees above freezing-point. This apparently offers the conditions most conducive to the health of one of the most beautiful plants of the high Alps—*Primula glutinosa*—which here attains its western limit. Nowhere have I seen it grow in such beauty and profusion, and for a distance of several hundred yards its delicate and evanescent, yet penetrating, scent is borne by the breeze. Among the few flowering plants that bear it company are its natural allies, *Androsace glacialis* and *Soldanella minima*.

Another very rough and little-used track leads from Santa Catarina to the Gavia Pass by the west side of the torrent, or that opposite to the Tresero. In following that track and ascending from it to one of the secondary peaks of Monte Gavia, I found some plants of interest, but especially, at a height of about 9,000 ft., *Cardamine gelida* of Schott, intermediate in structure between *C. alpina* and *C. resedifolia*.

I have reserved for the last the most attractive botanical excursion to be made from Santa Catarina. This is directed

to the slopes and the ridge of the Monte Sobretta, which is the massive mountain that encloses on the E. side the upper part of Val Furva. Though patches of snow lie on its flanks, the ridge is bare in summer up to about 10,000 ft. Beyond that height there is no difficulty in following the ridge westward to the rounded almost flat-topped summit of the mountain, about 11,000 ft. in height, which commands a panoramic view not much inferior to that from the Confinale. Immediately above the woods that clothe the slopes behind the Stabilimento is a broad gently-sloping shelf of alpine pasture, some two miles in length, and in many parts marshy. Here may be found *Thalictrum alpinum*, *Saussurea alpina*, *Pedicularis recutita*, *Eriophorum alpinum*, and other uncommon species; but the chief prize is *Willemetia apargiodes*, a Cichoraceous plant not uncommon in the Salzburg and Styrian Alps, rare in Tyrol, and which here finds its only Italian habitat. It has the general appearance of a *Crepis*, but is easily distinguished by its fruit, which much resembles that of the common dandelion. The ridge of the mountain rises in a rather steep range of rock, partly of a pale yellow sandstone, and is most easily ascended by its lower or eastern end. Some of the plants here enumerated seem to be confined to the ledges of sandstone rock, but most of them may be found on the summit of the ridge. The following list includes only a portion of the rare plants of the mountain, but to examine the ground thoroughly more than one day should be devoted to it:—

<i>Arabis cœrulea</i>	<i>Senecio carniolicus</i>
<i>Draba fladnizensis</i> of Wulfen	<i>Phyteuma pauciflorum</i>
<i>Hutchinsia brevicaulis</i>	<i>Androsace glacialis</i>
<i>Alsine recurva</i>	„ <i>obtusifolia</i>
<i>Potentilla frigida</i>	<i>Statice alpina</i>
<i>Saxifraga controversa</i>	<i>Lloydia serotina</i>
<i>Gaya simplex</i>	<i>Allium sibiricum</i> of Willdenow
<i>Gnaphalium carpaticum</i>	<i>Elyna spicata</i>
<i>Artemisia spicata</i> , var. with stem leaves deeply cut	<i>Avena subspicata</i>
<i>Achillea nana</i> , together with an almost glabrous variety	<i>Sesleria disticha</i>
	<i>Festuca Halleri</i> and <i>F. pumila</i>

I reserve for separate notice three plants of especial interest. A single specimen of *Potentilla nivea*, a pretty arctic species, hitherto seen in Europe only in the Valais Alps, where it is very rare, in three localities in Tyrol, at one spot in the Apennines and in the north-western corner of Piedmont, was found by Dr. Levier, and must be exceedingly scarce, as I have never since lit upon a specimen. *Dianthus glacialis*, a

species of the Carpathians and Eastern Alps, here reaches its western limit, unless it has been found by Rota a few miles farther in that direction, somewhere near the Tonale Pass. *Sesleria microcephala*, still more exclusively a native of the Eastern Alps, here also attains its western limit, and, save one station in Friuli, on the dividing ridge of the Carnic Alps, this is its only Italian habitat.

Of the genus *Hieracium*, so ubiquitous in the Alps, and so protean in its forms, there are not many noteworthy examples about Santa Catarina. The most remarkable is a form approaching to, but not identical with, *H. furcatum*.

Of ferns the most interesting is *Woodsia hyperborea*. The diligent searcher will certainly find a few specimens, usually rooted in the crevices of rather dry overhanging rocks, but I decline to mention the precise spot where it most abounds, lest these pages should fall into the hands of some one of the tribe of rapacious collectors.

The Val del Zebbru has been very imperfectly examined. It, doubtless, offers an interesting vegetation, and in itself the circuit of the Monte Confinale, which is effected by crossing the ridge at its head and descending by the Val di Cedeh and Val Forno to Santa Catarina, is a delightful walk; but it would be necessary to start very early in order to find time for a careful examination of the rocks and slopes on its N. side, which promise an ample harvest. *Aconitum paniculatum*, rare elsewhere in this district, is abundant in the lower part of the valley.

To become fully acquainted with the Flora of Bormio, one should devote several days in the month of June to the lower slopes and exposed rocks, and return in the second half of July to visit the upper part of the Stelvio Pass and the surrounding ridges. Many rare species are seen close to the Baths, and others may be found by anyone who will ascend the overhanging steep slopes of limestone débris up to the rocks that will probably bar his further progress.

Of the plants of the lower region near the town, and extending thence to the Baths, the following deserve notice:—*Aquilegia atrata*, *Papaver dubium* (in cornfields), *Nasturtium pyrenaicum*, *Sisymbrium strictissimum*, *S. Sophia*, *Cochlearia saxatilis*, *Æthionema saxatile*, *Neslia paniculata*, *Helianthemum fumana*, *Viola pinnata*, *Saponaria ocymoides*, *Silene noctiflora*, *Alsine rhatica* of Brügger—apparently a singular variety of *A. verna*, very common—*Alsine rostrata*, *Geranium divaricatum* (not seen by me), *Astragalus Cicer* and *A. Onobrychis*, *Pencedanum rablense*, *Aster Garibaldi* of Brügger—a poly-

cephalous variety of *A. alpinus*—*Hieracium glaucum*, *Veronica Teucrium* and *V. anagallis*, the latter rare in the Alps, *Ophrys muscifera*, *Bromus racemosus* and *Adiantum Capillus-Veneris*—a few small fronds about the so-called Fountain of Pliny, which should not be disturbed. The following occur on slopes of débris, or on rocks, on most of the mountains near Bormio up to a height of about 7,000 ft. :—*Arabis ciliata*, *Draba Thomasii* (I agree with Hausmann in considering this a variety of *D. incana*), *Silene saxifraga*, *Arenaria Marschlinii*, *Phaca australis*, *Sorbus chamæmespilus*, *Saxifraga Vandellii* (flowers early in June), *Athamanta cretensis* var. *mutellinoides*, *Heraclium asperum*, *Laserpitium Gaudinii* and *L. Siler*, *Leontodon incanus*, *Crepis alpestris* and *C. Jacquini*, *Hieracium pulmonarioides*, *Gentiana asclepiadea*, *Pedicularis Jacquinii*, *Carex mucronata*, *C. firma* and *C. alba* and *Poa cenisia*. *Crepis pygmæa*, a curious Pyrenean species, found very rarely in the Apennines and Western Alps, here reaches its eastern limit at a point far removed from its natural home. It is found in débris about 2,000 ft. above the Baths, and more abundantly near the entrance to the Val dei Vitelli. An interesting excursion may be made by ascending the Monte Fraele, or Monte delle Scale of the Swiss Federal map, which rises W. of the Baths, and descending thence to the Lago delle Scale, a rather large alpine lake scarcely indicated on that map. The shortest way back to Bormio is by the Scala, a steep track leading down to Pedenosso in Val di Dentro; but a more interesting way is by Val Fraele and the gorge connecting it with the Stelvio road. Besides other species already mentioned, I found on the mountain *Ononis rotundifolia*, *Phaca alpina*, a curious rose, probably *R. glandulosu* of Bellardi, a stunted downy-leaved form of *Dryas octopetala*, and *Valeriana supina*, which here probably reaches its south-easternmost limit. In the lake M. Brügger has found *Ranunculus paucistamineus*.

The upper part of the Stelvio road will afford occupation to the botanist for at least two or three days. The steep slope of Spondalunga, which the high road ascends in zigzags, the short glen called Val dei Vitelli, extending thence to the glacier of the same name, the slopes of Piz Umbrail and Monte Braulio, and even the immediate neighbourhood of the Cantoniera of Santa Maria, are unusually rich in rare plants. A good many of these mentioned by German botanists as having been collected on the Stelvio or the Wormserjoch may, however, have been found at some distance, as those terms have been vaguely applied to the entire tract between the Münsterthal, the

Stilfserthal, and the town of Bormio. In the following list special localities are mentioned for the rarer species :—

- Thalictrum alpinum*, Spondalunga.
Ranunculus parnassifolius, Braulio and Val dei Vitelli.
 „ *pyrenæus*.
 „ *alpestris*.
 „ *glacialis*, unusually large below the Stelvio Pass.
 „ *hybridus*, Braulio and Val dei Vitelli.
Aquilegia Haenkeana, Wormserjoch.
Papaver pyrenaicum.
Arabis pumila.
Cardamine gelida of Schott.
Braya pinnatifida, Braulio, its extreme eastern limit.
Draba frigida.
 „ *fladnizensis* of Wulfen.
Dianthus superbus, Braulio.
 „ *alpinus*, Wormserjoch, somewhat doubtful.
 „ *glacialis*, Piz Umbrail.
Alsine biflora, a very rare plant found near the summit of Wormserjoch.
Mæhringia polygonoides.
Stellaria Frieseana, said to have been found once on the Stelvio.
Oxytropis Halleri.
 „ *montana*.
Saxifraga elatior, Spondalunga.
Achillea atrata.
Leontodon Taraxaci.
Rhododendron intermedium, here and there, probably a hybrid.
Gentiana tenella.
Primula ænensis of Thomas.
Salix arbuscula.
Carex ornithopoda, up to above 8,000 ft.
Kæleria hirsuta, near the Wormserjoch.
Cistopteris regia.

A few plants of *Polemonium cæruleum*, which has no other Italian habitat, still exist between Bormio and the top of the Stelvio, but should be spared by any true botanist. The plant is found abundantly on the other side of the pass in open places in the woods above Trafoi. Some curious forms of *Hieracium*, being links in the chain connecting *H. glaucum* with *H. villosum*, may be found in the alpine region above Bormio.

As already mentioned, the Val del Zebro and the lateral glens of Val Viola, have been little or not at all examined by botanists; and any traveller who will explore them carefully is pretty sure to make additions to the rich flora of this district.

ALPINE NOTES.

To the Editor of the Alpine Journal.—My dear Sir,—I send you some notes of one or two excursions in the Adamello district, including an ascent of the Adamello, combined with a pass from the head of the Val di Genova to the Val Camonica.

On September 14, my friend C. P. Ilbert, and myself left Pinzolo in the Val Rendena, intending to pass the night at the head of the Val di Genova, and, if possible, combine the ascent of the Adamello from thence with a pass into the Val delle Susine to Ponte di Legno. We had spent the chief part of the previous day in endeavouring to obtain information as to our intended route, and a guide, or, at any rate, some one who professed to know something of the country. The latter we signally failed in doing, though we were fortunate enough to obtain the former in the shape of a publication (the exact title of which I forget now*), which contains a very graphic account, by Lieutenant von Payer, of an ascent of the Corno Bianco and the Adamello in 1864. The maps by which it is illustrated are extremely good, and both the book and a large map taken from it are to be found in the inn at Pinzolo. It is strange that at a distance of only $4\frac{1}{2}$ hours from the head of the Val di Genova, no one should know anything of the Adamello, but so it is; the only answer to enquiries being a reference to one Girolamo Botteri, mentioned by Mr. Ball, who, with Fantoma, a chamois-hunter, accompanied Payer in 1864. As, however, both these men absolutely refused to attempt the ascent of the Adamello when they reached the ice, and referred to it as 'la brutta bestia la drìo,' we came to the conclusion that their services would not be very valuable if we could find them. We did, in fact, send for Botteri, but as he did not make his appearance, we started with a porter from Pinzolo, to carry some food, &c., and trusted to finding some herdsman in the Val di Genova who might know something of the district. We finally picked up Cesare Caturani, who accompanied Mr. Ball over what we believe to be the same pass (Bocchetta di Marocaro) as that traversed by ourselves. Caturani, however, flatly refused to leave the rocks at all, or put foot on the glaciers leading up to the Adamello, saying 'he shuddered,' so that we left him behind, and found our way to the top without him. Besides which, he has no mountaineering instinct whatever, and lost his way altogether in getting down into the Val Susine. About $4\frac{1}{2}$ hours' walking took us to the head of the Val di Genova from Pinzolo, and we managed to get fair sleeping-quarters at a saw-mill, about a quarter of an hour's walk from what Mr. Ball calls the malga of Bedole. The malghe, or châlets, however, were too full to be pleasant, as they were to be deserted the next day (September 15), and a great quantity of both bipeds and quadrupeds was collected there. We left the sega at about a quarter before 4 A.M. on the morning of September 15, and after a steep climb, at first through a pine-forest, reached the mandron, or

* It forms a number of Petermann's Geographische Mittheilungen.

shepherd's hut, described by Mr. Ball and from which Lieutenant Payer made his ascent in 1864, in about three hours from leaving our night-quarters. The view of the Vedretta di Bedole at the head of the Val di Genova is very fine, and the whole scene of snow-fields and glaciers from the mandron is striking in the extreme. I should not, however, recommend the mandron for sleeping-quarters, as it is little more than a hole, and it would be necessary to carry up wood, blankets, &c., from Pinzolo, as there is absolutely nothing in the hut.

From the mandron we followed the rocks which skirt the north side of the Vedretta di Bedole, leaving on our right the Lago Scuro, and the Col by which we eventually crossed into the Val Susine, and after climbing partly on the moraine and partly on the rocks for some two hours after leaving the mandron, reached the head of the upper ice fall, and took to the glacier at about 9.15 A.M. There is really very little choice of route thus far for anyone attempting the Adamello from the mandron, as it would have been almost impossible to cross the glacier lower down. At this point, Caturani refused to proceed farther, and we therefore left him to wait our return while we pushed on in a north-westerly direction for the foot of the Corno Bianco. We found the glacier somewhat crevassed, though not really difficult to anyone with rope and ice-axe, and soon reached the long snow-slopes which lead up and round the Corno Bianco to the foot of the Adamello itself. This peak is completely hidden from sight by the Corno Bianco, and it is not till you have rounded its west side that the Adamello becomes visible. We attacked it from its west side, and reached the summit, a pure snow-peak, corniced on its N. and E. sides, at 12.30. The distant view, which ought to be very extensive, was overclouded. The snow on the peak was just thick enough to enable us to dispense with our ice-axe, as far as step-cutting was concerned. We reached the rocks where we had left Caturani at 3.15., and found him blue with cold, and saying that he was half dead with hunger. As we had given him a very liberal share of our small stock of provisions, this latter complaint we regarded as unfair, while he had only himself to blame for the first. From this point to the Col over which our guide persisted in taking us, into the Val Susine (i.e. the Bocchetta, as he called it), is about $2\frac{3}{4}$ hours' walking in a north-easterly direction, over huge granite boulders, which I confess to having found very fatiguing, especially as we had been walking fast all day, with very short halts.

But we believed, and were confirmed in our belief when looking at the head of the Val Susine from Ponte di Legno, that it would have been possible to cross by a Col much to the west of the Bocchetta, and consequently much nearer the point where we left the glacier. It was, however, too late to try experiments, and we descended down a perpendicular face of rock, some twenty-five feet, on to the glacier below. This we crossed at its head, keeping to the left, when we reached another shelf of rock which divided the glacier. This, though higher than the first descent from the Col, was not quite so steep, and was not coated with ice, as Mr. Ball seems to have found it. The glacier has probably receded since then. After crossing the lower glacier, we found considerable difficulty in getting down into the valley, though if we had

had more light I have no doubt we should have got down more easily. Here Caturani lost his way entirely, and confessed that he did not know where he was, and after stumbling about in the dark for some three hours, we finally reached Ponte di Legno at 10 P.M. The proper route, after descending from the glacier, is on the left side of the stream. We took the right, and thereby made a considerable *détour* which might have been otherwise saved. The time required from the Col to Ponte di Legno would not in fine weather and daylight be more than three hours, if so much. The whole expedition is 'sehr lohnend,' as Bädiker would say, but is too long to attempt starting, as we did, from the Val di Genova. The start should be made from the mandron, or if starting from the Val di Genova, it would be more prudent to sleep at the mandron after ascending the Adamello, and go over the pass the next morning, as we came to the conclusion that it should decidedly not be attempted without daylight.

INNS, &c.—The inn at Ponte di Legno fully justifies Mr. Ball's description as to its high charges; in other respects we found it comfortable, and the food good. At Pinzolo, the inn is not clean, but otherwise it is tolerable. At Molveno, from which place we went over the Bocca di Brenta to Pinzolo, it is possible now to get meat, and fish from the lake. We took a son of the landlord Bonetti as guide to the top of the pass (five hours from Molveno), and found our way down to Pinzolo in about another five hours. It is not necessary to cross any glacier from the Bocca to Pinzolo, though the people at Pinzolo seem to think it is.

There is a good inn ('La Stella') at Pieve di Buono, at the foot of the Val di Daone, which would be found very convenient for anyone coming as we did from Cedegolo in the Val Camonica by the Lago d'Arno to the valley of the Chiese; and it is better to cross to Tiano, and so on by the Lago di Ledro, to the Lake of Garda from Pieve di Buono than from Condino. The summit of the pass from Pieve di Buono to Tiano commands a very fine view of the Brenta Alta and the Care Alto, at the head of the Val di Daone.

The inn at Cedegolo we thought very indifferent, and not deserving the praise bestowed on it by Mr. Ball.

RISDON D. BENNETT.

We take the following from the 'Anglo-American Times' of October 22, 1870. No other information has come to us, beyond that which was published at the time of the accident:—

'A correspondent in Switzerland informs us that the search on the summit of Mont Blanc for the sufferers in the recent catastrophe has resulted in the discovery of Mr. J. Beane, an American, who was one of the party. On his body papers were found proving his identity, which have been sent, together with his effects, to the U.S. Consul at Geneva. The following is a paper written by Mr. Beane in a grotto near the summit of Mont Blanc, and finished, in all probability, just before his death:—

"Tuesday, September 6.—I have made the ascent of Mont Blanc

with ten persons; eight guides, Mr. Corkendal and Mr. Randall. We arrived at the summit at half-past 2 o'clock. Immediately after leaving it I was enveloped in clouds of snow. We passed the night in a grotto excavated out of the snow, affording very uncomfortable shelter, and I was ill all night. September 7 (morning).—Intense cold; much snow, which falls uninterruptedly; guides restless. September 7 (evening).—We have been on Mont Blanc for two days in a terrible snow-storm; we have lost our way, and are in a hole scooped out of the snow at a height of 15,000 ft. I have no hope of descending. Perhaps this book may be found and forwarded. (Here follow some instructions on his private affairs.) We have no food; my feet are already frozen, and I am exhausted; I have only strength to write a few words. I die in the faith of Jesus Christ, with affectionate thoughts of my family; my remembrances to all. I trust we may meet in heaven. My effects are in part at the Hotel Mont Blanc, and partly with me in two portmanteaux. Send them to the Hotel Schweitzerhoff, at Geneva; pay my bills at the hotel, and heaven will reward your kindness." The letter ended with instructions for his family, and death must have immediately ensued on his having written his farewell.

'It appears from these dates that Mr. Beane and his companions were alive when the news of the disaster reached Chamounix. If, therefore, the expedition, which immediately started, had not been delayed by bad weather, it is probable that it would have been in time to save them. The bodies of Mr. Beane's companions have not been recovered, doubtless from being covered with snow. The other day, while the sun was shining on the snow, some black spots were perceived near the summit of Mont Blanc, which were presumed to be the bodies of the missing explorers, but while an expedition was being arranged for resuming the search, bad weather again set in, since which snow has fallen in such quantities that all hope of recovery is for the present abandoned.'

The accident on Mont Blanc, to which the above refers, is one of the most terrible that has ever happened to tourists in the Alps. The loss of a whole party, and of no less than eleven lives, is probably unprecedented. Owing to various circumstances, it has attracted comparatively little attention. The war has absorbed all public interest. Only one of the sufferers was a countryman of our own; and perhaps people thought that, whilst men were falling by the thousand in France, it was not worth while to make much trouble about a dozen more or less lives lost in the mountains. The main facts are so simple, that little explanation is needed. The one special danger of Mont Blanc is bad weather. The inexperienced travellers were probably ignorant of the fearful danger they were encountering, and had not the slightest conception of the risk to life and limb which accompanies even a successful ascent of the mountain under such circumstances. I once ascended Mont Blanc in a day so unusually fine, that we could lie on the summit for an hour, light matches in the open air, and enjoy the temperature. Yet, in two or three hours before sunrise, the guide of another party which ascended the same day was so severely frostbitten as to lose his

toes. Such things may happen in the finest weather, when proper precautions are neglected; but in bad weather it is simple madness to proceed. Why, one cannot help asking, did not the guides oppose the wishes of their employers?

The other accident which occurred this year on the same mountain suggests a similar question. A gentleman goes on with one guide and leaves two ladies alone with a porter. The porter gives one lady his arm, and walks across a snow-field notoriously full of crevasses. The catastrophe which occurred was that which every experienced traveller would have predicted as highly probable. I will not enquire whether, in this case, any blame attaches to the traveller; but it is difficult to imagine that anyone with the slightest pretensions to act as guide could have committed the folly to which it was owing that the porter lost his own life and that of his companion.

Now it seems a very difficult task to persuade travellers that there are very serious dangers in the Alps. If people will not be persuaded by the numerous fatal catastrophes, neither will they be persuaded though the 'Alpine Journal' should turn its thunders upon them for years to come. So far as travellers are concerned, we can only express the hope, but hardly the expectation, that they may gradually become more cautious. In the two cases, however, to which I have referred, the remarkable fact is the untrustworthiness of the guides. They must have acted in the most reckless manner, and in defiance of the clearest warnings. We seem, in fact, to be driven to a conclusion which Mr. Moore expressed very forcibly in a letter to the 'Times.' It is plain that the inferior guides at Chamouni are not to be trusted in high ascents. No doubt the great increase of tourists has had something to do with this unfortunate result. Every man in the village thinks that he is qualified to be a guide by his geographical position; and, though in every Alpine village, and especially in Chamouni, there are men fully up to the greatest responsibilities, it is equally true that in every such village there are men who are good for nothing more than carrying knapsacks. Now, it would seem that having used up the best material at Chamouni, they are beginning to pass off the inferior. The rota system operates in the most injurious way, as Alpine travellers have long pointed out that it must do. And the consequence is, that an inexperienced man goes to Chamouni, takes the first shoemaker or tailor who offers his services, and straightway puts himself in positions where a Balmat, a Couttet, or a Devouassoud might be severely tried. With a really experienced guide, I cannot but believe that the party who were lost must have been able to find their way. They might have suffered frostbites, or even lost the lives of some of the weaker members of the party; but that eleven men should be so bewildered as actually to be incapable of discovering a route, implies a singular want of that instinct for which a good guide is generally remarkable, and which all tolerable guides ought to possess. The main conclusion is, therefore, that we have one more strong argument against the rigid system which prevails at Chamouni; and that if the rota principle is maintained, there should at least be a line drawn between the guides who are qualified for high ascents, and those who are only fit to carry a lady's parasol to the Montanvert.

L. S.

REVIEW.*

In the year 1859 the modest sum of 3,000 francs (with the expectation of its repetition as an annual grant) was voted by the Assembly of the Bund to the Swiss Natural History Society, and the society resolved to devote this grant to the preparation of a geological map of Switzerland. Fortunate indeed might the society deem itself that it was able to commit the conduct of this undertaking to such distinguished and competent hands as those of MM. Studer, Merian, Escher von der Linth, Desor, and Favre.

The work they had undertaken was one of no trifling magnitude. In most countries the construction of a geological map requires only the determination of the boundaries of well known and easily recognised formations. In the Alps, where the structure of the mountains is often of the most contorted and complex character, it is necessary to follow and examine it step by step. The identification of the different formations is often extremely difficult; the fossils, by which alone, in the generally abnormal order in which they are found, they can with certainty be recognised, are rare, and not unfrequently absent; while the precipitous heights and frequent interruptions of continuity by faults and chasms, render it most difficult to disentangle the utter confusion which on the first inspection they appear to present.

One preliminary necessity of a good geological map was already furnished in the admirable Federal Survey of General Dufour. The published maps, to a scale of 1 in 100,000, were considered sufficiently large for a general map; and if for purposes of detail a larger scale might be desirable, some advantage was obtained, on the other hand, in the greater convenience and adaptation of the smaller for conveying general views of the geology of the Alps. For districts, the complexity of which rendered a larger scale absolutely necessary, it was decided to publish special maps, on a scale of 1 in 50,000 or 25,000, the materials for which were obtainable from the bureaux of the Federal Survey.

The volumes before us form a small portion only of the labours undertaken by the Commission. The first contains an account of the Geology of the Canton of Basle, by Dr. Albrecht Müller; the second and third a Geological Description of the Graubünden, by Professor Theobald; the fourth one of the Jura, in the Canton Aargau and the northern part of Zürich, by Cassimir Moesch; and the fifth one of Mont Pilatus, by Professor Kaufmann. The whole are illustrated by coloured maps, by lists and engravings of fossils, and by numerous sections.

While the most cursory inspection is sufficient to show the valuable

* *Beiträge zur geologischen Karte der Schweiz.* Herausgegeben von der Geol. Comm. der Schw. Naturforsch. Gesellschaft. 1-5 Lieferung. 4to. Neuenburg: 1863-7.

character of the work performed, and the care with which it has been executed, it would be quite impossible for us, in the limited space which we are able to devote to the purpose, to give any detailed account of the contents of these volumes; and we can only recommend our readers to examine them for themselves. The description of Pilatus will be found particularly interesting. It is illustrated by a map on the scale of 1 in 25,000, and by views as well as sections geologically coloured. Among the numerous travellers who now visit this mountain, or make a stay in the excellent hotels which have been recently erected near its summit, there must be many whose acquaintance with geology is sufficient to give them an interest in the structure of the mountain, though, even were it extensive enough to enable them to unravel its intricacies for themselves, the limited time at their disposal would render hopeless any attempt to do so. Such persons would find Professor Kaufmann's essay an instructive guide and companion.

In a work of this nature the discussion of theoretical questions as to the causes which have led to the actual configuration of the country is not to be expected, and indeed would be out of place. But no such discussion could do so much real service towards an elucidation of the mode in which mountain chains have originated as a careful and accurate exposition of the actual phenomena. The question is perhaps not yet ripe for dogmatic conclusions. But we venture to think it hardly possible for anyone to study the maps and sections before us without being convinced that other causes than mere aqueous erosion and glacial action have contributed, and perhaps even to a much greater degree than these, in the production of mountain forms, such as we now see them.

We have received a remarkable paper, called 'The Armourer.' Its main object is, as we judge, to support the doctrines of the Bible, or what are supposed to be those doctrines, by refuting men of science and upsetting what is called 'Newton's imposture.' The following passage is intended for members of the Alpine Club; and we have much pleasure in giving to the challenge it contains the benefit of our circulation:—

'How can Alpine travellers dare support the Newtonian theory when they know that mountains of snow are frequently poised on glacier heights so hazardly loose that the report of a pistol or a loud word vibrating the air will bring down the overwhelming avalanche, and thus prove to anyone but the insane philosopher that his theory of a madly careering and revolving world must be designed only for the amusement of cockney journalists and visionary schemers of all grades, whose greed for the sensational obliges them to treat all matters of Biblical truth as fit only to be denounced as the ravings of an enthusiast?'

THE
ALPINE JOURNAL.

MAY 1871.

THE LATE ACCIDENT ON MONT BLANC. By J. STODDON.
A Paper read before the Alpine Club, on Tuesday, March 7,
1871.

THE accident on Mont Blanc last September, though probably as fatal as any two other Alpine accidents put together, has attracted a wonderfully small share of attention, even after making every allowance for the absorbing interest taken in the war. I suppose Alpine accidents are beginning to lose the factitious importance they have possessed, and to take their place among what may be called the specially recognised English misfortunes, such as accidents in hunting or shooting, or crossing the streets. The luxury of abusing us too, is, I fancy, not quite so delicate as it used to be, for no one, however little his soul, can possibly say anything properly abusive and at the same time new. Still to mountaineers the facts about a terrible calamity like this, and the lessons to be drawn from it, can never be without their interest. My own ascent may be useful as an illustration, which is my only excuse for offering it. I was at Chamouni with my friend Mr. Marshall last August, in the peculiar weather with which we had been favoured all the month. Though we never once had to turn back from an expedition, we were always concealed in mist and snow-storm long before we had finished, which involved us once or twice in some rather exciting adventures, and we always had reason to congratulate ourselves, that if such or such a vile atmospherical condition had set in some few minutes earlier we must have beat a retreat. We had brought with us Moritz Andermatten, of Visp, for the sake of his admirable knowledge of the high-level route and his experience of the

VOL. V.—NO. XXXIII.

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Mont Blanc country, sufficient, we hoped, to save us from an experiment on the Chamouni guides. Old Peter Taugwald was our second man. The former had been up Mont Blanc sixteen times, the latter once. We set off on the 25th, taking with us, from the Pierre Pointue, Johann Graf, who made his first ascent with us, and was so soon to make his last. I suppose no man ever had a more surpassingly glorious afternoon and evening at the Grands Mulets than we had, a level floor of clouds below us stretching away, as it seemed, to infinity, gilded at first, and then tinged with the finest rose colour by the setting sun, the top of the Fys or some other peak breaking through here and there. Fine weather for the next day was voted an absolute certainty. I had had slight misgivings caused just about sunset by a rim of distant vapour, of a colour something like burning zinc, which I had only once before seen on an otherwise faultless evening, and which then proved the precursor of a most maniacal wind and snow-storm. My burning zinc was soon forgotten in the perfect glory of the evening, and I slept without misgiving. The morning was, if possible, finer than the night had been, there was not a cloud nor a breath of wind, and as we rose higher and higher, pounding through the deep snow, the distant views opened out in more absolute perfection of form and colouring than any I remember ever to have seen. Owing to the complete absence of wind, we chose the Bosse arête, as more interesting and exciting, and reached the depression on the right of the bosse in the highest good humour.

At this point splashed into our cup the first drop of bitterness. Mr. Ruskin tells us of a certain cloud that is seen only on the top of Mont Blanc, hovering over the summit, adapting itself to the shape of the top without ever actually touching it. This scientifically interesting cloud had now presented itself; none of us saw it come, but there it unmistakably was, like a night-cap, the recognised space intervening between it and the top. We comforted ourselves with the idea that the intervening space was constant, and that there would be plenty of room in it to look about us. Miserable fallacy! the top was presently covered, then came the well-known chilly sensation, as if the sun were going out, and gloom settled down upon us. By this time we were looking over the Miage, and on the glorious arête of the Aiguille de Bionassay. On our own arête, too, steps had become necessary, for the snow had been swept away by the constant winds, and hard ice was exposed, when, without any warning except the night-cap and a few whirling mists in the caldron of the Miage Glacier, we were smitten

by a blast which brought us to our faces on the slope. The mists closed over us, and till we saw the Grands Mulets again, our vision was limited to our dear selves and the bit of snow at our feet. I suppose we ought to have at once turned back, and something was said about it, but the remark met with no attention, and we struggled on, now lying down for a gust to sweep over us, now advancing again to the charge. We only knew we were at the top by finding there was no more to get up, and the only thing I saw there was a perfectly flat piece of greenish ice, like a thick window-pane, sticking out of the snow.

We didn't stop an instant, but began walking down one of the other sides—if a roundish thing like the top of Mont Blanc can be said to have any sides at all—the guides laying down the axiom that we should be infallibly blown away if we attempted to go down the steps we had cut in the icy part of the Bosse arête. In about half a minute from the top we unanimously pulled up; the guides evidently had not the remotest idea where to get down, and we went back in our tracks to the top again. By this time the wind had got so terrible that we were utterly dazed by it. It required the greatest effort not to be blown bodily away. It was almost impossible to speak, as the wind seemed to numb one's jaws and block up one's mouth and ears. The cold, too, was intense, and I remember vividly the way in which everyone by walking round me had coiled the rope round and round my legs. Old Peter meantime had got himself let down a few feet with the rope, and was actively engaged in cutting steps apparently straight down to the Grand Plateau, in spite of Moritz's abuse. At this time I felt if we were ever to get back to Chamouni again, it must be by the way we had come, taking our chance of being blown away. I yelled my opinion at the top of my voice, though I seemed scarcely to hear myself, and everyone immediately started off, old Peter first, on what seemed a kind of forlorn hope. Off the top, however, the wind got sensibly less, and we really had no serious difficulty beyond the difficulty of keeping our feet in ice-steps under every disadvantage. Some rocks crop out some way down; here the wind was much less, and we fell almost helpless against them, our fingers in an agony with the cold, which was so great that our wine was frozen into lumps in the bottles. From this point our only difficulty was steering properly through the thick mist, but as Moritz and Peter are neither of them deficient in the instinct of returning in the afternoon exactly where they have been in the morning, our difficulties were soon over, and

after a dismal walk in deep snow, and a cutlet at the Grands Mulets patiently waited for and ravenously eaten in soaking garments, we got back to Chamouni about 8 o'clock, thankful to find ourselves once more in the haunts of men. The only apology for this description is that it seems to have been the experience of the unfortunate party so soon to follow us with such a different result, and I will now state the facts of that expedition so far as I know them myself, or have been able to collect them by enquiry.

It was the night of our return that an American gentleman, named Randall, asked me to let him come into our sitting-room and talk over Mont Blanc. The consequence was, I didn't get to bed till two, and I found in Mr. Randall, in spite of his fifty years, the most intense mountain enthusiast I ever had the pleasure of meeting—fed, too, before this year, not on the mountains themselves, but entirely on books. To see, not necessarily to climb, Mont Blanc had been the dream of his life, and he had come over at last to fulfil it. Poor fellow! just after I had left Chamouni, driven to England with much undone by the continued bad weather, he was induced to become one of a large party for the ascent of Mont Blanc. They left Chamouni on Monday, September 5, for the Grands Mulets, taking with them as guides Jean Balmat, Joseph Breton, Edouard Simon (of whose capabilities some member of the Club will probably know more than I do), and five porters—Albert Couttet, Alphonse Couttet, Albert Cachat, Fred. Tairraz, Alphonse Balmat—and an Oberland servant of the Pierre Pointue named Johann Graf, a most promising lad, who had made his first ascent with us. The next morning they started from the Grands Mulets in fine weather, leaving behind them their only compass. It is not clear what time they set off. Mr. Bean, in his diary, mentions an observation taken at 2 A.M., but probably, considering the time of year, they did not start till 3.30, or 4; and 2.10 is about the mean of the various statements made as to the time at which they reached the summit—not, as has been stated, by the Bosse arête, but by the usual route up the Mur de la Côte. They had only just reached the top, when the same species of furious storm burst upon them without warning, as had before upon us, and we know absolutely no more about them till their death, except what we can gather from the disjointed and unsatisfying diary of poor Mr. Bean, found subsequently in his pocket, and from the conclusions we may draw from the positions of the bodies. None of these were recovered till September 17, twelve days after the expedition had started,

several attempts having been previously stopped, the first actually at the Pierre Pointue by a continuance of the same terrible weather. The wind was from the east, called apparently by the natives the Vent de l'Aiguille de Dru.

By the 17th the weather was perfect, and five of the bodies were found, first of all a little way above the Mur de la Côte; but quite out of the right track were the bodies of Mr. Mac-Corkendale and two porters, lying near together, all with the head uppermost, and apparently, though on this account testimony differs, with their clothes more or less torn, as if they had slidden—but at any rate, there was no bodily injury whatever. They were quite unattached, and, so far as I can make out, no rope was found near them.

Higher up, at about the same height as the Petits Mulets, lay the bodies of Mr. Bean and another porter, in the same positions as the first three, and with all the baggage about them on the snow, the ropes coiled up, ice-axes, belts, and empty wine-canisters. All five were, of course, completely frozen.

Of the remaining six nothing whatever was seen. On the 20th, 21st, 22nd, a party of some of the best Chamouni men searched in all directions from the Grands Mulets upwards, bestowing special attention to the Calotte, where they dug and sounded with the greatest care, finding, according to a statement in the 'Écho des Alpes,' one or two small articles scattered here and there upon the snow along a line from somewhere near the other bodies to the great crevasse at the summit of the Glacier de Brenva.

So far two or three things strike us as curious—first, the fact that the five bodies found were those of the heaviest of the party. Second, the curious fact that not one of the three guides was found, though two out of the three travellers were.

We now come to the only light which has been thrown upon the history of these unfortunate men since they were last seen upon the summit. In Mr. Bean's pocket was found a disjointed diary, quoted at length by Mr. Stephen in his notice of the accident in the last number of the Journal. The genuineness of this I was at first disposed to doubt, from the very unsatisfying explanations contained in it. The external evidence in its favour is, I think, however, too strong to allow any reasonable man to think it a forgery. They left the summit, according to this paper, at 2.30 P.M. on the 6th. The history of the day ends in their hollowing a grotto out of the snow, and passing a miserable night at an altitude of some 15,000 feet. How it came to pass that they had by

nightfall descended so little—whether they went down farther and were forced up again by impassable difficulties—whether the six missing men were then with him, he does not tell us.

On the 7th we find the weather was no better; and the letter which follows apparently only repeats the history of the 6th, that they had no idea where they were, and that they had dug a hole in the snow. He tells us, too, that his feet were frozen, and his strength gone. He does not drop a hint as to what they did on the 7th, whether any attempt was made to find the way, or whether, utterly worn out with cold and hunger, they had laid themselves down to die. Then comes the last entry, written in characters more and more blurred and indistinct. ‘Morning terribly cold again and much snow.’ This seems to mean the morning of the 8th, but it may just possibly refer back to the time he began the letter which precedes it, and be a further account of the 7th. I am inclined, however, to the other opinion, that life was prolonged till some time on the 8th. So that after losing their way they spent the night of the 6th, the day and night of the 7th, and varying parts of the 8th, in a sinking condition on the snow, without food or wraps.

The difficulties which meet us in thinking over this account and the positions of the bodies are: How was the 7th spent? What caused the division of the party, and on what principle was the division made? I cannot frame any really satisfactory theory to embrace all the facts. The five who were found were probably the weakest members of the party, and the other six apparently made one more effort to find their way, resulting, if we are to trust to the evidence of the glove picked up in the direction of the Brenva Glacier, in a grave in the snows of the south side, or perhaps a fall down the steep rocks above the lower basin of the glacier. In no other way, that I can see, can we explain the entire absence of guides with the party found on the 17th; and the position of the ropes and axes seems to show that they, for their part, had finally given up all attempts to save themselves. The three bodies lower down were possibly blown down the slope from the two above, as the torn condition of their clothes tends to show, or must have wandered there in utter aimlessness, as no rope even was found with them.

The idea first entertained, that all had been blown away by the violent storm, is clearly disproved by Mr. Bean’s diary as regards the bodies found, and presumably as regards those missing, otherwise he would surely have made some comment upon it. After these latter had left their companions, it is of

course possible that they suffered that fate; but then we can scarcely imagine an east wind blowing them over on to the south side, on which the general opinion seems to be they have perished. Marks on the snow there were of course none, owing to the lapse of time, and of the grotto no trace, I believe, was discovered, a natural consequence of the violent wind and constant snow-storms during the first half of September.

Mr. Stephen, in the last number of the 'Alpine Journal,' has made some valuable remarks about the lessons to be drawn from this accident, in which, I suppose, we should all agree. I would only lift my voice against the depreciation of Mont Blanc, in which, owing, I suppose, to the number of successful ascents, it has become the fashion to indulge. If Mont Blanc has been the scene of many successful expeditions, he has, on the other hand, more blood on those white snows of his than, I think we may say, all the other Alpine peaks put together. I, being a married man, and conscientiously debarred from the tempting peaks at which I used to aim, was casting about last year for high but safe ascents. The popular Mont Blanc seemed just the peak I wanted, for has not some injurious writer told us in the 'Times' that there is no more difficulty on it than on Snowdon? Difficulty there no doubt is none, but terrible danger there most certainly is, at any rate in bad weather. And even on the finest day, no one who has stumbled over the acres of avalanche *débris* under the Dôme du Goûté can say that he is in *perfect* safety.

I do not at all know what reputation as guides these three poor men who perished possessed. It is hard to see, as Mr. Stephen has said, that they could have been first-rate, especially as they had just ascended the very ground they such a short time after failed to descend. I do not think our guides would have brought us down if we had attempted the Mur de la Côte, as they did not pretend to be specially skilled on Mont Blanc; but having come up by the Bosse arête, and having once brought themselves to face the danger of descending it in an icy state in a high east wind, their instinct was never once at fault, and our confidence in them, shaken on the top, was completely restored again.

I believe at Geneva there is a subscription opened for the families of the guides, two of whom at least have left widows unprovided for. Donations may be sent to M. Feundler, 41 Plain Palais, Geneva—President of the Geneva section of the Swiss Alpine Club.

SWISS DOLOMITES. By DOUGLAS W. FRESHFIELD. A Paper read before the Alpine Club, on Tuesday, April 4, 1871.

SHORTLY after the publication of Messrs. Gilbert and Churchill's well-known book, a lady is said to have been overheard enquiring at the circulating library whether the Dolomites were not a sect of Eastern Christians. The majority of the members of the Alpine Club could scarcely treat these mountains with greater indifference were they really as distant and as uninteresting as the Maronites, whom, it may be presumed, the lady had in her mind.

The votaries of orthodox Switzerland have always turned very deaf ears to those who preach to them of Eastern Alps. Firm and happy in their belief that no good thing can come out of the Tyrol, they look on those who frequent that country much as the Jew looked on the Samaritan, who preferred to go up to Mount Gerizim rather than to Mount Moriah. I believe that the strong prejudice often exhibited against the Dolomite Alps is only part of the larger prejudice against anything Tyrolese, and that the reasons which prevent many members of the Club from giving these mountains a fair trial might fairly be stated in the following form:—

All Tyrolese mountains are contemptible.

All Dolomites are Tyrolese mountains.

∴ All Dolomites are contemptible.

At some time or other I may, perhaps, directly dispute the truth of the major premiss. But that, after all, involves a matter of opinion, while the minor involves a matter of fact, and is therefore far more easily assailable. I purpose here to call attention to some Dolomites which exist in Switzerland, because I know that many of my readers will readily believe good of a mountain in that country who would listen with hardened hearts to the praises of peaks which happen to have the ill-fortune to be situated fifty miles further east. I shall thus carry out my object by reversing a proverb, and, as our Mahomets will not go to the mountains, bring the mountains to them. If by this means I succeed in subjecting one of my fellow-clubsmen to the spell of this class of scenery, and thereby induce him to vary his regular Swiss round, I shall, to use the conventional phrase, be amply rewarded for my trouble. I ought, perhaps, to guard myself against being supposed to wish to set up the Swiss Dolomites as in any way rivals to those of the Southern Tyrol. The latter are more

numerous and on a larger scale; they, moreover, from being on the southern side of the Alpine watershed, enjoy the advantages of an Italian vegetation. Scenery of this character has, however, even when divested of such adornment, much to recommend it, and to distinguish it from ordinary Alpine landscapes. Glacier streams, filtered underground until they are fit to sparkle through mossy glens, take the place of torrents bursting forth noisily and muddily from their parent ice. The 'rocks which in unimagineable forms,' and still more unimagineable colouring, tower above or cluster round the climber, form a strange contrast to snowy domes and iceclad peaks. A dream of fairy-land, tinged with recollections of Gustave Doré's landscapes, may perhaps serve as a comparison for the impression made on the mind by its first introduction to Nature in her dolomitic dress.

Moreover, from a mere practical climber's, as well as from a picturesque or scientific point of view, the rock possesses peculiar merits. 'The cragsman,' writes Mr. Ball, 'gets to prefer dolomite climbing to all other rockwork, finding it afford far more of excitement and variety than the crystalline slates or even granite.'*

To sum up these introductory remarks, it seems to me that amongst the heavier courses of our Alpine *menu*, the place of game may fairly be claimed for the Dolomite mountains. Admitting that 'toujours perdrix' is a mistake, I still venture to maintain that most members of this Club will find that a day or two given out of their summer tours to a dolomitic district will supply a new sensation to appetites somewhat jaded with moraines, snowslopes, and step-cutting.

Being no geologist, it does not enter into my plan to attempt to point out every spot within the Swiss frontiers at which this peculiar rock crops out. I shall rather confine myself to some details of two expeditions which I had the good fortune to accomplish in 1866, and to a brief indication of a few other walks amongst Swiss Dolomites which I have either taken, or hope to take, before very long. There are at least three points in Canton Graubunden where dolomite is found. The first is in the range which rises on the west of the gorges of the Hinterrhein. From the Compatscher Hof, the

* I disapprove strongly of the attempt made in this passage to hide under a thin veil of geology the exhibition of that clambering instinct which has created the Alpine Club, and of which therefore (despite the manner in which Mr. Darwin would probably account for it) I do not think we ought to feel ashamed. But with the conclusion arrived at I heartily agree.

highest habitation in the Savien Thal, one of the most picturesque valleys in this part of Switzerland, a very interesting pass, leading through fine rock-scenery, might doubtless be made to some point near Andeer on the Splögen road.

A more considerable mass of dolomite exists in the range which separates the parallel troughs of the Ober Engadin and Val Livigno. The head of the Val Cluozza, which opens close to Zernetz, is entirely surrounded by dolomite ridges. This valley, besides being recommended in German guidebooks to 'passionate mountain-tourists and friends of characteristically wild Alp-scenery,' has the attraction of being one of the few recesses of the Alps where bears are always 'at home,' even if they will not show themselves to visitors, and where chamois may still be seen in herds. When, therefore, in the summer of 1866 I carried out, in company with Mr. Douglas Walker, a plan of striking straight across the little-known country between Zernetz and the Val Tellina, we naturally decided to pass through this valley, and make a way across the mountains at its head in the course of our first day's march. We put up at Zernetz, by Jenni's advice, at an inn kept by a certain Filli, well known in the Lower Engadine as a great bear-hunter. The rooms were decorated with highly-coloured sporting pictures, presented to our host by various German and Austrian archdukes whom he had initiated into the mystery of his craft. But the most striking ornament of the house was a specimen of the natives of the wild country we were bent on exploring, in the shape of a huge stuffed bear six feet high, who, standing up on his hindlegs in one corner of the *salle-à-manger*, threatened us with an hitherto undreamt-of Alpine danger on the morrow.

Our host the bearslayer was of course consulted on our plans, into which he entered warmly, entertaining no doubt of their being practicable, although he assured us that no Zernetz hunter had ever taken the route we intended. Being himself unwell, he procured us a strong youth, who knew the footpath up the lower part of Val Cluozza, to act as porter.

The next morning broke grey and showery, and we delayed our start until nearly 7 A.M., when we filed off across the meadows behind the village. The Ofen road is left, and the Spöl crossed by a covered bridge, about half a mile from Zernetz. From this point a cart-track leads up, first amongst underwood, then through a pine-forest, to a brow overlooking the narrow wooded gorge by which the stream of Val Cluozza finds a way into the Spöl. The path through this ravine is a mere hunter's track, overgrown by leg-führer, and almost

destroyed in places by torrents and earthslips. As it winds round the frequent gullies, at a great height above the foaming torrent, the views are very striking, whether the eye dips down into the ravine or rests on the opposite mountain side—a mass of crag and wood, where an occasional cave offers eligible lodgings for a family party of bears. Close to the stump of an old fir-tree, scored with numerous initials and dates, carved by the hunters of the neighbourhood, the first view of the upper valley is obtained. We saw before us a green glen covered by primeval forests, and destitute of any signs of human habitation. The rugged crags and scanty glacier of Piz Quaternals rose at its head.

A screen of fir logs was here raised across the track; this, we were informed by our porter, was a hunter's lair, the situation of which was determined on account of some herb, esteemed a special delicacy by Bruin, growing close by, and often attracting him to the neighbourhood. Two hours' walking from Zernetz, the path returns to the level of the torrent, and recrosses to its left bank. After roaming on for half an hour through fir woods, where the trees seemed to decay and fall unheeded, and the moss and lichens hung in long streamers from the boughs, we crossed a small stream flowing from the glacier of Piz Quaternals. Just beyond it we found a hunter's hut—a snug little den built of pine logs, with the interstices stuffed with moss, and fitted inside with shelves and a bed. The clean solitary cabin, so unlike the usual populous and filthy châlet, the dense pine woods, the bold bare peaks around, and, above all, the romantic flavour imparted to the whole by the possibility of bears, gave an unusual zest to our midday meal. From here a fine expedition might be made by a mountaineer not wishing to cross to Livigno. It is, probably, possible to ascend Piz Quaternals from this side, and descend through Val Trupchum, one of the most densely wooded and picturesque of the lateral valleys of the Engadine, to Scans or Zutz.

Beyond the hut all definite path ceases. The character of the scenery remains the same as far as the bifurcation, where Val Cluozza splits into two utterly desolate glens, forcibly and appropriately named the Valley of Rocks and the Valley of the Devil. The latter probably offers the shortest way to Livigno; it seems also the wildest and most striking of the two valleys. After the mouth of the Val del Sasso has been passed, the Val del Diavel assumes a savage sublimity, in accordance with its name. Huge dolomitic cliffs—not so fantastically broken as this rock often is, but stained by nature with the strangest colours—close in on all sides. In the bottom of

the glen vegetation entirely ceases, and the stream itself disappears, buried even in September under the snow-avalanches, which, falling in spring from the impending crags, lie unmelted through the summer in these sunless depths. Their hard consolidated surface affords an agreeable path, and enables the explorer to avoid the rough boulders, and advance rapidly towards the barrier of mingled rock and snow which closes the view. We had here an encounter with a herd of seventeen chamois, who were feeding above us, until, disturbed by our shouts, they scampered off among the wild crags which separated us from Val del Sasso. Jenni, in getting out his telescope to inspect them, laid down his umbrella (an implement which, perhaps in order to assert their claim to be gentlemen, and to show their superiority over other guides, Pontresina men are fond of carrying). The Gamp was of course forgotten, and unless it has been discovered by some fortunate hunter, probably remains to this day as a monument of our passage. Down the rocky barrier already referred to the stream from a glacier on the nameless summit marked 3,127 metres on Dufour's map pours in a waterfall. Mounting beside it, we found ourselves on the level of an elevated table-land, surmounted by rugged peaks, and somewhat resembling, on a smaller scale, the Grand Plateau of Primiero. At its further extremity was the low ridge over which our pass lay. Advancing over beds of shale and snow, we soon came to the foot of a small glacier, which we crossed, making for the lowest portion of the ridge on the N.W. of a tooth of rock which jutted out conspicuously from its centre. A steep bank of snow had to be climbed; this surmounted, our work was done, and we were looking away to the west over the wild ranges which enclose Val Livigno. Deep below us lay the head of Val Fiera, a narrow glen ending in a rock *cirque*. The descent into it was evidently steep. We found a way at first down shaly gulleys; then came cliffs much broken, and presenting no serious difficulty, although any one who missed the right spot at which to take them might be considerably bothered. Once beside the stream, we followed it closely amidst the *débris* of avalanches. The Val Fiera soon makes a considerable bend, and the rock-scenery becomes of the highest order. Quaint red and grey pinnacles of every variety of form rise above; pale lemon-coloured cliffs, stained by weather and spotted by the dark mouths of caves, shut in the view, while, looking backward, the ridges from which the traveller has descended tower precipitously overhead. We were constantly arrested by the fantastic and perpetually shift-

ing character of the views around us, before we reached a second bend in the valley, where it turns back sharply to the east. Here the path makes some ascent, but we met with no difficulty, and found some amusement in following the stream through a miniature gorge, jumping from bank to bank as occasion required. When the gorge widened a little, the path rejoined us, and we met first some cows, then an old woman gathering sticks, who was either dumb or rendered speechless by fright at our sudden appearance. Travellers at Livigno at all are few and far between; and as no human being had probably ever entered the valley by our route, the old crone may well have considered us a party of gnomes descending from their rock castles on some errand of mischief.

When the picturesque ravine came suddenly to an end, we emerged without any descent into the broad meadows of Val Livigno, and, turning a corner, saw the whole of its upper and inhabited portion before us. It was a charming landscape. Over the entrance of the gorge through which the Spöl fights its way to Zernetz rose the ruddy castellated crags of the dolomitic Dosso del Ferro; elsewhere all was green and pastoral, except where the distant snow-peaks at the head of the valley peered over the lower ranges. Half an hour's stroll over the softest and smoothest of turf, on which all the croquet-clubs in England might find room to practise, brought us to the inn near the central of the three churches, and just beyond the stream issuing from Val Federia.

I trust your patience is not as yet exhausted, for I have still to speak of the finest group of dolomitic peaks in Switzerland. They stand, strange to say, in neglected yet conspicuous obscurity between the two highroads leading from Chur to the Engadine. Two of the peaks, the Tinzenhorn and Piz St. Michael are familiar to all who have passed through Davos as forming bold though distant features in the otherwise somewhat mild landscape of that favourite summer retreat of Chur burghers. The third and highest of the three dolomite brothers, Piz d'Aela, rises immediately above Bergiün, on the Albul, and its precipices and hanging glaciers present, as seen from the neighbourhood of the village, an aspect sure to excite the respectful admiration of the boldest mountaineer.

These three peaks have all been at least once climbed. The first and (as far as I know) only ascent of Piz d'Aela was made by Jenni and Fluri, unaccompanied by any impediment in the way of Herrschaft, an unaccountable proceeding afterwards repeated by them on Piz Pisch, behind Tarasp, which surely calls for our most severe reprobation. The game-

keeper who should choose the moment when his employer's game was nearly exhausted to go out by himself and shoot off the few remaining pheasants would, it seems to me, be guilty of an offence venial in comparison to that of these guides, for maiden peaks, unfortunately for us, cannot as yet, like pheasants, be bred on the farmyard, or sent down by the morning express from town.

The two Pontresina men agreed in giving me a most alarming account of the difficulties of their undertaking, which they declared to be greater than any they had ever met with elsewhere. Five hundred and twenty steps cut in ice were amongst the exploits they recounted of themselves. It is gratifying, therefore, though somewhat puzzling, to read in Herr Tschudi's excellent little 'Schweizer-Fuhrer' that a Piz d'Aela Committee was formed some time since at Chur for the benevolent purpose of reforming the mountain, and rendering it accessible to tourists. What success has attended their endeavours I have yet to learn.

The second in height, and most northerly of the three peaks, Piz St. Michael, was climbed, I believe for the first time, by Mr. Cooledge. On the occasion in question his only companions were the brothers Devouassoud, of Chamouni. As they were climbing the precipitous western face of the mountain, a *lâas avaidhs* fell from above and struck the rope with such violence as to dislodge the whole party and carry them down headlong for some distance. Fortunately, on the brink of a perpendicular cliff, François Devouassoud contrived to attach himself to a projecting rock, and to arrest his companions' fall. With the greatest pluck and perseverance, the bruised and bleeding mountaineers resumed the ascent, reached the peak without further accident, and descended by an easier route.

I now come to the Tinzenhorn, the boldest in form, although triflingly the lowest in height, of the three dolomite peaks. One morning in August 1866, I crossed, in company with François Devouassoud, from the Engadine to Bergün by the Eschia Pass, a fine col free from difficulty, but leading over quite as much ice as the St. Théodule. We had intended to ascend Piz Kesch *en route*, but the cold was too great and the weather too cloudy to tempt us to the further climb. We found ourselves, therefore, in good time at Bergün, with nothing to do save saunter about the charming meadows which encircle the village, and discuss schemes for the morrow. While descending Val Tuors, we had carefully examined the face of Piz d'Aela, and made out, as we thought, the route taken by Jenni and Fluri in their ascent the previous year.

This was our first and most obvious temptation. The second was the Tinzenhorn, at that time a maiden peak enjoying a certain reputation as the young Matterhorn of the Zehngerichten Bund and an item of my original programme. While our plans were still unsettled, to our great surprise, Jenni and Fluri suddenly appeared on the scene, leading with them a worthy citizen of Chur. We soon learnt that our new acquaintance was a distinguished member of the Swiss Alpine Club, and that he had engaged Jenni and Fluri to take him up the Tinzenhorn. It was obviously impossible to allow a maiden peak set down in my programme to be carried off under our very eyes, and we announced to the Herr that he would probably have us for companions on the morrow.

The next morning was cloudless. The Herr and his guides, who intended to return to Bergün the same evening, obtained half an hour's start of us, in consequence of certain difficulties we experienced in getting our bill. We secured the services of a villager to carry some provisions, and to show us the path up through the fir woods, and, though an elderly man, our porter stalked uphill at such a pace that in less than an hour we had caught up our companions. The rough track led us through a noble pine forest, succeeded by luxuriant grass-slopes, over which towered the dolomitic pinnacles of the buttresses of Piz d'Aela. In time we gained a brow, whence we had our first near view of the Tinzenhorn, which rose immediately opposite to us in the form of an irregular rock-pyramid. Its lower portion was evidently practicable; the sides of the final peak looked almost vertical and exceedingly difficult. We noticed, however, a sort of scratch in the face of the cliffs, which it seemed possible might offer a practicable breach. We had been already frequently delayed by our companions, and now, when Jenni sat down, and pulling out his inevitable telescope, began an interminable discussion with his Herr as to the *pros* and *cons* of every possible and impossible line of ascent, our tempers were sorely tried.

For the present, however, I restrained François' impatience, feeling unwilling to seem anxious to race off to get first to the top. We accordingly set out in company to make the circuit of the head of the glen (Val Sparlotsch) which separated us from our mountain. After crossing one of those wastes of white cracked-up rock which become familiar to travellers in dolomitic regions, we arrived at the base of the peak, and all halted for breakfast. Thence we again started in company, Devouassoud and I leading, as yet unroped. The usual bed of shaly débris had first to be surmounted. When we came to

the solid rock we found broad ledges slanting upwards, and carrying us on towards the ridge of the eastern buttress of the mountain. We were amused in watching the proceedings of five chamois, which, perched on the crags above us, observed our advance with great uneasiness. We had drawn close to them before they decided on any course of action; three then dashed past us along the top of the buttress; the remaining two, a mother and little one, would not venture this, and turned upwards. We saw them or their tracks several times during the day, ultimately following them over the top of the peak and down the other side, a circumstance which seems to show that there is little choice of paths even for chamois on the Tinzenhorn. Devouassoud took the opportunity of calling the other party's attention to the animals to exhort the Herr, who had already fallen some distance in the rear, to 'venir seulement.'

We reached the point where the buttress merges in the steep face of the peak without meeting with the slightest difficulty. Devouassoud made a reconnaissance to our right, which only served to confirm our previously-formed idea, that the best line of attack was up the rocks on our other hand. In this direction lay the scratch or furrow in the face of the mountain which we had noticed from below. To reach it we traversed a series of ledges, averaging, perhaps, two feet in breadth, and affording excellent foothold, which was the more welcome as beneath us was one of the sheerest precipices I ever found myself on the brink of, at least 1,500 feet deep. Devouassoud led on rather too far to the left before turning upwards, and it was evident to us afterwards that we thereby somewhat increased our difficulties. After a halt, during which we put on the rope, drank a glass of wine, and allowed the Herr to come up with us, we started again in the same order. The climbing now became very serious work. First we wriggled up two steep chimneys, where hands and knees were both useful; then came the *mauvais pas* of the day, where, instead of working up a gully with rock on both sides, we went slantingly up, and round a projecting crag with nothing but air on the outside. We were enabled to point out to the Swiss a way of avoiding this difficulty. More chimneys followed, separated by sloping ledges, the general inclination of the side of the mountain being certainly a good deal steeper than that of the rocks leading up to the saddle of the Schreckhorn. Once and again we came to absolute walls, and there was a momentary embarrassment as to where François might find any support by which to upheave his con-

siderable bulk. The difficulties, however, were, as far I was concerned, wholly enjoyable, owing to the good supply of solid nooks where my guide could firmly establish himself, while I mastered at leisure any piece of rockwork demanding peculiar caution.

Thus, by dint of constant but most varied gymnastics, we won our path upwards, until about three hours after leaving our halting-place at the foot of the peak, we grew conscious that we had prevailed, and that 'the toppling crags' of the Tinzenhorn would soon be under our feet. After a last awkward scramble to get on to the crowning arête, no further obstacles were met with, and we pushed quickly along a cockscomb resembling Crib Goch to the highest point. Devouassoud, who was considerably elated by our success, proposed to build a stoneman before the Swiss party arrived, a satisfaction which I would not allow him.

The first thing we did was to go on to the western extremity of the ridge and examine the ground beneath us. To our surprise and delight—for the chimneys up which we had clambered were far from desirable for descent—we saw that it would probably be comparatively easy to get down the opposite side of the mountain to the gap between our peak and Piz St. Michael. Much pleased with our discovery, we returned to the summit and spent half an hour in enjoying the superb view and attending to our provisions. For long the stillness of the mountain air was unbroken by any sound of our followers. At last Devouassoud grew anxious, and going some way back along the ridge, shouted down to ask if he could help them. We had been on the top nearly an hour before the Swiss party came in sight. When they did, the progress of the little procession along the arête afforded us no small entertainment. In front capered Fluri, his catlike gambols only restrained by the necessity of paying some attention to the remonstrances of his Herr, who, somewhat exhausted by his exertions, and with his attention divided between the selection of proper footholds and the management of the rope, was naturally averse to being hurried. The portly Jenni—the Falstaff of Swiss guides—brought up the rear with a somewhat crestfallen air, attributable to the loss of a favourite ice-axe, which had escaped him during the ascent. As they came up, I, knowing the importance attached by foreign mountaineers to such small points, indicated a boulder two feet higher than that on which I was sitting, and said, 'See, sir, there is the "allerhöchste Spitze;" it is still unclimbed.' With a sudden effort the Herr rushed on to it, and grasping Jenni and Fluri by either hand, so as to form

the familiar group of the oath of the Grutli, gave vent to his feelings in a sentence which, beginning with 'Hoch' and 'Vaterland,' soon subsided into 'Geben Sie mir Schnapps.'

We spent altogether more than two hours on the top, basking in the most delicious sunshine, while the guides built a sixfoot-high stoneman of unusual solidity. I was, meanwhile, able materially to assist our Swiss acquaintance in writing out a catalogue of the summits visible, which extended from Monte Rosa to the Zillerthaler Ferner, beyond Innsbruck. The most prominent features of the view were our two brother dolomites, the Piz d'Aela and Piz St. Michael—the former a sheer wall of ash-grey rock, rising several hundred feet above us; the latter a bold precipitous peak, over the top of which we looked on to the more distant ranges. At our feet were spread out numerous valleys, the broad Davos Thal, with its meadows, lake, villages, and churches, the country traversed by the Julier road, and the defile of the Schyn, backed by the green slopes of the Heinzenberg.

When we were about to descend, the Swiss party announced their intention of profiting by our discovery of a second route, and shortly followed in our rear.

The north-western crags of the Tinzenhorn are covered with loose stones, and we soon found that by resuming the lead we were subjecting ourselves to a constant fusillade of missiles dislodged by the stumbling steps in our rear. Our position became momentarily more critical, as by gaining ground on our sluggish companions we gave room to the stones to acquire impetus before they reached us. We consequently halted, and, for the first time since the morning, allowed the Pontresina expedition to pass before us.

The side of the mountain we were now descending proved, despite its general steepness, free from any very serious difficulties, and it was only now and then that a longer step than usual was rendered easy by a helping hand. Progressing sometimes by one broken rib of rock, sometimes by another, we drew slowly but steadily nearer to the base of the peak.

From the Tinzenhorn to the opposite mass of the Piz St. Michael stretches a long and steep-sided ridge of rock, separating the head of a glen leading down to the baths of Alveneu, from the Alp Tigial, a wide-spread pasturage on the east of Val d'Err. We felt sure of being able to descend to Alveneu, but our wish was to find a passage into Val d'Err, by doing which we should both establish a new pass, shorten our next day's journey, and get better quarters.

From the very foot of the peak a ghastly couloir led down

on the Val d'Err side, but it was only fitted for the passage of stones. We consequently clambered up on to the ridge, not without difficulty, and made our way along it, anxious not to pass over any practicable gap. We saw afterwards that it would have been shorter and easier to keep a little lower down on the Alveneu side.

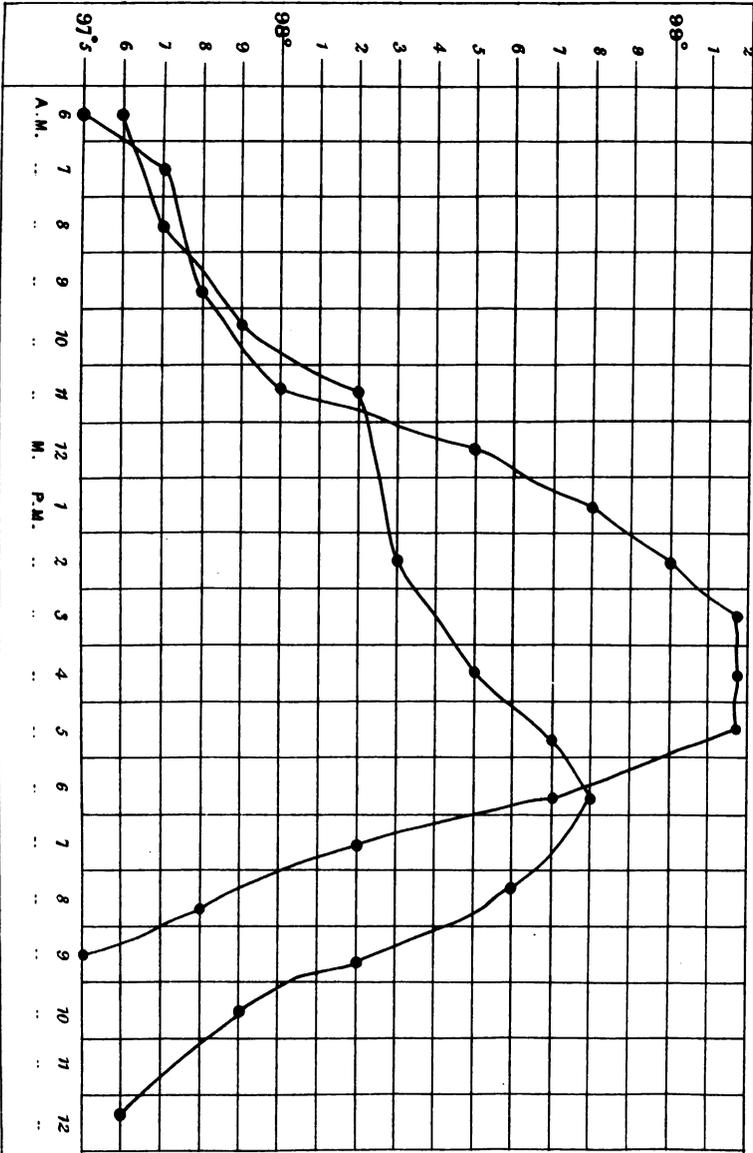
When we were about half-way between the Tinzenhorn and Piz St. Michael, we descended into a snow-filled couloir; remounting to its head, we saw another gully running down towards Alp Tigial. Both couloirs were as perfectly straight as if they had been artificially constructed, but the one we were about to descend was the more striking of the two, owing to the height of the walls of rock which rose on either side of it. Through it, as if through a window, we could see a bright blue lake. Our new pass was found, and altogether surpassed our expectations. I trust some day the Tinzen Thor will be often traversed; it is easy enough for a lady, and in singularity vies with many of its rivals in the dolomitic regions of Southern Tyrol. We slid down the shaly floor of the trench, hurried on over a bank of loose boulders, and soon found ourselves on the grass beside the lake, where, our work over, we halted to look back on the crags we had been climbing amongst. The Tinzenhorn itself was foreshortened, and its actual top invisible; on its south an easy pass led to the head of Val Sparlotsch; from its other side to Piz St. Michael extended the impracticable-looking curtain of rock, in which we had so luckily discovered the weak point. The couloir is masked from below by a great tower of dolomite, which rises close to its mouth.

I need not here enter into any details of our pleasant descent to Molins, on the Julier road, where we were forced, after all, to sleep in a hayloft, the whole of the inn being occupied by a detachment of the Swiss army, returning from the Engadine, where it had been stationed to preserve the neutrality of the frontier during the Austro-Italian war.

ON THE EFFECT OF EXERCISE UPON THE BODILY TEMPERATURE. By T. CLIFFORD-ALLBUTT, M.A. M.D. Cantab. F.L.S. &c.*

IN the summer of 1870 I made it one of the lesser aims of my Swiss ramble to ascertain how far the temperature of the body was changed by muscular exertion. I say one of the lesser aims, because I hold that the genuine mountaineer takes to the mountains as a duck to the water, and is as little likely as that eminently unscientific animal to make any observations upon the element in which he lives. I feel, therefore, that I owe an apology to my Alpine friends for allowing the pure impressions of a mountain holiday to be disturbed by the somewhat impertinent intrusion of scientific enquiry. My old work at home refused, however, to be cast wholly aside, and I may perhaps be permitted to communicate my results to the Club, under its protest, assuring the Club that I offer them humbly, and in a truly subordinate or 'Pickwickian' sense. It may excite the angry impatience of some of my readers to be told that the effect of exercise upon bodily temperature is very trifling. It seems absurd to tell a man who is toiling up a steep snow-slope, about 11.45 A.M., under a blazing sun, that if he thinks he is decidedly hot he is wholly in error, and that his temperature, if raised at all, is raised in a measure only perceptible to a very delicate thermometer. He will probably make rude and disparaging remarks about thermometers, or even carry them so far as to bear upon the owner of these innocent engines. I have, I believe, been called a 'humbug' under such circumstances; a reflection which I hope I received in a spirit becoming a philosopher. I may venture, perhaps, with more impunity to reassert this fact now, as most of my readers are far away from slopes of 45°, and are shivering in their easy-chairs under the rigours of an English spring. The 'general reader' has probably been made aware that modern men of science have shown that all forms of force, such as heat, light, motion, chemical action, vital action, and the like, are mutually convertible, the one into the other; or rather, that indeed they are but various manifestations of one thing—motion; motion of molecules or motion of masses. Heat, for instance, is a motion of molecules: a climber upon a slope represents the

* The present essay is founded upon a paper recently read before the Royal Society: *vide* 'Proceedings of the Royal Society,' No. 126, 1871. Sixteen charts of the bodily temperatures on as many days were then laid before the Society, and are now in its possession.



The higher curve with the earlier fall is an average curve of Temperature during exertion, the lower & more gradual curve is an average of an ordinary town life at the same season of the year.

motion of a mass, and the one kind of movement is convertible and constantly being converted into the other. Food taken into the blood, if so directed, will raise the man through 14,000 or more feet, as a ton of coals, if so directed, will carry a locomotive along a certain length of railway. In each case, by a process which differs only in detail, is heat converted into motion. It might be expected, therefore, that a man ascending Monte Rosa would lose in heat what he expends in movement; for on his arrival at the top he represents a certain definite amount of force derived from combustion of food in his body. Were he suddenly precipitated into the Val Anzasca, he would manifest this force again as motion, which motion, when arrested at the bottom, would be reconverted into heat. Were these all the facts in the case, the man would thus simply recover again the heat which he had expended in the ascent. But these are not all the facts in the case. Warmblooded animals must stand at a certain temperature, or rather they can only vary within certain very narrow limits. The average temperature of the human body is about 98.5° (F.), and it may vary between 97.5° and 99.2° , with a few tenths of indifference above and below. To rise to 100° is, however, to become slightly but decidedly feverish, and temperatures of 105° – 110° are positively and rapidly destructive. On the other hand, temperatures below 97° show danger of an opposite kind, and signify a depression of vitality below the limits of health. It is clear, then, that if the body is to survive, its temperature must preserve a constant level, or rather it must move in a definite curve, the place of which is constant for the same hour of every day, or nearly so. Under all circumstances, then, whatever the body does, this much is clear—that it must preserve a uniform temperature. If this endeavour be defeated, the body passes from health into disease, as when sickness follows say, a period of over-exertion. The wonderful faculty of adjustment by which the body is enabled to resist changed conditions—to quicken combustion or prevent radiation when heat is removed or converted into mechanical work, or, on the other hand, to check overheating when this latter danger is at hand—we call the self-regulating power of the organism, and it is familiar to physiologists under many very various conditions, such as the cold bath and the hot bath, sleeping and waking, and other changes. Did we now refer to principles of final causation, we should say that the body was endowed with this self-regulating action in order to preserve it alive; in more modern words, we say that the body survives, inasmuch as it has developed and possesses the power of heat regulation.

Now, under no circumstances can this power of self-regulation be more severely tested than under the pressure of great mechanical exertion, all of which must be provided for from stores of heat and inner combustion. A climber must have, therefore, not good legs alone, but also a good heart, capacious lungs, loose clothing over and about the chest, and plenty of those foods known as the carbohydrates, which foods burn in the body, giving off as products water and carbonic acid.

It was, then, my earnest desire to test the organism under such circumstances of mechanical work which led me so far astray as to sacrifice part of my enjoyment to mere profit. Knowing that the essence of enjoyment is so fleeting that a light touch may mar or disperse it, forgetting for the time that enjoyment is as rare as it is evanescent, while it is well known that profitable exercises are always to be had, I consented to march over highroads, alps, and glaciers, with a thermometer between my teeth and my breath hissing through the narrow aperture of my nostrils like the breath of a steam-engine, to the contempt and disgust, I fear, of my friend Kennedy, who found conversation a mockery, and who was insensible to the romance of animal thermometry. The thermometer I used was made by Messrs. Harvey & Reynolds, of Leeds, and was four inches long. It was furnished with a register, but I also carried a pocket-mirror, by which I was enabled to watch the instrument at pleasure while in place. The bulb I used to put well back under the tongue, the stem being wrapped in a slip of washleather and held between the teeth. The mouth was of course kept closed, often to my great distress. The instrument was always kept in place for ten minutes, often for fifteen minutes. Luckily, I did not break it till three days after my return home, and my results were so uniform that I have faith in the adequacy of my method. Once or twice, and no more, was Kennedy foolish enough to submit himself to the same investigation, on which occasions I obtained results identical with those obtained on myself. Unfortunately, the weather we suffered was horrible. Many days rained hopelessly, and the whole time mists sank gloomily or swept playfully over and about the peaks, making high excursions almost impossible. However, we did work enough to test the effects of exercise to a sufficient degree. We set off with the usual ambitious plans,—plans hatched during the usual long period of eager anticipation, and which collapsed in the usual way. The elaborate schemes for compassing the Engadine, threading its cols and climbing its peaks, ended as usual in an ignominious rush to Chamouni and home again. My temperatures up to Neufchâtel

and Bex were little disturbed, if at all, by long night journeys, irregular meals, and so forth: they observed throughout the journey from Leeds the same average as is shown in the accompanying diagram, which illustrates my usual curve of twenty-four hours. At Bex we met François Devouassoud, and we thence walked up to Les Plans; the day was hot, and we lengthened the walk by various deviations. I found my temperature on this day modified as much as it was on subsequent walks; that is, it was one or two-tenths (F.) higher than my average and descended more quickly towards night. The next day was miserably wet and cold, but we stuck to our intention of ascending the Dent de Morcles. On the whole, my temperature was a little lower, say one or two-tenths, than during exertion in warmer weather. We crossed the small glacier and reached the col looking down upon the Rhone, where we were rewarded by a succession of fine panoramas seen through rifts in the mist. The last bit of rock leading to the summit we did not climb; there is an easy way up the cliff, but we were unable to find it, and the mist dissuaded us from making any original investigations into the matter. The miserable weather quite broke up our plans, which were to ascend the Diablerets and to run down the Sanfleuron Glacier; so we went ignobly back to Bex and in heavy rain to Martigny. Walking quietly in wet clothes did not raise either my temperature or my spirits to any unusual level. On the following day we had a very hot sun and a hot walk to Salvan, up what Devouassoud playfully called a 'cinquantaine de ziczacs'; the new path up the hill above Trient being for the while closed, on account of certain blasting operations. Under this hot sun I again rose the trivial one or two-tenths which the cool applications of the day before had prevented. In the evening at Chamonix, also, I noted the earlier and steeper fall which always succeeded any forcing up of the temperature during the day. Here we remained at Coutet's pleasant pension, watching day by day the effects of mist unpenetrated by peaks. We wandered hopelessly about in the drizzle on the Plan des Aiguilles, and fried innumerable potatoes in the châlet thereupon, but were 'defended' from going higher. We therefore turned the enemy by walking along the valley to the Mont Joli, Contamines, and up to the châteaux of Trélatête. On ascending the slope to these châteaux, my temperature rose to 100° for the first and only time. This, I think, was an abnormal elevation, for the long pound along the uninteresting highroad and the steep ascent during the close evening had perhaps made me a

little feverish. The next day we went over the Mont Tondu pass and the Col de la Seigne, the temperatures during the day being, as usual under exercise, a little higher. I took a deliciously cold bath in the evening at Courmayeur, which did not make any impression upon the curve, which fell in the usual way, a little sooner and a little more rapidly to the invariable 97.5° . The weather seemed now more promising, and our return walk over the Col du Géant to Chamouni showed the same temperature curve. I may say that, although in walking casually on roads and paths I was able to take hourly observations, that in threading séracs the observations had to take their chance; I made two, however, while descending the ice-fall of the Géant. I should have said that my observations were always made while in movement, except a few taken at rest and kept separate from the former. The latter showed, however, nothing more than a loss of the two-tenths gained during the previous exertion.

We next made an attempt upon Mont Blanc, an expedition which I wished especially to make, in order to test my temperatures to the uttermost. As the weather now seemed a little better, we set off for the Mules, and in ascending to the Pierre Pointue, I observed for the first time a curious drop of 4.5° . This drop took place rather suddenly, when about twenty minutes from the chalet; on reaching the chalet, the mercury again rose to the normal position. As we proceeded to the Mules, I took my temperatures repeatedly—indeed, I seldom had the instrument out of my mouth—but no more drops were observed. At the Mules the weather seemed tolerable, and we were hopeful. On setting off in the morning, we found the mountain enormously crevassed, and the snow caked on the top with a crust just insufficient to take the full weight of the voyager, who went therefore sharply in up to his knee at each step, and barked his shins every time he extracted himself. This was monotonous, to say the least; but in addition to this, the top looked very threatening. When we were on the Grand Plateau, a storm of wind and snow was clearly playing about the summit and sweeping down the Calotte, and we were indisposed to venture within its limits. Devouassoud reluctantly admitted that we should find the Calotte somewhat deficient in shelter, and we began with shame to descend. During all this time the temperatures behaved as they do usually under exertion. On descending from the Mules to the Pierre Pointue again, however, I observed a drop precisely similar to that which took place during the ascent to the same place. On neither occasion was I conscious of anything wrong

with my health or strength. We shortly had reason to congratulate ourselves on our discretion in returning, for in what I may call the same storm, Mr. MacCorkendale and party perished on Mont Blanc, a day or two afterwards.

The weather was now so treacherous that we both determined to stand it no longer, and, shaking the dust off our boots and axes, we turned indignantly but firmly homewards.

The conclusion, then, which I think these experiments give me a right to make is this, that exertion under favourable circumstances tends slightly to raise the bodily temperature for the time, the elevation being compensated by a rather earlier and more rapid setting in of the evening fall. Food seemed to affect me but little either way, and rest merely brought down the temperature to its average level. During the night I always found myself at 97.5° , whatever the work of the day. When I rose at 'zwei,' the 97.5° sullenly held its place during what was called dressing, but rose gradually and under protest on setting out to walk. I claim, therefore, so far as my own person is concerned, to have proved that during exertion within the limits of health the body does not, as a rule, lose its regulating power. On the other hand, two curious depressions were noted, one during the casual and easy morning stroll up to the Pierre Pointue, which did not reappear between that place and the Great Mules, and the second while leisurely descending the séracs to the same place the day after. Here I must refer to some observations of M. Lortet, of Lyons, which were pointed out to me by an intelligent Swiss gentleman whom we met at Coutet's; I subsequently bought M. Lortet's pamphlet in Chamouni. M. Lortet denies, upon the strength of his own observations, that the body has the power of making up for rapid conversion of heat into mechanical work during an ascent. He says that not only on ascending Mont Blanc—which he did, I think, twice—but also on climbing little hills at home, his temperatures underwent very serious depressions, amounting to 5° F. and more. Such depressions I twice noted, but one was during a descent, and the other during a gentle ascent of lower slopes. On Mont Blanc itself no such depression occurred. I had made many of my observations before I met with M. Lortet's pamphlet, and in every subsequent one I kept a careful look-out for these depressions, but, with the before-named exceptions, they never occurred. And if I may now venture upon an *à priori* or analogical argument, I may point out the improbability of so serious an occurrence in the normal state. In my own case, I believe, the two depressions of temperature were

due to lack of fuel. In the first instance, we had deferred our breakfast until we should arrive at the Pierre Pointue; and in the second instance, we were returning from the hospitable but somewhat limited entertainment offered by the Mules. I cannot but think that if a warmblooded animal has stomach enough to assimilate plenty of food, a strong heart to propel the food through the lungs, and lungs of capacity sufficient to burn it rapidly off, such animal will not be liable to lose the balance of his forces during wholesome exertion. I am even disposed to think that no better test could be found than the thermometer to decide the wholesomeness of exertion in different persons; and if I may reason from myself to others, I should say that the effect of hard exercise in a mountainous district is to accelerate the morning rise, to carry it two or three-tenths above the average level of health, to favour the somewhat earlier occurrence of the evening fall, if the exertion be ended, to make the fall more rapid, and to carry it again one-tenth or perhaps two below the usual night level of health. Also that any depression during exertion signifies either deficiency of food or inefficiency of internal work.

When I discover that my body has become incapable of finding heat enough to lift me into the high Alps, and of maintaining its own work at the same time, I shall steam up the Rhine, boat on Lucerne, visit the Giessbach by candlelight, and pay my submissive twopence for admission to the icehole of the Rhone Glacier—use of umbrella included.

DETERMINATION OF HEIGHTS BY MEANS OF THE
THERMO-BAROMETER. By F. F. TUCKETT.

THIS method of determining heights is based upon the fact that, when the tension or elastic force of vapour of water is equal to the atmospheric pressure, ebullition takes place; hence, as the pressure varies either with altitude or from other causes, so does the boiling-point of water, the temperature of the latter being of course lower the higher the observer's station.

Various formulæ have been made use of for calculating the height from the boiling-point, and the names of Le Monnier, De Luc, Wollaston, Sir J. Leslie, Colonel Sykes, and Professors J. D. Forbes, Christie, J. D. Hooker, and Ch. Martins, as well as that of M. Regnault, may be mentioned as amongst those who have most largely contributed to the literature and practical elucidation of the subject. Of late years it has come

to be generally admitted that the 'Tables of Barometric Pressures corresponding to the Temperature of Boiling Water,' calculated by the last-named savant from his 'Tables of the Elastic Force of Aqueous Vapour,' leave little to be desired either as respects simplicity or accuracy, under varying conditions of climate and at all altitudes at which they have hitherto been tested.

Though the working-out of results has thus been at once facilitated and placed on a firm foundation, it may freely be admitted that it is not intended to set up this mode of determining altitudes as superior, or even equal in accuracy to that which is based upon the direct observation of the pressure with a good mercurial barometer. Professor Guyot, in his admirable collection of 'Tables Meteorological and Physical, prepared for the Smithsonian Institution' (2nd edition, Washington, 1858, section D. pp. 96-7), speaking of the comparative merits of the two methods, remarks: 'Both derive the difference of altitude from the difference of atmospheric pressure. But the temperature of boiling water gives only *indirectly* the atmospheric pressure, which is given *directly* by the barometer. This method is therefore liable to all the chances of error which may affect the measurements by means of the barometer, besides adding to them new ones peculiar to itself, the principal of which, not to speak of the differences exhibited in the various tables of the force of vapour, is the difficulty of ascertaining with the necessary accuracy the true temperature of boiling water. In the present state of thermometry' (written in 1851), 'it would hardly be safe, indeed, to answer in the most favourable circumstances for quantities so small as hundredths of degrees, even when the thermometer has been constructed with the utmost care; moreover, the quality of the glass of the instrument, the form and the substance of the vessel containing the water, the nature of the water itself, the place at which the bulb of the thermometer is placed, whether in the current of the steam or in the water—all these circumstances cause no inconsiderable variations to take place in the indications of thermometers observed under the same atmospheric pressure. Owing to these various causes, an observation of the boiling-point, differing by one-tenth of a degree from the true temperature, ought still to be admitted as a good one. Now, as the tables show, an error of one-tenth of a degree Centigrade in the temperature of boiling water would cause an error of 2 millimètres in the barometric pressure (or 1.44 mil. at 80° C.; 2 mil. at 90°; and 2.73 mil. at 100°), or of from 70 to 80 feet in the final result; while, with a good

barometer, the error of pressure will hardly ever (?) exceed one-tenth of a millimètre, making a difference of 3 to 4 feet in altitude. Notwithstanding these imperfections, the hypsometric thermometer, or thermo-barometer, is of the greatest utility to travellers traversing distant or rough countries, on account of its being more conveniently transported, and much less liable to accidents than the mercurial barometer.'

The MM. de Schlagintweit, in the second volume of their 'Results of a Scientific Mission to India and High Asia' (1862, p. 22), bear the following high testimony to the advantages of the method, which go so far to counterbalance, for travelling purposes, its admitted defects:—'Besides barometers, we had with us several thermo-barometers, or boiling-point thermometers, which were constructed with much greater nicety than the ordinary thermometers, and answered their purpose exceedingly well. When travelling in disguise and under the necessity of concealing our instruments, we were obliged to leave our barometer behind, and to limit ourselves entirely to the use of thermo-barometers. Travellers placed in circumstances of similar difficulty will, we think, find these instruments preferable to barometers, as they are more portable, can be carried with greater ease and safety, and are much less liable to get out of order. *Great accuracy, moreover, is attainable with them in the determination of heights*; and their general advantages, which we can speak to from experience, are such as to induce us to give a detailed description of their construction and use.'

My own experience entirely confirms the remark last quoted, and I am disposed to believe that no instrument is better adapted to the varied requirements of a traveller in rough or unexplored countries. Its portability is extreme; its hardness, perhaps, surpasses that of any other form of hypsometer; its accuracy is increasingly admitted, *provided the necessary precautions be taken*; and its use entails but little greater expenditure of time than that of an ordinary mercurial barometer.

Of the accordance between its indications and those furnished by the barometer or by triangulation, I may note the following cases in proof. In an article in the 'Revue des Deux-Mondes' (March 15, 1865, page 404), Professor Ch. Martins says: 'The temperature of ebullition obtained by us on the summit of Mont Blanc differs from that given in Regnault's Table, as an equivalent to the observed barometric reading, by only 0.05° Centigrade, whilst on the Grand Plateau the deviation was only 0.01°, and at Chamouni 0.04°.'

Simultaneous observations of the barometer and boiling-

point thermometer, by Mr. Wisse, in the Andes, under pressures varying from 752 to 430 millimètres (29·6 to 16·9 inches), show a most satisfactory agreement between the observed pressures and those obtained from Regnault's Tables, as equivalent to the boiling-point, 'the differences never exceeding a few tenths of a millimètre.'

Again, the MM. de Schlagintweit, after applying the necessary fundamental corrections to the thermometer, found that the pressures corresponding to their boiling-points by Regnault's Tables differed from the simultaneous readings of the barometer by quantities lying between 0·1 and 0·7 millimètres.

It may be almost superfluous to add further testimony, but I venture to give two observations of my own in confirmation of the satisfactory nature of boiling-point observations.

1. Lys Joch. Bar. (reduced) 456 millimètres. Air temperature $-2\cdot5^{\circ}$ C. Resultant height, as compared with Great St. Bernard (bar. reduced, 569·16 millimètres; air $+12\cdot4^{\circ}$ C.; altitude 2,478·3 mètres), 14,053·1 feet. Boiling-point, mean of two thermometers ($187\cdot35^{\circ}$ F. and $187\cdot5^{\circ}$ F.), $187\cdot42^{\circ}$ F. = $86\cdot34^{\circ}$ C. = 456·3 millimètres (by Regnault's Table), which, by comparison with the above St. Bernard reading, gives a height of 14,030 feet.

2. Riffel Hotel. Barometer (reduced) 561·6 millimètres. Resultant height, by comparison with Great St. Bernard, 8,497 feet. Boiling-point, mean of two thermometers ($197\cdot2^{\circ}$ and $197\cdot3^{\circ}$ F.), $197\cdot25^{\circ}$ F. = $91\cdot81^{\circ}$ C. = 562·66 millimètres (by Regnault's Table), which, by comparison with the same St. Bernard observation, gives a height of 8,458 feet.

I venture to believe that, as a rule, and when observations cannot be frequently repeated, the differences between the results of good barometric readings and those obtained by the level or the theodolite will constantly equal, and frequently exceed, the above discrepancies of 25 and 39 feet respectively. Of course accuracy in the construction of the thermometers is essential, but our instrument-makers have attained to a very high degree of perfection in this respect. I have much pleasure in stating that, in the case of two supplied to me in 1861 by Mr. Casella, and divided respectively to $0\cdot1^{\circ}$ and $0\cdot2^{\circ}$ F., which I have used at altitudes of from 4,000 to 14,000 feet, the greatest recorded difference in their reading throughout the scale amounted to only $0\cdot15^{\circ}$ F., and rarely exceeded $0\cdot05^{\circ}$.

The Thermometers.

As respects the thermometers to be selected—three at least of which should be taken if the journey be a distant one—I

am of opinion that closer graduations than 0.1° F. (representing, at 185° and 212° respectively, differences of pressure of only 0.037 and 0.060 inches) are of questionable utility, and, on the whole, I prefer such divisions to any others, as they are quite sufficiently open, even when the range of scale is considerable and the tube of moderate length. 5° F. to the inch will not, I think, be found too crowded, and an estimation to 0.05° may be accurately made with a little practice; but if greater openness of scale is preferred to the maximum of compactness and portability, it can of course be adopted. It is generally believed that thermometers, however accurately constructed in the first instance, will gradually develop an index error which may become very serious in amount. Its progress is, however, supposed to be arrested after the lapse of an interval, variously stated by different authorities as from a few months to a year, or even more, and it is therefore desirable to select instruments that have been constructed some time, and ascertain their index errors at various points of the scale by careful comparisons at Kew or Greenwich before starting. If this be impossible, the observer must *lose no opportunity of testing their performance at different pressures against his own portable barometer*, if he has one, or *such standards as he may chance to meet with during his journey*, especially those at all such lower stations as are likely to form the base of his calculations.

On these points the following remarks by the De Schlagintweits ('India and High Asia,' vol. ii. pp. 27, 28) are of interest:—'The two following elements of disturbance may, however, interfere with the limits of the nicest accuracy in such observations: *a*, an alteration in the size of the bulb by gradual contraction or expansion: *b*, a temporary or permanent alteration in the size of the bulb, from long exposure to atmospheres of different pressure. In our instruments neither of these causes of error was appreciable. With respect to the regularity of their action, something is due to the fact of their having left the maker's hands some months previous to our departure from England. A comparison of the corrections determined at Kew with those ascertained by ourselves a few days after our arrival in India showed a very slight expansion to have taken place. It was of no importance, however, in itself, and did not undergo any subsequent increase. The thickness of the glass used in the construction of the instruments proved very useful, and entirely excluded temporary expansion of the bulb at great heights.'

In selecting a thermometer, regard must, of course, be had

to the height at which it is likely to be used, as nothing would be more disappointing than the discovery that the boiling-point at some interesting station was not included in the scale. Omitting from our consideration the disturbing element which is introduced by the correction for the temperature of the air at the upper and lower stations, and which is applicable alike to barometer and boiling-point observations, and also bearing in mind that the pressure at the sea-level may have descended as low as 29 inches, and the corresponding boiling-point be thus about 210.5° instead of 212° , we may, roughly speaking, say that 1° F. is equal to a difference of level of 550 feet (about 563 in the Himalayas, and 543 in Europe), and 1° C. of about 300 mètres, and thus determine for ourselves the length of scale we are likely to require. Throwing off the degrees above 210° F. (99° C.), as a margin to meet the possible fall of the pressure at the sea-level to 28.751 inches (730.27 millimètres), we can determine the length of scale required, by dividing the greatest height at which it is supposed that the instrument will be used by 550 feet or 300 mètres respectively. The quotient, subtracted from 210° F. in the first case, or 99° C. in the second, will approximately give the lower limit of the scale.

The *total* length of my own thermometer, divided to 0.1° F., and ranging from 180° to 215° , is 10 inches, which is ample for the Alps, and probably a lower range than 175° F., or about 79° C., is not likely to be required in any part of the world, and would suffice for the determination of heights of 19,000—21,000 feet, according to the air-temperature correction and the pressure at the sea-level. The scale should not be continued too close to the bulb, but an ungraduated margin be left for insertion in the cork or india-rubber which closes the aperture of the steam-chamber in any of the forms of boiler usually adopted.

I have always boiled my thermometers in steam, rather than in water, less on account of any theoretical views on the disputed question as to which most correctly furnishes the true temperature of ebullition, than because I have found it difficult, if not impossible, when the bulb of the thermometer was immersed in water, to secure anything like steadiness in the mercurial column, the 'pumping' action of which is incessant and often amounts to several tenths of a degree. With a view of testing the matter more carefully by a direct comparison of the results of the two methods with the readings of a first-rate standard barometer by Hicks, converted into terms of the boiling-point by Regnault's Tables, I have recently devoted some

time to the subject with the following results:—1. In water the mercury not only pumps incessantly, and to an extent varying from 0.15° to 0.4° F., but the readings are from 0.5° to 1.15° higher than those obtained in steam. 2. If the water employed be impure, or contain, for instance, much salts in solution, the readings with an immersed bulb become still more largely in excess, whilst the temperature of the steam from such water does not differ by more than 0.05° from that recorded in the case of the steam from distilled water. 3. In the steam experiments, ‘pumping’ disappeared or, at any rate, was confined within such extremely narrow limits as to be practically non-existent. The readings in steam from distilled, soft, and hard water were accordant within about 0.1° , being highest in the first, and lowest in the last. The water-readings in each case showed the excess already referred to, the difference being least when distilled water, and greatest when hard water was employed. 4. The results obtained when a ‘Russian furnace’ was employed as the source of heat were slightly higher—about 0.05° —than in the case of the ordinary flame of spirits of wine.

The mode of using the apparatus and reading off the thermometer will be better understood after five minutes’ inspection and practice at the maker’s than by pages of description, even with the assistance of illustrations; and I will therefore confine myself to the simplest instructions for the treatment of the boiling-point readings when obtained, merely adding that a simultaneous observation of the temperature of the air in shade, precisely as in the case of a barometer observation, is essential. The thermometer having been compared at Kew or Greenwich before starting, every opportunity of subsequent control by comparison with all available and accurate barometers during the journey should be taken advantage of. The corrections thus obtained having first been applied to the reading, enter, with the resultant corrected boiling-point, the ‘Table by Regnault, revised by Moritz’ (which will be found at the end of this article), and take out the barometric pressure corresponding therewith. This last must then be treated precisely like an ordinary observation with a barometer, to which the corrections for index error, capillarity, and temperature of the mercury (reduction to the freezing-point) have already been applied. That is to say, the corrections for the temperature of the air at the upper and base station, and those for the decrease of gravitation on a vertical line, and its variation with latitude, alone remain to be applied in working out the resultant height with the aid of the tables of Delcros, Guyot, Loomis, or Plan-

tamour, given in the volume of the 'Smithsonian Miscellaneous Collections,' edited by Professor A. Guyot, to which reference has already been made. It is perhaps unnecessary to say more on this point, as the method of reducing and calculating barometrical observation is familiar, but a single example will set the matter in a clearer light.

Upper Station, Lys Joch, June 15, 1861, 11 A.M. Boiling-point (mean of two thermometers), $187\cdot42^{\circ}$ F. (= $17\cdot969$ inches by Regnault's Table). Air temperature, $27\cdot5^{\circ}$ F.

Lower Station, Great St. Bernard, same hour. Barometer (reduced to 0° C.), $569\cdot16$ millimètres = $22\cdot408$ inches. Air temperature, $+12^{\circ}$ C. = $54\cdot3^{\circ}$ F. Height of station, $2,478\cdot3$ m. = $8,131$ English feet.

Use of the Tables (Guyot, Section D. page 36).

In Table I., find first the number corresponding to the atmospheric pressure at the lower and upper station respectively, h and h' . In the present instance, $h = 22\cdot408$ inches; find in the first column on the left the number $22\cdot4$; on the same horizontal line, in the column headed $\cdot00$, are given the figures corresponding to $22\cdot40 = 21,070\cdot5$; and in the last column but one, on the right, we find for $\cdot008$ (thousandths of an inch) = $9\cdot1$, or for $22\cdot408 = 21,079\cdot6$. Similarly, we obtain $15,311\cdot8$ for the value of h' . The difference, or $5,767\cdot8$, is the *approximate* difference of level D in English feet.

For computing the correction due to the expansion of the air according to its temperature, or $D \times \left(\frac{t + t' - 64}{900} \right)$, where t

and t' are the air temperatures at the upper and lower stations respectively, make the sum of the temperatures; subtract from that sum 64; multiply the remainder into the approximate difference, D; and divide the product by 900. This correction is of the same sign as $(t + t' - 64)$, and by applying it, we obtain a second approximate difference of level, D' .

In Table III., with D' and the mean latitude of the stations, find the correction for variation of gravity in latitude, and add it to D' , paying due attention to the sign.

In Table IV., with D' , take the correction for the decrease of gravity on a vertical, and add it to the approximate difference of level.

The sum thus found is the true difference of level between the two stations, or Z, and by adding the elevation of the lower station above the level of the sea, when known, we obtain the absolute altitude of the upper station.

*Determination of Heights by means of**Application in the present case.*

St. Bernard, $h = \text{Bar. } 22\cdot408$ inches.	Air temperature, $t = 54\cdot3^\circ$ Fahr.	
Lys Joch, $h' =$	Do.	$t' = 27\cdot5^\circ$ „
„ 17·969 „		$t + t' = 81\cdot8^\circ$
		$- 64\cdot0^\circ$
		$(t + t' - 64) = 17\cdot8^\circ$
Table I. gives for $h = 22\cdot408$ inches	.	21079·6 ft.
„ „ $h' = 17\cdot969$ „	.	15311·8
		<hr style="width: 100%;"/>
	Approximate difference of level $D =$	5767·8
$D \times \left(\frac{t + t' - 60}{900} \right) =$	$\frac{5768 \times 17\cdot8^\circ}{900}$. . . = +114·0
	Second approximate difference of level $D' =$	5881·8
Table III. gives for $D' = 5882$ feet, and latitude 46°		+ 0·5
„ IV. „ $D' = 5882$ „		+ 16·4
		<hr style="width: 100%;"/>
Height of Lys Joch above St. Bernard	.	5898·7
Height of St. Bernard barometer above sea		8131·0
		<hr style="width: 100%;"/>
Altitude of Lys Joch above sea	.	<u>14029·7 E. ft.</u>

Table of Barometric Pressures corresponding to the Temperatures of the Boiling-point of Water. Expressed in English inches for Temperatures of Fahrenheit. Reduced from Regnault's Table, revised by Moritz.

This table (reprinted and extended at the end of this article) will be found in the valuable collection of Professor Guyot already alluded to. That for the Centigrade scale ranges from 80° to 101° ($= 176^\circ$ to $213\cdot8^\circ$ F.), but the corresponding set for the Fahrenheit scale only extends from 185° to 213° . In their great work on 'India and High Asia,' however (vol. ii. pp. 78-82), MM. de Schlagintweit have continued the same table as low as 176° Fahr., and give the corresponding barometric pressure for differences of $0\cdot02^\circ$ in the boiling-point; but as it is easy to calculate $0\cdot01^\circ$, it is unnecessary to occupy valuable space by printing values below $0\cdot1^\circ$, and between 176° and 213° .

Apparatus for heating the Water, etc.

I have devised an arrangement for boiling the thermometer in steam which will admit of the use either of a 'Russian furnace' or an ordinary spirit-lamp (both of which can be packed in it) as the source of heat. When spirit of wine is not procurable, charcoal can be made to supply its place, and acts most efficiently, on the principle of the well-known Russian 'samovar.'

I have already introduced it to some of our principal scientific instrument-makers, such as Messrs. Negretti and Zambra, and Mr. J. Hicks, 8 Hatton Garden.

P.S. I have stated that the correction for the decrease of gravitation in a vertical line and its variation with latitude are applicable to the pressures corresponding to the boiling-point, as given in Regnault's Table, precisely as in the case of direct observation with the barometer; but though this course has been pursued by the Messrs. de Schlagintweit in the reduction of their observations, it is at least doubtful whether it is theoretically correct, and therefore practically right. In the case of the barometer, the correction for gravity in a vertical is compounded of that for the diminution in weight of the mercurial column and of that for the diminution in weight of the column of air above the point of observation. Similarly, the correction for latitude has the same two components. It would seem that that part of the correction which has reference to the air column must be introduced into the calculation of height based on the boiling-point, but that the part referring to the weight of the mercurial column should not be taken into account. All, however, depends upon the principle upon which Regnault's Table is constructed, and on this point I should be grateful for information, though, after all, the result would not be *very* materially affected if we discarded these two corrections altogether. If the lengths of mercurial columns given by Regnault as equivalent to the various boiling-points are expressed in mercury at the mean sea-level in latitude 45°, the part of the gravity and latitude corrections due to the diminution in the weight of the *observed* barometric column will have no place in the boiling-point observations.

Boiling-point, Fahr.	Barometer in English inches.	Difference.	Boiling-point, Fahr.	Barometer in English inches.	Difference.	Boiling-point, Fahr.	Barometer in English inches.	Difference.
176 ^o 0	13·962	·032	177 ^o 0	14·281	·032	178 ^o 0	14·602	·033
176 ^o 1	13·994	·032	177 ^o 1	14·313	·032	178 ^o 1	14·635	·033
176 ^o 2	14·026	·032	177 ^o 2	14·345	·032	178 ^o 2	14·669	·033
176 ^o 3	14·058	·032	177 ^o 3	14·377	·032	178 ^o 3	14·702	·033
176 ^o 4	14·090	·032	177 ^o 4	14·409	·032	178 ^o 4	14·735	·033
176 ^o 5	14·122	·032	177 ^o 5	14·442	·032	178 ^o 5	14·769	·033
176 ^o 6	14·153	·032	177 ^o 6	14·474	·032	178 ^o 6	14·802	·033
176 ^o 7	14·185	·032	177 ^o 7	14·506	·032	178 ^o 7	14·835	·033
176 ^o 8	14·217	·032	177 ^o 8	14·538	·032	178 ^o 8	14·868	·033
176 ^o 9	14·249	·032	177 ^o 9	14·570	·032	178 ^o 9	14·902	·033

Determination of Heights by means of

Bolling-point, Fahr.	Barometer in English inches.	Difference.	Bolling-point, Fahr.	Barometer in English inches.	Difference.	Bolling-point, Fahr.	Barometer in English inches.	Difference.
179 ^o 0	14·935	·033	183·5	16·498	·036	188 ^o 0	18·195	·039
179 ^o 1	14·968	·033	183·6	16·533	·036	188 ^o 1	18·235	·039
179 ^o 2	15·001	·033	183·7	16·569	·036	188 ^o 2	18·274	·039
179 ^o 3	15·035	·033	183·8	16·605	·036	188 ^o 3	18·314	·040
179 ^o 4	15·068	·033	183·9	16·640	·036	188 ^o 4	18·353	·040
179 ^o 5	15·101	·033	184·0	16·676	·037	188 ^o 5	18·393	·040
179 ^o 6	15·134	·033	184·1	16·713	·037	188 ^o 6	18·432	·040
179 ^o 7	15·167	·033	184·2	16·750	·037	188 ^o 7	18·472	·040
179 ^o 8	15·201	·033	184·3	16·788	·037	188 ^o 8	18·512	·040
179 ^o 9	15·234	·033	184·4	16·825	·037	188 ^o 9	18·552	·040
180 ^o 0	15·267	·034	184·5	16·862	·037	189 ^o 0	18·592	·040
180 ^o 1	15·302	·034	184·6	16·899	·037	189 ^o 1	18·632	·040
180 ^o 2	15·336	·034	184·7	16·936	·037	189 ^o 2	18·672	·040
180 ^o 3	15·371	·034	184·8	16·974	·037	189 ^o 3	18·712	·040
180 ^o 4	15·405	·034	184·9	17·011	·037	189 ^o 4	18·753	·040
180 ^o 5	15·440	·034	185·0	17·048	·037	189 ^o 5	18·793	·040
180 ^o 6	15·475	·034	185·1	17·085	·037	189 ^o 6	18·833	·040
180 ^o 7	15·509	·034	185·2	17·122	·037	189 ^o 7	18·874	·041
180 ^o 8	15·544	·034	185·3	17·160	·037	189 ^o 8	18·914	·041
180 ^o 9	15·578	·034	185·4	17·197	·038	189 ^o 9	18·955	·041
181 ^o 0	15·613	·034	185·5	17·235	·038	190 ^o 0	18·996	·041
181 ^o 1	15·648	·034	185·6	17·272	·038	190 ^o 1	19·036	·041
181 ^o 2	15·682	·034	185·7	17·310	·038	190 ^o 2	19·077	·041
181 ^o 3	15·717	·034	185·8	17·348	·038	190 ^o 3	19·118	·041
181 ^o 4	15·751	·035	185·9	17·385	·038	190 ^o 4	19·159	·041
181 ^o 5	15·786	·035	186·0	17·423	·038	190 ^o 5	19·200	·041
181 ^o 6	15·821	·035	186·1	17·461	·038	190 ^o 6	19·241	·041
181 ^o 7	15·855	·035	186·2	17·499	·038	190 ^o 7	19·283	·041
181 ^o 8	15·890	·035	186·3	17·537	·038	190 ^o 8	19·324	·041
181 ^o 9	15·924	·035	186·4	17·575	·038	190 ^o 9	19·365	·041
182 ^o 0	15·959	·036	186·5	17·614	·038	191 ^o 0	19·407	·042
182 ^o 1	15·995	·036	186·6	17·652	·038	191 ^o 1	19·448	·042
182 ^o 2	16·031	·036	186·7	17·690	·038	191 ^o 2	19·490	·042
182 ^o 3	16·067	·036	186·8	17·729	·038	191 ^o 3	19·532	·042
182 ^o 4	16·103	·036	186·9	17·767	·039	191 ^o 4	19·573	·042
182 ^o 5	16·139	·036	187·0	17·806	·039	191 ^o 5	19·615	·042
182 ^o 6	16·175	·036	187·1	17·844	·039	191 ^o 6	19·657	·042
182 ^o 7	16·211	·036	187·2	17·883	·039	191 ^o 7	19·659	·042
182 ^o 8	16·247	·036	187·3	17·922	·039	191 ^o 8	19·741	·042
182 ^o 9	16·283	·036	187·4	17·961	·039	191 ^o 9	19·783	·042
183 ^o 0	16·319	·036	187·5	18·000	·039	192 ^o 0	19·825	·042
183 ^o 1	16·355	·036	187·6	18·039	·039	192 ^o 1	19·868	·042
183 ^o 2	16·390	·036	187·7	18·078	·039	192 ^o 2	19·910	·042
183 ^o 3	16·426	·036	187·8	18·117	·039	192 ^o 3	19·952	·042
183 ^o 4	16·462	·036	187·9	18·156	·039	192 ^o 4	19·995	·043

Bolling-point, Fahr.	Barometer in English inches.	Differ-ence.	Bolling-point, Fahr.	Barometer in English inches.	Differ-ence.	Bolling-point, Fahr.	Barometer in English inches.	Differ-ence.
192.5	20.037	.043	197.0	22.033		201.5	24.191	.050
192.6	20.080	.043	197.1	22.079	.046	201.6	24.241	.050
192.7	20.123	.043	197.2	22.125	.046	201.7	24.291	.050
192.8	20.166	.043	197.3	22.172	.046	201.8	24.341	.050
192.9	20.208	.043	197.4	22.218	.046	201.9	24.391	.050
193.0	20.251	.043	197.5	22.264		202.0	24.442	.050
193.1	20.294	.043	197.6	22.311	.047	202.1	24.492	.050
193.2	20.338	.043	197.7	22.358	.047	202.2	24.542	.050
193.3	20.381	.043	197.8	22.404	.047	202.3	24.593	.051
193.4	20.424	.043	197.9	22.451	.047	202.4	24.644	.051
193.5	20.467	.043	198.0	22.498		202.5	24.694	.051
193.6	20.511	.043	198.1	22.545	.047	202.6	24.745	.051
193.7	20.554	.044	198.2	22.592	.047	202.7	24.796	.051
193.8	20.598	.044	198.3	22.639	.047	202.8	24.847	.051
193.9	20.641	.044	198.4	22.686	.047	202.9	24.898	.051
194.0	20.685	.044	198.5	22.734	.047	203.0	24.949	.051
194.1	20.729	.044	198.6	22.781	.047	203.1	25.000	.051
194.2	20.773	.044	198.7	22.829	.048	203.2	25.051	.051
194.3	20.817	.044	198.8	22.876	.048	203.3	25.103	.051
194.4	20.861	.044	198.9	22.924	.048	203.4	25.154	.052
194.5	20.905	.044	199.0	22.971		203.5	25.206	.052
194.6	20.949	.044	199.1	23.019	.048	203.6	25.257	.052
194.7	20.993	.044	199.2	23.067	.048	203.7	25.309	.052
194.8	21.038	.044	199.3	23.115	.048	203.8	25.361	.052
194.9	21.082	.044	199.4	23.163	.048	203.9	25.413	.052
195.0	21.126	.045	199.5	23.211	.048	204.0	25.465	.052
195.1	21.171	.045	199.6	23.259	.048	204.1	25.517	.052
195.2	21.216	.045	199.7	23.308	.048	204.2	25.569	.052
195.3	21.260	.045	199.8	23.356	.048	204.3	25.621	.052
195.4	21.305	.045	199.9	23.405	.049	204.4	25.674	.052
195.5	21.350	.045	200.0	23.453	.049	204.5	25.726	.053
195.6	21.395	.045	200.1	23.502	.049	204.6	25.779	.053
195.7	21.440	.045	200.2	23.550	.049	204.7	25.831	.053
195.8	21.485	.045	200.3	23.599	.049	204.8	25.884	.053
195.9	21.530	.045	200.4	23.648	.049	204.9	25.937	.053
196.0	21.576	.045	200.5	23.697	.049	205.0	25.990	.053
196.1	21.621	.045	200.6	23.746	.049	205.1	26.043	.053
196.2	21.666	.046	200.7	23.795	.049	205.2	26.096	.053
196.3	21.712	.046	200.8	23.845	.049	205.3	26.149	.053
196.4	21.758	.046	200.9	23.894	.049	205.4	26.202	.053
196.5	21.803	.046	201.0	23.943	.049	205.5	26.255	.053
196.6	21.849	.046	201.1	23.993	.050	205.6	26.309	.054
196.7	21.895	.046	201.2	24.042	.050	205.7	26.362	.054
196.8	21.941	.046	201.3	24.092	.050	205.8	26.416	.054
196.9	21.987	.046	201.4	24.142	.050	205.9	26.470	.054

Boiling-point, Fahr.	Barometer in English inches.	Difference.	Boiling-point, Fahr.	Barometer in English inches.	Difference.	Boiling-point, Fahr.	Barometer in English inches.	Difference.
206·0	26·523	·054	208·5	27·898	·056	211·0	29·331	·059
206·1	26·577	·054	208·6	27·954	·056	211·1	29·390	·059
206·2	26·631	·054	208·7	28·011	·056	211·2	29·449	·059
206·3	26·685	·054	208·8	28·067	·056	211·3	29·508	·059
206·4	26·740	·054	208·9	28·123	·057	211·4	29·566	·059
206·5	26·794	·054	209·0	28·180	·057	211·5	29·625	·059
206·6	26·848	·054	209·1	28·237	·057	211·6	29·684	·059
206·7	26·903	·055	209·2	28·293	·057	211·7	29·744	·059
206·8	26·957	·055	209·3	28·350	·057	211·8	29·803	·059
206·9	27·012	·055	209·4	28·407	·057	211·9	29·862	·059
207·0	27·066	·055	209·5	28·464	·057	212·0	29·922	·060
207·1	27·121	·055	209·6	28·521	·057	212·1	29·981	·060
207·2	27·176	·055	209·7	28·579	·057	212·2	30·041	·060
207·3	27·231	·055	209·8	28·636	·057	212·3	30·101	·060
207·4	27·286	·055	209·9	28·693	·058	212·4	30·161	·060
207·5	27·341	·055	210·0	28·751	·058	212·5	30·221	·060
207·6	27·397	·055	210·1	28·809	·058	212·6	30·281	·060
207·7	27·452	·055	210·2	28·866	·058	212·7	30·341	·060
207·8	27·507	·056	210·3	28·924	·058	212·8	30·401	·060
207·9	27·563	·056	210·4	28·982	·058	212·9	30·461	·060
208·0	27·618	·056	210·5	29·040	·058	213·0	30·522	0·060
208·1	27·674	·056	210·6	29·098	·058			
208·2	27·730	·056	210·7	29·156	·058			
208·3	27·786	·056	210·8	29·215	·058			
208·4	27·842	·056	210·9	29·273	·059			

COL DE LA TOUR RONDE.

IN the course of the summer of 1867, I was travelling with three friends who, though all experienced in Alpine expeditions, had none of them paid homage to the 'Monarch of Mountains.' They were naturally anxious to supply the omission: I was not unwilling to revisit an old friend. From the commencement of our journey it had been, therefore, an understood thing that we should ascend Mont Blanc, and that, to vary a little the commonplace character of the excursion, and to avoid the Chamouni cannon, we should take the route by the Aiguille du Midi, and Monts Maudits. Of course, the natural way from Courmayeur to the 'cabane' on the rocks of the Aiguille du Midi is over the Col du Géant, but our ideas pointed in a different direction. The problem of connecting, by a practicable pass, the Brenva, the noblest of the southern, with the Mer de Glace, the noblest of the northern glaciers of Mont Blanc, was still unsolved, and presented to us irresistible attractions. The head of the Brenva had been but once explored, and must, we knew, offer scenery of the most magnificent character. Besides, in these latter days, a new pass over the main chain of Mont Blanc is in itself a tempting bait to those who have contracted the taste for 'some new thing.' A cloudless Sunday at Courmayeur, after a most successful week in the

Graians, incited us to start on Monday morning, and profit, as far as possible, by the fine weather.

We were called before 2, and by 3 A.M. were on the march. Clouds had collected during the night, and formed a thin veil between us and the chain of Mont Blanc, through which glimpses of peaks, backed by bright blue sky, seemed to promise fine weather later in the day. Passing the bridge by which the road of the Allée Blanche crosses the Dora, we followed the path to Entrèves. After traversing the Val Ferrex torrent we profited by a short cut over inundated meadows, and soon joined a track which led us over the mass of stony *débris* left by the Brenva as a monument of its departed greatness, in the days when it spread across the valley and almost touched the mule-path to the Col de la Seigne. Where the ascent first grew steep, we found a *châlet*, and made enquiries of an old man, who recommended us to keep close to the glacier. We mounted accordingly through the dell between the ice and the mountain, and then along the top of the moraine, until it became a mere lean-to of loose stones against the hill-side. We were then obliged to scramble across the steep rocky face overlooking the glacier. There was no difficulty in doing this, but all Alpine travellers know how quickly time goes by on such ground. The guides, however, were determined to stick to the rocks, and finally brought us to a corner, where we had to use the rope, and lost quite a quarter of an hour. This was more than our patience could endure, so we got on to the ice as soon as possible, and wound our way up the steep, slippery glacier, having above us the great icefall, with the *Heisseplatte*-like rock in its centre. To surmount this obstacle it was necessary to regain the rocks on our right. To reach these, we had to traverse a considerable tract of *sérac-débris*. It was all old, the remains of spring avalanches, and the masses of ice which kept toppling over above us, once, at least, in every five minutes, did not come anywhere near our track. Still, we did not loiter, having no wish to be caught by an extraordinary discharge of the glacier battery.

A short scramble up the rocks brought us to a beautiful grassy bank. The view hence across the great icefall of the Brenva—one of the finest in the Alps—to the flame-like peak of Mont Peteret, is magnificent. Water abounded, and we were glad to halt and make a meal, for we had spent nearly four hours in getting thus far. To our surprise, we found our proceedings were being watched by a flock of half-wild sheep, which we had driven from their pasturage. There is an easier path to this spot, but we failed to discover it, and, looking downwards, could still see no way except by the glacier.

While waiting for the guides, for the rope was now expedient, we debated on our further course. Immediately opposite us rose the rocky bluff, which divides the upper Brenva into two portions—the main western and a smaller eastern branch. The latter falls steeply from a snow-field, enclosed between the base of La Tour Ronde and the upper part of the ridge dividing the Brenva, which abuts on the watershed rather to the west of La Tour. We determined to ascend the eastern branch of the glacier, and gain the watershed at the point of junction of the two ridges.

As we advanced up the glacier, crevasses grew numerous and troublesome; one big chasm after another sent us round a hundred yards right or left, to get past it, and we lost a good deal of time and patience. As we mounted, the crevasses were more and more choked with snow, until, at last, the comparatively level basin under the final ridge was gained. Here we changed our original plan. To strike the ridge where we had first intended, it was plain would involve a weary bout of step-cutting, while the rocks immediately above us, though steep, looked promising. We made a short zigzag beyond them to cross the bergschrund, and then releasing ourselves from the bondage of the rope, set to work at what we fondly imagined to be a half-hour's scramble to the Col.

We were now drawing near the level of the watershed farther to the left; immediately above us it rose to the likeness of a peak. This was our first intimation that we were actually climbing La Tour Ronde, and was a very welcome discovery, the more so since the guides expressed a strong belief that the descent on the eastern side of that peak was practicable.

After another half-hour of the same sort of work, we were rounding a steep corner on the last crags, with only a gentle bank of honest snow between us and the watershed. I was soon standing on it, beside T. and B., who had been ahead. Below us—somewhat too immediately below us—lay the névé of the Glacier du Géant. On our left, a broad snow-ridge led up to a rocky crest some 150 feet above our heads. 'Let us bag the peak' were, I think, the first words on our lips: as to the pass, silence seemed, for the present at least, to be discreet.

A few minutes later T. and I were quarrelling and accusing one another of murderous designs, because there was not room for two people to investigate the view at once on the actual topknot of La Tour Ronde.

The guides were anxious, and we were all more or less excited, on the question of descent. There were several places whence it was possible, by dint of step-cutting, to reach the head of the Glacier du Géant, but any great loss of time would involve, we knew, a night on the glacier, for it was already 3.40 P.M. We had been twelve hours (including halts) in ascending from Courmayeur! Fortunately we all agreed that the best course was to follow the eastern ridge till we came to a promising spot, and then do our best.

I have seen a great many panoramas more extensive, but none which has left on my mind a recollection of such overpowering magnificence as that gained from La Tour Ronde. There is no other point from which the precipitous eastern face of Mont Blanc is seen so fully and so close at hand, or from which the great rock-peaks which encircle the frozen sources of the Mer de Glace appear to greater advantage. We were constantly turning, at a loss whether to fix our eyes on the 'massif' of Mont Blanc flanked by the Peteret and the Monts Maudits, or on the noble rock-peaks of the Aiguille Verte and Grandes Jorasses.

On the one side the Brenva poured down in an unbroken succession of shimmering sérac and torn icefall into the depths of the Allée Blanche, beyond which we looked on to the house-roofs of Courmayeur.

On the other the broad spotless névé of the Géant spread between us and the Grandes Jorasses, while in the gap beneath the Aiguille Verte appeared the green slopes of the Col de Balme, dotted by its white inns, and backed by a hazy glimpse of the Swiss lowlands and far-off Jura.

The southern and eastern view is a slightly enlarged edition of that from the Col du Géant, and includes the same ranges. We were now almost exactly on a level with the top of the Peteret, yet it looked if possible more striking than ever, while its Chamouni rival the Dru was literally nowhere, and seemed to have abandoned all claims to be anything but a buttress of its taller neighbour.

The guides now found to their great grief that they had left one of the knapsacks behind at our last halt. Luckily for us, it was the one which contained their own change of clothing, which was of no great extent or value. Loud, however, were the lamentations as they gazed sadly on the lost treasure, which was just visible far down the slope—much too distant for us to have time to return and fetch it.

After staying as long as we dared at so late an hour on the top (till 4.20 P.M.), we roped and trotted down the snow-ridge. After following it some little way below the spot at which we had struck it, rocks cropped out, and we stepped on to a projecting boulder to reconnoitre. The prospect was tolerably favourable, and we determined to quit the ridge and descend the steep wall of crags which separated us from the Glacier du Géant. Almost at once we came to the top of an ugly rock-chimney. Ballay went down like a monkey, and those above soon heard the pleasant sound of 'Venez seulement.' We had rope enough between each of us to allow of only one moving at a time, which removed all risk or difficulty. Below the chimney it was necessary to bear to the right to avoid the track of stones falling from La Tour, with which the glacier below was covered. The crags now became most delightfully practicable, and we got along down a ridge, as fast as a roped party may, till, 50 feet from the bergschrund, we stepped off on to snow, kicked steps down the bank, crossed a bridge by the aid of a few footholds, and so in little more than an hour from the summit found ourselves safe and sound on the much-desired glacier.

After a brief consultation—for we had feared at one time we should be unable to reach the Aiguille du Midi hut—we resolved to adhere to our original plan and set off across the glacier.

We soon reached the bottom of the great snow-valley at the head of the Glacier du Géant. Here we had a capital opportunity to examine the long ridge north-west of La Tour Ronde; it is very steep throughout on this side, but a mountaineer might doubtless force his way over it, and though he would, I believe, gain little in time, and lose in scenery by preferring this to our route, he would have the satisfaction of effecting the lowest pass between the Géant and the Brenva. We now began to ascend the broad slope under Mont Maudit.

After a time the slope grew less and less, and a snow-plain opened in front, backed by the crags of the Aiguille du Midi, on the western end of which the hut came into sight for the first time. It was nearly 8 P.M., and seeing sunset was at hand, we unbuckled our belts and almost ran for the rocks. No snow lay against the door of the hut,

but a peep inside revealed to my dismay an interior entirely choked by a white mass, on which the porters had but just begun to work. After a comfortless night, we woke up to a morning of bad weather, and instead of attempting Mont Blanc or the Aiguille du Midi, descended straight to Chamouni.

Within ten days of the expedition I have here described, I had the good fortune to cross both the Cols de Miage and d'Argentière in perfect weather. I was thus enabled to compare our new pass with these established favourites, both as regards scenery and difficulty. The descent on to the Brenva would be easier than the Swiss side of the Argentière (as we found it), but the Brenva itself is longer and more crevassed than the La Neuvaz Glacier. The northern side of the Tour Ronde ridge is not really difficult, and it is only necessary to avoid carefully the tracks of falling stones. As regards scenery, I have no hesitation in ranking the Col de la Tour Ronde first. It is altogether grander than the Miage, and if the scenery of the Argentière Glacier and the Mer de Glace be held equal, the Brenva far surpasses the La Neuvaz Glacier, and the panorama from the Tour Ronde is more beautiful than even the lovely view from the Col d'Argentière. The superiority in point of scenery of our new pass to the Col du Géant is manifest, but it will always require longer time. I believe it will be found to take on an average 15 hours' actual walking to reach Chamouni from Courmayeur by this route—9½ hours up, 5½ hours down. We were longer; but various circumstances delayed us, and we lost a good half-hour on the rocks at the foot of the Brenva.

D. W. F.

REVIEW.*

MR. WHYMPER'S SCRAMBLES AMONGST THE ALPS.*

It may be hoped that within a short time after the publication of this number of the 'Alpine Journal,' every member of the Club will have the opportunity of studying Mr. Whympers long-expected book upon the Alps. We are fortunately able to present our readers with a specimen of the illustrations, which will speak sufficiently for itself. The author's place in the records of English mountaineering is so conspicuous, that it is a kind of duty to every one who takes an interest in the subject to read his narrative. A few words upon the book itself, and upon certain topics which it suggests, may therefore not be unwelcome.

After turning over Mr. Whympers pages, I felt myself naturally impelled to take down a well-thumbed volume, which, either from its intrinsic merits or from the associations which it awakens, is a highly-valued member of my library. I thought that I would compare the good old 'Peaks and Passes,' published in 1859, with this latest in the

* *Scrambles amongst the Alps.* By E. Whympers. London: 1871. John Murray. We have been kindly favoured by Mr. Whympers with advance sheets of his book, which will appear in May.



GLISSADING.



"BUT WHAT IS THIS?"



THE GRAND PELVOUX DE VAL LOUISE.



THE WRONG WAY TO USE A ROPE.

long line of its successors. That volume, as all who then loved Alpine walking can well remember, was a brilliant success; and if it gave much occasion for scoffing to the outside world, it was also the means of bringing many proselytes into the true fold. More than one energetic member of these later years may date his first perception of the merits of Alpine adventure to his perusal of its thrilling pages. And now, let any of my readers open his copy, and after placing it by Mr. Whymper's, reflect upon the change which has taken place within twelve years. How very commonplace sound the adventures which then excited so much interest! How we used to exult over scrambles which are reckoned easy work for a beginner in his first season! And how energetically we proclaimed to the outside world the discovery of a new pleasure which has since become rather a threadbare topic of discussion! Yet in many ways that volume, though some rash young members of our fraternity may despise it, was perhaps superior to any of its successors. It had some genuine literary merit, owing to the unaffected spirit of enjoyment which it everywhere displayed; and if the exultation over rather easy victories strikes us as a little extravagant, it is nevertheless true, as shall presently be said, that the early explorers required and exhibited at least as much courage as has fallen to the lot of most of their followers.

In one respect, however, the comparison is unequivocally and conspicuously in favour of Mr. Whymper. Look at the poor old chromolithographs which then professed to represent the mountains, and compare them with Mr. Whymper's admirable woodcuts. The difference is really remarkable. Though some of these old illustrations, copied from photographs, suggest the general outlines with tolerable fidelity, most of them utterly fail to represent a mountain at all to an educated eye. If a comparison must be made, put the queer little white hummock which stands for the Combin in the old 'Peaks and Passes' beside any of Mr. Whymper's drawings—the Mont Pelvoux, for example, or the Matterhorn from the summit of the Théodule Pass—and it will be readily admitted, especially by members of the Alpine Club, that if the Alpine Club has done nothing else, it has taught us for the first time really to see the mountains. In fact, however, serious comparison is impossible. The old daubs are mere random indications of certain obtrusive features, which could not well be overlooked. Mr. Whymper's woodcuts seem to bring the genuine Alps before us in all their marvellous beauty and variety of architecture. Not a line is thrown away, or put in at random; and we could almost lay down the correct line of assault of one of the peaks represented, without need of looking at the originals. Still more striking is the force with which particular incidents are brought before us. Look, for example, at Mr. Whymper's fall on the Matterhorn, at the descent of the arête of the Écrins, at the spring over the bergschrund on the Col de la Pilatte, at the passage of another bergschrund on the Dent Blanche, or at the picture which Mr. Whymper has allowed us to extract of the cannonade on the Matterhorn. Setting aside the purely artistic merits of the drawing, every Alpine traveller will have memories stirred within him at each of these and at many other cuts, and will be ready at once to exclaim, 'That is the very thing!' No one who was not thoroughly

familiar with the scenery could have produced such life-like sketches, and it is to be feared that few people will quite appreciate them who have not gone through a similar experience. Even unfortunate outsiders, indeed, may recognise the spirit of the drawing, though it is only too probable—such is the ignorance of the world at large—that they will imagine that there is some exaggeration. To our readers it will be unnecessary to point out the strict fidelity of even minute details. No photograph can possibly recall the dramatic scenes which the traveller delights to remember; and it is delightful to be carried back by so skilful a hand to all the varieties of séracs, crevasses, and knife-edges of rock. If these scenes are fully enjoyable only by the expert, everybody may admire such views as the 'Fogbow seen from the Matterhorn,' or the thunderstorm amongst the crags of the same mountain. They prove conclusively that Mr. Whymper has a full appreciation of the beauty, as well as of the bare facts, of the scenery to which we are introduced. In short, the value of the book, considered simply from an artistic point of view, is incontestable. No illustrations that I know of Alpine travel will at all bear comparison with Mr. Whymper's, when we once ascend above the snow-line. The accuracy and extent of his knowledge of rock and snow forms is surprising. The previous numbers of this Journal bear sufficient testimony to his skill, and it is only necessary to say that the present book surpasses everything that he has hitherto done.

I pass, however, the matters on which there may perhaps be more difference of opinion. The change from the narratives of the old 'Peaks and Passes' to those of Mr. Whymper is at least as remarkable as the change in the mode of illustration. The art of mountaineering has, as it is evident, been revolutionised. It is the difference between the mail-coach and the railway, or between Brown Bess and the Martini-Henry. How far that is altogether a matter for congratulation is a different question, and one too large for present discussion. Some of us find it rather melancholy to look back upon the good old days when a mountain was a mountain still, and a man made his will before going up Mont Blanc—a ceremony, by the way, which is hardly superfluous at the present day under some circumstances. Accepting the change, however, as a matter of fact, there is no doubt that Mr. Whymper is a very good—and in some important respects the best—representative of the modern school. The great difference is not that the more recent performers are braver, nor, except in certain minor points, more skilful than their predecessors. The difference is chiefly that their imaginations have become familiarised with the mountains. The prestige has disappeared, and no particular courage is required to take liberties in which the boldest formerly dared not indulge. Now, it is Mr. Whymper's special merit that he is the most conspicuous example, as his feats were amongst the chief causes, of this difference. He tells us that the great reason for the many failures in attacking the Matterhorn was simply that the best guides had no heart for it. Nothing can be truer, and the same remark may be extended to nearly all amateurs. In fact, the Matterhorn alone retained for many years that influence over the *morale* of travellers which had, in the older



A CANNONADE ON THE MATTERHORN.

period, belonged to all the higher peaks. To look at those tremendous cliffs was enough to make the most determined lose their heads. Now, whilst other members of the Club were proof against this influence on the part of all the other peaks, Mr. Whymper, almost alone, was proof against the influence of the Matterhorn. The school which succeeded the first publication of 'Peaks and Passes' shook off all superstitions as to the peaks of the Oberland, Mont Blanc, or Dauphiné; but they had still one weak spot in their minds. To Mr. Whymper belongs the credit of having had no weak spot at all; and there are only two or three others, especially Professor Tyndall, of whom a similar remark can be made with any plausibility; whilst even of that few, none were quite equal to Mr. Whymper. Amateurs might be mentioned who are probably quite equal to Mr. Whymper in skill, endurance, and speed; but he deserves the special credit of having carried to the highest point that spirit which, in an inferior degree, distinguished all the mountaineers of the later epoch from their predecessors. And for that reason, I at least am ready to give my vote to Mr. Whymper as occupying the same position in the mountaineering world as a Robespierre in the French Revolution. He was clearly the most advanced, and would, but for one melancholy circumstance, have been the most triumphant of us all.

Everybody who reads his book will find traces of this determination in every chapter. It is impossible for a true member of the Club not to admire the unflinching spirit in which he sets about his task. He plans his campaigns carefully before going to the Alps; he takes out all conceivable apparatus; he lays himself out for success without permitting himself a distraction, and he succeeds accordingly. His career in 1865, up to its most disastrous end, was by far the most brilliant ever carried out in the Alps; and we, who remained behind and heard the reports of his successive triumphs, can well remember the admiration, not unmingled with jealousy, with which we received them. He would leave us, we thought, nothing to conquer, and perhaps we weakly attributed his good fortune to accident. That accident, in the shape of favourable weather, had something to do with it is undeniable; but it will be plain to all his readers that he had at least qualified himself to take the fullest advantage of accident. Nor can one pass by without a similar feeling the records of his various assaults upon the Matterhorn; how he showed the way to victory by planting his tent on those terrible cliffs; how he climbed alone to a height greater than had been previously attained, and how, coming back, he had the narrowest escape from sudden death that has ever fallen to the lot of any climber; how he started again within a week, and was only beaten back by unfavourable weather; how the failure of Professor Tyndall, after reaching the base of the final peak, did not discourage him; and how, in short, he came up smiling after every round with a courage which would excite the warmest praise in any other enterprise. The story is told quietly and methodically enough; but anybody who reads it with a due appreciation of the difficulties encountered and the effect of such difficulties upon ordinary minds, will agree that Mr. Whymper is really the best example that can be quoted of the qualities which

are sometimes too easily claimed on the strength of exploits requiring inferior endowments of courage and perseverance.

The interest of the story to genuine mountaineers will atone for any absence of good set eloquence as to views and panoramas, if, indeed, that were not more than compensated by the excellence of the illustrations; but there is one other question which will occur to everybody and which cannot be overlooked even in this Journal. It may be assumed that all members of the Club have made up their minds as to the degree of risk which may be justifiably encountered in such expeditions; but Mr. Whymper's narrative brings forward some points so distinctly that I must venture to dwell for a few moments upon a well-worn topic. Mr. Whymper distinguishes between 'positive' and 'negative' dangers—the first being those which cannot, the second those which can, be avoided by a little discretion. He argues that the first are really trifling, and that consequently the Alps may be trodden with sufficient safety by all who are duly qualified to use discretion. Agreeing with him in a general way, I must nevertheless remark that any outsider who reads these pages will have certain uncomfortable doubts suggested to him. He will find that a first-rate amateur, generally accompanied by first-rate guides, was constantly incurring really serious dangers. What is the inference? That Mr. Whymper is mistaken in his estimate of the unavoidable dangers, or that Mr. Whymper was not so prudent as he ought to have been? Let us look for a moment at some of the cases mentioned.

Mr. Whymper, as we have just noticed, had a fall of 200 ft. in descending the Matterhorn, which, but for a lucky accident, would have been only the preface to a fall of 800 ft., and, it need hardly be added, a broken neck. This story, by the way, immediately follows the discussion on danger just noticed. On another occasion, Kronig, a fair guide, had a similarly narrow escape on the same mountain. Presently, as Mr. Whymper is walking once more in the same agreeable neighbourhood, he is treated to the cannonade portrayed in our Frontispiece. Again, on the Écrins, he climbs some rocks coated with ice, where, he says, a slip (apparently of any one of the party) must, 'beyond doubt,' have been 'fatal to every one,' and where 'nothing was easier than to make one.' Directly afterwards Almer—one of the very best of guides—only owes his escape from sudden death to stepping off with his left foot instead of his right; and in the descent, he is apparently saved by another accident in following the only available route of descent. On the Aiguille d'Argentière, we are told that the security of the whole party depended on the strength of a thin vault of ice, which might have given way at any moment. In crossing the Moming Pass, the party foolishly cut along an ice-slope under a threatening mass of séracs, which, in fact, comes down upon their pathway just after they have reached a place of safety. Of this performance, Mr. Whymper says 'it was a monstrous folly. It was foolhardiness. A retreat ought to have been sounded.' On the Dent Blanche, if there was no such risk as this, there was at least a very serious risk of frost-bites; and, so far as appears, the party were not far from being benighted, in which case they would in all probability have been frozen to death.

Here, then, is a list of some half-dozen occasions on each of which a fatal accident might easily have occurred, and in one or two of which to escape was really rather improbable than otherwise. I shall say nothing of the lamentable case in which such an accident naturally did occur. Now, if anybody asked Mr. Whymper how he was justified in running such risks, his answer would apparently be, 'I was not justified—I was careless and foolhardy.' And, in fact, it may be said, that in each of these cases, with the exception of the *Écrins*, a little care and foresight would have evaded the danger. But then we have only removed the difficulty one step further, because it at once becomes obvious that an experienced amateur, with excellent guides, is unable to resist the temptations to which he is exposed. The real difficulty is, in fact, that when success may be gained at a critical moment by running a certain risk, it requires very great moral courage to retreat. Probably there are few good mountaineers who have not at times been guilty of actions which, in their cooler moments, they would unhesitatingly condemn. A short cut offers itself under an ice-fall; or it is very tempting to climb some difficult place without a rope which has been accidentally left behind, and at the time it seems cowardly to fall back. Considering how often such temptations overpower the most virtuous, it is perhaps rather curious that so few accidents have happened to experienced mountaineers. The excellent climber who fell on the *Schreckhorn* lost his life apparently because he did not like to be bothered by a rope; and perhaps the accident on the *Haut de Cry* and that from avalanches on *Mont Blanc* may be considered as of this character. But we can hardly hope for impunity if such risks are often run. I could quote an instance of a party of excellent mountaineers exposing themselves thoroughly for some hours to the danger of an ice-avalanche, which must have been fatal, merely to cross a well-known pass. When Mr. Whymper made most of his expeditions, the imprudence might be venial, and will at least be pardoned by those Alpine travellers who know the excitement of making a new ascent. Now that that source of interest has disappeared, it is to be hoped that all who have influence in the matter will use it in favour of caution. There is perhaps some pleasure in being killed in trying to do what has never been done before; but there is no pleasure in being killed in simply following other people's footsteps. It is high time for sacrificing a little of our enthusiasm to common sense, and for doing our best to encourage the growth of a healthy public spirit in regard to such matters.

And here, perhaps, I might leave off by simply commending Mr. Whymper's performance to all readers of this Journal. It seems, however, unpleasant to take leave of his work in something of a controversial spirit, and the more so because we all know to what kind of criticism Mr. Whymper is certain to be exposed. All the old battery of epithets is still ready to be discharged at him. The mad passion for running risks, which can only be justified by scientific purposes; the irreverence of using the mountains in the character of 'greased poles'; the wickedness of making a joke about them, and the impertinence of expecting the public to be interested in details of eating and drinking—all these and other conventional subjects of denunciation

will fill the pages of indignant reviews. Indeed, we must admit that Mr. Whymper has provided rather strong meat for the ordinary digestion. These pictures of travellers flying through mid-air across crevasses of boundless depth, exposed to a relentless fire of stones, or camping comfortably on the edge of ghastly precipices, are calculated to try the nerves of the placid gentlemen who lay down canons of criticism in the quiet of a London street. Under their assaults, Mr. Whymper may find consolation in more than one reflection. In the first place, the Alpine Club has hitherto thriven, and, we may hope, will long continue to thrive, on attacks of this character. No puff of a sensation novel is so good as a scathing denunciation of its immorality, and no advertisement of Alpine adventure is so attractive as a clear demonstration that it is totally unjustifiable. And, secondly, the true believer will be edified in proportion to the furious raging of the heretics. Those who have lived through the period which is just now closing—the period, that is, in which inaccessibility has been finally abolished—will probably admit, on reflection, that Mr. Whymper's book contains the most genuine utterance of the spirit in which the victory has been won, as well as the authentic record of some of the most stirring incidents in the final contest between man and the mountains. Other writers have tried to give a scientific, or a poetical, or a humorous turn to their narratives. There is just enough of those various elements of interest in Mr. Whymper's narrative to show that he is capable of enjoying the mountains from those points of view also. Nobody, for example, can read him fairly, and fail to admit—though I have no doubt that many will criticise him, and loudly deny—that he has a true eye for mountain beauty. But the real pith of Mr. Whymper's book consists, to my mind at least, in this—that it is the congenial record of the most determined, the most systematic, and, on the whole, the best planned series of assaults that were made upon the High Alps during the period of which he speaks. All who have shared in some degree in that spirit will be carried back to those pleasant memories which are perhaps the greatest rewards of mountain adventure. The grand excitement of ascending an untrodden peak—never again to be known by our successors; the close associations with the really noble guides of Chamouni and the Oberland; the still pleasanter associations with friends which, as Mr. Whymper puts it, 'regele'—or as one would rather say, thrive with amazing facility—in the Alpine atmosphere; solitary rambles, convivial meetings, fine weather enjoyed to the utmost, and bad weather endured by the help of Stoicism and tobacco—these and innumerable other pleasures of the old scrambling days revive within us as we read; and we rejoice that so able a historian has fixed the disappearing type in a book which will of necessity be consulted by all future travellers who wish to understand the history of the subject. And finally, it is necessary to repeat explicitly that this criticism has of necessity failed to do justice to that which is certainly to the outside world, and perhaps even to Alpine travellers, the most enduring merit of the book, namely, the admirable quality of the illustrations.

L. STEPHEN.



"HE PROBABLY OWED HIS LIFE TO HIS COOLNESS."

THE
ALPINE JOURNAL.

NOVEMBER 1871.

ON MOUNTAINS, AND ON MOUNTAINEERING IN GENERAL.
By Count HENRY RUSSELL. Read before the Alpine Club, May 1871.

CONSIDERING how little I know of the Alps, where so many members of the Alpine Club have toiled for years, and won immortal fame, throwing the feats of Léotard himself into the shade, it is with great hesitation and diffidence that I have been prevailed upon by some kind friends to come forward to-day, and say something of my own experience in different parts of the world, but more especially among the Pyrenees, where probably twenty summers of my life have been—not usefully, perhaps, but actively—spent in explorations of snow and rocks. Mont Blanc is, I fear, the highest peak I have ever climbed. I never tumbled down a precipice nor disappeared under an avalanche—never analysed or discovered a plant; and the sole accident I might speak of was being lost, without food or companion, for three terrible days on the New Zealand Alps. But most of you, I hope and believe, will acknowledge that in order to say something interesting or new about peaks, enthusiasm and the habit of observing are often sufficient. We need not know the age of mountains, their weight, and the names of their plants or fossils, nor have broken any of our limbs on them, to speak of their beauties or their perils; and it is not in the Alpine Club I need fear to be contradicted, if I say boldly that there is no passion more innocent, more indisputable and more manly, than that of scaling peaks, even if science gains nothing by it, for in legitimate pleasures there is always wisdom; and, no ladies being present, I will not scruple to add, that of human passions those connected with peaks are often the strongest, although they last so long.

VOL. V.—NO. XXXIV.

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After these preliminaries, let me first say a word about the Pyrenees, which none of you seem to respect, perhaps because their glacier-fields are limited and far between, or else because not one of their summits attains 12,000 feet.

But even admitting what cannot be denied, that mere elevation has much to do with the attractiveness and the prestige of mountains, who can fix the height at which a peak is worthy of respect, and deserves to be called fascinating or perilous? I should say 10,000 feet (I mean in Europe). But if we once admit this theory, that the difficulties or majesty of mountains invariably increase with their elevation, the Alps themselves will have to be despised, for there are plains in other lands—in Thibet, for instance—where battles have been fought as high as Mont Blanc, and where its altitude becomes nothing. Must we ridicule it for that? In the appreciation of mountains, height therefore is not everything; for, after all, the most formidable and inaccessible aiguilles in the world are the spires of cathedrals, if climbed from outside, although not one of them is 500 feet, and they have no glaciers.

As for dangers, indeed the Pyrenees have theirs—plenty of them. Let any one who doubts it climb the frightful arêtes of the Balaïtous, or the couloirs of its precipices, with the huge crevasses of its eastern glacier yawning below. Perhaps, if you fell there, the impetus would carry you over any crevasse. No rocks could be climbed more difficult than those of the Balaïtous, only 10,318 feet above the sea. Indeed, speaking of rocks, perhaps I may venture to say that a Pyrenæan chasseur, though timid on ice, would astound any mountaineer the moment rocks are in question. He is marvellous there: no quadruped could follow him. And the reason is plain; for although some glaciers in the Pyrenees are eight miles in length, and the Vignemale Glacier has crevasses, séracs, and ice-pinnacles as enormous and blue as any in Europe, still the natural element of a mountaineer, in those hot climates, is mostly rock. There is step-cutting too, and some summits could not be reached without an axe; but, alas! they are so little known, that not one man visits them in ten years—some of the most snowy regions in the chains of Luchon have not even a name! So deserted, so misrepresented, and so ignored are those grand and sunny Pyrenees, which in some things surpass the Alps—in their tints, for instance, the purity of their waters, the loveliness of their skies, and their magnificent contrasts of torrid blue with snowy cones as white as the poles. Perhaps no one could ever paint or describe the calm and peculiar beauty of an autumn sunset on those Pyrenæan ranges. Certainly not I;

for, except on the plains of Bengal, where, face to face with the Sikhim Himalayas, and already surrounded by night, you can still see hundreds of snowy peaks, reddened with unearthly colours and shooting up six miles through the gloom and vacuum—except in those miraculous countries, with their oceans of snow and their forests as black as midnight, where you are so tempted to fall upon your knees and think you can never admire a mountain again—except in those enchanted lands, never have I seen any sunsets so tropical, and so impossible to describe, as those of a Pyrenæan autumn. No, not even in the Andes, of which Mr. Hall has spoken so truly, when he told you they were so bare and so monotonous; indeed, they seem, at a distance, to have no definite snow-line at all. And there are peaks in Bolivia, 22,000 feet high, and even more, where not a particle of snow remains to prove their height, after rainless or long summers.

Still, the Andes will, let us hope, be soon explored; and the Chimborazo, especially—the most famous, though not the loftiest of peaks—must and will be assaulted and conquered. I was not near enough to see it; but it seems probable, from what we know about it, that the difficulties would not be great, considering all the advantages it has. In the first place, its latitude: it is under or near the Equator, consequently no snow would be found until quite near the top—probably not before 18,000 feet. Then its base is itself so high that the real ascent would thus be diminished by 9,000 feet, the starting-point being Quito, a large and flourishing town, with plenty of hotels and every reasonable comfort. The shape of the Chimborazo is, according to all accounts, also in its favour: it is an immense cone, with gentle slopes. What stopped Humboldt was an arête; but, in the present state of science, no arête ever seen ought to stop any one calling himself a mountaineer. In fact, the one—the great—difficulty would probably consist in the rarefaction of the air.

And here allow me to make a few remarks, which may not be out of place. I am afraid there is a tendency in the Alpine Club to deny or underrate danger in mountain ascents, and to maintain that imprudence alone explains all accidents. Now I beg to protest most energetically against such a fatal doctrine. Danger is, no doubt, one of the charms of mountains, and in many cases their greatest attraction. It has a mesmeric effect. An easy peak is left alone, and deserves to be so. But, that granted, it is surely one thing to face peril, and another to deny its existence. Well, there are two dangers which, in my mind, will for ever attend ascents, even by balloon, in the high

regions of air ; one of them, it is true, might be called a great inconvenience, rather than a danger—I mean the action on the lungs of air reduced to half its density ; but the other danger I feel sure no one will hesitate, on reflection, to call by its proper name—and that is, the *weather*.

I am indeed sorry to see that some of the greatest authorities in the Alpine Club have gone the length of utterly denying any such thing as the painful phenomenon known in all lands by the name of 'mountain-sickness,' or, at least, of calling it an exception, or mere fatigue and exhaustion. Very privileged lungs may rise very high, and continue to breathe quite comfortably. In the same way, some travellers are exempt from sea-sickness ; but you might as well deny one of those evils as the other ; and mountain-sickness is an infirmity known and felt all over the world (though less in the tropics)—in the Andes, and in the Altaï, in the Himalayas, where the silly natives attribute it to the exhalations of a venomous plant—in fact, everywhere. No animal is anywhere exempt from it at a certain elevation ; and as regards myself, I humbly confess that I could scarcely breathe on the top of Mont Blanc ; in fact, we were all sick, more or less, including the guides. On the Calotte, where the slopes are nothing, not one of us could walk more than thirty-four steps without a good halt. And it was not fatigue, for we all ran down in two hours to the Grands Mulets, in excellent spirits and health.

However, I am ready to grant that mere height is not exclusively the cause of this painful feeling. I believe, and others have believed before me, that snow has a great deal to do with it, for the moment you touch *terra firma* you feel relieved. Has not every one of us often observed that on glaciers the air has a metallic taste, analogous to snow-water—that it feels vitiated, as if ice and snow poisoned it in evaporating? Why is it that under the tropics, where you can walk on grass up to 18,000 feet, this nausea and sleepiness, not unlike somnambulism, are only felt at much greater heights than in Europe?

In any case, whatever the reason may be, that peculiar sickness is plainly quite beyond dispute, and man can no more live at certain altitudes than in the depths of the ocean.

Now, to the weather, if you will forgive me for alluding briefly to so many subjects. Perhaps it is because my own experience of weather has generally been a sad one, but I am bound to say that to me the weather seems not only the most formidable of all dangers connected with ascents or travel, but greater by far than all the rest put together. Let us reflect

and remember, and surely none of us will then speak lightly of polar colds in mid-summer, of furious blasts, of snow-storms and lightning. In certain winds man cannot live, especially on an arête or a glacier; and, on the other hand, given a calm and sunny day, things are greatly simplified. But on the Alps, of which the martyrology could fill a book, is it not true that bad and dangerous weather is constantly to be met with, and that it is a rule, and not an exception? Do not snow-storms, as violent as typhoons, but with Patagonian horrors of every variety, burst several times a week upon the Alps, with such fury and pertinacity that Alpine travel, in numberless cases, becomes a mere battle between the elements and man? It is the same at sea and on deserts, where the weather literally kills travellers wholesale. Indeed, if I were not selfish, I could give many a proof of the perils of snow and sand, and wind, sadly illustrated by my own travels. Even in the Pyrenees I was once thrown down by the wind, with four strong men, and we were blown away like feathers or straw. Fortunately, it was on a level snow-field. On an arête, none could have lived. And on the cold and lofty solitudes of the Desert of Gobi, the 'roof of the world,' as it is called, which I crossed in the depth of winter in going from Moscow to Peking, and where we ate brandy, with the Fahrenheit thermometer at 90° below freezing-point, I really could not say how often we were assailed, especially in returning in spring, by such storms of sand or snow that the word 'infernal' is the only one I can apply to them. And so it is on mountains—often, very often, I should even say oftener in summer than in winter. This seems a paradox, but I think it is true. And Mr. Moore has told you the same thing; but I am very glad to be able to confirm his conclusions. I believe that November and spring are by far the worst and most stormy seasons on mountains; summer is a little better, but mid-winter is, perhaps, on the whole, the best and the safest of all. Of course there are plenty of exceptions; but, as a rule, in mid-winter both snow and air appear to fall asleep; there is a lull of about two months between the angry storms of December and those of March. Then the sky is clear, spotless, and calm. And so it is in high latitudes. Never have I seen weather more cheerful and lovely, on the whole, than in Siberia in the heart of winter. On the Gobi Desert, once behind the Altai, it became very bad; but no rules apply to deserts, where caprice reigns supreme. In Siberia it seldom snows in mid-winter; the air is calm, and when, from a hot room, you look outside at the deep blue sky, the blazing sun, the peaceful wilderness,

and the smoke curling up so slowly from the roofs in vertical columns coloured by morning or evening tints, you might imagine you were in the tropics. Winter is the proper season for travelling in high latitudes, and, for my part, I have no doubt that if ever the poles are reached, it will be in winter, on the ice and in sledges—never by navigation.

Indeed, I would say the same of the Himalayas. If ever those huge peaks are climbed, I strongly suspect it will be in winter, by sleeping for weeks in bags made of rein-deer or other furs, and in snow-huts, such as the Esquimaux are used to build in a few hours. The storms of summer are quite frightful on the Himalayas.

But, strange to say, on many mountains the winter seems to be not only calm and safe, but much warmer than is supposed. On February 11, 1869, I reached the summit of the Grand Vignemale, in the Pyrenees, with two first-rate guides of Gavarnie, Henri and Hippolyte Passet. It was, I admit, extremely fatiguing, as we walked in soft snow for sixteen hours. But dangers there were none, although this peak is almost 11,000 feet. Avalanches do not fall in winter. The eastern glacier, so fearfully crevassed in July, had quite disappeared under snow-hills, undulating all over it like some monstrous waves on an ocean of milk or cream. Both heat and light became intense. The peak itself, which rises from the glacier like an island upon the sea, was free from snow, save a few specks here and there, which melted in the sun, and fell on the hot slopes with all sorts of murmurs and whispers. On the very summit (10,820 feet), my thermometer marked 50° in the shade at 3 o'clock P.M., a temperature higher than any observed on that day at Tarbes, on the plains. In fact, the two guides wanted to sleep, and suffered from the heat, which felt like summer.

As for beauty and majesty, nothing ever surpassed or equalled them in the finest days of July.

Winter ascents appear to me to be especially a question of fatigue, the snow being generally softer than might be expected.

Now, before ending this very long paper, my friend Packe tells me I ought to say something of my last summer's encounter with the brigands in Aragon. But I hope the Pyrenees will not suffer from it, as such an accident never happened before in any part of them, and they are just as safe at Regent Street, by night or by day.

It was in July, after the hottest days I have ever experienced in Europe, and a little after midnight. We were four:

M. Lequentre,—a Parisian gentleman of almost unlimited mountaineering powers—myself, and two young guides of Gavarnie, Henri and Célestin Passet. As the night before we had bivouacked, rather than slept, on the top of the Coticilla, at about 10,000 feet, and without fire or shelter, we were very tired; so after midnight, after admiring for hours the exquisite grandeur of the whole scenery, the lofty old pines which stood in thousands all round us, and the full moon which sent streams of silver on the glaciers of Mont-Perdu in the distance, M. Lequentre and myself went to sleep in an empty cabane on the edge of the lawn, where, most fortunately for us, the two guides remained outside, near the fire. We had not slept for half an hour, when I was seized convulsively by Célestin, who, in an agony of most excusable terror, told me to go out at once and look, as four hideous Spaniards were just before the door, armed to the teeth, with glittering daggers round their waists, an axe and a rifle. Let it be remembered that none of us was armed. I went out, looking, but not feeling, very composed, and shall never forget what I saw. There were four men standing like statues on the other side of the fire, one behind another, and at not more than about a dozen yards from the cabane. They did indeed look like four wild beasts, ready to spring forward; or like four demons, as the red flames of the fire threw strange and angry glares upon their bronzed faces. We stood with our backs to the cabane, and resistance or threats being plainly useless, I simply asked them why they were so armed; I told them they had nothing to fear from us, that we were honest men, and that I promised to pay for the cabane if it was theirs. I also offered them wine and provisions. . . . At that moment, that is, after a few seconds, the one in front levelled his gun at us most deliberately, and, aiming well, he fired. I think his hand shook; for the bullet, grazing the right ear of my friend Lequentre, struck with a hiss the wall of the cabane.

I need not tell you that, as we were not there to fight for honour or country, and we had no weapons but alpenstocks, we ran away, and all vanished in one second, I however, saving my knapsack, but leaving behind my boots, sleeping bag, alpenstock, etc. etc. Shooting across the lawn, which was about 300 yards long, with the full moon upon my back, I most luckily managed to reach the woods before the savages had reloaded their gun, and there I went on, running madly down, upon loose stones, and slopes almost impossible, until at length my lungs gave way, and I had to stretch myself under a dark pine, then under another, and so on, until I

chose one, and rested there. Then it was I began to shudder, as I thought of my three companions, not knowing in the least what direction they had taken, and having no doubt that they were all either murdered, or lost without hope in those immense pine-forests and solitudes, where none of them had ever been before. No words could possibly express my anguish and agonies during that terrible night. But it became worse still, when, a little later, I heard the brigands, now more numerous, approaching me on all sides with hideous yells. Thinking the last moment had come, like eleven years ago on the New Zealand peaks, I recommended my soul to God. But the shadow of my pine, and Providence especially, saved me. Not one of the brigands saw me; and the moment daylight came, hearing nothing, I most cautiously crept down to the little village of Plan, four miles below, where, awaking almost everyone, I at once despatched to the fatal forest the strongest man I could get, being myself barely able to stand, after such emotions and two consecutive nights without sleep. At length, after two long and cruel hours, I saw my three unhappy companions emerge from the forest, silent and ghastly, but, thank God! alive. Célestin had escaped through the pines, and was not touched. But not so with Lequentre. Caught on the lawn, and knocked down by seven bandits, with three huge blades upon his breast, and the muzzle of the gun on his face, he probably owed his life to his coolness, but lost his purse, his rings, his watch, etc.—in all 18*l*. Henri Passet, his guide, seized, as he came down too soon from the branches of a pine, had to bow his neck under the axe, and felt the edge of it for several minutes at the root of his hair. But they did not kill him either, and Lequentre, once sure of his life, and utterly overpowered by fatigue, not only smoked, but fell asleep whilst they were still there! They were even civil enough to give him back one of his shirts!

Nevertheless, my escape had made them so furious, that, in a fit of exasperation, they bombarded the poor cabane with an artillery of stones, hoping I might still be hidden under the roof, of which the beams soon broke down with a great crash. Daylight having come, they disappeared at length, yelling like demons and cannibals; and, I fear, not half of them have yet been arrested. Justice in Spain is as slow as railways.

Excuse these long and personal details. If they interest you, I sincerely hope they will deter no one from visiting the Pyrenees, where crimes are almost unheard of, and where Nature itself is not more pure and innocent than man.

THE DOLOMITES OF VAL RENDENA.

SINCE I was first attracted thither in 1864 by the praises of Mr. Ball, I have twice had the good fortune to revisit the neighbourhood of Pinzolo. Each time it has been for a few days only, in the course of extended Alpine tours. Yet I have invariably found on my return home, when time has given the right perspective to the scenes of the past summer, that the brightest among the store of bright day-dreams which such journeys leave behind them, have been those of the country enfolded between the cliffs of the Presanella and the Brenta Alta.

Our first glimpse this summer of the mountains of Val Rendena was from the Col at the foot of the Pizzo della Mare. As our heads rose above the ridge of pure snow which had hitherto formed our horizon, and we walked up against the hard blue sky, a well-known pinnacle shot up before us, and out of the great sea of cotton-wool cloud, spread over the Italian hills and valleys, rose the shining cliffs of the Presanella. Further from us the serrated outline of the Dolomites cut sharply against the clear upper heaven. Familiarity can never render commonplace this marvellous range. Seen from the Orteler group, it is a gigantic wall, crowned by square towers, and riven in places to its base by mighty clefts. The breaches, despite their depth, are cut so narrow and so clean, that one fancies the elements must have borrowed some magic power with which to work such fantastic ruin.

It was partly the intention of scaling the Cima Tosa, one of the loftiest towers of the Dolomites, which was taking us for the third time to Pinzolo; so the mountaineers amongst us pulled out opera-glasses, and began at once to dissect the peak; decide this couloir was snow and available, that rib of rock broken and useless—in short, to converse in that Alpine jargon which marks the race considered by Mr. Ruskin capable of treating the Alps only as greased poles.

On the morning of the following day we found ourselves at a tolerably early hour at the little village of Dimaro, a cluster of prosperous-looking farmhouses standing some distance off the high road, amongst quiet meadows, fields of tall maize, and walnut-trees. Here the mule-path over the Ginevrie Pass leaves Val di Sole, and we had to abandon our car and look for a quadruped of some sort to help us over the hill. The only available mule had just come in from a hard morning's work, drawing down granite boulders to embank the bed of

the torrent, and required some rest; its master also demurred on his own account to starting in the heat of the day. These hindrances, joined to the probable length of the journey, and the unanimous voices raised in favour of the Hospice of Campiglio, made us reconsider our previous plan of pushing on to Pinzolo, and agree to trust to the hospitality of the 'ricco signor,' who had always meat in his house, and whose best room was as beautiful as any at Cles, or even Trento.

The inn at Dimaro is a very clean-looking little house, evidently owned by tidy people. Some of us spent the mid-day hours in a siesta in a cool bedroom, with a row of bright flower-pots across the window, through which there came in to us glimpses of an atmosphere quivering with light, mingled with fresh sounds of rustling branches and running waters. The sunshine of the mountains is always full of life and freshness; it is only down in the stagnant plains that the mid-day heat burns like a dull furnace, drying up the energies alike of plants and men.

Meanwhile the agriculturist of the party found interest in watching the threshing in the barn below, where a dozen peasants—men, women, and girls—disposed in a circle, were wielding their short flails with incessant industry. At length the mule was rested. Its master did not at first seem likely to prove a pleasant addition to our number, for he declined to help the guides by carrying a knapsack, resented strongly the suggestion that he should go to his animal's head, and discoursed gloomily on the difficulties and fatigues of the road. This strange conduct on the part of a Tyrolese peasant was accounted for by our companion's informing us he had spent a year in Paris.

A mile of dusty cartroad leads to a bridge at the foot of the wooded rock, which juts out from the dolomite range, and blocks up the lower part of Val Selva. Steep zigzags carried us up through a picturesque tangle of trees and crags to where the road turns the northern corner of the huge promontory. A fair landscape of the romantic school now opened suddenly before our eyes. In front, and slightly beneath us, lay a wide green basin, through which the stream wandered peacefully towards our feet. Above its further end rose a sheer cliff, limestone or dolomite, fringed with dark pines. Beyond this valley-gate the eye wandered into the quivering Italian sky, imagining, if it did not see, further distances, and a limitless extent of waving hills and wooded plains. On our right, the ground rose in wave above wave of forest, in the recesses of which, the right track once lost, one might wander for hours

without seeing any snowy landmark by which to steer a course. The path traverses the stream, and then mounts gently along the north side of the valley, through glades where wild strawberries and bilberries flourish in rare profusion. After the foot of the cliff has been passed, higher mountains tower on the south, and glimpses of the strange red pinnacles and white waterless gullies of the Sasso Rosso are caught from time to time through the floating vapours that wreath them. A boundary-stone marks the limit of the districts of Cles and Tione. As yet there is no sign of a watershed. In fact, there appears no reason why we need come to one at all. The ground rises sufficiently to hinder our seeing for any distance in advance, but still so gently that it might go on rising almost for ever. Deep boggy holes, which we cross on causeways of decaying logs, while the ingenious mule picks his own way through the mud, interrupt the path. These are the difficulties of which our Parisian warned us. Meantime the southern range retreats further from us, and a stream flows out from a broad valley at its base. At last the hill-side sensibly steepens, and the forest grows less thickly. We overtop the brow of the ascent, and find ourselves on the edge of a vast undulating pasture. Barns and stables, too large to be called *châlets*, are sprinkled here and there. Frequent fences and gates suggest an English homestead. Sleek cows repose contentedly on the grass, careless young heifers quarrel and make it up again, while a couple of fussy donkeys raise a bray of welcome and gallop up to greet their half-brother in our train.

The highest point of the plateau of the Ginevrie Alp is our pass; from it the path dips suddenly into a waterless dell. A few paces further brought us to the verge of the short steep descent, whence we looked down on the meadows of Val Nambino and the tower of La Madonna di Campiglio. The path makes a circuit to reach it, and we preferred a short cut, despite the warning of a priest, who shouted after us that it was *'piu pericoloso.'*

The pilgrimage church and hospice of Campiglio are situated far from any village in the middle of hayfields, immediately surrounded by mountains too low to reach the snow-level. The buildings are ranged in the form of a quadrangle, of which the church occupies one side, and the inn the remaining three. The long convent-like passages lead to a number of bedrooms, one of which has been most comfortably furnished with walnut-wood beds and other luxuries unusual in the mountains. The fare is rough, but good, and we found

the milk and butter particularly delicious. The cows here ought to lead a happy life. The present owner of the inn (absent at the time of our visit at the Baths of Rabbi) is also a large farmer, and has built for his animals the most magnificent stable that any Alpine herd can boast of. An entrance, supported by wooden pillars, leads into a sort of hall of columns; down the centre runs a spacious and scrupulously clean passage, on either side of which seventy cows are ranged before their mangers.

Before we went to bed it was decided that Tucker and I should set off next morning with Henri Devouassoud in search of a route up the still maiden Cima Tosa. Owing to various delays, it was past five when we started. Our ideas as to the direction to be at first taken were rather crude, and had been rendered more so by the assurances of a German traveller we met overnight that there was no valley between the Val Brenta and Monte Spinale.

Close to a second inn—said also to offer fair accommodation—the road to Pinzolo crosses to the right side of the valley. We left it for a terrace-path skirting the lower slopes of Monte Spinale. As we gradually turned the most projecting spur of the mountain, the lower portion of Val Nambino opened beneath us. The morning mists were rapidly dispersing under the warm influence of the sun. High up in air, severed from the solid earth by a grey belt of yet undissolved mist, the great snow-plains of the Adamello shone in a golden glory, such as that in which Mont Blanc veils himself when seen from a hundred miles' distance. Thin vapours still clung round the dolomites of the Bocca di Brenta, making their strange forms appear still more fantastic. Thus far our path had been gradually descending. Now a valley opened exactly where we looked for it, at the south-eastern base of Monte Spinale. A timber-slide, which, if in good repair, forms the most luxurious of mountain-paths, avoiding all inequalities of ground, bridging chasms, and mounting by an almost uniform gradient, led us up the glen, which seems to be known as the Val Asinella. Through breaks in the forest the glacier-crowned crags of the Cima Tosa were now seen for the first time, followed on the north by an array of slender obélisques, beaks, and crooked horns, the strangeness of which would, but for a long experience in dolomite vagaries, have made us doubt our eyes. In the foreground a romantic waterfall, framed amongst woods of birch, beech, ash, and pine, dashed over the rocks. We could not but feel the contrast between such mountain scenery, where Nature seems to revel in the indul-

gence of her most poetical mood, and the dull formality of much we had lately been living amongst in eastern Switzerland. To me, the upper Engadine, with its long perspective of brown barren mountains, leading to an ignoble termination, suggests irresistibly the last Haussman boulevard. Yet, while the choicest spots of the Italian Tyrol remain deserted, fashion crowds the bleak shores of St. Moritz, and finds a charm in the swamps of Samaden.

Until they abandon the tourist-throng, English artists will continue to return home vowing Switzerland a crude mass of pine-trees and snow—colourless and unpaintable. They must accustom themselves either to climb, like Mr. Walton, amongst the clouds and glaciers, or to wander deeper into the southern recesses of the Alps. There they will find the Italian atmosphere they profess to love joined to the mountain grandeur they have, most of them, yet to learn to paint. We longed even for a photographer to preserve for us some recollection of the mere forms of the forest foregrounds and wild rockshapes which at every turn called forth our admiration.

On a knoll above the waterfall stands a group of *châlets*. We were attacked in passing them by a gigantic dog, armed with a collar bristling with iron spikes. But for our ice-axes our expedition might have been brought to an untimely end. As it was, we stole a flank march on the foe, while Henri occupied his attention with a blow on the nose which indisposed him to follow up our retreat. The timber slide we had lately followed comes down from the furthest corner of the recess at the back of Monte Spinale, whence an easy pass leads into the Val Teresenga, a lateral glen of Val di Sole, parallel to Val Selva. From its head it must be possible to reach Molveno through the Val delle Seghe, passing under the cliffs of the Cima Tosa. I cannot imagine a walk more likely to repay an explorer who enjoys novelty without difficulty.

Under the *châlets* a bridge crosses the stream, and a path mounts steeply the opposite hillside. We, by keeping too long beside the water, missed the track. While forcing our way back to it over the slowly decaying trunks, and amongst the rich ferns and weeds, we were tempted for a moment to fancy ourselves once more in the Caucasus. Alas! the wood-cutter's axe is already busy on these slopes, and they will not long retain their robes of primeval forest.

The path regained, a well-marked zigzag led us to the broad crest of the ridge dividing Val Brenta from Val Asinella. There is, probably, no spot in the neighbourhood—not even excepting Monte Spinale—which commands so general, and at

the same time so picturesque, a view. On three sides the ground falls rapidly towards Val Nambino and its tributary glens. Full in front of us stood the defiant tower of the Brenta Alta (or Cima di Nodis, as some people now prefer to call it), with the two Boccas on either side of it. We could trace every step of our ascent to the Bocca dei Camuzzi, an expedition in some respects even more singular than the Bocca di Brenta, and one which will in time become well known to travellers. Beyond the valley rose the comparatively tame forms of the granite range. Nearest to us was my old conquest, the Presanella, the highest summit of the whole country; further south, the upper névés of the Laris and Bedole glaciers, spread in a great white curtain between the Carè Alto and Adamello. Behind Monte Spinale the circle of mountains was completed by the Dolomites of Val Selva.

Our path forked on the crest, one branch descending to a chalet perched on a shelf immediately overlooking the green plain at the head of Val Brenta. From this alp a footpath of some kind leads down to the track of the Bocca—a fact to be borne in mind by future travellers who wish to see in a day as much as possible of the scenery of the Dolomites, without crossing the pass to Molveno. We followed an upper track, skirting the southern base of a group of rocky pinnacles, on the highest of which stands a withered pine stem, perhaps planted there by some agile shepherd. Before long the path came to an end in a rocky hollow immediately at the base of the precipices of the Cima Tosa, the appearance of which, had we not learnt from afar something of their secrets, would have been sufficiently forbidding. Over the gap by which we were about to recross into the head of Val Asinella shot up an astonishing dolomite, a facsimile of a Rhine castle, with a tall slender turret, perhaps 300 feet high, at one corner. Once across the ridge, the climber turns his back on all green things, and enters on a stony desert. He is within range of the mountain batteries, and in a fair position to judge of the havoc caused when frost and heat are the gunners. Overhead tower sheer bastions of red rock; the ground at their base is strewn with fragments varying in size from a suburban villa to a lady's travelling-box. A dripping crag, with a scanty patch of turf beside it, offered all that was wanted for a halting-place. We were now overlooking the lower portion of the deep trench, filled higher up by glacier, which divides the Cima Tosa from the rockpeaks to its north. Through it a pass, a worthy rival of the Bocca di Brenta, will be some day discovered to the Val delle Seghe.

A short distance above us was the glacier-covered breach, by which we felt confident the fortress might be won. To reach the level of the ice we climbed under the base of an almost overhanging cliff, and then across a boulder-strewn shelf. Mounting the sides of the glacier by a ladder of steps kicked in the snow which still covered them, we quickly reached and left below precipices and pinnacles which a short time before had looked hopelessly near the sky. At the top of the steep ascent lies a miniature snow-plateau, surrounded by steep broken crags. From its further end a sort of funnel, perhaps scaleable at an emergency, fell through the cliffs overhanging the Bocca di Brenta.

The summits of the Cima Tosa lie at some distance to the left, and it seems possible there may yet be difficulties in store for us. The steep faces of rock fronting the south offer good hold for feet and hands, and discarding the rope we take each of us his own path. In a quarter of an hour we come to a broader part of the mountain, and surmount in succession two snowy cupolas. The second looks like the summit, but on reaching it we see a still higher crest beyond. Between us and it is a gap, on the north side of which lies a glacier, which soon curls steeply over and falls upon the larger icestream at the base of the mountain. A short scramble, down and up again, brings us to the real top—a ridge of shattered crag; nearly level for some distance. From here our eyes should have feasted on a view of rare beauty over the rich valleys of the Trentino to the rival peaks of Cadore and Primiero, down upon the deep-lying waters of Lago di Garda, and northwards over the snowy ranges of Tyrol. But our ill-luck in distant views this season followed us to the last. Dark clouds, the forerunners of a thunderstorm, had already wrapped the distant mountain tops, and fleecy vapours choked up the valleys at our feet. Nothing was clear but our own peak and the Brenta Alta, the huge mass of which now scarcely overtopped us by the height of its final snowcap. We waited long and patiently for some friendly breeze to lift even a corner of the white carpet, which concealed from us all that lay at the base of the precipices on the Molveno side. We prayed in vain; the weather changed only for the worse, and we did not care to risk a meeting with the thunder-cloud.

The storm which broke on us during the descent prevented any attempt to vary the morning's route until we reached Val Nambino, when we turned off to the left, and hurried down to rejoin our companions at Pinzolo.

Pinzolo is distinguished amongst the villages which cluster

round the head of Val Rendena by its tall modern campanile of Adamello granite—a pretty feature of the landscape, but an evil sign of the times. In southern Tyrol campaniles are generally built by the communes which have realised their wealth by cutting down their forests, and I suspect the great sawmills at the mouth of Val di Genova have had a large share in the execution of this pious work. The charm of the situation is not enhanced by any view of distant snows; its beauties lie all close at hand, in the verdant water-meadows and rich chestnut woods, under whose luxuriant shade grows a moist carpet of moss, ferns, and flowers. In some lights and aspects the scenery may appear tame; but it will not be thought so by the traveller who, sated with the wild mountain grandeur of Val di Genova, reaches as evening falls the old church of Charlemagne, and looks down for the first time over the softer landscape and sylvan slopes of the lower valley. The fading light below brings out on the hill sides the delicate shades of green which are lost in the full blaze of the noonday sun, while high up in air the red cliffs of the Brenta Alta, glowing with the last rays of sunset, seem unearthly enough to form part of the poet's palace of Hyperion, which

‘Bastioned with pyramids of glowing gold,
And touched with shade of bronzed obélisques,
Glared a blood-red through all its thousand courts,
Arches and domes, and fiery galleries.’

Bonipace's inn is kept by wealthy people, who drive an excellent trade with their own country-folk, and look with some astonishment on the few pleasure travellers whom each summer brings them. An arched doorway opens out of the paved street into a sort of barn, whence a steep stone staircase leads up into a dark low-roofed hall or lobby, crowded with benches and tables. Out of it open two still gloomier inner chambers. In one a faint glimmer of bright copper, a sound of hissing, and a bustling of Marthas, reveal the kitchen; in the other, at the foot of an enormous family bed, leaning over a table, sits the master of the house, one eye intent on accounts, the other keeping a quiet watch over what goes on around. At his order a handmaiden leaves her labours in the kitchen and conducts one up another steep flight of stairs and into a large dormitory, containing five beds, three tables, and two washing-basins, which is considered to fulfil every possible requirement for night-accommodation. A cheerful room in the next house, over the grocer's shop, is now, however, put at the service of English prejudice. Meals, slightly greasy, but very plentiful, are served in a dingy little room with a bed in the corner,

which opens out of the lobby. Both are generally filled of an evening with a crowd of customers of the peasant-farmer class, perfectly well-conducted, but too talkative and fond of smoking to be agreeable companions. Yet dark and dingy and crowded though it be, there is a romance about this typical Italian mountain inn. The splash of the fountain at the corner, under the walnut-tree, where the women in their bright-coloured handkerchiefs wash their linen and call out cheerily to the bare-footed little Pietros and Marias playing in the sunshine; the sudden bustle and tinkle of the goats returning from the mountain, as they troop off in little companies to their several homes; the noise of the bowls and the laughter of the players, kept up till there is no longer light to pursue the game. Last of all, in solemn contrast to the exuberant life of the day, the melancholy voice of the watchman, ringing through the silent night.

The walk from Val Rendena to Stenico, through Val Dalcon, is dismissed in the guide-books with a few words of faint praise, which raise no expectation of its varied beauty. We left Pinzolo on a perfectly cloudless morning, to descend to the shores of Lago di Garda, with for our guide the old idiot who, seven years before, had led me up to the Bocca dei Camuzzi, under pretence of its being the pass to Molveno. To-day he was only engaged as a companion to the donkey which carried our traps; and it was chiefly to the quadruped's sagacity that we trusted not to be misled.

At the village of Giustino we left the high-road down the valley, and climbed a steep pavé past the stations, leading to a whitewashed church, perched on a knoll amongst the mossy chestnut groves. Another village, with a trim granite-edged fountain and a tall campanile, was soon left below. The ascent then became hot and tiresome for a time, when the path perversely left the woods and chose for its zigzags a loose, dusty, shadeless slope. The summit of the Presanella was now in view. The ungainly hump, which here represents the mountain, is the greatest possible contrast to the noble mass which, with its long escarped sides and icy pinnacles, towers above the Tonale road. The Grivola is the only other mountain I know of which undergoes so complete a transformation. Above the bare ascent lies a sloping shelf of meadow, dotted with hay-châlets. The path next enters the forest, the thick stems of which shut out all distant view; suddenly they open and leave room for a smooth, level glade. Shut round by a green wall of pines, it is a place where an altar to Pan might have risen out of the mossy sward, and shepherds have held their

sylvan revelries. This 'leafy pleasantness' is the top of the ridge known by the poetical name of the Pra Fiori. Behind us the icy comb of the Carè Alto gleamed through the branches; in front the massive form of a dolomite towered over the tree-tops. Bearing to the left, and descending very slightly from the ridge, we came in a few minutes to a grassy brow adorned with beech-trees. A more beautiful site is hardly to be found; and here, with one consent, we built our ideal Alpine chalet.

Below us lay the smooth level of the Val Dalcon; on one side the bare, torn, and fretted face of a great dolomite, surrounded by lower ridges scarcely less precipitous, but clothed in green, wherever trees or herbage could take root. Towards the south the distant hills beyond the Sarca waved in gradations of purple and blue through the shimmer of the Italian sunshine.

A short zigzag, through thick copses, leads down to the meadows. The large solitary building in their midst is a glass manufactory. At this point a good car-road begins, which, branching lower down, leads either to Tione or Stenico.

The loftier dolomites are soon lost to view behind a bend in the valley, and the road plunges down a deep and narrow glen between banks of nodding cyclamens, bold crags, and the greenest of green hillsides. About two hours from the glass manufactory the gorge of the Sarca opens in front, and the road to Stenico, leaving the stream to fall into it, winds at a level round the face of perpendicular cliffs. Tione and its village-dotted valley are seen for a few moments before our backs are turned to them, and we fairly enter the gorge of the Sarca. The high-road and river thread side by side the intricacies of the great cleft; our way lies along a shelf blasted out of the side of the cliffs a thousand feet above them. The rays of a midday sun stream full upon us from an unclouded heaven, and every rock reflects back the glow of light and heat. Notwithstanding, we walk briskly on, for the castle of Stenico is full in view and scarcely a mile distant. Before reaching it we have to make the circuit of a gorge, through which a fresh stream pours down. Under the shade of the picturesque old covered bridge, which crosses it, we halt for a few minutes to admire a view almost unique in my Alpine experience. Close beside us stands the castle of Stenico, perched high on a crag, commanding on one side the entrance to the gorge, overlooking on the other a wide sunny basin, girt by verdant ridges, compared to which the shores of Como are bare and brown. The hollows and lower slopes sparkle with villages, and teem with Indian corn and trailing vines. The hills do not, as in the

Northern Alps, rise in continuous ridges, but are broken up into masses of the most romantically beautiful forms. Such may have been the scenery of the fairest portions of Asia Minor, before the Mahometan conquest brought desolation upon the land.

Two roads lead from Stenico to Riva, one hilly and picturesque, by the little lake of Tenno, the other through the lower gorge of the Sarca, and down the deep trench of the river to the lake. The lateness of the hour forced us to take the latter. Beyond the Baths of Comano there is a fine view of the back of the Brenta Alta, at the head of a glen parallel to Val Dalcon, and penetrating even more deeply into the heart of the range. One pass leads from its head to the Lake of Molveno, another joins the route of the Bocca di Brenta, near its summit. Whether Pinzolo can be reached by crossing the ridge south of the Brenta Alta remains to be proved. The descent to Val Rendena is assured, but we shrank from an attempt to get down the cliffs on this side on the day we lost our way in a snowstorm on the Bocca dei Camuzzi.

Daylight left us soon after passing the inn of Le Sarche. For hours, as it seemed, our rickety car rolled on through the moonlight down the half-desolate, half-luxuriant valley. Now a train of bullock-waggon, travelling through the cool hours, creaked slowly past; then our wheels rattled over pavement, and we plunged into the long gloomy street of some road-side town; then out again into the moonlight, now shining full on the huge castled crag of Arco, and through long cypress avenues and broader streets. Still onwards amidst trellised vineyards and gardens, until at last our long drive came to an end at the door of the 'Sole' at Riva.

Two mornings later, as our boat, leaving the olive-green shores and bold cliffs of Riva for the terraced lemon-groves of Gargnano, danced over the blue waters of the Lago di Garda, the lower ranges opened behind us, and we looked regretfully for the last time on the lofty wall of the dolomites and the crowning snow of the Brenta Alta.

AN ASCENT OF THE MATTERHORN FROM THE SOUTH SIDE. By C. E. MATHEWS.

IT is quite impossible to say anything new about the Matterhorn. The spirited articles of Professor Tyndall, and the artistic and admirable work of Mr. Whymper, have exhausted the history of this famous mountain. We are as familiar with

its outlines as with the forms and faces of our personal friends. But familiarity will never breed contempt for it, huts will never render it uninteresting, ropes and chains will not vulgarise it, 'age cannot wither or custom stale its infinite variety.' The mystery which once surrounded it is gone, the evil spirits once believed to haunt it have been frightened away; but greater knowledge of it brings only an increased admiration. Lightning may smite, and suns burn, and frosts disintegrate, but

'Each in passing touched with some new grace,
Or seemed to touch her—so that day by day,
Like one that never can be wholly known,
Her beauty grew.'

I think an apology is needed to the Alpine Club for venturing to occupy these pages, in the year 1871, with a story of the Matterhorn; but the experiences of two memorable days in the past month of August are here recorded, at the command of the Editor of this Journal, whose will is law.

For several years my friend Mr. Frederic Morshead and myself, accompanied by Melchior Anderegg, have found ourselves at Zermatt, in the hope of reaching the summit of the Matterhorn. In 1867 we gave the preference to the Lyskamm from the south side, after climbing which, bad weather prevented our attacking the object of our desires. In 1869, after a campaign in the Oberland, letters which Morshead received from England, on his arrival at Zermatt, compelled his immediate return, and I was unwilling to try the mountain in the absence of my genial and valued friend. In 1870, during one week in Zermatt, we had reached with the greatest ease the summits of the Rympfischhorn, the Weisshorn, and the Dom, but there was so much fresh snow on all the mountains that Melchior absolutely refused to set foot upon the Matterhorn. Our desire to climb it, however, it is needless to state, increased with our repeated disappointments.

Early in August in the present year Melchior met us at Innsbruck. He informed us that a few days previously he had made the ascent from the side of Zermatt, and urged us to try it from the Breuil or south side. Professor Tyndall, with whom we had subsequently passed a few pleasant hours at Pontresina, was good enough to give us the same advice, and urged us to follow the example he set in 1868, and pass from Breuil to Zermatt, over the summit of the mountain. He told us, as we were indeed aware, that no rock scenery in the whole Alps was equal to the south-western arête of the Matterhorn, and he added that of all the guides of the *Va Tournanche*

there were only two, Jean Antoine Carrel and Joseph Maquignaz, with whom we were likely to be contented; and I cannot, added the Professor, 'recommend the one more highly than the other.' Before we had left England, however, we had read and noted the tribute paid by Mr. Whympers to the former of these accomplished guides. 'He was the only man,' says Mr. Whympers, 'who persistently refused to accept defeat,' and 'he is the finest rock climber I have ever seen.' A few days later we had ample opportunity of bearing our testimony to the accuracy of this description.

On Wednesday, August 16, in rude health and excellent training, we were discussing our plans over the dinner-table at Ivrea. It was a beautiful afternoon, and Morshead, who had been wasting, as he said, three golden days in the heat and luxury of Como and Milan, was sighing for the purer air and simpler food of the Val Tournanche. We wanted to reach Chatillon on the night of the 16th, and were soon en route for that village in a rickety carriage drawn by a pair of withered and melancholy steeds.

Clouds gathered thick as we left the old town of Ivrea, and before we were half way to our journey's end a tremendous thunderstorm broke over the valley, accompanied by torrents of rain. Our horses were utterly unable to make head against it, so we put up for the night at a roadside inn, and starting again early in the morning, reached Chatillon to breakfast. The heavy rain that had fallen during the night had cleared the air, but there were heavy clouds about, and our prospects looked gloomy and threatening.

We were anxious that no one should be acquainted with our plans, and simply announced our intention of crossing to Zermatt by the hackneyed pass of the Theodule. We had not arrived ten minutes when a tall and resolute man, with a Solferino medal on his coat, came up and spoke to me. 'You are Mr. Mathews,' he said, 'and your friend's name is Morshead.' I admitted the facts, and told him we thought of crossing the Theodule. He smiled and said, 'Oh no, I think you are mistaken; you are going to Zermatt over the top of the Matterhorn. You want a Val Tournanche guide. I am Jean Antoine Carrel.' He produced his credentials—one or two chapters of Mr. Whympers's charming volume, on one of the pages of which is a most excellent portrait of this well-known guide. It was the same Carrel the ambition of whose life was to be the first to set foot upon the Matterhorn, and who spent seven years in the earnest endeavour to find out a way to the summit from the side of his native valley. He

tried it in 1858 and 1859, with local friends, and reached a spot now known as 'the Chimney,' above the Col du Lion, and between 12,000 and 13,000 feet above the level of the sea. He made another attempt in 1860, with Professor Tyndall and Mr. Vaughan Hawkins, and reached the foot of what is now known as the Great Tower—a height of a little more than 13,000 feet. He tried again in 1861, reaching a point known as the Crête du Coq, some 200 feet higher than his ascent of the previous year. He tried again in 1862, twice with Mr. Whymper, on neither of which occasions, however, did he quite reach the point previously attained; and again in the same year with Professor Tyndall, when after a gallant fight the party reached the shoulder at the foot of the final peak, some 14,000 feet in height; and finally, in 1865, he first reached the summit from the Italian side after a desperate climb, three days after Mr. Whymper's party had made their memorable and disastrous expedition from the northern or Zermatt side. He was the man we wanted, and we immediately engaged him, leaving him to hire two porters to carry our luggage up to Breuil, and to accompany us on the following day as far as the hut where we hoped to pass the night, some 1,500 feet below the summit of the mountain.

As we walked up the lovely Val Tournanche not one of us had even a hope that our enterprise would be successful. There was a little rain, and as we reached the spot from which the majestic peak is first visible, nothing confronted us but impenetrable clouds. At the village of Val Tournanche, however, the prospect became brighter, and on our arrival at Breuil, though we could not even see the form of the mountain, the keen cold air gave us a little hope. Morshead, who was never known to be depressed, announced in a cheery voice that at 3 o'clock in the morning the weather would be superb; and having made our arrangements, and specially warned our guides to give no hint to anyone of our intentions, we retired. At 2 o'clock on the morning of the 18th Melchior called us. We were up in an instant, for he said, 'The sky is cloudless, and there is no snow upon the mountain.' The good news was perfectly true; the recent storms had been partial, and apparently had not touched the stupendous mass that loomed darkly at us through the early dawn. Our plan was to climb the south-western arête till we reached the cabane; to sleep there, and on the following day to gain the summit and descend to Zermatt.

We were ready to start at 3 o'clock, and the porters left at that hour, but we had to wait for nearly an hour before

there was light enough to enable us to pick our way. At five minutes to 4 we started, and, eager to be off, walked rapidly over the gentian-studded slopes which stretch from Breuil to the foot of the well-known Col du Lion. We soon overtook the porters, and our party of six tramped up the hard snow with great rapidity and ease till we reached the rocks a little below the col. Here the scenery is exceedingly impressive. Just above us was the slight snow col overlooking the great basin of the Zmutt glacier. To the left were the steep rocks of the Tête du Lion, and immediately on our right was the savage arête of the Matterhorn, pointing directly to the wished-for goal. It was a difficult scramble to get from the snow-gully on to the rocks, but we were soon on the arête, looking down upon the gorgeous ice-fields of the Zmutt basin. The weather was absolutely perfect. The sun had risen. There were no clouds in the sky. We were at last, under the most favourable circumstances, climbing the ridge for which we had so often longed. The rocks, although by no means easy, did not disintegrate. There was no ice upon them, and there were no falling stones. The guides of the Val Tournanche have fixed ropes in some of the most difficult portions of the climb. When I was satisfied, which was not always the case, that the ropes would hold, I was glad to avail myself of their undoubted assistance. Morshead, however, regarded them with loathing, would never touch them if he could help it, and repeatedly suggested that if the Matterhorn could not be climbed without such aids, it ought not to be climbed at all. After some hours of steady, and, considering the nature of the work, exceedingly rapid climbing, we reached the extraordinary obelisk of rock known as the Great Tower. The sky was still cloudless; we were in tremendous spirits; and we rested for a few minutes to take food, and to admire 'those wild and wonderful rock-towers into which the weather of ages has hewn the southern ridge of the Matterhorn.' 'Courage!' shouted Melchior, as we turned again to our work; 'le diable est mort.' We were now climbing up that portion of the ridge which leads from the Great Tower to a point which from Breuil looks like a second and lower summit of the mountain, when an unexpected difficulty arose. We found the rocks ice-covered, to a small extent at first, but as we got higher to an extent which damped our energies, and seriously impeded our progress.

On most mountains, even where there are real difficulties, there is so much that is comparatively easy that the mind is not fully occupied, but now the work became so seriously difficult that our entire bodily and mental energies were devoted

to it. The rocks became worse and worse. We tied our axes over our arms, and climbed hand over hand. Carrel led us with indomitable energy, and it was a mountaineering treat to watch the skilful manner in which he climbed. I followed him. Morshead came next, and Melchior brought up the rear, the two porters being on a rope of their own. After some very severe climbing we reached a patch of snow known as the Cravate, a height of 13,400 feet, and about 1,400 feet below the summit of the mountain. But to our inexpressible consternation one of those sudden changes took place for which the Matterhorn is so notorious. A cold wind began to blow. A few minutes before there was no apparent vapour in the atmosphere; now sudden wreaths of whirling mist seemed to form under our feet, the blue sky was blotted out, and then snow began to fall. It was a bitter moment, but in an instant we changed our plans. We dreaded a break up of the weather, and felt that if we were to reach the summit at all not a moment was to be lost. Instead of sleeping at the hut, which we had nearly reached, we would send back our porters, load ourselves with such food or clothing as was absolutely necessary, make an immediate push for the summit, and get over to the cabane on the Zermatt side the same evening. It was now half-past 12. The porters climbed with us to the lower summit known as the Pic Tyndall, where we arrived shortly after 1 o'clock, and found the flagstaff planted by Tyndall and Bennen in 1862. Here we rapidly relieved our porters of part of their load, and sent them back to Breuil. In light marching order, but with heavy hearts, we attacked the long horizontal ridge which stretches from the Pic Tyndall to the base of the final peak. Imagine a saw many hundreds of feet long, with jagged teeth of various heights and size—imagine gigantic precipices on either side—imagine these teeth coated many of them with thin ice, rapidly being concealed by falling snow, and imagine four men struggling up these teeth one after the other at a rapid pace, up one and down again, and up another. This was the position of affairs. Melchior had promised to take us over on to the Zermatt side if we could gain the summit before 3 o'clock. It was after 2 before we got to the end of the ridge and stood face to face with the 600 feet of final precipice which still towered above us, most of it ice-covered, and rapidly being whitened with fresh snow. This was the spot which dazed Professor Tyndall in 1862, and which he sat down to inspect, whilst his guides exclaimed, 'It is impossible.' Melchior had become extremely grave, and began to mutter the ominous word 'dummheit.' Morshead and I had agreed to abide by his

decision in any event, but we all determined not to give up without a struggle; and still more that whatever conference took place should be in the act of climbing, and not standing still. To have stopped would have been to have turned back. I looked up, and saw about half way up the peak a rope-ladder fixed in the rocks. I felt certain that if we could pass this rope-ladder we should, in spite of all difficulties, reach the summit. The wind howled, and the hail and snow drove into our eyes and ears, but we got to the ladder. It seemed to me to be fixed at the top and bottom of an absolutely overhanging rock. We got up the ladder very quickly, but the effort was so great that we had to wait a few seconds to regain our breath. Melchior now began loudly to expostulate; it would take us, he said, another hour to get to the summit, and it was folly to proceed. We admitted the folly, but as he did not turn back, we climbed harder and harder, Carrel pulling at the rope with tremendous energy. At a quarter-past 4, panting and breathless, with quivering muscles and bleeding hands, we arrived at the highest point. It was bitterly cold; we had been climbing hard for over twelve hours; we were not fatigued, but we were covered with snow, our whiskers were icicles, and ice clogged our eyelashes and our hair. Carrel laughed; but Melchior, who looked like a representation of Father Christmas at a pantomime, persisted in saying 'dummheit,' and was anything but pleased. We could see nothing. Instead of the old familiar faces of the great peaks of the Pennines, towering above the smiling fields of Zermatt, we could barely see the ridge we were standing upon, so in the drifting snow-clouds and bitter cold we shook hands solemnly over Mr. Whympers's cairn.

We did not stay five minutes on the summit. It was far too late to try and reach the cabane on the Zermatt side. Melchior secured me the usual trophy, a bit of the highest rock, and telling us he hoped we might not be frozen, drove us rapidly down. It would require the pencil of Gustave Doré to do justice to the scene. The storm raged about the peak. Carrel was leading. Morshead followed, securing the leader from time to time by the rope carefully held over every available projecting rock; I close to Morshead, and Melchior last of all, holding a firm rope, but shouting perpetually, 'Schnell! schnell!' Our only serious difficulty, however, was in descending the rope ladder. The cords and wooden rungs were coated with ice; and when I put my hands upon it, I found that I had no feeling in any of my fingers. I had no notion until then that the rocks had cut my snow gloves, and that all my fingers were

exposed. I made hooks of my arms, and so got down the ladder, though not, as Mr. Sapsea observes, without some fever of the brow. The rock over which this ladder is fixed does overhang, and to be suspended by the arms on a frozen rung, with one's feet dangling over an abyssmal precipice, may be exhilarating, but it is not climbing properly so called. We got down to the saw, repeated our acrobatic performances on its jagged teeth, gained the Pic Tyndall, and, skirting the Cravate, reached the hut at half-past 8, just as it got dark.

We passed a miserable night. Carrel attempted to enliven us by relating the experiences of Signor Giordano, who passed five nights there, unable, from the bad weather, to go up or down. We had no fire; but the courtesy of the Italian Alpine Club has placed an india-rubber mattress and two sheepskins at the disposal of visitors to that elevated spot. We boiled some coffee with the aid of some spirits of wine, and wrapped ourselves up in the frozen sheepskins. Morshead was not much the worse for wear; but I knew that all my fingers were more or less frostbitten, and all night long I saw Melchior driving us down those gruesome rocks, and heard his constant exclamation, 'Schnell! schnell!'

It snowed all night, but cleared about 7 in the morning. We thawed our frozen boots by burning paper inside them, and descended the mountain with extreme care, for the ice-bound rocks were now covered with 6 or 7 inches of fresh snow. By 3 o'clock we were off the arête, descended the snow couloir of the Col de Lion, skirted the interminable moraines at the base of our vanquished mountain, crossed the Theodule late in the evening, and arrived at Zermatt a few minutes after 10 P.M., where we received from M. Seiler our usual kindly welcome. Kind-hearted Madame Seiler bound up my wounds; and, thinking that a hair of the dog that bit me was an excellent specific, three days afterwards I sunned my frostbitten fingers on the highest peak of the Gabelhorn.

PETERMANN SPITZE IN EAST GREENLAND.

It should be well known to the readers of this Journal, that Dr. Augustus Petermann, the learned and energetic geographer of Gotha, has been, for a long time past, endeavouring to promote exploration and research within the Arctic Regions. He laboured hard for several years, without result, trying to stir up his countrymen to send an expedition to the north. At length, in 1868, he was able to fit out a sloop, and to despatch it towards the Pole under the command of Captain Koldewey. This little vessel—the 'Germania'—no bigger than

an ordinary fishing-smack, started from Bergen on May 24, with a crew of only eleven men, to fight its way through the icy seas. At first they endeavoured to reach East Greenland, but they everywhere encountered the heavy floes which are permanently drifting down that coast, and they were forced to retreat. Koldewey then made his way to Spitzbergen, and, after some severe combats with ice and storms, succeeded in carrying his ship as far as $80^{\circ} 30'$ N. lat. Thence he was obliged to return on account of pack-ice, and he again essayed to reach the Greenland coast. Again he was baffled, although this time he succeeded in approaching the land closer than upon his first attempt. He then steered northwards once more; managed to pass round the northern side of the great island of Spitzbergen, and made some small discoveries upon its eastern shores. Finally, he turned his ship's head towards the Pole again, and struggled manfully to get northwards. On September 14 he was in $81^{\circ} 5'$ N. lat., but beyond this they could not go. Heavy ice and foggy weather rendered navigation extremely perilous during the nights, and at last the explorers turned back, ran rapidly home, and re-entered the port of Bergen upon September 30.

Koldewey's narrative has only recently been published in Petermann's 'Mittheilungen' (January 18, 1871). It is accompanied by a large and clear map (which, like all of Petermann's maps, is admirably and thoroughly executed), and this alone, without reference to the text, renders ample testimony to the courage and perseverance of Koldewey and his associates. You see at a glance how they battled with wind and ice, and how pertinaciously they returned to the attack; and the little views which are given upon the margin of the map, of the 'Germania' in different positions, arouse one's sympathy for these bold, although unsuccessful explorers. This expedition, indeed, recalls the doings of our countrymen—Hudson, Baffin, and Frobisher. Like them, Koldewey sailed in a mere 'cock-boat,' and like them he was gifted with an indomitable spirit. Dr. Petermann acted wisely and generously in giving the command of his second expedition to his zealous lieutenant.

To this second expedition we wish to draw especial attention. It started from Bremen on June 15, 1869, in the presence of the King of Prussia. This time there were two vessels. One, a screw steamer of 140 tons, was again called the 'Germania'; the other was named the 'Hansa.' This latter was chiefly laden with fuel for the use of the 'Germania.' She was speedily separated from her consort; was crushed in the ice off the East Greenland coast on October 22, and her crew of fourteen persons was forced to take refuge on the floe that destroyed the ship. They drifted southwards for more than 600 geographical miles, and, after having been exposed to the rigours of an Arctic climate for 200 days, reached the Danish settlement of Friedrichstal alive, but with one of their number bereft of reason!

The 'Germania' was more fortunate. She gained the East Greenland coast, and, after pressing up it as far as $75^{\circ} 30'$ N. lat., returned to the Pendulum Islands (lat. $74^{\circ} 30'$) to winter. Sledging parties were sent out during the winter and spring, and explored a considerable extent of heretofore unknown land. On July 22 the 'Germania'

again steamed towards the north, but was stopped by ice in lat. $75^{\circ} 29'$. The expedition then returned to the south, and in lat. $73^{\circ} 13'$ discovered the entrance to a great fiord. This was free from sea-ice, although encumbered by icebergs, and the explorers proceeded up it for 70 miles.

The surrounding scenery was of the grandest character. Cliffs thousands of feet in height rose directly from the water's edge; mighty glaciers filled the valleys and ravines and entered the fiord, giving birth to the icebergs which were just now mentioned; and sparkling waterfalls bounded from ledge to ledge down the great precipices. The country was everywhere mountainous, and the peaks became more and more important as the explorers proceeded towards the west. Oberlieutenant Julius Payer, who accompanied the expedition, ascended a mountain in $26^{\circ} 30'$ W. long., of about 7,000 feet, and saw from it a grand snowy ridge rising beyond the western extremity of the fiord, the culminating point of which he estimated to be 14,000 English feet above the level of the sea! This was the greatest geographical discovery made by the expedition, and the name of Dr. Petermann has been naturally connected with it. Petermann Spitze, in East Greenland, will hereafter rank with the celebrated mountains of the world. The peaks which have hitherto been measured in Greenland scarcely, if at all, exceed 7,000 feet.

In introducing this important discovery to the notice of the Royal Geographical Society on January 23 last, Sir Henry Rawlinson took the opportunity to speak of the value of mountain ascents in an unexplored country; and when he expressed a hope that some of our Alpine climbers would turn their attention to the great mountains discovered by the second German Arctic Expedition, he provoked long-continued and enthusiastic applause. Much, however, as we should like to hear that members of the English Alpine Club had succeeded in ascending Petermann Spitze, and gazed down upon the great unknown interior of Greenland, we still think that this is work which belongs rightly to the Germans. They have commenced the work, and they should finish it; and although we might envy them the success, they may be well assured that we shall be among the first to do honour to their courage and their enterprise.

Dr. Petermann has lately presented impressions of a photograph from a sketch by Payer of the Franz Joseph fiord, and the great range at its head, to the Alpine Club and to the Royal Geographical Society, and we recommend this view to the notice of our readers. It is meritorious as a work of art, and it appears to be faithfully executed. In the foreground there are masses of frost-riven rock, surmounted by some members of the expedition in Arctic dress. Behind, a long line of snow-covered glacier stretches downwards towards the inlet. In the middle-distance lies a branch of the fiord, whose still waters is dotted with icebergs from the great ice-streams which flow into it; and, in the background, the sharp snowy pyramid—Petermann Spitze—towers aloft. It is a tempting view—a fascinating view—and it suggests the desirability of the immediate formation of a Greenland Alpine Club.

THE ITALIAN ALPINE CLUB.

It may be interesting to the readers of the 'Alpine Journal' to know that this society is gradually gaining ground throughout the whole of Italy, and numbers at present about 400 members.

The Central Club at Turin has opened branches at Florence, Naples, Aosta, Varallo (in the Monte Rosa district), Domodossola, and at Agordo in the Dolomite region. Under the auspices of the Clubs at Varallo and at Domodossola, subscriptions have been successfully opened for establishing two barometrical stations, the first at l'Ospizio di Valdobbia on the summit of the col between Gressoney St. Jean and the village of Alagna; and the second at the College of Domodossola, in connection with the one at the Hospice of the Simplon. The branch at Aosta is busily occupied in adding to its collection of wild mountain animals of the district, to which His Majesty the King of Italy has most liberally contributed by the gift of an ibex from his own hunting grounds among the Graian Alps.

The general meeting and dinner of the Italian Alpine Club was to take place this year at Agordo, near Belluno, on September 17 and 18. Members of the different Clubs, and travellers desirous of any *special* information concerning the mountain districts of Italy, may obtain it by applying to the following gentlemen:—Signor Professore Baretti, Directeur du Club Alpin Italien, Palazzo Carignano, Turin; Signor Cav. Ingegnere Pellati, Directeur du Club Alpin Italien, Agordo, près Belluno; Signor G. B. Rimini, Secrétaire du Club Alpin Italien, Piazza de' Giuochi, 1, Florence; Signor Cav. Prof. Pietro Calderini, Directeur du Club Alpin Italien, Varallo, Piemont; Signor Avvocato Trabucchi, Secrétaire du Club Alpin Italien, Domodossola; Monsieur le Chevalier Gal, Président du Club Alpin Italien à Aoste, Piemont; Signor Prof. Barone Cesati, Vice-Président du Club Alpin Italien, Directeur del Orto Botanico, Naples. These gentlemen will also most gratefully receive any information from members of the different Alpine clubs and tourists which may be thought useful for the benefit of foreign travellers.

PANORAMA OF THE ALPS FROM TURIN.—The Italian Alpine Club is having produced by lithography (in four tints) the panoramic view of the Alps seen from Turin. An unfinished copy of this view has recently been forwarded to us, and it promises to be highly interesting to those who know the Italian side of the Alps. Its length is nearly 10 feet, and it will be sold at the moderate price of four francs. We understand that a limited number of impressions only will be taken from the stones.

CHANOINE CARREL OF AOSTA.

THE bearer of this name, so well known to members of the Alpine Club who frequented the Italian mountains, is no more. The old canon was struck by a partial paralysis of the brain towards the end of April of last year, and he gradually sunk under the disease. Few men have done more than Chanoine Carrel in trying to bring constantly before the travelling public the natural beauties of the Italian Alps.

Of humble origin, without fortune, without the aid of powerful friends, from his mountain home at Aosta he strove manfully *alone* against enormous difficulties, and, alas! against the prejudices of his own countrymen. At length his untiring energy was appreciated, and he was able to publish his panorama of the Becca di Nona, establish by means of a subscription of the Italian Alpine Club the hut at the cravate on the Matterhorn, found a branch of the Turin Club at Aosta, furnished with Alpine books, maps, photographic views, panoramas, &c., and commence a small collection of animals, plants, minerals, specimens of rocks, &c., of the district, which he intended to place in the rooms.

It is gratifying to know that out of honour to his memory the members of the Italian Alpine Club at Aosta (which has greatly increased in numbers since his death) are trying vigorously to carry out the pet designs of their lamented countryman.

It is proposed to place a portrait of the old mountaineer in the rooms of the Club, together with a selection of his correspondence with scientific men. His ruling passion, love of his native mountains, was strong even till death; and an English friend when visiting him roused him from his lethargic state by repeating the well-known names of MM. Ball, Reilly, W. Mathews, Whymper, Nicolls, and Professor Tyndall, whom he justly considered as the benefactors of his valley. When the name of his friend Mr. Tuckett was mentioned, he added with energy, 'C'est un brave cœur!' Nearly his last words were, 'Je finirai par faire mon panorama du haut du Mont Cervin,' which seems to have been one of the great objects of the latter days of this singularly energetic man. His example has not been lost upon his countrymen, and his nephew, Joseph Carrel, Recteur de Cogne, with the Curé Chamonix, the well-known explorer of the Grivola, are now writing a work called, 'La Géographie de la Vallée d'Aoste,' which will probably throw more light upon the topography of those parts.

Canon Carrel was born at Valtournanche, on the Italian side of the Matterhorn, and was upwards of seventy years of age at his death. He was justly proud of his descent from the family of the great De Saussure.

Readers of the 'Alpine Journal' who wish for a more detailed account of his life, will find it in an article of the 'Bullettino del Club Alpino Italiano,' written by his fellow-countryman, Abbé Gorret Amé de Valtournanche.

It is impossible in such a brief sketch to do justice to this simple-hearted but patriotic man, but it was thought he deserved to be mentioned in the pages of the 'Alpine Journal,' as he was always styled by the inhabitants of the Valley of Aosta, 'L'Ami des Anglais.'

R. H. B.

THE ALPS AND CONSUMPTION.

WE have received the following from a foreign correspondent :—

We have just had a foretaste of what is said to be the peculiar summer weather of Vienna; and if experience, as it threatens, repeats itself, the high winds and blinding clouds of dust which characterised it will shortly drive all who can afford to leave the capital to their summer retreats. To everyone this weather is most unpleasant, and especially obnoxious to the weak-chested, who require no scientific acquaintance with the etiology of consumption to be fully impressed with the necessity of seeking a more quiet and pure atmosphere if they wish to avoid contracting the dreaded 'Vienna disease.' Such a change of residence, however, is manifestly beyond the means of the great majority of phthisical persons here and throughout Austria, and so we find that the percentage of deaths from 'tuberculosis' is increased rather than diminished in this country during the summer months.

How very high this percentage at present is, and how Vienna especially suffers, may be readily learned. If I consult the newspapers of to-day I find that out of a total of 39 deaths in the city, 11 or 28·2 per cent. are from so-called 'tuberculosis.' This morning I counted in four wards in the General Hospital which I usually visit, 29 'tuberculous' cases, mostly phthisis, out of a total of 85 patients; that is 34 per cent. The published statistics of deaths give somewhat less alarming results, the yearly average being put down at 25 per cent., which, however, is a sufficiently great proportion to far surpass that of most other large cities. Thus it is twice as in London—12·5 per cent.; while in Paris, Nice, and New York, the percentages are 16·7, 14·3, and 12·5 respectively. Only the famous Madeira comes up with Vienna; there, also, a fourth of the deaths are from 'tuberculosis.'

This enormous death-rate from such diseases has at last alarmed the Austrians; and the Government has now felt it to be its duty to bestir itself in the matter, and to inquire into the spread of consumption in the land, and into the means to be adopted for combating it. Last year, accordingly, the Minister of the Interior laid before the Royal Imperial Central Statistical Commission, for their opinion, the work of Dr. Kuchenmeister, of Dresden, which appeared in 1869, and which is probably known to many of your readers. The Statistical Commission consulted at once with men familiar with the subject, and, following the advice which they received, asked the three medical Corporations in Vienna for their opinion. This week the answer of the Medical Club is being returned; that of the College of Physicians was sent in a short time ago; and so far the two agree in pronouncing on the subject to this effect: 'That such investigations on the spread of phthisis in Austria, and on the absence of the same from many mountainous regions, as well as on the cause which lies at the foundation of this, would not only furnish results of the greatest value to science, but also be invaluable for the well-being of the people. Whatever is to be done, however, must be undertaken and carried out with the greatest conscientiousness by able men standing at the head of the profession. Above

all, there must be organised a registration of deaths in the whole country, even in the most obscure districts.'

Meanwhile the absence of phthisis from Alpine districts has been turned to practical account by the most prominent physicians of Vienna, as Skoda, Oppolzer, Duchekera, who send many patients suffering from diseases of the lungs and larynx to reside during the summer in the high valleys of the Austrian Alps; and this, it is said, with the best, often with most surprising, results.

Ischl and Aussee are the two favourite health-resorts, and it is extremely probable that, when the Government comes to make arrangements for providing the poor with the benefits which as yet only the rich can enjoy in the way of change of climate, either of these two spots will be fixed upon. Ischl must be known to many English physicians as the most fashionable Austrian Alpine resort, and is extremely popular; but as a summer residence for consumptives, it cannot for a moment compare in the light of our latest experience in the south of Ischl, to which, as we have said, it is much to be preferred, not only however, on account of the perfect immunity of its inhabitants from tuberculosis, but also because it lies 2,100 feet above the sea-level (Ischl only 1,500), and because, from its being perfectly surrounded by mountains, the lowest of which is 4,000 feet high, such an unpleasant and dangerous element as wind is quite unknown.

A question here readily suggests itself—Why should not English physicians, following the example of their Viennese brethren, avail themselves of this hitherto to them almost unknown climate, and send their consumptive patients to the Austrian Alps, and to Aussee especially? Ischl is easily reached from the English side by taking the rail to Gmunden, and thereafter crossing the Waadersal lake of the same name; and Aussee is separated from Ischl only by a mountainous but excellent road of three hours. The whole of the country abounds in most romantic scenery.

For the benefit of those who prefer having their patients under careful medical superintendence while abroad, I am able to add that a Vienna physician, Dr. Schreiber, who devotes himself to the study of medical climatology, with a special view to the treatment of diseases of the lungs, has erected in Aussee a so-called sanatorium, where the delicate and sick are under his direct care, while deriving every advantage from the climate.

In thus drawing the attention of English physicians to the advantages of the Austrian Alps as a summer residence for invalids, I cannot but regret that Dr. C. T. B. Williams did not extend his tour beyond Switzerland and the Tyrol in his visit to Alpine summer quarters, of which he gives such a pleasant account in the 'British Medical Journal' for November 20 and 27, and December 4, 1869. The true value of the country to which I now refer might thus have been sooner recognised in England; as it is, I hope that during the coming season some competent English physician will visit it, and report upon the probable benefit to be derived by his countrymen from a climate which has already done so much for the Austrians.

Vienna, April 6, 1871.

MOSS FLORA OF ST. MORITZ.

THE canton of the Grisons is one of the richest districts of the Alps in cryptogamic plants. Some species have not been found elsewhere, and others, supposed to be peculiar to the extreme north, have been discovered in the Upper Engadine.

The names and localities of the rarer species among a collection of mosses which I made last year at St. Moritz and the neighbourhood, may be useful to bryologists.

On my way to the Engadine, in the gorge of Pfäfers, on rocks and trees about half way to the Baths :

<i>Homalia Sendtneriana</i>		<i>Orthotricum pallens</i>
<i>Eurynchium Vaucheri</i>		<i>Anomodon attenuatus</i>
<i>Hypnum incurvatum</i>		<i>Tortula tortuosa</i>

In the wood behind the Curhaus St. Moritz, on rocks and on the ground :

<i>Lescuræa striata</i> (var. <i>insignis</i>)		<i>Cynodontium polycarpon</i>
<i>Pterogonium filiforme</i>		<i>Dicranum Schraderi</i>

Near the torrent to the east of the Curhaus :

<i>Mnium orthorhynchum</i>		<i>Grimmia elatior</i>
<i>Weisia crispula</i>		<i>Blindia acuta</i>
		<i>Webera elongata</i>

In the wood to the west of, and above the Curhaus :

<i>Plagiothecium pulchellum</i>		<i>Brachythecium Starkii</i>
<i>Mnium serratum</i>		<i>Webera cruda</i>

In rocky hollows near the path which leads to Kämpfer :

<i>Plagiothecium latum</i>		<i>Cynodontium gracilescens</i>
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In the marsh at the end of meadows to the west of the Curhaus :

Cinclidium stygium. Also the rare sedge *Carex Buxbaumii*

Above the woods to the west of the Curhaus, following a small stream towards the Surlei Fuorcla :

<i>Hypnum glaciale</i>		<i>Bryum Ludwigii</i>
<i>Hypnum sarmentosum</i>		<i>Bryum Duvalii</i>
<i>Dicranum Starkii</i>		<i>Dissodon Frahmichianus</i>
<i>Amblyodon dealbatus</i>		<i>Cyrtodon sphaceloides</i>

On rocks on the hill to the north of the Curhaus on the other side of the Inn :

<i>Webera longicolla</i>		<i>Hypnum fastigiatum</i>
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On rocks above the gorge of the Inn to the east of the village of St. Moritz :

Heterocladium dimorphum.

On the shores of the Stazer See :

<i>Hypnum nitens</i>		<i>Paludella squarrosa</i>
<i>Hypnum scorpioides</i>		<i>Hypnum trifarium</i>
<i>Hypnum Sendtneri</i>		<i>Hypnum stramineum</i>

In the woods south of the Stazer See :

<i>Hypnum pratense</i>		<i>Dicranella curvata</i>
<i>Hypnum plicatum</i>		<i>Timmia austriaca</i>

In the pastures above the Stazer See towards Pontresina :

<i>Bryum bimum</i>		<i>Grimmia alpestris</i> (on rocks)
<i>Sphagnum contortum</i>		<i>Splachnum sphaericum</i>

In the dry bed of the Inn between Samaden and Cellerina :

Bryum imbricatum.

In the first or second pool close to the main road about half a mile beyond Bevers :

Angströmia longipes.

On the other side of the road :

Hypnum giganteum.

On the Piz Languard :

<i>Myurella apiculata</i> (growing among <i>Bartramia</i> (Ederi.)		
<i>Grimmia mollis</i>		<i>Hypnum saxatatum</i>
<i>Grimmia Doniana</i>		<i>Cylindrothecium concinnum</i>
<i>Grimmia torquata</i>		<i>Ulota Hutchinsiae</i>
<i>Desmatodon latifolius</i>		<i>Meesia alpina</i>

Species whose habitat I cannot recollect, but I should say in the woods to the west of and above the Curhaus :

<i>Eurynchium strigosum</i>		<i>Webera polymorpha</i>
<i>Leskea catenulata</i>		<i>Mnium spinosum</i> *
<i>Barbula fragilis</i>		<i>Leskea atrovirens</i>
<i>Bryum pallens</i>		<i>Bryum pallescens</i>
<i>Bryum inclinatum</i>		<i>Dicranella Schreberi</i>
		<i>Trichostomum crispulum.</i>

T. HOWSE, JUN.

ALPINE NOTES.

THE WEISSHORN.—On August 11, J. H. Kitson, with Christian and Ulrich Almer, left a bivouac on a hill called the Kastel, three hours from Randa, at 3 A.M., and passing through the ice-fall of the Bies glacier, and over the rocks to the left of the Bies Joch, crossed the upper glacier basin towards the point marked 4,161 in the Federal map. They then ascended the steep slopes of ice and snow to the glacier on the face of the mountain, and mounted from that to the northern arête, which they followed to the top, where they arrived at noon. They returned to their camp at 4 P.M., and reached Zermatt at 7.40 P.M.

Mr. Marshall Hall, accompanied by Jean Martin as guide, and Joseph Möser as porter, left Zermatt at 3.30 A.M., on August 22, 1871, and, following the usual route of the Trift Joch, breakfasted on the

* By the Fletschbach.

Trift glacier at 9, after which they mounted by the Rothhorn glacier, which proved laborious from séracs and crevasses, requiring much step-cutting, to the snow-slopes (50° in some places) near the bottom of the S.W. arête of the Rothhorn. A bergschrund was successfully crossed by a snowbridge of ticklish appearance. Taking to the rocks, they climbed to the ridge, and thence to the point marked 3,878 on the map of the Swiss Alpine Club, which they propose to call the Pointe de Mountet. The views were splendid. Clouds to the W. partially obscured Le Blanc and Lo Besso, but it appeared practicable to cross to the Moming glacier, which would constitute a new col of the utmost grandeur. Having, however, left the provisions and knapsacks upon the Trift glacier, they again descended, and thence crossed the Trift Joch. The weather became cloudy, and snow began to fall. They missed their way among the rocks, and did not extricate themselves till dusk began to come on, and had to cross the glacier to the moraine of Mountet in the dark and rain.

The Swiss Alpine Club have built a comfortable cabane at the Mountet, which there was great difficulty in finding, the darkness increasing; but at 9.30 P.M. they fortunately hit upon it, and spent the night there.

A few days afterwards, Mr. Marshall Hall reconnoitred Lo Besso and Le Blanc from the Pointe de Sorrebois, and felt still more convinced of the great probability of successfully making the new col spoken of above.

From the Trift glacier to the Pointe de Mountet and back took five hours and a half, including an hour at the summit.

TIEFENMATTEN JOCH, July 17.—Messrs. G. E. Foster and A. W. Moore left Zermatt at 1.35, and followed the route of the Col d'Erin as far as the foot of the Stockje; they then kept to the left up the Tiefenmatten glacier, and at 9.45 reached the col at its head between the Dent d'Erin and the peak marked on the map 3,813 mètres, close under the latter. The Tiefenmatten glacier is much crevassed, and a good deal of the way up it is dangerously exposed to avalanches from the hanging glaciers on the Dent d'Erin. The last slope is very steep, and, at its most accessible point, where the party climbed it, is liable to be raked by falling séracs and stones. Nearer the Dent d'Erin the ascent would be less dangerous, but would require prolonged step-cutting. The height of the pass is about 11,550 feet, somewhat lower than the Col de Valpelline. The descent to the lower Zardezan glacier by its third eastern tributary, reckoning from south to north, was quite easy, and only took an hour and a quarter; so, instead of descending to Prerayen, the party climbed the rocks on the right side of the Zardezan glacier to the Col de Mont Brulé, and reached Evelena at 8 P.M. Guides: Jakob Anderegg and Hans Baumann.

In addition to being a very fine one, the pass has a melancholy interest as being the last imaginable new route out of Zermatt—the col between the two peaks of Monte Rosa and the still more dubious Col du Lion under the Matterhorn, of course, excepted.

LA SALLE, 11-936', and MONT PLEUREUR, 12-161', *July 19.*—The same party left the Liapppy Alp at the head of the Val d'Hérémence at 3.50, and, ascending by the grass and stone slopes on the right bank of the small Glacier du Petit Côte de Liapppy, got on to its upper snow-field, and so reached the Col de Vasevey, leading to the Val de Bagnes at 7.10. Turning along the ridge, and cutting up a steep ice-slope, which might have probably been avoided by striking to the left below the Col de Vasevey, they attained the summit of La Salle at 8.45, and that of Mont Pleureur, still following the ridge, in 50 minutes more. Descending the eastern face of the mountain, which was entirely covered with snow, the party reached the Gétroz glacier in 45 minutes, crossed to its left bank below the ice-fall, and soon hit upon a track which, passing the Gétroz Alp, led them to the Val de Bagnes, where the inn at Monvoisin was reached at 1.30 P.M.

These peaks have more than once been climbed by members of the Swiss Alpine Club from Monvoisin, and Herr Weilenman is believed to have descended to the Val d'Hérémence by the route above described, but the expedition is new to English mountaineers, and deserves to be better known.

FÜSSHORN, *August 28.*—Miss Brevoort, Messrs. S. P. Cockerell, and W. A. B. Coolidge, with Tschingel, a dog, effected the first ascent of the highest point of the Füsshörner which is visible from the Sparrenhorn, but not from the Bel-Alp Hôtel. Leaving the hôtel at 3.2 A.M., the party passed by the châteaux marked Trist on the Federal map, and reached the highest group near the foot of the west of the two small unnamed glaciers. Mounting by stony grass slopes on its left bank, they followed a little valley between the moraine and the rocks of the Geissgrat, and reached the ice at 7.26. Thence, ascending the somewhat crevassed glacier, a sattel was attained at 11.13. Mounting the right-hand peak they found it lower than that to the left hand, which was reached by some steepish rocks at 11.40. This point is the one marked 3,666 mètres on the Federal map. The peak marked 3,746 mètres, and reckoned by M. Studer, in the 'Über Eis und Schnee,' as the culminating point of the Füsshörner, is locally known as the Geisshorn, and is separated from the Füsshorn group by a well-marked depression. Therefore our peak may be considered the real summit of the Füsshorn. After enjoying the magnificent view (extending over the Pennine and greater part of the Oberland Alps), the party left at 12.25, and regained the hôtel at 5.34. The expedition thus occupied 14½ hours' slow walking, including numerous halts. Guides: Anton Walden and Franz Gasser.

EIGER-JOCH, *July 5.*—Miss Brevoort and Mr. W. A. B. Coolidge, under the guidance of Christian and Ulrich Almer, effected from the Little Scheideck the second recorded passage of the Eiger-joch. The ascent of the great wall, which was formed of ice with a thin coating of loose fresh snow, occupied three hours. Owing to very unfavourable weather, no view was obtained, and the party was forced to halt 5½ hours in a tent on the summit of the pass till the violence of the

storm subsided sufficiently to allow them to descend to the Mönch-joch hut.

EIGER, July 14.—The same party ascended the Eiger by a new route. From the Little Scheideck they kept close under the rocky ridge which encloses the Eiger glacier on the left hand, and gained a plateau at the head of that glacier. Turning to the left up a snow wall they reached the crest of the snowy ridge, so conspicuous from the H. Bellevue, following which they attained the summit of some steep and difficult rocks. Tschingel, our dog, accompanied us.

SILBERHORN AND JUNGFRAU, July 17-18.—On July 17, the same party ascended the Silberhorn, and, passing the night in the Silberlücke, the next morning attained the summit of the Jungfrau, which the dog reached also.

MATTERHORN, September 5.—The same party, with the addition of Nicholas Knubel, reached the summit of the Matterhorn at 7 A.M. by the Zermatt route, and descended by the Breuil route. This is the first time the feat of crossing the mountain has been accomplished by a lady.

WEISSHORN, September 10.—The same party, starting from a bivouac on the 'Kastel,' above Randa, made the second recorded ascent of the Weisshorn from the névé of the Bies glacier.

DENT BLANCHE, September 14.—On September 13, the same party crossing the ridge of the Col d'Hérens just below the peak marked 3,595 on the Federal map, bivouacked on the rocks at the foot of the southern arête of the Dent Blanche, and next morning attained the summit at 9.48, keeping below the crest of the jagged ridge, and re-joining the ordinary route from Bricolla at the point where the arête is reached.

BEITSCHHORN, September 20.—The same party, starting from a bivouac on the left bank of the Nest glacier, ascended the Bietschhorn by the northern arête, and descended by couloirs and ridges on the western arête. This line of descent is not recommended. It is believed that this is the first time any of the three last-named peaks has been ascended by a lady.

FROM THE HEAD OF THE GLACIER DE MIAGE TO CONTAMINES BY THE COL 'DIT INFRANCHISSABLE.'—Immediately upon the right or west as you descend from the Col de Miage to the base of the great ice-falls, an abrupt and formidable wall of rock rises precipitously from the Glacier de Miage, and separates it from the head of the Glacier de Trélatête, a narrow and broken arête of rock, which here and there gives place to an almost perpendicular couloir of snow, extends from the Aiguille de Miage on to the Aiguille de Trélatête, and forms the crest of this ridge or ice-shed. On the face of these wild precipices—

strange as it may appear—a silver-mine (*argentifère*) bearing was worked for many years, chiefly by speculators from Cormayeur, until the smallness of the gain and the large loss of life among the miners, owing to constant avalanches and falling rocks, compelled its abandonment. All that is now left to mark the site of these strange operations are the crushed and broken remnants, at different levels, of three wooden cabins, with occasional strands of rope and iron rivets, by aid of which the men pursued their perilous occupation. Every trace of the dangerous track that once just faintly indicated the direction which must be followed to reach the mines, has long been worn away, and the cabins themselves will probably soon disappear under the combined influence of storm and frost. The most elevated of these huts is perched at an enormous height above the glacier, and beyond it, as is believed, no one had ever ascended. Last year, however, Michel Clement Payot climbed to the summit with Mr. Eccles, and descended on the other side down the whole length of the beautiful Glacier de Trélatête to Contamines. Payot made the passage again this season with myself and one of his younger brothers, Alphonse, who came with us as porter, and as I do not think that any account of the pass, which is a remarkably interesting one, has yet been given, a brief note of the expedition may be useful. We crossed the Col from the chalets of Miage on September 16, and having descended on the southern side nearly to the bottom of the last steep ice-fall, crossed the glacier diagonally to the west, and then, by a rapid snow-slope and rocks, climbed for several hundred feet up to the second of the above-mentioned cabins. When Payot was there on the previous occasion, he had found it still entire, but winter storms had since done their work, and it was now a roofless ruin. With a little labour, a temporary shelter was soon built up again, and a blazing fire, for which ample material was afforded by the timber of the deserted huts and out-houses, enabled us to pass the night with sufficient warmth, and as much comfort as a resting-place on bare planks admitted of. We started next morning at a few minutes after five, but a thick mist which long hung about the rocks, and filled the valley, rendered it at first somewhat difficult to preserve a true direction. The limits, however, within which the ascent is practicable, are so narrow that it is not possible to diverge far without coming to a standstill. It must be made at some point between the cabin in which we had halted, and a broad steep couloir filled with snow to the south of it, which could only have been crossed at imminent risk, owing to the falling rocks that raked it with a withering fire. All the night through we had heard the dull thud of the rolling masses as they bounded down and fell with a sharp crash on to the glacier below. It took us rather less than three hours to attain the summit, and during the whole of this time it was good hand over hand climbing. The danger consists in the utter disintegration of the rocks, which causes vast splinters to crumble to pieces as you touch them, and sometimes a large boulder which looked firm enough to support a house would break away, and once dislodged would fall in three or four terrific leaps on to the glacier many hundreds of feet beneath. With rocks in such a state, it is clear that caution is

necessary, and it would probably be unsafe to be upon them except at an early hour of the day, and under favourable conditions of weather. At about two-thirds of the way up, we came close to the last of the three cabins, and crossed over to examine it. It is now nearly choked with ice and snow, but, with the adjoining sheds, is of considerable size, and it is extraordinary how the materials for its construction can have been got up and into position. We reached the Col at eight o'clock, and, the clouds lifting grandly off the mountains, had a splendid view. I imagine that the western face of Mont Blanc can from no other point be seen to such effect, and the out-look on that side is magnificently wild; while on the other, to the west, the Glacier de Trêlatête, falling away from the arête on which we stood, winds between fine ranges of rock and snow, and sweeps in a graceful curve round a distant promontory of cliffs. The descent is quite without difficulty; three hours of pleasant walking brings you to the Pavillon de Trêlatête. It is not easy to find a distinctive name for the pass as that which would most accurately describe it. Col de Trêlatête has been already twice appropriated. In some of the Swiss maps it is marked, probably on account of its evil reputation for falling rocks and avalanches, 'infranchissable;' but this designation is scarcely accurate, as it has now been crossed at any rate twice, though the name may be allowed to stand until a better one can be devised.

A. MILMAN.

THE ENGADINE AND NEIGHBOURHOOD.

PIZ QUATERVERS (10,358 feet), *August 7.*—Anxious to avoid the dull monotony of the drive up the Engadine, and to profit by a fine morning, François and I left the high road half an hour above Zernetz, just before it crosses to the left bank of the Inn. An indistinct track through a dense pine forest led us into the narrow funnel by which the stream of Val Tantermuozza makes its escape. We remained on the right bank until we had passed a corner where the forest had been destroyed by spring avalanches. The upper part of the glen is more open, and affords pasturage for a few sheep and heifers. Looking backwards, Piz Linard and the snowy peaks of the Silvretta are seen picturesquely framed between the golden-tinted crags of the ridges close at hand. The stream soon disappears underground, and it is necessary to climb over a waste of boulders and avalanche-débris, in order to reach the level of the upper pasturages, which fill a considerable recess at the back of Piz d'Esen, the sugar-loaf peak conspicuous from Scans. Here a fox, an animal I saw for the first time in the High Alps, scurried across our path. Judging by his leanness, Reynard had not found marmot-hunting on the mountains much of a success. The glacier of Piz Quatervers was now close at hand on our left; we avoided the ice, mounting by a long and tolerably steep snow-slope to the névé basin. It was difficult to feel sure from below which was the highest point of the range above us. We decided to lose no time in gaining the ridge on our left. The sun was just beginning to tell on the rocks

overhead, and to set them free from the fetters of the last night's frost. Showers of small stones took advantage of their opportunity, and whizzed past our ears at a pace which made us prefer a more difficult climb to the easy but exposed gullies. A few steps along the crest of the mountain brought us to the top of its northern peak, which it was now evident was considerably the highest. No traces of a stoneman were visible, and I have every reason to believe that our ascent was the first. The top of Piz Quaternals is a long and deeply indented ridge, falling gradually towards the south. The northern peak overlooks the heads of Val Cluozza and Val Tantermuozza (the glen by which we had come); the southern, which is much lower, lies on the watershed of Val Cluozza and Val Muschem, a branch of Val Trupchum. The easiest way to ascend the mountain is probably through Val Cluozza and the Valletta.

Piz Quaternals is the highest summit of the range enclosed between the Casana Pass, the Spöl, and the Inn. The panorama is therefore complete. The Bernina and Orteler are almost equidistant, and are both seen to great advantage. Between the latter and the Weisskugel there is an unexpected view of the Venetian Alps, amongst which the peaks of Primiero stand out very distinctly.

In order to descend into Val Muschem, we were obliged to scramble over the whole length of the final arête. Our way then lay down a steep face of rock and snow. The head of Val Muschem is enclosed by a cirque of precipices which render a direct descent into it difficult, and perhaps impossible. We were rewarded for our patience in bearing considerably to the left round the top of the cliffs by finding a snow-filled gully, down which we shot in five minutes to their base. The torrent-bed, often entirely choked by snow-avalanches, offers the best means of escape from this narrow and savage glen. After some tiresome walking a goat-track came to our relief, and we soon entered the broader Val Trupchum. Thence to Scans is an easy walk over meadows and along a good path, which soon broadens into a car-road. Time—four hours up, three down.

PIZ ZUPO (13,120 feet), FROM THE ZUPO PASS, *August 14.*—The lowest point of the ridge between Piz Zupo and the Bellavista, was one of several points at which on the same day Mr. Tuckett, in one of his most rapacious moods, crossed the Alpine watershed. As however, he and his friends reached the Col from the south, viâ the Cresta Agiuza Sattel, and abandoned the proper descent to Poschiavo, to go in search of a third novelty, somewhere south of Piz Verona, there seemed something left to be done by a party who would content themselves with the one pass. Although the highest in the Bernina group, the Zupo Pass had never attracted any attention or been traversed in its entirety. It can now be recommended as enabling a mountaineer on his way from Pontresina to Poschiavo to go up and down the entire length of the two noblest ice-falls of the district, and to climb with singular ease a peak of over 13,000 feet.

The séracs of the Morteratsch glacier offered this year no obstacle, and we found five hours amply sufficient to reach the watershed from



THE AIGUILLE DU GÉANT, FROM THE NORTH-WEST.

THE FLOWERS OF THE FIELD

the Boval hut. Leaving my companions, Messrs. J. G. and R. T. W. Ritchie, on the pass, Henri Devouassoud and I took to the ridge of Piz Zupo. For some distance we enjoyed an easy rock climb. About half way the character of the work suddenly changed, and we passed on to a gently inclined but narrow snow arête. Fortunately the snow was in such good condition, that we were able to tread it down under our feet into a sufficiently firm pathway. Holding our ice-axes as balancing-poles, we walked steadily but quickly along the beautiful crest, which continued to rise before us in wave-like undulations, each higher than the last. At length rocks appeared below us on the right, and in forty-five minutes from the Col we stood on the top of Piz Zupo, gazing down into the depths of Val Malenco. It was the first time the summit had been gained from this direction, all previous ascents having been made by the N.W. face of the peak. The descent to Poschiavo from the pass commences with a long and laborious tramp across the névé of the Fellaria and Palu glaciers. As soon as possible we struck down the centre of the latter, and, after dealing successfully with its four ice-cascades, quitted the glacier at its lower extremity for the meadows of the Palu Alp in less than three hours after leaving the Col. Our only difficulty was in the lowest ice-fall, where we were stopped for a moment by a small but smooth cliff. Henri Devouassoud proved equal to the emergency; and after lowering us successively by the rope, solved the problem of the last man's descent by using the porter as a buffer, and dropping judiciously upon his back.

TARASP AND PIZ PISOCH.—In the communes of Tarasp and Schuls, in the Lower Engadine, on the verge of Switzerland, and within a few miles of the Austrian frontier at Martinsbruck, there issue from the ground on both sides of the Inn a number of mineral springs. Their properties are various, but the most in repute with patients are of a strongly saline character. Of late years a large bath-house—the largest in Switzerland, as advertisements continually inform us—has been built near to the principal sources.

The first disease on the long list prepared by the local doctor of those likely to be benefited by a course of the waters, is 'general fattiness.' Thither, accordingly, from the furthest parts of Germany, and even from Spain and Denmark, repairs a crowd of patients to seek relief from the bonds of corpulency to which nature or their own appetites have condemned them.

In short, if St. Moritz is, as Mr. Stephen thinks, the limbo of Switzerland set apart for the world—that is for kings, millionaires, and people who travel with couriers—Tarasp is its purgatory, providentially provided for the class whom the flesh has rendered unfit for such Alpine paradises as Grindelwald, or even Pontresina.

The bath-house, planted as it is beside the river at the bottom of a steep-sided trench, in a position very like a deep railway-cutting, is never, I think, likely to become a favourite resort of mountaineers. It is difficult even to feel mountain enthusiasm in an establishment tenanted chiefly by invalids or Italians whose walks are limited to the

extent of their own bowl's throw. The social atmosphere of the place is, as might be expected, not Alpine. The use of guides is unknown, as excursions are habitually undertaken in carriages, and have villages for their object; riding-horses for ladies are a rare luxury, and their owners attempt to bargain that they shall never be taken off the car-roads of the valley. But for the energy of Mr. Whitby, the resident English chaplain, mountaineering would be an unheard-of pursuit.

It is only fair, however, to say that travellers need not stay at the baths. They have the choice of two neighbouring villages, at both of which inns have sprung up of late years. Neither of these situations, however, struck me as attractive. Schuls, on the left bank of the Inn, lies on a bare hill-side, at a considerable distance from the commencement of all the pleasantest walks; while the 'pensions' at Vulpera, although better placed for excursions, look straight on to the dreary slopes behind Schuls—a prospect to which eyes accustomed to other Alpine scenery will scarcely reconcile themselves.

The neighbourhood of Tarasp is not, however, so wholly ugly as appears probable to the traveller who arrives at the bath-house by the high road. The slopes on the northern side of the valley remain, it is true, from whatever point they are seen, amongst the most naked and featureless in the Alps, and the knobs which crown the lower spurs of the Silvretta can only by an extreme stretch of courtesy be called peaks. But the natural features of the country on the opposite bank of the Inn are far bolder and more varied. There the ground rises above the river in a succession of wooded banks and grassy terraces, cut by the deep ravines of torrents issuing from wild lateral glens. Copses of birch and fragrant pine woods afford shelter to a host of rare ferns and wild flowers, while the sides of the path are garlanded with dog-roses blooming with a profusion and brilliancy peculiar to the spot.

On the lowest and broadest of the meadow-shelves or terraces stands the hamlet and castle of Tarasp; the latter a whitewashed building perched on a rocky knoll, and mirrored in a shallow tarn. Seen from a certain distance, it forms a picturesque element in the foreground. From this point, where an hotel ought to be built, a charming forest-path follows the right bank of the Inn to Steinhaus, and numerous sledge-tracks, commanding fine views of the stern limestone peaks which encircle the entrance to the Scarl Thal, lead to upper shelves of the mountain.

The Piz Pisoch, Piz St. Jon, and Piz Lischanna, are in their own way really fine objects, challenging of course no comparison with the snow-clad giants of the Upper Engadine, but rather recalling to mind the wilder portions of the Venetian Alps.

Piz Pisoch (10,427 ft.), the highest of the group, enjoyed for long a local reputation for inaccessibility, until, in 1865, Fluri took the trouble to come down from Pontresina, and, in company with a young native of Schuls, no longer to be found there, planted a flag on the summit. Some details of the ascent have been furnished for Herr Tschadi's 'Schweizerfuhrer;' and, I presume, it is on Fluri's authority that in

the new Grisons guide tariff the mountain is described as 'schwierig,' and taxed at thirty francs a guide. No one had followed Fluri and his friend until I climbed the mountain on August 3, this year, in company with François Devouassoud. Our experiences differed considerably from those of our predecessors, both as to the length and difficulty of the expedition; and the following directions will, I think, be found useful by future climbers. Turn off the road leading from Vulpera to Schloss Tarasp by a cart-track, mounting steeply at first, and then traversing meadows to the entrance of Val Zuort. At the corner take the higher of two paths, following a water-course until it reaches the stream. Cross, and ascend by an ill-marked track, which soon fails, and leaves you to find your own way through rhododendron bushes and over stony slopes beside the rocky barrier closing the glen. Climb the snow-slope above the barrier to the level of the Zuort glacier. A large snow-filled couloir now opens on the left, offering an unexpectedly easy means of surmounting the lower cliffs of Piz Pisch. Ascend the couloir for some distance, until above a slight bend in its direction a recess is seen on the left, with a small bed of snow in it divided from the couloir-snow by a bank of shale.

This spot is the gate of the mountain. A short sharp scramble places one on the rocks above the small snow-bed, and there is no further difficulty in climbing straight up them towards the gap at the northern base of the final peak. A few yards only before reaching it, turn sharply to the right, and, by keeping below the ridge and choosing with some care the easiest spots at which to pass a succession of low cliffs, the summit will soon be gained. The blindness and intricacy of the route form the only difficulty. If the right course is hit off, there is no hard climbing on the mountain; but the general steepness and abominably loose nature of its stony slopes render mountaineering experience or a good guide essential.

Of the panorama as a whole we saw and can therefore say nothing. The near view has a strong character of its own. The corn-fields and white villages of the Engadine enhance by contrast the savage effect of the wild limestone crags and gloomy glens which surround the peak on every side but the north. The drop from our feet on to the path which threads the defile of the Scarl Thal was absolutely terrific, and the precipices did not appear less tremendous when I looked up at them afterwards from their base.

The return to Tarasp may probably be varied without difficulty by turning to the left at the foot of the great couloir, and crossing by the col at the head of the Val Zuort into a branch of the Scarl Thal. Times—to foot of couloir, 3 hours; ascent of peak, 1 hour 45 minutes; descent to bath-house 2 hours 40 minutes.

VAL BEVERS.—The tour of Val Bevers may be rendered more complete and interesting by turning to the left (coming from St. Moritz) just before reaching the little tarn on the Suvretta Pass, crossing the ridge east of Piz Suvretta and descending over the glaciers of the Cima da Flix into the head of Val Bevers. A rope is necessary on the glacier.

THE TINZENTHOR.—From the Baths of Alveneu a most interesting path, unnoticed in guide-books, and unmarked even on the Federal map, affords access to the valley between the Tinzenhorn and Piz St. Michel. A series of ladders leads up the cliff beside the fine waterfall seen from the high road. The highest of them abuts against the mouth of a tunnel blasted through the rock. After groping through the darkness, one emerges in the gorge of the torrent, just on the brink of its boldest leap. The path climbs fearlessly into the wild ravine, and by a succession of ingenious contrivances, crossing numberless bridges and passing along wooden platforms, finds a way for itself beside or overhanging the roaring stream. It is throughout in good repair, and the only difficulty of the passage is an encounter in a narrow spot with one of the heavily-laden charcoal-burners for whose use it has been made and maintained. When at length the track leaves the waterside, it wanders for about an hour through a gigantic wild strawberry-bed.

From the opposite cliffs the stream bursts forth full grown, with a volume of water which recalled to us the fountains of the Lebanon. Beyond some untenanted chalets, built of massive unsmoothed pine-logs, the traces of a path become indistinct. Two steep ascents have yet to be climbed in order to gain the strange boulder-strewn wilderness which fills the space between the cliffs of the Piz St. Michel and Tinzenhorn. At the base of the latter lies a lake, the cobalt waters of which were flecked even in August with large patches of white ice. But a short distance from the lake is the foot of the great snow-couloir of the Tinzenthor. The slope is steep enough to require in places the use of the axe.

The western side of the pass has already been described in the Journal. On the present occasion we crossed a second pass over the ridge south of the Tinzenhorn, and descended to Bergun after a walk of seven hours through the most varied and romantic scenery.

MONTE DELLA DISGRAZIA.—So much has been written of late in Swiss Jahrbücher about the difficulties encountered and time required in the ascent of the Disgrazia, that it may be worth while to mention that on the same day I was on Piz Zupo my friends Mr. Tucker and Beachcroft, with François Devouassoud only as guide, reached the top of the Disgrazia in five hours from the highest châteaux in Val Sasso Bissolo. The final ridge, from the col beneath the Pico della Speranza to the summit, took two hours to traverse. Much of this time was spent in step-cutting.

THE ORTELER GROUP.—The remaining notes refer to the Orteler group.

It does not seem to be generally known, even so near the spot as at Pontresina, that the Stelvio road is now in thorough repair and crossed daily by two diligences during the summer months. A large new house is being built by the Ortelers at Trafoi, as a dependance to the old inn. A new inn, 'Gasthaus zum Orteler,' was opened this year at St. Gertrud, in the Suldenthal. The rooms were only half furnished this season, and the fare very rough, but the goodwill and intelligence

of the landlord made amends for many shortcomings, and give good promise for the future of his house. It stands in full view of the Orteler, on the meadows on the right side of the valley, immediately opposite the church and 'widum,' where travellers are still accommodated. The ascent of the Orteler, without local knowledge and with the snow-slopes in bad condition, took less than ten hours (all halts included) going and returning from St. Gertrud.

The most direct pass from St. Gertrud to Santa Catarina, is undoubtedly that between the Kreilspitze and Schrottenhorn, called by Lieut. Payer the Passo di Forno. In a snowy year, when the crevasses on the north side of the col are choked, it is easy even for a lady, and involves scarcely seven hours' actual walking. The name selected by Lieut. Payer can hardly be accepted, as the pass has no more connection with the Forno glacier than the St. Theodule with the Gorner. Passo di Cede, or Kreiljoch, may be suggested as more appropriate.

Ladies will be glad to learn that competent donkeys and a side-saddle may be procured at Santa Catarina. By such aid not only the Confiale, but the Tresero and Pizzo della Mare (Punta di San Matteo of Payer), are brought within the reach of moderate walkers.

The route over the Passo dei Tre Signori to Pejo, seems proverbially dull and monotonous, and Mr. Tuckett found it occupy eight hours. Mountaineers thinking of taking this road will do better, and only add an hour to their walk, by passing over the top of the Pizzo della Mare, ascending by the Gavia and descending to Pejo by Payer's route. The whole expedition is free from any serious difficulties, and offers a series of most glorious views of the Orteler and Adamello groups, besides the chance of a panorama unsurpassed in the Alps. Beware in the descent of being beguiled by a tempting path leading along the hill side to the left, which comes to a sudden end in a wood. It is better to go down at once into the bottom of Val del Monte.

DOUGLAS W. FRESHFIELD.

REVIEW.

TYNDALL'S HOURS OF EXERCISE IN THE ALPS.*

WE should perhaps have noticed Professor Tyndall's book sooner. Most of the articles, however, are already familiar to our readers; we know the history of his assaults on the Matterhorn, of his conquests of the Weisshorn, and of the various adventures in which he has proved conclusively that, if distinguished as a scientific observer of Alpine phenomena, he has no less claim to be distinguished as an active mountaineer. We may, however, briefly express our satisfaction that he has collected articles scattered in various places, where reference to them was more or less difficult. Some writers, perhaps, though we should have a difficulty in mentioning any name except that of Mr.

* *Hours of Exercise in the Alps.* By JOHN TYNDALL. London: 1871. Longmans.

Ruskin, have given more eloquent descriptions of Alpine scenery than Mr. Tyndall; others, it may be, have reflected more fully in their writings that spirit of simple adventure and athletic enjoyment, in which most of us have been content to approach the high Alps; but no other writer has been so able an interpreter of the complex feeling which Alpine scenery produces in the worshipper qualified alike by a love of beauty and a love of science. And, from this point of view, we may possibly be inclined to find fault with a passage in the preface. Mr. Tyndall quotes Mr. Herbert Spencer to the effect that great part of our enjoyment of natural scenery is due to 'certain deeper, but more vague, combinations of states that were organised in the race during barbarous times, when its pleasurable activities were amongst mountains, woods, and waters.' This theory is a corollary from Mr. Herbert Spencer's philosophical principles, and we by no means deny that there is a great deal of force in it. The limitations, however, to which it is liable seem to us to be well illustrated by Mr. Tyndall's own pages. According to Mr. Spencer's doctrine, Mr. Tyndall may be regarded, if the quaintness of the comparison may be excused, as an animated onion. The outside coat is the man of science. Peel that off, and we come upon the feudal baron, who delighted in the pursuit of bears, wolves, and foxes in the fastnesses of the hills. Deeper down, again, we should find the savage of the stone period, who once picked up a precarious existence in the wildernesses now full of railroads and monster hotels. The instincts inherent in these deeper strata of his being still survive, and find a satisfaction identical in kind, though modified in their manifestations, by driving Mr. Tyndall to the rocks of the Matterhorn and across the glaciers of the Oberland. The doctrine, we have said, may probably be true in great measure, though it would explain much more fully the pleasure enjoyed by the race of simple scramblers, than that which absorbs a cultivated and scientific mind. Matthew Arnold has called our nobility the 'barbarians,' and would doubtless assert that their love of field-sports may be a relic of barbarian tastes. On the same principle, the love of climbing, pure and simple, shows that the pleasure of pure muscular exertion, which finds an inadequate vent in our ordinary town life, sends us to attack the Alps. But surely this leaves out of account one, and, as we venture to think, the most important ingredient in our delight. The love of mountains, in fact, is a purely modern passion, and has increased, instead of diminishing as man became more civilised, and as the barbarian presumably died out within him. If we endeavour to discover the nature of this phenomenon, nobody can supply a better answer than Mr. Tyndall. There is scarcely a description in his pages which is not, so to speak, saturated by the ideas derived from scientific observation. We need hardly give examples from pages so familiar to our readers, but we will take one at random. Here, for example, are some fragments from his descriptions of sunset under the Weisshorn. The moon, he says, 'finally appeared exactly behind the peak of the Rymfischhorn, the cone of the mountain being projected for a short time as a triangle on the lunar disc. Only for a short time, however; the silver sphere soon cleared the mountain, and bore away through the

tinted sky. The motion was quite visible, and resembled that of a vast balloon. All the lower portions of the mountains were deeply shaded, whilst the loftiest peaks, ranged upon a semicircle, were fully exposed to the sinking sun. They seemed pyramids of solid fire, whilst here and there long stretches of crimson light drawn over the higher snow-fields linked the summits together. An intensely illuminated geranium flower seems to swim in its own colour, which apparently surrounds the petals like a layer, and defeats by its lustre any attempt of the eye to seize upon the sharp outline of the leaves. A similar effect was here observed upon the mountains; the glory did not seem to come from them alone, but seemed also effluent from the air around them, &c. Now we feel, as our readers will willingly acknowledge, the truthfulness and power of this description. We have all witnessed such sights, and we have all been dimly sensible of the influences described, though few, if any, of us could put the sentiment into such appropriate language, or so accurately analyze the sources of our emotion. And we may boldly put it to our readers whether the images thus forcibly described could by any possibility have occurred to the supposed savage in prehistoric times, or whether they were not rather indicative of a mind thoroughly prepared by familiarity with scientific observations, and with that whole current of feeling which has only become manifest at a recent period. We should just as soon expect a savage to be thrown into ecstasies by the beauty of the most abstruse theorems of the undulatory theory of light, as to see him moved by the peculiar effects of light so forcibly described by our author. The love of mountain scenery is in truth a highly complex emotion; it has its root in thoughts and feelings which we cannot even attempt to indicate, as, indeed, nothing like an exhaustive account has ever been given of them. So much, however, we may venture to say; that whoever will attempt to analyse the pleasure which he derives from such a sunset as that described, or from any of the innumerable scenes which have delighted his soul in the high Alps, will find that an explanation which takes into account only the physical pleasure with which a savage might enter, or even the dumb pleasure of a chamois-hunter, is grossly inadequate. The mountains can only be fully appreciated by one of a cultivated mind, by a man in whom the poetry and the science of the most civilised races awakes a sympathetic emotion. We could not wish for a better exemplification of this truth—one which the Alpine Club, at any rate, will be slow to deny—than the pages of Mr. Tyndall; and for that reason, amongst others, we have great pleasure in recommending them to our readers.

We will only add a few remarks on a subject specially interesting to the Alpine Club. When Mr. Tyndall made his ascent of the Matterhorn in 1868, he reached the point from which he had been repulsed in 1862. He makes the following remarks in explanation of that failure:—‘I think there must have been something in the light falling upon this precipice that gave it an aspect of greater verticality when I first saw it than it seemed to possess on the present occasion. We had, however, been struggling for many hours previously, and may have been dazed by our exertions. I cannot otherwise account for three

of my party declining flatly to make any attempt upon the precipice. It looks very bad ; but no climber with his strength unimpaired would pronounce it without trial insuperable. Fears of this rock-wall, however, had been excited long before we reached it. It was probably the addition of the psychological element to the physical—the reluctance to encounter new dangers on a mountain which had hitherto inspired superstitious fear—that quelled further exertion.'

It is no disparagement to Professor Tyndall, who was not, we fancy, one of the three refusers, if we say that we suspect this 'psychological element' to have been the chief cause of the retreat. Indeed, the psychological element prevented nearly all mountaineers from even attacking the base, to say nothing of the summit, of the mountain. And we only notice the statement as a frank explanation of a circumstance which may have struck some readers as singular, and as explaining further the curious difference which all climbers of any mountain have discovered between the first and all subsequent ascents. Though the fact is recognised in words, few people succeed in fully realising how greatly the success of mountain expeditions depends, not upon the intrinsic difficulties, or the state of the weather, important as those conditions are, but upon the state of the adventurers' nerves, stomachs, and imaginations. That is a lesson which cannot be too fully impressed on all new aspirants.

THE
ALPINE JOURNAL.

FEBRUARY 1872.

ROUND MONT BLANC. By LESLIE STEPHEN. A Paper read before the Alpine Club, December 12, 1871.

SOME time ago I ventured to write an article, called the 'Regrets of a Mountaineer.' In it I endeavoured to express the sentiments which might naturally occur to a man who, having once been bitten by the mania of mountain-climbing, and having indeed suffered from a somewhat virulent type of the disease, had been suddenly cut off from indulgence in his favourite pursuits. Following the precedent of dramatic performances, I bade a solemn farewell to the mountains, and—still according to that precedent—I have to confess that the farewell was perhaps a little premature. That which ought to have been was not, in fact, my positively last appearance in the character of an assailant of the High Alps. Should the announcement be made in the spirit of a penitent, or of a sinner returning to the true fold? Must I speak like a dipsomaniac who has, after a temporary course of teetotalism, once more fallen a victim to the charms of brandy-and-water, or like a deserter begging for re-admission to the army from which he has prematurely withdrawn himself? Members of the Alpine Club will, of course, be inclined to take the latter view of the question; and I must regard them as receiving the present confession. Perhaps, however, I might make some defence to those who would regard my conduct in a severer light. Good resolutions, I might urge, are made by all sensible men chiefly for the pleasure of breaking them. Or rather, to define the precise state of the case more accurately, I may perhaps put it thus: the advantage of resolving to break off a vicious habit is that you no longer practise it when it is disagreeable; though you

VOL. V.—NO. XXXV.

U

need by no means feel bound to refrain when it is only liable to the objection that it is immoral. My position, at any rate in regard to mountaineering, is, that I no longer indulge in it as, to say the truth, I once used to indulge in it, even when in the depths of my private consciousness I felt it to be rather a bore; I have cast off that fanaticism which made me regard it as a solemn duty to spend all available moments of leisure in measuring myself against some previously inaccessible peak. I regard mountain climbing as a weakness instead of a duty, and therefore I only climb when I thoroughly enjoy it; and this is a state of mind which, if not rising to the highest moral strain, has, at any rate, many undeniable comforts.

So much by way of preface to a paper which might perhaps most fitly be entitled the 'Relapses of a Mountaineer.' And yet I must add that the relapses have not been of a grave character. Indeed, I have so little to communicate to the Club that, but for the barrenness of these latter days upon which fate has cast us, I should scarcely venture to consider that I have the raw materials of a presentable narrative. Such crumbs of remainder biscuit as I have managed to gather may, however, be palatable to appetites doomed to a very scanty diet; and I will venture to chronicle with some minuteness the incidents which produced my recent lapses from the paths of virtue. And, first, let me endeavour to set forth the numerous temptations by which I was surrounded.

I was spending a month at the lovely village of St. Gervais. Though the Chamouni diligences call daily at the baths, few cockneys stop at that repulsive establishment, and still fewer climb the 600 feet which are necessary to reach one of the most beautiful centres of Alpine scenery. The excellent Hôtel du Mont Blanc, in which we took up our quarters, was almost free from the visits of our dear fellow-countrymen, and I was reduced to solitary rambles. St. Gervais can boast of an almost infinite variety of *courses*, great and small, rising by exquisite gradations from the Mont Joli up to the monarch himself. In almost all these walks, I need hardly say, the view of Mont Blanc is the culminating point of the interest. I saw him from many points of view, and meditated much on their respective merits. Mont Blanc is a noble object, when looking across the valley of Montjoie from the Mont Joli; or when lying in one of the little hollows amongst the great beds of rhododendrons that cover the undulating summit of the Prarion; or, still more, for the explorers of a less hackneyed district, from any of the summits that rise above the great limestone wall which stretches from the Aiguille de

Varens to the cliffs above the Col d'Anterne. I climbed that wall at two points; and I will in passing notice, for the benefit of the lovers of scenery, that one of the most perfect of Alpine walks may be taken by climbing the path which leads to the pass of the Portetta. A very good path lies beneath the western half of the limestone range of cliffs which enclose the *Plane de Joux*. Just where the forest ceases, a number of streams suddenly burst in full vigour from beneath huge boulders covered by a dense growth of underwood. From that point, or a little higher, *Mont Blanc* appears, filling up the whole space between the horns of the great crescent of limestone cliffs. After climbing a path not unlike that of the *Gemmi*, the traveller reaches the edge of that singular stone-glacier—as it appears—called the *Desert de Platei*; and from thence he may either climb the *Aiguille de Varens*, which lies at some distance from the edge of the plateau; or, if his time be too short, he may easily ascend the point known as the *Aiguille de Platei*. From any high point in this neighbourhood the view of *Mont Blanc* is necessarily superb. I was not sufficiently favoured by the weather to enjoy it in perfection; but from what I saw and inferred, I came to a conclusion rather opposed to the ordinary doctrines about *Mont Blanc*. If anyone were asked what is the best single view of the *Mont Blanc* range, he would probably reply by naming one of the well-known *belvederes*, the *Buet*, the *Brévent*, the *Mont Joli*, or, if he prefers the southern view of the mountain, the *Cramont*, or it may be, the *Ruitor*. Now, in endeavouring to settle this question, two or three principles may be laid down. It must, in the first place, be admitted that a view of the panoramic kind ought to include as many points of the range as possible, compatibly with a due picturesque effect. The *Mont Joli*, for example, must be pronounced a failure, in so far as it affords a very imperfect view of the north-eastern portion of the chain. Secondly, the point of view should be so high and at such a distance as to involve the least possible distortion of the fair proportions of the mountain. The *Brévent*, for example, and the *Mont Chétif* near *Courmayeur*, are perhaps rather too low and too immediately beneath the monarch to enable the spectator to do him justice. And thirdly, it is certainly desirable, if possible, that the whole height of the mountain should be visible, without any intervening range to break the effect of his imposing grandeur. The *Buet* and the *Cramont* fail conspicuously in this respect; and I imagine that they owe part of their reputation to fashion, and (in the latter case) to the influence of *Saussure*. Guides are an unimaginative

race, and when a point of view has once obtained a reputation, it is hard to overthrow it. No other reason can be given why the range of the Aiguille de Varens should never have obtained the reputation which is its undoubted due. Admitting the grandeur of the view from the Buet, it is impossible to rate it above, or, in my opinion, on an equality with, that obtained from the cliffs divided only by the deep ravine of the Arve from the majestic snow-fields of the great mountain.

And yet, admirable as is the view from any part of that remarkable plateau, I discovered — and my apology for making these remarks is, that I appear to have been the first person who has made, or at any rate published, the discovery — that there is yet another point of view which combines in the highest degree all the essentials that I have enumerated, and which has yet never been visited by a traveller. If I am right in this assertion, it is a curious proof of how much is overlooked, even in the most familiar portions of the Alps; and I think that the reasons I can allege will at any rate raise some *primâ facie* presumption in my favour. Indeed, I regard the matter as almost capable of mathematical demonstration. If anybody will glance at the map of the Mont Blanc range, he will see that, in order to obtain a view of all the chief summits, the spectator must be placed in or near a line drawn from Mont Blanc through the Aiguille du Gouté. Otherwise, the central dome will cut off either the western or eastern end of the chain. We must look for a summit of between (say) 9,000 and 11,000 feet somewhere sufficiently near to this axis. It must be at a distance of, at least, ten or twelve miles from the object, and there must be no intervening range, but, if possible, a level plain in the foreground. It is impossible to state these propositions without at once perceiving that we are describing the celebrated view from Sallenches, as it would be seen by a spectator from a balloon raised some 8,000 feet above the town. The view from Sallenches is, in fact, unique, and the only objection to it is that Mont Blanc is too much foreshortened, owing to his great height above the spectator. The question then occurs whether there is no peak which will serve the purpose of the hypothetical balloon; and I answer by saying that there is such a peak, and that its name is the Mont Fleuri. Looking, in fact, from St. Gervais, the great wall of limestone precipice which forms a background to Sallenches is crowned by a lion-like mass of rock, on which I had frequently looked with curiosity before I made its closer acquaintance. Nobody except chamois-hunters had

made the ascent, though it was said to be free from all serious difficulty; and I had the pleasure of ascertaining, by personal observation, that the view of Mont Blanc is all that I have described. Nearly every summit in the chain, from the Col de Balme to the Col de Bonhomme, is visible; the whole 14,000 feet of ascent from Sallenches to the summit is revealed, and made more striking by its contrast with the level intervening plain of the Arve valley; whilst the height and distance of the Mont Fleuri is just sufficient to show the huge mass in its fair proportions, whilst preserving the distinctness of detail. The height, I may observe, is not known to me; but, as the mountain is palpably higher than the Aiguille de Varens, I should put it at between 9,000 and 10,000 feet. And now I am ready to maintain against all comers that, although tourists have been seeking the best point of view for seeing Mont Blanc for at least three generations, nobody except a few chamois-hunters has ever seen that particular aspect of the monarch of mountains which is demonstrably the best.

Nobody? it will be asked; not even yourself? and I am compelled reluctantly to repeat, nobody! And thereby hangs a tale, which shall be told as briefly as possible, though it is strictly relevant to the main purpose of this paper. The studied ambiguity of a certain sentence in my last paragraph may not have been noticed; but though I satisfied myself by 'personal observation' of the surpassing merits of the view in question, I am constrained to add that my observation was taken from a point some distance below the summit. My friend (Mr. J. Birkbeck, jun.) and I took a guide one fine morning from St. Gervais, and walked by moonlight to Sallenches, and thence up the beautiful glen of Cordon to a lofty alp immediately under the Mont Fleuri. It would be hard to find a more exquisite spot than that from which we saw the sunrise, and it is easily accessible, even by those whose delight is in the legs of a mule. A brilliant lawn, studded by groups of beech trees, a mighty wall of cliff rising behind with a really fine waterfall spouting in Staubbach fashion from a ledge midway, and a grand view of Mont Blanc and his attendant aiguilles in the distance, put us in the best possible spirits. But our guide—whom, because it is not his name, I will call Russell—was labouring under a singular disease. Its symptoms were a burning thirst, a certain squeamishness like that which the vulgar call 'hot coppers,' and a decided incapacity for steady pounding up hill. He attributed it partly to an undue consumption of milk at the châteaux—which, how-

ever probable in itself, scarcely accounted for its coming on a couple of hours before we reached them—and partly to a bullet-wound in his arm, which had been received some months before as he was following the fortunes of Garibaldi. At any rate, it delayed us very much in our ascent, and perhaps had something to do with his decision, when we were very near the top, that the fresh snow made the last rocks too dangerous to be attacked. It is my invariable rule, however, not to press a man to proceed to what he considers to be dangerous, whatever the causes of his nervousness, and I do not regret that I observed it in this instance. Yet if I had had a little more experience of Mr. Russell's character, I should perhaps have been less ready to listen to his appeals for a retreat. For on a subsequent occasion the same singular disorder manifested itself on a start for the Aiguille de Miage, and he became not a little sulky when I positively refused to allow him to treat it by doses of brandy at a tavern. On that occasion also we were forced to retreat from the Aiguille de Miage (and I must add that I think our retreat was no more than prudent) by the state of the snow; and I found that from some cause or other his nerves had been so shattered that from a daring mountaineer, as I am told he had once been, he had sunk to be one of the least satisfactory companions I have ever had for the passage of very moderately difficult rocks. I cannot give his real name; but let travellers at St. Gervais be careful as to their guides.

Before leaving the Mont Fleuri, I must observe that though there appears to be no difficulty in climbing it, some local knowledge would be useful. The last part of the ascent lies through a very deep couloir, which descends into a wild hollow on the southern, or it may be the south-western, side of the arête which the traveller follows so far as it is practicable, in starting from the valley of Cordon. But the discovery of the route may fairly be left to the ingenuity of experienced mountaineers. I will only remark that the experiences thus described ended by sharpening my appetite for the mountains. The constant views of Mont Blanc from various heights and in various directions disturbed my peace of mind; and the irritation produced by useless guides made me long for an expedition more after the old fashion. I groaned at the ineffectual nibblings at second-rate peaks, and I longed inexpressibly to be once more assaulting with an Anderegg or a Lauener one of the true race of giants that looked so invitingly near. Other circumstances speedily heightened my zeal. We had transferred ourselves to the pleasant little inn kept by Couttet (dit *Baguette*)

at Chamouni. It is an oasis in the midst of a desert of cockneyism. Looking towards the great mountain, and having at your back the huge caravansaries which bring New York and Piccadilly to the Alps, you may fancy yourself at Zermatt or the Aeggischhorn. There my growing desire to climb was strengthened by the presence of sundry members of the Alpine Club. The enthusiasm of the younger was contagious; and my own contemporaries, who have more or less retired from the field of action, who groaned at grass slopes, poured maledictions upon zigzags, and appeared to find the Alpine air sufficiently stimulating to their appetites without the aid of rough exercise; even those respectable veterans, I say, could still tell stories of youthful prowess, and solaced their postprandial hours not more by tobacco and other gentle aids to digestion than by eloquent exhortations to their friends to be up and doing. If I—was the substance of most of these harangues—measured no more round the waist than you, my energy would know no bounds, and the lurking scepticism evoked by such protestations was unable to quench the effect of the eloquence by which they were enforced. Moreover, those pleasant tobacco parliaments were joined by an honorary member of our club, who is in danger of becoming one of the recognised attractions to Chamouni. M. Loppé, who may be described as court painter to the monarch of mountains, has, as my readers know, or ought to know, opened a gallery of Alpine paintings at Chamouni, and there spends most of the summer. He is always ready to give the friendliest advice to the tourists who have the good fortune to make his acquaintance; and was the object of incessant, and I fear rather wearisome, appeals from everyone who wanted anything done. Ladies taking a mule to the Glacier des Bossons, and travellers on the look-out for a hitherto untrodden peak, trespassed with equal recklessness and equal impunity upon his good-nature. To him I owed a very pleasant walk, which may be indicated to mountaineers, as not yet sufficiently known. Leaving Chamouni in the morning, we ascended the Glacier du Tour, crossed the Col du Tour, thence passed to the Fenêtre de Saléna, and crossed by the Col de Chardonnet to the Glacier d'Argentière, returning to Chamouni at night. It is difficult to design a walk which, with an equally small expenditure of fatigue, shall show so much of the very grandest snow-scenery. My appetite for climbing was naturally sharpened; but the final impetus was yet to be given. M. Loppé informed me that there were still two or three untrodden peaks on the Mont Blanc range, and of these the most seductive, because offering the greatest chances of

success, was the Mont Mallet. Whilst shaking under this temptation, there appeared another and a most unanswerable cause for action, in the person of my old friend Melchior Anderegg. He came fresh from ascents of the Matterhorn, and I know not what other peaks, in company with Messrs. Mathews and Morshead. I had engaged him for a week, more for the sake of old acquaintance than with a design for work, and destined him chiefly to the occupation of carrying a certain young lady of eight months old to such heights as were appropriate to her time of life. But the combination of circumstances just enumerated was too powerful for me. Mont Blanc had been appealing to me for weeks with eloquent silence; M. Loppé, not only by his pictorial and verbal exhortations, but by his guidance on the glacier expedition I have noticed, made my mouth water for higher things. The youthful enthusiasts who said 'Come,' and the decayed veterans who said with equal emphasis 'Go,' urged me in the same direction; the weather was perfect, the snow in first-rate order; a new mountain was waiting for the first comer, and here was Melchior Anderegg promising to compensate me by his unsurpassable skill for the annoyances suffered from inferior guides. If Adam had been able to produce equally good reasons for eating the apple, his justification, to human eyes at least, would have been amply sufficient; and what was I that I should be better than my remote progenitor? If that precedent be somewhat doubtful, we live at any rate in days when the rulers of our country have laboured to erase the word 'irrevocable' from the political dictionary as actively as the Alpine Club to get rid of another objectionable epithet. Is this a time for being over-scrupulous as to pledges or consistency? Leaving my good resolutions to pave any place that may be in want of such materials, I agreed once more to gird up my loins and start in search of glory.

What was the precise task before us requires a few words of explanation. The tourist who climbs the giddy heights of the Montanvert sees before him, apparently closing the valley of the Mer de Glace, a mass of mountains upon which the unsophisticated taste of an earlier race of peasants conferred the name Mont Mallet—*mallet* being the patois for *mauvais*. The great block conspicuous from Chamouni itself, and including Mont Blanc, was called the Mont Maudit. In a free translation they might, I presume, be called Mount Hell and Mount Purgatory. By degrees the name of Mont Maudit has been confined to one peak in the higher mass; and by a similar process Mont Mallet has become the name of a single summit, and indeed has almost disappeared from popular usage; for the Mont Mallet, so called

in the official map, is more generally known as the Aiguille Noire (though this name again is affixed in Mr. Reilly's map to a subordinate summit). If the Dent du Géant be regarded as a canine tooth in a monstrous jaw, from which all the incisors have been extracted, the jaw itself will be represented by a wild ridge sweeping round the head of the glacier, and the opposite canine tooth will be the Mont Mallet. It is of nearly equal height with the Géant, and may also be regarded as the highest point in the wild range called *les Périades*. A huge glacier descends from the northern side of this range, and joins the Glacier de Léchaud some distance above its confluence with the Glacier du Taléfre on the opposite bank. Few travellers have ever ascended this (apparently) nameless glacier; and the completeness with which, in spite of its vast dimensions, it is withdrawn from the observation of tourists, few of whom would even suspect its existence, is a striking proof of the immense extent of the Mont Blanc snow-fields. A few crystal-hunters had rambled among the *Périades*, and Mr. Wills had climbed the glacier in his attempt to cross the Col des Grandes Jorasses. A short inspection and the testimony of M. Loppé convinced us that the most promising route was to ascend this glacier and to reach, if possible, a col lying, as it were, at the back of the Mont Mallet, and forming the watershed between the French and Italian valley, and thence to attack our mountain from the east, i.e. from the side opposite to that visible from the Montanvert. And this led to a remarkable incident, which I commend to the consideration of the Alpine Club. My friend Mr. Wallroth had joined forces with me, and proposed to bring with him a very eminent Chamouni guide, with whom he had attempted just before to ascend the Aiguille Blaitière. They had been repulsed by showers of stones in a couloir of such unprepossessing aspect that the bare attempt to ascend it became a standing joke with our party. The guide—he shall be nameless—has a high character for courage and skill, and we were not a little amazed when he came to Mr. Wallroth with a story of a venerable father who had begged him not to attempt the glacier of the Mont Mallet. This venerable person declared, on what grounds it did not appear, that it was the most frightfully dangerous of all Alpine glaciers; it was a nightmare of a glacier; a collection of all horrible crevasses, seracs swept by avalanches, falling stones, and I know not what else, defying the skill of the bravest of guides. This hypothetical father—for I confess to classing him in my own mind with Mrs. Harris—was impregnable to argument; and the guide, taking refuge under the touching veil of filial piety, turned a deaf ear to our

remonstrances. Nor was this all. After we had good reason to know by personal experience that the glacier was a glacier of the most domestic and pacific character, a glacier so mild that, as somebody said of a small earthquake, 'you might stroke it'; a glacier which we traversed from top to bottom at a jog-trot, and which barely deserved the ceremony of a rope; after we could make our affidavits to all this, the most fearful reports continued to circulate in Chamouni, and induced another guide to bring forward a venerable mother in the same character as his colleague's father. Other benevolent persons endeavoured to bring female influence to bear upon the travellers themselves, by informing a lady that her husband was moving to almost certain destruction. Luckily the said lady possessed more strength of mind than had been expected, and the final result was simply to intensify our desire for success. Different opinions were expressed as to the secret of this singular reluctance of some of the best men in Chamouni even to look at a glacier, whose supposed terrors a single look would have sufficiently dissipated. Those who like it may believe in an epidemic terror affecting the venerable relations of our guides. M. Loppé inclined to the opinion that the nerves of the Chamouniards had been shaken by the accidents of the previous year. My own belief is that it was simply a case of jealousy, and that the objection was not so much to a glacier as to a Swiss guide.

It may be right to mention that, since returning, I have referred to Mr. Milman's interesting account of his expedition to the Col des Grandes Jorasses, and I there find that one at least of the guides who refused to accompany us had been with Mr. Milman on that occasion. This being so, it would appear that the fiction about the difficult glacier was even less excusable than one would have supposed, for the guide knew from personal experience that the glacier was perfectly practicable. It is true that Wills and Milman found, as I infer from their narrative, far greater difficulties than we encountered; and it appears to be generally the case that the high snow-fields were this year unusually easy, in consequence, it would seem, of the quantity of snow which fell during the previous winter. Still it is utterly impossible to justify a good guide for shrinking from the danger, if danger it can be called, of finding a passage through a series of seracs which would not at the worst be more troublesome than those of the Col du Géant. On the whole, therefore, I think that this fact tends to strengthen the theory that jealousy of a foreign guide was at the bottom of the reluctance exhibited.

On the night of Friday, September 1, we slept at the Mon-

tanvert, and I prided myself not a little on the obstinacy with which I had resisted an insane proposal to sleep in the hut at the Pierre de Béranger. It is my opinion—and I state it in defiance of the zealots who love to torture themselves at lairs combining cold bad air and general discomfort in the highest degree—that no policy is worse than that of gaining an hour in the morning at the expense of a bad night. Indeed, as a rule, nothing is gained; because it is generally possible to reach the said lairs over the easier ground below by the time at which it would in any case be possible to start for the more difficult climb above. But, right or wrong, I have done with sleeping in anything but beds, always excepting fresh hay. A mountain which involves a night on the rocks is a mountain which my sense of duty to my family imperatively forbids me to undertake. When we started from the Montanvert at one o'clock, by the light of a waning moon, I was in a thoroughly peaceful frame of mind. Quiet slumber had come to me in a decently good bed, and its calming influence still rested over me as I moved in a half doze along the well-known track up the Mer de Glace. The night was one of those questionable ones in which the mountains seem as if they had been painted against the sky in moist colours which had 'run'; they were surrounded by a faint misty halo, which blurred their sharp outlines; light clouds drew an occasional veil across the moon, and even when it shone out the rays were feeble and uncertain. I ought, I suppose, to have been annoyed by the prospect of indifferent weather, and perhaps in more enthusiastic days I might have been restless; as it was, I seemed to be continuing a peaceful dream; the moon was nothing but a dim night-light; the clouds were muslin curtains swaying sleepily in front of her; the little party silently plodding in front of me were such figures as one watches in a half-dream, moving monotonously yet never seeming to advance; and the huge glacier itself lay ice-bound in a slumber almost death-like, except that the booming sound of a distant moulin suggested that the monster was peacefully snoring. Brilliant moonshine on the mountains is crisp, frosty, and stimulating; but in such a night as this Nature has that watery, tremulous, and rather shambling aspect, which she sometimes wears to a gentleman lurching homewards under London gaslights just before dawn; only here the change was without and not within us; the moon herself, not our little party, was in the state so vividly described by the poet as 'na' that fou', but 'just a drappie in her ee'; and the stern voice of the mountains was for once sentimental, not to say maudlin. Gradually daylight straggled down to us, but through ever-increasing masses of cloud. Far over head, a faint flush

upon the loftiest vapours showed that the sun was rising, but the lower strata only grew more black and angry as the lights and shadows became more pronounced. The Aiguille Verte, in particular, was shrouded in vast masses of gloomy vapour, which clung throughout the day to his grim cliffs; another body of cloud, of even more threatening aspect, was suspended in mid-air across the Mer de Glace. So dismal was the prospect, that after our first meal in a crevasse I threw out a suggestion that we were only wasting our time by perseverance. Luckily, a sterner sense of duty prevailed, and we toiled up the glacier till, about eight o'clock, we were seated on its highest plateau. Close above us, as we knew, rose the final rock-tower of the Mont Mallet, and we also knew vaguely that the col of which I have spoken was in our immediate neighbourhood. But we were now in the position of men who, having climbed a long ladder, find that they are only knocking their heads against the ceiling—a ceiling composed, in our case, of the dense masses which were hanging in that painfully uniform formation 'the under-roof of doleful grey,' so well known to luckless mountaineers, and cutting off the heads of all the peaks at a height of about 11,000 feet. There was nothing to be done but to eat and then to smoke, and then to discuss the length of time during which we were bound in honour to wait. A few shifts in the gathering vapours permitted occasional glimpses upwards, and forbade us entirely to despair. Suddenly, the keen-eyed Wallroth exclaimed 'Chamois!' and pointed upwards towards the rocks of the Mallet. There, in fact, through a gap in the clouds, appeared a chamois, prancing down towards us, and giving his shrill whistle of alarm. The vapours instantly drifted back again, and Melchior was ready with an ingenious theory. We, he said, had frightened the chamois upwards; the animal had tried the rocks, and finding them impassable, was coming downwards and reconnoitring the enemy. The inference was that the rocks which had repelled a chamois would probably be impracticable for us. Having uttered this gloomy opinion with an air of considerable satisfaction, Melchior sat down, and cheerfully observed that he had foreseen, from the time we started, that we should be stopped by the weather. Rather annoyed at this application of the 'I told you so' formula, I was just about to retort, when the wind took the words out of my mouth. Puffing aside the vapour-curtain, it revealed a lovely little glacier rising at a gentle slope towards the col which we had marked from below as the stepping-stone to the summit. We sprang hastily to our feet, and pushed

forwards. Climbing an easy snow-slope, and cutting a few steps, we found ourselves well on the glacier, and scarcely a hundred feet lower than the col. Ten minutes more, and we should have won the day. The cup, so despairingly regarded, was suddenly presented to our lips; two steps more, and it was as suddenly dashed away; for the glacier was rent from side to side by a monster crevasse; and a wall of ice varying in height from (at a guess) twenty to a hundred feet fairly blocked all further progress. Without a ladder all direct assault was hopeless, and the fearfully steep cliffs of ice by which the glacier was bounded on both sides seemed to make it impossible to turn the obstacle. Melchior was furious, and tried to force a way up a very nasty mixture of smooth rock and ice on our left. He hacked away vigorously for a time, and finally announced to me his opinion that an ascent was possible, but that the descent would be dangerous. It was, in fact, one of those places where it was impossible to make satisfactory progress in consequence of the underlying rock; and, of course, the danger would be increased when we could not see to place our feet. In other words, it was not a place for one who had long ago forsworn dangerous expeditions. Accordingly, I gave the word for retreat with a complacency which rather disgusted my more sanguine friends; but the comfort with which one can consult safety rather than glory is the great advantage of a *blasé* state of mind. For Melchior it was a bitter fate: to be beaten by a second-rate peak; to be beaten when at the very verge of success; and to be beaten in accordance with the predictions of Chamouni was a triple vexation. More than once he returned to the assault, but only to find it worse than before; and indeed the precautions which even he had to use in returning were such as forcibly to suggest the impropriety of an attack by less experienced performers. We retired at length sulkily and grimly, and discussing the possibility of some other route; when suddenly, as we reached once more the scene of our last meal, another puff of wind revealed the rocks on which we had seen the chamois. As seen from the Glacier de L'échaud, this face of the Mont Mallet has somewhat the appearance of a small model of the Matterhorn, and it scarcely required Melchior's ingenious argument from the chamois to convince us of the hopelessness of its rocks. But now, to our surprise and delight, it became at once evident that, as in so many other cases, the rocks looked worse from below than above, and, in short, that there was a fair prospect of climbing them with ease. The hour, however, was late, and the weather doubtful, and a night on the glacier would have been a probable result

of an attempt to finish our mountain off-hand. We returned to Chamouni by about 3.30, and reported the result of our operations. M. Loppé, to our great pleasure, agreed to accompany us in another attack; and here occurred the second difficulty about guides, to which I have referred above. A jovial porter, one Alexandre Tournier agreed to join us; and after attending a concert at Chamouni on Sunday evening, started at 11 P.M., and reached the Montanvert a little before 1, just in time to join us. He walked all day pluckily and cheerfully, and I commend him to future travellers. The moon still favoured us, and the night was clearer and frostier, and far more promising. The deep rosy hue of a few lofty clouds at sunrise induced the weatherwise to prophesy bad weather for the next day—a prophecy which was of course utterly wrong—but for the present our prospects were good. We reached the foot of the rocks an hour earlier than before, after much chaff about the supposed horrors of the glacier, and immediately addressed ourselves to the climb. It will be a sufficient indication of our route to any one who may care to follow our steps, that if the face of the Mont Mallet be compared to the north-east face of the Matterhorn—and I have already noticed the faint resemblance—our route would correspond to a climb by the Hörnli arête till near the summit; when we crossed diagonally the face analogous to that visible from the Riffel, and then, almost immediately below the summit, crossed still another face, and thus found ourselves on a ridge analogous to the Breuil arête. The rocks were rotten, but nowhere seriously difficult; and part of the lowest arête was composed of ice, which delayed us by the necessity of step-cutting. This might perhaps have been avoided, but it is useless to give indications which cannot be made plain without much detail, and which would be superfluous to anyone standing with a good guide at the foot of the rocks. I will only say that the spiral motion which we adopted at the top was caused by the fact that the highest pinnacle is apparently inaccessible from the arête, which would have led us straight to its base. When we had crossed the first face of rock, Melchior had detached himself from the line, and went on to examine the route. It was long before he returned; though avalanches of stones testified to the fact that he was clambering somewhere amongst the disintegrated rocks of the summit. When at length he reappeared, he was more excited than usual. ‘It will be very difficult,’ he announced, ‘but go we must.’ Wallroth enthusiastically seconded the remark, whilst I showed my philosophic spirit by announcing that I would not risk my valuable neck for two

Mont Mallets. A short climb, however, revealed the true nature of the case, and proved that Melchior's words required interpretation. There was difficulty, it is true, but there was no danger, and the difficulty concerned Melchior far more than anybody else. The ridge on which we stood was interrupted by a huge rock, 'literally overhanging,' viciously smooth, and about fifteen feet in height. Melchior paid to it the unusual respect of taking off his coat, which he solemnly deposited on the rocks. Then he somehow fastened himself to the opposing rock, and helped by a shove from Cachat's axe, executed a singular caper in mid-air, which placed him in the right line of ascent; and finally, by a dexterous wriggle, reached the summit of the cliff. It was my fate to follow; and though expecting to need assistance, I expected also to do something towards raising my own weight. Never was expectation more signally falsified. In a second I was as helpless a bundle as ever was hoisted on board ship by ropes and pulleys. My companions, I rejoiced to see, were equally incapable; and the means by which my old friend had surmounted the force of gravity remained to me, as to them, an inexplicable mystery. This difficulty once surmounted, a couple of steps placed us on the top of the mountain in a state of more than usual excitement and satisfaction. We shook hands heartily, indulged in frantic howls, scrupulously ascended the very highest fragment of stone, and then, whilst the guides erected a cairn, I lighted the inevitable pipe and proceeded to contemplate the view. Light clouds hid the more distant ranges, and revealed only one glimpse of Mont Blanc; his proportions are perhaps more magnificent from this than from any other side, and we saw them to the highest advantage above the great snow-fields which feed the Glacier du Géant. The point of view is indeed one of singular merit, as giving perhaps the most complete panorama of all the mighty ice-streams which combine to form the Mer de Glace. So much may be readily understood by the maps; but one special object absorbed most of our attention, and I will venture to say that, in its way, it is one of the most striking in the Alps. From our feet a terrible precipice plunged down abruptly to the wild Glacier du Tacul; whilst just across the head of the glacier rose the astonishing pinnacle of the Dent du Géant.* Some mountaineers had been prowling round its base with a view to an assault; and their verdict, as reported to me by Christian Lauener, was to the effect that an ascent might be

* The illustration, as it is hardly necessary to say, represents a different side of the Dent du Géant from that which is visible from the Mont Mallet.

possible with the help of rockets and a sufficient allowance of rope. How that may be I know not; but the first thought that occurred to all of us as we looked at our tremendous neighbour was 'Nobody will ever get up that peak by fair means.' Of course it is impossible to say, after the Mont Cenis tunnel, what may not be within the resources of the engineer's art; but without stooping to some of those artifices which the mountaineer regards with the horror aroused in regard to other pursuits by the epithet 'unsportsmanlike,' no one, I venture to say with unusual confidence, will ever climb the Dent du Géant. Seen from the Montanvert, it looks precipitous enough; but one may cherish the belief that it is approachable from the rear. The view from the Mont Mallet at once dispels that pleasing illusion. At the time it reminded me of one of those quaint flint implements which suggests to us that our remote ancestors were not altogether unacquainted with the miseries of shaving. Take the sharpest of those flakes, which served the purposes of a razor or a knife, magnify it till it is some 200 feet in height, and then place it almost vertically but, if anything, rather leaning over towards the Italian side, and you have some notion of the Dent du Géant as seen from the Mont Mallet. The Aiguille Dru may, for aught I know, be climbed; the Charmoz and the Aiguille Blaitière are perhaps accessible; but if anybody, by fair climbing, ever reaches the summit of the Dent du Géant, I can only say that my ideas of the capacities of human nature will be materially enlarged. I have not, it is true, examined the peak from all possible points of view, and some mysterious couloir may have escaped me; but I feel little hesitation in asserting that 'inaccessible' ought still to remain in the dictionary till that strange obelisk has mouldered away to its base.

It is time, however, to turn to our descent; and yet I have little to say except that the range of Périades presents a dozen or two of minor pinnacles, each of them as inaccessible as the Dent du Géant, though not of such colossal proportions. With a passing glance at their grotesque shapes, we rapidly descended the glacier; and finally, if my memory serves me rightly, reached Chamouni, drenched to the skin by a thunderstorm, about 7 P.M. The zeal which formerly induced me to make a note of the precise time, 'including halts,' occupied in the expedition, has disappeared; but I seem to recollect that the ascent took about ten hours. Probably, it might be done rather more quickly, if anybody cares to repeat it; and the walk has many merits to those who wish really to appreciate the grandeur of the noble glacier system which we traversed.

And here my task must cease. I should wish, indeed, if so humble a performance were still regarded as worth description, to recount our subsequent ascent of Mont Blanc—to utter withering sarcasms against that Chamouni porter who calmly collapsed about half-an-hour beyond the Grands Mulets, and left Melchior to take care of two gentlemen alone—of the grand race which took place between a party which ascended by the Bosse and the rival party which followed the old route—of the cutting wind which threatened frost-bites, and made a stay on the summit impossible—and of many other exciting incidents which will never, I fear, find their way into print. They will be cherished not less affectionately by those who enjoyed them; for after all it is a great fact, and one which has of late years been too much forgotten, that there are few more charming expeditions in the Alps than the ascent of Mont Blanc in fine weather; and few, it may be added, more dangerous when the weather is bad. But on these matters I do not presume to speak at length. It is enough to say that, having once lapsed from the paths of virtue, I found the flowery track of vice so agreeable, that I never withdrew more sadly from the glorious Alps, or watched more fondly the last glimpses of cliff and glacier, as we entered the gorge below Sallenches, on our return to London fog. If I have had no thrilling incidents to recount, I feel a kind of senile affection for that child of my old age, if I may so call him, the Mont Mallet, and hope that he may not be found altogether unworthy of the attention of more industrious members of the Alpine Club.

THE WEISSHORN FROM THE NORTH. By J. H. KITSON.

AS I only date my existence as a mountaineer from the time when the last great peaks had succumbed to my more fortunate predecessors, I have had nothing left to achieve but the addition of new faces to old mountains.

I had long looked with eyes of eager admiration upon the Weisshorn, in my opinion the most beautiful of all Alpine peaks; but it was not until August 1871 that I had an opportunity of seriously trying the mountain, although in 1866 Almer and I had looked up its southern arête from the Schallen Joch to find a way to the summit. That arête is so steep and broken, that, if possible at all, it would be necessary to sleep among the rocks close to the Schallen Joch, and have a long summer day for the expedition. Melchior had decided against the

northern arête before, and from close inspection I quite agreed with him; there remained, therefore, only the three faces of the mountain giving any possible new route. Mr. C. E. Mathews gives an account of the south-eastern face which is not likely to induce others to follow in his footsteps, and besides one would only reach the eastern arête, and the new route would not be complete.

Accordingly, having added a new face to the Riffelhorn, in order to get a day's training, I started on August 6th with Christian and Ulrich Almer to camp out on a hill under the Bies Joch, to inspect the Weisshorn thoroughly on that side. Christian had, when crossing that pass for the first time with Messrs. Moore and Morshead, traced what he considered a probable route to the summit, for which he had once camped out on the Gruben side of the pass, but without success, owing to bad weather. We took with us a porter to carry a tent, which Mr. Coolidge had kindly lent to Almer for our excursions—a kindness which we repaid by robbing him of the honour of making the new route, which Miss Brevoort and he had been very anxious to do, and followed us in shortly afterwards.

Our object was to have sufficient time to examine the mountain and reach Zinal in one day. The next day we ascended by the rocks, which are very smooth but firm; they were rendered difficult by snow and thin ice in the cracks, and would have been very unpleasant to descend after a long and tiring day. The last bit was up the narrowest chimney I ever passed through, so narrow that Ulrich stuck fast with his knapsack, and had to go down again to take it off and send it up before him. Arrived on the top of the rocks, we went to the icefall to find a way through it ready for our serious attack upon the mountain, and by this reconnaissance gained at least an hour on our next attempt. We then turned our attention to the peak, and at once gave up the route Almer had thought of before, as it was raked by masses of ice falling from an ominous-looking bulge in the glacier above. In its place, however, we found a way so safe and obvious that Almer wished to go up at once, saying we should reach the top by two, and might get safely down to our camp before dark. But as it was my first day of real work, I had far too much respect for the mountain and my own legs to attempt it, so I declined, much to Almer's disappointment, and we went up the Brunegghorn for a better inspection of the whole route. In descending, we made an important deviation from the original route of the Bies Joch, which lay over the lowest part of the ridge, and entailed cutting steps down a steep ice-slope. By ascending the

ridge of the Bruneggorn a few hundred feet this obstacle is turned, and easy snow-slopes lead down to the upper basin of the Turtman Glacier. Instead of descending to Gruben, we crossed the glacier to a spur coming down from the Weisshorn, and, rounding this close to its base, ascended to the Col des Diablons. From here we examined the ridge running down from the Weisshorn to the col, but could not find a good way to gain the arête; so we went down to Zinal, and returned to Zermatt the next day by the Col Durand.

On the 10th we started from Zermatt early, intending to sleep on the summit of the Bies Joch, where we had found a good bank of shale and a little pool of water that would be very useful for any one wishing to follow in our footsteps. When we arrived at our former camping-place a heavy storm of rain, snow, and hail was coming on, so we pitched our tent to wait till it blew over. But the blowing over principally applied to the tent, which kept coming about my ears every half hour; and after waiting patiently till evening, we determined to stay where we were all night, expecting to be obliged to return in the morning. I had before always considered the dwellers in tents shocking sybarites, and thought that a climber who could not be satisfied with all the delights and comforts of an open-air bivouac, was not fit for his business; but this experience perfectly satisfied me that a tent has some advantages, as without it we should have been driven back.

Next morning the weather had improved considerably, and at three we started for the icefall of the Bies Glacier, arriving at the first difficulties as the light became sufficient for us to see them. The Bies Glacier has two large upper basins, each held up by a ridge of rock, and the opening into the valley is very narrow, so that the ice is broken up into most confused masses, and the greater part of the icefall is swept by blocks falling from the séracs at the top. These, however, take two wide channels, and leave a way up between which proves not as difficult as it seems from a distance, and, thanks to our reconnaissance, we mounted quickly, gaining the second basin in two hours, and the rocks that hold up the upper snow-field by half-past five. This field we crossed directly towards the angle of the mountain formed by the junction of the eastern and northern ridges, where some rocks showed through the ice-slope, forming a ridge, which had turned the avalanches, and left a safe path upwards, although on each side the slopes were swept bare. Almer said that two hundred steps cut would take us up the slope, and seemed very sanguine of success, but presently remarked that the rocks were longer than he had thought, so that

we should soon be up. But gradually the rocks ended and his work began, and to his astonishment he found he had completely misjudged, and he had cut nearly his eight hundredth step before we reached the top of this slope, the main difficulty of the mountain. As we had expected to sleep at least three hours higher, he had told my wife, who was to be on the Gornergrat, to look for us on the summit at nine, and during this step-cutting, when he was apparently working as hard as a man could work, he turned and asked, 'Could you go any faster if I cut steps faster, as I want to keep my word and be up at nine?' I, however, found quite enough employment in going his pace, and declined to hurry. The slope was fortunately in good order, consisting of snow until nearly the top, when it turned to ice, and became very steep. We here turned off our ridge, which a little higher became rocky again, and crossed over to the left, reaching the more gently inclined snow-fields by half-past eight. Our easiest and quickest route would have been to cross these on to the eastern arête, and reach the summit by that; but wishing to complete our route, and finding the snow very soft, we turned up on to the northern ridge. This we found to consist of a mixture of hard ice and steep rock pinnacles, arranged so as to give the maximum of work with the minimum of progress, and it would have cost us five hours to reach the summit, while a cutting north wind made matters still more unpleasant; so after losing nearly an hour in our attempt, we turned back and took to the slopes below again.

We traversed about half the length of these, and then returned up to the arête, which was now steeper but easier, as it was almost all ice, without the unpleasant rocks. The ridge is one of the sharpest I ever traversed, and the cliffs on the Zinal side are wonderfully steep; but it was in good condition. Our progress was rapid, and we reached the summit about noon. The views as we traversed the arête had been magnificent; but when we reached the peak, clouds obscured the Zermatt side and limited our view. I have never been on a mountain-top which seems so isolated from the rest of the world. The top is so small, and the slopes on all sides so steep, that beyond one's feet nothing is visible except by bending over to look down.

The Rothhorn and the ridge connecting it with the Weisshorn looked most painfully insignificant to me, as I had always had a great respect for their difficulties and a lively remembrance of them. But our old enemy the north wind made the summit unpleasantly cool, and it was impossible to go down and sit on

the shady side, so we turned and dropped quickly down through the deep snow to the head of the long slope. This required very great care, and seemed longer to descend than ascend, and my arms and shoulders ached violently when we reached the bottom, with anchoring fast with my axe all the way down. This difficulty passed, we trudged on up to our knees in snow to the head of the ice-fall. This we passed by taking to one of the avalanche channels where the crevasses were all smoothed over, and, choosing our opportunity, going down at a run, and jumping round a corner at the bottom into safety. We thus arrived at our camp by four o'clock, and after making tea and resting an hour, we carefully packed our remnants of firewood and hay under shelter, ready for Almer's use the next month, when he expected to try that route again. We then walked on to Zermatt, where we arrived at 7.40, thus proving that our route is good for a descent, if not so eligible for an ascent.

I believe that this route will be found decidedly preferable to the old one. A tent may be easily taken to the top of the Bies Joch, and thus plenty of time given, as the commencement of the route, being over snow, may be traversed before it is light; and if the long slope were ice instead of snow, there would probably be more rock bare. It possesses one very material advantage, a perfect immunity from falling stones.

VARIATIONS ON THE HIGH LEVEL ROUTE. BY A. W. MOORE. Read before the Alpine Club on the 30th January, 1872.

THE discoverers of the original high level route from Zermatt to the St. Bernard road have certainly no reason to complain of lack of appreciation on the part of the mountaineering public. On the contrary, they have had a crowd of followers, and their footsteps over the Cols de Valpelline, de la Reuse d'Arolla, and du Sonadon, have been adhered to with almost slavish exactness. Nevertheless there is no district in the Alps which offers a more inexhaustible variety of routes, suited to every degree of mountaineering capacity, or which is more crowded with gems of scenery accessible to the quietest, as to the most enterprising, pedestrian. Not that this mine of wealth has been left entirely unworked; had it been so, I trust that even in these days of equality and so-called fraternity I should have a keener sense of my duty towards myself than, under such circumstances, to break silence, or act as a finger-post to others when I should certainly desire to be the first passer my-

self. The fact is that, in this as in other parts of the Alps, every peak and pass has been climbed or crossed, during the last ten years, by Swiss or English mountaineers, and no absolute novelty remains; but many of the expeditions have been made only once or twice, and few men know anything of them except from the pages of Mr. Ball. My object in the present paper is to describe some of those which I have made myself, with the not very sanguine hope of diverting some part of the stream of traffic from the high level route proper to the equally interesting, and undeservedly neglected passes parallel to it.

My first acquaintance with the district was in 1862, a date which carries one back to the middle, if not to the dark, ages of mountaineering. On June 26 in that year, I slept in the Vassorey châlet, above St. Pierre, with designs on the Col du Sonadon. My refreshing state of 'green-ness' will be understood from the fact that I was attended not only by two Chamouni guides, but by Daniel Ballay, of St. Pierre, and a local porter. Notwithstanding this imposing force, at 7.30 next morning, I found myself hopelessly stopped on the rocks leading to the Sonadon glacier—a circumstance which, writing at this distance of time, seems extraordinary, and scarcely to be accounted for by the glaze of ice and falling stones which I find mentioned on my notes. Ballay was and is a thoroughly good man, but probably had no personal knowledge of the pass which had only been discovered in the previous year, and I can only suppose that we entirely missed the true line of ascent. However this may be, further progress was declared impossible, and at Ballay's suggestion I determined to cross into the Val de Bagnes by the Col de la Maison Blanche. This pass had for years been known to the hunters of St. Pierre, and was reached by Mr. Utterson-Kelso on his ascent of the Grand Combin in 1860; but whether, at the time of which I am writing, any traveller had used it as a route to the Val de Bagnes, I cannot say. Without descending more than was necessary, we kept round the face of the rocks above the Vassorey at a high level, and, after a laborious circuit, reached the small flat glacier at the foot of the Col. This glacier descends from the upper regions in a very narrow, but steep, cascade of séracs, between precipitous rocks, of which those on the right bank give access to the Col. We began the ascent at 12.15, and at 2.0 stood on the level snow-field at the head of the Corbassière glacier, after a scramble, which at that time I thought difficult, but should now probably describe as a good climb. We kept throughout quite close to the steep glacier, and at one point diverged on to it for a hundred feet or

so; at the top of the rocks was a sort of snow-crater, filled by a little lake frozen over, which, in 1863, when I again crossed the pass from the opposite side with Mr. Morshead, had disappeared. Upon that occasion, we had Melchior and Perren as guides, to both of whom the pass was new, who would not believe a descent possible from this point, and insisted on passing a good way further to the north, and descending by a couloir more distant from the steep glacier. Their route commanded a fine view of Mont Blanc, which is, I think, concealed from the true Col, and was certainly easier on the Vassorey side; but my course is preferable from a climbing point of view, and is, I believe, usually taken by the St. Pierre men.

The Corbassière glacier is one of the finest in the Alps, and its descent is a very varied and interesting piece of work. The upper snow plateau, with the Combin rising at its head, is of great extent, and the central portion of the glacier below it, though not at all steep, is a complicated system of crevasses, which, in 1862 at any rate, was by no means easy to pass. The difficulties we met were a good deal owing to the great quantity of soft fresh snow which covered the glacier, and concealed its numerous pitfalls, so that more than once two members of the party were in different crevasses at the same moment, and at one time we almost despaired of getting through. The best plan is to keep on the left side of the glacier until beyond the base of the Petit Combin, and then strike across to the right bank, and take to one of several parallel moraines, which offer easier walking. We reached this point in $3\frac{1}{2}$ hours from the Col, and were very thankful indeed once more to tread 'terra firma;' in 1863, with Mr. Morshead, $2\frac{1}{2}$ hours sufficed to ascend the same distance, but we then passed the night in the stone hovel by the side of the glacier, which served Mr. Mathews as a refuge in the course of his explorations, and so got through the difficulties while the snow was hard. In 1862, our intention was to pass the night at the Corbassière Alp, but on reaching it, at 7.10, we found no inhabitants, and accordingly made a rather headlong descent to the small hamlet of Fionnay, in the Val de Bagnes, where we arrived at 8.30, glad enough to find shelter for the night, which turned out wet, in the house of a hospitable peasant. There is now a small inn above the bridge of Monvoisin, in the Val de Bagnes, from which the Col de la Maison Blanche can be reached in, I should think, at least as short a time as the Col du Sonadon, the Corbassière glacier being gained either by the Glacier des Otanes, or by the Col des Pauvres, described by Mr. Mathews in 'Peaks, Passes, and Glaciers.' From my

experience of the latter Col in 1863, I should, on another occasion, prefer the route by the Glacier des Otanes. A stout walker, favoured by moonlight and a good state of the snow, might probably combine the ascent of the Combin with the passage to St. Pierre—one recommendation at least over the rival route of the Sonadon.

On the afternoon of the 28th a certain Gaspard Moulin, of Lourtier, having taken the place of Ballay as local guide, I marched with my army up the valley to the châlet of Boussine, which is on the left bank of the stream, just opposite the end of the Glacier de Breney. My object was to try a pass to Arolla over that glacier and the Glacier de Cijorénové, which would be parallel to, and perhaps shorter than, the Col de Chermontane over the glaciers of Otemma and Pièce. In the evening, however, the weather changed for the worse, and after an intensely cold night in the herdsmen's sleeping quarters under a big stone, we woke on the morning of the 29th enveloped in a fog, whose colour and consistency were more suggestive of London in November than of the Alps at midsummer. Serious glacier work over unknown ground was out of the question; but being anxious to reach Arolla, I listened favourably to a suggestion made by Moulin, that we should go there by the Col du Cret, a pass leading from the middle district of the Val de Bagnes to the head of the Val d'Hérémence, and by the Pas de Chèvres. He guaranteed to find the way over these two passes in any weather, and that, in eight hours from Boussine, we should be at Arolla. We accordingly retraced our steps down the valley as far as Mazeria below Monvoisin, and then turned up the slopes on its eastern side past the châlets of Vasevey to those of Cret, above which we once more plunged into fog. The result of our proceedings during the next seven hours was rather funny. After a steep climb up rather difficult rocks, followed by the descent of a glacier with no special features, we found ourselves at 5.30 P.M., not in the Val d'Hérémence, as, until five minutes before, we had fondly supposed, but back again in the Val de Bagnes, about a mile and a half lower down than the point at which we had turned out of it in the morning! Instead of the Col du Cret, we had effected a new and exciting pass from the glen of Cret to the parallel glen of Sévereu, having gone up the south side of the intervening ridge, and down the north side of the same! Our disgust may be imagined. The Chamouni men swore according to their fashion, I did ditto according to mine, while the wretched Moulin—anticipating by a few years the resources of modern statemanship under similar circumstances of discredit-

able failure—Moulin wept. Nothing could be done; so, abandoning the campaign for the year, I walked savagely down the valley, and slept that night amidst the mosquitos of Martigny.

Neither in 1863 nor 1864 did variations on the high level route form any part of my plan. In the former year, with Mr. Morshead, I crossed the Cols de Valpelline and Reuse d'Arolla, or Col d'Olen as it is now called, and renewed my acquaintance with the Maison Blanche, not for its own sake, but as a road to the Combin, which, however, we did not even attempt, mainly in consequence of Melchior's nervousness on the subject of avalanches. We saw three large ones fall across the route before six o'clock in the morning, so that his fears were not groundless, and we were unanimous at the time as to the prudence of leaving the mountain alone; but, as is usual, I have regretted the decision ever since. I cannot get over a sneaking idea that, so far as Morshead and I were concerned, laziness had as much to do as prudence with our unanimity, and I suspect that such is the case five times out of six in similar situations. Not that I for a moment mean to insinuate that Melchior, on this or any other occasion, gave, or is capable of giving, anything but a *bonâ fide* opinion; but all guides are not Melchiors; and I think that travellers are often not unwilling to accept, without much hesitation, any plausible suggestion for doing nothing, especially when the work is likely to be laborious rather than difficult or exciting.

The ludicrous fiasco, which had been the sole result of my first visit to the Val de Bagnes, was always a sore point of which the recollection was to be effaced at the first opportunity. With that object the Col de Breney, which remained uncrossed, was included in the programme drawn up by Mr. H. Walker and myself for 1865, and we proposed to prelude it by another new pass from Zermatt to Arolla, which should be more direct than the ordinary route by the Cols de Valpelline and Mont Brulé. In 1864, from the head of the Moiry glacier, I had got a view of the snow-field which is the common source of the glaciers of Ferpècle and Mont Miné, and had satisfied myself that there would be no difficulty in going straight across it from the Col d'Erin to the range of the Dents de Bertol, above the Arolla glacier. There were several well-marked depressions in that range, from one of which, overlooking, as I supposed, the Glacier de Bertol, I had little doubt we should find a tolerably easy descent.

On the evening of July 4 we arrived at Zermatt, with Jakob Anderegg, over the Sesia-joch, and, having satis-

factorily disposed of the Gabelhorn in the interval, started on our new adventure at 1.20 A.M. on the 8th. At 9.10 we were on the Col d'Erin, having travelled slowly, partly owing to Jakob not being very well, and partly because we expended much time in looking about us *en route*. The Matterhorn, in particular, came in for a large share of our regards. From the summit of the Gabelhorn, exactly opposite and at a distance of less than four miles, we had examined that famous peak with great attention, and with one consent voted that it would ever remain unscaled. There are, however, two ways of looking at a mountain—with a desire to see, or not to see, a way up it. We had ourselves no intention of trying the ascent, and therefore naturally were glad to think that attempts by other parties were not likely to be successful, and that we showed superior wisdom in passing by on the other side. But apart from this form of the 'psychological element,' I rather fancy, that from our point of view the steep wall above the elbow, which eventually proved the only serious difficulty on the ascent, assumed its most forbidding shape, and would have deterred us from any attempt, had we been ever so ardently bent upon it. However this may be, our opinion was considerably shaken during the progress of our walk up the Zmutt glacier, as we observed, not for the first time, the extraordinary change which takes place in the appearance of the mountain as the glacier is ascended and the Hörnli arête seen more and more in profile. The final peak looked formidable as ever, but the possibility of getting with ease to a very great height was so evident, that we were scarcely surprised when, only one week later, the news reached us of Mr. Whymper's long-struggled for, well-merited triumph.

After a few minutes' halt on the Col d'Erin we started across the snowfield, not, as we might have done, straight for its further side, but away to the left towards the Tête Blanche, in order to examine the range south of our supposed Col, called the Dents de Bertol, or Dents des Bouquetins, on the highest peak of which we had designs, if it should look decently practicable. The névé was much crevassed, but at 10.5 we reached its highest point, to find that, so far as the Dents de Bertol were concerned, we might have saved ourselves the détour. The peaks rose in front of us, a long line of splintered crags, suggesting very considerable difficulties, and a possibility of finally arriving on the top of one which might not be the highest—a consideration which, coupled with Jakob's indisposition, decided us to have nothing to do with any of them. It has since been discovered that the

highest point of the group is not that marked on the map 3783 mètres, but one further south, the height of which is 3848 mètres, and which was ascended last year by Mr. Hamilton.

Though balked in our immediate object, we in nowise regretted the time spent in reaching a position commanding such a glorious view. The snow-field which feeds the three glaciers of Ferpècle, Mont Miné, and Zardezan, is of vast extent, and as a piece of ice scenery seemed to me comparable to the Grand Plateau of Mont Blanc—to my mind the *ne plus ultra* of magnificence. The Dent Blanche is, from whatever point seen, a most noble peak, but from no other does it tower up with such grandeur, a symmetrical pyramid of rock, forming with its neighbours the Weisshorn and Rothhorn, which somehow come into line with it, a trio unequalled in ruggedness and boldness of form. Half an hour was spent in idleness, and we then once more turned towards our Col, the position of which was unmistakable, at the head of a small bay formed by the névé. The distance was considerable, but there was no sort of difficulty, and at 11.55 we stood in a broadish gap between two rock peaks, looking down, as we had expected, upon the small Glacier de Bertol, and across to the magnificent double ice-fall in which the Vuibez glacier joins that of Arolla. The Col de Bertol is certainly lower than the Col d'Erin, and the view from it, except westwards, is limited; in that direction too, save the Vuibez ice-fall and the Mont Collon, there is nothing very striking; but these exceptions are quite enough to redeem the pass from dullness, the Mont Collon in particular being, for its height, one of the most striking peaks in the Alps. The glacier, though rather steep and crevassed in places, was quite easy, and, thanks to some glissades, by 12.55 we reached its termination on a flat stone-covered plain extending to the brow of the cliffs above the Arolla glacier. The descent of these cliffs had always been the one doubtful part of the expedition, and we were prepared for some trouble on them. The stream from the Glacier de Bertol finds its way to the Arolla glacier through a very narrow and precipitous ravine, and it was soon decided that we could not do better than follow its example. The south side of the torrent looked rather the most promising, so we made for it, and began a very rough scramble, which in an hour landed us on the level surface of the Arolla glacier. The descent was not really difficult, but care was required to avoid knocking over the loose stones which abounded, and lay at such a ticklish angle that a very slight touch sufficed to set them

going. A large one broke away just behind me, and had I not luckily been able to stop its progress until Walker and Jakob in front had got into safe corners, the result might have been disagreeable, as when I jumped aside and let it go, it started a perfect avalanche, which would have effectually pulverised anyone unlucky enough to be in the way. A short hour took us off the glacier, which is so smooth and clean that it can be traversed to its very tip, and at 3.30 we reached Arolla, where we found one of the chalets in course of being transmogrified into an inn. The carpenters were still at work, and only one room, containing three beds, was in a finished state; but the accommodation was sufficient for our party, and as the beds had not been occupied before, we were free from the entomological annoyances for which the place has since become rather notorious.

At 3.0 A.M. on the 9th we started up the grass slopes behind the chalets, following for some distance a zigzag path in a direction apparently away from that which we desired eventually to take. Having gained a certain height, we turned sharp to the left across the upper part of the Combe d'Arolla, towards the left bank of the Cijorénové glacier, crossing on the way no fewer than five moraines of varying ages and great size, and at 4.35 set foot on the ice. The glacier stretched away in front of us smooth and level as far as the base of its central ice-fall, which streams grandly down between the rocks of the Zinareffien on the left bank, and a spur of the Pigne d'Arolla on the right. Direct ascent by the ice-fall was hopeless, and the rocks on the right bank did not look inviting; the only alternative route was therefore up those on the left—the Zinareffien. I have since heard that these particular rocks are, to this day, considered impassable by the hunters of Arolla on account of falling stones; happily, in the absence of any of the local men, we were without that little knowledge which is so proverbially dangerous, and turned towards them with perfect confidence that they would serve as a staircase to the upper snows. A red and angry sunrise, indicating a change of weather, shortened our deliberations and quickened our steps, so that at 5.20 we were at the foot of a rather steep snow-slope, which led up to what looked like the most accessible point in the rocks. No local knowledge was needed to tell us that this was no place for tarrying in, as stones lay thick in all directions, and an occasional pebble, whizzing past, gave evidence that the heavy batteries, though silent now, were quite ready to commence operations again at a later period of the day. The danger, however, was very short,

and we were soon on the rocks, which seemed firm and good enough.

Our original idea had been to make for a point about half way up the ice-fall, where there seemed to be a sort of gully between the glacier and the cliff up which we could pass; but, as we mounted, the policy of this seemed doubtful, and it was finally decided not to attempt to get on to the ice until much higher up. The rocks, at first free from difficulty, became more troublesome as we ascended, and were at last so smooth and void of handhold, that the rope was put on. With this precaution, and Jakob's judicious leading, we were still able to climb rapidly, and at 6.30 reached a point from which there was an easy passage on to the glacier above its most broken portion, having, as I believe, taken the best possible way, and that which should be followed by anyone crossing the pass. The weather since sunrise had steadily deteriorated, and, as we sat down to breakfast, a smart squall of wind and rain passed over us, and made that usually pleasant meal a cold and uncomfortable one.

Our progress up the glacier was uneventful until just below the upper snow-field, where a projecting spur of rock on the left bank, which we followed throughout, produced its natural effect in the shape of an ice-fall, not so steep and long, but nearly as broken, as that we had already circumvented. A formidable-looking snow-slope, which masked the rocks, offered a not really difficult way of turning the obstacle, and we were soon fairly above it, and pounding doggedly along over the upper névé, which extended in front for a distance made more apparently illimitable by the light mist which hung about. So very gentle was the slope, that it was hard to say exactly when the summit level was passed, but at 8.30 we had certainly ceased to rise, and therefore halted to look about us.

We were at the edge of a rather extensive plateau, which is the common source of three glaciers—the Cijorénové, by which we had ascended; the western Breney, by which we hoped to descend; and the Cheillon, which flows down to the head of the Val d'Hérémence. Our col was still some way to the left—a broad opening between the north end of the ridge of the Serpentine and the Mont Blanc de Cheillon, while behind us a steep slope led up towards the Pigne d'Arolla, which peak we determined to bag before commencing the descent to the Val de Bagnes. The height of our position was a great surprise; not only did we look over the Col de Bertol, but over the still loftier Col d'Erin beyond, to all the old familiar Zermatt peaks, so that we must have been very little below

12,000 feet. At 8.55 we turned up towards the Pigne d'Arolla, and, after surmounting the first steep slope, found ourselves on an undulating plateau, crowned on the further side by two low snow humps, the highest of which was our peak, though we did not at first realise the fact. The truth is, that the Pigne d'Arolla is not a peak at all, but merely the highest point of the snow-field, forming the head of the eastern or main branch of the Breney glacier. On the north side, above the Cijorénové glacier, it is cut away in a grand precipice, and from that direction looks like a really fine mountain, but it is none the less a rank impostor, and the partiality which we naturally were disposed to entertain towards a summit of which we were the first ascenders could not blind us to the painful truth. The snow-field which we had to traverse to get at the peak, such as it was, was only remarkable for the enormous size of its concealed crevasses, one or two of which cost no little trouble to cross, and, having attained the saddle between the two humps, we turned to the left, and at 9.55 stood on the highest point, 12,467 feet in height.

Whatever may be its inferiority as a mountain, as a point of view the Pigne d'Arolla more than holds its own with many loftier and more striking rivals. Placed almost midway between Mont Blanc and Monte Rosa, the Combin and Dent Blanche, and with nothing higher than itself between the Oberland on the north and the Graian Alps on the south, it stands in the one position most favourable for a comprehensive view of those great ranges. The weather was anything but perfect, but we saw enough to satisfy us of the grandeur of the panorama, which can scarcely be surpassed unless from the adjoining and slightly higher summit of the Ruinette. So far as we were concerned, this same Ruinette was one of the most satisfactory features in the view, for a reason which will, I am afraid, draw down upon us the contempt of the Club, but which I must nevertheless in candour state. We had long been of opinion that it was discreditable to the Club that so considerable a peak should remain unscaled, and had decided that, being in the neighbourhood, we were bound to attempt to reduce it to the same state of subjection as its neighbours. This, however, would involve passing a night at the dirty châteaux of Chanrion, on very short commons, and a probability of absolute starvation on the ensuing day—a prospect which, I almost blush to confess, had so few charms for us, that it was with supreme satisfaction we discovered on the summit of the supposed virgin peak an unmistakable stone man. There was no doubt whatever about

it, and we promptly moved a vote of thanks to the unknown individual (afterwards found to be Mr. Whympers) who had anticipated our views, and left us free to make our way to Aosta and the fleshpots of the Hotel Mont Blanc. The thought of these fleshpots, coupled with the again threatening appearance of the weather, drove us down after only ten minutes' halt, and by 10.35 we had rejoined our baggage on the plateau above the Glacier de Cheillon. This *détour* was unnecessary, as we might have gone straight down the main Breney glacier; but, besides having to pick up our effects, we wished to complete the pass without reference to the ascent of the peak.

Twenty minutes over level snow took us to the actual col between the Mont Blanc de Cheillon and the Serpentine, which we christened Col de Breney, but to which the Swiss engineers have since given the equally appropriate name of Col de la Serpentine, applying that of Col de Breney to some point of the snow-field at the head of the main glacier, which we crossed on our way to the Pigne d'Arolla. Without delay we hurried down the glacier, having on our right the long ridge which rises at either end into the peaks of the Ruinette and the Mont Blanc de Cheillon, and on our left that of the Serpentine. Where the glacier sweeps round the southern spur of the last-named peak came the inevitable ice-fall, and, just when we were in the thick of its intricacies, the long-threatened thunderstorm burst upon us. A deluge of rain, combined with a cold wind of extraordinary violence, rendered our position far from pleasant; but luckily the ice-fall did not prove very formidable; we found an easy passage on its left side, and so soon as we were below it, on the level glacier, all difficulty was over. We kept to the ice until it began to fall towards the Val de Bagnes, and then at 1 P.M. quitted it for the moraine on the left bank, after crossing which a run down steep grass slopes took us to a point near Chanrion at 1.45.

The same afternoon we crossed the Col de Fenêtre to Valpelline, and of so familiar a passage I need give no particulars. But I do not think that the last hour and half of our walk from Ollomont will ever be forgotten by either Walker or myself. The rain descended literally in sheets, the roar of the thunder never ceased, while the lightning was dazzling, its vividness being more remarkable from the inky darkness which followed each series of flashes. To us the spectacle was one of appalling, but still enjoyable grandeur; to the usually stout-hearted Jakob it had no charms; and his responses to our repeated exclamations of wonder as a blaze of flame over the whole heavens was suc-

ceeded by a crash as though the surrounding mountains were crumbling to their foundations, had in them more of anxiety than admiration. At 9 we reached Valpelline, and found refuge in a wretched cabaret, where we fell asleep over the table while waiting for supper—of which meal my only recollection is a liqueur, apparently flavoured with assafoetida, which I commend to the notice of connoisseurs of nastiness who may chance to visit the locality. The next morning, in bright sunshine, we jolted down to Aosta.

The last expeditions in the "High Level" country of which I have anything to say, are two which I had the pleasure of making in company with Mr. G. E. Foster during the past summer. The first and most important was an alternative route to the Col de Valpelline from Zermatt to Prerayen. I do not wish to say anything disrespectful of that pass, which is indeed one of the most useful ever made in the Alps. It traverses fine scenery, and may be crossed with decent guides in almost any weather. But there are three points in which it fails to come up to the ideal of a perfect pass. It is utterly free from difficulty from end to end, its summit is a snow-field, and it is not the direct route between the two places which it connects. I am not, of course, blind to the fact that to some persons, whose state of mind we can but pity, my first two objections may seem recommendations rather than otherwise; but with regard to the third, there can, I think, be no difference of opinion. A glance at the map will show that the traveller bound for the Valpelline who, on reaching the foot of the Stockje, turns to the right towards the Col d'Erin, deliberately goes out of his way, which would naturally lie to the left, up the Tiefenmatten glacier, and across the ridge which extends from the Dent d'Erin to a nameless peak, marked on the map 3,813 mètres, and which, for the purposes of this paper, I shall call Pic de Zardezan.

That the somewhat circuitous route of the Col de Valpelline should have been originally preferred, is not perhaps very wonderful, especially as the pass was first made *from* Prerayen, but that the direct route should have been so long untried is curious, as the appearance of the Tiefenmatten glacier is eminently stimulating, though, as a high road, it has certain obvious disqualifications, the nature of which will appear in the course of my narrative.

The Zmutt glacier is among glaciers what the Rhone valley is among valleys—the most tiresome, and, at the same time, one of the least avoidable with which the climber has to do. Often and often, when stumbling over its endless moraines, had

I cast longing looks at the shattered ice-falls of its principal feeder the Tiefenmatten, and speculated whether it might be possible to cross the formidable ridge beyond them, but never until last summer had I looked with intent actually to try the experiment. On July 9 I crossed the Col Durand from Zinal, —a noble pass, in my opinion, much to be preferred to the Trift—and from the slopes of the Ebihorn directed Jakob's attention to the Tiefenmatten. After looking at it long and anxiously, he expressed his opinion that a passage might be made, but that it 'would be a Winter-Joch,' referring to a certain pass which we had effected in 1870 from the Geschenen Thal, and which had left on his mind an unusually vivid impression of danger and difficulty. As, however, we *had* passed the Winter-Joch, and had not broken our necks on the way, his present opinion was, on the whole, encouraging, especially as he backed it up by pointing out the exact manner in which he proposed to make the assault. Accordingly, at 1.35 A.M., on July 17, Foster and I, with Jakob and Hans Baumann, started from Zermatt. Although the sky was cloudless, the wind was ominously warm, and in no way suggested, what proved to be the case, that we were commencing the one week of fine weather which marked the early season of 1871. The night was so intensely dark that, in spite of the aid of a candle stuck in a broken bottle, our progress as far as the châteaux of Zmutt was slow, and it was 5.50 before we were seated at breakfast on a big stone near the foot of the Stockje. We were exactly opposite to the couloir leading up to the Col du Lion—so well known in connection with the Matterhorn—and, during our meal, examined it with care. If any gentleman wishes to achieve the reputation of having made the most impossible-looking pass in the Alps, let him try to climb this couloir. If he succeeds, I shall have great pleasure in congratulating him, while if he fails and comes to grief into the bargain, it will afford me equal satisfaction to observe that it served him right. The Col Tournanche, further west, crossed by Mr. J. A. Hudson's party some years ago, is not a very inviting route, but with patience and step-cutting it is obviously practicable. The Col du Lion is a different affair altogether, and will demand fly-like qualities not often found even in the members of our Society.

So far we had been treading the old familiar route of the Col d'Erin; we had now to venture on new ground. The Tiefenmatten glacier tumbles into the Zmutt in a double ice-fall between the cliffs of the Dent d'Erin and a long spur from the Pic de Zardezan. The lower one, which first presented itself to our consideration, did not appear to be either very

long or very steep, but it was extraordinarily broken, and, even in this snowy year, was evidently only passable on its right side, under the Dent d'Erin. It unfortunately happens that this right side is the exact direction which every prudent man would desire to give as wide a berth to as possible, for the following reason:—the north face of the Dent d'Erin immediately above is for the most part precipitous rock, but at about half its height runs a broad band of broken séracs. How the ice clings to the cliffs at all is a marvel, but that portions of it are liable to, and actually do, come down with a run at varying intervals of time, is a fact which the merest novice would see at a glance. The danger was palpable, and theoretically we ought not to have incurred it; but, fortunately for the success of the majority of expeditions, people in the Alps do not allow theory to blind them to facts—at least when theory runs counter to the wishes of the moment—and we satisfied ourselves that, great as was the theoretical risk, the practical danger of a fall occurring at the precise moment of our passage was small. If it did, of course we deserved our inevitable fate; if it did not, we probably made our pass, and in so doing accomplished the desire of our hearts. The game may not have been worth the candle—at any rate, we thought it was, as hundreds have thought before under similar circumstances, and, as I hope, hundreds will think again. This elaborate argument was not, I need scarcely say, gone through at the moment. Baumann gave us very little time for anything of the sort; for, taking the rope between his teeth, as it were, he went straight at the only promising point as hard as he could go, and accommodating us with smaller and fewer steps than I ever before saw used in such a position, in a wonderfully short space of time landed us panting and breathless at the top of the fall, on a small plateau which was covered almost from side to side with avalanche *débris*. Over this we made our way towards the upper ice-fall, which was not an ordinary jumble of crevasses, but a series of huge dislocations in the glacier. As before, the only possible way seemed to be under the Dent d'Erin, and there we were nearly stopped at the last moment by a monstrous chasm stretching completely across the glacier. The bridge by which we finally escaped on to the upper snow-field was of a very ticklish character, and in a day, or perhaps even a few hours, might have been found non-existent, in which case the only alternatives would have been a retreat, or a prolonged and dangerous piece of step-cutting along the face of the Dent d'Erin.

The snow-field which we had attained is one of the most

secluded recesses in the High Alps; almost environed by steep and lofty ridges, there are few points from which even a glimpse of it can be got. The view from it is limited to the peaks of the Matterhorn, Täschhorn and Dom, Gabelhorn, Rothhorn, and Weisshorn, which range themselves in a sort of rough semicircle, and, standing up unrelieved by any extent of snow, produce a most singular effect, quite dissimilar to anything I know elsewhere. At its head an ice-wall of almost uniform height sweeps round from the Dent d'Erin to the Pic de Zardezan, and up this we had now to seek a way. The wall was steepest near the Dent d'Erin, and least so at its opposite end, where too it appeared to be faced with snow, while elsewhere along the line the ice glistened suspiciously blue in the sunshine, promising many a weary hour of step-cutting before the sharp crest should be reached. There was therefore no question as to the point at which it was advisable to make the attack, if possible. On that side where the ice-wall begins to merge in the rocky face of the Pic de Zardezan, the uniformity of the slope was broken by a bulging mass of séracs, the *débris* from which had partially choked the bergschrund below them. It would be necessary to cross the bergschrund by this *débris*, pass along to the right under the séracs, then turn up the slope alongside of them, until it was possible to swerve sharp to the left again, and so strike the ridge. The route was not tempting. Not only were there those threatening séracs, on which the sun had been playing since early dawn, but the Pic de Zardezan was in a most lively condition. Already, while crossing the snow-field, we had had to look out for stones from its cliffs on our right, towards which we had steered in order to avoid the dangerous neighbourhood of the Dent d'Erin. It was a case of Scylla and Charybdis—on the left, ice-avalanches; on the right, stones; even in the middle, the old proverb notwithstanding, no absolute safety, so contracted was the space.

I should have been sorry to attempt the ascent we had before us with inferior guides, but with men like Jakob and Baumann much might be risked. They showed no hesitation about proceeding, but only impressed upon us that, once committed to the venture, we must push on, without halt, at the top of our speed, as upon it might depend our safety. On this understanding, at 8:55, we crossed the bergschrund, and commenced the most helter-skelter, breathless ascent I ever made. The first thing was to get clear of the séracs, the danger from which was most imminent; and the pace at which Baumann led us across the deep gullies, scored in the face of the slope by the

falling blocks, which had so conveniently bridged the bergschrund, was a caution. Then came a race up the slope beyond, under a constant fire from the Pic de Zardezan, which was straight overhead. The inclination was greater than that of the Strahleck, and the snow, where there was snow, was deep and almost in a melting state. Where there was none there was ice, and that meant delay; so, as either condition was equally objectionable, Baumann made for a patch of crumbling rocks which looked practicable. We had scarcely reached them when a large shower of stones swept down to our right, mixed with huge masses of snow which they had started—a suggestive spectacle, though under no circumstances should we have been in danger from this particular fall. A short scramble up the wet and slippery rocks, followed by a nearly level passage above our old enemies the séracs, along the face of the slope, brought us on to the ridge at 9:45, and the Tiefenmatten Joch was a *fait accompli*. The final ascent had taken only forty-five minutes, but in those forty-five minutes had been excitement enough for three hours, which is about the time it would have occupied us to cut steps up the wall at any other point.

The ridge, which rises to no great height above the snowfield on the south side at the base of the Dent d'Erin and the long rugged range between that peak and the Château des Dames, was too sharp to be a pleasant resting-place, so we turned along the rocks of the Pic de Zardezan, and on a convenient ledge sat down in the glorious sunshine, in a happy state of contentment with ourselves and the world in general. The view towards Zermatt was not extensive, the spurs of the Pic de Zardezan on one side, and the noble cone of the Dent d'Erin on the other, intervening. We had had some thoughts of combining with the pass the ascent of the latter peak, the base of which was close to us; but its smooth rocks were so coated with snow, and the snow, as we had just seen, was in such a dangerous state, that the idea was given up; though, under more favourable circumstances, there would have been no difficulty whatever in striking from the col into the route followed by Mr. Hall's party in 1863. Looking south, the whole chain of the Graians was clear, while in the west the eye ranged over all the Bagnes mountains to Mont Blanc, which towered up pre-eminent in size and grandeur, as usual from all distant points of view. From a rough aneroid observation, the height of the col comes out about 11,500 feet, somewhat lower than the Col de Valpelline, another recommendation over that pass, if greater directness and the attractive features of the route,

on which I have dilated, are not considered conclusively to establish its superiority. Our satisfaction at the happy result of our exertions, and the skill shown by Jakob and Baumann, was not without a tinge of melancholy, as we reflected that, with the exception of the Silber-sattel between the Nord End and Hochste Spitze of Monte Rosa, and the still more dubious Col du Lion, we were making the last imaginable new route out of Zermatt. Some fifteen years earlier the Alpine Club had swooped down upon that dingy village, as a centre of seemingly inexhaustible novelties; in that time the district had been swept, if not garnished, and, beyond all question, from a strictly mountaineering point of view, its last state was worse than its first. Some such sentiment as this we expressed to Jakob and Baumann, but those prosaic individuals did not see it at all, and declined to be melancholy over what they justly considered a feather in their caps, and a source of much future exultation over the Zermatt guides.

For the descent we had a choice of routes. We could either traverse the whole length of the snow-field to its southern extremity, and come straight down upon Prerayen, following the line taken by Mr. Whymper in his attempt on the Dent d'Erin; or we could descend to the lower Zardezan glacier, either by the central and largest of the three tributaries which stream into it from the aforesaid snow-field, or by the northern and smallest of them, which was at our feet. The last alternative was decided on, and at 11, having first built a stone man, we started, keeping back along the ridge for a little way, and then striking sharp down to the right, over steep snow-covered rocks, which required care. On reaching the level snow below them, we still kept to our right, hugging the base of the Pic de Zardezan, and passing through an opening between it and the head of a buttress separating the central and northern tributary glaciers, descended on to the latter, and by it without the least difficulty, to the lower Zardezan, at the precise point where the route of the Col de Valpelline falls in. It was only 12.15, and we were within two hours of Prerayen, from which place our design had been to cross the Col Collon on the morrow to Evolena. It seemed a pity to pass the afternoon in idleness, so, instead of descending further, we crossed the glacier, climbed up some 2,000 feet of rocks on its further side to the Col de Mont Brule, and at 8 P.M. had the satisfaction of walking into the inn at Evolena, having not only gained a day, but substituted good fare and the most comfortable beds to be found in any inn in Switzerland, for the flinty bread and animated hay of Prerayen.

Our next destination was the Liappey Alp at the head of the Val d'Hérémence, a valley almost unknown to English mountaineers, if the meagreness of the information with reference to it in Mr. Ball's Guide may be taken as evidence. The range between it and the Val de Bagnes, extending northwards from the Mont Blanc de Cheillon, has several large glaciers, and at least two peaks of importance, the Mont Pleureur 12,161 feet, and La Salle 11,936 feet; but, like the valley, it has never received any attention from our members. The Swiss 'Alpen Club' has not been equally indifferent to its attractions, and the 'Jahrbuch' for 1868 contains narratives of a good many interesting excursions, including the ascents of the Mont Pleureur and La Salle from the side of the Val de Bagnes. From these narratives it appeared that it was possible to pass from one to the other of these peaks, and from a paragraph in one of the later volumes I inferred that Herr Weilenmann had descended from them into the Val d'Hérémence. Our plan was to reverse his route, which seemed likely to be a more interesting way from Evolena to the Val de Bagnes than any of the regular passes from Arolla, with most of which, moreover, Foster and I were already acquainted.

We intended to cross to the Val d'Hérémence by the Col de la Maigna, a grass pass north of the Pic d'Arzinol—a panoramic peak, sometimes ascended from Evolena. The path to the Col de la Maigna, after crossing the Borgne at Evolena, winds round the opposite hill-side through picturesque woods into the glen of Vouasson, follows its south side for some distance, and is then carried over the stream from the small Glacier de Vouasson to the Alp of the same name. We here made a very stupid mistake, for which I, as the bearer of the map, was alone responsible: instead of keeping to the left up the north side of the glen of Vouasson, we bore away to the right, and finally, at 1.30, struck the ridge above the Val d'Hérémence, a long way too far north, close under a small point of rock called *Pointe de Mandalon*. The col commanded a fine view, east, of the Dent Blanche, Rothhorn, and Weisshorn; north, of the Oberland from the Diablerets to the Gemmi; and west, of the Val d'Hérémence and the range on its further side. The Mont Pleureur was conspicuous, and, to the north of it, La Salle, a curious tooth of rock apparently rising, in a strangely isolated way, from the centre of a nearly level snow-field. The valley itself is a large and fine one, very green and well wooded, and on its western side broken by numerous lateral glens of considerable size, crowned by peaks, not of the first order, but bold and picturesque in outline.

It now became a question whether we should descend into the valley in order to gain the cowpath up it, or keep at a level along its eastern slopes, so as eventually to strike into the track we should have followed had we not missed the Col de la Maigna. The latter course, after much vacillation, was finally preferred, and the result was one of the most laborious walks I ever had. The Pic d'Arzinol, the face of which we traversed, is deeply scored by ravines, and the passage of each of these in succession was an excessively rough piece of scrambling. Further on, a faint track helped us here and there; but it was 4.20 before we reached the upper châlets of Méribé, which are placed on the hill side, at some height above the bed of the valley, just below the steep ascent to the level plain, on which are situated the châlets of La Barma. In point of labour, we should now, I think, have done better to have descended to the valley, and climbed this ascent by the path: but acting on the advice of the herdsmen, we adhered to our old course, which involved an ascent of about a thousand feet, nearly to the level of the small Glacier de Merdéré, and then a traverse by a series of grassy ledges along the face of the Pic de Vouasson, until we were at last able to descend on to the dreary plain of La Barma, and strike the long-desired path. The remainder of the way was easy enough, and at 7.0 we reached the extensive Liappey Alp, situated on the left bank of the torrent just below the end of the glaciers of Cheillon and Lendarey, at the extreme head of the valley. Our walk of six hours had thus resolved itself into one of nine hours and a half; but in spite of heavy loads, intense heat, and the roughness of the way, neither Foster nor I regretted our involuntary *détour*. The men, however, were not pleased; and Baumann in particular could not be persuaded to admit that the day had been interesting, unless, as he said, we were admirers of stones, stones, stones!

The Liappey Alp has an evil reputation for fleas; indeed, poor Herr Weilenmann seems here to have been driven by them to such a state of desperation that verse alone could express his feelings—

Von Bagne bis nach Heremanz
Von Nendaz bis Arolle,
Da führen die Flöhe ihren Tanz
Dass sie der Teufel holle,

sings the sorely-persecuted veteran. Foster and I not having been reduced to the same stage of despair, I do not feel called upon to translate the above effusion, which, however, pretty well conveys its own meaning.

We passed a not uncomfortable night, and at 3.50 next morning resumed our way, the weather being still fine, but too warm to be quite satisfactory. Immediately north of La Salle, the Glacier du Petit Côte de Liappey streams steeply down into the valley behind the alp, and we had reason to believe that by it Herr Weilenmann had effected his descent. Mounting steadily over pastures succeeded by stones and shale, we soon came in sight of the glacier, which is of the smallest dimensions, and much broken up in its central part, where it falls over a wall of rocks towards the valley. It was not at first obvious how the tiny snow-field above was to be reached, but in the end a tolerably easy way was found up the rocks and snow-slopes on the south side of the glacier, and at 7.10 we were looking down into the Val de Bagnes, at a point locally known as the Col de Vasevey, after the name of the alp just below on the Bagnes side. A strong wind made delay unpleasant, so we turned at once to the south, along the shaly ridge which led up towards the peak of La Salle. The ridge came to an end too soon, at the foot of a steep ice-slope, above which we knew was the snow plateau out of which rises the final peak. This promised some step-cutting; so Jakob calmly proposed that, in order to avoid it, we should try and cross the precipitous face of the mountain above the Val de Bagnes, until we could turn straight up towards the summit. Foster and I protested vigorously against anything of the sort, and Baumann smiled his grimmest smile at the very suggestion; so Jakob did not press the point, and began hacking away vigorously with his axe. The slope was steeper and longer than it had seemed to be from below, and the ice was hard and quite bare; but Jakob worked with a will, and in about three-quarters of an hour landed us on the snow-field above, on the further side of which was the peak—an apparently vertical pillar of rock, perhaps 100 feet in height. We went straight towards it, the snow gradually falling away on either hand until it became an arête, abutting at last against the rocks. Up to the very last moment these looked unscalable, and I really do not know now how Jakob got up the first five-and-twenty feet; but he did so, pulled us up after him, and at 8.45, after a short but very exhilarating scramble, we were on the top of La Salle, where we found a cairn with the cards of our Swiss predecessors.

Clouds were rising in all directions, but the view was nevertheless very fine; the Combin especially, comparatively close at hand, being an object of overpowering grandeur. The

ridge connecting us with the Mont Pleureur was evidently free from difficulty, but as the snowy summit of that mountain did not seem a convenient resting-place, we preferred making our principal halt where we were, and did not start towards our slightly-loftier neighbour until 9.25. No one had ventured to estimate the intervening distance at less than two hours; but in fifty minutes, at 10.15, we stood on the summit, having first descended along a ridge of broken rock, and then kicked steps up a slope of snow, very steep, but in perfect condition. The Mont Pleureur, on the side of the Val de Bagnes, is cut away in one of the most terrific precipices I ever saw; Jakob, having looked over, called on us to do the same, but the convulsive grip which he gave me as I craned forward clearly showed how it had impressed him. After only a few minutes' stay, we turned along the great south-western ridge of the mountain, but soon left it, and struck straight down the face towards the Glacier de Gétroz. On the map this side of the Mont Pleureur is represented as all rock, and I have no doubt that in most seasons it is so; but it was now from top to bottom densely covered with snow, down which we floundered at such a pace that, in three-quarters of an hour from the summit, we were at the edge of the glacier. Having crossed to its left bank below the great ice-fall without difficulty, we soon found a track down the steep grass slopes on that side, which took us to the Gétroz Alp, whence a good path led to the Val de Bagnes, and the little inn at Monvoisin, where we arrived at 1.30, after an expedition of remarkable interest.

The same afternoon we walked down the valley to Chables, drove on to Martigny, and slept that night at Sierre, thus satisfactorily concluding the last of my variations of the 'High Level Route.'

PROFESSOR TYNDALL'S ATTEMPT ON THE
MATTERHORN IN 1862.

We have received the following letter from Mr. E. Whymper:—

To the Editor of the Alpine Journal.—Sir,—My attention has been lately directed to an additional note at pp. 166–7 of the second edition of Dr. Tyndall's 'Hours of Exercise in the Alps.' I regret to learn from those pages that I have been misunderstood by their author upon two occasions, and I shall be greatly obliged if you will afford me sufficient space in the columns of the 'Alpine Journal' to explain away these unfortunate misconceptions.

The first part of the 'additional note' has reference to a conversation between us in the Val Tournanche. I returned to Breuil on July 26,

1862, from the Matterhorn, after an absence of two days, having, upon the latter of these days, in the company of Luc Meynet, attained a greater height than I—and to a considerably greater height than any other person—had reached on any previous occasion. We were agreeably surprised to find that Professor Tyndall had arrived at the inn during our absence. He was accompanied by the Valaisan guides J. J. Bennen and A. Walter, and had engaged my former guides, J. A. Carrel and Cæsar Carrel (who were then actually in my service), as porters. As he was ready to start, and intending to do so at once, provided with all the *matériel* that I considered necessary for success, and as it would have taken at least a day to provide myself equally well, it was useless to attempt to compete with him. My tent was on the mountain at about the height of 12,550 feet, and it seemed to be churlish not to place it at his disposal; for if it had not been, he would have been compelled either to camp lower down, or to displace it, or to use it without leave, or to construct for himself a new platform higher up. Dr. Tyndall is good enough to say in his volume, 'In the frankest spirit, he placed it at my disposal, and thus relieved me from the necessity of carrying up my own.' In the 'additional note' to which I have referred ('Hours of Exercise,' p. 166), Dr. Tyndall says, 'It certainly would have enhanced the pleasure of my excursion if Mr. Whymper could have accompanied me. I admired his courage and devotion; he had manifestly set his heart upon the Matterhorn, and it was my earnest desire that he should not be disappointed. I consulted with Bennen, who had heard many accounts—probably exaggerated ones—of Mr. Whymper's rashness. He shook his head, but finally agreed that Mr. Whymper should be invited, "provided he proved reasonable." I thereupon asked Mr. Whymper to join us. His reply was, "If I go up the Matterhorn, I must lead the way." Considering my own experience at the time as compared with his; considering, still more, the renown and power of my guide, I thought the response the reverse of "reasonable," and so went on my way alone.'

I entirely agree with Dr. Tyndall that such a response to his polite proposal would have been the reverse of reasonable. My recollection, however, of this conversation is very different to his. I positively deny having given such an answer, and as positively affirm that my answer was not intended to convey the meaning which he has put upon it. An hour or so after he had accepted my offer, he came to me and said (in a way which I thought seemed to imply that the answer might not be in the affirmative), 'Mr. Whymper, would you like to accompany us?' My answer could not have left him in doubt, for I replied warmly, 'Certainly I should; it is the very thing I should like,' or words to that effect. Dr. Tyndall then went on to say, 'If you go with us, you must place yourself under Bennen's guidance; you must obey his instructions; you must follow his lead,' and so forth. Now I was quite ready to place myself under Bennen, and should have done so as a matter of course had I accompanied the party. But being called upon to declare that I would implicitly obey his instructions, whether they were right or wrong, I could hardly avoid saying, 'You will remember, Dr. Tyndall, that I have been much higher than Bennen, and have been eleven days on the mountain.'

whilst he has been on it only for a single day; you will not expect me to follow him if he is evidently wrong?' It is not possible at this distance of time to remember the exact words I employed, but those given above cannot be far from the truth. Whatever was said was said because I desired that the expedition should succeed; and I thought at the time that Dr. Tyndall thoroughly understood me, for our conversation was not broken off abruptly; on the contrary it was agreed that I should accompany the party, and I went to my room to make the necessary preparations. It was some time afterwards (half-an-hour or more) before Dr. Tyndall came to me and said, 'Well, after all, I think you had better not accompany us.' He gave no reason for the change of plan, nor did I ask for any. I supposed that he wished to be alone, and had no idea that Bennen had anything to do with the matter.

The expedition started, and did not succeed. I heard of the failure, sought Dr. Tyndall in his room, and was received by him with more than his usual warmth and friendliness; which would scarcely have been the case if I had used the unreasonable expressions now attributed to me. He wrung my hands, and in the most earnest and impassioned manner abjured me to have nothing more to do with the Matterhorn. I left Breuil that year, as I have said elsewhere, 'almost inclined to believe that the mountain was inaccessible,' understanding that this was Dr. Tyndall's opinion, and that he would not try it again; but this appears to have been a mistake, for within a few hours after my departure from Breuil he proposed to Bennen to make another attempt upon it! Bennen, however, declined ('Macmillan's Magazine,' March 1869, p. 370).

Some of these details are now printed for the first time. I omitted them from 'Scrambles amongst the Alps,' because they were not necessary to the narrative; but, as my reticence has not been understood, it will perhaps be better to incorporate them in any future account of the ascent of the Matterhorn.

In the second portion of his 'additional note' ('Hours of Exercise,' p. 167), Dr. Tyndall says, in reference to 'Scrambles amongst the Alps':—

'I am concerned to find (J. A.) Carrel originating, and still more concerned to find Mr. Whymper giving currency to the fiction, that when Bennen halted in 1862 at the base of the final precipice of the Matterhorn, he, Carrel, stood forth and pointed out a way to the top. Of the guides and porters Bennen was the only man who entertained a thought of going on (!); he was throughout the natural commander of the party, and both Walter and Carrel shrank from the dangers of the last ascent. But with the experience gained from his association with Bennen, Carrel three years afterwards* returned to the charge. He had my rope to aid him, and by it he and his colleagues readily reached an elevation which gave them ample time for the thorough inspection of the last bit of mountain.† But even thus aided he accomplished a task which none but a first-rate climber could have accomplished, and it is doubly unworthy of a man capable of so gallant an achievement to deal untruly with the memory of a heroic predecessor, without whose initiative he might never have set his foot upon the Matterhorn.'

* And one year afterwards also.

† The same thing is said in different words by Dr. Tyndall on a previous page.

332 Professor Tyndall's Attempt on the Matterhorn in 1862.

Dr. Tyndall makes several very erroneous statements in this paragraph. As far as I am aware, J. A. Carrel has never said 'that he, Carrel, stood forth and pointed out a way to the top'; and I have never stated that he did any such thing. What I wrote ('Scrambles,' p. 134) was as follows:—

'The guide Walter (Dr. Tyndall says) said it was impossible to proceed, and the Carrels, appealed to for their opinion (this is their own account), gave as an answer, "We are porters; ask your guides." Bennen, thus left to himself, was finally forced to accept defeat. . . . Jean Antoine Carrel says that when Professor Tyndall gave the order to turn, *he* would have advanced to examine the route, as he did not think that further progress was impossible, but he was stopped by the Professor, and was naturally obliged to follow the others.'

And in a note on the same page of 'Scrambles' it was added:—

'The cause of Professor Tyndall's defeat was simply that his second guide (Walter) did not give aid to Bennen when it was required, and that the Carrels *would not act as guides after having been hired as porters*. J. A. Carrel not only *would not* of the existence of this place' (the cleft which stopped the party) 'before they came to it, but always believed in the possibility of passing it, and of ascending the mountain.'

These statements, it must be admitted, are very different from saying that 'Carrel stood forth and pointed out a way to the top.' I am prepared to stand by every word that I have written on this matter. My account, however, of the Professor's defeat is not perhaps so clear as it might have been, because I did not wish to lay too much stress upon it, and condensed it within a few lines. I willingly take the opportunity to refer to it at greater length, and by so doing to throw light upon the former relation.

When Dr. Tyndall and Bennen started from Breuil on July 27, 1862, they were under the mistaken impression that the Matterhorn had *two* peaks. This will be gathered by any person from Dr. Tyndall's published accounts of the expedition. J. A. Carrel, however, knew that this was not the case, for he had examined the mountain carefully, by himself, or in my company, on many occasions. I do not know whether Carrel was aware of the delusion which was entertained by the others; and, if he was, no blame should be imputed to him for not enlightening them, as he was engaged as a mere porter, and was placed strictly under the orders of Bennen, to obey his commands and to follow his lead. This I have heard from Carrel himself. When the party arrived upon 'the shoulder' (the long ridge that juts out towards the S.W. from the final peak), it was evident to all that there was not a second summit. Those who had supposed otherwise must have been considerably taken aback. They went towards the terminal precipices of the final peak, and presently found further progress was stopped by a deep notch in the ridge they were traversing. 'The ridge,' says Dr. Tyndall, in the 'Saturday Review,' 'was here split by a deep cleft, which separated it from the final precipice, and the case became more hopeless as we came more near. So savage a spot we had never stood upon. We sat down with broken hopes.' I knew this notch, from a distance, long before Dr. Tyndall's party arrived at it. It can be seen very well from the direction of the Col Theodule, and I had frequently consulted with J. A. Carrel as to the best manner of passing it. Carrel, therefore,

was perfectly cognisant of its existence—indeed, he knew of it years before I did. But Dr. Tyndall, Bennen, and Walter do not appear to have known of it before they were stopped by it. Bennen, the leading guide, could not see a way across. He broke down completely, and Dr. Tyndall called the others to help him out of his difficulty. But they did not respond; all saying, according to Dr. Tyndall, that further progress was impossible. J. A. Carrel denies this for himself and Cæsar Carrel, and says they replied, 'We are porters; ask your guides.' Anyhow, the result was that Bennen 'sought to fix the responsibility of return' on Dr. Tyndall, who (again according to his own account) gave him no help. 'It took him (Bennen) half-an-hour to make up his mind, but he was finally forced to accept defeat.'

When the order to turn was given, and it was evident that Bennen could not lead the party any further, J. A. Carrel stepped on one side, intending to examine the route; but Dr. Tyndall peremptorily ordered him to follow Bennen, and he was naturally obliged to do so. This I heard from J. A. Carrel so long ago as 1863, when he was acting as my guide on the Matterhorn; and learnt it because I inquired why it was he still believed that the mountain could be ascended by the southern route, when that route had been found impracticable by Dr. Tyndall. He has given me the same story on subsequent occasions, and cross-examination has failed to shake it. In 1869 I read over to him that portion of my relation of Dr. Tyndall's expedition precisely as it appears in 'Scrambles amongst the Alps,' and he expressed himself perfectly satisfied with its accuracy; and he then told me further that he had, in 1863, shortly after the publication of Dr. Tyndall's paper in the 'Saturday Review,' written to Aosta to say that the guides of Val Tournanche were not satisfied with the references which had been made to them, and that this letter had been printed, I believe in the 'Feuille d'Aoste.' I hope these explanations will assure Dr. Tyndall that I took pains to give an accurate account of his expedition, and that I have not even supposed that 'Carrel stood forth and pointed out a way to the top.' *

In regard to what Dr. Tyndall has written about 'dealing untruly with the memory' of Bennen, I have only to say that Carrel has never shown any disposition to depreciate that excellent guide. I believe Carrel felt the respect for him that one first-rate mountaineer always feels for another. The disagreements have been between Dr. Tyndall and Carrel, not between Bennen and Carrel. I cannot, too, concur with Dr. Tyndall in regarding Bennen as Carrel's predecessor, without whose initiative he might never have set his foot upon the Matterhorn, for the fact is that Carrel ascended to the height of 12,650 feet upon the Matterhorn two years before Bennen set his foot on the mountain! Bennen, indeed, followed Carrel's route. Bennen profited by Carrel's experience, and took with him J. J. Carrel (one of J. A. Carrel's associates in the earliest explorations), when accompanying Mr. Hawkins.

* I have no doubt that he *could* have pointed out a way, and have led the party to the top.

on the Matterhorn in 1860. Bennen, notwithstanding, made a slight advance upon his predecessors on each of the two occasions he was on the mountain, amounting in the aggregate to about 900 feet. Let him receive all the praise that should be awarded to him for doing so. But this, after all, was an almost insignificant portion of the whole. Reckoning from the inn at Breuil, an ascent of 7,890 feet has to be made before the summit of the Matterhorn is reached. About *seven thousand feet* of the way was found by others, and the chief part—by far the chief part—of this was discovered by Jean Antoine Carrel. It is therefore simply absurd to speak about the experience Carrel gained from his association with Bennen—that association amounting to about thirty-six hours' companionship with Bennen upon a mountain with which Carrel was already perfectly familiar.

It is not at all my desire to raise a controversy upon the respective abilities of these two men. Still, I cannot but think that Dr. Tyndall, in his great zeal for his favourite guide, does not do justice to the merits of the other, and that it is possible he may, by the very ardour of his advocacy, defeat the ends he has in view. The position taken up by Carrel upon the occasion in question (following his own account) is easily understood. He says in regard to it, in effect, 'I was hired as a mere porter, to follow another man's lead, and to obey his orders. Why should I be called upon to lead *him*, when he broke down at a difficulty which he would not have encountered if he had been better acquainted with the mountain? No, I said, we are *porters*; ask your *guides*.' I think you must admit, sir, that it would have been extraordinary magnanimity on the part of Carrel if, under these circumstances, he had shown Bennen a way up the mountain. Those who think otherwise should remember that Carrel was amongst the very first men who assailed the Matterhorn. In the expeditions of 1858–9, made from the side of Val Tournanche without the presence of amateurs, he was regarded as the leader, and he was generally admitted to be the right man in the right place. During these expeditions he made sacrifices of time and money which were considerable for a poor man. It must be therefore as annoying to him as it is surprising to others to find Dr. Tyndall reiterating no less than four times, in his 'Hours of Exercise,' the oft-repeated fiction that Mr. Vaughan Hawkins was the *first* man who assailed the Matterhorn. It is even more amazing to note in the same volume Dr. Tyndall declaring (pp. 165, 167) that the first Italian ascent (Carrel's ascent in 1865) was due to the assistance afforded by the rope left behind him in 1862. It is undeniable that the rope afforded a certain amount of aid to subsequent parties, but it is as unfair to claim this extraordinary value for it as it would be to pretend that Dr. Tyndall's advance in 1862 resulted from using rope, &c., that I had left behind lower down. Carrel's wonderful ascent in 1865 was executed step by step over the route which he indicated several years before, *even including the famous flank movement by which he turned and overcame the last difficulties*. I remember him, twelve months before he ever saw Dr. Tyndall and Bennen, describing to me, with great animation, how it was to be done. It would be cruelly unjust to attempt to deprive him of his hard-won.

honour by assigning such importance to this fragment of cord, and I cannot think that the claim will be generally admitted, least of any by the person who is most concerned.

In conclusion, allow me to say I believe that the statements in 'Scrambles amongst the Alps,' qualified by Dr. Tyndall in the final paragraph of his 'additional note' as 'other inaccuracies,' will be found upon examination to be as little deserving of this designation as those upon which he has dwelt particularly. I would gladly have offered these explanations to him in a less public manner had the opportunity been afforded me; and I trust he will see in this reply to his observations another proof of the attention ever given to his writings by

Your obedient servant,

EDWARD WHYMPER.

That any question should have arisen between two such distinguished members of the brotherhood of climbers as Professor Tyndall and Mr. Whymper, must be a matter of common regret. But it is chiefly, we are glad to find, from a generous rivalry in maintaining the honour of their respective guides that the two Englishmen, whose names will be most permanently associated with the Matterhorn, are now at variance. The siege of the noblest fortress of the Alps must always possess an historical interest for mountaineers; and every actor who took part in it is entitled to have as far as possible his share fully ascertained.

With regard to the first matter at issue, namely, the reason which led to Mr. Whymper's taking no part in Dr. Tyndall's second attack on the Matterhorn, the two accounts seem to us to be easily reconcilable. Professor Tyndall had, by his own showing, given up to Bennen the entire control and responsibility of the expedition. He felt, therefore, obliged to seek from his guide, as commanding officer, the permission to add a recruit to the party. Bennen gave his assent in qualified and—perhaps, as repeated by Dr. Tyndall—rather patronising terms.

On the conditions of his enrolment being put before him, Mr. Whymper seems to have asked to reserve to himself that right of expressing an independent judgment to which on the Matterhorn his personal knowledge peculiarly entitled him. Dr. Tyndall having surrendered for himself all independence of action, naturally hesitated to allow it in another; and was very likely to misinterpret the force of Mr. Whymper's phrase, for the exact words of which he has not expressly vouched.

The second portion of Dr. Tyndall's note, referring to the respective behaviours of Bennen and Carrel during the half-hour which decided the fate of the expedition, appears to be founded on a misapprehension, into which he has been led by a worthy haste to do justice to the memory of his guide. It is, we think, conclusively proved that Mr. Whymper has never stated that 'Carrel stood forth and pointed the way to the top.'

For the rest, the amount of influence which Carrel's experience with Bennen, and the aid of Dr. Tyndall's rope, had on the final success of the Breuil guides, is a subject on which everyone may form his own opinion. Dr. Tyndall surely, however, need not seek this uncertain foundation on which to establish his guide's reputation. Bennen's friends may be well content to rest his fame on the fact that he, almost

alone among Swiss guides, did not yield to the panic prevalent at that time with regard to the Matterhorn. On two occasions he gallantly attacked the foe whom the best men in the Alps could scarcely be brought to face. But he more than once expressed his conviction that the conflict was, in fact, hopeless. In this we think lies the real secret of his defeat, and of Carrel's final victory. The latter alone believed in the possibility of the ascent from Breuil, and therefore to him alone it became possible.

D. W. F.

PROCEEDINGS OF THE ALPINE CLUB.

*The Annual General Meeting was held on December 12, 1871 ;
Mr. W. MATHEWS, President, in the Chair.*

The following gentlemen were balloted for, and elected Members of the Club—viz., Right Rev. Dr. Ellicott, Bishop of Gloucester; Baron Albert de Rothschild; Messrs. M. Beachcroft, E. Collins, W. Leaf, W. Marcet, M.D., T. Middlemore, S. G. C. Middlemore, Schütz-Wilson, and H. J. Smith.

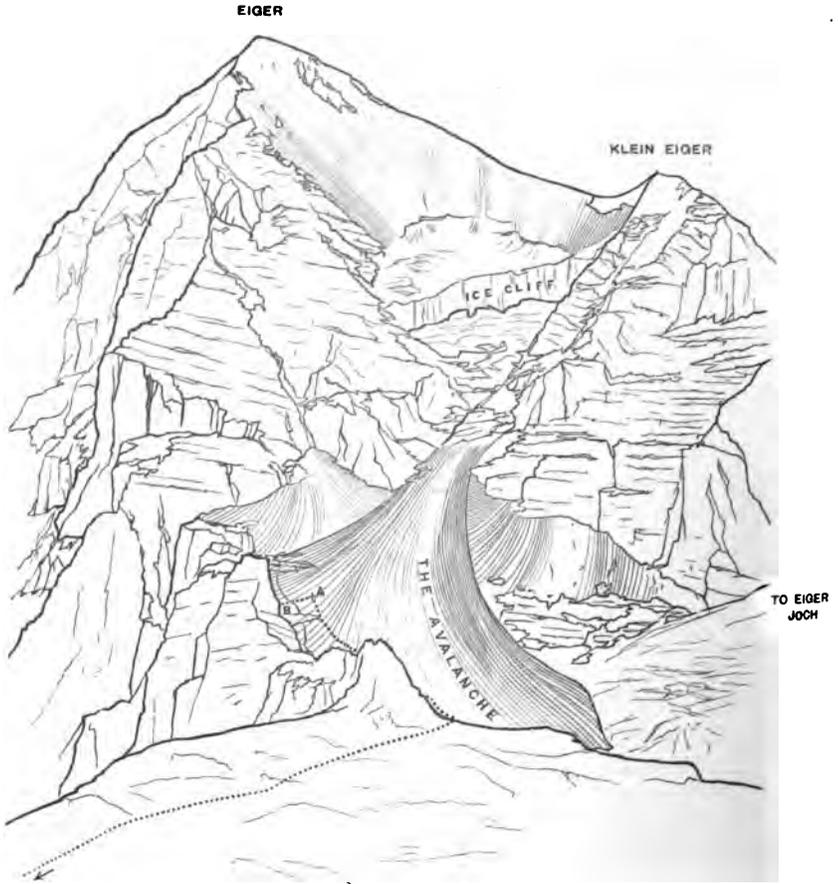
Mr. BALL proposed, and Mr. STEPHEN seconded: 'That Mr. W. Longman be appointed President of the Club for the ensuing year.' After some observations by Mr. W. Longman and the President, in the course of which it was mentioned that Mr. Tuckett had been asked to allow himself to be nominated President, but had been unable, owing to other engagements, to accept the position, the motion was carried unanimously.

The PRESIDENT moved, and Mr. MACDONALD seconded: 'That the Rev. T. G. Bonney and Mr. E. Whympy be appointed Vice-Presidents, and Mr. Morshead and Mr. Wallroth new Members of Committee in place of the Rev. H. B. George and Mr. F. Walker, who retire by rotation; that the other Members of Committee be re-elected; and that Mr. A. W. Moore be appointed Honorary Secretary.' Carried unanimously.

Mr. NICHOLS proposed, and Mr. MOORE seconded: 'That the thanks of the Club be given to the retiring President, Vice-Presidents, Members of Committee, and Secretary, for their services to the Club.' Carried unanimously. The PRESIDENT acknowledged the vote.

Mr. STEPHEN then read a paper entitled 'Round Mont Blanc,' which appears *in extenso* in our current number. At the conclusion of the paper, several gentlemen made observations on the unsatisfactory character, as a body (and with certain exceptions), of the Chamouni guides. The points chiefly dwelt upon were their unwillingness to serve with Swiss guides, want of enterprise, and untrustworthiness in cases of emergency.

December 13, 1871.—The annual winter dinner took place at St. James's Hall this day, when sixty-five members and their friends sat down; Mr. W. Longman, Vice-President, in the chair. Among the guests of the Club upon the occasion were Captain Richard Burton, Colonel Malleon, Sir F. Pollock, Bart., and R. G. W. Herbert, Esq., Under Secretary for the Colonies.



WENGERN SCHEIDECK

DIAGRAM TO ILLUSTRATE "A RACE FOR LIFE",
FROM AN OUTLINE BY F. F. TUCKETT.

THE
ALPINE JOURNAL.

MAY 1872.

A RACE FOR LIFE. By F. F. TUCKETT.

‘Tum quâ durati concreto frigore collis
Lubrica frustratur canenti semita clivo,
Luctantem ferro glaciem premit, haurit, hiatu
Nix resoluta viros, altoque à culmine præceps
Viventes turmas operit delapsa ruina.’

SILIUS ITALICUS.

OUR experience of Switzerland during the month of June last year, I think, fairly entitles my companions and myself to the sympathy of all, and, perhaps, the gratitude of some, inasmuch as we were not only made the luckless scapegoats of all the varied forms of meteorological misery which the Alps are capable of inflicting when in a thoroughly vindictive mood, but scarcely had we departed, moist, mouldy, and malcontent, when a turn for the better took place, and we had to comfort ourselves with the thought that we had at any rate served as so much blotting-paper to mop up the Oreads' tears, and set them smiling again on our more fortunate successors. When it did not rain, it snowed; when it did not snow, it hailed; when it did none of the three, it blew; and when the weather had apparently exhausted its repertory, it either began over again, or sulked, and indulged in those varying forms of alternate threatening and pretended amendment which are almost worse than more pronounced spite, as a false friend is worse than an open enemy. We seemed to be wandering in Dante's

‘. terzo cerchio della piova
Eterna, maledetta, fredda, e greve:
Regola e qualità mai non l'è nova.
Grandine grossa, e acqua tinta, e neve
Per l' aer tenebroso si riversa.’

INF. vi. 7.

On June 12th we were beaten back—oh that I should have to make so humiliating a confession!—by a snowstorm and avalanches on the Col de Sageroux. We had to abandon the Diablerets after two attacks, one frustrated by soaking rain, and the other by the ‘föhn,’ which raged in such furious fashion, scattering the roof shingles far and wide around Plan des Iles, and sweeping the cascades of the Creux du Champ in dust-like clouds of spray right across the vast cliffs of that mighty cirque, so that there was no standing up against it:—

‘La bufera infernal, che mai non resta,
Mena gli spirti con la sua rapina,
Voltando e percotendo li molesta.

Di qua, di là, di giù, di su gli mena;
Nulla speranza gli conforta mai,
Non che di posa, ma di minor pena.
E come i gru van cantando lor lai,
Facendo in aer di sè lunga riga;
Così vid’ io venir traendo guai,
Ombre portate dalla detta briga.’

INF. v. 31–49.

Mists persistently shrouded the Wildhorn whilst I patiently waited at Lauenen with Christian Lauener, the rest of our party having gone forward to An der Lenk by the carriage road; and when I rejoined them at the latter place on the 21st, in hopes of a pleasant expedition over the Wildstrubel to the Gemmi *en route* for the Bel Alp, rain below and fresh snow aloft drove me and my brother-in-law, Mr. J. H. Fox, to adopt the mild but charming alternative route of the Hahnenmoos, Adelboden, and Frutigen, whilst the ladies, under Mr. Howard’s care, went round all the way by road. We did, indeed, succeed in getting up the Wildstrubel from Schwarenbach, but the momentary exception only proved the rule; and after several days’ stay at the comfortable hotel on the Bel Alp, during most of which time it took two men and a boy to make out the Aletsch Glacier, and the prospect and retrospect of dinner were the two excitements of the day, it was in no very jubilant frame of mind that we at length threw up the (saturated) sponge, pushed down to Sierre, and, hurrying into a railway carriage, accomplished a flank movement upon Bern, which for the moment was inaccessible from the Valais by any other route suitable for ladies.

Our spirits, let down with so much water, were by this time far too weak even to rebel; and indeed it would have been perfectly useless, for, struggle as we might, we were not to

escape the clutches of the storm-fiend. Lauener and I started by the first train on the morning of the 28th for Gunten on the Lake of Thun, in order to visit the Glacière of the Schaffoch, whilst the ladies with our other gentlemen and F. Devouassoud proceeded later in the day to Interlaken, but my heart sank within me as from the steamer's deck I watched the Niesen and Stockhorn gradually emerge from the mists, clad in a pure mantle of snow far down into the region of pines. To be brief, we found the snow almost amongst the meadows a few hundred feet above the village of Sigriswyl, the Bergli Alp deeply covered, whilst beyond it, on the steep slopes above the Justithal, it was unpleasantly inclined to slip away in avalanches. The following morning Christian and I, again bent on performing some valorous exploit, actually screwed up our courage to no less formidable an expedition than an attempt to reach the summit of the Faulhorn viâ the Scheinige Platte, but were compelled to beat an ignominious retreat after wading through deep, soft snow for two hours, beyond the inn on the latter point, and satisfying ourselves that four or five more of the same sort of monotonous and laborious grind would be required to accomplish our object. The Scheideck and Wengern Alp were reported to be covered to a depth of three feet; and though this of course rapidly disappeared, it was with the gloomiest forebodings as to the impossibility of effecting anything in the shape of an expedition that our whole party finally assembled on the 30th at Grindelwald, which we had named as a rendezvous for certain of our friends who were to arrive the next day direct from England.

Amongst these was a tried and trusty ally of former years, Mr. E. R. Whitwell; and, after a hearty greeting, his first question was, 'Well, what's to be done?' '*Gar nichts*' was the truth at the moment, and I uttered the dismal words; but of course, as was natural in one whose spirit had not been broken by such a month of torture as we had just gone through, he did not seem to see it at all, and the weather once more showing some signs of maintaining the slight improvement which had set in a day or two before, we agreed not only to hope for the best, but to go up to the excellent inn on the Wengern Scheideck the next evening, so as to be prepared to take advantage of any chance that might present itself.

Our idea had originally been to ascend the Eiger and Jungfrau from the Wengern Alp before separating, Whitwell to proceed to Zermatt, and I to return home; and though my own hopes of accomplishing anything were now, I must confess, of the faintest, my friend's enthusiasm and my own keen

longing for at least one good climb before turning my back for a year upon the mountains, were irresistible. Accordingly the night of July 2nd found Fox, Whitwell, and myself, with Christian Lauener and his brother Ulrich, who had now joined us by arrangement with Whitwell, at the highly-to-be-recommended inn on the Wengern Scheideck, bent on trying what might prudently be effected on the morrow, if the weather should prove favourable. I say 'prudently,' because it was distinctly agreed that if, during the ascent, either we or the guides should see reason to believe that the state of the snow was still such as to render avalanches probable, the attempt should not be prosecuted. It had already disappeared with wonderful rapidity from the lower slopes, and had been discharging itself from the higher levels in an almost ceaseless succession of avalanches ever since our arrival at Grindelwald on the 30th, so that, as the sun was at times hot on Sunday, there was a reasonable probability that the expedition would not necessarily involve any imprudence, especially if the night should turn out to be clear and frosty, and we honestly acted on our resolve to turn back in the event of the snow proving to be in a dangerous condition.

Quitting our comfortable quarters between 3 and 4 A.M. on the 3rd, we skirted the ridge which rises from the Pass itself to the summit of the Faldbodenhubel, and still maintaining a south-easterly direction after passing the latter, soon found ourselves at the edge of the valley occupied by the Eiger Glacier, up which our course, now bending to the left, lay. During a short halt at this point we became aware that we were being followed at no great distance by another party, and in a few minutes were joined by Christian Almer, his son, and a porter, who were to accompany our friends Miss Brevoort and Mr. Coolidge over the Eiger Joch on the following day, and, stimulated by our example, and with a view to shorten the work of the morrow, were off to explore and cut at least a portion of the necessary steps up the formidable 'eiswand.'

Pushing on again in company, and entering upon the glacier, now entirely concealed by snow, we soon had to bid adieu to the others, who struck off to the right for its southern arm, separated from the branch up which our course lay by the great rocky buttress which descends from the Klein Eiger. The northern affluent of the Eiger Glacier lay between the base of this buttress on our right and the Rothstock—a mere irregular tooth jutting out rather boldly and picturesquely from the western arête of the Eiger itself—on our left. The lower

and upper portions of the ice-stream are to some extent divided, at least towards the right or Rothstock bank, by a rocky barrier or step (*stufe*), which, however, presents no sort of difficulty. Bearing, therefore, most fortunately as it proved in the sequel, well to our left, so as to hug the cliffs of the Rothstock and keep as much as possible out of the track of any avalanches, we advanced at a steady pace, considering that the snow was much softer than was agreeable or desirable at so early an hour.

We were nearly opposite the highest point of the Rothstock, whose cliffs, here slightly receding so as to form a sort of bay in the direction of the chord of whose arc we were at the moment moving, were probably about a hundred yards distant. Ulrich Lauener was leading, followed successively by Whitwell, Christian, and Fox, whilst I brought up the rear. The rope had not yet been resorted to, most providentially for us, as it would necessarily have hindered our freedom of movement. The morning was dull, and though by this time—about five o'clock I imagine—there was plenty of light for all purposes, there was nothing at the moment at all exhilarating or exciting in our proceedings as we trudged steadily up the gently inclined slopes straight for the base of the Eiger.

It will be within the recollection of most, and at any rate a map or photograph will make it abundantly clear, that at the point we had reached, we had the Eiger itself directly in front, rocks forming its lower portion, though wonderfully masked by masses of snow, which almost filled up the spaces between the successive ledges, and rendered its appearance very different from that which it usually presents in July. Above these was the beautiful western snow arête running up at a high angle to the summit. From this last another snowy ridge descends in a south-west direction to the Klein Eiger, more than 1,600 feet below it, and it is the prolongations of these two arêtes which form the boundaries of the north branch of the Eiger Glacier. Enclosed by them, and in the hollow or re-entering angle between the summits of the greater and lesser Eiger, a considerable mass of glacier descends very steeply, and terminates in a lofty cliff of ice or névé probably 250 to 300 feet in height, which seems to hang suspended some 2,000 feet above the Eiger Glacier, and is, so to speak, connected with the latter by a steep couloir, broken here and there by rocks, and gradually broadening out in a funnel shape until it ultimately blends with, or enlarges into, the main valley up which we were advancing.

I have said that Ulrich was leading, and I may here remark

that he is a little hard of hearing; and though his sight, which had become very feeble in 1870, is greatly improved, both ear and eye were perhaps less quick to detect any unexpected sound or movement than might otherwise have been the case. Be this as it may, when all of a sudden I heard a sort of crack somewhere up aloft, I believe that, for an instant or two, his was the only head that was not turned upwards in the direction from which it seemed to proceed, viz., the hanging ice cliff; but the next moment, when a huge mass of sérac broke away, mingled apparently with a still larger contingent of snow from the slopes above, whose descent may, indeed, have caused, or at least hastened, the disruption of the glacier, every eye was on the look out, though as yet there was no indication on the part of anyone, nor I believe any thought for one or two seconds more, that we were going to be treated to anything beyond a tolerably near view of such an avalanche as it rarely falls to anyone's lot to see. Down came the mighty cataract, filling the couloir to its brim; but it was not until it had traversed a distance of 600 to 800 feet, and on suddenly dashing in a cloud of frozen spray over one of the principal rocky ridges with which, as I have said, the continuity of the snow slope was broken, appeared as if by magic to triple its width, that the idea of danger to ourselves flashed upon me. I now perceived that its volume was enormously greater than I had at first imagined, and that, with the tremendous momentum it had by this time acquired, it might, instead of descending on the right between us and the rocks of the Klein Eiger, dash completely across the base of the Eiger itself in front of us, attain the foot of the Rothstock ridge, and then trending round sweep the whole surface of the glacier, ourselves included, as with the besom of destruction.

It would need the pen that has described the 'Vision of Sudden Death' to analyse the exact impression which such a process of almost 'unconscious cerebration' produced; and if I were but a De Quincey, I would hold my readers for a few minutes in suspense, as I piled up simile upon simile, and made them realize—though even then but imperfectly; for what word-painting can grapple with such a subject?—the awful downward rush, the 'swift destruction unawares' of the coming horror! As the great master of prose to whom I have alluded remarks: 'Meantime one aspect of sudden death there is, one modification, upon which no doubt can arise, that, of all martyrdoms, it is the most agitating, viz., when it surprises a man under circumstances which offer, or which seem to offer, some hurrying, flying, inappreciably minute chance of evading it. Sudden as

the danger which it affords must be any effort by which such an evasion can be accomplished.' I instinctively bolted for the rocks of the Rothstock—if haply it might not be too late—yelling rather than shouting to the others, 'Run for your lives!'

Ulrich was the last to take the alarm, though the nearest to the danger, and was thus eight or ten paces behind the rest of us, though he, too, shouted to Whitwell to run for his life directly he became aware of the situation; but by this time we were all straining desperately through the deep, soft snow for dear life, yet with faces turned upwards to watch the swift on-coming of the foe. I remember being struck with the idea that it seemed as though, sure of its prey, it wished to play with us for awhile, at one moment letting us imagine that we had gained upon it, and were getting beyond the line of its fire, and the next, with mere wantonness of vindictive power, suddenly rolling out on its right a vast volume of grinding blocks and whirling snow, as though to show that it could out-flank us at any moment if it chose.

Nearer and nearer it came, its front like a mighty wave about to break, yet that still 'on the curl hangs pausing;' now it has traversed the whole width of the glacier above us, taking a somewhat diagonal direction; and now run, oh run! if ever you did, for here it comes straight at us, still outflanking us, swift, deadly, and implacable! The next instant we saw no more; a wild confusion of whirling snow and fragments of ice—a frozen cloud—swept over us, entirely concealing us from one another, and still we were untouched—at least I knew that I was—and still we ran. Another half-second and the mist had passed, and there lay the body of the monster, whose head was still careering away at lightning speed far below us, motionless, rigid, and harmless. It will naturally be supposed that the race was one which had not admitted of being accurately timed by the performers; but I believe that I am speaking with precision when I say that I do not think the whole thing occupied from first to last more than some five or six seconds. How narrow our escape was may be inferred from the fact that the spot where I halted for a moment to look back after it had passed, was found to be just twelve yards from its edge, and I don't think that in all we had had time to put more than thirty yards between us and the point where our wild rush for the rocks first began. Ulrich's momentary lagging all but cost him his life; for, in spite of his giant stride and desperate exertions, he only just contrived to fling himself forwards as the edge of the frozen torrent dashed past him. This may sound like ex-

aggration, but he assured me that he felt some fragments strike his legs; and it will perhaps appear less improbable when it is considered that he was certainly several yards in the rear, and when the avalanche came to a standstill, its edge, intersecting and concealing our tracks along a sharply defined line, rose rigid and perpendicular like a wall of cyclopean masonry, as old Bible pictures represent the waters of the Red Sea standing 'upright as an heap' to let the Israelites through.

The avalanche itself consisted of a mixture, in tolerably equal proportions, of blocks of sérac of all shapes and sizes, up to irregular cubes of four or five feet on a side, and snow thoroughly saturated with water—the most dangerous of all descriptions to encounter, as its weight is enormous; and, being by the mere fact of motion and friction kneaded up into balls some of them a yard in diameter, their differential motion, unlike that of the dry, soft, floury sort, mashes and pulverises any body or substance involved in the mass. Such a moment is not very well suited for making reliable observations, but I seem clearly to remember that, beyond the momentary rush of the snow and ice 'staub,' sharing the momentum of the mass from which it proceeded, there was nothing of the nature of those great blasts which we are told not unfrequently immediately precede or follow the larger avalanches, and often cause even more destruction than the latter.

On examining at our leisure the nature and extent of our avalanche, we found that, as it now lay, it covered the valley for a length of about 3,300 feet and a maximum breadth of 1,500, tailing off above and below to 500 or 1,000 feet, and probably averaging five feet in depth over the whole surface. In fact, it *filled* the valley occupied by the northern branch of the Eiger Glacier to below its point of junction with the ice-stream which descends from the Eiger Joch, except at *one* point where a little bay remained free at the foot of the Rothstock, precisely where we happened to be at the moment of its fall. Had our position on the slope been a few hundred feet higher or lower, or in other words, had we been five minutes earlier or later, we must have been caught beyond all chance of escape.

Naturally all thought of prosecuting our attack upon the Eiger after such a warning was now at an end, so after making a few measurements we mounted hastily to the summit of the Rothstock for a more comprehensive view in a position of perfect safety. From this point the great triad of peaks, which constitute the glory of the Wengern Alp, shows to great advantage, whilst, in the opposite direction, the valley of Grin-

delwald and its northern barriers are well seen. Ulrich was a good deal upset and looked very white and grave, as, indeed, we all might well have done; but, in his case, this arose not so much from personal fear as because, whilst we were concealed from one another by the clouds of snow, he and W. had changed places in the line, and when we emerged from the obscurity he at once missed Whitwell, whom he expected to see below him with the rest of us, and, turning deadly pale, threw up his arms as he shouted, 'Ach Gott! wir haben einen Herrn verloren!' Of course the mistake was only momentary, but the shock told on his powerful frame, and he did not get over it the whole day.

I suggested that as Almer and his companions must have seen the avalanche, and would probably feel very anxious on our account, we might as well send them a cheery *jodel*; and he told me afterwards that it was indeed a joyful sound, as he had at first quite given us up for lost, and 'trembled like a child.' Thus assured of our safety, however, he pushed on for the Eiger Joch, and only returned in the evening, soaked to the skin, but with that fine smile of honest pride that plays about his mouth and eyes when he knows he has done a good bit of work, announcing half shyly that he had cut more than 1,000 steps on the great ice-wall, and would have gone to the top if the bad weather had not hastened his return. His track had led him across the lower portion of the fresh-fallen débris, and he assured me that he had never seen so mighty an avalanche in his life.

It may serve to convey some idea of the mass which had descended when I add that, if we assume its dimensions to have been: length 3,300 feet, average breadth 1,000, and depth 5—in many places it was twice as thick as this—we get 611,000 cubic yards, or in round numbers a weight of about 450,000 tons, taking the ice and saturated snow to average about fifteen hundredweight to the cubic yard!

On our way back we had an opportunity of judging of the crushing, resistless force with which it must have swept down from the condition of the rocks on the right bank of the glacier, which we naturally hugged as closely as possible as a means of escape in case of any renewal of the discharge before we could get out of the line of fire. To a height of seven or eight feet the low cliff was plastered so thickly and uniformly with a layer of frozen snow, that, for a length of a hundred yards or more, scarcely a particle of rock was visible, so completely had it been whitewashed by the tremendous friction!

Did time and space permit, I should be tempted to add, for

comparison's sake, some details of the distinguishing characteristics of other 'avalanches I have met,' and not always succeeded in avoiding; but, after all, it might only give a handle to unprincipled persons to 'point a moral' without 'adorning a tale,' and I refrain. Lest, however, notwithstanding the explanations I have given in justification of our setting out at all to see for ourselves the actual state of the snow, and our distinct resolve to abide by the prudential conditions laid down at the outset, anyone should be disposed to think that we practically courted the fate we so narrowly escaped, I desire to add that avalanches from this particular quarter are, according to the best local testimony, of very unfrequent occurrence, and of course still more rarely take place at so early an hour. I trust, too, that nothing I may have written, in attempting honestly to convey, as nearly as possible, the precise impressions produced on myself *during* those brief moments of excitement, suspense, and danger, will lead anyone to suppose that, either at the time or since, such an adventure was, or can be, lightly spoken of, or felt to be other than a very merciful and providential deliverance.

Note on the terms Lauine, Lawine, and Avalanche.—The above expressions have become so familiar by constant use that their derivation and exact significance are perhaps seldom thought of and not very generally known, and I therefore add a few remarks on the subject, which those who are inclined to exclaim 'What's in a name?' may skip if they prefer it.

Simler, in his '*Vallesia et Alpium Descriptio*,' Elzevir edition, 1633, under the head of '*Itinera Alpina difficilia et periculosa propter nives*,' page 288, remarks as follows:—'*Maximum omnium periculum est à decidentibus conglomeratis nivibus quas nostri Löuvvinen, Rheti Labinas, vocant, haud dubiè à labendo, unde et Germanicum nomen alterius vocis depravatione factum est.*' He gives a very good description of the various sorts of avalanche, and states that they '*Commoventur levi de causâ, si enim in monte summo arboribus nudo et acclivi nix commota fuerit, vel à prætervolante avicula, vel ab aliquo animali alio, aut etiam a vento vehementiore, aut prætereuntium hominum clamore, quando scilicet ipsâ repercussione vocis, quam Echo vocant, aër impulsus nives etiam movet.*' He quotes Silius Italicus (*vide supra*) and Claudian:—

. 'multos hausere profunda
Vasta mole nives, cumque ipsis sæpe Juvencis
Naufraga candenti merguntur claustra barathro,
Interdum subitam glacie labente ruinam .
Mons dedit; et trepidis fundamina subruit astris.'

De 4 Cons. Honorii.

Dr. Jacob Wagner, in his 'Historia Naturalis Helvetiæ curiosa' (Tiguri, 1680), has very similar comments to the foregoing, 'De Labenis vel Labinis,' both as to etymology and characteristics.

Scheuchzer, in his 'Itinera' (Lugduni Batavorum, 1723, page 220), has the following remarks:—'*Labina* vel *Labena* vocabulum ad ultimam Latinitatem relegandum notat nivosas ingentes moles conglomeratas, quæ per declivia Alpium *Latera labi* (inde autem nomen) solent. In vernacula nobis Linguâ vocantur communiter *Louwinen*, *Lauwinen*, *Schneelauwinen*, *Lauwenen*, *Louwinen*, *Louinen*, *Lovenen*, *Lauwinen*, *Lobinen*, *Lobinenstrich*, quasi *Leænæ*, uti quidem videtur (Phil. Camerario. Hor. subcisiv. Cent. 11. § 77), à bruti hujus celeritate, impetu et immensis viribus quibus non facilè resisti potest. Mihi cum Simlero 'de Alpibus,' p. 113, videtur Latina æque ac Germanica denominatio arcessenda à Rhætis, qui Italico Idiomate *Labinas* vocant *Lavine*, vernaculo autem *Lavigne*. Scribantur hæ voces vel enuntientur, a nobis Germanis, uti scribuntur, et erit Etymologia in vado. Ægid. Tschud utitur voce *Schnee Schlipfe*, qua rō materiale et formale *Labinarum* optimè exprimit: alii *Labinas* vocant *Schneebrüche*, *Schneeläste*, satis emphaticè. Helvetii Gal. Ling. *Levanze*, *Vallantze*, à valle (quòd conglomeratæ illæ nives in valles usque à summis montium jugis decidant) vocant. . . . *Labinarum* genera sunt potissimum duo, unum, si novæ et molles duntaxat *Nives* conglobantur et labuntur. Simler vocat has *Windlowenen*, tum à causâ, vento nivem recens delapsam, commovente, tum ob effectum, quoniam celeriter ruunt, et lapsu suo *ventum procellosum excitant*, qui etiam minùs quæque prostermit, *Abietes* crassissimas frangit, homines et jumenta suffocat, ædes et stabula subvertit; item *Staublowinen*, *Staubloweln* à vento et pulvere nivoso, quo constat, et quævis in valle obvia obtegit ac involvit, alii κατ' ἐφοχὴν *Schneelauwinen*, quòd ex mera nive constant: Itali *Lavine di Freddo*, Engadienses *Lavigne da Fraid*, quasi dicas *Labinas ex frigore*, *Labinas hyemales*, hybernas, quoniam hyeme potissimum et frigidissimâ aëris temperaturâ quâ nivei flocci recens lapsi raram porosam constituunt massam, à vento quovis facile dissipabilem, nec dum propius coactam oriri solent, sunt hæ admodum periculosæ, eo scilicet sensu, quatenus fugâ non tam facile evitari possunt et citò sæpe *Viatores* obruunt, nec via recta decurrunt sed à vento flante nunc hac, nunc illac pelluntur: alio tamen respectu minùs lethales, quàm quæ mox describendæ veniunt, quoniam minùs sunt compactæ, ut qui iis involvuntur faciliùs sese extricare queant, nec vitam statim suffocati amittant. "Alterum,"

pergit Simlerus, "quod inveteratam nivem quoque trahit et multum terræ secum abripit." Nuncupantur hæ *Schloss* et *Schlaglawinen*, quoniam non tam secundante vento, quàm ponderosa mole cuncta, quæ in via occurrunt, prosternunt, diruunt, nec solam nivem secum vehunt, sed et arbores radicitus extirpatas, rupes et saxa prægrandia (unde et *Grundlowenen* appellantur, "weil sic den Grund selbs mit sich fortführen, oder alles von grund ausreissen), et Viatores, quos corripiunt, vel statim suffocant, vel tam arctè claudunt, ut capite solo liberi, reliquo autem corpore integro involuti sese exsolvere nequeant, sed perire necessum habeant. Hoc sanè sensu prioribus sunt magis exitiales, minùs tamen periculosæ, quatenus non tam citò defluunt, nec etiam tam latum occupant spatium, quin maturè conspectæ evitari possint. Itali hoc Labinarum Genus vocant *Lavina di Caldo*, Engadienses *Lavigna da Chiod*, quoniam verno potissimum tempore, quo calor redit et nives constipat excitari solent. Utrumque genus describit carminicè Rebmannus, page 131 :—

‘ Der Schnee durch ein klein Windlein leicht,
 Oder von Vogels fluk bald weicht.
 Und rukt über den Berg hinab,
 Also das das Land erthönd darab,
 Und stost zu grund Baum und Erdrich,
 Felsen, Hauser, und was dergleich,
 Menschen und Viehe, was es trifft an,
 Muss ztodt, zu grund und Boden gan.
 Solch Schneebruch ein Lowin genant,
 Den Bergleüthen ist wol bekant;
 Wann aber starker Wind entstand
 Das Staubloweln hiemit angond
 Den Schnee dik in der Luft umbtreiben,
 Da muss der reisend Mensch oft bleiben.
 Dass er vom Schnee wird tieff bedekt,
 Wird bald erfröret und ersteckt,
 Wo nicht das Volk grabt nach mit gwalt
 Und also ihn bey leben bhalt,
 Und er nit ztieff hinunder fallt.

Labinarum causæ efficientes existunt quæcunque quovis modo, mediatiè aërem vel immediatiè nivem, in altissimis Montium Jugis movere aut devolvere aptæ natæ sunt; uti Lapidés et saxa decidua, venti, Nix recens delapsa, mobilior inveterata, flocci ex arboribus delapsi, nix vento cumulata; arboresque putridine consumptæ quæ collabuntur, Sonus tintinnabulorum, Campanarum, Sclopetorum, vox hominum clamantium aut etiam colloquentium, Pluvia, Calor vernus, Rupicapræ et aviculæ quævis."

Berlepsch ('The Alps,' Stephen's translation, page 177) says, 'The majestic crushing fall of heaped-up snow to the ground is called in different local districts in the Alps "Laue," "Lauwe," "Lauine;" in Tyrol, "Lahne;" in the Romansch mountains, "Lavigna." The name as ordinarily written in civilised German, "Lawine," is hardly to be heard from the people. Philologists have already disputed about the origin and meaning of this word, and started strange game in the dark forest of conjectures: some bring in Latin, and declare that it can only come from the word "labor, lapsus sum, labi," whilst others resort to metaphors, and say that the lioness (Löwin) has stood as godmother to the word, because the fall of snow dashes over the rocky wall into the valley with the rage and power of a wild beast. If we keep to the simple expression of the people, we shall find "Lau" to be the root of the word; the mountaineers, sparing of speech, shortly describe the whole phenomenon as "Lau" or "Lauine," because it takes place with the advent of the warm ("Lau") winds in the spring.'

Galschet ('*Jahrbuch des Schweizer Alpen Clubs*,' vol. iv.), in a valuable paper entitled '*Deutung Schweizerischer Localbenennungen aus den Hochalpen*,' speaks of '*Lovine* (*althochdeutsch*)' or '*Labina* (mediæval Latin),' and says that the village of Abländschen (French Avérenche), near Saanen in the Simmenthal, derives its name from the avalanches descending from the Gastlisflühen, 'in patois *avelantze, evalantze, liântze*, from the mediæval Latin *advallare*, to descend into the valley.'

Littre, in his magnificent French dictionary now in course of publication, has the following:—'Avalanche. Étym. génév. *evalanche*; *bas-lat. avalantia*, descente; de *avaler*, descendre.' So '*Avalaison*' or '*Avalasse*' is a '*cours d'eau torrentiel qui se forme soudainement à la suite de pluie et de fontes de neige*.' Note further that '*avaler*' veut dire proprement, faire descendre, mettre en bas; et il n'a eu longtemps que ce sens-là; puis, comme faire arriver les aliments dans l'estomac est aussi les faire descendre, il a pris peu à peu ce sens, et le primitif a tombé en désuétude, ne restant plus que dans quelques locutions techniques et dans certains patois.' Saint-Simon, for instance, writes: '*Quand autour du roi quelqu'un avalait son chaperon, les plus près du roi lui faisaient place, c'était une marque qu'il voulait parler avec lui;*' where it is obvious that the courtier was not expected to swallow his hood as well as his pride in token of a desire for conversation.

THE ASCENT OF MONT COLON. By G. E. FOSTER.
Read before the Alpine Club, April 9, 1871.

THAT an account of an expedition begun in 1866 and finished in 1867 should appear at this late date may seem to require some explanation. The only one, however, which I can supply is, that the requests of the Editor of the 'Alpine Journal' are, like royal commands, to be obeyed without question, though wondered at.

In the summer of 1866 Hans Baumann and I left Zinal for Evolena by the Col du Grand Cornier, a pass made for the first time two years before. Our knowledge of it was confined to the brief particulars given by its discoverers in the 'Journal,' and these certainly did not lead me to expect that it would turn out, as it did, one of the most difficult pieces of ice work I had met with or have since experienced. Had it been otherwise, I should not have undertaken to act as porter throughout the day; and on our arrival at Evolena I readily fell into Baumann's suggestion, that as our programme involved stopping at châteaux for the next few nights, we should be accompanied by a porter of the usual description. The man engaged in this capacity afforded us, unintentionally, abundance of amusement; and here, parenthetically, I may protest against the abuse so often poured forth on this class. Apart from my private objection to making myself a beast of burden, many of my most amusing recollections centre around my porters. Thus this very fellow last summer, after walking half-an-hour with Moore and myself, objected to the weight of his load; and his appearance, when we at once shouldered it ourselves and packed him off, is a thing to be remembered. On another occasion with Walker on the Weishorn our porter afforded us laughter for a week, by bolting at a particularly nasty place, exclaiming: 'Zu aller Ewigkeit will ich nicht darunter gehen,' though, as we lost much time and got into no little danger in consequence, we did not appreciate the joke at the moment.

To return to the Mont Colon. I hope I shall not be accused of exaggeration if I say that it has a certain likeness to a decapitated Matterhorn. With its triangular shape, and the long ridge running down from it, dividing the Glacier d'Arolla from the watershed of the Otemma Glacier, resembling the Breuil ridge of the Matterhorn, there are at least many mountains more dissimilar. But in the Mont Colon the cottage-like summit of the Matterhorn is replaced by a level table-land of much less elevation, but still attaining the respectable height

of 11,957 feet. In Mr. Ball's Guide, the height of the Mont Colon is given as 12,624 feet; but this is a mistake, those figures being applicable to the neighbouring but perfectly distinct summit, further south, called L'Evêque in the large edition of the Carte Dufour in course of publication. This peak is just visible from Arolla, a slender cone of snow, but notwithstanding its superior height is completely dwarfed by the massive proportions of its neighbour the Mont Colon proper. As in the similar case of the Wetterhorn and Mittelhorn, the lower peak is very much the most difficult of access, and the most attractive to a mountaineer. The glacier on the lofty plain which forms the actual summit of the Mont Colon overhangs the northern face of the mountain towards the Pigne d'Arolla so as to render it inaccessible, while the eastern cliffs above the Glacier d'Arolla are so steep and forbidding that we concluded that the western or Otemma face, which we could not see, must be the one to attack.

This conclusion Baumann and I came to as the result of a survey made on the afternoon of August 3, 1866, accompanied by the porter before-mentioned, who was shod in a wonderful-looking pair of Wellington boots, of which he was vastly proud. To effect this survey we had mounted some way along the route of the Col de Colon, and the cloudy weather made it a very imperfect one. In descending we halted at the foot of the ice-fall of the Vuibez Glacier to examine whether its reputed impassability was borne out by facts, or whether we could force a way up it, and so save ourselves a long détour. The ice-fall is divided into two by a ridge of rocks, and we thought that, though the Colon side was impassable below and the other a mere pile of threatening séracs above, we might combine the two with safety early in the morning if the rocks could be passed. I may here mention that as Baumann could only talk German and our porter only French, the latter was entirely ignorant of our plans—a fact to which I believe we owed the honour of his company the next morning.

I am glad to say the hotel at Arolla is now better than it was at the time of which I am writing, but it was with most unfeigned delight I abandoned its flea-infested couches and found myself *en route* at 3.30 next day, though the weather looked most unpromising for a '*grande course*.' At the foot of the Vuibez Glacier we had to halt for half-an-hour while a storm of sleet passed over. The first half of the ice-fall nearest to the Pigne d'Arolla presented little difficulty, but in order to cross to the other side we had to pass along a crack

in a very steep and smooth precipice of rock. This proceeding called forth from our porter most vehement remonstrances, which were frequently repeated at intervals of the day's work, but met with little attention, as they were quite unintelligible to Baumann, and I did not think them worth translating.

This difficulty past, the ascent to the Glacier d'Otemma was easy, but there the fog was so dense that the mountain was invisible, and we saw little more of it that day. Going back as our porter suggested would have been too humiliating, so we marched on parallel to the face of the mountain, seeking in vain for any promising couloir, and ignorant of a bergschrund, along whose covered brink we walked until Baumann's sudden and complete disappearance in it, with a jerk so violent as to bring me to my knees, unpleasantly awakened us to its existence. To get our porter to venture near it so as to cut the snow away and allow me to pull Baumann up was no easy task, but at length it was done, and crossing the schrund we approached a couloir which led up to the long arête before mentioned.

The top of the couloir was lost in mist, but we so soon reached it, at the same time topping the ridge, that I knew we must have left the main mass of the mountain behind us, and prepared myself for a prolonged struggle with the bitter cold wind if it should be necessary to follow the arête to the summit. Turning to the left we clambered on, only knowing that the general direction must be right, until, while Baumann was seeking a way up a tower of rock, I chanced to look round, half laughing, to answer some remark of the porter—whose blue face, chattering teeth, and constant invocations to his favourite saints showed that both mind and body were in an uncomfortable condition—and saw, three or four hundred feet below, through a break in the mist, a steep tributary glacier running down into the Glacier d'Arolla from the ridge we were on, with a snowy chimney descending on to it, which lay between our position and the main mass of the mountain, as I conceived, thus offering a comparatively sheltered route. Baumann, too, caught sight of it before it was enveloped in mist again, and the next minute reported from the top of the tower that the arête was no longer practicable, and that it would be better to try and get into the couloir. This suggestion being in German, was lost on our porter, whose face of delight at our retreat soon changed into one of blank consternation, as he realised the work before us.

The rocks were very steep, and in the mist it was impossible to pick our way, so with a 'Sei achtsam!' Baumann went straight

down. The work during the next half-hour was as nasty as could be desired by the most adventurous member of the Club. Unable to see far before us, the mist always exaggerating the danger, and the wretched brittle rocks slippery with ice and constantly giving way when least expected, our descent was a kind of purgatory, so that even Baumann expressed his delight when we at last reached the couloir we were aiming at. The snow was hard, and constantly swept by falling stones, so we crossed to the further side, and then recommenced our ascent. The rocks were crumbling and difficult, and when at length we came to a stop before a most inaccessible-looking place, our grumbling porter broke out, 'Oh mon Dieu! if we go up there we shall never come down again.' For once I translated this to Baumann, and his cheerful reply, 'Well then we shall get down somewhere else,' did not seem to give the unhappy man much comfort. With a great effort and a vigorous shove from me, the leader got up; and I only hope that he had not as much trouble to haul me up as I had afterwards with our frightened porter, whose arms and legs seemed for the moment perfectly useless.

After this the work became comparatively easy—for all things are comparative—and but for the wind and sleet would have been really enjoyable. Now I am not like some of my friends to whom even a moderate breeze is detestable. I think next to the enjoyment of climbing a stiff arête in still weather, comes the enjoyment of climbing one in a good healthy breeze. The wind surging wildly against the crags adds excitement, and gives a pleasant, though possibly deceitful, sense of power as each obstacle is overcome in spite of it. Still, as the dowager duchess said when asked to invite an aldermanic knight, 'one must draw the line somewhere,' and I draw it at sleet; in truth, climbing in bitter cold wind accompanied by stinging showers of sleet is to me the acme of misery. On this occasion wind and sleet outdid themselves, and smote my smarting face until I scarcely knew whether it was blood or water that trickled down my beard and froze there. The porter of course availed himself of this state of things to urge a retreat with fresh energy, but all in vain. The couloir alongside which we were climbing thinned out, and we were again on the arête. Having through the mist caught a glimpse of the flat glacier top of the mountain, with a thrill of coming victory we pressed on, in the full conviction that another quarter of an hour would see the work accomplished. Suddenly Baumann stopped short, and, on joining him, I saw with the bitterest disappointment that between us and our peak was a

chasm, scarce twenty feet across, through which the wind and mist were pouring with a fury that utterly prevented our seeing its depth. Twice did Baumann vainly try to descend into it, the second time losing his footing altogether on the slippery rocks, and only recovering it with some difficulty by the help of the rope. We were fairly, or unfairly, beaten, though so near victory that the summit was not more than thirty feet above our heads, and did not seem so much. Delay in such a temperature was out of the question, so merely piling up a stone man, we turned in despair.

Facilis descensus Averni. The remark is not new, but may serve to explain the fact that, somehow or other, we got down easier than we had got up. It seemed only a short time before we reached the spot which had called forth from our porter the pathetic remonstrance quoted above. Here, after spying about a bit, Baumann went first, so as to point out the proper places for his followers' feet. Next I lowered the porter down, and then for the first time found myself in the position of descending a really nasty place without assistance. I am not ashamed to confess that I did not like it, and if any of my readers fancy themselves in a climbing point of view, I can only advise them to put themselves in a similar position, and if they do not learn modesty they must be incurable. The natural instinct to stay where one is does not help much, and, on this occasion, having got down half way—I cannot exactly say how—my frozen fingers and wandering toes declined to hold on any longer; so, giving Baumann warning that I was coming down with a run, and that he had better catch me, I straightway let go, and, much to my relief and his own, found that he was able to obey my instructions. As soon as I had recovered my legs we resumed our way, he skirting the side of the couloir until it became less steep, and Baumann thought we might safely take to it if we descended backwards. By no advice or exhortation could our porter be induced to adopt so unusual a system of progression. The natural consequence was that as the snow was really hard and steep, after a few steps his heels flew up, and he fell into my arms in anything but the usual attitude chosen for that performance. Luckily, he did not knock me out of the steps, and, moved by some rather powerful polyglot expletives discharged at him by us both simultaneously, consented thenceforth to imitate our manner of descent. In this he was more successful, saying that, as I guided his feet into the steps, he availed himself of each recurring opportunity of jamming his Wellington boots on my fingers, a performance which when prolonged beyond a

certain length of time became aggravating. Fortunately the snow soon grew softer, and gave us a rapid glissade to the bottom, and as I surveyed his helpless descent head first my feelings were assuaged. A little dodging among the crevasses of the secondary glacier brought us to the moraine of the Glacier d'Arolla, where we halted for a meal and to take off the rope. Slowly and sadly we wound our way down after these operations were completed, gazing at the misty crags we had just left, till I suddenly found myself up to the neck in a concealed crevasse. A vigorous struggle with the help of Baumann's hand got me out of this, perhaps the most real danger I encountered during the day, and, aided by another glissade, we landed safely on the lower glacier, and soon after reached our inn at 5.30 P.M.

The next day, which was fine, we crossed the Col de Colon with a special view of examining the rocks more closely, as Baumann thought he had discovered a way among them. The following year found us again at Zermatt, with the intention of trying this route. Having had enough of Arolla porters, I engaged Johann Krönig as second guide, and resolved to cross the Col du Mont Brule to Arolla. On starting at about 3.30 we learnt that a German with a cohort of guides and porters had started two hours before us for the same pass. Previous experience had taught me that Arolla, with all its merits, possessed but one bed that was tolerably free from fleas, and my desire to occupy this, combined with the instinctive wish to overtake any forerunners, led us on at such a pace that we reached the summit of the pass with the German, and running down the other side arrived at Arolla in ten and a half hours from Zermatt. But a Nemesis was at hand, for on rising the next morning at 2.30 I found Baumann confined to his bed with decidedly feverish symptoms, whether the result of our too rapid pace or not I cannot say. Luckily our German friend proved to be a medical man, and consented, good Samaritan that he was, to see Baumann, and though his prescription was merely as much tea as could be poured down his throat, I found him towards evening so much better as to be likely to be fit for work again next day. The amusements to be indulged in at Arolla are not of a very varied kind, and not liking to go far away, I had hard work to kill time. I studied the three or four pages of writing composing the *livre des voyageurs* until I was sick of it, sketched and smoked till I was tired, then, as a last resource, washed certain of my clothes, which seemed to require it, and was only saved from an intolerable fit of the blues by the hope that it was the last day I

should have to pass in such miserable fashion. It was accordingly with no little relief that at 3.45 on the morning of July 31st I found myself again starting for the Mont Colon, the weather this time being all that could be wished. We proceeded along the ordinary Col de Colon route until above the ice-fall of the glacier and a little beyond the western arête of the mountain, and then struck boldly up the face. Of the work that ensued I will only say, that, though really difficult, and often sufficiently so to render considerable détours necessary, there was nothing sensational, and that after about three hours' hard climbing we struck the arête just where the rocks gave way to a short but very steep ridge of snow, which led us to the table-land forming the summit of the mountain. Several points, or rather mounds, of this are of nearly equal height, but the highest lies a little south of the arête we had climbed, and the stone man we built on it is visible from Arolla. For nearly two hours we sat on the rocks basking in the warm sunshine of a brilliant windless day—the most perfect contrast possible to our previous year's experience. The view in all directions, especially of the Oberland range, struck me as peculiarly fine, but one is apt to be prejudiced under such circumstances. When at length we unwillingly moved, Baumann started to inspect the ridge by which we had so nearly attained the summit the previous year, as he thought the descent by it would be easier than by the way we had come, if the cleft should turn out practicable when examined in fine weather. Alas! never had the elements played mountaineers a scurvier trick than they had us on our first essay. The cleft which, wrapped in impenetrable mist, and its sides coated with ice, had seemed so insurmountable an obstacle, now revealed itself as a gap some fifty feet deep and twenty wide, which ten minutes brisk but far from dangerous climbing sufficed to cross, and we stood again by our old stone man, doubtful whether to be vexed or amused that we should have been so easily beaten. The descent along the now familiar way was quickly, or apparently quickly, accomplished. The 'mauvais pas' almost ceased to merit the name, for, sustained by Baumann with the rope above, and with Kronig to point out the best direction below, I scrambled down with no great difficulty. The nonchalance with which Baumann descended last without aid further lowered my self-conceit, which nothing but the fact that Kronig had declined to descend the place unroped kept alive at all.

The remainder of our way to Arolla was without incident, but on arriving there at about 4.0 P.M. I was astonished to

find a small group of tourists, now gazing through a telescope at our stone man, now admiring the work of a young artist, whose delight was extreme at the coincidence that the peak should have had its portrait taken, as he flattered himself, for the first time, on the day on which it was first ascended.

MOUNTAINEERING ON THE PACIFIC.

THE following account of an ascent of Mount Baker, by a member of the Club, Mr. Coleman, the author of 'Scenes from the Snowfields,' is condensed from a very interesting article originally published in 'Harper's Monthly Magazine':—

In these times of volcanic activity, when from all quarters we have accounts of the heaving and rending of the earth's surface, and the whole Pacific slope is agitated with the throes of earthquake, some account of the first ascent of Mount Baker, which has been active within the memory of man, may not be uninteresting. At a time, too, when the Alpine Club finds its occupation gone, the opening out of a new field for exploration deserves attention.

Mount Baker is the most northerly of those great cones which dot the Cascade range, and is only fourteen miles south of the great boundary line cut through the forests which divide the American and English possessions. It forms the most striking feature in the attractive scenery around the Fuca Straits and the Puget Sound. Amidst numerous groups of islands (the Western Cyclades) and pine-clad heights, like another 'Snowy Olympus,' it towers above—the silent sentinel of a solitary land.

The mountain may be approached on the south-eastern side by the Skadgett River, taking Utsalady, on Puget Sound, as the starting point; on the western side by the river Lummi, which flows into Bellingham Bay, taking Seahome as the starting-point; and on the northern side by a trail from Fraser River, taking Fort Hope as the starting-point. For the third attempt the approach by the Lummi was chosen. General M'Kenny, Superintendent of Indian Affairs for Washington Territory, kindly placed four trustworthy Indians at my command. To the official sanction thus given, and the fitness of our dusky companions for their duties, we were indebted for our security in ascending the river. We cannot forget the expertness displayed in many difficulties by Squock and Talum. Though a Flat-head, Squock is very handsome, and, with his swarthy face and long thin limbs, resembles an Arab.

Sure of such good company, I determined to start from Victoria on August 4th, 1868. Travelling is very enjoyable in these inland waters. The bottom of the canoe is spread with small branches and twigs, and then covered with matting of native manufacture. Blankets are then placed against the thwarts and form a soft cushion, against which one can recline and be as comfortable as in a first-class railway carriage. When camping on shore at night, the mats are spread out on the beach, and (with one's blankets) make a soft bed. Gliding along in our canoe.

away from the noise and bustle of the busy world, the spirit revels amidst the beautiful scenery of the archipelago. Island after island is passed, all wooded to the water's edge with the cedar, the fir, and the tender green of the arbutus. The mossy banks are here covered with bushes, and there relieved with bold groupings of rocks in picturesque forms. As we look down through the clear and limpid waters, the silvery fish are discerned disporting themselves among the most beautiful forms of sea-weed and shell; while away in the distance, bounding the horizon, are the snow-capped mountain ranges of British Columbia and Washington Territory.

In passing along we noticed the camp of the English garrison on San Juan Island, and were struck with the singular beauty of the scenery around it. In the foreground is the level green sward, with a noble tree rising from its centre, and fringed with spreading maples. Up through these there are winding walks to the officers' quarters, and beyond a lofty hill, on which a summer-house has been erected, whence the surrounding shores are seen to advantage. Between this and the American camp, seven miles off, lie farms in a high state of cultivation, the proprietors of which declare it to be the 'best land they have struck,' since there are no rents, no sheriff's officers, no taxes, and no prisons.

We now enter Bellingham Bay, perhaps the future terminus of the Northern Pacific Railway. We made direct for Squalicum, the residence of the Hon. Mr. Eldridge, whose house we had appointed the rendezvous. We found that Stratton had anticipated Ogilvy and myself, and that a party had assembled to witness our departure. Starting in company with our dusky friends, under the command of a trustworthy Indian named 'Squock,' and our canoe loaded with a month's provisions, it appeared that the Fates had combined to render our journey interesting, for the spectacle that burst upon our view that night was grand in the extreme. For miles around the forests were on fire. No illuminations ever kindled for crowning of king or news of victory could be more brilliant. From numberless pines the coruscations darted up to heaven, their refulgence reflected in the gleaming waters.

Our journey was henceforth up the Lummi into the bosom of the forest. Its banks are adorned with several species of willow, alder, the crab-apple, grasses, English clover, the daisy, the cockspur thorn, the sweet-brier, the wild rose, and the beautiful festoons of the wild pea. There is plenty of open land along the lower portion of the river, and half a mile up we observed the telegraph wires crossing the river—a silent prophecy of speedy settlement. Five miles on our way was blocked up by a 'drift,' and a portage had to be made. This consists in carrying the canoe and provisions along the bank. For this we were prepared, having shortly before exchanged our 'Chinook,' or salt-water canoe, for two small shovel-nosed canoes. Leaving our Indians to manage this, we struck off on a trail to visit the 'ranch' of Mr. John Tennent, half a mile distant. He consented to join us, and was constituted our geographer and interpreter in chief. Scarcely had we rejoined our Indians when they hailed a couple of passing canoes, and had a 'wah-wah,' or friendly chat, which they commenced by shaking hands all round in a grave, business-

like manner. Our canoe was propelled against the stream at times by paddles, and at times by poles, and made about three miles an hour. This was slow progress, but we did not regret it, as the scenery became surpassingly beautiful. There were long rows of lofty cotton-wood trees, which at first sight reminded one of the English elm. The cotton-wood is sometimes called the balsam poplar. In spring, when the buds are breaking, the air is filled with the scent of it. Then there would be successive rows of pines in serried ranks, mingled with the cedar and broad-leaved maple, and relieved with the gorgeous crimson and Indian yellow tints of the vine maple and the hazel. The scene would then change; there would be next long reaches of alder and willow, indicating good bottom lands. Now and then the stately ranks of pines would be broken by some tall fir gracefully leaning forward with its arms, and sweeping the stream like some dishevelled beauty. Conspicuous among the arborage is the Menzies spruce (*Abies Menzii*), so called from its discoverer, Dr. Menzies, the surgeon of Vancouver's expedition. Its feathery foliage hangs down in delicate clusters, like lace upon a lady's jewelled arm. Coleridge said the birch was the 'Lady of the Woods;' and we would certainly rank the Menzies spruce as the 'Queen of the Forest.'

We took into consideration our final approach to the mountain. We had here to choose between the three forks of the river. The north fork is a whitish stream, showing that it is glacier-fed. By this we could have gone forty miles further; but owing to the numerous rapids in its upper part and the difficult nature of the country beyond, as discovered on my first journey, it was rejected. The south fork, which emerges from a sequestered leafy nook, looked very tempting. Its waters are gentle and limpid until they mingle with the turbulent main stream, and were suggestive of the peaceful current of youth before entering upon the toils and trials of manhood. It promised grateful repose after the difficulties of our previous journey. It seemed as if upon its easy surface we would have a breathing space before plunging into the desolate scenery around the base of the mountain. The south fork, however, would have led us out of the way; besides, Squock and Talum recommended the middle fork, alleging that a day's journey would bring us to the head of navigation, and that in the three days' land travel between that and the snow line we would find occasional elk trails, and reach a point where the ascent was more easy. This was the route chosen. Here we leave the outskirts of civilisation; our path henceforward will be through a howling wilderness tenanted by wild animals, through dense and trackless forests where the light of the sun never enters, across maddening torrents and precipitous rapids, and along overhanging precipices. We have to deal with Nature in her sternest aspects—torn and convulsed, at war with herself—bearing on her face the scars of countless ages of desolating power, of the flood of the avalanche, and of the burning tempest. Starting next morning at ten, our company was unexpectedly strengthened by one of Umptlalum's hunters. The toilsome fifteen miles beyond made us not sorry to quit the river. We had first three heavy portages, and afterwards twenty-seven riffles or rapids. Many hitches occurred, where the Indians got

out and lifted the canoes from the rocks on which they grounded. Our difficulties may be conceived when it is remembered that the river rises 285 feet in fifteen miles. Here we prepared for our land travel. Having taken out provisions for ten days, we stowed the canoes and their contents in a 'cache.' Cutting down some young alders, we fastened them across the trees, to form a framework. On this the provisions and other packages were laid, and covered with matting, while the canoes were thrust underneath. Care must be taken that the framework is fastened upon young trees that will not sustain the weight of a bear. Having made our packs as light as possible, we plunged into the forest along the bank of the river, in order to reach a ford some twelve miles up. With difficulty we made about a mile an hour, over fallen trees, under old logs, down steep ravines, over high rough rocks, and through close-set jungle. After reeling under our packs, knocking our feet against stones, and twisting our limbs among opposing obstacles, we came at last to a spot on the bank, which we named 'Camp Fatigue.'

Future travellers will find 'Camp Fatigue' where two gigantic pines spring up from one root, and a tributary joins the middle fork, which, being pure and limpid, was named by us 'Clear Water.' On the morning of August 12th we bade farewell to 'Camp Fatigue,' and kept along the bank of the river, the path being but a slight improvement upon that of the previous day. Mr. Tennent called our attention to a fern having a fibrous root, the young sprouts of which, if bruised, are good for wounds. We also observed a skunk-cabbage, a species of the tobacco plant, whortle-berries, red elder-berries, red huckle-berries, blackberries, thimble-berries, partridge-berries, a specimen of the mimulus, a solitary thistle with a fibre as strong as Manilla hemp, and a water-dock, which opens first with a flower like the tulip, out of which afterwards spring the leaves. We also observed the beautiful *Adiantum pedatum*, or Canadian maidenhair, which, seen *en masse*, resembles the plumage of a bird, and in England can only be cultivated in conservatories. But the most lovely plant we had yet seen was a monopetalous one, which exactly resembled modelling in wax—both stem and flower being perfectly white. It was about four inches in height, the stem being somewhat thick in proportion to the flower; but unfortunately it turned perfectly black when put in the collecting-case. About five o'clock we came to a brawling stream tumbling into the river which comes down from the Lincoln glacier. We named it 'Roaring River.' The spot where we took up our quarters was in a grove of alders, and was named 'Camp Doubtful,' for here the Indian guides were at fault. Fearing that we might get too much to the east of the mountain, we despatched Squock and Talum next morning to reconnoitre. I occupied myself meanwhile in making a sketch of the camp; Stratton, Tennent, and Ogilvy went off prospecting and geologising; and the remaining Indians crossed the fork. By-and-by, Ogilvy, Tennent, and Stratton came in and stated that the region was a perfect chaos of rocks, thrown up in all conceivable shapes and sizes, consisting principally of lava, cement, and sandstone—no granite nor quartz, and no stratified rocks—nothing but loose gravel and dirt mixed with huge boulders, and everything seeming to be on the move when

the heavy freshets come down from the mountains. Stratton said that the river resembled a mining stream rushing madly along, and as muddy as the Yuba River, in California, during the excitement; but, though they tried several pans, did not get even a colour—they did not expect it. They would as soon prospect in a haystack for gold; for, so far as the indications went, the 'bed-rock' must be hundreds of feet below the surface. There were very few berries, and not a bird to be seen.

The day passed by, and we were anxiously concerned in regard to Squock and Talum; but they returned late in the evening, and reported that they had reached a spot above the snow line by a path that was comparatively easy to find. They brought in a couple of marmots, which they demolished at supper. Wearied with fatigue, my companions sought their blankets, and 'left the world to darkness and to me.'

As foemen eager for the fight, we started early on the 13th; and if our path was steep and full of toil, we were cheered by noting our progress through the different zones of vegetation corresponding to the varied seasons. Passing from summer, a few hours brought us to the region of eternal snow. The camp behind us was 1,916 feet above the sea level, as determined by the aneroid. From that to 3,900 feet was the temperate region, where berries were found and the sal-lal plant. At this elevation ground vegetation ceased, although the hemlock, the spruce, and the fir remained. Indeed, we here passed through a magnificent forest of firs, extending as far as the eye could reach. They ran up a hundred feet without a limb, and on the northern sides were covered with moss. The indications showed us that the snow in winter reached eight feet above their base. We began to experience cold whenever we rested. The day was foggy, and the gloom, added to the labour of 'packing,' made it very depressing. As we continued up, the trees diminished to half their size, and the ridge became narrower and narrower.

The ridge became at last only five yards broad. Here there is a vast basin about a mile and a half in diameter. It descends precipitously in a succession of benches to a depth of perhaps 2,000 feet. The sides of the basin were lined with limestone and slate, with outcroppings of a cement rock—a mixture of sandstone and limestone, the latter predominating. These were strewn with pebbles, showing that the country had been submerged to this point in some former age. On the sloping sides of the basin were patches of snow, the first we had observed. This spot, which may be taken as the snow line, was 5,175 feet above the sea level. We had intended to make our encampment at the summit of this ridge, close to the ice-fields opposite the Lincoln Peak; but the fog increasing, and all being fatigued, we halted and sent the Indians forward to look for water, having been in a state of extreme thirst for several hours. In half an hour they reported the discovery of water. We followed up, and found an admirable camping spot, where there was an open space covered with grass and clumps of small balsam firs. In one of these clumps, where we found traces of the elk and the bear, there was a snug nook, sheltered all round, save

an opening to the north. Across this we placed a large ground-sheet that I had fortunately brought along, and lighted our fire within. This corner, which was only just large enough to accommodate the party, looked very pleasant, and received the name of 'Camp Hope.' But, alas! the water of which the Indians had boasted proved to be a muddy mixture from a marshy spot in the vicinity. Thirsty as we were, we could not drink it. After waiting a while the fog partially cleared, and we despatched the Indians down into the basin beneath us with every available pot and pan; and at a depth of 500 feet they found a stream formed by the melting patches of snow. During this delay we were cheered by observing that the clearing of the fog had revealed two magnificent rocky peaks, or 'aiguilles,' as they are termed in Switzerland, to which we gave the names of 'Lincoln' and 'Colfax.' While walking around we saw large patches of Scotch heather and blue-bell still in bloom, and plenty of lupins. The Indians having brought in the supplies of water, we had our tea made, and turned into our blankets, being, like Mohammed's coffin, between earth and heaven. In the night the noise of the falling avalanches frightened the Indians, and ever and anon they crossed themselves.

Next day, August 15th, the fog was still dense; so, acting on the proverb that we might go farther and fare worse than at Camp Hope, we remained there. Ogilvy, Tennent, and three Indians went out shooting, while Stratton and I kept camp, doing sundry repairs, posting our diaries, etc. About five o'clock they returned, with four marmots, as they are termed in Switzerland, but known in these parts by the name of ground-hog or wood-chuck. While sketching, I often heard their squeak, and saw them lurking around. They are greyish in colour, about $1\frac{1}{2}$ feet long, and have two long incisors in front of each jaw. The largest secured on this occasion weighed twenty pounds. They had also shot a species of rabbit.

On the morning of the 16th we found the fog had cleared away. The summit was now seen for the first time, lying to the north of the two peaks already mentioned. I called my companions, and directed their attention to the path I proposed to take. From this point it looked fearfully precipitous, and they doubtfully shook their heads. They followed up, however, and shortly afterward there was presented a magnificent view of the Red Ridge, with its glaciers cradled in its arms, which greatly resembles in outline the 'Aiguilles Rouges,' as seen on the north side of the Valley of Chamouni. It is separated from Mount Baker by a pine-covered ridge extending at a lower altitude, and distant perhaps ten miles. In its hollows are three small glaciers of the class termed by Professor James Forbes 'secondary' or 'rudimentary.' As we neared the snow-fields the ridge which we were keeping became broader, the trees became dwarfed into shrubs, and in the 'open' there were gentle slopes covered with grass, and occasional patches of snow in the hollows. These grass-covered slopes were strewn with flowers. We found the lychnis of a beautiful red colour. Although in California it grows to the size of a soldier's cockade, here it was very small. There were also the lupin (so plentiful in Vancouver Island), daisies, and other flowers. They were all good illustrations of Darwin's theory

of natural selection, having short thick stems to enable them to withstand the storms of their exposed situation, and at first sight appeared different species.

In rather less than two hours we reached our last encampment near the 'névé.' The ridge was still covered with scattered balsam firs of stunted growth. We encamped on a spot 7,054 feet high, where the trees formed a semicircle round a small volcanic rock which served us for a fireplace. The ground was covered with grass and heather, and sheltered by the trees from the cold winds of the glaciers. To the south-east was a vast snow-field, stretching perhaps 2,000 feet beneath, and terminating in a glacier. Below this glacier, and only separated from it by 'moraines,' lay a lovely valley, with open land covered with grass and sheltered by pines. It wanted only a 'chalet' or two, a flock of goats descending the hill-side, with the sound of tinkling bells, to make me believe that I was in Switzerland. Many valleys have I seen, but this was the best illustration of 'Beauty sleeping in the lap of Terror.' Away thousands of feet above the snow-field, rose on every side black, jagged, splintered precipices. Of these the Lincoln Peak is from this point of view the most prominent. A little further east is the Colfax Peak, and beyond that, due east, is the summit itself. The ridge on which we were encamped is two miles in length; it sweeps first round to the north, then to the east, intersecting another ridge running down from the Colfax Peak. These ridges may possibly be the walls of an extinct crater, whose vast hollow is some two miles in length by about the same in width. At the point of intersection of the above-mentioned ridges, but beyond it (a vast field of névé filling the intervening space), rises the great peak, entirely snow-covered.

Next morning we started at five, and about half-past six came to the end of the ridge (about two miles). Here we put on our creepers and spiked boots, made several packs, and took provisions for twenty-four hours. In fact, we prepared to pass the night out if need be. The Indians bade us farewell, and were observed to cross themselves and to utter prayers for our safety. No sooner had we launched forth than a division of opinion took place. Acting on my old rule in the Alps, always to follow the 'arête' when practicable, I was for following a ridge which leads to the Colfax Peak. Mr. Stratton, with genuine Yankee 'goaheadness,' and a happy ignorance of the dangers of concealed crevasses, and the frailties of snow bridges, started on a track of his own which he had marked out on the previous day. Not having a veil, he adopted the custom of the Cascade range Indians when travelling on the snow, and blackened his face—particularly around the eyes—with a piece of burnt stick. He thus appeared very much like an Ethiopian serenader. Although alarmed for his safety, I could not refrain from the mirth his appearance occasioned. I was obliged to compromise with the others and descend on the snow. We then roped ourselves together, and left the ridge, keeping twenty-five feet apart. We went up an elevated valley—possibly an extinct crater—filled with névé, and terminating in two glaciers. The first of these, which is covered with dirt, and scarcely recognisable as a glacier, lies on the northern side of the valley under a ridge which appears to lead directly

to the summit. It looked so practicable that on the occasion of the previous journey I at one time entertained the idea of trying it, but after surveying the vast extent of treacherous névé, intersected with numerous crevasses, which we should have to traverse, thought, in the weak state of my forces, it would not be advisable to trust it; and it was fortunate we did so, for on reaching the summit we observed that the ridge was covered on the other side with overhanging 'séracs;' and on leaving the mountain, as our route lay on that side, we could, with the aid of a glass, see that it looked very formidable. The ridge which joins the Colfax to the summit crosses the head of this elevated valley. We made for this. The route lay through more than five miles of névé. This was intersected by at least twenty-seven great crevasses. These were so close that sometimes they were not more than five yards apart. No sooner had we crossed one than we saw another. Their depths displayed those beautiful colours with which Swiss travellers are so familiar. The lovely mazarine blue prevailed. We crossed them by the bridges formed by avalanches which had fallen in the spring and early summer. We did not dare to trust these entirely, but, as a precautionary measure, kept firmly attached to each other by the rope.

To avoid the avalanches descending from the Colfax Peak on the one hand, and from the 'Grant' or main peak on the other, we kept on through the middle of this vast tract of névé. We were in considerable anxiety concerning Stratton. Divested of rope and without a pack, he had made rapid progress. At one time we saw him crossing a spot exposed to avalanches of ice, and shortly afterward were greatly alarmed to see him take a jump, and then suddenly disappear, being lost to view behind projecting masses of séracs. It appears that he had fortunately fallen in with the tracks of a grizzly bear, and wisely concluding that what would bear its weight would sustain his also, he had followed it without hesitation across snow bridges over the chasms. On the previous journey, about the same height, Mr. Bennett and myself observed the traces of a young elk followed by a wolf, and also the marks of blood where a scuffle had taken place. Our anxiety was at last relieved by finding Stratton's footmarks at the very spot where we expected to cross his track. Above this, the slopes of snow became very steep as we approached the shoulder of the main peak.

Soon after we had reached the shoulder leading to the great peak we came to a narrow ridge, about four feet in height, composed of reddish scoræ. From this point we saw a glacier flowing down through a deep and narrow gorge on the southern side of the Colfax Peak, having its origin in the snows of that peak. We were also able to see the head of another glacier, extending in an easterly direction, and fed by the snows of the Grant or main peak.

Having now reached this spot, about 9,265 feet above the sea level, we found it necessary to refresh. Ogilvy pounded some ice, and, with the aid of brandy, made a cocktail; it was very acceptable, and was christened the 'Mount Baker Cocktail.' Its fame reached Victoria, where it was reproduced at one of the bars, and, aided by the exhibition of a veritable piece of rock from the summit, attracted thirsty crowds. I had brought an alcoholic apparatus, which was filled with snow, and

some tea prepared; fortified by this refreshment and an hour's rest, we made for the top of the saddle by the northern side of these rocks. Like gladiators of old, we prepared ourselves for the combat by divesting ourselves of every superfluous article of clothing. The slope was steep, and there were crevasses immediately below. A single false step would probably have been fatal.

The last three or four hundred feet of this shoulder consists of a deposit resembling mud, quite dry in parts, and cracked from the action of the sun. At length we reached the top of the saddle, and stood on the base of the principal peak. Here we found Stratton, who informed us that, when dozing, a large eagle had swooped down upon him with murderous intention; he had succeeded in beating it off before it did him any injury. If we had indulged any doubt of this being a volcanic mountain, it would have been dispelled by the smell of sulphurous exhalation which greeted us. So nauseous was it that Stratton had vomited while waiting for us.

At this point the base proper of the peak may be said to commence. On our right, across a hollow filled with névé, is the lip of the crater, indicated by a huge triangular-shaped rock; and on our left are tremendous precipices extending down to the track of névé we had traversed in the morning. Around the summit of the peak is a perpendicular wall of ice, about thirty or forty feet in height, terminated on the left or northern end by a knuckle of rock, which can be plainly seen from the Sound. The only passage we could discern through this barrier was on the left, between the knuckle of rock before mentioned and the wall of ice. The peak rises about 1,000 feet above the saddle; its face is scored with deep furrows made by the masses of ice which have fallen from the crowning 'corniche.' It commences with a gentle slope, and gradually becomes steeper, until near the summit it is about 60°.

Roping ourselves together, we now attempted this, and soon found it necessary to use the axe. Some fresh snow had fallen, but had not had time to become consolidated with the ice beneath, and could not be trusted. We had thus to cut steps. The axe was passed on to Stratton, who plied it with vigour and skill. While thus engaged he got a great fright. Having heard a dull, grating sound, he looked up, and saw a mass of frozen snow, about twelve feet square, moving down toward him. Paralysed with terror, he was about to warn us, when it fortunately stopped. Even at this height there were crevasses. Into one of these Tennent sank, but he managed to extricate himself. The work of cutting the steps is very severe, and our progress was necessarily slow, for some 350 required to be cut. When nearing the summit we saw the spot where Mr. Bennett and myself were stopped on the previous attempt—on the right, at the foot of the perpendicular wall. Here we turned a little to the left, in order to make for the passage before spoken of; and in cutting a step Stratton disclosed a little stream of water. The day was very warm, and our labour made us thirsty; so the cup was joyously passed, and we all had a refreshing drink. As precipices extended downward from our feet, a single false step would have been fatal. In safety, however, we passed the most dangerous

point, and reached the passage, which, by a gentle ascent of thirty or forty feet, brought us to the summit. It was now four o'clock. We had been two hours making this final climb. The plateau on which we stood was about a quarter of a mile in diameter, and embraced an extent of about eighty acres. The scene was grand in the nakedness of its desolation. The white surface of snow was unrelieved by a single rock. The forests had been on fire for weeks, and a dense pall of smoke veiled the surrounding scenery from our view. It lay like a reddish cloud beneath us. We felt cut off from the world we had left. Overhead the sun poured down his bright beams from a sky which formed a dome of purplish blue, unsullied by a cloud.

There was a peculiarity in the snow which covered this plateau that I have not observed in the Alps. In form it resembled small tongues of flame, all leaning in the same direction, and was evidently caused by the violent eddies of wind. It seemed as if there was some mysterious sympathy between the volcanic fires within and the snowy surface without.

The only object that broke the monotony of the scene was another and smaller peak, at the distance of about 500 yards. As it was possible that it might be a few feet higher, I proposed that we should also plant a flag there. We accordingly marched up to it, and placed a flag, naming it after General Sherman. We found, however, that they were both of the same height—10,613 feet. It may be mentioned that this height, determined by the aneroid, agrees substantially with the trigonometrical measurements made by Captain Lawson, of the United States surveying-ship 'Fauntleroy' (10,814 feet), as also with those set down in the English maps (namely, 10,694 feet). The thermometer stood at 40° above zero Fahrenheit.

While making these observations with the barometer, and sketching the two peaks, my companions left to make a reconnaissance. They approached the southern side of the Sherman Peak, and, observing a slight depression, ventured down. Here they got a glimpse of the crater. As far as they could make out, it was about 300 yards wide, and appeared to extend under the north-eastern side of the Grant Peak. It is therefore not impossible that the greater part of this peak may disappear in the next eruption. Stratton described the spectacle as one that made him shudder—black walls of rock with streaks of sulphury yellow blending with green and red. No traces of fire were visible by daylight, but smoke was plainly observed. About 300 feet of the top of the crater on the Baker River side is torn out, and here vast masses of lava have rolled out—wave after wave overlapping each other as it cooled. Fire must still be slumbering beneath, as there is no snow on the lava.

My companions returned about five, and hurried me off before I had an opportunity of inspecting it personally. Indeed, as there was no time, unless we spent the night upon the summit, they concluded not to tell me of their good fortune.

Harnessing ourselves together with the rope, we prepared to descend. Each step had to be well considered, but we passed the most dangerous spot in safety. The sun had considerably melted the snow, so that we

were able in many places to let ourselves slide down. In a comparatively short time we arrived at the spot where we had left our 'impedimenta.' These we took up, and continued our journey. The sun was already sinking, so that we had no time to lose. Urged by the fear of having to pass the night on the mountain, we plunged after Stratton down slopes, across snow bridges, by walls of ice, as if pursued by a fiend. Vain were my remonstrances, fearful of an accident, but my companions hurried on in a manner that would have sent a Swiss guide into fits. Such a helter-skelter mad-brained party was never seen on either Mont Blanc or Mont Rosa. The sun set, twilight came on, when suddenly we could no longer discern our tracks of the morning. In the labyrinth of crevasses and séracs around we could not make out the route. Calling a halt, a consultation was held. We resolved to retrace our steps, and the tracks were again discovered. In the feeble twilight, the spot on the ridge we had left seemed ever to recede. Overcome by fatigue, I would fain have made my couch on the snow. But my companions pressed me on, and about nine o'clock we reached the ridge at the point where we had taken to the snow in the morning. Leaving there our packs for the Indians to pick up in the morning, we made for our last encampment. Stumbling over the angular rocks as well as we could in the dark, our progress was very slow. As we approached, we shouted out, when the Indians made a great blaze. At length, about eleven o'clock, we got in. The Indians were overjoyed. What with the injunctions of Umptalum and their own superstitions, the honest fellows had felt considerable anxiety on our account. Tea was soon made, and over the flowing bowls we recounted our adventures to the Indians. We had no sooner turned in than the weather changed. The wind moaned and blew in fitful gusts, telling of the coming tempest. It was very cold, and, as we turned round in our blankets, we felt thankful that we were not on the mountain.

THE PASSAGE OF THE SESIA-JOCH FROM ZERMATT TO ALAGNA BY ENGLISH LADIES.

MR. BALL, writing in 1863, referred to the first passage of the Sesia-Joch by Messrs. George and Moore, as 'amongst the most daring of Alpine exploits,' and expressed a doubt whether it was not a *tour de force* which would never be repeated. Mr. Moore, indeed, repeated his exploit with another companion, but he was for many years unsuccessful in inducing anyone else to follow in his footsteps, and both guides and mountaineers seem to have shared the doubts of Mr. Ball as to the route being one fit for ordinary use.

The members of the Alpine Club heard, therefore, with some astonishment that in the autumn of 1869 two ladies had not only crossed this most redoubtable of glacier passes, but crossed it from Zermatt to Alagna, thus descending the wall of rock, the ascent of which had until then been looked on as an extraordinary feat for first-rate climbers.

The details now in our possession leave no room to doubt that the

Misses Pigeon exactly reversed the steps of their predecessors. We can affirm from personal experience that the direct descent from the Lys-Joch to Alagna differs in almost every possible respect from the route here described. The former is, with the exception of two short rock couloirs, an easy walk over gently-inclined snow-fields and pasturages, and the whole distance from the pass to the inn at Alagna may be traversed in about four hours. It may be suggested that an intermediate route was taken, and that the ridge was crossed at some point between the Parrot-Spitze and Ludwig's-höhe. But Mr. Moore vouches for the remarkable agreement of the details given with the nature of the ground he has twice traversed. The impossibility of a direct descent from the actual col and the finding of the bottle at a certain height above it, towards the Parrot-Spitze, are facts, in the face of which it seems to us impossible to doubt that the Misses Pigeon crossed the true Sesia-Joch. The following extract from a local Italian paper,* aided by the notes kindly communicated to us by the Misses Pigeon, fully explains how this accidental but brilliant feat of mountaineering was happily brought to a successful conclusion.

'On August 11, 1869, Miss Anna and Miss Ellen Pigeon, of London, were at the Riffel Hotel, above Zermatt, with the intention of making the passage of the Lys-Joch on the next day, in order to reach Gressonay. Starting at 8.0 A.M. on the 12th, accompanied by Jean Martin, of Annivier, guide at Sierre, and by a porter, they arrived at 4.0 A.M. at the Gorner Glacier, which they crossed rapidly to the great plateau enclosed between the Zumstein-Spitze, Signal-Kuppe, Parrot-Spitze, and Lyskamm, where they arrived at 10 A.M. At this point, instead of bearing to the right, which is the way to the Lys-Joch, they turned too much towards the left, so that they found themselves on a spot at the extremity of the plateau, from which they saw beneath their feet a vast and profound precipice, terminating at a great depth upon a glacier. The guide had only once, about four years before, crossed the Lys-Joch, and in these desert and extraordinary places, where no permanent vestiges remain of previous passages, he had not remembered the right direction, nor preserved a very clear idea of the localities. At the sight of the tremendous precipice he began to doubt whether he might not have mistaken the way, and, to form a better judgment, he left the ladies on the col, half stiffened with cold from the violence of the north wind, ascended to the Parrot-Spitze, and advanced towards the Ludwigs-höhe, in order to examine whether along this precipice, which lay inexorably in front, there might be a place where a passage could be effected. But wherever he turned his eyes he saw nothing but broken rocks and couloirs yet more precipitous.

'In returning towards the col after his fruitless exploration, almost certain that he had lost his way, he saw, among some *débris* of rock, an empty bottle (which had been placed there by Messrs. George and Moore in 1862.) This discovery persuaded him that here must be the pass, since some one in passing by the place had there deposited this

* 'Monte Rosa Gazetta della Val Sesia,' Anno viii. No. 407. Varallo, September 4, 1869.

bottle. He then applied himself to examining with greater attention the rocks below, and thought he saw a possibility of descending by them. He proposed this to the ladies, and they immediately commenced operations. All being tied together at proper intervals with a strong rope, they began the perilous descent, sometimes over the naked rock, sometimes over more or less extensive slopes of ice, covered with a light stratum of snow, in which steps had to be cut. It was often necessary to stop, in order to descend one after the other by means of the rope to a point where it might be possible to rest without being held up. The tremendous precipice was all this time under their eyes, seeming only to increase as they descended. This arduous and perilous exertion had continued for more than seven hours, when towards 6 P.M. the party arrived at a point beyond which all egress seemed closed. Slippery and almost perpendicular rocks beneath, right and left, and everywhere; near and around not a space sufficient to stretch oneself upon, the sun about to set, night at hand! What a position for the courageous travellers, and for the poor guide on whom devolved the responsibility of the fatal consequences which appeared inevitable!

Nevertheless, Jean Martin did not lose his courage. Having caused the ladies to rest on the rocks, he ran right and left, climbing as well as he could in search of a passage. For about half-an-hour he looked and felt for a way, but in vain. At length it appeared to him that it would be possible to risk a long descent by some rough projections which occurred here and there in the rocks. With indescribable labour and at imminent peril of rolling as shapeless corpses into the crevasses of the glacier below, the travellers at length set foot upon the ice. It was 8 P.M.; they had commenced the descent at 11 A.M.; they crossed the Sesia Glacier at a running pace; on account of the increasing darkness of the night, which scarcely allowed them to distinguish the crevasses. After half-an-hour they set foot on terra firma at the moraine above the Alp of Vigne, whence they perceived, at no great distance, a light, towards which they quickly directed their steps. The shepherd, named Dazza Dionigi, received them kindly and lodged them for the night. Until they arrived at the Alp, both the ladies and the guide believed that they had made the pass of the Lys-Joch, and that they were now upon an Alp of Gressonay. It was, therefore, not without astonishment that they learnt from the shepherd that, instead of this, they were at the head of the Val Sesia, and that they had accomplished the descent of the formidable pass of the Sesia-Joch.

‘On the morrow they went down to Alagna, where the two intrepid *touristes* were obliged to remain some days on account of the frost-bitten foot of one of them, the only inconvenience from this arduous and almost incredible journey, the absence of fatal consequences from which was due to their courage, their habitude to Alpine travel, and especially to the masculine education, too little imitated by Italians, which the English give their children.’

The article concludes with an eulogium on Jean Martin.

As an accompaniment to the foregoing highly-coloured narrative, the following modest notes, sent us by the Misses Pigeon, will be read with interest. They seem to suggest that there is no reason why the Sesia-

Joch should not cease to be considered a *tour de force*, rarely to be attempted, and take its place among the recognised routes into or out of Zermatt :

‘All mountaineers are aware how much the difficulty of a pass is lessened or increased by the state of the weather. In this we were greatly favoured. For some days it had been very cold and wet at the Riffel ; and when we crossed the Sesia-Joch, we found sufficient snow in descending the ice-slope to give foothold, which decreased the labour of cutting steps—the axe was only brought into requisition whenever we traversed to the right or left. Had the weather been very hot, we should have been troubled with rolling stones. It was one of those clear, bright mornings so favourable for mountain excursions. Our guide had only once before crossed the Lys-Joch four years previously, and on a very misty day. We were therefore careful to engage a porter who professed to know the way. The latter proved of no use whatever except to carry a knapsack.

‘We take the blame to ourselves of missing the Lys-Joch ; for, on making the discovery of the porter’s ignorance, we turned to “Ball’s Guide Book,” and repeatedly translated to Martin a passage we found there, warning travellers to avoid keeping too much to the right near the Lyskamm. The result of our interference was, that Martin kept too much to the left, and missed the Lys-Joch altogether.

‘When we perceived the abrupt termination of the actual col, we all ascended, with the aid of step-cutting, along the slope of the Parrot-Spitze, until we came to a place where a descent seemed feasible. Martin searched for a better passage, but, after all, we took to the ice-slope, at first for a little way keeping on the rocks. Finding the slope so very rapid, we doubted whether we could be right in descending it ; for we remembered that the descent of the Lys-Joch is described by Mr. Ball as *easy*. We therefore retraced our steps up the slope to our former halting-place, thus losing considerable time, for it was now 12 o’clock. Then it was that Martin explored the Parrot-Spitze still further, and returned in three-quarters of an hour fully persuaded that there was no other way. We re-descended the ice-slope, and lower down crossed a couloir, and then more snow-slopes and rocks brought us to a lower series of rocks, where our passage seemed stopped at 5 o’clock. Here the mists, which had risen since the morning, much impeded our progress, and we halted, hoping they would disperse. Martin again went off on an exploring expedition, whilst the porter was sent in another direction. As both returned from a fruitless search, and sunset was approaching, the uncomfortable suggestion was made that the next search would be for the best sleeping quarters. However, Martin himself investigated the rocks pronounced impracticable by the porter, and by these we descended to the Sesia Glacier without unusual difficulty. When once fairly on the glacier, we crossed it at a running pace, for it was getting dark, and we feared to be benighted on the glacier. It was dark as we scrambled along the moraine on the other side, and over rocks and grassy knolls till the shepherd’s light at Vigne gave us a happy indication that a shelter was not far off. The shouts of our guide brought the shepherd with his oil-lamp to meet us, and it

The Passage of the Sesia-Joch from Zermatt to Alagna. 317

was a quarter to 9 o'clock P.M. when we entered his hut. After partaking of a frugal meal of bread and milk, we were glad to accept his offer of a hay-bed, together with the unexpected luxury of sheets. When relating the story of our arrival to the Abbé Farinetti on the following Sunday at Alagna, the shepherd said that so great was his astonishment at the sudden apparition of travellers from that direction, that he thought it must be a visit of angels.

'We consider the Italian account incorrect as to the time we occupied in the descent. We could not have left our halting-place near the summit for the second time before a quarter to 1 o'clock, and in eight hours we were in this shepherd's hut.

'The Italian account exaggerates the difficulty we experienced. The rope was never used to "hold up the travellers and let them down one by one." On the contrary, one lady went *last*, preferring to see the awkward porter in front of her rather than behind. At one spot we came to an abrupt wall of rock, and there we gladly availed ourselves of our guide's hand. The sensational sentence about "rolling as shapeless corpses into the crevasses" is absurd, as we were at that juncture rejoicing in the prospect of a happy termination of our dilemma, and of crossing the glacier in full enjoyment of our senses.'

It is impossible to pass over without some further remark the behaviour of the guide and porter who shared in this adventure. Jean Martin, if he led his party into a scrape, certainly showed no small skill and perseverance in carrying them safely out of it, and on this account fully merited the praises of the Italian writer. But his conduct, as a whole, seems to us a good illustration of the fallacy of the belief held by some climbers who, taking one or two first-rate guides as fair types of the class, attribute to guides in general the instinct or faculty of path-finding. According to our own experience, the bump of locality is pretty evenly bestowed on guides and amateurs, and in many instances the powers of a mind sharpened by daily use in other matters will, we believe, be found to more than counterbalance the special knowledge of a Swiss peasant. In the present case, it is almost incredible that any man who had once in his life crossed the Lys-Joch, should on a 'bright, clear morning,' imagine for a moment that the rocky precipices and ice-couloirs of the Sesia-Joch represented the smooth snow-slopes he had previously descended. The quotation from the 'Alpine Guide' may be some excuse for Martin's striking the crest at the wrong point, it is none at all for his subsequent stupidity in not at once recognising his mistake.

Porters have as a class, and with some honourable exceptions, long afforded a proof that Swiss peasants are not necessarily born climbers. Their difficulties and blunders have, indeed, served as one of the standing jokes of Alpine literature. But we doubt if any porter has ever exhibited himself in so ignoble a position as the man who, having begun by obtaining an engagement under false pretences, ended by allowing one of his employers, a lady, to descend the Italian side of the Sesia-Joch last on the rope.

That such a poor creature should have been sent out with travellers, and, above all, with ladies, on a glacier expedition, is a disgrace to

Zermatt, and more particularly to the Riffel Hotel. Unless innkeepers are speedily awoke to a higher sense of their responsibility in this matter, we shall have some day to tell an Alpine story in which the porter will play a tragic instead of a comic part.

ALPINE ACCIDENTS IN 1871.

ALTHOUGH three fatal accidents took place last year in the Alps, two of them occurred far from the peaks and glaciers of the central chain, and were due to botanical rather than to mountaineering zeal. Of one of these, by which we have to deplore the loss of a valuable member of our Club, the following letter from Mr. Moggridge, a member of the Italian Alpine Club, gives exact particulars:—

‘The Rev. Robert Crosse, accompanied by a friend, Mr. Collingsplat, left Mentone on December 4, for the gorge of Pont St. Louis, about two miles distant from his hotel. His object was to get the rare fern *Asplenium petrarchæ*. They passed up the eastern side, over a small aqueduct that spans the bottom of the gorge, and ascended the broken rocky ground on the western slope, which presents no difficulties to an ordinary climber—certainly none to my poor friend, who was especially good upon the rocks. Searching about for the plant, his progress was slower than that of his companion who, when about halfway up the slope, sat down to wait. Some twelve feet below Mr. Collingsplat was a rock—probably heretofore arrested on its descending course. Below this Crosse passed, stopped, and commenced hammering—we suppose to get out the fern which grew there. In doing so, it would appear that he removed the stones which supported the rock; a fearful crash was heard; the huge mass rolled over him and bounded down to the bottom of the gorge. Death, or at any rate the loss of all sensation, must have been instantaneous. Hoping against hope, Mr. Collingsplat sought medical assistance, and then came to me. Taking ropes to let down the body, I was soon upon the spot, and found my poor friend literally crushed. I need not now go at any length into further details; how the body was taken by the Italian authorities, left for more than a day exposed by the roadside; how I offered to pay any sum they might demand—to buy the body at their own price. No! “formalities must be gone through,” partly at Ventimiglia, partly at St. Remo, partly at Rome—all of course implying money. We to-day laid him in his last resting-place, in the same grave which some years back received his daughter.’

The second of the accidents above referred to happened on the Stockhorn, near Thun. Two young Swiss set out with a guide to ascend the mountain. They strayed from the path in search of rare flowers. In grasping at a plant growing on a grassy shelf, one of them slipped, and in falling caught hold of his companion’s leg. The two youths rolled downwards together, and soon fell over a cliff, at the bottom of which they were found lifeless.

The only fatal mishap in the High Alps was the death of a German

student in descending, from Piz Tschierva, one of the summits of the Bernina group. The unfortunate young man set out alone for the expedition, which is one of no difficulty, but requires all the ordinary precautions. He never returned. Of course, as soon as possible a thorough search was instituted, and it was ascertained that he must have fallen into a crevasse on the glacier while on his way down. This sad event should serve as a warning to tyros, who, finding that ordinary glacier expeditions offer no difficulties to men of active habits, are apt to fancy that the dangers of mountaineering are for the most part imaginary, and its recognised precautions traditional and lightly to be dispensed with.

ALPINE NOTES.

DR. GÜSSFELDT AND THE FIRST ASCENT OF PIZ ROSEG.—We beg once for all to assure foreign readers of the 'Alpine Journal' that, whatever may be the practice of individuals in other countries, English mountaineers are not in the habit of climbing peaks by proxy, and crediting themselves with the ascents, or of putting in print, with great precision of detail, statements which are deliberately untrue.

Such a warning is not so unnecessary as it may at first sight seem. Dr. Paul Güssfeldt, a member of the Bernese Section of the Swiss Alpine Club, has, in the 'Jahrbuch' of that Society for 1870, published an account of an ascent of Piz Roseg, made by him in 1869, in which he mentions that one of his objects in undertaking the expedition was to ascertain whether 'die von Berner Führer, Jakob Anderegg, aufgestellte Behauptung, dass er—*freilich ohne seine Herren* (es waren deren zwei)—die höchste Spitze 1865 wirklich erklommen habe, mit Recht oder Unrecht von den Pontresiner Führern angezweifelt wurde.' In the face of Mr. Walker's account of the ascent, published in 1867—of the statement by Herr Weilenmann (himself most anxious to have made the first ascent, and certainly with no bias in favour of English mountaineers), in the 'Jahrbuch' of 1869, that there could be no doubt on the subject—and of the fact that he himself found on the highest peak the card of Messrs. Moore and Walker—Dr. Güssfeldt, with incomparable coolness, assumes throughout his paper that our countrymen halted on the 'Schneekuppe,' or northern peak, and sent on Jakob alone to complete the ascent of the 'Allerhöchste Spitze,' which they afterwards claimed to have made themselves.

That the Pontresina guides may have doubted, or pretended to doubt, whether the ascent was effected at all, is likely enough. The assumption that, if effected, it was by Jakob alone, '*freilich* (of course) *ohne seine Herren*,' appears, however, to be Dr. Güssfeldt's own, and, unsupported as it is by a tittle of proof, and directly opposed to strong circumstantial evidence, can only be attributed to his desire to set up a claim to have been the first amateur climber to stand on the actual top of Piz Roseg.

In the small type of a foot-note the editor of the 'Jahrbuch'

states in mild terms that, in his own opinion, Dr. Güssfeldt is in error in thinking that Messrs. Moore and Walker did not complete the ascent. Considering, however, the wide circulation of the 'Jahrbuch,' and its more or less official character as the organ of the Swiss Club, we cannot help expressing regret and surprise that the editorial opinion did not lead to an alteration of the text; or, if this was difficult, to a more forcibly worded and conspicuous protest against a personal imputation of so offensive a character.

AN EARLY ATTEMPT TO ASCEND THE JUNGFRAU FROM THE ROTH-THAL.—Mr. F. Brown sends us the following very interesting account, found among his father's papers, of an attempt to ascend the Jungfrau, which, considering its date, must be reckoned as one of the most daring feats of early mountaineering:—

'On the afternoon of Wednesday, August 20, 1828, Mr. Yeats Brown and Mr. Frederick Slade left Lauterbrunnen for the purpose of attempting the ascent of the Jungfrau from the side of the Rothenthal. They had previously sent on guides (nine in number) to a chalet on the mountain, distant about four hours' march from Lauterbrunnen, where they met their guides and passed the night.

'The next morning, at three o'clock, they began the ascent, using a lantern for the first hour and a half, and at five o'clock reached the great glacier of the Rothenthal, which they passed with tolerable facility. Then by means of steps cut in the snow they began to climb the almost perpendicular ascent of the barrier of rock and ice which forms the eastern boundary of the Rothenthal. This they proceeded in for four hours, and till within one-third of the summit of the barrier, when one of the guides had an epileptic fit, and shortly afterwards two others refused to proceed.

'The climb, however, was continued with the remainder until within musket-shot of the top, when the weight of the ladders, hatchets, provisions, &c., combined with the necessity of two at least remaining unburdened for the purpose of cutting the way, occasioned a general remonstrance from the remaining guides, and unavoidably caused the abandonment of the project.

'It is but fair to state that Peter Bishoff, the brothers Hans and Christoffe Lowener, and the younger Gertz, behaved throughout with the greatest zeal and intrepidity, and are well deserving of strong recommendation.

'This attempt, though unsuccessful, has confirmed the previously conceived opinion that the ascent of the Jungfrau by the way of the Rothenthal, though very difficult, is feasible.'

THE ITALIAN ALPINE CLUB.—The accomplishment of the national union has naturally widened the field of the labours of the Italian Alpine Club. Last year the summer meeting was held at Agordo, in the Venetian Tyrol; and it has been suggested that the next should take place among the Neapolitan Apennines.

Naples itself is perhaps the last spot to which we should have looked for a display of mountaineering enthusiasm. Yet we learn that nume-

rous papers have been read before the Neapolitan section of the Club, and travellers are promised that before long the Gran Sasso d'Italia and the more remote mountains of Calabria shall be thoroughly explored, and that endeavours shall be made to improve the accommodation and render the country more accessible. An account of an ascent of the Gran Sasso, illustrated with views and a panorama by Count Paul de St. Robert, has lately been published by Vincenzo Bona, of Turin, at the price of four francs.

MODEL OF A PORTION OF THE GRAIAN ALPS.—We extract from the 'Feuille d'Aoste' the following particulars: 'After more than three years' labour, Mons. L'Abbé Vescoz has completed his model in relief of the Valley of the Cogne, and of the neighbouring mountains. The work includes all the ranges between the torrent of Val Savaranche and that of Fenis. The young vicar of Cogne has spared no pains to render his work perfect, and has for this purpose himself ascended many of the highest summits. The model introduces many important corrections on the Italian Government map. The author has, moreover, inserted more than 120 heights, the greater number of which were ascertained by Mons. le Recteur J. Carrel, director of the meteorological observatory at Aosta.'

THE KING OF ITALY AND MR. WHYMPER.—The King of Italy has, through Mons. Sella, the Finance Minister of Italy, and the President of the Italian Alpine Club, conferred on Mr. Edward Whymper, in recognition of the value of his recently published work, the order of SS. Maurice and Lazarus. Mr. Whymper is the fourth member of our Club who has received this mark of distinction; and we believe that English mountaineers will agree that these honours have been in every case most judiciously bestowed.

LAST WINTER IN THE ALPS.—'The Alpenpost,' a valuable weekly journal published at Glarus, under the editorship of Herr Senn, furnishes us with many of the following details:—The early winter of '71-'72 seems to have been remarkable throughout the Alps for bright but intensely cold weather. At Chamouni the sky was cloudless, and the frost severe throughout December. On the 28th the Halwyler See was completely frozen over for the first time since 1828; steamers could no longer run on the Zurich See for the ice; and the Lake of Constance sank thirty-three centimetres beneath the lowest recorded level since 1837.

On January 8th the weather broke. A furious 'föhn' burst upon the mountains and swept down into the valleys, stripping roofs in Glarus, and tumbling over like a card house a large solidly-built manufactory in Appenzell.

As in England, the temperature during the first months of the new year was unusually high, so that before the end of January the sunward-sloping meadows round Glarus were already carpeted with flowers, the birds had begun their songs, and the sun shone with a brilliancy more suited to May than midwinter.

Although no members of the Club profited last Christmas by Mr. Moore's example and precepts, they have perhaps not been altogether thrown away. The Rev. J. H. Echordge (?), with Peter Bohren, crossed on the first days of the new year the Great Scheideck and the Wengern Alp; and we hear of a party of Cambridge men spending their Christmas in skating on the Silser See in the Upper Engadine.

Davos seems to have become a recognised winter health-resort. One hundred and thirty guests, mostly German, were quartered there, when, on January 21, a terrible misfortune took place. The great Kurhaus was discovered to be on fire. Despite all efforts, it was slowly burnt to the ground. 'It was indeed,' says an eye-witness, 'a miserable sight to see the sick patients, leaning one upon another, issue sadly forth to seek some other shelter.'

CAUCASIAN EXPLORATION.—Mons. E. Favre, a son of the author of 'Recherches géologiques,' spent the greater portion of last summer in exploring the upper valleys of the Central Caucasus. He writes: 'On the south side of the chain I visited the valleys of the Ksan, the Quirila, the Rion, and the Zênes-Squali. I passed a fortnight in Suanetia, where I had splendid weather. On the north I visited the valleys of the Uruch (Digor), the Tcherek (Balkar), the Tchegem, and the Baksan. My expedition came to an end at Kislovodsk, where I was laid up with a severe attack of fever, which left me too weak to mount again on horseback. I consequently returned to Tiflis, where I completely recovered, and was able afterwards to pass some time in the Suram mountains and the district of Satskiri.' Mons. E. Favre adds the welcome announcement that he hopes soon to publish a work of some length on the geology and glaciers of the Caucasus.

We are glad to take this opportunity to mention that Herr Radde's work, 'Die Drei Langenhochthalern Imeritien's,' originally printed in the government offices at Tiflis, can now be purchased of Williams and Norgate. The book, which is full of ethnological and botanical, besides much general information, is intended to be the first of a series of volumes illustrating the whole region of the Caucasus. Herr Radde has lately been engaged, in pursuance of this object, in examining the botany of Armenia, and more especially of the slopes of Ararat.

THE RIFFELHORN FROM THE GORNER GLACIER.—On August 5th J. H. Kitson, with Christian and Ulrich Almer, left Zermatt for a training walk through the ice-fall of the Gorner Glacier. 'Having conquered its difficulties, we thought it would be well to go to the Riffel for lunch, and the direct way lay over the Riffelhorn. Close inspection led to the discovery of a route that would be practical if two points could be passed; and we determined to make the attempt. Our way led up an exceedingly steep gully for some distance, until this ended in a smooth face of rock, inclined at a very high angle, and with no good standing-place below. However, we managed to push Christian up over this with our axes, and he pulled us up after him. The way was then easier, until about fifty feet from the top, where a rock projected with a smooth face at one side and overhanging on the other. Christian, by the most wonderful piece of climbing I ever saw, managed to worm himself over

the smooth face, and began to pull me up; but a straight pull only brought my head under the projection, and the rope pulled me off any hold there was on the smooth face; so we were obliged to climb sideways, supported almost entirely by the rope, until a straight pull up was possible, after which we easily reached the top. I can confidently recommend the excursion to anyone with a liking for difficult rocks, as they are all very sound.'

THE JUNGFRAU.—When the upper part of the Jungfrau consists of hard ice, as is frequently the case, the step-cutting which is so tedious on it may be avoided by taking to the rocks on the Roththal side, which are easy. The snow was in such good condition in August this year that the ascent was made from the Faulberg and back in seven hours and a half.—J. H. KITSON.

MONT BLANC BY BALLOON.—Some time since an account of a projected railway to the summit of Mont Blanc appeared in this journal. We have now to bring before our readers a scarcely less daring project, by which it is proposed to set aside the difficulties which at present hinder so many tourists from ascending the monarch of the Alps.

A young native of Sallenches, a nephew of the mayor of that place, had the misfortune to be shut up in Paris during the Prussian siege. There he distinguished himself as a clever and successful aeronaut. On his return home his thoughts turned to the possibility of applying the skill which he had acquired to some practical and profitable purpose. He surveyed Mont Blanc with care, and arrived ultimately at the conclusion that nothing was easier than to arrange for its ascent by balloon. The details of his plan have naturally not been made public; but it is understood, says our informant, that a number of captive balloons will be attached to rocky eminences on the upper portion of the mountain. The inconveniences attendant on a change of carriages, or to speak more correctly cars, at so high an elevation have, it seems, therefore yet to be overcome. But whatever may be the details of the plan, it was in the course of last spring submitted to the Council of the Commune of Chamouni, and received their formal sanction.

We are sorry to learn that want of funds, and the opposition of some of the inventor's relations, have as yet prevented any steps being taken for the realisation of this daring project. We trust that a scheme so eminently fitted to increase the enjoyment of those of our fellow-countrymen who like to travel in gangs, may not be nipped in the bud by the proverbial distrust of a genius amongst his own people. There occurs to our mind, however, one serious danger, against which sufficient precautions will no doubt be taken. What if some ill-advised guide, urged by the peril of his craft, should cut the connecting rope of the balloon, and dismiss its hapless crew on a 'circular' voyage to heaven's gate, or some other region where return tickets are unknown, and accommodation coupons not as yet recognised.

ALPINE BIBLIOGRAPHY, 1869-1872.—The following list of books, maps, &c., mostly published since his last similar contribution to the 'Alpine Journal' in Feb. 1869 (Vol. iv. p. 239), has been received from Mr. F. F. Tuckett, who requests us to call the attention of those who may desire still more minute information, including the titles of many papers in the publications of all the various Alpine Clubs, to the extensive catalogue in the 'Zeitschrift des deutschen Alpen-Vereins,' Band i. Heft 2. München, Lindauersche Buchhandlung, 1870; and the 'Jahrbuch des österreichischen Alpen-Vereins,' Bande v. und vii. Wien.

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REVIEWS.

MR. H. DIXON'S SWITZERS.*

INTELLIGENT SWISS complain with reason that, while their country is treated as the playground of all nations, little or no attention is bestowed on themselves. Mr. Dixon's professed object is to remove this grievance by laying before British ignorance an adequate account of the political and social institutions of the Alpine Republic. In the pure blaze of his own newly-acquired knowledge, Mr. Dixon has perhaps somewhat exaggerated the previous darkness. Most climbers have learnt a little more than they are here given credit for about 'the boys who tie you up in ropes.' Constant intercourse with guides who are also looked on as companions can scarcely fail to teach their employers something of the simple pleasures, the hardships, and the interests of a Swiss peasant's life.

Yet we willingly confess that our knowledge is very imperfect and fragmentary; and we were ready to turn with eagerness to any teacher ready and capable to instruct us. Our only hesitation in trusting ourselves at once to the author of 'The Switzers' arose from the recollection that on previous occasions American and Russian acquaintances had hinted to us their belief that Horace's maxim as to the making of money had been applied by Mr. Dixon to the manufacture of books. We determined, therefore, to make use of an obvious and easy test. The opening chapters are full of topographical details, and on simple matters of this sort we felt ourselves competent to play the critic. If our proffered guide proved himself at the outset able to tread without stumbling on the beaten paths of Alpine geography, we would follow him with confidence into the more difficult and less-frequented region of Swiss politics.

The results of the inquiry are amusing, if not satisfactory. In the first few pages of the book we find a mass of geographical names chiefly from the neighbourhood of the St. Gothard Pass. Catalogues of obscure peaks show that the author pretends to an intimate knowledge of at least this corner of the Alps. So great minuteness might give us a right to expect accuracy as to leading facts, such as the name of the highest mountain of the district, or the passes which traverse one of its principal watersheds. Still we were not disposed to give up Mr. Dixon for sharing the until lately common belief in the Galenstock,

* *The Switzers.* By W. Hepworth Dixon. Hurst & Blackett.

or even for ignoring the Kreuzli, the Brunni, and the Sandgrat, in his statement that 'from Oberalp to Trons in the Vore-Rhine Valley, there is not a chamois trail across the northern heights.' Our precise geographical mind received, however, a severe strain when required to draw an imaginary line through points loosely described, as 'Six Madun and thence to Toma, Aldez, Suisen, Teufelstein,' the first a mountain, the second a lake, the third a village, the fourth undiscoverable on Dufour's map, the fifth a roadside rock. It underwent a far severer shock on finding that Mr. Dixon's pen, more powerful than Roland's sword, had hewn down two lofty ridges, one the Alpine watershed, in order to make the 'Toccia start beneath the Saashorn.' After this we learnt with comparative indifference that the Ticino no longer rises thirteen miles west of Airolo, but 'drops from Lago Sella,' beside the St. Gothard road, and that Val Blegno has taken to 'nestling in between the peaks and crests of Scopì and La Bianca.' The same magic weapon which can with so much ease remove rivers and mountains can also create them. From one of Mr. Dixon's lists of peaks we gather that two pasturages above the Gerenthal have lately lifted up their horns on high, and become mountain summits. We commend these babes of Anak breed (we have Mr. Dixon's authority for calling any mountain over 10,000 feet 'of Anak breed') to Mr. Tuckett's attention next month. They must necessarily be unconquered peaks, and we can only hope they may have grown sufficiently to afford fair sport to that excellent giant-killer.

Idle schoolboys anxious to swell their essay to the due number of lines, and at the same time to give it a false air of research, sometimes seize the nearest atlas and copy down a string of names. Mr. Dixon's Swiss topography seems to have been concocted on a somewhat similar principle. He trusted, no doubt with sufficient grounds, to the carelessness or credulity of the general public. But he must surely have forgotten that, in dedicating the volume to Mr. Forster, he was showing up his exercise to one who, as an active member of the Alpine Club, was likely to be among the first to detect any such trick. In ancient days authors' dedications seldom went wholly unrewarded. To learn by heart at least one volume of the 'Alpine Guide' is the recompense which would we think best meet Mr. Dixon's deserts, and remembering the positions which they respectively hold with regard to public education, we have some hope that Mr. Forster may have the power of bestowing it upon him. In this case, the often-asked question 'Quis custodiet ipsos custodes?' which may perhaps be translated, 'Who shall teach the school-board?' would for once meet with a satisfactory answer.

The references to mountaineering matters contained in 'The Switzers' are, fortunately, few and far between. The following extracts, referring to the Matterhorn, are stupid and pernicious nonsense: 'Now boys and girls go up that cone in sport. Two-thirds of the way from Zermatt to the peak a hut has been erected by the guides; a few years more, and what is now a lonely hut will be a pleasant populous inn.' The others we have marked are little better: 'There is a scatter of stone houses on the several roads (up Mont Blanc), one house on

the Aiguille du Gouter.' . . . 'In a hundred years the summit of Mont Blanc may be a town.'

Mr. Dixon has also a new theory about glaciers, which will certainly astonish Professor Tyndall. He thinks that the surface of the lower portion of the Rhône glacier 'has been smoothed and rounded by the noon-day heat,' and that its ice-fall has been 'jagged and broken by the midnight chill.' He pretends seriously to believe that the 'glaciers are dripping and wasting,' and the 'snow-fields melting,' before the advance of a few needy peasants and the Alpine Club. 'As nature owns her master,' he writes, 'she retires before him step by step.' 'Not long ago you found the pines and larches at Sierre, in Canton Valais, now you have to seek for them at Brieg. A vine will sprout to-day where pines would hardly cling some years ago.' These statements are, we need hardly say, directly opposed to the historical evidence offered by local archives.* But in this 'altogether novel' work, as a daily paper happily calls it, Mr. Hepworth Dixon lives and writes in a region far removed from local archives or facts of any kind.

We shut up the volume in despair. In all that concerns the physical features and topography of the Alps we find nothing but a pretence of minute knowledge coupled with a great deal of real ignorance. Into the main matter of the book it is hardly the province of the 'Alpine Journal' to accompany the author, of whose general untrustworthiness our readers are probably by this time sufficiently convinced.

THE MOUNTAIN.—BY JULES MICHELET.†

We confess that to our mind the adornment of a bright blue binding graced with the traditional gilt chalet and chamois, and the promise of numerous woodcuts, scarcely makes up for the loss which M. Michelet's prose poem inevitably suffers by being done into a foreign tongue. Between an 'illustrated work' like this and a 'book with illustrations' like Mr. Whympers there is little distinction, but a great difference. The present volume is 'eminently fitted to lie on the drawing-room table.' But for a place on our Alpine bookshelf we should prefer the less pretentious French edition.

We shall not attempt to criticize in detail the substance of the original work, which is probably well-known to most of our readers. M. Michelet's volumes, despite their frequent extravagancies, are always inspired with fancy, genius, and a true love of nature, and there are few who will not find in them some interest or charm. In the present instance, it is some disappointment to discover that our author's *montagne* is the same, or at least does not extend higher, than the *montagne* of the Swiss peasant, and that of the inner beauties of the gla-

* See "Denkschriften der allgemeinen schweizerischen Gesellschaft für die gesammten Naturwissenschaften, 1. Band, zweite Abtheilung, Zurich, 1833, Orell und Fussli. 1 Mémoire sur la Variation de la Température dans les Alpes de la Suisse, par M. Venetz, ingénieur en chef du Canton du Valais, rédigé en 1821."

† *The Mountain*. From the French of Michelet, with 54 Illustrations from designs by Percival Skelton. London: T. Nelson & Sons. 1872.

ciers and the upper snow-fields, of wave-like snow-crests and shining ice-falls, he has no knowledge. It is in the middle zone of the Alps, amongst the flowers and pine forests of St. Gervais, or the chestnut woods of Chiavenna, that he is thoroughly at home. More fortunate than most English travellers, he revels in the beauties of May on the shores of the Lake of Geneva, and dwells with characteristic fancy on 'the loves of the flowers,' which Nature has lavished so bountifully on the slopes of Veytaux and Villeneuve.

His nearest approach to the snow level is in the Engadine, where he and M^{me}. Michelet still find their chief enjoyment amongst the flowers of the Val du Fain, or in studying with a precision and love of detail worthy of a Dutch master the interior of a Pontresina farmhouse and the life of its inmates. Despite, however, M. Michelet's somewhat unexpected sympathy with the stern mountain scenery of the Graubunden, he draws a very dismal picture of the future prospects of the valley, which, thanks to foreign princes and London doctors, is now enjoying such unexampled prosperity. The Engadine, he declares, will before long be rendered uninhabitable by the constant diminution of the forests. For our part, we put no faith in the prediction. The Engadiners are far too shrewd a race to allow their pines to perish, and, even if they do, we doubt the consequence. In other mountain regions further east, men live and prosper despite the lack of firewood and the unrestrained fury of the avalanches in narrow treeless glens quite as exposed and fully as high as the Engadine.

To his fellow travellers, M. Michelet, or perhaps his translator, is scarcely polite. Circular tourists are forcibly described as 'the noisy dregs of society.' 'Alpine Climbers' is the title of an amusing sketch, the original of which (often to be found in great distress and a new Parisian *costume de voyage* on the rocks in the neighbourhood of the Montanvert and Mauvais Pas) would not be classed under that head except in a country as yet denied the blessing of an Alpine Club. 'On this subject' the reader is told 'he should consult those who know the most—the guides who haul the climbers to the summit, who for a little money afford them the pleasure of the boast, who up to the very glaciers carry their viands, dishes, and liqueurs. They relate with what peril they guide the great drunken and terrified *marmots* in their descent, hewing out for them flights of steps, planting their feet in each secure position, and frequently only able to extricate them from their danger by literally carrying them in their arms.' M. Michelet has evidently been hoaxed by some vain boaster of the Chamouni cafés; from Almer or Anderegg he would have heard a very different account of the nature and spirit of modern mountaineering.

Both in its merits and failings, 'La Montagne' is thoroughly French. The reader must not look for a comprehensive and minutely accurate account of Alpine life, such as has been given us by the German pens of Berlepsch and Tschudi. The charm of the book is due to the unaffected love of nature, which breathes through every page, and to the happy mixture of poetical fancy and truth with which natural phenomena are described. Here and there in the English translation we perhaps notice some hasty generalisation or ingenious

epigram, resting too lightly on solid fact to be able to afford the loss of that lightness and flexibility which render the French language at once the handiest and the most dangerous of tools. But these are mere surface blemishes, and scarcely affect our judgment of the real merits of the volume.

The translator has, on the whole, performed a difficult task with considerable spirit and success. But there are some traces of haste or carelessness about his work which might be removed with advantage. The following sentence at the end of a chapter leaves a peculiarly unpleasant impression:—'We could scarcely see the glaciers, and only by a narrow angle, but their verdurous margin promised nothing reliable.' We are told that the Righi and Pilatus look down on the Lake of Geneva; that the lakes and glaciers of the Engadine contribute largely to the Rhone; mistakes for which there is no warrant in the original.

The geography of the new foot notes, which are apparently by the same hand, is equally shaky. We quote at random. 'The glaciers on the flanks of Ararat give birth to four streams, of which the Axares [*sic*] is the principal.' Now, although the snows that rest on the mountain's head are eternal, they feed no glaciers. The Araxes rises far away south of Erzeroum, and, in place of giving birth to four streams, Ararat only feeds a few unimportant rivulets, all of which fall into the Araxes. Nearer home, the writer is not more fortunate. The Dent du Midi is described as one of the most picturesque summits of the *Piedmontese* Alps, and the principal summit of the Bernina group is said to be the Piz Morteratsch.

The exquisite care Mr. Whympers has lately lavished on the drawings of his own work has somewhat spoilt us in the matter of woodcuts of Alpine scenery. But we can honestly say that the illustrations to this volume are above the average. We may point out as especially praiseworthy a very faithful drawing of Mont Blanc from some point behind the Aiguilles Rouges, miscalled 'from the Brévent,' and two small cuts representing the approach of bad weather, and the arrest of an avalanche by a pine forest. These drawings give truthful impressions of scenes familiar to most mountaineers. There is, however, one sketch entitled 'mists on the glacier,' which is of a different order, and will at once strike the educated eye as shamelessly false to nature. But even this is not so bad as a chromolithograph lately to be seen in shop-windows, and intended to represent Zermatt, in which the Vispach is turned into a quiet English stream with reedy banks, a French grove of poplars appears in the middle distance, while a degraded pyramidal peak, without an outline in common with the mighty Matterhorn, is introduced in the background. Yet this caricature is, according to the salesman, 'very popular with the public.'

MOUNTAINEERING IN THE SIERRA NEVADA.*

The title of this volume will probably convey an altogether false notion of its contents to many English readers. The Sierra Nevada most in our minds on this side of the Atlantic is the Spanish range of that name, and we have lately been apt to fancy that we know enough about those somewhat formless and arid mountains; and that we do not care to hear any more about Granada, the Alhambra, or Spanish mules.

The Sierra for which Mr. Clarence King claims our attention proves to be the far nobler chain which forms the back-bone of North America, and divides for a distance of four hundred miles the sun-dried deserts of Nevada from the rich plains of the Sacramento and San Joachin, and the Pacific coast. One scene in this great mountain region has already attained European celebrity. Of the precipices, waterfalls, and 'big trees' of the Yosemite valley, we have had of late years descriptions enough and to spare. But the writers as a rule, however strong their passion for mountain scenery—and some of them, if judged only by their language, are passionate indeed—give no information whatever as to what lies above, and beyond, and on every side of the waterfall-draped defile. They come and go like the people who drive up to Lauterbrunnen, rave for a few moments over its dust-fall and mural cliffs, and never give a thought to what beauties may be hid in the surrounding Oberland.

The author of 'Mountaineering in the Sierra Nevada' is the exact reverse of a tourist of this class. His notes are the result of many years' rambles undertaken by him as geological member of the Government survey of California, through the length and breadth of the Sierra Nevada. His book gives an intelligible and satisfactory account of the features of these American Alps; and enables us to realise to a great extent the character of their scenery and the possibility and difficulties of mountaineering in their recesses. It is likely to suggest to many of us a new motive for a visit to America; and we shall certainly be disappointed if the Alpine Club does not secure for itself some of the still maiden summits of the Far West.

Mountaineers who have a general horror of geology, and a particular dislike to look on while their beloved peaks are dissected and labelled with hard names, need not be repelled by the branch of science to which Mr. King devotes himself. Here is his own confession: 'The paleontologist of our survey, my senior in rank and experience, had just said of me, "I believe that fellow had rather sit on a peak all day and stare at those snow mountains than find a fossil in the metamorphic sierra." Can it be? I asked myself. Has a student of geology so far forgotten his devotion to science? Am I really fallen to the level of a mere nature-lover?' Perhaps out of kindness to his readers Mr. King in his book comparatively seldom rises above the level to which he

* *Mountaineering in the Sierra Nevada*. By Clarence King. London: Sampson Low & Co. 1872

fancies himself to have fallen. His 'dry-enough' chapters will obtain the epithet from no one but their author. The whole volume is written with wonderful freshness and vigour of style, and only gains additional piquancy from the tendency occasionally shown by the author to find new verbs and substantives in order to express more tersely what he wants to say. We perhaps look too much on our language as a great instrument perfected by our fathers, which it would be sacrilege to alter. Americans, and especially residents in the Western States, deal with it as still capable of indefinite change and improvement, and do not scruple at any moment to adapt it to their needs.

The book opens with a general sketch of the Sierra Nevada, from which we can make but a few extracts. 'From latitude 35° to latitude 39° 30' the Sierra lifts a continuous chain, the profile culminating in several groups of peaks separated by deep depressed curves or sharp notches, the summits varying from eight to fifteen thousand feet; seven to twelve thousand being the common range of passes. Near its southern extremity in San Bernardino county, the range is cleft to the base with magnificent gateways opening through it into the desert. From Walker's Pass for two hundred miles northward the sky line is more uniformly elevated, the passes averaging nine thousand feet high, the actual summit a chain of peaks from thirteen to fifteen thousand feet.' . . . 'In the north domes and cones of volcanic formation are the summit, but for about three hundred miles in the south it is a succession of sharp granite aiguilles and crags. Prevalent among the granite forms are singularly perfect conoidal domes, whose symmetrical figures, were it not for their immense size, would impress one as having an artificial finish.'

The two following quotations describe the character of the country lying on either side of the great chain, and are at the same time good specimens of Mr. King's descriptive power:—

'Spread out below us lay the desert, stark and glaring, its rigid hill-chains lying in disordered grouping in attitudes of the dead. The bare hills are cut out with sharp gorges, and over their stone skeletons scanty earth clings in folds like shrunken flesh; they are emaciated corpses of once noble ranges now lifeless, outstretched as in a long sleep. Ghastly colours define them from the ashen plain in which their feet are buried. Far in the south were a procession of whirlwind columns slowly moving across the desert in spectral dimness. A white light beat down, dispelling the last trace of shadow, and above hung the burnished shield of hard pitiless sky.' Let us change the picture. 'Brown foothills, purple over their lower slopes with "fil-a-ree" blossoms, descended steeply to the plain of California, a great inland prairie sea extending for five hundred miles, mountain-locked, between the sierras and the coast hills, and now a broad arabesque surface of colours. Miles of orange coloured flowers, cloudings of green and white, reaches of violet which looked like the shadow of a passing cloud, wandering in natural patterns over and through each other, sunny and intense along near our range, fading in the distance into pale bluish-pearl tones, and divided by long, dimly-seen rivers, whose margins were edged by belts of bright emerald green. Beyond rose three

hundred miles of Sierra, half lost in light and cloud and mist, the summit in places sharply seen against a pale, beryl sky, and again buried in warm, rolling clouds. It was a mass of strong light, soft, fathomless shadows, and dark regions of forest. However, the three belts upon its front were tolerably clear. Dusky foothills rose over the plain with a coppery-gold tone, suggesting the line of mining towns planted in its rusty ravines—a suggestion I was glad to repel, and look higher into that cool, solemn realm where the pines stand green-roofed in infinite colonnade. Lifted above the bustling industry of the plains and the melodramatic mining theatre of the foothills, it has a grand silent life of its own, refreshing to contemplate even from a hundred miles away.

‘While I looked, the sun descended, shadows climbed the Sierras, casting a gloom over foothill and pine, until at last only the snow summits reflecting the evening light glowed like red lamps along the mountain wall for hundreds of miles. The rest of the Sierra became invisible. The snow burned for a moment in the violet sky, and at last went out.’

It is now time to turn to the mountaineering exploits which especially recommend the volume to our notice. By an Act of Congress the Yosemite valley has been given for ever to the State of California as a public pleasure-ground. One of Mr. King's duties was to make a survey defining the boundaries of the grant, and in the chapter headed ‘Around Yosemite Walls’ he gives an interesting account of the numerous scrambles which his task involved. In addition to these and other minor expeditions, he accomplished the ascent of four lofty peaks, one of them exceeding 15,000 feet in height.

The most exciting portion of the book is the account of the attack on a mountain named by the author Mount Tyndall. In May 1864, the members of the Californian survey were encamped near one of the sources of the King's River, at the western base of the chain. An eight hours' climb carried two of the party to the summit of one of the towers of the great mountain wall which rose above their heads, and which they believed to be the culminating crest and watershed of the Sierra Nevada. To their surprise they saw that, connected further to the south with the range upon which they stood by a transverse ridge, but separated immediately below them by a gulf 5,000 feet in depth, rose a group of snowy mountains, the summits of which towered from 1,200 to 1,500 feet above their heads. On their return to camp they reported the discovery to their companions, and at the same time assured them that ‘they might as well attempt to get on a cloud as to try the further peak.’ Such news only incited Mr. King to make the attempt. He was fortunate in possessing a thoroughly able companion in a camp servant named Cotter. Laden with provisions for a week, contained in packs weighing forty pounds apiece, the explorers set out, and reached the pass over the nearer range, about 12,000 feet in height, without serious difficulty. Hence they ‘looked down into a gulf 5,000 feet deep, sinking from our feet in abrupt cliffs nearly or quite 2,000 feet, whose base plunged into a broad field of snow lying steep and smooth for a great distance, but broken near its foot by craggy steps often a thousand feet high.’

‘Rising on the other side, cliff above cliff, precipice piled upon pre-

cipice, rock over rock up against sky, towered the most gigantic mountain-wall in America, culminating in a noble pile of Gothic-finished granite and enamel-like snow. How grand and inviting looked its white form, its untrodden, unknown crest, so high and pure in the clear strong blue! I looked at it as one contemplating the purpose of his life; and for just one moment I would rather have liked to dodge that purpose'

'This feeling soon passed, leaving a 'cheerful resolve to go ahead.' The position of the climbers may now be compared to that of a party standing on the Petersgrat, and looking for a way to reach the base of the Bietschhorn. After some hesitation, they determined that the cross ridge offered the least repulsive route. Impeded by their heavy knapsacks, they had a long and toilsome climb to reach its commencement, and were compelled to pass their first night on a granite shelf, below the junction of the chain they had just crossed with the transverse ridge.

Before daybreak next morning they were again on foot. At first a great snow-field was traversed towards the base of a gap in the crest, which they trusted would serve as an arch of Al Sirat to bring them to the object of their hopes. As they advanced 'the snow sloped more and more steeply up towards the crags, till by and by it became quite dangerous, causing us to cut steps with Cotter's large bowie-knife—a slow, tedious operation, requiring patience of a pretty permanent kind.' Perhaps greater experience might have taught our climbers not to trust to a granite arête for a practicable path. At any rate, after gaining the top by a severe climb, they found, as Alpine climbers would expect, that the ridge was cut into towers and pinnacles, and absolutely useless for their purpose, and that the next thing to be done was to get down again. The only prospect of reaching their goal seemed now to be by descending to some distance on the southern side of the cross ridge, the opposite to that by which they had mounted.

The three hours' work which ensued seems to have been about the most difficult Mr. King ever met with. The climbers were forced to descend a high face of smooth glacier-polished rocks. The first was let down from ledge to ledge with a lasso, which was then passed up again to the second, who hooked it round some granite knob before he attempted to follow. Their exertions were rewarded by finding that, the descent completed, the base of their mountain lay only six miles away, and with no great difficulty between them and it. A little grove of pines on its skirts offered an ideal bivouac towards which they bent their course.

On the third morning the actual ascent of the peak was commenced. Its earlier portion does not seem to have offered any more serious obstacle than the customary inconvenience of unsteady boulders. Higher up, steep iceslopes and granite cliffs were one after another encountered and vanquished. But the most desperate struggle was reserved for the last, and we must leave Mr. King to describe it in his own words. 'If Nature had intended to secure the summit from all assailants, she could not have planned her defences better; for the smooth granite wall, which rose above the snowslope, continued apparently quite round the peak, and we looked with great anxiety to see if there

was not one place where it might be climbed. It was all blank except in one place; quite near us the snow bridged across the crevice, and rose in a long point to the summit of the wall—a great icicle column frozen in the niche of the bluff, its base about ten feet wide, narrowing to two feet at the top. We climbed to the base of this spire of ice, and with the utmost care began to cut our stairway. The material was an exceedingly compacted snow, passing into clear ice as it neared the rock. We climbed the first half of it with comparative ease; after that it was almost vertical, and so thin that we did not dare to cut the footsteps deep enough to make them absolutely safe. There was a constant dread lest our ladder should break off and we be thrown either down the snowslope or into the bottom of the crevasse. At last, in order to prevent myself from falling over backwards, I was obliged to thrust my hand into the crack between the ice and the wall, and the spire became so narrow that I could do this on both sides, so that the climb was made as upon a tree, cutting mere toe-holes, and embracing the whole column of ice in my arms. At last I reached the top, and with the greatest caution wormed my body over the brink, and rolling out upon the smooth surface of the granite, looked over and watched Cotter make his climb. He came steadily up with no sense of nervousness until he got to the narrow part of the ice, and here he stopped and looked up with a forlorn face to me, but as he climbed up over the edge the broad smile came back to his face, and he asked me if it had occurred to me that we had by and by to go down again.

‘We had now an easy slope to the summit, and hurried up over rocks and ice, reaching the crest at exactly twelve o’clock. I rang my hammer upon the topmost rock, we grasped hands, and I reverently named the grand peak Mount Tyndall.’

Mr. King’s icestalk will no doubt try the faith of some of his readers. It would certainly be hard to find in Alpine literature the record of any ‘perilous position’ exactly similar to that here described. We can imagine, however, some such a rock-gully thinly coated with ice as Mr. Whitwell climbed to the Cimon della Pala, but blocked at its head by a snow corniche, of which one of the gigantic and not necessarily perpendicular icicles might prove of use to an expert mountaineer. At any rate, we think Mr. King tells us nothing of a character to disentitle him to the belief, which, unless he can be directly proved untrustworthy, every traveller has a right to claim.

Turning his eyes to the panorama, Mr. King found that Mount Tyndall was surpassed by at least two other peaks in the same range. Of the general aspect of the view we have no room to speak, but we cannot at all agree in the notion it suggested that Gothic architecture was inspired by granite forms, and that the models for early cathedrals of that order were furnished by the Alps. Mr. Swinburne by no means exaggerates the mediæval view of mountains when he makes his pilgrim describe how

‘before us rose and fell

White cursed hills like outer skirts of hell,

Seen where men’s eyes look through the day to night

Like a jagged shell’s lips, harsh, untunable,

Blown in upon by devils’ wrangling breath.’

And the reputed resort of semi-diabolical creatures of all sorts was about the last model an architect of the Middle Ages would have dreamt of imitating for the purpose of a sacred edifice.

When the time for descent arrived the climbers were dismayed to find that during their stay on the summit the upper half of the icicle had broken off and disappeared. This apparent misfortune led, however, to the discovery of what—as we are expressly told the rope was not called into use—must have been a comparatively easy line of descent.

The return journey proved of equal length, and was even more exciting than the earlier days of the expedition. How the travellers' boots fell to pieces; how they determined to descend into and cross the great gorge or cañon of the King's River; how, arrived at the bottom, they had to choose between scaling a perpendicular cliff and swimming an ice-cold lake; with what heroism Cotter behaved; and how, finally, the camp was regained in safety, we must leave to be learnt from the book itself.

The next feat of climbing recorded by Mr. King is the ascent (with a different companion) of the Obelisk, as its name implies, a 'spire of stone' overhanging the Yosemite. There he found one decidedly 'mauvais pas.' 'About seven feet across the open head of a cul-de-sac (a mere recess in the west face) was a vertical crack riven into the granite, not more than three feet wide, but as much as eight feet deep; in it were wedged a few loose boulders; below it opened out into space. At the head of this crack a rough crevice led up to the summit. . . . There was no discussion; but, planting my foot on the brink, I sprang, my side brushing the rough projecting crag. While in the air I looked down, and a picture stamped itself on my brain never to be forgotten. The débris crumbled and moved. I clutched both sides of the cleft, relieving all possible weight from my feet. The rocks wedged themselves again, and I was safe.'

The ascent of Mount Shasta, a volcano about 11,000 feet in height, and situated at the northern extremity of the Sierra Nevada, was a more common-place undertaking. 'There is no reason,' we are told, 'Why any one of sound wind and limb should not, after a little mountaineering practice, be able to make the Shasta climb. The fact that two young girls have made the ascent proves it a comparatively easy one.' The circumstance of the mountain being already, in 1870, under the tutelage of a regular guide, shows that mountaineering is assuming in California the place of a recognised pursuit.

Shasta is rendered interesting mainly by the huge glaciers which encase its flanks; their lower portions are described as covered, to an extraordinary extent, with débris. Strange to say, we cannot find any mention of glaciers in the higher but more southern portions of the chain, and we are unable to determine whether any now exist there. Of notices of their past action the volume is full, and the author shares Professor Tyndall's views in assigning to them at any rate an important part in the excavation of Alpine valleys.

Mr. King's 'crowning mercy' was the ascent of the highest summit of the Sierra Nevada, named after his chief Mount Whitney, and situated

in the same ridge, and only about six miles south of Mount Tyndall. The expedition proved shorter and easier than might have been expected. The dangers were confined to the last few hundred feet, and were then of a character which a larger party, armed with the usual implements of Alpine warfare, would have regarded but lightly. On the summit they met with a surprise. 'Close beside us a small mound of rock was piled upon the peak, and solidly built into it an Indian arrow-shaft pointing due west. I hung my barometer from the mound of our Indian predecessor, nor did I grudge his hunter pride the honour of first finding that one pathway to the summit of the United States, fifteen thousand feet above two oceans.' The climbers were able to return the same evening to a settlement called 'Lone Pine,' from which they had started on the previous day.

Beside the mountaineering adventures which give it a title, the volume contains accounts of other dangers encountered by the author in the course of his wanderings. One chapter, entitled 'Kaweah's Run'—Kaweah is a favourite horse, the run an escape from two Spanish brigands, who pursued Mr. King on and off for several days—reads as if cut out of Mayne Reid, and is certainly not inferior to the original of which it reminds us.

In other parts of the book we make the acquaintance of various strange characters, drawn with much humour and vividness. 'The Newtys of Pike' strikes us as a family group of great merit. Almost as good, although slighter, are the sketches of the painter of the Yosemite valley, or, as he preferred to call himself, 'The Pacific Slope Bonheur; or of the profane but modest teamster, who, having just succeeded by sheer force of language in inducing a team of mules to drag out of a soft spot a fast-stuck waggon, checks a compliment with the reply, 'Swear, me swear?' in a tone of incredulous questioning. 'No, I can't blaspheme worth a cuss. You'd jest orter hear Peter Green. *He can exhort the impenitent mule.* I've known a ten-mule team to renounce the flesh, and haul thirty-one thousand through a foot of clay mud under one of his outpourings.'

Enough has been said to show the varied fund of information and amusement to be found in this volume. It has but one serious defect—the want of a good map, for which, as well as for illustrations of the region here described, the reader must refer to the magnificent but somewhat ponderous volumes which sum up the information collected by the Geological Survey of California.

In conclusion, we must congratulate the Americans on the possession of a chain of mountains, surpassing in vegetation, and rivalling in height and picturesqueness of form, if not in extent of glacier and snow-fields, the Swiss Alps. Human habitations have already spread to within a day's journey of their highest summits, and, at the pace at which civilisation progresses in these regions, there is no reason why the Sierra Nevada should not in a year or two become a haunt of mountain-climbers, and in a few more be frequented by hundreds of pleasure tourists. We quite sympathize with Mr. King's protest against the introduction of the accompaniments of Swiss travel—guides, porters and hotel-keepers—into this new region. Still, unless breaking one's

neck is to be held the main object of mountain-climbing, we may, without any disparagement of our author's personal prowess, venture to think that some of the rules adopted by European climbers might advantageously be introduced in the Far West. Had Mr. King's party generally consisted of four, instead of two members, he would have had far fewer hairbreadth escapes,—but he would also have written a far less exciting volume.

PROCEEDINGS OF THE ALPINE CLUB.

January 30.—Mr. W. LONGMAN, *President, in the Chair.*

The following gentlemen were balloted for, and elected Members of the Club—viz., Lieut.-Col. G. B. Malleon; Capt. R. F. Burton; Capt. Utterson-Kelso; Messrs. A. B. Hamilton, J. Stevenson Lyle, J. Smyth Osbourne, and R. Pendlebury.

The SECRETARY read a letter from Mr. Moggridge, giving some particulars of a fatal accident which occurred on December 4, 1870, near Mentone, to the Rev. R. Crosse, a Member of the Club.

After some remarks by Mr. Hawker, the PRESIDENT expressed the regret of the Club at the occurrence, and observed that it was satisfactory that the accident was in no way the result of carelessness on the part of Mr. Crosse.

Mr. PACKE submitted the accounts for the year 1871, which, after some discussion, were passed.

The PRESIDENT introduced to the meeting Mr. L. Coleman, the brother of Mr. E. T. Coleman, a Member, who has been for some time travelling in British Columbia. Mr. L. Coleman made some observations on the subject of the ascent of Mount Baker by his brother, and exhibited some drawings by him.

Mr. MOORE read a paper entitled 'Variations on the High Level Route,' which appeared *in extenso* in our February number.

Mr. TUCKETT, referring to a remark of Mr. Moore that almost every imaginable pass out of Zermatt had now been made, observed that there might be reason to hope that in consequence of the oscillations of temperature in the Alps certain passes now easy might in course of time become difficult, and quoted in support of this view a statement by Mons. Venetz, that, in the early part of the century, the Col d'Erin had been an ordinary pilgrim's route from Zermatt to Evolena.

Mr. MURRAY BROWNE, adverting to the recent very great diminution of glaciers in the Alps mentioned by Mr. Tuckett, stated that a similar diminution had taken place of late years in many of the Norwegian glaciers.

March 5.—Mr. W. LONGMAN, *President, in the Chair.*

The following gentlemen were balloted for, and elected Members of the Club—viz., Col. H. E. Longden, Messrs. Albert Bankes, E. A. Ford, H. Malan, and W. Simpson.

Revised statements of account for the year 1871 were submitted in substitution for those passed on January 30, and, after some discussion, were adopted.

Mr. STEPHEN proposed, and Mr. MARSHALL HALL seconded: 'That the Committee be requested to consider the propriety of inviting the Swiss, Austrian, German, and Italian Alpine Clubs to hold a meeting, in conjunction with this Club, in some part of the Alps, during the ensuing summer, and that they be empowered to communicate with those Clubs, and to take such steps as may be necessary in order to arrange such a meeting.'

Messrs. D. Freshfield, Wallroth, Moore, Hinchliff, F. Barlow, Sheppard, Macdonald, Whympier, and Longman spoke. It was generally considered that there were serious difficulties in the way of this Club undertaking to organise such a meeting. The distance of Switzerland, the various times of year at which Members take their holidays, and the various and widely separated districts they frequent, were urged as reasons why it would be impossible to secure beforehand such an attendance as would justify this Club in taking the lead in, and rendering itself responsible for, the arrangements of the proposed meeting. At the same time several Members expressed their sense of the advantages to be gained by rendering more intimate the relations already existing between the English and foreign Alpine Clubs, and the pleasure it would give them to have an opportunity of meeting the many distinguished men the latter number among their ranks. Mr. Stephen having replied, and a motion for the adjournment of the debate having been put and negatived, the motion referring the matter to the Committee was agreed to.

The following alterations in the Rules of the Club were proposed and agreed to by the requisite two-thirds majority in each case, viz. :—

Rule VI. : after the words 'A General Meeting of the Club shall also be annually held in,' to read 'January or February, for passing accounts and for general business.'

Rule X. : that the first part of the Rule stand as follows :—'The Members of the Club shall dine together once in every year, on a day to be fixed by the Committee. Except under special circumstances, the dinner shall take place in December. The cost of the dinner, inclusive of wine, shall not exceed one guinea a head. Every member shall be at liberty to introduce friends at the dinner, at his own expense.'

In the second part of the Rule, after the word 'friend,' to insert 'or friends.'

That the following words be added to the Rule :—'A dinner of the Club shall also take place in May or June of each year, provided that

not fewer than twenty members shall, on or before the 20th May, signify to the Committee, in writing, their intention of attending such dinner, if held.'

Rule XV. : to add the words 'or receive the Club publications.'

Rule XVII. : that the Rule stand as follows :—'Any member, elected prior to the 1st January, 1872, who may be absent from England during the whole period for which the annual subscription is payable, may be exempt from subscription during such absence, but, while so exempt, he shall not receive the Club publications.'

Some discussion took place with reference to the unsatisfactory state of the Library, and the possibility of making it more easily accessible to members; but, there being no motion before the meeting, the subject dropped.

Mr. FOSTER's paper on the 'Ascent of Mont Colon' was postponed.

April 9.—Mr. W. LONGMAN, *President, in the Chair.*

Mr. C. T. Dent was balloted for, and elected a Member of the Club.

The PRESIDENT called attention to a project which had been brought to his notice by Mr. Whymper, for the construction of a path up the Grand Tournalin, a mountain 11,000 feet high, in the Val Tournanche. It had not been thought proper to make a grant towards the expenses out of the Club funds, but he considered that the project was worthy of support from individual members.

Mr. WHYMPER pointed out the extremely favourable position of the Grand Tournalin for a panoramic view of the Monte Rosa chain, and the importance of the proposed path, not only to tourists, but for scientific purposes. In consequence of the poverty of the Val Tournanche, the plan could not be carried out without external aid. He himself was about to leave England, but the Secretary of the Club would receive any sums which gentlemen might be disposed to contribute, and transmit them to the proper quarter.

Mr. NICHOLS, on the part of Herr Petermann, presented to the Club a photograph by Lieut. Payer of a portion of the interior of Greenland, including the lately-discovered Petermann-Spitze.

Mr. WHYMPER gave some interesting details of the proceedings of the German Arctic Exploring Expedition, and the PRESIDENT made some observations on the reported remarkable effect on the vegetation of the perpetual daylight within the Arctic Circle.

Mr. G. E. FOSTER read the paper on the 'Ascent of Mount Colon,' which appears in our present number, at the conclusion of which

Mr. HAMILTON mentioned that a new inn would this season be opened at Arolla, and drew attention to the great variety of expeditions which can be made from that place.

A vote of thanks to Mr. FOSTER was carried unanimously.

INDEX.

- AAR**
- AARDAL**, 57
Accidents in the Alps in 1871, 372
Adamello, ascended, 187
Aeschinen See, in winter, 63
Aiguilles d'Arve, Col des, crossed, 128
Ailetroide, ascended, 133
Alpine Bibliography, 375-383
Alpine Club, proceedings of the, 386, 396. New members elected, 396, 396. New officers elected, 336. Winter dinner of, 396. Rules of, altered, 397
Alpine Club, Italian, the, 269, 374. Meeting of, at Agordo, 269
Alpine dangers, 288
Alps, the, in winter, 62-76. Panorama of from Turin, 269. Consumption in, 271
Andes, the, 248
Aragon, adventure with brigands in, 247.
Araucar, 387
Arctic forms of vegetation, retreat of, 85
Arolla, inn at, 316, 390
Asinella Val, 282
Avalanche on the Eiger, 342. Etymology of the word, 346-349
Aussee, climate of, 272
- BALÁÏTOUS**, 242
Bathorn, in winter, 66
Barometrical stations, establishment of, 269
Baumann, the guide, 351-357
Beane, Mr. J., death of, 189, 196. Diary of, 197
Bedole, Maiga of, 186
Bellingham Bay, 357
Bennen, merits of, 333-336
Berlepsch on avalanches, 349
Bertol, Col de, crossed, 316
Beyers, Val, tour of, 283
Bies Joch, crossed, 306. Lake on the, 135
Bies Glacier, the, 307
Bietschhorn, ascended, 277
Bodily temperature, effect of exercise upon, 212-218
Bojumsdal, 56
Böverdial, 154
Bormio, notes on the botany of, 177-185
Bossone Glacier, in winter, 72
Bowfell, winter ascent of, 35
Breithorn, ascended from the north, 44
Brenta Alta, the, 254
Brenva Glacier, 281. Ascent of Mont Bianco from, 136
Brönseund, 51
Budir, 88
- CAMPIGNO, la Madonna di**, 257
Camuzzi, Bocca del, 254
Caneriz, 136
Carrel, Chanoine, memoir of, 270
Carrel's, Jean Antoine, knowledge of the Matterhorn, 334
Castrozza, San Martino di, 112
Caucasian exploration, 376
Cedeh, Passo di, crossed, 265
Ceresole, 176
Chardomet, Col du, crossed, 295
Chester, Mr., death of, 24
Chimborazo, 243
Cima Tosa, ascent of the, 253
Clemenz, Mons., inquiry held by, 32
Cinozza, Val, 208
Cocagna, the, 175
Coimbra, 123
Col 'dit infranchissable,' crossed, 277-279
Colon, Col du, crossed, 336
Curbassière Glacier, the, 311
Cotieilla, the, ascent of, 247
Crosso, Rev. R., death of, 372
Cret, Col du, 312
Crozetta, Col della, crossed, 176
- DALCON**, Val, 258
Dauphiné, 123-135
Davos, 376
Dent Blanche, ascended, 277
Dent du Géant, the, 304
Diavel, Val del, 203. Passo del, 204
Dimaro, 249
Disgrazia, Monte della, 46-48, 284
Dixon's 'The Switzers' reviewed, 384
Dolomites, Swiss, 200-211. Of Val Rendena, the, 249-259
Durand, Col, crossed, 321
- ÉCRINS**, Pointe des, ascent of, 132
Eiger, ascent of, 277. Avalanche on the, 342
Eiger Joch, crossed, 276
Eiterwater, 34
Engadine, the, 396
English lakes in winter, 34-38
Engstligen Grat, the, 67
Essefjord, 53
Estrella, Serra de, 122-128. Villages of, 194
- FERNES**, Alpine, 103
Fiera, Val, 204
Fjorland, 53-57
Flora of the Diablerets, 106. Of Grindelwald, 107. Of the Faulhorn, 108. The Mannlichen, 109. The Riffelberg, 109. Of Fontresina, 110. Of Monte Fraele, 184
Flowers, Alpine, 97-111. Robinson's work on, 99. Cultivation of, 160
Fluh Pass, crossed, 144
Forclaz, in winter, 68
Forno, Val, 176
Fradusta, Cima di, ascended, 119
Frans Josef's furd, 268
Fuschhorn, ascended, 276
- GABELHORN**, ascended, 314
Gelschet on avalanches, 349
Gavia Pass, flora of the, 181
Gelle, 88
Gemmi Pass, the in winter, 65
Girdlestone, Rev. A. G., his 'Mountaineering without Guides,' 93. Escapes of, 94. Net result of experiences of, 95
Glacial period, the, 83
Glitter, falls of the, 166
Glitterkind, ascent of, 155
Gobi, desert of, 245
Graian Alps, the, 171-177. Model of the, 375
Grancron, Col de, crossed, 174
Grand Cornier, Col du, crossed, 350
Grand Mulets, in winter, 73
Grand Tournath, the, 398
Gran Sasso d'Italia, the, 375
Great End, accident on, 86
Greenland, 1-23. History of, 2. Physical features of, 6. Seal fishery, 12. Shark-fishing, 14. Tools and weapons, 16. Government of, 20
Greenlanders, their dress, 7. Kayaks, 9. Houses, 15. Language, 22
Grivola, ascent of the, 172
Guides, qualities of, 86; training of 91. Norwegian, 170. Chamouni, 190-199, 298
Güssfeldt, Dr. Paul, corrected, 378
- HANS, EGGEDE**, 5
Heights, determination of, by the thermo-barometer, 218-230
High level route, the variations on, 309-329
Himalayas, sunsets in the, 243
- ISCHL**, climate of, 273
- JOSTEDALSBRÆE**, 55
Jungfrau, early ascent of, 374. Ascended, 277

KING'S, Mr. C., 'Mountain-
eering in the Sierra Nevada'
reviewed, 389-396
Kirken, the, 161
Koldewey, Captain, Arctic ex-
plorations of, 266-267
Kronig, Johann, 23-24

LA CAILLE, bridge of, 74
Langdale Pikes in winter, 35
Lanzo, 177
La Salle, ascended, 276-328
Lean Pitcher, the, ascended, 127
L'Évêque, height of, 361
Liaphey Alp, 327
Lion, Col du, 321
Littre, on avalanches, 349
Livigno, Val, 305
Loppé, Mems., 295
Lummi, voyage up the, 358
Lys Joch, the, in 1820, 137
Lyakam, fatal accident on, 23-34

MAIGNA, COL DE LA, 326
Maison Blanche, Col de la,
crossed, 310
Manteigas, 125
Mare Pizzo, della, ascended, 285
Marocaro, Bochetta di, crossed,
187
Martignare, Col de, crossed, 129
Martin, J., the guide, 371
Matterhorn ascended, 277. An
ascent of from the south, 259-
268. Snowstorm on the, 265.
Professor Tyndall's attempt on
the, in 1862, 329-335
Meije, ascent of second peak of, 130
Michelet's 'The Mountain,' re-
viewed,
Midi, Aiguille du, ascended, 44,
145-154. Hut near, 233. Stone
avalanche on, 161
Montanvert, in winter, 70
Mont Blanc, fatal accident on,
188-190, 192-199. Storm on,
195. By Balloon, 377
Mont Blanc, round, 289-305
Mont Brulé, Col du, crossed, 275-
325
Mont Fleuri, 293
Mont Mallet, ascended, 296
Mont Pleureur, ascended, 276, 329
Monvoisin, Inn at, 311
Morkfos, the, 57-62
Moseley, Canon's, Observations on
Mr. Matthew's theory of glacier
motion, 40-43
Mount Baker, approaches to, 357.
Ascent of, 365. Height of, 366
Mount Shasta, ascended, 394
Mount Tyndall, ascended, 391
Mount Whitney, ascended, 394
Mountains and Mountaineering
in general, 241-248. Without
guides, dangers of, 89
Mountet, Pointe de, ascended, 275
Mundal, 54
Muschem, Val, 280

NORWAY, excursions in, 49-
62. Avalanches in, 55.
Farmhouses in, 59. Roads in, 60

KIN

ORB

EUP

O BELISK, the, ascended, 394
Orteler, ascent of the, 285
Orteler group, the, 284

PACIFIC, mountaineering on
the, 357-367
Pala, Cimón della, ascended, 111-
121
Palu Glacier, the, 281
Paneveggió, 114
Papaver Alpinum, the, 76-86
Payer, J., Arctic discoveries of, 268
Pelvoux, ascended, 134
Petermann Spitze, 268
Pierre Pointue 71
Pigne d'Arolla, ascended, 317
Pinzolo, situation of, 255. Bona-
pace's Inn at, 256
Pisoch Pix, ascended, 282
Pioda, Forala di, 48
Pix d'Aela, 205
Pix, St. Michael, 206
Pix Tschierva, accident on, 372
Plattenhörner, winter ascent of,
65
Platel, Desert de, 291
Poppy, the fine-leaved, 78. The
broad-leaved, 79. The small-
flowered, 80.
Porters, qualities of, 350, 371
Portetta Pass, the, 291
Pra Fiori, Pass of the, 258
Pravitalo, Val, 118
Pressanella, the, 257
Pyrenees, the, 244

QUATERVALS, PIZ, ascended,
279

RACE, a, for life, 337-346
Radde, Herr, 376
Riffelhorn, the, 376
Riva, 259
Rommehest, 54
Roeg, Piz, first ascent of, 373
Rosheim, 154
Rothstock, the, 340
Ruinetze, the, 318

SAN JUAN, island, 358
San Martino, Palle di, 218
Santa Catarina, 285. Flora of, 180
Sarca, gorge of the, 258
Savien Thal, 202
Scheuchzer, on avalanches, 347
Schula, 282
Serpentine, Col de la, crossed, 319
Schwarenbech, in winter, 63
Sesia-Joch, crossed, from Zermatt
to Alagna, 143, 367
Sierra Nevada, the, 389-395
Silberhorn, ascended, 277
Simler on avalanches, 346
Snafell, Jökull, ascended, 38-40
Sobretta, Monte, flora of, 182
Sognefjord, 53
Sonadon, Col du, 310
Stencio, 258
Stappen, 38
St. Gervais, 290
St. Gertrud, 285
St. Moritz, moss flora of, 273
St. Romao, 125

Stockhorn, accident on, 37
Suphelledal, 54
Switzerland, geological map of, 191
Syber-Gysl, Herr, erroneous state-
ments of, 46

TALÉFÈRE, Col de, crossed, 135
Tantermnozsa, Val, 280
Tarasp, 281
Taugwald, Johann, conduct of,
23-34
Teresenga, Val, 253
Thermometer, 221. Apparatus
for boiling, 226
Tiefenmatten Joch, crossed, 275,
321
Tinzehorn, ascended, 207-210
Tinzehorn, crossed, 211, 284
Torgbatten, 49. Natural tunnel
in, 52
Tour, Col du, 295
Tour, Ronde, ascended, 232. Col
de la, crossed, 280-284
Travellers and guides, compari-
tive skill of, 87-95. Discussion
on, 96
Trelatete, Aiguille de, ascended, 147
Trondjemafjord, 49
Tyndall's 'Hours of Exercise in
the Alps,' reviewed, 285-288.
Attempt on the Matterhorn in
1862, 329-335

ULEDAL PASS, crossed, 161
Uledalstind, ascended, 163
Ulittidal, 59

VAL D'HÉRÉMENCE, 326
Valloires, Col de, crossed, 128
Valnonte, Combe de, 173
Varens, Aiguille de, 291
Vavesey, Col de, 328
Vege, 51
Veitestrand, 57
Vette, 60
Vezzana, Cima di, 117
Vienna, climate of, 271
Vignemale, ascended, 246
Visdai, 160
Vulbez Glacier, 351
Vulpera, 282

WEISSHORN, the, ascended
from the north, 274, 277,
305-309
Wetherlamn, 35
Whymper's, Mr. Edward 'Scram-
bles among the Alps,' reviewed,
234-240. Decorated by the
King of Italy, 375
Winter Joch, crossed, 243
Winter, the, of 1871-73, 375

YOSEMITE valley, the, 891

ZERNETZ, 202
Zinariellen, 316
Zmutt Glacier, the, 320
Zrnstein Spitze, ascended, 141
Zuort, Val, 283
Zupo Pass, ascended, 280
Zupo Pass, crossed, 280



