

Grindelwald, in 1875, the inhabitants certainly held that the glaciers, like streams in England, belonged to the owners of the adjacent land, each owner claiming up to the middle line of the glacier opposite his land; and tolls were demanded and taken accordingly. Moreover, Signor A. Grober of Varallo, in an elaborate discussion in the '*Bollettino del Club Alpino Italiano*,' vol. x. p. 1, maintains that in Italy, the Code of which seems very similar to the Swiss codes, the glaciers do not necessarily belong to the State. He says that some Italian jurists are of opinion that glaciers do belong to the State; others consider that they belong to the commune or parish; and others consider that they may be private property. Signor Grober comes to the conclusion that, by analogy to streams of water, large glaciers, like navigable rivers and large lakes, belong to the State; but small glaciers, like rivulets and ponds or small lakes, belong to the owners of the surrounding land. He founds his conclusion on the 427th article of the Civil Code of Italy which declares that rivers and torrents form part of the public domain, but he maintains that this law is not and cannot be applicable to small brooks and ponds.

As to the soil beneath the glaciers. Signor Grober is of opinion that it must follow the law as to rivers, which he states to be—though it does not seem quite certain—that the soil belongs to the owners of the adjoining land, as is the law in England. In France the right seems very doubtful. By Art. 538 of the Code Civil '*les fleuves et rivières navigables ou flottables sont considérés comme des dépendances du domaine public.*' This, I am told, has been held to make the bed of a navigable river the property of the State; but as to smaller streams, the Code being silent, the right has never been determined. The question has usually arisen as to the right to take gravel for the repair of the roads, which is sometimes claimed by the officials of the Government and disputed by the commune or the owners of the adjoining land. Such a dispute was in 1875 going on at the town of Gebweiler in Alsace. Signor Grober further argues that as the adjoining land is subject to be destroyed by the advance of a glacier, it is but fair that the owner should have the benefit of a retreat. He also argues that nothing else can be done with a moraine left by the glaciers and gradually covered with herbage; and he comes to the conclusion that, according to the law of Italy, the bed of the glacier, covered or uncovered, belongs to the owners of the adjoining land.

As the question of ownership has been under discussion for certainly twelve years, it seems odd that it has never been formally raised and decided, or at least had not been raised and decided up to the early part of the year 1876, when Signor Grober wrote on the subject.

ALPINE NOTES.

PRIMIERO.—Mr. A. de Falkner writes, with reference to his recent note (p. 162): 'My authority for writing Comelle instead of Cornelle is simply that of the people of Gares, where the name is so spelt, and is confirmed by Count Manzoni, who possesses some woods leading to the

pass. It has not, however, so far as I know, any meaning. In remote times, when the mines were worked, it is more than probable that the pass was frequented, as charcoal had to be brought down to Gares from the S. Martino woods. It will perhaps interest you to know that two years ago, as I was crossing the Comelle Pass, I found near the top, rather to my astonishment, some pieces of slack (scoriae). I was afterwards told that miners from Primiero were supposed to have gone to the plateau to smelt stolen silver minerals. Mr. Tucker proposed to give the name of Passo di Ball to the passage between the Cima di Ball and the southern side of the Palle di S. Martino, but it has already a local name, *Rodera*, as well as the gorge that leads to it.

'The spelling of *Pravitali* ought also to be corrected into *Pra Didi* (Il prato di Dali). My authority for this alteration is Count Welsperg, whose property lies up there.'

A summary of Mr. de Falkner's and Signor C. Tomè's brilliant campaign in the western dolomites is given in a pamphlet (*Adunanza generale straordinaria del 3 Settembre 1875, nella Valle di Gares*), recently published at Belluno. The *third* ascent of the Rothewand (Rosengarten) is mentioned. Who made the first? [See Mr. Tucker's paper in '*Alpine Journal*,' vol. vi. p. 362.] The bulk of the pamphlet is formed by an historical sketch of the Canale d'Agordo. The valley is first mentioned in a bull of Lucius III. given at Verona in 1184, which assigns '*Plebem de Agorde cum capellis suis, capellam de Alegne, capellam Sancti Simonis Canalis de supra*,' &c., &c., to the Bishops of Belluno. The simple meanings of most of the village names in this district are pointed out. The following note must be quoted. 'The word *Pala* is written with one *l* because it is not derived from "*palla*," but rather from the root "*palo*," whence *pala da fuoco* and *da forno, palata, palancola*, &c. *Pala* applied to part of a range in our vulgar dialect indicates either a very steep pasturage, or the abrupt flanks and smooth, almost perpendicular, cliffs of a mountain, whence the names "*Pala di San Martino*," "*Cimone della Pala*," and many others.' The heights here given for the two chief Primiero peaks are C. della Pala 3,343 mètres (10,968 feet), and C. della Vezzana 3,317 mètres (10,882 feet), and seem likely to be correct.*

* The reduction on p. 115 of the height of the Pala is incorrect. 3,300 mètres = 10,827 feet. The heights given on the New Austrian Maps for the C. della Pala and Vezzana are respectively 10,564 and 10,261 English feet. One of them must be wrong, inasmuch as the difference between the peaks is certainly not more than 100 feet. '*Palla*' is the spelling used. In the same sheet the Rosengarten range is thus treated. The Kessel Kogel is given a height of 9,783 feet. Next to this comes a nameless summit occupying the position of the Federer Kogel, in reality the highest of the group—marked as 16 feet lower than the Kes-el Kogel. It would not be difficult to multiply instances of blunders of this sort. But we do not desire to do more than justify the statement that, as regards heights and nomenclature, these maps do not seem to be founded on accurate observations and researches, and cannot claim any confidence. Unfortunately it is not only in Italian districts, where the engineers have the partial excuse of a foreign tongue, that these criticisms apply. For remarks on the sheets containing the Gross Glockner and Venediger groups see an article (*Studien über die Spezialkarte der österreichisch-ungarischen Monarchie, von Professor Richter, in Salzburg*) in the *Zeitschrift of the German and Austrian Alpine Club*, Heft i., 1877.—Ed.

AN ASCENT OF POPOCATEPETL.—Herr von Thielmann, of the German Embassy at Washington, well known as the author of an instructive work on the Caucasus, sends the following account of an ascent of this Mexican volcano, already mentioned in the 'Alpine Journal,' vol. iv. p. 234:—

The travellers left Mexico on Monday, February 21, and slept at Amecameca, where Signor Nonega hospitably received them and provided them with many of the necessaries for the expedition. The road as it ascends from Amecameca to the saddle between Popocatepetl and Iztaccihuatl, commands a beautiful view. Pleasant, too, was the ride through the noble pine-forest which clothes the base of the mountain. Despite the early season the underwood was already in blossom. In 3 hrs. the road to Puebla was left, and a narrow horse-path through pine-woods, where the absence of underwood and the stunted growth of the stems showed the increase of elevation, was followed to the Rancho of General Sanchez, Ochoa, lying at the base of the cone of Popocatepetl, about 12,000 (German) feet above the sea. The premises consisted only of a shed, in which the sulphur got from the crater of the volcano is melted into masses, another smaller shed to shelter the labourers (entirely Indian), and a hut divided into partitions which serves as the overseer's dwelling. Room to lie down and a friendly welcome, but nothing beyond, was found here. The peak of Orizava was finely seen lit up by sunset hues.

At 4.30 the next morning (the 23rd) the ascent was commenced. The first 100 feet could be ridden, although the fine volcanic arches with which the sides of the volcano are strewn made the work very severe for the animals, which were quite exhausted before the cross erected on a lava block, which marks the end of the path, was reached. The day was tolerably fine, the air fresh, the peak entirely free from clouds, as was also its neighbour Iztaccihuatl, and the far-off Orizava. The valleys were full of white clouds as the sun rose: the picture was a noble one, the dome of Popocatepetl shone in the purest white, and the two other peaks rose like islands from the sea of white mist.

The real climb now began. A small field of ashes had to be crossed; then came the snow slope which, with a uniform slope of somewhat less than 40°, leads to the summit. The condition of the snow was favourable, only in a few places an icy crust made the want of ice-axes felt; elsewhere nailed boots sufficed to give firm footing; the two guides and the Indians climbed quickly and surely on their sandals, for the snow had been ruffled by wind and slight inequalities gave fair footing. Where this help is not found the nailed mountain boot is far preferable. The ascent as far as the edge of the crater was somewhat monotonous, and took the travellers, who, although both experienced in Alpine climbing, had had no training in the preceding months, only 3 hrs. At nine o'clock the brink of the crater was reached, whence they looked into the terrible abyss, whose gold-grey walls rose perpendicularly 2,000 feet out of the depths. The scene had something overpoweringly awful, of which no picture or description can give any idea. The steam ascending from the sulphurous depths, the peculiar mixture of sulphur-gold and ash-grey in the crater, the dazzling white snow on the edge of the cliffs, and the deep blue sky overhead, combined to pro-

duce effects of light and shade which must be seen to be believed in. The travellers halted here but a short time, so as to set about at once the ascent of the summit. The guides at first made difficulties, alleging dangerous places and the state of the snow, which they gave up when they found the travellers prepared to go on without them. The work did not prove serious; ascending along the edge of the crater, climbing sometimes on the boulders, sometimes up the steep snowbanks by their side, the peak was gained in $1\frac{1}{4}$ hr. No dangerous places were encountered: still a steady head and a thoroughly sure foot were often desirable. The top itself consists of a gently curved snow ridge whose highest point is only some 30 feet distant from the edge of the perpendicular crater wall. The snow slopes round have been ploughed up by the stormwinds which rage round the peak into furrows 5 feet deep—a phenomenon nowhere seen to such an extent in the Alps, and here doubtless due to the isolation of the mountain and its exposure to every blast. For the moment, except for a few passing breezes, the air was perfectly still, and at 17,884 feet so warm and heavy that the travellers halted for $\frac{3}{4}$ hr., and took in at leisure the wonderful panorama.

Over the valley of Mexico clouds still hung, hiding all but the peak of Toluca; on the east the mists had parted and gave many beautiful glimpses towards Puebla. The south was entirely clear, and the mountains and valleys of the Terra Caliente stretched into an illimitable distance.

To their pleasant surprise, the travellers, while on the peak, were entirely free from all the unpleasant effects wont to be ascribed to the rarity of the atmosphere; neither giddiness, sickness, difficulty of breathing, swimming of the eyes, nor rush of blood to the head was felt. Only on beginning the descent did unusual indisposition and dull headaches make themselves perceived. At the edge of the crater breakfast was taken. The descent into the crater was given up on account of the gathering clouds and the noxious sulphur fumes. Moreover, from their halting-place the travellers had had a complete view of it. A sort of sledge, in which sulphur collected in the crater is brought down, makes the journey from the crater's edge to the lower limit of the snow. On this the travellers, each sitting behind a guide on a straw mat, were carried down with the speed of the wind to the valley. In little more than 15 min. some 2,500 feet of absolute height had been left behind. In another hour the Rancho was regained.

THE EFFECT OF A RAREFIED ATMOSPHERE ON CLIMBERS.—The following note has been received from Mr. L. Stephen:—I observe that in the last number of the 'Alpine Journal,' Mr. Gotch refers to the difficulty of muscular exertion in rarefied air. He says that although accurate calculation is difficult, he could not find any appreciable difference between the exertion required for jumping over a stick on the top of Mont Blanc and performing the same feat in Chamoniix. Nobody will deny that the early accounts of mountain adventure greatly exaggerated the effects of the rarefaction of the atmosphere, and good mountaineers may be apt to agree with Mr. Gotch in denying that any appreciable effect is produced. On the other hand, it is plain that there must be a limit

to human adaptability in this direction. Long before we had reached the height attained in some balloon ascents we should find exertion difficult, for at these heights the smallest exertion seems to have become impossible. I fancy, therefore, that even at the height of Mont Blanc a difference might be recognised by modes of observation more delicate than that employed by Mr. Gotch. Though I have never tried any experiments, I have certainly suspected in my own case that exercise was perceptibly more tiring at considerable elevations. Such vague impressions go for very little, and I wish to suggest that some more accurate observation might really be of interest. I will give one instance which may possibly prompt further enquiry.

The height of Chamonix above the sea level is 3,425 feet. The height of the Grands Mulets is 10,013 feet, and that of Mont Blanc 15,784. The height, therefore, of the Grands Mulets above Chamonix is 6,588 feet, and of Mont Blanc above the Grands Mulets 5,771 feet. There is a nearly flat walk of more than half an hour from Chamonix to the chalet of the Pélérins, where the ascent begins. The horizontal distance from the chalet to the Grands Mulets is almost exactly equal to that from the Grands Mulets to the summit. Supposing, therefore, that the nature of the ground were the same throughout, and the exertion equally trying at all altitudes, the time occupied in the second part of the route should be materially less than that occupied in the first part. Now, in my last ascent of Mont Blanc, I remember that the Grands Mulets hut was reached in less than 4 hrs.; I think 3 hrs. 45 min. This did not involve fast walking, as the guides had weights to carry; and I fancy that the average time under favourable circumstances would very little exceed 4 hrs., or $3\frac{1}{2}$ hrs. from the Pélérins chalet. I cannot say what is the average time from the hut to the top of the mountain. The quickest time recorded in the book at the Grands Mulets was, I believe, $4\frac{1}{4}$ hrs. Generally, of course, it is much more. Taking 5 hrs., however, as the time, it would follow that the rate of climbing between the Pélérins and the Grands Mulets is over 1,800 feet in an hour, and the rate in the higher section about 1,150 feet an hour. The question remains whether the greater rapidity in the lower region is to be attributed to the nature of the ground, or to the difference in the atmosphere. When the snow is in thoroughly good order, when traces have been made and steps cut, and when the weather is thoroughly fine, I do not see why snow slopes of moderate inclination should not be traversed quite as rapidly as the zigzag paths below; and it is only when such favourable conditions are secured that the time at all approximates to that which I have mentioned. I would therefore suggest that there is a *prima facie* presumption that climbing is more laborious at the greater height. I cannot at this moment think of any other mountain in which the conditions admit of so easy a comparison, nor have I the necessary data at hand. I merely throw out the hint that it might be easy to discover places where the average or maximum rapidity of ascent in two similar inclinations at different altitudes might be accurately compared. Such observations would throw some light upon a rather curious question; but I must leave them to better qualified travellers.—L. STEPHEN.

Modern climbers who have ventured to question for how much of the bodily discomforts, often felt on the High Alps, the rarity of the air is primarily responsible, have been sometimes spoken of as if they were rash sceptics who ventured to controvert the weight of the universal authority of the Fathers of Mountaineering. This is far from being the case. No one has spoken more strongly on this subject than one of those Fathers, Herr Meyer, in 1813. 'Vieles, was man der Reinheit der Luft zuschrieb, mag gar oft nur Wirkung der Aengstlichkeit bei dem Anblick möglicher Gefahren gewesen sei, verbunden mit erhöhter Anstrengung, welche sehr natürlich eine schnellere Erschöpfung herbei führt.' M. Desor, in his chapter on the Lauteraarhorn, writes in a similar strain of the 'prétendus inconvénients' of the upper air.

There are two questions. At what height will a man in sound physical condition and good mountain training find the rarity of the air an insuperable obstacle to uphill work? So far as we know, the answer obtained in the Himalaya is at between 22,000 and 23,000 feet. The second question is less easy to answer offhand. At what height will the bodily powers of the same climber be affected *in any way* by the condition of the atmosphere? That they are, as Mr. Stephen suggests, to some extent affected even on European mountains, is most probable. But that a sound subject suffers no perceptible (in the unscientific sense) inconvenience, beyond possibly a diminution in speed, has been again and again proved. Experiments, to be of any value, should be made on such a subject. That mountain air, like sea air, will produce nausea, headaches, palpitations, giddiness, or any other symptoms on deranged or abnormal constitutions, requires no proof. Sensations in which the external condition plays only a very small part, vary with each individual, and have very little general interest.

I hope Mr. Stephen's note will induce one of our medical members to take up the subject. Among the numerous observations of early climbers (probably for the most part of small practical value, compared with fresh experiments of which all the conditions can be clearly set out), the report of M. de Khanikoff on 3 days' residence at the top of Ararat (17,000 feet), communicated to the Royal Association in or about 1850, might profitably be consulted. A discussion of the subject, with some useful references, will also be found (p. 226) in M. Durier's recent work on Mont Blanc. The following hint from Meyer is, perhaps, worth consideration:—'The action of the air will necessarily differ according to its greater or less dryness. It will not be the same in damp and cloudy as on clear and sunny days.'

On one point I differ slightly from Mr. Stephen. I do not think we ought to assume that height is gained on snow slopes of moderate inclination and in good order as rapidly as on a zigzag path or easy rocks. My recollections and notes, so far as they go, make me disposed to believe that uphill progress is always slower on snow than on solid ground: e.g. that a man placed 500 feet below the Col du Géant on the S. side would get to the top before another placed at an equal distance on the N. side. I do not think it would be difficult to find reasons for such a result. By experiments on mountains of moderate height

this source of error may be eliminated, and the residuum of delay caused by the atmosphere set down with some approach to accuracy. I entirely agree that there is such a residuum, and that it is a considerable one. I may add one fact. The last 2,500 feet of Elbruz (16,000 to 18,500 feet), up easy rocks, took 3 hrs.—EDITOR.

HÖHBALM, ZERMATT.—It is not mentioned in Guide Books, or generally known among visitors to Zermatt, that a point of view, equal, if not superior, to the Gornergrat, rises immediately above the village.

Follow the path up the Trift torrent, cross the bridge, and you will discover a rough path leading you up into the woods above the right bank of the stream. Pursue this on to the hillside, and you will find yourself above the precipices and rising obliquely till the path ceases its upward course, and invites you to select your own way among the alternate terraces of grass and rock that rise gently above you. Make a note of the point where you leave the path, and stroll upwards at will, more and more enchanted by views which on a sunny day will not fail to surprise you into admiration. A quiet three hours' walk from the hotel will land you on the summit, an open undulating plateau, about 3,500 ft. above the village, forming the end of the promontory which descends from the Unter Gabelhorn, where you may roll or ramble at pleasure, and over your lunch drink in to your heart's content beauties of nature remarkable even in Switzerland. The Monte Rosa chain is in full loveliness, more interesting in shape than from the too near Gornergrat, and with the advantage of the Riffelberg as a contrasting middle ground. To compensate for the loss of the upper Gorner Glacier you have the sparkling icefall and the deep richness of the valley. True, the Weisshorn is hidden, but the Gabelhorn and Rothhorn have gained incomparably by proximity, and form a back-ground to the broad Trift Glacier, the majestic nature of which is entirely lost from the more pretentious Gornergrat. As to the Matterhorn, his aspect is no less striking than novel.

In returning, if you wish to vary your route, you may either wander on aloft till you look down on the Zmutt Glacier, or descend obliquely in that direction, till you find *châlet* paths, which will eventually lead you down to Zermatt by a different route; or, if more adventurous, may, the present writer believes, strike down to the Trift Glacier, a short way below, and gain the torrent.

Now, we have all mourned over M. Seiler's imminent loss of the Riffel Hotel, and the necessity under which he lies of building a new hotel on the Riffelberg. Why should not our estimable host spend a little money on the path to the Hōhbal'm, and divert thither some of the Gornergrat flood? Or, better still, could he get the ground, why should he not build a mountain inn on what is one of the finest sites in the Alps, and so open out the Trift Glacier?

Should he do so, one member of the club, at least, will gladly subscribe to get a monster telescope with which to watch the rebellious rival over the way tumbling to ruin.

A. C.

THE DEATH OF M. CORDIER.—The following account of the sad accident which has lately cost the life of a young and ardent mountaineer, a member both of our own and the French Alpine Club, is condensed

from the 'Impartial Dauphinois' of the 15th June, and from a letter from the Juge de Paix of Bourg d'Oisans, forwarded by M. L. Dècle.

On the 1st of June M. Cordier left Grenoble with Jakob Anderegg and Andreas Maurer. They went up to La Grave, whence after several excursions they crossed to La Bérarde on the 4th. On the 7th they made a successful ascent of the Plaret. The summit was reached at 11 A.M., and the descent successfully accomplished as far as the base of the Glacier du Plaret. 'Here some topographical details become necessary. The Vallée des Étançons which opens at La Bérarde extends from this point towards the Meije in a northerly direction. The spot where the valley bends is dominated on the E. by the Grande Ruine, on the W. by the Glacier du Plaret. This glacier fills a sort of cirque surrounded by the peaks of the Pic sans Nom, the Plaret, and the Tête de la Gondolière. It terminates abruptly on a wall of rocks rounded by its action at a time when it descended further towards the valley. In the centre of these rocks run the meltings of the glacier, the torrent of La Clause' The bed was covered with winter snows, beneath which the waters had worked their passage. M. Cordier and his guides, on quitting the glacier, halted according to the usual custom to take off the rope and eat. The meal finished, M. Cordier set off without waiting for the guides, who were packing up. The slope was at the proper angle for a standing glissade, and M. Cordier glissaded. It appears that one of the guides saw or suspected the hidden danger, and shouted to him to beware; but it was too late, the unfortunate traveller disappeared through a small hole, originally only 10 centimètres in diameter, a break in the snow vault that covered the torrent. The guides at once reached the spot and endeavoured to save their traveller. The direct fall was only 12 feet, but the steepness of the slope and the force of the torrent had carried M. Cordier 40 feet down the channel. Jakob was let down with the rope into the cavern, but he could not reach or find any traces of M. Cordier, and was drawn up again half suffocated. It was not till the next morning, after assistance had been obtained from the valley, that the body was found by digging a trench through the snow below the point at which M. Cordier had fallen into the stream. Death from suffocation must have been almost immediate.

M. Cordier was, like many distinguished mountaineers, extremely short-sighted, and this may have contributed to his fate. But the accident was one which might have happened to the most experienced climber. There are few of us probably who have not at one time or another run a risk of a similar fate. Of course no one should glissade at all on slopes where he cannot turn aside at the slightest indication of danger. But such a rule will never be rigidly observed; and in nine cases out of ten an awkward tumble is the only penalty for its infraction. Poor M. Cordier is no more to be charged with rashness than the man who slips in crossing the Strand and is run over. So far was he from being reckless that he had renounced this year the intention of attacking the Meije. But every year Alpine travellers receive some fresh warning that danger and difficulty are in no way coextensive, and that in the mountains the moments when we are off our guard are often the most fatal. The one satisfactory feature in this

sad story deserves to be noted. The foreign guides suffered in no way from local jealousy, and their conduct received the warmest praise from the French authorities.

Mons. H. Cordier, who was only 21, was a grandson of the geologist of that name and a great-nephew of M. Ramond, and gave promise of future distinction in the high honours he had taken in the *École des Sciences Politiques*. In the Alps he had climbed many of the Dauphiné peaks, and had shared last year in Mr. Middlemore's ascent of the *Aiguille Verte* from *Argentière*. His English friends, by whom he was warmly regarded, desire to join heartily with the French Club in its expressions of regret over their common loss.

FÊTES OF FOREIGN ALPINE CLUBS.—The second congress of the French Club will be held at Grenoble on the 12th August and following days. Special invitations have been courteously sent to many members of the English Club, and it is hoped that we may be represented at a meeting which promises to be very pleasant. The general meeting of the Italian Alpine Club is finally fixed for the 25th August at Auronzo. Another meeting was held at the Little St. Bernard on July 30 and 31, under the presidency of Mr. R. H. Budden. The Swiss Alpine Club met at Glarus on July 21 for a week of feasting and climbing. The German Club meets at Traunstein, in the Bavarian Alps, on August 21.

NOTICES.

A GUIDE-BOOK TO VAL D'AOSTA.*

In nothing has there been a more general advance of late years than in local guide books. It would be easy to spend a page in describing and illustrating the faults of the old school, the distinguishing mark of which was to give the smallest possible amount of information at the largest possible expense of type.

But we must go at once to the Italian work before us. The guide to the Val d'Aosta of M. l'Abbé Gorret and Baron Bich is a closely-bound volume of 400 pages. It is an excellent specimen of the new school, which is practical, intelligent, and thorough. It commences with a series of notices—geological, botanical, historical, philological, commercial—which will have each their interest for some readers. We can only cull a few facts promiscuously from them. There are now five observatories at Ivrea, Aosta, Cogne, the Great and Little St. Bernard, where meteorological observations are regularly taken. A French patois belonging to the *Langue d'oïl* is the native tongue of Val d'Aosta. There is, however, in one of the side valleys, that of Gressoney, an odd invasion of German. Numerous theories have been started to account for this curious colony. One writer maintains that we are in the presence of a tribe of Saxons escaped from Charlemagne, another that the German-speaking villagers are the de-

* *Guide de la Vallée d'Aoste*, par M. l'Abbé Gorret et M. le Baron Bich. Turin, Casanova, 1877. Prix 6 francs.