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CONTRIBUTIONS TO THE TOPOGRAPHY OF THE ORTELER  
AND LOMBARD ALPS. By F. F. TUCKETT, F.R.G.S.

“Der Ortler, aus Granit gewoben,  
Zur Gränzenhut emporgehoben,  
Ragt glorreich allen Nachbarn vor,  
Und trägt aus frommen Hirtenhale  
Des Dankes volle Opferschale  
Zu deinem Thron, o Gott! empor.”

*Beda Weber.*

IT is by no means one of the least of the benefits conferred on the geographer and the mountaineer by the publication of Mr. Ball's admirable 'Guide to the Central Alps,' that in directing attention to the topography and high attractions of the Orteler and Lombard Alps, it has thrown much new light on a district which has hitherto received a very inadequate share of notice. The construction of the great Stelvio road, indeed, familiarised the public with a portion of the country in question, whilst the valuable work of Schaubach ('Die Deutschen Alpen, B. IV. Handbuch für mittlere und südliche Tyrol:' Jena, 1850) afforded much useful information; but curiosity seems to have been limited to the immediate scenery of the pass, and though the summit of the Orteler Spitze itself has during the last sixty years been several times attained, few have cared to push their explorations farther, or to investigate the numerous other peaks which, whilst rivalling it in height, perhaps surpass in beauty the monarch of the group.

Stimulated alike by the charms of novelty and by the glimpses which a passage of the Stelvio last year had given me

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of some of the grandest features of the district, I resolved at the earliest opportunity to devote a few days at least to the more thorough exploration of its recesses; and finding that my inclination was shared by my friends Messrs. E. N. and H. E. Buxton, whom I had arranged to meet at Pontresina about the end of last July, a combined scheme of operations was agreed upon, the results of which I now propose to lay before the readers of this Journal.

In pursuance of our compact, the various members of our band collected on the 25th July at Samaden, whence on the following morning we sallied forth a merry company of ten (five of whom were ladies), to establish ourselves for a week at that pleasantest of headquarters the Krone at Pontresina. Here, amongst other Alpine friends, we found Messrs. Tyndall and Hinchliff, and learnt from the former that Mr. Ball was actually at Santa Catarina in the Val Furva, whither he was himself bound, and that they had designs of a similar character to ours. The chance of obtaining such an accession to our forces at once decided us to cut short our stay in the Engadine; and accordingly, after devoting a couple of days to some new excursions in the Bernina, which previous expeditions had suggested, we reassembled at the comfortable establishment of Le Prese, and thence journeyed on the 29th to Tirano and Bormio. Arrived at the latter place, and hearing discouraging accounts of the chances of accommodation at Santa Catarina, it was thought most prudent for some one to proceed thither at once and ascertain the actual state of affairs. Accordingly, after despatching a hasty dinner, H. E. Buxton and I started at 9.25, in a char, for the Val Furva, whose torrent, the Frodolfo, joins the Adda at Bormio. The night was dark, and as we generally proceeded at a foot-pace it was past midnight when we drove up before a large plain-looking stone building, from whose goodly array of windows, however, many a bright gleam of light shone forth upon the silent valley and sparkled in the swift waters of the Frodolfo. It was a comfort to find a waiter still astir and to learn that, though the entire building was packed to the roof with a dense mass of humanity, something in the shape of beds might and should be improvised for us in the billiard-room. The result was very superior to anything we had a right to calculate upon under the circumstances, whilst we had afterwards the satisfaction of being undeservedly pitied by the other members of our party, amongst whom a legend long gained credit that the billiard-table itself had constituted our couch.

The next morning was everything that could be desired for

a preliminary investigation, and having sent a message to our friends at Bormio and discovered Mr. Ball, a consultation was held as to the first point of attack. He so strongly recommended us to begin with the ascent of the Monte Confinale, and the position of that mountain was so obviously calculated to give us a general insight into the topography of the Orteler chain that we resolved to assault it at once without awaiting the arrival of the main body. Some provisions were therefore hastily collected, and at nine o'clock we set out amidst suppressed excitement on the part of the inmates of the establishment.

Deferring for the present a general notice of the topography of the district, I must here premise that the Confinale is the loftiest point of a spur from the main ridge which, quitting the latter at the S. foot of the Königsspitze, and running for a short distance nearly due S., bends round more and more till it gradually assumes a westerly direction, thus dividing the Val Forno and the middle portion of the Val Furva from the Val del Zebbru, of which latter it constitutes the E. and S. boundary. Though the actual summit is invisible from Santa Catarina itself it dominates the whole neighbourhood, and being equalled in height only by the peaks of the main chain, which sweep round it in a semicircle from the Cristallo to the Corno dei tre Signori, it will be seen at once that no better point could be selected for a general survey.

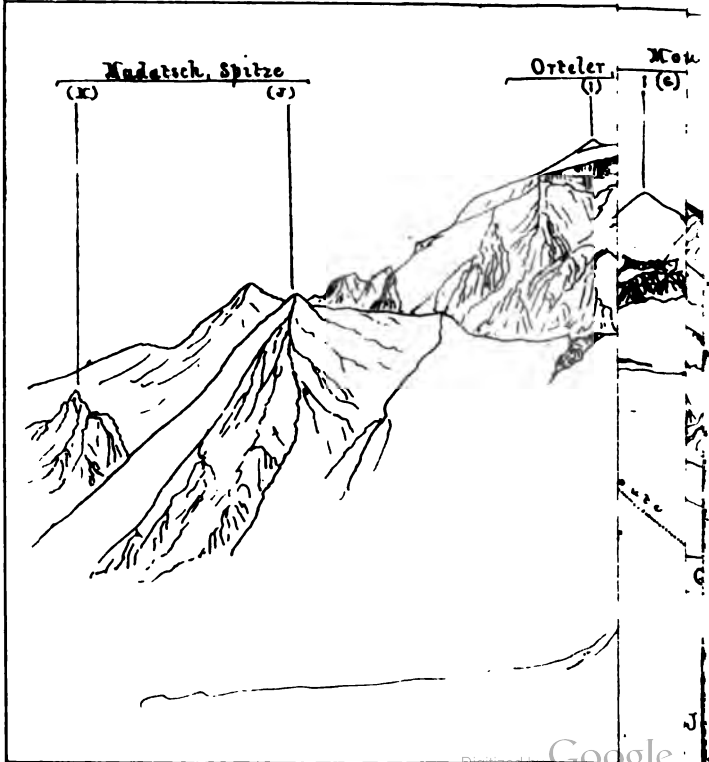
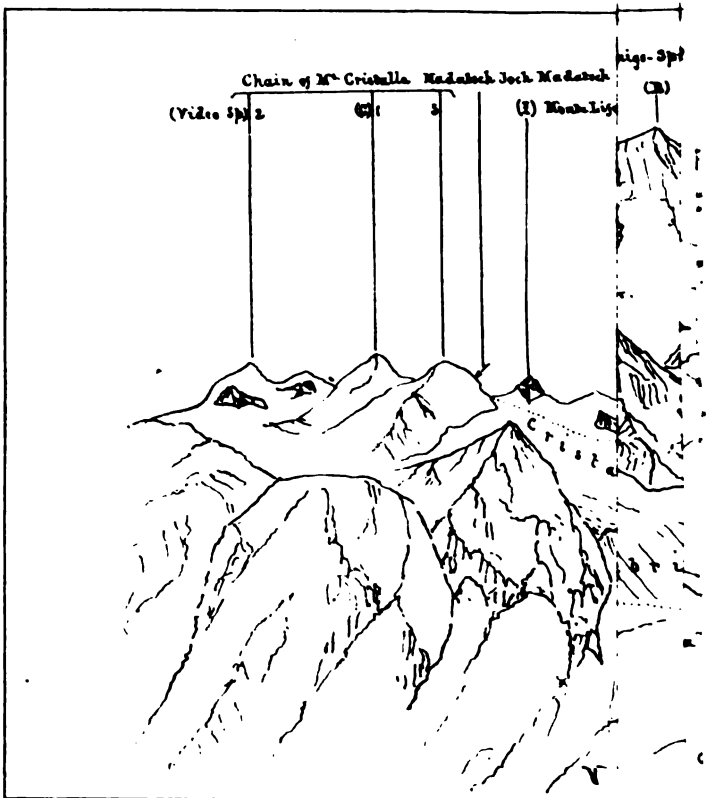
We crossed the Frodolfo by a bridge close to the Stabilimento delle Acque, passed through the little village, and struck up the mountain-side by a path on the left bank of a torrent which comes leaping down in a series of cascades, and is derived from the snows of the Confinale. Traversing a little pinewood we soon came out upon beautiful grassy slopes, commanding views of constantly increasing beauty and extent of the head of the Val Furva and its S. arm leading up to the Gavia Pass, guarded by the noble peaks of the Tresero and Corno dei tre Signori. Comforted by sundry draughts of milk, which the burning heat rendered most acceptable, we held on our way towards a line of cliffs which form the E. boundary of a small elevated valley running right up into the heart of the mountain. Here our course became more level, but our progress was slow, as we had to traverse a succession of slopes of débris descending to the level of the stream, whose right or W. bank would have afforded better walking. Gradually the cliffs circled round in front of us, but were broken by gullies, through one of which we scrambled up, amidst a perfect chaos of fragments of huge size and fantastic arrangement, to the

level of the snowfields above. The actual summit was now seen for the first time, separated from us by the névé of a small glacier which descended to the left of our station in a south-westerly direction. Half an hour's steady but by no means rapid ascent across the snowfield, and then parallel with the S.E. ridge of the mountain, brought us to the foot of the final rocks. These were free from difficulty, and in five minutes more we stood upon the summit at 1.45, just four hours and three-quarters after quitting Santa Catarina. Our progress had been leisurely, and our various halts having amounted altogether to one hour and a quarter, it will be seen that the ascent may easily be accomplished in three-and-a-half hours' walking. The height of the peak is 11,076 English feet, according to Von Welden, and that of Santa Catarina being about 5,000, the difference of elevation is upwards of 1,000 feet greater than that between Pontresina and Piz Languard, with which it may be most conveniently compared. It seems difficult to suppose that so excellent a station should not have been made use of by the officers charged with the survey of the great military map of the Lombardo-Venetian Provinces; but we could discover no trace of any erection, and flattered ourselves with the idea of being the first to discover the great attractions, easy access, and admirable view which characterised the mountain.

Whilst my companion set vigorously to work at the construction of a cairn, in which to deposit a record of our visit, I occupied myself for the next hour or two in transferring to my notebook an outline of the glorious succession of peaks, snowfields, and glaciers which stretched in an unbroken line around us through a horizon of something like 200°, and included nearly all the highest summits of the Orteler and Lombard Alps. Plate I. fig. 1 conveys, indeed, but an imperfect idea of the vastness and magnificence of the panorama; but it will serve, in combination with the map, to render more intelligible the details to which I must now direct attention.

A description of the topography of the group has, indeed, already appeared in the works of Schaubach and Mr. Ball; but the former is probably known to few English readers, whilst both still leave some points in obscurity which it seems desirable to clear up so far as our observations will admit.

In dealing with the *massif* of the Orteler the starting-point should, I think, be the double summit known as the Zufall Spitze (12,348 feet), occupying the angle between the Martell Thal and the Vals Forno and Della Mare, constituting in my opinion the true '*Knotenpunkt*' or nucleus of the



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group, and lying about due E. of the Confinale. The chain, indeed, attains a greater elevation farther to the W., but the Zufall Spitze is situated at the junction of the principal ramifications of the entire group, and hence its choice as a point of departure. Let us now consider in succession the various ridges which radiate from it as a centre, commencing with the western branch, which comprises the loftiest summits, and is most directly connected with our station.

Looking over the head of the Val del Zebru, immediately to the left of the Monte del Forno, a long snowy wall or curtain is seen stretching from the Zufall Spitze to the Königspitze, and forming the N. boundary of the Val di Cedeh, as the head of the Val Forno is called on the great military map of Lombardo-Venetia. The uniformity of this ridge is but slightly broken in our view (plate I. fig. 1) by some projections, which rise a little above the general level, and scarcely seem to deserve the name of peaks; but when seen from the level of the Val Forno or the Sulden Thal these eminences detach themselves against the sky, thus presenting an appearance of greater individuality. One of them is designated on the Austrian maps both of Tyrol and Lombardy by the name of Monte Cevedale, or Sulden Spitze. Its true rank may be inferred from the fact that, according to the Kataster Messung or Cadastral Survey, its height is only 11,109 feet, whilst that of the lowest point of the ridge from which it rises can scarcely be estimated at less than 10,700 feet. It would, indeed, be almost needless to call attention to its existence but for the fact that it occupies the angle between the Val Forno and the Sulden and Martell Thal, and that at its W. foot a pass is indicated, on the maps just alluded to, as leading (at an elevation which I estimate at 10,700 feet) by a circuitous course round its N. flank into the head of the Martell Thal. The authorities in question give no indication of any direct pass from the Val Forno to the Sulden Thal, and it was one of the objects which we had in view, as will appear in the sequel, to effect such a means of communication.

Proceeding in a westerly direction, the eye next rests upon the noble form of the Königspitze (12,648 feet), with which the offshoot culminating in the Confinale is connected by a depression, separating the heads of the Val del Zebru and the Val Forno. In adopting the name of Königspitze instead of that of Zebru, which appears on the map of Lombardy and is introduced as a synonym on that of the Tyrol, I follow the more recent authority of the Cadastral Survey which assigns the latter to another summit farther to the W., and almost due S.

of the Orteler Spitze. At Trafoi, Gomagoi and Prad, as well as in the Sulden Thal, I found that this mountain, the second in height of the entire group, was constantly referred to under the name of the Königswand — a title which, perhaps, corresponds better with its flattened and blunted appearance as seen from the N. (plates II. fig. 3, and III. fig. 1). As seen from the Confinale, the Königsspitze presents a grand pyramidal form, the rounding of the summit just referred to being here concealed. Its sharpness, when viewed 'end on' from the W. or E., is excessive, as may be remembered by those who have examined it from the Piz Languard (compare also plate I. fig. 3); and as in the somewhat similar case of the Finsteraarhorn, few mountains are bounded by more formidable precipices than those which descend on the one hand into the head of the Val del Zebbru, and on the other to the upper portion of the great Sulden or 'Monte Martello' Glacier. Need I add that as we scanned its craggy sides and pictured the wondrous view which its summit would afford, we felt it to be a foe worthy of our prowess, and mentally resolved to scalp the noble savage!

Resuming our survey, we come next to the Zebbru Spitze of the Kataster (C of the outlines), 12,255 feet in height. A comparison of plate I. fig. 1 with plate II. fig. 3 would almost dispose one to consider the Zebbru as merely a subordinate part of the Königsspitze; but plate I. fig. 3, plate II. fig. 2, and, to a less extent, plate III. fig. 1 show them to be separated by a considerable depression; and as the Zebbru, moreover, occupies almost the exact point of the main ridge where the short spur culminating in the Orteler Spitze stretches away to the N., its distinctive name is convenient and appropriate.

The Orteler Spitze itself (12,814 feet) is a remarkable instance of elevation out of the true axis of the chain, and is well described by Mr. Ball as 'a very bold promontory connected with the vast snowfields of the upper level of this group by a narrow crest covered with névé.' This crest, which (on the E. side at least) is much steeper and loftier than Mr. Ball had I believe supposed, is well seen from the upper part of the Sulden or Martello Glacier (plate II. fig. 3), and a portion of it is also visible from several other points subsequently reached by us, such as the Madatsch Joch (plate I. fig. 3) and the summit of the Cristallo (plate II. fig. 1). The appearance of the Orteler Spitze from the W. reminded me repeatedly of the Tödi, as seen from the Clariden Firn; the upper portions of both mountains consisting of a great uniform

field of snow and névé sloping gently towards the N., and bounded on almost every side by steep and lofty precipices, of which a better idea may, in the case of the Orteler, be obtained by an examination of the outlines than could be conveyed by any verbal description.

A sudden and considerable dip to the W. of the Zeburu (by which a passage might doubtless be effected direct from the Val del Zeburu to Trafoi, though difficulties in the lower part of the glacier on the N. side would probably be encountered) discloses the Orteler Spitze, and next in order follows a double-headed mass\* (E and F of the outlines), 11,962 feet in height, visible from Trafoi, and occupying the head of the Orteler and Trafoi Glaciers, whose common névé covers its N. slopes. It is not easy to decide to which of the two peaks the figures of the Kataster refer, nor do I feel quite confident of the correctness of my identification (indicated by corresponding letters) of the summits of this portion of the ridge, as seen respectively from the Confinale, the Madatsch Joch, the Stelvio Pass, and Trafoi; but after devoting a good deal of time and thought to the subject, I believe that, on the whole, the results I have arrived at are pretty near the truth, if not absolutely free from error.

Again the ridge sinks and reaches its lowest point between a prominence † (L), also visible from Trafoi, and a conspicuous rocky tooth, which appears to correspond with one of the two highest points of the Madatsch ridge, and is probably that marked I (11,245 feet) in plate I. figs. 1, 2 & 3, plate II. fig. 1, and plate III. figs. 1, 2 & 3.

Another spur, of which H and I are the loftiest and most southerly peaks, here quits the main ridge, and running northwards in a direction parallel to the Orteler itself, separates the Trafoi and Madatsch Glaciers throughout their entire length, and terminates, nearly opposite to the point on the Stelvio Road known as the Franzenshöhe, in a mass of splintered crags to which the name of Madatsch Spitze (plate I. fig. 2, plate II. fig. 1, and plate III. figs. 2 & 3) seems to belong *par excellence*,

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\* In the outlines (plate I. figs 1, 2 & 3; plate II. fig. 1, and plate III. figs. 1, 2 & 3) I have given the name of Monte Liferò (or Zuckerhut) as a synonym for H & I, the highest points of the Madatsch ridge. This is an error, as the name is applied to some point or points of the ridge visible from Trafoi to the east of I, and must be identified with either L, F, or E, or all three in combination.

† In plate III. fig. 1, the point marked L? is probably not that referred to in the text, but corresponds with either the summit or W. shoulder of F.

although the three loftier points of the spur (H I J) may all be fairly included under the same general appellation. As seen from Trafoi, the Heiligen drei Brunnen, or the lower portion of the Stelvio road, the appearance of this terminal buttress (K) is grand and colossal in the extreme, and suggests a comparison with the cliffs of the Wellhorn above Rosenlauri. It is possible that a pass may be effected between I and L or L and F to or from Trafoi; but, as before remarked in the case of the more easterly depression at the W. foot of the Zebbru Spitze, difficulties would probably be encountered in the lower portion of the glacier on the N. side. Seen from Trafoi, the mass of ice between the Orteler and Madatsch Spitzen, which derives its origin from their slopes and those of the connecting ridge, is divided pretty equally by a rocky excrescence, which rises towards the point marked L (plate III. fig. 3), but before attaining it gradually disappears beneath the snowfield constituting the common névé of the two glaciers, whose wildly-contorted extremities descend in a cataract of ice into the head of the valley above Trafoi. For the sake of distinction, and following the example of Schaubach, I have applied the term Orteler Glacier to the eastern and that of Trafoi Glacier to the western arm.

It will be seen by a comparison of plates I. fig. 2, II. fig. 1, and III. figs. 1 & 2, that the point I is situated in the direct prolongation of the ridge from K to J, whilst the snowy cone H, invisible from the Confine, lies somewhat to the W., and serves to connect it with the next group of peaks to which I must now direct attention. The actual link is a snowy *sattel* at the head of the Madatsch Glacier (plate I. fig. 2), subsequently crossed by us, and bounded on the S. by the loftiest of four peaks (G, 11,370 feet), which together constitute the mass of the Monte Cristallo. In the view from the Confine the actual pass is hidden by the third of these, whilst the fourth, or Nagles Spitze (10,687 feet), being of very inferior elevation, is in its turn concealed by No. 2, the Video Spitze (11,361 feet) of the Kataster. This Video Spitze, together with the broad ridge or gently-sloping plateau which connects it with the Nagles Spitze, constitutes the W. boundary of the upper portion of the Madatsch Glacier, and divides it from the fine basin of the great Vitelli Glacier, whose lower portion is visible from the Stelvio Road near Spondalunga. From the Nagles Spitze itself three spurs are thrust forward in directions varying from W. to NW. The most northerly of these, constituting the prolongation of the main chain, is crossed at its lowest point by the

Stelvio road which here attains its greatest elevation, and rises again on the other side into the well-known peak of the Monte Plessura (9,941 feet). The second spur terminates nearly opposite Santa Maria, and the third or most southerly sinks down to the level of the Val di Braulio, not far from the third cantoniera. A smooth gently-undulating snowfield caps the portion of the range just described, and pushes down at various points—especially near the summit of the Stelvio—several small and slightly crevassed tongues of ice, which, as well as the névé beyond, appear to be of easy access and traversable in all directions.

The Video Spitze is the last peak visible from the Confinale, but further to the left is a summit of nearly equal elevation, separated from it by a snowy depression, and constituting the highest point of a fine snowy rampart, which bounds the névé of the noble Vitelli Glacier on the S. as the Video Spitze does on the NE. Exhibiting magnificent masses of broken séracs, which reminded me of the E. slope of the Dôme du Gouté, it trends away in a nearly westerly direction till opposite the ice-fall of the Vitelli, when, bending back slightly to the southwards and becoming more broken by rocks and varied in outline, it terminates finally in the grand crags visible from Bormio, and separating the lower portion of the Val del Zebbru from the Val di Braulio. It will be seen in the sequel, as well as by a reference to the Table of Heights appended to this Paper, that the appearance of height assumed by the ridges on either side of the Vitelli Glacier when seen from the Monte Plessura, Monte Braulio, or Piz Umbrail, is wholly deceptive, and that the ideas of Mr. Hort on this point ('Guide to the Central Alps,' page 415) are not supported by facts. There are at least a dozen peaks of the Orteler and Lombard Alps which exceed in altitude the highest point (G) of the Cristallo, and yet more that of the Vitelli ridge.

As the offshoot which culminates in the Monte Confinale and Pizzo del Forno has already been noticed, and the topography of the southern slopes of the main ridge from the Video to the Zufall Spitze will I hope be rendered sufficiently clear by a comparison of the outlines (plate I. figs. 1 & 3) and an examination of the map, it will be unnecessary to describe them with the same minuteness as has appeared needful in the case of the northern spurs and glaciers of this the loftiest portion of the chain.

Returning then once more to the Zufall Spitze, a brief reference must next be made to the great branch which, extending southwards to the Corno dei tre Signori and Monte Tonale,

constitutes the E. boundary of the Vals Forno and Furva, and separates them from the Vals della Mare and Bormina or del Monte. The whole of this great mass, with its extensive snow-fields and glaciers, is still a *terra incognita*, and I have found it almost impossible in some cases to reconcile the details of the Lombardo-Venetian map with either the names and heights furnished me by Herr Mojsisovics, on the authority of the Kataster Survey, or my own observations from the Confinale, Königsspitze, Orteler Spitze, &c. Unfortunately, the time at our disposal was too limited to admit of our undertaking any explorations ourselves with the object of clearing up these difficulties, but there is no doubt that the dividing ridge may be attained on both sides of the Viozzi Spitze by following either arm of the great Forno Glacier; and though I can give no definite information as to the nature of the reverse slope, two very fine passes (of 10,500 to 11,000 feet) might thus in all probability be effected into the Val della Mare. The Viozzi or Vios Spitze (11,920 feet), the noble pyramid of the Palle della Mare (11,855 feet), and the graceful double-headed Monte Tresero (11,869 feet, according to Von Welden, but more probably about 11,700), which towers so superbly above Santa Catarina, besides the twin summits of the Zufall Spitze itself (12,348 feet), are all as yet unclimbed, and well worthy of the attention of mountaineers; whilst the Forno Glacier, which descends to a low level in the Val Forno, and may be reached in an hour and a half from Santa Catarina, is perhaps the finest in the entire group. The only pass direct from the Val Furva to the head of the Val di Sole which, as far as I am aware, has yet been effected is one which, quitting the track of the Gavia Pass near its summit, strikes off to the E., and traversing the ridge to the N. of the Corno dei tre Signori (10,912 feet), leads down on the other side into the head of the Val Bormina or del Monte, at whose junction with the Val della Mare the Baths of Pejo are situated. This pass is, I believe, referred to under the name of Sforzellina in the valuable work on the Hypsometry of the Tyrol by Trinker, who assigns to it a height of 9,594 Vienna or 9,950 English feet, which Mr. Ball's estimate would reduce to 9,700 feet.

It remains to say a few words on the third and fourth main divisions of the group, which separate respectively the heads of the Vals della Mare and di Rabbi and the Ulten Thal, from the Martell Thal, and the latter from the Sulden and Laaser Thal. As in their case I cannot speak from personal knowledge, I will be as brief as possible, referring the reader for

further details to the works of Schaubach and Mr. Ball, and the sheets of the Austrian map of Tyrol.

Between the Zufall Spitze, situated at the NW. angle of the head of the Val della Mare, and the Venezia Spitze which occupies a corresponding position to the NE., two passes are indicated on the tracing of the Kataster Survey. To the more easterly of these an elevation of 10,512 feet is assigned, whilst the height of the other is stated at 9,930 feet. From the Venezia Spitze an important spur diverges to the southwards, separating the Vals della Mare and di Rabbi, and culminating in the peaks of the Saent (10,441 feet) and Cima di Pontevecchio (10,414 feet). Continuing our examination of the chain to the E. of the Venezia, the next important summit is the Zufrid Spitze (11,262 feet), occupying respectively the NE. and NW. angles of the Val di Rabbi and Ulten Thal, and connected with the Venezia by a ridge which forms the N. boundary of the Val di Rabbi, and is traversed by a pass leading over a portion of the Gramsen and Zufrid Glaciers. As in the case of the Venezia, a considerable offshoot whose main summit, the Eggen Spitze (11,264 feet), slightly exceeds the Zufrid itself (11,262 feet) in height, runs at first in a SSE. and afterwards in an easterly direction, and separates the central and upper portion of the Val di Rabbi from the head of the Ulten Thal, into which at least two passes lead. East of the Zufrid Spitze two cols, the Soyputz and Soy Joch (9,454 feet), the former a glacier pass, connect the central portion of the Martell Thal with St. Gertrud in the Ulten Thal; but no peaks occur which require special mention here, and the range finally terminates nearly S. of Latsch, in the Etsch Thal, with the snowy summits of the Arzkor and Flatschberg.

The fourth main branch of the Orteler Group radiates rather from the Sulden than from the Zufall Spitze, and follows for some distance a NNE. direction, separating the heads of the Sulden and Martell Thal, and traversed to the S. of the Innere Peder Spitze (10,768 feet) by the Suldner Joch, which must command a glorious view of the E. side of the Orteler Spitze, Zeburu, and Königsspitze. At the Mittlere Peder Spitze (11,349 feet), which follows next to the NNE., the ridge divides—one arm trending away to the eastwards and constituting the N. boundary of the Martell Thal, whilst the other pursues a general northerly direction to the E. of the Sulden Thal. The space enclosed between the two is occupied by the Laaser Thal, a short valley which enters that of the Etsch or Adige, at the village of Laas. The principal elevations of the E. arm are successively the Aussere Peder Spitze (11,162 feet), the

Schluder Spitze (10,588 feet), the Laaser Spitze (10,827 feet), and the Weissmandl (9,101 feet). Those of the W. arm, proceeding northwards, are the Vertrain Spitze (11,371 feet), Ofen Wand (11,558 feet), Angelus Spitze (10,982 feet), Kompatsch (11,065 feet), Saurissl (8,642 feet), Wasserfall (10,194 feet), Praggischarte (10,282 feet), Schoneck (10,246 feet), &c.

I must now resume our personal narrative, with many apologies for the length to which these general remarks have run. It seemed, however, essential to clear the ground from the misconceptions which had previously existed in my own mind and been shared by others; and if to the general reader such details prove very wearisome, let me hope that they will be found of service to future explorers, for whom this paper is specially intended. I should, however, only do half justice to the panorama from the Confine if I omitted any mention of the view towards the W. and S., where range after range of noble peaks stretched away in far perspective. First came the countless summits of the Lower and Middle Engadine, followed by the glorious *massif* of the Bernina, the elegant Disgrazia, the Corno Brucciato, and then, on the E. side of the Valtelline, the ranges bounding the Val Camonica overtopped by the yet loftier summits of the Adamello Group, and finally terminating in the two graceful peaks of the Presanella (Cime di Nardis, 11,688 and 11,345 feet), set in a framework, of which the Corno dei tre Signori and Tresero form the sides. In fact, whilst few peaks of equal elevation are less difficult of access, its attractions as a point of view are second to few or none; and I feel the less hesitation in recommending it to the attention of future visitors to Santa Catarina, as our judgment was fully confirmed by Messrs. Ball and Tyndall, who subsequently made the ascent.

After a stay of rather more than three hours we started at 4.45, quitted the snow at 5.5. and at 7.15, after a quarter of an hour's halt, reached Santa Catarina—thus effecting the descent in two-and-a-quarter hours' walking. Here we heard that our companions had come up from Bormio in the morning; but finding the available accommodation less satisfactory than could be desired, some of them had returned to secure beds at the Bagni di Bormio, whilst the remainder had kindly waited for us. Our second detachment started in a carriage at 8.30, and, after a pleasant drive in the cool of the evening down the romantic Val Furva, rejoined the first at 10.45. Unfortunately, in the dark, both my barometers somehow contrived to fall from the carriage and get broken, so that during the remainder of our journey we were limited to an aneroid by

Browning, belonging to Buxton, which proved, however, to be a first-rate instrument.

The following day (July 31st) being Sunday, we spent the morning quietly between our capital quarters and the shade of a somewhat meagre pine-wood, and a little before five took our departure for the third cantoniera on the Stelvio road, which we proposed to make our starting-point for further explorations on the morrow. It was arranged that all the ladies, under the charge of Michel Payot and the two remaining gentlemen of our party, Messrs. Fowler and Waterhouse, should proceed to Santa Catarina on Monday, and establish themselves there as comfortably as circumstances, modified by the kind exertions of Mr. Ball, would permit; whilst Messrs. E. N. and H. E. Buxton and myself, accompanied by our respective guides—Franz Biener of Zermatt, and the gallant old Christian Michel of Grindelwald—devoted one or, perhaps, two days to clear up the mystery of the Cristallo, and investigate the Vitelli Glacier and Val del Zeburu.

Two-and-a-half hours' easy walking brought us to the third refuge or cantoniera, situated between the steep ascent known as the Spondalunga and the higher station of Santa Maria. The landlord is a decent fellow disposed to do his best, but the accommodation is of the most limited character, and appeared only to have reference to the wants of passing travellers. One bed was all that could be provided, but a mattress on the floor answered equally well, and after a good supper on our own provisions we laid ourselves down to rest.

It was just 3.15 on the morning of the 1st August when we issued forth upon the noble Stelvio road, and proceeded down it at a rapid pace till just before reaching the cantonier's house standing at the commencement of the zigzags by which the descent of the Spondalunga is effected. Here we turned off sharp to the left, and traversing slopes of débris by a path which in the faint light was barely distinguishable, found ourselves at 4.15 at the right or N. bank of the Vitelli Glacier not far from its extremity. The main body of the ice appeared to descend right in front from between a somewhat uniform ridge on our left and a fine snowy mass on the right, which we rightly conjectured to be the W. termination of the spur described by Mr. Ball ('Guide to the Central Alps,' p. 415 b), on the authority of the Rev. F. J. A. Hort, as 'including two principal summits, of which the E. peak, in form somewhat resembling the Lyskamm, may probably be the highest of the entire group.' Further to the right a succession of inferior

elevations sweep round till they terminate in the rocks which overhang the second cantoniera, and give rise in their intervals to two or three glaciers of secondary importance, the most easterly of which constitutes the W. affluent of the Vitelli. With these we had nothing to do, our course clearly lying up the main arm beneath, and to the N. of, the conspicuous snowy mass already referred to, which formed the centre of the picture. Buxton had indulged in the unusual luxury of a stereoscopic camera, which after doing good service in the Bernina was now again made useful, and after a short halt we stepped upon the ice at 4.40. The glacier, which is beautifully pure, presented no difficulty, and keeping straight up the centre we reached the foot of the ice-fall immediately to the N. of the western extremity of the Vitelli Ridge at 5.30. Here the rope was put in requisition, and at 5.40 we commenced the ascent. Keeping close under the S. boundary of the glacier, our progress was facilitated by the slopes of snow which obliterated the crevasses on this side of the ice-fall, and though the huge masses of overhanging séracs, towering high into the air on our right, were suggestive of avalanches, the débris of which we frequently traversed, this course would probably be at all times the best.

At 6.30 the level of the upper plateau was gained, and a glorious expanse of snow was descried sloping gently upwards towards a broad col, and bounded by two great ramparts of considerable uniformity of outline, but whose exquisite purity as they glittered in the bright clear morning light rendered them strikingly beautiful objects. Scarce a rock was to be seen, and it was at first very difficult to determine the relative altitude of the principal prominences or the scale of the scenery as a whole. As we progressed, however, it became more and more evident that of the two ridges, both of which attained their greatest elevation towards their eastern extremities, that on our left, which we afterwards ascertained to be the Video Spitze (11,361 feet) or second highest point of the Cristallo, was the loftier, whilst the conviction was momentarily strengthened that neither could rival for a moment either the Orteler Spitze or many other peaks of the group. The ridges in question are indeed but little more than great snowy hummocks, of exquisite beauty it is true, but scarcely attaining to the dignity of mountains.

Twenty minutes' steady walking at a rapid pace up the level floor of this noble corridor brought us at 6.50 to the depression at its head already mentioned, and all doubt as to our further course was at once set at rest by the discovery that we were looking down from a height of some 10,700 feet into the centre

and lower portion of the Val del Zebro, from which, however, we were cut off by apparently impracticable precipices of enormous depth. Feeling anxious to investigate the other side of the Cristallo ridge, and not knowing how large might be the demands on our time and strength before night, we did not attempt to test the chance of effecting a descent by *force majeure*; but retracing our steps for a few hundred yards and then gradually bearing away to the N. we made for the ridge at a point between the Video (11,361 feet) and Nagles Spitze (10,687 feet) of the map. Turning round the NW. shoulder of the former peak we found ourselves at 7.15 standing on the W. side of the upper névé of the Madatsch Glacier, and separated by it from the series of summits terminating on the N. in the Madatsch Spitze proper, over which towered the grand mass of the Orteler Spitze itself. Farther to the right (see plate I. fig. 2) a depression was visible, and beyond it a dome-like summit afterwards identified with peak 3 of plate I. fig. 1. Next to this came a sharpish cone (G, 11,370 feet), through whose snowy mantle a few rocks cropped out here and there. Again the eye was puzzled to say whether this summit or its neighbour, the nearer Video Spitze (part only of which is seen in the outline), was the loftier; but on the whole the betting was in its favour, and the event justified our estimate, as it proved to be the highest of the series of eminences to which the name of Cristallo has been collectively applied.

A glance sufficed to show that our course would lie over the depression between G and the most westerly of the upper peaks of the Madatsch ridge (H), as from it the ascent of the former (which on the side of the Vitelli Glacier was impracticable) appeared easy of accomplishment, and it seemed besides to offer the greatest chance of effecting our intended subsequent descent into the Val del Zebro. Again the camera was called into requisition, and operations were on the point of commencing, when the box containing the plates was suddenly seen to glide from its moorings, and set off on a voyage of discovery towards the névé beneath. Franz started in pursuit, forgetful that he constituted a link in a chain, and came to grief and the length of his tether at the same instant. Whilst he was detaching himself the rash adventurer slid merrily onwards, and laughter was mingled with vexation as we saw Franz wildly plunging downwards and, though gaining ground at every step, arriving at the upper edge of a crevasse just in time to see the object of his pursuit topple merrily over into the dark depths which he dared not approach more closely. We all rushed to the rescue, and after a short hunt Christian

appeared holding the truant aloft in triumph. Another attempt to photograph was more successful, and after sketching and indulging in a second breakfast we quitted our station at 8.45, and at nine reached the level surface of the Madatsch névé, over some steep slopes intersected by numerous crevasses.

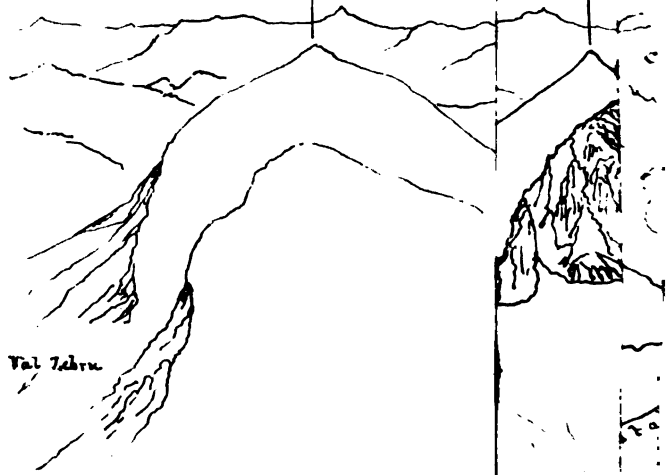
Fifteen minutes' steady walking brought us to the foot of the steep wall leading up to the col. Here step-cutting became necessary, the slope being very rapid: our progress was slow, and it was 9.40 before we stood on the summit. The view (plate I. fig. 3) on the other side was at once magnificent and satisfactory — magnificent because it included the massive Orteler and glorious Königsspitze with the Zebru and other intervening peaks, and satisfactory because the hope of being able to descend to the level of the Val del Zebru was on the whole strengthened. For the third time the camera was set up, and two slides, forming a panorama of the chain from the Orteler Spitze to the Königsspitze, were rapidly secured by Buxton, whilst I worked away more slowly at the outline reproduced in plate I. fig. 3.

Depositing our various traps on the col, we struck off at 10.30 to our right, climbed a steepish ridge broken in its lower part by rocks, and then keeping a little to the left found ourselves at eleven on the summit of peak G. The Video Spitze appeared to the eye to be but little less elevated than that on which we stood; but the superiority of our position would have been indisputable even without the authority of the Kataster Survey, which assigns to the two points the respective heights of 11,370 and 11,361 feet. On the S. we looked down into the Val del Zebru, from which we were cut off by enormous precipices, but could see nothing of the Vitelli ridge, even the highest point of it being entirely concealed by the intervening Video Spitze, which must therefore be the more elevated of the two. We spent a most enjoyable hour on the summit, in the course of which I secured the outline plate II. fig. 1, which, however, was cut short in the direction of the Königsspitze by clouds sweeping up from the S.

Starting again at twelve, we regained the col, which we propose to call the Madatsch Joch, at 12.30. Its height, as determined by an observation of Buxton's aneroid compared with Aosta and Turin, comes out 10,838 feet; but as the reading of the same instrument on the summit of peak G gives a height for the latter of 11,576 feet, or 206 in excess of the Kataster determination, these figures must be looked upon as probably too high by at least 100 feet, if not more.

Collecting our baggage we quitted the col at 12.35, and

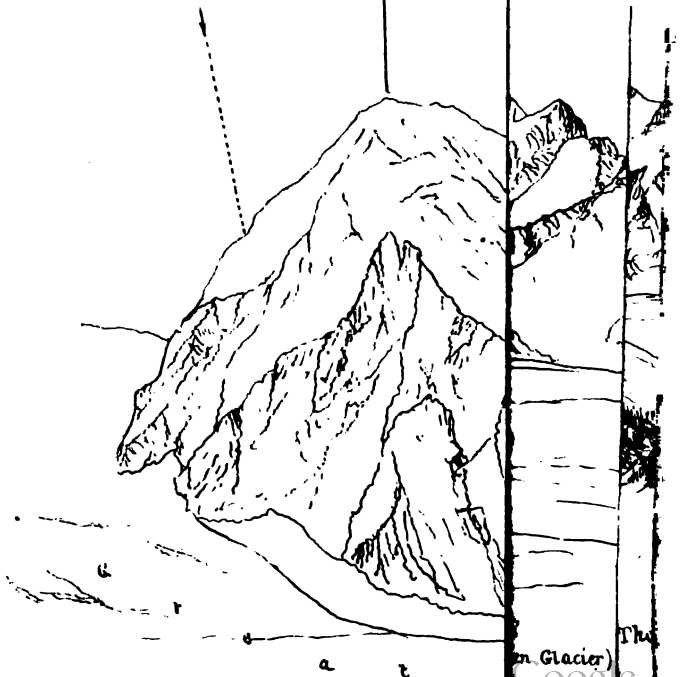
Videa Spitze  
(2<sup>nd</sup> peak of Cristallo)



View from summit of Me

Königs Joch

Königs Spitze (B)



en Glacier)

proceeded down the gently-inclined slopes of a glacier which, as it descends from the Cristallo and the ridge connecting its different peaks with the summits I, L, and F (plate I. fig. 1), I have ventured to name the Cristallo Glacier. Its termination towards the Val del Zebru is for the most part pretty uniform, but at the corner farthest from the Cristallo it thrusts forward a long narrow tongue of ice, forked at the end, which is well seen from the Confinale. Whether the valley may be reached at this point we did not attempt to ascertain, for our ultimate object being to cross into the Val Forno by the ridge separating it from that of the Zebru, it was obviously desirable to strike the latter as near its head as possible. We therefore kept well to the left, beneath the terminal cliffs of the points L and F (plate I. figs. 1 & 3), and at 1.15 halted on the summit of a ridge, part snow and part rock, dividing the Cristallo Glacier from another further to the east descending from the peak E (plate I. fig. 1). This last is in its turn separated by a similar barrier from the great mass of ice which has its source in the eastern slope of E, the southern side of the Zebru, and the south-western shoulder of the Königsspitze. In plate I. fig. 3 the second barrier is concealed by the first, which will be found immediately under the word Zebru (of Zebru Glacier), but in fig. 1 both will be at once recognised. An attack was now made on the provisions, and at 2.10 we again got under way.

The reconnaissance from the Confinale had satisfied us that it would be better to quit the ice by the lower edge of this small intermediate glacier, on whose W. boundary we were now standing, so we worked down diagonally to our right in the direction indicated in plate I. fig. 1, and at 2.30 got on to the slopes of débris below without the slightest difficulty. Here began the most troublesome and fatiguing work of the day. We had to traverse a seemingly interminable waste of unstable stones, inclined at a high angle and treacherous in the extreme. Our progress was thus slow, but at three o'clock we reached the singular and highly-attenuated tongue of the Zebru Glacier (like that of some gigantic ant-eater), traversed it without difficulty in five minutes, and at 3.15 gained some turf slopes. Round these we now wound at a tolerably uniform level, from time to time coming upon extensive patches of the detested *clapier*, till 4.15 when, wearied of this scrambling mode of progression which had now lasted nearly two hours, we reached to our delight the mass of ice occupying the head of the valley and formed by the union of a glacier descending on the NE. from the Königsspitze with two others from the

Confinale spur on the E. and S. The first was crossed in a few minutes, and then scrambling up the slopes on the left bank of the second or most easterly, and taking to the ice at 4.45, we gained the depression at its head at 5.30. We here stood upon the ridge separating the Val del Zebru from the head of the Val Forno or Val di Cedeh, and connecting the principal peaks of the Confinale spur with the main chain at the S. foot of the Königsspitze. For some distance to the N. the barrier maintains a pretty uniform elevation, and its passage might doubtless be effected at almost any point over a distance of half a mile or more. We kept as much to the right as the SW. boundary of the glacier permitted, in order to reach Santa Catarina with the least possible delay, for the day was already well advanced and we had no time to lose. On the Austrian maps a pass is indicated near the point selected by us for crossing, but as no name is given we have proposed to adopt that of Zebru Pass. The height calculated from an aneroid reading by comparison with Aosta and Turin comes out 9,908 feet, but judging by the error in the case of the Monte Cristallo observation, it would probably be safer to adopt 9,700 as the more probable figure.

The beauty of the view over the upper portion of the valleys on either hand as well as of the glorious peaks which form their respective boundaries, induced us to linger till 5.40, when we proceeded down the short and easy glacier on the E. slope and quitted it at 6.15. At 6.30, finding an excellent stream and remarkably sharp appetites, we disposed of the remainder of our provisions; but time was precious, and at 6.45 we once more set forth. We now kept more to the S. and pushed down the Val Forno at a rapid pace over lovely slopes of pasture and along the grass-grown summit of a beautifully-developed ancient lateral moraine, till we dropped at length into a well-defined path. This led us at 7.30 to a little village perched high on the mountain-side, whence a very steep track zigzagging downwards on the left over broken ground and amidst rocks and trees brought us at 7.45 to the main path, which is still, however, carried along the W. side of the valley at a considerable height above the stream.

By this time it was getting dark, and of the remainder of our tramp we saw but little more than enough to convince us that the lower part of the Val Forno possessed charms of the highest order. Stumping along over an unfamiliar road in that peculiar half-light which is almost more confusing than perfect obscurity is a process that soon becomes wearisome and monotonous, especially if one has been already seventeen hours

on foot; and it was therefore with feelings of lively satisfaction that, after traversing some meadows and turning a corner, we descried the lights of the Stabilimento delle Acque at Santa Catarina, and finally reached its hospitable door at 8.40, after a most interesting but somewhat fatiguing day.

Having as yet seen but little of the immediate neighbourhood of Santa Catarina, it was resolved to devote the following morning to the congenial occupation of lounging about, picnicking in the woods, &c. As the sunny hours sped rapidly by, the charms of scenery gaining new zest from those of the social circle which our goodly company of ten might fairly claim to constitute, one felt that it is good sometimes to be idle and go with the stream; but the lingering flavour of recent adventures, the consciousness that much yet remained to be accomplished in the very limited time still at our disposal, and above all the sight of the glorious mountains themselves encircling our little Capua, recalled us to a sense of duty, and reminded us that we must not allow ourselves to be more than temporarily demoralised in a climbing sense. In the evening we saw the ladies under the good escort of the same faithful squires drive off down the valley for the Baths of Bormio, with the intention of passing the Stelvio on the morrow, whilst we remained behind to explore more thoroughly the head of the Val Forno and, if possible, cross over to meet them at Trafoi viâ the Sulden Thal. Anticipating a long day's work we retired to rest soon after eight o'clock, and rising again at 11.30 breakfasted sharp at midnight—an arrangement which, whilst convenient for us, prevented the establishment from being unnecessarily disturbed, as the guests did not, and the waiters could not, get to bed till a late hour.

At 12.45 A.M. on the 3rd we quitted the house, led by a man with a lantern who was to accompany us up the lower portion of the Val Forno and return as soon as there was sufficient light to distinguish the track. We retraced our previous course, and passing the point where the small path already referred to led steeply up to the pastures on our left, we found ourselves opposite the foot of the Forno Glacier at 2.30. This is a noble stream of ice which deserves careful exploration, and might be investigated in conjunction with attempts to effect passes into the Val della Mare on both sides of the Viozzi Spitze, or with ascents of the latter peak and the beautiful pyramid of the Palle della Mare. Whether the summit of the Tresero could be gained from this side is I think uncertain, but there is little doubt of its accessibility from the direction of the Gavia Pass, or even by the glacier which descends

between its W. and SW. arêtes. Which of its two peaks is the higher I am unable to state positively: my own impression and that of Mr. Ball (though somewhat opposed to the evidence of plate III. fig. 1) is that the one visible from Santa Catarina is the lower, but it would certainly best repay the labour of an ascent, as everything may be seen from it which would be visible from its more easterly neighbour, besides much which it conceals from the latter.

For some distance beyond the Forno Glacier we stumbled uncomfortably onwards over slopes of turf, occasionally diversified with patches of débris and torrent-beds, till the increasing light rendered the use of the lantern no longer necessary, and enabled us to dismiss our attendant and improve our pace. It was just 4.30 when we reached the left-hand or most westerly glacier at the head of the valley, descending partly from the SE. slope of the Königsspitze, and partly from the adjacent portion of the ridge connecting that peak with the Monte Cevedale or Sulden Spitze.

We felt some doubt about the identification of this last, which is apparently a mere knob or projection, as may be inferred from the fact that its height is only 11,109 feet; whilst that of the lowest point of the ridge, where we supposed the Cevedale Pass to be situated, can scarcely be less than 10,700 feet. Time would not admit of my securing a careful outline of the amphitheatre of snow summits from the Königs to the Zufall Spitze, enclosing the head of the valley, which I the more regret as the scenery is very fine.

The ice proved extremely slippery, and the snow (which covered the glacier in patches) rather treacherous in places, so we halted for a quarter of an hour to put on gaiters. Keeping straight up the glacier—which was very slightly crevassed, of great width, and probably inconsiderable depth—we found ourselves about six o'clock at the foot of the steep slopes leading to the ridge near where it unites with the colossal mass of the Königsspitze. Up these we worked, bearing away slightly to the left so as to gain the ridge as near its origin as possible, and at 6.30 stood in a depression just beneath the peak. The view over into the Sulden Thal and away beyond to the mountains of the great Oetz Thal Group, the Vorarlberg, Lower Engadine, &c., as well as looking back towards the regions we had quitted, was most beautiful; and as we had the day before us, and were here tolerably sheltered from the high wind which was waving about the more exposed and lofty crests, we determined to enjoy it at our leisure whilst discussing a second breakfast, already almost too long postponed.

The height we had now attained appeared, by a rough observation with a level, to be about the same as that of the Tresero, or in round numbers 11,600 feet; and as that of the Königspitze is 12,648, according to the Kataster, there still remained 1,000 feet to climb. At 7.15 we addressed ourselves to the final tug, which proved steep, though presenting no serious difficulty. A snow slope at a high angle, occasionally assuming the character of névé and intersected here and there with incipient bergschrunds which were easily crossed or turned, led straight up to the summit, and is perhaps the only mode by which the latter can be attained, though on this point there was some difference of opinion amongst the members of our party; and I will not therefore insist on this view, which an ascent direct from the W. portion of the head of the Sulden Glacier by one of the glaciers between the Königspitze and Zeburu may possibly prove to be erroneous. At any rate, the result proved that we had selected the best and easiest course: and though, with snow in less excellent order or replaced by ice, the rate of progress might be very different, I think future travellers will do well to follow our example—as was done by my friends Messrs. Freshfield, Walker and Beechcroft, who repeated the ascent a few weeks later.

It was 8.20 when we reached the highest point, of the shape of which some idea may be formed from the outline plate III. fig. 1, and more imperfectly from plate II. fig. 3. The wind was here so furious and the cold so intense that it was impossible to remain still for many minutes without risk of frostbite. I managed with infinite difficulty to secure the outline plate II. fig. 2, which will give some idea of the majestic aspect which the Orteler here assumes as it towers grandly aloft on the other side of the W. head of the Sulden Glacier. In form it strikingly resembles the Piz Bernina as seen from the Piz Zupo, though more precipitous and far less accessible than the former peak. The view was of the grandest description, and, unless equalled or surpassed by that from the Zufall Spitze, must be decidedly the finest in the whole district, from the mere fact that whilst the Königspitze is second only to the Orteler itself in height, its situation on the axis of the chain gives it a far more commanding position than the latter peak, which only cuts off a small and comparatively uninteresting portion of the panorama in the direction of the Lower Engadine. To the N., S., and SE. the summit, which is narrow but drawn out from ESE. to WNW. into a flattened arête, sinks away in precipices of wonderful height and steepness, on which snow only rests in places. To the E. the slope, as

already stated, is more gentle, whilst to the NW. the ridge falls rapidly to the depression on the further side of which is seen the fine peak of the Zeburu. In this direction it might be practicable to creep down a few hundred feet, and then, turning to the right, effect a descent to the Sulden Glacier by a steeply-inclined and much-crevassed mass of ice which is seen half-way between the Königsspitze and Zeburu in plate II. fig. 3. Christian and Franz, however, both protested against any such attempt being made, and so, after exploring for a short distance without ascertaining anything very definite, we returned to the summit, and starting again at 9.10 regained our breakfast-place at 9.40. A descent to the Sulden Glacier at this spot appeared difficult if not impracticable, so we proceeded to a point further to the E. and several hundred feet lower, which seemed to offer a better chance and was reached at ten o'clock.

The exact locality, which we propose to call the Königs Joch, is distinctly marked by a conspicuous pointed rock like a gigantic cairn, which rises immediately to the E. of it to a height of 20 or 30 feet. The rocks here show indications of copper, and glowed with purple tints in the bright sunshine. Below us to the N., a very steep slope led down to the glacier, but the snow which covered it was soft and unstable, and moreover rested on hard ice at a slight depth below the surface. Here were all the conditions requisite for the dislodgement of an avalanche and the production of an accident, so we turned as an alternative to a ridge of broken rocks on the left which promised more secure footing for a portion of the descent, and till an involuntary glissade in company with a mass of snow would no longer be dangerous. After reading off the aneroid—which gave, by comparison with Aosta and Turin, a height of 11,063 feet (probably somewhat in excess of the truth)—we stepped over the edge at 10.10, and soon found that we had got our work cut out for us.

The rocks were very steep, but this we should not have minded if they had been trustworthy or our number had been smaller; but the fact was that a more utterly disintegrated, rotten, and untrustworthy collection of stones professing to be rocks I never saw. Not even the never-to-be-forgotten ridges of Monte Viso present such a complicated scheme of treachery and deception, and doubt and distrust were the garment of our minds. This state of things was all due to the circumstance that the ridge in question is composed of a very pure variety of dolomite, which I believe had not previously been observed in this portion of the chain, but of the character of which there can be no doubt, as, through the kindness of Mr. Ball, a small

specimen has been analysed at the Museum in Jernyn Street. We crept slowly downwards, those behind in constant fear of dislodging fragments upon those in front, and it was not till 11.15 that we stood on the more gently-inclined surface of the *névé* of the great Sulden Glacier.

An hour's halt was here called for lunch, and at 12.15 we again set forth, keeping rather to the left beneath the rocks of the *Königsspitze*, whose glacier-covered summits, however, forbade a too near approach. An hour's walk, varied by about the average amount of glacier difficulties in the shape of crevasses and other obstacles, took us to the central portion of the glacier amidst scenery of the highest order. The apparent height of the *Orteler Spitze* is, indeed, slightly diminished by the convex form of the back of the glacier descending from it, which conceals the lower portion of the mountain; but in close proximity the huge mass of the *Königsspitze*, followed by the *Zeburu*, was seen from base to crown, and formed a most imposing feature in the view.

Whilst I halted to complete the outline plate II. fig. 3, my companions, who were anxious to reach *Trafoi* with as little delay as possible, pushed on down the glacier, leaving me to follow at my leisure with *Christian* and *Franz*. Three-quarters of an hour thus passed away very pleasantly, and at two o'clock I started in pursuit. The glacier is of large dimensions but gentle inclination, and is fed, in addition to the two affluents from the *Orteler* and *Königs Joch*, by a third, which descends from the angle between the *Sulden Spitze* and the southern portion of the ridge dividing the heads of the *Sulden* and *Martell Thal*, across which further to the N. lies the *Suldner Joch*.

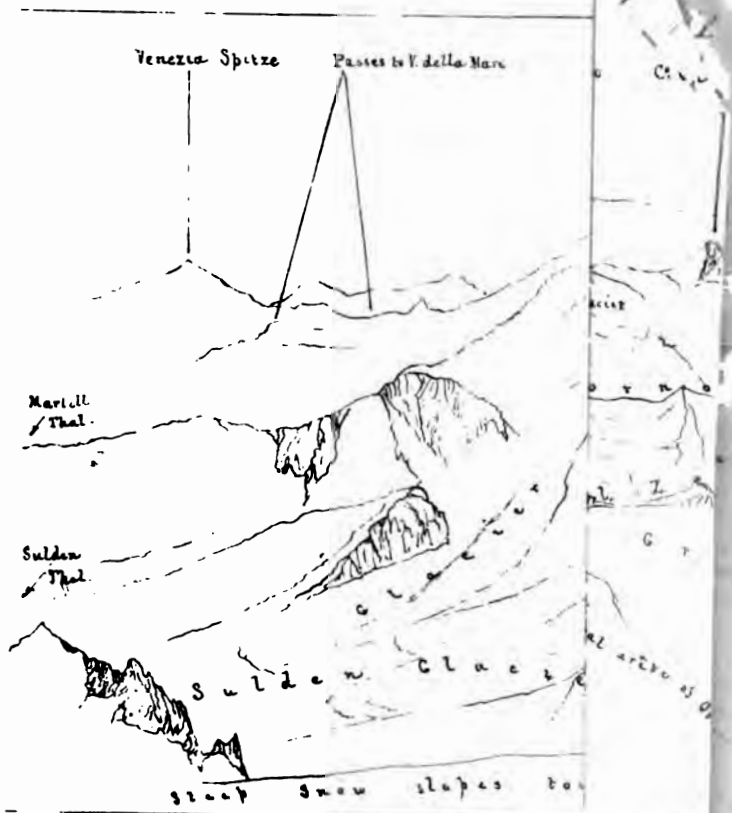
Following the right medial moraine for half an hour, we quitted the ice at 2.30 for the right bank, and at three o'clock reached the highest hamlet of the *Sulden Thal* just after passing the entrance of the *Rosim Thal* on our right. The *Sulden Thal* in its upper and central portions is a pastoral valley of considerable width, flanked on the W. by the magnificent snow-capped cliffs of the *Orteler* (see plate II. fig. 4), and on the E. by a series of minor summits which separate it from the Valleys of *Martell* and *Laas*. Fine pinewoods clothe the lower slopes; and these, with the broad expanse of bright-green grass that covers its nearly level floor, contrast most beautifully with the rugged grandeur of the higher regions. It is a striking scene of quiet peaceful beauty, enhanced by the charms of its setting amidst features of the highest order of grandeur. The peasants were all busily engaged in cutting or securing their hay-crop, and for miles the busy groups enlivened the solitude of this rarely-visited spot.

I halted for half an hour at the upper châteaux to indulge in some milk, and at 3.30 set off once more, halting for thirty-five minutes a little lower down to sketch the outline reproduced in plate II. fig. 4. At 4.25, just after crossing the torrent to its W. bank, St. Gertrud was passed on the left. The path still traverses the meadows for some distance nearly on a level, and then descending more rapidly, as the gradually contracting valley assumes more and more of a ravine-like character, again returns to the right bank, and continues along it as far as Gomagoi, which we reached at 6.10. Here we turned sharp to the left up the Stelvio road towards Trafoi, where I arrived at 7.15, shortly after my companions.

The rest of our party had arrived from the Baths of Bormio some hours previously, and thus our forces were once more united. The little inn at Trafoi and its excellent hostess, Frau Barbara Ortler, did their best to make us comfortable, and it was voted unanimously that we could not think of hurrying away, but would take up our quarters there for two nights at least; that the next day should be devoted to the quiet digestion of the beauties of the neighbourhood, and the following one to an ascent of the Orteler Spitze, with which we proposed to close our investigations for this season at least.

The next morning after breakfast there was a fresh arrival, whose appearance and equipment at once showed him to be a mountaineer. Entering into conversation I found, to my delight, that the stranger was no other than Herr E. von Mojsisovics, the well-known secretary of the Vienna Alpenverein. This was indeed a fortunate meeting: for though our friend's arrangements compelled him to be at Santa Maria on the 5th, and he could not therefore accept our invitation to unite with us in the projected ascent of the Orteler, I obtained from his travelling library, as well as from himself, much very interesting and valuable information, which might otherwise have never come to my knowledge. It was in this way that I became possessed of the hitherto unpublished hypsometrical results of the Kataster Survey, which will be found at the end of this paper, and constitute its principal value in the eyes of future explorers.

After several delightful hours spent in Herr von Mojsisovics' company I followed the rest of the party, who had started after breakfast for a stroll to the Heiligen drei Brunnen, and found them encamped in a fir-wood—the ladies busily engaged in sketching, and the gentlemen intent on abandoning themselves to the luxury of laziness. By-and-by we were joined by the Herr Secretär, who remained with us till it was time to return



Ridge N. of Salden



3. Salden Clact

to the inn. The walk from Trafoi to the Heiligen drei Brunnen, being described in all the guidebooks, scarcely comes within the scope of this paper; but the scenery is so indescribably grand, and the union of grass slopes, rock, and wood, which occupy the foreground of the picture in ever-varying combinations at each fresh turn of the path, is so exquisitely lovely, that I cannot refrain from urging others whose special object may be merely to cross the Stelvio, to halt at Trafoi for at least a couple of hours, and devote them to a stroll up the valley. The outline plate III. fig. 3 gives of course a miserably inadequate idea of the grand mountain barrier visible from Trafoi, but it will serve to illustrate the few remarks which it is necessary to introduce here on the topography of this side of the Orteler.

The slopes bounding the valley on the E. are merely the lower portion of the ridge which, descending from the summit of the Orteler in a nearly northerly direction, separates the Trafoi from the Sulden Thal, and call for no special remark here. Next to the right, and separated from them by a hollow or groove (called by Schaubach the Dobretta Thal) running up to the crest of the northern spur, is the mass of the Orteler, which presents the same majestic appearance characteristic of it when seen from every other point of view. The actual summit is invisible, but a portion at least of the extensive névé which caps the shoulders of the monarch is clearly distinguishable, whilst the 'Pleis' (misspelt 'Gleis' in figs. 2 and 3, plate III.), a steep tongue of ice or névé occupying a broad couloir by which the ascent is usually effected, is very conspicuous from the neighbourhood of Trafoi. On the W. the mountain sinks rapidly down in a series of step-like crags to the level of the Orteler Glacier, as (following the authority of Schaubach and other writers) I have ventured to designate the eastern of the two ice-streams which descend into the head of the valley from the main ridge, of which the Orteler itself and the Madatsch Spitze, on the E. and W., are only gigantic spurs. Further to the right the eye rests on a rocky ridge separating the Orteler from the Trafoi Glacier, and then on the various peaks of the Madatsch ridge seen in perspective, till all further view is cut off by a projecting buttress on the N. side of the valley round which the Stelvio road winds. In the angle between the foot of the Orteler Glacier and the Tabaretta Thal is a steep slope intersected by lines of cliff which stretch across it, and clothed with a mingled growth of pine and *legföhren* to a height of 1,000 feet above the valley. Up and across this lies the track usually taken in ascents of the Orteler. After attaining the

summit of the wood, the foot of the 'Pleis' is reached over masses of débris which have fallen from the cliffs in front. This 'Pleis' constitutes the main difficulty of the ascent, from its great rapidity and the frequent occurrence of falling stones and hard ice requiring caution and step-cutting; but when once its head is gained, there seems to be no difficulty in getting on to the upper plateau of névé; and to reach the highest point of the Orteler over this is simply a question of time and endurance, as no obstacles of a serious character are met with.

Herr Mojsisovics had engaged Josef Schöpf to accompany him in his various excursions during the next week or two, and on his arrival we all strolled up the road to reconnoitre the Orteler and decide on the route to be adopted on the morrow. A careful examination of the 'Pleis' with the telescope showed that almost its entire surface consisted of *glatt-eis* which would necessitate an enormous amount of step-cutting unless, as Christian suggested and affirmed, the rocks on its left bank could be climbed. We had previously almost determined to cut out a new route\* for ourselves by way of the Tabaretta Thal, and this idea became a fixed resolve ere we returned to the inn.

Some of our party had already started for Mals, and the remainder were to follow in the morning and then proceed over the Ofen Pass to Zernetz and Pontresina, whilst we rejoined them by way of Mals, Nauders, and the Engadine. At 9.30 we retired for a few hours' sleep, after bidding adieu to the ladies and Herr Mojsisovics.

We rose at 12.30 on the morning of the 5th of August, and at 1.45, headed by a lantern-bearer, proceeded along the now familiar path to the Heiligen drei Brunnen, which we reached at 2.30. Striking up into the wood above, we now commenced an ascent over the miseries of which it were perhaps better to draw a veil. Of course the guide contrived at an early stage of the proceedings to miss the way. Equally of course, the lantern was always glaring in one's eyes when it was not required and blinding one for the next few minutes, or mysteriously disappearing just when farther progress seemed impossible without its aid. Sometimes we tripped over the rotting

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\* Few mountains have so interesting a history as the Orteler Spitze, though the early ascents are almost unknown to English readers. I have been compelled, by want of space, to reserve for the next number of the Alpine Journal all mention of our predecessors in exploring this majestic peak.

stumps or fallen trunks of firs, or were brought up dead against miniature cliffs, or fell headlong over the long prostrate snake-like branches of the abominable *legföhren* (*Pinus Mughus*), which excited our especial antipathy, as the annoyance they caused us was infinitely varied in character. Their favourite trick was to curve round as each of us in turn would force his way through their interlaced foliage, and then execute vengeance on the next in the rank, against whose undefended face their heavy tufts of needles would sweep back with stinging effect. How hot we became, how cross we were, and how our unlucky leader fared at our hands need not here be told. Suffice it to say that at four o'clock we found ourselves clear of the wood and standing on the edge of the great débris-covered hollow leading upwards, in a southerly and easterly direction respectively, to the 'Pleis' and Tabaretta Spitze. Schaubach refers to this as the Dobretta Thal, but as the Austrian map of Tyrol calls the peak at its head the Tabaretta Spitze, I think we may fairly adopt that form of spelling.

The porter was now dismissed, and descending for a short distance, and leaving the route to the 'Pleis' on our right, we proceeded to traverse the slopes of débris diagonally in the direction of the rocks rising above the right bank of the glacier in front which fills the head of the valley. The ascent was by no means excessively steep, and several masses of well-consolidated snow (probably the remains of avalanches from the cliffs of the Orteler) facilitated our progress, and proved an agreeable exchange for the small rolling stones. At 4.50 the ice was reached, and a halt called till five, when we again proceeded rapidly upwards, keeping as near as possible to the rocks till forced by the dislocated state of the glacier to diverge a little to the right. This course was not altogether free from risk, as for some distance the surface was strewn with fragments of ice, which had evidently been recently detached from the overhanging masses of névé crowning the cliffs of the Orteler. There was, indeed, no fear of being caught unawares, as the source and direction of the danger were evident; and though the fall of avalanches is perhaps due as much to the state of the weather as to the direct action of the sun, yet as a general rule they are least likely to be encountered during the early morning hours, whilst in the descent the space exposed to them may be traversed so rapidly as practically to prevent any risk. Since our expedition, however, this source of danger in the new route has been entirely avoided by the selection of the next valley to the N. of the Tabaretta Thal as the line of ascent, and as this is doubtless the more direct course from Trafoi it will probably

be adapted in future. My friend Mr. Ormsby, who himself reached the summit of the rocks forming the N. boundary of the upper part of the Tabaretta Thal but was prevented by stormy weather from getting farther, informs me that this variation of our new route was for the first time struck out this autumn by the local guides, and a gentleman (whom I believe to have been Mr. Headlam, of University College, Oxford) who made an ascent of the Orteler shortly after us. Having thus reached the head of the Tabaretta Thal, they followed our track to the summit and, in proof of their and our success, brought back the bottle containing our names, attached to a small fir-tree which we had planted on the highest point. But this is anticipating.

The névé of the glacier we had been ascending was nearly level, and occupied a well-defined hollow between the rocky spur from the Tabaretta Spitze on the N. and the steep slopes of snow and ice descending from the upper portion of the Orteler on the S., which here take the place of the cliffs passed farther to the W. In front a low but precipitous and much-weathered ridge of rocks formed the eastern boundary of the névé of what I may perhaps term the Tabaretta Glacier, and cut off all view in the direction of the Sulden Thal. At 5.55, just before reaching this, we struck off sharp to the right, and addressed ourselves steadily to the real work of the day. The inclination was considerable but by no means excessive, and as the ice and snow were very hard at this early hour some step-cutting was necessary. Soon a bergschrund was encountered and crossed without the slightest difficulty, and at 6.40, after a steady and stiffish pull, we halted for breakfast at the edge of a crevasse where the surface was tolerably level.

The weather was, as usual, everything that could be desired, and the view had by this time become most magnificent, including range after range of peaks away to the east, as our present position enabled us to look over on the side of the Sulden Thal. In the sketch (plate III. fig. 2) the dotted line indicating our track is placed too far to the W., and, indeed, I doubt very much whether the curve of the mountain would not entirely conceal it from a spectator on the summit of the Stelvio. Probably, too, the old route by the 'Pleis' may be to a similar extent misplaced by being shifted too far to the left, but I could not get anyone to point out to me the actual course followed, and the line indicated must therefore be considered only an approximation to the truth.

At 7.20 we resumed our march, and winding steadily upwards without a halt, amidst and around some enormous crevasses and

magnificent masses of snow, without on the whole deviating much from a direct course to the summit or encountering any really serious obstacle, we stood on the highest point of the final arête at 9.27, just seven hours and three quarters after quitting Trafoi. We had been actually on the march for six hours and three quarters, and had, in fact, lost more than half an hour in the wood; so that our progress had been rapid, considering that the difference of altitude between Trafoi and the Orteler Spitze is 7,733 feet.

Let me here guard myself against the imputation of 'doing' mountains against time, a system which is, I fear, becoming not uncommon. It may be retorted that I have just dwelt on the comparative rapidity of our own ascent of the Orteler, but to this I would reply that the narratives of almost all our predecessors describe the expedition as a very long one; that we were attempting a new route, and, not knowing the nature of the obstacles we might encounter at any moment, could not venture to linger much on the way; and, lastly, that in order to effect a junction at Pontresina with the rest of our party on the following evening, it was essential that we should get back to Trafoi reasonably early.

The highest ridge runs from NNE. to SSW., and looks like a gigantic snowdrift blown up by the wind to a thin edge, capped on the NW. by a *corniche*, and sloping rapidly on the SE. to the fearful precipices which sink away towards the western head of the Sulden Glacier. It might not inaptly be compared to the keel of a boat turned bottom-up and broken-backed, so as to allow of the stern portion being tilted up. The foot of the rudder-post thus reversed would represent the highest point at the NNE. extremity, and the convex bottom of the boat itself, sloping away on all sides, would be no unfair illustration of the great dome-like mass of snow and névé which clothes the broad shoulders of the mountain. The arête subsides into the general surface at its SW. end, beyond which and in the direction of the ridge dividing the Sulden and lower Orteler Glaciers, there is a second and inferior elevation, which is indicated in all the outlines of the summit of the Orteler, and is given in some detail in plate III. fig. 1.

We struck the *hamm* at its lowest point, and turning sharp to the left proceeded along its gently-inclined profile, which presented no sort of danger to heads free from dizziness. The day was a lovely one; there was not a particle of wind, and as the sun shone warmly down upon us we resolved to take our fill of the enjoyment of the glorious panorama which our position commanded. This was the more needful, as our stay

on the Königsspitze had been brief, and we were desirous of atoning for the haste rendered necessary on that occasion by the intense cold.

Truth compels me to confess that the first portion of the two hours spent on the summit was devoted to the commissariat department, but hunger appeased, we set busily to work to make the most of the time. Clouds were already beginning to roll up here and there from the valleys, so the first thing to be done was to secure a sketch and a photograph. During our progress up the slopes of névé the legs of the camera had unfortunately slipped from the fingers of their bearer, and gone flying downwards over the hard-frozen surface, disappearing at last over a brow suspiciously like the upper lip of a crevasse. All our efforts failed to recover them, and so the future local New Zealander may some day fish them out from amidst the fragments of avalanches in the Tabaretta Thal. A stand was improvised for the occasion by driving three axes side by side into the ridge and piling snow upon their heads, which when pressed down formed, thanks to regelation, a level and stable support. Two stereoscopic slides, including the Zufall, Königs, and Zeburu Spitzen, with portions of the ridge between the first and the Tresero, were at length obtained by Buxton, and very successfully as the result has proved. Meanwhile I was busy with the outline plate III. fig. 1, which will give a tolerably correct notion of the southern half of the view, to the details of which I will not therefore allude further. In the opposite direction a wonderful array of peaks met the eye. It began on the W. with the summits of the Grisons, followed in succession by the Bernina group, the mountains of the Middle and Lower Engadine, and the still more distant Vorarlberg. Next came the remarkable depression through which passes the route of the Finstermünz, connecting the valleys of the Adige and Inn. The Malser Heide—its broad green expanse diversified by the lakes and bright-looking villages scattered over its surface, and traversed by the long reaches of the white road—was seen as on a map, bounded on the E. by the glittering snows of the Weisskugel (12,620 feet) and other giants of the Oetz Thal. Less familiar forms succeeded as the eye ranged over the peaks of the Stubayer, Duxer, and Ziller Thal to the broad snowfields of the Venediger, and finally rested on the sharp outline of the Gross Glockner, south of which a perfect forest of jagged aiguilles indicated the position of the glorious Dolomites, which stretch from Botzen on the W. to Villach on the E. Still nearer, the fine forms of the outlying members of the Orteler Group which cluster round the valleys of

Sulden, Laas, Martell, and Ulten, would have attracted yet more attention if the superior charms of the monarchs of the ice-world had not dwarfed their pretensions.

Besides the mere extent of the view and the beautiful grouping of the elements which composed it, there was on this particular day an indescribable charm of colouring which I have scarcely ever seen equalled. The atmosphere seemed to invest every object with the most wonderful harmony of tone, softening all asperities, subduing harsh contrasts, and blending the whole into the perfection of repose. Time flew rapidly by, and we could willingly have lingered; but much remained to be done, and at 11.10 we reluctantly quitted the summit, after securing an aneroid observation, from which, by comparison with Aosta and Turin, the height comes out 12,799 feet, or 15 feet less than the result of the Kataster Survey.

At 12.35, after a fruitless hunt for the lost legs, we reached the level surface of the névé at the head of the Tabaretta Thal, and running rapidly down the ice took to the moraine on the right bank of the glacier at 12.50. Here all doubt and difficulty were at an end, and we felt justified in halting for a pipe till 1.30. The wood was reached at two o'clock, the Heiligen drei Brunnen at 2.25 (the *legführen* now doing good service, as we swung rapidly down by their long supple arms), and Trafoi at three o'clock. Goodnatured Mrs. Ortler received us with warm congratulations, gave us an excellent dinner, and started us at 5.30 for Prad, which we reached at 6.45, after undergoing an examination of passports, and quitted at seven o'clock. The Orteler rose more and more grandly behind us; but the light was waning fast as we drove into Mals at 8.30. Tea was welcome, and the prospect of a long ride in the dark to Nauders did not look tempting. However, it was useless to grumble, as the exigences of our compact with our companions would not admit of our yielding to the seductions of Mals. Conscious misery was at least spared us, and I believe it was with a feeling of agreeable surprise that we found ourselves turned out at 1 A.M. into the road at Nauders before a gloomy rambling locked-up house, which for a long time gave no sign of life.

Thus ended our campaign in the Orteler district. Thanks to the almost uninterrupted fine weather and the able assistance of our guides, Christian Michel and Franz Biener, we had on the whole cause to be satisfied with the results attained, considering how short a time we had been able to devote to this object. It must not be supposed, however, that nothing remains to be accomplished, that the harvest has been more

than partially garnered by us, or that there are not plenty of objects left for the explorer and lover of novelties, and still more for those who are wise enough to believe that mountains are amongst those 'things of beauty' which 'will never pass into nothingness,' and are not unworthy of their attention because some one else happens to have previously trod their summits.

Since our return yet another peak—the beautiful Pressanella—has fallen (see p. 396); but the Zufall Spitze, the Zeburu, the Viozzi, the Palle della Mare, Tresero, Adamello, Peder Spitze, Venezia Spitze, and a crowd of other fine peaks are still unconquered, whilst passes remain to be effected from Trafoi to the Zeburu Thal of the western foot of the Zeburu, and the eastern shoulder of the point I (plate I. fig. 1), from the Val Forno to the Val della Mare by the Forno Glacier on either side of the Viozzi Spitze, &c. &c. The valley of Martell, on the N. side of the main chain, and those of Ulten, Rabbi, della Mare, di Genova, Rendena, &c. on the S., are but half explored, and in short, I know no district which, notwithstanding what has been already done, would better reward the attention of anyone able and willing to devote a few weeks to its careful examination. For that portion of it which is on Tyrolese ground the sheets of the 'General Quartiermeister Stab. Karte der gefürsteten Grafschaft Tyrol, nebst Vorarlberg und dem angrenzenden Fürstenthum Lichtenstein' (24 sheets, 1825-31, on a scale of  $\frac{1}{144000}$ ), and for the Lombard side those of the 'General Quartiermeister Stab. Topographische Karte des Lombardisch-Venetianischen Königreichs' (42 sheets, Milan, 1833-38, on a scale of  $\frac{1}{86400}$ ) will be found serviceable, though of course by no means comparable to the great work of Dufour. The map appended to this paper is based on a fusion of both those just mentioned with some corrections, the result of our own observations, which I hope will be found of service; but its execution requires an apology, and it is not of course offered as a substitute for the exquisite engraving of the Austrian engineers.

Table of Heights, determined by F. F. Tuckett.

Date	Hour	Station	Anerold	Air	Aosta	Turin	Mean	Probable
Aug. 1	9.45 A. M.	Madatsch Joch . .	20.49	5°	10850	10826	10838	10750
"	11 A. M.	Monte Cristallo (G)	19.97	5°	11583	11570	11576	11270
"	5.20 P. M.	Zeburu Pass . . .	21.15	9°	9871	9945	9908	9700
" 3	8.20 A. M.	Königs Spitze . . .	18.91	4°·5	12603	12621	12612	12648
"	10 A. M.	Königs Joch . . .	20.17	5°	11060	11067	11063	11000
" 5	10.45 A. M.	Orteler Spitze . .	19.05	3°·5	12722	12376	12790	12314