another glissade, and so got back to the lower couloir, and partly by climbing, partly by glissading down streams of stones—stones and all going down with us in a mild form of avalanche—we reached the bottom of the cliffs just at dark. The full moon rose in a clear sky, and by its uncertain light we threaded our way through the crevasses of the Ball Glacier, occasionally plunging knee-deep into a clear pool which we had mistaken for a patch of shadow, and at 9 P.M. reached our camp, feeling rather down-hearted at a second failure. We were very tired, as we had climbed for nearly seventeen hours, with heavy packs on our shoulders; our knuckles were all barked and the skin quite worn off the tips of our fingers from clutching the sharp rocks, as we had no time to select the smooth ones.

Next day we spent in camp washing clothes, baking bread in an oven built of stones, feeding up, and preparing provisions for our final attempt by the Mount Tasman spur.

Photography in the High Alps. By W. F. Donkin.

(Read before the Alpine Club, Feb. 28, 1882.)

I ONCE showed a lady who had never been to Switzerland a photograph of the Gorner Glacier, taken from the châlets just above the wood on the way up to the Hörnli, and her remark was, 'How steep that road must be!' This remark, however, coming from a person who had never seen a glacier, does not indicate lack of perception in the individual so much as failure on the part of the photograph to represent the facts in their true proportions to the inexperienced eye. It is a matter indeed of common observation that Swiss photographs, of the smaller sizes at least, give scarcely any idea of the scale of magnitude of the mountain and glacier scenes with which we are familiar. Nor is this to be wondered at when we consider how easily the eye is deceived when surveying the scenes themselves: we set off to climb a mountain which looks close at hand, it takes us hours to get to its base; we notice a patch of snow, apparently a few yards wide, up on the rocks above, by the time we get there it has expanded into a snow-field that takes the best part of an hour to cross. After having laboriously educated the eye to estimate distances in the Alps with some approach to accuracy, we go, say, to Scotland, and allowing ourselves a couple of hours on a misty morning to reach some heathery knoll, we find ourselves on the top of it in about forty minutes. Perhaps the chief cause of this uncer-

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tainty is what we call atmosphere. Atmosphere, in this technical sense, is an effect produced by watery vapour diffused through the air, which renders details in the distance indistinct and hazy, and we are accustomed to associate haziness with distance. It should be the aim, then, of the photographer of Swiss scenery to give the idea of size and distance by taking advantage of days when this atmospheric effect is most conspicuous, rather than by choosing those brilliant and clear days when every detail miles away can be rendered with microscopic sharpness. I do not, however, mean that clearness of detail is incompatible with breadth of effect; on the contrary, one has only to look at the beautiful photographs by Soulier or by England to see that the two may and should coexist. Some have attempted to produce a broad effect in their photographs, by the artifice of leaving the distance a little out of focus, thus rendering the outlines hazy, while bringing the foreground into the sharpest focus; others do just the reverse, and leave the foreground to take care of itself, as in a rough sketch, while giving all the sharpness possible to the distance. But when one looks at a view, the eye unconsciously adjusts its own focus to see with the greatest sharpness that particular portion, whether of far distance or of near foreground, to which it is directed; and since every portion of the picture should be capable of giving the same effect of sharpness of detail when looked at by itself as the corresponding portion of the view, it follows that the whole picture should be sharply in focus. It is in fact by careful attention to the composition and chiaroscuro of the picture, not by dodges of focussing, that breadth of effect is to be gained.

We come now to consider briefly the position of photography in its relation to painting. In the matter of colour, we lose of course entirely all those beautiful effects which are attainable by the painter, and of which we have such excellent examples in our club rooms. What would be the result of attempting to photograph those lovely effects, seen for a few moments only, but deeply impressed on our memories, as when, for example, we reach the Täsch Alp at early dawn on our way over the Alphubeljoch, and turn round to see the eastern arête of the Weisshorn shining like red gold up in the purple sky? Photography can do nothing with scenes like this; and even when coming down the same path in the afternoon, we find mountain and valley bathed in sunlight, how does the camera represent the sharply defined white pyramid piercing the brilliant blue, and the dark pine-woods and green alps below? In the photograph, blue sky and white snow are almost indistin-

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guishable, and everything else is nearly black. But although photography is so sadly deficient when effects of colour are chiefly concerned, it is in the accurate delineation of form, both in broad outline and in the minutest detail, that it rises pre-eminent. It is therefore among those scenes of rock and snow which depend so little on colour for their accurate representation that the capabilities of photography are turned to the greatest advantage. Conversely, it must be confessed that there are painters who, while representing with marvellous truth the vivid colouring of nature, do sometimes make accuracy of form a minor consideration, the inaccuracy generally being on the side of exaggeration of steepness in mountain forms. How seldom, for example, do we see a painting of the Matterhorn which does not represent it higher and more slender and pointed than the reality! That there are splendid examples of the exact contrary to this, I should be the last to deny; and if we look at the list of celebrated Alpine artists we find that those who best combine accuracy of form with beauty of colouring unite also with these the crowning virtue of being good climbers as well. This tendency to exaggeration is only natural; did we not estimate the steepness of our first snow-slope as being much greater than the reality, and feel decidedly hurt when a scientific companion with a clinometer declared it was only forty degrees, though we thought it nearly perpendicular?

But the camera is not liable to such perversions of judgment, and when properly used gives perfectly correct transcripts of form. Whether or not it will also give a representation of the view which will recall the scene to the mind in a satisfactory way, and whether in addition to this the photograph will possess merit as a pictorial composition, will depend largely on the skill and artistic perception of the photographer. The question, however, of art in photography scarcely falls within the scope of this paper, and I will only remark that a photographer who can produce a landscape or study which will fully satisfy the rules of composition, is a man to whom the name of artist may well be applied. To get such a picture he must choose his point of view with the utmost care, and having done this must wait patiently to seize just the opportunity when the light, the aspect of the sky, and all other circumstances combine to give the fleeting effect which he wants, and which alone will convert his photograph into a picture. However, in photographs of mere rock and snow scenery we do not look for artistic qualities of the highest order—if these are present so much the better—but we value

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them chiefly as being accurate records of the views from the points selected. To produce such records has been my chief aim in taking the series of photographs of which there are examples before you. When the point of view has been the top of a mountain I have generally endeavoured to take two or more photographs, which may be pieced together if necessary, so as to represent as much as was interesting of the view. For reasons, however, which will appear presently, I do not think such panoramas can be made to give a satisfactory impression. More interesting photographs on the whole I think are those, unfortunately not often to be secured, which represent a mountain top taken from some point not far from it and at a somewhat lower level, if possible showing clearly the route up it. As an example I may refer to a photograph of the Rothhorn, where the aspect of the mountain, as seen from the long snow arête which abuts on its southern side, is most striking. I am not sure that the view from a little further back, which includes more of the eastern face and the Weisshorn as well, would not have been rather better. When on the way up, however, I did not like to stop the party, and only did so when I saw that in a few steps more the chance of getting a view at all would be gone. It was, indeed, the only photograph I got that day, for when we reached the Gabel the clouds had begun to collect, and the camera was left there while we went to the top, where it would certainly have been useless, as we saw nothing whatever. It is not improbable that I should have been obliged in any case to leave the camera near this point, for on getting over on to the Zinal face of the mountain, a little above the Gabel, we found the smooth and steep rocks covered with more than a foot depth of fresh snow in an insecure condition, which made their passage a slow and somewhat dangerous operation. I had even less good fortune, in a photographic sense, on the Matterhorn, as it was too late for taking any views on the way to the upper hut, and in the morning the wind was high and we were soon enveloped in mist, so I left the camera a little below the shoulder. This was disappointing, as I am not aware that any successful photographs have been taken from the top.* There were twenty-six individuals on the mountain that day besides myself, twenty-four of whom spent the night in the lower hut; and a photograph of them all in a row along the summit ridge of the mountain would, I venture to think, have been unique.

* Since this was written, Signor V. Sella has taken twelve large photographs very successfully from the top of the Matterhorn.

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Until within the last few years the practice of landscape photography involved carrying about with one a vast quantity of apparatus and chemicals, and a tent; and moreover, a copious supply of water on the spot was essential, for the only process then in use was that known as the wet collodion process. To take a single picture you had to begin with a sheet of bare glass, and go through on the spot a long series of operations ending in the production of a finished negative. Twelve years ago I used to work this process in Yorkshire with small plates, 5 by 4 inches in size; and with vivid recollections of the toil involved in carrying about the tent and basket of chemicals, &c., necessary for taking pictures even on this small scale, I look with admiration and wonder at certain magnificent photographs of the Oberland mountains many times this size, which must have been done by the wet process, mentally picturing the train of porters carrying the tent, the huge camera, and all the outfit necessary for that cumbersome but eminently successful process. Nowadays this is all changed, and sensitive plates are prepared for you by the manufacturer at a few shillings per dozen, which will keep indefinitely if protected from light and from damp, and are ready at any time to be put in the camera. No tent is necessary, no chemicals or water, all that need now be carried is the camera and its stand, and a sufficient number of these sensitive plates for the day's use. When I first began photographing in Switzerland in 1877, I used small plates, 5 by 4 inches, and a light camera and stand, with three double slides holding two plates each, the whole apparatus, including a sling case, weighing only about 7 lbs. Photographs of this small size, however, are rather insignificant in appearance, and in 1879 I took out a larger kit, suitable for plates 7½ by 5 inches. Finding occasionally that a supply of six plates was insufficient for long expeditions, in the following year I still further increased my impedimenta by adopting a new arrangement for carrying the sensitive plates, known as Hare's changing box; it holds twelve plates, any one of which can be transferred to a slide, exposed in the camera, and returned to the box without any possibility of extraneous light reaching it. The whole apparatus, packed in a leather knapsack, weighs about 18 lbs., and the tripod stand 3 lbs. more. This is packed on the top of the knapsack, so that the whole can be carried comfortably and securely on the back, without interfering in any way with the arms. I am aware that it is a principle with most climbers to carry as little as possible themselves, and that it is a serious handicap if one 'scales' 11 stone, but climbs 12½; still against this I must set

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the pleasure of complete independence, so that one can ramble about with one's camera entirely alone, without either hiring a porter or boring a companion. Indeed, among the best photographs I have obtained are those taken from the top of the Ober-Rothhorn, and from near the Mountet hut, when I was quite alone, and thus had no distraction of any kind, and had plenty of time to select the best points of view. When, however, one is climbing with a guide and porter, it would be foolish to carry all the apparatus oneself, and I generally divide it into two smaller packages, and only carry the lighter and more fragile part myself. Thus, when going up the Weisshorn my share of the impedimenta weighed about 8 lbs., and certainly I found that this small burden was no hindrance to me whatever. The operation, however, of taking photographs when one is on the top of the Weisshorn is somewhat complicated by the exigencies of the position, especially when, as was the case at 8 A.M. on August 12 last year, the difficulty of finding standing-room for both the camera and myself was increased by the keenness of the brisk northerly breeze which was blowing. The circumstances, indeed, of an arrival at the top of a mountain on a brilliant morning, with a glorious view all round, and with a very limited time to spend there, are somewhat at variance with the cool deliberation and close attention requisite in order to make no mistakes while setting up the apparatus and going through the series of necessary operations, the omission of any one of which may spoil the result. I did, in fact, lose the first of the four plates I took up the Weisshorn through inattention to one adjustment of the camera. Most of the manipulations to be gone through are the ordinary ones which are the same everywhere, and need not be described; but there are one or two special points which must be attended to in taking panoramas from high points. These are, to level the camera accurately, and to take care that the back of it is exactly vertical, or else the sections of the panorama will not fit together; also to lower the sliding front carrying the lens as much as possible, so as to raise the line of the horizon, otherwise half the picture will represent nothing but sky. In most cameras the sliding front can scarcely be lowered at all, and I have had mine so made that it can be lowered an inch and a half if necessary. For single views the camera may be tilted upwards or downwards as required, provided that the plate at the back be brought into a vertical position by means of the 'swing-back.' When this has been done, and the focus carefully adjusted, the cap is put on the lens, the slide carrying the sensitive plate is inserted in its place, the shutter with-

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drawn, and the exposure made. In the dazzling brilliancy of sunlit snow scenes the exposure is very short, from one to two seconds being sufficient with a very small diaphragm in the lens, and the slowest plates I can get (Wratten and Wainwright's 'ordinary' gelatine plates). The right exposure must, however, be found by experience, as there are no absolute rules by which it can be regulated. After a little practice these manipulations will be found to present no difficulty; but there are a few mistakes one is liable to make, and which should be guarded against. In the first place, do not forget to put the cap on the lens before drawing out the shutter; the plate is ruined long before the mistake can be rectified. I spoiled one plate on the top of the Dom by this omission. Secondly, do not forget to draw out the shutter before taking the cap off the lens to expose the view. This is not quite so bad a mistake, as you do not waste the plate; but you lose the view, unless you find out the omission before leaving the place. Thirdly, don't expose one plate on two views. This is sure to happen unless the plates are used in strict succession, and each view carefully registered in a note-book immediately after being taken, and the exposed plates removed from the slides or changing-box every evening. Once I had been taking some portraits of friends at home, and among them was a striking group of two gentlemen in nigger costume playing a banjo and bones. This plate was, by some oversight, left in the changing-box when all the rest were replaced by fresh ones, and remained in it, undeveloped, when I went shortly afterwards to Zinal. In due course its turn came to be exposed on a view; and when I developed it the forms of two gigantic but ghostly Christy Minstrels gradually appeared, leaning against the Weisshorn and Lo Besso respectively, and completely spoiling what would otherwise have been a fine picture.

One of the most important questions to be settled in taking a view is, how much of it is to be included in the photograph? If we look at a view with one eye, closing the other, we shall find that the extent of view seen comfortably, without turning the head, is included within an angle of fifty degrees, more or less. To include a wider range involves somewhat straining the eye, unless the head is also turned; while if the eye itself is kept fixed on a distant object the range of distinct vision on either side becomes very limited. We may consider, then, that an angle of fifty degrees will be a suitable limit for an average view. Now, with a given size of plate, the angular extent of view included on it will depend solely on the focal

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length of the lens employed—that is, its distance from the plate. Thus a short-focus lens will include a wide range of view, but it will represent it on a very small scale; while a long-focus lens will give a picture on a larger scale, but of much less extent. Having decided on the limits of a view, we have to select the lens which will just bring the whole of it on the plate. This may, of course, be done by trial, but it saves much time to use an instrument called a view-meter, which will enable us to select the right lens at once. In its simplest form it consists of a piece of string with knots on it; each knot represents a lens, being so placed that the length of string which just covers the view when held out at arm's length between the hands indicates on inspection the lens to be used. I generally carry five lenses, all of which come in useful for different subjects, though one can do a good deal with two or three. The one I nearly always use for panoramic pictures is a Ross's 'symmetrical' lens of 8-inch focus, which includes very nearly fifty degrees on a 7½-inch plate.

When the plates have been exposed, the development of the latent image may be done at any time, though I seldom put it off long, the desire to know how the pictures are going to come out being too strong. It may be deferred, however, if necessary till one's return to England, the plates being carefully packed up again after exposure; but this is not advisable. I once brought home some undeveloped plates, but the packet was very nearly opened in broad daylight by a too curious custom-house officer, who insisted that it was a parcel of watches. Since then I have always finished the development in Switzerland, and have often found it a welcome occupation on wet days. The necessary chemicals and apparatus can be packed in a very small space, and one's hôtel bedroom is easily converted into a temporary 'dark room,' by covering up the window carefully with a thick shawl or rug, and lighting a small red lantern. The development of the plates is the most delicate operation in photography, and requires much practice and experience to get the best results, and should be thoroughly mastered at home before attempting it while travelling. Perhaps more plates are spoiled by faulty development than by any other cause. The operation of printing from the negatives is, of course, done entirely at home, and may if necessary be entrusted to a professional printer.

We may assume that we have now got our photograph, but that is not quite all yet. In order to get all we can out of it, we must know how to look at it. Suppose we were to hold up in front of a view a sheet of glass at a definite distance from

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the eye, say ten inches, and were to trace upon it the outline of the view as seen through it with one eye, and if we then made a copy of this outline on paper and filled in the details, we should have a sketch which, when held at the *same* distance of ten inches and looked at with one eye, would give the (optically) truest possible representation of the scene. It is evident, moreover, that if when we have made the tracing on the glass, we hold it closer or further from the eye, the tracing will no longer coincide with the view, and will not give to the mind the same impression as the view. In other words, to give the truest effect it must be *seen* at that distance at which it was *made*. The same holds good with a photograph; it should be held at the same distance from the eye as the lens or camera's eye was from the plate. Then, and then only, will it give an optically true representation of the scene. Unfortunately we very seldom know what was the focal length of the lens used, but we can often find by trial the distance at which a picture looks best. Now the shortest distance of distinct vision for a normal eye may be taken at seven or eight inches, so that all photographs taken with lenses of a shorter focal length than this will not give a correct idea of the scene, unless held uncomfortably near the eye. Hence all photographs on a small scale, and especially panoramas, really give a wrong notion when hung up on a wall and looked at from a distance; they should be treated more like maps, to be examined closely in detail. Enlarged reproductions from the original negatives have a far better pictorial effect, but are unfortunately very troublesome and expensive to make.

Still, a small photograph well taken and nicely mounted may be a charming little object, and much better than none at all, whatever one may say against it theoretically. Of course no photograph can equal a really good sketch, but to sketch well and rapidly is far more difficult than to take a good photograph. The wish must have occurred to most climbers to have the power of bringing home with them some record, however imperfect, of the scenery they pass through. To all such who cannot sketch I would say, take up photography; do not be deterred by the dry details and apparent difficulties on which I have perhaps dilated too long in this paper, but which are easily surmounted. Those members of the club and others who have already taken it up will, I am sure, bear me out in saying that photography combined with mountaineering is a most fascinating and delightful pursuit.

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