LITTLE has been written about the effects of actual lightning discharge on the individual high up in the mountains, so that a brief description of a personal experience, with a few observations on it, may be of interest to readers of the Journal.

On September 3, 1936, my guide, Franz Josef Biner of St. Niklaus, his nephew, Heinrich Biner, who acted as porter, and I went up to the Sciora Hut in Val Bondasca, starting from Promontogno in Val Bregaglia. We hoped to climb the N. ridge (or buttress) of Piz Badile, an ascent which had become very fashionable that year: in fact more ascents were carried out in 1936 than in the whole period since Risch and Zürcher first climbed it in 1923.

The weather had been fine for a few days, but was somewhat cloudy on September 3. The next morning on leaving the hut at 03.15 there were variable clouds about which occasionally obscured a moon now a couple of days beyond the full. A long traverse under Piz Cengalo has to be made and, with the route we took, this occupied nearly 4 hours. A Swiss party consisting of a frontier-guard and two guides taking a higher line were about 3½ hours en route. We noticed that it was very warm for the time of the day, but the weather, although doubtful, did not look really bad. I should state here that this was the first big expedition on which our porter had been engaged, and he acquitted himself admirably. Nevertheless, various complicated rope manoeuvres required some instruction and caused considerable delay on the two difficult sections of the climb. In addition to this, although we had passed the Swiss, we let them through again and this delayed us three-quarters of an hour at the slab. Further, we had but a 100-ft. rope, not knowing that twice that length or even a little more is really necessary.

It started raining in the afternoon, at first on and off and then continuously, so that our cloth-soled shoes did not hold so well on the rock and we had to exercise the greatest care, even in places which would be easy under ordinary conditions. By the time we were approaching the summit we were wet through. Just as I, the last man, was stepping on to a little flat platform beneath the Vorgipfel we received the first lightning discharge. My sensation was that of a very severe shock from the electric main—I know something about this because of working as a radiologist in the early days of that science. There was an exceedingly painful contraction of the muscles of the whole body, but especially of my right arm, which was touching...
Piz Badile, N. Buttress.

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the rock. The shock was a wavering contraction lasting half to one second. The whole thing was exceedingly painful and left me for a few minutes with a partially paralysed right forearm. This soon passed off, leaving but an area of loss of feeling in the fingers. Franz, the guide, was leading and he felt the shock mostly in one leg, while Heinrich, the porter, in the middle of the rope, experienced very little sensation. The others had ice axes and they threw these down on to a little patch of old snow on the platform. I had no axe.

We had heard no crack, merely a tearing, rushing sound. It was very cold and there was a strong wind from the N. blowing sleet into our faces; I crawled into the shelter of some rocks, not realizing that they were those of the *Vorgipfel*. A little while later we were hit again. This time apparently Franz received more than I did, and the severe contraction slightly damaged a muscle in his left thigh; for a time also he had no feeling in the left leg, which was partly paralysed. I again experienced it fairly severely, but the porter felt very little. We were all terrified and really lost the power of coherent thought. Franz was urging us to leave him, feeling that he could not possibly get down on account of his paralysed leg. I assured him, however, that it would get all right in a short time. I also had lost all power of judgment and stupidly persuaded the others to sit with me in the shelter of the rocks. Just as we were beginning to recover from the second shock we received another. My sensation was that I saw a big star right in the middle of my forehead and I thought my end had come. Then I heard the others imploring me to come to the patch of snow, but, as they were the length of the rope away, I realized that I must have been unconscious. I had a sharp pain round my waist and seemed to be paralysed from the waist down, as well as having no feeling in the legs. In a few minutes, however, I had recovered sufficiently to hobble to my companions.

Now, as to what had happened. Again the porter was not struck, and again Franz was; in fact he experienced similar sensations to myself but was not unconscious so long; he also saw several stars and thought *his* last moment had come. I imagine that one receives this impression when regaining consciousness, but it may be before one has lost it. Apparently, when I was hit, I straightened out, turned half round and then fell back into my original sitting position. Franz also was straightened out in a similar way. So there was Heinrich left alone on the mountain, apparently with two corpses—a good start for a beginner. Franz recovered consciousness first in about a quarter of a minute; it appears to have been more than half a minute before I came to. After a time Heinrich was able to get off first Franz's *Kletterschuhe* and then mine, and to help us on with our boots; at this time we were both incapable of doing this for ourselves. We tried to take the ice axes, but another lightning discharge in the near vicinity made us leave them behind. After a little while we proceeded to the top, where our arrival could not have been before 18.00 or 18.30.
We found tracks here and started immediately to descend. It was still snowing or raining and very misty. We went down rapidly until we had caught up the Swiss, but although they had started correctly, they were not then taking the proper route, and I begged Franz to let the porter seek the right one or take the lead himself. He continued, however, to follow the Swiss, and he told me afterwards that it was because he was still feeling the effects of the lightning, and I can quite believe it, for although I had nearly recovered by then, I had been much stupefied at first. Having again come back to the proper route the Swiss followed it in a false direction, left it to go over a small ridge and, roping down, found themselves on a completely wrong part of the mountain; we followed them and had to spend the night out, wet through. Although it was not actually freezing, except for a short period when the rain turned to snow before ceasing, we soon felt very cold. I was dreadfully tired and my ribs ached terribly, partly from fatigue and partly from the effect of the third shock: I longed to lie down, but there was nowhere flat enough. We ate a little food, the first for 12 hours or more: later we found a place where two of us could sit or recline uncomfortably with sharp rocks digging into us. This did not worry the porter, and he slept almost the whole night in a nearly vertical position. The snow stopped about 22.00 and luckily the thunderstorms, continuous over the Italian mountains to the S., did not invade us again. In the latter part of the night I dozed off once or twice, but Franz was unable to sleep at all.

At 03.30 the Swiss started up over the ridge where they had gone wrong, but we preferred to wait for daylight and followed them soon after 05.00. On clambering back over the ridge we soon found the correct route, finding ourselves shortly below the Swiss party, which had gone wrong again; we directed them towards the correct route.

We reached the Gianetti hut, had a good breakfast, put our clothes out to dry and went to bed. In a few hours, although it seemed but a few minutes, we were awakened by an Italian frontier-guard, who soon made it plain to us that we must return by the mountains into Switzerland and not by the valley; all this, notwithstanding the fact that the Italian-speaking Swiss party made our condition quite plain to him. By some mysterious process the Swiss themselves were permitted to return by the valley. The weather did not permit our return the next day, and luckily the frontier-guard took a Sunday off in the valley. On September 7 Heinrich fetched down the axes and we returned over the Passo di Bondo.

Now, can anything be learnt from this experience?

Thunderstorms usually come suddenly and often unexpectedly. Yet they will sometimes go on for several hours in the vicinity of the original storm, and this actually happened with us, for they continued for most of the night. It is therefore hardly advisable for climbers to seek for some sheltered cave at the first sound of thunder, for that might cause them to be benighted, with the possibility of worse conditions afterwards. In our case, by the time the rain had started we
could not go back; it would have been too dangerous and much longer than to proceed. We did not know that we were in the centre of an electrical disturbance; no hissing of ice axes was heard, and although there was some distant thunder there was none in the vicinity. We could not see the cloud formation, because of the mists. After the first shock we should have lain flat on the little patch of snow or on any level ground and should have got away as far as possible from any projecting rocks. I should have remembered this at any ordinary time, but obviously the power of clear thinking had been taken from me. No one who has not been through it can realize the terror such a thing inspires. If one has one's full faculties and the conditions of the climb permit, it is essential to avoid ridges and projections and to lie flat.

Why were we not killed? The first shock was probably what is known as an 'earth return shock' and the second may have been the same, but I think the last must have been a direct hit. What saved us was that the electrically-charged cloud was quite close to the mountain-top and therefore did not build up nearly so high a tension as a cloud discharging on to the plains from a relatively greater distance. The former will generally be the case in the mountains, but there is a special danger from the lesser discharges in these regions. Had we been but a few feet lower, the involuntary contraction of the muscles must inevitably have torn the leader from his hold and probably dragged off the others, although the ridge was thereabouts quite easy. There have been a number of cases where good mountaineers have failed mysteriously in bad weather and been lost. Is it not likely that a certain number of these have been cases of electric shock when the climbers were in a place which, even if quite easy, would need muscular control? Two Italians, for instance, were killed on the ordinary route of Piz Badile in 1922. That same day we had experienced a horrible battering on the Cima del Largo from large hailstones in a thunderstorm. Is it not possible that lightning caused the Badile accident?

What puzzled me at first was the fact that the porter, in the middle of the rope, practically escaped each shock. The explanation, however, must be that the rope was quite wet and conducted the current past him from the man at one end of the rope to the man at the other. I noticed, moreover, on examining his clothes later on, that he was wearing a much rougher cloth than either of us, a fabric which might absorb much more water without holding a layer of surface wet. It is possible that, with the amount of rain we had had, his cloth was not so good an electrical conductor as ours. The Swiss party was just beyond and over the summit during the thunderstorm and was not struck.

It will be interesting to medical members to note the temporary nature of the paralysis in the case of a relatively slight shock like the one in question. The third shock in my case probably passed from my head to the rope round my waist and paralysed me by its effect on the spinal cord or on the brain. The burning pain which I felt
round my waist on recovering consciousness leads me to think that the current took this path. All sense of time was lost, but it was only a few minutes before I was able to walk. It was the same in the case of the guide's leg. His paralysis was only temporary, but he was slower in recovering his mental balance. One curious fact remains to be mentioned. The next day I noticed that Franz's left hand was much swollen, and on mentioning it, he called my attention to my own right hand. This, although quite painless, was double the size of the left; it did not pit on pressure, it was merely puffy; it was not discoloured, but took two or three days to regain its normal size. The medical explanation of this is not at all obvious.

Thunderstorms are among the unavoidable dangers in climbing, but only in the case of mountaineers forcing a climb in obviously bad weather can the risk incurred be considered culpable.

We were all glad to escape not only with our lives, but with no permanent injury—so far as we know. Neither Franz nor I expected to survive during the storm. At the beginning of the night I did not expect to live through it; after midnight I realized that I should. We none of us want such an experience again.²