Conditions were on the whole similar to those of the previous year. There was considerable variation in night temperature. At Base Camp (18,000 ft.) the lowest temperature was −9·4° F. (−23° C.). This would correspond to a temperature of −45·4° F. (−43° C.) at 28,000 ft., assuming a lapse rate of 3·5° F. per 1000 ft. Usually night temperatures were considerably higher than this and in the Western Cwm in the latter half of May, the lowest night temperature observed was +14° F. (−10° C.). The Swiss party, in the autumn of 1952, recorded temperatures of −22° F. (−30° C.) in the Western Cwm. The intense cold was one of the main factors which defeated their autumn expedition.

Snow Conditions

Snow fell almost every afternoon from 10 April to 15 May on the Khumbu Glacier. This greatly increased the work of making routes and ferrying stores up the glacier. It is doubtful whether a smaller and less well equipped expedition would have been able to continue operating in these circumstances.

Every morning fresh snow, varying from a few inches to 2 ft. (0·6 m.) in depth, had obliterated the route and fresh tracks had to be made. The transition from fresh powder snow to old firn snow was, however, extraordinarily rapid and was accomplished within a day.

An interesting effect of the intense solar radiation was the "honeycombing" of the snow surface on the lower part of the ice fall with myriads of small shafts several inches deep due to the differential melting caused by aggregations of dust and gravel on the snow surface.

Other strange effects attributable to local conditions of temperature and radiation were the strange fluted pyramids and the upright blades of ice, shaped like Roman swords, which were a feature of the lower part of the glacier.

Whereas the Western Cwm was relatively sheltered from wind, the snow plume on the south-east ridge showed that high winds prevailed on most days above the South Col. Hillary's account of snow conditions climbing up the 400 ft. (122 m.) slope towards the South Summit are strongly suggestive of wind-crust, since he describes the crust breaking up all round his legs and sliding away down the slope.* Above the South Summit (28,700 ft.) he was relieved to find hard snow on the summit ridge in which step cutting was necessary.

Even above the South Col, some melting of the snow on the rocks was observed by the climbers. Thus, on the southern route on Everest, conditions in 1953 were very different from those reported by previous parties on the northern route, who reported that the snow did not melt or consolidate above 25,000 ft.

MS. received 31 *December* 1954

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* One would have thought that this was wind slab, and this was suggested to Sir E. Hillary by Dr. Pugh, but he did not agree.—*Ed.*

THE INITIATION OF DIRT CONES ON SNOW

COMMENTS ON J. WARREN WILSON'S PAPER†

By R. Streiff-Becker
(Zürich)

Mr. Wilson confirms the explanation given by Spethmann in 1908 regarding the formation of dirt or sand cones on ice or snow, according to which the transport by wind or dust or fine sand furnishes the primary cause for the production of these cone shapes, the secondary cause being

† *Journal of Glaciology*, Vol. 2, No. 14, 1953, p. 281–87.

insolation. Spethmann stated that in the Alps transport by wind was certainly not often the primary cause; there the transport of sand by water was a more important factor.

I agree with these opinions, and here I would merely mention two observations which I once made. In 1921 I saw that on the flat part of the Upper Grindelwald Glacier the stream of water from the snow and ice in its meanders melted a circular flat depression in the ice as shown in the drawing on p. 367. While the water kept flowing through and passing round in spiral eddies, a thick layer of sand remained lying in the quiet centre of the depression. Downhill, a transverse crevasse cut across the glacier. I then considered that the following would happen: the glacier is moving downhill, and as soon as this meander belt has reached the crevassed region the stream will fall into the newly formed crevasse, while the depression caused by the meander will remain dry and with the sand in it. Then, in time, just as the leg of a glacier table is produced under a block of rock by insolation, here an ice-cone will be formed, over which the sand will lie like a cape over a man's shoulders.

I would also like to state that I once observed how dirt cones are produced from another cause: until about 1920, the north-east end of the Clariden Firn (Canton Glarus, Switzerland) still lay below the rocks near its end on which the hut of the Swiss Alpine Club stands. In the following years the general shrinkage of the glacier began. The upper surface sank down, becoming quite concave. The slope between the rocks above and the glacier below became continually wider. It consisted of ground moraine and marly weathered rubble. One day the rubble slid down at a certain place over a front of about 20 m. and settled on the flat part of the glacier, thereby forming low, wreath-shaped humps, such as are typical in cases of solifluction. To my astonishment, in the following autumn I found a group of several black sand cones there, some of them 1 m. high. Investigation showed that there was old glacier ice under the covering of sand. In the following year, only three of these cones still remained. Neither in the previous years, nor in subsequent years right up to the present day, have cones of any considerable size been observed, so that the cause of the single occurrence of those sand cones was the mud covering of the small solifluction.

CORRESPONDENCE

The Editor,
The Journal of Glaciology

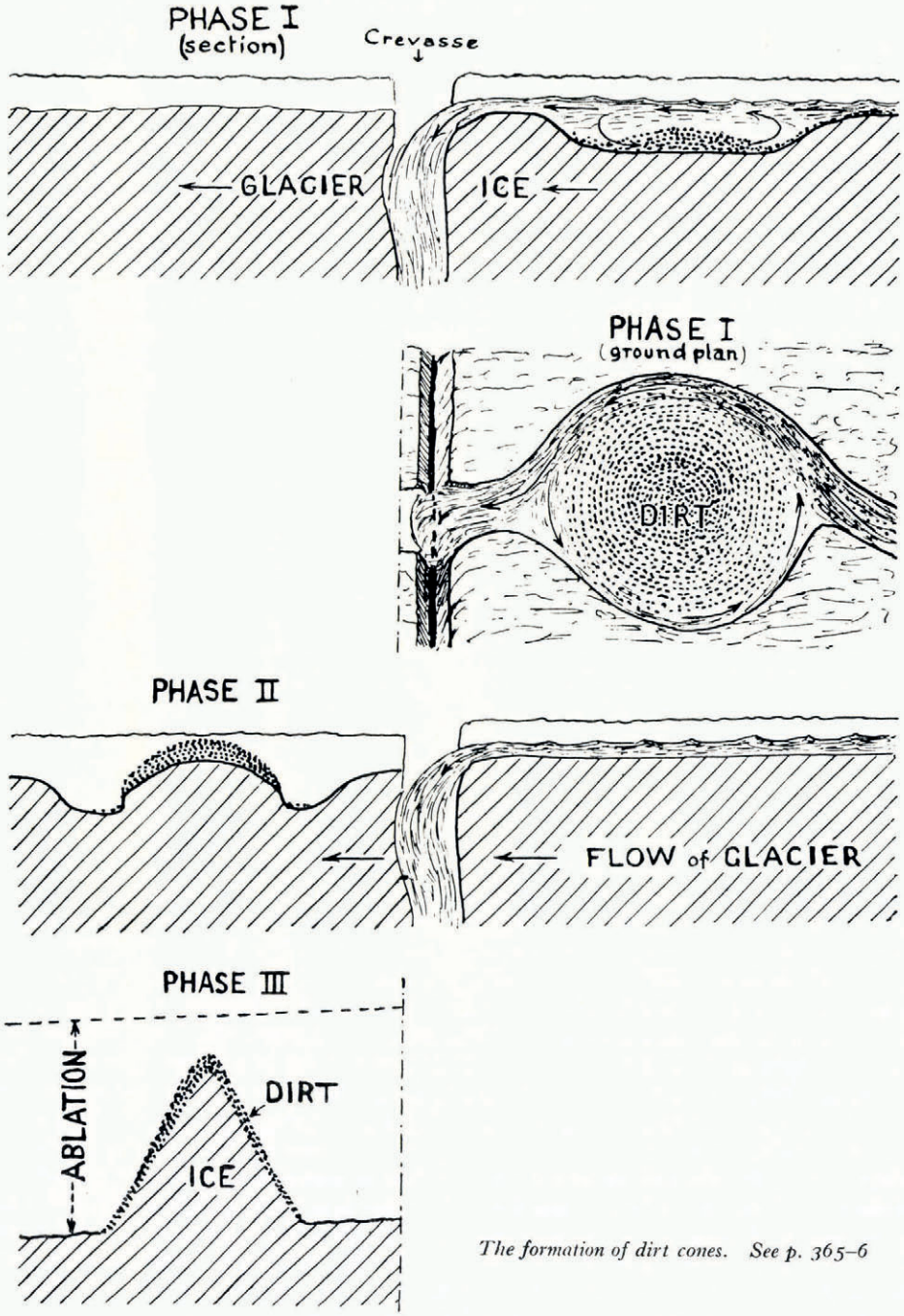
SIR, *Alpine Glaciers*

Will you kindly afford space in the *Journal* for a reply to some of the criticisms put forward by Mr. Side in his review of my book *Alpine Glaciers* in Vol. 2, No. 12, of the *Journal*? He incorrectly suggests that I have erred in stating the total length of the Great Aletsch Glacier as being 15 miles, owing to my having overlooked the fact that the upper reaches consist of the Jungfraufirn and the Grosser Aletschfirn. As a matter of fact my statement was really intended to indicate the approximate length of the whole glacier system from snout to bergschrund, the upper portions, the firn, being treated and named as part of the glacier as a whole, as is frequently the procedure in the case of a river, the original rill at the source of which bears the name of the larger stream into which it eventually develops. The portion known as the Great Aletsch Glacier proper, commencing at the Lötschenlücke, is certainly not more than about 13½ miles in length, but the inclusion of the Jungfraufirn, or of the even longer tributary the Ewigschneefeld, would bring the total length up to the 15 miles stated.

As to statements which might be misleading to mountaineers, the book contains only such information as I have gathered from my own experience, and my guides have always been of high repute.

In his concluding paragraph Mr. Side generously acknowledges that the book accomplishes the purpose for which it was intended. It is a pity that it should receive adverse criticism on account of my having used a term in its widest application, or on points which are really controversial.

66 *Shanklin Drive*, A. E. LOCKINGTON VIAL
Leicester
24 *October* 1953



The formation of dirt cones. *See p. 365–6*

https://doi.org/10.3189/S0022143000025296 Published online by Cambridge University Press