

## A NEW METHOD OF GLACIER EXAMINATION

It has for some time been obvious that far-reaching results could be obtained by penetrating right through a glacier to its bed. The expense however has always been prohibitive. Recently however Dr. H. Carol, of Zürich, had the ingenious but simple idea of going down through a glacier by means of a glacier pot-hole and has described his experiences in *Les Alpes*, 1945 (pp. 180-84).

He chose a point on the Lower Grindelwald Glacier marked on the Siegfried map as the "Walchiloch" whose present position is some 600 metres west of the Stiereghütte. The time chosen was November when water flow, and snow to block the entrance, would be at a minimum.

The exploration was by no means easy. The party first passed through a slightly inclined tunnel for 50 metres. This ended in a vertical shaft which was negotiated by means of a rope ladder. At the bottom they were about 72 metres below the glacier surface, which is about one-third of the total estimated glacier depth at this point.

Here however they were held up by a narrow and dangerous constriction which was blocked at its end by a large water-filled basin which prevented all further progress. There seems little doubt that if this method were followed up, a place might be found which would provide access to a glacier bed. It is understood that Dr. Carol will repeat his attempts.

It must be remembered that the constant movement of the glacier might overnight open up a suitable means of access but equally well might close it. Therefore this form of glacier exploration must always be a very risky venture.

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## THE CROSS SECTIONS OF GLACIATED VALLEYS

By W. V. LEWIS

THE typical U-shaped cross-section of glaciated valleys is well known but little understood. If a climatic change results in a glacier occupying a deep river valley, and some erosion is assumed to occur wherever the ice makes contact with the bedrock, then a partial change from the "V" to "U" section is to be expected. A more potent agency in such a change is probably the sapping of the valley sides by the alternate freezing and thawing of melt-water flowing down to, and under, the glacier. This has been briefly suggested by de Martonne and worked out somewhat more fully in the case of cirques.<sup>1</sup>

With regard to the mechanism of vertical erosion by glaciers the Horunger-Fanaråken area of central Norway proved instructive. Ice derived both from the mountains and plateau once converged on the deep glacial valley plunging down past Turtagrø into Fortundalen and the Sogne Fjord. The evidence here presented seemed to confirm the suggestion long held in many quarters,<sup>2</sup> that whereas relatively thin ice masses do little vertical erosion, as they thicken the vigour of down-cutting greatly increases. Such a process of over-deepening would clearly be a cumulative one provided the surface gradient were adequate. This would help to account for steps in the long profiles, and "U-in-U" forms in the cross profiles of valleys without the necessity of invoking separate glaciations, though the latter might well assist in the process.<sup>3</sup>

<sup>1</sup> Lewis, W. V. *Geog. Review*, Vol. 30, 1940, pp. 64-83.

<sup>2</sup> See for instance Cotton, C. A. *Climatic Accidents in Landscape Making*. Christchurch, N.Z.: Whitcombe and Tombs, 1942.

<sup>3</sup> Garwood, E. J. *Geog. Journ.* Vol. 36, 1910, pp. 310-339.