whether the different textures of the ice established by Fisher have a primary influence upon the formation of Forbes's Bands, for instance because bubbly ice has a different viscosity from that of clear ice, or whether, on the contrary, the difference in texture *is a result* of pressure variations or even simply a secondary phenomenon of the glacier surface. Unfortunately technical difficulties due to rapid plastic distortion did not permit crystallographic investigations to be made of the upper Mt. Collon Glacier. It is remarkable that the wave formation of the glacier surface below the ice fall, similar to that of the water surface immediately below a water fall, is by far the most intensive at that point and flattens out in the direction of the advance. Ablation reached the following values according to measurements made by E.O.S. in the summer of 1950: at 2390 m. about 7·3 m., at 2270 m. about 7·8 m. and at 2220 m. about 8·2 m. These were exceptionally high amounts. On the other hand, it is equally remarkable that important variations of the Newtonian viscosity may occur in the interior of the glacier as was proved later in the Z'mutt tunnel (E.O.S.) which, with a length of 1060 m., had a maximum ice cover of 80 m.*

Finally, I must thank Mr. Fisher for his remarks which will help in the further study of the formation of Forbes's Bands. The point he has raised regarding the different conditions obtaining in different glaciers deserves particular attention.

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SIR, *Pot-holes and Glacier Mills*

I agree with Professor Hollingworth (*Journal of Glaciology*, Vol. 1, No. 9, 1951, p. 490), when he says that in the subglacial stream under a strong hydrostatic head a swirling action, *i.e.* the scouring out of a pot-hole by rolling stones, is hardly possible. Unfortunately I am unacquainted with conditions in polar glaciers, but in alpine glaciers I know them well. In the latter, the subglacial stream is nearly always in contact with the free air, since the subglacial channel is subjected to continuous alterations. The ice roof of the channel is attacked by the comparatively warm, splashing water and moves steadily downhill with the glacier. The water level in the stream fluctuates enormously, not only from summer to winter, but more particularly from day to night. If for any reason the flow is momentarily obstructed, the hydrostatic head increases rapidly and must in time lead to a breakthrough that will certainly be violent and sometimes even catastrophic. Generally, as I have said, the stream under an alpine glacier is in contact with the free air. In the case of very deep pot-holes, higher hydrostatic pressure would have to be assumed, owing to their depth, and there could therefore be no swirling action. It may, however, be possible that the water in the pot-hole finds some exit to the ground, perhaps at a fissure in the side of the pot-hole, or the water-jet may fall tangentially into the hole and issue again by passing helically up along the wall and thus return to the glacier bed.

It is often found that above a step in the glacier bed, and close to the step, the subglacial stream divides into several arms spreading over a wide area. These cut into the tread of the step, circular lumps being formed between them. This is the reason for the frequent occurrence of this glacier phenomenon above steps. Crevasses occur in the ice where the glacier passes over, but here there is also the circumstance that the glacier stream is on a steeper slope, and consequently is better able to form pot-holes.

I do not deny the possibility of pot-holes being formed by the direct fall of water into a crevasse, but I am of the opinion that the frequency of such occurrence is very much less than the formation of pot-holes by the freely swirling subglacial stream.

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26 *March* 1951

• Details of this work will be communicated to the International Commission on Snow and Ice at Brussels in August 1951.