CORRESPONDENCE

The Editor,
The Journal of Glaciology

SIR,

Subglacial stoping or block caving

The description of subglacial stoping or block caving of the Black Rapids Glacier in Alaska in the *Journal of Glaciology*, Vol. 2, No. 20, 1956, p. 727, reminds me of the almost identical conditions of the Kome Glacier on Nugssuaq Peninsula in the Umanaq District of western Greenland observed 27 years ago (*Wissenschaftliche Ergebnisse der Deutschen Grönland-Expedition Alfred Wegener*, 1929, und 1930/31, Bd. 3, 1935, p. 14). Lowering and rapid recession of the central part, caving in with crescent-shaped crevasses, a huge ice tunnel and a vigorous meandering melt water stream cutting through the ice were features of the Kome Glacier too. Such forms are probably created if the front parts of a glacier become stagnant and the destructive forces of melt water are no longer counteracted by the supply of ice from the higher parts of the glacier. These features represent a particularly strong development of a complex of forms which are typical of the ablation zone near the snout of glaciers (see R. v. Klebelsberg, *Handbuch der Glaziologie und Glazialgeologie* 1948, p. 122–139).

F. LOEWE

University of Melbourne,
Department of Meteorology
12 November, 1956

SIR,

The Formation of Ogives

The review by Mr. W. V. Lewis[1] on the status of present-day knowledge on the formation of ogives, and suggestions for the direction that future research should take, is a most stimulating contribution to this important problem.

Mr. Lewis concludes by "posing the greatest puzzle of all—are these ogives the upturned ends of the parcels of annual layers which spill over the lip of the ice fall?" From observations in south-east Iceland[2], conducted by Dr. C. A. M. King and the writer, it appears that the answer to this question is "no"! Ogives on the south-east side of Morsárjökull were seen to form despite the fact that this glacier has been severed from its accumulation area since the 1930's and that the mode of supply is now entirely by avalanching ice. During this process all traces of the original stratification must be completely destroyed. Mr. M. M. Miller has described to the writer a similar glacier in Patagonia where ogives form beneath avalanches. Neither is it likely that such large-scale features as the stratification of the *névé* could descend through a broken ice fall without disruption.

Too much emphasis must not be placed upon the apparent annual formation of ogives, which has admittedly been proven on several glaciers. The spacing of the ogives does not always correspond to the annual movement of the relative section of the glacier. On Svínafellsjökull five ogives were seen to form in the space of one year's movement, albeit every fifth, or annual, ogive was more pronounced than the intervening ones. On Falljökull, however, the spacing, and presumably the time of formation, of the ogives was found to be irregular, and it appears that between six and twelve ogives form during the course of one year.

To explain these characteristics differential movement within the ice fall, or avalanche cones, including possible surges of flow and release of accumulated pressure along zones of thrusting, must be considered, together with the association of pressure ridges at the base of the ice fall with the formation of the ogives. In this connection Professor S. Thorarinsson has aptly commented on the formation of "ogives" in lava streams[3] where the question of an annual rhythm cannot be considered.