GLACIOLOGICAL OBSERVATIONS ON MORSÁRJÖKULL S.W. VATNAJÖKULL

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THE observations, which form the basis of these articles, were made as part of the scientific field programme of the Expedition to south-east Iceland, 1953, organized by the University of Nottingham Exploration Society.

Part I: THE OGIVE BANDING

ABSTRACT. Morsárjökull is a small outlet glacier of Vatnajökull, Iceland. Two outlet streams from the ice cap unite at the foot of a precipitous step and carry a well-developed medial moraine; the north-west glacier stream is fed by a steep ice fall, the south-eastern one has been fed only by avalanches since 1938.

The movement of the glacier was measured and showed that the alternate dark and light ogives were one year's movement apart. Their characteristics are described and tentative suggestions concerning their mode of origin are proposed.

ZUSAMMENFASSUNG. Morsárjökull ist ein kleiner Auslauf-Gletscher („Outlets-Gletscher") des Vatnajökull, Island. Zwei Abfluss-Ströme von der Eiskappe laufen am Fuss einer steil abfallenden Stufe zusammen und fördern eine gut entwickelte Mittelmoräne; der Nordwestgletscherstrom erhält seine Zufuhr von einem steilen Gletscherbruch; der Strom vom Südosten ist seit 1938 nur durch Lawinen gespeist worden.

Der Bewegungsgang des Gletschers wurde gemessen, und es wurde gezeigt, dass die abwechselnden dunkeln und hellen Ogiven eine Jahresbewegung auseinander waren. Ihre Merkmale werden beschrieben, und es werden probende Vorschläge die Art ihres Ursprungs betreffend erwogen.

I. DESCRIPTION OF THE GLACIER

Morsárjökull drains a small part of the south-western area of Vatnajökull. It is one of the smallest outlet glaciers, being less than 5 km. in length and having an average width of 900 m. The glacier is divided into two parts by a conspicuous medial moraine derived from the rock wall exposed at its head. The two sections are supplied differently; the north-west stream derives most of its ice via a thin, steep ice fall, that to the south-east is fed entirely by avalanches (Fig. 1, p. 416).

The average gradient of the glacier is 1 in 11·5. A profile was surveyed using a surveying aneroid and prismatic compass. The slope is fairly uniform, but a slight increase of gradient, with the associated increase of seracs immediately upstream, probably reflects a subglacial valley step (see Fig. 2, p. 425).

The crevasses tend to run at right angles to the ogives as indicated on the map (Fig. 2). They appear to be mainly longitudinal in type according to Nye's classification.[1] Their arrangement is characteristic of his theoretical pattern which should result from compressive flow. This type of flow, according to Nye, should occur in the ablation area or where the bed of the glacier is concave, and be associated with curved surfaces of maximum shear stress within the ice, which dip up-glacier. These may cause movement of ice along surfaces of rotation, thus carrying material up from the bed of the glacier.

The arrangement of the crevasses indicates that, in the lower part of the glacier at least, it is moving as one unit and not as two separate ice streams, as only one complete pattern of crevasses is present.

The speed of flow was measured on the upper part of the glacier. As the valley walls were very steep and inaccessible the theodolite was perforce placed on the medial moraine. This necessitated the re-setting of the theodolite on line with reference to fixed points on the valley side. Direct measurements by tape could then be made between the original and new position of each peg. The peg positions are shown on Figs. 2 and 3 (p. 425).

Movement between 29 July and 14 August on the faster parts of the glacier was of the order of 26 cm./day. Although the period of measurement was short some general conclusions can be drawn as to the characteristics of glacier movement in this zone. The medial moraine moved least