Project 640004

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During July and August 1974, periglacial research was carried out on Banks Island. The author observed numerous periglacial features, but will concentrate on three main subjects: a) pingos, b) wind action, and c) structures in relation with patterned ground.

Pingos

Pingos were observed on aerial photographs in several places on Banks Island. Three groups were studied in the field.

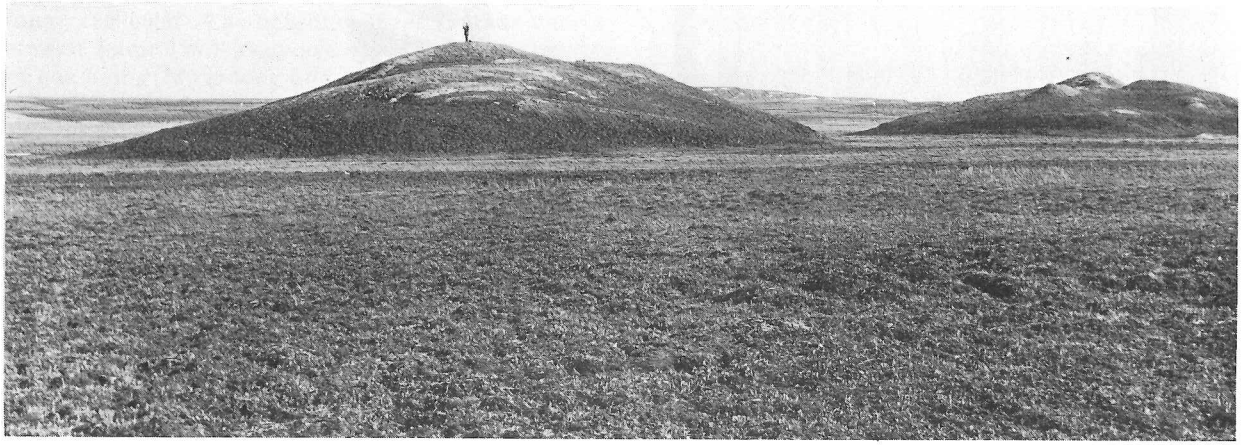

Figure 1. Pingos in the Thomsen valley.

Figure 2. Wind-blown sands in the Thomsen valley.

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Figure 3. Pingos in the Able Creek valley.

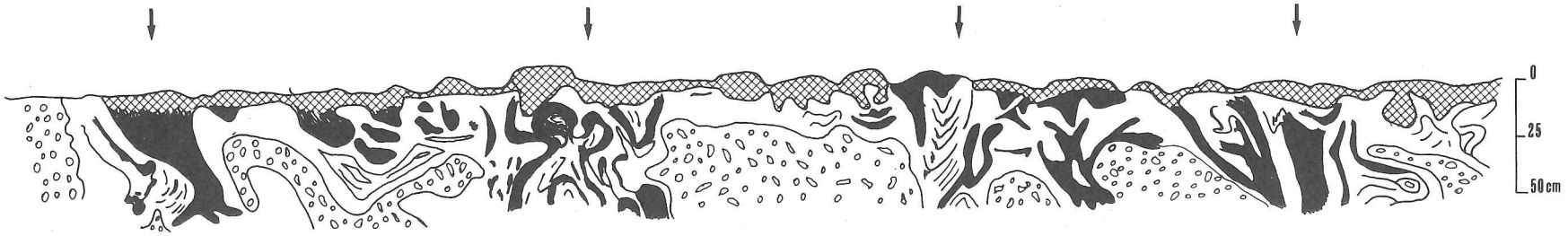

FIG 5 - SECTION IN NON-SORTED STRIPES

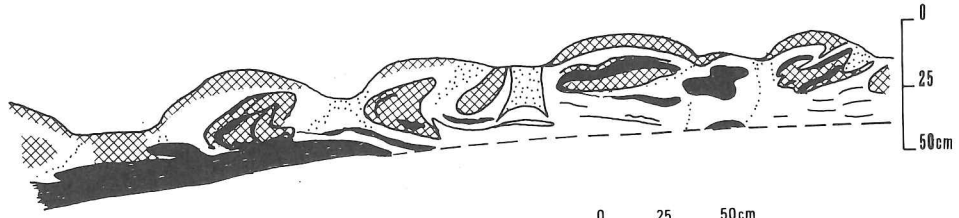

FIG 4 - SECTION IN HUMMOCKS

STRIPE AT THE SURFACE

PEBBLES IN SILTY SANDS

HUMIFEROUS SANDS

YELLOW SANDS

The first group of pingos is located on terraces of Thomsen River (lat. 73°43'30", long. 119°56'; Fig. 1) and was studied in collaboration with H. French (*see* this publication, report 128). Seven mounds with heights ranging from 5 to 14 m and lengths ranging from 75 to 180 m were investigated. Cross-sections were made using a pump in two of these; they showed the ice core of the pingos and the fluviatile sediments upheaved by the growing of the ice. These pingos are elongated and are thought to follow old channels of the Thomsen River.

The second group is a dozen pingos on low terraces of Able Creek, 8 km southeast of the first (lat. 73°41' 20", long. 120°00'). The height of these mounds varies between 3 and 9 m. They are elongated with the largest one being 230 m long and 30 m broad (Fig. 3). At this location also, their shape is in relation to an old channel of the river. Sections in two of these mounds have shown ice and demonstrated that these features appeared in a lake. Several samples taken for ^{14}C dating will give the age of these features. It is probable that these pingos grew only in the bed of Able Creek after the lake drained because the upper frozen ground was thinner there due to the flowing water.

A third group of pingos was examined 70 km southwest of Johnson Point (lat. 72°28'50", long. 120°9'). In this location, it is difficult to make the distinction between pingos and kame deposits. However, several mounds are definitely pingos, not only because of their horizontal-circular shape and their morphology, but because ice was observed in a section that was cut in one. The glacial history of the region must be considered in order to explain these pingos.

Wind Action

Along the Thomsen River between lat. 73°40' and 73°50', the present wind action is obvious on aerial photographs. Large surfaces of wind-blown sands are free of vegetation; deflation and accumulation appear very active (Fig. 2).

The wind deposits were studied in collaboration with J. S. Vincent. It is clear that the wind is now reworking old wind-blown sand deposits which in some places are more than 7 metres in thickness. These sands probably were supplied by the Thomsen River, and for a part at least, are derived from the Isachsen Formation. It looks probable, however, that these thick wind deposits are related to a Quaternary local event, perhaps an ice-dam lake.

Plant remnants and, in places, peat are conserved in these deposits. R.J. Mott collected samples for palynological studies and also for ^{14}C dating. When the age of these deposits is known, it will be possible to say more about their formation.

Some well developed ventifacts, stones faceted and polished by wind, were observed on a terrace of Thomsen River, in relation with these deposits.

Structures in Relation with Small-Scale Patterned Ground

At the beginning of thawing, cracks that exist between small non-sorted polygons and hummocks are filled with ice (depth 40 to 60 cm; width 5 to 30 mm). The cracks are probably initially due to desiccation and are filled by congelation of water when the snow begins to melt. This ice plays an important role in the evolution of these periglacial patterns.

Structures seen in sections cut through small non-sorted polygons (hummocks) show the upheaval of the material below the hummocks and, where sands are wind blown, some infilling of cracks occurs by eolian material (Fig. 4).

Frost scars (sorted circles) are the surface expression of cryoturbations. These phenomena occur in the upper part of the soil far from the top of the permafrost. It is always the finer material which is upheaving in the coarser one. Under the large non-sorted stripes that were investigated, large cryoturbations were found showing that this kind of patterned ground is due to important movements in the soil (Fig. 5).