

CORRESPONDENCE

The Editor,

Journal of Glaciology

SIR,

The temperature of the Sukkertoppen ice cap

We are very interested to read the paper by C. Bull in the October 1963 issue of the *Journal of Glaciology*, in particular the section classifying the ice cap as temperate.

The analysis of the results from the Cambridge West Greenland Glaciological Expedition 1958, mentioned in Dr. Bull's paper, is nearing completion. A small part of the expedition's field work was the measurement of ice temperature in the glacier Lyngbrae which flows north from the Sukkertoppen ice cap. Borings in the upper part of the glacier near the foot of the ice fall extended deeper than the crest of the winter cold wave. The readings show clearly that the glacier at these points was *not* temperate. From them we infer that the ice cap itself was probably "arctic" in this region. However, this does not accord with Dr. Bull's findings.

42 Hilary Avenue,
Cheadle,
Cheshire, England
30 October 1963

T. A. HENRY

R. J. WHITE

SIR,

The chemistry of ice-shelf brines

Brine soaking of ice shelves has been reported in the Antarctic by Stuart and Bull (1963) in the Ross Ice Shelf near Scott Base, and by Dubrovin (1960) near Lazarev Station. The phenomenon has also been reported in the Ward Hunt Ice Shelf, Ellesmere Island (Marshall, 1960; Lyons and Leavitt, 1961). The purpose of this communication is to describe the chemistry of the brine from the Ross Ice Shelf.

The brine was sampled in the summer of 1962-63 from a hole one kilometre east of Scott Base and 1.5 km. from the seaward edge of the ice shelf. The ice core containing the brine was allowed to melt and the melt water was collected in a polythene bottle. The samples were returned to New Zealand for analysis. The chemical analysis is shown in Table I, together with that of sea-water for comparison.

TABLE I. CHEMICAL COMPOSITION OF CORES FROM HOLE NUMBER 2

Sample number	Depth below top of ice shelf	Depth below surface of brine	Chemical composition of melted core					Minimum temperature (Fig. I) °C.	
	cm.	cm.	Na ⁺ g./l.	K ⁺ g./l.	Na ⁺ /K ⁺	SO ₄ ⁻² g./l.	Cl ⁻ g./l.		Cl ⁻ /SO ₄ ⁻²
S 13	407-458	107-158	1.3	0.05	26	0.221	2.3	10.4	-9.3
S 14	458-505	158-205	1.7	0.06	28	0.316	3.3	10.4	-9.3
Sea-water (for comparison)			9.1	0.33	27.5	2.3	16.5	7.2	—

It can be seen from the data presented in Table I that the sample is depleted in sulphate with respect to sea-water. Analyses by Dittmar (1884) have shown that, apart from variations in salinity, sea-water has practically a constant composition all over the world.

The most probable origin for this brine is sea-water percolating through the cold firn of the ice shelf where ice separates from it, producing a brine considerably more saline than sea-water.

Thompson and Nelson (1956) have studied the concentration of brines and the deposition of salts from sea-water under frigid conditions. When sea-water is cooled, ice first separates together with small quantities of calcium carbonate, but except for becoming more concentrated, the chemical composition remains practically unchanged until a temperature of 8.2°C. is reached, at which point hydrated sodium sulphate begins to crystallize. As temperatures are lowered the composition changes rapidly as sodium sulphate is removed from solution.