sion that further northing was impractical; and at 10/1500Z the *St. Laurent* turned south from 72°06'N., 63°55'W.

The open water in Smith Sound was observed by the DC-4 which flew over southern Nares Strait on the afternoon of the 10th. Their flight track did not allow delineation of the entire North Water area, but concentrations as low as 4/10ths young ice and gray ice were noted. In addition to an ice map, photographic and IR scanner imagery were obtained.

Following the decision to turn south, the scientific party decided that the optimum program would consist of 5 oceanographic stations at 100-mile (160 km.) intervals down the centre of Baffin Bay, and 4 stations along the latitude of Godthaab (64°), profiling the West Greenland current. The first station was begun at 10/1900Z at 71°57'N., 62°07'W. in 2,000 m. of water. Oceanographic samples were taken at 10-metre intervals down to 300 m. and at standard depths to the bottom. Biological samples were taken throughout the water column and micrometeorological measurements made.

Progress during the next 3 days was so slow that the second station was begun at 13/2400Z at 70°37'N., 56°52'W. in 395 m. of water. All 3 programs collected data. It had been impractical to remain in the centre of the Bay because of the ice conditions and additional stations over the West Greenland shelf were not warranted. Consequently, the ship proceeded south, in progressively slackening conditions, and took 4 stations along the 64th parallel on the 16th. The ship arrived in Halifax on the morning of the 21st, having logged 4200 miles (6750 km.) and consumed 80 per cent of its fuel.

The scientific party did not reach the North Water, but did obtain the first winter data from central Baffin Bay. Evaluation of the scientific returns of the trip is now under-way; however, the biologists found what appear to be some unusual specimens at the northern station, while the STD revealed a 6°C. thermocline between 100 and 125 m. in the West Greenland current. It was also shown that it is possible to collect oceanographic specimens at −30°F. (−34°C.) with a 20-knot wind (windchill equivalent of no wind and below −70°F., i.e. −57°C.) although it was extremely uncomfortable for those who had to work in exposed areas.

The cruise was supported by the Canadian Ministry of Transport, the Defence Research Board of Canada and the U.S. National Science Foundation. Grateful acknowledgement is made of that assistance as well as that of the U.S. Coast Guard, U.S. Naval Oceanographic Office, Bedford Institute of Oceanography and Defence Research Establishment Atlantic who generously loaned equipment.

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REFERENCES

[1]Dunbar, M. J., M. Dunbar and D. C. Nutt. 1967. *The North Water: A Review and Summary of Data.* The Baffin Bay — North Water Project Report No. 1. AINA Research Paper No. 45. 71 pp.

[2]Nutt, D. C. 1969. The North Water of Baffin Bay. *Polar Notes*, No. IX: 1-25.

[3]Muench, R. D. 1971. *The Physical Oceanography of the Northern Baffin Bay Region.* The Baffin Bay — North Water Project Scientific Report No. 1. 150 pp.

[4]Aber, P. G. and E. Vowinckel. 1971. *Evaluation of North Water Spring Ice Cover from Satellite Photographs.* Montreal: McGill University. Publication in Meteorology No. 101. 23 pp.

[5]U.S. Coast Guard Oceanography Unit. 1971. *Oceanographic Observations in Kane Basin and Baffin Bay, May and August-October 1969.* Wash., D.C. Report CG 373-44. 143 pp.

Observations of Well-Developed Podzols on Tundra and of Patterned Ground Within Forested Boreal Regions

In most, if not all, papers and monographs dealing with patterned ground there appears to be an implicit assumption that polygonal and patterned ground phenomena are exclusively characteristic of tundra regions. In rather extensive vegetational sampling in the forest, forest/tundra ecotone, and tundra of central northern Canada[1,2,3,4] it has been my observation that patterning is a relatively frequent characteristic of soils in at least the northern portion of the boreal forest in that region. This has escaped wider notice simply because the phenomenon is obscured by the thick layer of moss peat and living mosses and lichens, as well as herbaceous species, usually found under a boreal forest canopy. J. C. F. Tedrow (personal communication, September 1971) indicates that he also has observed patterning under forest in northern Canada and northern Scandinavia although the literature

FIG. 1. Well-developed patterned ground showing beneath a recently burned spruce forest near Inuvik.

FIG. 2. Well-developed A_2 and other typical podzol horizons in a soil developed on well-drained sand north of Pelly Lake, Northwest Territories, a location well into the tundra zone. (Scale in inches).

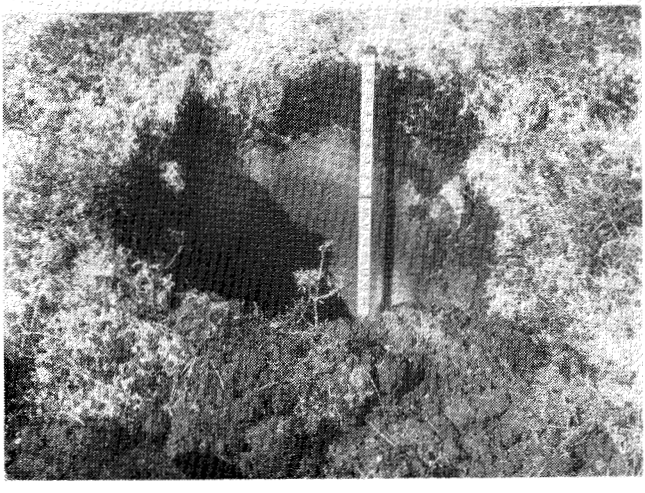

FIG. 3. Well-developed A_2 beneath a thick humus layer in a podzol soil beneath tussock muskeg vegetational community on fairly dry upland tundra site in the forest/tundra ecotone region at Winter Lake, northeast of Yellowknife. (Scale in inches).

on this subject is either very brief or non-existent.

At a site some few miles north of Inuvik, I observed during the 1971 summer field season an example of patterned ground formed beneath black spruce forest that had been exposed as a result of a recent fire (probably within the past 5 to 6 years as deduced from the initial stage of vegetational regeneration) and this is shown in Fig. 1.

Although Tedrow's extensive work in arctic soils clearly indicates that podzolization processes are at work in soils of regions northward of the continental forest borders, he indicates that very often these are not as clearly apparent as in the forested regions simply because of the absence or minimal development of the light coloration of the A_2 horizon characteristic of well-developed northern forest podzols. That such minimal coloration is not without exception is demonstrated by the soil profiles shown in Figs. 2 and 3; the first from an area about 12.9 km. inland (toward the northeast) at the north arm of Pelly Lake (66° 02'N., 101° 07'W.) some 400 kilometres or more north of the forest border at the present day[5]; the second from Winter Lake (64° 29'N., 113° 10'W.) at the northern edge of the forest/tundra ecotone about 200 kilometres northeast of Yellowknife, Northwest Territories.

These observations demonstrate clearly that patterning is not exclusively a property of tundra soils nor is podzolization (with a light-colored A_2 horizon) an exclusive property of northern forest soils. Much remains to be learned about both processes in the forest, forest/tundra ecotone, and tundra regions, but it is clearly apparent that soil characteristics cannot be taken alone as definitive or conclusive evidence of the former existence of forest or tundra vegetation (i.e., as basis for inferences concerning past climates from data employed in paleoclimatological interpretation). In such instances it is apparent that at least corroborative evidence in the form of macrofossils of tree species or arctic plant species of good climatic indicator value[3] should also be used.

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REFERENCES

[1]Larsen, J. A. 1965. The vegetation of the Ennadai Lake area, N.W.T.: studies in arctic and subarctic bioclimatology. *Ecological Monographs* 35(1): 37-59.

[2]————. 1971. Vegetation of Fort Reliance. *Canadian Field-Naturalist* 85(2): 147-67.

[3]————. 1971b. Vegetational relationships with air mass frequencies: boreal forest and tundra. *Arctic* 24(3): 177-94.

[4]————. (In press). The forest-tundra ecotone. In: *Arctic and Alpine Regions*, edited by Jack Ives and Roger Barry. Also, arctic paleoclimatology, same volume.

[5]————. 1972. The vegetation of northern Keewatin. *Canadian Field-Naturalist*, 86(1): 45-72.

The Isotopic Composition and Concentration of Strontium of the Brine From Tuborg Lake, Ellesmere Island

Tuborg Lake is at 81°N., 76°W. at the head of Antoinette Bay in northern Ellesmere Island, Northwest Territories. It trends in an east-west direction and is separated from the fjord by a glacier at its western margin. The lake is 20 km. long and about 3 km. at its widest[1]. An active glacier at the eastern end calves occasional small icebergs into the lake. In June 1963, the level of water in the lake was 10 to 12 m. above sea level.

The lake is markedly density-stratified; the salinity is less than 0.5‰ to a depth of more than 46 m. below its surface[1]. The salinity rapidly increases below this depth, and at a depth of 57 m. it is 25.594‰. Hattersley-Smith and Serson[1] attribute the saline water at the bottom of the lake to sea water trapped by the advance of the glacier across the fjord. The depth of the halocline at 50 to 55 m. (thus 40 to 45 m. below sea level) and the fact that the present level of the lake is about 10 m. above sea level both suggest a complex history of the lake.

Recently, the isotopic composition of strontium, conveniently expressed as the $^{87}Sr/^{86}Sr$ ratio, has been used to indicate the source of dissolved salts in Lakes Vanda and Bonney, southern Victoria Land, Antarctica[2,3,4,5] and of Great Salt Lake in Utah[6]. The $^{87}Sr/^{86}Sr$ ratio of surface water depends on the Rb/Sr ratios and ages of the rocks exposed in the drainage basin. Water in lakes and rivers on the Canadian Precambrian shield is significantly enriched in radiogenic ^{87}Sr, which is produced in the rocks by decay of naturally-occurring ^{87}Rb[7]. The isotopic composition of strontium in sea water is constant ($^{87}Sr/^{86}Sr = 0.7093$)[2] and can therefore be useful in identifying marine strontium.

The isotopic composition of strontium was determined on a sample of the brine from Lake Tuborg. This sample was collected 22