1968, several days after the new moon, did the large shore lead appear. It may be coincidence that the field party was halted for the first time by a substantial lead on the same day. It is tempting to speculate that both leads were caused by spring tides, but that hypothesis was not sustained by the observation that the shore lead did not close with disappearance of the postulated tide but instead persisted and froze "in position." Leads of a size great enough to halt progress were fewer than expected. The lead at 87°N. was so enormous and delineated such a distinctive alteration in the character of the ice that we considered it a unique structure. In 1909 Peary noted the presence of extensive lead formation at that latitude. His "sounding wire" did not reach bottom here at 1260 fathoms. Perhaps this is a somewhat fixed oceanographic phenomenon responding to subsurface conditions of current and ocean floor.

The persistence of snow drifts throughout the traverse testified to a west wind. It was also noted that no major ice movement or lead formation could be attributed to the wind. Indeed, when camped for 7 days at 84°30′N. during a 6-day storm with continuous winds estimated at averaging 45 knots, sextant readings before and after the storm detected no change in position, nor could new lead formation be detected by either the supply plane or the field party.

Arthur C. Aufderheide
Gerald Pitzl
Plaisted Polar Expedition 1968

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Disturbed Sediments in a Small Alpine Lake in Colorado

Palynologists, students of paleolimnology and others interested in former ecological conditions may study cores of sediments deposited in present or now-dry lake basins. Undisturbed sequences are crucial to drawing correct inferences from sedimentary records. Recently Nichols[1] called attention to the disruption of tundra pond sediments by blocks of ice floating from the basin bottom to the water surface.

This note records the derangement of sediments in a small alpine lake; while the actual disturbance was not witnessed, this type of event may be of frequent occurrence in remote mountainous areas and go unnoticed.

Among the lakes receiving limnological study in Rocky Mountain National Park is a small unnamed tarn at the head of Fern Creek, a tributary of the Big Thompson River (Fig. 1) (40°19′N., 105°41′15″W.). The tarn has a surface of 0.6 ha. and an observed maximum depth of 4 m. The lake is located in a northeast-facing cirque at an elevation of 3,355 m. (10,950 feet). Although probably not far beneath the surficial cover of morainal material and talus, no bedrock is exposed in the basin proper. Meltwater from permanent snowbanks higher in the cirque is impounded, at least in part, by a morainal deposit which rises 3 to 5 m. above the water level (Fig. 2). Soil development, vegetation and location in respect to other terminal moraines[2] mark this deposit as belonging to the Temple Lake stade of Neoglaciation. To the northwest, Notchtop Mountain rises about 390 m. (1,200 feet) above the lake.

On 16 October 1965, when 2 short cores

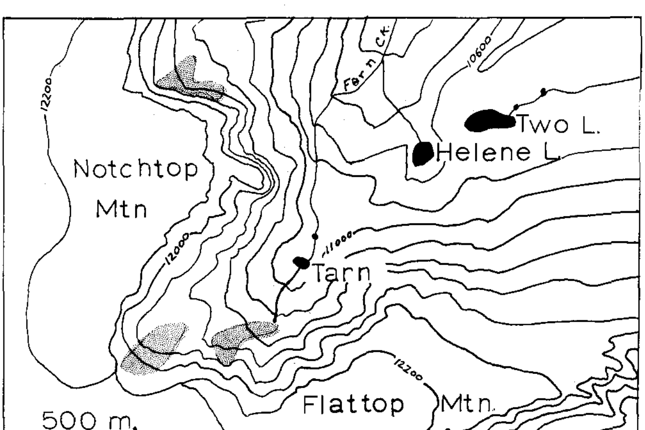

FIG. 1. Sketch map showing location of unnamed tarn in cirque at head of Fern Creek, Rocky Mountain National Park, Colorado. Stippled areas indicate permanent snow banks, altitudes in feet. From McHenrys Peak Quadrangle, U.S. Geological Survey.

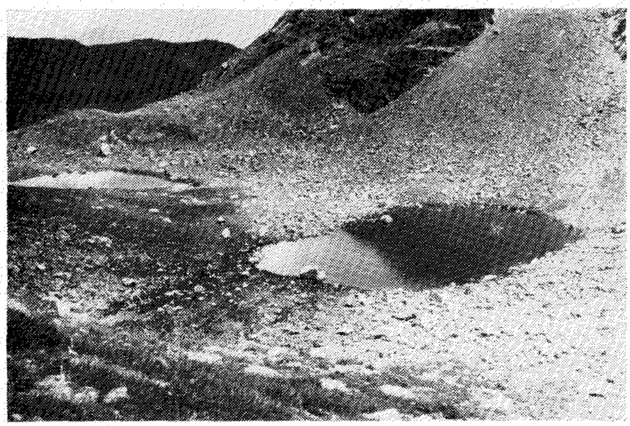

FIG. 2. Unnamed tarn, Fern Creek, Rocky Mountain National Park. View is to east. Note large boulder at edge of near shore, September 1966.

FIG. 3. Partly melted blocks of lake ice and mud thrown out onto shore at northeast corner of tarn, May 1966.

of sediments were obtained, the lake was covered by 25 cm. of ice. New snowbanks were forming along the bases of the cliffs but the ice was swept clear. Photographs taken on that date reveal no large boulder at the spot now occupied by the one shown in Fig. 2. The lake was next visited on 25 February 1966. Along the southeast margin of the lake, blocks of ice were scattered from the shore to the top of the impounding moraine. Two smooth surfaces on opposite sides of each block and the clear character of the ice indicated it to be of lake origin. Blocks ranged up to 1 sq. m. in area and were about 62 cm. in thickness. The lake was covered by drifted snow at least 2 m. deep. Mud, distinctly lake sediment, was mixed with the ice blocks and also stained the snow. The position of ice blocks and the vectors of mud splashes clearly indicated that they had been forced away from the lake at its northeast corner. Although only a few small, fresh fragments of rock were scattered over the snow northeast of the lake, it was surmised that a rock slide had entered the lake and that the evidence was buried under snow.

The lake was revisited on 15 May 1966. Blocks of ice that had been thrown out on the moraine were considerably melted (Fig. 3). The lake was covered by snowdrifts at least 3.5 m. deep, as digging with snowshoes and drilling with an ice auger to that depth failed to reach the ice.

The lake was next examined 19 June 1966. The outlet at the southeast corner was open although the rest of the lake was still covered with ice and snow. Nearly all of the blocks of ice had melted and mud was found coating the rocks 2 to 3 m. from the edge of the shore.

One month later the snow had melted from the shore except along the south and west. Now a large boulder previously hidden under drifted snow was exposed at the north side of the lake, resting on two smaller boulders at the water's edge. Careful examination all around the margin of the lake revealed no other large freshly-dislodged boulders nor was there any indication of a rock slide.

Subsequently the lake and the surrounding slopes were carefully examined on two occasions. Other than scattered fragments here and there which can be expected on any active talus the large boulder was the only new fragment. Air photos taken in 1946 clearly show the smaller boulders on which the recently fallen one rests.

Stones in the littoral zone along the north shore were uniformly covered by fine mud, the usual condition in this tarn. In contrast, mud unevenly covered the lake bottom along the east and south shores, many stones being completely bare.

Exact circumstances will remain unknown. However it is clear that a huge boulder, estimated to weigh 13 metric tons, either alone or as part of an avalanche fell from the heights of Notchtop Mountain to the shore of the tarn. It is equally clear that the ice cover and near-shore sediments at one side of the lake were seriously disturbed, being flung away from the lake. Perhaps the impact of boulder and/or avalanche striking on one side of the tarn was transmitted to the water and partially dissipated in breaking ice on the opposite side.

A pioneer naturalist[3] witnessed a large boulder, part of a rock slide, penetrating "twenty feet of snow and more than four feet of ice" at Chasm Lake, an alpine lake also in Rocky Mountain National Park. Mills further states: "Enormous fragments of ice were thrown into the air and hurled afar. Great masses of water burst explosively upward, as if the entire filling of water had been blown out . . . The cliffs opposite were deluged."

Whatever the cause, part of the surficial sediments of this small tarn were greatly disturbed. Similar disruptions of sedimentary sequences may be a frequent source of concern to paleolimnologists in mountainous areas.

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Potential Ecological Reserves in Arctic Canada

The International Biological Programme fosters a coordinated series of studies undertaken by many nations for the purpose of contributing to the understanding and maintenance of the world's productivity for the benefit of humanity. The program includes study of the adaptability of humans to various environmental conditions, study of productivity at all ecosystem levels and description of the world's biological resources. As a part of the last theme, the Canadian Committee for the IBP manages, under its CT Subcommittee, a program of inventory, identification and scientific analysis of natural ecosystems in Canada, and the setting aside of samples as ecological reserves. Ten panels have been set up by the Subcommittee for consideration of Canadian regions in detail. Our Panel is concerned exclusively with the arctic tundra parts of the Yukon and Northwest Territories.

The Panel recognized at the outset that its work would have to be organized on a vastly different basis from that of panels concerned with the better-known biological communities in the south. The tundra regions of Arctic Canada are biologically very poorly known. The work that has been done is little and scattered. Without the kind of detailed inventory available for the more productive and well-known landscapes in the provinces, the Panel would at first have to rely on expert opinion to narrow down the extent of the areas to be examined. Field work could then be supported as opportunity and funds permitted. The first stage of the work has been more or less completed, that is, a listing of potential reserves, with estimates of approximate locality and size necessary to maintain viable samples of ecosystems suitable for carefully-regulated, non-disruptive and manipulative studies and to provide refuges for the preservation and protection of natural biota and habitats against future destruction by man. Each reserve has been described on a preliminary data sheet. The data resulting from field studies of the potential reserves will be based on the official IBP-CT check sheets which demand very specific technical information concerning the landscapes and biological resources.

Biologists expecting to be able to assist the Panel in further delimitation and description of potential reserves are earnestly requested to write to my colleague and Panel Co-chairman, Dr. Roland E. Beschel, at the following address: Professor, Dept. of Biology, Queen's University, Kingston, Ontario,