

exceeded  $2 \text{ m s}^{-1}$ , suggesting that the drainage characteristics of surface and sub-surface melt water are similar in certain respects, the presence of flow in some form of channel being of particular importance.

Department of Geography,  
University of Sheffield,  
Sheffield S10 2TN, England

A. D. KNIGHTON

Department of Geography,  
University of Manchester,  
Manchester M13 9PL, England  
16 January 1978

W. H. THEAKSTONE

## REFERENCES

- Behrens, H., and others. 1975. On the water channels of the internal drainage system of the Hintereisferner, Ötztal Alps, Austria, by H. Behrens, H. Bergmann, H. Moser, W. Ambach and O. Jochum. *Journal of Glaciology*, Vol. 14, No. 72, p. 375-82.
- Krimmel, R. M., and others. 1973. Water flow through a temperate glacier, [by] R. M. Krimmel, W. V. Tangborn and M. F. Meier. (In [International Hydrological Decade. *The role of snow and ice in hydrology. Proceedings of the Banff symposia, September 1972.* Paris, UNESCO; Geneva, WMO; Budapest, IASH, p. 401-16 (IAHS-AISH Publication No. 107.)])
- Stenborg, T. 1969. Studies of the internal drainage of glaciers. *Geografiska Annaler*, Vol. 51A, Nos. 1-2, p. 13-41.

SIR,

*Experiments on the origin of kettle-holes:  
comments on the paper by Dr J. K. Maizels*

Dr J. K. Maizels' (1977) paper on laboratory simulations of kettle-hole development was a reminder of "mini-kettle-hole" formation observed in July 1958. Figure 1 shows the small cavities in various stages of development, each related to the melting rate of partially buried ice blocks.

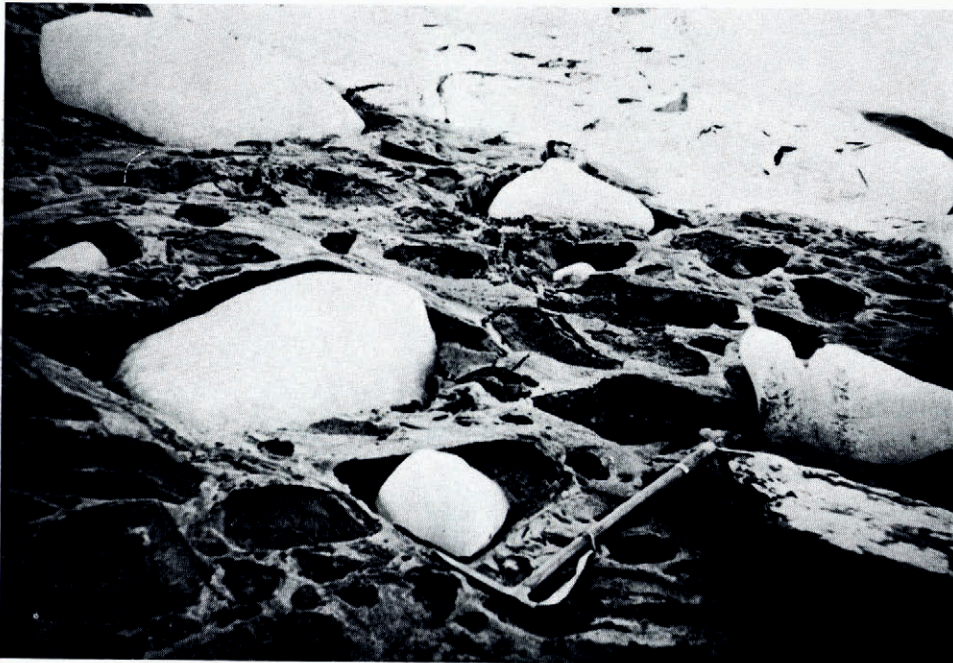


Fig. 1. "Mini-kettle-holes" formed by the ablation of ice stranded on the basin floor of Tulsequah Lake 3 days after it had drained.

The circumstances under which these features developed were rather unusual. Figure 1 shows part of the basin floor of ice-dammed Tulsequah Lake, British Columbia. Approximately 72 h earlier, the lake had drained catastrophically (Marcus, 1960). Icebergs derived from the Tulsequah Glacier ice dam were left perched about the slopes and floor of the emptied basin; many small pieces of ice were similarly stranded. Meanwhile, streams flowing into the lake dropped to the newly established base level, formed depositional fans along the lake floor and partially or fully covered the smaller ice blocks with sediments. Local equilibrium was roughly established within 2 days. Ablation produced the micro-landscape shown in Figure 1 by the end of the third day.

*Department of Geography,  
Arizona State University,  
Tempe, Arizona 85281, U.S.A.  
5 January 1978*

MELVIN G. MARCUS

#### REFERENCES

- Maizels, J. K. 1977. Experiments on the origin of kettle-holes. *Journal of Glaciology*, Vol. 18, No. 79, p. 291-303.  
Marcus, M. G. 1960. Periodic drainage of glacier-dammed Tulsequah Lake, British Columbia. *Geographical Review*, Vol. 50, No. 1, p. 89-106.