

cules, operating with the USARP-Scott Polar Research Institute ice-depth-sounding project, was also at the station, and the relief ship MV *Perla Dan* had arrived. This convergence led to a record for the base when 73 people were dining at the same time: the station complement is normally 32.

Overall, the project was a success since ground control for the U.S. photography of the Shackletons was completed and it should now be possible to enter upon the mapping stage. The accompanying control diagram shows the total scheme achieved in the two visits. Considerable geological work remains to be done, but the known area was greatly extended.

Electrical Depth Soundings in Antarctic Dry Valleys

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Electrical soundings to depths of approximately 150 meters were made at 26 sites in Wright and Taylor Valleys, Antarctica, during December 1969–January 1970. Resistivities measured ranged from 15 ohm-meters for water emanating from a saline discharge on the Taylor Glacier tongue (Black *et al.*, 1965), to over 150,000 ohm-meters for metamorphosed basement rock east of Lake Vanda in Wright Valley. Curves of apparent resistivity *versus* electrode separation (Lee-Partitioning Method) obtained near Lakes Vanda and Bonney reflect a surficial freeze-thaw zone extending to depths of less than 2 m, a permafrost layer having resistivities greater than 10,000 ohm-meters extending to depths of 30 m or less, and unfrozen, saturated glacial drift having resistivities in the order of 1,000 ohm-meters lying below the permafrost layer. Soundings made above present lake levels indicate that the permafrost zone thickens with increasing elevation.

Several curves obtained near shallow or completely dry lake beds in Wright Upper Valley indicate glacial drift and lake sediments containing little or no permafrost. From these curves, it is inferred that Lakes Vanda and Bonney are not underlain by permafrost. Electrical depth soundings obtained with electrodes placed in marginal ice streams adjacent to Taylor Lower Glacier indicate that the permafrost zone extends from near the surface to depths greater than 150 m.

A thin zone of permafrost bordering Lakes Vanda and Bonney and the absence of permafrost beneath the lakes suggest several alternative conditions which

may have influenced the dry-valley geothermal history, viz:

- 1) Solar heating during deeper lake stages causing an abnormally thin permafrost layer throughout the former lake basins;
- 2) Deep valley dissection during glacial maxima resulting in valley thalwegs intersecting abnormally high isogeotherms;
- 3) Late Tertiary intrusive and extrusive activity producing abnormally steep geothermal gradients which, in turn, results in abnormally high temperatures near the surface;
- 4) Groundwater flow directed toward lake basins (temperate-zone lakes are areas of groundwater discharge) producing abnormally high temperatures near the dry-valley lakes.

These factors, to some degree, have all produced the permafrost regime presently observed in the dry valleys. Lack of a permafrost layer beneath the lakes necessitates a hydrologic connection between groundwater and lake water. Shallow lakes in Wright Upper Valley, with limited surface-water recharge, may be fed mainly by groundwater. A hydrologic connection between sub-icecap water and dry-valley lakes (McGinnis, 1968) cannot be determined from the present data; however, given a permeable rock unit connecting the two water bodies, groundwater would flow beneath the icecap toward the dry-valley lakes.

References

- Black, R. F., M. L. Jackson, and T. E. Berg. 1965. Saline discharge from Taylor Glacier, Victoria Land, Antarctica. *Journal of Geology*, 73: 175–180.
- McGinnis, L. D. 1968. Glaciation as a possible cause of mineral deposition. *Economic Geology*, 63: 390–400.

Ice-Thickness Survey of Marie Byrd and Ellsworth Lands

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The purpose of this investigation was to obtain detailed information on the size, shape, and location of each of the islands which comprise Marie Byrd and Ellsworth Lands, and on the basins and troughs that separate these insular masses. This information was to be obtained through the use of the Scott Polar Research Institute's 35 MHz radio echosounder mounted in a C-130 aircraft. The program