

REVIEWS

MULTIPLE GLACIATION IN ALASKA.

By TROY L. PÉWÉ *and others*. *Washington, D.C.: Geological Survey Circular 289, 1953. 10½ x 8 inches; 13 pages; table and folding map. Free on application to Geological Survey, Washington 25, D.C.*

This is the first major research contribution applying the modern concepts of glacial chronology to sufficient of the vast territory of Alaska for the arctic specialist to begin formulating a complete picture of its glacial history. The eight field studies included in this report represent detailed reconnaissance during two to four warm seasons each; although the correlations are purely tentative, the archaeologist may start to see what the evidence is for a mid-Wisconsin interstadial time with intermontane corridors even more free of ice than at present. The biologist will find indications of four widespread ice advances of decreasing magnitude, after each of which a complete repopulation has occurred. He should not forget, however, that lesser advances, like the minor advance described in the "late Wisconsin", may have intervened between these major glaciations. The soil scientist will recognize evidence for rather long warm intervals between the "pre-Wisconsin" and "Wisconsin" glaciations and once again within the "Wisconsin".

None of this evidence is given in great detail, nor are there detailed maps, for this is a progress report. However, the nature of the evidence and the region in which each clue is found is clearly shown.

The Pleistocene geologist will find a two-fold division of major Wisconsin ice advances: (1) more than 18,000 years before the present, and (2) between 8,000 and 14,000 years before the present. As with recent radiocarbon dates in Illinois, Indiana, and Ohio, these may imply some readjustment in the timing

and naming of Wisconsin substages. Could a 20,000-year-old glaciation really be early Wisconsin equivalent of Tazewell? If "early Wisconsin", as used here, correlates with Cary substage, one wonders what happened in Alaska during the conventional earlier Wisconsin time. It may be possible that certain substages in Alaska expanded while others diminished due to precipitation changes. The maxima of glaciation might not then coincide with those in central North America. Perhaps one or two of the "pre-Wisconsin" stages based upon "very subdued end moraines" are actually the very early Wisconsin, just like the old Iowan in the United States. Frank admission of the uncertainties in these eight studies should prove an inspiration to further work.

It is surprising that in seven of the eight areas examined extending from the Brooks Range to the Alaska Peninsula, there is real evidence of one or more pre-Wisconsin glaciations. In some, there is glacial erosion above the level of later moraines, in others, till lies far beyond the confines of later moraines and dissection or loess cover indicate antiquity. Although the separation into two pre-Wisconsin glaciations may be questioned, there can be little doubt of at least one.

This report is an outstanding example of the cooperation and integration possible when independent studies in widely separated areas are carried out under one agency. It exhibits the value of frequent interchange of ideas during field study rather than the domination of Detterman, Fernald, Hopkins, Muller, Karlstrom, Krinsley, Péwé, and Wahrhaftig by any one man. The advantages of good air photos and air transportation can be seen. It is also heartening to see such basic scientific spadework coming from far-sighted expenditure of some military funds.

RICHARD P. GOLDTHWAIT