Short Papers in Geology Hydrology, and Topography Articles 1–59

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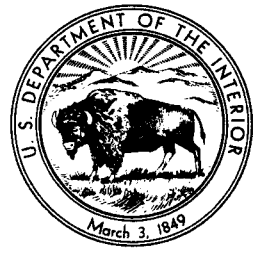
GEOLOGICAL SURVEY PROFESSIONAL PAPER 450-B

Scientific notes and summaries of investigations prepared by members of the Geologic, Water Resources, and Topographic Divisions in the fields of geology, hydrology, topography, and allied sciences



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GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

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FOREWORD

This collection of 59 short papers on subjects in the fields of geology, hydrology, topography, and related sciences is one of a series to be released during the year as chapters of Professional Paper 450. The papers in this chapter report on the scientific and economic results of current work by members of the Geologic, Topographic, and Water Resources Division of the United States Geological Survey. Some of the papers announce new discoveries or present observations on problems of limited scope; other papers draw conclusions from more extensive or continuing investigations that in large part will be discussed in greater detail in reports to be published in the future.

Chapter A of this series, to be published later in the year, will present a synopsis of results from a wide range of work done during the present fiscal year.

Thomas B. Nolan

THOMAS B. NOLAN,
Director.

CONTENTS

11. RADIOCARBON DATES RELATING TO A WIDESPREAD VOLCANIC ASH DEPOSIT, EASTERN ALASKA

By ARTHUR T. FERNALD, Washington, D.C.

A conspicuous blanket of volcanic ash, first described by Schwatka (1885, p. 196) and Dawson (1889, p. 43b–46b), covers a wide area in eastern Alaska and southern Yukon Territory. It generally occurs at or near the surface of the ground, but in certain localities it has been buried by several feet of loess and organic material. The distribution and thickness of the ash have been mapped in detail by Bostock (1952, fig. 1).

Capps (1916, p. 69–75, 81–83) estimated the age of the ash to be 1,400 years in the White River valley, where it is overlain by 7 feet of peat. He based this estimate on a calculated accumulation rate of 1 foot of peat in 200 years determined from the ages of trees, as shown by their annual rings, growing on a constantly thickening moss mat. He had observed that the trees send out successively higher root branches as the permafrost table, which is related to the thickness of moss, rises.

The 1,400-year age is remarkably close to radiocarbon-dated peat samples that indicate the ash fell between

1,750 and 1,520 B.P. (Before Present). The samples were collected from layered peat that overlies and underlies the ash in an exposure in the upper Tanana River valley. A pit dug in an interdune hollow within a stabilized dune field exposes, from top to bottom, (a) 16 inches of peat with admixtures of silt, (b) 6 inches of white ash, (c) 2 inches of peat, and (d) gray-brown dune sand. The sample (I–276) [1] from the bottom 2 inches of the upper peat bed is dated at 1,520±100 B.P. The sample (I–275) [1] from the lower bed has a date of 1,750±110 B.P.

Another radiocarbon-dated peat sample, collected from within the flood-plain deposits of the upper Tanana River, gives a maximum age of 2,000±250 years B.P. for the ash fall. The cut bank exposes, from top to bottom, (a) 12 inches of layered peat, (b) 42 inches of bedded silt and fine sand with organic debris, (c) 30 inches of white ash with thin beds of gray silt, and (d) 6 inches of layered peat. The sample (W–978) [2] was collected from the middle part of the lower peat bed.

The age of the ash provides an important reference point in the interpretation of the surficial geology of the upper Tanana River valley, particularly the flood-plain deposits. The ash is not present on or within the deposits of the slip-off slopes of the Tanana River, but it is present on all low terraces. It has been reworked into the deposits of parts of the flood plain that are intermediate between the slip-off slopes and the low terraces, as in the cut bank described above.

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[1] Dated by Isotopes, Inc., Westwood, N.J.
[2] Dated by U.S. Geological Survey Radiocarbon Laboratory.