

DATING CHAOS JUMBLES, AN AVALANCHE-DEPOSIT IN LASSEN VOLCANIC NATIONAL PARK

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ABSTRACT. Counts of tree-rings were employed to date a major avalanche deposit. This technique required the evaluation of assumptions as to delays in seeding and errors in coring. The data suggest a date of origin between 1684 and 1696.

The Chaos Jumbles in the northwestern portion of Lassen Volcanic National Park is a huge avalanche deposit with a typical hummocky topography. The deposit is composed of angular dacite fragments and forms an extremely rough terrain. It supports a sparse forest of various conifers with the trees widely spaced and frequently stunted, yellowish, with broken tops and other features indicative of difficult survival. There are, however, few dead or down trees.

In the original major study of this area, Williams (1928) mentioned but one avalanche and estimated its age then as 200 years. There are indications that there have been older avalanches but the techniques employed here were restricted to use only in areas unquestionably of most recent origin.

Cores were taken with a Swedish increment borer, and the trees were plugged with dowling and painted with sealant to prevent insect or fungus access. Each tree was mapped.¹ The coring procedures, although relatively simple under most conditions, proved to be quite troublesome. The trees are bent and crushed by snows during their early years and strong prevailing westerly winds distort their growth still more. Few cores hit the exact heart of a tree so that it was necessary to draw completion circles of the rings of early years and estimate those missing. Five or fewer missing rings can be estimated with moderate accuracy but greater departure from the heart seriously diminishes the value of the core. Attempting another core is often impractical for many of the trees have wood so dense that the strain on the coring tool is excessive. What is more, the irregularities mentioned often make a second try little better than the first.

Cores were oriented in grooves in hardwood (Heath, 1958) and planed to very smooth surfaces so that accurate counts could be made. Since some trees exhibited nearly 100 years' growth to an inch, only excellent surfaces were suitable.

In considering mechanical problems it should be noted finally that the coring tool must be used approximately 15 inches above the tree base thereby eliminating the years taken for this much development. Applying a very conservative estimate, seven years were added to all tree-core totals to offset this factor.

How long after the formation of such an avalanche deposit a suitable seed-bed would be provided is a problem that must be judged on the basis of evidence provided elsewhere in the park. Lassen Peak was the source of a major mudflow in 1915. Today, this area is covered with many conifers. In 1957 a second mudflow buried part of this same area. On a permanent quadrat of

¹ Maps are on file at the park.

5000 square feet, three conifer seedlings appeared the following spring and, whether or not they survive, it is clear that invasion can be exceedingly rapid.

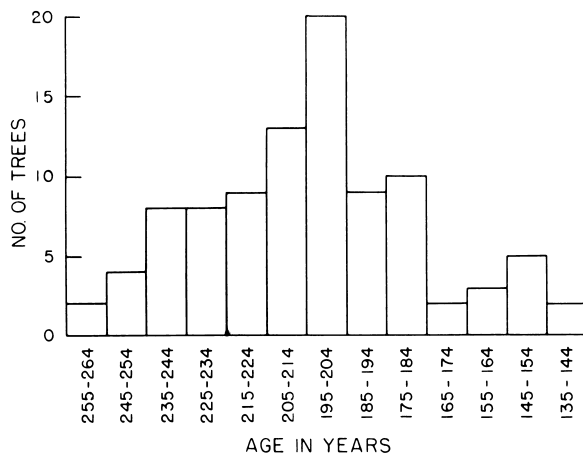


Fig. 1. Distribution of trees by age group.

The 92 satisfactory cores present the distribution shown in figure 1. The increasing number of trees found with decreasing years suggests gradual establishment of the forest. The decrease and erratic pattern of still younger groups is merely evidence of poorer discrimination in selection of trees worth coring. Strictly random coring would increase these younger groups considerably.

On the basis of the foregoing data and assumptions, the recent avalanche of the Chaos Jumbles seems to have originated not less than 263 years ago and probably not more than 275 years ago. Williams' estimate was very close.

Work in the future will be devoted to analysis of the older avalanche deposits.

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