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FINAL TECHNICAL REPORT

OBJECTIVES

"Dendrochronology in Northern Mexico" was funded by the National Science Foundation in July 15, 1973 and continued with field work and Laboratory analysis until June 30, 1977. The main objectives, as outlined in the original proposal were several fold:

1) To find old-age living trees in Mexico suitable for dendrochronological analysis which could be utilized in the reconstruction of long-term climatic records as has been done in the western United States by Fritts and Stockton.

2) To inventory and sample wooden beams from old-age mission structures, and other colonial buildings. The process would lead to several research applications. The first is that dates from old missions would be valuable for confirming somewhat sketchy historical records or establishing dates where no records existed. In addition, where original building dates did not exist, reconstruction of buildings, additions and modifications could be confirmed or supplied (again where no historical records exist). As one of the most important adjuncts to the mission collections, the ring records could be utilized to extend tree-ring chronologies further back in time where old-age living trees were non-existent (Stokes and Smiley, 1968). Due to the nature of the country, it was thought that trees as old as 500-600 year age class would be difficult to find, the extension back in time of the tree-ring records in mission samples would be sufficient to extend and overlap with a somewhat difficult and uncertain archeological record already worked for Northern Mexico (Scott, 1963).

3) The third objective was to seek out suitable weather records for Northern Mexico which might be utilized for tree-ring reconstruction of past

climatic variation, thus providing valuable insights into what might be considered a "norm" of climate for the past 200-300 years in an area now subjected to much pressure for the development of resources for the benefit of the Mexican nation.

ACCOMPLISHMENTS

Based upon previously published reports, and information obtained from persons who have traveled extensively through the mission country of Northern Mexico, some 123 missions and public buildings were checked. Workers in Mexico, especially those connected with the Instituto Nacional De Antropologia E. Historia, Regional office in Hermosillo, Mexico, were extremely helpful in locating some missions. Of the 123 checked, beam samples were collected from 43 buildings, most of which were in the more remote areas of the Sierra Madre Occidental. Those buildings checked that are in existence in the more arid desert areas of Chihuahua, Sonora, Sinaloa were often found to contain wooden beams unsuitable for tree-ring dating purposes. In addition, many of the churches were found to have succumbed to the development of progress, with roofs of recent addition (1952 or later) and of modern truss design.

Where at all practical living trees from the immediate vicinity of the churches were sampled to provide "on sight" dating controls for the structures. Again, this was often difficult because of the progress of modern lumbering practices. Also, it was not always possible to find out where the beams in the church originally came from, since informants were not always certain, or in many cases, the old people were simply no longer living. The nearest practical site was selected in cases where no information was available.

Modern tree sites were selected not only on the basis of proximity to mission sites, but were chosen because of their accessibility, or in reasonable proximity to known (or thought to be known) weather stations. A wide variety

of species were selected but primary emphasis was given to those species related to species known to be dateable that are found in the western United States. Collections therefore range in species from Pinus duragensis, Pinus arizonica, Pinyon, Douglas fir, and a few others whose classifications were uncertain. Of all collections made from living trees, cores were obtained from 75 sites, not all of which date, nor all of equal value for dendroclimatic purposes.

Dating results of mission sites were of unequal value, limited by the numbers of samples it was possible to obtain and by the degree of difficulty of dating. "False" rings are common in southern pines and in some collections this problem proved to be particularly difficult. A puzzling aspect is that cross-dating between beams from the same church was sometimes found to be possible but no modern trees could be found which would cross-date with the mission samples or, in some cases, whose ring sequences even remotely resembled those of the church samples. This may indicate that original construction depleted the supply of trees nearest to the church and tree-growth responses to climate may have been somewhat different than that of the nearest living trees. This is a point of further interest to us.

The earliest inside date found in a mission beam was 1542 with the latest being ca. 1908. Where dating was sufficient, and where some records were in existence, dates in general confirm no periods of reconstruction, remodeling, or additions.

On site maps were made of the structure, beams, and from which beam samples were obtained. Frequently, a photographic record was made of the structure and details supplied. A form supplied to us by the Southwest Mission Research Center was filled out to provide some details of architectural style, furnishings, and types of ornamentation. Copies of these are to be included in the files of the Southwest Mission Research Center, headed by Dr. Charles Polzer.

All samples, modern and historical, have been worked in the Laboratory. Dated samples have been processed through our Data Processing Center, under the direction of Ms. Linda Drew. This processing has resulted in tree-ring chronologies of unequal length and certainly of unequal strength. Work on the specimens is essentially finished.

More difficulties have been encountered with the weather data first because of the difficulty of finding out where the numerous records are kept, and because of the unequal strength of many of the records. Preliminary mass spectral analysis of somewhat scattered weather stations reveals that some may well be combined to provide greater length of record. This analysis roughly shows how similar different records are in trends but shows nothing as to why they are similar. Future work on this problem will allow us to make some rational judgment on what records to use for dendroclimatic reconstruction. A possible source of new records has been suggested and an attempt at getting these records (if they exist) has been initiated.

Publication plans are twofold. One publication will be the general nature of an overall view of the project (with pictures). The second publication will be a technical report detailing the results of the dendrochronological results along with possible climatic reconstructions. It is hoped that the second will be included in the Laboratory of Tree-Ring Research Papers, published by the University of Arizona Press. Projected time (absolute deadline) is November 1978.

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