

The figure compares the measured ring chronology in the dated specimens with standard Southwestern series, published in recent issues of the Bulletin.

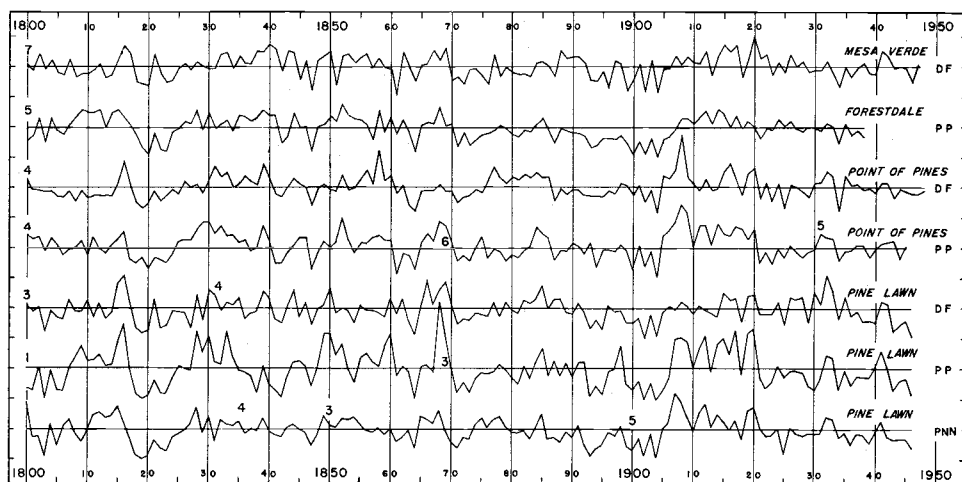
### CHRONOLOGY CHARACTERS AT RUINS IN THE GILA BASIN\*

EDMUND SCHULMAN

The extent of current and planned archaeological excavations in the Gila River Basin suggests the desirability of a skeleton survey of the problems in local ruin dating by wood and charcoal rings.

#### STATIONS

The Mesa Verde sequence in Douglas fir,<sup>1</sup> a standard index for the Pueblo area, is compared with the following exploratory collections by the writer. The standardized growth indices since A.D. 1800, based on the oldest and most sensitive trees in each set, are plotted in the figure. All of the following sites are in or near the border zone in which the ponderosa timberland meets the pinyon-juniper woodland; in moister areas near all sites Douglas fir may be found.



*Forestdale.* Arizona State Museum site<sup>2</sup> near the head of Forestdate Creek and some 220 miles south-southwest of Mesa Verde Park headquarters. Five ponderosa pines sampled in August, 1939, on sandstone ledges overlooking the campsite.

*Point of Pines.* Arizona State Museum site<sup>3</sup> some 60 miles south-southeast of Forestdale. Lava soils. Four Douglas firs sampled August 26, 1948, on Nantack Ridge, about eight miles southeast of the campsite. Radial growth for 1948 was very nearly or quite complete but coloring of latewood cells was not yet strong.

Six ponderosa pines sampled in June, 1946, from well-drained slopes, two near the campsite and the rest about four miles southeast.

No pinyon pines have yet been noted in the camp vicinity, though some grow near and on the crest of Nantack Ridge some miles to the south. The frequency of this species in the extensive ruin charcoal excavated in 1948 suggests an important change in forest composition since Puebloan times.

*Pine Lawn.* Chicago Natural History Museum site about 75 miles east-southeast of Forestdale<sup>4</sup>. Lava soils. Four Douglas firs some ten miles northwest of the campsite and about three miles east of Luna Pass.

\*Grateful acknowledgement is made of cooperation by the Arizona State Museum in the field work in Arizona, and of a grant to the Tree-Ring Laboratory by the Chicago Natural History Museum which greatly facilitated collections at Pine Lawn.

<sup>1</sup>E. Schulman, *Tree-Ring Bull.* 12(3), 1946, and 14(1), 1948.

<sup>2</sup>E. W. Hauray, *Univ. of Arizona Bull.* 11(4), 1940, and 18(4), 1947.

<sup>3</sup>E. W. Hauray, *Kiva* 12:3, 1946.

<sup>4</sup>P. S. Martin and J. Rinaldo, *Field Mus. Anthropol. Series* 32(3), 1947. See also 32(1), 1940 and 32(2), 1943.

Three ponderosa and five pinyon pines from the SU and Promontory sites near camp. No significant site differences in chronology within each species were found in hilltop and slope trees.

#### CHRONOLOGY CHARACTERS

In all areas a number of trees from well-drained sites, in addition to those noted above, and test borings from poorly located trees yield the following somewhat preliminary estimates of quality.

*Crossdating.* On well-drained sites crossdating was found on the whole to be slightly better at Point of Pines than at Pine Lawn; both are somewhat inferior to Forestdale in this respect. Fine looking, fast-growth ponderosa pines in wash bottoms and lowlands at all three sites in the Gila Basin showed complacent, erratic chronologies. Douglas firs, as elsewhere, showed excellent crossdating at both Point of Pines and Pine Lawn, false and missing rings being easily identifiable.

*Length of series.* 300 years seems to be a normal maximum in conifers throughout the Gila Basin, very few trees being noted which exceeded this age and most being substantially younger. An average ring-width from 0.5 to 1.0 mm seems to be characteristic of mature conifers on well-drained sites at Point of Pines and Pine Lawn, but young pines up to a foot in stem diameter averaged only about 50 rings. Slower growth and longer sequences are characteristic at Forestdale, though even here average ring-widths far exceed those to be found at Mesa Verde.

*Missing rings.* Increment borings in dry-site ponderosa pine at all three Gila sites and in pinyon at Pine Lawn indicate the normal proportion of locally-absent rings to be only two or three per century of mature growth. Because of weaker crossdating these are rather more difficult to identify with certainty at Point of Pines and Pine Lawn than at Forestdale.

*False rings.* The characteristic increase in frequency of false rings with decreasing latitude is well exemplified in the Gila Basin and, in the areas here discussed, seems to be greatest at Pine Lawn. Occasional false rings in ponderosa pine are so annual-like in character as to be identifiable only with most painstaking effort. No precise statement is possible, but an estimate of ten false rings per century, of varying strength, is perhaps not far off for ponderosa in all areas; even pinyon, characteristically less subject to this phenomenon, shows numerous cases of extra layering at Pine Lawn.

*Relation to master chronologies.* Figure 1 shows a general parallelism in chronology among all three Gila areas. The agreement of these chronologies with that at Mesa Verde is given more quantitatively in Table 1.

Table 1. Correlation Coefficients between the Mean Growth Index in Douglas Fir at Mesa Verde and Stations in the Gila River Basin.

Station	Species <sup>1</sup>	1800-1849	1850-1899	1900-1946	Mean
Forestdale	PP	.55	.55	.63 <sup>2</sup>	.58
Point of Pines	DF	.65	.30	.58	.51
Point of Pines	PP	.43	.49	.55 <sup>3</sup>	.49
Pine Lawn	DF	.60	.49	.62	.57
Pine Lawn	PP	.35	.45	.74	.51
Pine Lawn	PNN	.43	.44	.66	.51

<sup>1</sup>PP—ponderosa pine; DF—Douglas fir; PNN—pinyon pine.

<sup>2</sup>1900-1938.

<sup>3</sup>1900-1945.

All of the Gila mean growth curves have at least as close a relation to Mesa Verde as that found between the latter and Flagstaff (coefficient 0.46—see *Tree-Ring Bulletin* 14:24, 1948).

To summarize: Within the time range of the central Pueblo master chronology and on the basis of the characters above noted, ruin dating as determined by the average specimen may be expected to be progressively more difficult at Mesa Verde, Forestdale, Point of Pines, and Pine Lawn. Individual specimens of great simplicity are to be found at all stations with decreasing frequency in the suggested order. As indicated in the Figure, even the Pine Lawn sites, given sufficient archaeological specimens within the range of the master chronology, must be subject to certain dating.