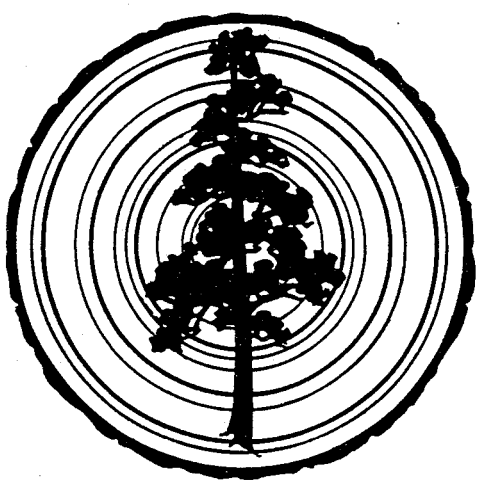
TREE-RING BULLETIN

Vol. 4 OCTOBER, 1937 No. 2

A Quarterly



CONTENTS

PUBLISHED BY THE TREE-RING SOCIETY

Emil W. Haury, Managing Editor
Department of Anthropology
University of Arizona
Tucson, Arizona

$1.50 Per Year 50 Cents a Copy

AUTHORS

The Tree-Ring Bulletin will publish papers resulting from original research in tree-rings in their relation to climatology, archaeology, and other subjects. Manuscripts should be typewritten in double spacing. The Editor reserves the privilege of returning to the author for revision approved manuscripts and illustrations which are not in the proper form for the printer.

In reporting tree-ring data authors are requested to use a tabular form such as appears on the back of Vol. 1, No. 1. Until funds are available authors will be requested to pay the cost of illustration.

Each contributor will be given, free of charge, twenty-five copies of the Bulletin in which his article appears. Reprints may be procured at cost with or without covers if ordered at the time the galley proof is submitted. Manuscripts and illustrations should be sent express prepaid or by registered mail to the Editor-in-chief.

SUBSCRIBERS

All correspondence having to do with subscriptions should be addressed to Dr. Emil W. Haury, Department of Anthropology, University of Arizona, Tucson, Arizona.

EDITORIAL

The southwestern archaeologist's position for making historical reconstructions has been immeasurably improved in the brief eight years since tree-ring data has been available. This fact can be emphasized by answering the question as to how far our interpretations of prehistory here would have been carried in recent years without the aid of tree-rings. The reluctant admission is that we would still be laboring under the delusion of a high antiquity for some of the remains, that we would still have false notions as to the vast amount of time needed for the advance of culture from what we know as Pueblo I to Pueblo III. We would plead ignorance as to the cause of some of the evident tribal shake-ups, such as took place towards the end of the thirteenth century when the center of gravity of the Puebloan area moved southward. And we would further be forced to recognize that tree-ring contributions have been directly responsible for the speeding up of the study of the southern cultures because the rapidity of culture development in the north, formerly believed to have been inherent, indicated the possibility that other forces were to be considered.

With this issue the Bulletin begins a check list of all dated ruins of the Southwest. The great amount of information, coming from various students, has demanded condensation to the point where only the range of dates and a few other pertinent facts can be given and, for want of space, these must be released in instalments. Some of the material has already been given in fuller form herein and in other publications; some has not previously appeared. When completed, this list should serve as the starting point for a series of papers dealing anew with general regional and cultural trends, movements of people, correlations, and possibly a revision of Southwestern prehistory.

—E. W. H.

SOUTHWESTERN DATED RUINS: I[1]

W. S. STALLINGS, JR.

Site No.	Name	Cultural Stage	No. of Specimens	Range of Dates
	SOUTHWESTERN COLORADO			
	Lowry Ruin[2]	Pueblo II-III	7	1090-1104±1
	SOUTHEASTERN UTAH			
	Alkali Ridge	B. M. III-P.I.	6	770±10
	Five Kiva House	Pueblo III	2	1243-44
	NORTHWESTERN NEW MEXICO San Juan Drainage[3]			
	(Gobernador canyon: E. H. Morris' excavation)	Pueblo V	3	1700+x-1752±10
L.A.1063	(Near Star Lake)	Pueblo V	1	1740±1
L.A.1687	(Munoz canyon)	Pueblo V	1	1754±10
L.A.1684	(Pueblo canyon)	Pueblo V	1	1735
L.A.1868	(Gobernador canyon)	Pueblo V	1	1732-33
L.A.1869	(San Rafael canyon)	Pueblo V	1	1752±3
L.A.1871	(San Rafael canyon)	Pueblo V	2	1742±10
L.A.1872	(San Rafael canyon)	Pueblo V	1	1737±10
	(San Juan canyon misc.)	Pueblo V	2	1723±1-1727±1
	SOUTH-CENTRAL NEW MEXICO			
L.A.1225	(Gallo canyon)	Pueblo III-IV	5	1349±1-1366
L.A.1231	(Three Rivers)	Pueblo IV	28	1335-1348
	NORTHERN RIO GRANDE AREA[4]			
L.A.641	(Capulin Ranger Station)	Rio Gallina complex	8	1106-07
L.A.653	(Chupadero Ranger Station)	Rio Gallina complex	181	1253-1256±3
L.A.654	(Chupadero Ranger Station)	Rio Gallina complex	14	1260

(1) This is the first set of dates in a series which will summarize tree-ring studies to date as applied to southwestern ruins of both pre- and post-Spanish times. Other instalments will follow in forthcoming issues of the Bulletin. This list represents the work of Mr. W. S. Stallings, Jr., Laboratory of Anthropology, Santa Fe, New Mexico. Owing to the fact that in a few cases the wood from a ruin has been analyzed by several students, some duplication will be inevitable. Generally, such cases, as Lowry Ruin, are indicated by asterisk. The site numbers are those of the Laboratory of Anthropology. The locality of unnamed sites is indicated in parentheses. The column headed No. of Specimens refers only to those which have been dated. (Ed.)

(2) See also lists in forthcoming Bulletins.

(3) The Pueblo V sites listed below pertain to the Gobernador complex and analagous sites. Ud. A. V. Kidder, "Ruins of the Historic Period in the Upper San Juan Valley, New Mexico." Amer. Anthro, N.S. Vol. 22, No. 4, pp. 322-329. Lancaster, 1920.

(4) The period references below require a note of explanation. During the course of Pueblo history in the Northern Rio Grande area there was a major flow of culture

Site No.	Name	Cultural Stage	No. of Specimens	Range of Dates
L.A.114	Arroyo Negro	Pueblo II(M)	5	1127-1144
L.A.191	Mocho	Pueblo II-III(M)	12	1185-1192
L.A.296	Tecalote	Pueblo II-III(M-O)	3	1170-1205+x
L.A.1	Pindi	Pueblo III(M)	3	1217±2
L.A.1872	Llano (near Taos)	Pueblo III(M)	20	1207-1240
L.A.1	Pindi	Pueblo III-IV(O)	192	1240-1348
L.A.8	Alamo	Pueblo III(O)	9	1245-1267+x
L.A.875	(Rio Puerco)	Pueblo III(O)	14	1260±4-1265
L.A.10	(Lamy)	Pueblo III(O)	6	1264±5-1273+x
L.A.27	(Lamy)	Pueblo III(O)	63	1267-1311+x
L.A.1104	(Manzanares)	Pueblo III(O)	15	1278-1302
L.A.309	(Galisteo Basin)	Pueblo III(O)	150	1271-1331
L.A.128	Rowe	Pueblo III(O)	2	1311±5
L.A.4	Chamisalocita	Pueblo III(O)	9	1314-1322
L.A.235	Pena Negra	Pueblo III(O)	4	1335-1337+x
L.A.76	(Arroyo Hondo, near Santa Fe)	Pueblo III(O)	18	1311-1316
L.A.545	(Pajarito Plateau)	Pueblo III(O)	18	1303-1310±5
L.A.920	Riana Ruin	Pueblo III(O)	11	1335-1336
L.A.301	Tsiping (Canones)	Pueblo III-IV(O)	5	1311±5-1328±5
L.A.31	Cundiyo	Pueblo III-IV(O)	5	1337-1343+x
L.A.581	Cedro	Pueblo III-IV(O)	18	1345-1394
L.A.2	Aqua Fria Schoolhouse	Pueblo III-IV(O)	3	1355-1364+x
L.A.251	Arrowhead or Glorieta	Pueblo IV	Ca. 600	frag. 1370-1392
L.A.625	Pecos	Pueblo III-V(O)	74	1348-1612
L.A.80	San Cristobal	Pueblo III-IV(O)	23	1417-1442±5
L.A.183	Pueblo Largo	Pueblo IV	19	1413-1450+x
L.A.240	Tunque	Pueblo IV	10	1431-1505±5
L.A.5	Los Aguajes	Pueblo IV	9	1457-1462
L.A.78	Frijolito	Pueblo IV	4	1447

from the upper Little Colorado and upper San Juan regions into the area: the Northern Rio Grande was marginal, there was a persistence of early traits, and at various times the tenor of the culture lagged considerably behind the hearths. In the early part of the thirteenth century the area experienced a marked change in material culture which cuts across the conventional Pueblo period designations. This change involves a list of traits of which black-on-white pottery is a convenient diagnostic for present purposes. In the earlier era, which in pottery can be traced from Basket-Maker III into Pueblo III, the black-on-white is in the "Chacoan" or "eastern Pueblo" tradition and is decorated with mineral paint. In its last years organic-paint pottery is present in small amount. In the succeeding era the black-on-white pottery is marked by the introduction of new styles, many of which may be attributed to the Mesa Verde complex, and organic paint is exclusively used. It is not the intent here to outline historical changes, but the epoch just mentioned is of such importance in the area that to omit its notation would seriously impair a proper interpretation of the dates. Accordingly, sites of the earlier era are identified by the letter "M" (mineral paint) in addition to conventional period designations; those of the succeeding complex. by "O" (organic paint). Following earlier usage, the beginning of Pueblo IV is considered coeval with the rise of glaze-paint and Biscuit wares in the area; its close is marked by the Pueblo rebellion and attending events at the end of the seventeenth century. The "Rio Gallina" complex refers to a peculiar culture in northwestern New Mexico which is characterized by modified early Pueblo features together with certain non-Pueblo traits.

Site No.	Name	Cultural Stage	No. of Specimens	Range of Dates
L.A.82	Tyuonyi	Pueblo IV	10	1423+x-1513
L.A.170	Tshirege	Pueblo IV	13	1480±10-1581±1
L.A.47	Puye	Pueblo IV	4	1507-1565±3
L.A.274	Poshu (Poshuouinge)	Pueblo IV	5	1391-1415+x
L.A.632	Posi	Pueblo IV	7	1375±25-1451+x
L.A.380	Hupobi	Pueblo IV	7	1375±25
L.A.271	Howiri	Pueblo IV	3	1412-1422±3
L.A.252	Te'ewi	Pueblo IV	4	1397-1424±1
L.A.123	Unshagi	Pueblo IV	65	1402-1605
L.A.481	"Amoxiumqua"	Pueblo IV	1	1505±3
L.A.303	Seshukwa	Pueblo IV	1	1598
L.A.133	Kiatsukwa	Pueblo IV	6	1614-1616
L.A.136	(Jemez region)	Pueblo IV	3	1657-1661±5

NEW MEXICO: SPANISH COLONIAL BUILDINGS[4]

Pecos: mission church	19	1459+x-1695+x
Gyusiwa: mission church	12	1625±2
Quarai: mission church	3	1630-31
Abo: mission church	2	1541+x-1646
"Gran Quivira": large church	4	1500+x-1583+x
Laguna: mission church	2	1784+x-1810+x
Acoma: mission church	2	1781+x-1870+x
San Juan: mission church	2	1815±15-1843+x
San Ildefonso: mission church	1	1785+x
Nambe: mission church	3	1534+x-1755±20
Taos: mission church (old)	2	1702+x-1721
Cochiti: mission church	2	1717±20-1744+x
Santa Ana: mission church	2	1729+x-1733+x
Santa Fe: parroquia (now part of cathedral)	5	1745±25-1851+x
Santa Fe: Palace of the Governors	9	1731±10-1850+x
Santa Fe: San Miguel Chapel	5	1653+x-1737+x
Santa Fe: "Oldest House"	7	1741±1-1768±1
Santa Fe: Guadalupe Church	1	1761±10
Santa Cruz de la Canada: church	2	1789±20-1845+x
La Vita: church	1	1750+x
Santa Rosa de Lima: church	1	1744±20
Abiquiu: church	1	1834+x
Las Trampas: church	3	1791+x-1812+x
Ranchos de Taos: church	4	1816±10
Talpa: chapel	3	1840±10
Cebolleta: church	2	1814+x-1836±10

[4] Spanish builders had the unfortunate custom of adzing their round beams; others they squared. Both of these processes, resulting in the loss of outside rings, make impossible the precise determination of bark dates for most of the material, although it is occasionally possible to estimate a date within a short range of years. In the accompanying list certain entries ("plus x" dates) have been made because of their indication of minimal age; others, to indicate tests made. For both classes preliminary investigations of the relation of heartwood and sapwood to age lead us to expect that more gratifying results will be forthcoming in the future.

NOTES ON CENTRAL GEORGIA DENDROCHRONOLOGY[1]

GORDON R. WILLEY

The dendro-chronology approach to archaeology at Macon, and other sites in Central Georgia, has been as follows:

1. Virtually all the prehistoric wood evidence preserved in Southeastern soils, has been obtained from house posts found under small occupation mounds and is in the form of charcoal. It has been catalogued from different structural levels of the great pyramidal mounds, each level distinct with its material culture associations. Also, over 1,000 charred specimens were taken from some 200 beams in the recently excavated ceremonial subterranean chamber at Macon. A great amount of this material shows ring size variations which are probably sensitive growth responses.
2. This charcoal is pine and oak. The pine may be divided into the specific class of long leaf (**Pinus palustris**) and the more generalized class of short-leaf which include **Pinus echinata** and other related types.
3. There are in Central Georgia a good many living trees of both classes of pine as well as a few living oak, whose ring chronologies extend back 125 years more or less.
4. The gap of years to prehistoric rings may be spanned as follows: first, houses dating from the early part of the 19th century are located in this area where they were built of native long-leaf pine. Historic documentation has located Indian sites clearly late in the time picture. Some of these sites are reported to have been burned. It is within the range of reason to hope that the wide chronological interval between prehistoric and modern can be thus bridged.

To lay a foundation it was necessary to investigate the following problems:

1. Is there sensitivity in Georgia trees, and does this sensitivity correlate with any definite weather factor?
2. What types of trees are the best "record trees" in the area in question?
3. What is the annual "ring structure" of the trees with which we are dealing, and how does this structure correlate with seasonal climate?
4. What are the geological, soil, and topographical conditions of this area and how will they affect tree growth?
5. What are the facts concerning "missing rings" and "doubles or extra rings"?
6. What percent of living tree specimens gathered from the field in the area in question are datable?
7. How many good "checking rings" are there to a century, and what are some of these specific years?
8. Is cross dating satisfactory?

In checking the related size of a specific annual ring against the same calendar year as registered in U. S. Weather Bureau reports, evident correlation was noticed within a fifteen mile radius of the city of Macon. Covering an area of over one hundred square miles, enough territory to be, eventually, archaeologically practical, precipitation records from seven stations within this region were compared against sketched and averaged ring sizes based upon over one hundred and forty trees scattered throughout the defined circle. Strong correlation was seen between deficient rainfall and small annual growth. Quite markedly, within a radius of fifty or more miles, there was a uniformity in precipitation and annual tree-ring growth. Undoubtedly other weather fac-

---

[1] This work was undertaken by the author as a member of Dr. A. R. Kelly's archaeological staff at the Macon site, Ocmulgee, near Macon, Ga. Dr. Kelly's continued help and support have been most instrumental in furthering dendrochronology in Georgia.

The research was further facilitated by Mr. James T. Swanson of the National Park Service, Acting Superintendent of the Ocmulgee National Monument; the WPA offices of Atlanta, Georgia; the Macon Chamber of Commerce; Dr. C. C. Harrold, Mr. L. M. Solomon, Gen. W. A. Harris, all of the Georgia Society for Archaeology; Mr. J. D. Crump, Mr. Marion Dunwoody, Mr. W. T. Anderson. Dr. W. B. Childs, of Macon; and Mrs. Isabel Patterson and Mr. Frank Lester of Columbus, Georgia.

To all others who have lent assistance, the writer is grateful.

tors are instrumental in tree growth, but the most obvious is precipitation.

As was mentioned, both the aborigines and the early Europeans coming into Central Georgia used, almost exclusively, the long-leaf pine for building purposes. Added to this, this particular tree gives the longest and most sensitive weather record of any tree with which we have worked. The short-leaf pine, also showing sensitive response, is good but has a rather large mean ring size and a relatively short life span. Within a radius of fifty or more miles, upon considering these facts with the practical item of the amount of this living wood available, we decided to use pine exclusively. All of our plots, charts, and computations are based upon this tree.

Southeastern annual growth, as we see it in the **Pinus palustris** and **Pinus echinata**, follows the lines of development noted in western **(Pinus ponderosa)** pine. The significant differences in the Georgia pine are: first, the white structure is resultant of a late winter-spring rainfall crest culminating in March; second, the dark structure as in the Southwest, affected by the July-August crest, is much heavier and denser than the same observed growth of the **Pinus ponderosa.** There is also a sensitivity in this summer growth, alone. Its striking appearance and effectiveness in "blind-dating" necessitated sketching each specimen, not only for total ring size, but for summer growth.

Topographically, Macon is on the fall line separating the lower Piedmont regions from the flat Atlantic coastal plains. Above and below this line we are confronted with differences both in terrain and rock structure. Our area, from which tree samples were taken, lies 20 or so miles above the fall line to some 100 miles below the fall line. Thus dendrochronological averages and comparisons were made upon an area composed of two major geological provinces. The lower Piedmont region is marked by numerous and rolling red clay hills cut with small streams. Granitic outcroppings are by no means uncommon north of the fall line, although, generally speaking, the residual soils are deeper to the extreme north of our area than on the immediate line where metamorphic and igneous rocks lie close to the surface. However, there are in many places along the fall line spotted areas of ancient sand dunes. These dunes are overdrained which is, of course, an important factor to be considered. Below the fall line the soils are principally sandy loams. Ocalla limestone, a Late Eocene formation, is the underlying formation throughout a large part of south Central Georgia.

From this brief summation we see that the area is not homogeneous. The selection of trees from the hill country may be made upon hill slopes, but for the coastal plains there is little choice from the standpoint of terrain. Most of the trees selected for this work showed some sensitivity. Naturally, a great many were better than others. No careful, correlative study has yet been made between trees and their ecological environment. It is quite probable that such would give us a definitive lead toward the selection of better record wood.

The fundamental factors of "missing rings" and "doubles" observed in our work are interesting and should be more intensely studied. At present we may summarize by saying that there are the following types of ring absences:

1. The typical, or Southwestern absence, where the tree does not grow, or the

growth is so very light that no ring is put down for that year.

2. The condition where the tree does put down white growth but where the dark growth of the summer is so thin and faint that it is lost between the preceding white of its own year and the white of the successive winter-spring period, for example 1856.
3. There is the case, as in our year of 1893, where the heavy summer wood of 1893 blends with the preceding dark wood of 1892, thus blurring the white of '93 and causing an absence or "double" appearance.

Concerning "doubles" or "extra" rings, these may fall into three divisions:

1. The simple "double." This is the usual Southwestern "double", usually marked by a single false and hazy line to the inside of the true summer terminant.
2. The "complex double". This is characteristic in the region. Here, there is more than one false line to the inside, sometimes two, three, or more.
3. The "double to the outside". In this type, there appears, to the outside of the clearly defined summer wood, a hazy and blurred continuation. It can be checked as false only by a well-grounded ring count. Specifically, the annual 1925 is often a "double to the outside." Turning to a month-to-month precipitation record of this deficient year, it is interesting to note that after a dry summer there is a single high precipitation crest for the normally dry month of October.

Out of our specimens about 85 percent were datable. Based upon this evidence from the area defined by precipitation and growth, our present master plot extends quite reliably to about 1800 A. D. Before this, insufficient material prevents further statement.

From a study of the one century with which I am familiar, there seem to be about 20 good "checking rings" to the century. Aside from these there are some dozen others which I believe are important.

Based upon the following specific annuals, cross dating in the Central Georgia area is possible with living specimens of pine trees:

1932—small total size, but large summer wood.
1931—small total, faint summer.
1930—small but not as faint summer as '31.
(1930 to 1935)—usually small.
1929 and 1928—big, both total and summer.
1925—very small (especially summer) excellent check.
1919—big (especially summer).
1914, 15, 16, 17, 18—small series with 16 heavy summer and 14 and 15 small total.
1912—big.
1904—quite small.
1902—faint summer.
1899—very small (sometimes no summer wood visible).
1898—large summer.
1897-1891 (inclusive)—small with 92 big summer.
1887-1885—small.
1886—big.
1883—very small.
1882—big, especially summer.
1872—very small, especially summer.
1869—small.
1863—small summer.
1860—very small, both total and summer.
1856—very small, both total and summer.
1857 & 1854—small.
1855—small total heavy summer.
1845—small both summer and total.
1835—small.
1830—small and small summer.
1828—faint summer.
1826 & 1824—small both total and summer.