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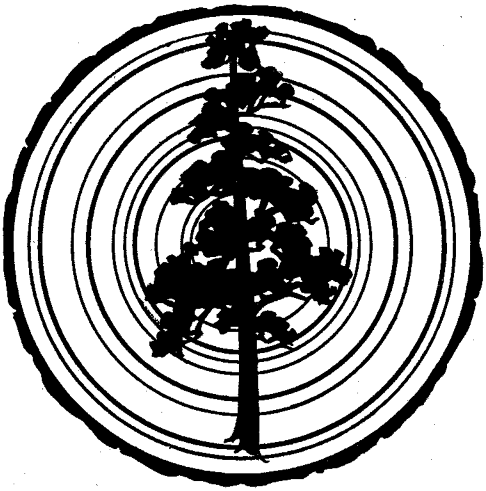

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THE TREE RING SOCIETY

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BY-LAWS

Article 1—The name of this association shall be the Tree Ring Society.

Article 2—There shall be two classes of active members,
(a) those who are contributing to basic research in dendrochronology
(b) honorary members who have contributed in special ways to tree-ring studies.

Article 3—Prospective members must be proposed by two members of the society and elected by a two-thirds majority of the members present at a meeting duly called by the president.

Article 4—The officers of the society shall be a president and secretary to serve for a term of one year.

Article 5—The Tree Ring Bulletin shall be the official organ of the society, the board of editors of which shall be appointed by the president.

Article 6—These by-laws can be amended at any duly announced meeting of the society.

INFORMATION

AUTHORS

The **Tree-Ring Bulletin** will appear four times a year and will publish papers which are the results of original research on tree rings in their relation to climatology, and to other subjects. No paper which has already appeared will be accepted.

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 submit their data in a table such as appears on the back page of Vol. I. No. 1. This will cut the cost of publication very greatly.

Until funds are available authors will be requested to pay the cost of illustration which may be line cuts or half-tones, but must be drawn or printed on white paper, and mounted with paste, not glue.

Each author 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, Dr. A. E. Douglass, Tree Ring Laboratories, University of Arizona, Tucson, Arizona.

SUBSCRIBERS

All correspondence having to do with subscriptions must be addressed to the Managing Editor, Dr. Harold S. Colton, Museum of Northern Arizona, Flagstaff, Ariz.

THE APPLICATION OF TREE RING ANALYSIS TO DEPOSITION PROBLEMS IN CHACO CANYON, NEW MEXICO

By DONOVAN SENTER

During the many seasons of excavation carried on by different scientific institutions in Chaco Canyon, New Mexico, the question of absence of burials representing the people of the large pueblos has many times been debated. Linked with this question is that of valley floor-fill since the period of desertion of this canyon in prehistoric times. Excavations made by the University of New Mexico in 1928 at the back wall of the large pueblo of Chetro Ketl indicated that fourteen feet of sandy fill had been deposited at that point since the foundations of the pueblo were laid. Finds of sherds by Pepper, Judd, and others in the walls of the Chaco arroyo likewise pointed to considerable fill since the period of occupation in the late ninth to the early twelfth centuries.

With these problems of burials and deposition in mind, the Anthropology Department of the University of New Mexico decided to excavate a deep trench as a part of their 1936 field program. This cut is eventually to be extended across the canyon along the line of projected stations.

The cut was begun between Chetro Ketl and the arroyo. The trench, fifty feet long and twelve feet wide, was carried down six feet, at which point excavation was shortened to twenty-five feet and narrowed to six feet. The trench was then carried down another six feet, at which depth it was narrowed to three feet and carried down six feet further. This gave a vertical face extending eighteen feet below the surface and twenty-five feet long. At the bottom was sand showing no trace of culture material. Deposition and erosion surfaces laid bare by the cut were identified* and all sherds encountered were collected and marked to indicate their locality. These sherds were classified and their period, as formerly determined by the pottery and tree ring work by Hawley on the Chetro Ketl dump**, was used to check the approximate dates of the surfaces which contained these sherds. The wet and dry periods indicated on the tree ring master chart for these dates were then checked against the wet and dry periods as suggested by the deposition and erosion surfaces. This application of data derived from dendrochronological data to a problem primarily geological in nature introduces a new combination of techniques whose success here suggests possibilities of application to similar problems eleswhere.

Conclusion:

Deposit I, sterile of sherd material, was topped by erosion surface I, and this in turn by deposit II, in which were Escavada black-on-white sherds dating from about 850 to 950 A. D. Erosion surface II represents a minor cessation of deposition and was probably not a period of considerable erosion. Above this surface, in deposit III, were found Gallup and Chaco black-on-white, dating between 950 and 1130 A. D. From these data it appeared that there was a period of extreme erosion in the Chaco before or early in the tenth century and that some time in the eleventh century there was a cessation of deposition. Following this, in the end of

* Geological identifications were checked by Dr. Ernst Antevs.

** Hawley, Florence M., The Significance of the Dated Prehistory of Chetro Ketl, Chaco Canyon, New Mexico, The University of New Mexico Bulletin, Monograph Series, Volume 1, Number 1, 1936.

the eleventh century or the beginning of the twelfth century, came another period of deposition. In checking these erosion-deposition data against the weather fluctuations known for prehistoric Chaco through the tree ring chronology, we find a definite relation. Chetro Ketl was occupied for some time prior to the extreme drought of 900 to 907 A. D. It seems probable that erosion surface I was formed near the time of this drought, after which the Escavada sherds were laid down in deposit II at about 950 A. D. The years between then and 1035 were of average rainfall, with occasional dry years. Between 1035 and 1041 a drought less severe than that of the tenth century probably is connected with the erosion of erosion surface II. Deposit to 1100 A. D. represents a moderately damp period, probably from about 1050 to 1100 A. D. and onward, at which time both Gallup and Chaco black-on-white, found in this stratum, are known to have been made.

The fluctuations in rainfall indicated in the successive erosion and deposition surfaces indicate that no major or even minor climatic changes occurred to cause the desertion of Chaco Canyon; if the canyon dried up and the water table was too low for continued agriculture, the condition was probably due to human despoilation of the forest border and to consequent forest recession and erosion of the light soil, according to the Douglass theory.

TYPICAL RING-RECORD FROM CHACO CANYON 700 TO 850, CK-331.

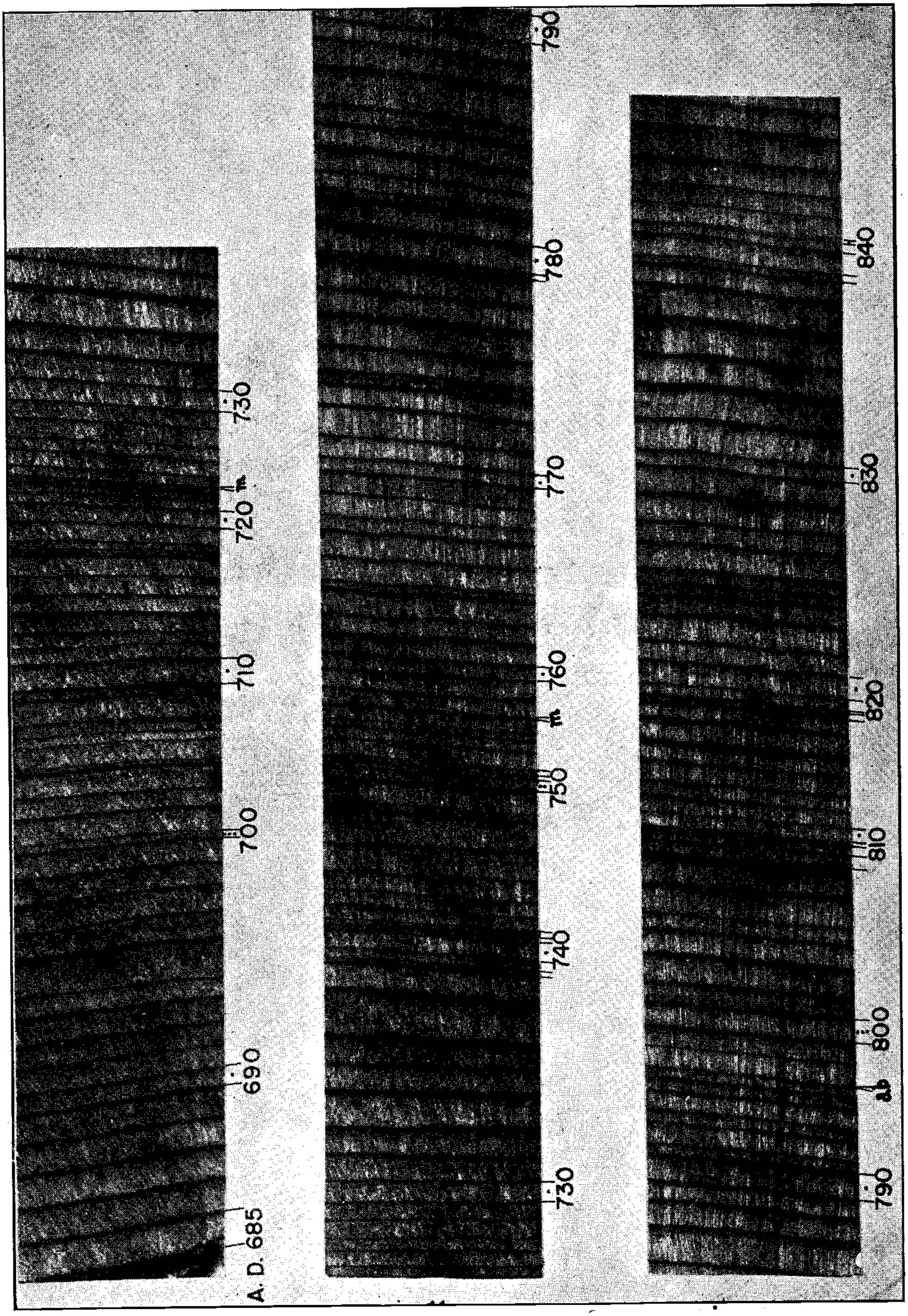
By A. E. DOUGLASS

In 1931 several groups of specimens collected by Morris in 1927 and subsequent years were examined and many of them were joined by cross-dating to form floating chonologies. It was, for a long time, an important question which one of these chronologies came first. In December, 1931, Miss Florence M. Hawley (Mrs. Senter) dated a superb pine specimen which she had found in Chetro Ketl in connection with work of the University of New Mexico. A certain configuration in this piece corresponded to a group of rings in one of these Morris groups and opened the possibility that the floating chronology JCD (Johnson Canyon Dating) immediately preceded and even over-lapped our known chronology which then extended back to 700 A. D.

The rings in the later part of that specimen, CK-331, identified beautifully with the sequences already known and supplied what is perhaps today the best ring record from the Central Pueblo Area extending during the seven hundreds.

The accompanying photographs of this specimen show an excellent sequence of rings from 685 A. D. to 846. The ring for 847 has a slight uncertainty in identity in this picture, being usually very small. These negatives were made several years ago by Mr. H. F. Davis at the Steward Observatory. In developing the entire Central Pueblo Chronology from 11 A. D. to the present time the early seven hundreds A. D. proved to be one of the difficult periods to cover with a large number of specimens and while this connection between the chronology before and after 700 A. D. has been amply verified by other specimens, it still remains a part of the sequence which has less than average number of specimens.

TYPICAL RING SECORD FOR CHACO CANYON
700-850, CK-331



SELECTION OF TREES FOR CLIMATIC STUDY

By EDMUND SCHULMAN

Recent developments have shown that the principles of selection of tree-ring specimens for purposes of climatic studies have frequently been misunderstood or neglected, and have thus led to inferences which may easily be in error. Random sampling of trees in a forest will give an approximation to their average growth as influenced by every active agent in the environment. It is often overlooked, however, that when the objective is the study of climate or especially one element of climate such as rainfall, not a random but a highly selected sample is necessary. Extensive remarks on the selection of specimens, particularly v-cuts, have been published by A. E. Douglass (1).

In the western yellow pine and Douglas fir, in drought areas, the recording of rainfall is greatly emphasized in the average individual by habits of the tree in relation to its dry environment. But other species in other more moist regions ordinarily seek conditions for growth which may permit many undesired influences to operate unchecked. Outstanding examples of this latter class are the California coast redwood and the Monterey pine. Hence the selection of individuals in such cases needs greater care than in our drought areas.

The general climatic quality in ring sequences needs to be established as firmly as possible before any definite climate correlations are worth attempting. This is done by making sure that different trees cross-date. First, the favorable tree must possess high circuit and vertical uniformity; that is, relatively small rings must be relatively small almost everywhere in the tree-trunk, large rings must be likewise large, so that annual growth curves derived from radials anywhere in the tree show agreements with each other approaching identity. Second, different trees from the same climatic area must show pronounced agreement in the changes of radial growth. The greater the distance between the trees combined with closer agreement, the more reliable the mean curve for the region will be, as a record to be correlated with climatic elements. Finally, the mean sensitivity, or average change from one ring to the next, should be high. An extensive set of sequences showing high climatic qualities has been published for the Central Pueblo Area (2).

Such comparisons with climate as those just mentioned are only worth making in trees properly selected for this very use. Hence it is most important to know the topographic and individual characters of locations where such trees may be found. Trees likely to yield good climatic records are as follows:

1. Those which grow high on the sides of steep slopes*; underground water supply is thus reduced to a minimum, and the immediate rainfall must be depended upon.
2. Those which grow on a thin soil; a combination of outcropping bedrock, a thin porous soil, and a steep slope might yield the tree record ideally most sensitive to rainfall.
3. Those which avoid highly exposed points; strain and dessication due to wind often introduce much irregularity into growth (3).
4. Those which are not subject to the influence of immediate neighbors; trees which are overtopped, or laterally suppressed from one or

* The author has the California coastal areas particularly in mind in this instance; in Arizona and Colorado certain differences between north and south slopes enter the problem.

more sides are likely to show erratic growth.

5. Those which are mature; young trees in many species grow very rapidly, or under protected conditions, and growth may be to some extent independent of climatic vicissitudes.

6. Those which have not been seriously injured by fire, or subjected to defoliation or other injury by insects or rodents; the latter effect is sometimes difficult to determine by inspection of the outside of the tree, but comparison of ring sequences will readily show the characteristic sets of thin rings (with faint latewood) slowly returning to normal, or rings with regions of badly deformed or crushed tracheids, phenomena which have been found to record defoliation (4, 5).

7. Those which possess cylindrical boles; a highly nonsymmetric crown system may in some species introduce irregularities in growth in different directions from the axis which may not have the same trend at different times, and thus submerge effects due to climatic changes. Strongly and irregularly fluted trees, showing the dominance of one or more roots, may act in the same way; in some species as the coast redwood in which fluting or lobing is characteristic, the lobes diminish in the upper portion of the trunk which may thus yield a usable record where the basal portion does not.

8. Those which do not grow near roads or other works of man likely to have disturbed their normal action.

The preceding applies to sequences of the last 50 to 100 years or so, all that is useable in comparison with recorded meteorologic phenomena. When results of correlations with climate are extrapolated to intervals of many centuries, other transitory effects, such as slow changes in topography or relatively sudden changes in neighbors need to be considered. However, comparison with growth curves of other trees will usually resolve any anomalous interval in any specimen, which may then be allowed for.

In conclusion, we may call attention again to the general condition in collecting ring records for climatic purposes; the greater the number of variables that influence tree growth in any area, the more careful must be the selection of trees in order to isolate the one variable that is sought.

1. A. E. Douglass. Climatic Cycles and Tree Growth, vol. II, chaps. II, III. Carnegie Inst. of Wash., pub. 289, Washington, 1928.
2. A. E. Douglass. Dating Pueblo Bonito and Other Ruins of the Southwest. Nat. Geog. Soc., Pueblo Bonito Series, No. 1, Washington, 1935.
3. F. W. Haasis. Diametral Changes in Tree Trunks. Carnegie Inst. of Wash., pub. 450, Washington, July, 1934.
4. D. T. MacDougal. Studies in Tree Growth by the Dendrographic Method. Carnegie Inst. of Wash., pub. 462, 124-129, Washington, February, 1936.
5. I. W. Bailey, and Anna F. Faull. Structural Variability in the Redwood. Jour. Arnold Arboretum, vol. 15, 233-254, 1934.
I. W. Bailey. The "Spruce Budworm" Biocoenose. Bot. Gaz., vol. 80, 93-101, 1925.

FURTHER DATA ON FIRST BEAM EXPEDITION SPECIMENS, 1923

By ALFRED PETERSON

(The data here given were secured by Mr. Peterson from the original specimens. The results were checked against the original dating records of 1928 and later were compared with recent reviews by the undersigned in which the climatic excellence of each specimen was estimated. This classification is here given in the accompanying table called "Quality of the Record" and expressed in the four letters A, B, C, D. Of these A is the highest quality of record and D is usually so poor as to be undatable. Mr. Peterson's previous list, covering numbers BE-1 to 100 was given in Tree Ring Bulletin, Volume 1, page 23, 1935. A. E. Douglass)

QUALITY OF THE RECORD

BE104	B	BE118	B	BE129	B	BE148	A-B
BE106	B-C	BE119	B	BE133	D	BE151	B
BE107	B-C	BE120	A-B	BE134	A-B	BE159	A
BE108	B	BE121	B	BE135	A	BE160	B
BE-109	A-B	BE122	B	BE136	B-C	BE161	A-B
BE112	A-B	BE125	A-B	BE138	B	BE162	B
BE113	B	BE126	B	BE139	B	BE163	A-B
BE114	B-C	BE127	B	BE146	B-C	BE168	
BE115	A-B	BE128	A-B	BE147	A		

Site: All from Oraibi

Piece No.	Outside Dated Ring	Inside Dated Ring	Approx. Radius in mm.	Kind of Wood	Type of Specimen	Sap-heart Date	Estim. Rings Lost at Outside	Estim. Bark Date
BE104	1706	1645	75	YP	Core	?		1707
BE106	1394	1313	103	YP	Core	No	50	1444
BE107	1421	1315	128	YP	Core	No	50	1471
BE108	1706	1648	77	DF	1/3Sec.	1680	1±	1707±1
BE109	1749	1647	98	DF	Sq.Cut	1710	6c	1755
BE112	1753	1620	120	YP	Core	1699	5±	1758±5
BE113	1759	1622	132	YP	Core			1759
BE114	1616±3	1376	140	YP	Core	1555	15	1631
BE115	1720	1654	35	DF	Sec.	Poss. 1684	5	1725±5
BE118	1451	1376	82	YP?	Core	No	50	1501
BE119	1682	1621	53	DF	¾ Sec.	1670	Cons.	1712±
BE120	1749±2	1621	49	DF?	F.Sec.	1715	Cons.	1759±10
BE121	1760*	1620	89	YP	Core	1724	0	1760
BE122	1630**	1513	70	YP	Core	1588	Prob.0	1630
BE125	1683	1619	37	YP	Core	1671	40	1723±
BE126	1512	1387	70	YP	Core	No	50	1562
BE127	1362	1314	73	YP	Core	No	50	1412
BE128	1518	1430	49	YP	V-cut	No	50	1568
BE129	1690±10	1657	47	DF	V-cut	1672	30	1720
BE133	1596?	1297	60±	YP	Core	1550	0	1596
BE134	1710±x	1680	37	DF	½Sec.	1693	25	1735±
BE135	1755	1721	41	DF	½Sec.	1740c	25c	1779
BE136	1703±2	1635	104	YP?	Core	1673? 1665	Few	1710±
BE138	1569	1518	89	YP?	Core		50	1619
BE139	1692	1629	81	YP	Core	1657	0	1692
BE146	1666±x	1621	31	DF	Core	No	Cons.50	1670±
BE147	1567	1477	96	YP	Core	1547	50	1617
BE148	1730	1702c	32	DF	F.Sec.	1715	25c	1755c
BE151	1754	1703	43	DF	Sq.Sec.	1733	20c	1774
BE159	1437	1379	60	YP	Core	Sap Worn Off	50?	1487
BE160	1515	1468	70	YP	Core		50	1566
BE161	1714	1644	93	YP	Core	1583	10	1726
BE162	1560	1515	36	DF	Sec.	1547	30c	1590
BE163	1726	1661	33	DF	F.Sec.	1697	15c	1741
BE168	1398	1313					50	1448

* Number absent—2. ** Number absent—1 or 2