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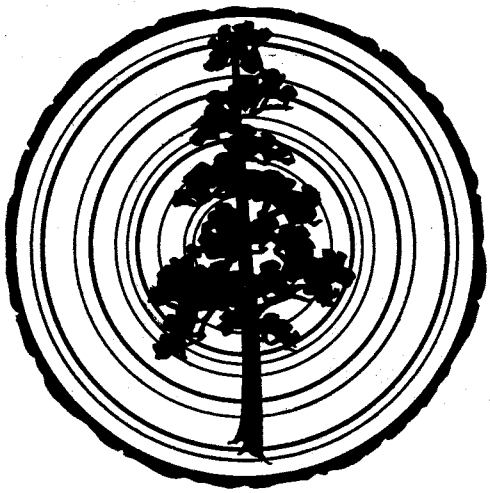

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CONTENTS

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HAROLD S. COLTON, Managing Editor
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Flagstaff, Arizona

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 this number. 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 Managing Editor, Dr. Harold S. Colton, Museum of Northern Arizona, Flagstaff, Arizona.

EDITORIAL

A. E. DOUGLASS

The field of tree-ring study touches a number of sciences. Botany is of the first importance. The annual rings at the dry borders of the southwestern forests give excellent rainfall records. This is a reaction of the tree to its environment and as such is a contribution to ecology; in this southwest area nature has produced a living laboratory and staged a test such as the biologist cannot prepare in his own garden.

Climatology is closely related to our studies because the trees we use give this rainfall record for more than a thousand years past and thus supply us with fundamental data not elsewhere equalled in length of time and accuracy of dated record. These long records have developed the use of new and more efficient analytical methods in the study of climatic cycles. These records of rain and drouth also meet certain needs of the reclamation engineer and the soil erosion specialist.

Geology stands also in close relation because the interpretation of modern rings in terms of climate enables us to read the meaning of fossil rings in the study of past climates.

Astronomy holds a close relation, for rainy and dry spells that influence the trees depend on atmospheric circulation whose motive force comes from the sun. And the astronomer finds in tree-ring variations a reflection of solar changes over longer periods than described in human histories. More than that, the study of geologic tree growth intimates a certain stability in the sun over immense periods of time.

And archaeology is finding important developments along tree-ring lines. The ancient rainfall conditions in this region long occupied by primitive man were recorded in the trees with which he built floors and roofs. In this way the student learns the exact time of construction of great ruins, and he can see in the drouths depicted in his logs a possible explanation of their abandonment.

In the last five years special development of tree-ring work has taken

place along lines of archaeology and climatology. Each is dependent on precise extension of a fundamental chronology, whose material is coming from the ancient ruins. In making this statement one does not forget that the three-thousand-year records of the big Sequoia have a superb climatic importance when obtained by correct dating of the upland trees. In the Sequoias rainfall also plays the chief role, but not so prominent a part as in forest border pines and firs of the pueblo area. In the latter region of greater dryness where the trees are growing under a keener stress, a field of new adventure has been opened to the archaeologist in the dating of ruins and a gratifying number of students have become skilful in the interpretation of rings. In a rapidly developing subject comparisons of data and methods are very important to the progress of all. Accidental meetings and discussions by letter are unsatisfactory, so a conference was arranged as described elsewhere in this bulletin and the needs of tree-ring students were discussed and methods of insuring cooperation were proposed. At the meeting it was brought out that while each student gets acquainted with parts of the long basic chronology, each new location or new period of time requires long preparation. Hence to establish dates of new ruins with proper care the best specimen on which the date is founded should be made available to all interested in the subject and capable of checking the results. In the discussions also new points of technique were brought out and some modifications of methods already in use were suggested.

To supply these present needs we require a medium of exchange of ideas, a publication in which new results may be set forth with some description of the data on which they are based, and new methods may be presented for consideration. This issue contains the suggested data regarding a group of dates from the Tsegi Canyon region. In the table may be found various facts on which the archaeological dating is based. In the limiting dates the chronologist and climatologist may discover whether there is material for his special studies. We hope later to be able to publish also the photograph of a good type specimen of each site whose dates appear in these tables. Such publication represents a thoughtful effort to standardize the accuracy of tree-ring dating so that before presentation to the public such dates shall have had every reasonable test to exclude error. This care, which had its immediate incentive in connection with archaeology, has equal importance, we must remember, in all the scientific lines associated with tree-ring study. It is only by infinite care that the language in trees can be correctly interpreted. While these are the present purposes of the publication it is not intended that the papers included should be limited in this way. The door is held open for development along any line to which the study of tree rings may be of service to science.

The emblem at the head of this issue needs explanation. The long chronologies constantly used in the sciences above mentioned have been under development since 1904. Extensions back into prehistoric times have been made from time to time by adding long ring sequences that were called floating chronologies. The earliest of these so far identified was named EPD, Early Pueblo Dating, and was recognized in 1927 on a specimen collected by Jeancon and Ricketson in 1923 at Mummy Cave ruin. This chronology has been recognized in great numbers of specimens by a certain characteristic configuration of rings that we call the "EPD Signature." It is this group of rings that appears in the emblem. It was drawn by Virgil Hubert July 25, 1934.

REPORT ON THE FIRST TREE RING CONFERENCE

WALDO S. GLOCK

A group of people directly interested in the use of tree rings for scientific purposes met in conference as the guests of Dr. and Mrs. H. S. Colton at Flagstaff, Arizona, June 11-12, 1934. All meetings were held under the chairmanship of Dr. A. E. Douglass who originated tree-ring studies and who founded the so-called Douglass method of tree-ring analysis for dating and climatic purposes.

Among those attending the conference there were two groups: the active workers, and those without special tree-ring experience, but deeply interested in the science. In the first group we must mention A. E. Douglass, W. S. Stallings, Emil Haury, John C. McGregor, Gordon Baldwin, Carl Miller and Waldo S. Glock. Florence Hawley and H. T. Getty were invited but were unable to be present. In the second group were Harold S. Colton, Lyndon L. Hargraye, L. F. Brady, Katharine Bartlett, E. H. Spicer, Louis Caywood, Ben Wetherill, and Claybourne Lockett. Virgil Hubert recorded the minutes of the meetings.

Since the workers are few in number the conference provided the unique opportunity for nearly all of the individuals in a certai field to meet for exhaustive discussions of all problems, much as in a Committee of the Whole. Topics freely touched upon for mutual benefit pertained chiefly to methods and practice, such as: tags to be left on beams from which specimens are taken; collection and preservation of charcoal; photography of tree rings; preparation of wood surfaces; illumination of specimens and the physical problems involved; cutting of sections; and the manner in which a tree puts down the annual ring.

The subjects upon which definite action could be taken will be considered under separate headings.

Government Permits to Collect Tree-Ring Specimens. Our National Park Service desires to preserve Indian ruins in a way to merit the appreciation of an intelligent public. And justly so! But no one is so vitally interested in the preservation without mutilation of ruins for historical and educational profit as is the trained archaeologist or the tree-ring man. Either one, in fact, has a clear-cut conception of his duty when collecting and, since his life work deals with the human history of the Southwest, either one above everybody else earnestly desires that the National Park Service preserve scrupulously our Indian ruins intact. Furthermore, tree rings have given a lucidity to the history of the Southwest unknown before their use: they have given definite calendar dates to the various ruins; they have placed occupations and migrations in orderly sequence; they have furnished a background against time for the cultural development of races; and they have yielded intimate glimpses into the history of a single ruin, its original construction, its repair, and those vicissitudes of fortune reflected in the home of a family. A beam which has been sampled by a tree-ring man, even to the sacrifice of half its length if need be, instantly becomes a prize exhibit because it has a story to tell, a story of the dim centuries when our land was occupied by strange races whose cultures and environments take on a new meaning, oddly enough, through the trees those people felled with infinite labor and incorporated in their dwellings. Tree-ring men are indeed anxious for our National Park Service to make use of their findings for the benefit of a public eager for information about those ancient races. It is a well-known fact that thousands of old beams have been burned wantonly as firewood by a portion of the public which little realized the irreparable damage mirrored in

the smoke and flames. And such destruction continues where direct Government supervision is not maintained constantly.

Therefore, the Conference recommended that stringent qualifications be demanded in the recipient of a permit, that the collector be an experienced field man, that he secure adequate samples with as little effect on the beams as possible consistent with the necessities of science, and that the information derived be furnished the National Park Service for its educational program in making the beams and ruins tell their stories to the citizens of our country.

Accurary of Dates. Dr. Douglass kindly consented to the requests of the assembled scientists that he take sufficient of his time to check all dates before they are published with finality.

The University of Arizona a Depository. Since the University of Arizona is the center from which tree-ring knowledge has radiated, it was decided to make the files of Dr. Douglass a depository for photographs of all valuable tree-ring specimens, skeleton plots, duplicates of valuable specimens where possible, and a system of index cards containing useful and pertinent information on prehistoric specimens and living tree materials. Duplicate cards and photographs will be supplied to other workers at their expense.

Publication. Everyone present at the Conference felt the urgent need of an avenue of publication for results distinctly tree ring in nature, because the many ramifications of tree-ring studies make their results somewhat alien to many of the standard serial publications. As the meetings progressed, the need for a separate journal evolved into the concrete form which makes its first appearance with this issue of the "Tree-Ring Bulletin." At first the Laboratory of Anthropology at Santa Fe, New Mexico, through Mr. W. S. Stallings, generously offered to print from time to time several mimeographed pages to the number of about twenty copies, but later it was realized that the demand for information concerning tree rings exceeds what the Conference felt it could accept gratuitously from the Laboratory of Anthropology. Plans were so made that the "Tree Ring Bulletin" can expand as material for publication increases and as support for the project becomes greater. Paramount among plans for the future is the desire to print photographs of type specimens and ring sequences much after the fashion among paleontologists and biologists.

Definitions. Certain definitions of important terms were agreed upon by the Conference in order to obviate any ambiguity, to further precision in the declaration of dates, and to serve as a guide in publication.

Center Ring: The actual center of the tree; the first ring formed by the tree around the elongating axis.

Inside Ring: The first ring of entire width shown by a specimen whose center ring is absent.

Outside Ring: The last ring of entire width shown by a specimen; not necessarily the final ring grown by the original tree.

Bark Ring: The ring immediately under the bark of a tree or specimen.

Bark Date: The date of the ring immediately under the bark of a tree or specimen. The ring represents the last one formed before the original tree died or was felled, which occurred after growth ceased at the end of the season responsible for the bark ring or before growth started in the following season.

Estimated Bark Date: The estimated date of the bark ring on a specimen, expressed as a date with probable error + and —. Used where the outside ring is not the bark ring.

Estimated Building Date: A composite date, derived from all specimens, of the year in which a ruin was originally constructed. Expressed with probable error + and —. The building date may be up to a year later than the estimated bark date or the actual bark date.

Resolutions. Several resolutions were formulated to express the sentiment of the Conference. They are as follows: (1) When the date of a ruin is published it should be accompanied by a photograph of a type specimen and its skeleton plot. (2) It was strongly felt by the members of the Conference that the value of tree-ring studies and the renown brought to the State of Arizona by the work of Dr. Douglass amply justify the State in releasing him from many of his other duties so that he may devote his time more fully to research. (3) The benefits of the present meetings made it clear that another Conference should be held next year. To this end the Laboratory of Anthropology at Santa Fe extended a cordial invitation. (4) A resolution of thanks was voted unanimously to Dr. and Mrs. Colton for their kindness and hospitality.

DATES FROM TSEGI

JOHN C. McGREGOR

The beam material which is included in this report was collected by Lyndon L. Hargrave, and party, as members of the Rainbow Bridge-Monument Valley expedition in northern Arizona, June to September, 1933. The sites from which the material was collected are located in the Tsegi canyon and its branches, between its mouth and the base of Navajo Mountain. The sites listed in the table by number are here listed with their respective popular names, and approximate locations.

N. A. 2507—"Swallows Nest"—Tsegi Canyon proper.

N. A. 2519—"Kiet Siel"—Tsegi Canyon proper.

N. A. 2521—"Turkey House"—Tsegi Canyon proper.

N. A. 2536—"Twin Caves Pueblo"—In a branch canyon above Bat Woman Canyon.

N. A. 2542—An unnamed and unexcavated pithouse. (Loose material from the side of the structure).

N. A. 2543—"Ladder House"

N. A. 2630—A site thus far unnamed.

From these sites, and several others thus far undated, the field party collected about two hundred specimens of beams, mostly in the form of wood poles, but with a few charcoal fragments. From the larger sites with abundant material only the most likely pieces were taken, whereas from those with a small amount of beam material present every available specimen was collected. Subsequent study, particularly of the latter group, indicated that many of them are undatable.

The most easily datable material was selected for preliminary study. Of this much was pinon and juniper, one juniper and three pinon being readily datable. The accompanying table lists the forty-four definite dates which were secured, all having been read and checked by Dr. A. E. Douglass.

The table was compiled in its present form at the suggestion of Dr. Douglass, with the idea that the selection of data might be improved as necessity demands. The following explanation of the table will serve as a key to its interpretation.

It was decided that sites numbered by institutions would merely be listed in this table by such numbers.

Individual specimen numbers represent the serial catalog numbers of

the institution in which those specimens are deposited, in this case the Museum of Northern Arizona.

Duplicates, if such exist, are indicated in footnotes, even though they may represent individual pieces from various locations in the site.

The outside and inside rings * permit the determination of the total number of rings.

The maximum radius in millimeters permits the determination of average ring size.

The kinds of wood are listed under the following abbreviations:

Jun.=Juniper
Pnn=Pinon
YP.=Yellow Pine
DF.=Douglas Fir
F.=Species of fir undetermined.

The type of specimen has been listed as:

Plank=Split plank, which will average 1″ to 2″ thick.
Sections=Listed roughly as follows:
⅛ Sec.—¼ Sec.—½ Sec.—¾ Sec.—and, F. Sec.
Core=Tubular borings of 1″ diameter.
Splints=Shakes or split fragments, such as door lintels, etc.

The sap-heart contact is indicated as follows:

Date given=Average contact date.
?=Contact invisible.
No=Heartwood only.
Sap=Sapwood only.

The estimated number of rings lost from the outside is listed in the third column from the last. Where obviously no rings are absent it is listed as 0, a slight question of doubt is expressed as "Prob." (probably), 1 etc., "Few" indicates only a very small estimated loss, "Consid." a relatively large number lost, and the abbreviation "Dam." that the outside rings are splintered, weathered, or otherwise damaged.

Many of the specimens of this collection, (i.e.-F.3194, 3161, 3106, 3175, 3107, 3186, and 3260), are excellent records, some of them undoubtedly of sufficient value to serve as type specimens of the locality and the time they cover. This is particularly true of several of the Douglas Fir beams. The above list of fine specimens, with the addition of F.3124 and 3263 will serve as type specimens from the sites dated. The one specimen of juniper, (F.3161), representing 166 years, is most outstanding in the excellence of its record, a fact which is unusual in the experience of reading tree rings. The preponderance of Douglas Fir, and the almost total absence of Yellow Pine give us some knowledge of the ecological conditions when the sites were inhabited. Building was most active at Kiet Siel, (N.A. 2519), during the years of 1274 and 1275; and at Twin Caves Pueblo, (N.A. 2536), chiefly in 1272 and 1274. Approximate building dates may be suggested as 1065 for N.A. 2543, and about 1127 for N.A. 2630. From the other sites too few dates have been secured to indicate building periods.

*Such terms defined in "Report on First Tree Ring Conference."

Site	Piece Number	Outs., dated Ring	Inside dated Ring	Approx. radius in M.M.	Kind of Wood	Type of Specimen	Sap Heart Rings Lost	Date at Outside	No. Absent	Estim. Bark Date
N. A. 2507	3107	1249	1165	107	DF	¼ Sec.	1216	Prob. 0	1	1249
N. A. 2519	3161	1106	940	88	Jun	Plank	?	Dam	1	1116±10
"	3124*	1153	956		DF	Splint	1097	Prob. 1	1	1154±1
"	3164	1255	1169	57	DF	⅛ Sec.	No	Dam	0	1258±3
"	3108	1259	1158	76	DF	½ Sec.	No	Few	0	1262±3
"	3152	1269	1236	39	DF	F. Sec.	Sap	Prob. 0	1	1269
"	3138	1272	1235	60	DF	½ Sec.	1252	Few	0	1275±3
"	3192	1272	1195	65	DF	½ Sec.	1234	Few	0	1274±2
"	3106	1273	1210	51	F	F. Sec.	Sap	Bark	0	1273
"	3119	1273	1242	54	F	Core	Sap	Prob. 1	0	1274±1
"	3139	1273	1214	37	DF	F. Sec.	1242	0	1	1273
"	3114	1274	1214	56	F	Core	Sap	0	0	1274
"	3118	1274	1238	42	F	Core	Sap	0	0	1274
"	3135	1274	1202	64	DF	F. Sec.	1231	0	2	1274
"	3144	1274	1192	87	DF	½ Sec.	1234	0	2	1274
"	3183	1274	1193	58	DF	½ Sec.	1239	Prob. 0	2	1274
"	3112	1275	1197	57	F	Core	Sap	0	0	1274
"	3113	1275	1238	57	DF	Core	1255	0	0	1275
"	3116	1275	1220	46	DF	Core	Sap	0	0	1275
"	3117	1275	1231	50	DF	Core	1256	0	2	1275
"	3111	1282	1221	92	F	Core	Sap	1 or 2	0	1284±2
N. A. 2521	3124	977	776	92	Pnn	¼ Sec.	947	Few	3	980±6
N. A. 2536	3175	1272	1159	79	DF	¾ Sec.	1234	1 to 3	1	1274±2
"	3179	1272	1211	59	DF	½ Sec.	1244	0	0	1272
"	3186	1272	1157	55	DF	¼ Sec.	1238	0	0	1272
"	3187	1272	1221	52	DF	F. Sec.	1249	Few	0	1274±2
"	3190	1273	1177	60	DF	⅛ Sec.	1243	Prob. 0	1	1274±1
"	3189	1274	1222	65	DF	¼ Sec.	1254	1 or 2	1	1276±2
"	3182	1205	1109	50	Pnn	½ Sec.	No	Few	1	1208±3
N. A. 2542	3263	1018	884	61	DF	Core	982	0	1	1018
N. A. 2543	3260	1059	905	132	DF	F. Sec.	1016	Few	1	1064±5
"	3262	1057	926	41	DF	Core	1024	Consid.	1	1067±10
N. A. 2630	3194	1124	903	211	DF	F. Sec.	1056	0	2	1124
"	3173	1127	1021	63	Pnn	½ Sec.	1088	Few	0	1130±3

*The following numbers are individual specimens all derived from the same log: 3125, 3127, 3128, 3130, 3131, 3140, 3141, 3142, 3145 and 3146.