

TREE RING BULLETIN

VOL. II

APRIL, 1936
A Quarterly

No. 4



CONTENTS

Central Pueblo Chronology.....	A. E. DOUGLASS
Early Date Archaeology.....	EARL MORRIS
Dates From Tsegi.....	J. C. MCGREGOR
Index to Volume II.	

PUBLISHED BY THE TREE RING SOCIETY

HAROLD S. COLTON, *Managing Editor*
Museum of Northern Arizona
Flagstaff, Arizona

\$1.50 Per Year

50 Cents a Copy

THE TREE RING SOCIETY

DR. A. E. DOUGLASS, President

H. T. GETTY, Secretary and Treasurer

Main office, University of Arizona, Tucson, Arizona.

Editorial office Museum of Northern Arizona,
Flagstaff, Arizona

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.

EDITORIAL BOARD OF TREE RING BULLETIN

A. E. DOUGLASS, University of Arizona
WALDO S. GLOCK, Carnegie Institution of Washington
HAROLD S. COLTON, Museum of Northern Arizona
JOHN C. MCGREGOR, Museum of Northern Arizona
EMIL W. HAURY, Gila Pueblo
W. S. STALLINGS, Jr., Laboratory of Anthropology
FLORENCE M. HAWLEY, University of New Mexico

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 CENTRAL PUEBLO CHRONOLOGY

BY A. E. DOUGLASS

The Central Pueblo chronology, 1900 years long, has been derived from some scores of pines and firs and a few pinyons that grew on the Colorado Plateau area. The records of these trees, averaging perhaps a century in length, were matched one to another at their ends so that all together they form a continuous sequence. The region best represented by them is the range of mountains along the boundary between Arizona and New Mexico. All the earlier specimens were found by the archaeologists and so it is both descriptive and fitting to call the full sequence the Central Pueblo Chronology, CPC.

The chronology actually includes not merely the building dates given below but extends back into the past some centuries before the earliest of them; its earliest complete ring is 11 A. D. It has unique value along two lines of interest. Its trees grew in a homogenous region where the annual ring growth bears a strong relation to winter rainfall. It therefore gives us a climatic record of great value. Its locality at the center of the Pueblo Area enables it to date the human occupation and construction from the Middle 300's on. We have found only one site, Obelisk Cave in the Red Rock Valley, that shows only beams of the 5th Century. It is possible that this site reached modern times with minimum defacement by secondary occupation. It would seem an appropriate place sometime for an attempt at restoring an American settlement of that period.

This chronology at its beginning in 1906 consisted of two 500-year ring records in pine trees that grew south of Woody Mountain, near Flagstaff, Arizona. A substantial Flagstaff group made in 1919 on the site of the present Fort Tuthill, produced five more trees of that age. For several years the combined chronology from these trees was referred to as the "7 five-hundred-year trees." In the next few years three more very old trees were found, one in Fort Valley, one on Woody Mountain and one at Fisher's Tanks. In 1927 these ten were combined into a single long chronology under the title of FLC, Flagstaff Century group.

In the years 1919 to 1929 splendid collections of pre-historic beams covering a thousand years or more were received and the various ring records were merged into definite chronologies by cross-identification. These were at first floating sequences of unknown date. In attempting to identify them the Flagstaff chronology reaching back to 1400 was extended to 1300 and greatly improved in quality by specimens from the Hopi villages, chiefly secured in 1928. On June 22, 1929, these floating chronologies were dated upon closing the "Gap" by a large charred beam from Showlow as described in National Geographic articles.(1)

In the next few years my attention returned strongly to climatic lines. (2) The hope was frequently expressed that with the dating work placed at the disposal of the archaeologists, they would aid me in extending the fundamental chronology backward into more remote ages preceding 700 A. D. This they have done very handsomely.

Prompt service came from the Museum of Northern Arizona. It was the discovery, by studies of Flagstaff specimens from Medicine Valley, that the two annual rings had been overlooked, one at 809 and the other

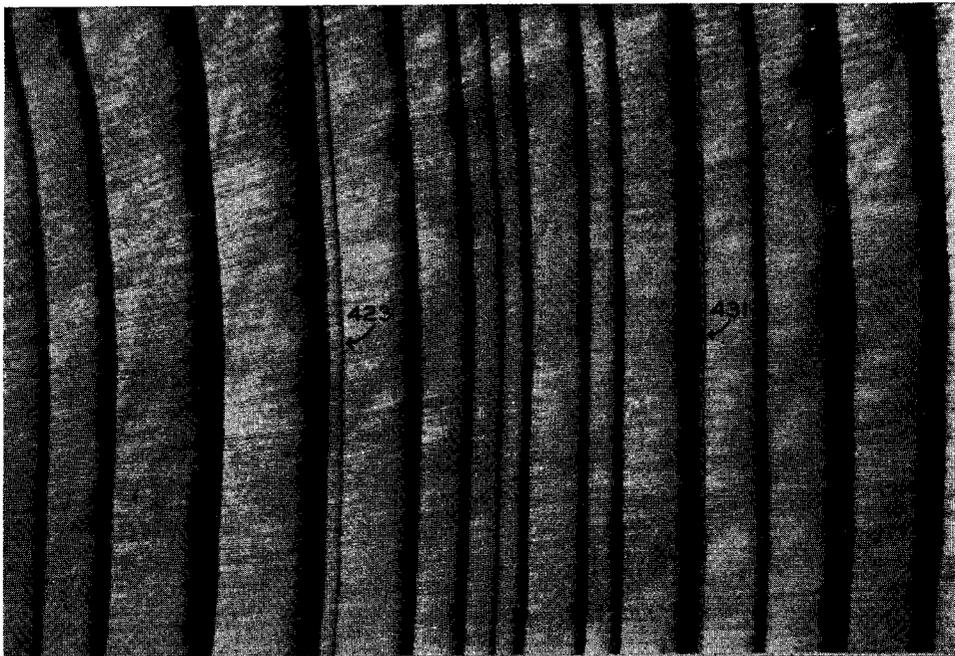
(1) "Dating Pueblo Bonita and Other Ruins of the Southwest," National Geographic Society, Contributed Technical Papers, Pueblo Bonito Series, Number 1, 1935.

(2) Climatic Cycles and Tree Growth, Carnegie Institution of Washington, Vol. I, 1919; Vol. II, 1928, and Vol. III in press.

at 817, on account of crowding of the rings in DPB 15, the Early Pueblo Bonito log, which at that time was our main source of information. These corrections were confirmed by further search on JPB 99, a very large Pueblo Bonito log already in hand. Meantime other specimens were producing more exactness in the chronology; namely, two in the 800's from

EPD SIGNATURE

From BE-33



EPD Signature in BE-33; A.D. 423 to 431, first recognized as part of an early chronology in 1927; dating assured in July, 1934

Sliding Ruin in Canyon de Chelly, one at A. D. 859 from Pueblo Bonito; and several specimens from Judd's Pit House in the Chaco Canyon Wash near Pueblo Bonito, which were dated at 777.

The germ of a further extension into the past had already come into existence before the completion of the 1200 years just referred to. In 1927 when various floating chronologies were developed and joined together there still remained a specimen exhibiting superb dating qualities whose ring record could not be located in any known sequence; we suspected that it belonged to a different age and might be very old. This was BE-33, a pine with 4-inch radius, showing 81 rings, large at the center of the tree with sudden striking differences in thickness indicating very high sensitiveness to climatic influence. Rings numbered 21 to 29 from the center gave a conspicuous and easily recognized "signature" (see the emblem on the front page of the Bulletin and the cut with this article).

In December of the same year, 1927, a large collection came from Mr. Earl H. Morris, largely from the Chinle region. These were given the group letter M, referring to him. He specially called to my attention M 101, a large roof beam in an early-type house at Mummy Cave. To my delight this contained the same "signature" found in BE-33 and since

agreement was equally good in the other rings common to the two, their identity in age was considered established and their ring sequence was recognized as a definite floating chronology. Mr. Morris in describing this roof beam had used the expression "early pueblo" age. This was taken as applying to the new chronology and it was therefore called EPD, Early Pueblo Dating.

The EPD chronology did not fit at any point the known chronology that extended back to 700 A. D. In 1931, late spring, attention again was given to it, stimulated by a large charred beam from the Johnson Canyon area, a few miles southeast of the Mesa Verde. This led us to make a complete examination of the "M" series collected in 1927. These ring records gave at first several floating chronologies and greatly enlarged the EPD sequence. As the number of specimens increased and especially as M 190, a fine Mummy Cave section sent on by the American Museum of New York, was examined, these separate sequences grouped themselves together into two continuous series, the EPD already known and a new series which we called JCD—Johnson Canyon Dating, each over 300 years long but whose relation to each other and to our dated chronology was unknown.

Thus in the second half of 1931 the situation regarding the early chronology resembled that of 1928 when the "gap" between historic and prehistoric ring records was recognized but not closed. In the present chronology building of 1931, there were also two sequences, this time nearly equal in length, 300 years each, with no clear guidance from the archaeologists as to which came first, and no very strong advice that either of them preceded 700.

Late in 1931, Dr. Florence M. Hawley secured a superb pine specimen from Chettro Keti in Chaco Canyon, New Mexico, and in December became assured of its dating. Its inner rings gave a well-nigh perfect series beginning at 643 A. D. It showed a group of small rings, 660 to 664, and a rather special configuration at 704-709 that was evident in the JCD chronology. This "tie-in" to the JCD's came near to the middle of Morris' great beam, M 200, from Johnson Canyon and if correct would place the cutting date of that beam as near 831 A. D. The outer parts of this great section were difficult to identify on account of compressed and missing rings.

Thus in January, 1932, we had secured a possible identity of the JCD's, as immediately preceding 700 A. D., but we considered this identification too weak to quote because it depended on a brief overlap near 700 in one specimen only.

In the summer of 1931, Dr. W. S. Glock did a fine piece of fundamental ring work on the pinyons in the M series, cross-identifying a large proportion of them. He followed this in 1932 by intensive work on Morris' collections of 1930 (for the Seventh Bernheimer Expedition) and 1931 from Broken Flute and Obelisk and other caves of the Red Rock Valley in North-eastern Arizona. He established the specimens from Obelisk Cave as belonging to the EPD sequence and cross-dated great numbers of specimens from Red Rock Valley which we were calling the MLK's (Morris Lukachukais). Broken Flute Cave contained both EPD and JCD specimens, while Obelisk Cave had only EPD specimens (suggesting that it was a better type settlement of the 5th Century).

It was not until March, 1933, that the true relation between EPD and JCD was discovered. This was done by specimen MLK-211, which be-

gan with the EPD signature near its center and ended up in the outer parts with groupings that plainly identified as early JCD, thus placing EPD before JCD. This was corroborated by other specimens in these beautiful collections and then by MV-23 from Step House Ruin in the Mesa Verde. This specimen had been turned over to me by Mr. Paul Franke, Park Naturalist, in June, 1931, but was not dated till February, 1934. The outside was approximately 625 A. D.; interior rings were identified in the JCD's and central rings matched the late EPD's with a small ring near the very center that corresponded to EPD-61 which now is recognized as A. D. 463.

Thus, by the summer of 1933 we had a long sequence covering the earlier EPD and the later JCD chronologies but connected weakly to the A. D.'s near 700. Specimens were greatly desired to strengthen this connection. The first assurance of its accuracy came in July, 1934, by the identification of a specimen numbered FR-20, collected by Mr. Carl F. Miller near Allantown, Arizona, on a Smithsonian Expedition under Dr. F. H. H. Roberts. This and two others from the same place (Numbers FR-8 and 572) were charred beams of large size. The cutting dates (recognized by Mr. Miller and published in the Tree Ring Bulletin, Vol. I, No. 4, April, 1935, page 31), were in the middle 800's. The center of FR-20 was formed in the last years of the 6th century. This specimen FR-20 (with FR-8 also) showed the JCD signature A. D. 611-615-620 in very good form. This signature is a remarkable group of rings first recognized in 1927 in M-179 from Mummy Cave. It contains 10 rings as compared to only 9 in the EPD signature.

This strengthened the weak place near 700 A. D. However, two specimens (possibly three) were none too strong for so important a connection and great satisfaction was felt when in February, 1935, Mr. John C. McGregor of the Museum of Northern Arizona at Flagstaff brought me a piece of charcoal from the Baker Ranch Ruin, North of the San Francisco Peaks at Flagstaff, which showed the same signature in excellent form. This established the early chronology and enabled us to date with confidence the early ruins and incidentally the EPD signature shown in the emblem of the Tree Ring Bulletin. The small inner ring barely shown is A. D. 423; the other small rings in the series, going outwards, are 426, 427, 429 and 431. These are excellently shown in the photograph made by Mr. H. F. Davis from the original piece BE-33 and shown here in a cut.

My strongest recollection perhaps of this long search for the early chronology is the picture of these two signatures always before the mind's eye but never agreeing.

The discussion of the details of this chronology, its source specimens and its reliability will be given in another place, where its climatological information will find extensive use. The value of these dates to the archaeologists right now is recognized, not merely to give the age of individual ruins but to give the geographical distribution of dates which form a skeleton of real prehistory, the movement of peoples and the evolution of cultures. Time does not permit us at this moment to make a complete list not to present all the details prescribed in the Tree Ring Conferences. The need of such details and of photographs and measures is fully recognized by the writer, and will be given later. At this time the giving of these dates is a result of an insistent request by the archaeologists for this information.

The collections of Mummy Cave, Broken Flute Cave, Obelisk Caves

and other caves in Red Rock Valley, Bennett's Peak (south of Shiprock) and Mesa Verde (as far as referred to here) and Johnson's Canyon were made by Mr. Earl H. Morris. The Institutions that aided him were the Carnegie Institution of Washington, the American Museum of Natural History of New York, the University of Colorado, and the United States National Park Service (at Mesa Verde). At Flagstaff the collection work was done by the Museum of Northern Arizona, Dr. H. S. Colton, Director, and Mr. John C. McGregor, Dendro-chronologist. The University of Arizona has finely cooperated in caring for the specimens and now it is maintaining a course of instruction in tree-ring work. The National Geographic Society and the University of Arizona gave important aid during the establishment of the chronology from 700 to 1600 A. D. or later.

The dates given below have been derived in building the early chronology. They may be taken as at or very near the cutting dates; note is made if there is substantial loss of outside wood.

SUMMARY BY CENTURIES A. D.

400's	600's	18 — 665+
MUMMY CAVE	MUMMY CAVE	32 — 665+
M 106 — 348	M 126 — 643	183 — 665+
110 — 348	139 — 649	46 — 666
105 — 352	137 — 656	50 — 666
143 — 358	163 — 666	54 — 667
159 — 367	BROKEN FLUTE CAVE	8 — 669
136 — 380	MLK 267 — 603	30 — 669
BROKEN FLUTE CAVE	266 — 605	43 — 669
MLK 254 — 354+X	64 — 615	23 — 670±
MUMMY CAVE	145 — 615±	201 ⁵ — 674
M 102 — 408+	76 — 621	MESA VERDE
112 — 409	170 — 622	STEP HOUSE
142 — 433+X	961 — 623	M 23 — 625±
109 — 440+X	269 ² — 624	Earth Lodge — 612±
141 — 441	264 ³ — 625	Many charcoal pieces from
195 — 436	M 164 — 675	location near Cliff Palace
BE 33 — 483	151 — 684	
M 166 — 483	165 — 684	700's
127 — 484	160 — 692	MUMMY CAVE
101 — 485	MLK 66 — 627	M 155 — 702
129 — 485	146 — 647	MUMMY CAVE, CAVE 1
125 — 489	CAVES 1, 2, 6, 7, and 8	H 179 — 701
119 — 492	(RED ROCK VALLEY)	181 — 787
118 — 495	MLK 19 — 630+X	RED ROCK CAVES
190 — 496	207 — 637+X	1, 2, 6, 7, 8
117 — 498	223 — 637+X	MLK 16 ⁶ — 759
BROKEN FLUTE CAVE	184 — 642	FLAGSTAFF
MLK 144 — 490	69 — 644	BAKER RANCH ⁷
OBELISK CAVE	20 — 645+	Site N.A. 2551
MLK 151 — 477	14 — 647	F 4040 — 685
152 — 477	15 — 652+X	Estimated building 750±50
150 — 483	195 — 654	SITE N.A. 2800
153 — 486	196 — 654	F 4060 — 680
500's	220 — 655	4053 — 711
BROKEN FLUTE CAVE	10 — 655	4079 — 747
MLK 226 — 507	194 — 655±	4062 — 792
174 — 513	199 — 657	Estimated building 750±40
109 — 595	193 — 657±	SITE N.A. 2798
CAVE 6	221 — 657±	F 3938 — 710
MLK 211 — 553	205 — 659	4008 — 737
	189 — 660±2	4009 — 742+
	206 — 660±	4027 — 748
	213 — 660	

4004 — 752	221 — 828	PUEBLO BONITO
3993 — 758	13 — 834	JPB 105 — 859
4012 — 758	231 — 835	(good section)
4089 — 798	79 — 843	900's
3992 — 800	4 — 845	FLAGSTAFF AREA
3995 — 828	6 — 845	SITE N.A. 1680
4003 — 927	78 — 848	F 892-919—990±
Estimated building 800±40	1 — 857	SITE N.A. 862
and 950±20	FLAGSTAFF	F 206-310 — 914
PUEBLO BONITO	SUNSET CRATER AREA ⁸	SITE N.A. 192B
Pithouse in Wash	SITE N.A. 1959	F 745 — 925
JPB 11 — 770±10	F 2361 — 784	SITE N.A. 1625C
13 — 777±10	SITE N.A. 1531	F 1343 — 930±4
800's	F 2613 — 834	SITE N.A. 408
BENNETT'S PEAK	2612 — 846	F 731 — 976
(NW New Mexico)	SITE N.A. 1925B	SITE N.A. 1531
MBP 77 — 675+X	F 2444 — 833	F 3062 ⁹ — 964±
200 — 794+	2450 — 859	Provisional
62 — 795	SITE N.A. 1920B	
160 — 796+	F 1680 — 860	

- 1 Other MLK numbers of this date are 73, 75, 78, 84, 85, 127, 128, 129, 130, 131, 133, 135, 62, 169, 166, 175, 55, 62, 178, and 179.
- 2 Other numbers of this date are 164, 165, 167, and 171.
- 3 Other numbers of this date are 265, 88, 51, 137, 138, 139, 140, and 173.
- 4 Other numbers of this date are 9, 17, 35, 36, 39, and 224.
- 5 Other numbers of this date are 202, 203, 204, 212, 214, and 47.
- 6 Other numbers of this date are 21, 49, and 44; dating provisional; charcoal "planks."
- 7 All sites in this group and most specimens show extensive loss of outer rings. Dates listed apply to last ring present on specimen.
- 8 Outer rings generally present; approximate original outside if three.
- 9 This date appears on a number of charcoal pieces but has been held several years for more satisfactory identification; if this is correct it means a second occupation of Site N.A. 1531.

ARCHAEOLOGICAL BACKGROUND OF DATES IN EARLY ARIZONA CHRONOLOGY

BY E. H. MORRIS

The following statements are made without having seen the dates which have been presented by Dr. Douglass in the preceding paper. A list of the sections from cave sites is before me and from previous correspondence I know that the outstanding timber from Obelisk Cave laid on its last ring in 477 A. D. while some from Broken Flute were cut near the middle of the latter half of the 600's, but there my information ends. It will be of interest to learn to what extent impressions based on strictly archaeological evidence, which, it must be admitted, is not as yet thoroughly digested, conform to chronological fact.

MUMMY CAVE

All Mummy Cave cists observed were used during BM III, but some of them may have been built during BM II. Long BM II occupation of Mummy Cave indicated by voluminous mass of ashy rubbish composing initial element of refuse talus which thus far has yielded no sherds whatever. Mummy Cave and its neighbor, Cave I (del Muerto), continued to be frequented during later culture horizons, hence, because of mixture, it

would be difficult satisfactorily to delimit BM III culture from materials found in them.

BROKEN FLUTE, OBELISK AND OTHER CAVES IN RED ROCK VALLEY

Broken Flute, Obelisk, and Caves 1, 2, 6, 7 and 8 are situated along the ramifications of Black Horse Creek which drains eastward from the divide connecting the Lukachukai and Carriso mountains. In that district the caves were seldom resorted to, at least as dwelling places, by later aborigines, hence present as clean a cross section of BM III culture as could well be expected. To this pattern culture of the period in del Muerto would seem to conform in every known particular.

From the first, Obelisk Cave impressed me as very early. House type, oval to vaguely circular, dug down somewhat into cave floor. Flat roof supported by four posts forming a rectangle set in from periphery. Sides of spaced slanting poles, their butts set back from edge of excavation to leave bench most of the way around. Poles covered with reeds or juniper bark laid horizontally, lashed in place and covered with thick outer shell of vegetable reinforced mud. Fire pit at S center. Nature of entrances not evident. Slab storage cists, some very large, nearby but not contiguous. Burials at center of cave, some wet, rest looted by later aborigines. In pits, bark lined, skulls undeformed. Blankets of both fur- and feather-string. Profusion of coiled baskets, twined bags, sandals and aprons with both dyed and painted patterns. Braided garters (?) sashes, etc. No pottery in graves. Mortars and trough metates in houses, metates most plentiful. In both houses and refuse, unfired vegetable reinforced mud bowls. Clay figurines present. Two distinct wares among true pottery: (1) plain gray; sand tempered usually coarse and not well smoothed; bowls, squash pots and globular vessels with low necks. (2) light mustard brown to pale light orange, fine grained, rather soft, highly polished over a slightly wavy or dimpled surface. No decorated or plain red sherds observed. Bow and arrow present. Excellent workmanship in wood, bone and mountain sheep horn.

While some of the chambers in Broken Flute and Caves 1, 2, 6, 7 and 8 may be as early as those in Obelisk, I believe most of them to be appreciably later. Single room dwellings up to 25 feet in greatest diameter, constructed after method previously described, rectangular with rounded corners, oval, or vaguely circular, the universal type. A low bench characteristic but not always present. Sometimes consists of pit bank, slab faced; more frequently of earth tamped in after walls and adobe floor had been completed. Follows varying proportions of the arc but never crosses the south or away-from-cliff side. Radial floor ridges from S center fire pit to periphery usually present. Commonly interior slab bins occur where ridges join side walls. Where not destroyed by erosion there is evidence of narrow lateral entrance. Smoke hole also served as entrance. Reached from inside by runged ladder identical to those known from Pueblo III. Storage cists, some of almost room size of slabs or mud and stones variously compounded between and behind dwellings, not frequently contiguous. Burials at extremities of cave or in talus slopes in front. Nearly all removed by erosion. Mortars common, but trough metate predominant grinding device. Both fur- and feather-string blankets. Coiled basketry prevalent, also twined bags but of small size and twined sandals ranging from slightly concave to round toed. Aprons, garters, etc., still made. Beans in addition to maize and squash a third staple food crop. In refuse and burned houses vegetable reinforced mud vessels, often basket molded,

prevalent. Usually of shallow bowl shape, but few have indrawn tops. Clay figurines conspicuous. Among true pottery four distinct wares. (1) plain gray with sand temper grading from fine to very coarse, finish from heavily pebbled to reasonably smooth. Forms: squash pots (very plentiful) from depressed spherical to elongated, bowls, globular pots with short necks, tapering, straight, swelled or recurved, bottles up to 15 inches diameter with relatively narrow necks. Small muffin-shaped vessels with orifice in top and lateral hollow spout rare but characteristic. Small pierced lugs occasionally present on squash pots and small bottles. No handles whatever on large vessels. (2) Light mustard brown, fine grained, sand tempered, rather soft, highly polished over dimpled surface. Forms, bowls and squash pots. (3) Rock tempered decorated. Bowls only. Light gray, hard, some pebbled, the majority rather smoothly finished but not polished. Pigment with one observed exception mineral. Sparse patterns carried over directly from basketry and other textiles. (4) Red ware tempered with fine sand. Fairly hard, heavily slipped, usually both inside and out. Well polished over surface sometimes dimpled, but usually true and uniform. Forms; bowls, squash pots and globular jars having break of curve 1 inch or more from rim and rising more abruptly thence to margin. Opposite small slenderly pierced lugs usually present on squash pots and jars. No observed instance of decoration. One specimen suggests a possible fifth category—a polychrome squash pot with pierced lugs. Grayish round, broad line dark red pattern outlined with black. Not to be confused with P 1 polychrome from north of the San Juan (Alkali Ridge and upper La Plata country).

Apparently bow and arrow had completely superseded atlatl. Beads and ornaments plentiful. Good work in bone and craftsmanship in wood excellent.

Detailed study of the field record and material objects from Obelisk, Broken Flute and the other caves of the district—an undertaking with which I am at present engaged—may reveal greater and more significant changes than are now apparent in BM III culture during the two centuries, more or less, from 475 A. D. and the latter 600's. In the light of the present, however, the culture in question seems to have remained surprisingly static during that interval. There would appear to have been a slight increase in size and somewhat greater stability in house construction; the addition of two types of pottery, rock tempered decorated and polished red, with a considerable amplification of the range of vessel forms; otherwise little change. Yet it must be borne in mind that Obelisk Cave, which affords the present basis for a contrast of "early" with "late" is but a single site and small at that. Future findings may reveal that cultural change was more rapid or more slow than it now appears to have been. I regard 750 A. D. as a workable terminal date for BM III. As to when the period may have begun we shall have no true lead until beam dates have been secured from a site in the nuclear area of unquestionable BM II identity:

ADDITIONAL DATES FROM TSEGI

BY J. C. MCGREGOR

In Vol. I, No. 1, July, 1934, issue of the Tree Ring Bulletin a report was made on dates from seven sites located in the Tsegi Canyon and its branches. This material was collected by Lyndon L. Hargrave, and party, as members of the Rainbow Bridge-Monument Valley expedition in northern Arizona. June to September, 1933. Subsequent investigation of additional material had led to the securing of dates from four more sites in this same general region. The five dates secured and listed in the accompanying table are reported by their Museum number. The list below indicates their numbers, respective popular names, and approximate locations.

- N. A. 2530—Loloma Ki—(Pueblo III), about three miles up Dogoszhi Biko and one mile west up a short side canyon.
 N. A. 2531—Bat Woman House—(Pueblo III), about five miles up Dogoszhi Biko from the mouth and one and a half miles up a west branch canyon.
 N. A. 2606—An unnamed site—(Pueblo III), around the point north from N. A. 2530.
 N. A. 2637—Calamity Cave—(Pueblo III), one-half mile north of the south fork of Naki Canyon, about two and a half miles north of Zilth Nez Mesa.

All of these additional dates are from Cliff Pueblos of the late Pueblo III culture stage. Pottery types common to this region and characteristic of all these sites are: Kayenta black-on-white, Kayenta and Tusayan polychromes, and Tusayan corrugated.

A review of the dates listed in the previous article above mentioned will indicate a tremendous and very widespread building period in the twelve seventies, and the dates here included fall into this same period, thus suggesting a rapid influx of people into the Tsegi drainage at this time.

Four of the beams represented are of Douglas fir, and the fifth is probably of some type of fir thus far not identified. All of the records are remarkably fine, any one of which might be chosen as a type specimen of this region and time.

Piece Number	Out. Dated Ring	Inside Dated Ring	Approx. Rad. in M.M.	Kind of Wood	Type of Specimen	Sap-heart Date	Rings Lost at Outside	Number Absent	Bark Date
N.A. 2530									
F. 4176	1278	1210	49	D.F.	Core	1247	0	0	1278
N.A. 2531									
F. 4185	1275	1198	65	D.F.	¼Sec.	1233	0	0	1275
F. 4188	1275	1214	41	D.F.	½Sec.	1240	0	0	1275
N.A. 2606									
F. 4182	1275	1225	71	Fir	½Sec.	None	0	0	1275
N.A. 2637									
F. 4191	1274	1240	56	D.F.	Core	1254	0	0	1274

BIBLIOGRAPHY

- Hargrave, Lyndon L.—Report on Archaeological Reconnaissance in the Rainbow Plateau Area.—University of Cal. Press, Berkeley, Cal., 1935.
 McGregor, J. C.—Dates from Tsegi.—Tree Ring Bulletin, Vol. I, No. 1, Flagstaff, Arizona, July, 1934.

INDEX TO VOLUME II

Allantown	32	Grand Canyon	21
Ariz., State Museum	11	Great Drought	11
Archaeological background (of dates)	34	Great Pueblo Period	11
Archaeology	23	Hargrave, Lyndon L.	22, 37
Baker Ranch	32, 33	Haury, Emil W.	3, 4
Baldwin, Gordon C.	11	Hawley, Florence M.	4, 8, 31
Bat Woman House	37	Hohokam	4
Bennett's Peak	33, 34	Island forest	3
Biotic survey	23	Johnson's Canyon	31, 33
Black Horse Creek	35	Kayenta Black-on-white	37
B.M. II	34	Kayenta Polychrome	37
B.M. III	34, 35, 36	Kinishba Pueblo	11
B.M. III (end of)	36	Lassetter, Roy	4
Broken Flute Cave		Late Gila Polychrome	11
.....	31, 32, 33, 34, 35, 36	Little Colorado	11
Calamity Cave	37	Loloma Ki	37
Canyon de Chelly	30	Lukachukai Mountains	35
Carriso Mountains	35	McGregor, J. C.	4, 32, 37
Casa Grande	4	Medicine Valley	29
Cave 1	34	Miller, Carl F.	32
Central Pueblo Chronology	29	Morris, Earl H.	4, 30, 33, 34
Chaco Canyon	8, 30	Mummy Cave	30, 32, 33, 34
Chetro Ketl	8, 31	Museum of Northern Arizona	29
Climatic indicators	22	Naki Canyon	37
Climatology	19	Obelisk Cave.....	29, 31, 32, 33, 34, 35, 36
Colorado Plateau	29	Photography	12, 14
Colton, H. S.	4	Pinal Mountains	3
Cummings, Byrom	11	Pottery wares	36
Curve, smoothed	20	Prediction, climate	19, 22
Curve, tree growth	21	Pueblo Bonito	7, 30, 34
Cycle analysis	19, 20	Pueblo Culture	4
Cycle variation	22	Pueblo II	23
Cycles	20, 21	Pueblo III	11, 23, 37
Cycles, dominant	21, 22	Pueblo IV	3
Cycleplot	20	Rainfall	19
Cyclogram	21	Red Rock Valley	29, 31, 33, 35
Cyclograph	20, 21	Ring Chronology.....	6, 13, 14, 15, 16, 24
Dates from Tsegi	27	Roberts, F. H. H.	32
Dating	23	Salado People	3
Davis, H. Faurest	12	Schulman, Edmund	4, 19
Dogoszhi, Biko	37	Sequoias, (California)	19
Douglass, A. E.	7, 19, 22, 29	Sholow	29
Drought records	3	Sierra Anchas	3
Early Arizona chronology	34	Sliding Ruin	30
Ecology	23	Solar radiation	19
EPD Signature	30, 31	Stallings, W. S.	4
Field collector	22	Step House Ruin	32
Flagstaff area	34	Sun	19
Flagstaff Century Group	29	Sunset Crater Area	34
Flagstaff	29	Sun-spot cycle	22
Floating chronology	31	Sun spots	19
Fort Apache	11	Tonto Basin	4
Fort Tuthill	29	Tree Ring analysis	19
Fort Valley	29	Tree Ring Conference	4
Four-Mile Polychrome	11	Tsegi Canyon	37
Fossil trees	22	Tusayan Corrugated	37
Franke, Paul	32	Tusayan Polychrome	37
Getty, H. T.	4	University of Ariz.	11
Gila Basin	4	Upper Gila	11
Gila Pueblo	3	Woody Mountain	29
Globe	3	Wupatki Pueblo	23
Glock, Waldo S.	31	Zilth Nez Mesa	37