SOUTHWESTERN DATED RUINS: III(1)

By JOHN C. McGREGOR

Site No.	Name	Section	Cultural Stage	No. of Specimens	Range of Dates
N.A.2637	Calamity Cave	Nokai Can.	Pueblo III	1	1275
N.A.2507	Swallows Nest	Tsegi Canyon	Pueblo III	1	1249
N.A.2519	Kiet Siel*	Tsegi Canyon	Pueblo III	30	1116+x-1248±2
N.A.2521	Turkey House	Tsegi Canyon	Pueblo II-III	1	980±6
N.A.2536	Twin Caves	Tsegi Canyon	Pueblo III	17	1110+x-1280±2
N.A.2542	Pithouse	Tsegi Canyon	Pueblo II	1	1018
N.A.2543	Ladder House	Long Canyon	Pueblo II?	2	1064±5-1067±10
N.A.2630	Ken-a Ki	Dogozshibito	Pueblo II-III	2	1224-1230±3
N.A.2531	Bat Woman	Dogozshibito	Pueblo III	2	1275
N.A.2530	Loloma Ki	Dogozshibito	Pueblo III	1	1278
N.A.2606	Unnamed Site	Dogozshibito	Pueblo III	1	1275
N.A.2515	Betatakin*	Betatakin Can.	Pueblo III	1	1267
N.A.2185	White House*	Canyon de Chelly	Pueblo III	1	1075
N.A. 405	Wupatki*	Wupatki N. Mon.	Pueblo III	49	1084+-1197
N.A. 538	Nalakihu*	Wupatki Nat. Mon.	Pueblo III	8	1183
N.A.2800	(Pithouse)*	Baker Ranch	Pueblo I	4	680+x-792±
N.A.2551	(Pithouse)*	Baker Ranch	Pueblo I	1	685+x
N.A.2798	(Pithouse)*	Baker Ranch	Pueblo I	12	710+x-927+
N.A.1925 B	(Pithouse)*	Bonito Terrace	Pueblo I	2	840-855
N.A.1920 B	(Pithouse)*	Bonito Terrace	Pueblo I	1	860
N.A.2002 A	(Pithouse)*	Medicine Valley	Pueblo II	18	914+x-1115
N.A.1238	(Pithouse)*	Medicine Valley	Pueblo II	5	926-1066
N.A. 862	(Pithouse)*	Medicine Valley	Pueblo II	21	904+x-1061
N.A.1570	(Pithouse)*	Medicine Valley	Pueblo II	3	941-1046
N.A. 863	Medicine Cave	Medicine Valley	Pueblo II	1	1025
N.A.2001	(Pithouse)*	Medicine Valley	Pueblo II	6	825+x-965
N.A.1625 B	(Pithouse)*	Medicine Valley	Pueblo II	2	879+x-927
N.A.1680	(Pithouse)*	Medicine Valley	Pueblo II	–	880+x-909±10
N.A.1625 C	(Pithouse)*	Medicine Valley	Pueblo II	7	777+x-947±10
N.A.1244 B	(Pithouse)	Medicine Valley	Pueblo II	2	817-821
N.A.1814 A	(Pithouse)	4th Terrace	Pueblo II	3	907-927
N.A. 192 B	(Pithouse)	Deadman's Flat	Pueblo II	2	910-924
N.A. 408	(Pithouse)*	Jack Smith Tank	Pueblo II	6	824+x-908+x
N.A. 534	Small Site	Winona	Pueblo III	1	1246
N.A.2134 A	Winona Village	Winona	Pueblo II-III	9	1100-1131
N.A.1531	Elden Pithouse*	Flagstaff	Pueblo I	3	708+x-855
N.A. 322	Cliff Dwellings	Walnut Canyon	Pueblo II	4	888-1094

(1) (Dated for the Museum of Northern Arizona. A number of these early pieces were in relatively moist ground and had lost their sapwood by decay; hence the "+x" may be large. For further discussion see "Dating the Eruption of Sunset Crater, Arizona", by John C. McGregor in American Antiquity, Vol. II, No. 1, pp. 15-26; July, 1936. A.E.D.)

* See also other installments of this series.

TREE-RING DATING: FACTORS PERTAINING TO ACCURACY

By WALDO S. GLOCK

Since unerring accuracy is the prime desideratum in dating by tree-rings of ancient Indian dwellings and of climatic changes indicated in the rings, it may be well to summarize briefly the pertinent observations of the last few years. Much of the information here given came from a forest-border ponderosa pine (OL-12) which was almost completely dissected. In particular, statements concerning locally present and missing rings, doubles, and branches depend largely upon that tree.

The sequence of rings in OL-12 was found more likely to be complete in mid-tree or slightly above. In other words, absences of rings were more common in the upper and lower parts of the trunk. Hence

specimens from pine beams to be used for dating purposes are best taken, if possible, at what was once mid-tree and should include as much of the trunk as practicable because in this way the chances of securing a complete sequence are at a maximum. An important chronology should not depend solely on a single radius of a specimen; all available material must be employed.

Since many trees in a single locality at the forest border tend to drop the same rings or parts of them, great care must be taken to see that no rings are left out of a local master sequence. Living trees, of course, do not present a serious problem. A collection of them should include a few trees of less age and a few of more uniform growth than a majority of the collection because these two very probably contain a complete sequence of rings. The matter is somewhat different among ancient timbers which were gathered by Indians for construction purposes. A collection of such timbers is limited not only in the number of specimens but also in the amount of material per specimen. Therefore the possible limitations of the material from ancient ruins should be clearly recognized and ring sequences should be duplicated many times in order to eliminate, in so far as possible, all chance of missing rings.

In OL-12 a ring, double at a given place, was not necessarily double throughout the entire trunk. The amount of doubling increased upward in the tree and toward its center. Also, the percentage of doubling per ring increased upward. Hence, doubling is not a stable character even within a single tree. The local occurrence of doubles within a tree necessitates extreme care in making climatic inferences dependent upon these doubles. For instance, a single radius taken from one part of the trunk may show that a certain set of rings is double whereas another radius taken from a different part of the trunk may show that a different set of rings is double. Resulting climatic interpretations, it is obvious, will be seriously open to question until exact information on all aspects of the origin of doubles is obtained.

Sequences taken from a branch are more or less aberrant with respect to the record in the main stem. Therefore, an admixture of branches in a collection under study would introduce material partly out of harmony with the typical record both chronologically and ecologically. The more a single tree contributes to a collection, the more restricted are the possible inferences and the less is the certainty that its record is typical.

The tree OL-12 was dissected chiefly for the purpose of establishing the fact that the ring record in one part of the trunk is essentially duplicated in all other parts. Uniformity within the individual trunk was revealed beyond all doubt, and any one radius is highly representative of all radii. However, more than one radius from a beam is advantageous for two reasons. (1) As previously stated, the possession of a completely accurate sequence demands that as much as possible of a beam be available for study. Different parts of a tree, it is to be remembered, have different values in the perfection of their records. (2) For precision work the measurement of four to six radii taken around the circuit or vertically in the trunk gives a more accurate determination of the relative volume of wood added each year than that given by one radius only.

It should be recognized clearly that uniformity, signifying a con-

stancy in the relative thickness of rings, is to a certain extent a variable feature both within a single tree and also within a group of trees. In other words, a certain amount of variation, or nonuniformity, is present and is to be expected in specimens of the most superb dating qualities.

The foregoing observations bear directly upon the questions, What constitutes accuracy of dating, or cross-dating, and how much leeway, or divergence from an absolutely perfect correspondence in ring thickness, does accurate dating entail? Obviously the answer is not far to seek. The amount of latitude permissible in behalf of wholly accurate dating should equal the variation characteristic of the individual trunk record plus the variation inherent in the combined gross record among two or more trees where, and only where, all the trees concerned in the dating grew under the same ecologic conditions. Acceptable divergence from exact correspondence between different ring records should not exceed that incorporated naturally within the trees and should be determined as little as possible by the individual opinion of any one student. From the practical standpoint the amount of latitude permissible must be gained by experience with what may be called the difference between mathematical and biological exactness.

An appreciation of the expected variability in a ring. structure which has been built under the influence of a complex of factors serves to clarify the nature of a standard sequence or master chart. The standard possesses not only the diagnostic rings common to a certain group of trees but also those rings **ordinarily** variable within the group. Therefore, since the standard bears only those features, fixed and typically variable, common to a locality, there is undoubtedly no single tree, or beam, whose sequence of ring thicknesses correlates 100 per cent with the standard.

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