

## SOUTHWESTERN DATED RUINS: II. (1)

EMIL W. HAURY

Site No.	Name	Cultural Stage	No. of Specimens	Range of Dates
SOUTHWESTERN COLORADO				
Colorado A:5:1—Lowry	Ruin*	Pueblo III	8	1085+x-1086
Colorado B:9:1		Basket-Maker III	6	543+x-590+x <sup>(2)</sup>
Colorado B:9:2		Basket-Maker II?	1	649 <sup>(3)</sup>
Colorado B:15:1—Piedra	Ruin	Pueblo I	1	774 <sup>(4)</sup>
Pine River	Ruin	Basket-Maker III	1	634+x <sup>(2)</sup>
NORTHWESTERN NEW MEXICO				
Wingate 11:47		Pueblo I-II	5	806+x-892+x
Wingate 11:49		Pueblo I-II	2	863+x-880
EAST-CENTRAL NEW MEXICO				
Mogollon 1:15—Mogollon	Village	San Francisco-Three Circle Phase		
		Transition	36	895+x-908
Starkweather	Ruin	Three Circle Phase	2	927
NORTHERN ARIZONA				
Echo Cliffs 13:1—Tusayan	Ruin	Pueblo III	6	1170+x-1205+x
NORTHEASTERN ARIZONA				
Canyon de Chelly 7:11—Vandal	Cave	Basket-Maker III	4	608-683
Canyon de Chelly 7:12—Twin	Cave	Basket-Maker III	11	605-667
Canyon de Chelly 8:3—Broken	Flute C.	Basket-Maker III	28	605+x-646 <sup>(5)</sup>
Canyon de Chelly 8:4—Obelisk	Cave	Basket-Maker III	9	473-489+x <sup>(5)</sup>
Ft. Defiance 12:60—White	Mound	Basket-Maker III-PI	34	671+x-802
Tusayan 7:1—Awatovi*		Pueblo IV	3	1484+x-1550+x
Cave 2 (Morris)		Basket-Maker III	11	626-669 <sup>(5)</sup>
EAST-CENTRAL ARIZONA				
Arizona C:1:8		Pueblo IV	9	1322-1329
Arizona C:1:14		Pueblo IV	5	1295-1312
Arizona C:1:16		Pueblo IV	21	1278-1324
Arizona C:1:21		Pueblo IV	2	1299-1313
Arizona C:1:25		Pueblo IV	9	1248-1323
Arizona C:1:30		Pueblo IV	2	1299-1308
Arizona C:1:38		Pueblo IV	1	1340
Arizona C:1:40		Pueblo IV	6	1303-1347
Arizona C:1:44		Pueblo IV	6	1310-1330
Arizona C:1:45		Pueblo IV	3	1309-1322
Arizona C:1:46		Pueblo IV	1	1323
Arizona C:2:8—Canyon Creek	Ruin	Pueblo IV	29	1326-1348
Arizona C:2:11		Pueblo IV	1	1340
Roosevelt 9:2—Tonto National	Monument (upper)	Pueblo IV	1	1346
Globe 6:1—Gila Pueblo		Pueblo IV	6	1345-1385
NORTHERN MEXICO				
Chihuahua H:11:1		Pueblo IV	1	1374+x <sup>(6)</sup>

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\* See also other instalments of this series.

(1) The dates given in this list were determined in the course of tree-ring studies at Gila Pueblo, Globe, Arizona.

(2) Preliminary analysis by I. F. Flora.

(3) This date was arrived at independently by Dr. Douglass and the undersigned from cuttings of a log supplied by I. F. Flora, excavated by him in a cave near Durango,

Colorado. Considerable interest is attached to the date as the log was found in association with cultural material dating from the Basket-Maker II horizon. On carefully reviewing the evidence it seems altogether likely that the log was planted in Basket-Maker II rubbish by later occupants of the area. A ruin not far away (Colorado B:9:1), giving dates very close to 600, was already in a Basket-Maker III stage of culture.

(4) From Group C-3. (See Roberts, F. H. H. Jr., 1930. Early Pueblo Ruins in the Piedra District, Southwestern Colorado. Bureau of American Ethnology, Bulletin 96, Washington, D. C.) Dated by I. F. Flora, checked by E. W. H.

(5) From specimens collected by Earl H. Morris and the undersigned in May, 1936. These partly duplicate an earlier collection made by Morris and dated by Douglass, a summary of which will appear in a forthcoming instalment of this series.

(6) In presenting this date it is realized that almost no tree-ring studies have been made in northern Mexico and that it may therefore be subject to question. But the cross-dating of this 111 year sequence is very satisfactory. This date is given with the hope that it will inspire further work in the area involved.

## CLASSIFICATION OF FALSE ANNUAL RINGS IN MONTEREY PINE

By EDMUND SCHULMAN

In a recent volume (whose treatment of wood anatomy would repay reading by workers in all branches of tree-ring analysis) there is found the following definition:<sup>(1)</sup> "a double ring or multiple ring is due to the interruption of the normal course of growth of a season; one of the zones of growth of such a ring is known as a false annual ring." The main purpose of the present note is to discuss and extend the concept involved in the preceding definition.

Multiple rings may result from a number of causes: Antevs<sup>(2)</sup> discusses the work of a score of authors, mostly botanists, and mentions damage of storms, damage to growing tip, insect damage, defoliation, girdling, decapitation, specially favorable following unfavorable climatic conditions, and frost. False rings resulting from the first group of six factors have commonly been called injury rings; appearing usually in isolated specimens only, and frequently broken-celled in structure, they are readily distinguishable from the more consistent multiple rings resulting from special climatic eccentricities. Frost, in the climate and consequent growing season of the Pueblo Area, results in an injury ring usually early in the spring. A study of frost rings in Canada by Bailey<sup>(3)</sup> shows them to be characterized by deformed tracheids and by rays laterally displaced. Bailey emphasizes in this paper a special pest effect—the complete omission of one or more rings.

False rings climatic in origin are those most commonly met with. As a result of observations on the characteristics of ring sequences in the Southwest, criteria have been established by Douglass<sup>(4)</sup> for the recognition of such false annual rings. The outside boundary of the zone of non-annual late wood is seen to be diffuse, as distinguished from the abrupt termination of the zone of late wood at the end of the annual growing season; the false ring lies inside the true annual late wood, and is thus usually nearer the annual ring following than the annual ring preceding. Douglass has shown that when the winter snows at Prescott, Arizona, are small, the tree may begin to lay down a layer of late wood

(1) Record, S. J. Timbers of North America, New York, 1934. p. 87.

(2) Antevs, E. Die Jahresringe der Holzgewächse und die Bedeutung derselben als klimatischer Indikator, Progressus Rei Botanicae, Bd. V, 285-386, 1917. pp. 326-332.

(3) Bailey, I. W. Frost Rings as Indicators of the Chronology of Specific Biological Events, Bot. Gazette, Vol. 80, pp. 93-101, Sept. 1925.

(4) Douglass, A. E. Climatic Cycles and Tree Growth, Carnegie Inst. Washington pub. 289, Vol. I, 1919, pp. 18-20, Vol. II, 1923, pp. 94-96.