

PALYNOLOGICAL CHRONOLOGY AND  
ANTIQUITY ESTIMATION AT  
CHAVEZ PASS RUIN \*

James Schoenwetter and Ella Stewart  
Palynological Laboratory  
Department of Anthropology  
Arizona State University  
April 1978

\* This research has been totally supported by an A.S.U. Faculty Grant-in-Aid.

In February and March, 1978, a series of 47 sediment samples collected at Chavez Ruin during the preceding summer were processed to extract and concentrate contained pollen. There were two subseries: a series which had been collected from the fill of a room in Pueblo 1, and a larger series representing the sampling of the stratigraphic units of the cemetery district.

There has been no need to examine the latter subseries fully, since the objectives of this study are limited to the problem of chronological assessment. The dating of depositions through examination of contained pollen is a form of biostratigraphic correlation. In the present case our concern was to identify the correspondence of palynological variations in the stratigraphic sequence of deposits at Chavez Ruin with those variations which occur in the Colorado Plateau Pollen Chronology (Schoenwetter 1970). The latter are dated in absolute time through association with dendochronologically dated ceramic styles. If the correspondence of palynological variations in the Chavez sequence to that of the Colorado Plateau Pollen Chronology is adequate, the absolute dates of the latter can be applied to the former. Though pollen analysis of the entire subseries would provide data to strengthen the argument of correspondence substantially, it was only necessary to recover enough data from each stratigraphic unit to demonstrate the validity or invalidity of the null hypothesis (i.e. no significant correspondence occurs). We determined to use a minimum number of samples for this purpose, and a minimum number of observations, in order to make the test extreme. In such a case, the probability is highest that the null hypothesis will be vindicated. If it turned out that the null hypothesis was rejected, the correspondence between the two chronologies would be satisfactorily documented.

There are five stratigraphically superimposed deposits in the cemetery district of Chavez Ruin. All but the oldest are artificial depositions, and

there is yet no secure evidence that the oldest actually is associated with human occupancy. The second oldest deposit is observed as crypt fill associated with the oldest log-covered graves, which were excavated into the soft rock substrate of the area, and also as a brown midden blanketing such graves. The younger deposits, in successive order, are red-brown midden, brown midden, and the fill of pits intruded into the younger brown midden.

Thirteen samples of these deposits were observed, of which two failed to yield sufficient pollen for a 50-grain pollen count in one drop of extract. The older brown midden appears to be the least polliniferous of the deposits, though the red-brown midden is nearly as depauperate in microfossils per unit volume.

The hypothesis of correspondence in chronologies is tested by the occurrence of significant variations in the adjusted AP frequency value as relative sample antiquity is increased. That is, if the hypothesis of correspondence is correct one expects specific arboreal pollen frequency value changes to occur in the biostratigraphic record. Because of sampling interval variation, or because particular horizons of time represented in the Colorado Plateau Chronology are not represented in the Chavez pollen sequence yet available, all variations existing in the former chronology might not occur in the latter. But a regular pattern of relationship is expected to be evident, and the Chavez pollen sequence should exhibit no AP frequency values not also exhibited in the same relative time sequence in the Colorado Plateau Chronology.

Granting the assumption that Chavez Ruin was occupied no earlier than AD 1000 and no later than AD 1450, the expected sequence of adjusted AP frequency values suggested by the Colorado Plateau Pollen Chronology is (from youngest to oldest):

$$(1) \quad \underline{AP\% = 58.5}$$

$$(2) \quad \underline{\quad = 22.2 - 58.5}$$

- (3)           = < 22.5  
 (4)           = 22.5 - 58.5  
 (5)           = > 58.5  
 (6)           = 22.5 - 58.5  
 (7)           = < 22.5  
 (8)           = 22.5 - 58.5  
 (9)           = > 58.5  
 (10)           22.5 - 58.5

The adjusted AP% values obtained, placed in stratigraphic order, are:

|  |        |       |
|--|--------|-------|
| Late Pit Fill                          | = 29.4 | } (2) |
|  | = 51.5 |       |
| <hr/>                                  |        |       |
| Younger Brown Midden                   | = 7.0  | } (3) |
| Red-brown Midden                       | = 4.0  |       |
|  | = 10.1 |       |
|  | = 26.9 | (4)   |
| <hr/>                                  |        |       |
| Older Brown Midden                     | = 16.3 | } (7) |
|  | = 18.4 |       |
| Burial Crypt Fill                      | = 20.8 |       |
| <hr/>                                  |        |       |
| Red Sandy Deposit                      | = 35.8 | (8)   |
| <hr/>                                  |        |       |
| Calcified base of<br>Red Sandy deposit | = 11.6 | (x)   |

As is indicated by the numbers in parentheses, the observed sequence of variations corresponds exactly to those expected if one grants (a) the oldest Chavez sample does not date to the period of occupation at all; (b) horizons 5 and 6 of the Colorado Plateau sequence were not sampled by this series; (c) horizons 9-10 and 1 are not represented in the cemetery district at Chavez Ruin.

(a), above, is justified by the prospect that some of the earliest unconsolidated deposit of the cemetery district, which is a natural decomposition product of the substrate rocks, pre-dates occupancy. (b) is justified by the limited character of the sample series and the fact that the relative paucity of preserved pollen in the older brown and the red-brown midden deposits could produce such gaps in the present Chavez pollen sequence. (c) is justified by recognition that horizons 9-10 in the Colorado Plateau Pollen Chronology date AD 1000-1075, and horizon 1 dates AD 1335-1425. Both are extreme dates for the earliest and latest occupancy of Chavez Ruin.

If one accepts the correspondence of the two chronologies as an accurate expression of correspondence in antiquity, the deposits of the cemetery district of Chavez Ruin were emplaced between AD 1075 and AD 1335. The youngest pit fills date to the AD 1335-1315 interval; the younger brown midden and upper and middle divisions of the red-brown midden date AD 1315-1275; lower divisions of the red-brown midden date AD 1275-1240, and probably extend to AD 1125; and the older brown midden and earliest burials date AD 1125-1075.

The second sub-series of Chavez Ruin pollen samples, from the floor level and fill of a room, yielded four pollen records. The four are statistically identical as regards AP frequency values, and provide other evidence of being drawn from the same population. The AP% values range from 48.0 to 34.7. Values of this magnitude occur on horizons (2), (4), (6), (8) and (10) of the portion of the Colorado Plateau pollen chronology expressed above. The most likely antiquity for this population of records at Chavez Ruin, however, is AD 1125-1210 [horizon (6)], since the samples are palynologically depauperate like those of the lower divisions of the red-brown midden. Also, the room appears to have been filled with red-brown midden.

This estimate of antiquity agrees well with the independent estimate for the floor and fill of this room based on ceramic evidence. The ceramic evidence also argues for the room fill occurring as a single temporal event.