

REPORT ON THE PALYNOLOGY
OF TWO HOHOKAM SITES

James Schoenwetter
Palynology Laboratory
Department of Anthropology
Arizona State University
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In May of 1978 Dr. Lyle M. Stone submitted a suite of six sediment samples to this laboratory for pollen analysis. Four samples had been obtained from a Hohokam site located southeast of the White Tank Mountains (Maricopa County) on State land proposed for exchange with the Caterpillar Tractor Co. Three were of deposits directly associated with artifactual evidence of the Santa Cruz Phase occupation of this site; the fourth was a sample of surficial sediment collected in the immediate, undisturbed, environs of the site. The other two samples were of sediments associated with artifacts dating to the pre-historic component of an historic site located in the central business district of Phoenix. In light of the occurrence of redware and polychrome pottery, it is likely that these samples date to the Classic Period of the Hohokam occupation of Phoenix -- possibly to the Civano phase.

The objective of the analysis was somewhat different in the case of each site. The major concern in regard to AZ U:10:2 (ARS) was the identification of site paleoenvironment. The surficial pollen rain sample was analyzed to identify the palynological reflection of the modern environment at this location. Comparison of the fossil pollen records with this standard would reveal whether the site environment was different at the time of prehistoric occupation, and comparison against other surface pollen records (Schoenwetter and Doerschlag 1971; Schoenwetter 1977) would indicate the character of such difference as might exist. The major concern at the site known as Maricopa 62 was the potential of pollen analysis to provide an estimate of the antiquity of the Hohokam component. The comparability of the pollen records of this site with those of Civano and Soho age from other sites would provide evidence to this issue. The identification of pollen of cultigens was also of interest in this case.

Table I presents the frequency values of the pollen observed in this series of samples. It will be immediately noted that the pollen frequency values of

Colts	Juglans	Prosopis-olneyi	Cercidium	cf. Yucca	Fouquieria	Cactaceae	Cylindropuntia	Ephedra (1)	Chenopodiaceae	Androsace	Tubuliflorae	Anthemidae	Gramineae	cf. Tidesstromia	cf. Sphaeroliceae	Mycetoginaceae	Onagraceae	Euphorbia	Typha	Pinus	Unknowns	N	Level II
1.0	2.5	1.5	3.0	0.5	0.5	0.5	0.5	37.5	46.5	3.5	6.0	7.5	0.5	1.0	1.0	1.5	0.5	0.5	1.0	3.5	1.0	200	Level II
1.0	1.5	3.0	0.5	0.5	1.5	40.5	25.5	11.5	7.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.5	1.0	200	Level IV	
1.0	1.0	1.0	0.5	0.5	6.0	31.5	6.0	0.5	3.5	3.5	3.5	3.5	3.5	3.5	1.0	1.0	0.5	0.5	0.5	3.5	200	Surface	
0.5	0.5	0.5	0.5	0.5	7.5	77.5	5.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	1.0	1.0	0.5	0.5	0.5	3.5	200	Test Unit 1 0" B.S.	
1.0	1.0	1.0	0.5	0.5	7.5	80.5	6.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0	1.0	1.0	1.0	200	Test Unit 1 Level 3	
1.0	1.0	1.0	0.5	0.5	4.5	85.0	5.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.0	1.0	1.0	200	Test Unit 2	

MariCopa
62
Struct. B

AZ U:10:2(MS)

Table I

samples from the two sites are markedly different. The Ambrosieae (Low-spine Compositae pollen type) pollen values at Maricopa 62 are one third to one half those which occur at AZ U:10:2 and the Chenopodiineae (Cheno-am pollen type) values are about six times higher and the Gramineae (grass) values twice as high. These differences could reflect any one or combination of a number of factors. Lytle (1971) and Bohrer (1970) consider high Chenopodiineae values in pollen spectra of Hohokam archaeological contexts to reflect local site disturbance as a result of occupation and/or agriculture. Schoenwetter (1977), on the other hand, argues that patterned distinctions of this sort are more likely to reflect differences in the local level of habitat xericity--particularly when a number of samples evidencing the same kind of pollen spectrum are recovered from ostensibly contemporary deposits. Essentially, this debate centers on the question of the probable consistency of human behavioral patterns. Schoenwetter believes that human actions which affect pollen records are not very consistent. Therefore, he finds it expectable that contemporary pollen records from an archaeological site will not be statistically similar if human behavior affects the distribution and preservation of pollen in the deposits, and will be statistically identical if natural ecological relationships are responsible for that distribution and preservation. Lytle and Bohrer believe that human behavior patterns affect both plants and the locations of human habitation to a sufficient degree that the distribution and preservation of pollen grains at a site may mimic "natural" pollen rains as regards both character and consistency.

Maricopa 62 and AZ U:10:2 are located in very distinctive physiographic-topographic-hydrographic districts. When occupied by the Hohokam, Maricopa 62 was located near the margin of the high alluvial terrace north of the main channel of the perennial Salt River. An irrigation canal in the immediate vicinity apparently provided a dependable local supply of domestic water, and also allowed

irrigation of fields upon this terrace surface. In the environs of the site, then, climatic xericity was modified by the continuous natural flow of the nearby river and the artificial flow of irrigation waters. The site habitat during occupation would have been significantly wetter than it appears today, as there are no irrigated fields nearby now and the perennial natural flow of the Salt River has been wholly modified by modern engineering.

The pollen records of Maricopa 62 appear to justify this reconstruction. If one applies the standards identified by Schoenwetter and Doerschlag (1971), the prehistoric pollen spectra reflect habitat conditions as mesic as now occur on river floodplains of the Desertscrub ecosystem of the Sonoran Desert, in plant associations dominated by mesquite and acacia. Dating the samples, however, demands assessment of the degree to which the mesic character of the reconstructed habitat was a result of climatic moisture and the degree to which it was a function of the moisture provided by irrigation. If one accepts Schoenwetter's position, comparison with the pollen records obtained at other sites may reveal the occurrence of patterns which have value as indices of regional changes in natural ecology. Such patterns are datable in absolute terms. Such an assessment cannot be made if the arguments of Lytle and Bohrer are accepted, however, since local habitat manipulation through disturbance or agriculture could produce a pollen record which mimics a natural mesic habitat pollen rain.

Classic Period pollen records have been recovered from two other Salt River sites: AZ U:9:42(ASU) and AZ U:9:100(ASU)¹. The pollen records of U:9:42 have significantly higher Chenopodiineae values than those from Maricopa 62, and lower Ambrosieae values. The stratigraphy of AZ U:9:100 allowed chronological separation of a series of pollen samples referable to both the Soho and Civano phases of the Classic Period. All of the Soho Phase samples and those of both

early Civano and late Civano phase have very low Chenopodiineae and very high Ambrosieae pollen values (ca. 8.0% and 85.0%, respectively). Mid-Civano phase pollen samples, however, produce pollen spectra with Chenopodiineae and Ambrosieae pollen values which are statistically identical to those obtained at Maricopa 62. There are no Civano Phase pollen records from U:9:100, however, which are comparable to any of the Civano Phase pollen records from U:9:42.²

The similarity of results obtained from mid-Civano Phase records at U:9:100 and Civano Phase records at Maricopa 62 argues for their contemporaneity. It also argues that the pollen records of both these sites were primarily influenced by their similar topographic relationship to the floodplain of the Salt River, rather than by the effect of irrigation waters on the immediate environment of the sites. U:9:100 is located at the margin of the high terrace on the south side of the Salt River, at Mesa. The dissimilarity of results obtained at U:9:42 argues that the presumably Civano Phase pollen record of that site is either misdated or is conditioned to a greater degree than the other sites by habitat modifications induced through the use of irrigation. It is noteworthy, in this regard, that habitation of the site would have been impossible without canal transport of water, as U:9:42 is located over a mile south of the margin of the high terrace of the Salt on the alluvial plain.

The ostensibly mid-Civano phase pollen records of Maricopa 62 and U:9:100 contain greater quantities of Chenopodiineae pollen than those of earlier and later Civano age. If one applies the ecological argument developed by Weaver (1972), this indicates a horizon of greater Salt River flow resulting from increased winter precipitation in the headwater basins drained by this river. According to the paleoenvironmental chronology proposed by Schoenwetter and Dittert (1968), such conditions occurred between 1335 and 1425 A.D.

The pollen records of Maricopa 62 are dissimilar from those referable to the Classic Period at either U:9:42 or U:9:100 as regards frequency of cultigen pollen. Pollen of *Zea mays* was not observed in either sample from Maricopa 62.

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But maize pollen has been observed in every sample of Classic age recovered from the other sites, even though the number of pollen grains observed per sample has been sometimes only half the number observed in the samples from Maricopa 62.³ The distinction, therefore, seems to be real and not an effect of the chance accidents of sampling populations of pollen grains. The distribution and frequency of maize pollen in archaeological sites is known to be controlled by behavioral, rather than natural, patterns. Martin and Schoenwetter (1960) documented the very low frequency values of maize pollen which occur in modern maize fields and the contrast of this pattern with maize pollen frequency values in site contexts. Subsequent studies (e.g. Berlin et al 1977; Schoenwetter and DaCosta 1976) have confirmed the pattern and have argued that constancy of occurrence is more relevant to interpretation than frequency values. However, Maricopa 62 is not the only Hohokam site in which maize pollen is lacking or rare. Of the seven trash mound pollen records from Snaketown only one sample (ostensibly Sweetwater-Estrella in age) produced any corn pollen (Bohrer 1970). Of the 20 Sacaton phase samples analyzed from the Cave Buttes locality (Schoenwetter 1977), only one contained maize pollen. Maize pollen also occurs in very low frequency values in the samples investigated at a Sacaton (?) age site near Carefree (Bruder, pers. comm.). There is evidence of agriculture at all of these locations. But some have maize pollen and some do not.

The pollen record of the surface sample from AZ U:10:2 (ARS) ostensibly reflects modern conditions of climate and vegetation at that location. U:10:2 is located on the upper bajada within the palo verde-saguaro vegetation zone on a low terrace immediately above an intermittent desert wash. The sediment substrate of the site is a colluvium; that of the desert wash to which it is proximate is an alluvium. The higher water retention capacity of the wash provides a more mesic effective habitat, which is exploited differentially by ironwood and a variety of other organisms. In surface pollen records of similar locations

analyzed by Schoenwetter and Doerschlag (1971), the distinction between the moderately mesic habitat of the alluvial deposits and the xeric habitat of the colluvial deposits is reflected by a statistically significant increase in Chenopodiineae pollen in the former. Xeric habitat surface pollen rain records previously examined contain neither Chenopodiineae nor Gramineae pollen in as much as 15% frequency. The surface sample from U:10:2 would be classed as a xeric habitat sample on the basis of its substrate and vegetation pattern. The pollen spectrum recovered from this sample would also be classed as representing a xeric habitat pollen spectrum by the Schoenwetter-Doerschlag criteria. The three pollen records recovered from the Santa Cruz phase deposits of the site are statistically identical to the surface sample pollen record and statistically identical to each other. The evidence of the palynological record, then, is that the paleoenvironment during prehistoric occupation of the site was not distinct from the modern environment in any fashions detectable through pollen analysis.

It is also of some interest to note that the pollen records of the Santa Cruz phase at this site do not include evidence of either maize or squash cultivation. Taken together, the three pollen samples account for 600 observations, and scanning of the specimens in an attempt to observe cultigen pollen brings that number over 2000. Though the artifactual record leaves little doubt that the Hohokam populations of this period engaged in an agricultural economy, it appears unlikely that maize, at least, was grown at this site.

NOTES

- ¹ Sediment samples from archaeological contexts at Las Colinas have also been analyzed, but the only information yet available is a preliminary report which includes no tabulation of observed pollen nor the exact proveniences of given samples.
- ² The Chenopodiineae: Ambrosieae pollen frequency relationships occurring at U:9:42 also occur in the Las Colinas samples.
- ³ Maize pollen occurs in some trash deposit contexts at Las Colinas, but only in a minority of samples from the site.

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