Palynological Test of AZ U:16:6 (ASU)

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Six sediment samples from Unit 2, representing five different depositional events, received a standard terrestrial sediment extraction procedure (Schoenwetter 1979) to remove and concentrate their contained pollen. A drop of resultant extract was observed briefly under the microscope to determine:

(a) pollen concentration per unit volume of sediment,

(b) if preservation problems would adversely affect the analysis,

(c) if more specialized pollen extraction procedures would be profitably employed,

(d) the kinds of pollen preserved, and

(e) if proportions of preserved pollen taxa were uniform amongst the samples.

Pollen Concentration

Though not more than a rough index, relative pollen concentration per unit volume of sample can be estimated by assuming (1) that the volume of sediment from which the extract was made was in all cases equal; (2) that the amount of extract used in making up each micro-slide was equal; and (3) that the distribution of pollen and non-palynological debris on a micro-slide is random under the cover slip. The second of these assumptions is the

most problematical, though some attempt is made to undertake the lab work in a way that will justify all of them. Granting the assumptions, the calculated pollen concentration per slide for each sample is:

Spec. #	Pollen/slide
28	108 ± 20
27	3000 ± 100
25	500 ± 40
22	640 ± 60
20	50 ± 5
26	50 ± 5

Pollen Preservation

The variety of phenomena which adversely affect the preservation of pollen is probably not fully known, and little empirical evidence has been accumulated about how the known factors interact to effect particular results. Preservation, in fact, is not normally considered separately from pollen concentration. Preservation is normally judged on a relative scale of poor to exceptional, with the normal appearance of pollen of temperate climate lake muds ranked "excellent." Terrestrial deposits tend to produce "fair" or "good" pollen on this scale, with "poor" being a common judgment. The judgment applies to the condition of the pollen grains themselves, not the capability of the pollen analyst to identify the pollen. Where preservation is "poor" or "fair" suspicion that differential preservation has occurred is supported. In those cases, pollen of certain taxa are more likely to have been removed or reduced in the pollen spectrum because they are more susceptible

to degradation.

Spec. #	Pollen Preservation	Effect on Identification?
28	poor to fair	maybe
27	very good to excellent	no
25	good to excellent	no
22	good to excellent	no
20	excellent to exceptional	no
26	poor	yes

Extraction

Specialized extraction procedures would have reduced the ratio of background debris to pollen in the cases of specimen numbers 25 and 22, and increased the amount of pollen observable in a single drop of extract in the case of specimen 20. The additional labor expense of treating each sample as a unique extraction problem, however, would not have been cost effective.

Kinds and Proportions of Observed Pollen

Though the confidence intervals on the pollen frequencies recorded on the following table are wide as a result of small sample size, it is evident that there is a good deal of statistically significant difference in the pollen spectra displayed by the specimens. Though certain consistencies may be discerned among the spectra (e.g., the significance of Gramineae pollen), and it is possible to identify some patterned variation in the stratigraphic sequence (e.g., the earliest and latest samples have more Chenopodinneae and less Tubuliflorae pollen), the general impression is that each pollen spectrum is probably as or more unique than otherwise.

Taxon	Pollen Frequency					
	#28	#27	#25	#22	#20	#26
1/3 Pinus	9.0	3.1		3.1		
P.edulis type	4.5	3.1				
P. ponderosa type			7.7			
Juniperus	9.0					
Quercus		9.4		3.1	15.8	
Celtis		6.2	3.8	6.2		7.7
Prosopis -Olneya type		6.2	26.9	3.1		7.7
Cercidium-Fouqueria type			7.7	6.2	7.7	
Alnus					7.7	
Yucca				3.1		
Ephedra T. type				3.1		
C_3 Cactaceae		3.1	3.8	3.1		
cf Larrea					7.7	
cf Artemisia					7.7	
Tubuliflorae	4.5	25.0	15.4	12.5		7.7
Ambrosieae	36.4	28.1	7.7	43.8	46.1	23.1
Gramineae	9.0	15.6	3.8	3.1		23.1
Chenopodinneae	22.7	3.1	7.7	6.2		23.1
cf Boraginaceae			3.8			
Eriogonum		3.1				
Unknowns	4.5	12.5	11.5	3.1	7.7	7.7
Nof taxa	8	12	11	13	7	7
N observed	22	38	26	32	13	13

RESEARCH IMPLICATIONS

Granting that the samples examined are representative of those which could be collected and analyzed from U:16:6, there is little doubt that pollen study could be undertaken without unusual technical or logistical difficulty. Perhaps a third of the samples would yield results that were questionable expressions of the true pollen rain incorporated at the time of deposition, however. It is fairly clear that the significant research problem would be establishing and recognizing statistically significant data patterns which are relevant to the objectives of the archaeological research and yet logistically rational. Establishing statistically significant data patterns is not itself a difficult matter. All that is required is a large enough group of replicate samples or a large enough number of observations. Recognizing which such data patterns are relevant, however, demands identifying the test implications pertinent to explicit pollen rain hypotheses consistant with the research questions to be explored by the archaeological research program.

This examination indicates that the pollen records directly associated with Archaic Period archaeology in the region are likely to be more highly variable than those now available from other parts of Southern Arizona. The research problem orientation and the research sampling strategy employed in future will therefore have to be very explicit and very carefully justified in order to produce results from which firm conclusions can be drawn. This will make the research expensive, and will require careful attention to normally non-relevant details during fieldwork (e.g., information on the sources or the deposits sampled).

It is advisable that sediment samples collected in future be twice to four times as large as those collected for the present analysis. It is not unlikely that multiple extractions will be needed in some cases to test the value of alternative extraction procedures or empirically determine the replicability of pollen spectrum values.

REFERENCE

Schoenwetter, James

1979 Archaeological Pollen Analysis of Copan Reservoir Sediment Samples. in Susan C. Vehik and R. A. Pailes, Excavations in the Copan Reservoir of Northeastern Oklahoma and Southeastern Kansas. Archaeological Research and Management Center Research Series No. 4:225-238. University of Oklahoma, Norman.