POLLEN STUDIES AT

WIDE REED RUIN

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In October of 1972 a series of 60 sediment samples were submitted to the Palynology Laboratory of the Department of Anthropology at Arizona State University for archaeological pollen analysis. The contracting agency, the Arizona Archaeological Center of the National Park Service, requested the accomplishment of such analyses as was possible in the equivalent of one month's research effort. No priorities were placed on individual samples. However, it was requested that maximal effort be directed toward the test of a specific hypothesis and that a specific format of analysis be utilized insofar as this was possible.

Wide Reed Ruin is characterized by the occurrence of rooms of distinctive architectural character. Plaza areas, a kiva, large rooms and small rooms are among the architectural patterns which have been excavated. Small rooms, which constitute the majority of the architectural units, have various types of floor features: some have no floor features at all, some have bins in the floors, others have flagstone flooring surfaces. The hypothesis given priority for testing through pollen analysis was that variations in architectural patterns observed at Wide Reed Ruin are reflections of functional or use distinctions of the rooms, and that these distinctions may be recognized and identified by the variances they cause in pollen rains.

Evidence that the hypothesis is testable has been provided by the work of Hill and Hevly (1968) at Broken K Pueblo. At that site, palynological research allowed recognition of a close correlation of pollen rain patterns and architectural patterns. Interpretation of the pollen rains appeared to support the usage interpretations and functional interpretations of Broken K architectural patterns which were made on artifactual grounds. However, as has been pointed out by Schoenwetter (1970:39), these findings were serendipitous. No research program had been specifically designed to establish the correlation between pollen rain patterns of specific sorts and architectural patterns, nor was the palynological study designed to allow statistically acceptable tests of the correlation once it was established.

There exist two methods of approach applicable to the problem of establishing a correlation between pollen rain and architectural pattern which may be interpreted in terms of usage and function. The direct approach is to isolate a small series of samples representing the pollen rain of architectural features which are so distinctive that they are very unlikely to represent members of the same functional or usage category. For example, small rooms with floor bins as distinct from kivas. Samples of floor contact sediment from rooms of such distinctive architecture would be observed to isolate the pollen rain distinctions which exist, or to demonstrate statistically that no correlations between architecture and pollen rains occur. If the palynological distinctions were subtle, involving significant differences of less than 5.0 per cent variation (which is not unlikely), observation of a sufficiently large number of pollen grains from each sample could be very time consuming. Since labor costs are high in pollen analysis, the direct approach to resolution of the problem could become very expensive. In any case, few samples would be observed.

The indirect approach is to obtain pollen spectra for a series of specimens representative of *potentially* functionally distinct categories of rooms. A large number of pollen grains are not observed in each sample, but a large number of samples If correlations occur between patterns of pollen rains and patterns of architecture, an assessment can be made of the probability that the correlations are representative of functional distinctions among room types. This is particularly true if the time variable is held essentially constant. However, if no correlations between architectural and palynological patterns occur, the pollen analyst cannot conclude that no correlations exist. He can only point out that they do not exist in the data available to him. The indirect approach risks inconclusive results in order to obtain data from a greater number of samples.

It was felt judicious to use the indirect approach in the present instance. This was considered advisable because: (A) the amount of research that could be accomplished was limited by budget imperatives. If the fixed amount of funds available had been expended before the direct approach yielded sufficient data for resolution of the problem (that is, if a sufficiently large number of pollen grains could not be observed in the roughly one hundred hours available for research), nothing effective would have been accomplished at all. If the same amount were spent on the indirect approach there was more risk that the problem of room function would be unresolved, but a greater prospect that the data accumulated would be pertinent to the solution of other problems. (B) The indirect approach happened to be the one employed by Hill and Hevly in collecting data on Broken K. Utilization of the same approach would provide an essentially comparable format of pollen data,

(C) It was hoped that the availability of more pollen records from the site would prove useful in assessing such other problems as intra-site chronology.

After discussion of the advantages and disadvantages of the two approaches with Mr. Mount, and after discussion of alternative hypotheses that could be tested through pollen analysis, Mr. Mount isolated the Wide Reed samples he had collected which he considered pertinent to the problem. Work was begun through the chemical processing of 40 sediment samples to extract such pollen as might be contained. Normal extraction procedures for archaeological and terrestrial sediments (Schoenwetter, 1962:207-9; Mehringer, 1967:136-7) utilize 75-150 cc volume of sample. Because the samples which were submitted were normally of less than 100 cc volume, all of the sample was used for the extraction. Thus no opportunity remains for independent analysis of the sediments by another investigator.

Time allowed observation of 33 of the 40 samples, of which 21 provided sufficient pollen for analysis. This (63 per cent) is an unusually high frequency of "good" archaeological samples; the normal average is closer to 50 per cent productivity (e.g., Schoenwetter, 1967:93-97), and not infrequently is about 30 per cent (e.g., Schoenwetter, 1964:29-30). In 19 cases analyses proceeded until 200 pollen grains--exclusive of "ethnobotanic" types (Bohrer, 1966:2; Schoenwetter, 1970:38)--were recorded. In the remaining two cases 148- and 100-grain counts were accepted as adequate. This analytic format provided pollen frequencies roughly equivalent in statistical value to those reported by Hill and Hevly.

SAMPLE	Pseudotsuga	Pinus ponderosa	P. edulis	Unid. Pinus thirds	Juniperus	Quercus	Celtis	Cheno-am	Ambrosieae	Tubuliflorae	Liguliflorae	Artemisia	Gramineae	Ephedra Tor.-type	E. Nev.-type	Sarcobatus	Polygonum pers.-type	Ribes	cf. Sphaeralcea	Leguminosae	Cylindropuntia	Zea	Cleome	Cucurbita	UNKNOWNS	N
4		6	27	23	24			39	43	33		13	5	1	1		1									200
6		1	17	9	13			34	17	4		5	4	1												100
7			12	6	18	2		67	35	24		38	1	1									2			200+2
9		5	26	3	14		1	23	66	32		18	6			1		1							4	200
20		14	32	19	18			24	30	10		6	5	2	1							3				148+3
22		2	60	19	28	4		22	28	17		19	14		2							2	2			200+4
27		4	44	33	23	6		37	26	24		13	5	4	2		1					1	4			200+5
29		1	47	15				46	24	27		18	6									2	4			200+6
30		6	46	21	22	7		36	16	15		22	5	16					1		1	7	2			200+9
31		4	53	33	21			46	20	21		17	7	1												201
32		15	48	27	27	3		22	30	21		10	12	2			1					6				200+6
33(A)		1	44	9	31	6		47	30	19		11	6			1	1						1			200+1
33(B)		5	37	13	19	2		75	15	9	1	13	5	6		4									5	200
43	1	13	49	15	16	1		40	26	16		22	4	1		1						2	1		2	200+3
53		6	41	16	26	4		55	25	14		4	4	3		1	2	3	1	1			4		5	200+4
54		2	49	24	19	8		41	13	18	1	33	2	5			1					3	2	1		200+7
55		12	63	15	19	2		40	27	8		12	4	2		3		3					5			200+5
56		2	49	16	27	3		34	37	18		16	6	2	1								1			200+1
58		8	26	6	21	3		51	40	24		19	5	1			1						2			200+2
59		5	45	9	23	5		31	41	27		12	6	1								1	2			200+3
61		6	43	6	19	2		39	31	30		19	6	3								2				200+2

ARCHITECTURE TYPE	ROOM NO.	SAMPLE	Zea	Cleome	Cucurbita
SMALL ROOMS with flagstone flooring	2	30	7	2	
	2	54	3	3	1
	3	53		4	
	3	27	1	4	
	4	33(A)		1	
	4	33(B)			
	4	55		5	
	11	31			
	11	56		1	
	13	58		2	
	13	59	1	2	
	15	61	2		
with bins	9	4			
LARGE ROOMS with bins	9	6			
	9	7		2	
	10	9			
	18	43	2	1	
WEST PLAZA		20	3		
Bin Interior West Plaza Floor II		32	6		
Bin Interior Rm. 8		22	2	2	
Below Floor Under pot Rm. 1		29	2	4	

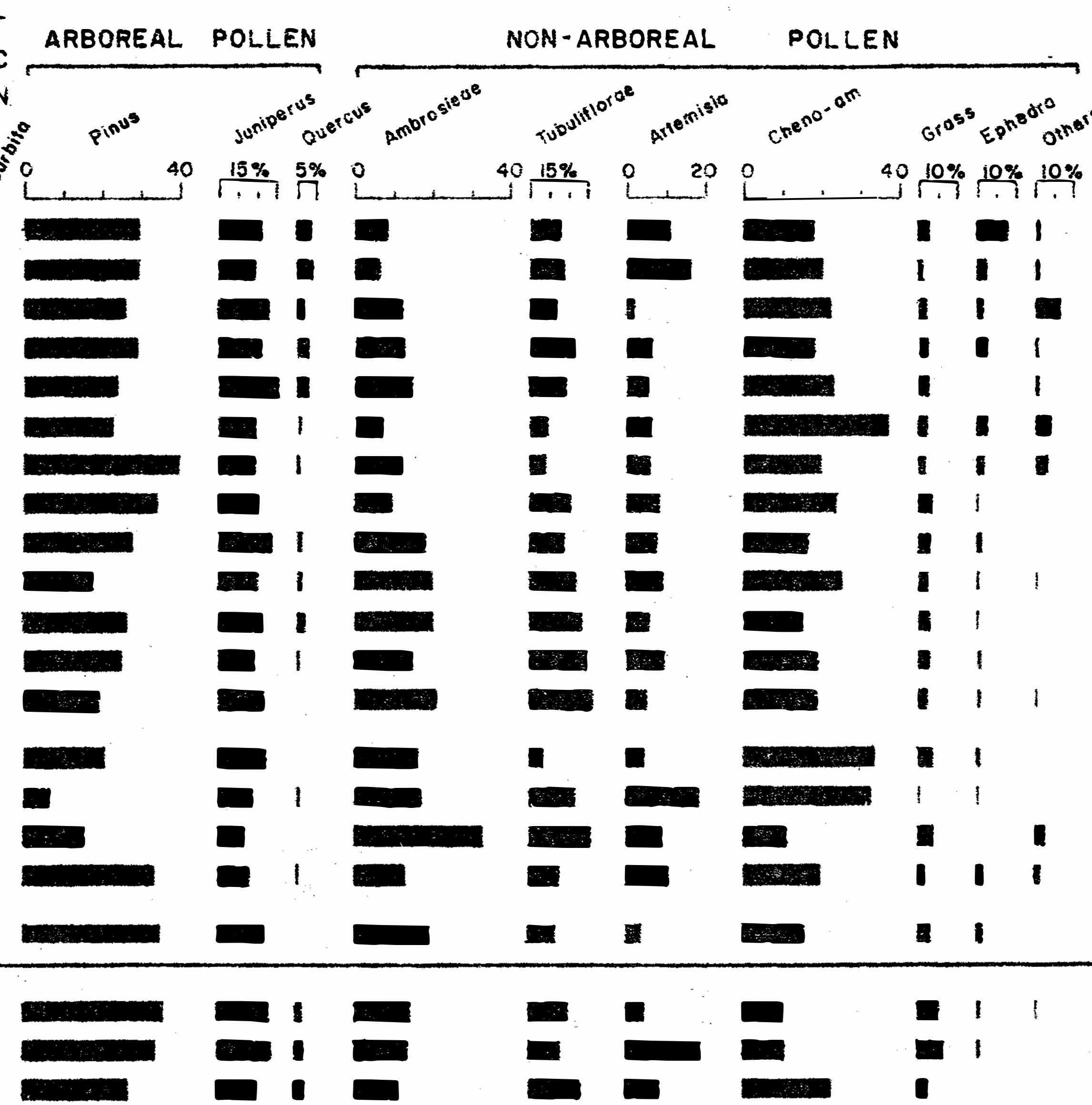

Table I records all observations made, and Figure 1 presents these in the usual graphic form of a pollen diagram. The data justify two conclusions: (A) there is greater variation in the pollen record within a category of architectural form than occurs between such categories. Essentially, the productive samples fall into four architectural categories: small rooms with flagstone flooring, small rooms with bins, large rooms with bins, and plaza. Only one sample was analyzed from the second and fourth categories, however. Thus, there are actually only two architectural categories from which replicate data are available. Statistically significant variations were measured at the 95 per cent confidence level by the confidence interval surrounding the binomial distribution. Significant variations occur in the pollen record, typified by the records of Pinus and Cheno-am pollen. Samples from the floor of the same room (e.g., Room 2) may show no significant distinction in any pollen category; or they may (e.g., Room 4) demonstrate significant distinctions in more than one pollen category. The general tendency is for the former situation to be more normal, but since the latter situation does occur, it is clear that a direct correlation between architectural form and pollen record cannot occur.

Further, where a number of samples are available for an architectural category, variation among the samples leaves no room for doubt regarding a lack of correlation. Each room in the "large room with bins" category provided a unique pollen record.

(B) The sorts of palynological records obtained at Broken K Pueblo which allowed discrimination of room function do not occur at Wide Reed Ruin. At Broken K, architecturally distinctive rooms produced records of ethnobotanic pollen types which patterned as to both type and frequency relative to architecture. At Wide Reed, the number of different kinds of ethnobotanic pollen types is not as great as at Broken K, nor do statistically significant variations in the frequencies of these types occur. It is thus clear that the format of analysis used by Hill and Hevly (1968) to indicate the differential functions of architecturally distinctive rooms does not accomplish similar ends at Wide Reed Ruin. The limited amount of data provided on each sample (i.e., the 200-grain count) is inadequate to the task of providing clues to a potentially useful format of analysis for indicating the differential functions of architecturally distinctive rooms. In the present case, obviously, application of the indirect in contrast to the direct approach to analysis was a losing gamble.

An attempt was made to salvage some of the effort invested in the pollen work by calculating the arboreal pollen frequency relative to the adjusted pollen sum of Schoenwetter (1970:43). This pollen statistic is designed to allow chronological placement and paleoecological reconstruction in terms of a generalized Colorado Plateau pollen chronology. Table II shows the results of this excercise.

The data indicate that the floors of all of the rooms sampled are referent to paleoecological conditions of the same type, and apparently of the same age. The sample collected below the floor of Room 1 is referent to paleoecological conditions of a distinctive type, apparently of a period prior to the general construction at Wide Reed. However, since this sample contains maize and beeweed pollen it would apparently not pre-date occupation of the site. The samples collected

Room Number	Sample Numbers	Size of Pollen Sum	Adjusted Arboreal Pollen Frequency (%)
2	30+54	399	44.9
3	27+53	396	43.9
4	33A+33B+55	596	42.2
11	31+56	401	43.8
13	58+59	399	35.3
15	61	200	36.0
9	6+7	299	33.1
10	9	199	23.0
18	43	199	42.5
West Plaza Floor I	20	148	47.3
W. Plaza Bin Floor II	32	199	51.3
Room 8 Bin	22	200	50.0
Under Room 1 floor	29	200	21.5

Table II: Calculation of adjusted AP %.

as bin fills from the West Plaza (Floor II) and the contiguous Room 8 contain relatively more arboreal pollen than the room floor samples. The average AP frequency of these samples (50.7 per cent) is significantly distinct from the average frequency (39.2 per cent) of the floor samples. This could be a function of the distinctive bin fill proveniences. I suggest, however, that the data are consistent with an interpretation of a distinct temporal assignment for the bin fill samples. This would be a period prior to the construction of the room floors, but after the time represented by the sample from the sub-floor at Room 1.

Assignment of absolute age to these three temporal units is complicated by a lack of surface sample control pollen records from the geographic district in which Wide Reed Ruin is located. If we presume that the pollen statistic accepted by Schoenwetter (1970:43) as indicating "modern" conditions would characterize surface pollen records at Wide Reed, dating may be attempted by reference to the Colorado Plateau pollen chronology. The most reasonable date for the sub-Room 1 samples that might be applied under this presumption is A. D. 1075-1125. The dates of A. D. 1240-1275 are those which would be most reasonable for the other samples, with indications that Floor II of the West Plaza and the bin in Room 8 date earlier on this horizon.

It is recognized that dendrochronological assessments of the beams used in room construction offer dates following A. D. 1275 for Wide Reed (Mount, pers. comm.). The presumptions regarding the character of the control pollen records, then, may be in error. Alternatively, the dates for the beginning of sediment accumulation on the room floor surfaces may indeed be somewhat earlier than the dates of beam cutting for roof construction, or the rooms dated by dendrochronology and those dated by pollen may be different rooms.

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