

TO: J. Brody

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FROM: J. Schoenwetter

TITLE: Pollen Studies in Taos County, Preliminary Report

Introduction

A series of nine sediment samples were submitted to the Palynological Laboratory of the Museum of New Mexico for pollen analysis. These samples had been collected in Taos County during 1965 by members of the archaeological field school of the University of New Mexico as part of the training program. After analysis of the cultural materials from archaeological sites in the area had been mostly completed, a suite of samples was selected for pollen work.

The analysis of cultural remains associated with the sediment samples indicated two specific problems which palynological studies could hope to resolve: (a) at what temporal period were the sites sampled for pollen occupied; and (b) compared to the present, what moisture conditions were prevalent during the period of occupation. The former question would be resolved by comparison of the pollen records of the Taos County samples with pollen records of known age collected elsewhere. The latter question allowed development of cultural ecological interpretation.

Methods

Extraction of pollen from the sediment samples was undertaken by a four-step process. First, the sediment was deflocculated in dilute HCl and the light and small particles segregated by swirling and decanting. Second, the fraction containing light and small particles was strained through an 80 micron mesh sieve to remove large light materials and to remove dense matter larger than pollen. Third, the segregated pollen-bearing matrix was acidified with HF to remove silicious matter. This step was undertaken by boiling the sediment-HF mixture in a nickel crucible for twenty minutes. Fourth, standard acetolysis and KOH treatment was applied to remove non-polleniferous organic matter.

The analytic design used in counting the pollen followed that proposed by Schoenwetter and Eddy (1964, pp. 68-72). This design has proved successful in dating other fossil pollen samples from the Colorado Plateau (Schoenwetter, 1965; Schoenwetter, 1967).

	9201-0	9201-2	9201-3-21	Floor, Fea. 3	Floor, Fea. 2	Floor, Fea. 5	Cist, Fea. 7	First Floor, Fea. 7
Pinus edulis	121	34	43	9	22	2	16	6
P. ponderosa	3	62	33	6	2	1	10	4
Juniperus	19	31	29	26	2	19	15	4
Quercus	4	5	6	7	8	5	8	2
Picea			3					
	AP% 73.5	66.0	57.0	24.0	34.0	27.0	49.0	32.0
Chenopodiaceae	20	20	29	48	36	19	14	10
Artemisia	14	16	15	52	15	12	9	6
Gramineae	13	10	19	15	4	27	13	10
Compositae	5	19	22	30	10	15	16	8
Ephedra N		3	1	2	1			
Ephedra T	1			5				
Unknowns				7				
N	200	200	200	200	100	100	100	50
Ambrosiaceae	1	3	3	11	6	1	4	1
Sarcobatus	1							
Zea		2						
AP %	66.0	73.5	57.0	24.0	34.0	27.0	49.0	32.0
	SURFACE SAMPLES			LA 9201		LA 9200		

TABLE I
POLLEN STATISTICS OF ANALYZED SAMPLES

represented by these fossil pollen records and the present, the latter alternative must be interpreted in terms of climatic factors. The climatic factor most likely to be involved would be precipitation, since arboreal density in this region is principally controlled by rainfall. The best interpretation that can be offered, then, is that precipitation values for the site area during the period of occupancy were significantly lower than they are today.

There are no surface samples from LA 9200 to act as controls in the interpretation of the fossil pollen spectra. This site, however, is presently located in a vegetation pattern much like that represented by the sagebrush - dominant ecological unit sampled at LA 9201. Judging on the basis of surface samples collected elsewhere on the Colorado Plateau, AP values for this type of vegetation average 46.5% with a standard deviation of 9.0%. Thus, AP values usually run in the 35-55% range for this type of environment.

The stratigraphically most ancient sample from LA 9200 (9200-5) yields an AP frequency below the level indicating an environment like that of the present: this is also true of the stratigraphically most recent sample. The sample from the cost in Feature 7, however, yields an AP frequency within the range of modern environmental conditions. Apparently the site was drier than present during the early and late parts of the period of occupation, but enjoyed environmental conditions like those of the present during the middle part of occupancy.

On the basis of cultural material, site LA 9200 is thought to date somewhat later than site LA 9201. To date the two sites in absolute time we must search the palynological record at other sites in which a dated sequence of environmental change is evident that correlates with the undated sequence of change at the Taos County sites. The sequence involves an early horizon of dry environmental conditions, a middle horizon of environmental conditions like those of the present, and a late horizon of environmental conditions drier than those of the present. This sequence must occur on the Puebloan horizon. It can begin no earlier than A.D. 700 and end no later than A.D. 1300.

In the Largo Canyon area, near its junction with Blanco Wash, palynological investigations have recently been completed. The vegetation patterns existing in this region today are much like those observed in Taos County as regards arboreal density.

Results

One of the nine samples submitted did not yield sufficient pollen for analysis. This was the sample from the floor of Feature 6 at LA 9200. Of the five remaining samples obtained in association with cultural material, only one (LA 9200-3-26) allowed a completely satisfactory analysis of 200+ grains. Four samples allowed an analysis of 100+ grains, and one yielded 50+ grains. This last sample is definitely statistically suspect; the other three may or may not be. The pollen counts obtained on all samples are shown on Table I.

The three surface samples from LA 9201 were collected at different parts of the site. The variation in pollen records between them is best interpreted as an indication of the range of variability in pollen records from such a limited area. The site today is located on the ecotonal margin of woodland and sagebrush plant associations. This condition seems best reflected in the Arboreal Pollen (AP) frequency, which is highest in samples collected closer to and in the woodland area and lowest in the sample collected in the sagebrush area. It will be seen that the surface sample collected in the sagebrush area does not contain significantly more sagebrush (Artemisia) pollen than the other surface samples. Apparently, there is sufficient AP produced in this area to be overrepresented in the pollen spectrum and, in effect, "drown out" the true proportion of Artemisia pollen. It may be assumed that such would also be true of ancient pollen samples. Even if no trees were present locally, significant quantities of AP may be expected as a result of overrepresentation.

The fossil pollen samples from site LA 9201 yield significantly less AP than the surface samples. Since a proportion of even this low quantity of AP must be considered as an overrepresentation derived from non-local sources, it is evident that the locality did not support an arboreal flora in the past similar to that observed today. There are two probable causes for such a reduction in arboreal flora. Either the trees were removed by human activity, or natural conditions were distinctive enough to offer an environment at the site which native cannot be evaluated from the palynological data, but there is little cultural evidence to support it. In view of the palynological records of other puebloan sites, the former alternative is also not supported. Since we can assume no change in edaphic or biotic conditions between the time period

The Largo Canyon archaeological sites from which pollen has been obtained, like the Taos County sites, presently occur in an ecotonal environment. Surface samples from sites in the two areas are quite similar in AP frequency.

Subsurface, or fossil, pollen spectra from the Largo Canyon sites have AP values very much like those from the Taos County sites. As is the case in the Taos County sites, there is a sequence wherein early pollen spectra contain 20-30% AP, later spectra contain 45-60% AP, and yet later spectra contain 30-45% AP (Schoenwetter, n.d.). The absolute age of this sequence is known, because of associated artifacts, to cover the temporal period between A.D. 850 and 950. The early low AP values are dated between 850 and 875; the later higher AP values are dated between 875 and 900; the still later low AP values are dated after 900 but prior to 950. A similar sequence of AP values is known for sites in the Chuska Valley (Schoenwetter, 1967) of the same absolute age. There are no other temporal horizons known palynologically on the Colorado Plateau where this sequence of AP variation occurs. In particular, there is no other time period between A.D. 700 and 1300 in which such a sequence occurs. By correlation with the Largo Canyon and Chuska Valley pollen sequences, the Taos County sites date to the A.D. 850-950 horizon.

Conclusions

I would interpret the absolute age of sites 9201 and 9200 to lie within the A.D. 850 to 950 period on the basis of comparison with pollen records from Largo Canyon and the Chuska Valley. Specifically, I would suggest that the floor of Feature 5 at LA 9200 dates between A.D. 850 and 875, the cist below the floor of Feature 7 dates between A.D. 875 and 900, and the floor of Feature 7 dates between A.D. 900 and 950. The floors of Feature 2 and 3 at LA 9200 are probably not contemporaneous in time. I would date the former between A.D. 850 and 875 and the latter between A.D. 900 and 950.

Judging by available surface samples from the area of these sites and the Colorado Plateau in general, the A.D. 850-875 and A.D. 900-950 horizons were periods of relative drought at these Taos County sites. The period around A.D. 900, however, seems to have enjoyed moisture values similar

to those obtaining at present in the area. It seems not unlikely that the conditions of relative drought were in part responsible for the occurrence of these sites.

Under modern conditions of climate maize agricultural productivity in Taos County is limited by the shortness of growing season. The present long winter season is advantageous to crop plants in that it provides a relatively high moisture value through reduction of evaporation and frequent winter storms, but this advantage is offset by the frequent occurrence of early killing frosts. During the period represented by occupation at these archaeological sites, moisture values were reduced relative to the present. This may have occurred consequent upon the occurrence of a shortened winter season. If this interpretation is correct, the advantage offered to maize agriculture by a lengthened growing season may well have offset the disadvantages of relative drought on the A.D. 850-875 and the 900-950 horizons.

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