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POLLEN ANALYSES IN THE WETHERILL MESA AREA

In the summer of 1959 archaeologists working on the Wetherill Mesa project in Mesa Verde National Park, Colorado, collected a large number of sediment samples for pollen analysis. It was hoped that information would be forthcoming on environmental changes that may have accompanied cultural changes such as abandonment in this area, and that stratigraphic horizon markers could be recognized in pollen sequences for purposes of cross-dating sites. As the study is not yet completed it is difficult to evaluate the degree to which these objectives have been obtained. The first year of research has, however, produced a good deal of information and some material for speculation which might profitably be passed on to this assembly. The discussion may be premature in terms of results, for the findings are admittedly incomplete and they have not yet even been fully correlated with the archaeological materials. The objective of this paper, then, is not so much the presentation of facts as it is the presentation of the types of information which archaeologists may expect from palynological studies.

Two major sites were investigated: a small cave containing evidence of occupation but no pottery, and a cliff dwelling. The cave site has so far been rather unproductive in terms of material culture, but a stratigraphic sequence of sediment samples was collected and these yielded a record of vegetational changes through pollen analysis.

SHOW SLIDE OF SITE 1205

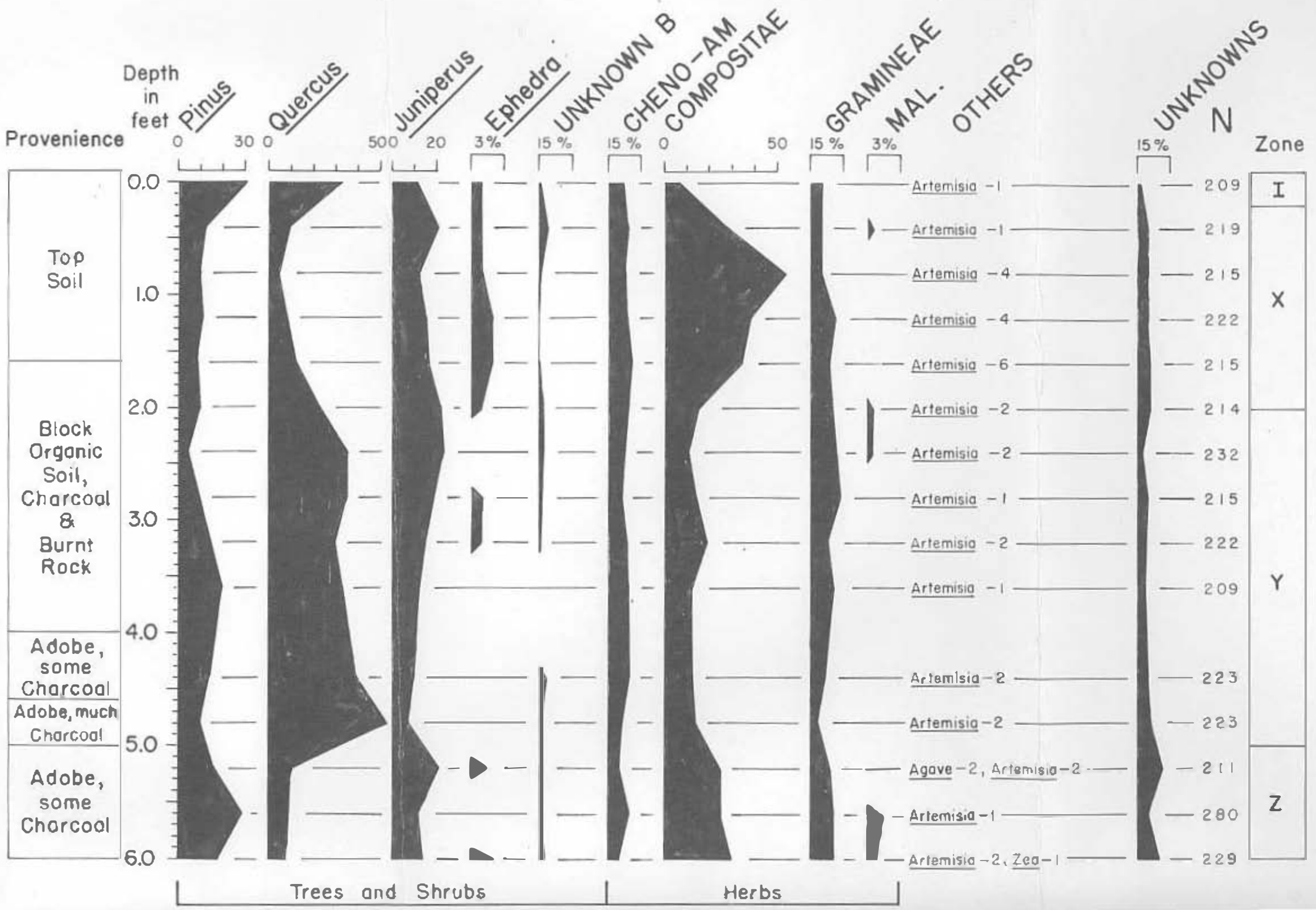

Figure 1. Pollen diagram from site 1203

The fossil record can be understood only in terms of the present environment. Today the site is located in an area of dense oak scrub. This is the direct result of an extensive fire in 1934. The uppermost sample in the pollen diagram was collected from the surface and shows the dominance of oak pollen due to the present plant association.

Next in the stratigraphic sequence is zone X, which contains a different dominant pollen type. Here the pollen of the plants in the sunflower family (Compositae) is that in highest percentage and the percentage of pine and oak pollen is reduced. As the Compositae are mostly herbaceous plants the record shows that the vegetation prior to the burn was not primarily of trees.

In zone Y we again see the dominance of oak in the local vegetation. As the sediments contain much charcoal, and as we recognize that oak is an indicator of fire in this area, we may conclude th at an earlier fire produced this response in the fossil record.

Zone Z contains tree pollen, notably pinyon and juniper, as the dominant elements and no doubt indicates the early existance of a pine-juniper forest or woodland at the site. Another important find is the presence of corn (Zea) pollen in this zone at the base of the sedimentary sequence. This is excellent evidence that man, equipped with agriculture, has been in the area throughout the period represented by the deposition of these sediments. I might mention again that no pottery has been found here, so the introduction of agriculture in this area may prove to be of some antiquity.

We can observe changes in vegetation at this site; can we then say that changes in climate have taken place? The most recent change, that from non-arboreal to oak scrub conditions, is known to have been induced hot by climate but by fire, and the earliest change--that from

Provenience | Depth in feet | P | Quercus | Juniperus | Ephedra | CACTACEAE | UNKNOWN B | Zea | Cucurbita | CHENO-AM | Artemisia + COMPOSITAE | GRAMINEAE | MALVACEAE | OTHERS | UNKNOWNS | N | Zone

Room 52 — Surface — 226 — I

Area III — Occupational Fill — 0.0 / 1.0

EUPHORB. – 1 — 208 — I
Juglans – 1 — 238
679 — IIa
Alnus – 1 — 366
239 — IIb
257

Area IV — Occupational Fill — 0.0 / 1.0 — Sherds — 2.0

231 — I
229
271 — IIa
443
218 — IIb
Juglans – 1 — 215
225
Juglans – 1 — 284

Room 24

Area H — W. Surface / Floor — 0.1 / 0.5

Juglans – 1 — 264
334 — IIa
EUPHORB. – 2 — 246

Area II & III — Wall Fall? / Occupational Fill — 1.0

196
501 — IIa
500

Room 53 — P III / Pre-Occupational Fill — 1.0 / 2.0 / 3.0

630
583 — IIa
756
Agave – 1, EUPHORB. – 1 — 350
Plantago – 1 — 273 — IIc
EUPHORB. – 1, Juglans – 1, Plantago – 1 — 482

Room 35 — P III Sherds / Ash / P II Sherds / Sterile — 1.0 / 2.0 / 3.0 / 4.0

250
224 — IIb
Alnus – 1 — 241
213
237
249
246 — IIc
224
237
206
Agave – 1 — 245

Trees and Shrubs | Economic Plants | Herbs

pine-juniper woodland to oak-- is also likely to have occured in this way. It seems improbable, judging from ecological relationships of this area today, that the change represented by the dominance of herbaceous vegetation is climatically controlled either, so this record does not appear to indicate that major changes in climate have taken place.

We recognize that man's influence may be reflected at any time in the period investigated, for his presence is recorded by corn pollen at the base of the sedimentary profile. An interesting speculation is that the early fire may have been intentionally caused as a land clearance devise for agricultural expansion.

SHOW SLIDE OF LONG HOUSE

The second and major locality investigated was Long House, a cliff dwelling which is primarily P III in age. Samples were collected in stratigraphic sequence through fill in various rooms and areas that were excavated. This diagram is a composite of the short sequences, arranged in probable chronologic order.

You will immediately see that the pollen types which were of major importance at the cave site are not those of importance in the cliff dwelling. Instead of a record of vegetation changes reflecting natural conditions, we are here primarily concerned with the pollen of plants which are of economic utility to the inhabitants of the dwelling such as corn and squash pollen. There is one pollen type which has been placed in the category of economic plants which is very important but is as yet unidentified: Unknown B.

Unknown B is an enigma. It is not referable to any wind pollinated plant growing in the area, it is not referable to known crop plants such as beans or cotton, it is not even possible to identify the family of plants this type belongs to. We do know, however, that it is present in the area today, for the pollen type can be found in surface sediments. We also know that plants which are not wind pollinated do not disperse pollen over any appreciable area, so it's presence in the pollen diagram in high percentages can only be accounted for by its selection by man.

The pollen sequence begins in zone I with the dominance of pinyon and juniper pollen. The sediments which produce this fossil flora are either post-occupational or surface sediments. They reflect the present pinyon-juniper forests of the region.

Zone IIa is characterized by high percentages of Unknown B. P III pottery is associated and the presence of corn and squash pollen seems to indicate that agricultural activity has not ceased. The stratigraphic zone containing Unknown B in high percentage has not yet been specifically dated by reference to pottery types or other artifacts. At present I cannot say how much of P III is represented in this zone.

Lower in the stratigraphic column, zone IIb, the importance of Unknown B declines in favor of corn. Obviously corn agriculture is the dominant economic motif at this time. These sediments are also associated with P III pottery, though as yet we have no more information in terms of dates.

At the base of the sequence we find sediments containing P II sherds and those which are considered pre-occupational. These also have a distinctive pollen flora. In this zone the percentage of both corn and Unknown B is generally reduced and that of the wild native flora is increased. This probably reflects the early stage of occupation of the site, before most

of the construction and the most intensive agriculture.

The plants represented as pollen fossils are not all indigenous to the area. Pollen of the walnut and the agave has been found in the sequence in very minor amounts, though these plants are unknown in Colorado today. Since the overwhelming majority of the fossil pollen is of native plants the walnut and the agave appear to me to represent trade in plant raw materials from the south. We know that these people traded in pottery and cotton to the south, perhaps agave and walnut should be added to this list. Agave is a source of fiber and is used in making mescal, and walnut bark is a dyestuff for deerskin.

The fossil pollen record at Long House does not seem to indicate that major climatic changes played a role in the establishment, flourescence, or abandonment of the site. Changes in the economic patterns of the inhabitants may be evidenced by the general increase in pollen of crop plants from P II to P III, and by the importance of the plant known only as Unknown B later in the history of occupation.

Until it is identified the meaning of Unknown B can be only a problem in the realm of speculation. One hypothesis is that it is some semi-cultivated or wild plant used as a food source prior to abandonment. Perhaps this is indicated by the decline in corn pollen.

I stated that the purpose of this paper was the presentation of the types of information which pollen analysis might allow archaeologists. At Wetherill Mesa this is the sort of thing which has been found:

1) Archaeological localities, including dwelling units and religious units, may be productive of fossil pollen. Not all sites will work-- for instance we found that trash mounds were unproductive-- but a sizable percentage are worth investigating.

2) Pollen analysis may be profitably used as a stratigraphic tool. By fitting samples into the pollen sequence from Long House, for instance,

we can now date the rooms relative to one another and possibly discover the developmental stages of cliff dwelling construction.

3) The early record of agriculture which may be demonstrated at the cave site points to the utility of pollen analysis in the investigation of the history of agriculture.

4) The presence of anomalous pollen types such as walnut and agave indicates that such cultural traits as trade relationships may be explored by other means than material artifacts.

and 5) The relationship of environment to cultural activity may be investigated through pollen analysis not only in terms of the impact of climatic phenomena, but also in terms of man's utilization of the plant world.