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Contents

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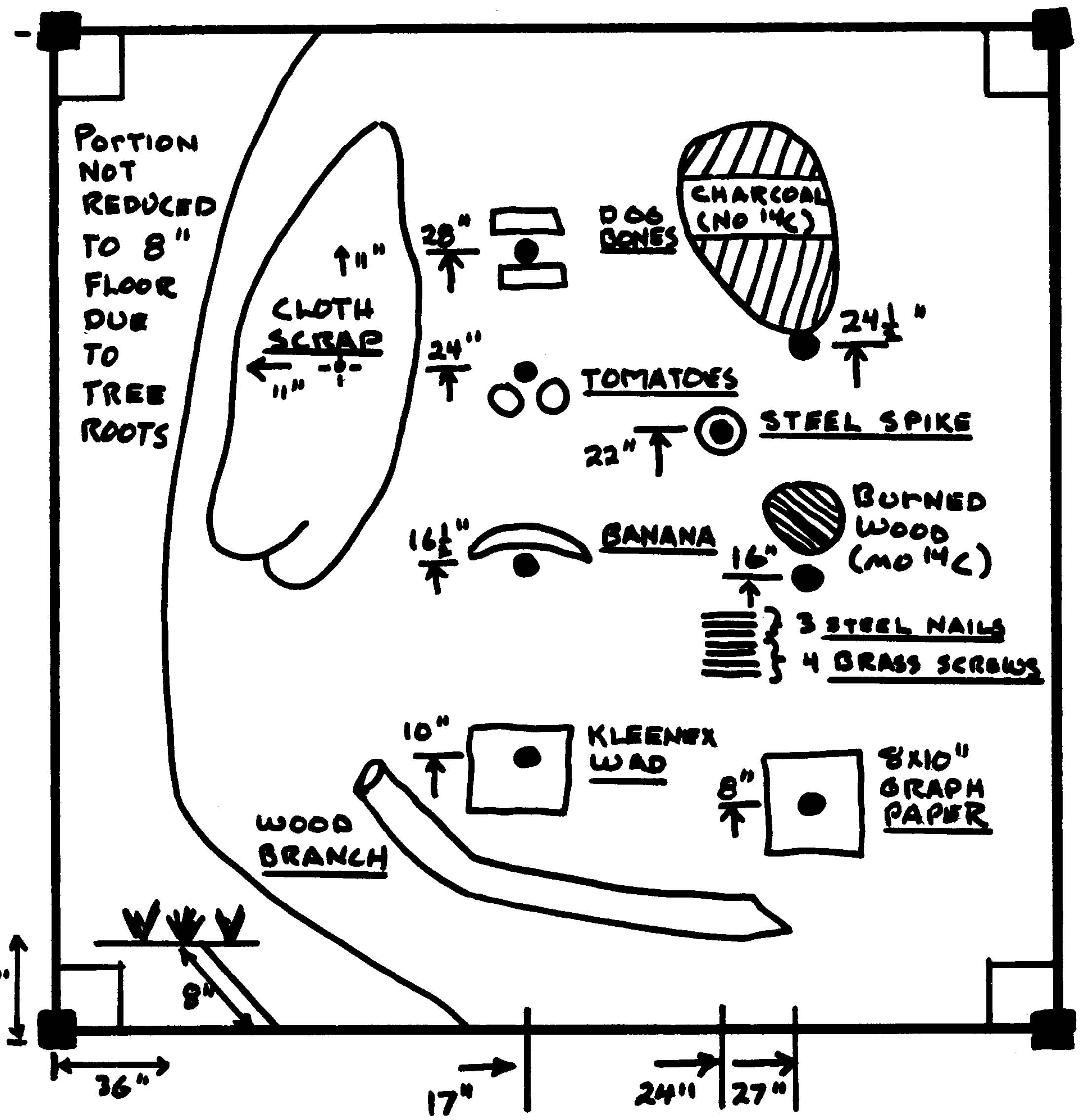

LABORATORY SITE R.O.-I

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J.C.C.-I AND R.O.-I:

EXPERIMENTAL LABORATORY SITES IN NEW YORK STATE ARCHAEOLOGY

Bruce Rippeteau University of Arizona

The construction and use of artificial archaeological sites is not an old or honorable business but the apparently static expenditure of great energy and planning is justified by the sufficient fact that the investigator attains diachronic control and can experiment with the data input of simulated archaeological depositions. Such laboratory sites provide information on excavation techniques and are of use in training students (Chilcott and Deetz 1964) or for understanding the long-term processes of material degradation and structural-chemical soil behavior (Dimbleby 1965, Jewell 1963). Clearly, part of the potency of New Archaeology lies in this attention to pedology, excavation strategies and experimental tests of depositional variables and vicissitudes.

This past summer, I constructed two such experimental archaeology sites and although both were modest, I herein report the results of one, and the planning and uses of both as aids to other experimenters.

J.C.C.-I

The first site was constructed on the campus of Jefferson Community College, Watertown, New York, with the aid of my introductory Anthropology class on the early evening of 17 June, 1970. Six and one-half weeks later, an interval of great rainfall and humidity, this site was excavated, by students drawn from two Anthropology classes, in a matter of two and one-half hours.

Although originally conceived as a strict approximation of a flood-plain depositional environment, to include testing Brown and Gould's (1964) suggestion of carbon-lens migration, the scope of this project settled upon two formal goals: first, combining various perishables in the available wet clay environment as an experiment in material alteration; and second, the instruction of students in the methods and theories of archaeological excavations and the measuring of their effectiveness in recovering and recording artifacts and perishables.

J.C.C.-I consisted of a 10 x 10 ft. x 10 in. excavation through the topsoil into a sterile stratum of clean wet gray-brown clay. Upon this surface were placed the various materials (Table I) including a hearth area where a small fire was burned during the preparation. Figure I shows this placement, although the rest of the artifacts and obsidian flakes are not in situ at the time of the photograph as they were added secretly to enhance the variability and novelty of the assemblage. Objects could not be marked or precisely measured-in due to a severe thunderstorm during the back-filling process, but I do not believe the circumstance of flat lying water-logged clay favored the possibility of soil creep or animal induced movement of the objects. Pictures were taken, the area was marked off and explained by a plastic covered sign, and publicity was developed in the local newspaper (Rippeteau 1970).

In the six and one-half week interval, rainfall was heavy and the impervious clay, unmixed with the topsoil, although broken and open above the actual floor of the excavation, formed a pool in which open water stood for approximately three weeks. This experience was followed by drying in humid air for two weeks and, the day before re-excavation, the site received a light rain, which perfectly softened the hardpan clay without making it slippery.

The excavation, by a total of 15 students, was crowded in the 10 ft. square, but after demonstration of competence at various archaeological techniques the excavators were

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Front Cover

Schematic of R.O.-I. Note orderly layout of materials and marking by stones.

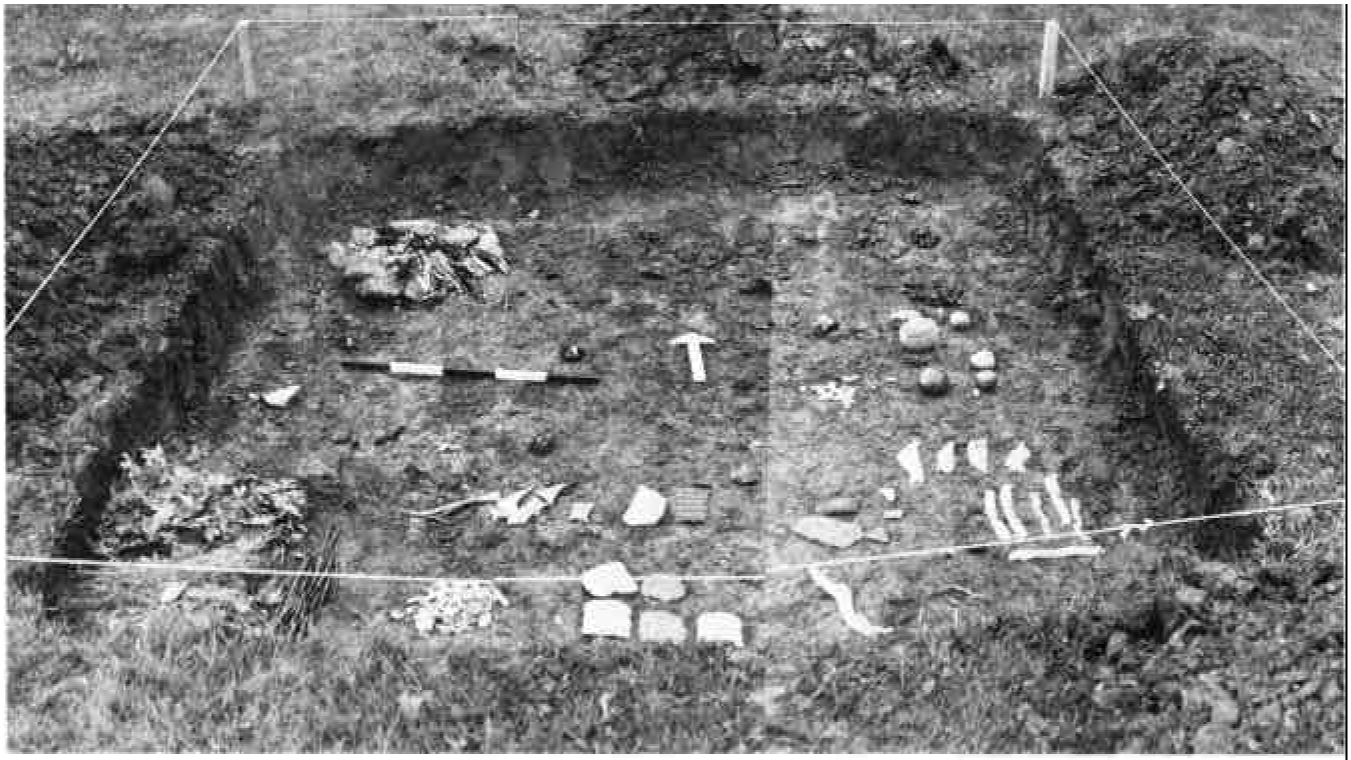

Figure 1. Composite photograph of J.C.C.- I prior to first back-filling and 6.5 week interval (v. text).

TABLE I

MATERIAL RECOVERY AND ALTERATION

I ARTIFACTUAL MATERIALS

1. 36 Obsidian flakes (scattered).	1. 3 *In Situ*; 6 noticed in backdirt (after water spraying); 27 flakes not recovered.
2. 14 Worked pieces (cores, blades, and points).	2. All recovered.

II HUMAN MATERIALS

*1. 5 Human molars (3 having large caries).	1. Soft tissue had grey putrid mold, most horrible odor of all materials; sides of caries rounded; otherwise unaltered.
*2. Assorted fragments dried human bone (from Arizona T:14:12 Burial #1; Misc. Osseous Debris Collection, Ariz. State Museum).	2. Bone not wet or soggy but stained orange and brown.

III FOODS

1. 1 2 1/2" (Diameter) Peach	1. Not recognized/recovered.
2. 23 Strawberries	2. Black but recognizable seeds.
3. 1 Medium-size Tomato	3. Skin very delicate, seeds reddened, interior not putrid.
4. 1 Medium Pear	4. Skin intact, brown and putrid interior.
5. 12 Cherries	5. Putrid and black. Hard to recognize.
6. 1 3 1/2" Onion	6. Outside: skin intact, red and black; inside: very putrid, white, onion smell.
7. 1 4 1/2" Cantaloupe	7. Easily recognizable, some yellow and brown stained putrification.
8. 20 Peanuts (in shell)	8. Easily identified, shell thinned, interior nuts were soft and white.
9. 4 5" Strips Ocean Perch (dried)	9. Fibrous, white putrid, no fish odor, compacted.
10. 6 8" Strips Bacon (mostly fat; dried)	10. Meat gone; fat was white, fibrous, and fragile.
11. 5 Slices Bread	11. Paper thin pieces (="thick sort of stain") grey putrid fibers.
12. 2 Large Bone Joints ("dog bones")	12. Meat gone; cartilage white and slippery, easily stripped from bone; bone whitened, slick, and soggy.

IV OTHER APPROXIMATIONS

*1. 8 Pieces sole leather	1. All found intact but wet-coated with white mold, lower surfaces blackened.
*2. 2 Pieces cloth (2x6" brown; 3x6" orange/white)	2. Softened, wet, brown staining obscures original color
*3. 2 Coins of Silver	3. AG: dark patination (Electrolysis ?).
*4. 4 2" Pieces of Copper (bright)	4. Cu: shine dulled, not other alteration of surface visually apparent.
*5. 6 2" Pieces of pottery (non-vitreous)	5. Apparently unaltered.
6. .5 Cup of dry dog feces	6. Putrid appearance, green interior, no odor.
*7. 1 10" Antler Piece	7. Wet, surface softened, but resilent and tough.
8. .5 Cup dried tobacco	8. Not found.

V VEGETATION	
1. .5 Cubic foot compacted brush	1. Substantially intact but wet, compacted, and some darkening.
2. .5 Cubic foot 8 month old dried oak leaves	2. Wet and decayed, black, no mold.
3. .5 Cubic foot fresh cut grass	3. Compacted and very wet, no molding.
4. Several small 1 foot sticks	4. Intact, bark loosened
5. Small bundle horsetail	5. Large cell structure removed, thinned and weakened, no mold.

*Samples (before and after) retained for future study, as were charcoal pieces from hearth.

allowed to concentrate upon recovering and cleaning the results of the perishables experiment. Except for those items asterisked in Table I, all these samples were later destroyed by inclusion in the final back-filling.

The alterations are summarized in Table I. In general, less decomposition had occurred than I would have expected. Perhaps the weak acidity (pH of 6) and the absence of free oxygen retarded aerobic decay regimes. Although Chilcott and Deetz (1964: 330,331) report losing many of their projectile points, apparently to the pockets of the students, all the J.C.C.-I artifacts were recovered. The explanation lies in the lack of individual privacy during excavation and preceding lectures on sample size and professional ethics. Seventy-five percent of the scattered obsidian chips were lost, however; this can be attributed to the gumbo-like consistency of the site's floor.

R.O. –I

In contrast to J.C.C.-I, this site is a long-term study of material alteration and contamination. The site was prepared August 2, 1970 as a 3 x 3 ft. square located in a mixed hardwood and pine forest on Wellsley Island in the St. Lawrence River. It is secluded on private property known as River Oaks, by permission of the owners, behind the bluff directly across the river from Seaway Channel Marker 197.

Upon a floor 8 in. below the surface, in Stratum-II, a well drained, moderately acid (pH of 4) red sandy loam, perishable items were carefully placed, mapped, and marked by various sized stones. The entire site is locatable by metal detector due to inclusion of a large steel spike. The front cover illustrates this content and placement.

The deposits of charcoal and of burned wood were included to study contamination by mobile ground water as well as excavation practices. The samples, obtained from Dr. A. Long of the Isotope Geochemistry Laboratory at the University of Arizona, Tucson, are 14C "dead" and therefore significant contamination will be indicated by any measurable radioactivity.

R.O.-1 is to be excavated in one year to allow a full cycle of winter and spring moisture exposure. Should more time pass, the excavators will probably have little save certain rocks and charcoal-stained sand (Brown and Gould 1964).

REMARKS

In addition to these reports, a comment is made on Brown and Gould (1964) who suggest that entire lenses of carbon may migrate vertically downwards to new archaeological levels and that radio-carbon (C14) dates may thus not correspond to the correct cultural strata.

Although this process accounts for soil stains and must be considered in dating soils, one must note that the carbon particle size they used in their chromatographic demonstration averaged four microns in size, which is exceedingly fine dust. Normally, geochronology laboratories try to date only samples with identifiable cell structure, and lumps this size are obviously not subject to solution migration.

For teachers who wish to construct and use such "class-room" experimental sites, I recommend small sites of less than a few hundred square feet and large plans, so that the experience of excavating them efficiently serves heuristic ends and the results can be based upon reproducible and clear variables. It is important to prepare students in techniques and a desire to participate, and to premise the immense work that even a 10 x 10 ft. site can be, upon a specific problem SL ~h as wet soil degradation, rodents and worm activity in artifact disordering, or excavation strategies such as sampling and culture reconstruction.

Furthermore, I suggest that readers intending to construct artificial sites might do well to consider not simply sub-surface plants of artifacts and perishables, but rather depositions on the surface. Studies of the ruin and rot of culture in the interval before such becomes covered and subject to soil regimes are notably lacking amidst a plethora of sub-surface experiments. Ascher's Cues-I (1970) or Longacre and Ayres' (1968) examination of an abandoned dwelling area would be an exciting introduction for this endeavor and I believe a substantial contribution to knowledge could be made by a simulated "pre-archaeology" site.

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A SIMPLE AMMONIUM CHLORIDE GENERATOR FOR USE IN OBSERVING AND PHOTOGRAPHING CHIPPING DETAILS AND WEAR EVIDENCE ON ARTIFACTS

Herbert Kraft Metropolitan Chapter

At the recent meeting of the Eastern States Archeological Federation, and again at the annual meeting of the Orange County Chapter of the N. Y. S. A. A., I presented a slide-illustrated paper concerning a newly discovered Paleo-Indian occupation site in New Jersey. In order to illustrate more effectively the superb lithic technology manifested on the fluted points, scrapers, gravers and other tools of specialized design, I prepared two sets of slides for simultaneous projection: the one in natural color, the other showing the artifacts coated with a microscopic film of dull white powder which effectively opaqued the artifact and reduced surface luster, in order to accentuate chipping and fluting details and striations produced from wear.

Artifacts photographed in natural color and without coating.

The same artifacts coated with ammonium chloride and photographed on a black velvet background.

The visual effect was sufficiently dramatic to induce a number of those present to ask for an explanation of the process used. This article, therefore, is intended to further clarify the procedure used and also to benefit the numerous professional and amateur archaeologists who were unable to attend these meetings.

The use of an ammonium chloride generator for the preparation of specimens for microscopic examination -or photography has been known for some time. I do not know who is entitled to the credit for this innovation in archaeological work, but the technique was first brought to my attention by Junius Bird of the American Museum of Natural History. It is, nevertheless, rather strange that even so technically oriented a scholar as Dr. S. A. Semenov does not mention this comparatively simple process in his otherwise very useful and informative book *Pre-historic Technology*. (1964).

The process involves two common chemical liquids: hydrochloric acid (H30+ + C1-) and Ammonia (NH4+ + OH-). When unbottled, or when agitated, each of these substances produces a rather noxious gas: HC1 and NH3 respectively. However, our interest lies in the fact that when these two gases are brought into contact with each other they produce a solid, *i.e.* a very fine white powder. In chemical terms this reaction is expressed: HC1 + NH3 - NH4C1. This powder is controllable, and is very useful in neutralizing the translucency of flints, cherts, quartzes and other lustrous substances without in any way damaging the specimens. The microscopic film will last as long as desired, provided you do not touch or wet it, and the coating can be easily and permanently removed simply by wiping it off, or even more easily by dipping the specimen in water.

The equipment needed is readily available from any chemical laboratory or supplier. I have used the following, but certain substitutions are possible.

1 mouthpiece - "Y" or "T" connector, glass
2 bottles - 8 ounce
2 six inch long glass tubes - 1/4 in. O. D.
2 two inch long glass tubes - 1/4 in. O. D.
2 rubber stoppers with two holes to fit bottle openings and to receive the glass tubes. The tubes must fit snugly.
4 lengths of rubber tubing about 18 in. long - 1/4 in. I. D., to fit "Y" connector and glass tubes.

Prepare the perforated bottle stoppers by inserting a long and short rod through each of the holes. The long rod should reach nearly to the bottom of the bottle when the stopper is in place; the short tube should just barely penetrate the stopper. Each glass tube should project about one inch above the stopper and the rubber tubes are attached to these glass tubes. (Figure 1).

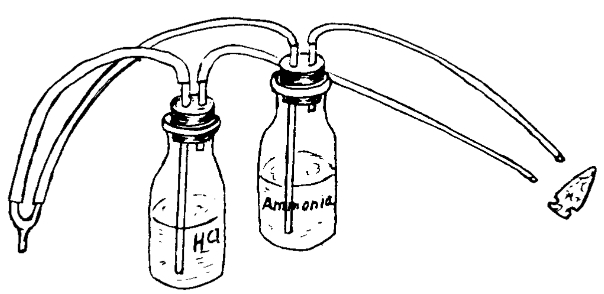

Figure 1. Ammonium chloride generator for ordinary use in coating artifacts.

Working by an open window or in an otherwise well ventilated area; fill one bottle about half full of hydrochloric acid, the other bottle about half full of ammonia. Place the prepared stoppers tightly into each bottle. Now join the hoses leading from the long glass tubes in each bottle to a mouthpiece (Figure 1). Steadily blow air through the mouthpiece into the liquid, in order to bubble it up. The vapor, under air pressure, will issue from the hoses leading from the short glass tubes. The latter should be held in the right and left hands respectively and the open ends of the rubber hoses should be brought together over the artifacts being prepared. As the gasses emerge and contact each other they will produce a white mist or powder.

The amount of powder and the degree of whiteness on the artifact can be controlled by both the air pressure and the length of time the gasses are in contact over the artifact.

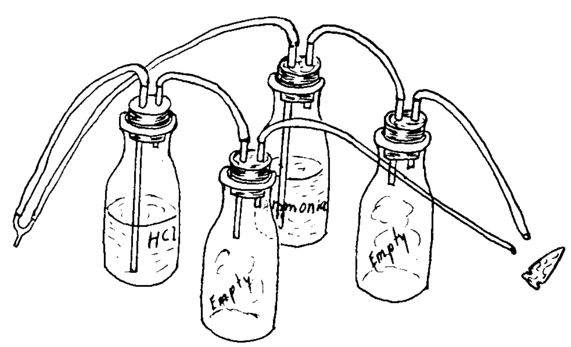

Figure 2. Ammonium chloride generator and condensation traps intended for prolonged use in coating artifacts.

If the hydrochloric acid and ammonia are of good strength the object can be coated in about one minute, depending upon size. Move the two hoses, and their vapors back and forth across the artifact to insure an even coating.

Again I would caution about working in a well-ventilated area or by an open window; both the hydrochloric acid fumes and the ammonia fumes are asphyxiating. Given proper ventilation, however, the job is easily and safely done.

The whitened artifact is best photographed on a piece of black velvet, which provides contrast while at the same time absorbing the shadows. To transport the coated artifacts from the area of preparation to the photographic table or microscope, care must be exercised to avoid touching and thereby impairing the dusted area.

With prolonged use, a condensation may occur which can drip on the artifact thereby spoiling the desired finish. To avoid this condition interpose a second set of empty bottles between the emerging vapor and the open-ended tubes. The wet vapor can thereby cling to the walls of the empty bottle and collect while allowing the drier vapors to emerge for purposes of coating (Figure 2).

ANTLERED DEER SKULL REMAINS IN ARCHAEOLOGICAL SITES: A USEFUL INDICATOR OF SETTLEMENT PATTERN

Robert A. Henke Auringer-Seelye Chapter

The purpose of this paper is, first, to summarize information pertinent to archaeology concerning the growth and development of deer antler and, secondly, to discuss this material in relation to the problem of determining the season of occupation of archaeological sites. Many site reports have been noted by the author which discusses the presence or absence of deer bone or antler remains in a site and on this basis infer its season of occupation. This paper will point out some difficulties with this sort of interpretation, and suggest that close examination of deer skull remains, even those in very fragmentary condition, may well reveal finer seasonal determinations than previously thought possible.

A search of the literature led to only one source applicable to our purposes, an article in the *American Journal of Anatomy* by G. B. Wislocki. Wislocki was chosen as a primary source for two reasons: first the direct applicability of his data and, secondly, his methodical approach. Most investigators studied *live* deer. This made it necessary to keep them in captivity, thus incurring the danger of artificial conditioning (e.g. differing diet, daily living pattern, etc.) which could be reflected in the physiological processes of the deer. Wislocki avoided this by shooting one or two deer each month for a one-year period of study. All specimens came from the same wild population, maintained on a large island.

This discussion will be limited in several ways. It is confined to data concerning the Northern variety of the Virginia White-tailed deer (Odocoileus virginianus borealis) in the Eastern Woodlands. It deals with male deer exclusively. Thus the term "unantlered skull" will refer to the skull of a male deer, as evidenced by the presence of the pedicles or antler platforms, which remain present in the antleress stage.

In the early spring, around the first of May, the increasing sunlight stimulates the release of testosterone, the male hormone, which in turn initiates the first antler growth on the top of the pedicle. This first growth is in the form of a cap of spongy bone, making the pedicle surface appear flat. The first period is one of very rapid growth; by the first part of June the antler is between 3 and 10 in. long, averaging around 5 in. This initial tine, on which no branching occurs, is soft enough to be split with a knife. Thereafter growth will take place only at the antler tips, whereas the calcification will start at the base and proceed upward. The corona of bony warts or burrs around the base of the antler does not yet develop. The antler is, of course, in velvet at this time.

The antler growth rate changes somewhat throughout the summer, varying with the individual. A spike horn buck will grow the initial tine at almost the same rate as does the buck, which will develop a much larger rack. However, on the smaller deer the growth will then slow almost to a stop while the larger rack continues to develop at the same rapid rate throughout the summer. During this long-duration rapid-growth period, antler size and form can be altered drastically by changes in diet, by age of the individual, by injury, etc. Thus the size or shape of the mature antler is no sure indicator of the age or size of the animal.

Growth continues through July to the middle of August. In the latter part of this period the approaching breeding season is reflected by increases in the testosterone level, which causes the cessation of growth and the start of the final maturation processes. During July calcification takes place slowly until by the end of the month and through the first weeks of August the outside of the antler, exclusive of the growing tips, is well calcified, but there remains a spongy center core, richly filled with blood vessels to supply the still growing tips. By the middle of August very rapid changes will once again begin. The antler will completely form now, with the outside calcification proceeding up to the point where the only uncalcified bone is the last few inches of the tips, which are partly calcified. Along with this, the spongy core of the antler starts to calcify: The last two or three centimeters of the base of the antler become extremely hard bone and develop longitudinal grooves separated by rows of small bony elevations (the corona). These grooves apparently develop to protect and house the arteries still supplying blood to the velvet.

The hardening continues through September until, by the end of the month, the antler is completely calcified, internally and externally. By October the velvet has been rubbed free of the antler on bushes and trees. It is to be noted that the antler itself is completely dead at this point. Wislocki tested this by injecting India ink into the blood system around the pedicle. This stopped at the lower border of an avascular zone just at the base of the corona, indicating that the antler is completely non-oxygenated, or dead tissue.

The antlers, which have taken all summer to grow, serve their purpose during the October-November rutting season, and drop off sometime in mid-December. Wislocki gives December 10 through January 25 as the extreme range during which the antlers are shed. My experiences tend to indicate that most are shed in the early half of this period. Right after the antler is shed the pedicle surface is quite concave.

To summarize: the antlers of the Virginia deer are decidious, that is they are renewed each year. They begin growth in April or May, become hardened fighting tools and lose velvet by September-October. Rutting takes place in October-November and the antlers are cast off in late December-January. We shall now consider how this relates to archaeological remains.

When attempting to discover indicators on this level it is necessary first to discern which particular classes of data will be useful. Our purposes require something, which represents a dramatic and distinctive change within a limited time span. Furthermore, we need to choose some structural feature, which we suspect, will be capable of preservation over a long time span. Hence, we cannot use an event such as the shedding of velvet, etc. but rather must confine bur study to bone tissue. We can also eliminate the antler beam and tines any time before August. They undergo a rapid calcification during August and would probably be too soft to be preserved any time before this final calcification takes place. This latter is, however, the type of dramatic change we are looking for. Furthermore, we can test this differential preservation. If this soft phase of the antler does, in fact, prove to be as durable as the more ossified form, this would be reflected archaeologically by the presence of antlered skulls with undeveloped coronas, which form in late August.

Given this differential preservation we can divide all data into two useful phases: (1) antlered deer, which would be found during a four-month period from the end of August through December, and (2) unantlered deer, which occur in the remaining 7-8 months of the year. Before drawing any inferences from these data however, there are some more limitations, which we must place on them.

First, it is obvious that no inference can be made based on the presence of antler, which is not attached to the skull. This includes antler tools and ornaments. Such antler would not necessarily belong to the season of occupation of the site where found; it could have been picked up in the woods or, more likely, could have been obtained at another site. Thus the antler tools found at one site could have originated 20 miles away. It is reasonable to expect that a group making tools from a material, which could be obtained only during a certain season, would carry the material with them to replace worn or broken tools. Secondly, antler, exclusive of the skull, would not indicate anything about the seasonal range represented at the site.

Given the above, the minimum unit of data we shall consider will be the skull. It should be noted that "antlered skulls" includes skulls from which the antler had been broken, as long as enough of the antler proper remains to show the corona (a likely occurrence since the antler is densest near the base). Thus a very small piece of bone, that portion of the skull containing part of the pedicle and the corona, can constitute an antlered skull for our purposes. Given this type of data, i.e. antlered or unantlered skulls with pedicles, the following inferences can be made: (1) Fall occupation, (2) Non-Fall occupation, or (3) Year-round occupation. These determinations are based on the relative percentages of each type of skull found.

An exclusively Fall occupation, i.e. anytime during the period from the end of August through the middle of December, would be indicated by the presence of only antlered skulls. Similarly, the total lack of antlered skulls would indicate occupation at some period of the year not in the fall. By the same reasoning, one would expect to arrive at some predictable ratio of antlered to unantlered skulls indicating year-round occupation. This unfortunately is not the case. There are other factors to consider which could cause radical deviations.

In the fall deer are starting to group together preparatory to a move to the winter yarding areas. This is helped somewhat by the harem-gathering activities of the bucks, although this is much less pronounced among the white-tailed deer than, for example, among the elk. Insofar as the rutting season is just starting, this consolidation of the population helps insure fertility by increasing the accessibility of the does. In rut the bucks tend to be a little less wary than other times of the year. When one considers these facts, as well as the ethnohistoric references to large Fall hunts taking place in November, it could be expected that a more abundant kill would occur in the Fall, resulting in a higher percentage of antlered skulls. Furthermore, in the spring a whole range of aquatic protein resources (e.g. spawning sucker runs, etc.) becomes available, taking some of the hunting pressure off the deer. This further lowers the percentage of unantlered skulls. Considering these factors it is probably necessary to assume (on the basis of antler alone) that whenever there exists any percentage of both antlered and unantlered skulls the site could have been occupied year-round.

On the micro-morphological level there seems to be only one phase which appears potentially useful. The antler-pedicle attachment consists of a number of very small bony "tubes" (the lamellae of the Haversian blood system which has developed between the antler and pedicle), which extend from the pedicle through the very densely interlaced bony spicules, which form the extreme base of the antler. The effect is analogous to nailing two pieces of wood together. In December the antler-pedicle attachment is weakened by the partial reabsorption of the lamellae by the pedicle. When the antler is detached, either by the deer kicking it off or knocking it off on bushes, etc., the effect is somewhat traumatic to the pedicle surface, leaving it with a fairly pronounced concavity. By February or March the new growth has filled this cavity with bony material, which could be expected to be preserved. Hence there is a very short period during which this concavity might be observable-December through January. What is potentially exciting about this is that it would enable us to determine whether a site which has both antlered and unantlered skulls does in fact represent a year-round occupation or merely a Fall-Winter encampment. Were all the unantlered skulls to exhibit this concavity it would indicate that the site was occupied only during the Fall-Winter period. A year-round occupation would be expected to contain unantlered skull of both types, i.e. with and without concave pedicle surface. It is hoped that subsequent laboratory analysis will reveal whether or not the above will be observable in an archaeological assemblage.

It is hoped that the above discussion will not only deflate some types of inferences and upgrade others for the reader, but also that it will suggest the usefulness of even the most fragmentary faunal remains and stimulate the care and preservation of these data. The minimum unit of data considered in this paper, the pedicle or antler platform, need be no more than an inch or two long, to permit the inferences discussed above. Furthermore, this discussion merely brushes the edge of the spectrum of information to be gathered from faunal analysis, through techniques in existence now and those, which remain to be developed. All, however, remains at the mercy of the excavator to whom falls the task and obligation of recording, preserving, and caring for excavated material of this sort.

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ACKNOWLEDGEMENT

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A REVIEW

THE ARCHAEOLOGY OF MICHIGAN: A guide to the Prehistory of the Great Lakes Region, James E, Fitting, Natural History Press, Garden City, New York, for the American Museum of Natural History, 274 pp,, 123 illustrations, $18.95.

The price of Fitting's fine archaeological-ecological study of Michigan prehistory is going to prevent it from attaining the readership-ownership it deserves. To be sure, it is a beautiful book and worth the price as a possession, but most non-Michigan students are going to weigh very carefully the $18.95 plus sales tax price tag against their interest in an area, which has not yet proved significantly productive archaeologically. Fitting himself writes "Not a single site in Michigan is mentioned in the recent summary volume An Introduction to American Archaeology (1966) by Gordon Willey,"

The Holcombe beach ridge series of Paleo-hunter sites excavated by Fitting and others have been reasonably dated by Great Lakes geology at 11,000 yrs, ago, and the Barnes site, by the same evidence, at probably 13,000 yrs, ago. But a long hiatus in dated occurrences follows the Paleo-hunter horizon. The earliest Michigan C-14 date is 5350 ± 150 yrs, (3350 B. C.), on charcoal and a skull without cultural affiliation; the earliest excavated and C-14 dated assemblage is at the Feeheley site, age 3930 ± 150 yrs, (1980 B. C.), The hiatus is filled in by Fitting by reference to sites from adjacent states, the 10,000 yr. old Raddatz Rock Shelter, the 8000 yr. old Renier site and the Old Copper sites of Osceola, Oconto and Reigh in Wisconsin, and the Modoc Rock Shelter in Illinois, and by analysis of surface collections in which are found projectile points typologically close to Early and Middle Archaic points from the certainly dated St. Albans site in West Virginia and from other time-placed southerly locales.

Though this hiatus is not as long in New York, possibly only 3000 years, between the Reagen late Paleo-hunter site (in adjacent Vermont) and the Sylvan Lake Rock Shelter at 6560 ± 100 yrs, ago (4610 B. C.), it does appear to exist in fact and certainly exists in the record. Only stray projectile points of southerly Early Archaic styles have turned up in excavation and collections. The paucity of materials for the millenia between 10,000 yrs, ago and 7000 yrs, ago can, at present, be thought of only as the result of paucity of population.

In Fitting's view, carefully argued from the floral-faunal environment of Michigan during the early Holocene, subsistence opportunities were limited by the spruce-birch and, later, the pine forest cover. These woods have a low faunal carrying and food producing capacity and subsistence niches existed only along lakes shores and waterways. The boreal forest period lasted, Fitting estimates, from about 11,000 yrs, ago to about 9000 yrs, ago, and the pine forest period from about 9000 yrs, ago to about 5000 yrs. ago. Together these two periods were "times when Michigan was marked by a very low population density" because "the environments to which archaic peoples were best adapted either did not exist or existed in more limited areas than they did after 3000 B. C.".

If I understand Fitting correctly he synchronizes the migration of Archaic hunting-gathering peoples into Michigan with the spread of deciduous forests into the pine forest zone. The conviction has been growing for some time that this was the influence and the direction of post-Pleistocene population movement in America but Fitting's is the first full-scale study, from topographical, geographical and ecological evidence, to make the point irrefutably. It may now be accepted as a basic principle, of profound importance to American prehistory, Such work as has been done in the past, premised on the assumption that Archaic patterns invaded the present United States from the direction of Asia and their spread was from north to south, must now be re-evaluated.

During the Late Archaic Michigan began to fill in with peoples only generally, perhaps speciously, related to the Lamoka and Laurentian cultures to which they have been compared in the past. The period seems to have no well-defined cultural character or traceable tradition, other than generalized Archaic, The Woodland period provides a much richer archaeology; there are about 80 C-14 dates to work with, but Fitting does not justify his subtitle "A Guide to the prehistory of the Great Lakes Region" until the protohistoric period, when he finds a "regional symbiosis" developing around the Lakes, based on agriculture and trade. The Woodland occupies 100 pages of the 237 pages of text, with another 50 devoted to historic Indians and historic archaeology. Fitting has done an exhaustive job, but Michigan is not yet New York or Pennsylvania, archaeologically.
What I am saying, however, I hope, is the "The Archeology of Michigan" is much more important and meaningful than the archaeology of Michigan, from which Fitting has extracted some landmark tenets. It should influence the archaeology of the Northeast for the next ten years.

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BOOK NOTE

A Bibliography of the Iroquoian Literature, partially annotated, Paul L. Weinman. Bulletin No, 411, New York State Museum and Science Service, Albany. 254 pp. No price given.

This bibliography lists the literature about the Iroquois under 14 headings, beginning with archaeology and ending with sources on Iroquois social and political life. If anything is missing from the 250 pages of entries I am not Iroquois scholar enough to know about it. I might, with trepidation, mention Dale Van Avery's three volumes on the frontier situation from 1754 to 1783, a kind of re-writing and updating of Theodore Roosevelt's "Winning of the West" with their recounting of the fading of Joseph Brant's dreams of retaining some part of America as Indian, But I doubt that there is anything now known about the Iroquois that can't be found here. It is a monumental piece of work. L.A.B.