WOODLEY THISTLE HILL

THISTLE HILL: A NEW LOOK AT THE LATE ARCHAIC

By

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ABSTRACT

This report discusses the excavation and analysis of the Southern Ontario Late Archaic Thistle Hill site (AhGx-226). Excavations concentrated on two house floors with internal storage pits and hearth(s), delineating the site margins, recovering artifacts from the topsoil and features, and reconstructing paleo-environment through pollen, floral and faunal analyses, and comparative data. The site is interpreted within a cultural ecological framework using paleo-environmental and physiographic data. As well, this report examines some of the assumptions associated with the Late Archaic, such as the littoral/inland, summer/winter, macro/microband dichotomies. Artifact and environmental analyses indicate a correlation between Small Point site location and microenvironment exploitation. A microenvironment-oriented subsistence model is postulated for all of the Late Archaic.

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Many people have helped me to complete this document; unfortunately, if I named everyone the list would be longer than the thesis. I would like to thank; the Fletcher family for their help and patience and for allowing me to test and later excavate on their property; all those people who helped during the initial testing and the following year's excavation, especially the crew of Dale Mark, Julie Galbraith, Kerry Randall, Ron Ross and Andrew Calverly, for your time and hard work; the Ontario Heritage Foundation for supporting this research through research grant ARG-434; and my fellow students at McMaster for their suggestions and support, and for making the whole process interesting. Also, many thanks to my thesis committee of Dr. Peter Ramsden and Dr. Laura Finsten of McMaster University, and Dr. Chris Ellis of the University of Waterloo, whose helpful criticisms and brutal editing improved this manuscript.

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Finally, I would like to extend a wet raspberry to Mr. Wenzel, my grade 11 guidance counsellor, for suggesting I quit high school and apply for a job with Bell Canada.

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CHAPTER 1
INTRODUCTION

This thesis discusses the excavation and analysis of the Thistle Hill site (AhGx-226), a southern Ontario Late Archaic Small Point inland occupation, and interprets results within the archaeological framework of southern Ontario. This discussion will also examine some of the existing premises associated with the Small Point Archaic and the Late Archaic in general.

The occupants of Small Point Late Archaic sites, as archaeologically defined, lived in south-central Ontario circa 3500 to 2900 B.P. It is postulated that these hunters and gatherers were adapted to a littoral/inland, summer/winter settlement pattern, utilizing the lakeshores to fish during summer and moving inland to hunt in winter (Ellis, Kenyon, and Spence n.d.). This postulated seasonal pattern is based in part on Late Archaic occupations in Michigan (eg. Taggart 1967, Fitting 1975) and on archaeological investigations in the Inverhuron area of Lake Huron (W. Kenyon 1959, Wright 1972, Ramsden 1976). It should be noted however that at the Rocky Ridge site in Inverhuron Park, Ramsden (1976: 45) postulated year-round settlement and subsistence oriented towards the lake-edge environment, not a seasonal adaptation to the shoreline. Subsequent research into the Late Archaic has utilized the concept of a warm season littoral adaptation, and consequently inland sites have been interpreted as their cold-season counterparts (eg. Lennox 1986; Muller 1988, 1989; Ellis, Kenyon, and Spence n.d.). Implicit in this hypothesis are micro-macroband seasonal encampments (eg. Spence 1986; Lennox 1986; Spence and Fox 1986; Muller 1988, 1989) in which winter hunting groups or micro-bands are composed of nuclear or extended family units, and warm season macro-band encampments were multi-family camps located along lakeshores (Ellis, Kenyon and Spence n.d.).

Objectives

In this thesis I describe the excavation and analysis of material recovered at Thistle Hill, including two Late Archaic house floor features and an external pit. The objectives of the project include: 1. refining the Late Archaic culture history of south-central Ontario, 2. examining the modern local environment, 3. reconstructing paleo-environment using floral, faunal, and pollen analyses from Thistle Hill and paleo-pollen diagrams, and 4. postulating how the paleo-environment might have related to tool utilization. I also examine some assumptions associated with the Small Point or Transitional Late Archaic of southern Ontario, specifically the littoral/inland, summer/winter, micro/macroband dichotomy. I have used a cultural-ecology theoretical framework that focuses on resource seasonality and the seasonal scheduling required of nomadic hunters and gatherers.

Theory

This project applies a cultural ecology theoretical framework within the paleo-environmental system which "...focuses on the contribution of ecological adaptation processes to the variability in foraging or social behaviour" (Smith and Winterhalder 1981: 1). Unlike some other researchers (eg. Keene 1981a, 1981b; Winterhalder and Smith 1981), I have not attempted to apply mathematical formulae to the Archaic as these models may not be applicable to the southern Ontario Late Archaic. Existing formulae depend on precise floral and faunal analyses which are generally not available for southern Ontario; without which the mathematical analyses can only be considered speculation (eg. Keene 1981a). It also cannot be assumed that southern Ontario sites duplicate the environmental conditions for which the formula were derived. Instead, I am simply deriving a settlement, subsistence, and seasonality hypothesis based on available archaeological evidence within the context of the southern Ontario Carolinian and Transitional biotic provinces.

Implicit in this discussion are the ideas of seasonality and resource scheduling. The model used here assumes that people will occupy the most easily accessible and productive environment by locating themselves in areas where subsistence needs are met with the least amount of effort (Winterhalder and Smith 1981). This model uses a concept of resource utilization or optimization similar to that discussed by Jochim (1976, 1983) in that people must choose between available resources. The optimization model stresses adaptive behaviour and assumes that selection operates consistently, that subsistence and need decisions are based on how best to attain the most productive results, and that selection will favour energy efficiency (Jochim 1983: 163). This suggests that the most reliable resource will be utilized, although "...people normally seek to attain several simultaneous goals in their behaviour" (Jochim 1983: 160). Therefore, sites should be located where a choice in resources is available; people would choose or schedule site location to best obtain results. The scheduling of resources among hunters and gatherers is evident from historic sources in the Great Lakes (eg. Fitting 1971) and from ethnographic (eg. Lee and DeVore 1968) and ethno-archaeological studies (eg. Binford 1980). As an archaeological tool, the concept of scheduling has been applied to the Archaic in Michigan (eg. Lovis 1986) and the American Midwest (eg. Yerkes 1986; Emerson, McElrath, and Williams 1986).

Also relevant to the model developed in this thesis is Cleland's Focal-Diffuse model (1966, 1976). Cleland holds that the Late Archaic people of the Great Lakes region followed a diffuse subsistence strategy through the careful scheduling of a wide range of exploitable resources, and by ensuring that alternate resources were available. "As a result, diffuse adaptation may appear only in areas of high ecological diversity" (Cleland 1976: 64, emphasis in original). This subsistence strategy implies a complete knowledge of an area and of where the most abundant resources are available. Again, Late Archaic site location should represent the maximization of subsistence options which would, without concentrating on one resource, provide a flexible and adaptable subsistence base. If one resource was not available, others could be utilized without a shift in adaptation or location.

The Site

My interest in the Thistle Hill site originated when Mr. Don Fletcher showed me a collection containing over 200 artifacts including projectile points, bifaces, and drills from his family farm. Projectile point types covered a range from Archaic Brewerton and Innes to Late Woodland Madison and Levanna points. All the artifacts had been recovered from a 20 acre field adjacent to a tributary of the Twenty Mile Creek. A brief survey in the spring of 1987 revealed at least 10 discrete occupations, all of which consist of flake scatters and tool fragments. No ceramics were evident. The largest and most dense flake scatter was designated the Thistle Hill site. The density and high frequency of artifacts attested to the research potential of Thistle Hill, and it was decided to test the site.

Location

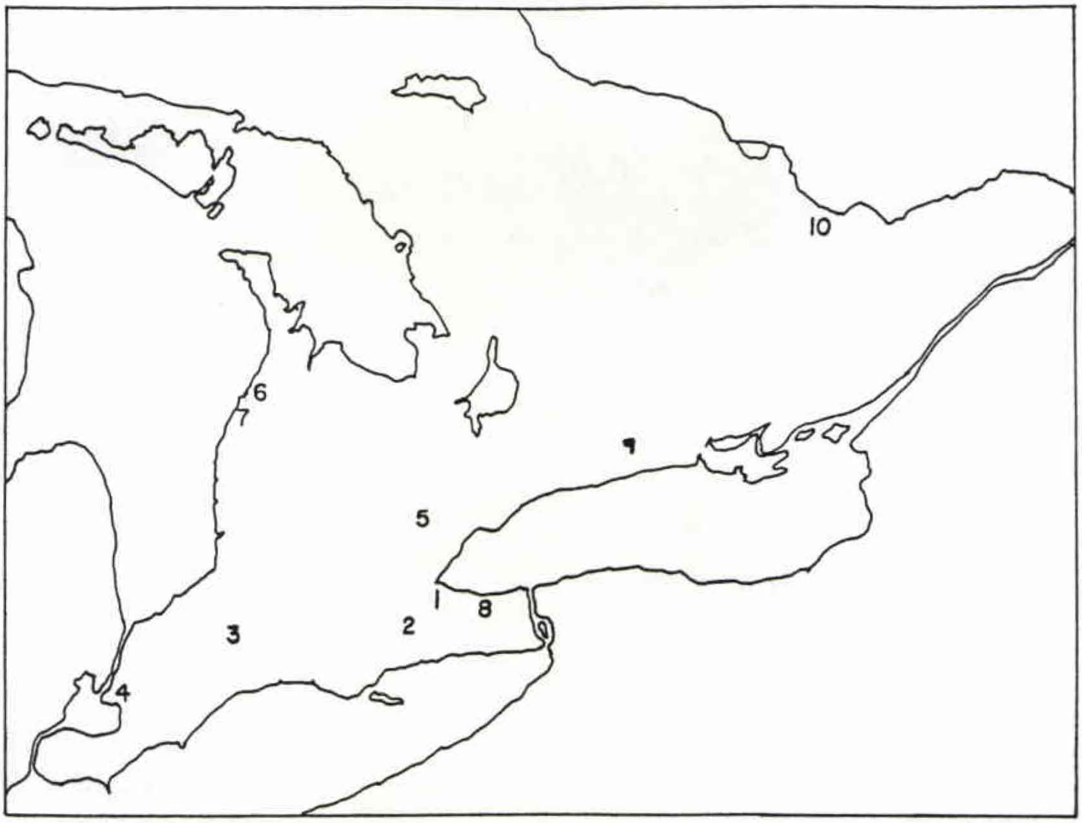
Thistle Hill is located in south-central Ontario, approximately 2 kilometres south of Hamilton, Regional Municipality of Hamilton-Wentworth (figure 1). It is near the community of Glanford Corners on the farm of Peter and Gaye Fletcher.

Physiography

The site is on the Niagara Escarpment and the Haldimand Clay Plain (Chapman and Putnam 1973) on a flat, loamy terrace thirty-three metres west of a first order tributary which leads to the Twenty Mile Creek (figure 2). Plate 1 is an air-photo in which the site is the square, unplanted area near the centre. The tributary is evident at the field edge along the bottom and right hand side of the photo. A narrow band of land on either side of the Twenty Mile Creek and the tributary has been designated wetland environment lost before 1967 (Wetland Mapping Series 1985). Low hills surround the site, as shown in Plate 2; the excavation is in the centre of the photo.

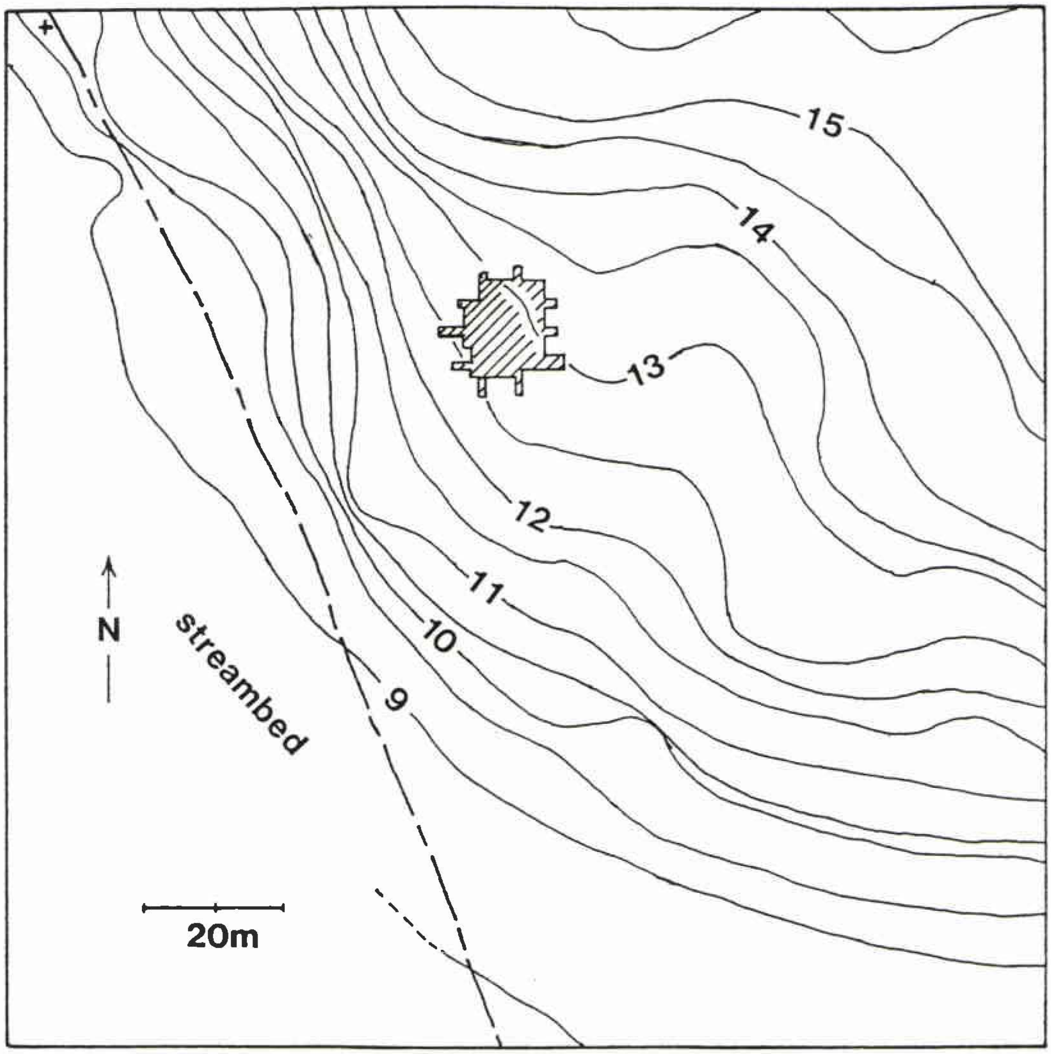
Thistle Hill is near both the Niagara and Onondaga escarpments. The Lockport formation of the Niagara Escarpment contains chert outcrops of Goat Island or Ancaster chert (McCann 1987:17), and Onondaga chert is found in secondary deposits noth of the Lake Erie shoreline, located about 30 miles to the south (W. Fox 1988: personal communication).

Figure 1
Location of Thistle Hill and Other Archaic Sites Mentioned in the Text



1. Thistle Hill
2. Innes (Lennox 1986)
3. Welke-Tonkonoh (Muller 1988, 1989)
4. Crawford Knoll (I. Kenyon 1980b)
5. Winter (Ramsden 1989)
6. Inverhuron (W. Kenyon 1959) and Rocky Ridge (Ramsden 1976).
7. Knechtel (Wright 1972)
8. Bell (ASI 1985)
9. McIntyre (Johnston 1984)
10. Morrison's Island-6 and Allumette-1 (Kennedy 1967)

Figure 2



Thistle Hill

Topographic Map

0.5m Contour Lines

+· Datum

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Environment

The Hamilton area is part of the transitional zone between the Canadian and Carolinian biotic provinces (MacDonald 1987) characterized by a mixture of hardwood and softwood trees, and best thought of as a westward extension of the St. Lawrence Lowlands (McCann 1987:13). Local tree distributions are controlled by physical and biological factors such as micro-climate, hydrology, soil characteristics, competition from other plants, and animal activities (MacDonald 1987:68). Three types of microenvironments are evident today: wet lowlands, dry uplands, and mesic or intermediate zones, each containing different tree species (MacDonald 1987: 68). Ash, willow, cotton wood, mulberry, and hackberry are the dominant tree species inhabiting the wet lowlands. The dry uplands are predominated by oaks; and the mesic area contains species from both the wet and dry environments, as well as maples, walnuts, black cherry and others (MacDonald 1987: 68). All three of these environmental zones are present near Thistle Hill (evident in Plates 1 and 2).

Micro-environmental differences are also found throughout the area. The regional "...climate is far from uniform, varying from place to place and from year to year..." (Bunting 1987: 51). The Mount Hope weather office, located near the site, reports average temperatures 1-2^{0} C cooler than downtown Hamilton 6 miles to the north (Rouse and Burghart 1987). Soil differences are found throughout the Hamilton region with moisture content varying with soil type (Bunting 1987). These small scale environmental differences suggest floral differences throughout the Hamilton region.

These soil, climate, and vegetation differences contribute to what Wiens (1976) calls a "patchy environment". Forest growth is not uniform within any environmental zone. Areas within the forest are continuously transformed as new plant species intrude into an area with the death and rebirth of plant life. Animals adapt to these specific environments within the forest, and therefore, there is not a uniform animal distribution throughout (Wiens 1976). A forest is not a uniform or homogeneous mixture of plants and animals. It contains a wide range of life forms which grow and live in distinct environmental zones within the forest, each having adapted to a specific econiche or microenvironment.

Paleo-environment

The concept of microenvironments can also be extrapolated to the paleo-environment of 3500 years ago. As well, the richest concentration of environmental zones would be located adjacent to rivers, streams or creeks.

Based on the influx of hardwood pollen, paleo-pollen diagrams show that the Transitional Zone between the modern Carolinian and Canadian Biotic Provinces covered southern Ontario by approximately 6000 years B.P. (Bennett 1987; McAndrews 1981) and has remained fairly stable ever since (McAndrews 1981). Recent climatic research suggests that the environment during the Late Archaic period was similar to our modern environment (Bennett 1987; Fritz, Morgan, Eicher and McAndrews 1987; McAndrews 1981), although moister and approximately 2^{0} C warmer (Edwards and Fritz 1988: 1405). Marl (authigenic calcium carbonate) deposition indicates small-scale regional climatic variations through time attributed to shifting air mass boundaries, short-term variability in the moisture regime, and post-Hypsithermal cooling over the last 1000 years (Edwards and Fritz 1988: 1403, 1405-1406). This suggests that the modern environment is similar but not identical to that of the Late Archaic period.

Paleo-pollen percentage diagrams taken from lake cores at various locales throughout southern Ontario indicate the variability of tree species and frequency (eg. Bennett 1987; McAndrews 1981). Bennett discusses the development of the southern Ontario Holocene forest as a stable environment, which, based on climate, soil conditions, and plant history forms a "mosaic of forest communities" (Bennett 1987: 1799). An examination of pollen percentage diagrams (eg. Bennett 1987: 1797; McAndrews 1981) indicates that the forest was not a static environment. Species location within the Carolinian and Transitional biotic provinces would gradually shift, implying a slowly changing southern Ontario environment during the Late Archaic Period. The hills surrounding streams and creeks, such as where Thistle Hill is located, would represent a series of microenvironments containing an assortment of plant and animal species.

Hams Lake (Bennett 1987: 1793), located 4 km north of Paris, is the closest pollen percentage diagram to Thistle Hill. It shows that during the Late Archaic (c. 3500 y.a.) the forest was dominated by (ranked by pollen frequency): Quercus (oak), Fagus (beech), Acer (maple) with a lesser amount of Ulmus (elm), and also contained small quantities of Fraxinus (ash), Pinus (pine), Carya (hickory), Betula (birch), Ostrya (ironwood) and Tsuga (hemlock)(Bennett 1987: figure 4). This paleo-environmental reconstruction is considered representative of Thistle Hill during the Late Archaic. Similar species and quantities are reflected in the modern pollen composition (McAndrews 1981: 322) and these trees are still found in the vicinity of Thistle Hill today, indicating a Late Archaic environment rich in forest resources.

This discussion has shown that the southern Ontario paleo-environment during the Late Archaic period was similar to the modern environment. Also, it indicates that a rich but diverse series of microenvironments were found near Thistle Hill in which Late Archaic people could have subsisted.

CHAPTER 2
FIELD METHODS AND RESULTS

This chapter discusses the excavation of Thistle Hill (AhGx-226), which focused on defining the size and perimeter of the site, recovering artifacts from the topsoil and features, recovering information about Late Archaic features and their construction, and obtaining paleo-environmental information from pollen analysis, and floral and faunal remains.

The Site

When found, the site consisted of a circular surface scatter, 11.5 m in diameter, of approximately 1000 flakes from which 2 point fragments, 2 biface preforms and 1 preform fragment were collected. A dark humic stain encompassed the site in August 1987, probably due to humic material in the topsoil. The surface artifact density and the topsoil stain signified its importance and the need for excavation.

Ploughzone Excavation Methods

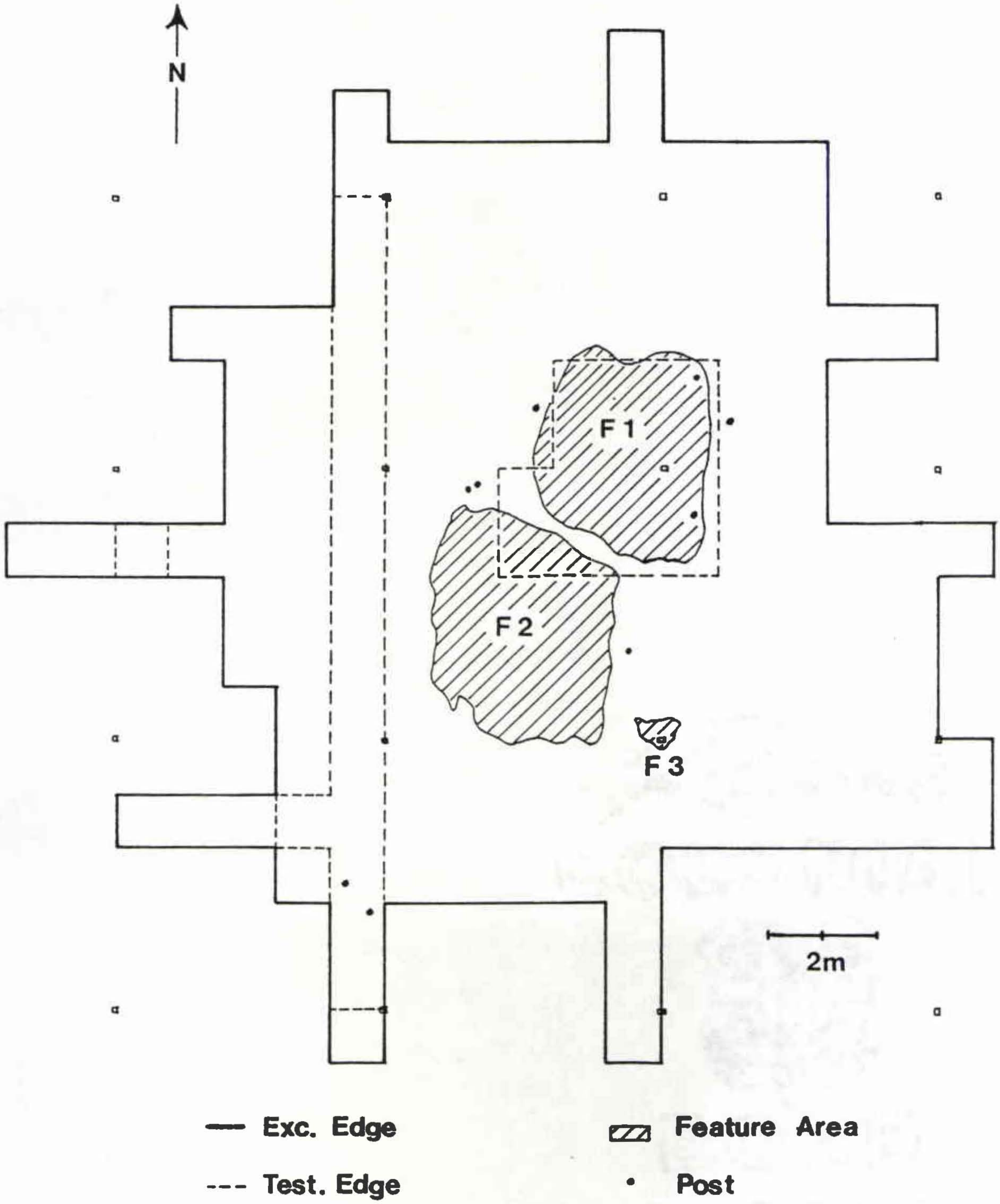
Thistle Hill was initially tested from late summer to early fall of 1987. A 15 m by 1 m north-south transect was excavated through the centre of the surface scatter. The unit in the north-south transect with the most flakes was chosen as the line for an east-west 1 m transect. The first unit in the east-west transect uncovered the east edge of feature 1, therefore further testing concentrated on exposing it. Fourteen 1 m squares forming an L-shape were excavated in this area and revealed most of feature 1 and the edge of feature 2. The dotted line in Figure 3 outlines the north-south transect and the area excavated to expose features 1 and 2. Because there was no time to excavate, the features were covered for winter by a plastic sheet with holes punched through. Backfill was then shoveled onto the plastic, protecting the features through winter. The holes in the plastic sheet allowed water to pass through but kept the backfill from contacting the features. A total of 31 topsoil units were excavated during testing.

The features found during testing and the density of topsoil artifacts made further excavation imperative. Excavations concentrated on exposing and excavating the features found while testing, locating other features and post moulds, and delineating site boundaries. This was conducted from June to August 1988 for a total of 35 days, resulting in the excavation of 175 one m squares and the exposure and excavation of three subsoil features.

During both testing and excavation 1 m^2 topsoil units were shoveled through 1/4" wire mesh screen to recover artifacts. To determine how representative this sample was, a 25 cm square topsoil sample from unit 507-54 was water screened through a 1/16" mesh. It was determined that only more retouch flakes would be recovered using a smaller mesh screen. Because the topsoil contains a substantial amount of clay a smaller screen would also have slowed excavation.

When excavating 1 m^2 topsoil units, the lower portion of each unit was carefully shoveled and the bottom 2 cm trowelled so as to locate but not disturb subsoil features. When the topsoil was completely removed, the subsoil was moistened with a hand sprayer, re-trowelled and carefully examined for cultural features.

Figure 3



A total of 175 one metre square ploughzone units were excavated (figure 3). Topsoil depth ranged from 22 cm in the north of the site to 28 cm in the south, with an average depth was 25 cm above the features. Since the features and most of the artifacts were located in one area, it was decided that concentrating excavations in the centre of the site would return the most information for the time and effort spent. Transects located the site perimeter, which were arbitrarily halted when less than 20 flakes or debitage per unit were recovered.

As delineated by these methods, Thistle Hill is approximately 20 m north-south and 18 m east-west (figure 3) with an estimated area of 335 m^2. Approximately 160 one m^2 remain unexcavated because time restraints made it impossible to completely excavate the site.

Ploughzone excavations exposed three features: features 1 and 2 are large oval/circular humic stains approximately 4 metres in diameter, and feature 3 is smaller with dimensions of 70 by 45 cm (figure 3). Plate 3 shows the 2 large features prior to excavation.

Soil at Thistle Hill is clay loam. The very hot and dry conditions during the 1988 excavation (with rain only on the last weekend) made the topsoil very hard and difficult to screen. There was a distinct difference between the moisture of the topsoil directly above and that outside of features. When topsoil units only partially covered subsoil features, the feature edge was indicated by a distinct line of moister soil.

Many units above the features were excavated in arbitrary 5 cm levels to determine where in the topsoil artifacts were concentrated. In total, 14 of the 24 units directly above features were excavated in 5 cm levels; for comparative purposes 15 units partially covering features and 26 units outside of features were also excavated in this manner. Results indicate that the majority of artifacts above features were located in the bottom 2 levels (10 cm or less) of the topsoil (mean = 49.86%) with fewer in the top 2 levels or 10 cm (mean = 34.78%). For units partially covering or outside of features there is a lower percentage of artifacts in the bottom 2 levels (mean = 39.57% and 41.92% respectively) with the majority in the top 10 cm (mean =

48.78% and 52.32% respectively). The 10 to 15 cm level contained a fairly even quantity of flakes above and outside of features.

All cultural material was bagged according to 1 m^2 units, and by 5 cm or feature level where applicable.

Subsoil Feature Excavation

Since stratigraphic layers were not evident, features 1 and 2 were excavated by trowel in arbitrary 2 cm levels. The two large features were excavated using the same 1 m^2 grid and numbering system employed for topsoil excavation. During excavation, each level within each unit was mapped and recorded on standard level forms. Each 2 cm level was designated by a letter to distinguish it from topsoil level excavations. For example, level A is 0-2 cm in depth, level B is 2-4 cm deep, C is the 4-6 cm level, etc. Soil samples were taken from most units. In features 1 and 2, units were excavated in a checker-board pattern and profiles drawn at 1 metre intervals in both north-south and east-west directions (Plate 4). Plate 5 is an example of a profile from feature 1. Feature 3 was sectioned in an east-west direction and profiled. Artifacts were bagged by level and quadrant of 1 m squares. Units were trowelled until neither feature material nor flakes were discernible.

All material from features was floated to recover floral and faunal remains. Floatation was carried out in the field by pouring feature soil into a bucket with a 1/8" screen in the bottom, in a wash tub of water. Soil was agitated by hand and by shaking the bucket. All floating material in the bucket was skimmed with a tea strainer and dried on newspaper for lab sorting. As well, all material caught in the bucket screen was dried and sorted.

Subsoil Features (fig. 3)

Plough scars were evident in features 1 and 2, but not in feature 3.

Feature 1:

This is an oval stain 4.00 m by 3.15 m (figure 4), which is slightly larger than originally reported (Woodley 1987, 1988a, 1988b), and has an indistinct edge. It is 2 to 4 cm deep and contains an internal pit (sub-feature 1a) near the south edge. Sub-feature 1a (figure 4) is 1.2 by 0.75 m and 0.12 m deep, and was not evident from the feature surface (level A) and therefore was dug beneath the feature.

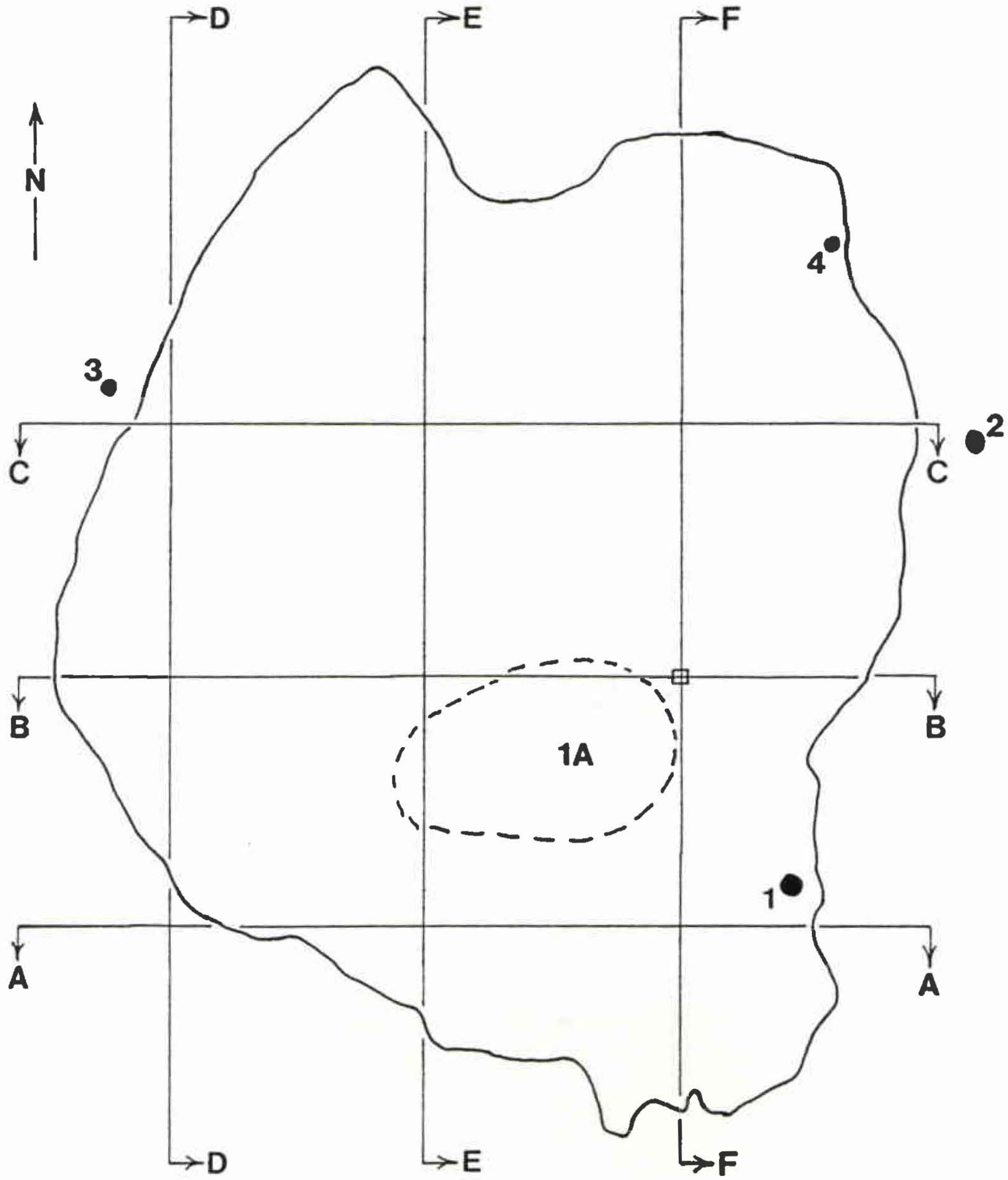
The feature is composed of mottled dark brown humic material intermixed with small amounts of subsoil clay. As it was excavated more deeply, the feature matrix became more mottled. Profiles (figures 5 and 6) indicate a large, shallow, irregularly shaped feature with a thin humic layer tapering towards the edges.

A quantity of flakes were found throughout feature 1, including a major flake concentration found above subfeature 1a (throughout levels A and B). Within-feature artifact distributions are discussed in Chapter 3.

In the north-east corner of feature 1 orange coloured subsoil and light grey ash patches were located. A root-burn in this area makes it difficult to determine whether this represents a hearth. A second root-burn was located in the north-west corner of the feature.

Four post-moulds were associated with feature 1 (figure 4): two outside its perimeter and two inside the eastern edge. The posts inside the feature (1 and 4) were not evident until Level B (2-4 cm) was exposed and therefore were beneath the feature. One external post is within 10 cm of the western edge (post 3) and the other is 29 cm from the east (post 2). All posts were vertical.

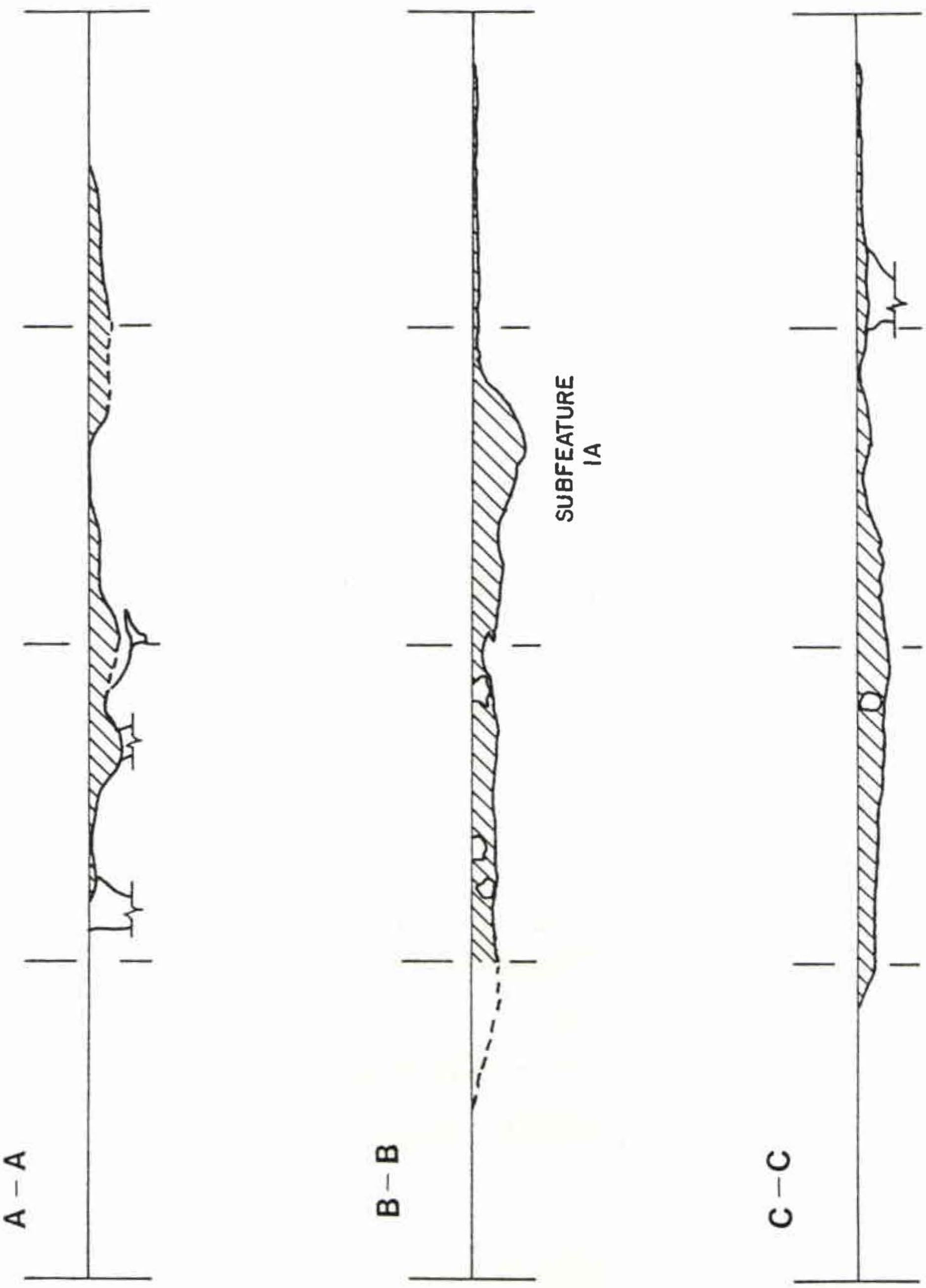
Figure 4



Feature 1

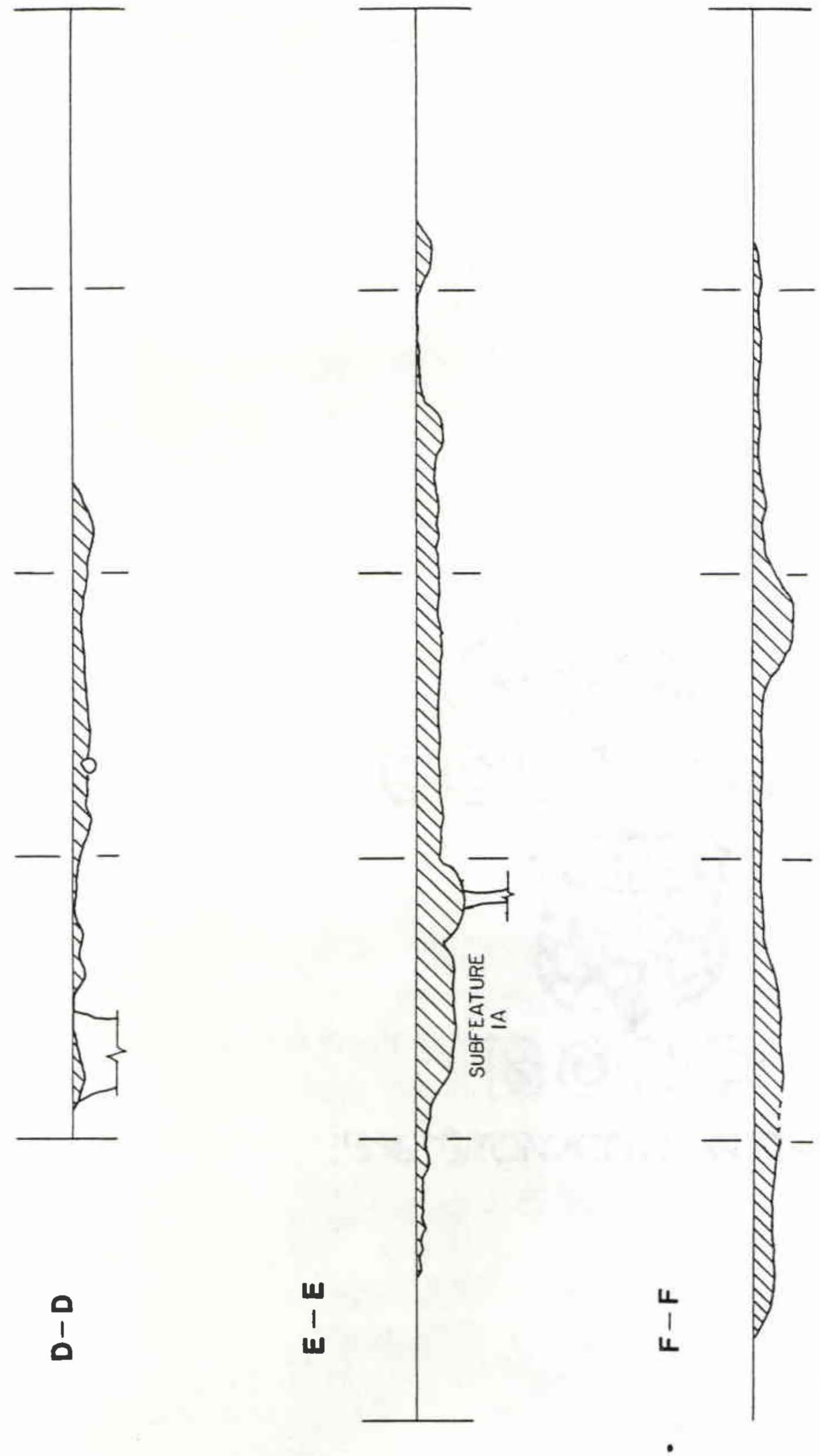
● Post

Figure 5



Feature 1; West – East Profiles

Figure 6



Feature 1; South – North Profiles

Post locations by unit, depths and sizes are:

Post	Unit	Diameter	Depth	Bottom
1.	509-60	10 cm	8 cm	pointed
2.	510-61	7 cm	8 cm	pointed
3.	511-57	9 cm	8 cm	pointed
4.	511-60	8 cm	8 cm	pointed

Feature 1 is interpreted as the remains of a house floor. It is an almost perfect 4 metre oval, contains an internal pit (sub-feature 1a) and possibly a hearth, and has four post moulds associated with it. The post mould location suggests a size only slightly larger than the feature. As will be shown, feature 2 is almost identical in size and shape to feature 1 and contains a hearth and also an internal pit. The average depth of topsoil above the features is 25 cm and therefore, when built, house 1 would have been approximately 29 cm deep with sub-feature 1a dug to 37 cm.

It is possible, although unlikely, that these features are tree falls. If so, why would tree falls occur only in the centre of a site and not elsewhere? Why would a tree fall be 4 metres in diameter but consistently only 4 cm deep with a maximum depth of 12 centimetres? Nor would both features, if tree falls, contain similar flake distributions. Also, why would tree falls have post moulds near their perimeter? These features are not tree falls, nor are they from recent disturbance. Recent activity would have been discerned during excavation, and any prehistoric disturbance would have been indicated by intrusive artifacts.

Feature 2:

This feature is slightly larger than feature 1 with a thinner and less distinct humic layer (2-3 cm). Its dimensions are 4.30 m by 3.22 m (figure 7). The western edge of the feature is very thin and almost straight, indicating that topsoil units were excavated too deep and part of the feature missed. A circular hearth (sub-feature 2a) 65 cm in diameter and 6 cm deep, consisting of orange subsoil and grey ash lenses or pockets (figure 10), was found near the west edge of feature 2. An internal storage pit (sub-feature 2b), measuring 100 by 75 cm and 12 cm deep, was found 60 cm northeast of the hearth near the northern feature edge. Again, this feature was only visible after excavating layer A and therefore was dug beneath the feature. A projectile point was recovered directly above it in level A.

Profiles (figures 8 and 9) indicate a thin occupation of varying depth. The contents, matrix and profiles are similar to feature 1. Sub-feature 2b's matrix was dark brown, loamy material containing few flakes.

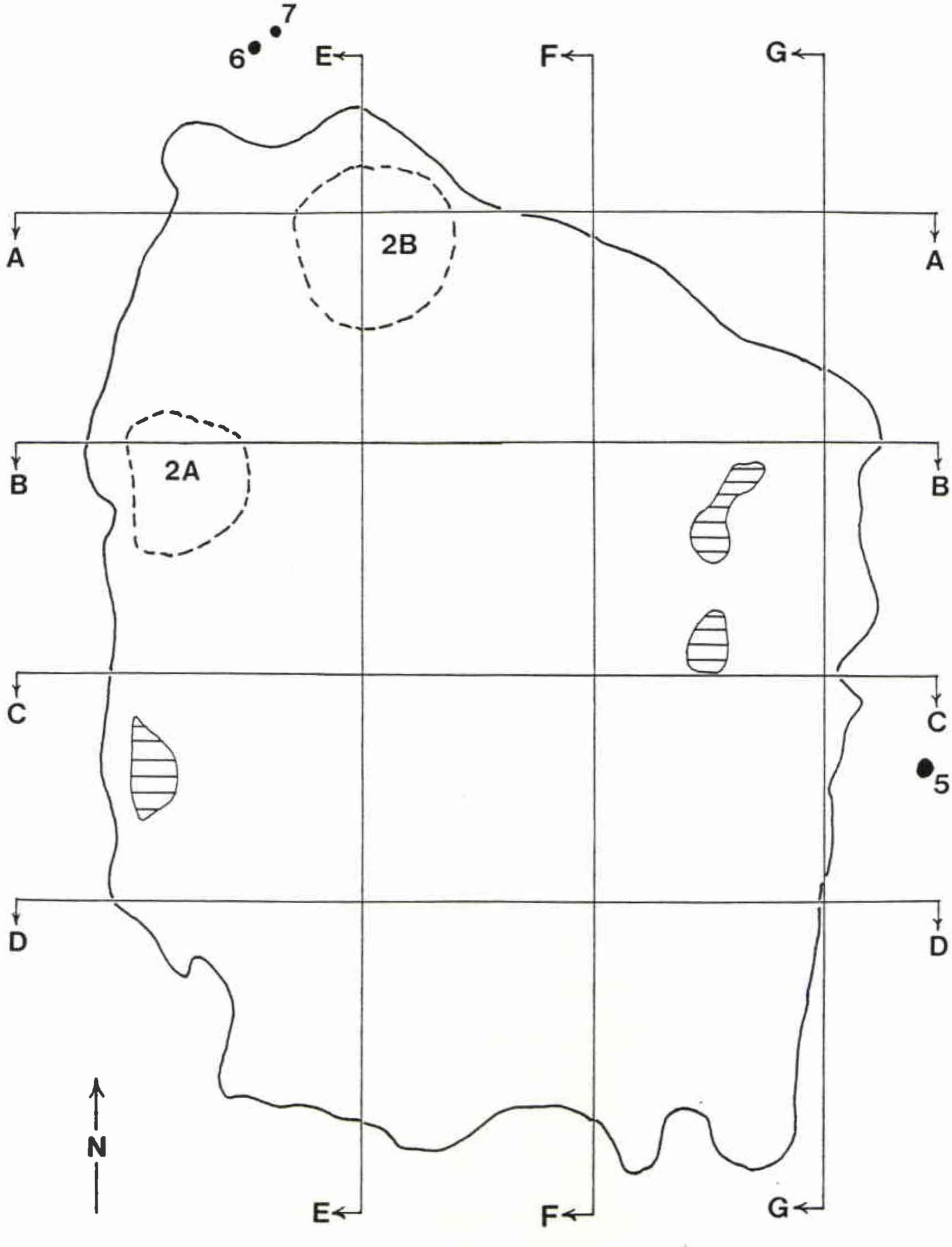
Three post moulds were associated with feature 2 (figure 7), one 30 cm from the eastern edge and two 35 cm to the northeast. Unlike feature 1, all three posts were found outside of the feature. All were oriented vertically. Their location, depth and diameter are:

Post	Unit	Diameter	Depth	Bottom
1.	506-59	7 cm	8 cm	pointed
2.	509-56	7 cm	5 cm	pointed
3.	509-56	5 cm	5.5 cm	pointed

These post-moulds are slightly smaller in diameter and shallower than those associated with feature 1.

Feature 2 is also identified as a house floor. It's size, shape and the proximity of post-moulds is similar to feature 1, indicating a similar construction. Feature 2 also contains a hearth and internal pit, and a similar quantity of artifacts. This house would have averaged 28 cm deep with feature 2b dug inside the house to a depth of 37 cm. The corresponding characteristics of features 1 and 2 are evidence against the possibility of their association by natural or random factors.

Figure 7



Feature 2

Subsoil   Post

Figure 8

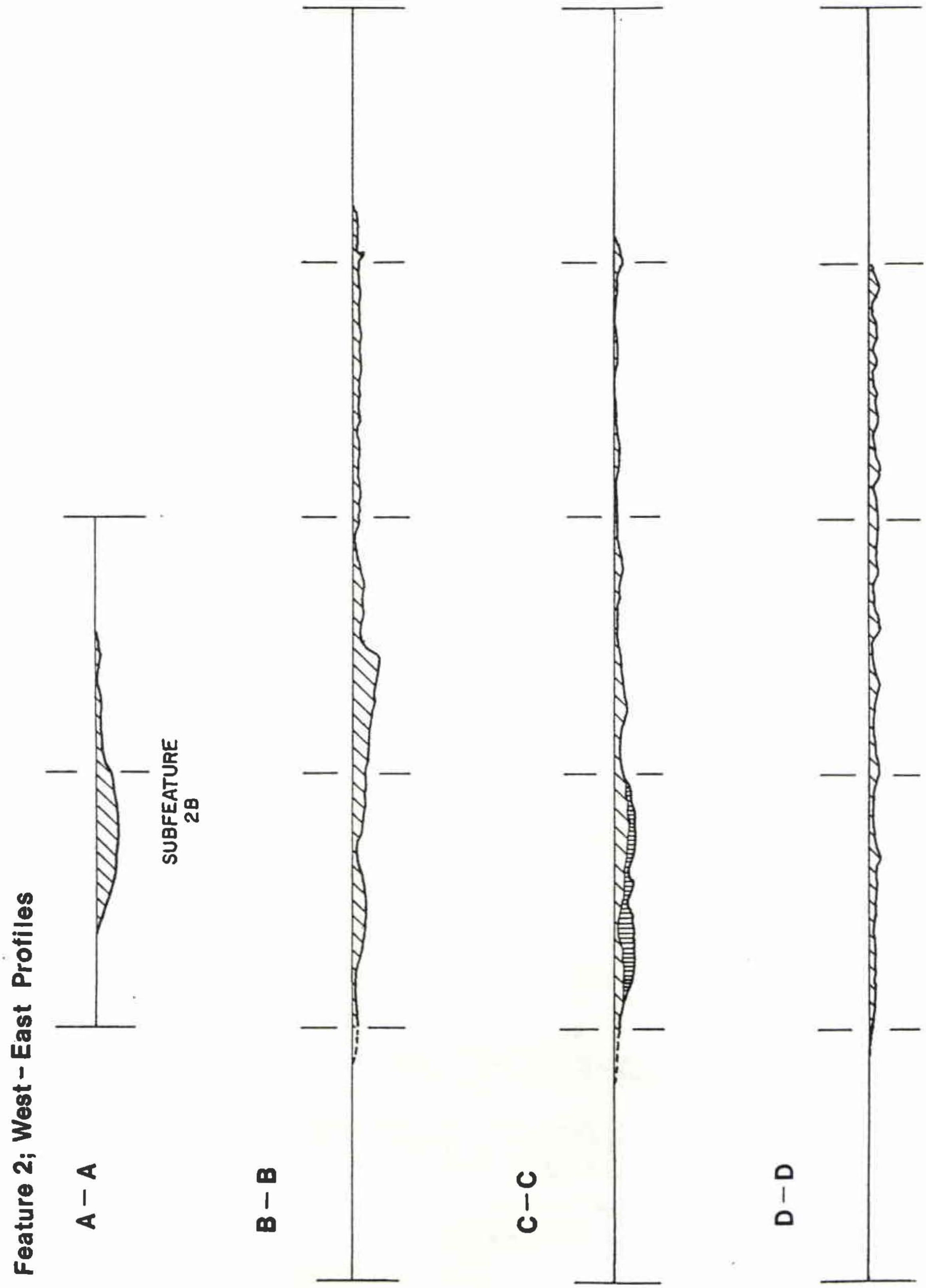


Figure 9

Feature 2; North – South Profiles

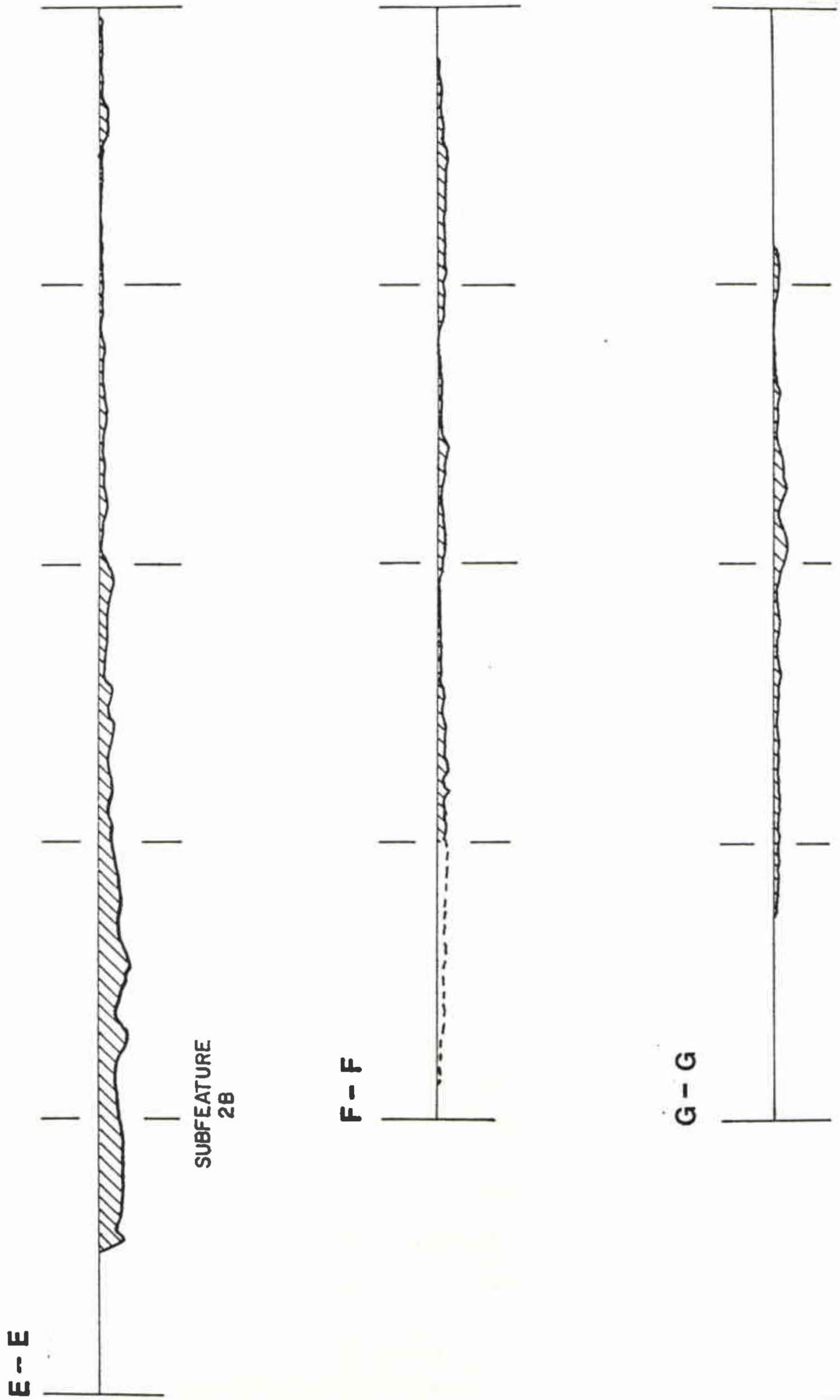
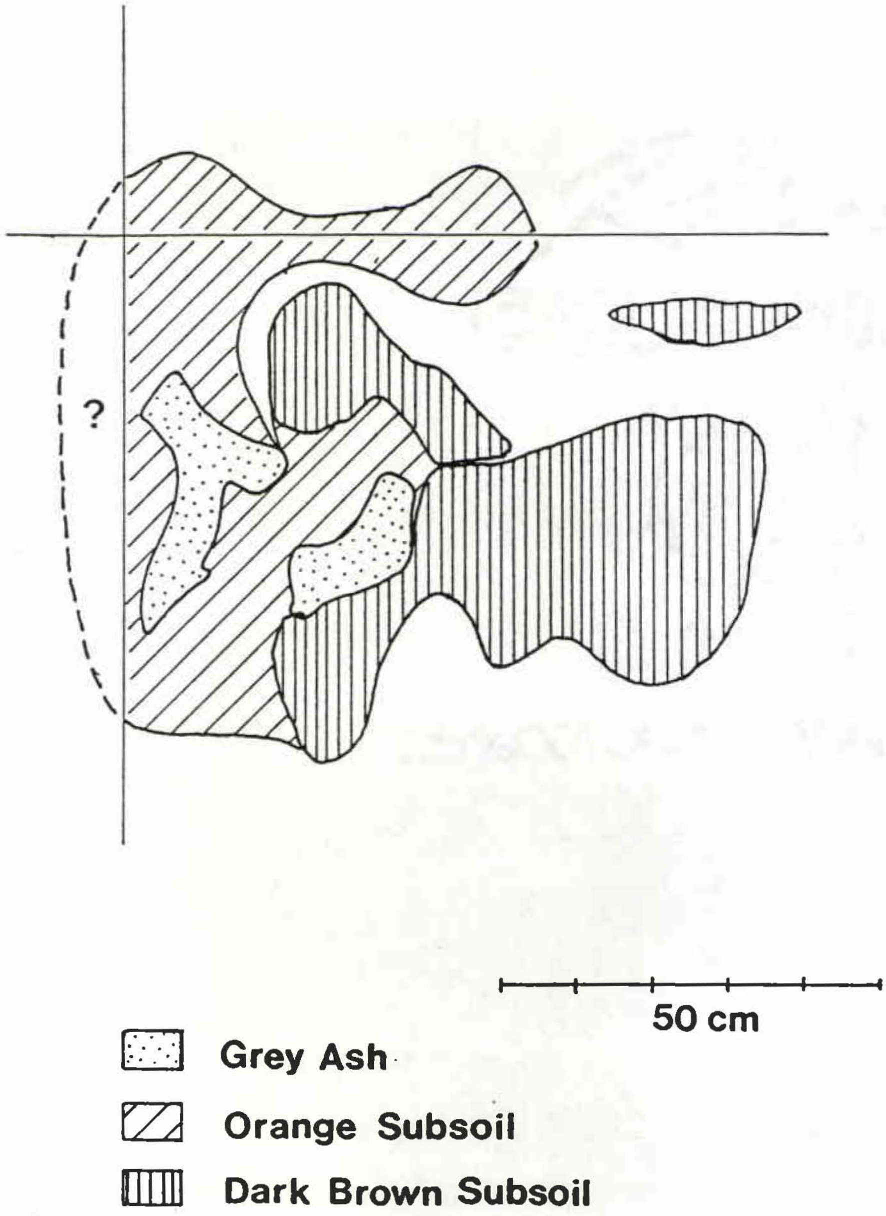


Figure 10

Hearth

Subfeature 2A



Feature 3:

Feature 3 was indistinct and found only after wetting the subsoil and carefully trowelling its surface. This feature was 80 cm east of the southern edge of feature 2 (figure 3). It has an irregular shape 67 by 45 cm in diameter with a basin shaped profile 8 cm deep (figure 11). The matrix consists of three layers (figure 12). Level one is mottled grey-brown loam; level 2 is brown humic material containing mottled grey and light brown clay; and level three, consisting of yellow-brown clay with mottled brown and grey patches, is only slightly darker than the surrounding subsoil matrix. Feature 3 contained floral material and nine large Ancaster chert flakes in level one.

Feature 3 is an external pit, possibly for storage, associated with the houses.

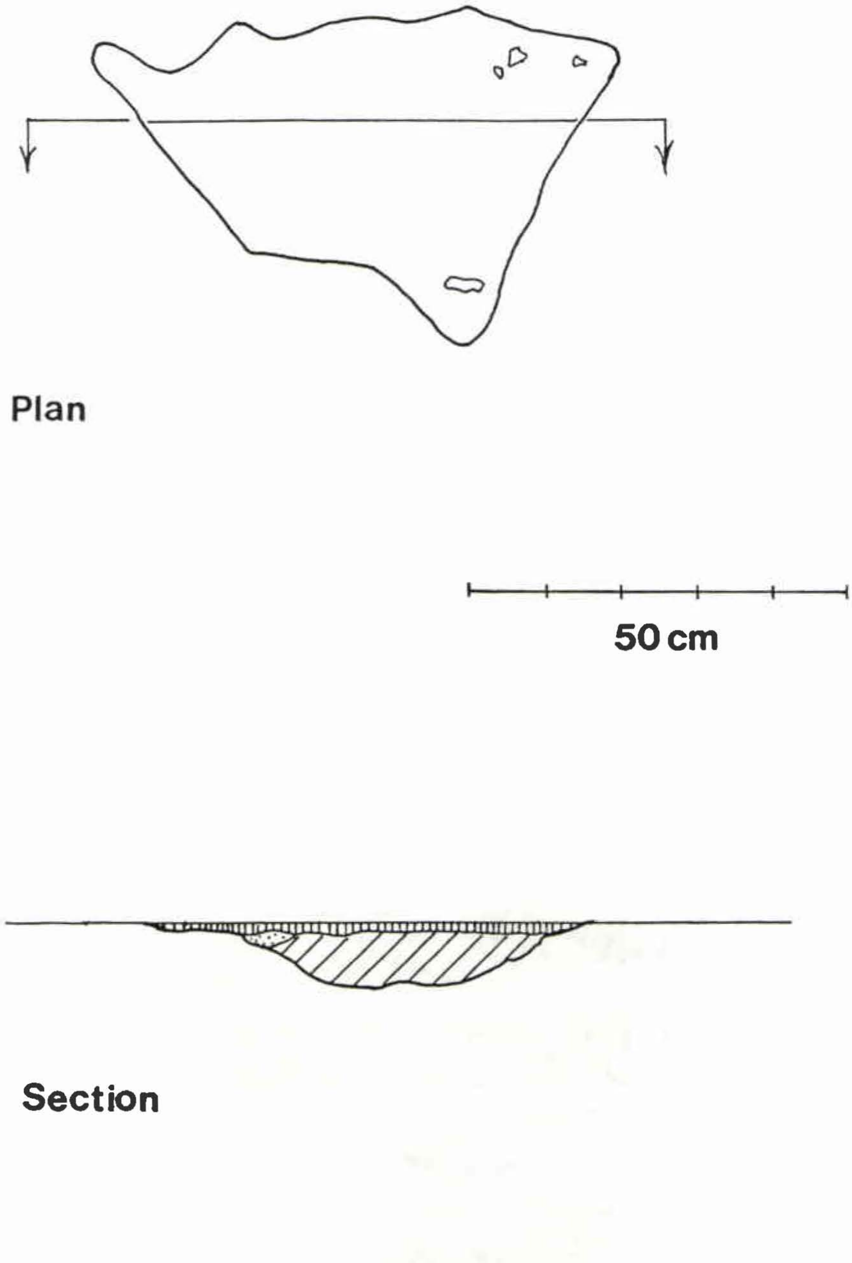
Extraneous Post Moulds

Two post-moulds were found in the southern part of the excavated area (figure 3), not closely associated with the house floor features. Post location by unit, depth and diameter are:

Post	Unit	Diameter	Depth	Bottom
1.	501-54	12 cm	16 cm	pointed
2.	502-54	6 cm	20 cm	pointed

These posts are much deeper than those associated with the features.

Figure 11



Feature 3

Pollen Analysis

Two soil samples, one from each of features 1 and 2, were submitted to Dr. J. McAndrews, Royal Ontario Museum, for pollen analysis. Results indicate that although some pollen remains, its significance is questionable. The majority of identifiable pollen (>85%) is pine, which, based on swamp coring in south-central Ontario, should be only 5% of recovered pollen. It is suggested that pine pollen remained because of differential decomposition, not because it was the main floral component at the site. Spores were also found in the samples which "reflect the ground flora of a mixed forest" and Sphagnum moss spores suggest a local bog (McAndrews 1989).

Floral Analysis

Carbonized plant remains recovered by floatation were analyzed by Dr. Irene Ockendon, Biology, McMaster University. Whether the floral remains are remnants of the Late Archaic occupation is questionable because both carbonized and uncarbonized material are present in the floatation samples. The uncarbonized floral material is present because of root and plough intrusions, or the natural progression of seed dormancy and storage. Research has shown that seeds and wood can carbonize in the ground, without being exposed to fire (Ockendon 1989). Pine charcoal from what appear to be different time periods was evident in the floral material (Ockendon 1989), some of which was used for radiocarbon dating. As the problems dating the site indicate (see below), it was difficult to determine which fragments belong to the Late Archaic occupation.

Faunal Analysis

Possible faunal remains were examined by Dr. David Black, McMaster University. No faunal material was present (Black 1989). The Haldimand Clay Plain has fairly acidic soil (Bunting 1987: 49) and Thistle Hill soil samples had a mean pH of 6.92, which is detrimental to faunal preservation.

Radiocarbon Dating

Radiocarbon dating Thistle Hill has proven difficult due to the problems of acidic soil and intrusive material. Five charcoal samples, two from each of the large features and one from feature 3, were run on the Tandem Accelerator at McMaster University and produced dates, from earliest to latest, of 7995+-100 B.P., 3440+- 75 B.P., 230 B.P., 210 B.P., and 120 B.P. respectively. The four charcoal samples from features 1 and 2 were from intrusive pine root fragments (Ockendon, personal communication, 1989), which accounts for the recent dates. The 7995+-100 B.P. date from feature 2 is inexplicable, although it suggests that not all intrusive material is necessarily recent.

The date of 3440+-75 B.P. returned from a fragment of maple charcoal from the relatively undisturbed feature 3 is accepted as representative of the site and of the features. This is the only date that fits within the Late Archaic time period, and with dates from other sites in Ontario with similar artifact assemblages (see Chapter 5).

CHAPTER 3
ARTIFACT ANALYSIS

In this chapter, I examine and analyse artifacts recovered during excavation. Artifact distributions are examined to determine within-site use-areas and temporal differences between use-areas and features. Artifacts from Mr. Don Fletcher's collection have not been used because they are without provenience.

Artifacts are classed as bifaces, unifaces, retouched flakes, cores, rough stone tools, and flakes. A total of 20,228 artifacts were recovered during excavation, including 479 tools. The vast majority is debitage (N = 19,749). The various tool types in each class are discussed in turn below. Tool frequencies are as follows:

Tool Type	N	% of Total
Points	17	3.5
Biface Preforms	34	7.1
Knife	1	0.2
Drill	4	0.8
Uniface	4	0.8
Utilized Flakes	374	78.2
Cores	34	7.1
Chopper	2	0.4
Grinding Stone	1	0.2
Pecking Tool	1	0.2
Worn Stone	1	0.2
Hammer Stone	6	1.3
Total	479	100%

In the following discussion, topsoil depths are presented in centimetres for those artifacts recorded by excavation level, eg. 10-15 is the 10 cm to 15 cm level from the topsoil surface. Feature levels are indicated by the feature number and a letter designation for each 2 cm level (as discussed in Chapter 2), eg. 2C means feature 2 at the 4 to 6 cm level. All measurements were taken using a Mitutoyo Dial Gauge Caliper accurate to 0.02 mm and are reported in millimetres.

Only complete measurements are provided. Artifacts were weighed on a Ohaus Triple Beam Balance; all weights are given in grams.

Unless stated otherwise, chert type is indicated by an A for Ancaster (a coarse, grainy, white chert), O for Onondaga (a finer quality chert which varies from dark to light grey in colour), C for Colbourne (a finer quality, light blue-grey chert), and U for Unknown/Other. Ancaster or Goat Island chert is found along the Niagara Escarpment and in secondary deposits in the Hamilton area (McCann 1987: 17; W. Fox, pers. comm. 1988). Onondaga chert is found in secondary deposits north of Lake Erie, and Colbourne Chert is found along the Onondaga Escarpment (W. Fox, pers. comm. 1988; C. Ellis, pers. comm. 1989).

Bifaces:

The biface category is divided into projectile points, Stage 1 and Stage 2 biface blanks, a knife fragment, and drill fragments.

i) Projectile points:

Of the seventeen projectile points and fragments recovered, nine are diagnostic. One diagnostic point fragment was found in each house feature. Eight non-diagnostic point tips were also found. The attributes for points (Table 3.1) are provided for comparative purposes.

Table 3.1
Point Attributes

1. Length (Lgth): maximum length, recorded to 0.0 mm.
2. Width (Wdth): maximum width, recorded to 0.0 mm.
3. Thickness (Thck): maximum thickness, generally measured at the shoulder.
4. Blade Length (Bld): maximum blade length, recorded to 0.0 mm.

5. Basal Width (Bs-Wdth): maximum width of base, recorded to 0.0 mm.

6. Neck Width (Nck-Wdth): minimum width of neck of stem, or distance minimum distance between notches, recorded to 0.0 mm.

7. Stem Length (Stm-Lgth): measured from shoulder to base, recorded to 0.0 mm.

8. Material (Mtl):
   1) Ancaster
   2) Onondoga
   3) Colbourne
   4) Other/Unknown

9. Blade Shape (Bld-Shp):
   1) Straight
   2) Excurvate
   3) Incurvate
   4) Other/ Unknown

10. Base (Base):
   1) Stemmed
   2) Corner Notched
   3) Side Notched
   4) Other/Unknown

11. Basal Shape (Bsl-Shp):
   1) Concave
   2) Convex
   3) Straight
   4) Rounded
   5) Other/Unknown

12. Basal Finish (Bsl-Fnsh):
   1) Ground (Abraded)
   2) Chipped
   3) Polished
   4) Unknown/Other

13. Thermal Alteration (Thrml):
   1) Present
   2) Absent

Results are provided in Table 3.2.

Table 3.2
Point Attributes

Cat. No	Unit	Lvl	Lgth	Wdth	Thck	Bld	Bs-Wdth	Nck-Wdth	Stm-Lgth	Mtl
259	504-63		31.8	22.1	8.3	25.1	14.6	14.7	7.7	2
309	505-61		41.4	24.4	8.8	32.4	14.0	13.5	6.4	1
291	505-57	10-15	32.7	26.9	7.1	25.8	16.7	14.9	7.5	1
537	511-55		*	19.1	6.3	*	12.4	10.4	8.9	1
726	508-56	2A	*	24.3	7.4	*	16.0	9.9	11.3	1
4	Surf.		*	*	7.6	*	*	10.0	12.6	1
816	510-58	1A	*	21.2	*	*	13.2	9.4	11.3	1
27	509-58		*	*	6.5	*	16.9	10.8	12.1	1
509	510-55	15-20	*	*	5.4	*	15.7	10.8	*	2
Mean			35.3	23.0	7.17	27.8	14.94	11.6	9.72	
Std. Dev.			5.302	2.76	11.10	4.03	1.65	2.15	2.38	

Table 3.2, continued

CAT. NO.	Bld-Shp	Base	Bsl-Shp	Bsl-Fnsh	Thrml
259	2	1	1	1	2
309	2	1	3	1	2
291	2	1	3	1	2
537	2	1	3	1	1
4	2	1	2	1	2
726	1	1	2	3	1
816	1	1	2	3	1
27	*	1	2	2	2
509	*	1	2	2	2

* = Missing Measurement

Eight point tips were recovered; none mend with basal fragments. Thickness ranges from 5.0 mm to 7.0 mm, well within the range of the complete points and basal fragments measured. All tips have straight to excurvate blades and two were purposefully heat treated. None were resharpened. Attributes of these point tips are similar to those for the diagnostic points in Table 3.2 suggesting they are of the same type.

All of the diagnostic points (Plate 6), except for #259 (Plate 6: 3), are of the Innes point type (Lennox 1986). The following features of Innes points are also characteristic of most points at Thistle Hill: excurvate blades, expanding stems, purposeful heat treatment, basal grinding, and resharpening. The two points from features 1 and 2 (Plate 6: 1 and 2) have similar metrics and other attributes and both were purposefully heat treated to the same blue colour. One point (Plate 6: 3), although smaller, has characteristics similar to Late Archaic Adder Orchard points or Middle Woodland Steubenville Stemmed (C. Ellis, pers. comm. 1989).

Seven of the diagnostic points were of Ancaster chert and 2 of Onondaga. Of the seven point tips, six are of Ancaster and one is of Onondaga chert. In contrast, Onondaga chert dominates the point collection from the Innes site (Lennox 1986: 231). At Thistle Hill, only those points of Onondaga chert were carefully flaked; the finish of the Ancaster chert is fairly rough and without the same attention to detail.

ii) Biface Blanks:

Bifaces blanks are separated into Stage 1 (N = 14) and Stage 2 (N = 20), each representing a stage in the reduction sequence. The criteria used to determine Stage 1 and Stage 2 preforms are: Stage One biface blanks (Plate 7: 1-5, 7, 8) have large flakes removed to rough out the biface preform shape, but no bifacial thinning. A Stage 2 or point preform is produced by bifacially thinning a Stage 1 biface (Plate 7: 6; Plate 8). The third and final stage is accomplished by removing small flakes to finish the Stage 2 preform into a point (C. Ellis, pers. comm. 1988; Muller 1989: 10)). Stage 1 and 2 bifaces may have been used as tools before being reduced into points (Muller 1989: 10). Metrics for Stage 1 bifaces are provided in Table 3.3, and Stage 2 bifaces in Table 3.4. Four biface fragments, too small to designate as a type, were made of Onondaga chert.

Table 3.3
Stage 1 Bifaces

Cat. No.	Unit	Level	Lngth	Wdth	Thck	Mtrl
1	SURF. COLL.		49.4	25.3	10.7	A
5	SURF. COLL.		52.9	25.3	8.0	A
3	SURF. COLL.		*	27.8	11.1	A
227	504-56	10-15	40.7	27.0	8.4	A
266	504-64		38.5	26.8	10.3	A
265	508-60	1A	*	26.6	7.7	A
830	510-59	1A	*	*	7.7	0
999	510-54		*	28.9	10.8	A
262	504-64		*	23.3	11.8	A
237	504-58	10-15	31.9	25.0	9.1	A
32	511-58		*	37.4	10.3	A
1028	508-62		*	26.2	8.5	0
1030	509-56		*	22.1	8.7	0
922	514-61		*	22.6	9.8	0
MEAN			42.68	26.85	9.554	
STD. ERROR			8.474	3.764	1.397	

* = MISSING MEASUREMENT

Table 3.4
Stage 2 Bifaces

Cat. No.	Unit	Level	Lngth	Wdth	Thck	Mtrl
800	509-59	1C	47.2	31.6	7.2	C
501	510-53		*	24.5	7.2	A
762	508-59	1B	*	*	8.1	0
973	507-60	20-SUB	*	26.9	7.6	0
498	510-53		*	23.6	4.1[A]	0
990[B]	508-60		*	17.9	5.4[C]	0
705	507-57	2A	*	*	7.1	0
55	510-60		*	*	5.9	0
954	504-58	15-20	*	*	6.6	0
1013[B]	512-58	5-10	*	17.4	5.1	0
29	509-58		*	*	7.4	0
187	503-52		*	22.8	6.3	0
574	512-57	0-5	*	*	5.9	0
934	515-61		*	24.6	7.9	0
914	514-60		*	*	5.5	0
70	504-54		*	23.9	5.8	0
998	504-61	5-10	*	25.7	5.1	0
1020	509-57	2C	*	17.0	4.6	A
48	510-59		*	*	4.7	0

Table 3.4, continued

Cat. No.	Unit	Level	Lngth	Wdth	Thck	Mtrl
887	502-57		*	*	6.3	A
MEAN			*	23.35	6.21	
STD. DEV.			*	4.222	1.153	

* = MISSING MEASUREMENT
A - MEASUREMENT TAKEN BESIDE 'PIG'; PIG THICKNESS IS 13.5 MM.
B - ARTIFACT BROKEN ATTEMPTING TO THIN 'PIG'.
C- MEASUREMENT TAKEN BESIDE 'PIG'; PIG THICKNESS IS 11.5 MM.

Stage 1 biface length ranges from 31.9 to 52.9 mm. (Mean = 42.68), width from 22.1 to 28.9 mm (mean = 26.85), and thickness from 7.7 to 11.8 mm (mean = 9.554). Ten are of Ancaster chert and 4 are of Onondaga.

Stage 2 biface width ranges from 17.0 to 31.6 mm (mean = 23.35), and thickness from 4.1 to 8.1 mm (mean = 6.21). Only one stage 2 biface made of Colbourne chert was complete (Plate 7: 6). Three fragments are of Ancaster chert, and 14 are of Onondaga.

The mean and standard deviation of Stage 1 and 2 biface width and thickness show a high degree of within-category similarity, but also differ between categories. Stage 1 preforms are wider and thicker and have smaller standard deviations, indicating a difference in their position in the reduction sequence, and suggesting that there may be more standardization at this stage of manufacture. The greater standard deviation among stage 2 bifaces (point preforms) that suggests the size variation may indicate they are intended for a specific type of tool; for example, the longer preforms may be used for knives, while the shorter are used for points. In both categories, preforms of Ancaster chert seem to be wider and thicker than those of Onondaga chert, although an unpaired t-test shows the difference is not significant.

iii) Knife Fragment:

One biface (Plate 9: 5) is a knife fragment 21.1 mm wide and 7.5 mm thick made of Onondaga chert. Both lateral edges indicate fine flaking with light grinding on the rounded end. A slight concave area on one lateral edge suggests an alternate use as a spokeshave.

iv) Drill Fragments:

Four drill fragments were recovered. One is a slightly expanding base fragment (Onondaga chert) 11.8 mm wide x 7.1 mm thick with an ovoid cross-section (Plate 4: 4). Two drill tip fragments were recovered: one of Onondaga chert is 11.8 mm wide x 7.1 mm thick with an ovoid cross-section (Plate 9: 2); the other, of Ancaster chert, is 9.5 mm wide and 6.7 mm thick, and triangular in cross-section (Plate 9: 1). The remaining fragment is a drill preform of Onondaga chert (Plate 9: 3) 15.1 mm wide and 6.2 mm thick, broken at a 13.5 mm thick 'hinge island' or 'pig' perhaps due to a material flaw. Drill fragments similar to these have been found at the Innes and Knechtel sites.

Uniface:

Fragments of four Uniface tools were recovered. Metric data are reported in table 3.5.

Table 3.5
Uniface Metrics

Cat. No.	Unit	Length	Width	Thick	Material
265	504-64	34.4	29.6	10.3	A
437	508-52	*	25.2	7.6	0
942	500-59	*	*	9.9	C
264	504-64	*	*	*	0

* = Missing Measurement

Artifact 264 is badly potlidded. The size and condition of these fragments make identification as to type impossible.

Utilized Flakes:

This is the most abundant tool class recovered from Thistle Hill, consisting of 374 items. Categorizing flakes as retouched implies that a flaking tool was purposefully employed, therefore, to avoid this implication, only the term utilized is used. Utilized flakes were analyzed using flake type, flake shape, use-wear shape and wear location into 6 functional types. Twenty-two attributes were originally recorded for each utilized flake, but during analysis 15 were determined to be too subjective or repetitive. The 7 attributes used for analysis are listed in Table 3.6.

Table 3.6
Utilized Flake Attributes

1. Flake Length: maximum length, recorded to 0.0 mm.
   (All flake measurements are taken at the maximum point and recorded to 0.0 mm.)

2. Flake Width: maximum width, recorded to 0.0 mm.

3. Flake Thickness: maximum thickness, recorded to 0.0 mm.

4. Material (Fox 1988: pers. comm.):
   1) Ancaster
   2) Onondaga
   3) Colbourne
   4) Other/Unknown

5. Flake type: types are recorded in the rough order they would be removed in the reduction sequence.

   1) Shatter (Blocky waste material);

   2) Primary Decortication Flakes (the dorsal surface is completely covered by cortex);

   3) Secondary Decortication Flakes (only partially covered by cortex);

   4) Tertiary flakes (the large flakes removed to shape a core).

   5) Tertiary Biface Thinning Flake (the smaller flakes removed to make biface preforms or tools).

6) Secondary Retouch (the small flakes actually used to form and sharpen bifacial tools).

7) Unknown/Other

6. Length of Retouch on Flake Edge: measured in mm. and recorded to 0.1 mm.

7. Tool Type:

1) General: this is a catch-all category for retouched flakes which do not obviously belong to a specific tool type. Size, shape and flake type show considerable variation, as does location and use-wear shape (Plate 10: 5-6).

2) Spokeshave: these have a concave worked edge, possibly used to shape spear shafts (Plate 10: 1).

3) Blade flake: these are long, narrow flakes almost exclusively made from Tertiary flakes. The sides are generally parallel with very little ventral curvature but pronounced bulbs of percussion. These were probably used as knives. Plate 11 shows examples of blade flakes oriented with the striking platform to the top of the photo and facing the dorsal surface. These are what Wright (1972) called linear flakes and suggested they represent a horizon marker.

4) Graver: these have a pointed, worked edge, probably used to engrave or mark bone, wood, shell, or some other material (Plate 10: 2-4).

5) Distally Utilized or Scraper Flakes: all have highly curved ventral sides with expanding lateral edges. Utilization is almost exclusively on the distal end, which provides a very sharp angle and produces a sharp working edge which might have been used for scraping hides. Most are Tertiary flakes with large bulbs of percussion. Some are made from Tertiary-Biface thinning flakes, utilizing the flake curvature. Plate 12 provides examples of distally utilized flakes or Scraper flakes oriented with the striking platform at the top and facing the dorsal surface; the utilized edge is on the distal end.

6) Denticulate: by definition these are multi-pointed graving tools. Only one denticulate was found at Thistle Hill.

Statistical Comparisons:

All flakes were analysed using these attributes to determine statistical differences and similarities between types. The quantity of each functional type is reported in Table 3.7.

Table 3.7
Utilized Flake Frequency

Type	Topsoil	Features	Total	Percentage
General	152	28	180	48.13%
Spokeshave	41	3	44	11.76%
Blade	55	7	62	16.58%
Graver	21	5	26	6.95%
Scraper	58	3	61	16.31%
Denticulate	1	0	1	0.27%
TOTAL	328	46	374	100%

Statistical comparisons indicate differences between the utilized flake functional types. Table 3.8 contrasts tool type, using the designations above, and flake type. Percentages are given by row, and the frequency is provided beneath it in brackets.

Table 3.8
Tool Type vs. Flake Type

Tool	Shatter	Primary Decort.	Second. Decort.	Tert-iary	Biface Thinning	Second. Retouch	Un-known	Total
General	7.73 (14)	0.55 (1)	13.81 (25)	44.2 (80)	20.44 (37)	0.55 (1)	12.71 (23)	100% (181)
Spokeshave	2.38 (1)	2.38 (1)	14.29 (6)	47.62 (20)	26.19 (11)	0	7.14 (3)	100% (42)
Blade	0	0	16.13 (10)	77.42 (48)	4.84 (3)	0	1.61 (1)	100% (62)
Graver	7.69 (2)	0	7.69 (2)	50.0 (13)	19.23 (5)	0	15.38 (4)	100% (26)
Scraper	1.61 (1)	3.23 (2)	16.13 (10)	59.68 (37)	19.35 (12)	0	0	100% (62)
Total	4.38 (18)	1.07 (4)	14.21 (53)	53.08 (198)	18.23 (68)	0.27 (1)	8.31 (31)	100% (373)

There is obviously a preference for Tertiary Flakes (over 53%) when selecting flakes to be utilized. A chi-square test shows that the discrepancy between Tool Type and Flake type is significant to $P < 0.0001$. The preference for Tertiary flakes greatly exceeds their frequency from the debitage sample, which consist of 26.25%, 17.0% and 19.23% from the topsoil, feature

1, and feature 2 samples respectively. The Blade and Scraper flake categories consist almost entirely of Tertiary flakes, suggesting that both types were removed from prepared cores to maintain uniformity. The majority of General, Spokeshave and Graver tool types are made on Tertiary flakes, but with less consistency in flake type. Apparently it was less important to maintain uniform flake shape for tools of these functional types.

Table 3.9 contrasts retouched flake tool type with raw material. Percentages for each row and column are provided. Actual counts for each tool type are provided in brackets beneath the percentages.

Table 3.9
Tool Type vs. Material

Tool Type	Ancaster	Onondaga	Colbourne	Unknown	Total
General	16.57 (30)	81.22 (147)	1.1 (2)	1.1 (2)	100% (181)
Spokeshave	11.9 (5)	88.1 (37)	0	0	100% (42)
Blade	12.9 (8)	85.48 (53)	0	1.61 (1)	100% (62)
Graver	19.23 (5)	80.77 (21)	0	0	100% (26)
Scraper	20.97 (13)	79.03 (49)	0	0	100% (62)
Total	16.35 (61)	82.31 (307)	0.54 (2)	0.8 (3)	100% (373)

There is obviously a preference for Onondaga chert (>82%) for all retouched flake tool types, with only 16.35% of Ancaster chert. Using a chi-square test, the discrepancy between tool type and material is significant to $P < 0.0001$. Only 5 retouched flakes were made of Colbourne or of Unknown chert. Of the tools made of Ancaster chert, Scrapers have the highest percentage while Blades and Spokeshaves have the lowest; this may reflect a correlation between material and use.

Onondaga chert is of higher quality than Ancaster and therefore may hold a cutting edge longer (personal observation).

Mean and standard deviations for all Utilized flakes are: Length = 28.263 mm and S.D. = 8.956; Width = 20.42 mm and S.D. = 6.231; and Thickness = 5.357 mm and S.D. = 2.344. Table 3.10 provides the mean (in millimetres) for length, width, thickness and length of utilized area by tool type.

Table 3.10
Means of Utilized Flake Size and Area by Tool Type
(in millimetres)

Tool Type	Length	Width	Thickness	Utilized Edge
General	25.754	20.592	5.165	14.704
Spokeshave	26.607	19.953	4.676	12.107
Blade	38.704	17.452	5.944	23.331
Graver	24.629	20.530	5.454	17.435
Scraper	26.330	23.206	5.734	19.902

As shown, a difference in flake size is evident between tool categories. Blade flakes are long and narrow with long utilized edges. Scraper or Distally Utilized flakes are the widest with the second largest length of utilization.

The following scattergram (Figure 12) shows Tool type (1 = General; 2 = Spokeshave; 3 = Blade; 4 = Graver; 5 = Scraper) compared to a ratio of length to width. As shown, there is clustering of the length/width ratio within each functional type. A similar comparison of tool type with Length/Thickness (Figure 13) and Width/Thickness (Figure 14) also indicate within category clustering.

Figure 12
Tool Type vs. Length/Width

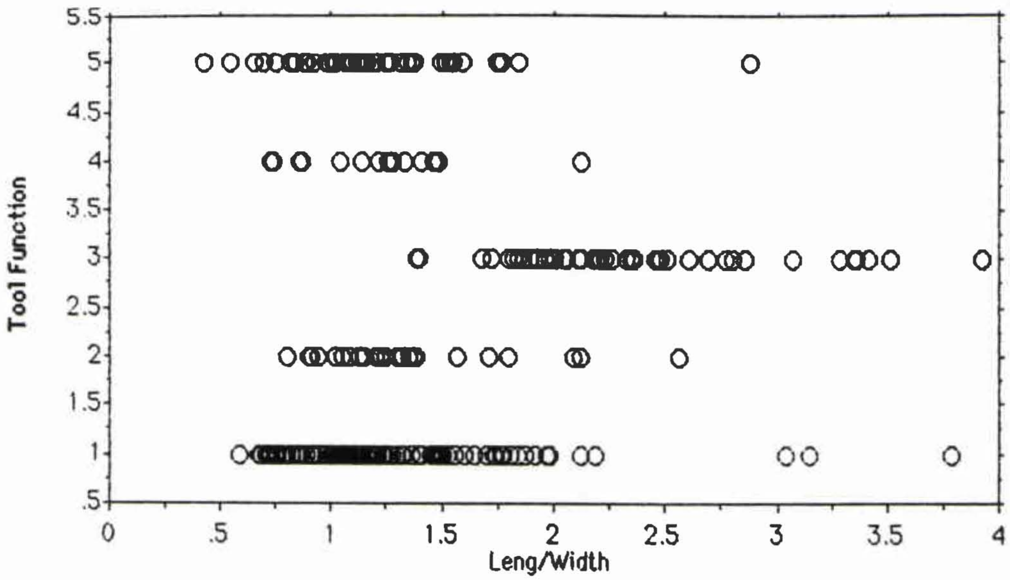


Figure 13
Tool Type vs. Length/Thickness

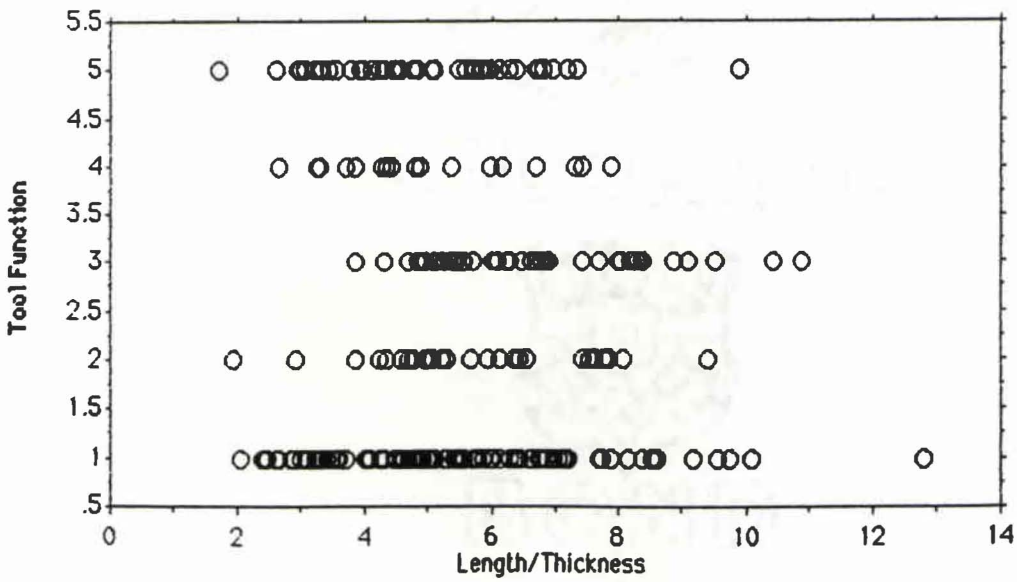


Figure 14
Tool Type vs. Width/Thickness

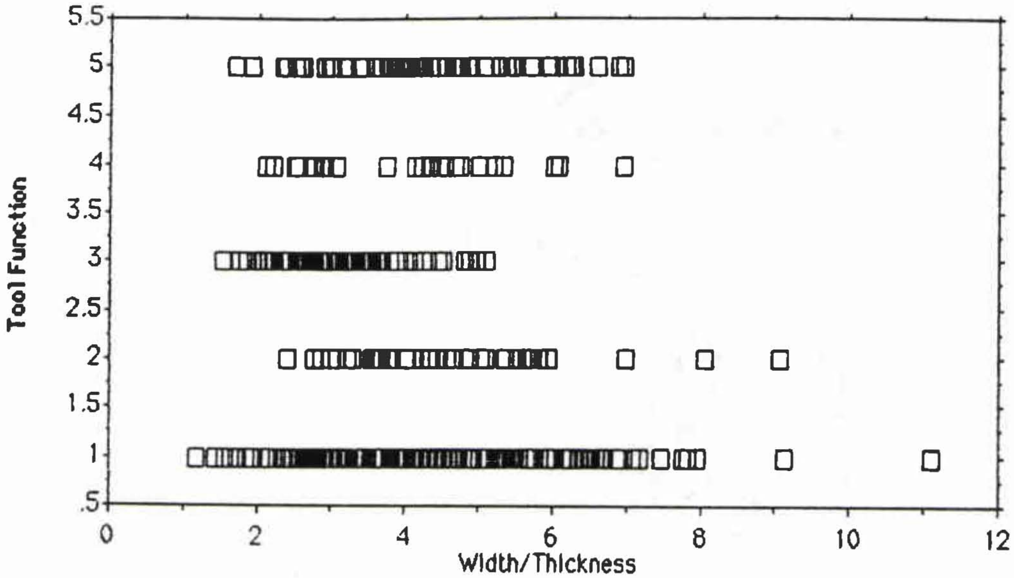


Figure 15
Tool Type vs. Length Utilized Edge

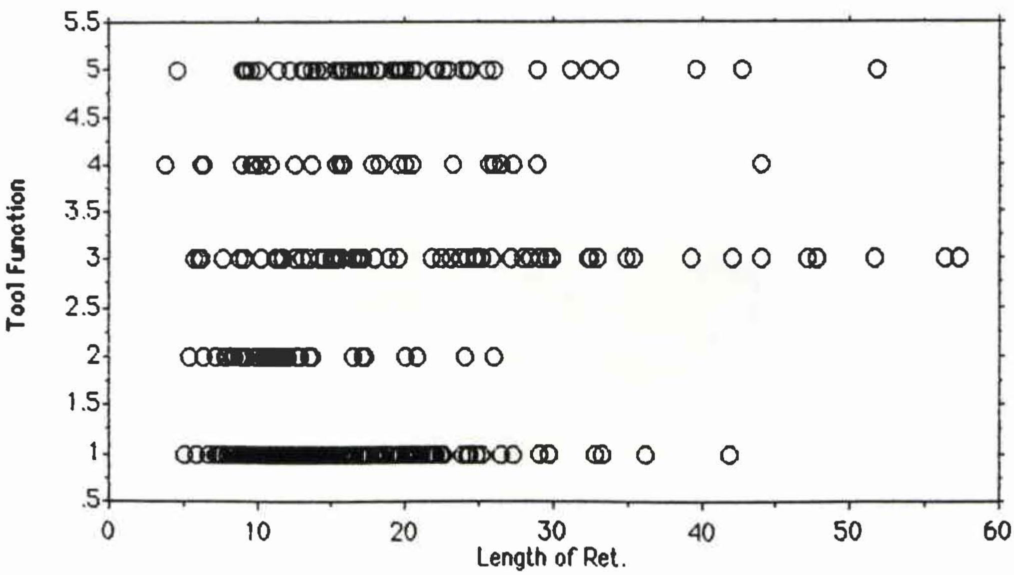


Figure 15 contrasts length of wear with tool function. The length of wear varies considerably among scraper, gravers and blade flakes, with the most consistency among spokeshaves.

Cores:

Of the 34 cores recovered during excavation, only four are whole. Two are bipolar cores, and the remainder are random cores. Complete measurements and unit locations are provided for all cores in Appendix Table A.1. The ratio of Onondaga chert (N=32) to Ancaster (N=2) cores is 16:1, which is lower but follows the same material use pattern as the biface preforms. No Colbourne or unknown chert cores were found. Twelve cores have cortex on at least one surface.

Rough Stone Tools:

Since the soils at Thistle Hill contain few rocks, all were examined for use-wear and eleven were identified as tools. Two are rough chopping tools with large flakes removed from one end to produce a sharp cutting edge. One is 112.4 mm long and weighs 724 grams with a 74.3 mm wide x 63.9 mm thick 'handle' (Plate 12). Scarring and striations on the cutting edge indicate use as a chopping tool. The other chopping tool is considerably smaller and lighter (59.1 mm long, 48.9 mm wide, and 30.2 mm thick, weighing 88.9 g). As shown in plate 12, these are only slightly modified rocks.

A large rock, 71.5 mm long, 91.2 mm wide, 69.0 mm thick and weighing 668 grams, is flattened and pecked on one end with the other end broken flat, suggesting use as a grinding stone. Another stone has one side pecked to form a flat surface with some evidence of grinding. Wear is restricted to a small hollow area on one side; its use is undetermined. A long, stone pecking tool (Plate 13), with dimensions of 101.3 mm long, 39.4 mm wide, and 22.3 mm thick, was recovered. The pointed end is rounded from extensive wear.

The remainder are hammerstones with slightly pitted or roughened use-wear on one or two end(s) probably caused by knapping chert. They differ from the rough stone tools described above because of the type and location of wear. These are unaltered stones used for a short time then discarded. The metric data for these are reported in Table A.2 in the Appendix.

Debitage

Debitage is the largest artifact category from Thistle Hill (n = 19,749). The term debitage is used to encompass all lithic debris (excluding cores) produced from tool manufacture. In total 15,956 pieces of chert debitage were recovered from the topsoil, 2077 from feature 1, 1707 from feature 2, and 9 from feature 3. To hasten analysis and yet recover all of the information possible, it was decided to sample the debitage. A random sample (with replacement) of 10% (n = 18) of the 175 excavated topsoil units was analyzed. Since feature units were excavated in 1 m^2 by 2 cm levels and by 50 cm quadrants, the southwest quadrant from each feature unit was selected as representative of each feature. As feature 3 contained only 9 flakes, all were analysed.

For each sample, the flakes were grouped into the seven categories used for utilized flakes: 1) Shatter (blocky waste material); 2) Primary Decortication Flakes (the initial removal of cortex from the chert block, therefore these are cortex flakes or flakes with cortex on the dorsal surface); 3) Secondary Decortication Flakes (flakes with the dorsal surface only partially covered with cortex); 4) Tertiary flakes (large primary flakes removed to shape or trim a core); 5) Tertiary Biface Thinning Flake (smaller flakes removed to shape preforms or tools); 6) Secondary Retouch (the small flakes removed when sharpening tools); and 7) Unknown/Other (flake fragments which could not be identified).

Topsoil flakes:

A total of 1383 flakes was examined from the 18 topsoil units, comprising 8.7% of the total flakes. Results are given in Table 3.11. Percentages are provided for the entire sample, rows, and columns. Percentages for the smaller quantities are not provided due to their small size, but they were used in calculations. Flake quantities are provided in the brackets beneath each percentage value.

Table 3.11
Topsoil Flake Sample

Flake Type:	Ancaster	Onondaga	Material Colbourne	Unknown	TOTAL
Shatter	3.26 (50)*	1.81 (25)	(1)	(0)	5.49% (76)
Primary Decort.	1.52 (21)	(3)	(0)	(0)	1.74% (24)
Secondary Decort.	1.30 (18)	5.28 (73)	(2)	(0)	6.72% (93)
Tertiary	4.77 (66)	21.19 (293)	(1)	(0)	26.25% (363)
Tertiary-Bif.Thin.	6.29 (87)	26.75 (370)	(4)	(4)	33.62% (465)
Secondary Retouch	1.01 (14)	8.03 (111)	(5)	(1)	9.74% (131)
Unknown	1.95 (27)	14.17 (196)	(7)	(1)	16.70% (231)
TOTAL	20.46% (283)	77.44% (1071)	1.45% (20)	0.65% (9)	100% (1383)

* Numbers in brackets are the quantity of flakes.

ii) Features:

Results of flake samples from feature 1 are provided in Table 3.12, feature 2 results are provided in Table 3.13.

Table 3.12
Feature 1 Flake Sample

Flake Type:	Ancaster	Onondaga	Material Colbourne	Unknown	TOTAL
Shatter	0.05 (3)*	2.03 (13)	(0)	0.16 (1)	2.65% (17)
Primary Decort.	(0)	(0)	(0)	(0)	0.00% (0)
Secondary Decort.	0.62 (4)	1.87 (12)	(0)	(0)	2.50% (16)
Tertiary	1.72 (11)	14.98 (96)	(0)	0.31 (2)	17.00% (109)
Tertiary-Bif.Thin.	2.34 (15)	29.64 (190)	(0)	0.31 (2)	32.29% (207)
Secondary Retouch	2.50 (14)	30.73 (197)	0.62 (4)	0.62 (4)	34.48% (221)
Unknown	0.16 (1)	10.45 (67)	0.16 (1)	0.32 (2)	11.08% (71)
TOTAL	7.80% (50)	89.70% (575)	0.78% (5)	1.72% (11)	100% (641)

* Numbers in brackets are the quantity of flakes.

Table 3.13
Feature 2 Flake Sample

Flake Type:	Ancaster	Onondaga	Material Colbourne	Unknown	TOTAL
Shatter	0.45 (2)*	1.31 (5)	(1)	(0)	1.58% (7)
Primary Decort.	0.45 (2)	(0)	(0)	(0)	0.45% (2)
Secondary Decort.	0.45 (2)	3.17 (14)	(0)	(0)	3.62% (16)
Tertiary	0.90 (66)	17.65 (293)	(0)	0.68 (3)	19.23% (85)
Tertiary-Bif.Thin.	1.36 (4)	25.53 (78)	(0)	0.23 (1)	25.11% (111)
Secondary Retouch	1.13 (5)	25.57 (113)	0.45 (2)	0.23 (1)	27.38% (121)

Table 3.13, continued:

Flake Type:	Ancaster	Onondaga	Material Colbourne	Unknown	TOTAL
Unknown	0.45 (2)	21.49 (95)	0.23 (1)	0.45 (2)	22.62% (100)
TOTAL	5.20% (23)	92.53% (409)	0.68% (3)	1.58% (7)	100% (442)

* Numbers in brackets are the quantity of flakes.

Due to excavation methods, there are much higher percentages of Secondary Retouch flakes in the feature samples than in the topsoil sample. As discussed in chapter 2, topsoil was shoveled through a 1/4" mesh screen while features were trowelled and the soil floated. This indicates that topsoil excavation methods bias results towards the larger flakes, and that the Secondary Retouch flake counts are smaller than the original deposition quantity.

iii) Feature 3:

Only nine flakes were recovered from feature 3, all of Ancaster chert. These include 8 primary decortication flakes, and 1 tertiary flake. The exclusive pattern of Ancaster chert affiliated with feature 3 is odd, considering the predominance of Onondaga throughout the site, but it may be due to the small quantity of flakes present.

iv) Within-Sample Flake Size (By Material):

Retouched flakes are mainly on tertiary or tertiary-biface thinning flakes. The length, width, and thickness of sampled whole tertiary and tertiary biface thinning flakes were coded for comparative purposes. These data are illustrated in Appendix Tables A.3 to A.6.

Because of the sample size, small quantities of whole flakes were excluded from the flake size aspect of analysis. These include: 3 Tertiary-Biface Thinning flakes of Colbourne chert from the topsoil sample; 1 Tertiary flake, and 4 Tertiary-Biface Thinning flakes of Ancaster chert from feature 1; 1 Tertiary flake and 3 Biface Thinning flakes of Ancaster chert from the feature 2 sample.

Results show differences between samples for both the Tertiary and Tertiary Biface Thinning Flakes. There are slight size or range variations for length and width of Tertiary and Tertiary-Biface Thinning flakes within and between features 1 and 2 and the topsoil samples. The reason for this discrepancy is unknown, but it may be because of the small sample sizes, therefore the data is provided only for descriptive purposes. Because of the small sample size, results of a significance test would also be questionable. Feature flake samples contained few whole Ancaster chert flakes. Only the topsoil sample contained sufficient quantity for analysis, described in Appendix Table A.4. As a comparison of Tables A.3 to A.6 indicates, there is a slight size difference between Ancaster and Onondaga chert flakes, but again, it might be because of the small samples of Ancaster chert.

Spatial Distribution of Artifacts

Figures 16 and 17 indicate topsoil distribution of debitage; figure 16 provides the recovered quantity per unit while figure 17 shows the coded density. Figure 18 shows the formal tool distribution, and Figure 19 the Utilized Flake distribution. Feature debitage quantity by 50 cm quadrants is Figure 16 provided in figure 20, while figure 21 illustrates the coded density. In figure 20, the features are outlined by dashed lines.

Overall flake density peaks in the core of the site but diminishes dramatically towards the site perimeter. Tools are scattered throughout the excavated area, with the highest density located above or near the features. As Figure 18 indicates, there are two tool clusters outside of the core area, one north of Feature 1, and the other south of Feature 2. A third scatter is possible near feature 3 west of stake 505-65. The majority of utilized flakes are located over the most dense within-feature flake scatters, but they are distributed fairly evenly throughout the remainder of the site. Within-feature debitage distribution shows flake density peaks within each feature, but it drops significantly near the feature edges. Since very few tools were recovered from the features, within-feature tool distributions are not included.

Figure 16

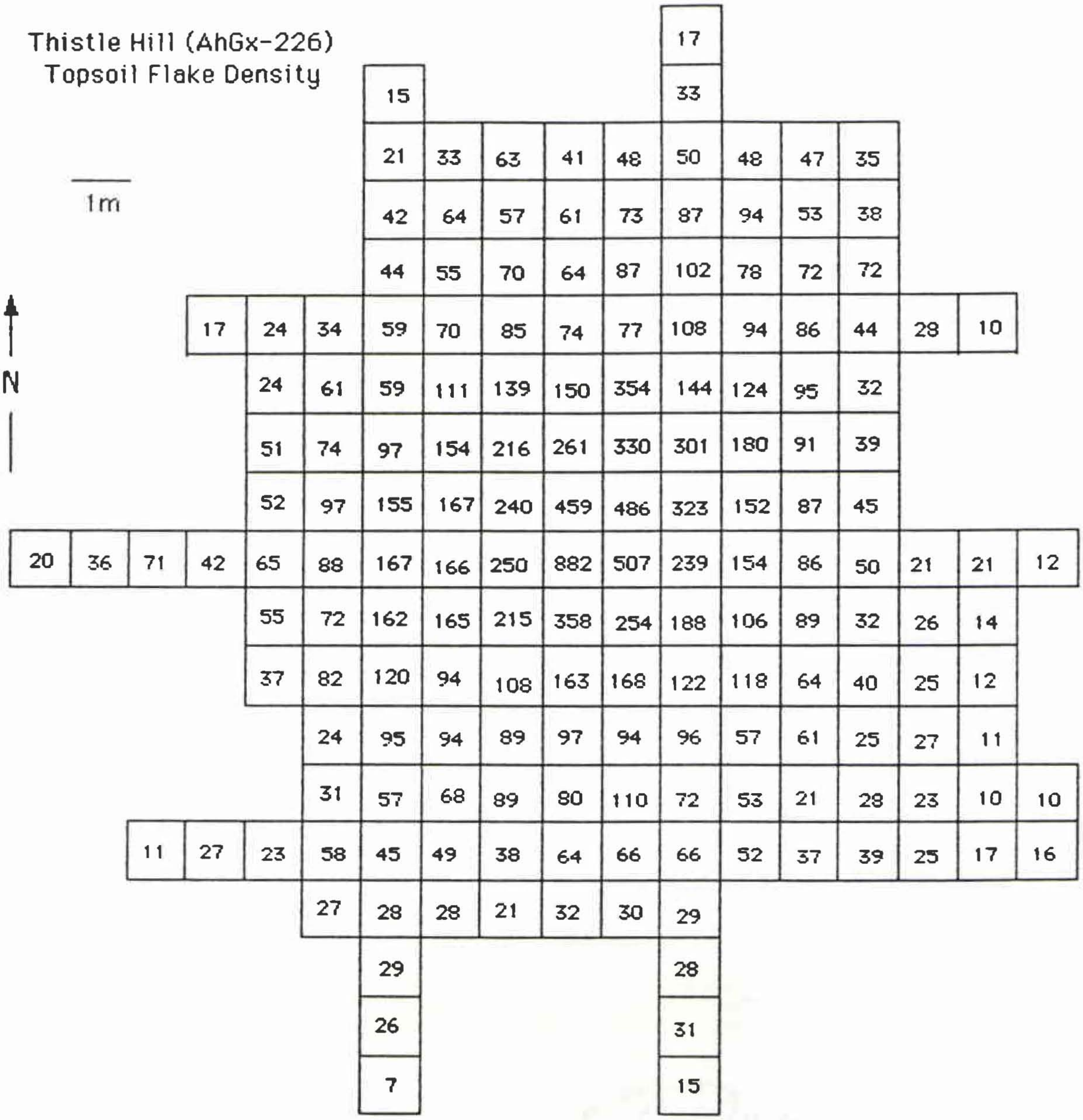

Thistle Hill (AhGx-226)
Topsoil Flake Density
1m
N
17
15 33
21 33 63 41 48 50 48 47 35
42 64 57 61 73 87 94 53 38
44 55 70 64 87 102 78 72 72
17 24 34 59 70 85 74 77 108 94 86 44 28 10
24 61 59 111 139 150 354 144 124 95 32
51 74 97 154 216 261 330 301 180 91 39
52 97 155 167 240 459 486 323 152 87 45
20 36 71 42 65 88 167 166 250 882 507 239 154 86 50 21 21 12
55 72 162 165 215 358 254 188 106 89 32 26 14
37 82 120 94 108 163 168 122 118 64 40 25 12
24 95 94 89 97 94 96 57 61 25 27 11
31 57 68 89 80 110 72 53 21 28 23 10 10
11 27 23 58 45 49 38 64 66 66 52 37 39 25 17 16
27 28 28 21 32 30 29
29 28
26 31
7 15

Figure 17

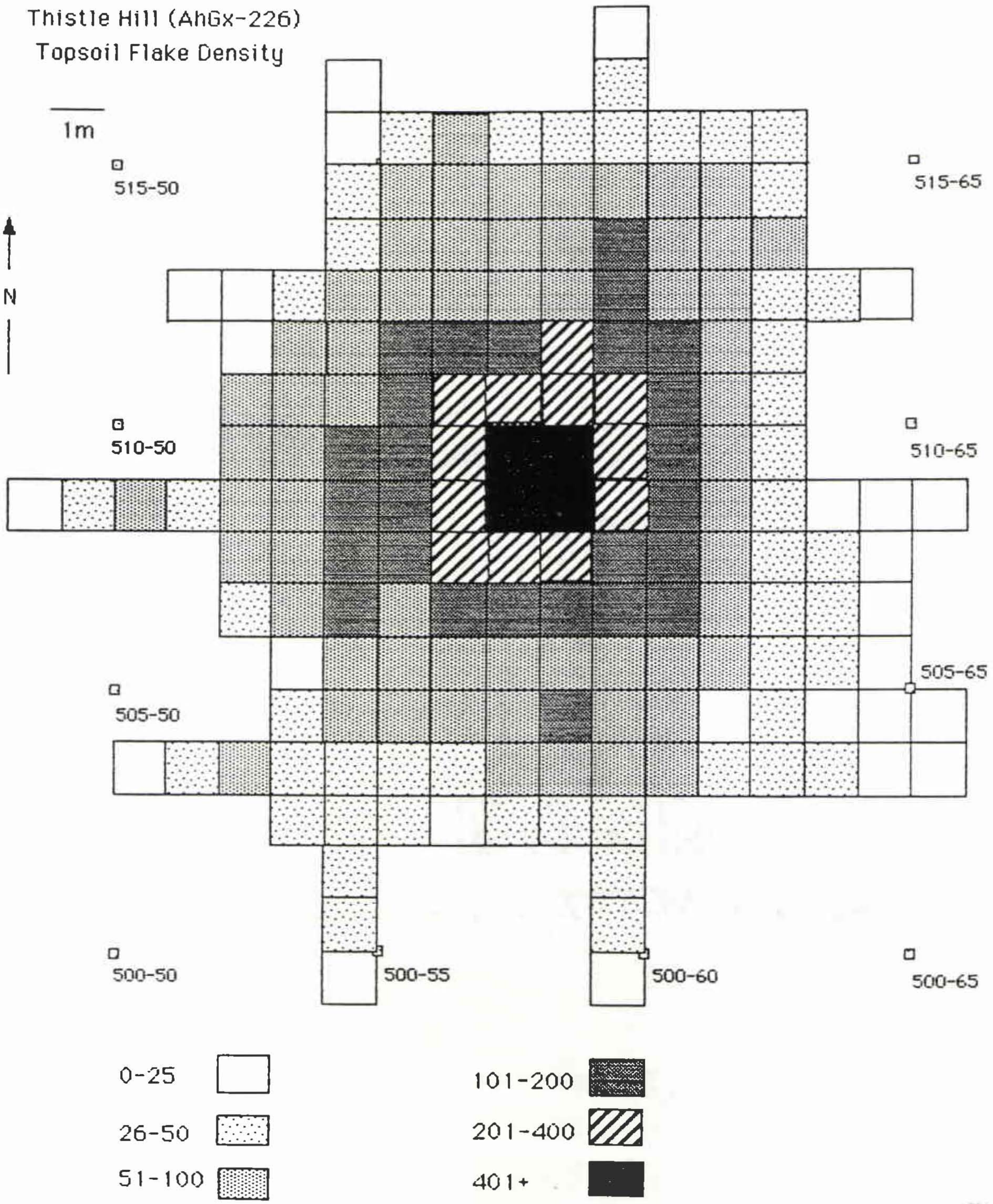
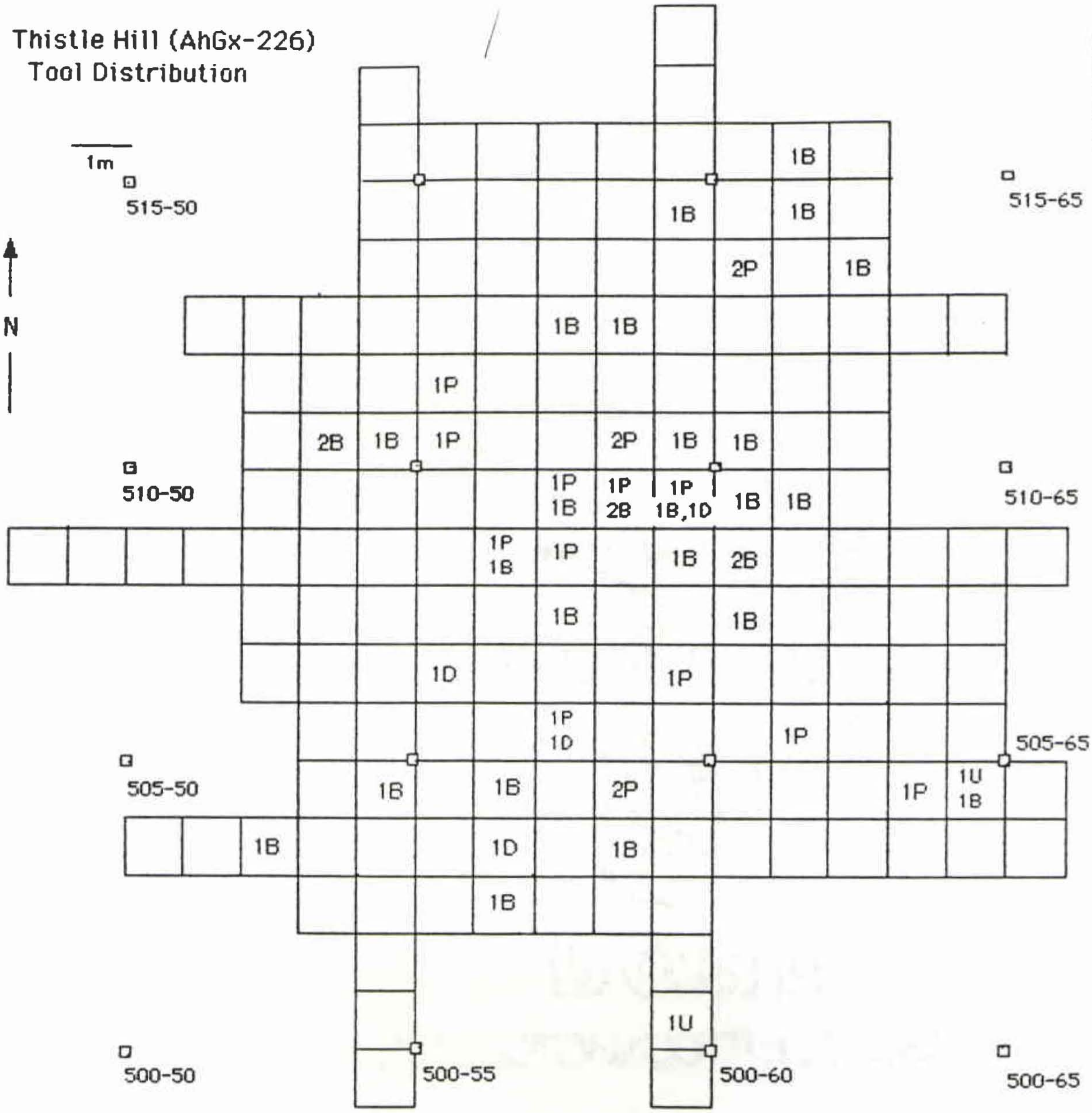

Thistle Hill (AhGx-226)
Topsoil Flake Density
1m
N
515-50
515-65
510-50
510-65
505-50
505-65
500-50
500-55
500-60
500-65
0-25
26-50
51-100
101-200
201-400
401+

Figure 18



P = Point/ Point Frag.

B = Biface/Biface Frag.

D =Drill Frag.

U = Uniface Frag.

Figure 19

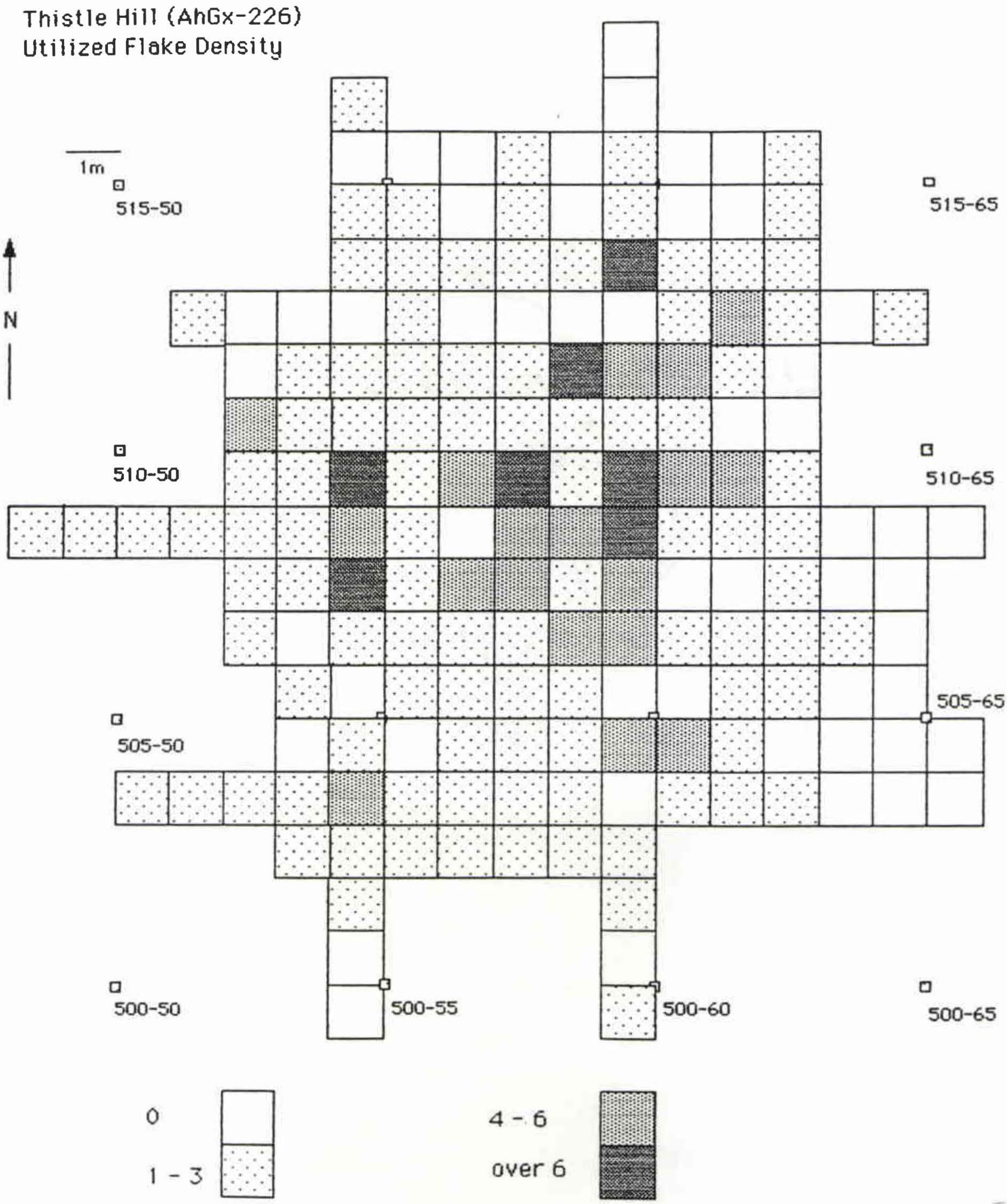
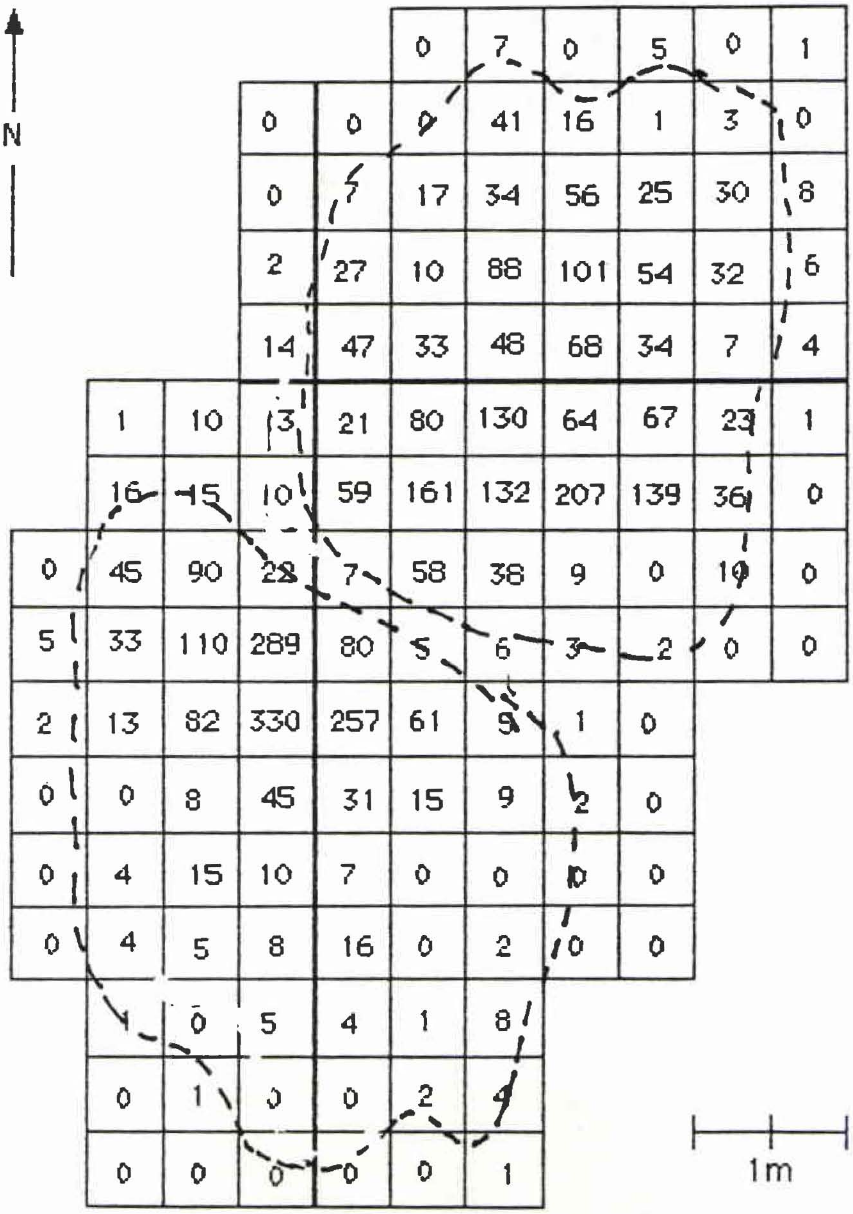
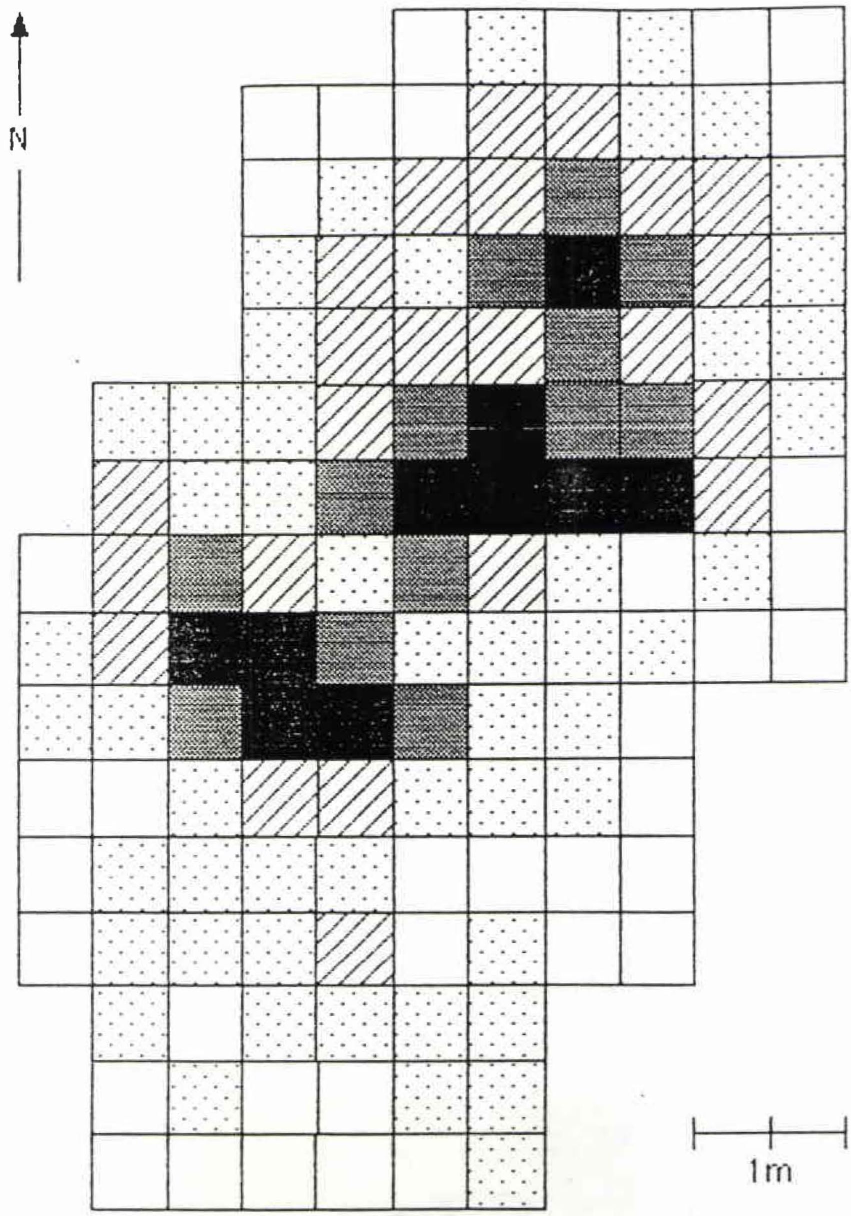

Thistle Hill (AhGx-226)
Utilized Flake Density
1m
N
515-50
515-65
510-50
510-65
505-50
505-65
500-50
500-55
500-60
500-65
0
1 - 3
4 - 6
over 6

Figure 20



Feature Flake Quantity by 50 cm Quadrant

Figure 21



Feature Flake Density By 50 cm Quadrant

0

1 - 15

16 - 50

50 - 100

> 100

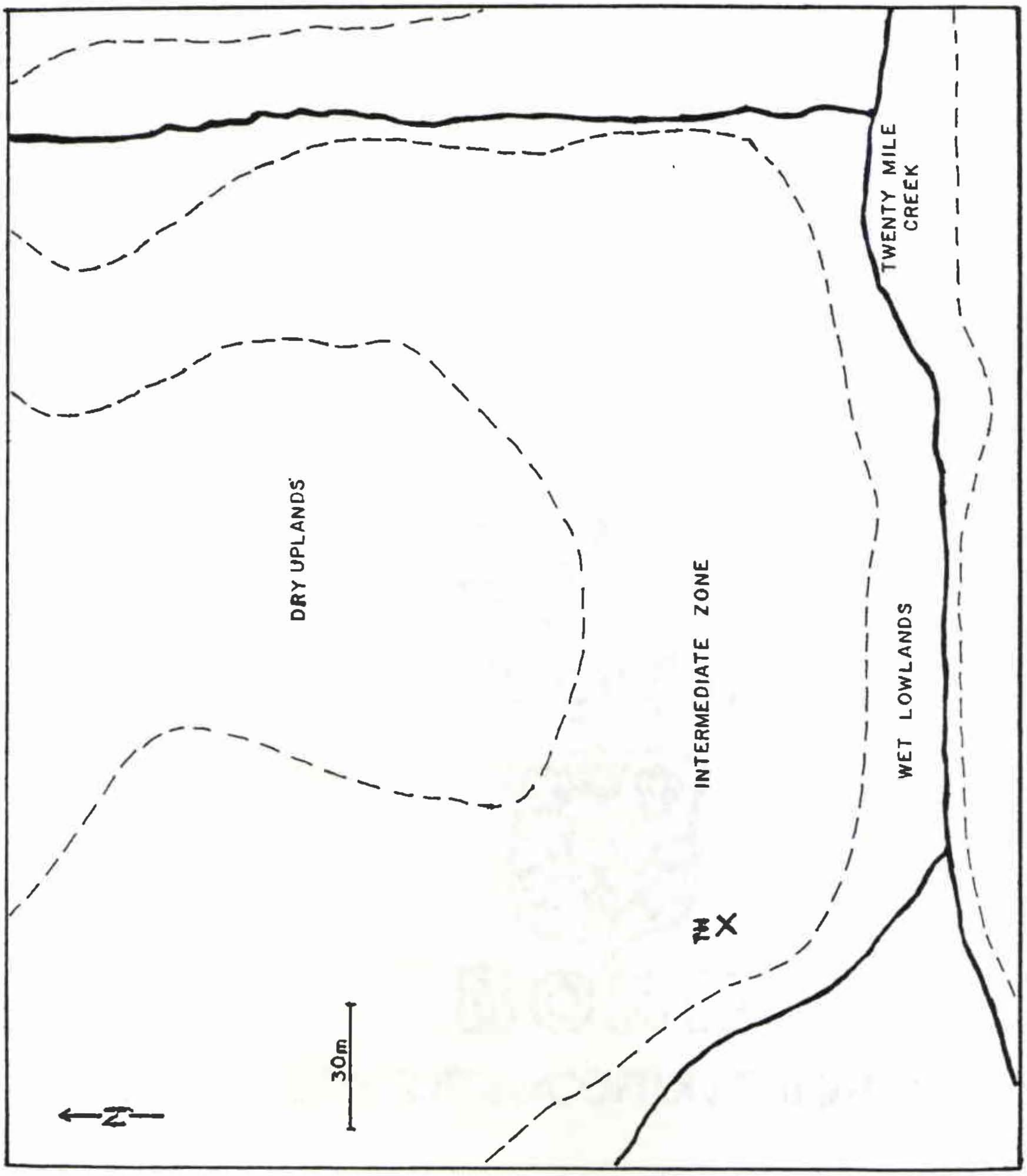
CHAPTER 4
INTERPRETATIONS

Environment:

Drawing catchment circles around the Thistle Hill site indicates that there are many diverse environmental zones within a few hours walk of the site. This is the key component of a general or diffuse adaptation (Cleland 1966, 1976), and of an optimization model where variability (Smith and Winterhalder 1981) and the ability to attain several goals simultaneously is of prime importance (Cleland 1976; Jochim 1983). Late Archaic site location would have been scheduled to be near the most productive subsistence base.

The modern Thistle Hill environment is a rich continuum of environmental zones or microenvironments containing a diverse variety of flora and fauna. This diversity is implied prehistorically by the repeated Archaic Period occupation adjacent to the Twenty Mile Creek tributary. Within the rich environment in the Hamilton region, temperature, soil and moisture differences produce environmental variations. The land adjacent to streams and creeks in the Thistle Hill area has been classed as a wetland environment lost before 1967 (Wetland Mapping Series 1985), the hilly areas surrounding the site are dry uplands, and hillsides and slopes belong to the mesic or intermediate zone (MacDonald 1987) as shown in Figure 22. These environmental zones each contain specific flora and fauna, and constitute a patchy environment (Weins 1976). Paleo-pollen diagrams (eg. Bennett 1987: 1798; McAndrews 1981) indicate a modern environment by 6000 B.P. that has remained fairly constant ever since. The climate of 3500 B.P. was moister and warmer (Edwards and Fritz 1988) than the modern one.

Figure 22
Environmental Zones



Site location within or near diverse microenvironments would enable the exploitation of the creek or stream for fish, waterfowl, beaver, muskrat, deer, turtle, plus an assortment of other animals. Various plant and berry species line the stream edge. The dry upland environment could have contained an assortment of walnuts, acorns, other nuts, and berries, and also mammals such as raccoon, squirrel, porcupine, and others. Open glades in the upland forest would have housed deer, ground hogs, and other plants and animals that thrive on sunlight and open areas. The mesic or intermediate zone would have housed trees from both other zones and maples, walnuts, black cherry and others (MacDonald 1987). Fish weirs dating to the Archaic Period were found at Atherley Narrows (Johnston and Cassavoy 1978), making it plausible that the people at Thistle Hill employed stone or wooden fish weirs in the stream. The palynological analysis of feature soil samples suggests a mixed forest environment, with a bog or swamp nearby (McAndrews 1989).

Figure 23 shows some seasonal differences in flora and fauna in the Thistle Hill vicinity. Since it would be an enormous task to list all of the available flora and fauna in southern Ontario exploitable by hunters and gatherers, Figure 22 contains only the more obvious subsistence possibilities. See Cleland (1966) and Yarnell (1964) for a more complete discussion.

Figure 23
Seasonal Subsistence

	Dry Uplands	Mesic	Wet Lowlands
Spring:	Deer Chenopodium Wild Turkey Squirrel	Deer Chenopodium Wild Turkey Squirrel	Deer Anadromous Fish Migratory Waterfowl Clams Beaver Muskrat Squirrel Turtle
Summer:	Deer Racoon Chenopodium	Deer Berries	Deer Stream Fish Beaver Muskrat Turtle
Fall:	Deer Acorns Walnuts Chestnuts Beechnuts Chenopodium	Deer Acorns Walnuts Chestnuts Beechnuts Squirrel	Deer Beaver Muskrat Squirrel Turtle
Winter:	Deer Ptarmigan Pheasant Rabbit Squirrel	Deer Ptarmigan Pheasant Rabbit Squirrel	Deer Rabbit Beaver Muskrat Squirrel

Table 4.1 suggests possible the quantity or density of floral and faunal subsistence alternatives, extrapolated from Keene's (1981) data from the Saginaw Valley in Southern Michigan. All of these plants are available in the Hamilton area (MacDonald 1987) near the Thistle Hill site, and are indicated on the paleo-pollen diagram from Hams Lake (Bennett 1987:1793). Both southern Ontario and southern Michigan are located within the Carolinian Biotic province or Transitional Zone, therefore it is assumed that there would be only minor plant and animal density differences. Flora measurements are provided by weight in kilograms per hectare (kg/ha), and fauna by individuals per square kilometre.

Table 4.1
Subsistence, Season and Density

Food Source	Time of Year	Density
Flora:		
Acorns	Sept.- Oct.	17.78 kg/ha
Hickory	Oct.	37.75 kg/ha
Walnut	Oct.	20 kg/ha
Butternut	Oct.	15.39 kg/ha
Beech	Sept.- Nov.	74 kg/ha
Hawthornes	Sept.- Oct.	263 kg/ha
Hackberry	Sept.- Oct.	368 kg/ha
Tubers (over 20 species available in mesic areas including Wild leek, wild onion, Solomon's seal, Jack-in-the-Pulpit, Pepperoot, and Spring Beauty)	May - Oct.	963 to 5681 stems/ha
Greens (includes Greenbriar, cow parsnip, skunk cabbage, and others)	May - Sept.	700- 1729 stems/species/ha
Chenopodium		
(greens)	May-June	?
(seeds)	Sept. Oct.	?
Fauna:		
Black Bear	All year	0.39 /km2
Beaver	All year	11.58 /km2
Deer	All year	7.72 /km2
Fish	All year	949 /km2
Muskrat	All year	116 /km2
Rabbit	All year	61.76 /km2
Raccoon	All year	15.44 /km2
Turtle	Warm season	247 /km2
Waterfowl	Warm season	30 /km2

Plant species available in the Hamilton area not included on this list are Chestnut, Red Mulberry, Wild Crab Apple, Cherry and Plum trees (MacDonald 1987). All of these plant species have preferred growth areas; for example most greens live in moist areas, while tubers prefer the mesic zone. It is obvious that on a macro-environmental level, there are sufficient species and quantities near Thistle Hill to meet the subsistence needs of a small group of hunters and foragers (eg. Lee 1968) at any time of year. If, as is generally assumed, that an upland environment supported a cold season occupation (eg. Lennox 1986; Muller 1988; Ellis, Kenyon and Spence n.d.), then I suggest that this same environment would also have supported a warm-season band of hunter-gatherers. Late Archaic site location alone does not indicate or predict the season of occupation.

Site Structure:

At 20 m x 18 m in size, Thistle Hill is comparable to other Late Archaic sites. The two large features suggest small, oval houses or tents, which, based on size and enthnographic sources (eg. Helm 1968; Binford 1980), probably housed nuclear or extended families. The houses/tents have internal storage pits and Feature 2 (and perhaps Feature 1) contains a hearth. The similarity of these features suggests both houses were of similar construction; two similar houses built in one location suggest that these may have been constructed by one group of people. The house features were separated by only 30 cm. Of the post moulds associated with feature 1, two were located inside it's eastern edge and the others were about 20 cm outside its edge. The post moulds associated with feature 2 averaged 30 cm outside its edge. This suggests that the features are smaller than the original houses which, therefore, would have overlapped if occupied contemporaneously. House depth is estimated at 28 and 29 cm with a maximum depth of 37 cm at the sub-features. Ploughing may have reduced the size of the features, but at 4.00 x 3.15 m and 4.30 x 3.22 m, they are far smaller than the 70 m^2 and 120 m^2 houses extrapolated from the flake scatters at the Innes site (Lennox 1986) and smaller than the 6 x 9 m house reported by Stothers and Abel in Ohio (1988). An alternate interpretation is that the Thistle Hill features 1 and 2 represent one 4 x 8 m oval structure from a single occupation, or perhaps one house that was occupied twice.

Each feature contains one major flake concentration above the internal subfeatures or pits, with few flakes around them. Such a pattern may have been caused from picking animal skins from the floor and shaking the debitage into the pit. Within-feature flake density (figures 20 and 21) indicate the houses are distinct, with each having activity areas within the houses. Based on this evidence, I interpret these as two separate occupations with only a short time between occupations. Possibly Thistle Hill was a base camp for a family group of hunter-gatherers reoccupying the same territory.

Feature 3 is an external pit located near the south edge of Feature 2, and perhaps represents a third occupation. The few flakes found within it were all of Ancaster chert, while the other features contained mainly Onondaga chert. A small tool cluster, all of Ancaster chert, was found in the topsoil near feature 3. Possibly these pits were for storage.

None of the pits, either internal or external, were very large or deep. Although there is variation in Late Archaic pit size, these are similar to those found on many Small Point sites such as Innes (Lennox 1986), Rocky Ridge (Ramsden 1976), and Crawford Knoll (I. Kenyon 1980b).

The single acceptable radiocarbon date of 3440+-75 B.P. places Thistle Hill firmly in the Late Archaic time period.

Lithics

Tool analysis will assist in determining the archaeological period and provide a rough temporal estimate for the site, and be used to make inferences about site function, and possibly seasonality. Cleland (1976: 64) states that tools for a diffuse adaptation would be adaptable and multi-functional, which is apparent from the tools recovered at Thistle Hill. The limited number of tools and the quantity of biface preforms indicate that portability and multi-functional lithics were the norm. A few multi-purpose tools (eg. preforms) would be easier to transport than a large number of specialized tools. The utilized flakes would have been used for a single task in camp, then discarded.

Ancaster chert dominates the point assemblage. Typologically, all of the points except one are of the Late Archaic Innes type (Lennox 1986), with similarities to other Small Point Late Archaic sites such as Welke-Tonkonoh (Muller 1988), and the Inverhuron site cluster (W. Kenyon 1959; Wright 1972; Ramsden 1976). Generally, Small Point type projectile points appear to increase in size through time (Spence and Fox 1986; I. Kenyon 1989). I. Kenyon (1989) statistically derived point clusters which show that Small Points can be grouped into discrete types, and also that there is a Small Point continuum with minor variations between sites and types. Based on the radiocarbon date of 3440+-75 B.P. and using I. Kenyon's (1989) recent statistical analysis of point metrics as a guide, Thistle Hill points best correlate with the earlier Small Point sites. They are slightly longer (X = 35.3 mm) than points from Knechtel (X = 31.25 mm) and Crawford Knoll (X = 32.73 mm), but shorter than those from Innes (X = 40.00 mm), Inverhuron (X = 43.86 mm), Rocky Ridge (X = 44.33 mm), Welke-Tonkonoh (X = 45.00 mm) and Hind (X = 63.80 mm)(I. Kenyon 1989: 13). The point size and radiocarbon date suggest Thistle Hill is one of the earlier Small Point sites.

Two points (Plate 5: 1-2), one recovered from each of features 1 and 2, are nearly identical. Both were heated to the same blue colour and have nearly identical metrics. If a craftsman uses one pattern when producing points, then these were produced by one knapper. If so, then the site may have been re-occupied by the same group of people, possibly a family group.

Biface preforms are consistently found on Small Point Archaic sites such as Innes (Lennox 1986), Welke-Tonkonoh (Muller 1988), Rocky Ridge (Ramsden 1976), Knechtel (Wright 1972), and Inverhuron (W. Kenyon 1959), and others. Size and material varies, but their use as tool preforms is generally accepted.

There are size, material and qualitative differences between Stage 1 and 2 bifaces at Thistle Hill. Stage 1 bifaces and biface fragments are larger and are predominantly made of Ancaster chert; Stage 2 bifaces are smaller, more finely flaked and are predominantly of Onondaga chert; the finished points are generally of Ancaster chert. Differences between Stage 1 and 2 bifaces may be biased more by material than by a reduction sequence difference. Onondaga is a finer quality chert and easier to flake, a knapper utilizing these properties would be able to create finer bifaces than those made of Ancaster chert. The Onondaga biface fragments are generally smaller than those of Ancaster chert, indicating the broken Onondaga chert tool preform fragments were reworked and transported after breaking, but that the Ancaster fragments were rejected. The points and whole biface preforms are almost exclusively of Ancaster chert; possibly they were rejected because of their poor quality. Ramsden (personal communication, 1988; 1989: 5) suggests that some of the poorer quality lithics are juvenile attempts at biface manufacture.

Drills similar to those from Thistle Hill are found on many Late Archaic sites.

Six types of utilized flakes (General, Spokeshave, Blade, Graver, Scraper, and Denticulate) were analysed. None show extensive wear, indicating that they were used once and discarded. The consistency of Blade and Scraper flake shape suggests they may have been removed from prepared cores, but none were recovered. The size of utilized flakes indicates a preference for large Tertiary and Tertiary-Biface Thinning flakes. It would be easier to utilize available waste flakes or produce the necessary flakes when needed than to produce formal tools. This also indicates chert resources were plentiful. Over 82% of the utilized flakes were of Onondaga chert, suggesting a recent visit to the Onondaga Escarpment or to the secondary deposits north of Lake Erie. This would also explain why the lower quality Ancaster chert preforms and points were discarded.

The two chopper tools may have been used for house construction and discarded. The grinding stone has few striations, possibly evidence that very little nut grinding occurred. There is great variation in hammerstone size, which might reflect the type of knapping done; large hammerstones may have been used for removing cortex from chert blocks or use with a punch to remove Tertiary flakes, while the smaller ones could be used for the removal of smaller biface thinning or retouch flakes. The rough stone tools have little use-wear on them, indicating short-term use. Again, this correlates with Cleland's (1976) diffuse model.

The Debitage samples examined contain low frequencies of Primary and Secondary Decortication flakes (especially of Onondaga chert), slightly higher frequencies of Tertiary flakes, and high percentages of Tertiary-Biface Thinning flakes and Secondary Retouch flakes. The paucity of primary and secondary decortication flakes indicates that the initial reduction was done elsewhere. The number of Biface Preforms and the high frequency of biface thinning flakes suggests Thistle Hill was a biface manufacturing site. Onondaga chert dominates the feature and topsoil flake samples.

Material

The proximity of the Niagara escarpment and the continuous weathering of its face by streams would provide easy access to Ancaster chert cobbles. But, surprisingly, Ancaster chert was not extensively used at Thistle Hill, probably because of its poor quality. As discussed, Onondaga chert dominates most tool and flake categories. Of the 18 projectile points and fragments found at Thistle Hill, only 1 point, 1 basal fragment, and 2 point tips are made of Onondaga chert. Four whole Ancaster chert biface preforms were found, but only 1 whole non-Ancaster preform. The larger biface fragments are also of Ancaster chert while Onondaga chert biface preforms are generally small. The remainder of tools are all made of Onondaga chert. As well, 82.31% of the Utilized flakes and over 75% of the debitage is of Onondaga chert, again suggesting they had recently been to an Onondaga chert source. Many of the decortication flakes have rounded edges, indicating they were collected from a secondary source (glacial deposit) north of Lake Erie The whole or large fragments of tools are of Ancaster chert, while those of Onondaga are generally small fragments. There is an obvious preference for Onondaga chert among the artifacts left at the site. The larger Onondaga fragments were reused and transported while the larger Ancaster tool fragments were rejected and discarded. This preference for Onondaga chert is similar to that found at Innes (Lennox 1986).

Artifact Distributions:

Debitage distribution shows the majority of flakes are in the centre of the site immediately above and outside of features, with fewer flakes towards the edge (Figures 16 and 17). Topsoil debitage distribution does not indicate temporal differences for the house/tent features. It does show that there was intensive use of the area near the features. Topsoil tool distributions show the majority of artifacts were found directly above the features (suggesting they were originally inside) and in two outdoor use-areas near the features. One is indicated by the tool scatter north of feature 1, and the other south of feature 2 (figure 18); these scatters are interpreted as two occupations. A third, outdoor occupation is suggested by the tools found near feature 3. Retouched flakes are distributed throughout the site.

Seasonality:

As with most Late Archaic sites in southern Ontario, determining seasonality at Thistle Hill is ambiguous. The pollen analysis found a predominance of pine pollen and also Sphagnum moss spores (McAndrews 1989) which hint at a spring occupation, but the pollen was recovered from the pit fill and therefore may be intrusive. The floral and faunal analyses conducted for this thesis contribute little towards determining seasonality, therefore it must be based on inferential data.

Ethnographic evidence indicates that many hunters and gatherers build houses/tents at all times of year (eg. Lee and DeVore 1968). Summer houses provide shelter from rain, heat, and biting insects among an assortment of other things. The house/tent features were dug into the topsoil and subsoil, most easily constructed when the ground is soft. Alternately, it can be argued that the house/tent features represent a cold season occupation, for which the houses were constructed before the ground froze. Feature/house 2 also has an internal hearth, and the quantity of within-feature flakes indicates that knapping was done indoors. Our own biases would suggest that these activities be done outdoors in summer and indoors in winter. Using the house features to determine seasonality is ambiguous, since they can be used to argue for either a warm or cold season occupation. Based on the work required to dig these house floors into the subsoil with nothing but stone, wood or bone tools, they must represent fairly long-term occupations. It seems unlikely that anyone would go to this much trouble to build a house or tent unless they planned on staying for a fairly long time.

A warm season occupation, when plenty of plant foods were available, could mean there was less need for stone tools. There are few whole projectile points, and 34 biface preforms and small preform fragments probably produced for trade or storage. One drill fragment is interpreted as a preform. A biface manufacturing site implies the stock-piling of tool preforms, presumably for the upcoming winter when the raw material is not readily available. As discussed above, it would be easier to produce and carry preforms, finishing a tool when necessary rather than transporting a wide range of finished tools. There are no scrapers and wedges. Utilized flakes, which could be manufactured when needed, seem to have been used instead, and contribute over 78% of all tools implying that long-term, meticulously made tools were unnecessary.

Of the excavated Late Archaic sites with good seasonal indicators, there are similarities or at least consistencies between tool assemblages. The stratified Rocky Ridge (Ramsden 1976) and Knechtel I (Wright 1972) sites have both bone and stone tools and good faunal preservation. These sites have both warm and cold season occupations, but similar tools are found in each stratigraphic level. Wright's (1972: 46-47) Tables 4 - 7 indicate the faunal remains and Table 1 (Wright 1972: 52) the tools by strata, indicating a fairly consistent assemblage without major seasonal and temporal differences. Crawford Knoll (I. Kenyon 1980b) also has a similar tool collection, as do many other Late Archaic Small Point sites. An indepth tool analysis of Late Archaic sites might provide the key to seasonal differences, but, for now, the assemblages seem too alike to gain any insights about seasonality.

The density of waste material suggests a fairly long-term or intense occupation. Over 75% of the debitage is of Onondaga chert, which must be collected from secondary deposits north of Lake Erie, 30 miles south of Thistle Hill, best collected before there was snow on the ground. As well, a warm season trek to the secondary deposits would be easier than in winter. From ethnographic evidence, Sahlins (1968:85) terms hunter-gatherers the "Original Affluent Society", implying their food quest is not a full time occupation. This would be especially so in summer when food was more abundant, suggesting there was more spare time for other activities, such as travel and knapping.

Evidence indicates that Thistle Hill was a base camp reoccupied three times. The season of occupation remains ambiguous and in fact may not have been at the same time of year. The houses may represent either warm or cold season occupations with much of the activity done indoors. Feature 3 and the associated outdoor activity or use-area suggests a warm season occupation. At Thistle Hill the season of occupation may have varied. A warm season occupation would question the generally accepted pattern of a littoral/summer, inland/winter seasonal adaptation.

In general, hunting is thought to be more important to hunter-gatherer subsistence than gathering (Lee 1968) although this has recently been questioned (Hill and Hurtado 1989). It is assumed that the Late Archaic people of southern Ontario utilized a combination of both hunting and gathering, for which emphasis varied with the seasons. The warm season would have been spent harvesting plant foods and the cold season on more intensive hunting. When considering the rich year-round environment at Thistle Hill, it would have been possible for nomadic hunter-gatherers to occupy this upland environment at any time of year. This varied and extensive subsistence base would have been available throughout the southern Ontario Transitional or mixed forest environment. To Optimize the available subsistence options, Late Archaic settlement and subsistence would have been oriented towards microenvironments along or near river, creek or stream edges which provide the most productive and diverse microenvironments with an assortment of flora and fauna.

CHAPTER 5
THE LATE ARCHAIC

This chapter examines the Late Archaic of Southern Ontario in general and specifically the Small Point occupation. Inferences about settlement and subsistence strategies are examined and contrasted with site location and the variety of available microenvironments. It is here postulated that all Late Archaic occupations followed a similar seasonal round focused towards a diffuse microenvironment exploitation. In this chapter, the concept of a littoral/inland, summer/winter dichotomy is examined to determine if it is plausible that the Small Point Archaic differed from other Late Archaic occupations.

Much of what is known about the Archaic in southern Ontario stems from Ritchie's (eg. 1932; 1936; 1940; 1961; 1980) early work in New York State, and the Michigan Archaic occupations around the shore of Lake Huron (eg. Taggart 1967; Fitting 1975). Due to the sparse nature of many Southern Ontario Archaic occupations, the paucity of artifacts, and the number of archaeologists interested in the field prior to 1970, little research was conducted into the southern Ontario Archaic and researchers were content to assume continuity or similarities with the Northeastern states (eg. Emerson and Noble 1966; Wright 1962, 1978). For an in-depth discussion of the southern Ontario Archaic see Ellis, Kenyon, and Spence (n.d.). Table 5.1 shows the Late Archaic sequence for southern Ontario and lists some sites. See Figure 1 for their location.

The Late Archaic is problematic because the sites which have been excavated are generally those with large collections and/or those with intense occupations. Thistle Hill, which was excavated because of its dense surface scatter, is an example of a preference for excavating the larger, more intensely occupied sites. Because of this bias toward the most spectacular or productive sites, we are examining only a portion of the seasonal round. The majority of Archaic sites, which consist of sparsely scattered lithic debris, are deemed unworthy of excavation. There

Table 5.1
The Late Archaic

Tradition	Date	Sites
Laurentian type	5500 - 4500 B.P.	McIntyre (Johnston 1984) Morrison's Island-6 and Allumette Island - 1 (Kennedy 1967) Bell (A.S.I. 1985)
Narrow Point	4500 - 3800 B.P.	McIntyre (Johnston 1984) Winter (Ramsden 1989)
Broad Point	4000 - 3500 B.P.	George Davidson (I. Kenyon 1978, 1979, 1980a) Surma (Emerson and Noble 1966) McIntyre (Johnston 1984)
Small Point	3500 - 2800 B.P.	Inverhuron (W. Kenyon 1959) Knechtel I (Wright 1972) Rocky Ridge (Ramsden 1975) Crawford Knoll (Kenyon 1980b) Welke-Tonkonoh (Muller 1988, 1989)

are many small flake scatters throughout southern Ontario, some of which undoubtably are Late Archaic, yet we have attempted to develop a Late Archaic settlement and subsistence model from only a few select sites. It is here assumed that most small flake scatters are specialty camps affiliated with the larger base camps such as Thistle Hill. I use the term specialty camp to designate a short term occupation by a 'task group", which, based on ethnographic (Helm 1968) and ethno-archaeological (Binford 1980) data, is established to exploit a specific resource. These camps would be for short term hunting, fishing, gathering, food processing, or similar activities necessary for survival.

Much of what is known about the Archaic is derived from survey and collection analysis. A survey of selected areas north of Lake Ontario (Roberts 1980, 1981, 1985) indicates few temporal distinctions in Archaic site location but rather an 'adaptive uniformity' throughout the preceramic period. Many of the sites found were thought to represent winter hunting camps, but they are clustered around streams or springs (Roberts 1980) for drinking water, fishing in streams, and deer hunting.

The Late Archaic McIntyre site represents the most in-depth study of Late Archaic artifacts, paleo-environment, and subsistence in southern Ontario. McIntyre is located near Peterborough, Ontario, on a drumlin overlooking low-lying marshy ground 0.4 km from Rice Lake (Johnston 1984). From this location it is possible to exploit several microenvironments, including the marshy lowlands, the lake shore and dryer upland areas. The results of floral (Yarnell 1984), faunal (Naylor and Savage 1985; Waselkov 1984), and pollen analysis of cores from the marsh and lake (McAndrews 1984) indicate a warm season adaptation and diverse subsistence exploitation, including the harvesting of spring and summer spawning fish.

The McIntyre site (Johnston 1984) contains a wide range of point types of which the majority (>95%) were from local collections and not excavation. The extensive subsoil fire pits and features contained few or no diagnostics making interpretation difficult; many of the artifacts may not have been directly associated with the Late Archaic occupation. A series of six radiocarbon dates ranging from 4715+-270 B.P. to 3650+-110 B.P. (Johnston 1984) indicates an extensive re-occupation over at least 1000 years, yet the artifact, floral and faunal components from the site were analyzed as a whole. It should have been possible to determine floral and faunal continuity or change through time by using radiocarbon dates and seriating features. Artifact analysis suggests affiliations with the Late Archaic Laurentian tradition and the Morrison's Island 6 site, as well as the later Late Archaic occupations of southern Ontario (Johnston 1984).

The Morrison's Island-6 site, a cemetery and fishing camp located in the Ottawa River near Pembroke, Ontario, contained 18 burials and about 2300 artifact including 276 copper artifacts and 325 chert projectile points (Kennedy 1967). Morrison's Island-6 and the nearby Allumette Island - 1 (also excavated by Kennedy) sites have cultural ties with the Laurentian tradition of New York, the only sites with such clear ties, and ties with the "Old Copper Culture" of the upper Great Lakes region (Kennedy 1967). MN-6 is radiocarbon dated at 4700+-150 B.P. and Allumette Island - 1 at 5200 B.P. (Kennedy 1967). These are by far the richest Archaic sites excavated to date in the southern Ontario-western Quebec area. Unfortunately only preliminary analyses have been published.

The Bell Site (A.S.I. 1985), near the town of Pelham in the Niagara Peninsula, consisted of three Archaic occupations overlooking a tributary of the Twenty Mile Creek: two discrete flake clusters 20 metres apart, and a larger flake scatter situated on a sandy loam ridge nearby. Excavations of the latter produced four small subsoil features. Few diagnostics were recovered, but fragments of 7 point bases were found which have been interpreted as Brewerton points, tying Bell to the Brewerton/Laurentian complex of New York. These points are the only Brewerton diagnostics recovered. The majority of tools recovered are scrapers. Artifact, floral and faunal analyses indicate a fall occupation to exploit deer and other mammals living within a mixed hardwood forest, suggesting a cold season occupation (ASI 1985: 47).

These sites are earlier than the Small Point Late Archaic but have a similar location and inferred subsistence pattern as that recorded for Thistle Hill. Morrison's Island-6 contains many Laurentian-type artifacts (Kennedy 1967). As a fishing camp and cemetery, Morrison's Island-6 is a specialty site and therefore would not be expected to have contained a similar range of tools to the McIntyre and Bell campsites. New York Laurentian cultural ties are less evident at McIntyre and at the later Bell site with only the Brewerton point type as a cultural marker, suggesting that cultural affiliations with the New York Laurentian had nearly ceased or had not extended into Ontario.

Both the warm season McIntyre and the cold season Bell are located in areas where it would be possible to exploit a set of differing microenvironments. McIntyre is situated to fish the river and lake side environments, but is also near diverse microenvironments. The stream-side location of Bell suggests less dependence on fishing and a greater reliance on microenvironment exploitation. This implies regional or temporal settlement and subsistence differences for the Late Archaic, indicating a change in reliance from fishing to microenvironment exploitation. As well, artifact differences may indicate functional or seasonal differences within a scheduled seasonal round.

Three major point classes are found in southern Ontario after the Brewerton/Laurentian complex: Narrow Point (4500 to 3800 B.P.), Broad Point (4000 to 3500 B.P.), and Small Point or Terminal Archaic (3500 to 2800 B.P.) (Ellis, Kenyon and Spence n.d.: 71-72). There are possible affiliations with New York for the Narrow Point occupations (Ramsden 1989), and the Broad Points are found throughout the Northeast (I. Kenyon 1980a). The Small Point or Transitional Archaic affiliations seem to lie more towards southern Michigan (Ramsden 1976) and the Riverton Culture of Illinois (I.Kenyon 1989).

Narrow Point

This occupation is best understood as a northern variant of the Lamoka Phase of New York State (Ritchie 1980). Dean Snow (1980) suggests that Narrow Point, including Lamoka, represents a mast forest adaptation. If this is the case, one might expect a distribution of Lamoka points in the lakeshore areas bordering Lakes Erie and Ontario, and the southern Huron Basin, reflecting a mast-forest adaptation (Ellis, Kenyon, and Spence n.d.: 57). Roberts (1985) found a small quantity of Narrow points close to the north shore of Lake Ontario, and 40 Lamoka-like points are associated with the McIntyre site north of Rice Lake (Johnston 1984).

The Winter Site, a Narrow Point site in the drumlin fields near Ospringe in Wellington County (Ramsden 1989), is located within the Transitional Forest Zone of a mixed Hardwood forest, outside the expected range of Narrow point sites as argued by Dean Snow (Ellis, Kenyon, and Spence n.d.: 57), suggesting a similar environmental adaptation for Lamoka sites in Ontario and New York. The Winter points are typologically similar to Lamoka points, a pattern similar to that at Bell, but no Lamoka beveled adzes were found. Four small features were excavated but they contained no floral nor faunal remains. Ramsden suggests that the Winter site was established for fall deer hunting and plant gathering. Although C14 dates are unavailable, Ramsden (1989) accepts a 2500 B.C. date based on cultural affiliations with the Lamoka Lake Site (Ritchie 1932) in New York state. From Ontario there are no other excavated Narrow point sites available for comparison.

Broad Point

These are the most well-known and identifiable Late Archaic points in Ontario, with many analyses available (eg. I. Kenyon 1978, 1979, 1980a, 1980c; Emerson and Noble 1966; Fisher 1988). Their predominance in collections and their location during field surveys may be due to their distinctive large size and shape. Broad Point Archaic sites are thought to represent more of an adaptation to the Oak-Hickory upland areas along major river systems and along the Lake Erie shore to exploit nuts, deer and other mammals (Ellis, Kenyon and Spence n.d.: 69).

George Davidson is a Broad Point site located near the northern limits of the Carolinian Biotic province. It is part of the two major site clusters centred in the Ausable and Komoka river valleys. Both of these clusters are within similar physiographic settings which "...would have been associated with a corresponding ecological diversity so that, within a short distance of these sites, there would have been a number of environmental zones which could have been exploited" (I.Kenyon 1980a: 19-20).

The Surma Site (Emerson and Noble 1966) is a multi-component burial site located in Fort Erie, Ontario. At least three occupations have been identified, including Middle and Late Woodland occupations, but of particular interest is the Late Archaic occupation dating between 2000-1000 B.C. The Archaic component contains, almost exclusively, Genesee points (14 complete and 12 fragments) and pentagonal preforms indicate cultural ties to New York State

(Emerson and Noble 1966: 78). Due to the type of site and the preliminary nature of the report, little data except point typologies are available for comparative purposes.

Small Point:

The Small Point or Terminal Archaic occupation of southern Ontario dates from c. 3500 to 3000 B.P. and indicates a trend towards smaller, narrower points, which "...implies a significant modification in weapons technology (introduction of bow and arrow?) and, perhaps, hunting techniques" (Ellis, Kenyon, and Spence n.d.: 71). Site location indicates a summer lake shore and winter inland orientation, and there are suggestions of an elaboration of burial practices (Ellis, Kenyon and Spence n.d.: 71), beginning with the Haldimand Complex of the Bruce Boyd Site (Spence, Williamson and Dawkins 1978) and culminating in the "Glacial Kame" burial complex (Spence and Fox 1986).

The earliest work in southern Ontario Small Point sites is W. Kenyon's (1959) work in the Inverhuron area of Lake Huron, and the adjoining Rocky Ridge (Ramsden 1976). Also nearby is the Knechtel 1 site (Wright 1972), located just north of Kincardine. Both Rocky Ridge and Knechtel are stratified sites with sterile sand layers between cultural occupations. It was for these sites along the east shore of Lake Huron that Ramsden (1976: 44-45) suggested a littoral adaptation to a narrow band of rich environmental (or microenvironmental) zone along the lake edge.

Optimization models suggest that resources must be fairly reliable even if not overly abundant and that sites should be located near an assortment of subsistence targets (Jochim 1983). Even though the Inverhuron sites indicate a lakeshore occupation, they also represent a riverine oriented adaptation. All three are located near a small creek or stream. At all three Inverhuron sites white tail deer and beaver dominate the faunal assemblage, with fish representing only a fairly small portion of recovered material. Of the fish recovered at Knechtel (Wright 1972), lake-dwellers such as pike, sturgeon, and drum are found only in the earliest components, which, along with a native copper fish-hook, represent deep water lake fishing. Freshwater Drum, Channel Catfish, Walleye and Sucker, all stream spawning fish, are found in each stratigraphic component at Knechtel I (Wright 1972: 43) and Rocky Ridge (Ramsden 1976). Due to the paucity of fish bones at Knechtel I, Wright (1972: 56) suggests there was ritualistic non-burning of fish bones, but it may also indicate other preservation techniques such as smoking or drying, that they were consumed elsewhere, or that they decayed because of the acidic soils. Alternately, it may be that fishing played only a minor role in subsistence.

If fishing were the most important resource, then the tool assemblage should reflect this. A copper fish hook was found in Stratum II at Knechtel 1 (Wright 1972: 17) and bone gorges or barbs in levels II and III at Rocky Ridge (Ramsden 1976). Netsinkers are found at Inverhuron (Kenyon 1959) and Rocky Ridge (Ramsden 1976), and there is an increase through time in netsinker frequency at Knechtel (Wright 1972). The deep water fish species at both Rocky Ridge and Knechtel indicate that the Inverhuron area Late Archaic people were line fishing using copper hooks and small watercraft, but the increase in spawning fish in the upper levels indicates net fishing in streams became more reliable.

Lake Huron can be very rough with unpredictable weather patterns. A light net with small sinkers could be destroyed quickly and easily. As well, the sandy beach extends into Lake Huron and did so in the Late Archaic period (Ramsden 1976), providing very little vegetation or food for small fish. Without these small fish, who in turn would be prey for the larger deep water fish, it is unlikely the large fish would come near shore.

Co-occurring stream spawning fish remains and netsinkers from these sites suggests that the people were not just line fishing. Netting fish during spawning runs in small streams might have been far easier and more productive than deep water line fishing. After the initial spawning run, Late Archaic fishermen could have either moved upstream to reset their nets or to devise wooden or stone weirs, or, as Ramsden (1976: 44-45) suggests, remain in the lake edge environment to exploit other resources. The latter is most likely because of the seasonal differences between occupations at Knechtel I and Rocky Ridge (Wright 1972; Ramsden 1976).

Innes is both spatially and temporally the closest reported Late Archaic site to Thistle Hill. Located in Burford County just west of Brantford, Innes is 250 m from the third order Landon's Creek on the Norfolk Sand Plain. The site vicinity is considered to be complex with "...oak dominated forest with adjacent lowland areas listed as black ash swamp" (Lennox 1986: 222). Based on flake distributions in the topsoil, two loci have been interpreted as houses. The north is 70 m^2, while the south is 120 m^2 (Lennox 1985: 237). The two loci date differently, with a 3350 +- 195 B.P. date for the north locus and a 2620 +-80 B.P. date for the south (Lennox 1986: 233). Based on artifacts and the upland location, Innes was determined to be a cold season base camp. Interpreting flake scatters as houses has been questioned (I. Kenyon 1989) and I agree with an alternate interpretation suggesting two independent occupations (Ellis, Kenyon and Spence n.d: 76). The difference between tools and materials associated with each locus might represent temporal differences, or possibly seasonal. If so, than the two Innes loci also show the similarities between Late Archaic tool assemblages.

The Welke-Tonkonoh site on the Caradoc sand plain near Mount Brydges, has Hi-Lo, Early Archaic, Terminal Archaic and Early Woodland material, indicating the extensive re-occupation and preference for one area. This site is also located within the transitional Carolinian to Canadian Biotic zone in a rich stream-side environment similar to that present at Innes and Thistle Hill. No radiocarbon dates are available. Based on its inland location, artifacts, and extensive lowland environment with rolling terrain, the Late or Terminal Archaic aspect of this multi-component site was suggested to be a cold season one (Muller 1988, 1989).

Crawford Knoll is a Small Point site located on a very low sand spit at a juncture of the Chenal Ecarte and a small creek in the eastern St. Clair River Delta. This site has very good bone preservation, including a number of bone tools, especially harpoon fragments and bone fish gorges.

Faunal remains include mammals such as deer, bear, dog, raccoon, bob-cat, and lynx, with black duck and turtle also present, and fish, including lake-dwellers and migratory spawning fish, indicating a varied subsistence pattern. One netsinker was found at the site. The site was occupied in late fall, but possibly at other times as well (I. Kenyon 1980b), and more recent evidences indicates a spring and summer occupation (Ellis, Kenyon and Spence n.d.). The most plausible radiocarbon date from Crawford Knoll is 3480+-120 B.P. (I. Kenyon 1989).

Settlement and Subsistence

Recent research in southern Ontario has shown both the similarities and differences between the Late Archaic of Ontario, Michigan and New York. Many of the point types from New York and Michigan are also found in Ontario, but the degree of similarity varies through time. Roberts (1985) states that the Laurentian Archaic of New York does not extend north of Lake Ontario, contrary to its initial definition (Ritchie 1980; Tuck 1977), but Ellis (pers. comm. 1989) reports there are at least 60 Brewerton/Vergennes sites in the Trent-Severn area. The McIntyre (Johnston 1984) and Morrison's Island-6 (Kennedy 1967) sites both show similarities to and differences from the Laurentian Archaic Robinson and Oberlander sites (Ritchie 1940) near Brewerton, New York. They contain only some of the culture traits (eg. Brewerton/Vergennes points, etc.) of the Laurentian tradition (Ritchie 1980). Brewerton and Lamoka points found in Ontario indicate ties with New York, but the analysis of Late Archaic Small Points suggests affiliations with Michigan (Ramsden 1976) and Illinois (I. Kenyon 1989). Even though Lamoka-like points are found in Ontario (eg. Johnston 1984; Ramsden 1989), as defined, no sites of the Lamoka culture have been found in southern Ontario (Spence and Fox 1986). Broad point occupations are found in New York (Ritchie 1980) and from Ontario to Florida (I. Kenyon 1980c). Late Archaic biological affinities are indicated by similarities in non-metric cranial morphological traits among individuals buried in Ontario and New York (Pfieffer 1979). Based on biological and cultural data there is obviously a Late Archaic relationship between New York and southern Ontario, but the archaeological differences make it difficult to assume a direct link. Ontario differs in many important aspects and therefore is best examined and interpreted independently.

Each site discussed is located in an area where diverse microenvironments overlap, in a setting where there are a variety of environmental zones. These similar settlement and, inferentially, subsistence patterns indicate more continuity within the Late Archaic occupations in southern Ontario than previously thought. Differences are suggested by the difficulty in determining seasonality, due mainly to the absence of floral and faunal evidence from inland Small Point sites.

The one thing Late Archaic sites have in common is their proximity to streams. A survey north of Lake Ontario (Roberts 1985) shows the association of sites and streams. Rocky Ridge (Ramsden 1976), Knechtel (Wright 1972) and Inverhuron (W. Kenyon 1959) are also located near shallow waterways. This is also true of Thistle Hill, Bell (A.S.I. 1985), Crawford Knoll (I.Kenyon 1980b), and Innes (Lennox 1986). Streams can be used for travel, fresh water and are focal areas for deer (Banfield 1974) and beaver, both of which dominate Archaic faunal assemblages (Roberts 1980), as well as waterfowl and fish, both of which are found in assemblages. Fish weirs, like those found at Atherley Narrows (Johnston and Cassavoy 1978), could have been used extensively in streams near upland sites but leave no archaeological evidence, although they may have been better used in the larger waterways.

The most important factor for all Late Archaic settlement is a location within diverse environmental microcosms. The Inverhuron sites represent warm season adaptations to the lake edge environment (Ramsden 1976). Crawford Knoll is a spring to fall adaptation to a marshland environment (I. Kenyon 1980b; Ellis, Kenyon and Spence n.d.), and Thistle Hill, Innes (Lennox 1986) and Welke-Tonkonoh (Muller 1988, 1989) represent upland adaptations to areas near stream-side environments. The tool assemblages represent adaptations to the particular needs present at each site, with each assemblage representing a slightly different response to environmental pressures. Each response optimizes what is available.

The distribution of Late Archaic sites indicates the extensive re-occupation of specific areas within diverse microenvironments in southern Ontario. These areas include the McIntyre Site (Johnston 1984) in the Rice Lake area near Peterborough, the Inverhuron cluster (Kenyon 1959; Wright 1972; Ramsden 1976), Welke-Tonkonoh (Muller 1988) and the Grand River Valley near Brantford (personal observation). An examination of the maps in Roberts' survey north of Lake Ontario (1985) indicates site clusters around or near the headwaters or sides of small streams or creeks. The field where Thistle Hill is located contains at least 10 distinct Archaic occupations. If microenvironments each contain locally available and distinct flora and fauna, the most productive areas and therefore those utilized most would be areas with overlapping or diverse microenvironments. These clusters of Late Archaic sites are indicative of the extensive re-occupation of rich and productive environments and represent the horizontal equivalent of vertically stratified sites. This incorporates the optimization model idea that sites will be located near an assortment of resources, so that if one is not available, others can be utilized (Jochim 1983).

There is an assumption pervasive in the literature that there was a littoral/inland, summer/winter, macro/microband dichotomy during the Late Archaic. This has been extrapolated from the Woodland period and historic Ojibway (Ellis, pers. comm. 1989), Ramsden's (1976) interpretation of the Rocky Ridge site as an adaptation to a narrow strip of mixed environment along the shore of Lake Huron, and from analogies with Michigan fishing camps around Lake Huron. This hypothesis has been incorporated and extrapolated to the Archaic in general (eg. Roberts 1980; 1985) and for the Small Point Late Archaic of southern Ontario (eg. Ellis, Kenyon and Spence n.d.: 83). Sites such as Innes (Lennox 1985) and Welke-Tonkonoh (Muller 1988, 1989) are defined as winter occupations based on archaeological data and their inland location. Although the seasonal occupation of Thistle Hill is ambiguous, it was possibly a warm season base camp which does not fit the generally accepted pattern. Although many littoral Late Archaic Small Point sites are identified as warm season, for example Crawford Knoll (I. Kenyon 1980b), Rocky Ridge (Ramsden 1976) and Inverhuron (W. Kenyon 1959), and Knechtel I (Wright 1972), for which there must be winter sites which could be in an upland environment, it does not rule out the possibility that upland sites such as Thistle Hill may also be warm season occupations. Late Archaic settlement and subsistence may be more complex than is usually inferred, with many variations throughout southern Ontario. Micro-environments were exploited, but in a variety of ways.

Implicit in this littoral/inland, summer/winter dichotomy is the idea that Small Point Late Archaic people needed the rich lakeshore environment to survive. If Cleland's Focal-diffuse model (1976) is adopted, Late Archaic people would have been utilizing all available resources. This analysis has shown that the mixed-forest southern Ontario environment around Thistle Hill is rich and varied and capable of supporting a population year-round. If an inland site location is plausible during the winter, then the inland environment would certainly support a hunter-gatherer population during summer. In fact, those areas in southern Ontario with a dense Late Archaic site location all have an environment sufficiently varied so as to support a nomadic hunting and gathering population. Obviously some Small Point Late Archaic people occupied the lakeshore environment during summer because it is also rich in resources. The Inverhuron Late Archaic sites focused on the lake-edge environment in summer rather than the lakeshore (Ramsden 1976; Wright 1972), but the Crawford Knoll summer occupation was focused towards a marshland environment (I. Kenyon 1980b; Ellis, Kenyon and Spence n.d.) indicating there are Late Archaic differences in microenvironment adaptation. Subsistence was focused on rich and abundant resource areas where microenvironments overlap, but with regional variation. Broad and Small Point occupations both seem to indicate a site location focusing on similar microenvironments suggesting a similarity in settlement and subsistence, for which differences in tool assemblages may represent temporal differences between related tool kits.

Although usually implicit, there is a presumed micro/macroband dichotomy for the Late Archaic based on the assumed continuity with the Early Woodland period (eg. Spence and Fox 1986). There is no available archaeological evidence to conclusively show Late Archaic macroband encampments. Most large sites have mixed assemblages, indicating not one but many occupations. For example, the McIntyre site (Johnston 1984) north of Rice Lake has been interpreted as a large summer base camp, implying a macro-band encampment. But the tool assemblage and radiocarbon dating indicate periodic re-occupation through time, contradicting the interpretation of a single, large occupation or macro-band encampment. Each subsoil feature at McIntyre might feasibly represent a different occupation. Thistle Hill may be a warm season base camp occupied by a single family, and at 20 x 18 metres, is too small for a macro-band population. Upland microenvironment exploitation would have supplied a consistent and reliable food source, but it might not have supported a large aggregation of people.

Cleland (1976) discusses territoriality as part of the diffuse adaptation, because each band had to have a complete knowledge of their area. The regional differences during the southern Ontario Late Archaic suggest small territories for each family band. Recent ethnographic research indicates that variability between hunter-gatherer bands is the norm rather than the exception (Hill and Hurtado 1989). The scheduled seasonal round could have incorporated band levels similar to Helm's (1968) Local Band, Task Group and Regional Band. Sites like Thistle Hill are the remains of a family or Local Band base camp occupation; the small flake scatters found throughout southern Ontario represent Task groups for hunting, fishing or gathering. As Helm emphasizes (1968:121), although everyone is aware of the Regional Band, it may never actually meet as a group. The exploitation of stream and creek-side areas would make it necessary to schedule occupation of these areas to fulfil subsistence needs. The re-occupation of Thistle Hill suggests that a family or local band returned to the same spot within a short time span, possibly within a year or two.

Stream Oriented Subsistence

The diverse forest surrounding Late Archaic sites makes it plausible that Late Archaic hunter and gatherers followed a diffuse adaptation by utilizing diverse micro-environments. As diffuse (Cleland 1976) and Optimization models (Jochim 1976; 1983) suggest, site location is manipulated to exploit a variety of subsistence resources. This discussion has shown that Late Archaic sites occupy environmental niches near creek, stream or river edges. ~~Within walking~~ distance of Late Archaic sites are a multitude of diverse microenvironments, from the wetlands along side the water edge, to the hilly dry upland area dominated by oaks. These locations would allow the exploitation of many subsistence resources and represent a generalized adaptation, fortifying Cleland's (1976) interpretation of a diffuse adaptation for the Late Archaic. Streams would be focal points for deer, beaver, waterfowl and other small game, and could be fished using weirs. As well, nuts, berries and other plant life would be available seasonally. These same upland areas could be used for hunting during the cold season when other subsistence alternatives are not available. For a discussion of available flora and fauna and their respective environments in the Great Lakes Region, see Yarnell (1964) and Cleland (1966).

Although upland Small Point sites are generally thought to represent an adaptation to a winter environment, a warm season occupation is also possible. The analysis of Thistle Hill has shown that an inland summer occupation in a mixed microenvironment within the Carolinian-Transitional biotic zone is plausible. Both Innes and Welke-Tonkonoh are far from the shore of Lake Erie and there are no small lakes nearby. These sites are interpreted as fall to winter camps and are part of a littoral/inland seasonal dichotomy (Lennox 1986, Muller 1988, 1989). But I suggest that their upland location near creeks or streams indicates that they are part of an upland seasonal round oriented towards riverine environments to exploit the rich variety of surrounding microenvironments.

The Small Point Late Archaic of southern Ontario is an adaptation towards microenvironments, an adaptation similar to the Broad Point and possibly Narrow Point settlement and subsistence patterns, as well as the earlier Brewerton/Laurentian complex. There are regional variations throughout southern Ontario as to the location of preferred microenvironments and therefore subsistence. But an upland location should also be considered as a possible warm season settlement and subsistence alternative.

CHAPTER 6
SUMMARY AND CONCLUSIONS

Thistle Hill (AhGx-226) is an inland Small Point Late Archaic site located near Glanford corners, south-central Ontario, in the Transitional zone between the Carolinian and Canadian biotic provinces. The site is located 33 m from a tributary leading to the Twenty Mile Creek, around which the environment varies between wet lowlands, dry uplands and the mesic or intermediate zone. Flora and fauna vary between these patchy environments or microenvironments within the mixed forest environment.

Thistle Hill is 20 x 18 metres in size and features represent two 4 metre oval house or tent floors with internal pits and hearth(s). Feature 3 is an external pit. Based on their location, internal debitage distributions and flake sample differences, the features each represent a distinct occupation. Two work areas are indicated by the location of tools in the topsoil, possibly with a third near feature 3. Based on the tool assemblage, the Innes points, and a radiocarbon date of 3440+-75 B.P., Thistle Hill is a Small Point site later than Crawford Knoll (I. Kenyon 1980b) and Knechtel I (Wright 1972) but earlier than Innes (Lennox 1986), Inverhuron (W. Kenyon 1959), Welke-Tonkonoh (Muller 1988, 1989), and Rocky Ridge (Ramsden 1976). It is a biface manufacturing site for producing preforms, probably to be cached for future use, traded, or carried as tool blanks to be retouched into formal tools when needed. Results of seasonality analyses are ambiguous and can be used to represent either a warm or cold season occupation.

The paucity of formal tools and the quantity of utilized flakes indicate a generalized occupation scheduled to exploit the plethora of diverse microenvironments adjacent to the stream edge. This stream-side location, oriented towards the available flora and fauna available from each microenvironment, would provide subsistence on a year-round basis. This correlates with a diffuse or optimization model where settlement locations would provide a variety of subsistence alternatives.

This interpretation questions the traditional littoral/inland, summer/winter, macro/microband seasonal round for the Small Point Late Archaic. A stream-oriented settlement and subsistence pattern best correlates with the available archaeological evidence from inland southern Ontario Late Archaic sites. These do not necessarily represent winter occupations for a littoral/inland adaptation. Regional subsistence differences, indicative of the exploitation of distinct microenvironments, are evident between sites and reinforce the variability of hunter-gatherer subsistence (Hill and Hurtado 1989). This also reinforces Cleland's (1976) general or diffuse subsistence and settlement pattern and incorporates resource optimization (Jochim 1983). Resources might have been limited if all Late Archaic people focused on a similar subsistence (littoral) base. Regional differences suggest small band or family territories, in which each band would utilize a series of creek or stream-side environments within a limited area. This is shown by the possible reoccupation of Thistle Hill by one (family?) group.

Site clustering and/or the reoccupation of specific areas, for example the McIntyre site (Johnston 1984), the Inverhuron cluster (W. Kenyon 1959; Wright 1972; Ramsden 1976), the Grand River Valley near Brantford, Ontario (pers. observation), and Thistle Hill among others, indicate the reoccupation of preferred environmental zones or a location near the richest microenvironment, and represent the horizontal equivalent of vertically stratified sites. These site clusters are in areas where a multitude of diverse microenvironments overlap, providing a plethora of flora and fauna subsistence possibilities. Some sites indicate an spring and summer occupation oriented towards the lake edge environment, for example Rocky Ridge (Ramsden 1976), Inverhuron (W. Kenyon 1959) and Knechtel (Wright 1972), or towards a marshland environment, for example Crawford Knoll (I. Kenyon 1980a) and perhaps McIntyre (Johnston 1984). There is enough variation between warm season occupations to suggest that an inland location should not relegate a site to a winter occupation. As discussed for Thistle Hill, there is an ample subsistence base for a warm season occupation.

In conclusion, Thistle Hill is a Late Archaic Small Point inland site, occupied around 3440+-75 B.C. It may represent an occupation by nuclear or extended family or local band in an area where the exploitation of several microenvironments is possible, and may have occurred at any time of year. This interpretation questions the generally accepted pattern of summer/winter, littoral/inland dichotomy for the Small Point Archaic. There is enough variation in preferred settlement location for the Late Archaic that some inland sites may represent part of a year-round settlement and subsistence adaptation oriented towards inland creeks, streams and rivers, around which the surrounding microenvironments contain a diverse variety of flora and fauna.

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APPENDIX

Table A.1 provides the metrics for cores from Thistle Hill. Material (Mat.) is indicated by A for Ancaster chert and O for Onondaga. Length, Width and Thickness (Thick) are presented in mm, and Weight is provided in grams. Cortex is marked as P for present or A for absent, and Condition (Cond.) indicates whether the core was whole (W) or fragmented (F).

Table A.1
Core Metrics

No.	Unit	Level	Mat.	Length	Width	Thick	Weight	Cortex	Cond.
196	503-58		A	48.0	38.8	15.7	25.0	A	F
912	514-56		A	44.4	37.3	16.2	20.0	A	F
974	507-61		O	31.5	38.2	13.9	11.7	P	F
235	504-58	5-10	O	19.9	27.1	15.3	7.3	A	F
116	508-59		O	27.1	17.2	10.0	4.6	A	F
958	505-62		O	30.1	42.3	10.3	10.7	A	F
617	513-55		O	44.4	39.9	17.3	14.2	P	F
544	511-56	0-5	O	36.0	37.8	17.3	17.3	P	F
914	514-57		O	33.7	21.9	10.3	7.3	P	F
334	506-57	10-15	O	60.7	22.7	16.5	18.9	P	W
911	514-56		O	35.4	46.1	15.8	16.6	A	W
528	510-61	20-Sub	O	38.1	33.7	16.7	20.4	A	W
46	508-58		O	23.3	43.3	12.2	9.6	A	F
470	509-55		O	32.1	37.6	13.3	10.1	A	F
50	510-59		O	39.1	34.5	15.0	22.3	P	F
52	512-54		O	38.1	38.8	13.1	5.0	A	F
928	515-57		O	29.8	31.6	11.3	10.1	P	F
59	508-54		O	32.4	33.6	11.1	10.6	A	F
917	514-58		O	29.0	22.9	8.2	5.5	A	F
825	510-58	1D	O	25.5	28.1	13.2	8.0	A	F
436	508-52		O	26.5	32.3	13.3	10.0	A	F
427	507-60	20-Sub	O	48.3	24.3	14.0	12.4	A	F
832	510-59	1A	O	33.7	30.7	10.7	8.1	A	F
742	508-57	2C	O	30.9	19.5	13.1	5.5	A	F
165	510-54		O	31.5	22.7	10.3	4.7	A	F
883	502-55		O	29.5	19.8	10.9	4.6	A	F
363	508-62		O	22.3	22.2	8.7	5.1	A	W
799	509-59	1C	O	31.8	27.4	10.1	7.3	P	F
16	508-57	0-5	O	37.2	18.1	14.0	7.2	P	F
991	508-60		O	24.6	46.2	15.7	5.9	P	F
300	505-58	20-Sub	O	29.0	21.6	11.9	6.0	P	F

Table A.1 continued.

No.	Unit	Level	Mat.	Length	Width	Thick	Weight	Cortex	Cond.
750	508-57	2E	0	28.2	21.6	9.2	4.8	A	F
920	514-60		0	28.3	20.7	7.2	3.8	P	F
325	506-56	5-10	0	27.8	23.9	10.5	6.4	A	F

Table A.2 provides Hammerstone size in mm and weight is in grams.

Table A.2
Hammerstone Metrics

Cat. No.	Unit	Level	Length	Width	Thick	Weight
822	510-58	1C	78.4	64.0	55.2	339.8
304	505-59	15-Sub	77.1	61.1	48.2	305.2
314	505-63		69.0	50.7	40.3	157.4
263	504-64		63.2	54.1	31.6	116.4
863	511-60	1B	35.8	33.6	25.6	32.9
357	506-59	15-Sub	36.9	32.8	28.3	51.6

Tables A.3 to A.6 provide data on whole Tertiary and Tertiary-Biface Thinning flake measurements from the topsoil and feature samples. Data is provided in percent by row with the quantity of flakes per range included in brackets beneath. Onondaga flakes samples are indicated by T = topsoil, 1 = Feature 1, and 2 = feature 2. Ancaster chert flakes are from the topsoil sample. Flakes are discussed by type and material, and measurements are coded as follows:

Length
A) 0 - 15.0 mm;
B) 15.1 - 30.0 mm;
C) 30.1 - 45.0 mm;
D) 45.1 - 60.0 mm;
E) 60.1 - 75 mm.

Width
A) 0 - 10.0 mm;
B) 10.1 - 20.0 mm;
C) 20.1 - 30.0 mm;
D) 30.1 - 40.0;
E) 40.1 - 50.0 mm.

Thickness
A) 0-5.0 mm;
B) 5.1 - 10.0 mm;
C) 10.1 - 15.0 mm;
D) 15.1 - 20.0 mm;
E) 20.1 - 25.0 m.

Table A.3
Onondaga Chert Tertiary Flake Size

	Sample	A	B	C	D	E	TOTAL
Length							
	T	34.0	64.8	1.1	0	0	100%
		(30)	(57)	(1)			(88)
	1	39.1	60.9	0	0	0	100%
		(9)	(14)				(23)
	2	18.6	51.8	25.9	3.7	0	100%
		(5)	(14)	(7)	(1)		(27)
Width							
	T	11.4	68	21.6	1.1	0	100%
		(10)	(60)	(17)	(1)		(88)
	1	8.7	65.2	17.4	8.0	0	100%
		(2)	(15)	(4)	(2)		(23)
	2	33.3	37.0	18.6	7.4	3.7	100%
		(9)	(10)	(5)	(2)	(1)	(27)
Thickness							
	T	2.7	63.6	29.5	4.6	0	100%
		(2)	(56)	(26)	(4)		(88)
	1	8.7	52.2	26.1	13.0	0	100%
		(2)	(12)	(6)	(3)		(23)
	2	29.6	29.6	37.0	3.7	0	100%
		(8)	(8)	(10)	(1)		(27)

Table A.4
Onondaga Tertiary-Biface Thinning Flake Size

	Sample	A	B	C	D	E	TOTAL
Length							
	T	55.6	41.9	2.6	0	0	100%
		(65)	(49)	(3)			(117)
	1	67.1	32.9	0	0	0	100%
		(55)	(27)				(82)
	2	67.6	32.4	0	0	0	100%
		(25)	(12)				(37)
Width							
	T	41.5	49.1	8.5	0.8	0	100%
		(49)	(58)	(10)	(1)		(118)
	1	43.9	45.1	11.0	0	0	100%
		(36)	(37)	(9)			(82)
	2	56.8	37.8	5.4	0	0	100%
		(21)	(14)	(2)			(37)

Table A.4 continued

Sample	A	B	C	D	E	TOTAL
Thickness						
T	59.8	35.0	4.3	0.9	0	100%
	(70)	(41)	(5)	(1)		(117)
1	69.5	30.5	0	0	0	100%
	(57)	(25)				(82)
2	67.6	29.7	2.7	0	0	100%
	(25)	(11)	(1)			(37)

Table A.5
Ancaster Chert Tertiary Flake Size
(Topsoil Sample)

	A	B	C	D	E	TOTAL
Length						
	42.8	53.6	3.6	0	0	100%
	(12)	(15)	(1)			(28)
Width						
	14.3	67.9	17.8	0	0	100%
	(4)	(19)	(5)			(28)
Thickness						
	10.7	53.6	25.0	7.1	3.6	100%
	(3)	(15)	(7)	(2)	(1)	(28)

Table A.6
Ancaster Chert Tertiary-Biface Thinning Flake Size
(Topsoil Sample)

	A	B	C	D	E	TOTAL
Length						
	60.0	37.5	1.5	0	0	100%
	(24)	(15)	(1)			(40)
Width						
	37.5	62.5	0	0	0	100%
	(15)	(25)				(40)
Thickness						
	55.0	40.0	5.0	0	0	100%
	(22)	(16)	(2)			(40)

PLATE 1
Air Photo of the Thistle Hill Site and Environs
(Site is the Square in the Centre of Photo)

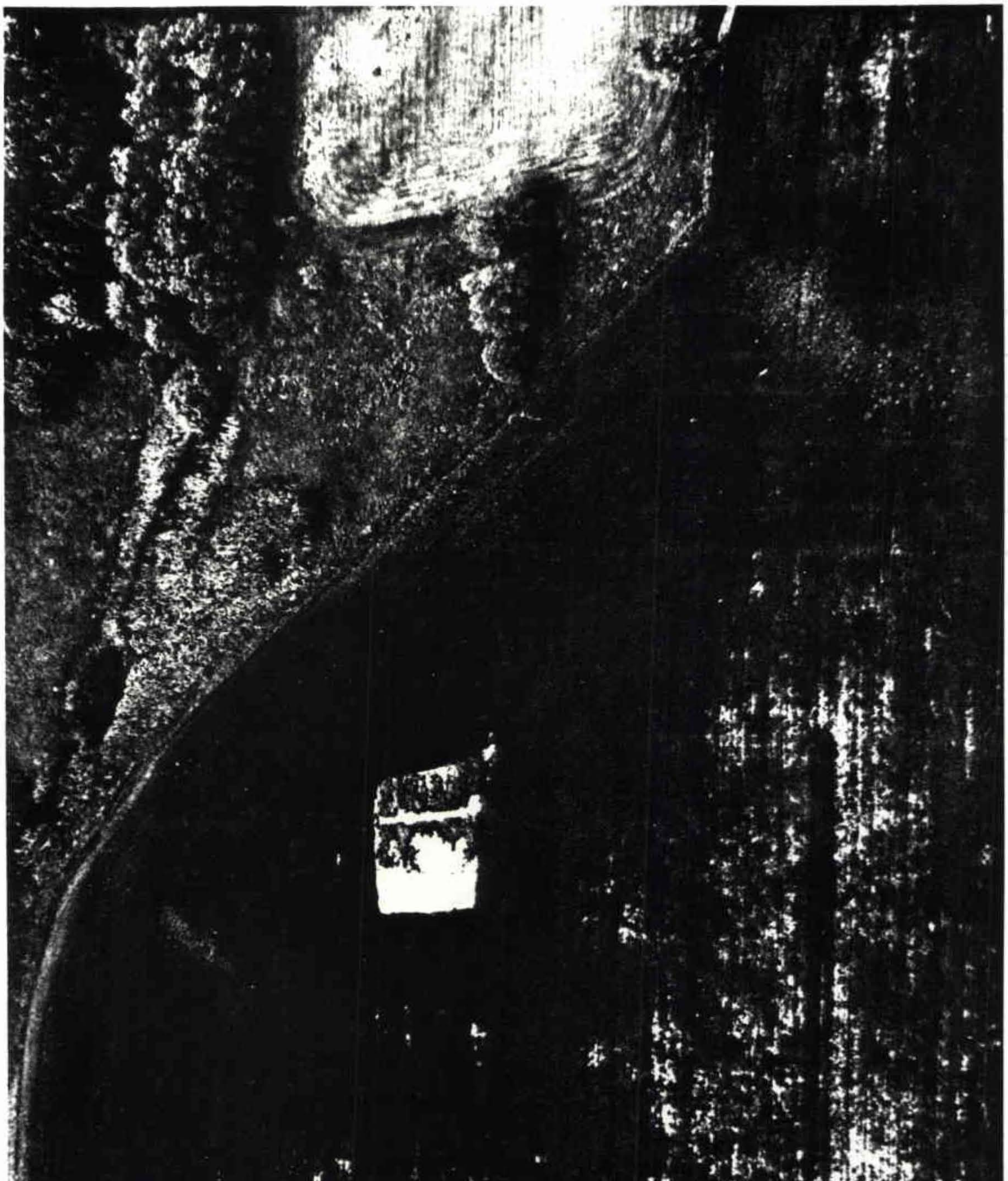

PLATE 2
Thistle Hill and Environs
(Site is in the Centre of Photo)

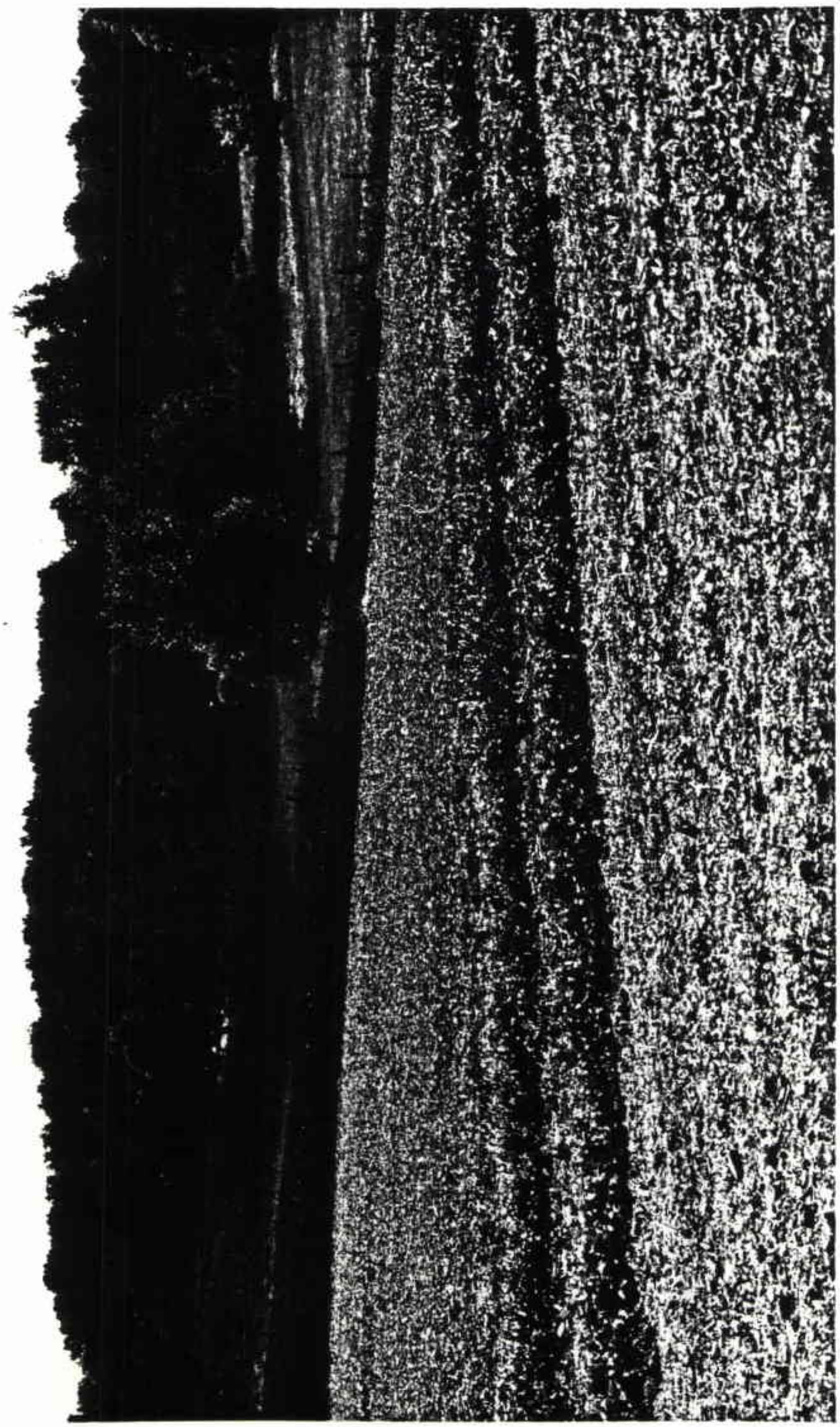

PLATE 3
Features 1 (lower left) and 2 (upper right)
Scale is 2 metres long

PLATE 4
Feature Excavation

PLATE 5
Example of Feature Profile

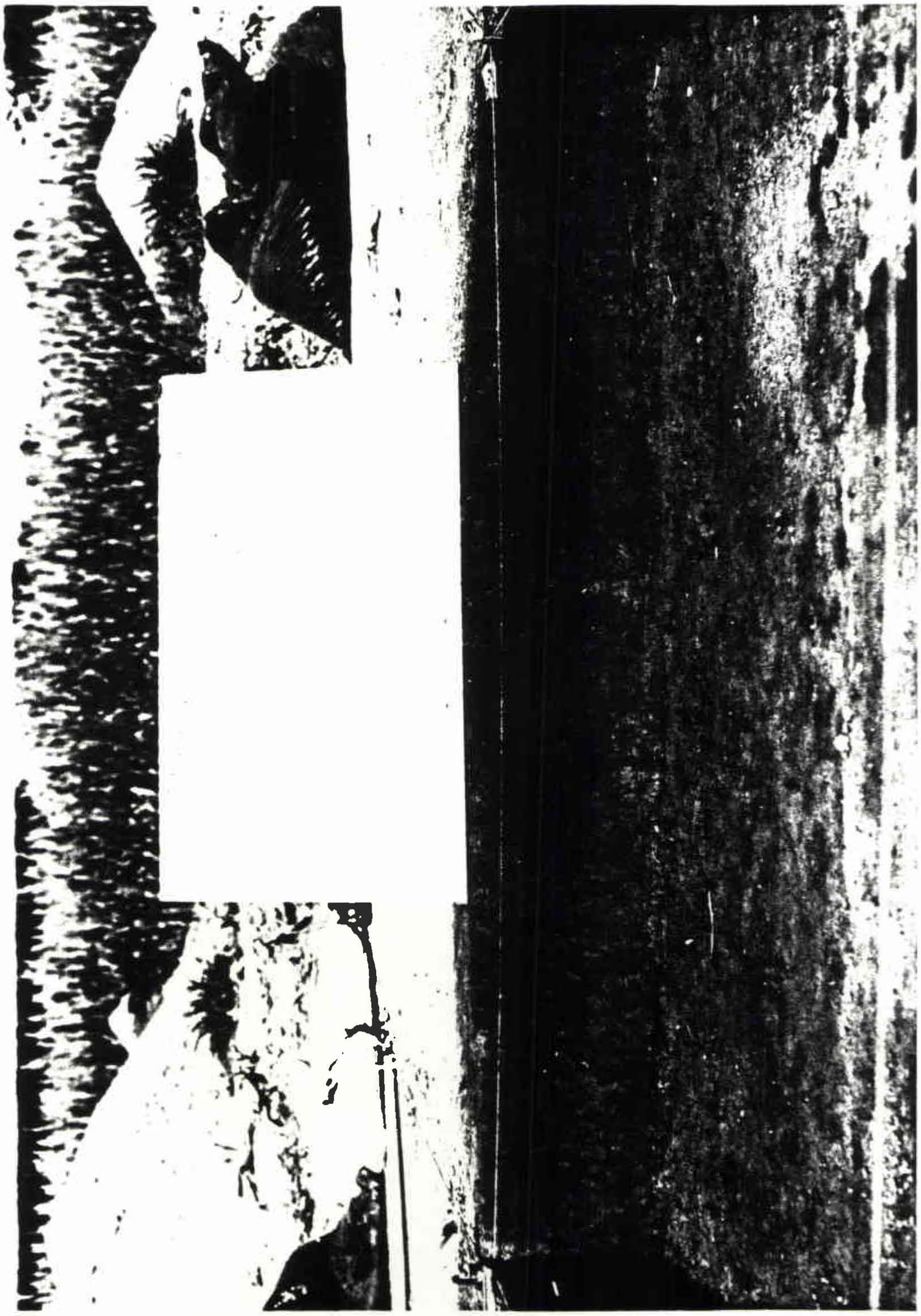

PLATE 6
Diagnostic Points

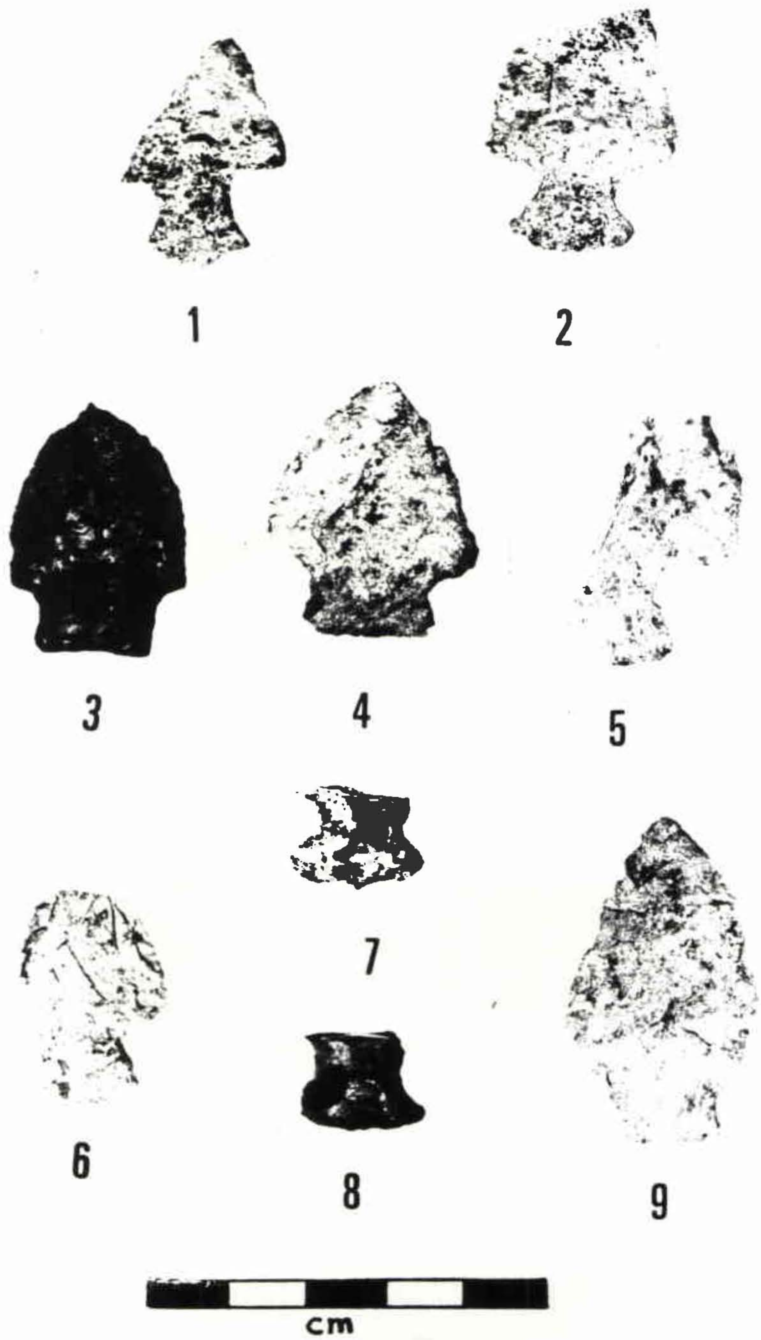

PLATE 7
Biface Preforms

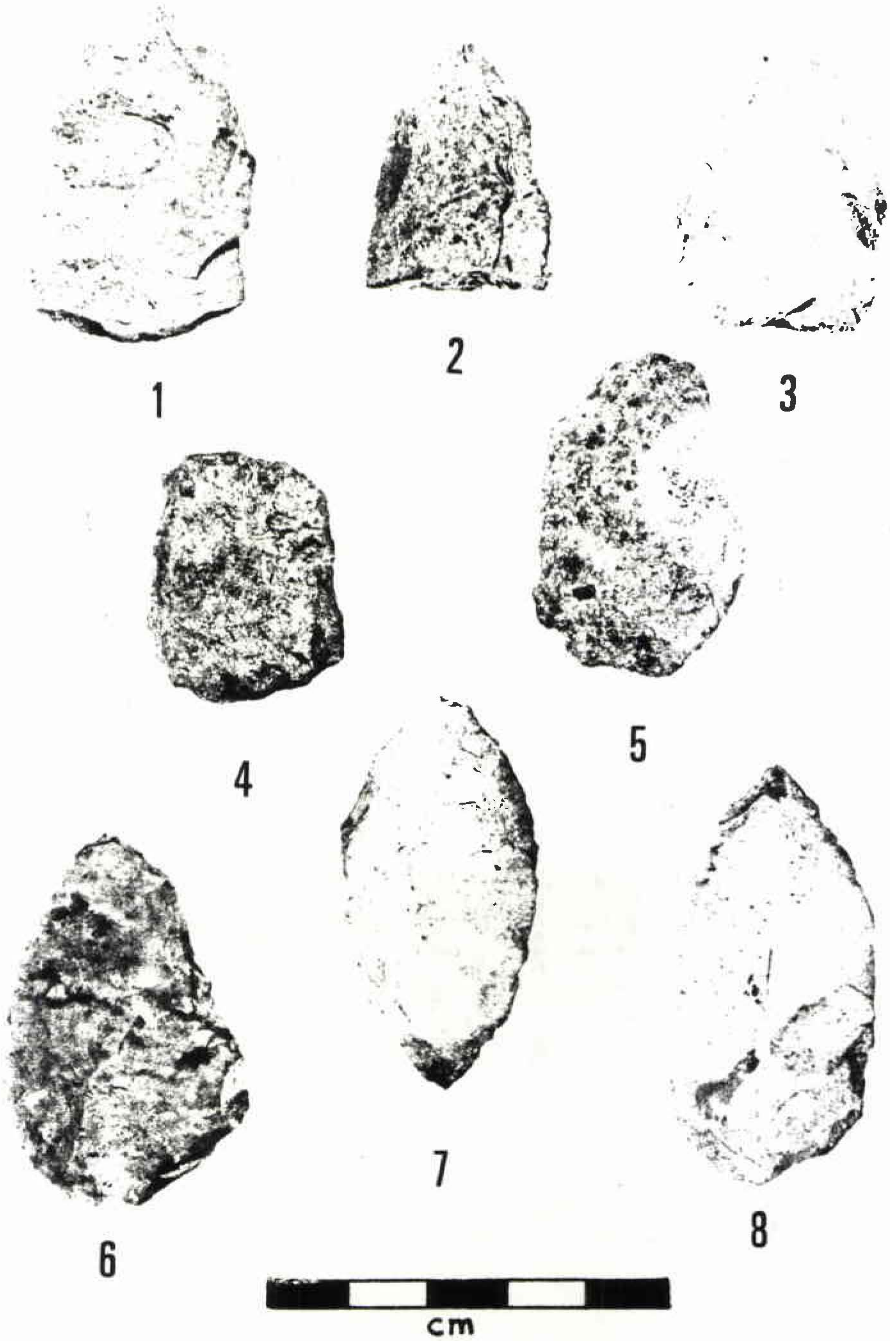

PLATE 8
Biface Fragments

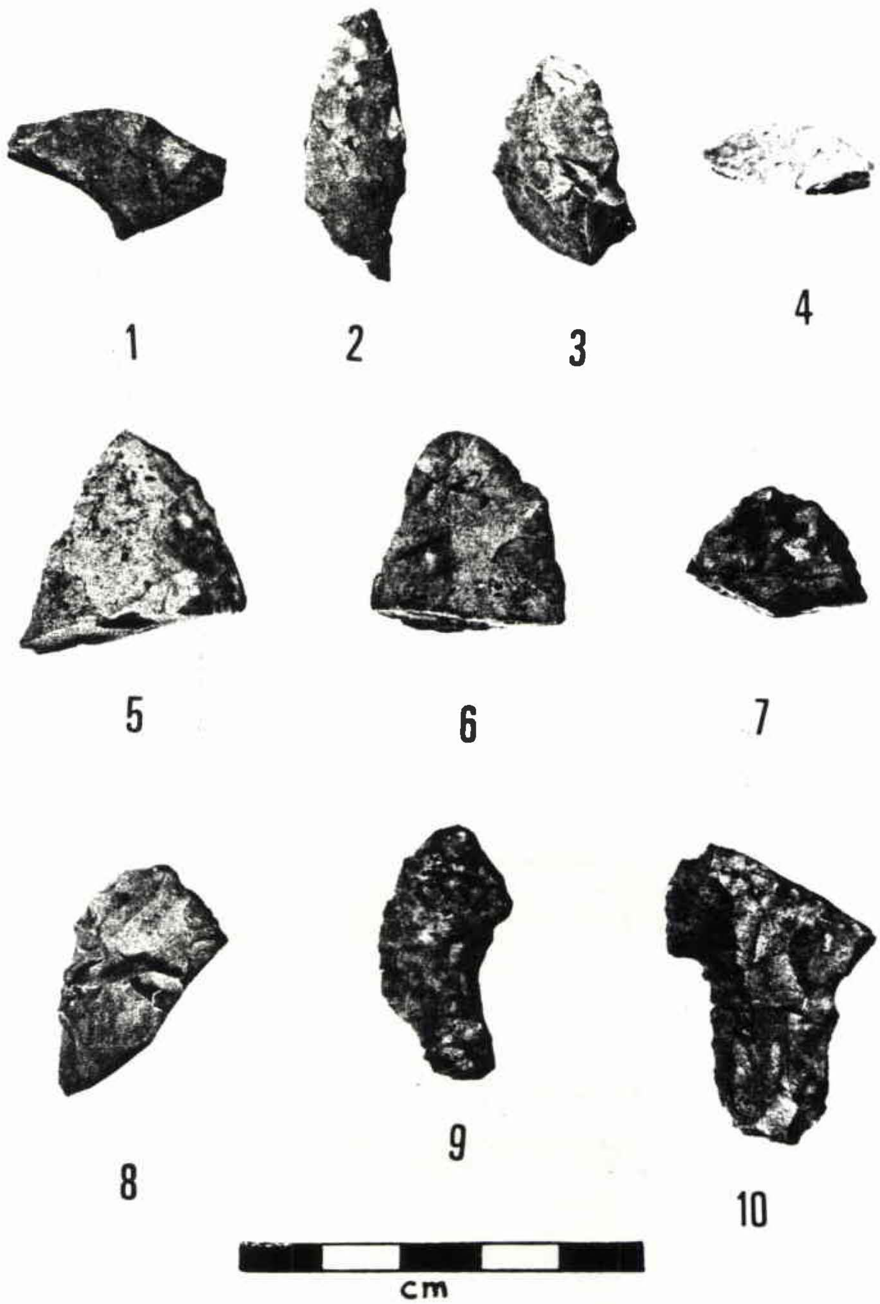

PLATE 9
Drill and Knife Fragments

PLATE 10
Utilized Flakes
(Gravers, Spokeshaves, and General)

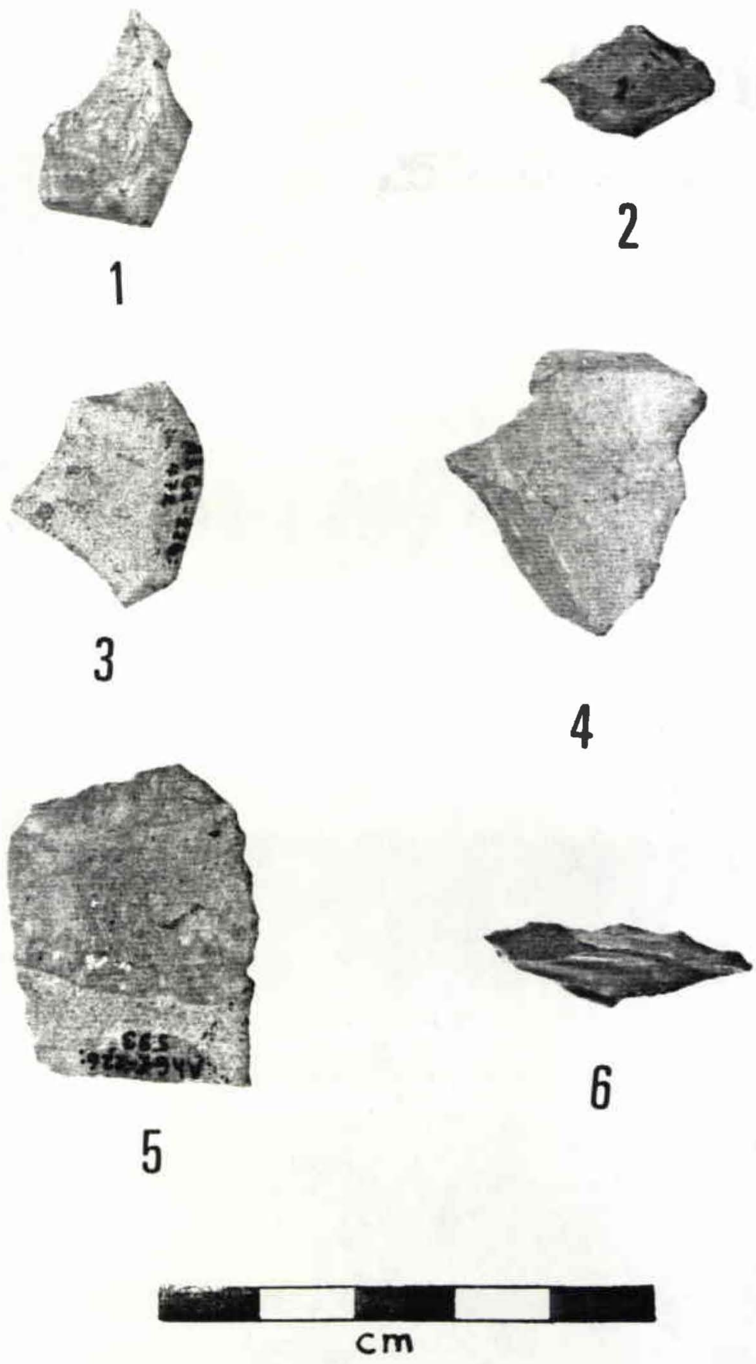

PLATE 11
Blade Flakes

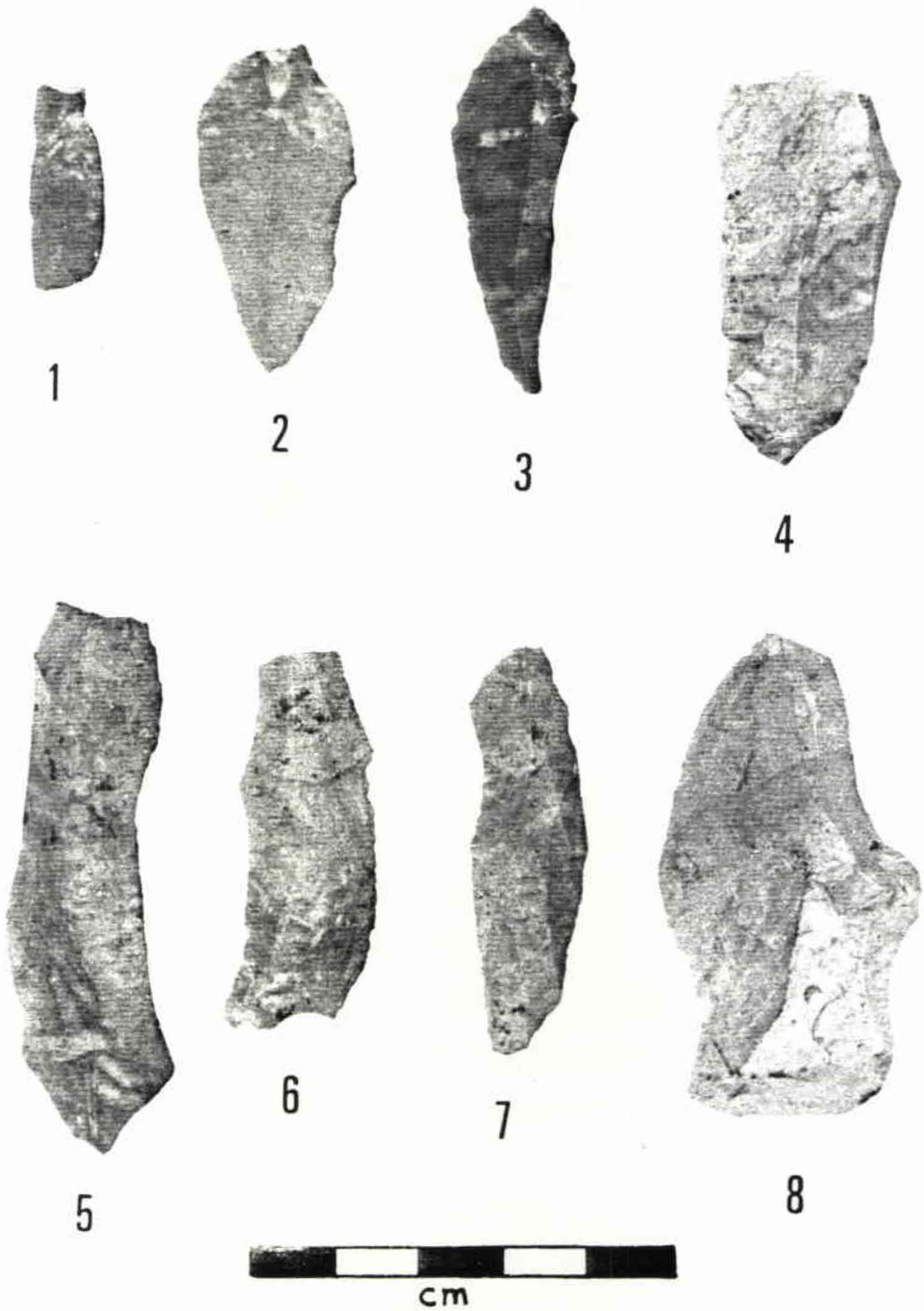

PLATE 12
Scraper or Distally Utilized Flakes

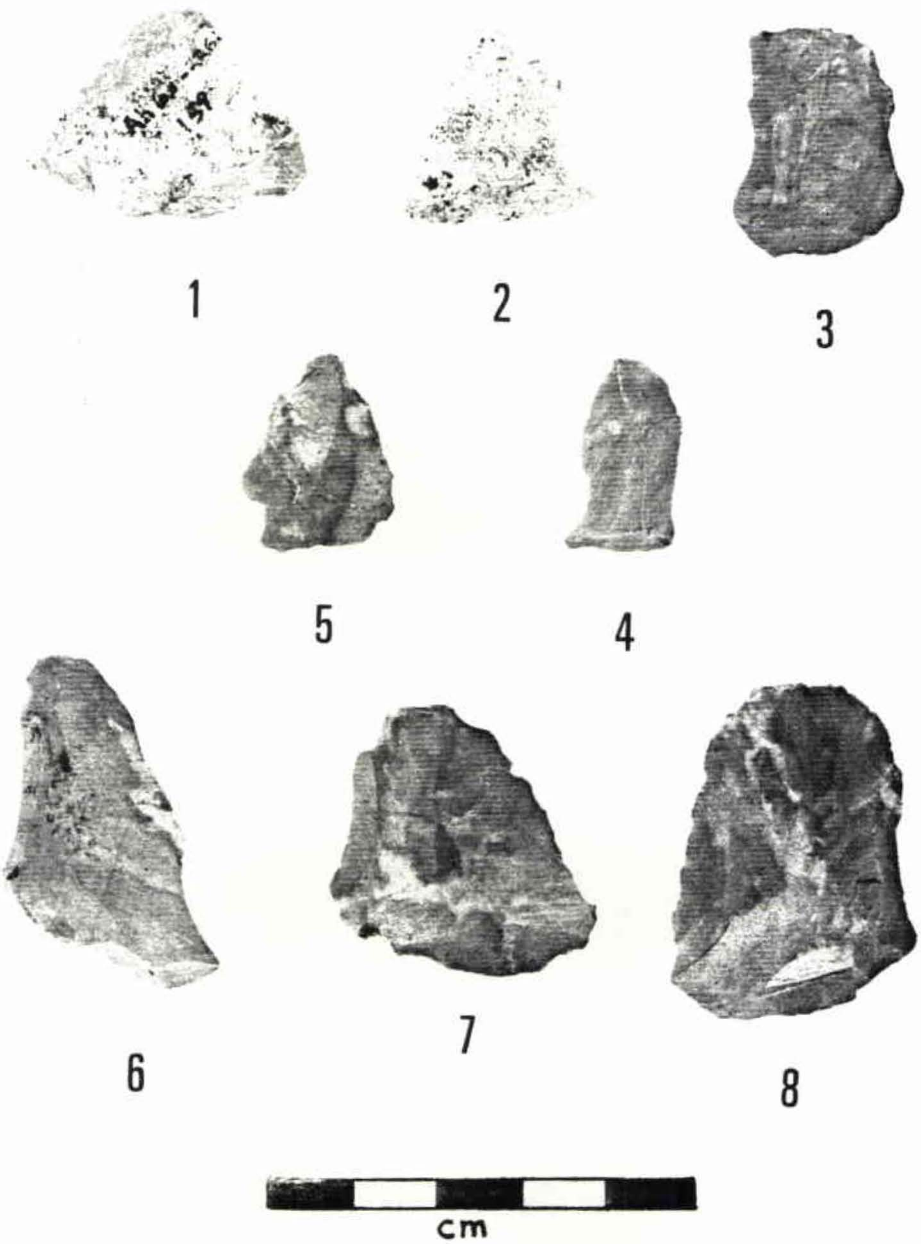

PLATE 13
Chopper Tool

PLATE 14
Pecking Tool