QUERIES NEAR THE QUARRY:

A TECHNOLOGICAL ANALYSIS OF THE JESSUP LITHIC WORKSHOP SITE

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A TECHNOLOGICAL ANALYSIS OF THE JESSUP LITHIC WORKSHOP SITE

By

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ABSTRACT

The prehistory of the Lake Abitibi area has remained largely untold. Ridley's excavations in the 1950's and early 1960's showed that Lake Abititi had been a focal point for prehistoric activities over the last 4,000 - 5,000 years. Since that time, however, few excavations have been conducted and the chronological sequence today contains many gaps.

Upon the advice and encouragement of Dr. Wm. Noble of McMaster University, who drew my attention to this area, an archaeological investigation under my direction was carried out in the Lower Bay area of Lake Abitibi, in the summer of 1979. Here the remains of a rich and extensive site called Jessup, had been found three summers previously along the beaches by local amateur archaeologists Marjorie and Justin Jordan. The Jordans' findings strongly indicated that this was a lithic workshop site, inhabited by both Archaic and Laurel peoples. Our survey and excavation in Lower Bay rapidly proved this to be the case.

The Jessup site was a workshop and habitation site inhabited by both Shield Archaic and Laurel peoples over a period of approximately 3,000 years. This thesis has examined the lithics, ceramics and faunal material from Jessup. Its major contribution is the in-depth descriptive analysis of the lithic detritus and tools recovered from the site for the purpose of determining the types of raw material reduced at the site, their sources and the strategies used by the respective occupants of the site.

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Thanks must also go to Dr. Michael Bisson of McGill University, who initially sparked my interest in lithic analysis.

Credit for suggesting the Jessup site on Lake Abitibi as a thesis topic must go to Dr. Wm. C. Noble, who knew that I was "itching" to tackle archaeological research in a relatively unknown and isolated area in northern Ontario. His help, encouragement and interest are most gratefully acknowledged.

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I would also like to thank Mary and Gary Jessup for their advice and help. They, along with the Jordans, initially discovered the Jessup site while surveying along the beaches of Lower Bay, and generously allowed me to study and photograph their beach findings.

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

TABLE PAGE

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF PLATES

CHAPTER 1

1 INTRODUCTION

Archaeological research in northeastern Ontario has spanned a period of 34 years, and within that time spurts of intensive research have been carried out by Ridley, Lee, Knight, Pollock, Noble and Brizinski. This chapter will summarize the research conducted by these archaeologists beginning regionally with Ridley's excavations and surveys in 1948, through to the surveys done by Marjorie and Justin Jordan at the Jessup site, the subject of this study. Following this discussion of past research, the specific goals of this thesis will be outlined.

Pioneering efforts to open up northeastern Ontario were conducted by Frank Ridley and Thomas Lee during the years 1948 to 1953. Their research provided the foundation for all subsequent research in northeastern Ontario. During this time, Ridley surveyed and excavated prehistoric and historic sites along the shores of Lakes Temiskaming and Nipissing, discovering such sites as the Frank Bay site on Lake Nipissing in 1948 (Ridley, 1954), and the Montreal River site on Lake Temiskaming in 1953 (Ridley, 1957). Both of these sites contained Archaic, Woodland and Historic components.

Sixty miles to the west of Frank Bay, Thomas Lee discovered and excavated in the early 1950's, the remarkable quarry workshop site Sheguiandah, with palaeo-Indian, Archaic and Woodland affiliations (Lee, 1954, 1955, 1957, 1964).

More recent surveys and excavations which have served to further refine the cultural history of northeastern Ontario, have been conducted by Knight, Pollock, Noble and Brizinski. Dean Knight surveyed and excavated sites in the Cobalt-Lake Temiskaming area in 1969, 1971 and 1972. Knight reopened the stratified Montreal River site which Ridley had initially excavated, and uncovered the presence of at least two Archaic phases as well as a Woodland phase extending in time from 3000 B.C. to 180 B.C. (Knight, 1977).

In 1972 and 1973, John Pollock located a total of 54 archaeological sites in the Kirkland Lake District. Three of the sites were excavated and were found to have two phases of Shield Archaic present, guess-dated from 3000 B.C. - 800 B.C., a Laurel occupation estimated at 300 B.C. - A.D. 500, plus Historic Algonquians, Ojibwa and Cree who inhabited the area from A.D. 1650 to the present and A.D. 1750 to the present respectively. Two additional occupations postulated for this area are a Northern Plano presence (ca. 5000 B.C. - 4000 B.C.), and a Laurentian Archaic presence (ca. 4000 B.C. - 3000 B.C.) (Pollock, 1976).

Wm. C. Noble's surface collection at the Pearl Beach site on Larder Lake in 1973 and his excavation in 1977, as well as his discovery of eleven additional sites during the 1977 field season also indicate an extensive utilization of the Larder Lake area from the Archaic, guess-dated from about 3000 B.C., to the present (Noble, 1979).

In 1978, Morris Brizinksi reopened the stratified Frank Bay site and excavated two additional sites along the southern shore of Lake Nipissing demonstrating that the area was inhabited from 3255 B.C. to the present by Archaic (Shield and Laurentian?), Middle Woodland, Late Woodland and Historic peoples (Brizinski, 1980).

To the east of Lake Abitibi, in the province of Quebec, archaeological research was conducted in the Mistassini-Albanel area by Rogers and Rogers in 1947 and 1948, and Rogers and Bradley in 1950. The initial analysis of this material by Johnson (1948), pointed out that the material was unusual and resembled the European Paleolithic. Not until the late 1960's were the Mistassini-Albanel assemblages identified as Plano and Shield Archaic, and thus likely to represent an occupation of the central region of Quebec from ca. 5000 B.C. until A.D. 1000 (Martijn and Rogers, 1969).

The announcement of the construction of the extensive James Bay hydro electric project in 1972 in northern Quebec, initiated a flurry of archaeological research after 1972 by such archaeologists as James Chism (1976, 1977, 1978), Marcel Laliberté (1976), Jean Mandeville, Jocelyn Seguin (1976) and David Denton (1977, 1978). Their research will aid considerably in refining the prehistory of the subarctic region of northern Quebec.

1.1 Cultural Chronology of Northeastern Ontario

The cultural chronology for the prehistory of northeastern Ontario can be summarized as follows. The earliest occupation in the area begins with the posited presence of Plano Archaic peoples approximately 6,000 - 7,000 years ago (Pollock, 1976). The major characteristics of this culture include the production of unfluted lanceolate tools, and the utilization of "ripple" (Wright, 1972) or collateral flaking. The subsistence strategy was geared towards the hunting of big game.

Pollock appears to suggest the early presence of Plano in northeastern Ontario in the Kirkland Lake District, on the basis of a single projectile point excavated from Area C at the Pearl Beach site (Pollock, 1976, Figure 60:1). It showed a remarkable similarity in size and form to the Acasta Lake point type described by Noble (1971) from the Acasta Lake site in North West Territories, dated at 5020 ± 360 B.C. (Pollock, 1976:138). Pollock does however sound a cautionary note when defining its affiliation. "Although the point may not be related in any way to the Acasta Lake complex, its form and association with large bi-pointed and crude uni-pointed plano-convex quartzite implements suggest an early cultural complex for this geographical locality; a date of 3-4000 B.C. does not seem unreasonable" (Pollock, 1976:139).

The next postulated culture to inhabit northeastern Ontario after the Plano is the Laurentian Archaic, with dates between ca. 5,000

TABLE 1.1

Prehistory of Kirkland Lake District

Period	Culture	Phase	Date
Historic	Ojibwa & Cree	Temagami	1750-Present
Historic	Historic Algonquians	North Temiskaming	1650-Present
Terminal Woodland	Northern Algonquians	Duncan Lake	1000 A.D. - 1650 A.D.
Middle Woodland	Laurel	"Eastern Laurel"	300 B.C. - 500 A.D.
Archaic	Shield Archaic	Mattawan	2000 B.C. - 800 B.C.
Archaic	Shield Archaic	Abitibi Narrows	3000 B.C. - 2000 B.C.
*Archaic	Laurentian Archaic (surface finds and lower level of Montreal R. site)		4000 B.C. - 3000 B.C.
*Plano	Northern Plano		5000 B.C. - 4000 B.C.

*Postulated cultures (Pollock, 1976:165)

Prehistory of Larder Lake

Period	Culture	Date
Historic	English/ Ojibwa ?	1800 - 1840 A.D.
Historic	French/ Algonkian	1720 - 1740 A.D.
Late Prehistoric	Larder Lake	1550-1600 A.D.
	Pearl Beach	1200-1400 A.D.
Middle Woodland	+ Laurel	500- 700 A.D.
Early Woodland	Meadowood	700- 500 B.C.
Archaic	Shield Archaic	1500-1000 B.C.
Archaic	Laurentian Archaic	3200-3000 B.C.

(Noble, 1980:15)

+ Laurel C-14 date from Pearl Beach 600 A.D. ± 90 (I-10, 974) (Noble, 1980:25)

TABLE 1.2

Prehistory of L. Nipissing

Period	Culture	Phase	Date
Contact	Nipissings		A.D. 1600 - A.D. 1700
Terminal Woodland	Iroquois		A.D. 1200 - A.D. 1600
	Pickering		
			A.D. 700 -
	Blackduck		
			A.D. 1200
	Mackinac		
Middle Woodland	+ Laurel		600 B.C. - A.D. 700
Archaic	Shield Archaic	Mattawan	1600 B.C. - 600 B.C.
Archaic	Shield or Laurentian Archaic (?)	Abitibi Narrows	3000 B.C. - 1600 B.C.
*Palaeo & Plano			8000 B.C. - 5000 B.C.

*Postulated cultures (Brizinski, 1980:209-263)

+Laurel C-14 date from Frank Bay 560 A.D. ± 40 (S1684) (Brizinski, 1980:224)

Prehistory of L. Timiskaming-Mtl. River

Period	Culture	Phase	Date
Middle Woodland	Laurel	Eastern Laurel	500 B.C. - A.D. 500
Archaic	Shield Archaic	Mattawan	2000 B.C. 800 B.C.
Archaic	Shield Archaic	Abitibi Narrows	3000 B.C. 2000 B.C.

(Knight, 1977:291)

and 6,000 years ago as suggested by Pollock (1976) and ca. 5,000 and 5,200 years ago according to Noble (1980). The Laurentian Archaic is mainly characterized by Otter Creek points, ground stone, pecked and native copper tools. To date, no native copper tools or Otter Creek points have been found in northeastern Ontario in an Archaic component (Noble, 1980:27). Ground stone and pecked tools have been found, however, and there is disagreement on the meaning of their presence in northern Ontario assemblages. Their appearance both in surface and excavated sites is sporadic, as has been noted by Pollock (1976), Noble (1980) and Brizinski (1980).

Environmental data can shed some light on the possible presence of the Plano and Laurentian Archaic cultures in northeastern Ontario.

No dates 6-7,000 years ago have been obtained for sites in northeastern Ontario, however recent geological and palynological evidence indicate that the area from the Ottawa River to Lake Abitibi was accessible ca. 7,900 B.P.. The fact that an open boreal forest followed deglaciation, apparently without a "tundra-stage" (Richard, 1979:41), means that caribou may have been present shortly after the drainage of proglacial Lake Ojibway ca. 7,900 B.P. and that Plano peoples could have followed the caribou as they migrated further north with the establishment of the boreal forest.

As in southern Ontario, with the discovery of early man on remnant beaches of Lake Algonquin, the investigation of the various strandlines of proglacial Lake Ojibway as it drained, may reveal the presence of Plano people in northeastern Ontario. The geological research of Jensen (1978:27), indicates that the highest level of Lake Ojibway in the Lake Abitibi area was 380 meters above sea level. Archaeological research at and above this level may reveal even earlier occupations between 7,900 B.P. (drainage of Lake Ojibway) and 9,000 B.P. (when the Abitibi area was deglaciated).

While there is little or no archaeological evidence for a Plano existence in northeastern Ontario, environmental data makes the presence of such an early occupation plausible.

Environmental data as of 1976, suggested the following, regarding the Laurentian Archaic.

> In the Kirkland Lake District, definite sites relating to a Laurentian Archaic occupation are lacking, the evidence that is available is based on surface finds and ecological factors. Perhaps the dominant supporting evidence comes from palynological studies. Hills (1962:52) has postulated that at the time of draining of the glacial lake bed around 4,000 B.C., a warmer climate prevailed during this post-glacial hyperbissal period. During this time the area was covered by a Great Lakes Forest type that had migrated into the area from the south via the Ottawa Valley. It is logical to assume that along with plant migration Great Lakes forest adapted peoples would be able to enter the area...The writer

feels that occupation by later phases of Laurentian (i.e., Brewerton) is not feasible because of cooling climatic conditions circa 3,000 B.C., and subsequent re-occupation of the area by boreal forest vegetation (Pollock, 1976:170-171).

More recent palynological studies in the northern portion of the Kirkland Lake District at Lake Abitibi (Richard, 1979), show that an open boreal forest followed immediately after deglaciation ca. 9000 years ago. With the drainage of Lake Ojibway the open boreal forests at its southern edge rapidly migrated into the drained area. From ca. 7,900 B.P. to the present, there has been either closed or open boreal forest. Richard (1979:42-43) further suggests that, although the climate was slightly warmer and drier between 7,200 B.P. and 3,000 B.P., no great environmental changes occurred.

I would suggest, given the above information, that the prehistoric environmental conditions do <u>not</u> support the idea of a Laurentian Archaic occupation in the more northern areas of northeastern Ontario. The sporadic appearance of ground and pecked stone tools, particularly in the Lake Abitibi area, may instead be a result of trade with Laurentian Archaic peoples further south, perhaps in the Allumette Island area on the Ottawa River (Kennedy, 1963). Clearly, further research needs to be carried out before their presence as a separate cultural occupation can be established in northeastern Ontario.

The next major culture to inhabit northeastern Ontario is the

Shield Archaic. The earliest date generally attributed to this culture is ca. 3,000 B.C.. It was defined by Wright in 1968 to describe a pre-ceramic culture that existed in the Canadian Shield. Its tool assemblage is characterized by "biface and uniface blades, lanceolate and side-notched projectile points, a wide range of scraper varieties, crude chopping and scraping-cutting tools, and a paucity or absence of stone grinding" (Wright, 1968:57).

Within the Shield Archaic culture in the Kirkland Lake District, Pollock has outlined the existence of two regional phases. The earliest phase, called the Abitibi Narrows phase, is thought to have existed ca. 3000 B.C. - 2000 B.C.. It was named after the Abitibi Narrows site excavated by Ridley on Lake Abitibi. Its toolkit includes such artifacts as,

> large percussion-flaked plano-convex predominately quartzite implements, large biface blades, ovate blades, leaf-shaped bifaces, predominately large crescentic end scrapers (over 10 gm), some small end scrapers, bifacial core chopping tools (turtle cores), core derived lanceolate and stemmed projectile points. These implements are predominately percussion flaked, and a low incidence of flake-derived tools is indicated (Ridley 1958, 1966; Pollock 1972, 1973) (Pollock, 1976:175).

Evidence for the existence of this phase can also be found in the Montreal River area (Knight, 1977).

The younger phase within the Shield Archaic is called the Mattawan phase. It was named after the Mattawan complex, a pre-ceramic stratum excavated by Ridley at the Frank Bay site, and is thought to date between ca. 2000 B.C. and 800 B.C. (Pollock, 1976). The tools within this phase include such artifacts as "lanceolate, stemmed, and expanding convex based side-notched points, with small endscrapers, leaf-shaped biface blades, ovate bifaces, side scrapers, chipped bifacial core choppers and small retouched random flakes" (Pollock, 1976: 178). This is essentially the same tool kit found by Ridley within the Mattawan stratum at Frank Bay. The one artifact type that Pollock has not included from Ridley's stratum is the trianguloid point. In its place, he has added the convex base side-notched point (Pollock, 1976: 178). The trianguloid point was dropped because of "the possibility of mixing of the strata of Frank Bay" (Pollock, 1976:178). The question that comes to mind is how much admixture actually occurred at Frank Bay. Ridley writes that "some 140 implements are attributed to the Mattawan complex. Certain of these lay close to the overlying pottery strata, but the majority were deeply buried in the sand" (Ridley, 1954:41). It is quite possible that the Mattawan stratum as defined at Frank Bay, is not as homogeneous as Ridley portrays, particularly in light of Ridley's statement that there was "seasonal or at least intermittent inundation between Mattawan occupations...Since the highest surface of the preceramic stratum was but 3 feet above the water level marked on the rocks, northeast storms could have sent waves over it" (Ridley, 1954:41). It is possible that there has been admixture of artifacts between this stratum and that of the Laurel stratum (called Point Peninsula by

Ridley) just above it. This, the considerable overlap in tool types between the Mattawan and Abitibi Narrows phases (i.e. 6 of the 9 tools listed for the Mattawan can be found in the Abitibi Narrows phase), and the fact that the Smoothwater Lake site used to define Mattawan in the Kirkland Lake District is actually multicomponent, confuses the supposed distinctiveness of these two phases.

All of the cultures discussed to this point have been preceramic in nature. The next major culture that follows the Shield Archaic in northeastern Ontario is the Laurel culture. It was originally defined by Wilford (1941) during the course of his excavations in northern Minnesota at the Smith, McKinstry and Pike Bay Mound sites. It has subsequently been discovered in Michigan, Saskatchewan, Manitoba, Ontario and Quebec. No agreement has yet been reached regarding the time depth of this culture in northeastern Ontario as can be seen in Tables 1.1 and 1.2. This is primarily a result of the dearth of Laurel radiocarbon dates in the area. Dates for the Laurel occupation range between 600 B.C. and A.D. 700.

Laurel has mainly been defined on the basis of its ceramic ware. The vessels are generally coil manufactured, decoration is largely confined to the upper portions of the pots, the body sherds are plain, the interior of the vessels has usually been wiped clean or smoothed, and there is a tendency for the lip to be thinned in relation to the rest of the vessel (Wright, 1967; Lugenbeal, 1976).

Other major characteristics of this culture for northern Ontario are small scrapers, side-notched points, biface "blades," net sinkers, paintstone nodules and copper tools (Wright, 1967:97). The lithics belonging to this culture are not as well defined as the ceramics.

In northeastern Ontario, Pollock has defined the Laurel occupation as a regional phase called the Eastern Laurel. It differs from the more western sites in that it contains less copper. On the other hand, "adzes, picks, and large "bust-off" spall tools are more common on Eastern sites. There are abundant red ocher nodules, a high frequency of end scrapers and a lack of pipes on Eastern Laurel sites" (Pollock, 1976:185).

The next major period within the northeastern Ontario cultural sequence is the Terminal Woodland period. It includes such cultures as the Mackinac, Blackduck, Pickering and Iroquois in the Lake Nipissing area (Brizinski, 1980) with a time depth from A.D. 700 to A.D. 1600. At Kirkland Lake, Pollock has named the culture "Northern Algonquins" because at the time of contact, northeastern Ontario and the Ottawa Valley were inhabited by Algonquian speaking peoples called Algonquins (Pollock, 1976:186). "Utilizing the Direct Historic Approach, one would then assign the late or terminal Woodland period in the Kirkland Lake District to a prehistoric phase of the Northern Algonquin peoples" (Pollock, 1976:187). The phase name given to this culture is the Duncan Lake phase. It existed from ca. 1000 A.D. to 1650 A.D..

Noble has defined two cultures in the late Prehistoric period which extends from 1200 A.D. to 1600 A.D. at Larder lake (Noble, 1980). The two phases are called Pearl Beach and Larder Lake. The earlier phase, Pearl Beach, has been defined "on the basis of corded rim pottery with underlying dentate stamp, and a herring stamped rim sherd. Both styles occur with green Gordon Lake chert lithics associated with radiocarbon dates of 1265 A.D. ± 140...and greater than 1470 A.D. (I-7873) on burned bone (Pollock, 1976:210)" (Noble, 1980:23-24).

The later phase, Larder Lake, "represents an interesting hybrid of local lithics and Huron Iroquois ceramics" (Noble, 1980:21).

The Historic or Contact period of 1600 A.D. to the present is represented by the Nipissing culture in the Lake Nipissing area (Brizinski, 1980), and French/Algonkian, English/Ojibwa (?) (Noble, 1980) and Ojibwa and Cree at Larder Lake (Pollock, 1976).

1.2 Background to the Archaeological Research at Lake Abitibi

A few surface collections were made on Lake Abitibi as early as 1900 and 1901, however, the earliest systematic archaeological work on the lake was carried out by Mr. Frank Ridley only in 1954. Ridley's research in northern Ontario was largely prompted "by questions arising out of Huron-Iroquoian research in the southern zone" (Ridley, 1966:2). He further writes that, "Prior to 1948, anthropologists knew nothing concerning pottery of the Canadian Algonquins, questioned possession of clay cooking vessels by that people, and attributed the few appearances of pottery in the northern area to raiding Iroquois of the 17th Century" (1966:2).

In the years 1954 - 62, he found ten sites along the shores of Lake Abitibi containing components from the Historic, Late Prehistoric, Late Woodland, Middle Woodland and what we now know as Archaic periods. By comparing the Lake Abitibi material to that of George Lake 1, Sheguiandah, the Giant site, and Rogers and Rogers collections from Mistassini-Albanel, he postulated that the earliest occupation at Abitibi occurred 4000 - 5000 years ago (Ridley, 1966:47).

Of the ten sites that Ridley excavated, the only ones to show stratification were the Abitibi Narrows and the Ghost River Garden sites, but even these show turbations typical of the boreal forest area. For example, a rimsherd found in the third level of the Ghost River Garden site belongs to sherds found on the surface, a difference of approximately 6 - 9 inches (Ridley, 1966:41).

Ridley mainly used the morphology of tools to compare his assemblages but he also noted the way in which tools were manufactured. In this respect he was well ahead of the majority of North American archaeologists. He noted such techniques as percussion, pressure flaking, the use of prepared platforms, and the "Levallois" technique. Ridley did not however pay very much attention to the flakes that he found other than to say that at the Abitibi Narrows site, "Levallois" flakes were numerous. "Unmodified Levallois flakes each with a faceted striking platform or butt, are so numerous that no count was made" (1966:15). It is worth nothing that Ridley's use of the term "Levallois" is not synonymous to the Levallois technique as defined in the European Middle Paleolithic. Instead, he appears to be referring to bifacial retouch

TABLE 1.3

Sites Excavated on Lake Abitibi

EXCAVATIONS	CULTURAL AFFINITIES	YEAR EXCAVATED	INVESTIGATOR
Abitibi Narrows	1,3	1954	F. Ridley
De Troyes Island	2	1954	F. Ridley
Ghost River	1,2?	1954,1955	F. Ridley
Ghost River Beach	-	1955	F. Ridley
Ghost River Island	1,2,3	1955	F. Ridley
Ghost River Garden	2,3?	1961	F. Ridley
Abitibi River Point	3	1957	F. Ridley
Abitibi River A	2,3?	1957	F. Ridley
Abitibi River B	-	1957	F. Ridley
Abitibi River Island	3?	1957	F. Ridley
Louis	1,3	1964	T. Lee
Slate	-	1964	T. Lee
Iroquoian Point	1,3	1964	T. Lee
Bérubé (DdGt-5)**	1?,2?,3	1970	R. Marois
Margot (DdGt-6)	3	1970	R. Marois
Morin (DdGt-7)	1?	1970	R. Marois
Micheline (DdGt-8)	2	1970	R. Marois
Réal (DdGt-9)	3	1970,1975,1976	R. Marois
Jessup (DdGw-2)	1,2	1979	I. Kritsch-Armstrong

* Cultural Affinities - 1 Shield Archaic
2 Middle Woodland - Laurel
3 Late Woodland

** Bérubé C-14 date 350 ± 90 A.D. (Gak-3793; N.M.C.-432) (Marois, 1974:101) flakes that have prepared flake platforms and numerous dorsal flake scars which are a result of previous thinning and shaping.

On the Quebec side of Lake Abitibi, Mr. Thomas Lee carried out a very brief 5 hour survey of the eastern part of the lake in 1962 south of Nepawa Is., locating a small quarry at the eastern end of Nepawa Is.. This quarry contained the same grey-green chert found by Ridley at his Abitibi Narrows and Ghost River sites (Ridley 1966:8; Lee 1962b). Lee returned in 1964 and excavated the Louis, Slate and Iroquoian Point sites. The Louis and Iroquoian Point sites have been described as having Shield Archaic and Late Woodland components. The Slate site has not been categorized.

Within the past 12 years a series of excavations at the eastern end of Lake Abitibi, at the mouth of the Duparquet River, have been carried out by Dr. Roger Marois. Here, in 1970, he excavated the Bérubé, Margot, Morin, Micheline and Réal sites. These sites range in size from 10 to 22 meters and average 10 cm. in depth with the exception of the Bérubé site which extended to a depth of 25 cm. (Marois, 1974: 337).

Marois has ordered the five sites chronologically by comparing their assemblages and using the radiocarbon date obtained from Bérubé. The date of 350 ± 90 A.D., is the only radiocarbon date for the Lake Abitibi area. It was based on charcoal collected from the bottom of a depression, on top of the lowest soil level (Marois, 1974:101). The assemblages have been compared on the basis of the <u>morphology</u> of the tools and the decorations on the pottery.

The Morin site has been suggested as the oldest site because it contains no pottery and the lithics differ from the other sites. The remaining four sites have been arranged into two groups: Bérubé and Margot, and Micheline and Réal (Marois, 1974:99-100).

The pivotal site is Bérubé. The lower levels of Bérubé contain only stone tools while the upper levels consist of lithics, pottery, metal tools and glass beads (Marois, 1974:99). The glass and metal artifacts from the upper two levels of Bérubé have been identified as belonging to the Middle Historic period (1670-1730 A.D.), as have the historic artifacts from Réal and Micheline, according to Quimby's classification of French goods from the Great Lakes region (Marois, 1974:100). Bérubé also contains rimsherds which resemble the Northern Branch of the Huron-Petun (Marois, 1974:237). No attempt has been made to assign the lower lithic levels of Bérubé or any of the other sites to any other prehistoric cultural groups.

Even after spending two additional field seasons at the Réal site, uncovering more pottery and lithics, Marois still hesitates to confirm the presence of the Shield Archaic peoples here. In his opinion this tradition is ill-defined, covers an enormous amount of territory and does not allow for regional specialization (1977:33-34).

Marois also makes no mention of the presence of Laurel or Blackduck peoples, but the presence of these two occupations can be clearly seen in the pottery unearthed at the Micheline and Réal sites.

In addition to the excavations described above, there have also been a number of beach surveys carried out by such individuals as Joseph Bérubé and Rene Ribes on the Quebec side of the lake, and by Marjorie and Justin Jordan on the Ontario side. Mr. and Mrs. Jordan have been surveying the beaches since 1970, and to date have identified approximately 20 additional sites.

The Jessup site which is the subject of this study, was located in 1976 from a beach survey carried out by the Jordans along with Mary and Gary Jessup, after whom the site is named. It is located on the southern shore of the upper lake, along the beaches of Lower Bay.

In 1976, the perimeter of the site was roughly estimated as being 50 meters long and from 1 to 6 meters wide, the length of the sand beach which was exposed (Jordan, 1977:2). These dimensions were revised in 1977 when Jessup was revisited by the Jordans. At this time, the water level of the lake had dropped to reveal for the first time, a sand beach which stretched the entire length of Lower Bay, a distance of approximately 2.5 km. (Jordan, 1978:1). Along this newly exposed beach, hundreds of broken tools, cores, flakes and preforms were recovered. This additional area was called the Jessup Site Extension.

The abundance of the preforms and flakes recovered from the Jessup site and extension areas, as well as the presence of numerous hearth stones scattered along the beach, suggested to the Jordans that "the entire length of the Bay had been one enormous manufacturing site" (Jordan, 1978:2).

In the summer of 1979, a survey and test excavation involving 29 square meters, were carried out along the banks of Lower Bay to investigate the Jordans and Jessups findings in greater depth. In the course of excavation, lithic, faunal and ceramic materials were recovered.

One of my concerns was to determine if the material found on the beaches was eroding out of the banks along the bay, or whether the prehistoric occupants had lived right on the beaches. The water level of the lake remained high throughout our five week field season, therefore very little of the sand beach was exposed. We found one large multicomponent site "in situ" along one of the higher banks of the bay in Jessup Site Extension area. The site is eroding into the waters of Lower Bay because of fluctuating water levels. At the same time, there were several areas along the bay which only contained material on the beaches, but not behind on higher ground. From this, it would appear that both the beaches and the banks were occupied prehistorically.

The large site that was found in situ while surveying on the banks of Lower Bay in the Jessup Site Extension area, is the subject of this thesis. It is this area which is referred to in this thesis as the Jessup site.

1.3 Goals of Research

> Archaeologists are beginning to use technological analysis to solve classificatory problems which have plagued traditional artifact studies. This analysis is directed

> toward explication of the artisan's behaviour, as recorded on the tools and debitage (wastage) he produces and the implements used during manufacture (Sheets, 1975: 369).

This thesis is concerned with the description and analysis of the lithic debitage and tools from the Jessup site, in light of the prehistoric environmental conditions present at Lake Abitibi, the sources and types of raw materials used, the strategies and rules used to manufacture stone tools, the types of tools manufactured, and the activities carried out by the different temporal groups who occupied the site. All of these subjects are pertinent and interrelated because manufacturing is environmentally, culturally and individually influenced.

While this thesis argues from a technological perspective, technology is only one of four analytic levels. The other levels of analysis include raw material, shape and size. Together, these levels of analysis will help to outline the manufacturing stages and sequences involved in processing the raw materials into tools, as well as differentiating the intentional from the accidental aspects of tool manufacture.

The advantage of a technological approach at a workshop site such as Jessup where the predominant part of the artifact assemblage is made up of flakes is that flakes show the methods and techniques that were used to produce stone tools. It is well known that although two artifacts may look the same, very different techniques and sequences may be involved in their production, and these differences may represent different cultural groups (Crabtree, 1972; Bonnichsen, 1977).

Manufacturing techniques change over time. Whether there is evidence for this at Jessup for the different temporal groups will be one of the underlying issues that will be investigated.

It was hoped that a complete lithic reduction sequence could be worked out for the Jessup artifacts. In order to do this however, one needs a good sized assemblage of finished tools in addition to detritus and unfinished tools. Finished tools are lacking at Jessup, however, the early and middle stages of biface production are relatively well represented.

One of the advantages of having numerous flakes but not many completed tools is that it forces the researcher to thoroughly investigate the flake debitage. Completed tools show only the last stages of reduction as noted by Crabtree (1972) and Muto (1971). Flakes which are generally left behind at workshop sites, are much more informative than finished tools in terms of investigating strategies and techniques. They are indeed the key to any technological analysis.

The idea of analyzing debitage was suggested by Havlor Skavlem in the late 19th century (Pond, 1930). Its application to assemblages has not been widespread. Indeed, except for a relatively small group of archaeologists, chipping detritus has been largely ignored and thought of as "non-diagnostic" (Muto, 1971; Jamieson, 1976, 1977). It has become increasingly clear that the analysis of chipping detritus can be an invaluable aid in explaining the technological processes and flaking characteristics of the raw material used in manufacturing stone tools. This has been shown by the research of such archaeologists as Muto (1971), Hassan (1971), Crabtree (1972), Speth (1972, 1974, 1975), Morlan (1973), Sims (1974), Bucy (1974), Sheets (1975), Fox (1975), Jamieson (1976), and Ellis (1979).

Ten questions will be specifically addressed in this thesis:

1. What were the prehistoric environmental conditions at Lake Abitibi? This information is important for three reasons:
   a) for determining when the earliest occupation of the area could have occurred,
   b) whether changes in the environment corresponded to changes in cultural groups and
   c) which raw material sources were available.
2. What types of raw materials were used?
3. Where were the raw materials obtained? Were they obtained from local, regional or "foreign" sources? What can this information tell us about prehistoric trade routes and resource scheduling?
4. What problems did the aboriginal craftsmen face given the available raw materials?
5. What types of tools were being manufactured at Jessup? Both unifaces and bifaces? Flake, blade and core tools?

6. How were these tools manufactured? With soft hammer, hard hammer or indirect percussion? Is there evidence for the use of pressure flaking?

7. What rules and strategies are manifested in the Jessup lithics? Are there any differences in the respective manufacturing technologies of the Archaic and Laurel peoples? Any group of people that manufactures and uses lithics must make decisions from the first stage of obtaining raw material to that of final disposal. An example of the types of decisions that would have to be made just in relation to lithic procurement are as follows:

   a) a previous knowledge of the location and availability of a raw material source, plus how and when to enter the source area,

   b) how to procure the raw material. Whether to scavenge or quarry,

   c) whether to reduce the material at the source or at a workshop some distance from the source,

   d) how much material to collect, and

   e) who will quarry, collect and reduce the raw material? (Bonnichsen, 1980, lithic workshop notes).

8. Was the site solely used as a workshop or was it also a habitation site. Was it used year round or seasonally?

9. Who inhabited the Jessup site? Archaic, Middle Woodland, and Late Woodland peoples? Did Northern Plano peoples reach Lake Abitibi? Which variants of the Archaic are manifested at Jessup? Were the Archaic peoples ancestral to the later Laurel occupation?

10. How does Jessup compare with other sites in the Lake Abitibi area as well as other northeastern Ontario sites at Lake Nipissing (Ridley, 1954; Brizinski, 1980), and Larder Lake (Pollock, 1977; Noble, 1979, 1980)?

1.4 Limitations and Assumptions of Research

Several limitations are evident in this study. First and foremost is the absence of radiocarbon dates for Jessup. This has made it difficult to define the different occupations with absolute certainty, a problem which is not only characteristic of Jessup but of most sites within the Canadian boreal forest. This problem has been compounded by the overwhelming presence of workshop blanks and rejects and the general lack of finished tools, which makes it difficult to make comparisons with other sites around Lake Abitibi and in northeastern Ontario which have been defined using the morphology of presumably finished tools. This, plus the fact that no other technological studies have been undertaken for northeastern Ontario, means that comparisons must remain speculative until more technological studies have been conducted and radiocarbon dates in good association have been obtained. At the present, only one radiocarbon data has been published for the Lake Abitibi area. Unfortunately, no artifacts were definitely associated with this date (Marois, 1974).

Second, the prevalence of beach collections over controlled excavations, the rare occurrence of stratified sites with an extensive prehistory and the mixture of different cultural components in shallow soils makes the establishment of a cultural chronology at Lake Abitibi and in the boreal forest generally a frustating exercise. At Jessup, the different components can be partially separated horizontally. Vertical separation, however, is questionable.

Two assumptions have been made within this study, largely as a result of the above limitations. First, the two areas set aside for flake analysis have been treated as homogeneous areas, although it is highly likely that some admixture is present in both locations. In other words, the levels have been treated as physical and not cultural levels.

Second, it has been assumed that all of the groups living at Jessup used the site as a workshop, leaving behind their flakes, broken tools, and manufacturing rejects which are indicative of the strategies they each used to manufacture their stone tools.

1.5 Organization of Study

This study has been organized into eight chapters. Chapter two sets the stage by presenting a prehistoric and historic environmental perspective of the Lake Abitibi area, and what this means archaeologically, thereby addressing parts of question one.

Chapter three examines the Jessup site with reference to its location, the archaeological recovery technique used, its features, the soil profile, and the faunal sample recovered from the hearths. Also addressed is how the different components were designated.

Chapter four addresses questions two and three, the main focus of this study, the types of raw material used at Jessup, the source of this material, and its flaking characteristics. These topics were examined through a series of chemical and trace analyses carried out on eight Jessup samples.

The properties of these raw materials and how they react to fracture were examined in Chapter five by experimentation in respect to the statement made by Crabtree that, "the type of material used has a direct bearing on methods of manufacture; poor material restricting and fine material allowing the toolmaker to control the thickness, width, length, and uniformity of the flakes" (1967:8). Chapter five also defines the term lithic debitage and looks at how the debitage was sorted and analyzed. This chapter deals with question four.

Chapter six examines the artifacts from Jessup, the stone tools and the ceramics. The stone tools were analyzed according to four levels of analysis: technology, shape, size and raw material. They were sorted according to whether the retouch was bifacial and unifacial, by the size i.e. weight, and the shape of the tool. Questions five, six and seven were examined in this chapter.

Chapter seven summarizes and discusses the data from Jessup in relation to the ten questions originally posed in the introduction. Questions seven through ten, dealing with Laurel and Archaic strategies, the nature of Jessup, who inhabited it and how it compares to neighbouring sites at Lake Abitibi and in northeastern Ontario are addressed in some depth.

CHAPTER 2

2 AN ENVIRONMENTAL PERSPECTIVE OF LAKE ABITIBI

2.1 Physical Location and Features

Lake Abitibi is situated approximately 500 miles north of Lake Ontario and 175 miles directly south of James Bay, in the Hudson's Bay watershed (Figure 2.1). The lake straddles the Quebec - Ontario border, with 7/8 of the basin lying in Ontario. Drainage is to the north into James Bay by way of the Abitibi River. Both Lake Abitibi and the Abitibi River have had a long history of canoe use, being a main thoroughfare between the Ottawa River and Hudson Bay in the historic and quite possibly the prehistoric period as well. How early this route could have been travelled prehistorically has been substantially modified by recent geological and palynological studies. As the glacial, floral and climatic information presented in this chapter show, a major part of this route (from the Ottawa River to Lake Abitibi), could have been travelled by prehistoric peoples as early as 7,900 years ago.

Lake Abitibi, a remnant of pro-glacial Lake Ojibway, stretches 50 miles long and 8 miles wide, and consists of an upper and lower lake joined at the Narrows. Magnificent forests of spruce and cedar inter-spread with paper birch surround the lake. Periodically however, vast areas of these forests have been destroyed by fire. Within the last

The Great Lakes to James Bay Area

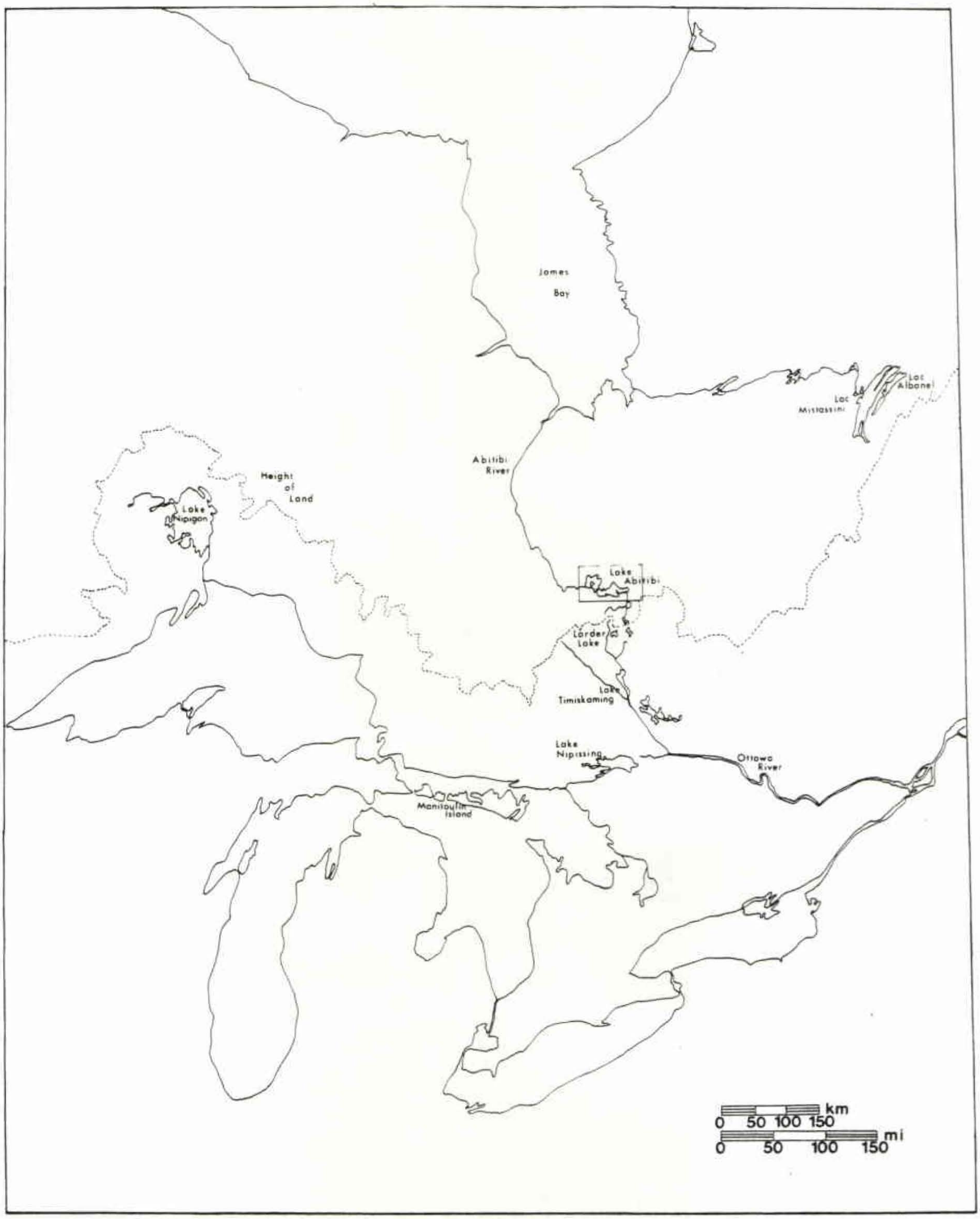


Figure 2.1

century alone, two major fires have destroyed substantial tracts of forested land. The shoreline is interrupted by many deep bays and points of land, and hundreds of islands dot the water.

In spite of the large size of the lake, it is relatively shallow, averaging only between 6 and 15 feet, with a maximum depth of 23 feet (Snyder, 1928:3). The construction of power dams in 1915 at Iroquois Falls for the Abitibi Pulp and Paper Company (now Abitibi Price), has raised the natural lake level from its pre-dam level of 875.5 feet to 878.5 feet (Lee, 1974:46). This has resulted in the flooding and erosion of many archaeological sites along the lakes shoreline.

This lake is in the midst of a very distinctive physiographic region known as the Clay Belt. This belt is a relatively flat clay plain stretching for 600 miles, with a maximum width at its eastern edge of 260 miles (Baldwin, 1958:5).

The topography around the lake is generally lowlying with the occasional rocky ridge or hill protruding through the varved clay deposits, particularly along the south shore in the Lower Bay and Ghost River areas.

2.2 Glacial History

The relatively flat topography of the area broken only by the occasional hill or ridge, and the widespread occurrence of water-worked till and lacustrine clay, are clearly legacies of the Laurentide Ice Sheet and Lake Ojbway. As the Laurentide Ice Sheet retreated north, meltwater from the glacier became trapped between the margin of the ice sheet and the Hudson Bay - St. Lawrence River drainage divide (Vincent and Hardy, 1979:1). This entrapment resulted in the formation of Lakes Barlow and Ojibway which existed from ca. 11,500 to 7,900 B.P. (Vincent and Hardy, 1979:1). Thick deposits of clay and other sediments accumulated within these lakes and have had an important impact on the economic development of this northern Clay Belt area. They have made not only lumbering but also farming feasible occupations.

J-S. Vincent and Leon Hardy, two geologists who have recently studied the evolution of Lakes Barlow and Ojibway, and Pierre Richard, a palynologist, have shown that Lake Abitibi was deglaciated ca. 9,000 B.P. during the Temiscaming phase of Lake Barlow and the Angliers phase of Lake Ojibway (Vincent and Hardy, 1979:15; Richard, 1979:33). At this time the water level of Lake Ojibway in the Lake Abitibi area was approximately 355 meters. In the township of Marriott, located just southeast of Frecheville township in which this study was carried out, Jensen has noted that

> The highest recognizable beach line of glacial Lake Barlow-Ojibway occurs at an elevation of 380 m (1250 feet) above sea level...Above the beach line the bedrock is till covered. Below the beach line, clearly washed outcrops are present, and are surrounded by undulating plains of clay and sand (1978:27).

From this description, one can visualize that only a few of the higher hills surrounding the lake stood as islands peeking out above the vast stretches of water.

Shortly before 7,900 B.P. during the late Kinojevis phase of Lake Ojibway, the water level dropped to approximately 300 meters (Vincent and Hardy, 1979:15; Richard, 1979:6). About 7,900 B.P., as a result of the separation of the Hudson and New Quebec glaciers, Lake Ojibway rapidly drained to the north (Vincent and Hardy, 1979:17), leaving the land around Lake Abitibi exposed. The present day limits of Lake Abitibi (minus the three foot increase created by the dam at Iroquois Falls), were therefore established ca. 7,900 years ago.

The significance of this fact becomes clear when one considers Noble (1979) and Pollock's (1976) proposal of the possible occupation of northeastern Ontario by early man. As discussed in chapter one, Pollock has suggested that Plano peoples were present in the Kirkland Lake region ca. 6-7,000 years ago. No dates of this antiquity have as yet been obtained for this area. The fact however that the Lake Abitibi area was accessible, and its present boundaries established ca. 7,900 years ago, and that an open boreal forest followed deglaciation, makes such an early occupation plausible.

To the east of Lake Abitibi, Martijn has defined a late phase of the Plano tradition called the Temiscamie Complex in north central Quebec at approximately 5,000 B.C. which he sees as developing from hunting woodland caribou in the northern Great lakes area (Martijn and Rogers, 1969:324).

West of Lake Abitibi, 450 miles, in the Thunder Bay area, a Palaeo-Indian complex dated at ca. 10,000 years old called the Lakehead Complex, has been defined which inhabited the old beach ridges of glacial Lake Minong (Fox, 1975). Palaeo-Indian occupations along these ridges took full advantage of the taconite, jasper taconite and Kakabeka cherts within the local Gunflint Formation. Included in this complex are the well known Brohm and Cummins habitation and quarry/workshop sites.

Southwest of Lake Abitibi, ca. 210 miles, on Manitoulin Island area, lie the Paelaeo-Indian quarry/workshop sites of Sheguiandah and Giant.

2.3 Climate and Flora - Prehistoric and Present Day

Two question unanswered until very recently, are when and what type of vegetation followed the drainage of pro-glacial Lake Ojibway. This information is essential for providing an environmental framework in which to interpret the culture history for the Lake Abitibi area.

In 1979, Roger Marois, of the Archaeological Survey of Canada, took several pollen core samples from lakes Clo and Yelle, situated approximately 10 km. south of Lake Abitibi. These pollen cores were analyzed by Pierre Richard at the Laboratoire de Paleobiogeographie et de Palynologie of the Université de Montréal. Richard's analysis showed (Figure 2.2), that at ca. 9,000 B.P., the southern shore of Lake Ojibway was characterized by

> an open forest dominated by black spruce (*Picea mariana*), with abundant aspen (*Populus tremuloides*) and jack pine (*Pinus divaricata*)...This type of vegetation lasted about 1,000 years on the islands formed at that time by the hills around Yelle Lake, whilst lake Ojibway's level went from 355 to 280 meters. The forest vegetation migrated rapidly in the lowlands after the drainage of the proglacial lake. From 7,900 to 7,200 years B.P., the forest belonged to the balsam fir - white birch domain, on the mesic sites, but black spruce and jack pine were abundant. From 7,200 to 6,000 B.P., the vegetation was at its maximum of diversity and thermophily. White pine (*Pinus strobus*) migrated in the area, especially on the hills and on the xeric sites. Between 6,000 and 3,250 B.P., juniper (*Juniperus*) became more abundant due to a general opening of the forest canopy. Since 3,250 B.P., the forest cover has closed and black spruce and jack pine have progressed at the expense of white pine, in particular. The balsam fir - white birch community, on the mesic sites, has remained almost unchanged in the landscape...(Richard, 1979: abstract).

Richard's study shows that an open boreal forest followed immed-

Palynological Sequence at Lake Abitibi

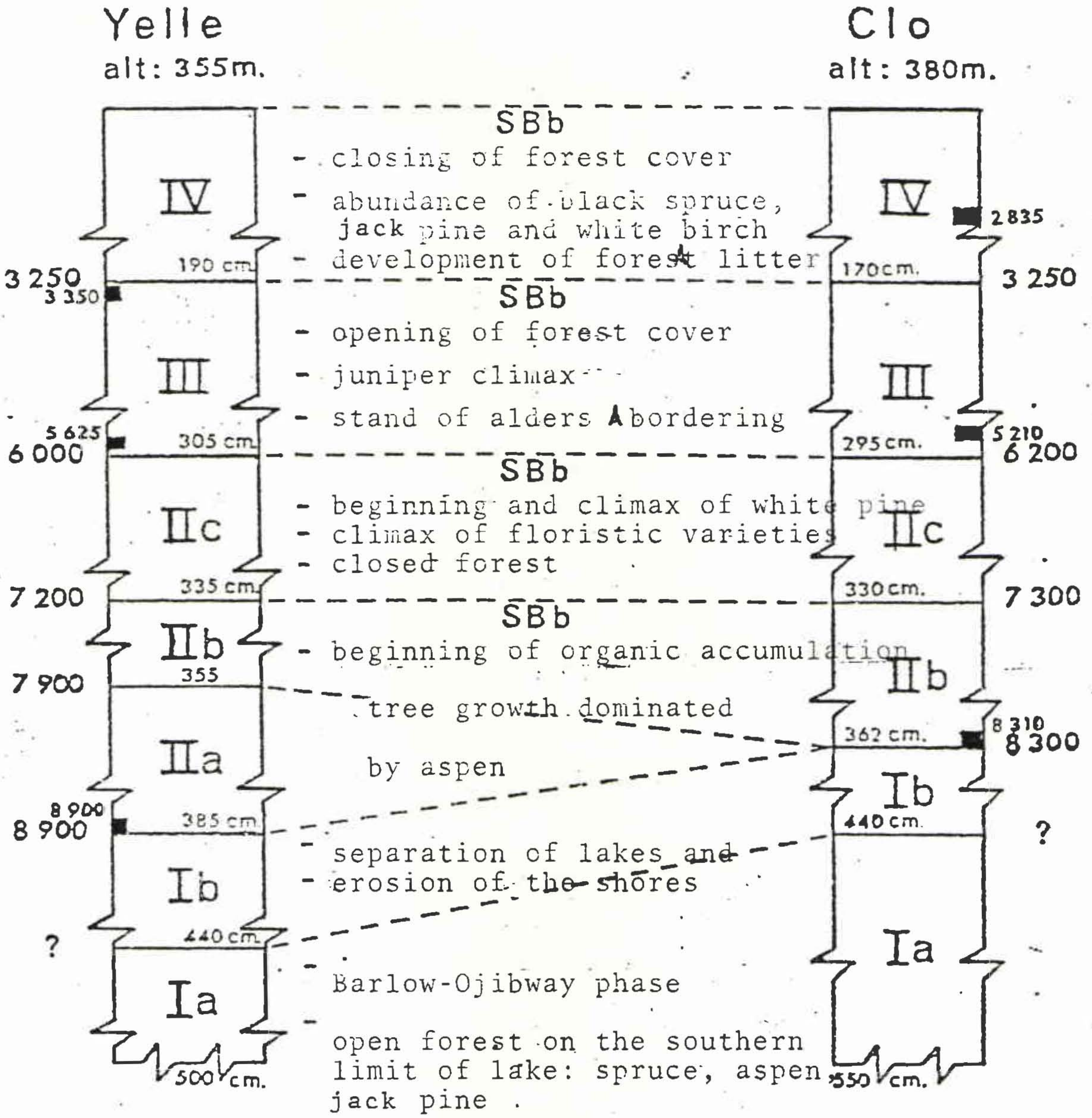


Figure 2.2

Chronopalynostratigraphic comparison of the Yelle and Clo lake sites (Translated from Richard, 1979) iately after deglaciation, and that there does not appear to have been a "tundra-stage" (Richard, 1979:41). He suggests that between 7,200 B.P. and 3,000 B.P., the climate was slightly warmer and drier, but on the whole there were no great environmental changes that the native peoples had to adjust to following the establishment of this forest until the arrival of the Europeans (Richard, 1979:42-43), with the exception of forest fires which play an important recurrent and recycling role as destroyers and rejuvenators in closed boreal forests. They greatly affect the distribution of fauna and hence human subsistence and settlement patterns.

> The development of the boreal forest is characterized by a period of over-maturation wherein tree form and stand density decline and an increasing percentage of the nutrients are tied up in undecomposed matter. This bottleneck is broken by the occurrence of forest fires which destroy the overmature stands, release the nutrients and leave favorable conditions for the regeneration of the forest. Spruce budworm epidemics play an important role in these events by attacking the overmature forest and producing considerable litter, thereby making the forest highly susceptible to lightening caused forest fires over an extensive geographical area. The areas involved were several thousand square miles, and even tens of thousands of square miles. A complete cycle of fire, regeneration and mature forest would, we estimate, last between 200 and 340 years in the

> Mistassini region. Thus, the entire territory of the Mistassini people, or a significant proportion thereof, would be burned by forest fires and have to be abandoned every seven to eleven generations (Feit, 1969:137).

The effects of forest fires on the distribution of fauna and human settlement patterns in the Lake Abitibi area would probably be similar to that of Mistassini, given their similar environments.

Today, Lake Abitibi lies within what is known as the Boreal Forest region, a region which stretches from Newfoundland to the Rocky Mountains. It is notable that the closed boreal forest type of vegetation that grew around Lake Abitibi 3,250 years ago, still characterizes the area today. The forests here are essentially coniferous, although several types of broadleafed trees such as white birch, balsam poplar and trembling aspen can also be found (Rowe, 1962:6). Rowe has remarked that the most impressive characteristic of the Clay Belt "is the seemingly endless stretches of stands of black spruce which cover the gently rising uplands as well as the lowland flats, alternating in the latter position with extensive sedge fens and sphagum-heath bogs" (1962:19). In the better drained areas one finds mixed stands of trembling aspen along with black spruce. Where soils are more sandy and dry, white birch and jackpine grow. In the lowland regions where drainage is poor, spruce-cedar swamps, bogs and muskeg are prominent (Rowe, 1962:19).

The climate for this area has been described as one of extremes. Temperatures have been known to reach as high as 94°F, and as low as -51°F (Rowe, 1962:140-141).

2.4 Fauna - Present Day

Comprehensive studies of the fauna in the Abitibi region were conducted by Snyder and LeRay of the Royal Ontario Museum, and by Dymond and Hart of the Ontario Fisheries Research Laboratory in 1925. Their studies indicated the presence of 30 species of fish of which pike perch, goldeye and pike predominate, 34 species of mammals, 102 species of birds, 6 species of amphibians and 1 reptile (garter snake). Black bear, white-tailed deer, moose and woodland caribou constitute the large mammals available within a 15 mile radius of the lake at the present. Medium and small sized mammals include such animals as the beaver and wolf plus marten, fisher, weasel, mink, wolverine, otter, skunk, fox, Canada lynx, woodchuck, muskrat, porcupine, and hare, and different species of shrew, chipmunk, squirrel, mice, voles and bats.

The wide variety of migratory waterfowl which nest on Lake Abitibi include such species as the loon, ducks, geese, the great blue heron, hawks, owls and osprey. Spruce partridge and Canada ruffed grouse represent the terrestrial species available around the lake.

Of the mammals mentioned, only the Woodland Caribou appears to have disappeared from the Lake area, about 1921. Until this time, they wintered there regularly, with a few summering on the islands. Snyder notes that their disappearance has been attributed to "forest fires, the increase of moose, and the incoming of the white-tailed deer, (1928:15).

Snyder also noted that both white-tailed deer and moose are relative newcomers to the study area. White-tailed deer were present in 1906 but relatively rare until 1921. Their spread may be associated with the great fires of 1911 and 1916 (Snyder, 1928:14). Moose were seen, around the year 1875, somewhat earlier than deer. Snyder obtained this information from an Indian living in Lowbush, whose father had killed the first moose in the Abitibi area. "Tracks had been seen previously, but the Indians did not know what animal had made them" (Snyder, 1928:15). Noble has evidence from the Pearl Beach site on Larder Lake that indicates that moose was in the Larder Lake area 30 miles south of Lake Abitibi in 1720-30 (Noble, 1979:62).

The waters of the lake are shallow and turbid, but support a high fish population. Dymond and Hart noted the presence of three commercial fishing companies on the lake in 1925. They stated that "Pike perch is the most important commercial species, and is said to be of sufficiently high quality to command a premium on the New York market" (Dymond and Hart, 1927:8). Pike perch is also known as yellow pickerel or doré. Two other fish found in large quantities are goldeye (northern mooneye) and pike (Dymond and Hart, 1927:8, 16).

A notable feature concerning the fish in Lake Abitibi is that, although most of the fish species are characteristic of the Great Lakes, there is also "a small though significant element which suggests a western relationship" (Dymond and Hart, 1927:9). Dymond and Hart expand upon this western connection further.

Neither the tullibee (Leucichthys nipigon) nor the mooneye (Amphiodon alosoides) have been authentically recorded from the Great Lakes (Hubbs, 1926), but they are both represented in Manitoba. The sheepshead (Aplodinotus grunniens) occurs in the Great lakes, but is absent from Lake Nipigon and other northern Ontario Lakes, so far as is known, but is reported from Manitoba. The occurrence of these western species in Lake Abitibi may be due to ecological factors, as ecologically Lake Abitibi probably resembles the lakes of Manitoba more closely than it does Lake Nipigon or any of the Great Lakes. As is the case with the lakes of Manitoba, Lake Abitibi is the sucessor of a much larger lake, the deposits of which formed the great clay plain within which it lies. The western relationship of the Abitibi fauna is further emphasized by the finding of western species of mollusks and spiders (Dymond and Hart, 1927: 9).

The only fish that Dymond and Hart consider to have been recently introduced at Lake Abitibi is Lake Sturgeon. They have postulated that sturgeon only gained access to the lake in 1921, "when the dam at Twin Falls in the Abitibi river was completed. This dam raised the level of the river between Couchiching Falls and Twin Falls, so that sturgeon would ascend the former, which had previously been impossible of ascent" (Dymond and Hart, 1927:10).

The above faunal information solely reflects the present day populations. There is very little ethnographic information on the native peoples inhabiting this area and in particular about their hunting practices. Of the three ethnographies which have been done, Wm. Jenkins (1939), provides a brief but interesting account of how beaver, bear, fisher, fox lynx, marten, mink, weasel, moose, deer, caribou, ducks, partridge, otter, rabbits and fish were hunted, trapped or netted by the Abitibi Indians.

2.5 Fauna - prehistoric

Information about the prehistoric fauna at Lake Abitibi comes from two sources, Dr. Marois' excavations at the Micheline, Réal and Bérubé sites and my excavations at Jessup. In both studies, preservation was poor as a result of the acid and wet soils of this area. Marois's faunal sample included such specimens as moose, beaver, bird, and unidentifiable medium and large mammals (Marois, 1974:237-268).

At Jessup, the faunal analysis showed that beaver was important prehistorically to the Middle Woodland peoples who inhabited the site. The very poor preservation of the bone from Jessup made additional identification difficult. In addition to the 70 bones of beaver, there were 1355 bones of medium sized animals such as beaver and wolf, 1 bone from a medium/large animal, and 5 fragments from a possibly medium or large animal such as deer or caribou.

To date, we have no evidence for the prehistoric distribution or utilization of fish from any of the excavations on the lake. The only aquatic species that has been identified in prehistoric occupations is beaver. The absence of fish bone or Abitibi sites may be related to both environmental and cultural/ideological factors. The acidic soils in the area are not conducive to preservation. In addition, we do not know what cultural/ideological factors may have affected the treatment and disposal of bone prehistorically.

Historically, Borron (1890), Coultard (Ontario, 1900), and Jenkins (1939), all mention that the Indians living at Lake Abitibi fished. Borron, who made a survey of the Moose and Abitibi drainage area resources mentions that,

> The natives appear to congregate at posts like Abitibi, and Moose Factory, soon after the ice leaves the rivers, and remain there most of the summer. It is their season of social intercourse, which the young at least seem to enjoy. The women and children set out and attend to the fishing nets, while the men either hunt, or find employment voyaging, making hay, and such like work at the posts.
>
> ...Pike and suckers are the most important as a food supply; the former in places all the food the natives can get during the winter (Borron 1890 as quoted from Ridley, 1958:6-7).

Coultard (Ontario, 1900) writes that,

> Late in the spring or early in the summer they bring

> their winter's capture to the post, where all trading is performed. They remain about the posts or the large lakes, where most of them live chiefly on fish from their nets until the latter part of September. Then they return to their winter hunting grounds with supplies in proportion to their capacity of fur getter (as quoted from Ridley, 1958).

While there are problems inherent in using ethnographic analogy in a site so far removed in time from the historic period, we can get some tantalizing glimpses of the cultural/ideological reasons that may have affected the recovery of bones from Abitibi sites, by looking at the ethnographic accounts of McPherson and Jenkins. They discuss how various animals were treated and disposed of by the Abitibi Indians. Bears, for instance, were considered the strongest and most intelligent of the animals, and their hunting and capture was surrounded in a complicated ritual ceremony. Bears were brought back to camp intact. The bones were disposed of in the following manner. "No bear meat is given the dogs. Everything is saved. The skull is decorated with charcoal or red paint, and hung with ribbons. The jaw is tied to the skull. It is then hung near the camp in a tree. If it is hung near a path where many people travel, it will bring good luck. No bones are given to the dogs but instead are put in a lake for luck" (Jenkins, 1939:20).

McPherson notes essentially the same ritual and disposal of bear bones with one exception. "The bones of the bear are thrown into the water or placed on a scaffold where dogs cannot reach them" (McPherson, 1930:42 as quoted from Jenkins, 1939:22 footnote).

Other animal bones were used for devination and good luck. The Abitibis practiced scapulimancy using rabbit scapulas or partridge breastbones (Jenkins, 1939:21), and beaver haunches for divination. In addition, the patellas of beaver "were scraped and put in a fyring-pan; if the joint hopped around, the hunter would have good luck in killing beaver" (Jenkins, 1939:22). Jenkins also mentions that beaver knee joints were thrown into the water for good luck in hunting beaver. Otter forepaws were thrown into the air and depending upon whether they landed palm up or not, the hunter would have either good or bad luck. Duck heads were worn on hunters coats or kept in the house for good luck (Jenkins, 1939:22).

2.5 Bedrock Geology

Understanding the geology of the Lake Abitibi area is crucial to determining where the raw material for making stone tools could have been procured prehistorically by native peoples living in the Jessup area.

The Jessup site is located in the township of Frecheville. A doctoral thesis on the geological structures found within this township has recently been completed by L. Jensen of the Ministry of Natural Resources. Much of the information in this section comes from Jensen's (1981) dissertation, and his published analysis of the geology of Stoughton and Marriott Townships (Jensen, 1978). These townships are just to the east and southeast of Frecheville.

Lake Abitibi lies within the Superior Province of the Canadian Shield. This province contains some of the oldest rock on earth. The Early Precambrian volcanic rocks which underline Stoughton, Marriott and Frecheville townships "are part of the Abitibi Greenstone Belt. (It)....Extends from west of Timmins to east of Chibougamau, Quebec (A.M. Goodwin and R.H. Ridler 1971). The belt is composed of volcanic rocks and lesser amounts of sedimentary rocks which have been intruded by rocks of ultramafic to felsic composition" (Jensen, 1978:3).

Over 95% of the bedrock in Stoughton and Marriott Townships is volcanic in origin. Jensen has divided these volcanic rocks into three sequences. The oldest sequence is called the Stoughton-Roquemaure Group and is made up of several flows of ultra mafic and basaltic komatiite rocks. The middle sequence known as the Kinojevis Group contains 4,000 meters of magnesium-rich and iron-rich tholeiitic basalt. Of archaeological significance is the fact that within the lower 1,000 meters of this sequence are "interflow-units of tuff-breccia, crystal tuff, and cherty tuff of calc-alkalic dacite and rhyolite composition, as well as chert, argillite, graphite and cherty oxide iron formation" (Jensen, 1981:234 emphasis added). The calc-alkalic tuffs are probably representative

> of distal, once active calc-alkalic volcanism to the north, that was possibly related to the expansion of the granodiorite intrusions north of the map-area (Stoughton and Marriott townships). These intrusions were associated with the earlier period of calc-alkalic volcanism (Jensen, 1978:52).

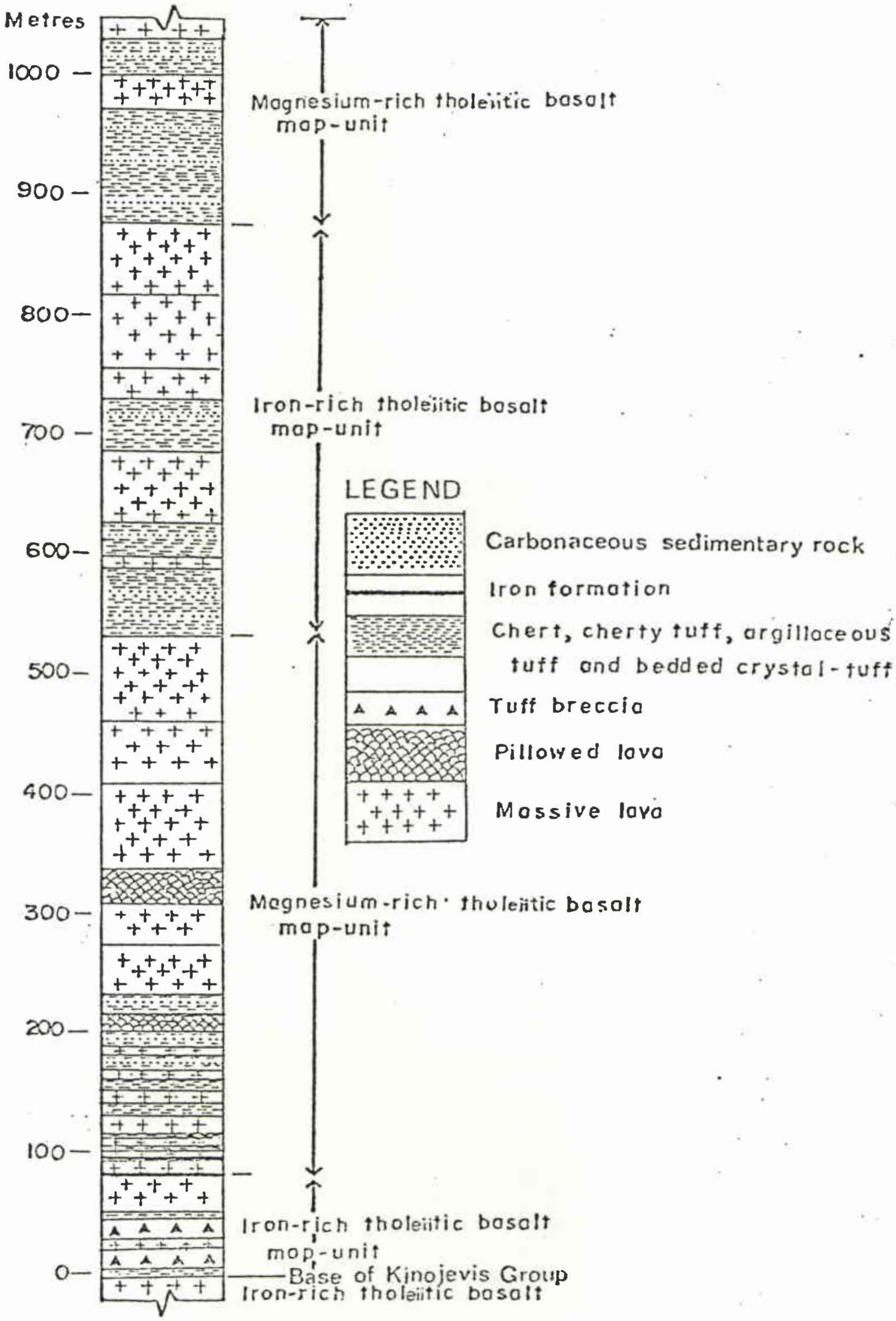


Figure 2.3 Strategraphic Column of the Lower 1,000 m of the Kinojevis Group (Jensen, 1981:236)

The youngest sequence called the Blake River Group, consists of calc-alkalic basalt and andesite which are "lensoid, pillowed, and are massive flows mixed with fragmental units of pillow breccias and tuff breccias (Jensen, 1978:10).

The tuffs present in the lower portion of the Kinojevis Sequence are found in a 1,000 meter thick zone where the Stoughton-Roquemaure and Kinojevis Groups meet (Jensen, 1978:23-24). An important factor to note is that whereas little of this zone outcrops in Stoughton Township, "the full width of this zone is exposed to the west in Frecheville Township" (Jensen, 1978:24). Jensen believes this zone to be approximately 2,709,000,000 years old (1980, personal communication). The profiled cross-section of this sedimentary zone can be seen in Figure 2.3. Fine laminated chert and cherty tuffs are found in graded beds from 0.5 to 2.0 cm. thick throughout the bottom half of this zone. Thicker beds of chert which range from 10 cm. to 50 cm. also occur here, but these are found with "laminae of magnetite and hematite 1 to 2 mm" (Jensen, 1978: 24). In the upper half of this 1000 meter zone, "the intercalated sedimentary rocks become thicker and contain a high proportion of soft grey argillaceous tuff" (Jensen, 1978:25).

This rock formation extends about 12 km. through Stoughton and Frecheville townships in a "v" configuration (Figure 2.4). The cherty and andesite tuffs which are found in this formation outcrop in several locations along the south shore of the lake. One of these outcrops is almost directly behind the Jessup site near Mt. Goldsmith. It is notable that much of the raw material and tools from the Jessup site has

Map Showing the Kinojevis Group in the Lightning River and Magusi River Map Area

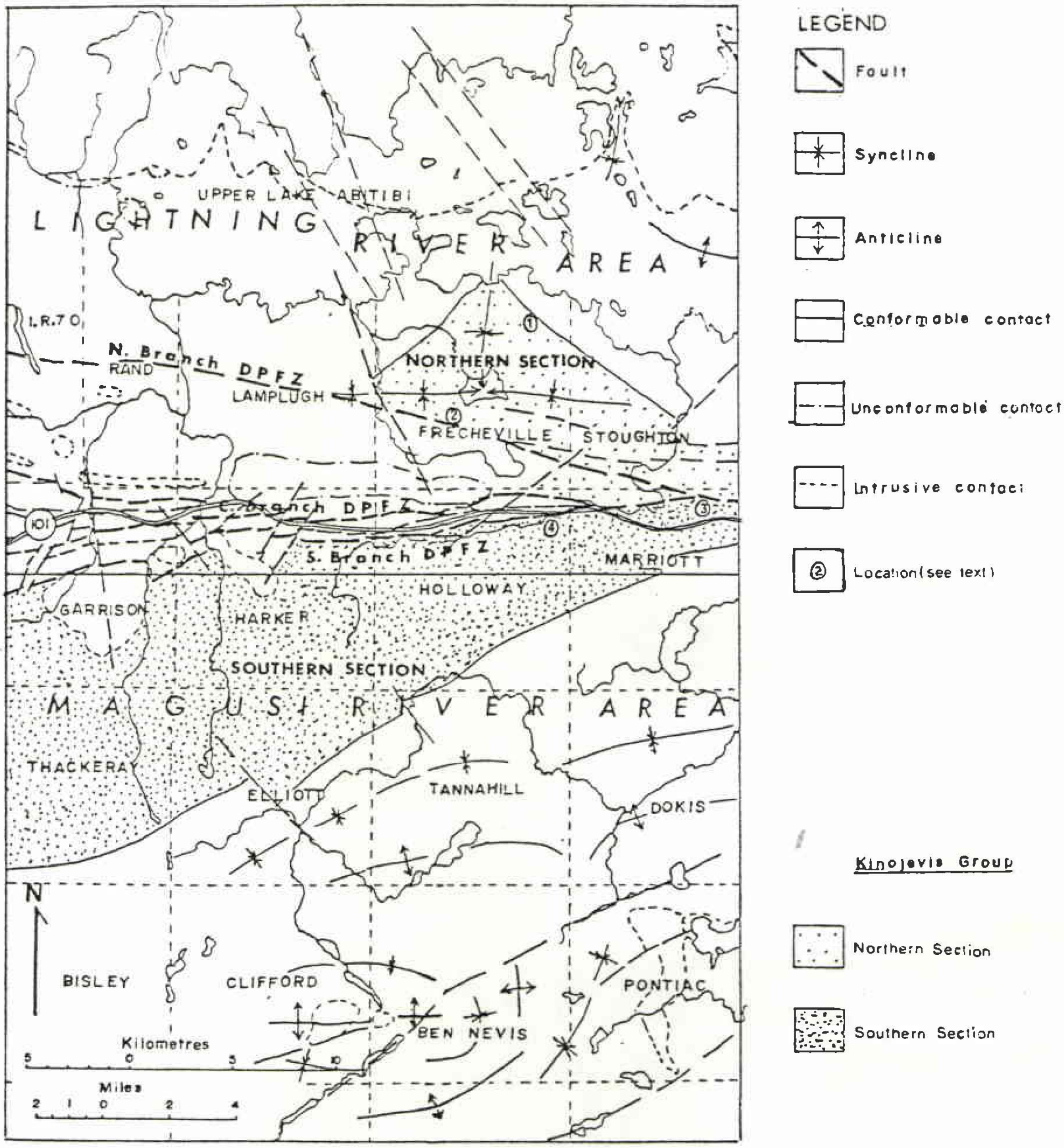


Figure 2.4 (Jensen, 1981:233)

been identified by Jensen as cherty and andesite tuff from this formation. Judging from the large quantities of chipping detritus recovered, over 200 lbs. excluding cores, as well as the large size of some of the cores and chipping debris, this outcrop would appear as the most logical source of the bulk of lithic material processed at the Jessup workshop. A chemical analysis was done on some of the raw material found at Jessup, the results of which can be seen in Chapter 4.

Most of the lithic material from Jessup appears to come from the Lake Abitibi area with the exception of greywache, sandstone, quartzite and perhaps Hudson's Bay Lowland chert. There is a possibility that the Hudson Bay Lowland material was recovered from drift deposits in the area.

The location of the indigenous and non-indigenous materials used at Jessup can be found on Figure 4.2. Chapter 4 discusses these raw materials in greater detail.

CHAPTER 3

3 JESSUP SITE: DESCRIPTION, EXCAVATION, NON-ARTIFACTUAL REMAINS

3.1 Location

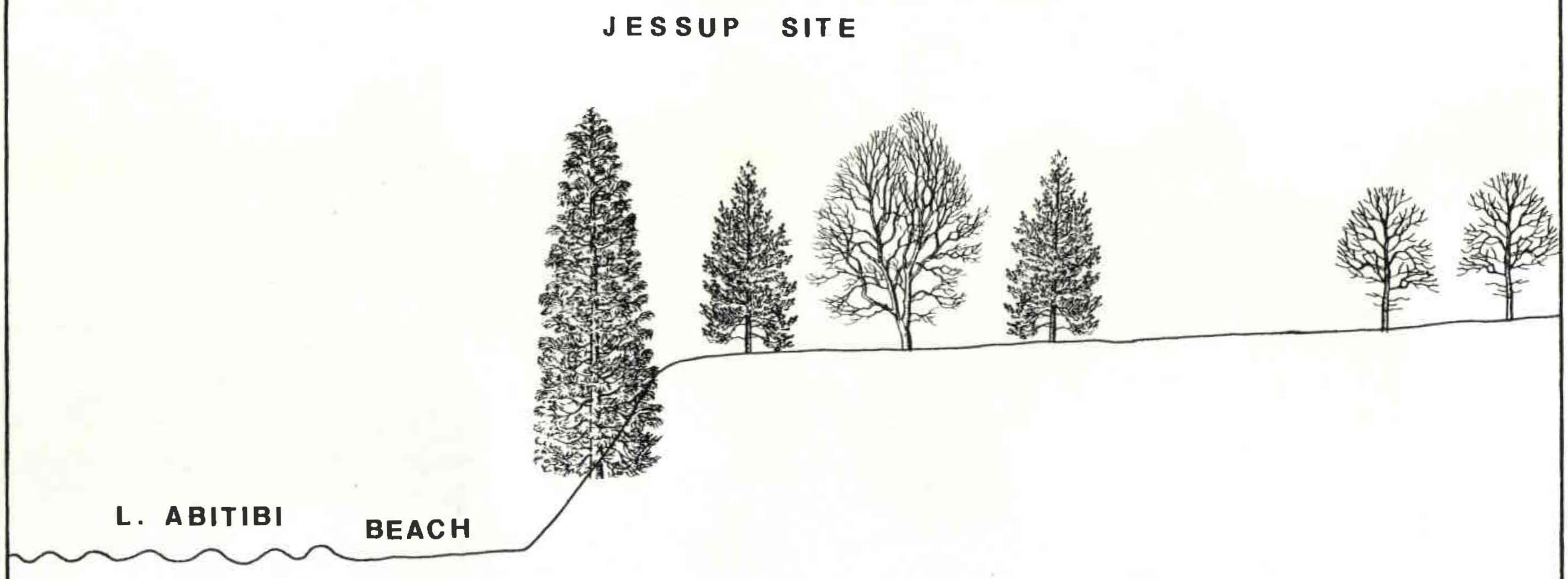
The Jessup site is located behind a small sandy beach on top of a moderately well drained bank of varved clay which rises 6 - 7 feet above the lake (Figure 3.1). It is bounded on the east and west by two rocky points, on the north by the waters of Lower Bay, and on the south by a low lying wet area and a stand of trembling aspen which begins approximately 30 metres from the shore. The bank, which is composed largely of varved clay, is rapidly eroding away, and along with it much of the site. Flakes and tools litter the beach and water, accumulating to depths of two to three feet in four to five feet of water. These flakes and tools extend as far out as 30 feet from the shoreline.

The site is relatively sheltered from northwesterly winds by the long, curved arm of Lightening Point and by the presence of two small islands to the northwest. It is one of the few areas in the bay that is raised, well drained and flat. There are additional advantages to the location of this site. The sandy, protected beach and shallow waters in front of the site makes it particularly suitable to beaching canoes. It is readily accessible to the andesite, dacite and rhyolite quarries behind the site, and is within view of the marsh/stream systems southwest of the site, in the central portion of the Lower Bay. Although the waters of the lake are shallow and turbid, they support a large fish population.

Jessup extends approximately 40 meters along the top of the bank and 30 meters inland. Originally, the site was more extensive, but fluctuating water levels have resulted in considerable erosion and destruction of the site.

This is only one of several locations where lithic reduction was carried out in Lower Bay. It is unique, however, in that it is the only site that is on a raised bank. Consequently, it has not been inundated by water. The remainder of the sites are located on the beach that stretches for 2.5 km along the bay. This full stretch of beach is only visible at low water and was largely under water in 1979.

The vegetation on the Jessup site is typical of closed boreal forest. Cedar and black spruce predominate with paper birch interspersed, while treefalls and smaller growth provide the ground cover. There is some evidence of logging having taken place in the past in the form of logging chains left in the bush, as well as cut trees. Most of this activity appeared to have occurred south of the E - W baseline. This may account for the younger and different growth that occurred in this area, namely the stand of trembling aspen. The trees overlying the site appeared to be more mature and undisturbed. One large cedar proved to be at least 75 years old.



Schematic Profile of DdGw-2

Figure 3.1

Jessup Site Location and Excavation Units

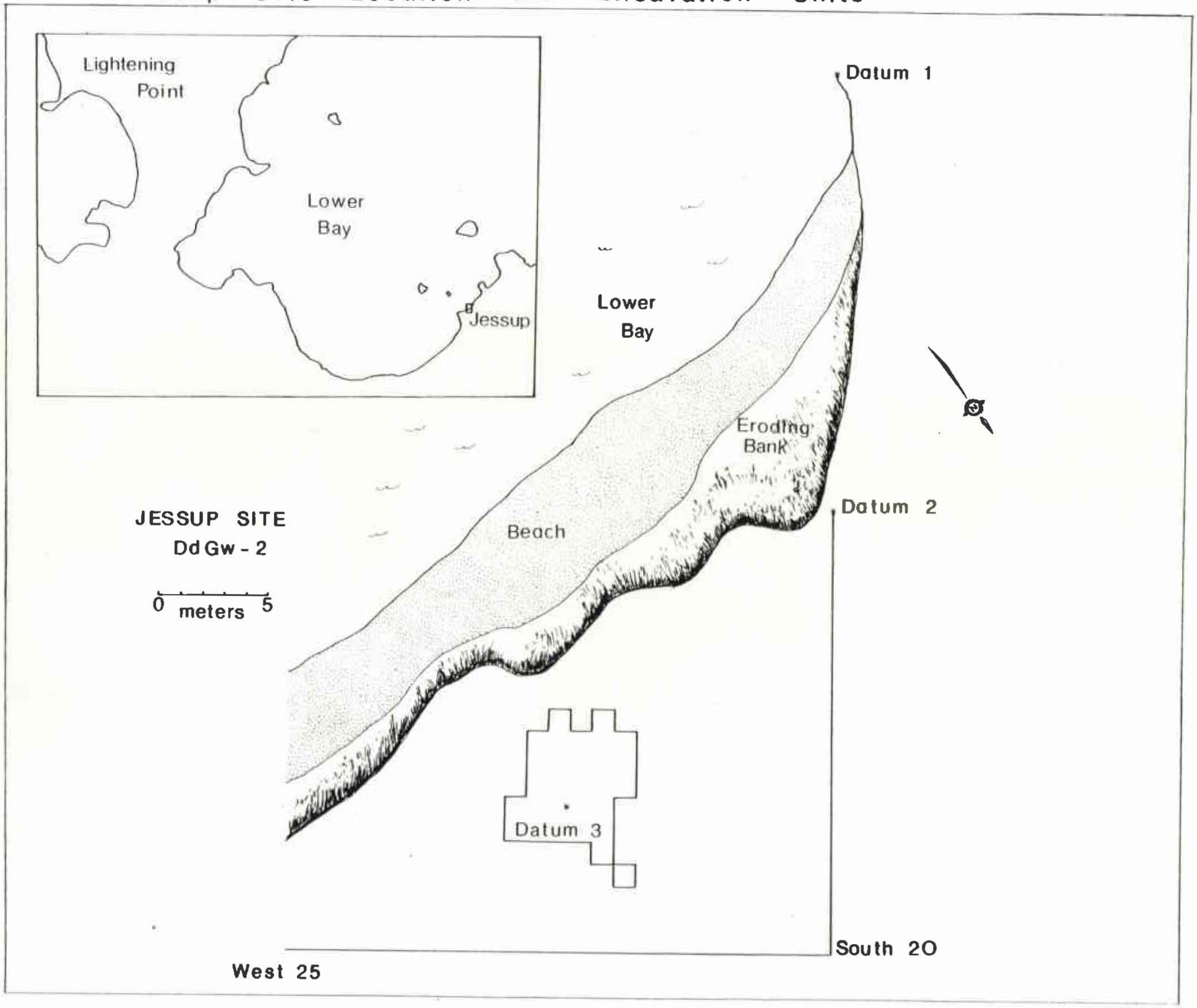


Figure 3.2

3.2 Survey and Excavation Techniques

The dense growth over the site necessitated a substantial amount of clearance by axe in order to transit in the baselines and establish the grid.

The permanent datum, Datum 1, was established as a nail on the rocky point on the eastern boundary of the site. Two additional datums were transmitted in. Datum 2 was the 0 - 0 point on the North-South baseline. Datum 3 was located within the excavation unit as a nail on a tree stump. All measurements within the excavation were taken from this point.

Twenty-nine square meters were excavated in total, which constitutes almost 19% of the total site. Each excavation unit (1 meter × 1 meter) was identified by the coordinates of the southwest corner, and every meter was excavated by 50 cm quadrants eg. NE, NW, SE, SW.

All levels were trowelled and then screened using 1/4 inch or 1/16 inch mesh. The depths of the different levels and artifacts found in situ were measured from Datum 3.

3.3 Stratigraphy

The soil profile (Figure 3.3) is relatively straightforward and varies little throughout the site. The soils analysis, carried out by Susan Jamieson, shows that the profile is in the early stages of podzo-

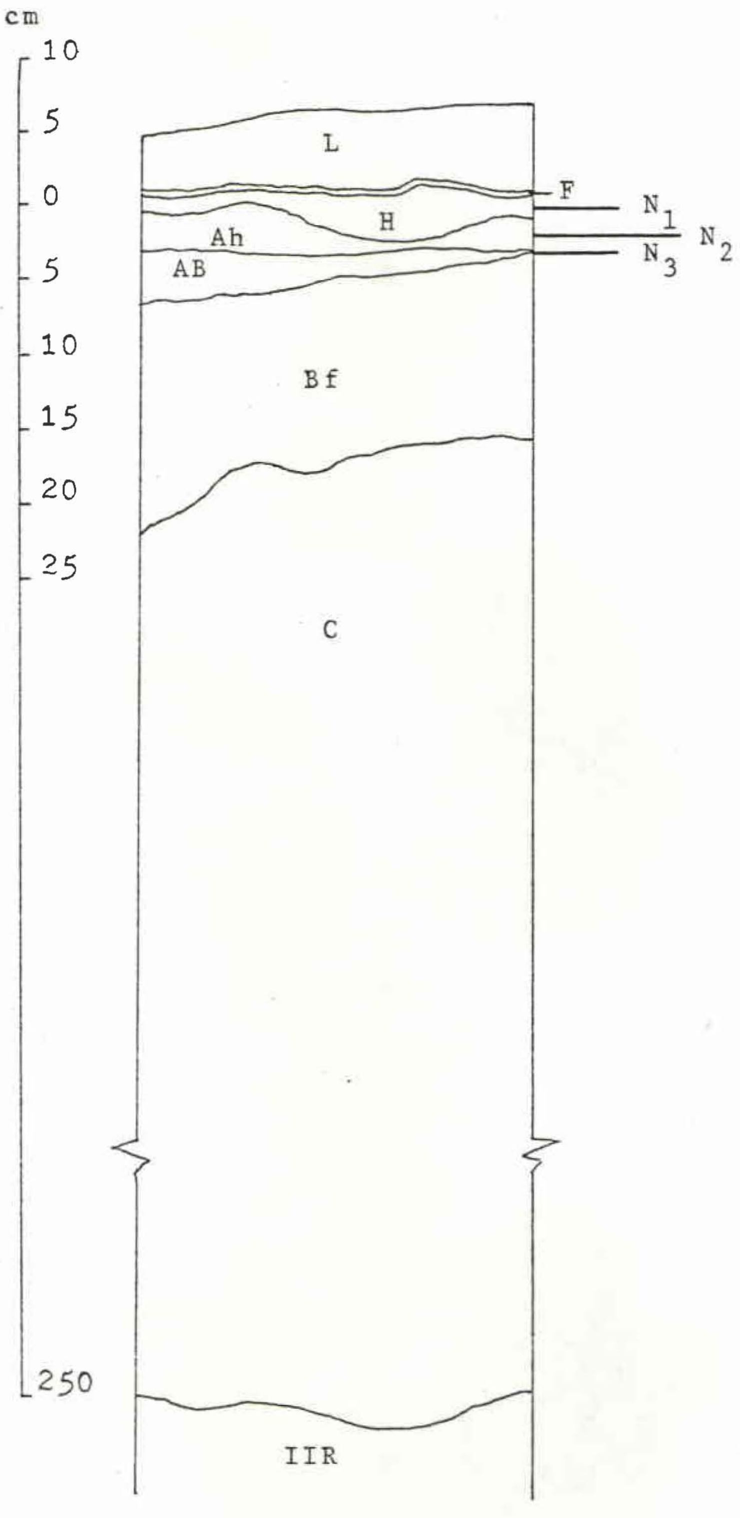


Figure 3.3 Jessup Soil Profile

lic development, and can be classified as a Brunisolic Gray Luvisol. The L horizon (see Appendix A) varied in depth from 1.5 - 7.0 cm, F from 1.0 - 1.5 cm, and H from 0 - 1.5 cm in depth. The Ah horizon made up of silty clay loam varied in thickness from 1.5 -6.0 cm, and the AB horizon also of silty clay loam but more compacted ranged from 3.5 - 6.5 cm. The Bf horizon made up of clay loam ranged from 6.5 - 24.5 cm, and the C horizon composed by clay alternating with silt (varved clay) varied from 24.5 - c. 250.0 cm.

Cultural refuse was found within the H, Ah, and AB horizons, and these three horizons were used as archaeological levels. The H horizon was designated as N_1, the Ah as N_2, and the AB as N_3. The majority of the artifacts came from within the N_2 layer which averaged 3 cm in depth.

The many treefalls and roots encountered during excavation impeded rapid progress and often obscured the distinctiveness of the upper two levels. They also served to move and mix artifactual material, thereby affecting their stratigraphic position.

Given the shallowness of the cultural deposits, it was initially hoped that the natural stratigraphy could be used to separate the different occupations of Jessup. This has not proved to be the case. Pottery was found in both the N_1 and N_2 levels, as were the tips and bases of various tools. The stratigraphic integrity of the site was not only affected by treefalls and roots but also by the nature of the soil profile and environmental conditions in the area. For example, the fact that the greatest concentration of artifacts was in the Ah (N_2) horizon is likely a result of the artifacts perching on the compact AB horizon, being slightly frost-heaved during fall and winter and then percolating down as a result of spring and summer rains. This action would considerably alter the context in which the artifacts were originally deposited. As a result, stratigraphic levels cannot be strictly equated with cultural components.

There is, however, an interesting correlation between the differential distribution of the flakes within the N_1 and N_2 levels of the site, as indicated by Figures 3.4 and 3.5, and the distribution of the unifaces, the bifaces fragments and the ceramics (Figure 3.6).

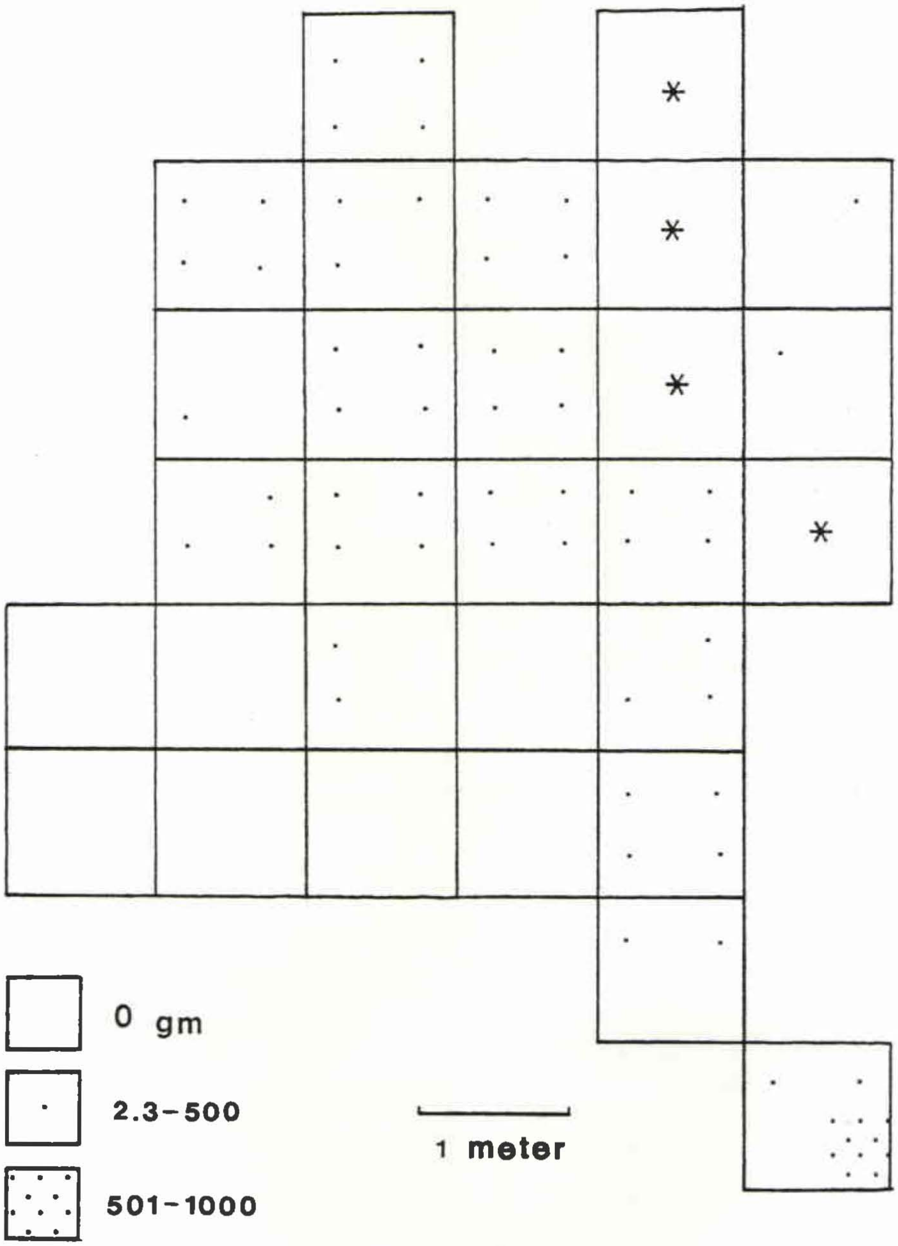
The multi-component nature of Jessup and the possible cultural affiliations of the site will be discussed further in Chapters six and seven. Figure 3.6 shows the respective occupation areas within the site.

3.4 Site Features

During the course of excavation, 5 features were recorded: two depressions which appear to be small pits, and three hearths.

Feature 2 was a possible pit feature. It measured 30 cm in diameter and 7.5 cm in depth and contained very moist and claylike

Flake Distribution by Weight – N_1 Level



* Distinctiveness of N_1 and N_2 levels obscured. Flakes found within the N_1/N_2 level and were placed within the N_2 level on Figure 3.5

Figure 3.4

Flake Distribution by Weight – N_2 Level

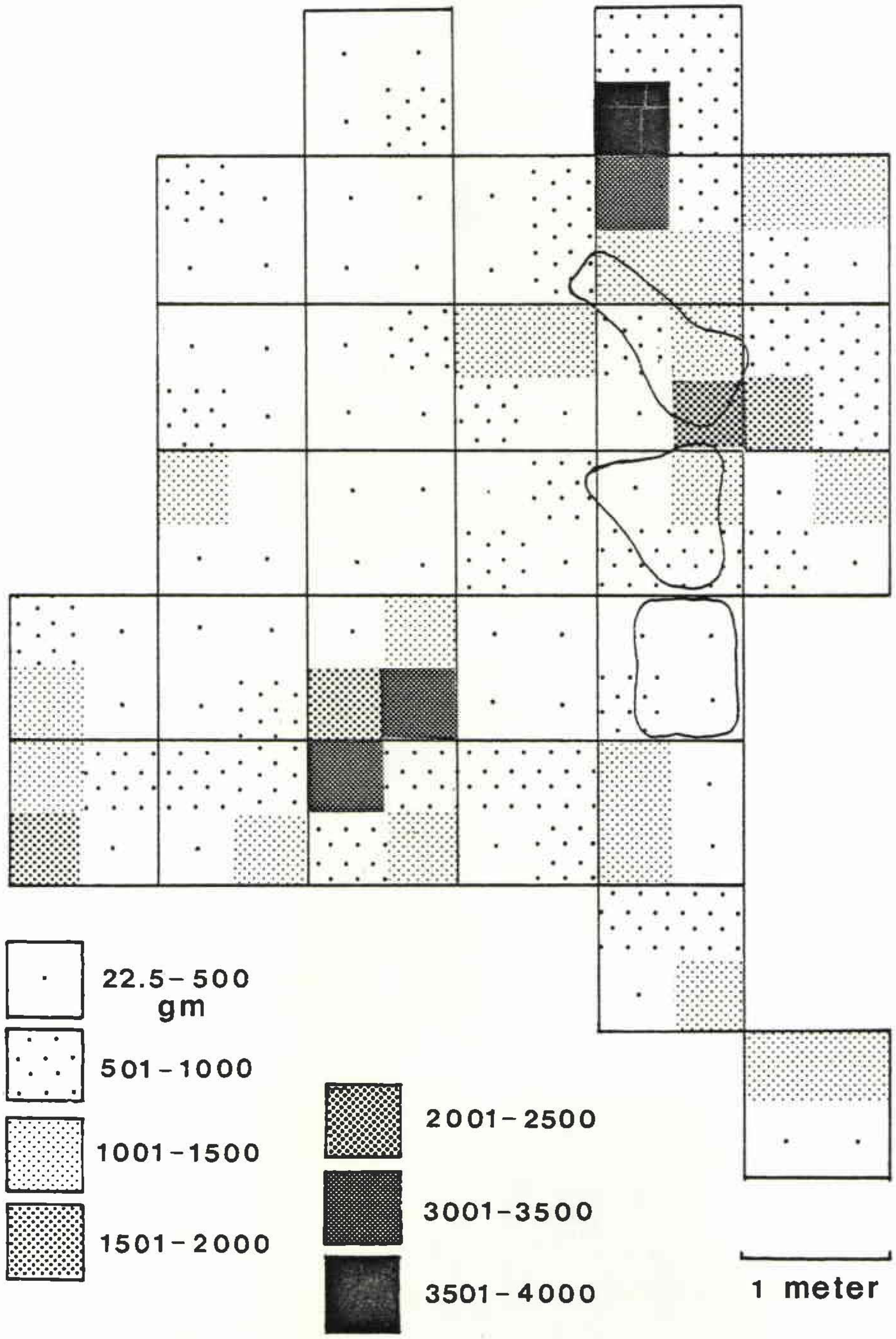


Figure 3.5

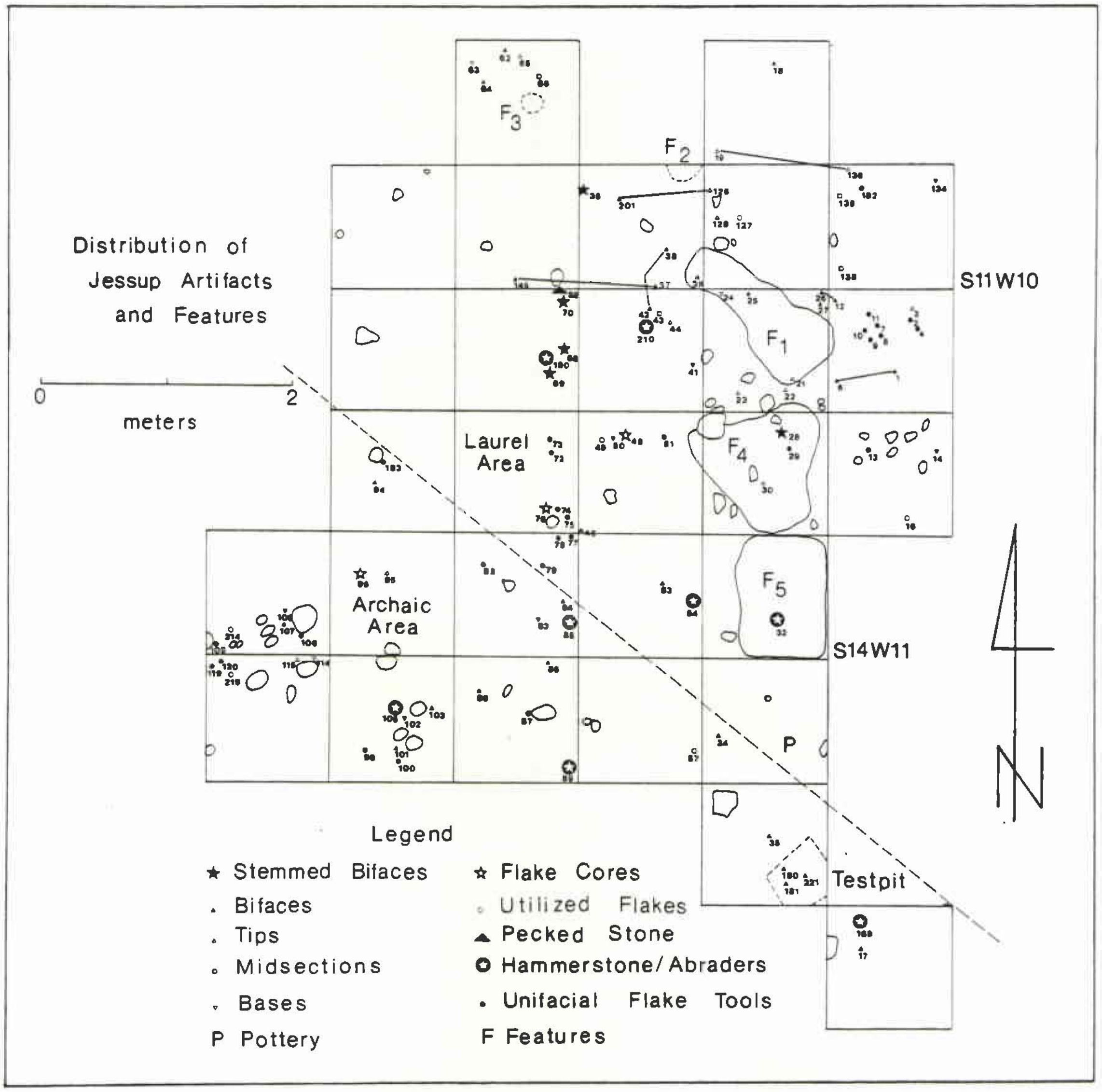

Distribution of
Jessup Artifacts
and Features
0
2
meters
Laurel
Area
Archaic
Area
S11W10
S14W11
Testpit
P
Legend
Stemmed Bifaces
Bifaces
Tips
Midsections
Bases
P Pottery
Flake Cores
Utilized Flakes
Pecked Stone
Hammerstone/Abraders
Unifacial Flake Tools
F Features

Figure 3.6

FEATURES

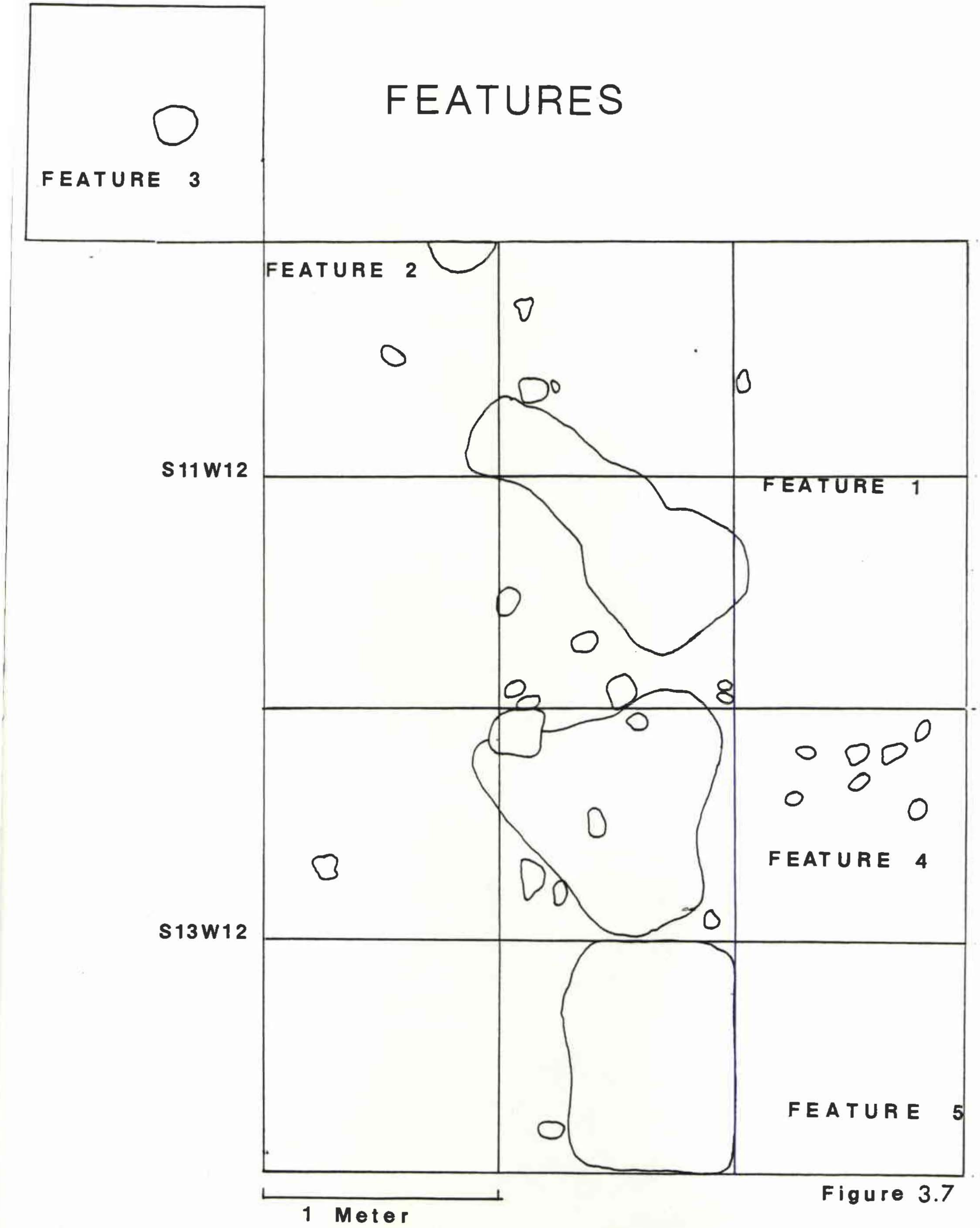


Figure 3.7

TABLE 3.1
Depression Features

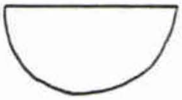
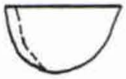
Feature Number	Excav. Square	Quad.	Levels	Max. Depth	Max. Width	Fill	Profile
2	S11W12	NE	N_1-N_3	7.5 cm	30 cm	moist brown/ black soil, charcoal flecks, flakes	
3	S10W13	SE	N_2-N_3	10 cm	19 cm	N_2 soil, orange col- oured soil along west edge, flakes	

TABLE 3.2
Hearth Features

Feature Number	Excav. Square	Quad.	Levels	Max. Length	Max. Width	Associations
1	S11W12	SE	N_1			Bone Pottery, Tools, Flakes
	S11W11	SW	N_1-N_2			Bone, Pottery, Flakes
	S12W11	NW	N_1-N_2			Bone, Pottery, Tools Flakes
		NE	"	1.28 meters	0.55 meters	Bone, Pottery, Tools Flakes
		SE	"			Bones, Tools, Flakes
	S12W10	NW	N_2			Pottery Flakes
		SW	N_2			Bone, Pottery, Flakes
4	S13W12	NE	N_1			Bone, Flakes
	S13W11	NW	N_1-N_2	1.0 meters	1.0 meters	Bone, Flakes
		NE	"			Bone, Pottery, Tools, Flakes
	S13W11	SW	N_1-N_2			Bone, Tools, Flakes
		SE	"			Bone, Flakes
5	S14W11	NW	N_2			Bone, Pottery, Flakes
		NE	N_1-N_2	1.0 meters	0.55 meters	Bone, Pottery, Flakes
		SW	"			Bone Flakes
		SE	"			Bone, Tools, Flakes

a depth of 10 cm This feature extended from levels 2 to 3, and contained level 2 (N_2) soil with orange coloured soil along the western edge. Many flakes were recovered from within the feature fill (Table 3.1).

The three hearths were aligned in a linear fashion running roughly North-South. Their exact boundaries were difficult to discern because of the propensity of trees and roots to grow through such features. As a result, they were outlined by the concentration of calcined bone and pottery (Table 3.2). The bone was found in pockets and scattered throughout the N_1 and N_2 levels, mixed with flakes, tools and pottery. The bone pockets averaged 1 - 2 cm in depth, but because of their scattered nature could not be picked out as a distinct layer in any profile. Pottery was found either in direct association with the bone or just below, suggesting that these pots were used for cooking and broke in the cooking process. The pottery is Laurel ware.

The rocks recorded in the hearth area ranged in size from 5 - 20 cm in diameter. As Figure 3.7 shows, the rocks are loosely scattered and are only generally helpful in defining any of the hearth's boundaries. Most of the rocks are granitic in composition.

The alignment and close proximity of the three hearths suggest the presence of a long tent or rectangular 3-fire structure. It appears to date to the Middle Woodland Laurel period because Laurel ceramics were found within the three hearths and in one quadrant south of the most southern hearth. The three hearths were aligned in a linear fashion. It would seem unlikely given their close proximity, within approximately 10 cm of each other, that they are the result of three separate occupations.

It is difficult to determine the exact limits of this posited structure on the north, south and eastern sides because of the small size of the excavation. To the west, however, there is a very marked linear (north/south) scatter of unifacial and bifacial tools, with a corresponding dramatic decrease in flake detritus. This linear distribution strongly suggests the presence of a barrier such as a house wall. If one assumes that hearths are placed in the centre of such structures, the structure was approximately 4 meters wide and at least 5 meters long.

Inside the structure there are three major workshop areas where the flake detritus alone ranges in weight between 2,455.8 and 3,521.4 gms with a mean weight of 3,076.1 gms. These, and adjacent areas also contain a high incidence of broken tools. In addition to the workshop activity areas, there are two areas within which there are differential distributions in terms of raw material and formal characteristics of the artifacts found there.

3.5 Faunal Remains

A sample of 1424 pieces of bone was recovered from the three hearth features at Jessup. The bone is calcined and averages less than 1 cm in size, making identification difficult. The analysis of the faunal sample was carried out by Jim Burns of the Department of Zoology at the University of Toronto.

The faunal sample is entirely of mammalian derivation. Beaver was the only species identified. It is represented by at least 70 of the 1424 bones or 4.9% of the total sample. The unidentified bone, with one exception, was derived from medium-sized mammals such as beaver and wolf and represents 1354 bones or 95.1% of the sample. The one exception comes from a medium/large mammal (caribou or bear?). Burns describes this fragment as having "a cortical thickness of 4 mm, and thus beyond the range of beaver bone" (1979:2). In addition, Burns has pointed out that there is a very slight possibility that 5 fragments of the 1354 unidentified pieces of bone are part of a tarsal or carpal from a deer/caribou-sized animal (Table 3.3).

At least three beaver are represented in the faunal sample. One of the three is suspected to be that of a subadult based on the lack of epiphyseal union on a phalange, radius and ulna, and the presence of epiphyseal portions of a humerus, a tibia and a vertebral disc (Burns, 1979).

Burns further notes that although all parts of the beaver skeleton were recovered, they are not uniformly represented. He sounds a cautionary note, however, in putting any cultural significance on the predominance of forelimbs, as Table 3.4 shows. As Burns explains, "Part

TABLE 3.3

Frequency of occurrence of identified bone from the Jessup site faunal sample

Identification	No. of Bones	%
Beaver (<u>Castor canadensis</u>)	70	4.9
Mammal sp. (medium)	1353	95.0
Mammal sp. (medium/large)	1	0.1
Total	1424	100.0

(Burns, 1979:3)

TABLE 3.4

Distribution of beaver skeletel elements in the Jessup site faunal sample

Portion of Skeleton	No. of Bones	%
skull, teeth	13	18.6
forelimb	44	62.9
hindlimb	7	10.0
vertebrae, ribs	6	8.6
Total	70	100.0

(Burns, 1979:3)

of the disparity, in favour of forelimb bones - lies in the relatively easy identification of fragments of beaver ulna and radius; whereas the forelimb is easily recognized, the hindlimb is not as easily recognized from similar-sized fragments" (Burns, 1979:2).

3.6 Radiocarbon Dates

The bone from features (hearths) 1 and 4 were submitted to Teledyne Isotopes for radiocarbon dating. The sample from Hearth 1 was run but did not contain enough collagen for a C-14 date. "The yield of carbon was less than 10% of that necessary for a date" (Buckley, 1980: personal communnication). Mr. Buckley felt that the sample from feature (hearth) 4 would fare just as badly and very kindly returned the sample. At the present time, two bone samples from feature (hearths) 4 and 5, remain intact for dating at a later time.

CHAPTER 4

4 SOURCES AND PROPERTIES OF THE LITHIC MATERIAL

4.1 Past Speculation about Sources of Abitibi Lithic Material

The source of the lithic material used by prehistoric populations at Lake Abitibi has been speculated on by both Ridley (1966) and Lee (1962b, 1965), but until recently has remained a mystery.

In the course of Frank Ridley's research on the lake, he repeatedly encountered a distinctive type of raw material which he described as a grey to green coloured fine-grained chert. Frequently this material had a white to grey patinated surface (Ridley, 1966). In a footnote in his 1966 publication, Ridley notes that Dr. MacLaren of the Mines and Technical Survey Department in Ottawa reported that "outcrops of chert occur in the vicinity of Ghost River" (Ridley, 1966:8).

Lee also encountered similar material in his surveys in 1962 on the Quebec side of the lake. He recounts that in this year he was guided to a quarry on the north shore of L. Abitibi by a resident of Nepawa Island. The quarry was located,

> some 100 yards southeast of a covered bridge which joins Nepawa Island to the mainland. There, rising almost

> from lake level in a series of steps and slopes to a height of perhaps 75 or 80 feet, is an outcrop of most unpromising-looking and weathered rock. At the point of its nearest approach to water, however, the surface is unweathered and sharply irregular. It is at once evident that blocks of the material, perhaps three or four inches in diameter, have been removed by some means. No other such occurrence was observed in a quick check of the exposed surfaces uphill (Lee, 1962b:163).

Lee adds that although no hammerstones were found, a broken leaf-shaped biface and a collection of flakes was uncovered from a narrow beach only 12 feet away from the quarry (Lee, 1962b:163).

As far as I have been able to determine, no other archaeologist has visited or further investigated this potential quarry. An interesting feature in Lee's description, is that 3 to 4 inch blocks of rock had been removed from the cliff face. Whether these blocks had joint planes or not, Lee does not mention. If they did, this would accord with my findings at Jessup where several blocks of raw material of this size were found almost intact. The only modification to some of these blocks was that 4 or 5 flakes had been struck off in what I presume to be a way of checking the suitability of the raw material and perhaps in prying out the block from an outcrop. Another interesting observation that Lee makes is that the same differences in texture found on the beach flakes, were also evident on the cliff face (1962b:165-166). This is another factor readily visible at Jessup in the flakes as well as the tools.

Lee suggested that this quarry of bluish-grey chert could be the source of the raw material that Ridley discovered at the Ghost River, a distance of 23 nautical miles (1962b:166).

Ridley and Lee were both interested in finding the source(s) of the lithic material used by Abitibi peoples. Their suggestions however have remained speculative because at the time of their research, the area had not been extensively mapped geologically and no geological analysis and comparison was made between the outcrops they mention and the artifactual materials recovered in their surveys and excavations around the lake. The geological mapping of much of this area has in fact only been undertaken within the past 10 years by Larry Jenson of the Ontario Geological Survey.

4.2 Aims of Chemical and Trace Analysis

Upon excavating Jessup and discovering what appears to be the same grey to green type of "chert" that Ridley and Lee had already encountered, I thought it valuable to have the material identified and the source(s) of this distinctive looking raw material, pinpointed, as closely as possible. Such information would aid in understanding the fracture mechanics of this material, as well as add to our knowledge of the spatial mobility and settlement pattern of the prehistoric groups living in the Abitibi area. For instance, there appears to be a great deal of homogeneity around the lake in terms of the utilization of raw material. Does this mean that the raw material was obtained almost exclusively from this area and perhaps from only one or two locations around the lake? How far afield does one find this material? North to James Bay and south to Lake Nipissing?

With this in mind, eight archaeological specimens from Jessup were submitted for a chemical and trace analysis to the Ontario Geological Survey Geoscience Laboratories. The results of the analyses were then compared to the chemical and trace analyses that Jensen had obtained from bedrock sources in the Abitibi area. Much of the following information was acquired through consultation with Dr. Jensen (Jensen, personal communication).

4.3 Identification of Specimens by Chemical Analysis

The silica content is one of the major chemical elements in defining the rock types in this area. The 8 specimens submitted for analysis ranged in silica content from 60 to 72.2%. This range, their fine-grained texture and bedded structure, suggest a very specific type of material - calc-alkalic dacite tuff, which extends into calc-alkalic andesite tuff on the mafic side and calc-alkalic rhyolite tuff on the felsic side. Table 4.1 shows the general limits of the percentage of silica content for each of the different rock types found in the Abitibi region.

TABLE 4.1

Silica Content and Rock Types

Silica Content	< 50%	52%	57%	63%	72%	80%
Komatiitic and Tholeiitic Basalt		Calc-alkalic Basalt Tuff	Calc-alkalic Andesite Tuff	Calc-alkalic Dacite Tuff	Calc-alkalic Rhyolite Tuff	

Table 4.2 presents the results of all the chemicals analyzed in the Jessup samples. While the silica content ranges from 60 - 72.2%, the remaining elements such as Aluminum oxide (Al_2O_3), Iron oxide (Fe_2O_3), Magnesium oxide (MgO), and Calcium oxide (CaO), show corresponding decreases with increases of Silicon oxide (SiO_2) as would be expected in calc-alkalic andesite, dacite and rhyolite. Of the alkalies, Potassium oxide (K_2O) is particularly erratic, while Sodium oxide (NaO_2) roughly increases with Silicon oxide (SiO_2).

The only other rock types that have a similar composition to the calc-alkalic tuffs are intermediate to felsic intrusive rocks such as diorites, granodiorites and tonalites. They, however, are coarse grained massive rocks (flows vs. tuffs), which the 8 samples are clearly not.

Another group of rocks, albeit a very small one in the Abitibi region, are sedimentary rocks. They deviate only slightly from a SiO_2 content of 57-58%, Al_2O_3 17-18%, Fe_2O_3 4-6%, MgO 2-3%, CaO 4-6%, Na_2O

TABLE 4.2

Chemical Analysis

Jessup Sample	Sample No.	Rock Type	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	S	LOI	Total
	1	Calc-alkalic Rhyolite Tuff	72.2	13.1	4.18	1.02	1.67	5.14	0.38	0.76	0.13	0.03	-	0.8	99.4
	2	Calc-alkalic Andesite Tuff	60.0	14.8	8.03	3.21	4.04	3.59	2.46	0.54	0.17	0.06	-	1.5	98.4
	3	Calc-alkalic Dacite Tuff	68.1	13.5	6.25	1.55	3.90	3.74	0.30	1.08	0.18	0.05	-	1.4	100.0
	4	Calc-alkalic Dacite Tuff	64.8	14.5	6.80	1.63	3.23	4.45	1.36	1.09	0.19	0.07	-	1.1	99.2
	5	Calc-alkalic Rhyolite Tuff	72.0	14.6	2.42	1.10	1.35	6.85	0.08	0.44	0.03	0.03	-	0.3	99.2
	6	Calc-alkalic Dacite Tuff	69.5	13.7	6.56	1.47	1.95	3.82	1.38	0.75	0.12	0.06	-	1.2	100.5
	7	Calc-alkalic Andesite Tuff	61.3	15.0	8.74	2.91	2.72	2.63	2.80	0.96	0.13	0.10	-	2.0	99.3
	8	Calc-alkalic Rhyolite Tuff	71.1	13.3	6.88	1.11	1.14	4.30	0.86	0.38	0.02	0.07	-	1.2	100.3
Jensen's Samples															
	147	Calc-alkalic Dacite Tuff	70.2	13.8	3.70	0.95	3.43	3.99	0.75	0.42	0.06	0.06	0.14	1.4	98.9
	39	Calc-alkalic Andesite Tuff	60.2	17.7	5.14	3.64	4.84	3.64	3.64	0.67	-	0.08	-	1.9	101.5
	45	Calc-alkalic Andesite Tuff	63.6	15.7	6.14	2.13	5.18	2.29	1.88	1.06	-	0.10	-	1.8	99.9
	98	Calc-alkalic Dacite Tuff	62.3	15.2	4.60	3.66	3.83	7.33	0.36	0.70	0.22	0.08	0.01	1.9	100.2
	99	Calc-alkalic Dacite Tuff	66.4	15.8	3.57	1.63	3.86	3.86	1.61	0.05	-	0.05	-	-	97.3
	122	Calc-alkalic Dacite Tuff	68.8	14.7	2.07	2.11	2.21	6.83	0.66	0.37	0.09	0.05	0.01	1.8	99.7
	87	Calc-alkalic Rhyolite Tuff	71.2	14.5	2.93	1.05	1.52	3.50	2.31	0.34	-	0.03	-	-	97.4
	64	Calc-alkalic Dacite Tuff	75.5	12.1	1.18	1.76	1.81	6.33	0.05	0.48	0.09	0.03	0.07	1.0	100.4

L.O.I = Loss of ignition. The amount of CO_2 and H_2O that was driven off in the process of analysis

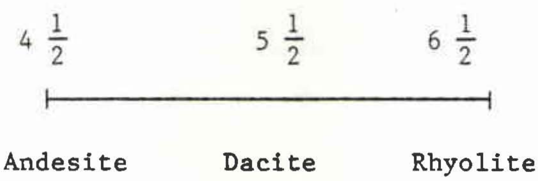
4-5%, K_2O 2-4%. The higher percentages of aluminum and potassium reflect the deposition of clay particles.

Tuffs are deposited like sedimentary rocks, which explains why they are bedded and laminated. The definition of sedimentary material is that which is created from the erosion and weathering of pre-existing rocks. Tuffaceous material is primarily volcanic material that has been thrown into the water or air, suspended for a short time, and then has slowly settled out quite distant from the volcanic vent. Although this material is found in beds it is made up of volcanic ash and is therefore considered a volcanic or meta-volcanic type of rock.

Jensen collected and analyzed more than 575 rock samples from the Abitibi region, the majority of which are volcanic. Of the volcanic rocks, more than 90% of the bedrock is made up of mafic lavas called komatiitic and tholeiitic basalts. The calc-alkalic tuffs form a very small percentage of the total range of volcanic rocks. As a result, they are found in fairly restricted areas around the lake. Their location will be pursued in the section on sources. The tuffs are found in thin beds which range in thickness from 5 cm to 5 m. They are found deposited between the volcanic flows of tholeiitic basalt, and in one area are associated with a unique iron formation.

The andesite, dacite and rhyolite tuffs are fine-grained, well bonded and vary from being isotropic to microcrystaline. They range in hardness from 4 1/2 to 6 1/2 on the Mohs Scale as they become cherty. Indeed, a more general term describing calc-alkalic dacite and rhyolite tuffs is cherty tuff. In this study, cherty tuff can be of calc-alkalic dacite or rhyolite tuff composition.

FIGURE 4.1: Range of Jessup Samples on Mohs Scale



4.4 Trace Analysis

The trace analysis concurs with the chemical analysis in defining the 8 samples as calc-alkalic volcanics. Table 4.3 contains the breakdown of the different trace elements measured from the Jessup samples. Two of Jensen's trace analysis samples are also included for comparative purposes.

4.5 Sources of Jessup Samples

The objective of the chemical and trace analyses was two-fold, as previously mentioned:

1) the identification of the types of lithic material selected by prehistoric flint knappers

and 2) the identification of the bedrock sources, especially where the bedrock outcrops on the surface.

TABLE 4.3

Trace Element Analysis

Jessup Samples	Sample No.	Rock Type	Ba	Co	Cr	Cu	Li	Ni	Pb	Zn
	1	Calc-alkalic Rhyolite Tuff	130	20	17	136	6	25	10	56
	2	Calc-alkalic Andesite Tuff	560	19	208	70	14	100	10	115
	3	Calc-alkalic Dacite Tuff	200	19	16	22	6	20	10	96
	4	Calc-alkalic Dacite Tuff	230	18	9	41	9	8	10	153
	5	Calc-alkalic Rhyolite Tuff	90	5	11	5	3	5	10	18
	6	Calc-alkalic Dacite Tuff	350	8	26	49	10	16	10	78
	7	Calc-alkalic Andesite Tuff	660	12	24	11	13	18	10	76
	8	Calc-alkalic Rhyolite Tuff	280	7	18	60	10	7	10	50
Jensen's Samples										
	122	Calc-alkalic Dacite Tuff	350	5	20	25	6	8	10	50
	147	Calc-alkalic Dacite Tuff	100	5	15	40	5	9	5	40

I turn now to the second objective.

The 8 archaeological artifacts analyzed, as well as the innumerable other artifacts from Jessup, have textures and colours (fine-grained, grey to green), bedding and laminations, and fracturing patterns, which correlate with rock exposures south of L. Abitibi in Frecheville and Stoughton townships. Located here is a triangular shaped synclinal formation which is approximately 15 km along its northeast and northwest arms. See Figure 4.2. This formation is one of the few areas in the Abitibi region where calc-alkalic andesite, dacite and rhyolite tuffs are well represented, and in terms of distance from the Jessup site would be within a relatively short walking distance (1000 m), depending upon which outcrop was used. Within the formation, there are at least 7 areas where the cherty and andesite tuffs outcrop.

Most of the Jessup material is believed to have come from a medium sized but poorly exposed outcrop northwest of Mt. Goldsmith. This outcrop is approximately 3/4 mile from Jessup and would appear to be a likely candidate for the quarry operations, particularly in light of the recent finding made by the investigations of Jensen and Pollock (Pollock, 1980). See outcrop 1, Figure 4.3.

In August of 1980, Jensen pointed out a number of pits or depressions at this outcrop which he remembered having fallen into while studying the volcanic stratigraphy and collecting rock samples when he had initially researched this area.

POSSIBLE SOURCES OF JESSUP LITHIC MATERIAL

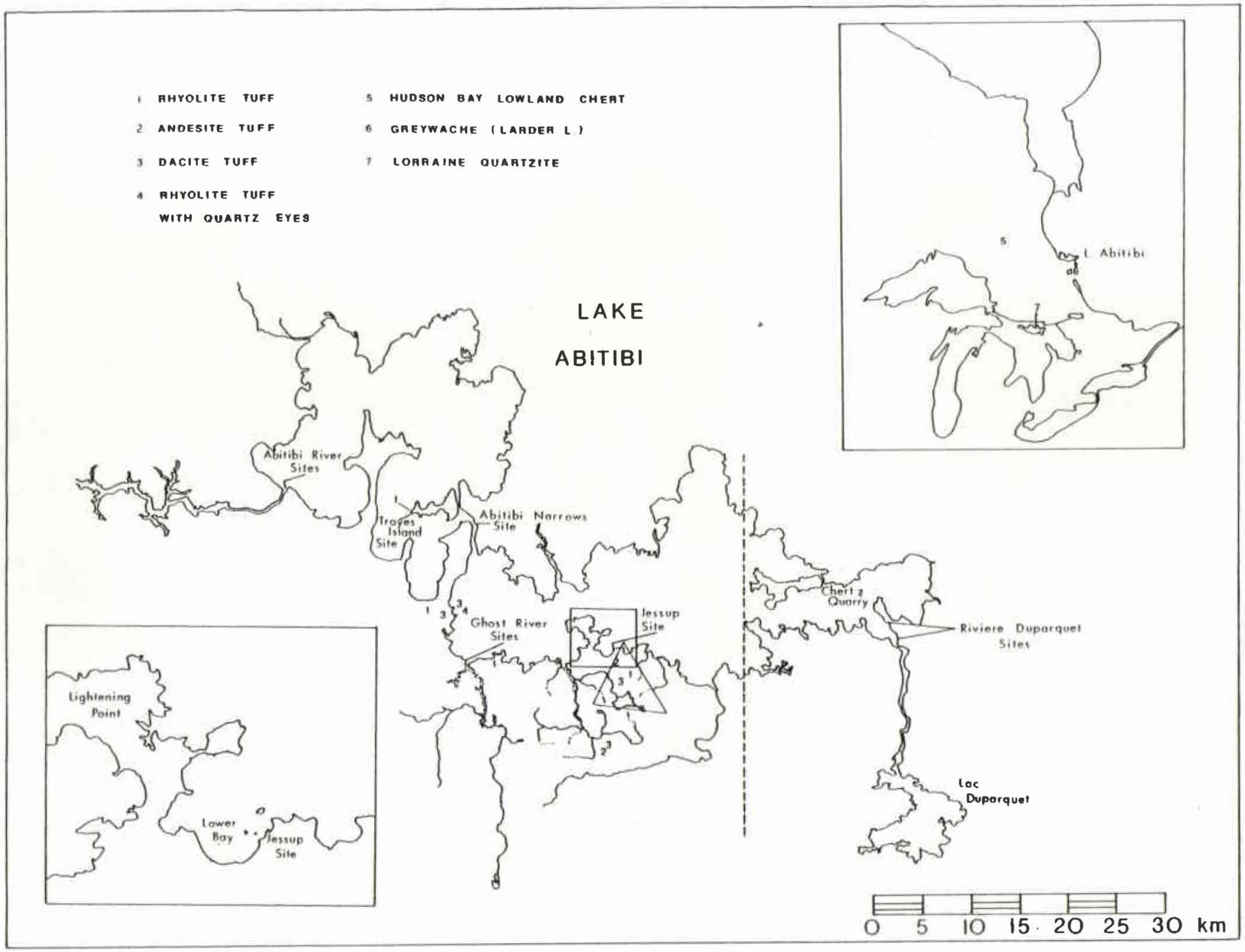
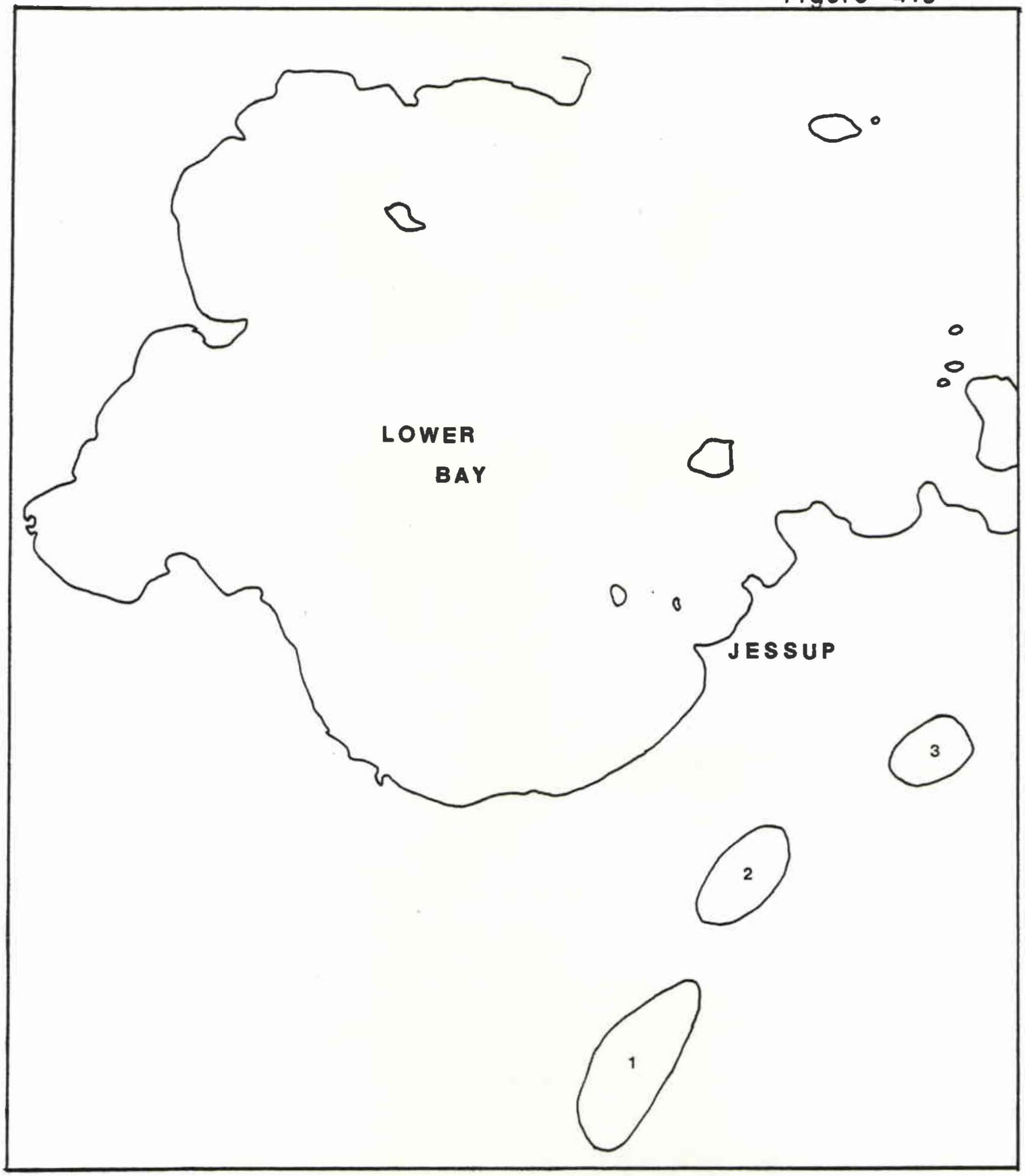


Figure 4.2

THE THREE OUTCROPS
CLOSEST TO JESSUP

Figure 4.3



> Mr. Jensen felt that these were 'unnatural' features and he feels they are definitely not the work of early European prospectors. Thus, there is a possibility that they are shafts and trenches made by prehistoric miners. My observations tend to support his ideas. Some of the pits are very deep (several metres) and have been filled in with organic rubble. I did not have a shovel, but I did attempt to investigate one with a rock hammer and uncovered, in one, a large granite cobble (which one would not expect to find on top of a volcanic outcrop). (Pollock, 1980:1-2).

A subsequent visit was made by Jensen, Pollock and myself to the same outcrop the following August of 1981. Additional artifactual evidence, in the form of flakes and one biface was found at the bottom of one deep pit.

Of the three outcrops which Jensen and Pollock visited in 1980, the only one which appeared to have been used as a quarry was the one described above. It is located NW of Mt. Goldsmith "and within visible distance (1000 M.?) of the Jessup lithic workshop site" (Pollock, 1980:1). See outcrop number 1 on Figure 4.3.

An interesting feature about this possible quarry is that the cherty and andesite tuffs are bedded and are bounded by joint planes. Blocks of this material can sometimes be seen lying loose in the bedding structure or on the surface in this area. As mentioned previously when discussing Lee's potential quarry, many of the unaltered blocks of lithic material found at Jessup were bounded on all surfaces by reddish coloured bedding planes. This suggests that in many cases, this material would not have been difficult to quarry. Indeed, a more accurate description would be that the raw material was "scavenged" from the surface or simply lifted or pried out of the bedding structure.

This exposure was not subject to numerous analyses, however, the one sample taken by Jensen (number 147) which comes from the corresponding outcrop and is the right rock type, falls neatly within the range of values obtained from the Jessup samples.

The rocks which are on strike, the same, only in the NE arm of the formation, are numbers 39, 45, 98 and 99 from Jensen's samples. The rocks of the same group (formed by the same event toward its end), but slightly higher in the volcanic sequence are numbers 122, 87 and 64 from Jensen's samples.

A comparison of the samples collected by Jensen with those from the Jessup site shows, as can be seen in Tables 4.2 and 4.3 that the Jessup samples fall well within the range of values exhibited within the triangular basin formation located behind the Jessup site. Indeed, Jensen considers them to be identical.

Jensen has also pointed out to me the presence of two additional outcrops along the NW arm of the triangular formation that are closer to the Jessup site (Figure 4.3, nos. 2 and 3). These outcrops, however, are not as high as outcrop number 1. They are smooth faced, and may have proved difficult to quarry.

A unique feature associated with these three outcrops is a banded iron formation which is made up of alternating layers of red jasper and black magnetite. These layers range in thickness from 1 mm to 1 cm (Jensen, 1978:24). This is the only area where the iron formation occurs in the Lake Abitibi region.

Calc-alkalic andesite, dacite and rhyolite outcrop in several areas along the lakeshore, however they are usually in the form of massive flows and not as bedded tuffs. Jensen recalls that the few areas where bedded chert tuffs do outcrop (Ghost River Bay and de Troyes Island), they occur in very limited deposits in lowlying, smooth-faced outcrops. They were difficult to sample because they were either at the water's edge or under water. The outcrops behind the Jessup site are only 18 km away from the Ghost River by water. Portaging across Lightning Point, as was done historically, would reduce the distance by at least 3 km. If, as Jensen thinks, the lithic material near Jessup was superior and more accessible to that in the Ghost River area, then it seems reasonable to assume, provided that they had knowledge of these outcrops, that prehistoric flintknappers would have travelled the 15 - 18 km to obtain suitable material. Only a chemical and trace analyses could tell us whether this is indeed the case.

The massive types of calc-alkalic andesite, dacite and rhyolite mentioned previously as outcropping in several areas along the lakeshore (namely the Ghost River Bay area), are not considered very suitable in Jensen's opinion for flintknapping because they do not fracture conchoidally. These rocks have been metamorphosed and have consequently recrystallized, causing them to have a "linear fabric." Fracturing this material would be similar to trying to chip wood or mica.

In contrast, the tuffaceous types of calc-alkalic andesite, dacite and rhyolite which outcrop in the triangular formation behind Jessup, have been subjected to a low grade of metamorphism which has not affected the internal structure of the rock. This material fractures conchoidally.

4.6 Exotic Materials

In addition to the calc-alkalic volcanic tuffs described above, there are several exotic lithic materials present in the Jessup collection. These exotics include such materials as Hudson Bay Lowland chert, greywache and quartzite. The Hudson Bay Lowland chert, identified by Mr. Wm. Fox, is extremely siliceous and varies in colour from salmon to dark brown. It is difficult to pinpoint the location of Hudson Bay Lowland chert because it is often found in modules in till deposits. Figure 4.2 shows the approximate location of the bedrock source of this material.

The greywache, identified by Dr. Jensen, is greyish-green in colour and very granular in texture. Jensen suggests that it comes from the Larder Lake area.

The final type of exotic material has been identified by Brizinski, Jamieson, and Jensen as being Lorraine quartzite, the origin of which is the locality of the site of Sheguiandah.

The presence of lithic material from Sheguiandah and Larder Lake suggests that the people at Jessup either travelled long distances, or were in contact, direct or otherwise, with groups considerably south of Lake Abitibi. In either case, it strongly suggests that the Ottawa River to James Bay route was in use in prehistoric as well as historic times.

4.7 Summary

To summarize, most of the Jessup lithic material has been identified through chemical and trace analysis as being of tuffaceous calc-alkalic andesite, dacite and rhyolite composition. The same material outcrops behind the Jessup site, in a formation which is shaped like a triangle. The samples which underwent chemical and trace analysis are identical to those found in the outcrops in the triangular formation. This, the formations location in relation to Jessup, the pits and trenches found by Jensen and Pollock on outcrop number 1, and the scarcity of other suitable sources makes this formation the most likely candidate for the source of the lithic raw material knapped at Jessup, and perhaps even many of the sites found by Ridley in the Ghost River and Narrows areas.

CHAPTER 5

5 THE DEBITAGE

5.1 Introduction

The Jessup lithic workship contains a substantial amount of chipping debitage and broken tools as a result of over 3,000 years of occupation, yet few so-called "diagnostic" tools. This type of site can be most usefully approached with a typology which investigates, among other aspects, the technological processes of manufacture, as reflected in both the debitage and the tools.

If one believes that manufacturing techniques are governed by the norms of a culture and transmitted through enculturation processes (Hassan, 1976:28), it should be possible "to identify regional groups in both time and space (Bordaz, 1970), and the record of technological change thus evidenced may be interpreted as an indicator of social or environmental shifts" (Jamieson, 1976:137).

Within every lithic assemblage, there are two distinct but integrated cultural traditions, "the chipped stone tool tradition (tools) and the lithic manufacturing tradition (techniques and knowledge applied in the production of chipped stone tools)" (Geier, 1973:1).

The tool tradition is concerned with producing implements for man's economic, social and physical survival, while the manufacturing tradition is involved in processing raw material into tools, different materials requiring different techniques and knowledge (Geier, 1973:2).

> Both traditions embody a significant range of cultural behaviour which is fossilized within the chipped stone tool assemblage of a site component...Both represent adaptations to different factors, and therefore have the potential to change at different rates and in response to different stimuli. This could be of extreme importance in detecting cultural contact and observing continuity in time and space (Geier, 1973:20).

Tools can be considered as a fairly conservative commodity within a culture, in terms of their production, importance and use. Geier suggests that these factors act as an "ideological brake" (Geier, 1973:2). Change can, however, be initiated by "changes in the local environment, the development of new subsistence techniques, cultural diffusion, the development of more efficient tools, and the development of new flaking processes" (Geier, 1973:2).

Changes occur in the manufacturing tradition, on the other hand, as a result of "the development of new flaking techniques, access to a new raw material source, or possibly by the introduction or deletion of a series of tool forms" (Geier, 1973:3).

In general, only the first of the two traditions, the tool tradition, has been used to determine "prehistoric cultural continuity and change" (Geier, 1973:3). Very little attention has been paid to recording the system of prehistoric cultural behaviour that is reflected in the manufacturing tradition (Geier, 1973:3). Much information has therefore been left untapped. What makes these two traditions so interesting is that if

> the manufacturing tradition changes at a rate different from, and in responses to different stimuli than the tool tradition, then <u>its analysis could play a major role in obtaining evidence of cultural continuity that might otherwise be covered by time and changes in the other components of material culture</u> (Geier, 1973:3, emphasis added).

Bonnichsen and Young (1980) take a similar but more involved tact when they present a cognitive model for lithic analysis which essentially says that too much attention has been paid to just the morphology of tools and not enough to the type of technology employed in the manufacture of stone tools. They have pointed out that studies done in information processing indicate that "visual images or verbal codes" are processed and stored differently than "motor skills" (Bonnichsen and Young, 1980:14). Since decisions involved in the technological aspect of tool making are linked to motor skills, they "are both difficult to communicate and time consuming to perfect" (Bonnichsen and Young, 1980:49). This suggests that "once a craftsman has mastered a technique, he will normally hold his motor units relatively constant at a subconscious level. Since he does not have to concentrate on his motor units, his creative attention can be devoted to other levels of decision-making such as shape and size" (Bonnichsen and Young, 1980:14).

Bonnichsen and Young have made such an interesting case for the differences in cognitive perception which exist between the tool i.e. its shape and size, and the manufacturing procedures involved in stone tool production in terms of lithic analysis, that I have quoted them at some length.

> Technological attributes linked to motor skills are more difficult to communicate then attributes linked to shape. This is because the removal of a single flake involves an extremely complex group of behaviours. For example in percussion flaking, the craftsman must simultaneously deal with the material properties of the rock, motor coordination, holding position, flaking implement, force, location and angle of blow, etc. Thus the craftsman combines and coordinates a variety of variables to bring about the desired result. By changing one variable, the outcome may be significantly altered.
>
> Such complicated procedures as pressure or percussion flaking may be extremely difficult for an observer to understand even if he is an experienced craftsman...it may take the observer several months to develop and/or

refine a set of motor skills capable of replicating the observed behaviour. For the above reasons, technological repertoires are regarded as less subject to change than shape repertoires. Once a craftsman has technological competence, there would normally be little reason for abandoning techniques of demonstrated utility for unfamiliar techniques for accomplishing the same end.

Craftsmen perceive shape on the other hand as a gestalt phenomenon or mental image. A mental image is an idea or concept which can be communicated either verbally or pictorially with relative ease. For example, the outline of a new kind of projectile point could be sketched in the dirt with a stick, or the artifact could be passed along and copied by people working in a variety of technological traditions. Knowledge of the original tradition would not be essential and there would be no need for a master-apprentice learning situation. There are other kinds of ideas which diffuse rapidly. The idea of heat treatment would not be difficult to explain nor would the idea of hafting. If the need existed, such ideas could have spread like wildfire across an entire continent in a relatively short period of time. A complex, multi-dimensional technological procedure, on the other hand, is not simply an idea. It is a motor unit which can be learned only with difficulty, perfected only with practice, and is often not amenable to verbal or graphic description

> ...Both Boas (1927) and Schapiro (1966) observed that technological procedures employed in creating totem poles and statues are more conservative and less subject to change than shape patterns. Nevertheless, this working assumption needs further testing in a variety of ethnographic settings.
>
> For the above reasons, we believe that technology is a more sensitive indicator of cultural affiliation then shape (Bonnichsen and Young, 1980:14-15).

This chapter will investigate one aspect of the lithic manufacturing tradition, the flake debitage, with the objective of outlining the respective manufacturing technologies of the Archaic and Laurel peoples.

5.2 Definition of Debitage

In this study, chipping debitage refers only to the unmodified flakes and shatter that occur as a byproduct of manufacturing stone tools. Cores, core fragments, and modified or utilized tools have been excluded from ths category and are discussed separately. The debitage has a total weight of just over 210 lbs.. The distribution of the debitage by weight by quadrant and level can be seen in Figures 3.6 and 3.7.

If all the cores and core fragments were included in the debitage weight total, this figure would be raised to approximately 250 lbs..

5.3 Methodology

The enormous quantity of chipping debitage necessitated that a random sample be drawn from the whole of the excavated population. Initially, each quadrant was numbered. Random tables were then used, and samples (quadrants) were drawn until approximately 10% of the total population by weight was reached. Once this was done, it was realized that even a sample of this size would take an inordinate amount of time to analyze and would not help to distinguish the differences, if any existed, between the Laurel and Archaic lithic technologies. As a result, two areas within the random sample which had initially been drawn were deliberately chosen for further analysis.

The first location is the NE quadrant in square S13W11. This quadrant contains an N_1 and N_2 level. It represents a portion of one of the three hearths which has been designated as Laurel because of the presence of Laurel ware.

The second location consists of two quadrants, NE and SE, in square S15W15. It is not affiliated with any features, but because of the types of tools found in its vicinity, i.e. large bifacial tools reminiscent of the Abitibi Narrows phase defined by Pollock (1976), this area has been designated as Archaic. See Figure 3.5.

In order to gain the most useful information about the processes of manufacture, the debitage from each of these two locations was sorted into the following 5 categories:

1. Flakes with cortex and platform
2. Flakes with cortex and no platform
3. Flakes with no cortex and platform
4. Flakes with no cortex and no platform

and 5. Shatter.

From these five categories, only the flakes in categories 1 and 3 were set aside to be analyzed.

Platforms are an extremely important feature of the total flake. The nature of platforms i.e. their size, whether they are cortical, facetted or plain and their angle can help to tell us about the stage of manufacture of the tool being produced. This is not to say, that all the flakes analyzed were by-products of the manufacturing process. Some flakes may have been produced as tools in their own right, however, at Jessup the major activity appears to have been the manufacturing of bifaces.

The platform in conjunction with the bulb can inform us about the fabricator used (hard hammer, soft hammer, pressure etc.), according to Crabtree (1972) and Muto (1971) among other scholars. Other archaeologists would disagree (Mewhinny, 1964), and the argument within the literature still exists of whether one can distinguish between hard and soft hammer percussion and soft hammer percussion and pressure flaking. It is generally agreed however, that looking at a population of flakes can aid in differentiating techniques or methods of production (Muto, 1971).

Very little information can be gained from analyzing the distal fragments of flakes or from the shatter, and as a result, these remaining categories were weighed, but not analyzed further.

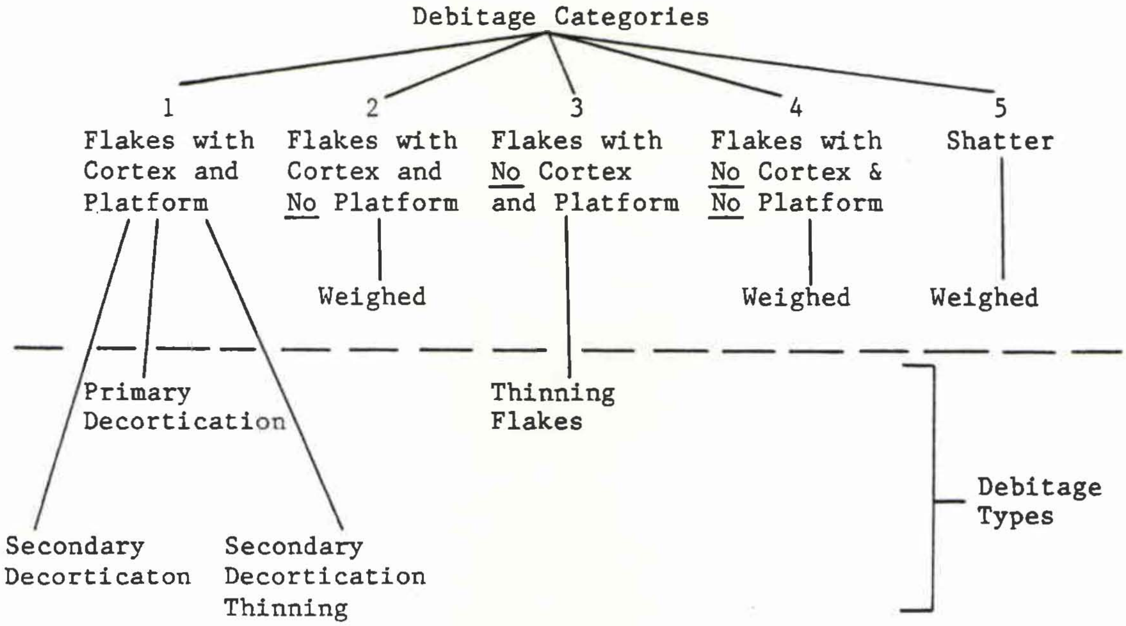


Figure 5.1: Flake Debitage Categories

The next step, involved randomly selecting 25 flakes from category 1 and 25 flakes from category 3. As a result, 50 flakes were randomly selected from the NE quadrant in square S13W11 in the N_1 level, and 50 flakes from the N_2 level. Fifty flakes were also selected from the NE quadrant in square S15W15 and 50 flakes from the SE quadrant in the same square, resulting in a sampling fraction of approximately 1% of the total flake population in terms of weight.

5.4 Flakes and Stages of Manufacture

The process of manufacturing stone tools, as related by Muto (1971:48), can be broken down into the following general "stages:"

1) selection of nodule or flake of adequate size to produce the finished implement
2) selection of fabricator
3) removal of cortex or rind from the nodule
4) thinning of the objective piece to the approximate section and cross section
5) securing the final outline and sections
6) finishing the edge and hafting mechanism if any.

There are not, explained by Muto as "harsh steps" but rather should be considered on a continuum. The value in setting out the above stages is that characteristic types of flakes are associated with each of these operations (Muto, 1971:48). Any changes which occur are a result of "material selection, percussor used in fabrication, hinge or step fracture impediments, broken objective pieces and others" (Muto, 1971:48).

5.5 Debitage Types

In view of Muto's "stages" of manufacture, the flakes from Jessup have been separated into the following 4 categories.

The flakes with cortex have been designated as either:

1) primary decortication flakes
2) secondary decortication flakes

or 3) secondary decortication thinning flakes.

The flakes without cortex have been collectively called thinning flakes. Included in this category are also secondary decortication thinning flakes. They contain a minimal amount of cortex plus certain features characteristic of thinning flakes which will be discussed shortly.

The thinning flake category is somewhat of a catch-all category because it includes flakes which are a result of the shaping and perhaps even retouching and finishing stages of manufacturing stone tools.

The 4 types of flakes are defined by the following features. These features have been adapted from Muto's 1971 thesis.

Primary decortication flakes have:

1) cortex covered platforms

and 2) a cortex covered dorsal surface

Secondary decortication flakes have:

1) cortex covered platforms and flake scar(s) on the dorsal face

or 2) fracture surface (plain or bevelled) platforms and a cortex covered dorsal face or 3) fracture surface platforms with both flake scar(s) and cortex on the dorsal face

Secondary decortication thinning flakes have:

1) fracture surface platforms which have been strengthened, with some cortex on the dorsal face but also previously removed flake scars.

Thinning flakes have:

1) no cortex present on the platform or dorsal face
2) fracture surface platforms, often strengthened or abraded (Muto, 1971:77-79).

5.6 Flake Attributes

A total of twenty-eight attributes were looked at for each of the 200 flakes analyzed. These attributes are outlined in Table 5.1. They were chosen to illustrate not only the morphology of the flakes involved but also the techniques of manufacture which manifest themselves on the striking platform, the ventral and dorsal surfaces. The attributes have been grouped according to the areas in which they are found on a flake. These attributes have been drawn from studies done by Muto (1971), Crabtree (1972), Stothert (1974), Wiersum and Tisdale (1977), and Ellis (1979).

TABLE 5.1

Flake Attributes

Proximal End

Platform Preparation	Platform Character	Platfm. Angle	Lip	Platfm. Length (mm)	Platfm. Width (mm)
1. Strengthened	1. Bevelled with Sparse Facetting		1. Present		
2. Abraded	2. Bevelled with Cluttered Facetting		2. Absent		
3. Crushed	3. Cortical Platfm.				
4. Collapsed	4. Plain				
5. Strengthened & Abraded	5. Cortical with some Bevelling				
6. Strengthened & Crushed	6. Cortical & Plain (1 Facet)				
7. Strengthened & Collapsed					
8. None					
9. Isolated, Abraded, Strengthened					

Dorsal Surface

Cortex	Dorsal Flake Scar Orientation	Dorsal Ridges	Size of Largest Dorsal Scar	Hinging	Number of Dorsal Scars
1. Present	1. Transverse	1. Pronounced (+ 1mm.)		1. Butt end	
2. Absent	2. Parallel	2. Diffuse (- 1mm.)		2. Medially	
	3. Complex	3. N/A		3. Distally	
	4. N/A			4. All above	
				5. N/A	
				6. None	
				7. 1 & 2	
				8. 2 & 3	
				9. 1 & 3	

Ventral Surface

Bulb of Applied Force	Ripples	Eraillures	Fissures
1. Salient	1. Present	1. Present	1. Present
2. Diffuse	2. Absent	2. Absent	2. Absent
3. Undetectable or Flat	3. Salient	3. Cannot Determine	3. Cannot Determine
	4. Cannot Determine		

TABLE 5.1 (cont'd)

Longitudinal Section

Curvature	Curvature Placement
1. Pronounced	1. Proximal
2. Moderate	2. Distal
3. Little or Absent	3. Symmetrical
	4. Absent

Flake Size & Outline

Weight (gms) | Maximum Length (mm) | Maximum Width (mm)

Maximal Thickness (mm) | Thickness below Bulb (mm)

Point of Max. Width	Pt. Max. Thick.	Flake Index
1. Flake Butt	1. Flake butt	$\frac{\text{Length} \times \text{Width}}{\text{Thickness} \times 100}$
2. Bulbar area	2. Bulbar area	
3. Midsection	3. Midsection	
4. Distal area	4. Distal area	
5. Equal	5. Equal	

Lateral Edge Orientation	Distal Termination
1. Contracting	1. Feather edge
2. Parallel	2. Hinge Fracture
3. Expanding	3. Step Fracture
4. Expanding-Contracting	
5. Side-struck	
6. Amorphous-Roundish	
7. Parallel-Contracting	
8. Cannot classify -	
9. Expanding-Parallel	
10. Straight-Convex	

A. Platform Preparation

Nine variations were observed within this attribute.

1. Strengthened - this refers to tiny flake scars removed from the juncture of the striking platform and the dorsal surface. Such removals result from trimming the overhangs on a platform to bring it in line with the flake (Muto, 1971:69). It strengthens the platform to provide more "purchase" for the percussor and less of a chance of the platform collapsing.
2. Abraded - the striking platform edge has been noticeably ground. This too serves to strengthen the striking platform.
3. Crushed - the edge of the striking platform has been battered either intentionally or as a result of excessive force.
4. Collapsed - the platform has fractured or shattered.
5. Strengthened and abraded - see above.
6. Strengthened and crushed - see above.
7. Strengthened and collapsed - see above. Very rarely occurs.
8. None - no preparation or alteration of any kind was noticed on the platform.
9. Isolated, Abraded, Strengthened - the isolation of a platform also referred to as a nib or tit, "provides accuracy in percussion flaking" (Muto, 1971:116). The strengthening and abrading provide "a platform strong enough to withstand the

force required to produce the predicted failure" (Muto, 1971:116). Only one example of this type of platform preparation was observed.

B. Platform Character

1. Bevelled with sparse facetting - 2 or 3 facets (fracture surfaces, flake scars) (Ellis, 1979).
2. Bevelled with cluttered facetting - more than 3 facets (Ellis, 1979).
3. Cortical platform - the entire platform is covered with cortex.
4. Plain - no facets or cortex present on the platform surface, only 1 facet.
5. Cortical with some bevelling - cortex present on the platform in addition to several flake scars (facets).
6. Cortical and plain - cortex present on the platform plus one flake scar or facet.

C. Platform Angle

This is the angle between the striking platform and the dorsal surface of the flake. This angle was measured to the nearest 5° using a contact goniometer. It gives an idea of the angle of the core/flake being reduced.

D. Lip

"Projection found on the proximal ventral surface of some flakes, believed to be associated with soft hammer percussion or pressure" (Crabtree, 1972:74). Muto in his experimentation found that lips can occur with both soft and hard hammer percussion, however, "the population percentages do show some significant differences" (Muto, 1971:115). A higher incidence of lipping occurs in soft hammer percussion.

1. Present
2. Absent

E. Platform Length

The maximum length of the platform was measured in mm. using calipers, to the nearest mm. See figure 5.2.

F. Platform Width

The maximum distance between the ventral and dorsal edges, measured to the nearest mm. using calipers. See figure 5.2.

G. Cortex

Cortex includes joint plane surfaces.

1. Present
2. Absent

H. Dorsal Flake Scar Orientation

The orientation of previously removed flake scars in relation to the longitudinal axis of the flake (Ellis, 1979).

1. Transverse
2. Parallel

Platform Length and Width Dimensions

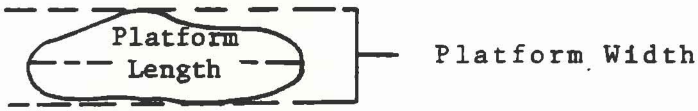
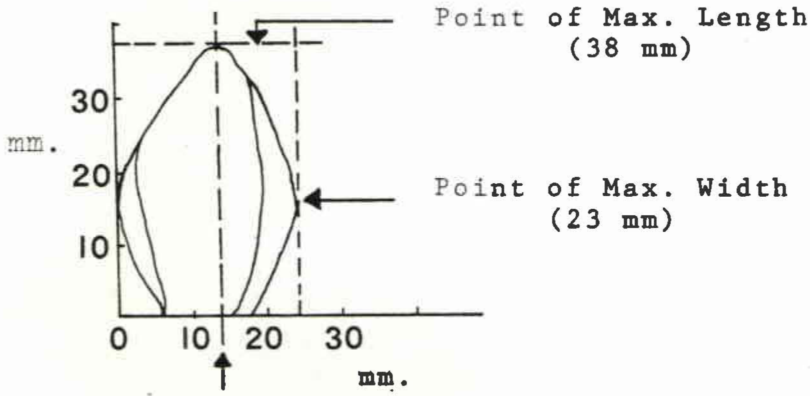


Figure 5.2

Flake Length and Width Dimensions



Axis of Percussion

Figure 5.3

3. Complex - a combination of the above.
4. Not applicable (N/A) - as in the case of primary decortication flakes.

I. Dorsal Ridges

It has been well documented that ridges influence the shape of flakes, indeed direct the shape (Muto, 1971).

1. Pronounced - "The ridges between scars are over 1 mm. above the surface of the deepest portion of the flake scar" (Ellis, 1979:32).
2. Diffuse - the ridges are less than 1 mm. above the flake scar surface (Ellis, 1979:32).

J. Size of Largest Dorsal Flake Scar

Measured in mm. to gain some idea of the size of previous flakes removed from the dorsal face.

K. Hinging

This is a fairly common occurrence when knapping the tuffaceous material from Abitibi.

"Any flake scar terminating at right angles to its longitudinal axis in a steeply curved surface. It indicates premature termination as the fracture front dissipates before reaching the projected end point of the flake" (Wiersum and Tisdale, 1977:162).

Hinging occurred on the dorsal face of flakes in one of the following positions.

1. Butt end
2. Medially
3. Distally
4. All of the above positions.
5. Not applicable.
6. None - no hinging observed on the dorsal face.
7. 1 and 2
8. 2 and 3
9. 1 and 3

L. Number of Dorsal Flake Scars

These scars were counted in the hope that they might prove useful in differentiating stages of production. The greater the number of scars on the dorsal surface the more intensive the previous flaking and the higher the flake in the production sequence.

M. Bulb of Applied Force

"The bulbar part on the ventral side at the proximal end of a flake. The remnant of a cone part, the result of the application of either pressure or percussion force" (Crabtree, 1972:48).

This term is sometimes synonymous with Cone of Force. Its saliency or diffuseness (in addition to other features i.e. lips) appears to be instrumental in defining the type of applied force used i.e. hard hammer vs. soft hammer percussion.

1. Salient - well defined and raised above the ventral surface, "having good definition of the cone part. Indicating a confined contact force" (Crabtree, 1972:89).
2. Diffuse - the bulb "lacks the definition of the cone part. The bulb is disseminated, indicating a broad contact with the pressure or percussion tool. Common to billet technique. Generally lacks an erraillure scar and ripple marks are much subdued" (Crabtree, 1972:59).
3. Undetectable or flat - ill defined, flat.

The bulb was also initially measured in relation to the contact area i.e. whether the bulb was acuminate (tapered to a point) or truncated (blunted). This attribute was dropped when it became clear that all the flakes analyzed had truncated bulbs.

N. Ripples

"Waves appearing on the plane of fracture. Compression rings. Characteristic of solids which have the properties of viscous liquid" (Crabtree, 1972:89).

Synonymous terms - undulations, waves of compression, rib marks.

It is a directional indicator because it is "concentric to the point of impact and around the bulb of force" (Wiersum and Tisdale, 1977:163).

1. Present
2. Absent
3. Salient - very pronounced
4. Cannot determine - due to type of material encountered.

O. Erraillures

A flake scar, often D-shaped, that occurs on the bulb below the point of impact. Synonymous term - Bulbar Scar.

1. Present
2. Absent
3. Cannot determine

P. Fissures

Another type of directional indicator.

"Lines of radii usually originating at the margins of the flakes on ventral face and directed toward the point of force. Fissures are not cracks, but are crests and troughs. The appearance of fissures on the bulb of force usually indicates that a percussion technique was used" (Crabtree, 1972:64).

Synonymous terms - Hackles, Striations, Lances, Tearlines, Grooved Shatter Lines.

Q. Curvature

1. Pronounced
2. Moderate
3. Little or absent (Ellis, 1979).

R. Curvature Placement

1. Proximal - the proximal end of the flake is the most curved.
2. Distal - the distal end of the flake is the most curved.

3. Symmetrical - gradual curvature along entire length of flake. (Ellis, 1979). See table 5.1.

S. Weight

Measured in gms.

T. Maximum Length

All flakes were oriented and then measured on graph paper in relation to the axis of percussion (longitudinal axis). The maximum length was measured in mm. See figure 5.3.

U. Maximum Width

Measured in mm. in the same orientation position as the length but perpendicular to the axis of percussion. See figure 5.3.

V. Maximum Thickness

Measured in mm. using calipers and holding the flake in a horizontal position "such that the measurement is made along a line perpendicular to the length of the flake" (Stothert, 1974:66). Measurement includes the bulb.

W. Thickness Below Bulb

Measured in mm at the maximum point of thickness.

X. Point of Maximum Width

Useful for determining flake outline.

1. Flake butt
2. Bulbar area
3. Midsection
4. Distal area
5. Equal in width (Stothert, 1974).

Y. Point of Maximum Thickness

1. Flake butt
2. Bulbar area
3. Midsection
4. Distal area
5. Equal in thickness (Stothert, 1974).

Z. Flake Index

The attributes of maximum length, width and thickness are used to calculate this index.

$$\frac{\text{Flake Length (mm)} \times \text{Flake Width (mm)}}{\text{Flake Thickness (mm)} \times 100} = \text{Flake Index}$$

"The index is designed to act as a handy, comparative number for describing a single flake or a group of flakes. It gives a rough idea of the relation among the dimensions of a flake" (Stothert, 1974:126-7). High values would indicated long, wide or thin flakes. Medium values indicate no exaggeration in any of the 3 measurements. Low values mean that flakes are either short, narrow or thick (Stothert, 1974:129).

AA. Lateral Edge Orientation

Ten variants of this attribute were observed during analysis.

1. Contracting
2. Parallel
3. Expanding
4. Expanding-Contracting
5. Side-struck
6. Amorphous-Roundish
7. Parallel-Contracting
8. Cannot classify
9. Expanding-Parallel
10. Straight Convex See Table 5.1.

BB. Distal End Termination

1. Feather edge - the distal end is sharp. The ideal end. The following two end terminations are the result of errors of force.
2. Hinge fracture - appears to be "the result of insufficient force to clear the projected flake but of enough force to be redirected due to the mass of material ahead of the flake ...the hinge fracture is a termination of the plane of fracture in a radius" (Muto, 1971:58). In other words, the distal end of the flake is rounded.
3. Step fracture - seems to be "related to insufficient force at a particular angle to clear the projected flakes combined with an interval of contact of sufficient duration to snap

the flake on the proximal side of the incipient fracture termination...The step fracture is a break in the flake" (Muto, 1971:58). The break is a right-angled break.

Before continuing with the analysis, I would like to briefly outline the experimental results from working with some Lake Abitibi raw material.

5.7 Experimentation with Abitibi Lithic Material

In August of 1981, I accompanied Jensen and Pollock to Outcrop #1 behind the Jessup site, to obtain some bedded tuffaceous raw material with which to experiment. These samples were gathered to gain some understanding of:

1. how the Abitibi tuffs react to different types of percussion i.e. hard hammer vs. soft hammer
2. what preparation looks like in this material

and 3. what problems they present to flintknapping.

The experimentation was done mainly to become familiar with, and gain some "feel" for the way in which to approach this type of tool-stone. Knapping the Abitibi tuffs not only gave me a subjective feel for the methods needed to work with this material, but also suggested ways in which to overcome the same problems that the prehistoric stone workers faced.

In order to answer such questions, I was fortunate to have the invaluable assistance of Mr. David Black, an adept flintknapper.

We used two different types and sizes of soft hammers and ten hard hammerstones for experimentation. The use of so many stonehammers was not intentional but rather due to continual breakage. Two different sizes of soft hammers were used to give us some idea about the size of flakes and size of platforms found in the Jessup collection. The large antler of elk weighed 530 gms, and the smaller one of moose weighed 223 gms.

The major observation that we made was that this tuffaceous volcanic material can be controlled much better using a soft rather than a hard hammer. Much longer and more complete flakes can be driven off using soft hammer percussion. Hard hammer percussion produces a great deal more crushing and shattering, and flakes tend to abort. In addition, many of the striking platforms collapsed, and proximal hinging was common. The bulbs are more pronounced with hard hammer percussion and ripples are more salient. Lips, hackles and fissures occurred with both techniques. Hackles and fissures are to some degree controlled by differing toolstones. In other words, they are apparent in some lithic materials but not in others (Jamieson, 1982: personal communication).

In comparing the sizes of striking platforms in the Jessup sample with those made during experimentation, it is evident that some very large soft hammers were used to flake the Jessup material.

One of the greatest obstructions that we found to controlled flaking was the occurrence of bedding planes. These planes disrupt the fracture front and do not allow the flake to terminate naturally (feathered). This must have caused no end of frustration to prehistoric craftsmen, and indeed many of the tools at Jessup have been found broken along these bedding planes. However, there is no way of knowing which bedding planes will cause problems in knapping, because some of the beds are quite well cemented or integrated to the surrounding rock, while others may appear to be, but are not.

Generally we found that aside from the unexpected nature of the bedding planes, this material can be substantially controlled when a concerted attempt has been made to prepare the platforms' edges i.e. by abrading and strengthening during the thinning stage of producing bifaces.

5.8 Descriptive Analysis

The general frequencies and means for all 28 attributes have been recorded in Table 5.2 for Location 1 and 2. Within each of these areas, the frequencies for decortication and thinning flakes have been kept separate so that comparisons can be made between the two different types of flakes as well as between the two locations.

One of the first observations that can be made is that the decortication flakes reflect a different stage of manufacture from thinning flakes by differences in: platform preparation, character,

TABLE 5.2

Flake Attribute Frequencies for the Laurel and Archaic Occupations

Attributes	Variables	Location 1 (Laurel)		Location 2 (Archaic)	
		Decort. N=50	Thinning N=50	Decort. N=50	Thinning N=50
Platform Preparation	No Preparation	76%	22%	48%	10%
	Strengthened	14%	24%	16%	8%
	Abraded	6%	30%	22%	62%
	Strengthened-Abraded	2%	18%	8%	20%
	Crushed	2%	-	2%	-
	Strengthened-Collapsed	-	4%	-	-
	Isolated-Strength-Collap	-	2%	-	-
	Collapsed	-	-	4%	-
Platform Character	Plain	40%	32%	28%	14%
	Cortical	34%	-	26%	-
	Cortical with Bevels	6%	-	10%	-
	Bevelled-Sparse Facets	18%	22%	20%	22%
	Bevelled-Cluttered Facets	2%	44%	16%	64%
	Cortical and Plain	-	2%	-	-
Platform Angle	$\bar{X}$ =	79.6°	71.2°	70.4°	66.5°
	Standard Deviation =	16.868	12.72	18.84	14.223
	Range =	40-110	45-100	40-115	45-100
Lip	Present	82%	98%	86%	98%
	Absent	18%	2%	14%	2%
Striking Platform Length (mm)	$\bar{X}$ =	13.52	7.60	11.10	9.87
	Standard Deviation =	8.476	3.355	6.944	5.686
	Range =	5-42	2-17	3-38	4-32
Striking Platform Width (mm)	$\bar{X}$ =	4.10	2.27	3.51	2.73
	Standard Deviation =	1.959	1.226	2.572	1.549
	Range =	1-9	1-6	1-15	1-8
Dorsal Cortex	Present	88%	10%	92%	0
	Absent	12%	90%	8%	100%
Dorsal Flake Scar Orientation	Complex	44%	68%	24%	82%
	Transverse	30%	20%	52%	10%
	Parallel	16%	12%	12%	6%
	Not Applicable	10%	-	12%	2%
Dorsal Ridges	Pronounced	62%	40%	52%	40%
	Diffuse	26%	60%	36%	58%
	Not Applicable	12%	-	12%	2%

TABLE 5.2 (cont'd)

Attributes	Variables	Location 1 (Laurel) Decort. N=50	Location 1 (Laurel) Thinning N=50	Location 2 (Archaic) Decort. N=50	Location 2 (Archaic) Thinning N=50
Size of Largest Dorsal Scar (mm)	$\bar{X}$ =	189.44	124.30	155.10	203.10
	Standard Deviation =	211.076	137.035	252.06	162.819
	Range =	0-1050	0-800	0-1725	20-600
Hinging	Butt end	36%	32%	22%	34%
	No Hinging	26%	20%	44%	28%
	Medially	14%	10%	8%	8%
	Not Applicable	10%	-	4%	-
	Distally	6%	8%	2%	6%
	Butt end & Medially	4%	12%	10%	12%
	All 3 Position	4%	16%	4%	-
	Medially & Distally	-	2%	-	4%
	Butt end & Distally	-	-	6%	8%
Number of Dorsal Scars	$\bar{X}$ =	3.26	5.56	2.90	4.96
	Standard Deviation =	1.904	2.557	1.94	2.07
	Range =	0-8	2-16	0-9	1-12
Ripples	Present	50%	56%	22%	48%
	Absent	44%	44%	70%	52%
	Salient	4%	-	-	-
	Cannot Determine	2%	-	8%	-
Bulb of Applied Force	Diffuse	74%	62%	88%	76%
	Salient	14%	28%	8%	16%
	Undectable or Flat	12%	10%	4%	8%
Erraillures	Absent	64%	74%	82%	84%
	Present	36%	26%	18%	16%
Fissures	Present	84%	82%	92%	100%
	Absent	12%	18%	2%	-
	Cannot Determine	4%	-	6%	-
Curvature	Little/Absent	52%	34%	50%	46%
	Moderate	42%	56%	44%	54%
	Pronounced	6%	10%	6%	-
Curvature Placement	Absent	50%	32%	42%	42%
	Symmetrical	18%	34%	30%	42%
	Proximal	16%	22%	26%	12%
	Distal	16%	12%	2%	4%

TABLE 5.2 (cont'd)

Attributes	Variables	Location 1 (Laurel) Decort. N=50	Location 1 (Laurel) Thinning N=50	Location 2 (Archaic) Decort. N=50	Location 2 (Archaic) Thinning N=50
Weight (gms)	$\bar{X}$ =	5.608	1.994	5.703	3.272
	Standard Deviation	9.428	2.334	19.765	4.15
	Range	.28-40.44	.07-9.64	.11-139.42	.06-22.24
Maximum Flake Length (mm)	$\bar{X}$ =	26.66	22.30	25.46	28.50
	Standard Deviation =	10.619	9.358	16.96	13.704
	Range =	11-60	7-48	7-94	7-68
Maximum Flake Width (mm)	$\bar{X}$ =	25.96	21.62	22.88	24.50
	Standard Deviation =	13.161	10.943	10.948	9.496
	Range =	10-64	7-50	7-66	6-47
Maximum Flake Thickness (mm)	$\bar{X}$ =	6.20	3.66	4.72	3.72
	Standard Deviation =	3.574	1.996	3.031	1.773
	Range	2-17	1-10	1-20	1-10
Thickness Below the Bulb (mm)	$\bar{X}$ =	4.46	2.68	3.40	2.78
	Standard Deviation =	3.412	1.491	2.68	1.25
	Range =	1-17	1-8	1-17	1-6
Point of Maximum Width	Midsection	46%	40%	36%	58%
	Distal	20%	40%	28%	24%
	Bulbar	16%	10%	26%	12%
	Butt end	14%	6%	10%	6%
	Equal	4%	4%	-	-
Point of Maximum Thickness (mm)	Butt end	44%	14%	30%	14%
	Bulbar	30%	42%	32%	32%
	Midsection	20%	26%	30%	32%
	Distal	6%	8%	6%	2%
	Equal	-	10%	2%	20%
Flake Index	$\bar{X}$ =	1.211	1.404	1.35	2.029
	Standard Deviation =	0.633	0.854	0.892	1.075
	Range =	.39-3.49	.33-5.64	.25-3.8	.42-4.29

TABLE 5.2 (cont'd)

Attributes	Variables	Location 1 (Laurel) Decort. N=50	Location 1 (Laurel) Thinning N=50	Location 2 (Archaic) Decort. N=50	Location 2 (Archaic) Thinning N=50
Lateral Edge Orientation	Expanding-Contracting	42%	40%	60%	48%
	Cannot Classify	14%	-	6%	6%
	Side-struck	12%	4%	18%	22%
	Expanding	8%	32%	10%	10%
	Parallel-Contracting	8%	2%	-	2%
	Contracting	6%	6%	2%	6%
	Amorphous-Roundish	6%	2%	4%	2%
	Parallel	2%	6%	-	-
	Expanding Parallel	2%	8%	-	-
	Straight-Convex	-	-	-	4%
Distal End Termination	Feather	62%	48%	50%	50%
	Hinge	22%	38%	22%	34%
	Step	16%	14%	28%	16%

angle, width, and length; size of dorsal ridges; number of dorsal scars; weight; maximum thickness; and thickness below the bulb.

In regards to platform preparation, decortication flakes have a high percentage of unprepared platforms, particularly in Location 1 where 76% are unprepared, 22% are strengthened, abraded, or strengthened/abraded, and 2% are in the "other" category. The platform preparation in Location 2 for decortication flakes is more balanced with 48% being unprepared, 46% strengthened, abraded, or strengthened/abraded, and 6% "other". When the above figures are compared to those for the thinning flakes, definite differences can be seen. In Location 1, 74% of the platforms on thinning flakes are strengthened, abraded or strengthened/abraded, 22% are unprepared, and 4% fall within the "other" category. In Location 2, 90% of the thinning flakes have strengthened, abraded, or strengthened/abraded platforms and 10% are unprepared.

Looking at platform character informs us that bevelling is more closely associated with thinning flakes. Bevelling aligns the force more directly into the mass being reduced. For example, the platform character of the decortication flakes in Location 1 shows that 40% of the platforms are plain, 34% are cortical, 20% are bevelled, and 6% are included in the "other" category. In Location 2, 36% of the decortication flakes have bevelled platforms, 28% are plain, 26% are cortical, and 10% are "other". The analysis of the platform character on thinning flakes in Location 1 shows that 66% are bevelled, 32% are plain, and 2% are in the "other" category. For Location 2, 86% of the platforms of thinning flakes are bevelled, and 14% are plain.

Platform angles are more acute for thinning flakes than for decortication flakes. This appears reasonable given the fact that more acute edge angles occur later in the manufacturing sequence of tool production. See Muto's stages 4 - 6. In Location 1, the decortication flakes have a mean value of 79.6°. Location 2 has a mean value of 70.4°. The thinning flakes in Location 1 have a mean value of 71.2°. Location 2 has a mean value of 66.5°.

Decortication flakes have longer and wider platforms than do thinning flakes. The decortication flakes in Location 1 have a mean platform length and width of 13.52 mm and 4.10 mm respectively. Location 2 has mean values of 11.10 mm and 3.51 mm for platform length and width. The thinning flakes in Location 1 have a mean value of 7.60 mm and 2.27 mm for platform length and width. Location 2 has mean values of 9.87 mm and 2.73 mm. The mean ratios for platform length/platform width for the decortication flakes in Location 1 and Location 2 are 3.4 and 3.7 respectively. The mean ratios for the thinning flakes in both Locations 1 and 2 is 3.8.

The dorsal ridges are more prominent in the decortication flakes than the thinning flakes. Of the decortication flakes in Location 1, 62% have pronounced ridges, 26% are diffuse and 12% are in the "other" category. In Location 2, the decortication flakes can be divided as follows: 52% have pronounced ridges, 36% are diffuse, and 12% fall within the "other" category. The thinning flakes in Location 1 have diffuse ridges 60% of the time and pronounced ridges, 40% of the time. The thinning flakes in Location 2 have the following frequencies: 58% diffuse, 40% pronounced, and 2% "other."

As would be expected, there are more dorsal scars on thinning than on decortication flakes. The decortication flakes in Location 1 and Location 2 have mean values of 3.26 and 2.90 for the number of dorsal scars present on the dorsal face of the flake. The thinning flakes in Location 1 and Location 2 have mean values of 5.56 and 4.96 for the number of dorsal scars.

Decortication flakes have a greater weight and thickness than do thinning flakes. The decortication flakes in Location 1 have the following mean values for weight, maximum thickness, and thickness below the bulb: 5.61 gms, 6.20 mm, and 4.46 mm. In Location 2, the mean values are, 5.70 gms, 4.72 mm, and 3.40 mm for weight, maximum thickness and thickness below the bulb. The thinning flakes within Location 1 have mean values for weight, maximum thickness and thickness below the bulb of: 1.99 gms, 3.66 mm and 2.68 mm. The mean values for Location 2 are 3.27 gms, 3.72 mm and 2.78 mm.

5.9 Statistical Results

Both chi-square and t-tests were conducted on the variables within Table 5.2 in order to determine if significant differences were present between the two types of flakes in the two locations. The results of these tests can be found in Appendix D. The null hypothesis tested in each case was that location and the attribute tested (attribute "X"), were independent variables.

An inspection of the results indicates that there is more similarity than difference between the two locations. One important attribute where a significant difference is present, however, is platform preparation.

Further analysis was done on high frequency single variables within this attribute, and the results can be seen in Table 5.3.

The high chi-square value for no preparation on decortication flakes, and for abraded platforms on thinning flakes indicates that location has a significant effect on these variables. This suggests that hard hammer percussion may have been the favoured technique of the Laurel occupation for at least decortication, while soft hammer percussion prevailed in the Archaic for thinning. The idea being that soft hammer percussion requires more platform preparation in order to be executed successfully. In terms of frequencies, the fact that 90% of the platforms (Table 5.2) on Archaic thinning flakes are strengthened, abraded, or strengthened/abraded, also indicates a greater concern for controlling the raw material available. It also helps explain why flakes from this area are longer.

TABLE 5.3

Chi-Square Results for Platform Preparation Variables

	Loc. 1 vs. Loc. 2 Decortication	Loc. 1 vs. Loc. 2 Thinning
No Preparation vs. Preparation	8.32 Significant	2.68 Not Significant
Strengthened vs. Non-Strengthened	0.08 Not Significant	4.76 Not Significant
Abraded vs. Non-Abraded	5.32 Not Significant	10.3 Significant

Level of Significance Tested = 0.01
df = 1

I was also interested in seeing if certain "types" of flakes would be reflected within the flake assemblages from both locations - either the same types or different types. Consequently, 15 attributes from the 28 previously presented, plus 3 additional ones, were selected for further analysis.

5.10 Type and Response Attributes

Following Geier's study, the 28 attributes discussed earlier, were divided into:

1. Type attributes

and 2. Response attributes.

The type attributes are a "series of attributes which reflect core and striking platform prior to flake removal" (Geier, 1973:11). In contrast, response attributes "refer to morphological traits of a flake which are the results of applied behaviour both observable and not" (Geier,1973:13).

In this analysis, the type attributes include the following:

* 1. Platform preparation
* 2. Platform character
* 3. Dorsal Flake Scar Orientation
4. Dorsal Ridges
* 5. Number of Dorsal Scars

* 6. Angle - partly response attribute

7. Cortex

8. Size of the Largest Dorsal Scar

9. Hinging

The <u>response attributes</u> are as follows:

10. Lip

* 11. Platform Length

12. Platform Width

* 13. Bulb

14. Ripples

15. Erraillures

16. Fissures

17. Curvature - partly type attribute

18. Curvature Placement

* 19. Weight

* 20. Max. Length - partly type attribute

* 21. Max. Width - partly type attribute

* 22. Max. Thickness - partly type attribute

(Items 20–22: Flakes can however be no longer, wider or thicker than the max. dimensions of a core.)

23. Thickness below the Bulb

* 24. Point of Max. Width

* 25. Point of Max. Thickness

26. Flake Index

* 27. Lateral Edge Orientation

* 28. Distal End Termination

TABLE 5.4

	Platform Preparation	Location 1	
Variables	Decortication	Thinning	Total %
1. Strengthened	7	12	19% *
2. Abraded	3	15	18% *
3. Crushed	1	-	1%
4. Collapsed	-	-	-
5. 1 and 2	1	9	10% *
6. 1 and 3	-	-	-
7. 1 and 4	-	2	2%
8. None	38	11	49% *
9. Isolated, 1 and 2	-	1	1%
TOTAL	50	50	100%

TABLE 5.5

	Platform Character	Location 1	
Variables	Decortication	Thinning	Total %
1. Bevelled - sparse facetting	9	11	20% *
2. Bevelled - cluttered facetting	1	22	23% *
3. Cortical	17	-	17% *
4. Plain	20	16	36% *
5. Cortical - some facetting	3	-	3%
6. Cortical and plain	-	1	1%
TOTAL	50	50	100%

TABLE 5.6

	Dorsal Flake Scar Orientation	Location 1	
Variables	Decortication	Thinning	Total%
1. Transverse	15	10	25% *
2. Parallel	8	6	14% *
3. Complex	22	34	56% *
4. N/A	5	-	5%
TOTAL	50	50	100%

TABLE 5.7

	Platform Preparation		Location 2
Variables	Decortication	Thinning	Total %
1. Strengthened	8	4	12% *
2. Abraded	11	31	42% *
3. Crushed	1	-	1%
4. Collapsed	2	-	2%
5. 1 and 2	4	10	14% *
6. 1 and 3	-	-	-
7. 1 and 4	-	-	-
8. None	24	5	29% *
9. Isolated, 1 and 2	-	-	-
TOTAL	50	50	100%

TABLE 5.8

	Platform Character		Location 2
Variables	Decortication	Thinning	Total %
1. Bevelled - sparse facetting	10	11	21% *
2. Bevelled - cluttered facetting	8	32	40% *
3. Cortical	13	-	13% *
4. Plain	14	7	21% *
5. Cortical with some facetting	5	-	5%
6. Cortical and plain	-	-	-
TOTAL	50	50	100%

TABLE 5.9

	Dorsal Flake Scar Orientation		Location 2
Variables	Decortication	Thinning	Total%
1. Transverse	26	5	31% *
2. Parallel	6	3	9% *
3. Complex	12	41	53% *
4. N/A	6	1	7%
TOTAL	50	50	100%

Flake types were generated using the attributes with asterisks (*) beside them. In addition to the 15 attributes utilized in defining flake types, three ratio type attributes were added to the response attributes.

- * 29. Platform Length/Platform Width
- * 30. Platform Length/Flake Width (to give an idea of the relative size of the striking platform in relation to the maximum width of the flake)
- * 31. Flake Width/Flake Thickness (to give an idea of thickness).

5.10 Frequencies of Variables Within the Type Attributes

The frequencies of the variables within 3 of the 5 type attributes were noted for the purpose of discovering which might be culturally significant. Tables 5.4, 5.5, and 5.6, record the frequencies of the variables within the attributes platform preparation, platform character and dorsal flake scar orientation for the decortication and thinning flakes found within Location 1.

Of the nine variables within Table 5.4, four have frequencies of 10% or more and these will be examined more closely. Numbers 1, 2, 5, and 8.

Of the six variables in Table 5.5, the four that have the highest frequencies are numbers 1, 2, 3, and 4, and these will be given further analysis.

Three of the four variables in Table 5.6, will be given more attention. Numbers 1, 2, 3.

Tables 5.7, 5.8 and 5.9, present the frequencies of the variables within the attributes platform preparation, platform character and dorsal flake scar orientation, for the flakes found within Location 2.

Four of the nine variables in Table 5.7 will be analyzed further. Numbers 1, 2, 5, and 8.

Of the six variables in Table 5.8, numbers 1, 2, 3, and 4, will also be analyzed further.

Three of the variables in Table 5.9 will be further examined. Numbers 1, 2, and 3.

An interesting outcome of comparing the frequencies in the two locations is that the same variables within both locations have the highest frequencies.

5.12 Response Attributes

Thirteen response attributes were analyzed in conjunction with the three type attributes discussed above. The frequencies and means of these attributes have been presented in Appendix B. The histograms in appendix C illustrate the nature and distribution of the continuous attributes.

5.13 Determination of Descriptive Classes of Flakes

The hypothesis that Geier and I have been testing is that,

> "within the lithic manufacturing tradition of a community there is a body of behaviour which when sequentially applied by a craftsman to a core or preform of chert, can result in the production of a flake having a desired range of morphological charcteristics. This hypothesis follows from the nature of lithic manufacturing. Flakes are sequentially removed from the raw material in the process of manufacturing a tool. If a flake is too thick, too long, or too wide, it can destroy the artifact being manufactured" (Geier, 1973:33).

It is also possible, that each type of tool may have been manufactured using a "distinct sequence of behaviour", which entails different types of flakes be removed at different stages. "If we assume that this distinctive sequence of behaviour exists for each tool, then it is possible that certain flake types will be produced only during the manufacture of specific tool forms. In order, therefore, specifically to associate a flake with a level of tool manufacture, a knowledge of the tool being produced must be available "(Geier, 1973:33).

At Jessup, large and small bifaces were the primary types of tools being manufactured. In an attempt to follow Geier's methodology, the following variants were found to have the highest frequencies within the three type attributes platform preparation, platform character and dorsal flake scar orientation:

1. Platform Preparation
   A. Strengthened
   B. Abraded
   C. Strengthened/Abraded
   D. None.

2. Platform Character
   A. Bevelled with sparse facetting
   B. Bevelled with cluttered facetting
   C. Cortical
   D. Plain.

3. Dorsal Flake Scar Orientation
   A. Transverse
   B. Parallel
   C. Complex.

In order to determine if any of these variants combine to form significant combinations of flake attributes, one first has to determine how many combinations are possible.

Forty-eight combinations are possible in total (i.e. AAA, AAB, AAC, ABA etc.). Of these possible 48 however, only 31 are present at Jessup for a total of 172/200 flakes. Within the 31 combinations only 7 combinations (flake types) occur with a frequency of 4% and above, resulting in a subsample of 96 out of the original 200 flakes. These 7 descriptive classes of flakes are as follows:

1. Strengthened, plain, complex (1, 4, 3 = 4.65%)
2. Abraded, bevelled with sparse facetting, complex (2, 1, 3 = 6.98%)
3. Abraded, bevelled with cluttered facetting, complex (2 , 2, 3, = 16.28%)
4. Strengthened and abraded, bevelled with sparse facetting, complex (5, 1, 3 = 5.81%)
5. Strengthened and abraded, bevelled with cluttered facetting, complex (5, 2, 3 = 4.07%)
6. No preparation, plain, transverse (8, 4, 1 = 9.88%)
7. No preparation, plain, complex (8, 4, 3 = 8.14%).

These 7 flake classes were then considered with their respective angles and measurements for the response attributes (Appendix B), to see "to what extent they are associated with specific morphological responses" (Geier, 1973:26). Further discussion follows in Chapter seven.

CHAPTER 6

6 ARTIFACTS

6.1 Introduction

The underlying goals of archaeology have changed considerably during the last 40 years. The growing trend in North America has been a shift from an interest in the form of tools, to their function, to finally the cultural processes involved in their manufacture and in cultural change. In other words, there has been a shift from analyzing stone tools as products, to examining the processes i.e. behaviour behind their manufacture. This thesis continues along the lines of the latter approach.

This shift in research has been made possible through the chipped stone experimentation done by such archaeologists as Evans (1860), Holmes (1890), Coutier (1929), Skavlem (see Pond 1930), Ellis (1940), Knowles (1953), Bordes (1947, 1961, 1968, 1970), Leakey (1950, 1953), Tixier (1963), Painter (1972), Crabtree (1967, 1968, 1969, 1970, 1972, 1975), Bonnichsen (1977), Bucy (1971), Muto (1971), Newcomer (1971), Bradley (1972, 1974, 1975), Faulkner (1972), Collins (1975), Gunn (1975), Johnson (1977), and Callahan (1979). The value and impact of this research has become increasingly clear.

> By providing us with the basic information of possible or even probable production methods and techniques, experimental flint-knapping becomes an integral part of any study that ultimately looks to the definition and explanation of cultural variation among stone tool users in time and space (Crabtree, 1978: 360)

Reading through the literature on the Archaic and Laurel peoples in Ontario, it becomes evident that research concerning these peoples is still basically at the upper end of the "product-process" continuum. Although the study of form and function can give important information about behaviour, this thesis also devotes considerable attention to the manufacturing processes of tool production for the purpose of adding to the several avenues by which prehistoric groups can be defined

The fact that unfinished artifacts have been called finished leads to the establishment of new "diagnostic types" (Bucy, 1974:1). This has been a consequence of the emphasis on establishing a time depth framework, which is typical of pioneering research in vast areas. While this may be necessary in the initial stages of research, this thesis suggests that a more technological approach to analyzing the lithics may also help to define an area's prehistory. Attributes such as raw material, size, and technology can profitably be looked at in conjunction with the attribute of shape.

A technological analysis examines the processes of tool manufacture and the end-products. Sheets explains the aims of such an analysis as follows.

> Because the chipped-stone industry is fundamentally a subtractive one, considerable planning is necessary to arrive at the desired end product (Muto, 1971:3). That planning, or the lithic reduction strategy, translated into behavior and recorded on the products and wastage of the industry, is the focus of technological analysis (1975:372).

Support for the technological approach comes from both Old World and New World archaeological research. Bordes' definition of the Mousterian cultural traditions and the Levallois technique and the numerous Palaeo-Indian studies done by such archaeologists as Crabtree, Callahan, Bonnichsen and Bradley, amply speak for the use of this approach in building models about prehistoric behaviour and identifying prehistoric groups, and how they adapt to their environment.

6.2 Jessup Classification Scheme

The classification system used in this chapter was largely drawn from Bonnichsen and Young (1980), Davis (1978), Wiersum and Tisdale (1977), and White, Binford and Papworth (1963).

The stone tool assemblage (Table 6. 22) at Jessup was sorted into seven classes:

1. Unifacial flake tools
2. Stemmed bifaces
3. Non-stemmed bifaces

a.	Small	13.9-17.7 gm.
b.	Medium	28.1-48.2 gm.
c.	Large	61.2-119.9 gm.
d.	Very Large	275.8-745.0 gm.

   i. tips
   ii. midsections
   iii. bases
4. Cores
   i. flake cores
   ii. quarry block cores/fragments
   iii. embryonic quarry joint blocks or wedges
5. Hammerstones/Abraders
6. Utilized Flakes
7. Pecked Stone

These classes were examined from four levels of analysis: technology, shape, size and raw material. Bonnichsen and Young also looked at wear in their cognitive analysis of the Cypress Hills lithics, but this attribute will only be examined in a general sense in this study.

The four levels of analysis were examined with the intent of uncovering and understanding some of the strategies which were involved in producing stone tools at this workshop site, the assumption being that these levels "represent important decisions on the part of the maker and/or user of the artifact" (Bonnichsen and Young, 1980:13).

Once these strategies have been determined, the next step is to decide, among other things, what the variation in strategies means. This issue will be examined in Chapter Seven.

Although all four levels of analysis were considered in this analysis, the shape and size of the tools were particularly used when comparisons were made to other collections in order to speculate on cultural affiliations. No other technological studies on Archaic and Laurel sites have been conducted in northeastern Ontario so only the attributes shape and size could be used for comparative purposes.

LITHICS

6.3 Unifacial Flake Tools (Plate II)

The unifacial flake tools were examined and oriented in the same manner as the flakes analyzed in Chapter Five. All of the unifaces with platforms were oriented with the proximal end (the platform) facing the bottom of the page, and the length of the specimen placed parallel to the axis of percussion. In the few cases where platforms where platforms were missing, the unifaces were oriented along their greatest length with the worked edge divided into two equal parts. In all cases, the dorsal surface faced the observer.

Each specimen was drawn in its orientation position on graph paper using an extended lead pencil. As many measurements as possible were taken directly from the drawing except for thickness; platform angle; platform length and width; weight; distal, proximal or lateral worked edge angles; average working edge thickness; and the total and modified perimeter measurements. The latter measurement were taken by rolling the specimen alongside a ruler. Angles were determined using a contact goniometer.

A total of 27 attributes was examined for each of the 27 unifacial flake tools. These attributes are outlined in Table 6.1. The attributes have been segregated into the four categories mentioned previously: technology, shape, raw material and size, with the latter two plus "condition of uniface and potlidding" subsumed under the miscellaneous category.

6.4 Unifacial Flake Tool Analysis

A uniface has been defined by Crabtree as an "artifact flaked on one surface only" (1972:97). In this analysis, these artifacts must also have continuous and regular retouch along an edge. There are a total of 27 artifacts in this category, and they are referred to as unifaces or unifacial flake tools.

The Jessup unifaces have all been retouched on the dorsal sur-

TABLE 6.1
UNIFACIAL FLAKE TOOL ATTRIBUTES

Technology

Platform Type

1. Cortex Covered
2. Single Facetted
3. Multifacetted
4. Multifacetted/Ground
5. Single Facetted/ Platfm. Strengthening Flakes
6. Not present
7. Single Facetted/Ground

Dorsal Morphology

1. One or More Ridges
2. Flat
3. Concave
4. Cannot Determine

Side on Which Retouch Occurs

1. Dorsal Edge Margin
2. Ventral Edge Margin

Platfm. Angle

Platfm. Length (mm)

Platform Width (mm)

Dorsal Cortex

1. Present
2. Absent

No. Working Edges

1. One
2. Two
3. Three

Location of Retouch

1. Distal End
2. Proximal End
3. Lateral Edges
4. Distal & Lateral Edges

Shape

Maximum Length (mm)

Maximum Width (mm)

Maximum Thickness (mm)

Total Perimeter (mm)

Modified Perimeter (mm)

Distal/Proximal Edge Width (mm)

Width of Lateral Edge I (mm)

Width of Lateral Edge II (mm)

Distal/Proximal Edge Angle

Angle of Lateral Edge I

Angle of Lateral Edge II

Avge. Working Edge Thickness (mm)

Cross-Section

1. Triangular
2. Trapezoidal
3. Amorphous

Working Edge Profile

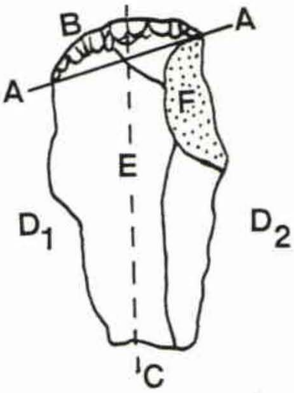
1. Excurvate
2. Straight
3. 1 & 2

TABLE 6.1 (cont'd)

Miscellaneous			
Raw Material	Size	Condition of Uniface	Potlidding
1. Calc-alkalic Andesite or Dacite Tuff	Weight (gm)	1. Intact	1. Present
2. Calc-alkalic Rhyolite Tuff		2. Broken	2. Absent
3. Hudson Bay Lowland Chert			
4. Unidentified Chert			

DORSAL VIEW OF UNIFACE

ATTRIBUTES



A — Distal Edge Width

B — Working Edge Thickness

C — Proximal End

D — Lateral Edges

E — Axis of Percussion

F — Cortex

G — Width of Lateral Edge 1

H — Width of Lateral Edge 2

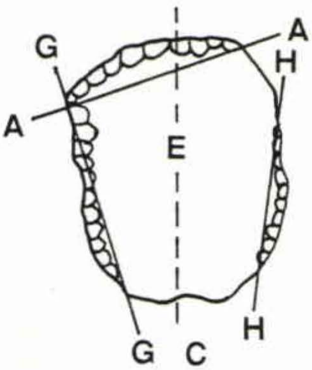


Figure 6.1

face along either the distal or proximal end, and/or one or both lateral edges. These unifaces are notable in that they form the most abundant class of artifact. They are followed next in frequency by the complete non-stemmed bifaces. A summary of some of the uniface highlights are as follows:

1. 26 of the 27 unifaces are manufactured on flakes - the one exception is a blade-like flake. It is at least twice as long as wide, has negative flake scars on the dorsal surface which run parallel to the axis of percussion, and the long axis of the blade is parallel to the axis of percussion.

2. The retouch on 25 of 27 unifaces is secondary. Only 2 of the 27 show purposeful primary flaking or thinning. These 2 exceptions, artifacts 109 and 119, have been extensively retouched on the dorsal surface. Artifact 109 can be described as a convex-triangular shaped end and side scraper on a unifacial preform (Montet-White, 1968:91). Artifact 119, is an elongated-triangular shaped double side scraper on a retouched blade. See figure 6.2. (Modified flakes and blades).

3. Almost half of the unifaces (12/27) bear cortex.

4. Eight (almost 30%) of the 27 unifaces are manufactured from an "exotic" raw material, Hudson Bay Lowland chert. Eighteen were manufactured from local raw material, and 1 has remained unidentified (figure 6.3).

TABLE 6.2

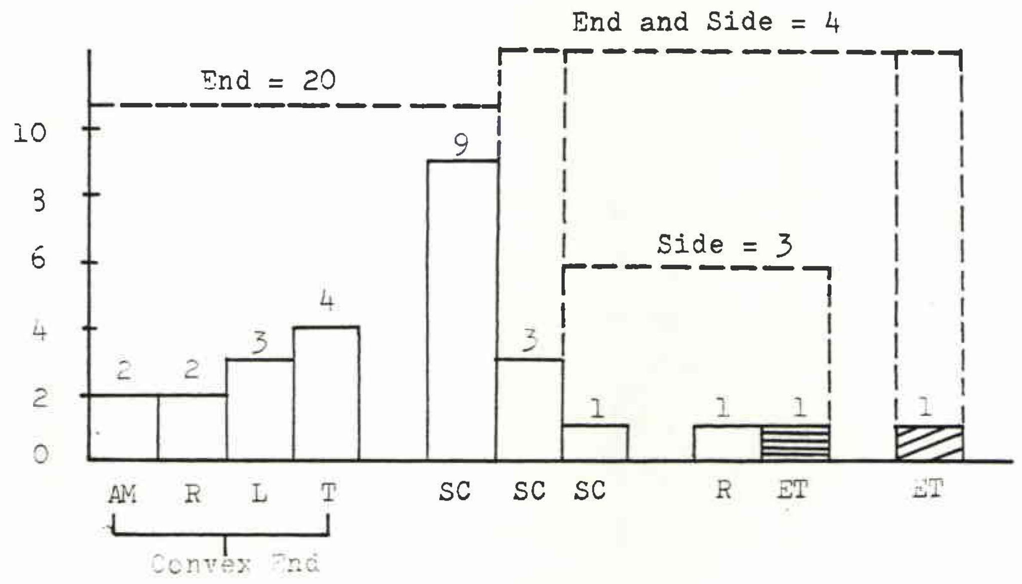
Unifacial Flake Tool Metric Data

Plate#	Cat#	Length	Width	Thick.	Weight	Platfm.<	Total Perimeter	Modified Perimeter	Ratio TP/MP	Avge. Wking Edge Thick.	Wking Edge Wid.	Wkd. End <	Wkd. Lat. <
Plate II, 1	2	45	24	8	7.8	115°	115	23	5.00	3	21.0	65°	-
2	4	38	28	4	4.5	-	105	29	3.62	3	23.5	55°	-
3	7	39	30	5	5.5	90°	110	21	5.24	2	20.0	45°	-
4	8	44	36	7	10.0	75°	126	69	1.83	2	32.0	50°	-
5	9	33	29	5	4.2	70°	96	26	3.69	3	25.0	-	40°
6	10	32	33	5	5.4	70°	100	53	1.89	3	33.0	50°	-
7	11	25	30	6	5.2	70°	85	25	3.40	2	25.0	55°	-
8	13	25	22	4	1.8	85°	70	20	3.50	2	19.0	65°	-
9	29	36	28	5	5.0	70°	104	35	2.97	2	28.5	60°	-
10	51	19	21	5	2.1	-	64	22	2.91	3	20.5	65°	-
11	72	30	25	8	5.5	80°	90	21	4.29	3	19.0	65°	-
12	73	23	23	4	1.7	80°	75	24	3.13	2	22.5	75°	-
13	74	23	25	3	1.7	-	75	29	2.59	2	25.5	60°	-
14	75	27	24	8	4.7	90°	82	23	3.57	3	22.0	65°	-
15	77	20	25	5	2.4	-	75	34	2.21	3	25.0	70°	-
16	78	29	24	5	3.4	-	86	33	2.61	3	24.0	65°	-
17	79	27	27	4	2.6	80°	82	31	2.65	3	27.0	65°	-
18	82	66	48	9	29.9	80°	183	51	3.59	2	13.0	70°	-
										2	35.0	-	45°
19	87	49	38	11	18.5	90°	149	96	1.55	3	42.0	-	60°
										3	49.0	-	55°

TABLE 6.2 (cont'd)

Plate#	Cat#	Length	Width	Thick.	Weight	Platfm.<	Total Perimeter	Modified Perimeter	Ratio TP/MP	Avge. Wking Edge Thick.	Wking Edge Wid.	Wkd. End <	Wkd. Lat. <
20	98	37	30	6	8.9	65°	108	80	1.35	3	25.0	70°	-
										3	27.0	-	55°
										3	24.0	-	60°
21	100	24	24	8	5.6	-	78	44	1.77	5	22.5	90°	-
22	106	29	23	7	4.2	-	81	25	3.24	3	21.0	75°	-
23	109	45	25	7	8.0	-	114	56	2.04	5	25.0	70°	-
										2	11.0	-	60°
										2	14.0	-	65°
24	119	59	26	5	9.8	80°	140	95	1.47	2	49.0	-	60°
										2	47.0	-	65°
25	120	51	39	8	19.1	75°	150	38	3.95	2	34.0	60°	-
26	182	31	39	6	6.4	60°	110	21	5.24	3	19.0	50°	-
27	183	29	34	11	11.5	90°	98	66	1.49	6	34.0	75°	-
										6	24.0	-	80°
N = 16	$\bar{X}$ =	34.63 mm	28.89 mm	6.26 mm	7.24 gms	79.74° mm	101.89 mm	40.37 mm	2.99 mm	2.89 mm	26.51 mm	64°	59°

Shape and Type of Unifaces
Plus Location of Retouch
N = 27



SHAPE OF UNIFACES

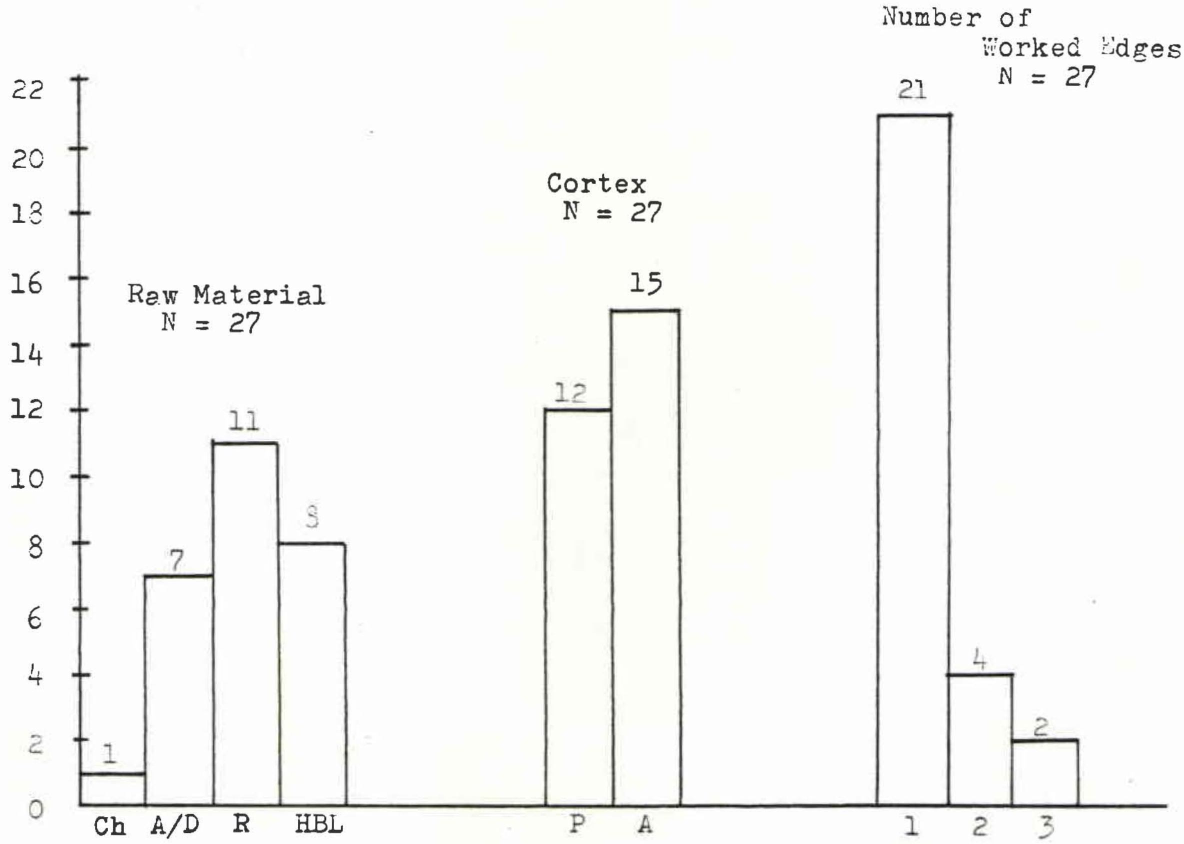
AM = Amorphous
R = Rectangular
L = Lamellar
T = Triangular
SC = Semi-circular
ET = Elongated Triangle

TYPES OF UNIFACES

Unmodified Flakes =
N = 25
Modified Flakes =
N = 1
Modified Blades =
N = 1

Figure 6.2

Unifacial Flake Tool
Non-Metric Data



RAW MATERIAL

Ch = Unidentified Chert
A/D = Calc-alkalic Andesite or Dacite Tuff
R = Calc-alkalic Rhyolite
HBL = Hudson Bay Lowland Chert

CORTEX

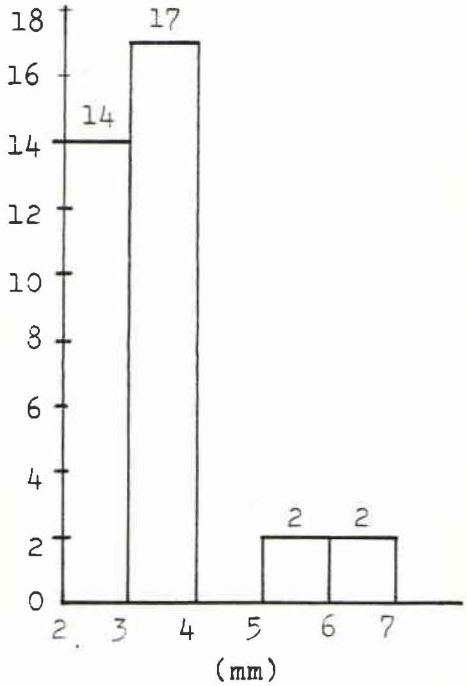
P = Present
A = Absent

NUMBER OF WORKED EDGES
1
2
3

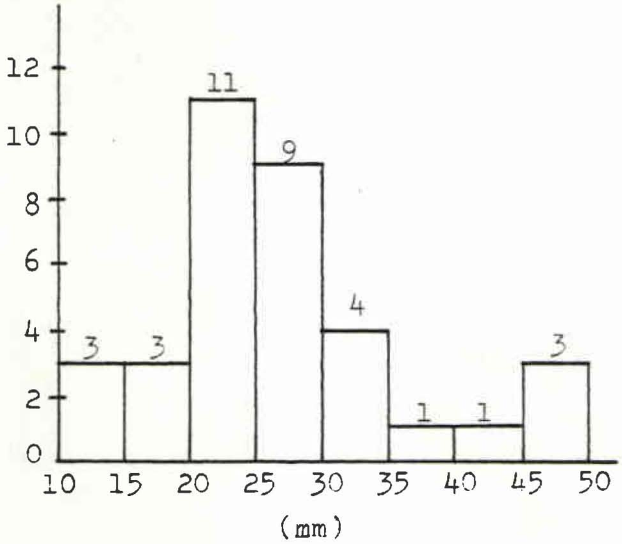
Figure 6.3

Unifacial Flake Tool - Metric Data

Working Edge Thickness
N = 35



Working Edge Width
N = 35



Combined Lateral & End Working Edge Angles
N = 35

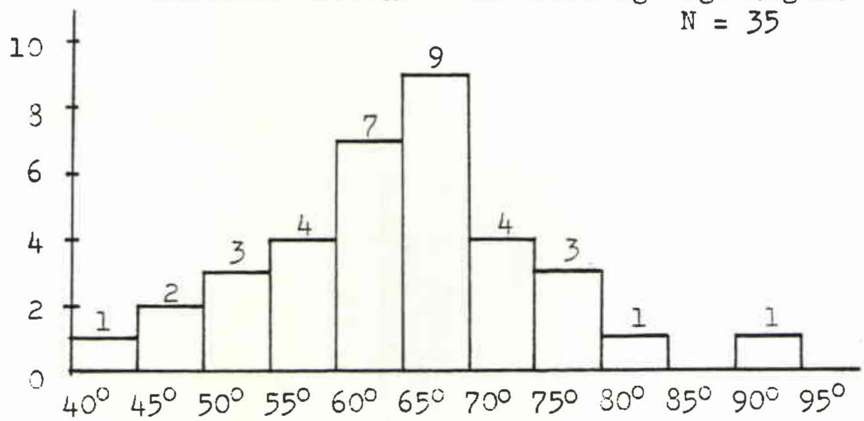
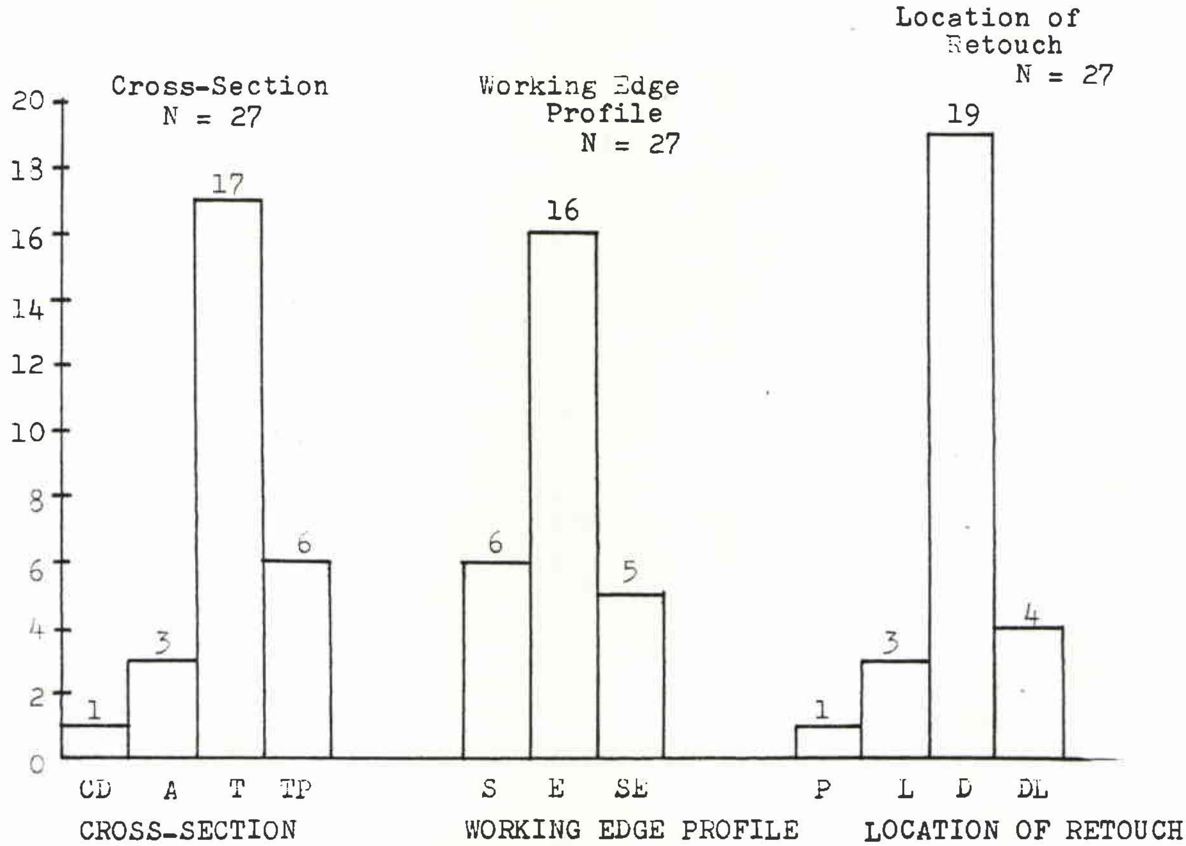


Figure 6.4

Unifacial Flake Tool - Non-Metric Data



CD = Cannot Determine
A = Amorphous
T = Triangular
TP = Trapezoidal

S = Straight
E = Excurvate
SE = Straight & Excurvate

P = Proximal
L = Lateral
D = Distal
DL = Distal & Lateral

Figure 6.5

5. Over 91% (31/35) of the working edge angles are greater than 45° (Figure 6.4).

6. On 54% (19) of these artifacts the working edge is on the distal end of the flake. Only one of the unifaces was retouched along the proximal end. 11% (4) were retouched both distally and laterally, and 9% (3) only laterally (Figure 6.5).

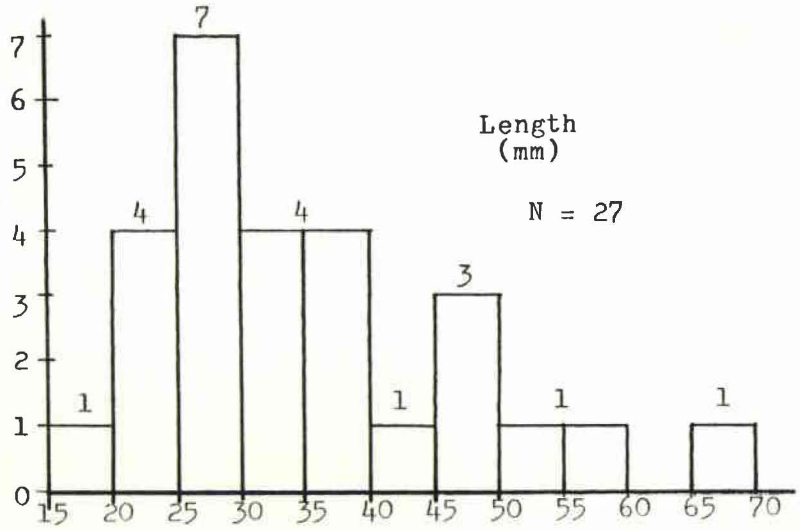
7. The majority (16) of the working edges are excurvate in form. Six have straight profiles and 5 have a combination of the above (Figure 6.5).

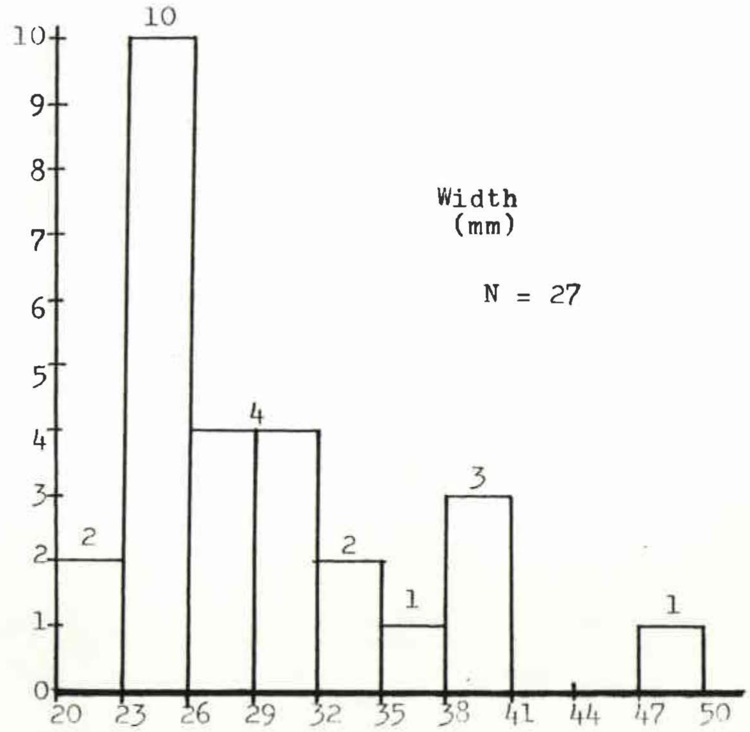
8. Almost 89% (31/35) of the working edges are 2 and 3 mm. thick. The remaining 11% (4/35) are evenly divided between 5 and 6 mm. (Figure 6.4).

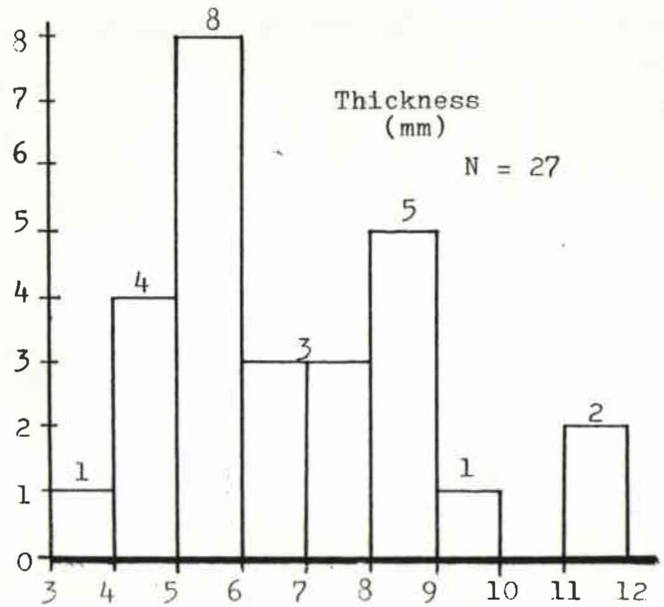
9. Almost 30% of the unifaces have no striking platforms. The types of striking platforms which predominate are single-facetted (22%) and multi-facetted and ground platforms (22%). The remaining platform frequencies are cortical (11%), multi-facetted (3.7%), single facetted and strengthened (3.7%), and single facetted and ground (7.4%).

10. There is a definite bimodal distribution for the weights of the unifaces. 24/27 (89%) weigh between 1.7 - 11.5 gms. and 3/27 (11%) weigh from 18.5 - 29.9 gms. (Figure 6.7).

11. It is interesting that although the unifacial scrapers made







JESSUP

Unifacial Flake Tool
Metric Frequencies

Figure 6.6

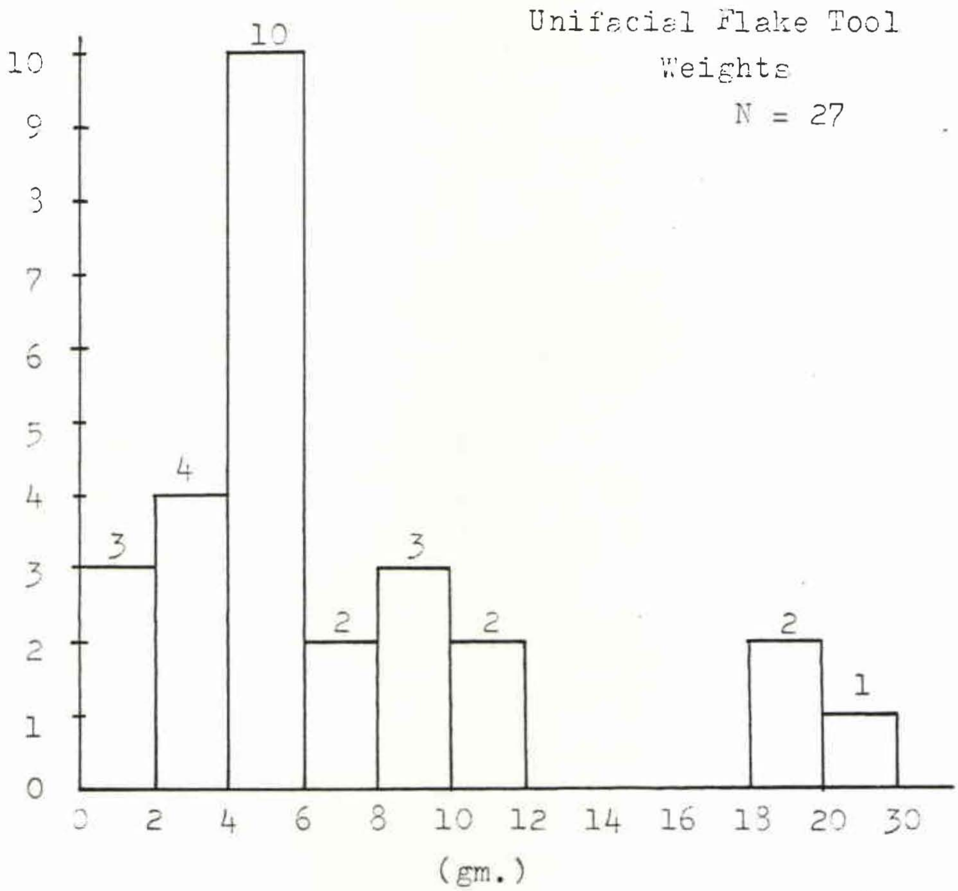

Unifacial Flake Tool
Weights
N = 27
10
9
8
7
6
5
4
3
2
1
0
3
4
10
2
3
2
2
1
0
2
4
6
8
10
12
14
16
18
20
30
(gm.)

Figure 6.7

from Hudson Bay Lowland chert made up almost 1/3 of this category, no cores and practically no detritus of this type were recovered, which leads to the conclusion that these unifaces were manufactured elsewhere.

12. Dorsal ridges on the face of cores or bifaces were used to guide the removal of flakes made into unifacial flake tools. These flakes were struck either behind or between these ridges, and as a result, 24/27 (89%), of the unifacial flake tools, have triangular or trapezoidal cross-sections.

6.5 Unifaces and Raw Material

Nine uniface attributes were considered in conjunction with the different types of raw materials, in order to investigate the relationships that may exist between the raw materials, technology, shape, size and function (Table 6.3).

The most noticeable feature of Table 6.3 is that there is a decided gradient in the mean proportions of the unifaces as they become more siliceous. The andesite/dacite and rhyolite unifaces are longer, thicker and heavier, and have wider and longer platforms and longer working edge widths. In addition, they have a larger range of values than do the Hudson Bay Lowland chert unifaces. The two exceptions to this trend are the mean worked edge angles and the working edge thicknesses. These increase as the uniface materials become more siliceous, which suggests a difference related to function, or perhaps they have outlived their usefulness, from being reworked.

TABLE 6.3

Unifaces and Raw Material

RAW MATERIAL		Length	Thick-ness	Weight	Platfm. <'s	Platfm. Length	Platfm. Width	Wking. Edge Thick.	Wking. Edge Width	Wked. Edge <'s
Andesite/Dacite	N	7	7	7	7	7	7	8	8	8
	X	40.86	7.14	10.04	83.57°	16.21	5.43	2.5	31.0	53.75°
	Range	25-51	5-11	4.2-19.1	70-115°	9-25	3-10	2-3	20-49	40-65°
Rhyolite	N	11	11	11	7	7	7	17	17	17
	$\bar{X}$	39.0	5.73	8.01	72.14°	12.21	3.79	2.71	26.24	61.18°
	Range	27-66	4-9	2.6-29.9	60-80°	5-20	2-5	2-5	11.49	45-75
Hudson Bay Lowland Chert	N	8	8	8	4	4	4	8	8	8
	$\bar{X}$	23.88	5.63	3.19	83.75°	8.75	3.63	2.88	22.0	69.38°
	Range	19-30	3-8	1.7-5.6	80-90°	4.14	2-5.5	2-5	19-25.5	60-90°
Unidentified Chert	N	1	1	1	1	1	1	2	2	2
	$\bar{X}$	29.0	11.0	11.5	90°	24.0	9.0	6.0	29.0	77.5°
	Range	29.0	11.0	11.5	90°	24.0	9.0	6.0	24-34	75-80°

The differences in the morphological attributes may reflect not only the differences in the workability of the different raw materials but also the size of the available raw material. For instance, andesite and dacite are available in large and fairly homogeneous tabular blocks. Rhyolite is found in smaller blocks which are often riddled with bedding planes, and Hudson Bay Lowland chert is available in small nodular form.

Another possiblity for the differences in size between the local and exotic unifaces is that the latter were not as readily available and were not rejected as readily as the local materials, but retouched and used until considered exhausted.

An inspection of the range of values for the technological attributes, platform angle, platform length, and the platform width, shows that considerable overlap exists between the various raw materials. The one exception is the platform angles of the rhyolite unifaces. These uniface angles range in value from 60° - 80°, compared to 70° - 115° for andesite/dacite, 80° - 90° for Hudson Bay Lowland chert and 90° for the unidentified chert uniface.

Another observation dealing with the technological attributes is that the range of values tends to decrease from andesite/dacite to Hudson Bay Lowland chert. In particular there is a decided decrease in the range of platform angles. This narrowing of range could be the result of a greater technological control over the production of Hudson

Bay Lowland chert unifaces partly because of the siliceousness of the material, but also because of the preparation of the platforms.

6.6 Distribution and Cultural Affiliations of the Unifaces

It would be tempting to treat all of the unifaces as belonging to the Laurel occupation, however, this would be unjustified given their distribution across the site. The unifaces were found in the Laurel hearth areas as well as in the Archaic part of the site. The question that needs to be addressed is how to differentiate the two occupations' unifaces. For instance, are there any differences in location of retouch with respect to the different occupations.?

Previous researchers such as Wright (1967), Janzen (1968), Stoltman (1973), Pollock (1976), Wiersum and Tisdale (1977), Noble (1979), and Brizinski (1980), have found that small endscrapers are the artifacts that predominated in Laurel assemblages. The significance of this for Jessup becomes clear when one considers that 20 out of a total of 27 unifaces can be classified as endscrapers. In addition, it has been noted that Laurel scrapers were often manufactured on non-local or "exotic" types of chert, such as Hudson Bay Lowland chert (Brizinski, 1980). Taking these two attributes together, in addition to size, one can draw a fairly distinctive boundary line as seen in Figure 3.6 to distinguish the Laurel and Archaic occupations. This is based on the fact that endscrapers clustered predominately on one side of the site (17/18 unifaces are endscrapers in what has been called the Laurel area of the site). Unifaces with multiple retouch i.e. lateral and end or lateral retouch occurred primarily in what has been designated as the Archaic area. Significant differences in size and raw material were also noted that further differentiated these areas, as will be discussed below.

Within the Archaic part of the site, there are nine scrapers (Plate II, 19-27). Of the nine scrapers, seven are made from local raw material - five from rhyolite and two from andesite/dacite. Of the two remaining scrapers, one is made of a light toffee coloured Hudson Bay Lowland chert, and the other has not been identified in terms of raw material, except that it is chert. Only three of the nine unifaces can be classified as endscrapers. The remainder are either end and side scrapers or side scrapers. They average 12.8 gm in weight.

In the Laurel section of the site, there are 18 (Plate II, 1-18). Of these, seven were manufactured from Hudson Bay Lowland chert ranging in colour from a salmon pink to deep brown. Six unifaces were made on rhyolite flakes and five on andesite/dacite. Seventeen of the eighteen unifaces are <u>end</u>scrapers. Only one was retouched laterally. The Laurel unifaces have an average weight of 4.4 gm.

The relationship between raw material and the uniface blank dimensions was discussed previously. It was noted that there was a general reduction in the size of the unifaces from andesite/dacite to Hudson Bay Lowland chert, and that all the unifaces were made from flakes which were either derived from cores or from the early stages of the bifacial reduction sequence. The next logical step would be to compare how the three different raw materials were treated in the Laurel versus the Archaic portions of the site. The one unidentified uniface has not been considered in these calculations.

Eight continuous and three discrete measurements were tabulated for both the Archaic and Laurel unifaces. Table 6.4 shows that the Archaic scrapers are consistently longer, wider, thicker, heavier and have longer and wider platforms. The platforms of the Archaic unifaces are either single-facetted (3/5) or cortical (2/5), while the Laurel platforms are more varied in terms of platform preparation. For example, out of the thirteen platforms, six are multi-facetted/ground, three are single-facetted, two are single-facetted/ground, one is single-facetted/strengthened, and one is multi-facetted. As Table 6.4 shows, the more siliceous materials within the Laurel occupation (rhyolite and Hudson Bay Lowland chert) have more carefully prepared platforms than do the andesite/dacite materials.

The number of worked edges differs significantly according to the occupation as does the location of retouch. The Laurel unifaces have all been retouched along only one edge. In seventeen out of eighteen specimens this retouch occurs along the edge most distant from the bulb of percussion. The Archaic unifaces have generally been retouched along more than one edge. Unlike the Laurel unifaces, retouch occurs along the lateral edges or the distal and lateral edges. The three unifaces classified as endscrapers may be intrusive to the Archaic occupation, particularly the one uniface made from Hudson Bay Lowland chert.

TABLE 6.4

Raw Material Dimensions in Relation to Cultural Affiliations

	Length	Width	Thick	Weight	Plat. <	Plat. Length	Plat Width	PL/PW	*Plat Type	**No. Wkd. Edges	*Loc. of Retouch
Andesite/ Dacite											
Laurel N=5	37.2	29.8	6.2	6.54	84.0°	12.7	4.2	3.09	$2^2 3^1 5^1 7^1$	1^5	$1^4 3^1$
Archaic N=2	50.0	38.5	9.5	18.80	82.5°	25.0	8.5	3.04	$1^1 2^1$	$1^1 2^1$	$1^1 3^1$
Rhyolite											
Laurel N=6	32.17	29.83	4.83	4.55	70.0°	11.63	3.38	3.35	$4^3 7^1$	1^6	$1^5 2^1$
Archaic N=5	47.2	30.4	6.8	12.16	75.0°	13.00	4.33	3.09	$2^2 1^1$	$2^2 3^2 1^1$	$4^3 3^1 1^1$
HBL Chert											
Laurel N=7	23.86	23.57	5.29	2.84	83.75°	8.75	3.63	2.45	$4^3 2^1$	1^7	1^7
Archaic N=1	24.0	24.0	8.0	5.6	-	-	-	-	-	1^1	1^1
	$\bar{X}$ (mm)	$\bar{X}$	$\bar{X}$	$\bar{X}$ (gm)	$\bar{X}$	$\bar{X}$	$\bar{X}$	$\bar{X}$			

* 2^2 = 2 type 2 platforms (single-facetted)

3^1 = 1 type 3 platform (multi-facetted)

** 1^5 = 5 unifaces have 1 worked edge

* 1^4 = 4 unifaces are retouched in location 1 (distal end)

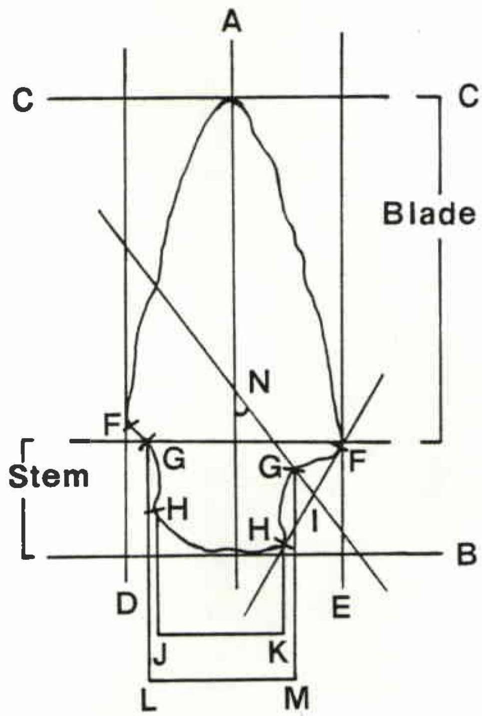
6.7 Stemmed Bifaces (Plate II, 1-5)

This class of artifacts includes bifaces that are either stemmed or notched. Five stemmed bifaces were excavated at Jessup. Of these five, two have been notched or stemmed on only one side (#68, #69) and two have broken blades (#28, #69). All of the specimens have been extensively retouched bifacially, and although they all appear flake derived, the retouching has obliterated any evidence of platforms, if indeed there were any.

These bifaces appear to be incomplete, at the preform stage of reduction. At least one was used (#28) as evidenced by the impact fracture which snapped off the point tip. This is the only stemmed biface found directly in association with bone and pottery. It was excavated from Hearth 4.

All but one of the five specimens were made from local raw material. The one exception, #69, is a milky white quartzite which has been tentatively identified as Lorraine quartzite. It was found in close proximity vertically and horizontally with #68 and #70. It is broken and only one side has been stemmed. Of the four remaining specimens, three (#28, #68, #70) are made from purple rhyolite with quartz eyes (rhyolite-quartzite), and one (#36) from black andesite/dacite tuff. The interesting feature about the rhyolite-quartzite is that it is only known to outcrop in the Ghost River area (Jensen, pers. comm.). Of the three rhyolite-quartzite tools, one (#28), which was originally purple is now greyish in colour because of its exposure to heat within Hearth 4.

STEMMED BIFACE ATTRIBUTES



A = Longitudinal Axis (bisects max. width)

F = Shoulders

G = Stem-Blade Intersection

H = Stem-Base Intersection

I = Midpoint between F and H

N = Notch Angle

F-H = Notch Width

G-I = Notch Depth

H-H = Base Perimeter

J-K = Base Width

L-M = Stem Width

B-C = Maximum Length

D-E = Maximum Width

Figure 6.8

6.12 Methodology

The stemmed bifaces were compared using the four analytic levels of technology, shape, size and raw material. Table 6.5 illustrates the attributes used in each level.

Each specimen was placed, with the catalogue numbered side facing up, and oriented on graph paper so that the longitudinal axis of the tool parallels the orientation line that bisects the tool as shown in Figure 6.8 (Bonnichsen and Young, 1980:97). After the specimen was oriented, it was drawn on graph paper using an extended lead pencil. As many measurements as possible were taken directly from the drawing. The edge angles were measured using a contact goniometer, the notch angle was obtained using a protracter, and each specimen was weighed using a beam balance. The data for each of the 5 stemmed bifaces has been presented in Tables 6.6 and 6.7.

The format for this study of stemmed bifaces comes from Bonnichsen and Young (1980). Their explanations are carefully presented and will not be extensively repeated here. They use a line and point system to obtain measurements, and then use the range of values to set up categories of a more descriptive nature. A good example would be the ratio, stem width/stem length, where, considering the range of values (-1.23 to 2.50) three categories were established as shown below (Bonnichsen and Young, 1980:115).

TABLE 6.5

Stemmed Biface Attributes

Technology

Platform Preparation	Blade Thinning Flake	Thinning Flake Angle	Basal Thinning
1. Strengthened	1. Parallel-sided	1. Oblique	1. Present
2. Abraded and Strengthened	2. Parallel-sided and Expanding	2. Oblique Perpendicular	2. Absent
3. No preparation			

Shape

Condition

1. Complete
2. Blade Tip Missing

Maximum Length (mm)

Maximum Width (mm)

Maximum Thickness (mm)

Blade Length (mm)

Shoulder Width (mm)

Blade Length/Shoulder Width (mm)

Notch Width (mm)

Notch Depth (mm)

Notch Width/Notch Depth (mm)

Stem Width (mm)

Stem Length (mm)

Stem Width/Stem Length (mm)

Base Perimeter (mm)

Base Width (mm)

Base Perimeter/Base Width (mm)

Base Width/Stem Width

Notch Angle

Edge Angle #1

Edge Angle #2

Size

Weight (gm)

Raw Material

1. Andesite Tuff
2. Rhyolite (with Quartz Eyes) Quartzite
3. Lorraine Quartzite

TABLE 6.6

Stemmed Biface Data

Catalogue #	Plate #	Platform Preparation	Blade Thinning Flake	Thinning Flake Angle	Basal Thinning	Weight (gm)	Raw Material
28	III, 1	1	2	2	1	15.64	2
36	III, 2	2	1	1	1	16.44	1
68	III, 3	1	1	1	1	13.13	2
69	III, 4	*	*	*	1	15.04	3
70	III, 5	3	2	2	2	10.45	2

* These attributes cannot be discerned very readily due to the coarse nature of the raw material and the numerous hinge and step fractures

TABLE 6.7

Stemmed Biface Data - Shape Attributes

Cat.#	Condition	Max. Length	Max. Width	Max. Thick	Blade Length	Shoulder Width	BL/SW	Notch Width	Notch Depth	NW/ND
28	2	56+	28.0	9.5	39+	26	1.5+	18.0	6.0	3.00
36	1	62	29.0	9.5	47	29	1.62	15.5	4.5	3.44
68	1	53	27.0	9.5	42	-	-	10.0	4.0	2.50
69	2	-	30.5	9.0	-	-	-	-	-	-
70	1	51	23.0	10.5	37	-	-	-	-	-

Cat.#	Stem Width	Stem Length	SW/LW	Base Perim.	Blade Width	BP/BW	Base Wid/ Stem Wid	Notch Angle	Edge < 1	Edge < 2
28	18.5	16.5	1.21	27	21.5	1.26	1.16	23°	50°	50°
36	19.5	15.0	1.30	22	18.0	1.22	0.92	37°	50°	50°
68	-	11.0	-	-	-	-	-	16°	30°	30°
69	-	10.5	-	-	-	-	-	-	40°	40°
70	-	13.0	-	-	-	-	-	-	40°	60°

+ Catalogue Number 29 is almost complete. Approximately 5-6 mm. of the tip is missing.

Category Number	Category Boundary	Description
1	-1.30 to +1.30	1. Stem width and stem length are approximately equal.
2	+1.31 to +1.90	2. Stem is wider than long.
3	+1.91 to +2.50	3. Stem is twice as wide as long.

Unfortunately, the Jessup sample of five stemmed bifaces, and the range of values, is so small that this could not be done. Another departure from Bonnichsen and Young's study is that whereas they used only finished specimens, I used all of the Jessup stemmed bifaces, of which one or at the most two of the five were finished - numbers 28 and 36. Since Bonnichsen and Young's way of establishing categories could not be followed, each specimen was described using the format produced initially by McKay and Sanger for projectile points found in Maine and used by Stephen Davis in his description of projectile points from Teacher's Cove (1978). See Tables 6.8 and 6.9.

6.9 Analysis

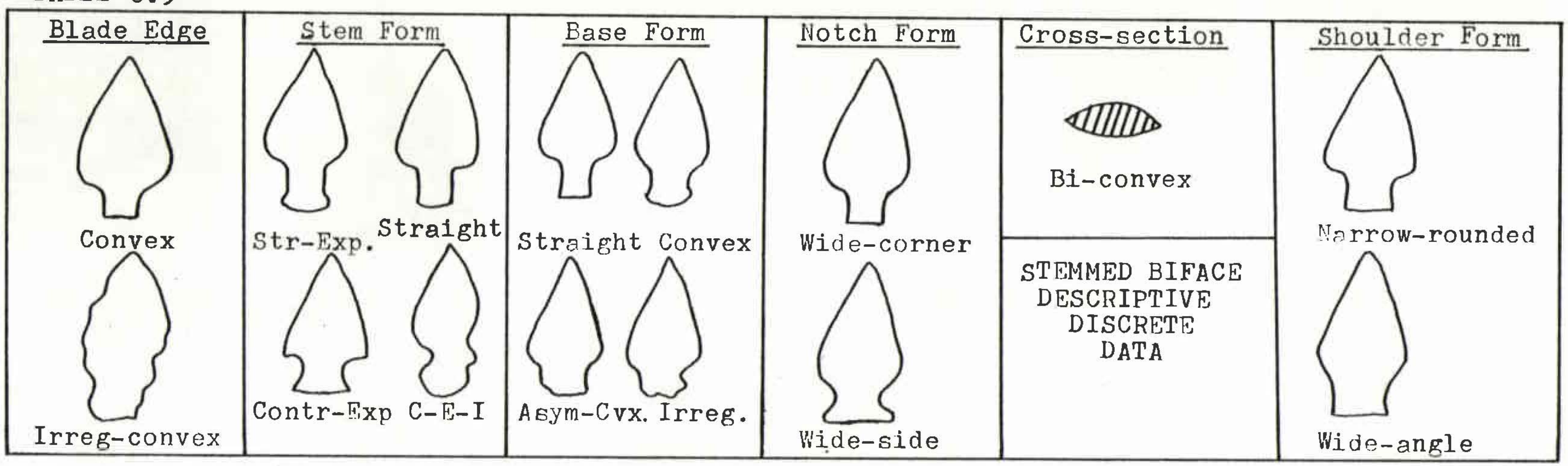
Technologically and morphologically, the 5 stemmed bifaces show a considerable similarity. Specimen #70 shows more variation. This latter specimen has no recognizable platform preparation or basal thinning. Indeed, unlike the the other stemmed bifaces, the base has been truncated. It is the most irregularly shaped of the group, is the only one with cortex, and is also the thickest in relation to width. I am tempted to call this biface a "juvenile point", the result of a beginner to the stone working craft, as it is reminiscent of my own early attempts at flintknapping. During knapping, the specimen became narrower faster than it could be thinned owing to edge collapse. In many cases the flakes ended prematurely in hinge or step fractures. This in itself is not very remarkable because some step or hinge fractures occur on most artifacts. What is unusual, however, is that whereas the other four specimens have shallow flake scars on their surfaces, several of the flake scars on specimen #70 are quite deep. This, the lack of platform preparation and the shortness of many of the flakes suggest that a harder hammer was used to try to thin this specimen, which in turn could add credence to the "juvenile point" theory - a matter of not matching raw material with technique.

The remaining four specimens share many similarities. For example, the ratios for maximum width/maximum thickness are all approximately 3:1, and the mean weight for these four is 15 gms. The bases have all been thinned, presumably to facilitate hafting, and three of the four have prepared platforms along the edges. It is difficult to see if there is any preparation on the quartzite specimen as is the type and direction of the blade thinning flakes. Also the blade thinning flakes range in distance from 1/3 to 2/3 of the way across the blade surface and are either parallel-sided or a combination of parallel-sided and expanding. The flake scars are shallow and the flake angles are either

TABLE 6.8 Stemmed Biface Discrete Data

Catalogue #	Blade Edge Form	Stem Form	Base Form	Notch Form	Cross-Section	Shoulder Form
28	Convex	Straight-Expanding	Convex	Wide side	Bi-convex	Narrow Rounded
36	Convex	Straight	Asymmetric-Convex	Wide corner	Bi-convex	Narrow Rounded
68	Convex	Contracting-Expanding	Straight	Wide side	Bi-convex	Narrow Rounded
69	-	Straight	Irregular	Wide corner	Bi-convex	Narrow Rounded
70	Irregular-Convex	Contracting-Expanding Irregular	Straight	Wide side	Bi-convex	Narrow Rounded

TABLE 6.9



oblique or oblique and perpendicular to the longitudinal axis of the tool. The ratio of notch width/notch depth differs somewhat for the 3 specimens that could be measured, and this accords with the three differences in stem form (straight-expanding, straight and contracting-expanding) and the two differences in notch form (wide side and wide corner). All 3 specimens have convex blades, bi-convex cross-sections and narrow-rounded shoulders. The edge angles for the four specimens other than #70, range in value from 30° to 50° with a mean of 42.5°.

6.10 Cultural Affiliations of the Stemmed Bifaces

Stemmed bifaces, and in particular projectile points, are generally considered the most diagnostic of all tools in terms of placing assemblages into cultures. In this case, the unfinished and broken nature of the majority of these tools poses some problems. The one exception, specimen #28, was found in direct association with bone and pottery in one of the three Laurel hearths, and is consequently considered a Laurel point. This stemmed-side notched point is similar in appearance to one of the points discovered by Ridley in the Ghost River Garden perimeter area (see Ridley, 1966, figure 25,e). Ridley's point appears to have been found just above a layer that contained Laurel pottery. Specimen #28 is also similar to a Laurel side-notched point excavated from the Frank Bay Site (Brizinski, 1980: Plate 5, No. 2).

Specimen #36, a stemmed projectile point, appears more characteristic of the Archaic. It is similar in form to a stemmed point found by Ridley in the lowest stratum of the Abitibi Narrows site (see Ridley, 1966, figure 6,e). Ridley places this stratum at approximately 2,000

B.C.. A similar stemmed point, in form and size can be seen at the Shield Archaic Beach site (see Wright, 1967; plate II figure 14). This site is located on the north shore of Lac Dasserat which flows into Lake Abitibi.

The remaining three specimens, #68, #69 and #70, are more problematic. They were found in very close proximity to each other horizontally and vertically in Square S12W13. They all appear unfinished. For instance, specimen #68 of rhyolite quartzite has only one notched side, and is rather unique in that it is the only stemmed biface to have a rounded tip.

Biface #69 of Lorraine quartzite is broken and has only one slightly stemmed side and many hinge fractures. Specimen #70 of rhyolite-quartzite, has a very irregular edge, a flat fracture base and a very thick cross-section.

6.11 Non-Stemmed Bifaces (Plate IV, Plate V)

Tools included in this category are characterized by bifacial thinning flake scars which extend at least one-third of the way across both faces of the specimen from the lateral edges. There are a total of 21 complete artifacts in this category, and 30 fragments, including tips, midsections, and bases. The number of biface fragments, the unfinished (blank) character of most of these bifaces and the nature of the breaks are all characteristic of workshop rejects. The breaks are a result of flaws in the material, such as natural cleavage planes and changes in texture or homogeneity, or due to excessive or misplaced force, resulting in endshock or perverse fracture.

End shock has been defined as, "Transverse fracture due to the stone exceeding its elastic limits. Failure of the material to rebound and recoil before fracture occurs" (Crabtree, 1972:60).

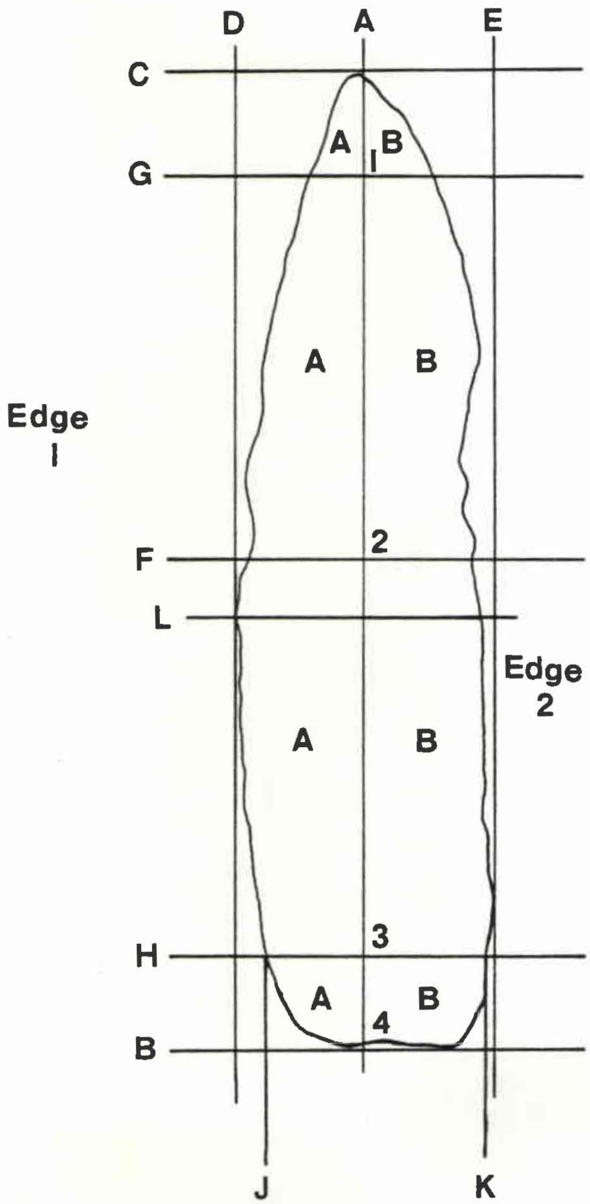
Perverse fracture is somewhat more complex. Crabtree defines it as,

> A helical, spiral or twisting break initiated at the edge of an objective piece. Natural flaws, excessive force and mass to be removed add to the possibility of perverse fracture. Production errors such as step fractures may produce more mass than platforming and force can overcome. Energy is then deflected into and through the mass of the object (1972:82).

6.12 Methodology

The twenty-one complete non-stemmed bifaces were oriented in the same manner as the stemmed bifaces, with the catalogue numbered side facing up, and the specimen oriented and bisected by the longitudinal axis, with the widest end proximal (Bonnichsen and Young, 1980:79). Each biface was drawn on graph paper, and as many measurements as possible were taken from the drawing. Once the maximum length was calculated, each biface was divided in half (line F on figure 6.9), and into a

NON-STEMMED BIFACE ATTRIBUTES



A = Longitudinal Axis
B-C = Maximum Length
D-E = Maximum Width
F = Mid-Length
G = Distal End
H = Proximal End
J-K = Basal Width
L = Point of Max. Width
B-L = Distance between Point of Max. Width & Base

1,1A,1B; 2,2A,2B; 3,3A,3B; 4,4A,4B = Positions of Maximum Width and Thickness

Figure 6.9

distal and proximal end by dividing the specimen further using 1/10 of the total length for the latter two points.

The longitudinal axis divides the specimen in half and, as a result, each biface is subdivided into eight sections. These sections are used when describing positions of maximum width and thickness. The numbers 1, 2, 3, and 4 are used to refer to the juncture of each section. For example, the biface in Figure 6.9, has its maximum thickness at number 2, which is also the midpoint of this biface. Its maximum width, however, is in sections 3A/3B (3A/B). Edge thickness was calculated by taking three measurements along each edge, approximately 5 mm. in from the edge. These measurements were taken at the distal, proximal and mid-length points and then were divided by 3 to get an average measurement for each edge.

The terms, basal width and proximal end width, are synonymous. They are shown as the distance between lines J and K which run parallel to the longitudinal axis (see figure 6.9). Measuring the basal width at a point which is 1/10 of the total length from the proximal end, gives a more standardized measurement, particularly for pointed and convex bases where it is difficult to say where the base ends.

The measurement, maximum width, is represented by the distance between lines D and E. These lines are parallel to the line of longitudinal axis. The point of maximum width is represented by line L. The distance between this line and the base (line B), is divided by the total length in order to determine the relative position of greatest

TABLE 6.10

Non-Stemmed Biface Attributes

Technology

Platform Preparation	Thinning Flake Angle	Shape of Thinning Flakes	Size of Flake Scars
1. Strengthened	1. Perpendicular	1. Parallel-sided	1. Less than $\frac{1}{2}$ way across surface
2. Abraded	2. Oblique	2. Expanding	2. $\frac{1}{2}$ way
3. Both 1 & 2	3. Both 1 & 2	3. Both 1 & 2	3. More than $\frac{1}{2}$ way
4. Crushed			
5. None			
6. Cannot determine			

Origin	Edge Form	Cortex	Hinging	Average # of Flake Scars/Face
1. Flake	1. Strongly sinuous	1. Present	1. Present	1. Less than 20
2. Core	2. Moderately sinuous	2. Absent	2. Absent	2. Greater than or Equal to 20
3. Cannot determine	3. Straight			

TABLE 6.10 (cont'd)

Shape

Condition

1. Unbroken
2. Broken - but all sections recovered
3. Tip only
4. Base only

Maximum Length (mm)

Maximum Width (mm)

ML/MW

Maximum Thickness (mm)

Edge Angle #1

Edge Angle #2

Edge #1 Thickness (mm)

Edge #2 Thick. (mm)

Basal (Proximal End) Width (mm)

Maximum Width/Basal Width (mm)

Position of Maximum Width

1. F (mid-length)
2. 3A/3B

Distance between Max. Width & Base (mm)

Position of Max. Thickness

1. 2
2. 2A/2B
3. 3A/3B
4. 4A/4B

Lateral Edge Form

1. Convex
2. Parallel
3. Convex-Irregular

Tip Form

1. Pointed
2. Rounded
3. Partially Broken

Base Form

1. Pointed
2. Convex
3. Convex-Concave (Irreg.)
4. Straight-Truncated
5. Partially Broken
6. Convex-truncated

Cross-section

1. Bi-Convex
2. Irregular
3. Convexo-Triangular
4. Asymmetric Bi-Triangular
5. Plano-Triangular
6. Convexo-Rectangular

Size

Weight (gm)

Raw Material

1. Calc-alkalic Rhyolite Tuff
2. Calc-alkalic Andesite/Dacite Tuff
3. Calc-alkalic Rhyolite-Quartzite

width in relation to the entire specimen. Ratios such as this have proved useful in defining artifact types such as the Morton lanceolate preform and the Pomranky blade (Montet-White, 1968:32-35).

6.13 Analysis

The 21 complete non-stemmed bifaces cluster into 4 distinct groups according to weight. These 4 groups are as follows:

1. Small (N=3)	13.9 - 17.7 gms.
2. Medium (N=9)	28.1 - 48.2 gms.
3. Large (N=6)	61.2 - 119.9 gms.
4. Very Large (N=3)	275.8 - 745.0 gms.

Each of these groups was examined according to the continuous and discrete attributes outlined in Table 6.10. The attributes were subsumed in the same 4 levels of analysis as the unifaces and stemmed bifaces: technology, shape, size, and raw material. The discrete and continuous data for the 21 complete non-stemmed bifaces, has been recorded in Tables 6.11 and 6.12.

Most, if not all of the bifaces are considered to be blanks or workshop rejects. The term, blank, is defined according to Crabtree as,

> A usable piece of a lithic material of adequate size and form for making a lithic artifact - such as unmodified flakes of a size larger than the proposed artifact, bearing little or no waste material, and suitable for

> assorted lithic artifact styles. The shape or form of the final product is not disclosed in the blank. A series of objects in the early stages in the manufacturing process before the preform is reached (Crabtree, 1972:42).

The Jessup bifaces are defined as workshop blanks and rejects because of their sinuous edges, thick cross-sections, the high incidence of cortex, the pattern of breakage i.e. along bedding planes, and the repeated but unsuccessful attempts at clearing the thick humps or "pigs" which were caused by excessive hinging.

6.14 Small Bifaces

The 3 bifaces which fall within this category are all made of rhyolite tuff. They also share the characteristics of strengthened platforms, basal thinning, hinging, moderately sinuous edges, less than 20 flake scars per face, the same position of maximum thickness, as well as the same edge thickness, lateral edge form and tip form.

The mean maximum length, width and thickness of these specimens is 58.67 mm, 31.33 mm, and 11.67 mm respectively. Their small size suggests that they were all made from flakes. The angle of the thinning flake scars is either oblique, or a combination of oblique and perpendicular. These flake scars reach $\frac{1}{2}$ way or less than $\frac{1}{2}$ way across the surface of the specimens and are either parallel-sided, or parallel-sided and expanding. All 3 appear to be thinned from the base to the tip.

The basal form in artifact #18 is straight-truncated, while the remaining two have convex-concave irregular bases. These latter two are the only non-stemmed bifaces that have maximum widths which occur within the proximal $\frac{1}{4}$ of the artifact. In addition, they appear to be the only two bifaces which have been partially thinned by pressure flaking. Their position within and beside Hearth Feature #1, at the same depth in the upper layers, strongly suggest their cultural affiliation as being Laurel.

6.15 Medium Bifaces

Nine bifaces are classified in this category. All 3 types of raw material are represented here. Three are made from rhyolite, 5 from andesite/dacite and 1 from rhyolite quartzite.

These bifaces have mean lengths, widths and thicknesses of 84.0 mm, 34.22 mm and 14.56 mm respectively. The type of platform preparation is divided between being strengthened (3/9), strengthened and abraded (4/9), and crushed (2/9). The thinning flake angle is predominantly a combination of perpendicular and oblique (8/9). The one exception was flaked at an oblique angle. The shape of the thinning flakes in this group is predominantly parallel-sided and expanding (7/9). The remaining two specimens exhibit parallel-sided thinning flakes. Only 1 of the 9 medium bifaces has flake scars which travel consistently further then the $\frac{1}{2}$ way point.

Four of the artifacts in this group are made from flakes. The mean edge thickness is approximately 4.5 mm, and the lateral edge form is almost evenly divided between convex (5/9) and convex irregular (4/9). Four of the 9 bifaces have pointed tips and 5 have rounded tips. The morphology of the bases varies as follows: 4/9 are convex, 2/9 are convexo-concave irregular, 1/9 is convex-truncated, and 2/9 are partially broken.

The maximum width of 6 of the 9 artifacts is located close to the mid-line (0.40 - 0.47). All of the variations of cross-section are represented with the exception of the variant "irregular". Six of the 9 are evenly divided between bi-convex and convexo-triangular. The edge angles range in value from 30° - 85°. All nine specimens have been retouched basally. Further observations have been noted below.

Biface #53 has been thinned ventrally, primarily where the bulb of percussion and platform originally were. The "pig" on this specimen was unsuccessfully thinned using both lateral edges. In terms of size and shape, it resembles one of the Archaic bifaces that Brizinski excavated from the Campbell Bay site on Lake Nipissing, dated at ca. 3255 B.C. (1980:Plate 5, no. 9).

Biface #64 is the only non-stemmed biface made of rhyolite-quartzite. As noted earlier, this material outcrops in the Ghost River area and appears to have been a favourite for manufacturing stemmed bifaces (3 of the 5 stemmed bifaces found at Jessup were manufactured from this material). Only one other artifact made from this material, a broken biface tip with a rounded edge, has been recovered from Jessup. It was excavated from the same square as the Laurel point (#28), which was also made of rhyolite-quartzite. The noticeable feature about biface #64, outside of its very thick cross-section and assymmetry is that all of its surfaces appear very worn as though it were either carried around for an extended period of time, or else was water rolled. If it was found lying on the sandy beach, perhaps it was picked up because of its unique purplish colour. Initially, it appears to have been discarded after all attempts at thinning the central area of the biface from both lateral and basal edges failed.

Bifaces 1/6, 25, 84, 180 and 221 all have bedding planes within their raw materials that have adversely affected the control that the prehistoric craftsmen had over their medium. For example, 4 of the 5 have a large number of hinge and step fractures which have terminated along these flaws, and 1 specimen (#1/6), broke as a result of "perverse fracture". Crabtree defines this type of fracture as follows: "A helical, spiral or twisting break iniated at the edge of an objective piece. Natural flaws, excessive force and mass to be removed add to the possibility of perverse fracture" (1972:82-3).

Biface #181 has a small "pig" in the central but distal portion of the artifact. This knob was repeatedly cleared from both lateral

TABLE 6.11

Non-Stemmed Biface Discrete Data

	Cat. #	Plate # IV	Raw Mat.	Plat. Prep.	Thin. Fl.	Shape Fl.	Size Fl.	Origin	Edge Form	Cortex	Hing.	Avge. # Scars	Cond.	Lat. Edge	Tip Fm.	Base Fm.	Cross Stn.
	18	1	1	1	3	3	2	1	2	2	1	1	1	3	1	4	3
Small	38/42	2	1	1	2	1	1	1	2	1	1	1	2	3	1	3	3
	39	3	1	1	3	3	2	1	2	1	1	1	1	3	1	3	4
	25	4	2	4	2	1	1	3	2	2	1	1	1	3	2	2	1
	46	5	2	1	3	3	3	3	2	2	1	1	1	1	1	2	4
	53	6	2	3	3	3	1	1	2	2	1	1	1	1	1	2	5
	64	7	3	3	3	1	1	3	2	1	1	1	1	3	2	3	3
	84	8	1	1	3	3	1	1	2	1	1	1	1	1	2	5	6
Med.	180	9	1	1	3	3	2	3	2	1	1	1	1	1	2	2	1
	181	10	2	3	3	3	2	1	2	2	1	1	1	1	1	6	1
	221	11	1	4	3	3	1	3	1	1	1	1	1	3	2	5	3
	1/6	12	2	3	3	3	2	1	2	2	1	1	2	3	1	3	3
	34	13	1	3	3	3	2	3	2	2	1	2	1	2	1	4	3
	37/149	16	1	1	3	3	3	3	2	1	1	2	2	3	1	2	2
Large	12/26	15	2	3	3	3	2	1	2	2	1	2	2	1	1	1	1
	35	14	2	3	3	3	2	1	2	1	1	1	1	1	1	5	2
	94	17	2	5	3	3	2	1	2	1	1	1	1	3	2	3	3
	27	18	2	3	3	3	3	3	2	1	1	1	1	1	3	4	4
		Plate III															
Very	62	7	2	4	3	2	2	1	2	1	1	1	1	3	3	4	4
Large	86	6	2	2	3	3	2	3	2	1	1	1	1	3	1	1	3
	101	8	2	3	3	3	1	3	1	1	1	1	1	2	2	3	6

TABLE 6.12

Non-Stemmed Biface Continuous Data

Cat. #	MAX. LENGTH mm.	MAX. WIDTH mm.	POS. MAX. WIDTH	ML/MW	MAX. THICK mm.	POS. OF MAX. THICK.	BASAL WIDTH mm.	MW/BW	DIS. BETWN. MW + BASE mm.	EDGLE ANGLE #1	EDGE. ANGLE #2	EDGE. #1 THICK mm.	EDGE. #2 THICK mm.	WEIGHT gm.
18	59	33	F	1.79	11	3A	22	1.5	29.5	45°	40-45°	3	3	17.7
38/42	63	31	3A/3B	2.03	12	3A	28	1.11	12.0	45-75°	40°	3	3	16.1
39	54	30	3A/3B	1.80	11	3A	24	1.25	8.0	45-60°	50-60°	3	3	13.9
$\bar{X}$ =	58.67	31.33		1.87	11.67		24.67					3	3	15.9
25	70	38	3A/3B	1.84	12	3A	32	1.19	29.5	55°	40°	5	3	33.3
46	91	33	3A/3B	2.76	12	3A	24	1.38	36.0	45°	40-50°	4	4	36.8
53	100	40	3A/3B	2.50	11	2	26	1.54	41.0	30-50°	35-65°	3	4	40.6
64	65	33	3A/3B	1.97	18	3A/3B	23	1.43	19.0	55-60°	45-60°	5	5	33.1
84	81	31	3A/3B	2.61	16	4A/4B	23	1.35	24.0	40-85°	40-65°	5	5	30.7
180	73	28	3A/3B	2.61	13	2B	21	1.33	34.0	55-65°	50-65°	5	5	28.1
181	88	37	3A/3B	2.38	12	2A/2B	23	1.61	39.0	30°	35-45°	3	4	32.7
221	72	29	3A/3B	2.48	21	3B	15	1.93	33.0	60-75°	60-85°	5	6	39.6
1/6	116	39	3A/3B	2.97	16	3A/3B	24	1.63	44.0	40-55°	45-65°	5	6	48.2
$\bar{X}$ =	84.0	34.22		2.46	14.56		23.44					4.4	4.7	35.9
34	133	34.5	3A/3B	3.86	20	2	30	1.15	45.0	45-60°	45-65°	4	4	74.3
37/149	121	36	3A/3B	3.36	15	3A	20	1.80	48.0	55-75°	40-80°	7	7	61.2
12/26	127	47	F	2.70	12	2	28	1.68	63.0	40°	40°	4	4	76.0
35	122	55	3A/3B	2.22	15	2A/2B	45	1.22	32.0	40-60°	45°	4	4	90.7
94	104	62	3A/3B	1.68	21	2A/2B	33	1.88	43.0	30-55°	35-55°	4	4	113.1
27	108	48	3A/3B	2.25	26	3A	34	1.41	29.0	45-60°	45-70°	4	4	119.9
$\bar{X}$ =	119.17	47.0		2.69	18.17		31.67					4.5	4.5	89.2
62	173	90	3A/3B	1.92	52	2A/2B	56	1.61	84.0	80-100°	50-65°	9	9	745.0
86	123	58	3A/3B	2.12	38	3A/3B	30	1.93	39.0	55-90°	65-100°	8	8	275.8
101	141	68	3A/3B	2.07	44	3B	44	1.55	55.5	55-100°	55-80°	8	7	476.7
$\bar{X}$ =	145.67	72.0		2.04	44.67		43.33					8.3	8.0	499.17

edges as well as from above, but these efforts were not completely successful in removing the total mass. Although the base of this biface is convex in shape, it has also been truncated and several small thinning flakes removed from this edge.

Biface #46 is the most regularly flaked and finished looking of the 9 medium sized bifaces. It is the only one to have flake scars which travel consistently greater than $\frac{1}{2}$ way across both dorsal and ventral faces. This type of flaking has given this specimen an asymmetric bitriangular cross-section. The direction of flaking was from tip to base along the dorsal surface where upon it was turned over to the ventral surface and worked from the opposite edge, also from tip to base. The biface was then turned around and flipped over and flaked from base to tip along both the opposite edges.

6.16 Large Bifaces

Six non-stemmed bifaces fall within this size category. Four of the six are manufactured from andesite/dacite tuff and the remaining 2 are made from rhyolite tuff.

There is considerable overlap in the technological attributes. Four of the six bifaces have strengthened and abraded platforms, thinning flake angles which are perpendicular and oblique, and flakes that are parallel-sided and expanding in shape, which run $\frac{1}{2}$ way and further across the face of the artifacts. The remaining 2 bifaces have either no platform preparation or only strengthened platforms. The latter has flake scars which travel consistently past the midpoint, while the former has flake scars which reach the $\frac{1}{2}$ way mark.

Three of the bifaces are made from flakes. All of the edges are moderately sinuous in form and all of the bifaces have hinge or step fractures. Cortex is present on 4 of the 6 bifaces. The number of flake scars per face is evenly divided, 3 bifaces have less than 20 flake scars per face and 3 have 20 or more.

The mean maximum length, width and thickness measurements are 119.17 mm, 47.0 mm, and 18.17 mm respectively. The position of maximum width is located between the proximal $\frac{1}{4}$ and $\frac{1}{2}$ of the total specimen. The position of maximum thickness is evenly divided between the midpoint of the specimen and sections 2A/2B and 3A/3B. The edge angles range in value from 30° - 80°. The mean for edge thickness is 4.5 mm.

There is considerable variation between the discrete shape attributes. Three of the bifaces have convex lateral edges, 2 have convex irregular edges and 1 has parallel lateral edges. The morphology of the tip in 4 cases out of 6 is pointed. One is rounded and the last one is partially broken, so no conclusive description can be made. Five of the six variables for base form are represented. The one that is missing is convex-truncated. The frequency and type of cross-sections represented in this category are as follows; 1 specimen is bi-convex, 2 are irregular, 2 are convexo-triangular, and 1 is asymmetric bi-triangular. Several additional observations which were made for each of the 6 large non-stemmed bifaces are presented below.

Biface #34 has the highest maximum length/maximum width ratio of all the Jessup tools. It is the only complete lanceolate (parallel-sided) non-stemmed biface. The substantial knob or "pig" at the mid-point of this specimen gives it in exaggerated maximum thickness. Outside of this area, a more average measurement for thickness is 12 mm.

Several attempts at clearing the knob were made from both lateral edges and from above the knob, but to little avail. These attempts just resulted in numerous hinge and step fractures, and an edge too thin to clear the central mass. This specimen is also one of two bifaces in this category that has a truncated base which is straight in plan view. Some basal thinning was carried out from this break onto the ventral surface. Flaking appears to have been carried out from the tip to the base.

Biface #37/149 has the second highest maximum length/maximum width ratio. The lateral edges of this biface are more convex than those of biface #34, and are also more irregular as a result of the numerous bedding planes that run through this material. Indeed this specimen broke during manufacture along one of these bedding planes.

The ventral surface of this biface has been completely flaked by expanding shaped flakes which run 2/3 of the way across this face. The dorsal surface however is still partially covered with cortex near the tip and thinning flakes in this area only travel about 1/3 of the distance from the edge across the tip.

Biface #12/26 is one of 2 complete bi-pointed non-stemmed bifaces at Jessup. It was broken during manufacture by perverse fracture probably as a result of excessive force as evidenced by the deep flake scar left behind where the break occurred along the right lateral edge (edge #2). The 2 pieces of this flake tool were found within a few inches of each other in 2 adjacent squares but in the same level. Oddly enough, the 2 sections weathered very differently. The base is green, while the tip is dark grey/green on the ventral side and light grey/brown on the dorsal side. This differential weathering or patination could be a result of exposure to the heat in Feature #1. Both sections were excavated just a few inches northeast of the bone and Laurel pottery. Section #26 was in fact found in the same quadrant and the same level as Feature #1, while section #12 was excavated from the same level in the quadrant just a few inches east. See Figure 3.6.

The specimen was completely flaked on the dorsal surface but, with only a few exceptions, was only flaked along the edges on the ventral face. Expanding shaped thinning flakes cover the dorsal face, but the flakes on the ventral face are predominantly parallel-sided.

This biface is similar in shape, size, raw material and flaking to a biface excavated by Ridley from the lowest stratum of the Ghost River Garden site. The similarity goes even further to include differential patination. Ridley described this specimen as "a biface knife of

Abitibi chert found in two parts, the basal part green, the upper patinated to grey" (1966:40, see figure 24,g). In addition to the similarity in form, size and raw material, there is a similarity in association. Ridley also excavated within the same layer, a rim sherd "with bands of dentate stamp woodland type (Ridley, 1966:figure 24,d). This dentate stamped pottery is clearly Laurel. The association at the Ghost River Garden site and the Jessup site of Laurel ware with "leaf-shaped" bifaces is a significant finding.

Biface #35 is also manufactured on a large flake. It has been thinned ventrally where the platform and bulb were originally, along edge #1 and along the opposite lateral edge in the upper half of the specimen. Both edges have been heavily abraded. The unusual aspect of this abrasion is that it is almost continuous along both edges. In all the other artifacts, the abrasion has not been as extensive and has been more clearly related to platform preparation. In this case, the extensive abrasion may be a result of utilization.

This artifact appears similar in size and shape to a "unipointed bifacial tool" photographed by Pollock (1976:figure 63, no. 5), and identified as an artifact from the Abitibi Narrows phase of the Pearl Beach site, excavation area C. Biface 35 however is made on a flake, while Pollock's biface is core-derived.

Biface #94 is also manufactured on a large flake which has been thinned ventrally where the platform and bulb originally existed. This is, however, the one artifact that appears to have been struck from a prepared core, or to be more exact, a partially prepared core. The flake still retains part of its original cortex on the dorsal face. The ventral surface has very pronounced fissures and fairly well defined undulations, suggesting that the flake was removed with considerable force.

Biface #27 has the thickest cross-section of all of the small, medium and large non-stemmed bifaces. It has been thinned unsuccessfully from the base and both lateral edges. The base has been truncated and is straight in plan view. The raw material is riddled with many dark coloured bands which makes the material appear to grade between andesite/dacite and rhyolite, making flaking difficult.

6.17 Very Large Bifaces

The three bifaces within this category are all made from andesite/dacite tuff. These are the heaviest, the longest, widest and thickest of all the non-stemmed bifaces. They all have cortex, numerous hinge and step fractures, both perpendicular and oblique thinning flakes angles, and have less than 20 flake scars per face. Their platforms have either been crushed, strengthened and abraded, or just abraded. The thinning flake scars are expanding and parallel-sided in two cases and expanding in one. The flake scars run $\frac{1}{2}$ way across the surface in two cases and less than $\frac{1}{2}$ way in one case.

One of these bifaces is manufactured from a flake (#62). The remaining two appear to be core-derived, but there is cortex on only one side, so it is impossible to say for sure. Biface #101 has strongly sinuous edges with parallel lateral edges, while the other two have moderately sinuous edges and convex irregular lateral edges. The tips are rounded, pointed, and broken, and the bases are either pointed, convexo-concave irregular or straight-truncated.

The edge angles range from 50° - 100°, and the mean for edge thickness is 8.0 mm. The cross-sections are convexo-triangular, asymmetric bi-triangular and convexo-rectangular. Further comments on these bifaces follow below.

Biface #62 is the largest flake originated artifact from Jessup. It has very prominent fissures on its ventral surface and a truncated end which appears to be a platform. The tip is irregularly pointed because of 2 large flakes which have been taken off both the dorsal and ventral surfaces. The edges have been heavily crushed in places, which further suggests that it may have been utilized as a hand axe, chopper or perhaps even a wedge.

Biface #86 has been extensively flaked, but still has a very thick cross-section. This appears to be due to the several bedding planes which run through this material and have consequently affected the normal termination of flakes. The tip and part of edge #1 have been heavily ground.

Biface #101 in longitudinal section is wedge-shaped. The proximal end and lateral edges have been very steeply retouched while the distal end has a more gradual and acute angle. In transverse section, the artifact is best described as convexo-rectangular, because the sides of the dorsal surface have been steeply retouched, and a long narrow blade-like flake was removed from the top of the biface, flattening out the top. This biface may very well have served as a core. It is similar to the turtle-back cores described by Ridley (1966) and Pollock (1976).

6.18 Biface tips, midsections and bases (Plate V)

The discrete and continuous data for the 30 bifacial tips, midsections and bases has been recorded in Table 6.13. Taking this sample as a whole, one can make the following statements:

1. All of the types of platform preparation observed in the complete non-stemmed bifaces have been noted with the exception of extensive crushing.
2. Four of the 30 specimens have at least one heavily abraded edge.
3. Cortex is present on 8 of the 30 biface fragments.
4. The mean measurement for maximum thickness is 13.37 mm. with a range of 7 to 24 mm.
5. The edge angles range in value from 30° to 85°.
6. Bifacial fragments manufactured from rhyolite account for 6 of the 30 specimens, andesite/dacite for 22 of the 30, and rhyolite-quartzite for 2 of the 30.

TABLE 6.13

Bifacial Tip, Midsection and Base Data

	Cat. #	Platfm. Prep.	Cortex	Thick	Edge < 1	Edge < 2	Raw Mat.	Weight
Tips	3	5	1	13	45°	45°	2	15.6
N=16	17	5	2	12	50	50	2	24.1
	19/136	3	2	18	40-45	45-70	2	114.0
	21	2*	1	9	40-45	40	2	13.9
	22	1	2	10	35	45-60	2	1.7
	23	3	2	15	40-45	50-60	2	53.5
	30	1	2	9	45	45	3	13.6
	44	1	2	6	35	35	1	9.1
	65	1	2	13	50	30-45	2	37.9
	88	1	2	9	40	30	1	14.1
	95	3*	2	8	35-40	35	2	11.4
	103	1	2	7	40	40	2	13.9
	107	3*	2	13	45	45	1	33.7
	115	1	2	8	30	30	2	10.0
	126/201	3*	2	12	35	40	2	53.5
	128	5	1	9	40	50	1	6.8
Mid-Sections								
N=4	43	5	2	11	40°	60°	2	17.0
	66	3	2	15	50	40	2	56.6
	135	6	1	21	55	55	2	56.8
	138	6	1	17	55	65	1	50.0
Bases	14	5	2	18	50°	70°	2	47.1
N=10	24	5	2	14	50	50-80	3	22.4
	41	2	1	22	65	40	2	67.6
	50	2	2	11	45	-	1	16.9
	63	6	2	23	60	60	2	113.0
	83	1	1	10	45	45	2	35.0
	102	3	2	24	50	50	2	105.6
	108	5	2	12	35-40	35	2	23.5
	114	2	2	15	35	40	2	46.4
	134	6	1	17	60-85	55	2	52.2

TABLE 6.14

Archaic Biface Fragment Data

	Cat. #	Platfm. Prep.	Cortex	Max. Thick.	Edge < 1	Edge < 2	Raw Mat.	Weight
Bases	83	1	1	10	45°	45°	2	35.0
N=4	102	3	2	24	50	50	2	105.6
	108	5	2	12	35-40	35	2	23.5
	114	2	2	15	35	40	2	46.4
Tips								
N=6								
	88	1	2	9	40°	30°	1	14.1
	95	3*	2	8	35-40	35	2	11.4
	103	1	2	7	40	40	2	13.9
	107	3*	2	13	45	45	1	33.7
	115	1	2	8	30	30	2	10.0
	17	5	2	12	50	50	2	24.1

* Very heavily abraded edges.

7. The range for the attribute weight is from 1.7 to 114.0 gm, with a mean value of 37.9 gm.

An interesting observation concerning the distribution of these bifacial fragments is that there is a definite gap spatially on the site which corresponds to the Archaic/Laurel division previously discovered with the unifaces. Tables 6.14 and 6.15, show the specimens which fall into the respective Archaic and Laurel areas and their corresponding data.

On average, the Archaic specimens are thinner ($\bar{X}$ = 11.8 mm vs. 14.15 mm), have more acute edge angles (30° - 50° vs. 30° - 80°), and are lighter ($\bar{X}$ = 31.77 gm vs. 40.96 gm). Only one of the ten Archaic specimens has cortex compared to seven of the twenty in the more Laurel area. There is somewhat less variation in raw material in the Archaic area of the site. Eight of the 10 biface fragments were manufactured from andesite/dacite and 2 from rhyolite. In the Laurel area 4 were manufactured from rhyolite, 14 from andesite/dacite and 2 from rhyolite-quartzite.

6.19 Utilized Flakes (Plate VI)

The seven flakes that fit into this category have been analyzed using some of the unifacial flake tool attributes. The discrete and continuous data for this category of tools has been noted in Table 6.16, while a more detailed description follows.

TABLE 6.15

Laurel (?) Biface Fragment Data

	Cat. #	Platfm. Prep.	Cortex	Max. Thick.	Edge < 1	Edge < 2	Raw Mat.	Weight
Bases	3	5	1	13	45°	45°	2	15.6
N=10	19/136	3	2	18	40-45	45-70	2	114.0
	21	2*	1	9	40-45	40	2	13.9
	22	1	2	10	35	45-60	2	1.7
	23	3	2	15	40-45	50-60	2	53.5
	30	1	2	9	45	45	3	13.6
	44	1	2	6	35	35	1	9.1
	65	1	2	13	50	30-45	2	37.9
	126/201	3*	2	12	35	40	2	53.5
	128	5	1	9	40	50	1	6.8
Mid-Sections N=4								
	43	5	2	11	40°	60°	2	17.0
	66	3	2	15	50°	40	2	56.6
	135	6	1	21	55	55	2	56.8
	138	6	1	17	55	65	1	50.0
Bases								
N=6	14	5	2	18	50°	70°	2	47.1
	24	5	2	14	50	50-80	3	22.4
	41	2	1	22	65	40	2	67.6
	50	2	2	11	45	-	1	16.9
	63	6	2	23	60	60	2	113.0
	134	6	1	17	60-85	55	2	52.2

* Very heavily abraded edges.

Specimen #15 is the only utilized flake manufactured from Hudson Bay Lowland chert. It is square-like in shape and is broken. The utilized edges appear serrated and converge into a point which may have been utilized as a graver. The central portion of the flake has cortex which has been considerably smoothed in comparison to the remaining cortex.

Specimen #16 is unique in shape as well as utilization. This U-shaped specimen has had a very large flake removed from the dorsal face. The ridge where the flake terminated and the cortex begins again has been heavily worn to the point of being shiny, which suggests that it was either hafted or hand-held. The convex distal end of the flake has been heavily battered, with a few flakes driven off both the ventral and dorsal faces. This utilized flake was found broken transversely, but both pieces were recovered within inches of each other. The platform is very large and lipped, and the bulb on the ventral face is very diffuse, which suggests that it was struck off using a soft hammer with a large contact area.

Specimen #49 was broken. Only the tip was recovered. The lateral edges can be described as straight and convex, while the tip is rounded. The wear on the lateral edges mainly consists of crushing and an almost "quina-like" or scalar wear of tiny flake scars within larger flake scars. This pronounced wear occurs on both the dorsal and ventral edges. Specimen #49 is the only utilized flake tool manufactured from rhyolite. Five of the remaining specimens were produced from andesite/dacite, and one from Hudson Bay Lowland chert (Specimen #15).

Specimen #57 is the longest of the seven utilized flakes. It may have been utilized but only shows signs on the ventral face of one edge. The large platform, the diffuseness of the bulb and the lip suggest soft hammer percussion with a large contact area.

Specimen #127 has a small amount of what may be utilization along one edge on the ventral face. Thin flake has been snapped transversely and longitudinally.

Specimen #214 is a side-struck type of flake, hence the greater width than length measurement. All of the edges with the exception of the platform edge, appear to have been utilized. Tiny flake scars have been removed from both dorsal and ventral faces but not consistently. This flake has a rather worn appearance, similar to that of flakes picked up from the beach.

Specimen #219 is square in shape. The utilization or retouch covers a very small area on the dorsal surface. This flake like #214, has a worn appearance to it.

6.20 Pecked Stone (Plate VI, 8)

Only one such specimen, #188, was recovered from Jessup, and it is broken. The two lateral edges and the tip (or base), have all been either intensionally modified and shaped by pecking or have a crushed appearance due to heavy utilization. The break on this specimen is on the dorsal face (catalogued side) and is oblique and transverse to the

TABLE 6.16

Utilized Flake Tool Data

Cat. #	Plate # VI	Platfm. Type	Platfm. Angle	Plfm. Length	Platfm. Width	Loc. Utiliz.	Dorsal Cortex	Max. Leng.	Max. Wid.	ML/MW	Max. Thick.	Raw Mat.	Weight
15	1	2	85°	90	30	4	1	36	26	0.72	14	3	6.8
16	2	1	75°	55	15	1	1	64	62	1.03	19	1	79.7
49	3	-	-	-	-	3	2	-	17	-	5	2	4.7
57	4	3	80°	40	10	3	1	105	85	1.24	18	1	162.8
127	5	-	-	-	-	3	2	-	-	-	12	1	23.3
214	6	2	85°	26	12	4	1	60	73	0.82	12	1	38.1
219	7	Collapd.	-	-	-	3	2	50	44	1.14	8	1	16.5

longitudinal axis. This material has been identified as andesite (Jensen, personal communication), however it reacts to fracture more like slate in that flakes tend to peel off in flat layers rather than concoidally. This is the only specimen of its kind on the site. If the crushing is due to pecking rather than wear, than perhaps this specimen was a preform for an adze. Its measurements are as follows:

Maximum length (keeping in mind it is broken) = 81 mm

Maximum width = 71.5 mm

Maximum thickness = 24.5 mm

Weight = 195.2 gm

The lateral edges are parallel, the end is straight with rounded corners, and in transverse cross-section the specimen is trapezoidal-triangular.

6.21 Hammerstones and Abraders (Plate VII)

Hammerstone #32 has two areas of pronounced wear on opposite sides where it was very likely held and hence worn during flaking. There is only a small amount of pecking evident at the ends.

Abrader #54 (?) is the only artifact at Jessup made of mica horneblende schist. It does not appear to have been intentionally shaped, nor does it show visible signs of use. The reason that it has been included in this category is that this type of material does not occur naturally on the south shore of L. Abitibi. It had to have been imported from the north shore of the lake.

TABLE 6.17

Hammerstone and Abrader Data

Cat. #	Plate # VII	Max. Length	Max. Width	Max. Thick	Shape	Raw Material	Weight	
32	3	65	57	39	Oval	Granite	210.0	Hammerstone
54	4	158	55	15	Elongated Oval	Mica Horne-blende Schist	192.7	Abrader?
85	8	94	78	55	Circular	Granite	675.6	Hammerstone
89	6	95	60	62	Semi-Circular	Granite	475.4	Hammerstone/ Abrader
105	7	95	64	63	Rounded Rectangular	Granite	565.7	Hammerstone/ Abrader
189	5	91	27	13	Elongated Rectangular	*	38.0	Abrader?
190	2	76	36	19	Rectangular with Nose	Gneiss	93.5	Hammerstone/ Abrader?
210	7	64	63	43	Irregular Circular	Granite	255.9	Abrader

* Contact area between a silica rich (rhyolite?) and a (mafic?) igneous rock.

Hammerstone #85 has been battered at both ends.

Hammerstone/Abrader #89. The bottom edges of this specimen have been abraded to such an extent that one of the edges has turned white. Both ends have had several flakes removed.

Hamerstone/Abrader #105 (?). The largest end which is flat, appears considerably worn as though it had been used for grinding. In addition, the ends and sides show signs of battering.

Abrader #189 (?). This peculiar shaped artifact (elongated rectangle) may have been used as a whetstone. The ventral face appears ground and has a reddish tinge to it which is not present dorsally.

Hammerstone/Abrader #190 (?). Both sides and dorsal surfaces of this specimen appear ground. The tip of this tool was broken off suggesting that it may have been used as a hammerstone. The texture of the stone where it has been broken is much coarser. This is the only artifact from Jessup made from gneiss.

Abrader #210 (?). The edges of this roughly circular shaped specimen appear to have been abraded.

The fact that such few hammerstones were found at Jessup is not unusual for a workshop site. Bordes has noted the lack of hammerstones found in Western Europe at Middle and Upper Paleolithic workshop sites.

For instance, at Corbiac, in the Perigordian there are only 20 hammerstones "for more than 100,000 blades, flakes and implements, and the abundance of small waste flakes, as well as the large number of cores, clearly indicates that the working of flint was done on the spot" (Bordes, 1959:10-11) as quoted from Bucy, 1974:27).

Present day experiments in flint-knapping have shown that hammerstones may remain in use long enough to produce several thousand flakes (cf. Bucy, 1974:27). "It would not be uncommon for Crabtree to use only a few hammerstones at certain obsidian sources in East Central Oregon over a period of a week during that time he may remove close to a hundred thousand flakes" (Bucy, 1974:27). Bucy has noted from his own experimentation that "It is not uncommon to use a single hammerstone for several weeks or months. I have several favorite hammerstones which I have used for four years during that time I have used them to remove probably several hundred thousand flakes" (Bucy, 1974:27).

The hammerstones may have been used at Jessup to roughly block out the blanks and reduce the tabular plates, as indicated by the deep negative scars and prominent ridges on many of these specimens. I would suggest, however, their rarity is due to a greater reliance on soft hammers such as antler billets to thin and shape the bifaces present at the site. This has been deduced by examining the flake detritus as well as the tools. The thinning flakes generally have broad platforms, diffuse bulbs, extensive platform preparation (i.e. strengthening and/or abrading), and ventral lipping. The workshop blanks and rejects have shallow negative flake scars.

6.22 Cores

Cores are one of the most problematic categories of artifacts to analyze. They tend to be a catch-all category and are difficult to systematically describe. As Bonnichsen and Young have noted, "In one sense, every flaked artifact is a core" (1980:169).

Following Bonnichsen and Young, cores in this study have been defined as follows.

> Only specimens which exhibit one or more negative flake scars from the intentional creation of flakes or spalls used for subsequent artifact manufacture are considered. During the manufacture of cobble unifaces, non-stemmed bifaces and stemmed bifaces, flakes are created and these flakes were sometimes selected for tool production. The creation of these flakes was not the primary intent of the craftsman. Thus, cobble unifaces, non-stemmed bifaces and stemmed bifaces are not considered as cores (Bonnichsen and Young, 1980:169).

Taking this definition of cores into consideration, there are only three lithic specimens that fit this description with any accuracy. These three cores appear to have been used to produce the uniface flake scrapers discussed previously.

There are, however, 47 other lithic specimens which do not quite fit the criteria set out above. Of these, at least ten of these 47 can be classified as <u>embryonic quarry joint blocks and wedges</u>. They have a few flakes taken off but these appear to have been a result of quarrying and testing the quality of the raw material. Bucy has also noted the presence of such specimens at a basalt quarry in western Idaho (1974:18).

Of the remaining 37 specimens, four appear to be in the very early stages of reduction. These specimens (20, 110, 111, 187) have been unifacially flaked and then discarded because of their numerous hinge and step fractures and general thickness. Specimen #187 is interesting in that it shows differential patination. The surface which had originally been flaked became patinated. A later group of people picked up the specimen and tried to reduce the specimen further but to no avail.

The 33 remaining specimens have retained much of their original angularity and cortex and have been flaked more haphazardly. As a result, they have been classified as <u>quarry block cores and fragments</u>. It is difficult to tell if these specimens were flaked for the purpose of obtaining flakes or if they are the earliest rejects of the bifacial reduction scheme at Jessup.

All of the data for the 47 specimens discussed above can be found in Table 6.17.

The analysis of the three flake cores has been divided into the

TABLE 6.18

Core Data
N = 47

Cat. #	Raw Material	Weight (gm.)	Type
20	1	621.1	Unifacially flaked reject or core
*45	3	1881.9	Quarry block core?
55	1	1234.3	Quarry block core
58	1	281.0	Quarry block core
81	1	419.1	Quarry block core
97	1	608.8	Quarry block core
99	1	88.0	Quarry block core
104	1	192.1	Quarry block core
110	1	496.2	Unifacially flaked reject or core
111	1	350.9	Unifacially flaked reject or core
112	2	790.0	Quarry block core
113	1	491.1	Quarry block core
116	1	262.2	Quarry block core
117	1	645.8	Embryonic quarry joint block
118	2	114.3	Embryonic quarry joint block
121	1	663.3	Quarry block core
122	1	324.4	Embryonic quarry joint block
129	1	225.9	Quarry block core
132	2	132.8	Quarry block core
133	1	101.3	Quarry block fragment
139	1	228.3	Quarry block core
140	1	207.4	Quarry block fragment
141	1	339.3	Embryonic quarry joint block
143	1	227.4	Embryonic quarry joint block
144	1	303.9	Quarry block core
145	1	464.7	Quarry block core
146	1	361.2	Quarry block fragment
147	2	101.5	Quarry block fragment
187	1	276.9	Unifacially flaked reject or core
191	1	269.8	Embryonic quarry joint block
192	1	194.0	Quarry block fragment
200	1	374.6	Embryonic quarry joint block
202	2	359.4	Embryonic quarry joint wedge
203	2	21.8	Quarry block fragment
204	1	468.0	Quarry block core

TABLE 6.18 (cont'd)

Cat. #	Raw Material	Weight (gm.)	Type
205	1	320.2	Embryonic quarry joint wedge
206	1	330.5	Quarry block core
207	2	182.6	Quarry block fragment
208	2	135.7	Embryonic quarry joint wedge
209	1	425.1	Quarry block core
211	1	344.6	Quarry block core
212	1	343.8	Quarry block core
213	1	274.7	Quarry block fragment
215	1	460.8	Quarry block core
216	1	266.8	Quarry block core
218	1	183.1	Quarry block core
220	1	332.6	Quarry block core

Total 17.723.2 gm (39 lbs) wt.

* Specimen #45 is the only artifact made from greywache. Jensen has suggested that it may come from the Larder L. area (personal communication).

four levels of technology, shape, raw material, and size. There are two attributes within the level <u>technology</u>:

1. direction of flake removal

and 2. kind of core platform (Bonnichsen and Young, 1980:172-3).

The attribute, direction of flake removal, has two variants:

1. Bidirectional. Flake scars occur on two different sides of an edge or originate from two opposite edges.
2. Polydirectional. Flake scars originate on platforms or edges on several different planes of the core (Bonnichsen and Young, 1980:172-3).

The attribute, kind of core platform, has two variants:

1. Cortical
2. Both cortical and primary material (fractured surface) (Bonnichsen and Young, 1980:172-3).

The level, <u>shape</u>, has only two variants:

1. Block
2. Rectangular

The reason for the lack of variability is that none of the three cores has been extensively flaked, and, as a result, cortex covers most of the cores. Since the cores have all been derived from tabular joint plates or blocks, they have retained much of their original block or rectangular form.

The three different types of raw material present in core form at Jessup are:

1. Andesite/Dacite
2. Rhyolite
3. Greywache

Size was calculated by weighing each specimen using a beam balance. Table 6.19 contains the five discrete and continuous measurements for the three cores. Additional observations have been noted below.

Core #48. This small specimen has several cleavage planes which run through the material, somewhat interrupting fracture. Although the direction of flake removal has been classified as polydirectional, many of the flake scars appear to have served to regularize the two core faces. There is some evidence of platform preparation. The one intact flake scar that remains measures 27 mm in length, 25 mm in width and is expanding in shape. The platform length measures approximately 13 mm. The core angle along this edge is approximately 70° - 75°.

I would suggest that because of the many cleavage planes present in the material, the very small size of this core, and the fact that the

Cores

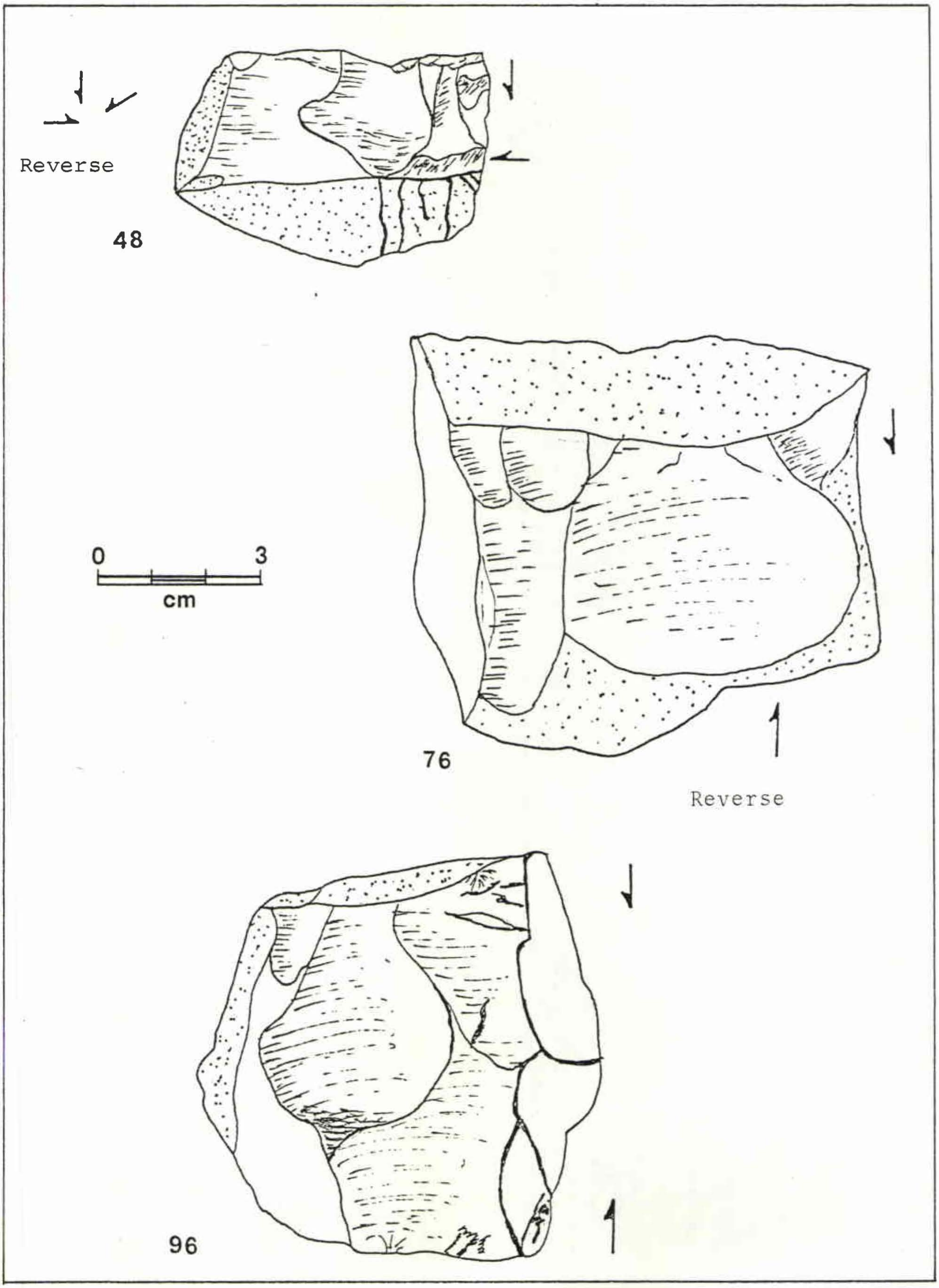


Figure 6.10

length and width measurements are considerably less than those measured from the rhyolite unifaces, that this is an exhausted core used by Laurel peoples for producing flakes that could be manufactured into scrapers.

Core #76. No platform preparation is evident on this bidirectional block core. The measurements of one, relatively intact, flake scar are as follows:

Platform Edge Angle = 80°

Platform Length = 25 mm

Maximum Length = 45 mm.

These measurements correspond most closely to the two Archaic scrapers made from andesite/dacite. This core was excavated near the juncture of the Archaic/Laurel "boundary" line.

Core #96. This bidirectional block core is made of the same material as uniface scraper #106. Not only is it the same colour and texture, but it also has the same beige coloured cleavage planes running through the material. The single intact flake scar remaining on the core face has the following measurements:

Maximum Length = 47 mm

Maximum Width = 32 mm

Platform Length = 11 mm.

It is difficult to get an accurate platform angle measurement but the edge appears to form an obtuse angle of approximately 100°. The opposite edge which retains a portion of a flake scar has an angle measurement of 60°.

These measurements are closer to those for the Archaic rhyolite unifaces than they are for the Laurel rhyolite unifaces. These measurements, the type of material, and its location all point to it as an Archaic core.

TABLE 6.19

Flake Core Data

Cat.#	Direction of Flake Removal	Kind of Core Platform	Core Shape	Raw Material	Weight
48	Polydirectional	Cortical & Fractured	Rectangular	Rhyolite	54.4
76	Bidirectional	Cortical	Block	Andesite/ Dacite	364.5
96	Bidirectional	Cortical	Block	Rhyolite	286.9

6.23 CERAMICS

The ceramic sample at Jessup is small but informative. A total of 168 sherds was recovered from the site. The vast majority, 160 out of 168, were found in Feature 1. Two sherds were excavated from Feature 4, three sherds from Feature 5, and an additional three sherds from the square directly south of Feature 5 in square S15W11. See Table 6.20. These sherds represent a minimum of 3 different vessels, all of which fall within the Laurel Ware classification.

TABLE 6.20

Laurel Vessel Summary

Vessel #	Feature or Provenience	# of Rims Sherds	# of Neck Sherds	# of Body Sherds	Total
1	Feature 1	6	8	146	160
	Feature 4	0	0	2	2
2	Feature 5	1	1	1	3
3	S15W11 SE	2	0	1	3

All of the Laurel vessels have grit temper, smoothed surfaces, nonthickened lips, and nondecoration of the rim interior (cf. Stoltman, 1973:63).

The three vessels at Jessup represent two different types of Laurel Ware, although three different types of decorative elements were utilized. The two types represented include Laurel Undragged Oblique (Lugenbeal, 1976:465), and Laurel Cord-wrapped Stick (Lugenbeal, 1976:430-434). The continuous and discrete attributes used to analyze the ceramics have been presented in Table 6.21. The decorative element and mode of application were determined in consultation with Susan Jamieson, by the use of plasticine impressions and viewing these impressions under the microscope, using low magnification (15X).

Laurel Vessels

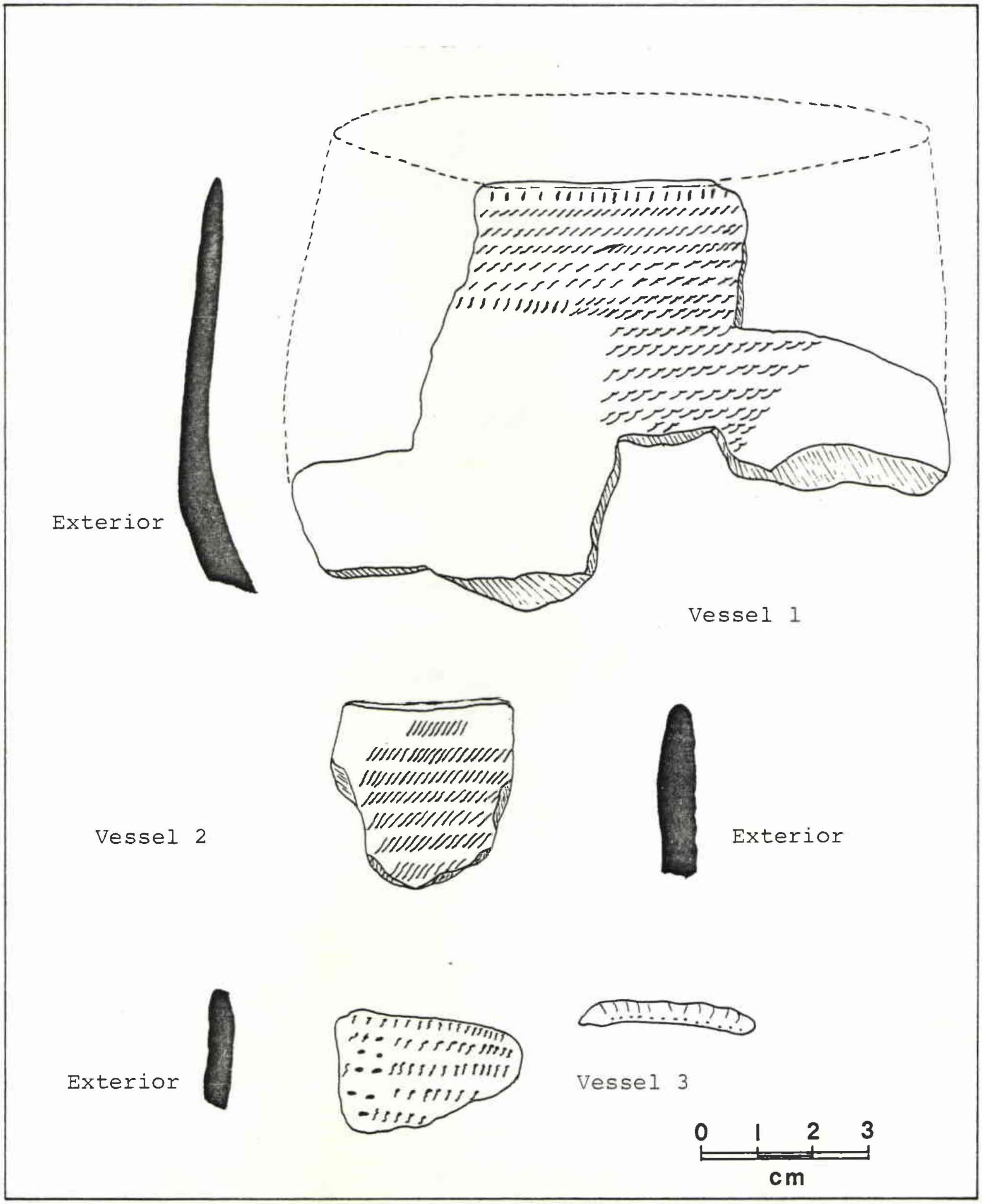


Figure 6.11

TABLE 6.21

Discrete and Continuous Atributes of the Laurel Vessels

Vessel#	Plate #VIII	Lip Thick	Rim Thick 15mm below Lip (mm)	Rim Diam. (mm.)	Lip Form	Dec. Elemt.	Mode Applic.	Lip Dec.	Motif
1	1-5	3.5	5.5	110	Round -Flat	Babiche Wrapped Stick	Impressed	Abs.	
2	8	5.0	7.0 - 8.0	-	Round	Dentate Stamp	Stamped	Abs.	
3	6-7	4.0	5.5	-	Flat	Cord-Wrapped Stick	Impressed	Pres.	

Vessel 1

This vessel consists of 6 rimsherds and 156 neck and body sherds. The body sherds range in size from 15 mm to 40 mm. There is very little difference in colour between the interior and exterior surfaces. Brose has suggested that the lack of difference between exterior and interior surfaces "may indicate that a fairly low degree firing took place in an oxidizing atmosphere (Matson, 1937:116)" (Brose, 1970:54). Both surfaces range in colour from a pale brown to a reddish brown. The exterior and interior surfaces have a slight burnished appearance which may be the result of weathering or intentional burnishing. Coil breaks are evident on several body sherds. The temper consists of very fine grit and quartzite particles mixed with organic material. The particles are 1 mm and less in size. There is a general laminated texture to the paste. The interior surface has been wiped while the exterior has been slightly smoothed.

This is the only vessel of the three to have been partially reconstructed. The profile of this vessel can be described as straight and then gently curved inwards at the shoulders. There is a definite decrease in thickness as the lip is approached. The body sherds average 6-7 mm in thickness, while the rim measures 5.5 mm at 15 mm below the lip. The lip is 3.5 mm thick.

Vessel 1 was a small container. It has a rim diameter of approximately 110 mm and a maximum body diameter of 165 mm.

The decorative elements and techniques displayed on this vessel were initially thought to have been produced by a dentate stamp which had been dragged obliquely. Use of the plasticine and microscope however quickly dispelled this view. The impressions proved to be much too irregular in shape and were clearly not dragged. Instead, the decorative element appears to have been impressed using babiche-wrapped stick. Babiche is suggested rather than cord because there are no cord marks visible and the surface of the impressions is smooth.

The decoration consists of relatively small (2 mm) vertical or near vertical impressions over closely spaced babiche-wrapped stick ribbons, which give the general effect of a horizontal motif. At one point on the vessel these obliques are interrupted and are followed by small vertical impressions again. This occurs 25 mm from the lip. Next to this area, the oblique impressions continue to at least a distance of 50 mm from the lip. They may have originally extended further, but the sherd that fits here is missing. The overall effect of this decoration is a vertical over horizontal motif. The vertical motif was added after the horizontal motif. The lip was smoothed and rounded, and in some places flattened.

Vessel 1 conforms to one of the two modes Lugenbeal specifies for Laurel Undragged Oblique i.e. short oblique motif made by individual impressions (Lugenbeal, 1976:447). However, the vessel does not conform to either of his 2 subtypes - linear stamped or notched. As a result, Vessel 1 has been placed into a different subtype entitled babiche-wrapped stick.

Vessel 2

Vessel 2 is represented by only 1 rimsherd and 2 neck and body sherds. It is grey-brown in colour on both exterior and interior surfaces, although the exterior is the slightly darker of the two. Coil breaks are not readily evident, but this is not surprising given the fact that only 3 sherds were recovered from this vessel. Temper consists of small quartzite and mica particles which are less than 1 mm in size. The paste has a laminated texture to it.

The one rim sherd has a maximum length of 31 mm. It has a straight profile on the exterior edge, while the interior tapers gently towards the lip. The lip itself is generally rounded, and measures 5.0 mm in thickness. The rim measures 7.0 - 8.0 mm in thickness at 15 mm and 30 mm below the lip.

Rim decoration consists of small, very closely spaced dentate stamp oblique impressions which measure 2 mm in length, 0.5 mm in width and 1.0 mm apart. There are 7 rows of this stamp on this one rim sherd. The top row and part of the left margin have been somewhat smudged.

On the basis of decorative element, technique and motif, the modes "Undragged Oblique Stamp and the Short Oblique Motif" (Lugenbeal, 1976:447), this vessel can be classified as Laurel Undragged Oblique subtype Notched (Toothed) (Lugenbeal, 1976:462-5).

Vessel 3

Vessel 3 is represented by 2 rimsherds and 1 body sherd. One of the rim sherds is in such an eroded condition that little can be determined from it, except that the 2 rimsherds belong to the same vessel.

This vessel appears to have been reddish-brown externally and brown-grey internally. The temper consists of quartzite and granite mixed with organic material. The paste is laminated.

The one analyzable rim sherd has a maximum length of 22 mm. The profile is straight. The interior rim is slightly constricted immediately below the lip, which has been flattened, creating a channelled effect. The lip measures 4.0 mm in thickness and the rim is 5.5 mm at a point 15 mm below the lip.

The rim decoration was created through the use of a cord-wrapped stick. The cord that was used was quite small, measuring approximately

1 mm in width and 3 mm in length. There is a small amount of overlap on the left hand side of the rimsherd. This overlap approximates rocker stamping, but the rim is broken where this occurs so it is impossible to ascertain.

This vessel is unique in that it is the only one to have a decorated lip. The lip was corded and then smoothed over.

On the basis of the above characteristics, this vessel accords with Lugenbeal's type, Laurel Cord-wrapped Stick (Lugenbeal, 1976:430-434).

By way of a summary statement, Table 6.22 presents an overview of the number of lithics and ceramics recovered from Jessup, through excavation.

TABLE 6.22

Excavated Jessup Tools

LITHICS	N	%
Unifacial Flake Tools	27	18.12
Stemmed Bifaces	5	3.36
Non-Stemmed Bifaces (Complete)	21	14.09
Non-Stemmed Bifaces (Fragments)	30	20.13
Utilized Flakes	7	4.70
Pecked Stone	1	0.67
Hammerstones and Abraders	8	5.37
Flake Cores	3	2.01
Embryonic Quarry Joint Blocks and Wedges	10	6.71
Quarry Block Cores and Fragments	33	22.15
Unifacially Flaked Rejects or Cores	4	2.69
TOTAL	149	100.00
CERAMICS	**N**	**%**
Rimsherds	9	5.36
Neck Sherds	9	5.36
Body Sherds	150	89.28
TOTAL	168	100.00

6.24 Summary of Jessup Cultural Affiliations

The forgoing clearly indicates that Jessup is a multi-component site which was inhabited by both Shield Archaic and Middle Woodland Laurel peoples. While some overlap and mixture may be present, the site can be divided into an Archaic and a Laurel area on the basis of both artifactual and stratigraphic evidence. The broken line in Figure 3.6 shows the boundary of the respective occupation areas within the site. The Laurel occupation being north of the line and the Archaic being south of the line.

By way of summary, the highlights of how these areas have been defined are again discussed briefly below.

The unifaces at the Jessup were an important element in distinguishing the occupations.

The unifaces clustered differently in relation to size, the types of raw material used, and the amount and location of retouch. The unifaces north of the boundary line are primarily end scrapers. They are small in size and average 4.8 gms. in weight. Hudson Bay Lowland chert was a major type of raw material used. All of these characteristics are common to the Laurel peoples.

The unifaces south of the boundary line are mainly side scrapers or end and side scrapers. They are larger and heavier and have a mean weight of 12.8 gms.. Local raw material was primarily used. All of these characteristics are common to Archaic peoples.

Several stemmed and non-stemmed bifaces were also instrumental in defining the Laurel and Archaic areas at Jessup. A stemmed-side notched point (#28) found in Hearth 4, and a bi-pointed non-stemmed biface (#12/26) found in association with Hearth #1, are both similar to specimens excavated from the Ghost River Garden site which were associated with Laurel ceramics (Ridley, 1966).

Biface #35, excavated from S16W11, resembles a "uni-pointed bifacial tool" that Pollock identified as belonging to the Abitibi Narrows phase of the Shield Archaic at the Pearl Beach site on Larder Lake (1976: Figure 63, No. 5).

Biface #101 and #86 from S15W14 and S15W13, strongly resemble the "turtle-back" cores described by Ridley from the Abitibi Narrows site. Pollock suggested that a similar find at the Pearl Beach site belonged to the Abitibi Narrows phase of the Shield Archaic (1976: 176).

Biface #53, excavated just north of the Laurel/Archaic "boundary line", resembles one of the Campbell Bay Archaic bifaces dated at ca. 3,255 B.C. (Brizinski, 1980).

Stratigraphic evidence was also useful in distinguishing the different areas of occupation. There is a pronounced difference in the distribution of the first and second stratigraphic levels (N_1 and N_2). As can be seen in Figure 3.4, the N_1 level is generally confined to the Laurel area, as it has been defined by the unifaces.

One of the most conclusive factors in defining the boundaries of the different occupations is the presence of ceramics only along the eastern section of the site. The ceramics were found within the three hearths and in one quadrant just south of the southern most hearth. They are diagnostic of Laurel ware.

CHAPTER 7

7 CONCLUSIONS

Ten questions were originally posed in the introduction of this thesis. This chapter summarizes conclusions relative to questions one through six, and re-examines questions seven to ten for which definite conclusions are less clear.

7.1 The Prehistoric Environmental Conditions at Lake Abitibi

Recent geological and palynological research indicated that the southern shore of Lake Abitibi was deglaciated by ca. 9,000 B.P.. Pro-glacial Lake Ojibway drained ca. 7,900 B.P. and the open boreal forest at its southern edge quickly migrated into the drained lowland areas. As a result, the present day boundaries of Lake Abitibi were established ca. 7,900 years ago. From this time to the present, an open to closed boreal forest has been present in the Abitibi area.

Wildlife such as caribou may have migrated north with the boreal forest as early as 7,900 years ago, making the Lake Abitibi area suitable for occupation. However, no Palaeo-Indian or Plano peoples appear to have been present at this early time. Research along remnant beaches of Lake Ojibway or along the higher banks of Lake Abitibi may produce such evidence in the future.

During the period from ca. 7,200 B.P. to 3,000 B.P., Richard (1979) notes that the climate was slightly warmer and drier but no great environmental changes occurred. Changes in culture at Lake Abitibi would not appear to be a result of any marked environmental change. They may, on the other hand, be due to more specific, localized, and less marked changes in the environment.

7.2 Types and Sources of Raw Material

The vast majority of the raw material utilized at Jessup has been identified as local Abitibi volcanic material. The chemical and trace analysis carried out on eight representative samples identifies the material as calc-alkalic andesite, dacite and rhyolite tuff. These materials are fine grained, well bonded, and range from being isotropic to microcystalline. They fracture conchoidally and range in hardness from $4 \frac{1}{2}$ to $6 \frac{1}{2}$ on the Mohs scale, as they become more cherty.

A substantial amount of the raw material used by Jessup flint-knappers has been identified as coming from the triangular rock formation southeast of the site. This statement is based upon the following four observations:

1. The eight samples analyzed from Jessup proved to be identical to those collected by Jensen from this area.
2. At least three of the seven available outcrops in the forma-

tion are close to Jessup.

3. Several pits and trenches were found by Jensen and Pollock in outcrop #1.
4. There is a scarcity of other suitable sources, within the Lake Abitibi area.

These factors make the formation the most likely candidate for the lithic material knapped at Jessup and other archaeological sites along the lake.

The non-indigenous raw materials used at Jessup include greywache, Lorraine quartzite and perhaps Hudson Bay Lowland chert.

The greywache, appears to come from the Larder Lake area. The Lorraine quartzite, comes from the northeastern end of Manitoulin Island, in the vicinity of the Sheguiandah quarry/workshop site. The presence of these two materials suggests that the people at Jessup were in contact, direct or otherwise, with groups located considerably south of Lake Abitibi.

Hudson Bay Lowland chert is "thought to originate around the 49th parallel in southern Ontario" (Brizinski, 1980:221). Brizinski's excavations at Lake Nipissing have uncovered evidence for long distance trade along the Nipissing to Lake Abitibi route, because of the high incidence of Hudson Bay Lowland chert on Nipissing Woodland sites. Hudson Bay Lowland chert "was found in glacial till in areas primarily inhabited by northern Ojibwa and Cree groups...the presence of Huron pottery at the Milky Bay site (Noble, 1979:65) on Larder Lake...supp the obvious directions of travel - the Lake Nipissing via the Sturg River to Lake Abitibi region "(Brizinski, 1980:230-232).

<u>Historic</u> evidence for long distance trade, population moveme and social/political alliances along the Ottawa River to Lake Abi route have been recounted by Noble (1980:10). In the early hist period, northeastern Ontario was inhabited by "the Crees, the Abiti the Timagami, the Timiskimings, the Nipissings and the Objibwa" (No 1980:6). There was considerable contact between these groups histo ally. For instance,

> the Nipissings were accustomed to journeying northward during the 1640-1660 era to trade with the Cree (JR 11: 197), whom they reached at James Bay in fifteen days (JR 44:243-245). Their route undoubtedly led through north-eastern Ontario and adjacent Quebec via Lake Timiskaming to the height of land, and thence downriver to Lake Abitibi and the Abitibi River. De Troyes mentions meeting natives all along the route during his epic military/exploratory expedition of 1686 (Caron 1981; Kenyon and Turnbull 1971). Previously in 1657-58, Iroquois raids into northern Quebec had caused wide-spread fear and dislocation of native populations. Some Algonkians are known to have joined the Abitibi during this period (JR 45:233; Noble 1979:12). Toward the end of the 17th Century, we learn from Lahontan (1703) that the Abitibis

and Timiskamings were allies who helped the French against General Peter Schuyler in 1691 (Orr 1922:26, 29) (Noble, 1980:10).

The presence of exotic materials at Jessup may be a result of trade with more southerly groups in exchange for furs or other items not recoverable in the archaeological record, or a result of marriage or political alliances.

7.3 Problems the Aboriginal Craftsmen Faced with the Available Raw Material

There are a number of general properties that are required of an effective tool stone. They must be elastic, brittle, homogeneous, isotropic and rigid (Speth, 1974:8). In addition to these properties, the raw material must be large enough for the finished tool that the knapper has in mind (Crabtree, 1967:9), and be "relatively free of flaws, cracks, inclusions, cleavage planes and grains in order to withstand the proper amount of shock and force necessary to detach a flake of a predetermined dimension" (Crabtree, 1967:8).

The lithic material used at Jessup can be classified as "tough" in contrast to obsidian, fine and less fine-grained basalt, heated Georgetown flint and other finer flints, which are considered elastic or strong (Callahan, 1979:16). In terms of ease of workability, the Jessup stone tools would rate approximately 4.0 out of 5.5 (Callahan, 1979:16). The most difficult materials to work are coarse quartzites, coarse rhyolites, felsites, common basalt, and Catoctin Greenstone, graded at 5.0 to 5.5. The easiest materials to work are opal and obsidian which Callahan grades at 0.5 to 1.5 (Callahan, 1979:16).

The properties of a toolstone are important when considering methods of production. Tougher materials, such as those at Jessup, must be approached differently than finer grained cherts and obsidian, for example,

> The way to overcome the weakness and increased incidence of flake fracture in the tougher lithic materials is to prolong and diffuse the contact interval of the percussor (Crabtree, 1972:9). As mentioned above, by employing a suitably soft hammerstone, one may execute quite competent secondary thinning within the grade range of 2.0 to 3.5. But beyond 3.5, flakes tend to snap off prior to expenditure of the force applied. Switching to antler, bone or ivory billets (of sufficient mass for the objective piece, or course) will enable one to thin the tougher and less elastic materials because of longer contact time. However, successful secondary thinning, even with the anter billet, begins to diminish at 4.5. Beyond that, failure due to flake fracture and resultant step-fracture becomes increasingly incident (Callahan, 1979:166).

The problem of toughness is readily apparent in the Jessup assemblage, judging from the high incidence of flakes with hinge or step fractured terminations and the large number of bifaces with "humps" or "pigs" in the central portion of the artifact (i.e. artifacts 181, 34). This problem also surfaces in the specimens that have become narrower, faster than they could be thinned due to edge collapse (i.e. artifacts 70, 64).

Jessup craftsmen faced additional problems in their tool stones that led to the apparent rejection or breakage of many of the tools. There were problems such as:

1. changes in texture from coarse to fine grained material resulting in breakage, or in width/thickness ratios that could not be reduced further,

and 2. bedding planes and inclusion which caused breakage.

Callahan has made an interesting statement in terms of the relationship of abundant raw material to the number of bifaces rejected. "A surplus of suitable raw material at a site may lead to a higher percentage of rejects. Surplus encourages gambling. But willingness to gamble is one sure way to learn to solve lithic reduction problems. Unless one continually tries to solve problems whose solutions are not evident, they will always remain problems" (Callahan, 1979:163). The large number of broken and rejected bifaces at Jessup suggests that the Jessup flint knappers were gamblers and readily experimented with the available raw material. There is, at least, one unifacially flaked reject or core that shows it had been picked up and worked by people at two different times (artifact #187), and each time discarded. This can be deduced from the weathered flake scars that had at a later date been reflaked.

Experimentation with Abitibi raw material showed that this material could be controlled during the thinning stage of manufacturing bifaces by preparing the platform edges by strengthening and abrading, and using an antler billet as a percussor.

7.4 Types of Tools Manufactured at Jessup

The production of bifaces appears to have been the major occupation at this site. Bifaces were produced from both flakes and cores. There is no evidence for a blade technology.

The complete non-stemmed bifaces ranged in size from 13.9 to 745.0 gm, and clustered into four categories.

Many of the bifaces, non-stemmed and stemmed, appear to be blanks and workshop rejects because of their sinuous edges, and thick cross-sections. There is also a large proportion of bifaces with cortex (almost 50%), a large number of biface fragments (30), a large number of steep edge angles, and a high incidence of repeated but unsuccessful attempts at clearing the central humps or "pigs" caused by excessive hinging.

The unifaces at Jessup made of Hudson Bay Lowland chert, were not produced at the site, judging from the appearance of only a few resharpening flakes, and the complete absence of cores of this material.

7.5 Processes and Strategies of Tool Manufacture

The presence of hard hammerstones within the Jessup assemblage is an indication that hard hammer percussion was used to produce some of the tools and detritus at Jessup. The morphology and flaking characteristics of the detritus and tools indicates that soft hammer percussion and pressure flaking were also used. Pressure flaking, however, appears confined to only two tools in the Laurel area of the site (specimens 38/42, 39). Hard hammer percussion was used more extensively in the Laurel occupation.

Muto (1971) has determined through bifacial replication experiments that it is possible to distinguish between the techniques of hard and soft hammer percussion, keeping in mind that the hardness or softness of the percussor is relative to the raw material being utilized. The techniques of hard and soft hammer percussion

> are different in principle, with the hard hammer technique dependent for success upon the appropriate matching of percussor and toolstone masses. Percussor density and rigidity as well as angle and speed of application must be taken into account before stoneworking commenses. Soft hammer technique, where the percussor is at least as soft or softer than the tool-

stone, is dependent for success more on control of speed and platform preparation. In general, the contact area of the blows is larger than for hard hammer percussion (Wiersum and Tisdale, 1977:62).

Muto has characterized the different techniques using the following criteria. Decortication flakes removed with a hard hammer have an acuminate bulb relative to the contact area, a salient bulb, fissures, erraillures and ripple marks (Muto, 1971:77-78). The thinning flakes removed by hard hammer have in addition to these characteristics, platforms which are collapsed or moderately to heavily crushed (Muto, 1971:79-80). Decortication flakes removed by a soft hammer have a truncated bulb relative to the contact area, a diffuse bulb, fissures, erraillures, ripple marks and a lip on the proximal end of the ventral surface (Muto, 1971:79-80). Thinning flakes removed by a soft hammer have essentially the same characteristics (Muto, 1971:80).

The flake data was initially examined using 29 attributes, but one of these attributes, the presence of a truncated or acuminate bulb was dropped when it was discovered that all of the flakes had truncated bulbs relative to the contact area. The other attributes pertaining to percussor type were noted with the following results. Lips were slightly less common on the decortication flakes but still exhibited a very high presence. The lowest occurrence (82%) was in the decortication flakes in Location 1. The bulb of applied force proved to be predominately diffuse. The highest percentage of salient bulbs occurs in the thinning flakes in Location 1 with a frequency of 28%. The large majority of flakes had fissures. Erraillures were present but in relatively small numbers. Ripples were present approximately 50% of the time, with the one exception being decortication flakes in Location 2. Platform preparation and character have already been discussed.

The above observations, i.e. the much lower incidence of platform preparation on Laurel flakes, a higher incidence of salient bulbs, the presence of salient ripples only in the Laurel artifacts, and the presence of broader striking platforms in the Archaic material, suggest that the technique of hard hammer percussion was used more extensively in the Laurel than in the Archaic occupation.

The flake detritus was basically examined using descriptive statistics in order to see if any difference in strategy could be deduced from the data. The following conclusions are largely based on the comparison of the frequencies and means of selected attributes between the different flakes and the different locations. This information was mainly derived from Table 5.2.

The differences between the cortical and non-cortical flakes goes beyond the presence, absence or amount of cortex. There are also substantial differences in platform preparation and character, in platform angles, lips, lengths and widths of striking platforms, the size of the dorsal ridges, the number of dorsal scars, their weights, maximum thickness, thickness below the bulb, and the point of maximum thickness. This is not to say that there is no overlap between decortication and thinning flakes. As will be seen shortly, there is some overlap early in the stages of reduction.

The most significant differences in relation to location are:

1) The frequency of abraded platforms. Location 2 (Archaic) has more than twice the number of abraded platforms as Location 1 (Laurel).

2) The frequency of bevelled-cluttered facetted platforms. There are almost twice as many in Location 2 as in Location 1.

These two differences show that there was considerably more concern with preparing platforms during bifacial reduction in the Archaic than in the Laurel. This could be interpreted in one of two ways: It may indicate a significant difference in technique between the two temporal groups. The Laurel relied more on plain or sparsely facetted platforms and strengthening, and the Archaic on cluttered facetted platforms and abrading. On the other hand, it could indicate that a different (more advanced) stage of reduction was being practised in the Archaic area as compared to the Laurel.

The flake data tends to support the first hypothesis. If the second hypothesis were "true" then one would expect a prevalence of acute angles on the thinning flakes within the Archaic occupation. At first glance, looking only at the means, this appears to be the case. The mean dorsal platform angles are more acute in the Archaic area for both the decortication and the thinning flakes, which suggests that more finished tools were being manufactured here. When the <u>ranges</u> of the angles are examined, however, they are almost identical for the different types of flakes i.e. thinning vs. decortication. In addition, the flake angles all peak at the 70° - 79° category with the exception of the Archaic decortication flakes which peak in the 60° - 69° category. The thinning flakes in both locations are spread out in a similar fashion. The decortication flakes, however, are distributed very differently. In Location 1 (Laurel), 20% (10) of the decortication flakes range in value from 45° - 69°, whereas 80% (40) fall between 70° - 119°. In Location 2 (Archaic) 52% (26) fall within the range of 45° -69°, and 48% (24) range between 70° - 119°. This suggests either that very different types of cores were processed into bifaces or that the Archaic peoples were removing approximately half of the cortex at a later stage in the reduction sequence than the Laurel.

Another factor which mitigates against hypothesis 2 is that the thinning flakes in the Laurel area have the greatest number of dorsal flakes scars. Generally, the higher the stage of reduction, the greater the number of dorsal flake scars on those flakes being removed.

The smaller values for the continuous attributes such as weight and maximum flake length in the Laurel occupation suggest that smaller tools were being manufactured in the Laurel. The attributes of maximum flake width, thickness and thickness below the bulb have an almost identical range of values for the different types of flakes within the two locations.

An interesting difference in the morphology of the Laurel and Archaic flakes is that the major types of Laurel thinning flakes are expanding-contracting and expanding. For the Archaic, the highest percentage of thinning flakes are expanding-contracting followed by side-struck. An additional difference between the two components is the presence of parallel and expanding-parallel flakes in only the Laurel occupation. With one exception, the same can be said for parallel-contracting flakes. The shape of flakes is dependent upon the face of the core (Muto, 1971:99). The differences in flake morphology also seem to reflect slightly different strategies in reduction. The occurrence of parallel flakes within the Laurel occupation may be a result of pressure flaking, and platforms being placed in line with ridges.

In order to further investigate the possibility of different strategies existing between the Archaic and Laurel lithic reduction sequences, a series of "type" and "response" attributes were studied as defined by Geier (1973). Using his approach of discovering which type responses are culturally significant a combination of 7 descriptive classes of flakes were established using platform preparation, platform character and dorsal flake scar orientation. This type of analysis can help us understand production in terms of a continuum, instead of stages.

It is assumed that prehistoric lithic craftsmen had a good idea of what their end product would look like. Breaking down the end products into reduction stages is not necessarily possible. There are so many different approaches or sequences of stages, that even though two artifacts look alike, very different techniques and sequences may be involved. By looking at the individual attributes and their variables (i.e. platform preparation - abraded platforms), and how they combine with other variables, one can get around the boundary definition problems involved in setting up a typology based on stages of reduction, and can instead illustrate the different manufacturing strategies involved in tool production.

Ninety-six out of the original 200 flakes were used in this part of the analysis. The seven descriptive classes of flake types are as follows:

1. Strengthened (platform preparation), Plain (platform character), Complex (Dorsal Flake Scar Orientation)
2. Abraded, Bevelled with sparse facetting, Complex
3. Abraded, Bevelled with cluttered facetting, Complex
4. Strengthened and Abraded, Bevelled with sparse facetting, Complex
5. Stengthened and Abraded, Bevelled with cluttered facetting, Complex
6. No preparation, Plain, Transverse
7. No preparation, Plain, Complex.

The discrete and continuous data that applies to each of the seven flake classes can be seen in Appendix B.

Two significant features about the Jessup craftsmen become apparent using Geier's approach:

1. The same variables within both the Archaic and Laurel areas have the highest frequencies, however, when they are combined into flake classes, different flake types predominate in different areas. For instance, types 2, 3 and 5 are predominate in Location 2, the Archaic. Types 4, 6 and 7 predominate in Location 1, the Laurel.
2. If we study the flakes regardless of location, one can see a general but distinct reduction strategy in the seven flake classes, particularly in regards to the thinning flakes. The two classes of flakes with the highest angle measurements have plain platforms that either have no preparation or are just strengthened. Significantly, these 2 flake classes have a combination of decortication and thinning flakes in their categories. The most acute angled flakes are associated with either abraded, or strengthened and abraded platforms with cluttered facetting. The two classes of flakes with these characteristics are entirely composed of thinning flakes. One can see from the seven flake classes that as the platform angles become more acute, the platforms become more facetted and more carefully prepared, either by abrading which appears to have been favoured by the Archaic craftsmen, or by strengthening and abrading. Flakes also tend to become shorter, thinner and narrower which attests to the increased control exercized by the craftsmen as manufacturing progresses.

The Jessup stemmed (and side notched) bifaces generally show more similarities than differences, both in terms of morphology and technology. The only one of the five that appears to be "odd man out" is the biface which has been called the "juvenile point"." It is not only the smallest, thickest, and most irregular in shape, but it has also been manufactured differently. The mistakes in manufacture appear to be a result of not matching raw material with technique.

The three stemmed bifaces, which are either complete or almost complete have convex blades, bi-convex cross-sections and narrow rounded shoulders. They also have a 3:1 width to thickness ratio, platform angles which range from 30° - 50°, prepared platforms along their edges, and generally shallow parallel thinning flake scars which travel 1/3 to 2/3 of the way across the blade surface. Their position within the site and their similarities, particularly in light of the way they were manufactured, suggest that they are all Laurel "points" with the possible exception of specimen #36, which may be Archaic. It is similar to a stemmed point found by Ridley in the basal stratum of the Abitibi Narrows site.

The non-stemmed bifaces clustered into four size categories: small, medium, large and very large. The complete bifaces within the Archaic area of the site tend to be larger and are less varied in terms of raw material. The broken non-stemmed bifaces within the Archaic area are generally thinner, have more acute angles, are lighter and have considerably less cortex.

A total of 27 unifaces were excavated from Jessup Substantial differences in raw material, in the number of working ed and in the location of retouch were discovered between the two occupa ons.

In general, the question remains as to whethe here was a substantial change in lithic technology between the Ar ic and the Laurel periods, other than the fact that there was a heavi reliance on nodular cherts to produce unifaces and that Laurel tool ended to be smaller in size. Percussion appears to have been the m r technique for reducing stone tools in both periods, however the a ysis of the Jessup debitage and tools suggest that pressure and ard hammer percussion were used more extensively in the Laurel than the Archaic period. The higher frequencies of unprepared platforms the Laurel occupation is either related to the use of hard hammer pe ssion or is indicative of more unifacial reduction being practised the Laurel occupation than bifacial.

7.6 Nature of the Jessup Site

Jessup was utilized as both a workshop and habitat site. The workshop nature of this site is readily apparent given th abundance of local raw material in the form of chipping detritus, the ces, unfinished tools, broken tools and cores. Jessup's main at ction would appear to be the local raw material readily available with approximately 1000 meters of the site (Pollock, 1980).

The presence of 3 hearths within a postulated lo tent structure also indicates that Jessup was used as a habitation site by Laurel peoples.

The structure may have been approximately 4 meters wide and 5 meters long. Within the structure, there were three major workshop areas, which are indicated by the copious quantities of flakes and broken tools.

In addition to the workshop activity areas, there are two areas within which unifaces cluster. One of these clusters is located just east of feature (Hearth) 1, and the other is to the west of feature (Hearth) 4. The uniface cluster near feature 1 (cluster 1) has a range of edge angle values between 40° and 65° with a mean of 51.43°. The edge angles of the unifaces near feature 4 (cluster 2), have a smaller range of values from 60° to 75°. They have a mean value of 66.43°. These clusters differ in several respects including proximity to the two hearths, raw material, and working edge angles.

The unifaces in cluster 2 are made from Hudson Bay Lowland chert and rhyolite, whereas there are only three in cluster 1 (the remainder are made of andesite/dacite). The differences in the range and means of the two uniface clusters, suggest that these areas were used for different activities. Following Wilmsen's study on the function of different edge angles, cluster 1, with its more acute angles, falls within his popular multi-purpose category of 46° to 55°. Generally this range of values appears to have been used to process relatively soft materials. Wilmsen suggests this category was used for "(1) skinning and hide scraping, (2) sinew and plant fiber shredding, (3) heavy cutting of wood, bone or horn, and (4) tool back blunting" (1970:70). Cluster 2, with its steeper edge angles and more siliceous raw materials, may have been used to process harder materials such as bone and wood, or used for heavy shredding (Wilmsen, 1970:71).

It is notable that in the Lake of the Woods area in northwestern Ontario, four Laurel sites: the Ballysadare, Rushing River, Fisk and Meek sites, contain what appears to be oval dwellings (Rajnovich, 1980:39-41). Rajnovich notes that these sites "are distinguished by a semi-oval line of rocks and interior hearths and pits: the 3 latter sites also have a line of post moulds associated with the rocks" (Rajnovich, 1980:41). The postulated structure at Ballysadare has been radiocarbon dated at 150 B.C. ± 165 (Rajnovich, 1980:37). At Heron Bay, Wright has suggested the presence of a roughly circular structure approximately 10 feet in diameter from the pattern of the post moulds (Wright, 1967:8).

Recent excavations carried out by James Chism, in the James Bay LG-2 area at Lac Washadimi, have unearthed the remains of at least four prehistoric (Woodland) long tent structures (Chism, 1978:25-29). Historically, Chism has noted that this type of structure has been documented for both the Naskapi and the Cree in Quebec.

> There are historic photographs of Naskapi living in long tents to the northeast (of Washadimi). Fred Georgekish includes long tents in his reports on Paint Hills Cree

> traditional structures from areas to the southwest of Washadimi (1977)...Pierre Gregoire collected considerable new data...such structures (were) being used in the Caniapscau Lake area due east of Washadimi. Edward Rogers also discusses their use by Mistassini people to the southeast, and Creeway (education) Project in Rupert House to the south has a model of one made by a local person (Chism, 1978:32).

Preston has noted the use of a 3-fire long tent by the Eastern Cree for purposes of feasting. This type of structure was used historically for exchange feasts when the Coasters and Inlanders joined together to exchange geese, caribou and grease (Preston, 1973:5, 1981:198).

There is no mention in the ethnographic studies done on the Abitibi Indians of the presence of 3-fire dwellings. Although 3-fire dwellings are not mentioned, rectangular lodges or 2-fire lodges have been described by MacPherson for the Abitibi Indians. He describes them as follows:

> This type of lodge had rectangular sides and a triangular roof, not unlike the typical log cabin. The ends consists of a pair of stout poles, crossed and lashed together at the top. When the ends were put into place, a ridge pole was set in and lashed firmly to the ends. Other poles were lashed to the ridge pole and bark

> covering laid on the poles. Doors were made at both ends. Generally the rectangular lodge covered two fire-places. In the lodge four families would dwell together; two families to each fire-place. Each family had a definite area in the lodge. These areas were bounded by imaginary lines and it was considered a distinct breach of good manners to step over one's boundary. So far as I could learn, these boundary lines did not have any religious or sacred significance. It is logical to suppose, however, that - when it was customary for four closely relatd families to live under the same roof in one fairly large, unpartitioned, space - these imaginary boundary lines, involving, as they did, the question of etiquette, would serve society as static guardians of peace, and as such, would have utilitarian value. Pieces of birch bark, sewed together, skins, or reed matting served for doors. Above each fire-place, holes were made in the roof so that the smoke could escape. The rectangular lodge was very rare (MacPherson, 1930 as quoted from Jenkins, 1939:26).

The use of rectangular or long tent structures has been well documented for the eastern subarctic ethnographically, although their use appears to have been rare and in some cases attributed to ceremonial purposes. The presence of a 3-fire lodge at Jessup extends the use of such structures into the Middle Woodland period. Using MacPherson's figure of two families per hearth, as many as 6 families may have inhabited this structure. It can only be speculated as to whether feasting or other ceremonial practices were carried out within the structure. The presence along the western "wall" of Hudson Bay Lowland chert unifaces, a large core tool of greywache from Larder Lake, and a basal fragment of a stemmed biface made from Lorraine quartzite suggests the possibility that Laurel peoples from different areas were coming together with local Laurel people to feast, trade, arrange marriages, procure raw material, to fish, hunt or any number of other reasons. The presence of basically the same motif on the Laurel ceramics (oblique or vertical over oblique), but with three different modes of application may be argued as a feature in favour of the above ideas.

7.7 Inhabitants of Jessup

Jessup was inhabited by Shield Archaic and Middle Woodland Laurel peoples. Northern Plano peoples may have reached the Lake Abitibi area, but they were not present at the Jessup site.

The suggestion that Laurentian Archaic peoples occupied the Abitibi area does not seem likely given the fact that boreal forests occupied the area since deglaciation, and the Laurentian Archaic subsistence was geared towards a woodland environment. The sporadic occurrence of ground and pecked tools at four of the Abitibi sites, a bevelled ground slate projectile point from the Abitibi Narrows site, the polished bit of a basalt celt at the Ghost River Garden site, the polished and ground basalt gouge from the Ghost River Island site, and a grooved maul from the Dam site, are likely a result of contact.

There is no evidence for the presence of Late Woodland Blackduck or Iroquoian peoples at Jessup. They are, however, well represented at other sites around the lake (see Table 1.3).

Pollock defined two phases within the Shield Archaic - the Abitibi Narrows and Mattawan phases. The former phase appears well represented at Jessup in light of the lanceolate bifaces, the large uniface scrapers and the "turtle-back" core tools. I hesitate however, to apply the phase name of Mattawan to any of the Jessup assemblage.

This thesis provides a different perspective in which to consider the question of a cultural continuum between the Archaic and Laurel in that both the lithic debitage and the tools were analyzed to see what differences if any, existed in the lithic strategies for the two groups. If the two groups' strategies were similar, then one could assume that cultural continuity existed. On the other hand, if obvious differences are evident in the strategies used by the different groups, then the problem becomes more complicated, and cultural continuity cannot be assumed. Great care has to be taken to account for any variation that may have been caused by the use of different raw materials by one of the groups.

Knight suggested the implementation of such an approach when considering Wright's contention that cultural continuity existed between the Shield Archaic and Laurel traditions.

> Suffice it to say that however strong Wright's arguments are, at the present time I do not believe the necessary quantitative data is available to effectively solve the problem one way or the other. Obviously, the continuum, if it exists, must be reflected in the lithic tools. Unfortunately, to date, not enough detailed studies of these artifacts for neither the Shield Archaic nor the Laurel have been published in order to effectively compare the possibility of such a continuum. I would suggest that lithic chipping debris offers a possible solution to this problem as technology may reflect a set of behaviour patterns more so than completed artifacts. Wilmsen (1968, 1970) has demonstrated the possibilities for this type of analysis (Knight, 1977:240).

The data from Jessup suggests that there were differences in strategy between the two groups. The major differences between the two groups include contrasts in technique (i.e. hard hammer percussion and pressure flaking were used more extensively by the Laurel, while the Archaic occupants relied more on soft hammer percussion), platform type and preparation (i.e. the Archaic peoples relied more on abraded and cluttered facetted platforms and the Laurel on plain or sparsely facetted platforms and strengthening), and raw material (the greater usage of Hudson Bay Lowland chert and rhyolite-quartzite in the Laurel occupation). Whether these differences are enough to warrant saying that there was no cultural continuity between the two groups is questionable. It is questionable because statistical analysis conducted in the form of chi-square and t-tests against the attributes listed in Table 5.2, indicates a high degree of similarity as presented in Chapter 5 and Appendix D.

One important attribute that did show significant difference was platform preparation. Further analysis was done on single value high frequency variables within this attribute. The results were presented in Table 5.3 and support the idea that hard hammer percussion was the favoured technique of the Laurel occupation, while soft hammer prevailed in the Archaic for thinning.

Because the statistical findings indicate more similarity than difference, I suggest that the differences that are present are more qualitative than absolute, and cultural continuity could very well exist between the two groups.

The Laurel culture has mainly been defined on the basis of its ceramics. At Jessup, only three vessels were excavated, and these have all been identified as Laurel ware. They all have an oblique motif as their central theme, although vessels 1 and 3 also have single rows of vertical impressions. The oblique motif on vessel 1 is bounded or "framed" (Marois, 1982) by vertical impressions. Vessel 3 is represented by very small lip and rim fragments. Keeping its size in mind, this rim's motif can be described as a vertical over oblique type of decoration. Three different types of decorative elements were used; babiche-wrapped stick, a dentate stamp and cord-wrapped stick. Only vessel 3 has been decorated on the lip. None of the vessels have bosses, punctates or interior rim decorations.

One feature of the Jessup ceramics which is somewhat puzzling is the use of organic material in the paste. No reference to this has been found in other Laurel reports. Perhaps this is a unique characteristic of the Abitibi Laurel.

Where exactly does the Jessup Laurel ware fit in the internal temporal framework of the Laurel culture? Is it early, middle, or late?

The problem with fitting Jessup into the developmental schemes of Wright (1967), Stoltman (1973) and Lugenbeal (1976), is that the collections that they studied are quite distant from the Lake Abitibi area. At the present time, we do not have a very extensive knowledge of the time slope involved in the diffusion or development of traits from one area to another i.e. west to east, south to north and vice versa. In addition, the Jessup ceramic sample is very small.

An estimate of middle to late Laurel (A.D. 300 - A.D. 600) is tentatively offered given the presence of cord-wrapped stick decoration and the absence of punctates which are generally thought of as middle to late in the Laurel sequence in Manitoba and Minnesota.

The presence of cord-wrapped stick decoration on Laurel pots has been documented by Lugenbeal (1976) Rajnovich (1979), Wiersum and Tisdale (1977) and Tisdale and Jamieson (1982), for sites in the Rainy

River region (Mound Point), southeastern Manitoba (Lockport) and northern Manitoba (UNR-23 Notigi Lake and UNR-26 Wapisu Lake). Lugenbeal considers it a late Laurel type in northern Minnesota and southeastern Manitoba (1976:658). Tisdale (1982) obtained a date of approximately A.D. 305 (1645 ± 195 B.P.) for the Laurel occupation at Wapisu which contained dentate, pseudo-scallop shell and corded wares. There is some question, however, of what is associated with this date as there were no ceramics and hardly any lithics in direct association with the area that was dated. As Tisdale notes, "no directly diagnostic associations can be drawn for this sample -- other than a somewhat tenuous connection with Laurel pottery in adjacent units located both above and below the level from which the date was recovered" (1982:55).

Assigning a date to the Jessup Laurel occupation based on its ceramics is difficult, as was discussed above. First and foremost, there are few radiocarbon dates for northeastern Ontario Laurel sites. Brizinski obtained a data of A.D. 560 ± 40 for the Laurel occupation at Frank Bay (1980:224). This date was run on charcoal from a hearth containing dentate stamped sherds which produced a "lightly punctated motif" (Brizinski, 1980:149, 228). Knight's radiocarbon date from the Laurel component at the Montreal River site is much earlier at 180 ± 280 B.C.. Within the Abitibi area, Marois has one C-14 from the Bérubé site (DdGt-5) on Riviere Duparquet. The date of 350 ± 90 A.D. is problematic because the only ceramics present have been identified as resembling the northern branch of the Huron-Petun (Marois, 1974:237). The only two rims from Marois's collections which appear to be Laurel come from DdGt-8, the Micheline site. Interestingly, Marois has described them as cord impressed ("d'impressions cordées"). (Marois, 1974 Plate XVIII:1,m). No date has been recorded for the site.

At Pearl Beach, on Larder Lake, Noble has obtained a date of 600 A.D. ± 90 for the Laurel component on the site (Noble, 1980:25).

The few dates that we have for the northeastern Laurel, suggest a time depth that could be equivalent to that of Manitoba and Minnesota, between 200 B.C. and A.D. 800. it is worth noting that the earliest date that Brizinski obtained for the Blackduck component at Frank Bay is A.D. 955 ± 50 (1980:244).

In 1976, Pollock suggested the existence of a "regional variation" or "phase" of the Laurel Tradition (Pollock, 1976:184). He saw the "Eastern Laurel phase" as extending from Manitoulin Island north to Lake Abitibi. Included in this phase are such sites as Sheguiandah, Killarney, Frank Bay, Buck Lake No. 2, Montgomery Lake 2, the Montreal River site, Pearl Beach and De Troyes Island (Pollock, 1976:184). To these sites, we can now add Jessup.

We still need many more dates to put the Eastern Laurel phase on a firm chronological footing. Also needed is a more open ended classification scheme, in terms of the type of decorative element used in the Eastern Laurel, particularly in light of recent research in northern Manitoba. For instance, in addition to the "dominant Eastern Laurel motifs" of pseudo-scallop shell, dentate stamp and dragged stamp (Pollock, 1976:185), we can add cord-wrapped stick and babiche-wrapped stick, as demonstrated in the Jessup Laurel ceramic sample.

7.8 Jessup Compared to Other Lake Abitibi and Northeastern Ontario Sites

While the main focus of this thesis is technological in nature, some speculation on how the Jessup material compares to other Shield Archaic and Laurel materials in the Lake Abitibi area and in northeastern Ontario can be tentatively offered using the attributes of shape, size and in some cases, raw material.

Shield Archaic material is present on at least five Abitibi sites besides Jessup: Abitibi Narrows, Ghost River, Ghost River Island, Louis and Iroquoian Point (Wright, 1972). Archaic materials may also be present on Marois' Bérubé and Morin sites.

Laurel material is exhibited at De Troyes Island, Ghost River Garden, Ghost River Is., Abitibi River A, Micheline and perhaps Bérubé.

There is considerable similarity between the materials excavated from the lowest level of the Abitibi Narrows site and the materials from Jessup. Both Ridley (1966) and Wright (1972) have placed the Abitibi Narrows site as an early expression of Shield Archaic. The similarities between the sites include the following. The unifaces are retouched distally, or distally and laterally as are the Archaic unifaces at Jessup. Also, the majority have triangular cross-sections and appear to be manufactured from bifaces thinning flakes or prepared cores. Ridley called these "Levallois" flakes (Ridley, 1966:15). The size of the

Abitibi Narrows unifaces at the Abitibi Narrows site and at Jessup within the Archaic component, are also roughly equivalent. The unifaces that have been illustrated have mean lengths of 49 mm and 43 mm respectively. Ridley gives no measurements of weight, so this attribute could not be compared.

Seven of the nine unifacial scrapers that Ridley illustrates in his 1966 publication (1966:figures 4e,f; 5d,e,f,j,k) were manufactured from patinated chert believed to be from local sources. One of the unifaces has not been identified (Ridley, 1966:figure 5i), and the final uniface is made from smoky quartz (Ridley, 1966:figure 5g). The use of predominantly local sources for the production of unifaces would appear to be characteristic of the Archaic period of Lake Abitibi, as is the retouch of both the distal and lateral edges, and the manufacture of large unifaces.

There is also a general similarity in the shape of the bifaces and "uniface knives" in the lowest stratum at the Abitibi Narrows site (i.e. leaf-shaped and lanceolate), with those at Jessup within the Archaic portion of the site. In terms of size, however, the Jessup bifaces are generally longer. The mean length of those illustrated from the Abitibi Narrows site is 73.78 mm. The Jessup Archaic bifaces have an average length of 104.13 mm. The ratios for maximum length/maximum width, are on the other hand almost identical (Abitibi Narrows = 2.4; Jessup = 2.5). Bifaces at both sites are flake and core derived. Those at the Abitibi Narrows site are all manufactured from local patinated chert. The Jessup bifaces are also locally derived. Hinging, and the presence of thick cross-sections and "pigs" are typical of bifaces at both sites.

One of the points illustrated by Ridley from the lowest stratum of the Abitibi Narrows site (1966:figure 6e), is almost identical in size and shape to one of the stemmed points from Jessup (#36). The only difference between the two artifacts is that the Jessup point is made of andesite tuff and the Abitibi Narrows point is manufactured from milky quartz.

The Ghost River site has been classified by both Ridley (1966) and Wright (1972) as being an intermediate stage of Archaic. Only about one-half of the artifacts recovered from the Ghost River site are illustrated, which makes comparison difficult. The artifacts that are illustrated suggest in my opinion that a Laurel component may also be present at this site. This is largely proposed on the basis of the size and type of raw materials used in the manufacture of the unifacial scrapers. From Ridley's description, seven of the eight scrapers illustrated appear to have been produced from a material which appears to be Hudson Bay Lowland chert. In addition, they have an average length of 29.7 mm, which is almost identical to the mean lengths of the Jessup Laurel scrapers (30.3 mm). Another similarity is that one of the Ghost River scrapers (Ridley, 1958:figure 3a) has at least one potlid fracture popped out of the dorsal face.

The few bifaces illustrated are similar in size and shape to those from the Abitibi Narrows site and from Jessup. The biface illustrated in figure 2,m from Ridley's 1958 report, is identical in shape, size and raw material to that of biface #53 from Jessup. Three of the four side-notched bifaces are smaller than the quartz stemmed biface excavated from Abitibi Narrows. They average 51 mm in length, have convex or irregular-convex bases and slightly convex blades. The fourth and largest point is approximately 64 mm long, has a convex base and irregularly notched side.

The Ghost River Garden site contains a Laurel component as is evident from the dentate stamped rim sherd illustrated in Ridley's 1966 publication (Ridley, 1966:figure 24d). This rimsherd was found in the lowest (4th) level of the site in conjunction with six biface and 1 uniface "knives". One of these bifaces (figure 24g) is almost identical in size, shape and raw material to Jessup biface #12/26 found beside the boundaries of Hearth 1, in the same quadrants and level as the pottery and bone. The Ghost River Garden specimen is approximately 131.0 mm long and 51.0 mm wide, with a length to width ratio of 2.6. The Jessup biface is 127 mm long and 47 mm wide, with a length to width ratio of 2.7. Both tools were broken and both weathered differentially in terms of colour, the base remaining the original green and the tip weathering to grey. The association in both sites of this large leaf shaped biface with Laurel ware suggests that this is a Laurel implement, and that such leaf-shaped bifaces are present throughout the chronological sequence at Lake Abitibi from the early Archaic (Abitibi Narrows phase) to the Middle Woodland (Laurel) period.

The De Troyes Island site has been designated as Laurel by Wright (1967) because of the presence of dentate stamped pottery on a coil-constructed vessel. Ridley called the material from this site "a contemporary of the Point Peninsula Woodland stratum" (Ridley, 1966:24). The small number of flakes and three biface fragments of dark grey chert are believed to be associated with the Laurel ware. Unfortunately, the broken nature of the bifaces does not allow comparison with the Jessup material.

Abitibi River Site A was a very small site situated almost at the water's level. "The cultural material was enclosed in a soggy stratum four inches thick, extending some two square yards under protective networks of roots" (Ridley, 1966:32). The decoration on the Laurel ware present at this site (Ridley, 1966:figure 17, e,f, (h?)), includes pseudo-scallop shell and dentate stamp ware. The only similarity to the Jessup ceramics is the use of the horizontal motif (figure 17,e), but in this case produced by pseudo-scallop shell impressions.

The Ghost River Island site has been designated as having late Archaic (Mattawan?), Middle Woodland, and late Woodland components (Ridley, 1958). The majority of the artifacts from this site were surface collected. Only a small portion of the site had not been eroded away by the elevated waters of the lake, a problem which affects many Abitibi sites.

Among the artifacts within the surface collection which resemble the Jessup artifacts are the leaf-shaped bifaces that range in length from 65 mm to 90 mm and have thick cross-sections, a stemmed point that is approximately 58 mm long and only weakly stemmed on one side, and a dark blue slate tool which Ridley refers to as a "rectanguloid plano-convex knife" (Ridley, 1958:figure 5,b). This tool is 106 mm. in length and 40 mm. in width. The shape and flaking characteristics of this artifact favour the broken pecked stone tool (#188) that was found within the Laurel section of the site.

Two fragments of Laurel pseudo-scallop ware (Ridley, 1958:figure 5,m,i) were recovered from the surface. The only similarity to Jessup is the use of the horizontal motif in figure 5,m.

The only artifacts within the excavation resembling Jessup are the three unifacial scrapers found in levels 3 and 4 (Ridley, 1958: figure 6,r,t,w). They average 32.3 mm in length. Level 3 contained the conical base of a Middle Woodland vessel.

The scrapers fit more readily into the Laurel period on the basis of shape and size.

The <u>Louis</u> site (Lee, 1965) is located at the mouth of the Riviere Duparquet on the eastern side of Lake Abitibi. Zone 2 of the site has been designated at Shield Archaic (Wright, 1972). Very little similarity was noted between the Louis and Jessup sites. The one exception is a broken but repaired elongated biface with a rounded tip (Lee, 1965:figure 2, #30). It is 129 mm long, 34 mm wide and 8 mm thick (Lee, 1965:24). This biface resembles the tip found at Jessup in terms of its shape (rounded tip), width (31 mm) and thickness (9 mm).

Zone 2 of the Iroquoian Point site has also been called Archaic or what Lee referred to as preceramic (Lee, 1965:42). This is a difficult site to compare because there are few tools within zone 2 and many of them are broken and unfinished with thick cross-sections. No similarities were seen between the Jessup and Iroquoian Point sites except for the presence of prepared striking platforms on several flakes.

The five sites excavated by Marois at the mouth of the Riviere Duparquet, which flows into Lake Abitibi, have not been identified in terms of cultural affiliation except for the upper strata which relate to the Late Woodland and Middle Historic periods. A study of the artifacts that have been described in the text and photographed also suggest, in my opinion, the presence of Archaic and Laurel components.

For example, at the Berubé site, the largest elongated biface (Marois, 1974:Plate II, figure a) is very similar in shape and size (72 mm long, 26 mm wide) to several bifaces and "uniface knives" from the lowest stratum of the Abitibi Narrows site (Ridley, 1966:figure 5b;6f,h).

The bifaces at Jessup are generally much larger. The only artifact to come close in terms of shape, size and edge angles is biface #180 from the Archaic section of Jessup. Several biface fragments from Bérubé are also similar to those from Jessup within the Archaic area of the site. A biface midsection (Marois, 1974:Plate IX, figure e), is identical in size, shape and flaking characteristics to a long, narrow and finely worked tip found in the Archaic section of Jessup (artifact

#103). Also similar to the Jessup Archaic biface fragments are two bifacially worked tips (Marois, 1974:Plate, IX, figure c,f).

A Laurel occupation of the site is suggested on the basis of the radiocarbon date obtained from Bérubé at 350 ± 90 A.D., the presence of 13 small uniface scrapers (Marois, 1974:Plate III, figure b; Plate VI, figures a-l) and a side-notched point (Marois, 1974:Plate I,h). The radiocarbon date is, at present the only C-14 data available for the whole of the Lake Abitibi area. It was run on charcoal from the bottom of a depression just above the lowest soil level (Marois, 1974:101).

The 13 scrapers recovered from Bérubé were, with one exception all manufactured from chert. The one exception was produced from quartz (Marois, 1974:229). Taken as a group, these scrapers have an average length of 28.77 mm which is just less than the 30.3 mm average length for the Jessup Laurel scrapers. The majority of the scrapers (6/13) have been retouched distally. The remainder have been retouched distally and laterally (4/13), and laterally (2/13) (Marois, 1974:312).

One of the side-notched points recovered from Bérubé (Marois, 1974: Plate I, figure h), resembles the base of a side-notched point recovered from the De Troyes Island site which was found in direct association with Laurel ware (Ridley, 1966:figure 12,c).

Marois has suggested that the Morin site is the oldest of the five that he excavated at the mouth of Riviere Duparquet, because of the complete absence of pottery on the site. It may in fact be Archaic. Of the seven artifacts recovered from Morin, the 2 bifaces (Marois, 1974: Plate IV, figure d; Plate XVI, figure c) resemble the Jessup Archaic bifaces. The presence of so few artifacts make any further comparison or interpretations difficult.

The Micheline site has been designated as having a Laurel component on the basis of the presence of Laurel ware (Marois, 1974:Plate XVIII, figures l,m). Marois has described the decoration on these sherds as cord-impressed. "Les décorations consistent en impressions horizontales de corde, produites par l'application latérale d'un outil dont un fine corde a été enroulée autour des bordes minces" (Marois, 1974:257). Noble, on the other hand, has called the decoration, pseudo-scallop shell (Noble, 1979:56). Regardless of the nomenclature, these sherds appear to be typical of Laurel ware in design.

It is also interesting to note that the Micheline site has the third highest sample of scrapers. It is surpassed by Bérubé by 7 scrapers, and by Réal by 1 scraper (Marois, 1974:335). This, and the small size of the scrapers, and the presence of retouch distally on three of the six scrapers adds credence to the existence of Laurel at this site.

Similarities between Jessup and other sites within northeastern Ontario can also be noted. For instance, just south of Lake Abitibi at Larder Lake, Noble's excavations at Pearl Beach have unearthed the remains of a considerable Laurel occupation. Included in the Laurel artifacts is a cache of 25 finished end scrapers "found alongside 7 scraper blanks" (Noble, 1979:55). The 25 finished end scrapers are small and range in length from approximately 12 mm to 40 mm. Other scrapers are shown in Noble's 1979 report (Plates 4 and 5), but it is not clear whether these are considered Laurel, with the exception of scraper B12 (Plate 4, figure 12). The Laurel scrapers at Pearl Beach are considered comparable to the Jessup Laurel scrapers in terms of retouch (at the distal end) and size.

Pearl Beach produced pseudo-scallop and dentate stamp Laurel ceramics (Pollock, 1976; Noble, 1979). The similarity to Jessup lies not in the decorative design but rather in the vertical/oblique over horizontal motif demonstrated in Plate 2, figures 1, 2 and 3, in Noble's 1979 report, and the total absence of punctates (Noble, 1980:24) on both Laurel sites.

An additional similarity between the two sites, is the reliance on beaver for food (Noble, 1980:25) and perhaps furs.

A radiocarbon date of 600 A.D. ± 90 (I-10, 947) was obtained from Pearl Beach, dating the Laurel occupation (Noble, 1980:25).

Pollock (1976) excavated in the Larder Lake area at Smoothwater Lake, Duncan Lake and Pearl Beach.

Some similarities can be noted between the "preform" bifaces found within Pearl Beach area C, which have been identified as belonging to the Abitibi Narrows phase, and those at Jessup. For instance, the "uni-pointed bifacial tool" that is illustrated in Figure 63:5, is similar in length, width and shape to Jessup biface 35, found within the Archaic section of the site. Pollock includes this artifact in the Abitibi Narrows phase because of its similarity to the bifaces in the Abitibi Narrows site. No dates unfortunately were obtained for the Shield Archaic occupation at this site.

Similarities were not noted between the Jessup and Smoothwater site. The artifacts that Pollock has designated as Mattawan at this site (Pollock, 1976:Figure 38) are generally smaller than the Archaic artifacts at Jessup. The one side-notched point that is included in the Mattawan phase from Smoothwater Lake, is similar in shape and hafting element to the broken Laurel side-notched point found in Hearth 4. The Smoothwater specimen, however, is considerably smaller. It also resembles the small side-notched point Ridley found in the third level of the Ghost River Island site. This level contained the conical base of a Middle Woodland vessel (Ridley, 1958:figure 6,s,p).

At Lake Nipissing, Brizinski excavated early and late Archaic occupations at the Campbell Bay and Frank Bay sites (Brizinski, 1980), and a Laurel occupation at Frank Bay.

One of the bifaces from Campbell Bay (Plate 5, figure 9), is particularly similar in shape and size to bifaces from Jessup. The Campbell Bay biface is 85 mm long, 36 mm wide, 8 mm thick, and weighs 30.6 gm (Brizinski, 1980:66). It compares favourably to Jessup bifaces 53 and 181. The former biface was found less than half a meter north of the Archaic/Laurel "boundary" line, just within the Laurel occupation.

Biface 181 was excavated from within the Archaic area of the site. The Campbell Bay biface has been dated using charcoal in a nearby feature, to 3255 ± 85 B.C. (S-1682) (Brizinski, 1980:213). Brizinski sees similarities in technology between this biface and the Abitibi Narrows phase defined by Pollock (Brizinski, 1980:213).

The Laurel ware at Frank Bay is represented by "a dentate stamp producing either a pseudo-scallop shell or lightly punctated design" (Brizinski, 1980:219). The Frank Bay dentate stamp vessel (Brizinski, 1980: Plate 3, figure 2) is similar to Jessup's dentate stamp vessel in that both use a horizontal motif.

The Laurel ware at Frank Bay has been dated at 560 A.D. ± 40 (S-1684) (Brizinski, 1980:224).

A comparison of the Archaic and Laurel materials excavated by Ridley, Lee, Marois, Noble, Pollock, and Brizinski, using the attributes of shape and size, places the Jessup Archaic occupation tentatively between ca. 3,000 B.C. and 1,000 B.C. and the Laurel occupation between ca. A.D. 300 and A.D. 600.

7.8 Summary

This thesis began with the investigation of ten separate questions as listed in Chapter One. The debitage and tools from Jessup were examined and as the analysis proceeded the ten separate questions were synthesized into two primary objectives:

1. To identify the source of the distinctive Abitibi chert first described by Ridley and Lee and found in abundance at Jessup,

and 2. To detail the lithic manufacturing strategies of the Archaic and Laurel peoples who inhabited this workshop/habitation site.

The first of the two objectives was successfully met, and work has been ongoing in the outcrop/quarry areas by Larry Jensen and John Pollock since 1980.

The second major objective has been achieved with mixed results. Differences in strategy were noted between the Archaic and Laurel Jessup components. Statistical analysis of the debitage attributes, however, shows more similarity than difference. Are the differences meaningful in terms of defining these groups in time and space? Are the overlaps strong enough to assume that there is cultural continuity between the Archaic and Laurel? I have suggested that the differences are more qualitative than absolute in light of the same techniques being used, and that continuity could very well exist between the two groups, with the proviso that limitations related to the raw material used, might be contributing to this result.

Clearly further research is needed, along these lines.

In conclusion, the Jessup site was utilized as a lithic workshop and habitation site by Archaic and Laurel peoples over a period of approximately 3,000 years. The major attraction to this site was the availability of raw material from nearby sources, as shown by the abundance of local raw material in the form of chipping detritus, unfinished tools, broken tools and cores.

Although the Late Woodland and Contact periods are not represented at this site, it is present at other sites on the lake. This shows that Lake Abitibi has been a focal area for prehistoric peoples for at least the last 5,000 years.

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PLATE I

AERIAL VIEW OF JESSUP

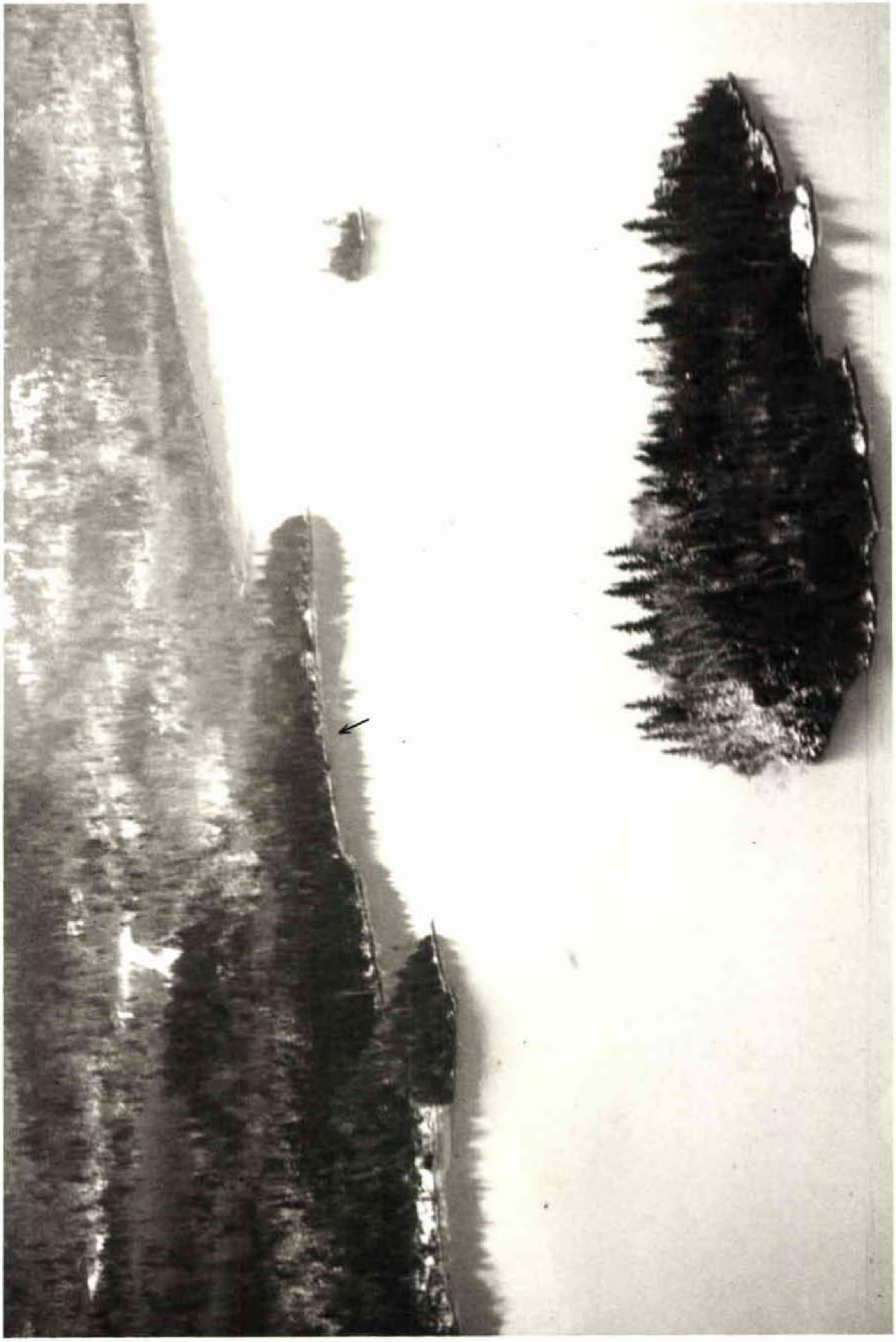

PLATE II

JESSUP UNIFACIAL FLAKE TOOLS

1.	DdGw-2:2	Laurel endscraper
2.	DdGw-2:4	Laurel enscraper
3.	DdGw-2:7	Laurel endscraper
4.	DdGw-2:8	Laurel endscraper
5.	DdGw-2:9	Laurel sidescraper
6.	DdGw-2:10	Laurel endscraper
7.	DdGw-2:11	Laurel endscraper
8.	DdGw-2:13	Laurel endscraper
9.	DdGw-2:29	Laurel endscraper
10.	DdGw-2:51	Laurel endscraper
11.	DdGw-2:72	Laurel endscraper
12.	DdGw-2:73	Laurel endscraper
13.	DdGw-2:74	Laurel endscraper
14.	DdGw-2:75	Laurel endscraper
15.	DdGw-2:77	Laurel endscraper
16.	DdGw-2:78	Laurel endscraper
17.	DdGw-2:79	Laurel endscraper
18.	DdGw-2:182	Laurel endscraper
19.	DdGw-2:82	Archaic side and end scraper
20.	DdGw-2:87	Archaic double side scraper
21.	DdGw-2:98	Archaic double side and end scraper
22.	DdGw-2:100	Archaic (?) endscraper
23.	DdGw-2:106	Archaic endscraper
24.	DdGw-2:109	Archaic double side and end scraper
25.	DdGw-2:119	Archaic double side scraper
26.	DdGw-2:120	Archaic endscraper
27.	DdGw-2:183	Archaic end and side scraper

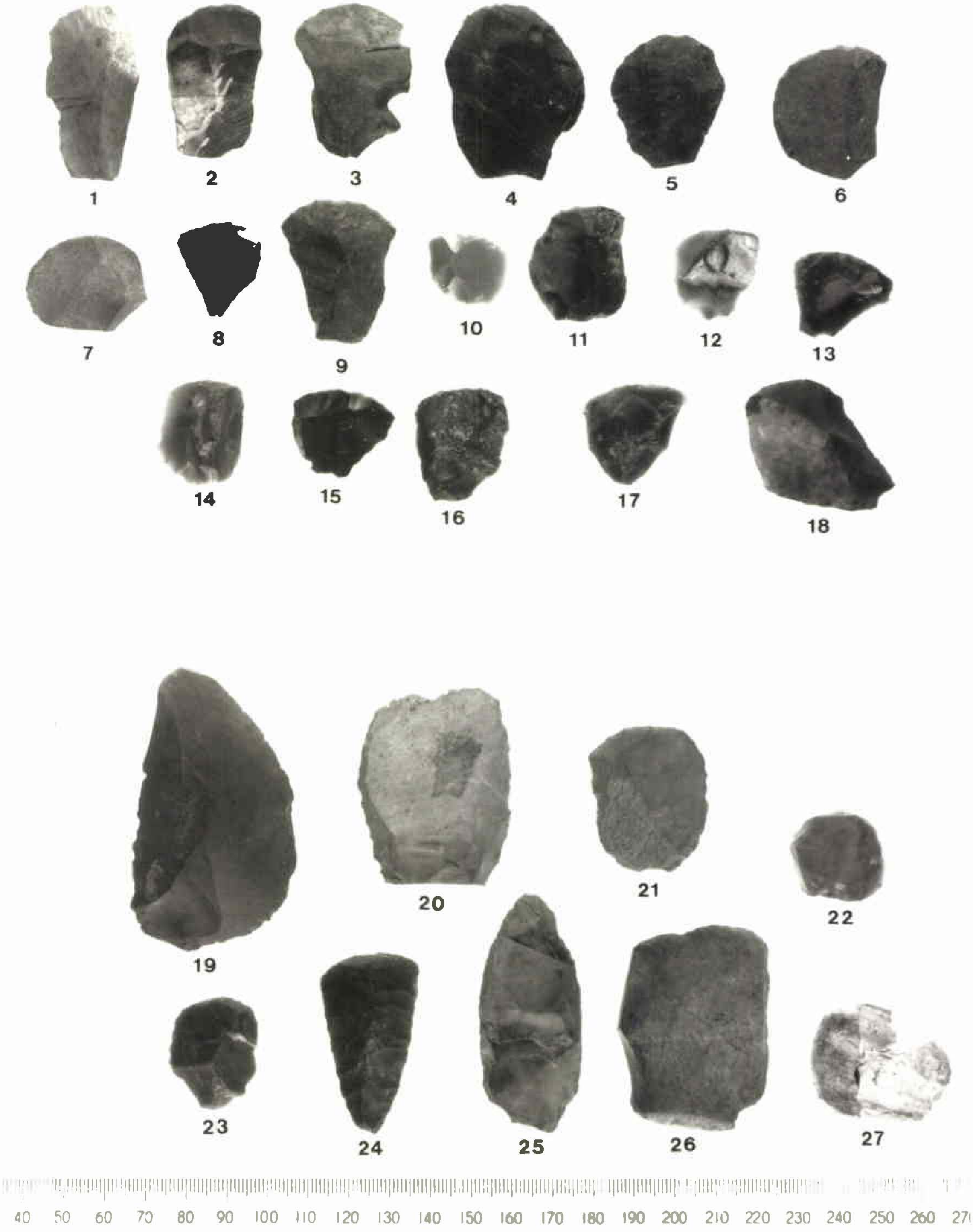
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PLATE III

JESSUP STEMMED BIFACES AND VERY LARGE BIFACES

1. DdGw-2:28 Stemmed/Side-notched Biface - Laurel
2. DdGw-2:36 Stemmed Biface
3. DdGw-2:68 Single Side-notched Biface
4. DdGw-2:69 Stemmed Biface (Lorraine Quartzite?)
5. DdGw-2:70 Stemmed Biface - Juvenile Point
6. DdGw-2:86 Very Large Non-Stemmed Biface
7. DdGw-2:62 Very Large Non-Stemmed Biface (Hand-axe, Wedge?)
8. DdGw-2:101 Very Large Non-Stemmed Biface (Turtle-back Biface/Core?)

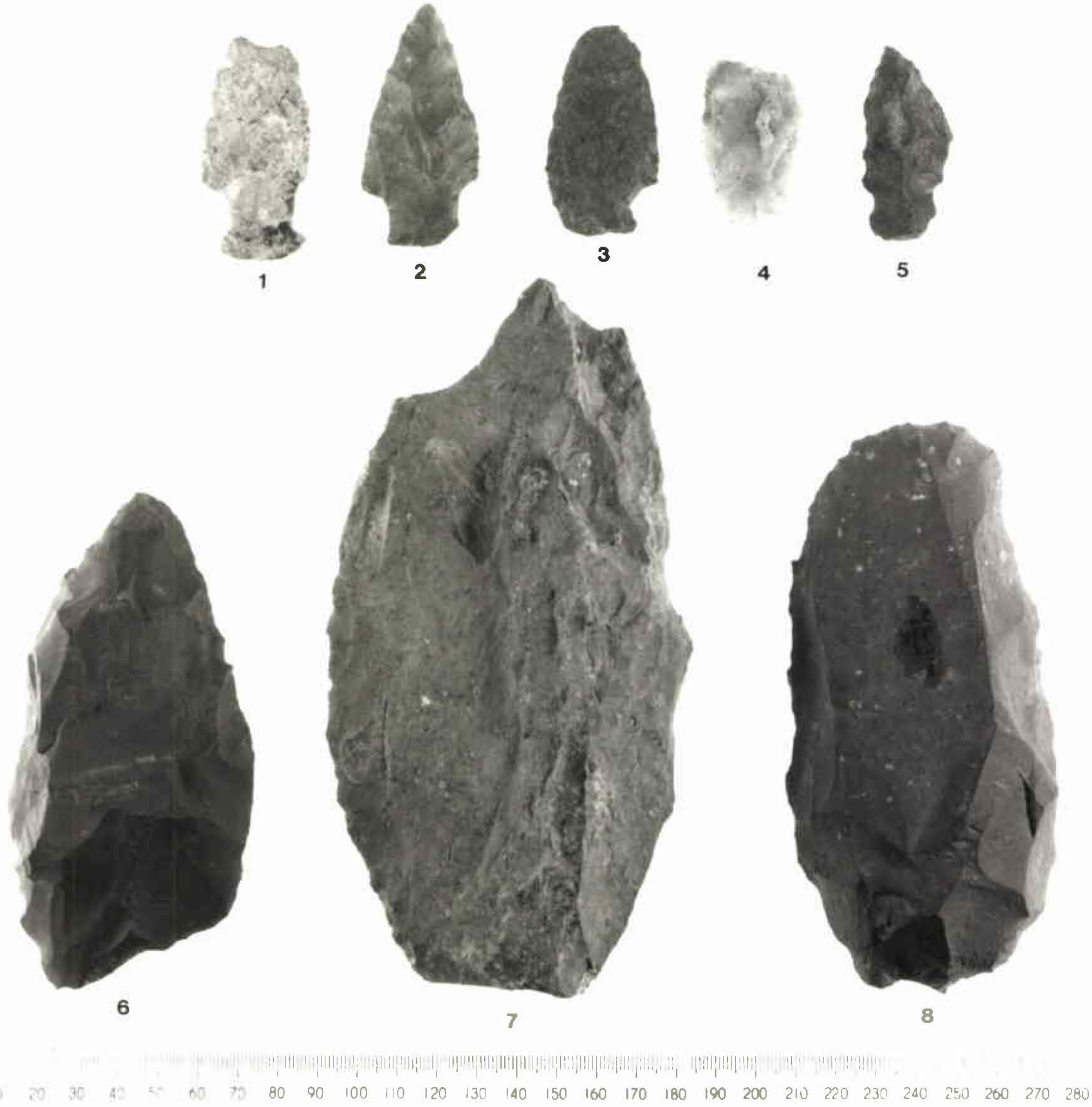
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PLATE IV

JESSUP SMALL, MEDIUM AND LARGE NON-STEMMED BIFACES

1.	DdGw-2:18	Small Non-Stemmed Biface
2.	DdGw-2:38/42	"
3.	DdGw-2:39	"
4.	DdGw-2:25	Medium Non-Stemmed Biface
5.	DdGw-2:46	"
6.	DdGw-2:53	"
7.	DdGw-2:64	"
8.	DdGw-2:84	"
9.	DdGw-2:180	"
10.	DdGw-2:181	"
11.	DdGw-2:221	"
12.	DdGw-2:1/6	"
13.	DdGw-2:34	Large Non-Stemmed Biface
14.	DdGw-2:35	"
15.	DdGw-2:12/26	"
16.	DdGw-2:37/149	"
17.	DdGw-2:94	"
18.	DdGw-2:27	"

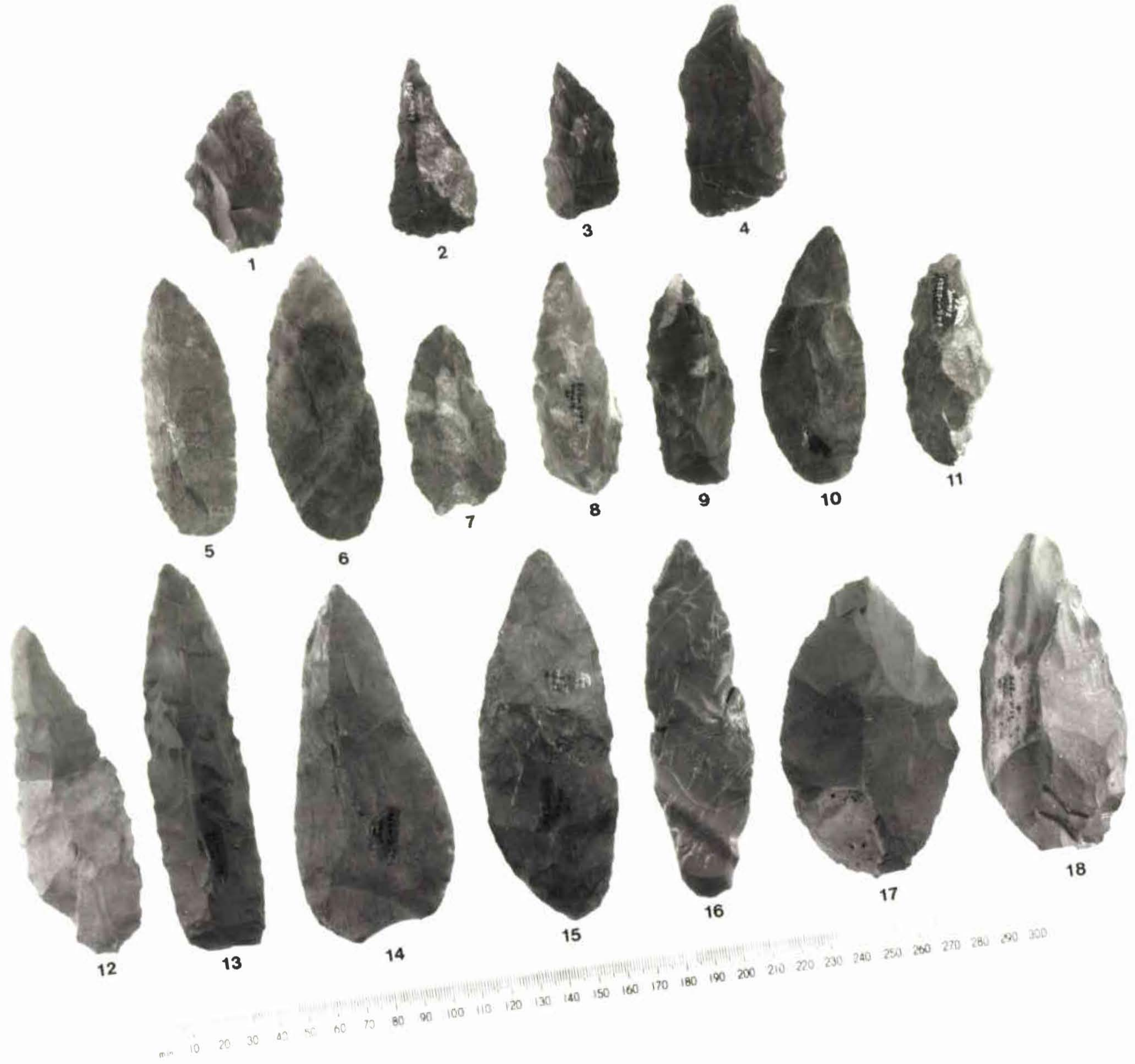
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PLATE V

JESSUP BIFACIAL TIPS, MIDSECTIONS AND BASES

1.	DdGw-2:3	Bifacial Tip	
2.	DdGw-2:17	"	Archaic
3.	DdGw-2:19/36	"	
4.	DdGw-2:21	"	
5.	DdGw-2:22	"	
6.	DdGw-2:23	"	
7.	DdGw-2:30	"	
8.	DdGw-2:44	"	
9.	DdGw-2:88	"	Archaic
10.	DdGw-2:65	"	
11.	DdGw-2:103	"	Archaic
12.	DdGw-2:107	"	Archaic
13.	DdGw-2:24	Bifacial Base	
14.	DdGw-2:115	Bifacial Tip	Archaic
15.	DdGw-2:83	Bifacial Base	Archaic
16.	DdGw-2:102	"	Archaic
17.	DdGw-2:95	Bifacial Tip	Archaic
18.	DdGw-2:108	Bifacial Base	Archaic
19.	DdGw-2:126/201	Bifacial Tip	
20.	DdGw-2:128	"	
21.	DdGw-2:63	Bifacial Base	
22.	DdGw-2:134	"	
23.	DdGw-2:50	"	
24.	DdGw-2:114	"	Archaic
25.	DdGw-2:43	Bifacial Midsection	
26.	DdGw-2:138	"	
27.	DdGw-2:66	"	
28.	DdGw-2:135	"	
29.	DdGw-2:41	Bifacial Base	

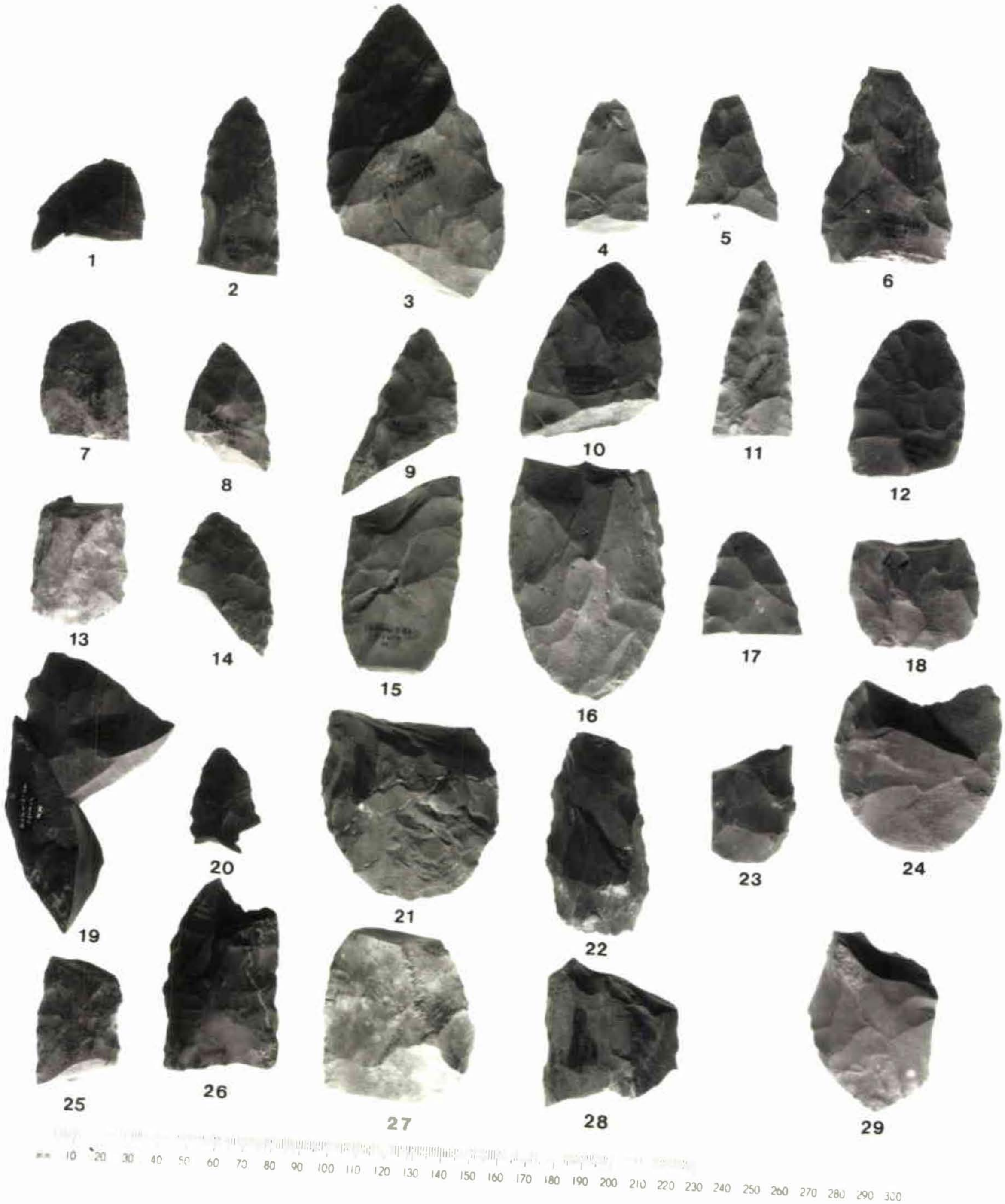
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PLATE VI

JESSUP UTILIZED FLAKE TOOLS AND PECKED STONE

1.	DdGw-2:15	Utilized Flake
2.	DdGw-2:16	"
3.	DdGw-2:49	"
4.	DdGw-2:57	"
5.	DdGw-2:127	"
6.	DdGw-2:214	"
7.	DdGw-2:219	"
8.	DdGw-2:188	Pecked Stone

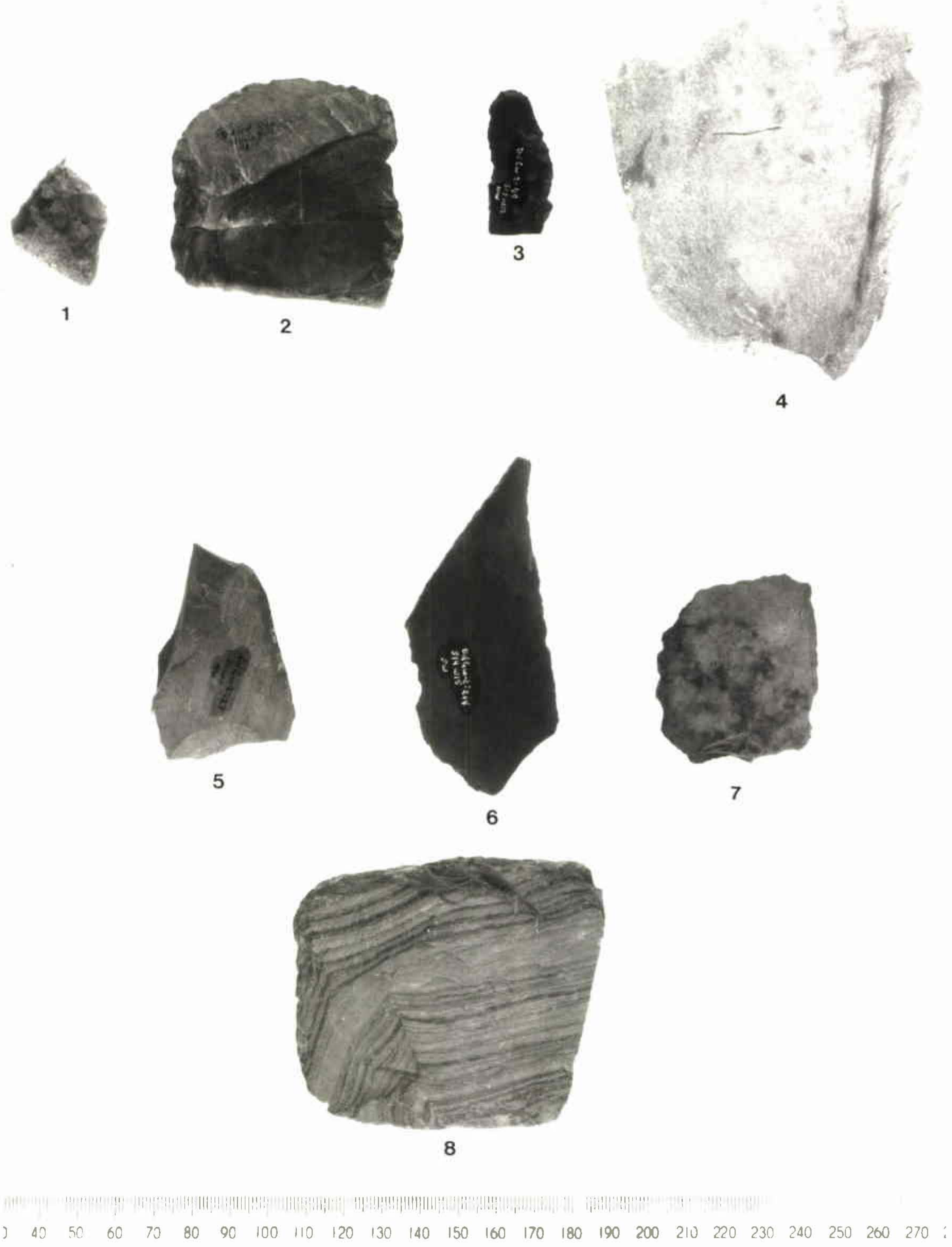
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PLATE VII

JESSUP HAMMERSTONES AND ABRADERS

1.	DdGw-2:105	Hammerstone/Abrader?
2.	DdGw-2:190	Hammerstone/Abrader?
3.	DdGw-2:32	Hammerstone
4.	DdGw-2:54	Abrader?
5.	DdGw-2:189	Abrader?
6.	DdGw-2:89	Hammerstone/Abrader
7.	DdGw-2:210	Abrader
8.	DdGw-2:85	Hammerstone

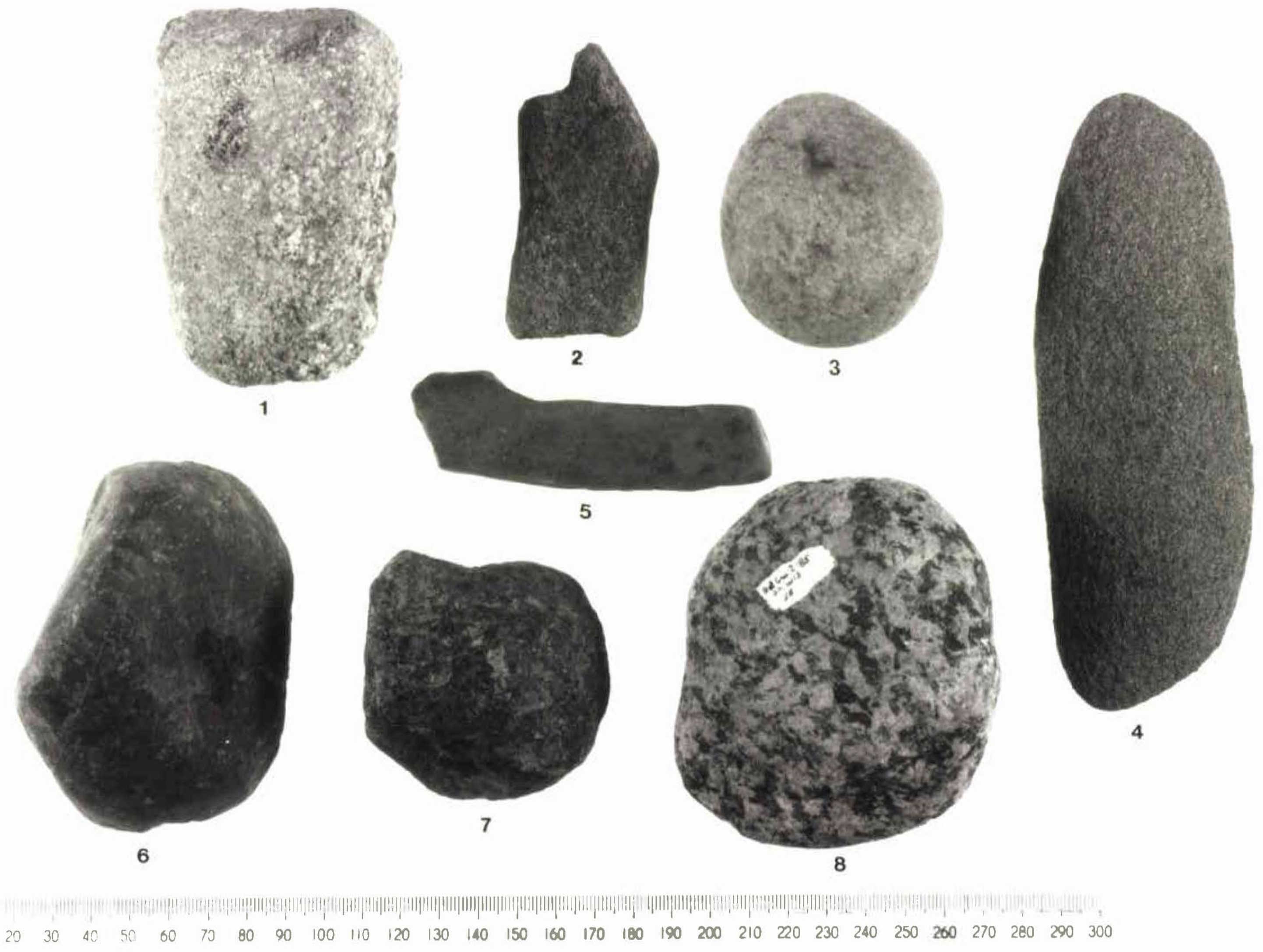
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PLATE VIII

JESSUP CERAMICS

1. - 5. Vessel 1 (Babiche-wrapped Stick)

6. Plasticene Impression of Rim Sherd From Vessel 3 (Cord-wrapped Stick)

7. Vessel 3 Rim Sherd (Cord-wrapped Stick)

8. Vessel 2 rim Sherd (Dentate Stamp)


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Appendix A

Jessup Soil Profile

Soil Type: Brunisolic Gray Luvisol

Date: October 26, 1979

Location: north wall unit S10W11, DdGw-2, Jessup Site, Lake Abitibi, District of Cochrane, Ontario.

Vegetation: cedar and paper birch forest.

PM: Ojibwa-Barlow varved silts and clays

Climate: 80-85 cm ppt.; 2°C mean daily temperature; 123 frost free days; 2.4-2.8 M snow.

Classification: fine textured loam over silty clay.

Land Form: lacustrine deposits over Precambrian rock types, c. 270 M elevation.

Slope and Aspect: 0-6%, all aspects.

Drainage: moderately well drained.

int: moderately rapid in upper solum.

ext: slow.

Notes: this subgroup represents early stages of podzolic development. No dry consistence or colour descriptions taken in the field. Lower H boundary is equivalent to N_1 field designation. Ah is equivalent to N_2 field designation, and AB to N_3 field designation.

soil horizon	description
L	7.0 - 1.5 cm -- fresh fallen litter. mostly leaves, twigs and needles.
F	1.5 - 1.0 cm — partially decomposed litter

soil horizon	description
H	1.5 - 0 cm -- well decomposed organic matter; 1.5 cm thick; abrupt, wavy lower boundary.
Ah	0 - 3.5 cm -- brown (10YR 5/3, moist) silty clay loam; moderate, fine, granular structure; very friable; crushes under gentle pressure; nonsticky: practically no adherence when pressure is released; nonplastic: no wire is formable; common, large roots; many fine to medium roots; very fine interstitial pores; abrupt, smooth lower boundary; 1.0 to 3.5 cm thick.
AB	3.5 - 6.5 cm -- light brownish gray (2.5 Y 6/2, moist) silty clay loam; moderate, fine, subangular blocky structure; firm: crushes under moderate pressure between thumb and forefinger but resistance is distinctly noticeable; slightly sticky: after pressure, soil adheres to both thumb and finger but comes off one rather cleanly, does not appreciably stretch; few fine roots; interstitial pores; few, thin clay films on ped faces; abrupt, wavy lower boundary; 0.5 to 3.0 cm thick.

soil horizon	description
Bf	6.5 - 24.5 cm -- brown (10YR 5/3, moist) clay loam; moderate, medium subangular blocky structure; firm: crushes under moderate pressure between thumb and forefinger but resistance is distinctly noticeable; slightly sticky: after pressure, soil adheres to both thumb and finger but comes off one rather cleanly, does not appreciably stretch; plastic: wire forms, moderate pressure required to deform soil mass; few fine roots; interstitial pores; many thick clay films on ped faces; abrupt, wavy lower boundary; 16.0 to 18.0 cm thick.
C	24.5 - c. 250.0 cm -- grayish brown (10YR 5/2, moist) clay, dark grayish brown (10YR 4/2, dry) alternating with light brownish gray (10YR 6/2, moist) silt, white (10YR 8/2, dry); clay has moderate, medium platy structure; hard; firm; sticky; plastic; no observable film on ped faces; very fine tubular pores; smooth to wavy lower boundary with alternating silt. Silt has moderate, very fine subangular blocky structure; loose, noncoherent; nonsticky; nonplastic, micro interstitial pores. Clay bands are 0.3 to 0.6 cm thick; silt bands 0.1 to 0.2 cm thick.

Appendix B

Flake Classes

TYPE 223 (abraded, bevelled with cluttered, complex

ARTIFACT #	LOCATION	ANGLE	#DORSAL SCARS	BULB	PT.MAX WIDTH	PT.MAX THICKNESS	LAT.EDGE ORIENTATION	DISTAL END TERMIN.	PLATFORM L/PLAT. W	PLAT. LENGTH	PLAT. L/ FLAKE W	FL. WID/ FL. THICK	MAX. LENGTH	MAX. WIDTH	MAX. THICK
251	1	80	8	1	3	3	4	1	3.5	7	.17	5.86	45	41	7
254	1	65	5	1	3	5	4	2	3.0	6	.33	9.0	18	18	2
263	1	100	4	1	3	2	4	1	3.0	3	.23	3.25	13	13	4
269	1	85	6	1	4	1	3	1	2.5	5	.63	4.0	9	8	2
308	1	75	4	2	4	2	3	2	3.0	9	.35	6.5	18	26	4
309	1	55	7	2	3	2	9	2	4.0	4	.21	6.33	23	19	3
315	1	65	8	2	4	3	3	1	4.0	8	.35	7.67	23	23	3
318	1	60	7	3	4	4	3	1	2.67	4	.33	6.0	18	12	2
320	1	60	6	1	4	5	3	3	5.0	5	.39	13.0	12	13	1
349	2	85	5	2	3	2	5	2	3.2	8	.17	7.83	48	47	6
352	2	65	6	2	3	2	5	1	5.0	10	.26	9.5	32	38	4
353	2	85	5	1	3	2	4	1	4.25	8.5	.30	7.0	48	28	4
354	2	70	5	2	3	2	4	1	6.0	15	.63	6.0	40	24	4
359	2	85	3	1	4	3	4	3	4.0	12	.44	6.75	18	27	4
365	2	70	7	2	4	5	4	3	3.33	5	.24	10.5	23	21	2
366	2	70	6	2	3	3	5	1	4.0	8	.42	6.33	23	19	3
368	2	60	6	2	3	1	5	1	3.33	10	.48	7.0	19	21	3
371	2	45	3	3	3	1	4	2	3.0	6	.38	8.0	16	16	2
397	2	70	6	2	2	3	7	2	3.63	29	.74	3.9	68	39	10
400	2	85	9	2	2	2	6	1	3.75	15	.47	6.4	39	32	5
402	2	65	6	2	3	2	10	1	2.4	12	.33	6.0	29	36	6
405	2	60	3	2	3	2	4	2	5.33	8	.26	10.33	32	31	3
406	2	70	6	2	4	5	3	1	2.67	8	.27	10.0	34	30	3
407	2	55	6	2	4	3	3	2	2.8	7	.22	8.0	21	32	4
408	2	55	9	2	3	2	4	1	6.5	13	.59	7.33	25	22	3
412	2	55	4	2	4	5	4	2	2.5	5	.28	9.0	17	18	2
414	2	70	5	1	4	2	3	2	3.43	12	.67	4.5	14	18	4
418	2	70	3	2	3	2	5	2	4.67	7	.70	5.0	13	10	2
	AVGES	69.	5.64						3.73	8.91	.39	7.18	26.36	24.36	3.64

TYPES OF FLAKES

TYPE 143 (Strengthened, plain, complex)

ARTIFACT #	LOCATION	ANGLE	#DORSAL SCARS	BULB	PT.MAX WIDTH	PT.MAX THICKNESS	LAT.EDGE ORIENTATION	DISTAL END TERMIN.	PLATFORM L/PLAT. W	PLAT. LENGTH	PLAT. L/ FLAKE W	FL. WID/ FL. THICK	MAX. LENGTH	MAX. WIDTH	MAX. THICK
231	1	110	4	2	1	1	4	1	3.33	5	.21	4.0	31	24	6
252	1	100	5	2	3	2	3	1	1.5	6	.18	3.3	35	33	10
258	1	80	4	2	4	2	3	2	3.0	12	.36	6.6	21	33	5
300	1	80	9	2	3	2	9	1	4.0	10	.39	5.2	35	26	5
335	2	100	2	1	4	4	5	1	7.0	7	.33	5.3	24	21	4
355	2	75	3	2	3	3	4	1	2.14	7.5	.25	7.5	33	30	4
356	2	60	5	3	4	2	4	1	2.8	7	.24	9.7	32	29	3
382	2	85	4	2	3	3	4	1	3.33	5	.33	2.1	15	15	7
	AVGES	86.	4.5						3.39	7.4	.29	5.46	28.25	26.38	5.5

TYPE 213 (abraded, bevelled with sparse facetting, complex)

ARTIFACT #	LOCATION	ANGLE	#DORSAL SCARS	BULB	PT.MAX WIDTH	PT.MAX THICKNESS	LAT.EDGE ORIENTATION	DISTAL END TERMIN.	PLATFORM L/PLAT. W	PLAT. LENGTH	PLAT. L/ FLAKE W	FL. WID/ FL. THICK	MAX. LENGTH	MAX. WIDTH	MAX. THICK
244	1	95	5	2	3	1	4	2	6.0	6	.32	4.75	19	19	4
247	1	70	6	2	4	2	3	2	5.67	17	.35	6.86	32	48	7
267	1	75	4	3	3	2	4	1	2.5	5	.50	5.00	14	10	2
319	1	55	5	3	4	2	4	1	5.0	5	.33	7.50	16	15	2
329	2	85	6	2	3	3	4	1	2.0	5	.19	3.25	42	26	8
344	2	90	4	1	4	5	3	1	5.0	5	.31	10.00	11	16	1
348	2	85	5	2	3	1	4	2	4.57	32.	.84	5.43	50	38	7
350	2	75	8	3	4	3	4	2	2.5	10.	.26	7.80	55	39	5
357	2	50	5	3	3	3	4	2	3.2	8	.26	10.33	33	31	3
362	2	65	12	2	3	2	5	1	4.0	8	.35	3.83	26	23	6
401	2	55	9	2	3	2	4	3	3.5	7	.18	13.33	31	40	3
415	2	45	4	2	3	1	5	1	2.8	14	.82	3.40	16	17	5
	AVGES	70.	6.08						3.90	10.17	.39	7.29	28.75	26.83	4.42

TYPE 513 (strengthened and abraded, bevelled with sparse facetting, complex)

ARTIFACT #	LOCATION	ANGLE	#DORSAL SCARS	BULB	PT.MAX WIDTH	PT.MAX THICKNESS	LAT.EDGE ORIENTATION	DISTAL END TERMIN.	PLATFORM L/PLAT. W	PLAT. LENGTH	PLAT. L/ PLAT. W	FL. WID/ FL. LENGTH	MAX. LENGTH	MAX. WIDTH	MAX. THICK
225	1	65	6	2	3	3	8	2	3.33	10	.32	6.2	27	31	5
250	1	75	4	2	4	4	3	2	3.33	10	.46	5.5	25	22	4
265	1	85	6	2	2	2	9	2	3.0	6	.46	3.25	23	13	4
298	1	95	16	2	3	2	4	3	3.6	9	.22	8.2	40	41	5
304	1	75	5	2	3	3	4	2	2.67	8	.36	4.4	30	22	5
332	2	70	6	2	2	3	4	1	6.0	12	.55	4.4	25	22	5
360	2	100	3	2	2	1	4	1	5.0	15	.65	4.6	27	23	5
367	2	70	5	1	3	2	4	1	6.0	15	.68	7.33	15	22	3
404	2	65	4	2	2	3	4	1	3.0	6	.25	6.0	35	24	4
268	1	90	6	2	3	2	4	1	4.0	4	.36	5.5	12	11	2
	AVGES	79.	6.1						3.99	10.7	.43	5.54	25.9	23.1	4.2

TYPE 523 (strengthened and abraded, bevelled with cluttered facetting, complex)

262	1	65	3	1	2	5	4	1	6.0	6	.67	9.0	7	9	1
347	2	80	4	2	3	3	4	2	3.17	19	.44	6.14	48	43	7
351	2	70	5	1	3	2	4	2	4.0	16	.57	4.67	44	28	6
369	2	45	5	2	3	3	4	2	4.0	6	.46	6.5	15	13	2
410	2	45	5	2	1	1	1	1	3.5	14	.88	4.0	23	16	4
411	2	85	8	2	3	5	4	1	2.5	5	.26	9.5	24	19	2
417	2	45	4	2	4	3	3	3	5.5	11	.69	5.33	9	16	3
	AVGES	62.	4.86						4.10	11.0	.57	6.45	24.29	20.57	3.57

TYPE 841 (no preparation, plain, transverse)

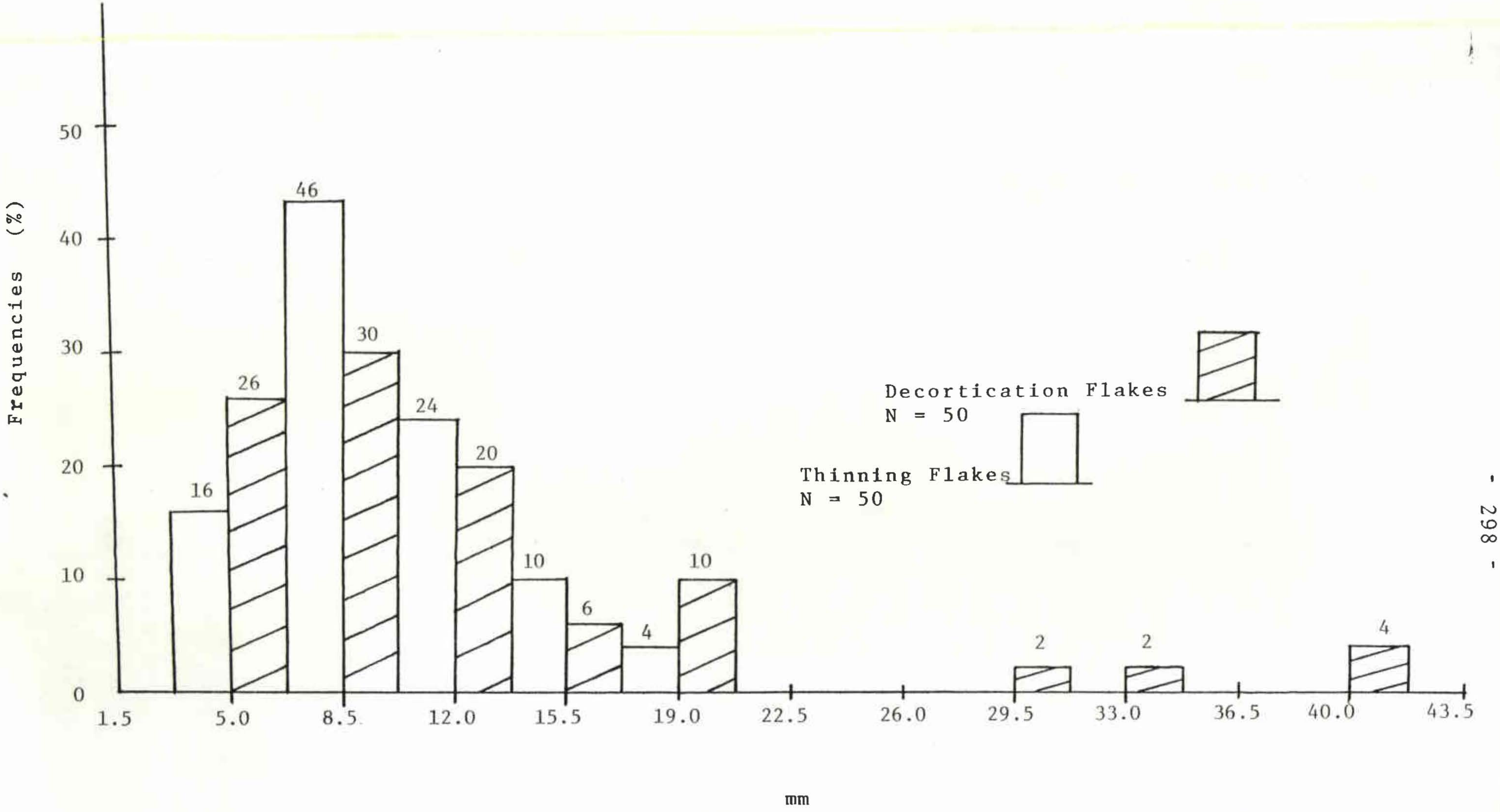
ARTIFACT #	LOCATION	ANGLE	#DORSAL SCARS	BULB	PT.MAX WIDTH	PT.MAX THICKNESS	LAT.EDGE ORIENTATION	DISTAL END TERMIN.	PLATFORM L/PLAT. W	PLAT. LENGTH	PLAT. L/ FLAKE W	FL. WID/ FL. THICK	MAX. LENGTH	MAX. WIDTH	MAX. THICK
227	1	95	4	2	3	2	4	3	4.0	8	.40	4.0	32	20	5
228	1	70	3	2	3	1	4	1	3.14	22	.73	3.0	28	30	10
230	1	105	3	2	4	2	3	1	5.0	5	.24	4.2	21	21	5
232	1	90	3	2	3	3	4	1	5.33	8	.38	7.0	24	21	3
235	1	65	1	3	3	3	4	1	2.75	11	.65	3.4	17	17	5
236	1	95	2	2	4	3	8	2	2.8	7	.24	4.14	25	29	7
237	1	80	5	2	2	2	8	1	1.8	9	.41	1.38	32	22	16
255	1	75	6	2	4	2	3	2	2.25	9	.39	4.6	27	23	5
256	1	75	4	2	3	3	4	2	2.0	8	.40	4.0	38	20	5
270	1	80	4	1	3	3	4	1	3.0	4.5	.18	6.25	15	25	4
283	1	65	2	1	1	1	4	2	4.5	36	.86	4.67	37	42	9
284	1	55	2	2	4	1	3	1	2.17	13	.34	6.33	22	38	6
296	1	70	2	1	3	3	4	1	2.5	5	.46	5.5	18	11	2
346	2	70	3	2	3	1	6	3	2.5	5	.71	3.5	7	7	2
377	2	70	4	2	3	2	4	3	3.67	11	.41	5.4	30	27	5
378	2	85	1	1	3	3	4	3	3.33	5	.17	5.0	24	30	6
327	2	90	5	2	3	2	5	2	2.57	9	.23	5.71	43	40	7
	AVGES	79.	3.18						3.14	10.32	.42	4.89	25.88	24.88	6.0

TYPE 843 (no preparation, plain, complex)

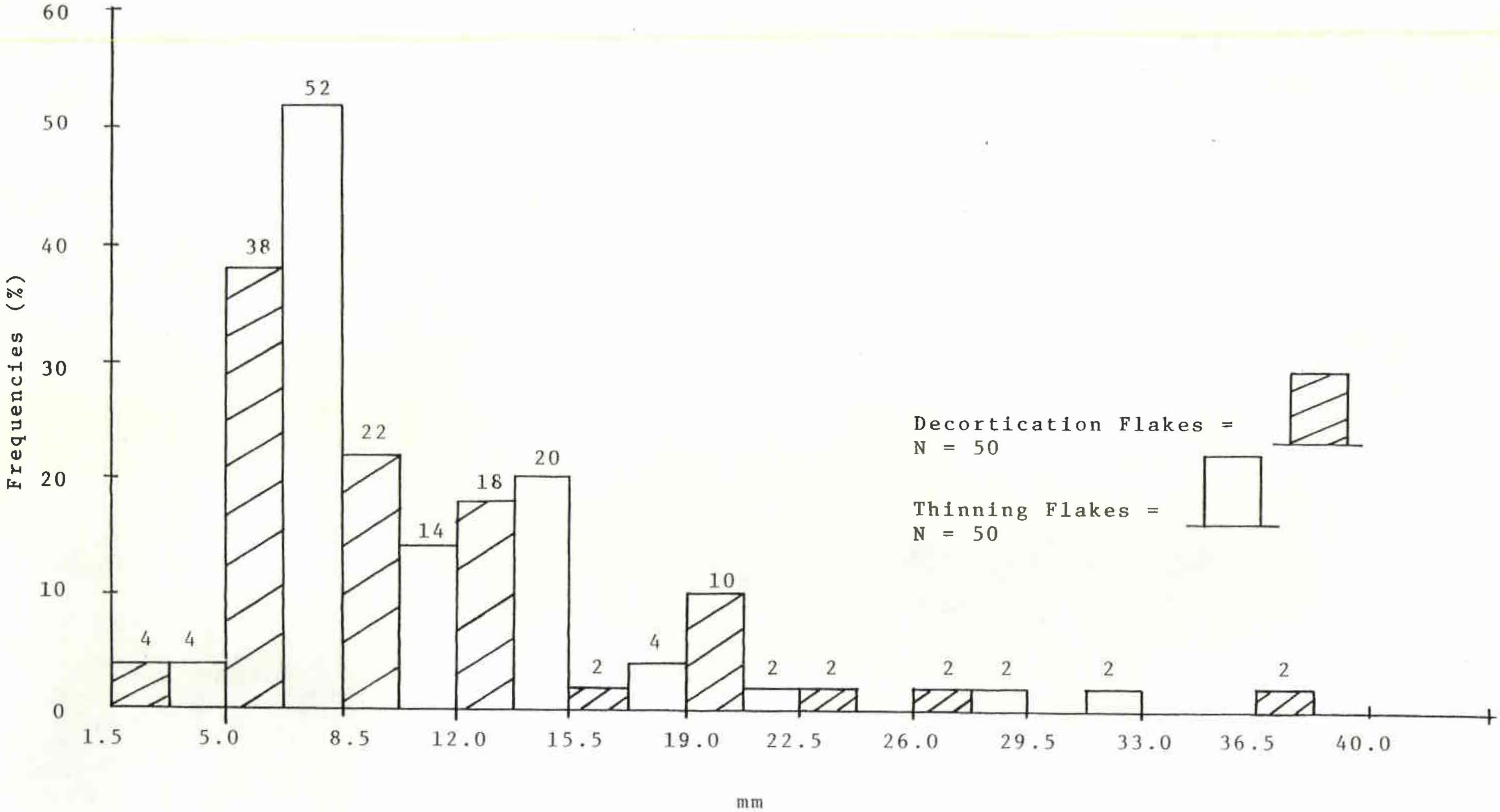
ARTIFACT #	LOCATION	ANGLE	#DORSAL SCARS	BULB	PT.MAX WIDTH	PT.MAX THICKNESS	LAT.EDGE ORIENTATION	DISTAL END TERMIN.	PLATFORM L/PLAT. W	PLAT. LENGTH	PLAT. L/ FLAKE W	FL. WID/ FL. THICK	MAX. LENGTH	MAX. WIDTH	MAX. THICK
229	1	110	3	2	5	1	6	1	1.8	9	.69	2.6	15	13	5
233	1	95	3	2	2	2	8	1	2.67	8	.38	3.5	26	21	6
234	1	75	4	2	2	1	5	1	3.25	13	.57	5.75	24	23	4
253	1	80	3	2	4	2	3	1	3.0	6	.25	6.0	26	24	4
257	1	80	8	1	4	3	3	2	2.5	5	.23	7.33	18	22	3
259	1	75	3	2	1	5	1	2	3.0	9	1.00	3.0	19	9	3
276	1	105	2	2	3	3	4	3	5.5	22	.34	4.57	42	64	14
278	1	110	6	2	3	3	4	1	1.6	8	.22	2.12	46	36	17
282	1	75	6	2	3	2	4	3	2.89	13	.27	7.0	33	49	7
314	1	70	7	1	2	2	4	3	3.4	8.5	.50	5.67	22	17	3
338	2	85	4	2	4	3	5	1	2.5	5	.25	6.67	26	20	3
358	2	100	6	1	3	2	5	1	3.67	5.5	.25	5.5	29	22	4
398	2	80	4	2	2	4	5	1	2.5	5	.15	6.8	56	34	5
399	2	70	5	2	3	3	8	2	3.2	8	.31	5.2	48	26	5
	AVGES	86.	4.57						2.96	8.93	.39	5.12	30.71	27.86	5.93

Appendix C

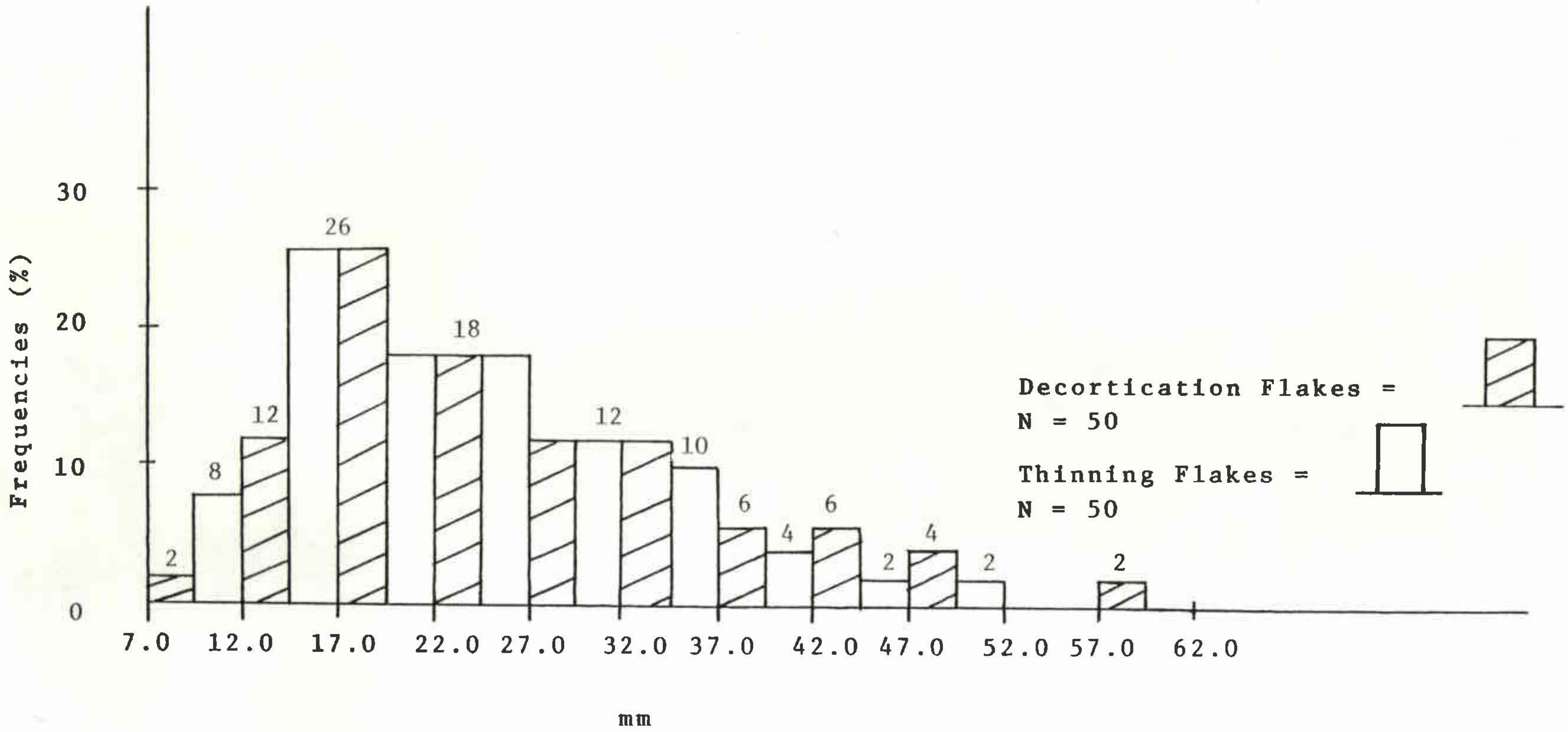
Histograms of the Continuous Response Attributes



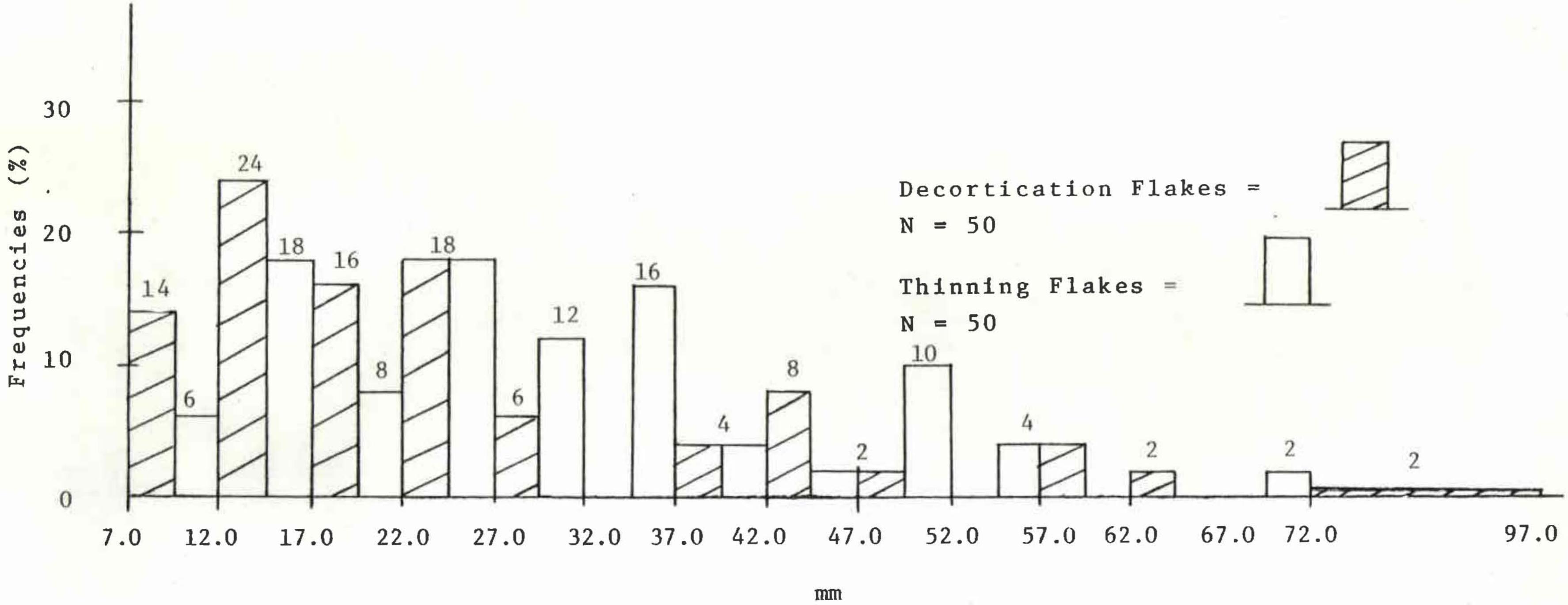
STRIKING PLATFORM LENGTH - LOCATION 1



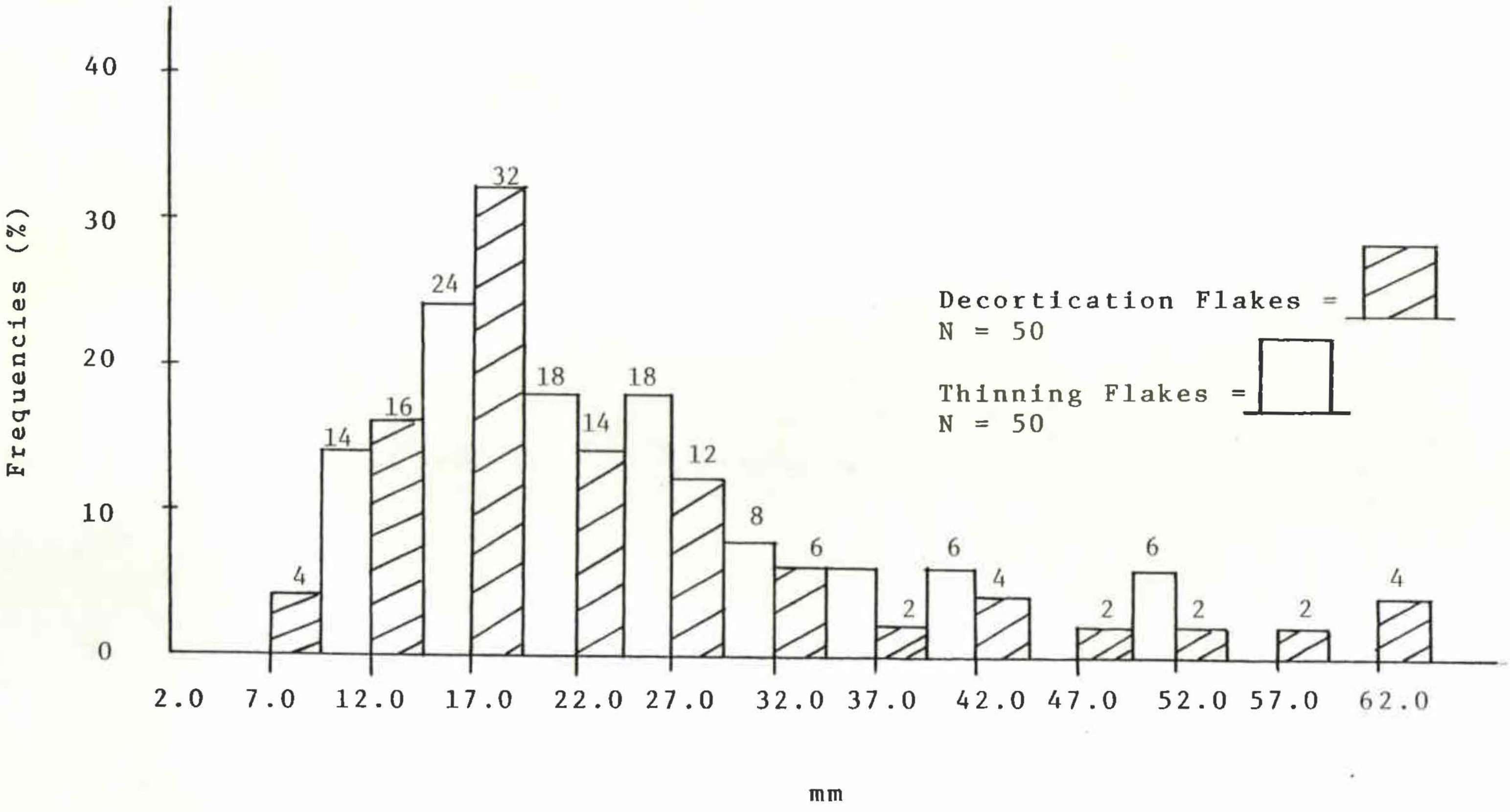
STRIKING PLATFORM LENGTH - **LOCATION 2**



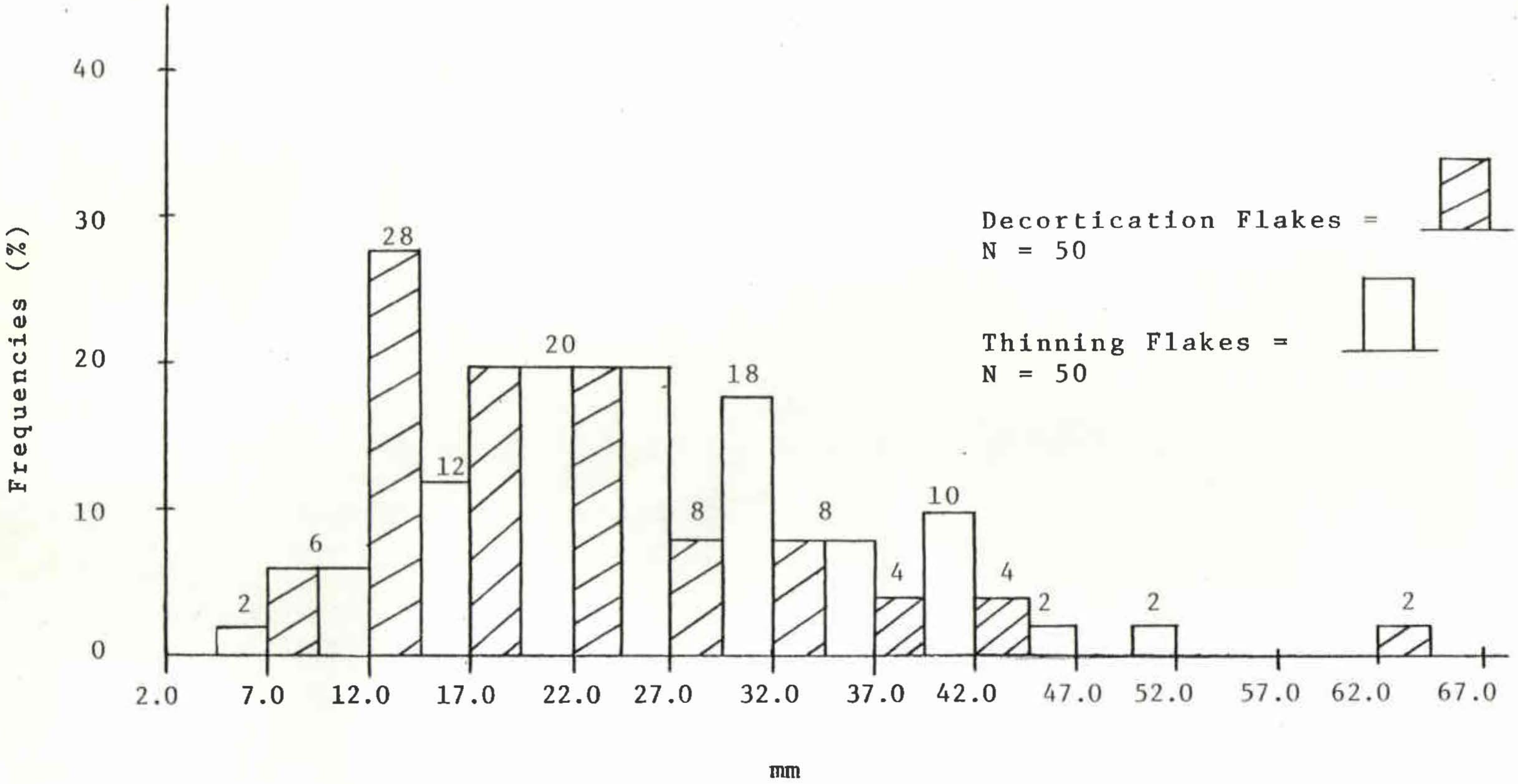
MAXIMUM FLAKE LENGTH - LOCATION 1



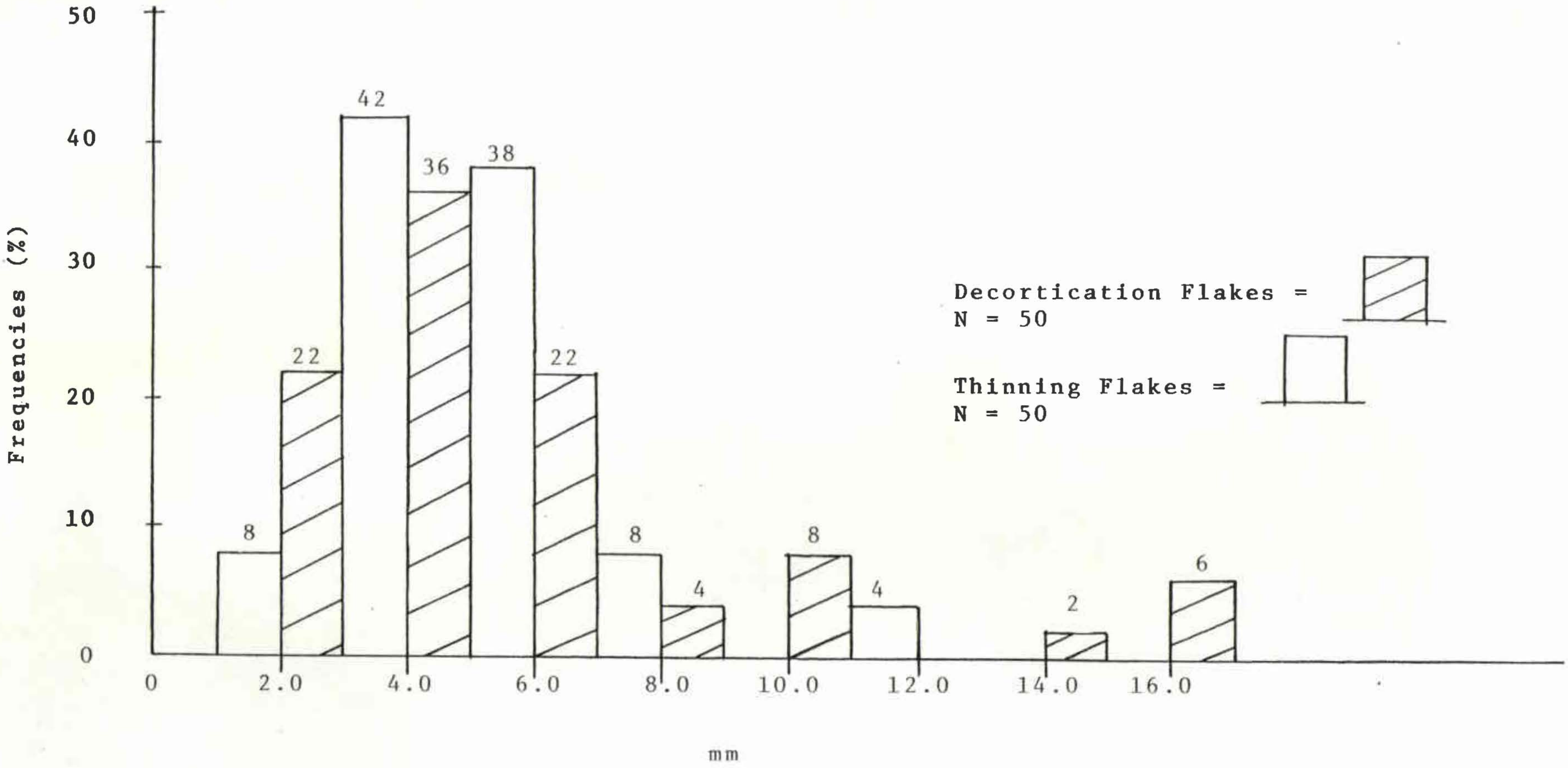
MAXIMUM FLAKE LENGTH - LOCATION 2



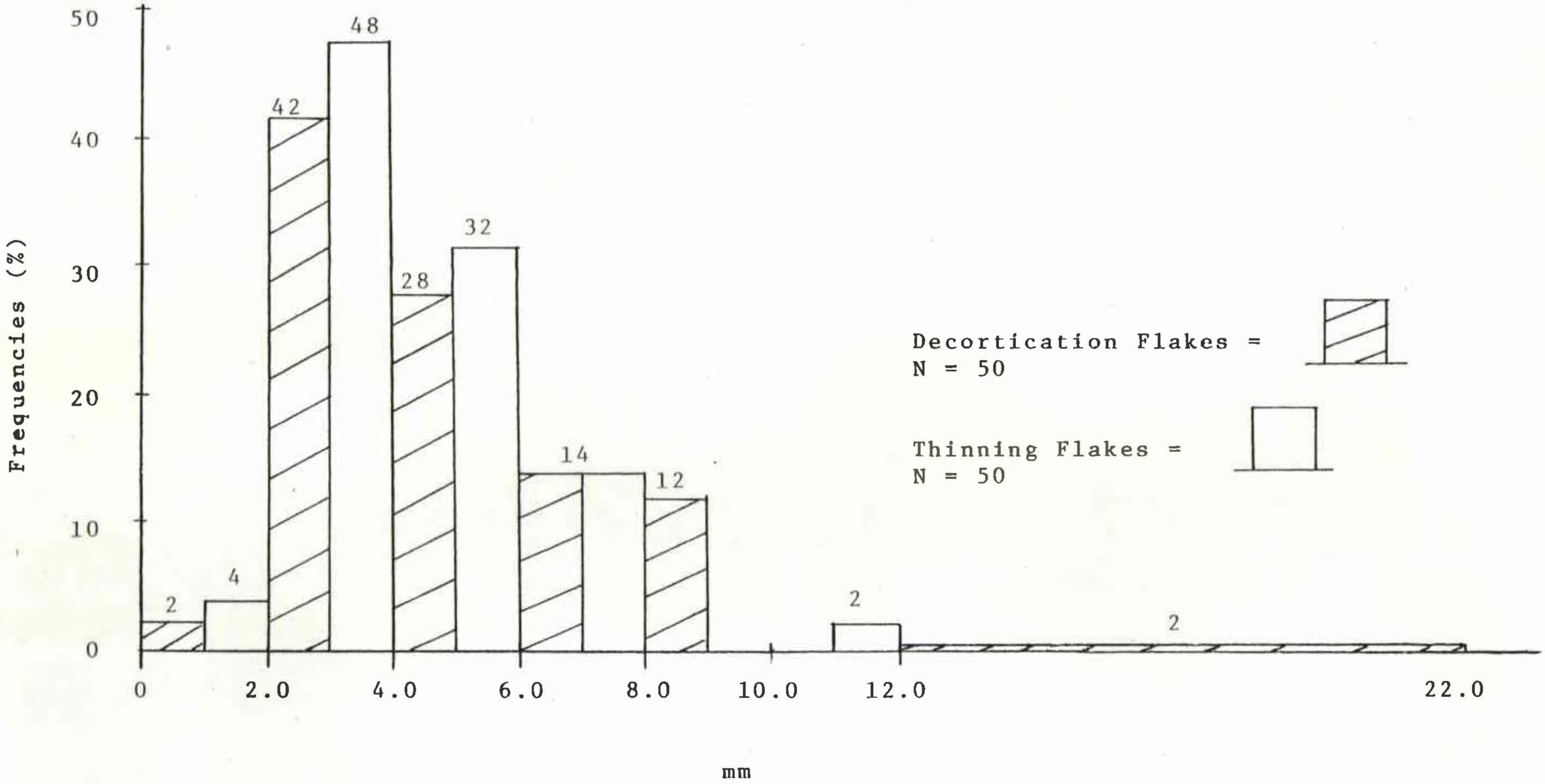
MAXIMUM FLAKE WIDTH - LOCATION 1



MAXIMUM FLAKE WIDTH - LOCATION 2



MAXIMUM FLAKE THICKNESS - LOCATION 1



MAXIMUM FLAKE THICKNESS - LOCATION 2

Appendix D

Chi-square and t-Test Results

t-TEST RESULTS

	LOC. 1 VS LOC. 2 DECORTICATION FLAKES	SIGNIFICANT YES OR NO	LOC. 1 VS LOC. 2 THINNING FLAKES	SIGNIFICANT YES OR NO
PLAT. ANGLE	2.57	YES	1.74	NO
STR. PLAT. LENGTH	1.56	NO	-2.43	YES
STR. PLAT. WIDTH	1.29	NO	-1.65	NO
SIZE LARG. DORS. SCAR	0.74	NO	-2.62	YES
WEIGHT	-0.03	NO	-1.90	NO
MAX. FL. LENGTH	0.42	NO	-2.64	YES
MAX. FL. WIDTH	1.27	NO	-1.40	NO
MAX. FL. THICK	2.23	NO	-0.16	NO
THICK. BELOW BULB	1.73	NO	-0.36	NO

LEVEL OF SIGNIFICANCE TESTED = 0.01

df = 98

TABLED VALUE = 2.36

(Mosteller and Rourke, 1973:315).

CHI-SQUARE RESULTS

	LOC. 1 VS LOC. 2 DECORTICATION FLAKES	SIGNIFICANT YES OR NO	LOC. 1 VS LOC. 2 THINNING FLAKES	SIGNIFICANT YES OR NO
PLAT. PREP.	11.599385	NO	14.867849	Yes
PLAT. CHAR.	7.5892329	NO	6.373591	NO
LIP	0.29761905	NO	0.0	NO
DORS. CORTEX	0.4444	NO	5.2631579	YES
DORS. FLAKE SCAR ORIENT.	6.2690193	NO	4.32	NO
DORS. RIDGES	1.2450481	NO	1.0169491	NO
HINGING	11.393551	NO	13.284271	NO
RIPPLES	12.209357	YES	0.64102564	NO
BULB OF APP. FORCE	3.4231201	NO	2.4576197	NO
ERRAILLURES	4.109589	YES	1.5069319	NO
FISSURES	3.9532467	NO	9.8901099	YES
CURV.	0.428636	NO	5.91818	NO
CURV. PL.	8.4782	YES	4.5673164	NO
PT. MAX. WID.	4.8002323	NO	5.7439703	NO
PLT. MAX. THICK.	3.3565824	NO	4.4526872	NO
LAT. EDGE ORIENT.	11.099346	NO	24.35631	YES
DIST. END TERM.	2.2792208	NO	0.19818594	NO

LEVEL OF SIGNIFICANCE TESTED = 0.05

H_0: There is no correlation between location and the frequency of attribute "X".

H_1: Location has a significant effect on the frequency of attribute "X".

(Hurst Thomas, 1976)