ONTARIO IROQUOIS TRADITION LONGHOUSES

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ABSTRACT

This is a study of longhouse attributes through time and space. Statistical test results suggest that house length and feature and post mold density reached maximum dimensions during the Middle Ontario Iroquois stage. House length and related attributes (eg., storage partition length, hearth number and spacing, house width) are apparently associated with the number of occupants and their wealth or status. Feature and post mold density are thought to be related to intensity and/or length of occupation.

An increase in frequency of expansions to Southern Huron villages and longhouses, not evident on Neutral sites of the same period, may reflect architectural differences and/or intensity of warfare or trade. The longer Southern Huron houses were more frequently extended, suggesting that perhaps wealthier households could more readily absorb refugees and/or neighbouring villagers seeking protection or advantages in the newly established European trade network.

Analysis of the Protohistoric - Historic Ball village longhouses indicates that ethnohistoric depictions of longhouses more precisely describe the longest houses in the village and were apparently not an accurate representation of Iroquoian longhouses in general. No significant clan segment localizations were detected within the Ball village based on longhouse attribute variations among house orientation clusters.

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I. Introduction

This thesis provides a spatio-temporal analysis of Ontario Iroquois longhouses. The analysis of available archaeological longhouse data furnishes additional information regarding Ontario Iroquois development and society. Also, in assembling and describing available longhouse floor plan data, a comparative longhouse sample is provided for future studies.

Houses are thought to be a reflection of the builders' culture (Duly 1979; Guidoni 1975; King 1980; Moholy-Nagy 1957; Oliver 1969; Rapoport 1969; Trigger 1967, 1968). Dwellings and their spatial configuration in the community act as a form of non-verbal communication relating characteristics of a society's socio-political, economic, and religious organization. As Rapoport (1969:47) notes:

> Given a certain climate, the availability of certain materials, and the constraints and capabilities of a given level of technology, what finally decides the form of a dwelling, and moulds the spaces and their relationships, is the vision that people have of the ideal life. The environment sought reflects many socio-cultural forces, including religious beliefs, family and clan structure, social organization, way of gaining livelihood, and social relations between individuals.

The study of houses is only one aspect of archaeological settlement patterns. Trigger (1968) defined three levels of settlement analysis: individual dwelling; community, (in this case the village); and zonal pattern, (the regional density and distribution of the population). This thesis deals exclusively with individual buildings and the community pattern.

Despite the possible wealth of information that may be extracted from the analysis of houses there have been few such studies (Trigger 1968:55). Indeed, a comprehensive study of Ontario Iroquois longhouses has never been undertaken. As the following brief summary of the history of Ontario longhouse archaeology demonstrates, analysis of longhouses as an integral element in the interpretation of archaeological excavations has lagged behind the more traditional methods of pottery, lithic, and faunal analysis.

A Brief History of Longhouse Excavations in Ontario

Between 1887 and 1911 David Boyle amassed extensive collections of artifacts through mound trenching and surface collecting throughout Ontario, especially in the Lake Simcoe region (Kidd 1952:71). W.J. Wintemberg was the first of Boyle's field survey crew members to excavate portions of village settlements, in addition to middens. Wintemberg's work at such prehistoric villages as Uren (1928), Roebuck (1936), and Lawson (1939) laid the foundation for current theories concerning late prehistoric occupations of southern Ontario (Noble 1972b:16, 1973: 64). However, since Wintemberg's primary interest was in artifacts, their cultural association, function and frequency of occurence, little was written about post molds other than that they "may be referable to such structures as lodges, corn cribs, and scaffolds" (Wintemberg 1915:42). Possible house forms were reconstructed solely on the basis of ethnohistoric data (Wintemberg 1936:11).

By the late 1940's and early 1950's descriptions of house structures began to appear in published reports (e.g., Jury's 1948a, 1948b descriptions of the Flanagan and Crawford houses; Jury and Jury's, 1955, Saint Louis excavations; and Emerson's 1954 discussion of the Mckenzie and Hardrock longhouses). However, these descriptions are short and often lack any discussion of post molds or other features.

On the basis of ceramic assemblages, settlement patterns and ossuary data, supplemented by ethnohistoric and ethnographic information, Wright (1966) formulated what became the accepted sequence of Iroquoian development and Noble (1968) traced the development of Iroquois social organization. However, the longhouse developmental sequence was still virtually unknown.

Since the 1960's, acquisition of settlement pattern data has become an increasingly important focus of Ontario archaeology. Excavation has emphasized large protohistoric and historic villages. There are fewer prehistoric longhouses excavated, and the data base is especially weak for the middle period of Ontario Iroquois development.

Unfortunately, floorplans of excavated longhouses are not often published (for example, of 417 archaeological houses examined in this thesis, 20% have been published, 36% came from unpublished theses and the remaining 44% from unpublished site reports). Nor is there a synthesis of longhouse data available. Therefore, an inital objective of this thesis is to amass all available longhouse data and describe longhouse attributes through time and space.

Outline of Chapters

In order to place this study in perspective, the archaeological sequences of Ontario Iroquois development, based primarily on pottery analysis, is outlined in the succeeding chapter. The Huron and Neutral peoples, and their antecedents, are the specific subject of this thesis, therefore Chapter Two ends with a discussion of Huron and Neutral culture as documented ethnohistorically and interpreted archaeologically. Chapter Three deals exclusively with longhouse and community patterns as described in ethnohistoric chronicles and interpreted anthropologically. Chapter Four presents hypotheses on the development of the Ontario Iroquois longhouse, village planning and regional longhouse variations, based on information provided in preceding chapters. A sample of 50 sites, containing a total of 417 longhouses, was used to test these hypotheses. Statistical procedures were employed to test for significant associations between variables through time and space. Conclusions based on this analysis are discussed in the fifth and final chapter.

II. Description of the Ontario Iroquois

In this chapter the basic sequence of Ontario Iroquois development is briefly summarized. A short introduction to the study area and the Neutral and Huron tribal confederacies is provided. These groups form the focus of this thesis.

Prehistoric Sequence

Pre-Iroquoian Sequence

Table 1 provides an outline of the chronological sequences of southern Ontario prehistory. As this table indicates, the earliest houses excavated to date in Ontario belong to the Middle Woodland period (ca. 700 B.C.-A.D. 500-600). This period was apparently characterized by small bands of hunters and gatherers (Trigger 1976:1:122). Middle Woodland houses, such as those at the Donaldson site, ca. 500 B.C. (Wright and Anderson 1963), and Summer Island, ca. A.D. 100-200 (Brose 1970), are small, elliptical dwellings containing hearths, not always centrally aligned, and few other features. The Summer Island settlement is thought to have been a seasonal fishing camp, possibly occupied by a patrilineal band (Brose 1970:148).

Table 1: General Chronclogy for Southern Ontario.

Time	Period	Culture	Cultural Traits
A.D. 1650			
	Late Woodland	Ontario Iroquois	longhouses palisaded villages horticultural
A.D. 600			
	Middle Woodland	Princess Point	first villages first evidence of corn
		Serpent Mound	Hopewellian burial ceremonialism
		Saugeen	small ovate houses riverine settlements
700 B.C.			
	Early Woodland		first pottery
1000 B.C.			
	Archaic		ground and polished stone tools
6000 B.C.			diversity of tool types
	Paleo-Indian	Fluted Point	large mammal hunters
10,000 B.C.			

*after Noble (1975c:98)

The onset of the Late Woodland period and the birth of Iroquoian culture is associated with the shift in subsistence from hunting and gathering to corn cultivation ca. A.D. 500 (Trigger 1976:1:105).

Adoption of horticulture as the primary subsistence pursuit probably led to increased territoriality and increased sedentism (Flannery 1972:28; Trigham 1972:469), as the cultivators struggled to establish ownership of their fields, and protect and maintain storage facilities. Also associated with increased sedentism were a larger or more concentrated population, increased warfare, increased trade and, formalization of village social and political organization (Smith 1976:60).

The Ontario Iroquois Tradition

Until the mid-1940's the Iroquoians were considered an intrusive culture in a widespread Algonquian matrix (Trigger 1969:25). In 1952 R.S. MacNeish devised the _in situ_ theory of Iroquois development, based on pottery styles. He proposed Point Peninsula as the ancestral culture base for the regional development of four Owascoid variants: Mohawk; Onondaga-Oneida; Cayuga-Seneca; and, Neutral-Erie-Huron (MacNeish 1952, 1976).

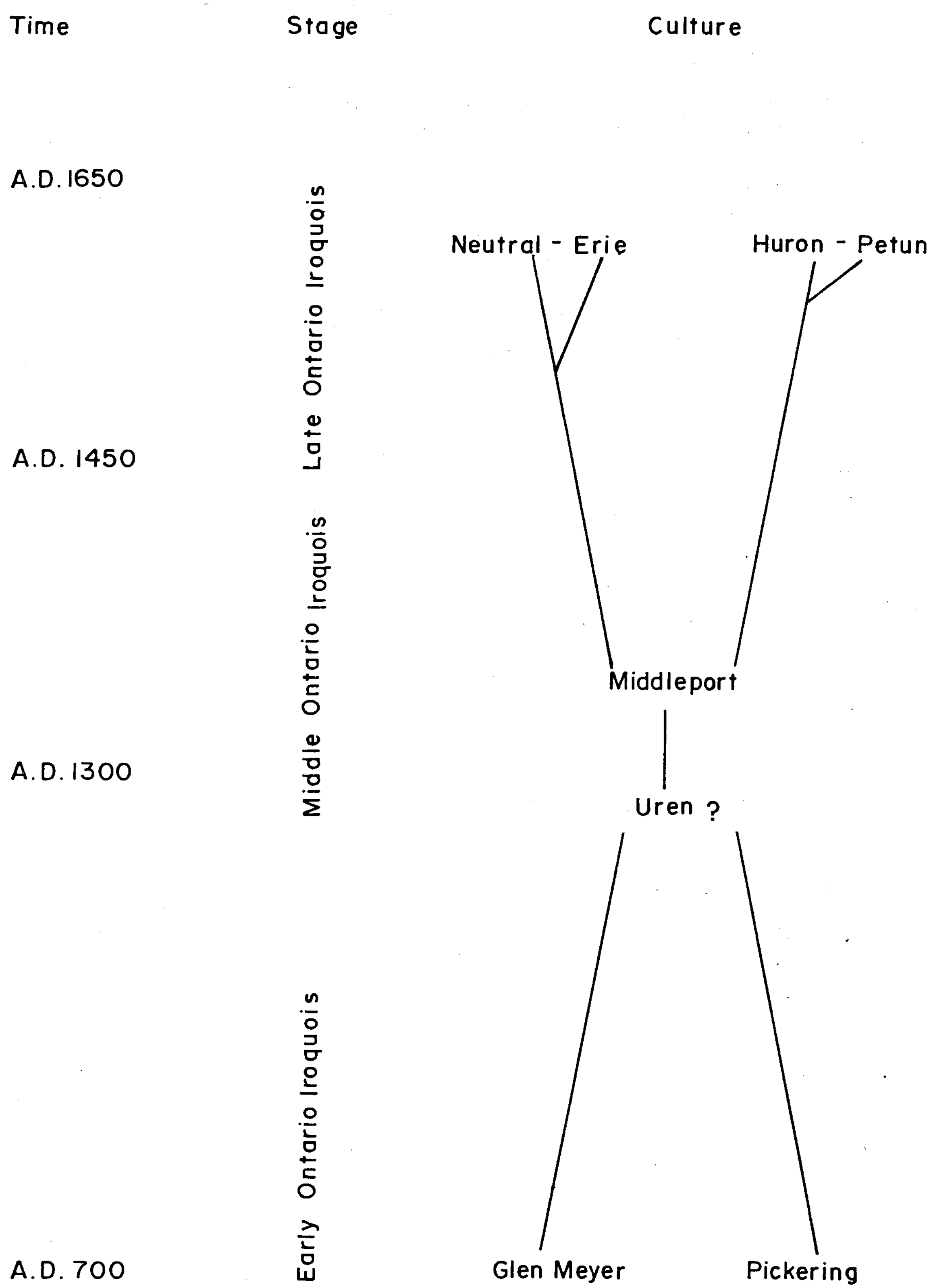
In 1966 J.V. Wright expanded and revised MacNeish's _in situ_ theory as it applied to Ontario Iroquois archaeology. He formulated a three stage developmental sequence of Iroquoian culture, commencing ca. A.D. 1000 with the Early Ontario

Iroquois stage. Recent excavations at such sites as Auda, Porteous and others, have projected this stage backwards an additional 300 years (Kapches 1981; Noble 1975a:5, 1975b:38) (Fig. 1).

The Early Ontario Iroquois Stage

During the Early Ontario Iroquois stage southern Ontario was occupied by two geographically and culturally distinct complexes: the Pickering culture in the southeast, and the Glen Meyer culture in the southwest. Two characteristics considered diagnostic of the stage are: a subsistence economy based on an increased reliance on corn horticulture supplemented by hunting and fishing; and small, nucleated villages, usually enclosed by palisades, situated on high ground (Noble 1975a:45, 1975c:111; Stothers 1975:115; Trigger 1976:1:126; Wright 1966:22). Other shared traits include secondary bundle and flexed burials (Wright 1966:52), a weakly developed worked bone industry, and similar methods of pottery manufacture, including vessel shape, region of design and bossing (Noble 1975a:47; Trigger 1976:1:126; Wright 1966: 44,52). There is evidence of long distance trade networks with peoples of Ohio (for opaque chert), the upper Great Lakes (for native copper), Pennsylvania (for bluish steatite), and the Mattwaw River region (for red ochre) (Noble 1975a:48; Reid 1975a:9).

Fig. 1: Cultural Sequences of the Ontario Iroquois Tradition



after Wright (1966)

Gaming discs and cup-and-pin deer phalanges have been recovered from Pickering sites exclusively, whereas slate pebble pendants are a feature of Glen Meyer sites (Trigger 1976:1:126; Wright 1966:53). Pickering body sherds are commonly treated with a ribbed paddle or checked stamp; Glen Meyer vessels are scarified, corded, or fabric impressed (Reid 1975a:12; Trigger 1976:1:126; Wright 1966:29,53). Push-pull and dentate stamping techniques of rim decoration are more frequent among Pickering ceramics; Glen Meyer pottery is mainly linear stamped, corded, or plain (Reid 1975a:9).

Wright (1966:22) terminates the Early Iroquois stage with the westward expansion of Pickering and subsequent war, conquest and subjugation of their Glen Meyer neighbours. Although Noble (1975c:111) agrees that there was a merger of Glen Meyer and Pickering, he is uncertain as to the manner of fusion.

The Middle Ontario Iroquois Stage

According to Wright (1966:54), the conquest of Glen Meyer culminated in the Uren substage, A.D. 1300-1350, of the Middle Ontario Iroquois stage. Others feel that there is not sufficient evidence as yet to determine the role of the Uren substage in the developmental sequence of Ontario Iroquois prehistory (Noble 1975a:52). The Uren substage led directly into the following Middleport substage, which also lasted ca. 50 years. However, several Middleport sites, such as Slack Caswell, Unick, and

Chypchar, have been occupied beyond the projected A.D. 1400 termination date (Jamieson 1979; Smith pers. comm. 1982). Therefore, for the purposes of this thesis, the Middleport horizon will be taken to extend to A.D. 1450.

The Middleport substage is a horizon of widespread cultural homogeneity across southern Ontario. It is distinguished by the development of an elaborate pipe complex and the dominance of Middleport Oblique, Lawson Incised, and Ontario Horizontal pottery styles (Wright 1966:5-6). During this stage ossuary internments became more frequent and contained more individuals (Trigger 1976:1:147). Expansive trade networks between the regional Middleport groups (Sutherland 1980:33) and with the Algonquians to the north (Wright 1974:304) have been suggested. The Middleport substage provides the foundation for the formation of the Huron-Petun and Neutral-Erie branches of the Late Ontario Iroquois stage of A.D. 1450-1650.

The Late Ontario Iroquois Stage

The Late Ontario Iroquois stage can be divided into Late Prehistoric, Protohistoric, and Historic periods. Unfortunately, the boundaries between these periods are poorly defined. The main problem lies in attempting to establish a time frame for the onset of the Protohistoric. The Protohistoric period is defined as the first appearance of European goods on Iroquoian sites (Noble 1975c:111). The potential existed for European goods to be traded to Hurons at an early date, since European fisherman and explorers had travelled the Atlantic coastline since the late 1490's (Quinn 1974). However, early trade materials were often perishables (Fitzgerald 1981:9) and may not be preserved on Protohistoric sites. Due to the problems inherent in attempting to establish the start of the Protohistoric period, no distinction will be made between the late Prehistoric and the Protohistoric periods.

The Late Prehistoric - Protohistoric Huron are classified into southern and northern divisions. The southern division comprises sites around the Rouge, Humber and Trent rivers. Northern Huron sites are located in the vicinity of the Penetanguishene Peninsula (Wright 1966:71). The southern division is differentiated by Black Necked, Huron Incised, Lawson Incised, and Lawson Opposed pottery, while northern division pottery styles are predominately Lalonde High Collar, Huron Incised, and Black Necked (Wright 1966:73).

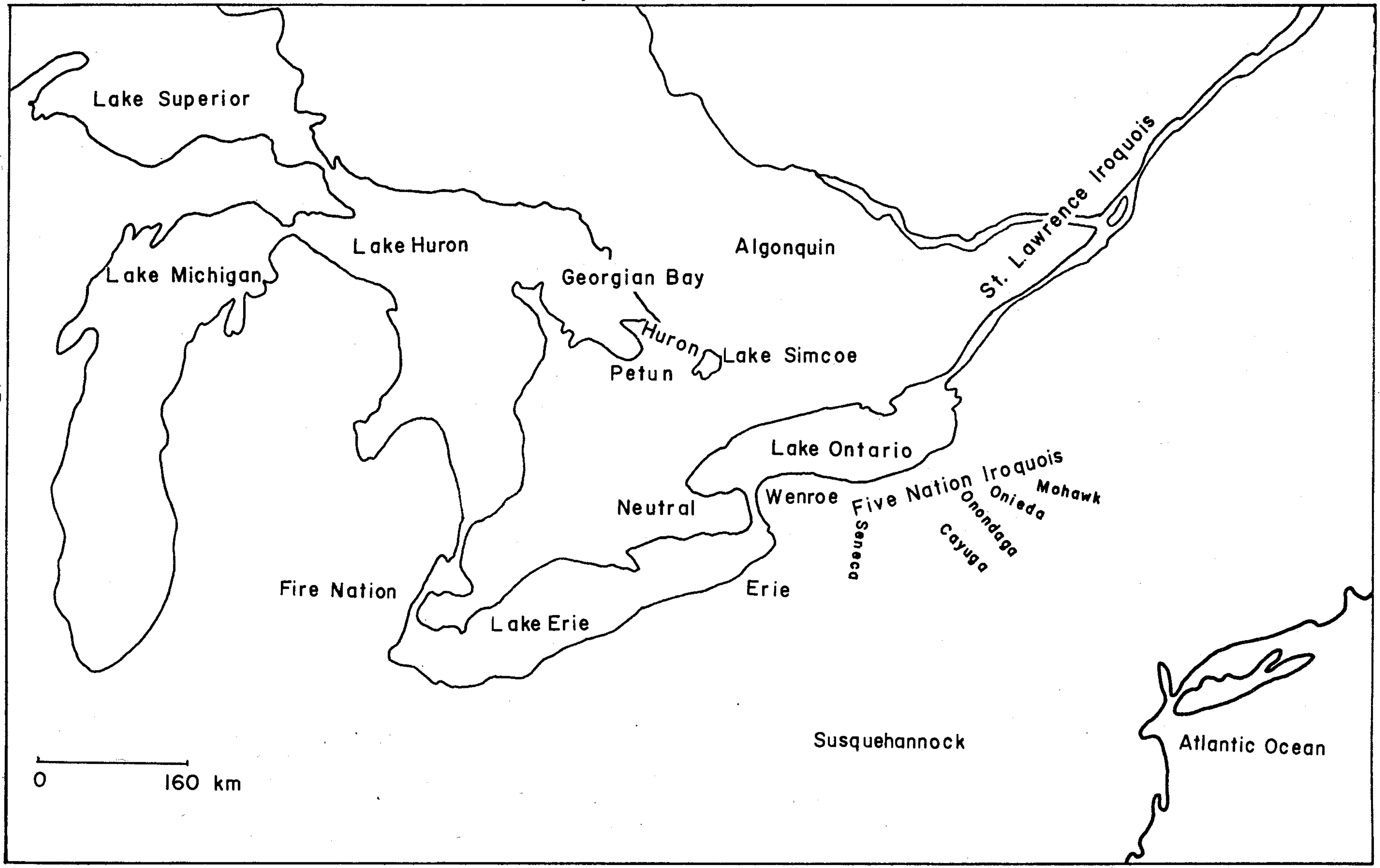
Southern Hurons are thought to have migrated north and fused with the northern division to form the Historic Huron shortly before direct contact with Europeans (Wright 1966:67). A desire to be close to the source of furs is the reason usually accorded for the northerly location of the Historic Huron (Trigger 1969:25).

The Prehistoric Neutral are more closely related to their Middleport antecedents, and developed <u>in situ</u> in the region of the Niagara Escarpment (Trigger 1976:1:27-30).

The Historic Iroquoians

The Northeast culture area includes members of the Algonquian and Iroquoian language families. The Iroquoian stock is composed of the Ontario Iroquois (Huron, Neutral, and Petun) in the southern portion of the province and the St. Lawrence Iroquois, along the St. Lawrence River valley. The New York Iroquois include the League of Five Nations Iroquois (Mohawk, Onondaga, Oneida, Cayuga, Seneca and later the Tuscarora), and the Erie, south of Lake Erie. The Susquehannock Iroquois inhabited Pennsylvania (Fig. 2). These Iroquoian groups all shared a common subsistence pattern based on slash and burn horticulture, supplemented by hunting and/or fishing, depending on the local resource base (Fenton 1978:298). They all lived in large, often palisaded villages composed of longhouses. Many of the groups formed confederacies, and all were involved in expansive trade networks, alliances and wars. For instance, the Huron were allied with the Susquehannock in a vicious war against the Five Nations Iroquois, while the Neutral remained neutral in that conflict but were engaged in a fierce struggle with the "Fire Nation", thought to be the Mascoutens of southern Michigan (Thwaites 1959:20:193; Wrong 1939:157).

Fig. 2: Location of Nations Mentionned in Study



after Trigger (1976:2:

Although Northeast Iroquoians all shared the same basic cultural traits, specific environmental settings and economic-subsistence orientations were dissimilar. In the following pages, variations between Huron and Neutral habitat, and economic and subsistence patterns will be briefly summarized.

The Historic Huron

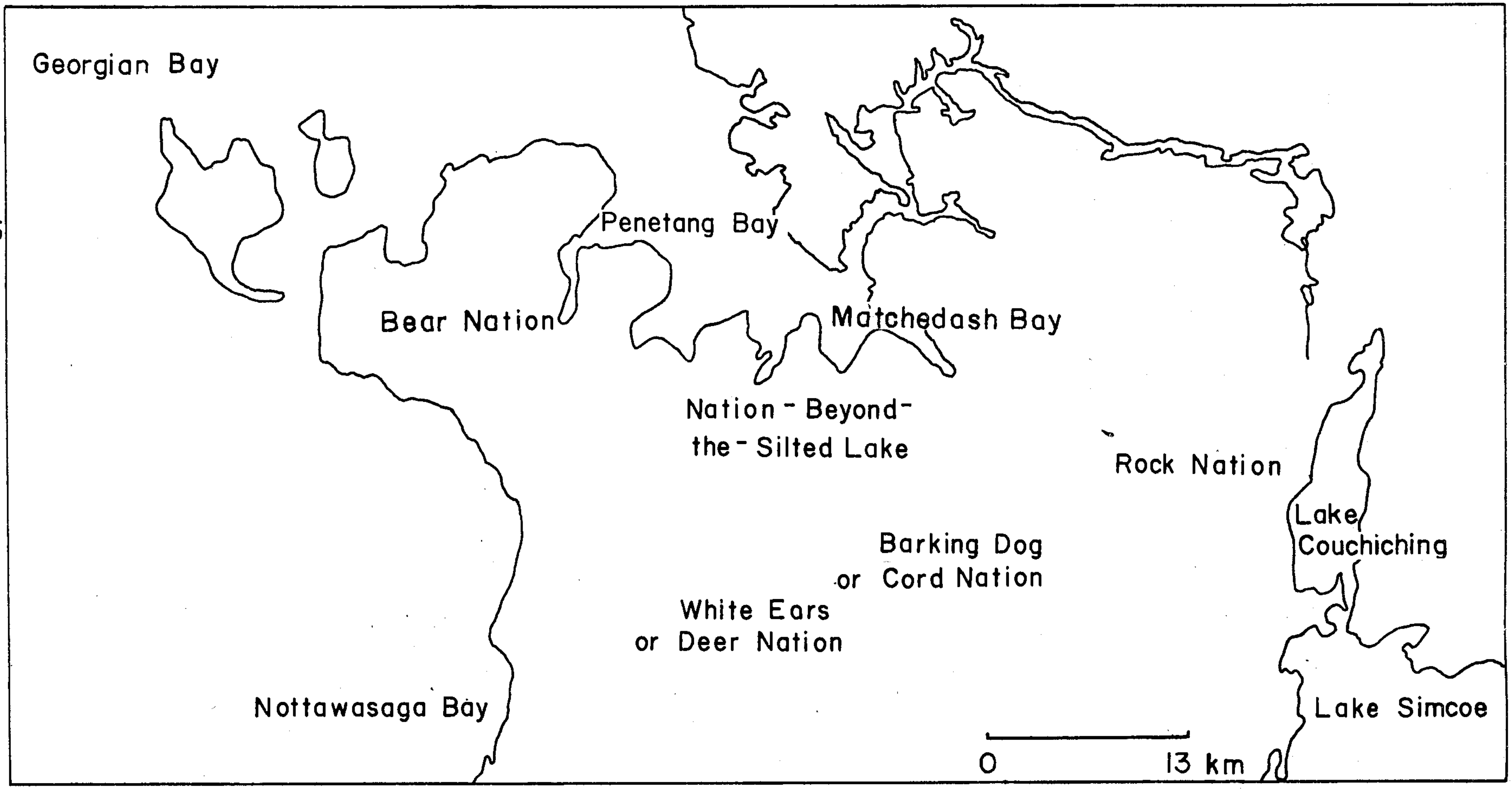
The topography of southern Ontario, largely the result of glaciation, is characterized by gently rolling moraines, till plains, and drumlins (Chapman & Putnam 1966). The climate of the area around Lake Ontario, inhabited toward the east by the southern division of the Prehistoric - Protohistoric Huron and in the west by the Historic Neutral, has milder, drier, and warmer summers, and more frost-free days than Historic Huronia (Trigger 1969:11). There is a great deal of variation in wind direction, but the strongest gales generally come from W to SW (Norcliffe & Heidenreich 1974:18).

Huron settlements differed from those of other Iroquoian groups in that the total population of the confederated tribes, estimated at 20,000 to 30,000, were all concentrated in a small region of 2,072 sq. km (Heidenreich 1978:369; Trigger 1962:137, 1976:1:105). At the time of contact the Huron occupied the territory from the Penetanguishene Peninsula south to the Nottawasaga River, bounded on the west by Nottawasaga Bay, and on the east by Matchedash Bay and Coldwater River (Fig. 3).

Huronia lies at the northern edge of the Great Lakes-St. Lawrence forest, a region of highly mixed forests characterized by eastern white pine (*Pinus strobus*), red pine (*Pinus resionsa*),eastern hemlock (*Tsuga canadensis*), and yellow birch (*Betula alleghaniensis*). Sugar (*Acer saccharum*) and red maple (*Acer rubrum*), basswood (*Tilia americana*) and red oak (*Quercus rubra*) are also found in this zone (Hoise 1973:22). Game is abundant and includes deer (*Odocoileus virginianus*), bear (*Uras americanus*), beaver (*Caster canandensis*). Fishing, particularly for whitefish (*Coregonus culpeaformis*), is considered to have been an important subsistence task (Trigger 1969:9).

Based on ethnohistoric and ethnographic sources, the Huron are considered to have been a confederacy of at least four tribes (Heidenreich 1971:81; Noble 1968:63; Trigger 1976:1:30). The westernmost, and largest tribe was the Attignawantan (Bear Nation); the easternmost, and second largest tribe, was the Arendarhonon (Rock nation); sandwiched in between were the Attigneenongnahac (Cord or Barking Dog nation) in the north, and the Tahontaenrat (One White Lodge nation) in the south. The Ataronchronon (Nation Beyond the Silted Lake) was a fifth tribe that may have been a member of the Huron confederacy.

Fig. 3: Location of Huron Nations



after Heidenreich (1971)

The Huron confederacy is thought to have developed from the Middleport substage ca. A.D. 1380-1400, with the Attignawantan and Attigneenongnahac as founding members, and the Arendarhonhon and Tahontaenrat joining in the late 16th Century (Trigger 1962:140, 1978:344).

A Huron village represented a cohesive group acting in mutual defense and cooperation in clearing fields and erecting houses and palisade (Thwaites 1959:14:57). The Jesuits noted the presence of village governments composed of civil and war chiefs and councils of elders (Thwaites 1959:10:229-231). Small villages probably consisted of a single clan segment (Noble 1968:38; Trigger 1969:55). Larger villages may have included several clan segments, each with their own civil and war chiefs (Heidenreich 1971:78). These chiefs may have each been housed in their own quarter of the settlement (Trigger 1976:1:55).

According to the Brebeuf, trade routes were family owned (Thwaites 1959:10:229). Apparently the Arendarhonons were the first to directly encounter Europeans and consequently trade rights were reserved for them, although they shared the products with the other nations (Thwaites 1959:19-20).

According to the earliest records of A.D. 1615-1623, villages were relocated every 10, 20, 30, or 40 years (Biggar 1932:3:304; Sagard 1636:235; Wrong 1939:92). By A.D. 1639 villages were apparently moved every 10 to 12 years (Thwaites 1959:15:153), and by A.D. 1640, every eight or nine years (Thwaites 1959:19:133). The reason given by missionaries for this movement was always the same: depletion of the soil fertility and/or the wood supply. Fitting (1972:11) suggests that length of village occupation coincides with the length of time it takes a post to rot in the ground and the amount of time required to repair posts.

It has been noted that some Historic villages occasionally split in two new villages (Wrong 1939:92). The stated reason was, again soil fertility depletion or exhaustion of the wood supply. However, the economic system and the political climate may have dictated village size, requiring fissioning of excessively large communities (Flannery 1972; Hayden 1978). It is thought that village size, particularly among slash-and-burn horticulturists, is maintained below the maximum carrying capacity of the land. Once an optimal size is attained the community fissions as a result of weak social-political mechanisms incapable of adequately policing the various, often feuding factions of the village (Flannery 1972:47; Hayden 1978:108).

During the Historic period there was great turmoil, and expansionist wars created a refugee problem. The Jesuits document on several occasions the adoption of dislocated people by another tribe. For instance the Wenroe, when defeated by the Five Nations Iroquois in A.D. 1639, fled to the Huron and were accepted and dispersed throughout their villages (Thwaites 1959:17:29, 35:207). In 1649 the Huron confederacy was defeated and members of an entire village relocated in a Seneca village as a distinct unit and managed to "retain their own customs and peculiar usages, and live apart from the Iroquois" (Thwaites 1959:44:21).

The Neutral

The Historic Neutral population, variously estimated at 12,000 (Mason 1981:37) to 35, - 40,000 (Noble 1968), inhabited the region between the lower Grand and Niagara Rivers, in the warmer climes of southwestern Ontario. The shorlines of Lake Ontario and Lake Erie contain the only segment of the Deciduous Forest Region outside of the eastern United States (Hoise 1973). In addition to sugar maple, beech (Fagus granchifolia), white elm (Ulmus americanus), basswood and red ash (Fraxinus pennsylvanica), this zone marks the northern limit of trees such as the tulip tree (Liriodendron tulipifera), cucumber tree (Magnolia acuminata), pawpaw (Asimina triloba), black oak (Quercus velutima), black walnut (Juglans nigra) and sycamore (Platanus occidentalis) (Hoise 1973:21).

According to Charlevoix (1761:152), the Neutral spent more time hunting and were less sedentry than the Huron. Trigger (1969:18) feels that Neutral settlements may have been fairly small and dispersed in order to maximize hunting efficiency. However, the early missionaries mention only two visits to the country of the Neutral so ethnohistoric information is limited. Direct trade with Europeans may have been withheld from the

Neutral by the Huron (Hunt 1940:56-57; Trigger 1976:2:736; Wright 1963:11-12). The first European contact with the Neutrals was made by Recollet Father Daillon in 1627 (LeClerq 1973:2:263-272). Daillon claimed that he stayed in the village of a great man:

> This man is the chief of the greatest credit and authority that has (ever) been in all these nations, for he is not only chief of his village, but of all those of his nation, composed of (in number) 28 towns, cities, and villages, made like those in the Huron country, and also of several little hamlets of 7 of 8 cabins, built in various parts convenient for fishing, hunting, or agriculture (LeClercq 1973:265-266).

This statement has been used by archaeologists to assert that the Neutral had chiefdoms (Jamieson 1981; Noble 1978). The next visit was in 1640 when Jesuits Brebeuf and Chaumonot travelled through 18 of the 40 Neutral villages. The only significant difference they noted between Huron and Neutral house structures was that the Neutral dead remained in the longhouse longer than Huron dead, often over an entire winter (Thwaites 1959:21:199).

The Neutral are thought to have been a confederacy of up to nine tribes (Noble 1978:156). The Neutral confederacy was defeated by the Five Nations Iroquois in A.D. 1651. Neutral homeless sought refuge among their enemies as had the Huron. In one instance, Jesuit Father Fremin described a Seneca village composed of Huron and Neutral (Thwaites 1959:54:81).

In conclusion, the sequence of Iroquois cultural development devised by Wright (1966) has undergone few revisions. By the onset of the Early Ontario Iroquois stage, horticultural villages were well established. The geographically restricted Glen Meyer and Pickering groups both practised corn horticulture and inhabited small nucleated villages. The Middle Ontario Iroquois stage commences with the fusion of the Glen Meyer and Pickering cultures, and is characterized by widespread cultural homogeneity.

The historic Huron and Neutral shared many cultural traits. The main differences were in geographic location and subsistence orientations. The Neutral inhabited the warmer Deciduous Forest biotic region and their subsistence pattern may have been geared more toward the hunt. The Huron, on the other hand, were situated in a prime trading location, close to the Algonquian (source of the prized beaver pelts) and the Europeans. Indeed, the Huron probably felt the effects of Eurpoean presence before the Neutral.

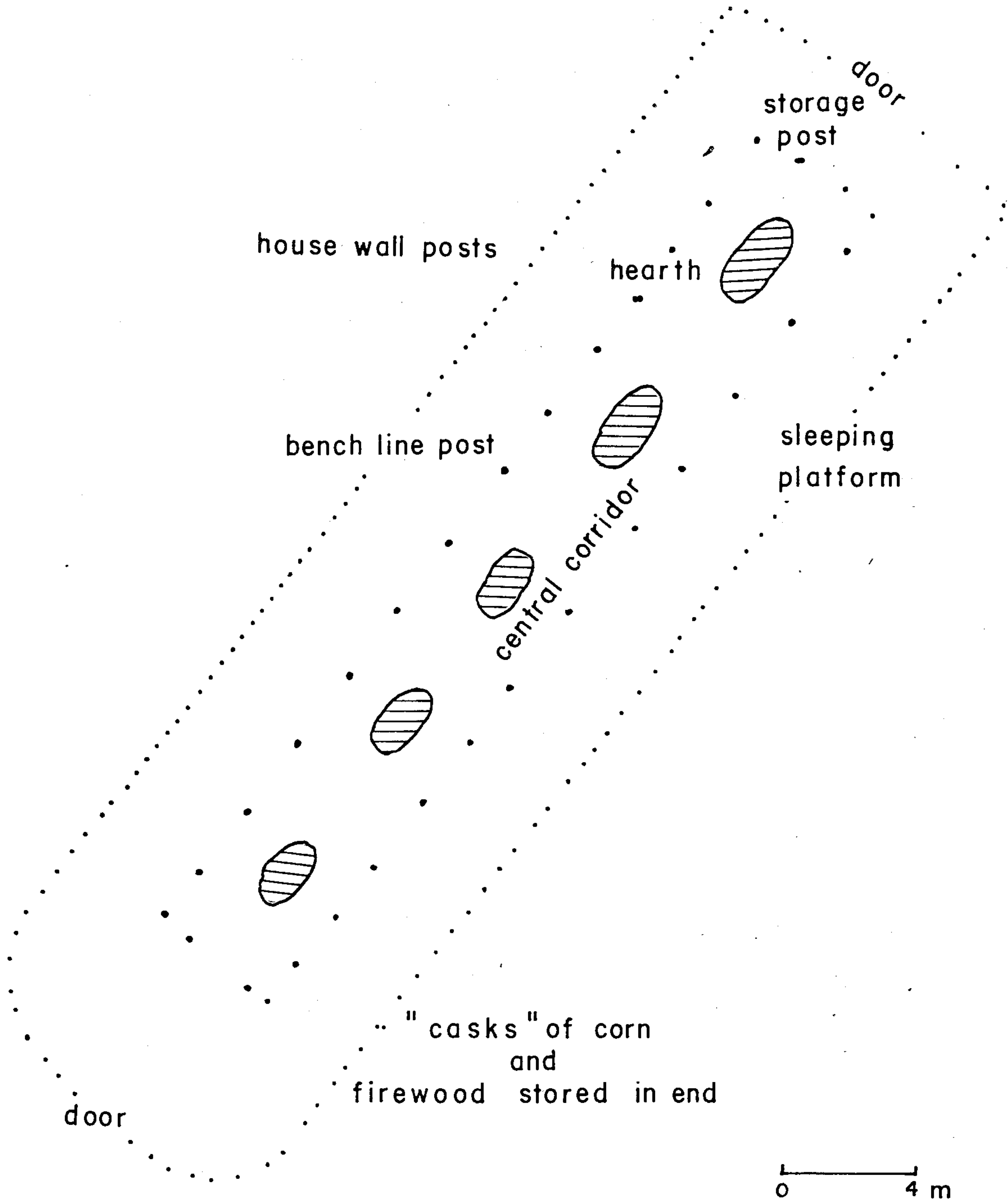
III. The Longhouse

In the preceding chapter the developmental sequence of Ontario Iroquois culture was summarized and the Huron and Neutral tribes of the Historic period were introduced. This chapter is concerned with ethnohistoric accounts and anthropological interpretations of longhouses.

The Ethnohistoric Longhouse

Ethnohistoric documents play a large role in the interpretation of Historic and Prehistoric Huron culture. The following is a brief summation of the Iroquoian longhouse as gleaned from ethnohistoric accounts to the mid 17th century and supplemented by later ethnographic sources. Appendix A provides a complete transcription of relevent ethnohistoric documents pertaining to the longhouse and a comparison with excavated longhouses of the Historic period. Fig. 4 is a representation of a typical longhouse, as described by the early chroniclers.

Fig. 4: Idealized Longhouse Floor Plan Based on Ethnohistoric Documents



There was apparently general unanimity among early 17th Century explorers and missionaries that Iroquoian houses were totally covered with large bark sheets (Biggar 1929:3:133; Jameson 1909:141; Thwaites 1959:10:93, 14:75, 15:153, 17:17, 18:17, 23:145, 35:173, 38:247, 42:139,159, 43:176; Wrong 1939:95), except for a smoke hole opening along the midline of the roof (Biggar 1929:3:124; Thwaites 1959:8:107; 18:17; Wrong 1939:95). Cedar (Thuja occidentalis) was considered the best bark covering (Thwaites 1959:8:105, 13:45,14:43), although ash, elm, or spruce (Picea) were also used (Thwaites 1959:8:105). Apparently by A.D. 1664 scarcity of cedar necessitated the use of these alternatives more frequently (Boucher 1883:105).

The fronts of lodges were often painted with figures of birds, men, and "beasts" in red or black colours (Jameson 1909:149; O'Challaghan 1850:11; Thwaites 1959:10:47; Wrong 1939:98). These figures have been interpreted as clan totems (Noble 1968).

Few early observers were much concerned with actual methods of construction. Lalemant mentioned walls and roofs of bent poles (Thwaites 1959:17:17), while Bressani noted that the bark covering was held in place by beams (Thwaites 1959:8:247). Although van den Bogaert interpreted Mohawk houses as being "mostly flat at the top" (Jamieson 1909:141) most authors could find no comparable European structures other than the arbors or bowers in their gardens (Biggar 1929:3:123; Thwaites 1959:8:105, 15:153, 17:175; Wrong 1939:93). Some house entranceways were sheltered by a small roof (Thwaites 1959:16:241), and the two doors (Thwaites 1959:19:221), one at each end, were usually open to all visitors (Thwaites 1959:16:241).

Iroquoian cabins were described as "long, wide and high in proportion" (Thwaites 1959:15:153). Specific lengths ranged anywhere from 2 brasses (3.1-3.7 m) (Thwaites 1959:8:107) to 100 paces (76.2-106.7 m) (Jameson 1909:141,144,145), with the most often cited length being 25 fathoms (38.1-45.7 m) or 50 paces (38.1-53.4 m) (Biggar 1924:156; Biggar 1929:3:123; Jamieson 1909:142; Wrong 1939:93). Certain cabins, normally those of the civil chiefs or war captains (Thwaites 1959:13:59), were especially long to accomodate large crowds assembled for council meetings, feasts, and games, and also to house visiting dignitaries, such as missionaries (Coyne 1903:25; Jogues 1977:38; Thwaites 1959:8:93, 10:181,233,251, 13:59,193, 15:173, 18:19, 39:65, 42:87,95,115, 47:77; Wrong 1939:115,149,161).

Longhouse widths were more uniform. Initial observers estimated longhouse width to be around 6 fathoms (9.2-11.0 m) or 12 to 13 paces (9.1-12.8 to 9.9-13.9 m) (Biggar 1924:156; Biggar 1929:3:133; Wrong 1939:93) although Brebeuf calculated their breadth to be 4 brasses (6.1-7.3 m) (Thwaites 1959:8:107). These lodges were apparently as high as they were wide (Thwaites 1959:8:107).

Hearths were located along the length of the centre of the house. For each hearth there were said to be two families (Biggar 1929:3:123; Thwaites 1959:16:234; Wrong 1939:94). The number of hearths depended on the number of families (Thwaites 1959:17:175-177), varying from 4 or 5 (Thwaites 1959:15:153, 16:234) to 12 (Biggar 1929:3:123).

Large logs for burning in the central hearths, and "casks" of corn were stored at one (Biggar 1929:3:125) or both ends (Thwaites 1959:21:285; Wrong 1939:94). Corn and fish were hung from the roof (Biggar 1924:157; Wrong 1939:95).

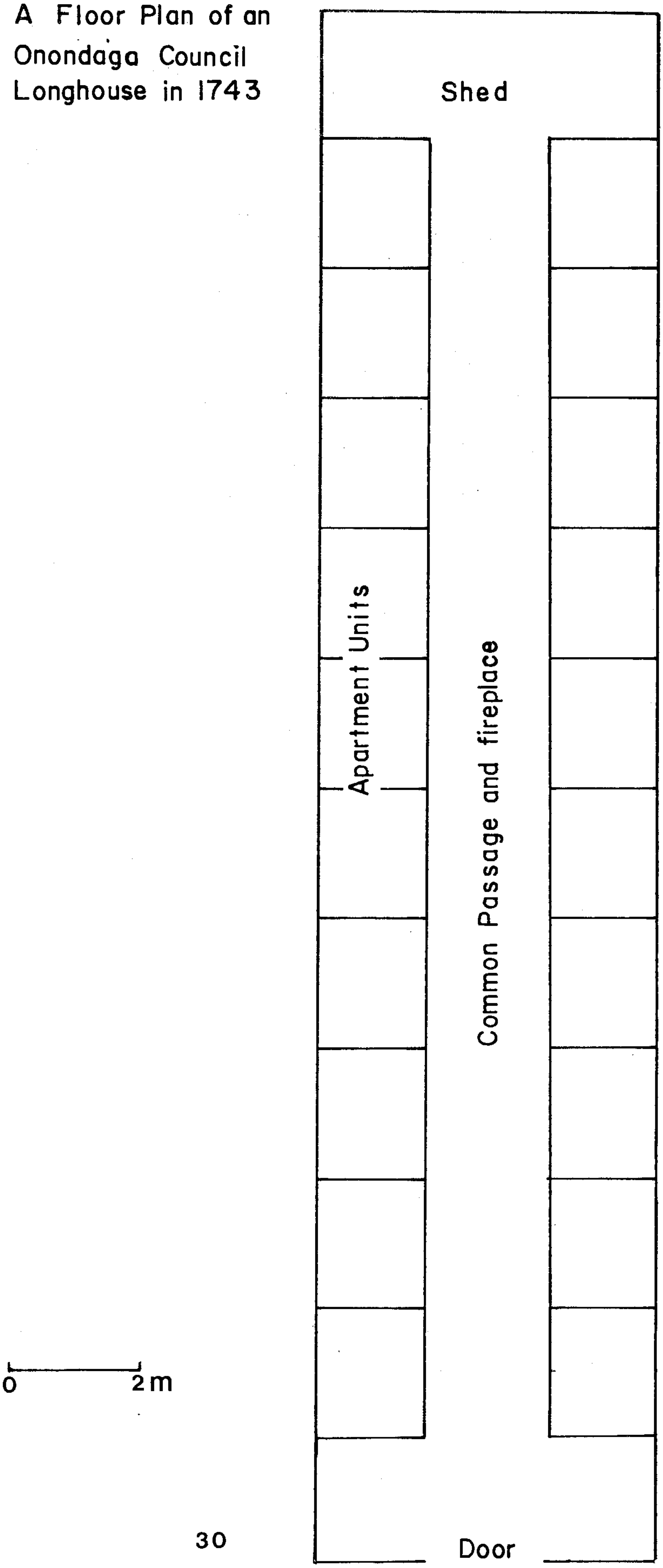
Cartier states: "And inside these houses are many rooms and chambers ...afterwards the men retire to the above-mentioned quarters with their wives and children " (Biggar 1924:126). Van den Bogaert also notes the presence of "inside doors" (Jamieson 1909:141). On the contrary, the later missionaries saw no different stories, garrets, cellars, rooms, closets, or apartments (Sagard 1636:1:237; Thwaites 8:107, 18:17, 35:153). Still, sections of the longhouse could be partitioned off, for instance, to hide a sick child from Jesuit baptismal rites (Thwaites 1959:13:121), or to fast in fulfillment of a dream (Thwaites 1959:13:227).

A "sort of platform" (Jamieson 1909:149; Thwaites 1959:8:107, 10:187, 13:61, 17:203), or "poles...laid and suspended the whole length of the cabin" (Thwaites 1959:17:203-205) "as high as the roof" (Thwaites 1959:10:187) was used to seat large crowds viewing a game of plum stone, or the torture of a captive. These platforms were raised 1.2 to 1.5 m (4 to 5 feet) off the ground (Biggar 1929:3:123; Wrong 1939:93), and the space beneath was used to store a winter's supply of firewood (Thwaites 1959:8:107-109; Wrong 1939:94). The 3.1 to 3.7 m (10 to 12 feet) wide central corridor was the focus of longhouse activities including cooking, eating (Jamieson 1909:144; Thwaites 1959:15:153, 16:243), and sleeping (Biggar 1924:247; Biggar 1929:3:123; Thwaites 1959:17:203, 38:247; Wrong 1939:93). Sweatbathing (Thwaites 1959:13:203, 38:247; Wrong 1939:93), and raising bears and buzzards for feasts (Thwaites 1959:13:61,97) were other activities carried out in the longhouse.

Chroniclers of the 18th Century were more explicit in their descriptions of longhouses. These more detailed narratives have often been used to describe Iroquoian longhouses instead of the earlier accounts. For example, Bartram's 1751 account of an Onondaga council house has been reproduced as the typical longhouse in works by Morgan (1881), Douglas (1939), Rapoport (1969), and Guidoni (1975), and is represented here in Fig. 5. Lafitau's 1724 description of Mohawk longhouses on a reserve near Montreal is another account frequently referred to when detailing Iroquoian longhouses.

The basic similarity between accounts of the 17th and 18th Centuries is in the description of longhouses as arbour shaped (Boucher 1883:54; Fenton and Moore 1974:2:19; Quaife 1962:9). Important dissimilarities included type of bark used, house length, and interior house organization.

Fig. 5: A Floor Plan of an Onondaga Council Longhouse in 1743



after Morgan (1881)

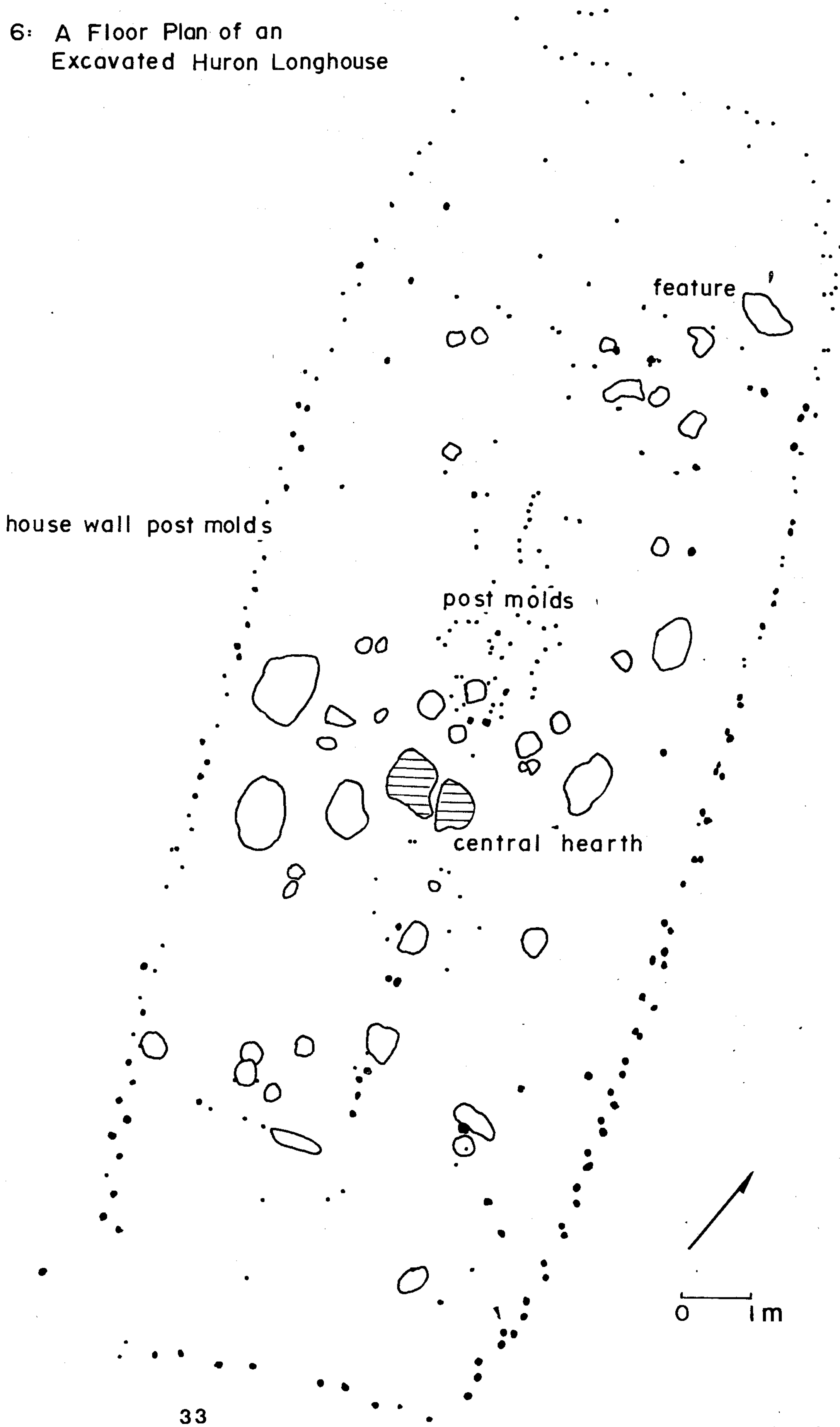
By the 18th century only elm bark was mentioned as the house covering material (Fenton & Moore 1974:2:19; Lahontan 1703:2:417). The cabins of the 1700's were smaller, estimated at 3.7 m (12 feet) (Wallace 1945:93), 5.2 m (17 feet) (Bartram 1966:40) and 7.3 or 7.6 m (24 or 25 feet) long (Fenton and Moore 1974:2:19; Lahontan 1703:2:417). Accounts of the mid 17th and 18th Centuries also invariably reported the existence of apartment units utilized by individual families (Bartram 1966:41; Fenton & Moore 1974:2:21; Lahontan 1703:2:418; Quaife 1962:9). This decrease in house size and addition of partitioned apartment units may reflect increasing European influence on Iroquoian culture.

A Brief Comparison between Ethnohistoric and Archaeological Longhouses

As the above summary suggests little attention was paid to Iroquoian house structures by 17th Century European chroniclers. In addition, it appears that ethnohistoric longhouse descriptions were often inaccurate. (A further elaboration of this statement is provided in Appendix A). Figure 6 is a floor plan drawing of an archaeologically excavated Huron longhouse. As this figure indicates many longhouse characteristics detailed by missionaries are often not recovered archaeologically. These incongruities have led some archaeologists to suggest that certain longhouse attributes may have been restricted to certain nations. For example, Noble (1968) is of the opinion that bunklines may not have been characteristic of Rock Nation houses.

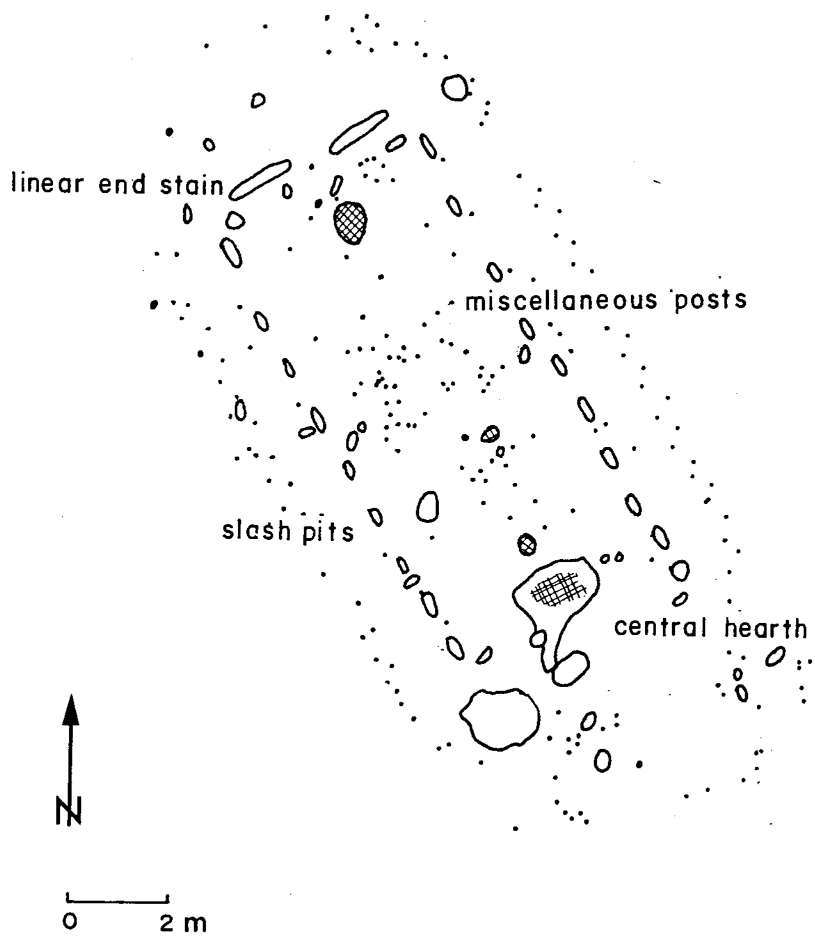
Figure 7 is a floor plan drawing of an archaeologically excavated Neutral longhouse. Missionaries mention no differences between Huron and Neutral house styles, however dissimilarites are readily apparent in archaeological floor plans. For example, Neutral houses often have "slash pit" and "linear end" features in place of bench and storage line posts. It is thought that these features contained wooden planks used to separate the central corridor from the storage and bench areas, and may have also partitioned the house into family apartment units (Fitzgerald 1981; Lennox 1978, 1981).

Fig. 6: A Floor Plan of an Excavated Huron Longhouse



after Knight and Snyder (1982)

Fig. 7: Floor Plan of an Excavated Neutral Longhouse



after Lennox (1978)

Anthropological Interpretations of Longhouses

In the following section, theories on the use and development of longhouses worldwide, and among Iroquoians in particular, will be briefly discussed. These theories will provide the framework for hypotheses to be stated and tested in the succeeding chapter.

Ethnograhphic Longhouse Studies

Dwelling shape has been the focus of many cross-cultural studies on primitive architecture. A circular dwelling form is said to provide maximum heat retention, most resistence to wind, and encompass the greatest amount of volume for the smallest amount of area (Fitch and Branch 1960). Generally, rectilinear houses are said to be associated with more sedentary, resource-rich communities (Hunter-Anderson 1977:312; Robbins 1966:7; Simonsen 1972:188; Whiting and Ayres 1968:133). Apparently rectilinear houses are more readily enlarged in order to accomodate extra storage space and additional people (Flannery 1972; Hunter-Anderson 1977).

There are several possible explanations for the use of longhouses. As Rapoport (1969:32) notes, the longhouse is often thought of as a survival unit when communal living is considered necessary for survival. Three of the most often mentioned benefits of communal longhouse living are: mutual defence (Wallace 1971:68), subsistence cooperation (Wallace 1971:86), and lineage associations (Trigger 1968:58). A survey of ethnographic sources indicates longhouses are not always occupied by related and/or corporate groups. For example, the Land Dayak live in extremely long houses, and yet each individual, unrelated family unit acts independently of its neighbours. In this instance, the primary reason for cohabitation is thought to be economic, constructing one longhouse instead of several nuclear family houses reduces the amount of material and time necessary for construction (Wallace 1971:86).

Throughout the world native house styles changed rapidly under the influence of European culture (Cranstone 1972:501). For example, houses often changed from circular to rectangular in plan, apparently as a symbol of urban life (Prussin 1969:35; Walton 1956:142). Among the Guarani of Paraguay, houses decreased in size (Schaden 1962:35), while among other South American tribes the longhouse disappeared altogether. The Christian Garo of the Assam region in India began to build squarer and shorter dwellings. The reason accorded these changes are: "to be different" and, because the Christian Garo no longer hold feasts they have no need for the longer houses (Burling 1963:315).

Iroquoian Longhouse Studies

Longhouses have usually been interpreted as developing in response to the formation of the lineage, specifically the matrilinage (Noble 1969:18). The Iroquoian longhouse has also been interpreted as being occupied by the corporate group, loosely based on kinship groupings (Hayden 1976, 1978, 1982). Hayden describes the residential corporate group as the living unit involved in economic production under a "titular head" (Hayden 1976:9). He suggests that this status difference is manifested in the disproportionate distribution of posts and features within the longhouse, assuming that feature and post density are indicative of feasting and other ritual activities performed by the head familiy (Hayden 1976:8).

Among the New York Iroquois, longhouses attained maximum length in the 15th Century. Whallon (1968:241) equates increase in house dimensions to a rise in population resulting from the late addition of beans and squash to the diet. However, Tuck (1978:328) relates the increase in size of New York Iroquois houses through time to endemic warfare.

Tuck (1971:328) attributes the late decline in the length of Onondaga houses to the diminishing power of the matrilineage. This apparently resulted from the formation of the League of Five Nations around A.D. 1400, which lead to a decrease in village endogamy, and a breakdown in the matrilocal residence pattern. However, Englebrecht (1972:12) associates the increase in pottery homogeniety and decrease in longhouse length with increased trade, rather than with the formation of the League.

Among the Ontario Iroquois, the prehistoric sequence of longhouse development is not well defined. Noble (1975b:42) states that houses reached maximum length in immediate post-Middleport times. Hayden (1982:151) feels that the growth of the Ontario Iroquois longhouse is associated with differential control of resources such as land and trade. Hayden (1982:149) and Noble (1975b:42) attribute the reduction in size of longhouses to European influence on native culture during the Late Protohistoric period. Hayden (1982:149) suggests that this decrease in house length may be related to a weakening in the power of the corporate elite as trade goods became available to everyone.

Anthropological Interpretations of Villages

Ethnographic Village Studies

In this section theories concerning the layout and variations of houses within villages, and within Iroquoian villages in particular, will be briefly summarized. An overview of theories on village planning provides a framework for the formalization of hypotheses in the next chapter.

Village Plan

Generally, village plan is thought to be associated with local topography and climate, and also with socio-political organization. Settlement plan is often determined by features of the landscape (Whiting and Ayers 1968:126). Where such considerations are not important, the plan of the settlement will correspond to the shape of the dwellings. Fraser (1968:47) maintains that the major factor in determining house layout is social relationships and that an organized village plan is related to the complexity of the economic situation (e.g., villages of hunters and gathers are the most flexible).

The presence or absence of a palisade could affect village plan (Noble 1969:19; Rowlands 1972:460; Trigger 1976:1:146). If the enclosure constricts space, some sort of organized effort at village planning would be required.

Intra-Village Variations

Similarity of house styles within a village is said to be a reflection of restrictions imposed by building materials, the communal nature of house building and, more importantly, group identity and social cohesiveness (Pussin 1969:115). When different tribes or bands unite in one village the newcomers may copy the style of the original residents (Fraser 1968:12), or they may retain their own house style (Williams 1968:169). According to Hodder (1979), different groups in close contact and competition for the same resources may strive to assert their ethnicity, or maintain social or political boundaries through variations in house plan or interior house organization.

Among the Kachin of Burma clans or lingeages may or may not be localized in the village (Leach 1954:121). Among South American tribes, such as the Kalapalo of Brazil clans/lineages are not localized within the village (Basso 1975:48), whereas among the Apinaye clans are spatially segregated within the village (Nimuendaju 1967:21).

Longhouse length may reflect the wealth and/or status of the occupants (Burling 1963; Hayden 1982; Kaplan 1975; Leach 1954). For example, among the Caroline Islanders, the chief's residence is larger than the commoners' dwelling (Alkire 1970:18-20). According to Burling (1963:481), the best single indicator of political and economic status amoung the Garo of Assam is house length; in other respects their houses are remarkably similar. Among the Piaroa of the Orinoco, the poor people live in small houses, and wealth is associated with the number of people living together in one house (Kaplan 1975:30). Hayden (1982:138-139) states that, among 150 highland Mayan households he studied, the wealthier households have, on average, more living space than the poorer households.

Hayden (1976:5) maintains that during times of shortage or times of plenty people will more readily associate with the economically more viable households than with deprived households. He points to the numerous extensions to Iroquoian longhouses as reflective of this type of flexible, economically oriented house membership that grows or declines depending on the wealth and status of the corporate head.

Archaeological Village Studies

The establishment of villages is usually thought to be associated with increasing reliance on a stable and reliable resource subsistence base which required an increase in the cooperative labour force, a permanent location for the storage and maintenance of surplus foodstuffs, and protection of the cultivated fields from raiders (Blouet 1972:4; Flannery 1972:28; Trigham 1972:469). In Ontario, the village is thought to have been established ca. A.D. 500 (Noble 1975b:37).

Noble (1975:38) defines an archaeological village site by the following criteria:

1. Size: a site of 0.2 to 5.0 hectares is labelled a village, anything larger is a town;
2. The presence of midden deposit as opposed to a random scatter of debris; and,
3. Nucleated settlement of contemporary dwellings.

Sear's (1956:46) definition of villages includes the added criterion of definite village plan.

Village Plan

Palisades on Iroquoian sites are usually interpreted as defensive structures (Noble 1969:19). However, it has also been suggested that the palisade could serve to protect villagers from marauding animals (Latta 1980) or the destructive force of the wind (Fox 1976). It may also act as a barrier to reinforce village identity (Rowlands 1972:448,459).

Longhouse Orientations

Preferred house orientation has been associated with cosmological religious beliefs (Rapoport 1969:51), socio-political groupings (Sangmeister 1951), and environmental factors. The last explanation is particularly favoured by researchers studying longhouses of the Linear Pottery culture of Neolithic Europe. Marshall (1979, 1980) has discerned similarities in house construction and orientation between the axially pitched trapezoidal houses of Enga Province, Papua New Guinea and Linear Pottery culture longhouses. He asserts that both groups placed the narrow end of the house into the prevailing wind to assure maximum heat retention and smoke ventilation.

Sangmeister (1951) hypothesized that minor variations in Linear Pottery culture longhouse orientations may be useful in chronologically ordering the occupation sequence of a village. Milisauska (1972:62) tried this approach but was not convinced of its usefulness, preferring instead to cluster the houses of one occupational level on the basis of house structure and pottery content. Soudsky (1969:73) argued that variations in orientation of plus or minus 5 degrees are of no import, whereas orientations fluctuating 10 to 15 degrees from the norm are significant reflections of changes in the environment, especially wind directions.

Among Ontario researchers the sole study of orientations was done by Norcliffe and Heidenreich (1974). Their figures indicate that, for the Huron, the preferred orientation was to the west of north. They infer that this was the direction of the prevailing wind during the winter. Trigger (1969:59) states that Huron houses were oriented to the northeast, often with the narrow end facing into the prevailing wind to prevent fire spreading to adjacent buildings or house collapse.

Variation in Longhouses of an Iroquoian Village

Iroquoian houses aligned parallel to one another are usually assumed to be contemporaneous (Tuck 1971:61), representing a clustering of affiliated relatives (Wagner,Toombs, and Riegert 1973:9). In fact, Noble (1969:19, 1975b:40) associates appearance of houses parallel to one another with the "crystallization" of the matrilineage. Houses grouped together may mirror the village clan segment or moiety organization (Trigger 1969:60).

The Iroquoian longhouse is said to be composed of matrilocal extended families (Noble 1968, 1969), perhaps even a clan segment (Tuck 1978:328). The longhouse nuclear family is thought to be the basic unit of production. Longhouse length is thought to vary in response to the number of occupants (Heidenreich 1971:115; Fenton 1978:303). In fact, Emerson (1961) maintains that house length grew in increments of 9.2 m, and Fenton (1978:303) says in multiples of 7.6 m. Hearths have often been used as indicators of longhouse population, based on the missionary count of two families per hearth (Emerson 1961:7, Heidenreich 1971:118 1972:48, Fenton 1978:303).

Summary

The most frequently observed longhouse traits include an arbour shape, outer bark covering, internal storage partition cubicles, platforms, and two families per hearth. Eighteenth Century descriptions of longhouses often conflict with earlier accounts, describing them as being shorter and containing separate apartment units.

A general survey of ethnographic sources indicates that the main advantage of rectangular buildings is that they can be readily extended to make more storage or living space. The reasons usually given for living in longhouses are because they offer protection, a pooled labour force, or clan/lineage associations. Among the New York Iroquois houses reach maximum size during the 15th Century A.D. and decline thereafter. Population growth due to the addition of beans and squash to their diet is one reason suggested for the increase in longhouse length. Later decline in house length is thought to be associated with increased movement between the separate tribes resulting in a decrease in the power of the matrilineage.

Among the Ontario Iroquois, house length is thought to have reached maximum size during the 16th Century and declined in the Late Protohistoric period as a result of European influence.

IV. Hypotheses, Data, and Analyses

In this chapter, hypotheses will be formulated concerning the prehistoric sequence of longhouse development, evolution of village planning, and regional variations, based on theories and data outlined in preceding chapters. A sample of 417 longhouses from 50 Ontario Iroquois sites will be used to test these hypotheses. Measurements of archaeological floor plan attributes will be calculated, and the results will be tested for statistical signficance.

Hypotheses

The fundamental assumption of this thesis is that the longhouse is an integral part and centre of Iroquoian culture, and that its form and arrangement in villages reflect various aspects of social, political, and economic organization, as well as environmental factors. Given this assumption, changes through time in construction method or house interior organization may provide information regarding the development of Iroquoian society. Across space, variations in longhouse layout may parallel geographic or ethnic boundaries. Specific hypotheses will be discussed under four broad headings: general trends in longhouse form; development of longhouses and villages; intra-village longhouse variations; and regional longhouse variations.

General Trends in Longhouse Form

Longhouse Symmetry

Norcliffe and Heidenreich (1974:22) suggest that longhouses were oriented into the prevailing winter wind to maximize heat retention, and Linear Pottery culture archaeologists state that end walls facing into the wind were more tapered (Marshall 1979, 1981; Soudsky 1972). In this thesis, the hypothesis that deviations in longhouse symmetry are indicative of concern for the effects of the wind will be tested. If concern for the destructive forces of the wind was a factor in house construction then archaeological longhouses may display differential tapering on the end facing into the wind. Also, the windward end (or in some cases side) wall may have been composed of a greater number of posts than the leeward wall.

According to the 17th Century observers, each hearth along the length of the central corridor was used by two families. Assuming that each family maintained their own living and working space (e.g., for the preparation and cooking of food), features and posts molds should be distributed equally on either side of the midline and between central hearths.

Longhouse Correlations

According to ethnohistoric documents, house length is associated with the number of occupants (Thwaites 1959:15:153; Wrong 1939:93). Therefore, if house length is determined by number of occupants, and hearth number correlated with number of families then the longer the house the greater the number of hearths.

According to ethnographic information, longer houses and a greater amount of interior house space per household are symbols of the occupants' wealth/status in the community (Hayden 1982; Leach 1954). Therefore, distance between hearths/families should also increase as house length increases.

Hayden (1976) suggests that if longhouse residential units were flexible. Members would join longhouses depending on the status of the head family. Therefore, if this theory is correct, houses with extensions should be the larger houses of the village, assuming that extensions represent additions to house length and that house length is associated with wealth.

Development of the Longhouse and the Village

Development of Longhouses

The hypothesis that longhouses reach maximun extent during the Protohistoric period, as suggested by Noble (1975b) will be tested. If, as supposed by Noble (1975b) and Whallon (1968), this increase in length is associated with an increase in population due to a stable subsistence economy (horticulture), then all houses of each village should demonstrate a concurrent increase in length. Also, length should be associated with hearth number rather than hearth spacing.

However, both Hayden (1976) and Tuck (1978) suggest that house length increases with a disproportional increase in the power of a few families, who controlled access to status/wealth positions, either through the ownership of land or trade routes (Hayden 1976), or through warfare (Tuck 1978). If this hypothesis is true, then houses should increase disproportionately and not uniformly.

Further, the hypothesis that Ontario Iroquois longhouses began to decline in the Late Protohisoric period (Hayden 1979, 1982; Noble 1975b), will be examined. This decline in house size is thought to be associated with a breakdown in trading monopolies formerly controlled by a few families (Hayden 1982).

Given this hypothesis, longhouses should return to a more uniform size following contact.

Development of Villages

Orientation

Norcliffe and Heidenreich (1974) using a sample of 96 Ontario Iroquois longhouses, state that Ontario Iroquois longhouses were preferentially oriented into the prevailing winter NW-SE wind. Only Early Ontario Iroquois houses did not follow this pattern. The authors suggest this "non-conformity" may mean that purposeful orientation of houses into prevailing winds was not fully developed until the Late Ontario Iroquois stage. In this thesis, the hypothesis that Late Ontario Iroquois houses were oriented to the NW, and that Early Ontario Iroquois houses were randomly oriented will be tested.

Village Plan

Villages of the Historic period were said to be occupied for approximately nine years (Thwaites 1959:19:133). It is hypothesized that such brief occupations did not represent the average life span of Ontario Iroquois villages. Instead, an expanding village population that resulted in depletion of wood supplies and/or soil fertiltiy was the main cause for these more frequent relocations. In comparison, prehistoric Iroquoian societies should have been relatively stable and therefore villages were probably occupied longer. This should be demonstrated archaeologically in a decrease, through time, in the density of features and posts, assuming feature and post mold densities are related to length of occupation.

Intra-Village Longhouse Variations

The Ball site is a late Protohistoric - Historic village and will be used to test for significant intra-village variations in length classes, orientation clusters, and interior house organization differences. It is generally assumed that parallel aligned houses denote the presence of lineages (Noble 1968, 1975a, 1975b). Ethnographic information suggests that villages may be divided into distinct clan segments (Nimuendaju 1967). Therefore, it is hypothesized that orientation clusters may mirror lineage or clan segments, and that these clans may have built their own style of longhouse.

According to Hodder (1979) groups in close contact may try to maintain their separate identity by ridgid enforcement of dress styles or house layout. Assuming that village expansions represent an influx of people from another area, then a comparison of houses in the original village with those in the new expansion may indicate differences in house styles (e.g., house shape, or internal refinements).

The early chroniclers described longhouses as containing at least four central hearths, storage partitions, and side wall benches. However, as Noble (1968) observed, ethnohistoric descriptions do not always match archaeological longhouse data. Upon first arrival in Huronia the missionaries, as valued guests, stayed with village chiefs. Therefore, it is hypothesized that the Jesuits were describing these longer dwellings and not the average Huron longhouse.

Regional Longhouses

According to the Jesuits, the Neutral, who inhabited a warmer region of southwestern Ontario, were more reliant on the hunt than were the Huron. Therefore, it is hypothesized that differences in geographic location, and subsistence will also be manifested in dwelling styles. These variations in house style are expected to be most pronounced during the Late Ontario Iroquois stage due centuries of _in situ_ regional development.

The Sample

The Sites

The sample consists of 50 sites (Fig. 8) containing, in sum, 417 longhouses. Appendix B provides a short description of the sites. Table 2 lists the number of sites and longhouses in the sample, arranged by estimated period of occupation and cultural affiliation.

The major problem with the sample is the disproportionate number of Protohistoric and Historic longhouses, since an overwhelming 314 houses (75.30% of the sample) span the years from A.D. 1450 to 1650. The data are weakest for the Middleport substage which provides only 7.34% of the sample. This figure reflects not only the tendency of Ontario archaeologists to focus on later sites, but also the larger size of these sites and therefore the larger number of houses.

Another major problem with the data base is irregularity in both quantity and quality of longhouse information. Several of the longhouses, particularly those excavated many years ago, are represented only in terms of their external house wall characteristics. Feature and post mold information have often been misplaced and, in many cases where the field notes were retrieved, the feature information was of limited utility since often few dimensions were recorded.

Key to Figure 8

■ Pickering

1. Auda
2. Richardson
3. Boys
4. Miller
5. Bennett
6. Gunby

□ Glen Meyer

7. Porteous
8. Calvert
9. Dewaele
10. Van Besian
11. Force
12. Kelly
13. Reid

▲ Uren - Middleport

14. Uren
15. Nodwell
16. Crawford Lake
17. Unic
18. Chypchar
19. Slack Caswell
20. Moyer

● Huron

21. Draper
22. McLeod
23. McKenzie
24. Seed
25. Coulter
26. Kirche
27. Benson
28. Sopher
29. Hardrock
30. Copeland
31. Ball
32. Warminister
33. Alonzo
34. Maurice
35. Robitaille
36. Lecaron
42. Cleveland
43. Fonger
44. Christianson
45. Thorold
46. Walker
47. Hood
48. Boggle I
49. Boggle II
50. Hamilton

○ Neutral

37. Southwald
38. Lawson
39. Smallman
40. Ronto
41. Windemere

Fig. 8: Location of Sites Used in Sample

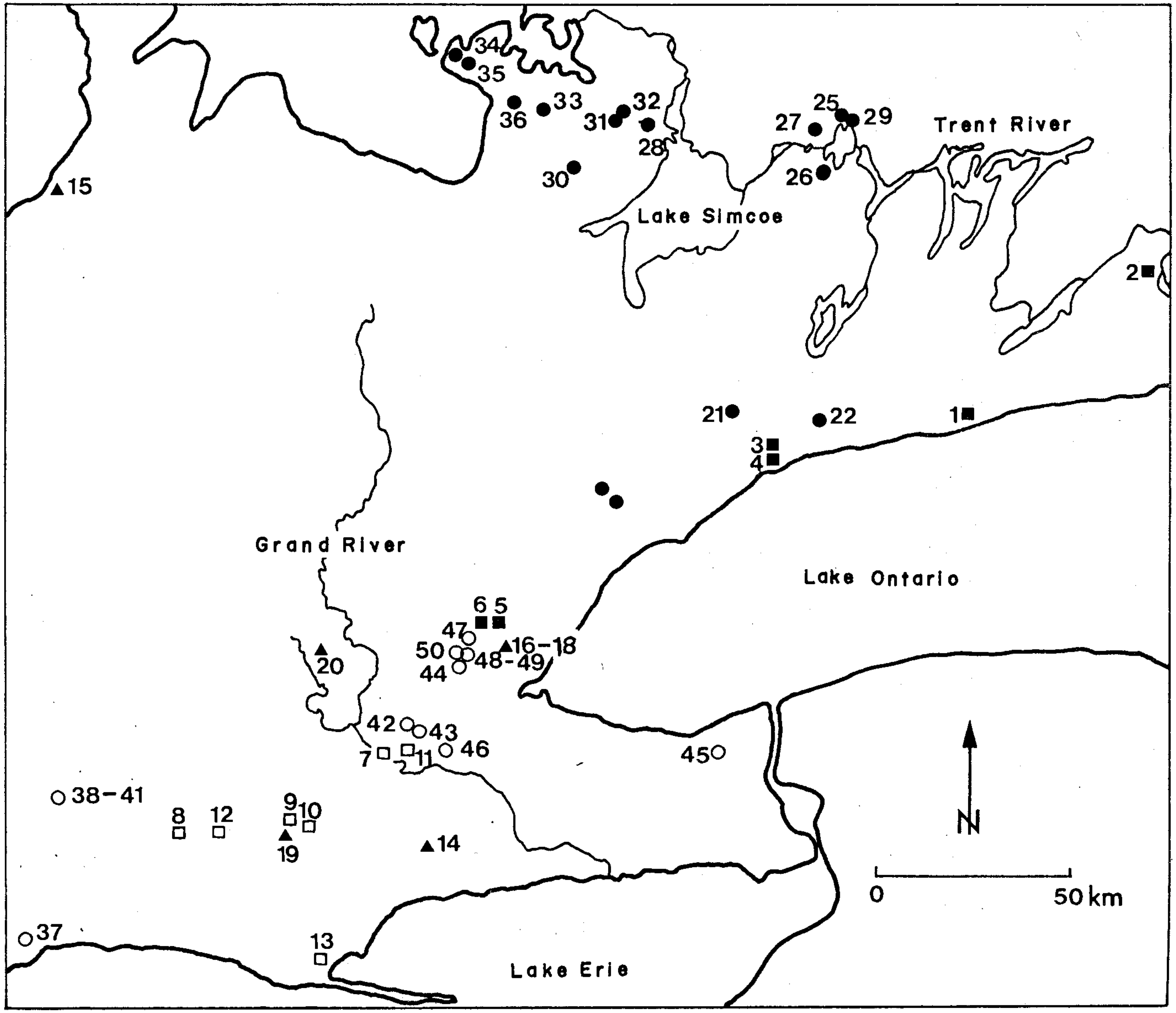


Table 2: Sites and Longhouses Considered in the Study.

	# of sites	%	# of houses	%
years A.D.:				
700-1300	13	26.0	62	14.9
1300-1450	7	14.0	41	9.8
1450-1609	18	36.0	199	47.7
1610-1650	12	24.0	115	27.6
total	50	100.0	417	100.0
by culture:				
Pickering	6	12.0	32	7.7
Glen Meyer	7	14.0	30	7.2
Uren	1	2.0	10	2.4
Middleport	6	12.0	31	7.4
PreHistoric Huron	11	22.0	158	37.9
PreHistoric Neutral	7	14.0	41	9.8
Historic Huron	5	10.0	67	16.1
Historic Neutral	7	14.0	48	11.5
total	50	100.0	417	100.0

The manner in which Iroquoian sites have been excavated also affects the sample. There are three basic approaches to the excavation of village sites: to uncover the entire site; to open a small area completely; or, to trench across the site. The first method requires either a large labour pool, money, and several years, or a bulldozer. Exposing as much of the site as possible permits the excavator to analyze the settlement pattern as a whole, including relationships between juxtaposed longhouses and between clusters of houses. This approach is rarely attempted because of the costs necessary to open a village of 3 to 5 ha in size (e.g., the Draper and Ball sites).

On a smaller scale, when the budget and available time are limited, some researchers have opted to excavate only a small portion of the village completely (e.g., the Warminister, Boggle I, and Unick sites). This permits the excavator to study the plan of that segment and the internal organization of those houses, but the rest of the village remains unknown.

The final method - to trench across the site, "chasing" house outlines and palisade rows wherever encountered - is frequently employed. This method provides a general idea of village layout, and longhouse size, but information on internal longhouse structuring is scarce (e.g., the Coulter, Kirche, Benson, Chypchar, Crawford, and Moyer sites).

Only a few houses have been carefully excavated in sub-units, screening all overburden (e.g., the Robitaille, Draper 1 and 2, and Slack Caswell houses). In each of these cases the deposits over the site were relatively undisturbed, and the excavator wished to take advantage of a rare opportunity to analyze interior house subgroupings. Unfortunately this method of excavation is time consuming. This fact, coupled with the Jesuit statement that house floors were often swept clean, has meant that detailed excavation is not usually considered a worthwhile endeavor, particularly on disturbed (ploughed) sites. As a result, the distribution of artifacts, the relation between artifacts and features, and the location of possible activity areas within longhouses have not been thoroughly investigated.

Longhouse Attributes

Only a small proportion, approximately 133 (31.8%) of the 418 houses in this sample, were completely excavated. Hence piecemeal information had to be extracted from various site reports. Orientation, house width, and house length were most often recorded. All other attributes were far less frequently observed. Table 3 provides a list of the analytical and categorical variables and the method of taking the measurements. In the section that follows these variables will be discussed in greater detail.

Table 3: Description of Longhouse Attributes.

House Wall Characteristics (Fig. 9)

1. House Length (in m)
   a. House length, maximum length of the house, measured from inside house wall posts.
   b. Original length of house prior to extensions.

2. Extension Length (in m)

   Length of house extension, measured from outside house post of original wall to inside house wall post of extended end.

3. House Midline Width (in m)

   House width measured as close to midline of house as possible, from inside house wall posts.

4. House End Width (in m)
   a. Width of northernmost end wall, measured at end of the house, from where the side walls begin to taper.
   b. Width of southernmost end wall.
   c. Mean width of house end walls.

5. Difference between Midline and End Widths (%)

   The difference between house width at midline and average end width, multiplied by 100.

Table 3 (cont'd)

6. Linear Taper Length (in m)

   a. Length of the taper on the northernmost side wall, north corner of north end, measured from where the side wall begins to curve into the end wall.

   b. Length of taper on the southernmost side wall, south corner of north end.

   c. Mean length of taper on north end.

   d. Length of taper on northernmost side wall, north corner of south end.

   e. Length of taper on southermost side wall, south corner of south end.

   f. Mean length of taper on south end wall.

   g. Mean length of taper for house end walls.

7. House Wall Post Mold Number

   a. Number of posts in north side wall, counted to the points where the side wall begins to taper.

   b. Number of posts in south side wall.

   c. Number of posts in north end wall, counted from the points where the side wall begins to taper.

   d. Number of posts in south end wall.

Table 3 (cont'd)

8. House Wall Post Mold Density

   a. Density of posts per m of north side wall.

   b. Density of posts per m of south side wall.

   c. Density of posts per m of north end wall.

   e. Density of posts per m of south end wall.

9. House Wall Post Mold Diameter (in cm)

   Mean diamter of post molds in house wall.

Interior House Attributes (Fig. 10)

10. Storage Cubicle Length (in m)

   a. Distance from the inside posts of the north house wall to: (1) a line of posts; or linear end stains; or (2) the point where corridor features begin; or (3) where storage features end.

   b. Length of the storage cubicle in the south end.

   c. Total storage cubicle space for the house.

   d. Storage Partition Posts/Linear End Stains

      i. Absent

      ii. Present

11. Bench Width (in m)

   a. Distance from the inside north house wall posts and a line of posts or slash pits parallel to the house wall

   b. Distance between the south house wall and the line of posts parallel to the wall.

Table 3 (cont'd)

12. Corridor Length (in m)

   c. Bench Line Posts/Slash Pits

      i. Absent

      ii. Present

   Distance between the storage cubicles.

13. Corridor Width (in m)

   Distance between bench lines.

14. Central Hearths

   a. Distance from the tip of the northernmost hearth to the north end, measured in m.

   b. Distance from the tip of the southernmost hearth to the south end, measured in m.

   c. Mean distance between central hearths, measured in m from the outer edges of the hearths

   d. Hearth number.

15. Feature Number

   a. Number of features in the central corridor.

   b. Number of features in the north storage cubicle.

   c. Number of features in the south storage cubicle.

   d. Number of features behind the north bench line.

   e. Number of features behind the south bench line.

Table 3 (cont'd)

16. Feature Density

a. Density of features within 4 sq. m of the middle of the central corridor, centred on a hearth if possible.

b. Density of features within 4 sq. m of the north end of the central corricor, centred on a hearth wherever possible.

c. Density of features within 4 sq. m of the south end of the central corridor, centred on a hearth wherever possible.

d. Density of features in the northernmost half a longhouse, lengthwise.

e. Density of features in the southernmost half a longhouse, lengthwise.

f. General density of features in the house.

17. Distribution of Storage Features (features >25 cm deep)

a. Storage Cubicle Features

i. Absent

ii. Present

b. Storage Features in Corridor and Bench Area

i. Few or no storage features.

ii. Mainly behind the bench line.

iii. Mainly in the central corridor.

iv. In both regions.

Table 3 (cont'd)

18. Interior House Post Mold Number

   a. Number of post molds in the central corridor.
   b. Number of post molds in the north storage cubicle.
   c. Number of post molds in the south storage cubicle.
   d. Number of post molds behind the north bench line.
   e. Number of post molds behind the south bench line.

19. Post Mold Density

   a. Density of post molds within 4 sq. m of the middle of the central corridor, centred on a hearth wherever possible.
   b. Density of post molds within 4 sq. m of the north end to the central corridor, centred on a hearth wherever possible.
   c. Density of post molds within 4 sq. m of the south end of the central corridor, centred on a hearth wherever possible.
   d. General density of post molds per sq. m.
   e. General Post Density
      i. Few or none.
      ii. Many

20. Post Mold Diameter (in cm)

Mean Diameter of the interior house post molds.

Fig. 9: Method of Taking External House Wall Measurements

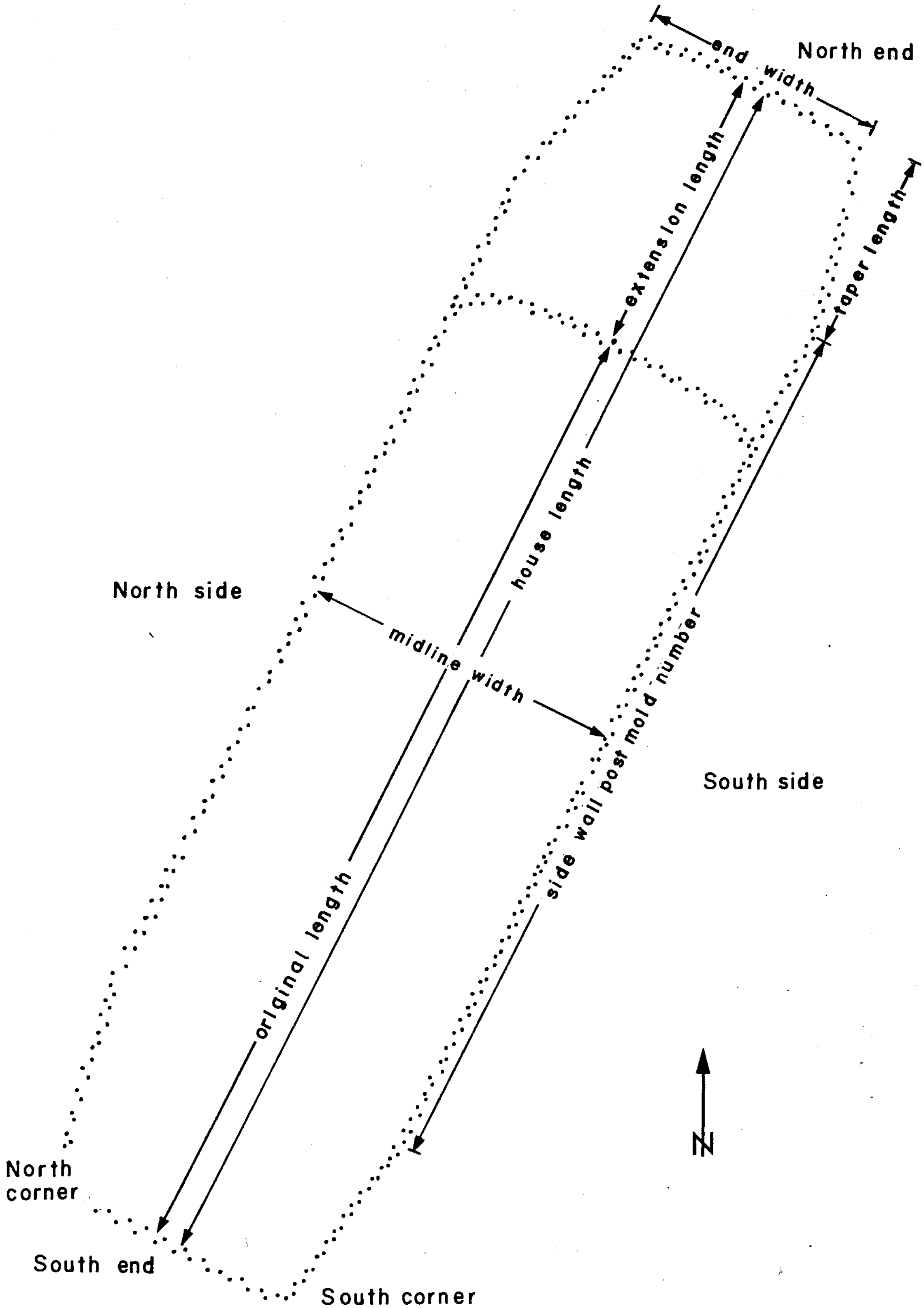
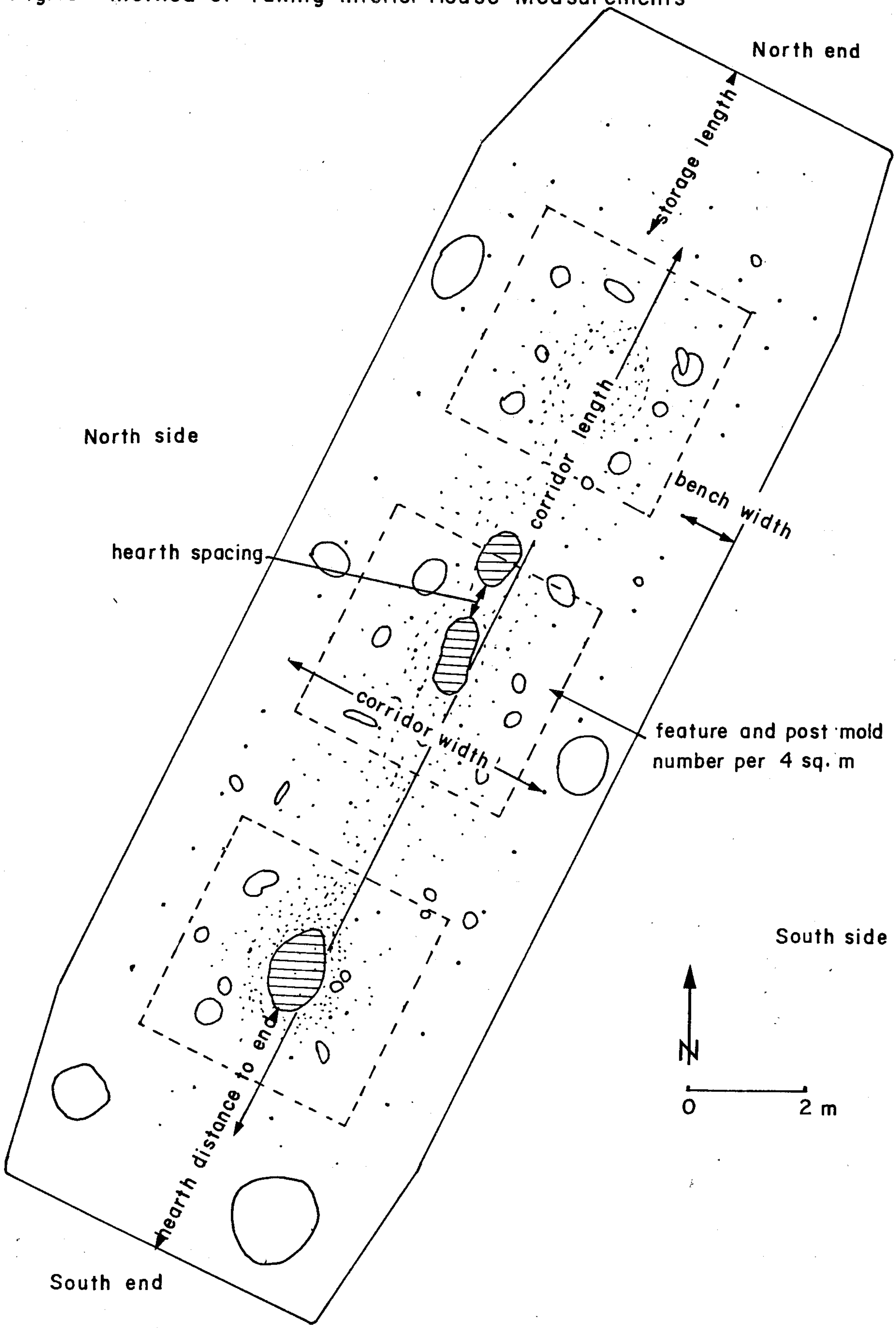


Fig. 10: Method of Taking Interior House Measurements



The variables will be discussed under the following headings: external shell, interior house organization, and village plan.

External Shell

Variables that comprise the external shell of the house are: (1) house length, (2) house width at the midline and at the ends, (3) linear taper length, (4) house side and end wall post mold densities, and (5) house wall post mold diameter (Fig. 9). Two measurements on house length were taken: (1) the original length prior to any subsequent extensions; (2) and the maximum length. The number and length of any extensions to the original length were also recorded. The presence of a double end wall is assumed to be an extension to house length for two reasons: First, in a majority of cases features overlay the interior end wall and, second, the only probable reason for reducing house length would be to maintain thermal efficiency. It is felt that this could be more easily accomplished by suspending skins or bark on a few poles or from the roof. Unfortunately, in the majority of cases is was impossible to determine if maximum length was original length, since relatively few houses were completely excavated. A majority of houses in this study were wall trenched only.

House width at the midline is, aside from orientation, the most commonly recorded archaeological longhouse attribute. This measurement was usually taken as close to the centre of the longhouse as possible; however, in several instances the centre of the longhouse could not be judged and so the measurement was taken wherever side walls were juxtaposed. The only difficulty encountered in measuring the width at the ends was with those houses that had highly convex termini which made defining end wall - side wall junctures somewhat difficult. The difference between the width at the midline and the ends is an index measure of the "rectangularity" of the structure (Ramsden 1977b).

The final shape measurement is linear taper length. Taper length was measured tangent to the side wall, at the point where the side wall began to curve toward the end wall. The length of house taper could be affected by the length of occupation and the depth of the plough zone.

Although categorical variables describing the shape of the ends and corners and the placement of doors were originally recorded, it was soon discovered that these are highly subjective. The decision to describe any given corner, for example, as "curved" instead of "bevelled" is judgmental and open to debate by another investigator. Identification of doorways on Iroquoian houses is often a matter of guesswork, since there are frequently so many gaps in house wall posts that any number of entrances could be envisioned. The Jesuits mentioned doors in one or both ends of the houses, thus any gap in the end wall is readily labelled a door, whereas it takes much firmer archaeological evidence before a gap in a side wall is accepted as a doorway. For these reasons, the variables concerned with shape of ends and corners and location and number of doorways were abandoned.

The number of wall posts per meter and post mold diameters were also recorded. There are several sources of possible error involved in these variables. Post counts may increase by the number of roots and burrows recorded as unverified posts in the field. Perhaps the most serious source of error is in disturbance of a site by ploughing. Snow (n.d.) has determined that plough action can diminish the size and number of posts recovered below the plough zone.

Internal Layout

Information to be obtained from internal organization includes: (1) the amount of end storage space, (2) the placement of storage pits, and, (3) feature and post mold densities throughout the longhouse. The corridor area is a zone of family activities delineated by side wall benches and end storage cubicles (Fig. 10). Again, there are problems in assessing bench lines and storage posts. Does one interpret any post positioned about 1 m from the side walls as a bench post, or only the larger ones? A line of posts or linear end stains several meters before the end walls are thought to delineate cubicles used for storage, as mentioned in the ethnohistoric records. Above-ground storage facilities may be indicated by a lack of miscellaneous features and post molds in the end areas. The distance between the last hearths at each end and the respective end walls was also measured. It is thought that this figure should correlate well with the length of the storage space at each end, since hearths would presumably be placed at a safe distance from the stored goods.

Hearth number and spacing are two variables presumably associated with the number of families and the amount of space allocated to each pair of families, assuming the ethnohistoric estimates to be correct. However, ploughing often eradicates any evidence of shallower hearths. As Hayden noted on the unploughed portion of the Draper site, many of the hearths were only 15 cm below the surface (1979:4).

Several density variables were recorded, including feature and post mold density for the entire house and for each subdivision (storage ends, benches, central corridor). In addition, in houses with central corridors at least 12 m long, the number of posts and features in each of three 4 sq. m units along the length of the corridor were counted. Four m sq. units were drawn around a centre hearth and two end hearths. In those cases where hearths were missing, a unit was arbitarially placed in the centre and one at each end of the central corridor. Feature and post mold densities may indicate increased length of occupation of any one house relative to another or any section of a housé relative to the other, or simply increased intensity of use. Again it must be noted that disturbance of a site by ploughing and the variable depths of the plowzone may affect the densities of interior house features, perhaps eradicating shallower posts and pits completely.

The Village Plan

Measurements of village planning attributes are presented in Table 4 and illustrated in Figure 11. Village original and maximum size, spacing between juxtaposed houses, and orientation are the analytical variables concerned with village plan. Since few villages were completely excavated, measurements on village size are estimates. Double or multiple palisades may denote expansions, contractions, overlapping villages, or contemporaneous but segregated communities. However, very few villages in this sample display double palisades and in each case (with the possible exception of Ball) the excavator found evidence of houses overlapping the palisade. Therefore, these double and multiple palisades are considered expansions to original village size.

Table 4: Village Plan Attributes

1. Village Size (ha)

   a. Original site size prior to any expansions

   b. Maximum site size, final size of the site

2. House Placement (m)

   a. Average distance of the spacing between juxtaposed houses of a village.

   b. Average distance of the spacing between opposing house end walls.

      General Distance between Houses.

      i. Close - house surrounded by other houses both sides.

      ii. Open - house in open, or with a house close on one side.

   d. Location of House

      i. House located in original core village.

      ii. House located in the first expansion.

      iii. House located in a later expansion.

   e. Overlaps

      i. None

      ii. House - house overlap.

      iii. House - palisade overlap.

Table 4 (cont'd)

3. Orientation (degrees east of north)

   a. Taken along the midline of houses, otherwise the measurement was taken from the side walls

   b. Orientation Groups

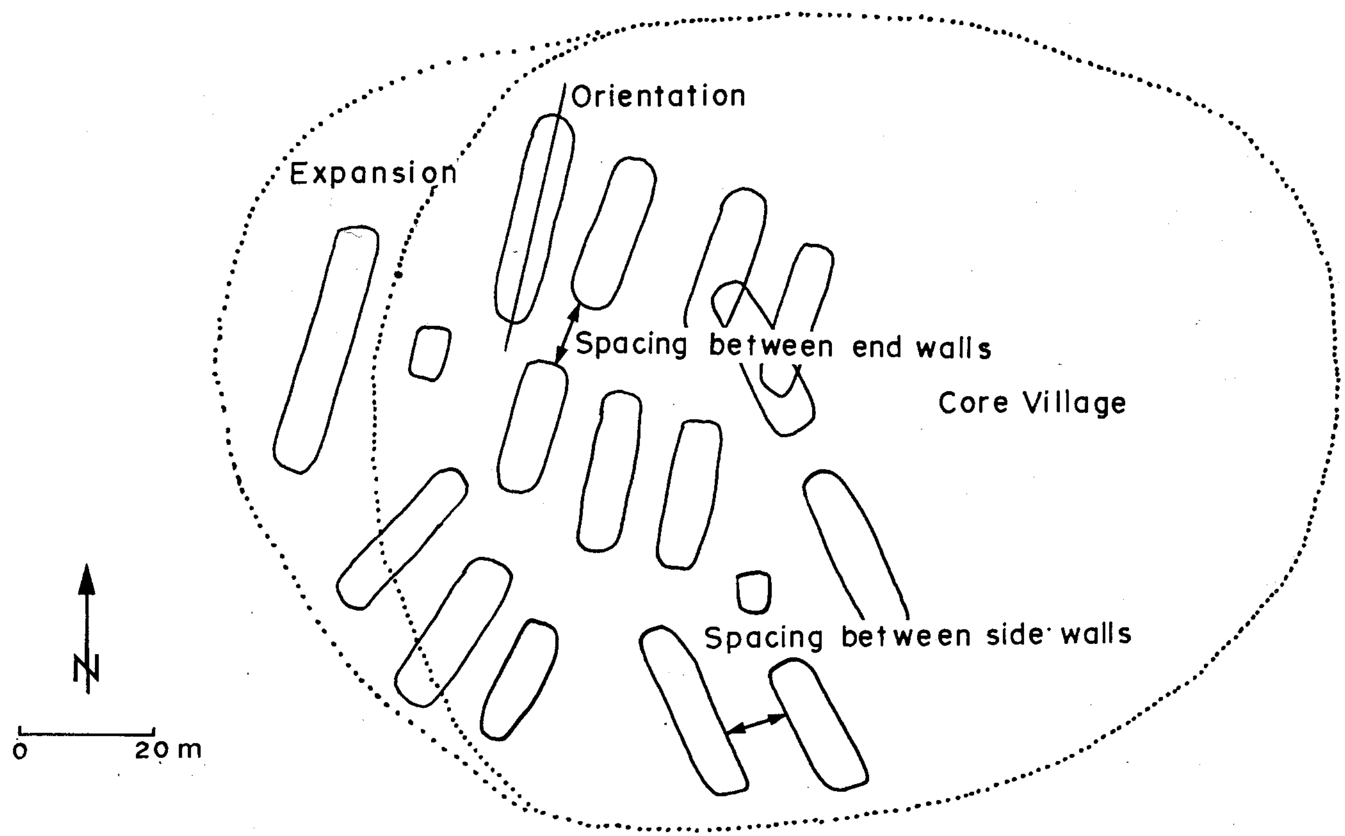
      i. Northeast (0-45 degrees east of north)

      ii. East-Northeast (46-90 degrees east of north)

      iii. West-Northwest (91-135 degrees east of north)

      iv. Northwest (136-180 degrees east of north)

Fig. 11: Method of Taking Village Plan Measurements



The Results

Statistical tests, primarily nonparametric, were used to assess significance of the data. In all cases significance was set at the 0.05 level. For a discussion of the statistical procedures involved see Blolock 1972, Fox and Guire 1976, Fox et. al. 1976 and Siegal 1956.

General Trends in Longhouse Form

Longhouse Symmetry

Paired student's t tests were used to analyze the symmetry of longhouses. The results presented in Appendix C, Table 1 indicate that there is little significant deviation between matched pairs of house attributes. House wall post densities are the same for each side wall; feature density is also the same, or does not significantly differ, on either side of the central hearths; nor is there any dissimilarity between linear taper or storage cubicle length, or width of end walls. Therefore, it would appear that houses were not constructed specifically to maximize heat retention, nor were walls buffered against the force of the wind. Although bark sheets or animal skins could have served this function.

The only significant differences in matched longhouse characteristics, at the 0.05 level, are between house wall post diameters and interior house post diameters and in the distribution of features and posts along the length of the central corridor. House wall posts are, on the average, larger than interior house post mold diameters. Features and posts are concentrated in the middle 4 sq. m of the central corridor and taper off toward the ends, whereas features and posts at the ends of central corridors do not significantly differ from one another. Therefore, while there is no difference in the number of features on either side of the central line of hearths, the density of features and posts is heaviest in the middle.

Attribute Correlations

In an effort to determine which longhouse variables were interrelated Pearson's Rank Order Correlation coefficient rho and Kendall's tau tests were run. The results are displayed in Appendix C, Table 2. According to the results, house length is apparently associated most strongly with the length of the end storage cubicles (Fig. 12), and moderately correlated with house midline width (Fig. 13), hearth number (Fig. 14), hearth/end walls spacing and spacing between consecutive hearths (Fig. 15), bench width, and length of the linear taper. This indicates that an increase in house length apparently is associated with a corresponding increase in house width, hearth number, and storage cubicle length. As Figures 12-15 indicate the relationship between house length and other variables is curvilinear. It would appear that house length increases at a faster rate than storage length. This may mean that: (1) the sample is biased; (2) extra space was built into longer houses to accomdate extra people not accounted for in permanent end storage (e.g., refugees or ambassadors); or (3) the foodstuffs were being stored elsewhere, such as along the rafters, or in individual family storage pits. The scatter plot of house length vs. house width indicates that unlike house length, width is restricted in maximum breadth. Therefore, house width is probably constricted by materials and method of construction. House length also increases faster than hearth number. This suggests that (1) the sample is too small, (2) there is more room for each family in the larger houses, or (3) there are more people per hearth.

Fig. 12: Scatter Plot of House Length vs. End Storage Cubicle Total Length

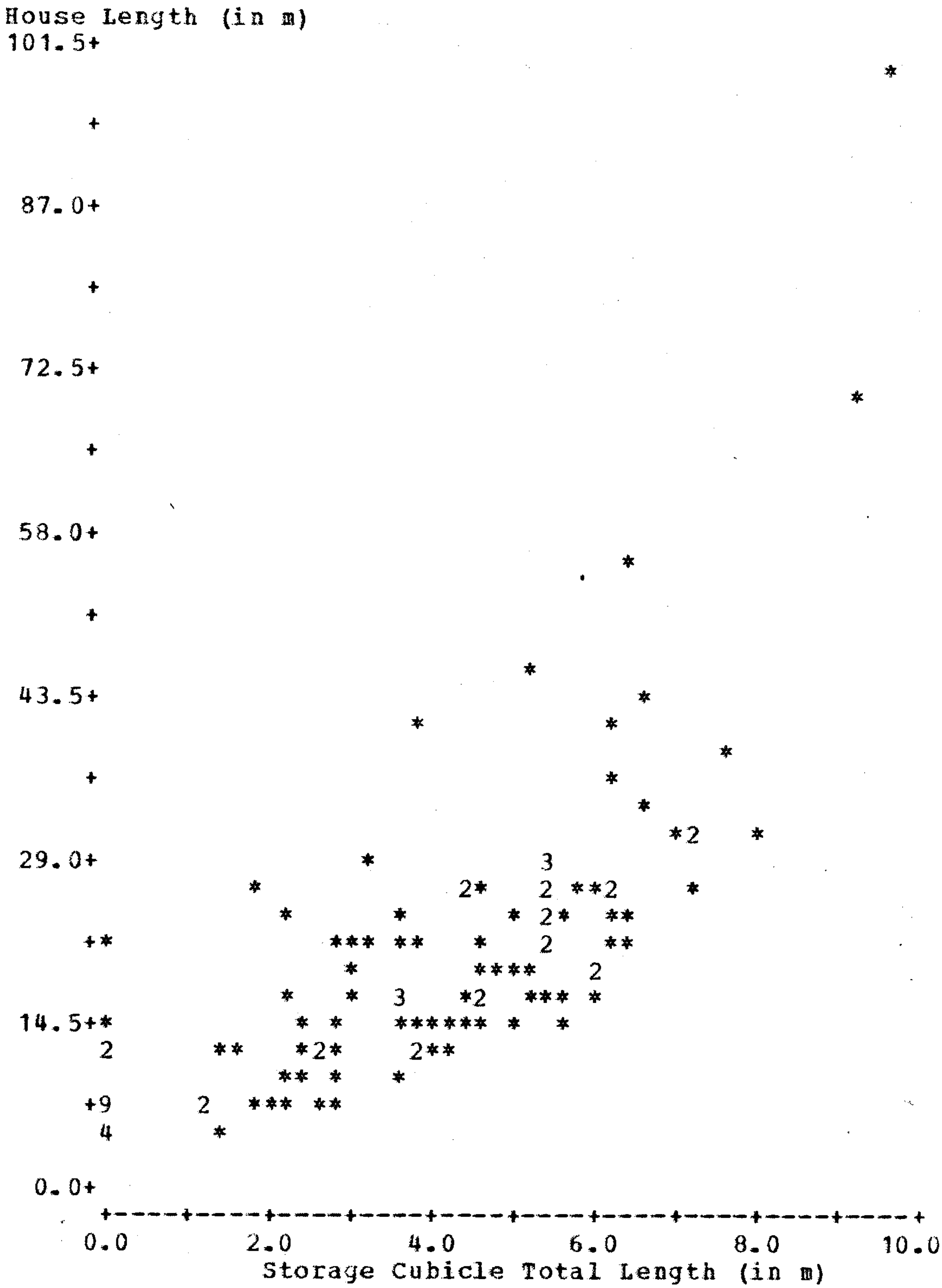


Fig. 13: Scatter Plot of House Length vs. House Width

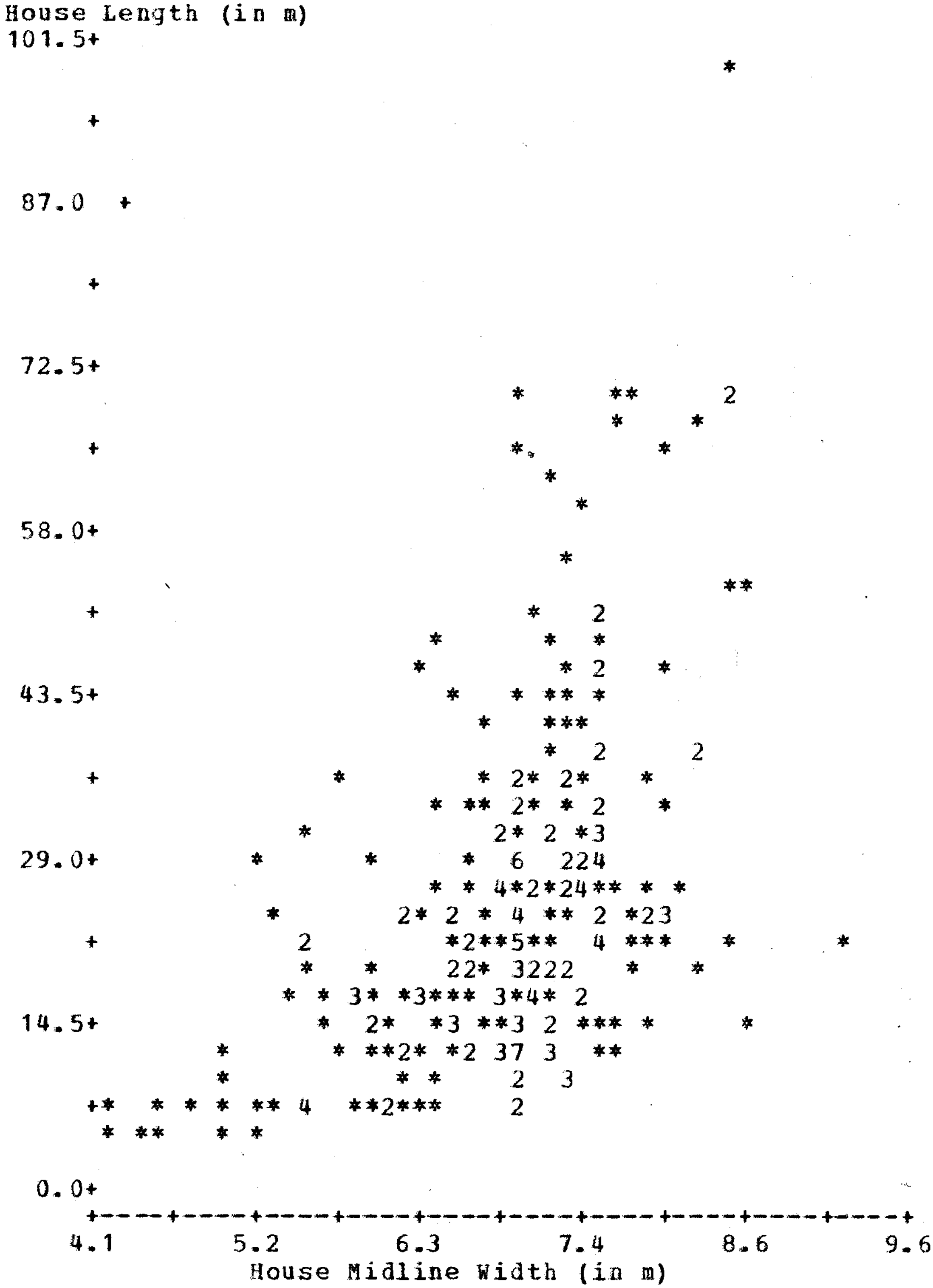


Fig. 14: Scatter Plot of House Length vs. Hearth Number

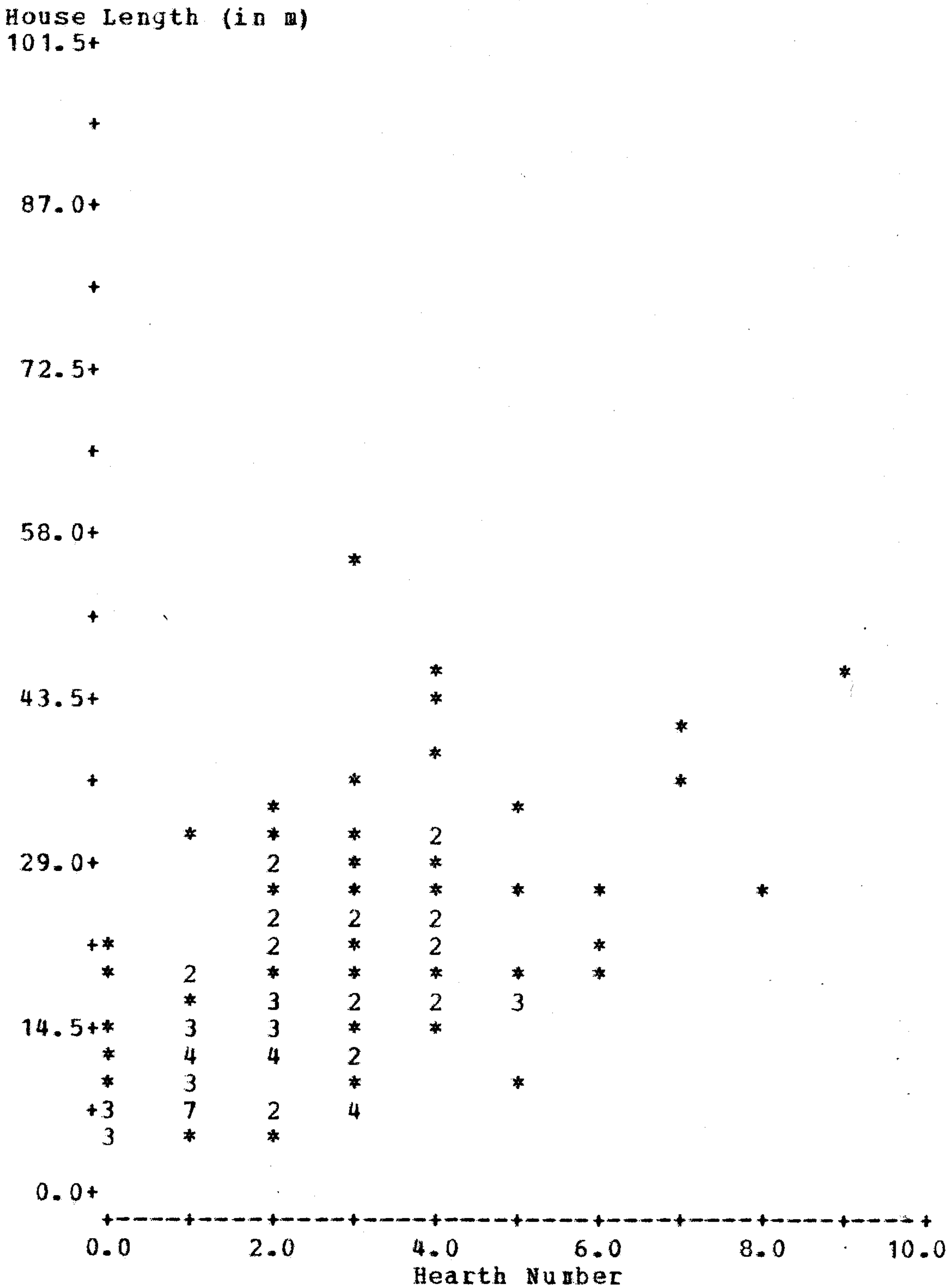
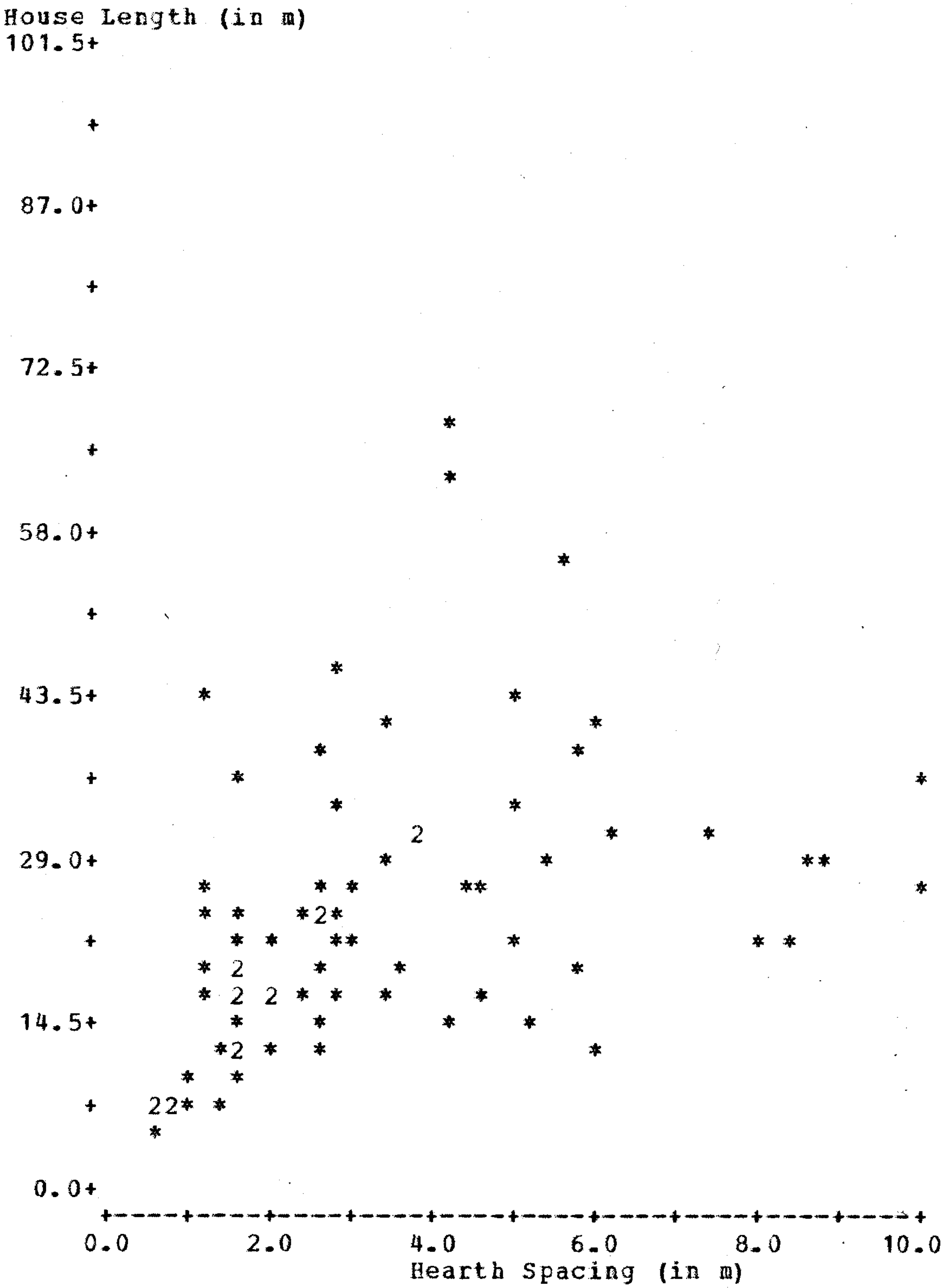


Fig. 15: Scatter Plot of House Length vs. Hearth Spacing



Spearman's rank order correlation coeffiecient rho also indicates that there is a significant, though moderate correlation between the length of houses and the length of the extension. Hence, the longer the house, the longer the extension. In addition, as Table 5 indicates, the longer houses appear to be more frequently extended, although a sample of 27 houses is too small to assess statistical significance.

House length is apparently unrelated to end wall width, feature or post mold density. The correlation between house width and other width measurements, aside from corridor width, is weak but positive. Density variables are all positively associated with each other. For example, an increase in corridor post mold density is apparently positively associated with an increase in central corridor feature density, and house wall post mold densities. This suggests that the density variables are all related to length of occupation.

Table 5: Comparison of Houses with and without Extensions.

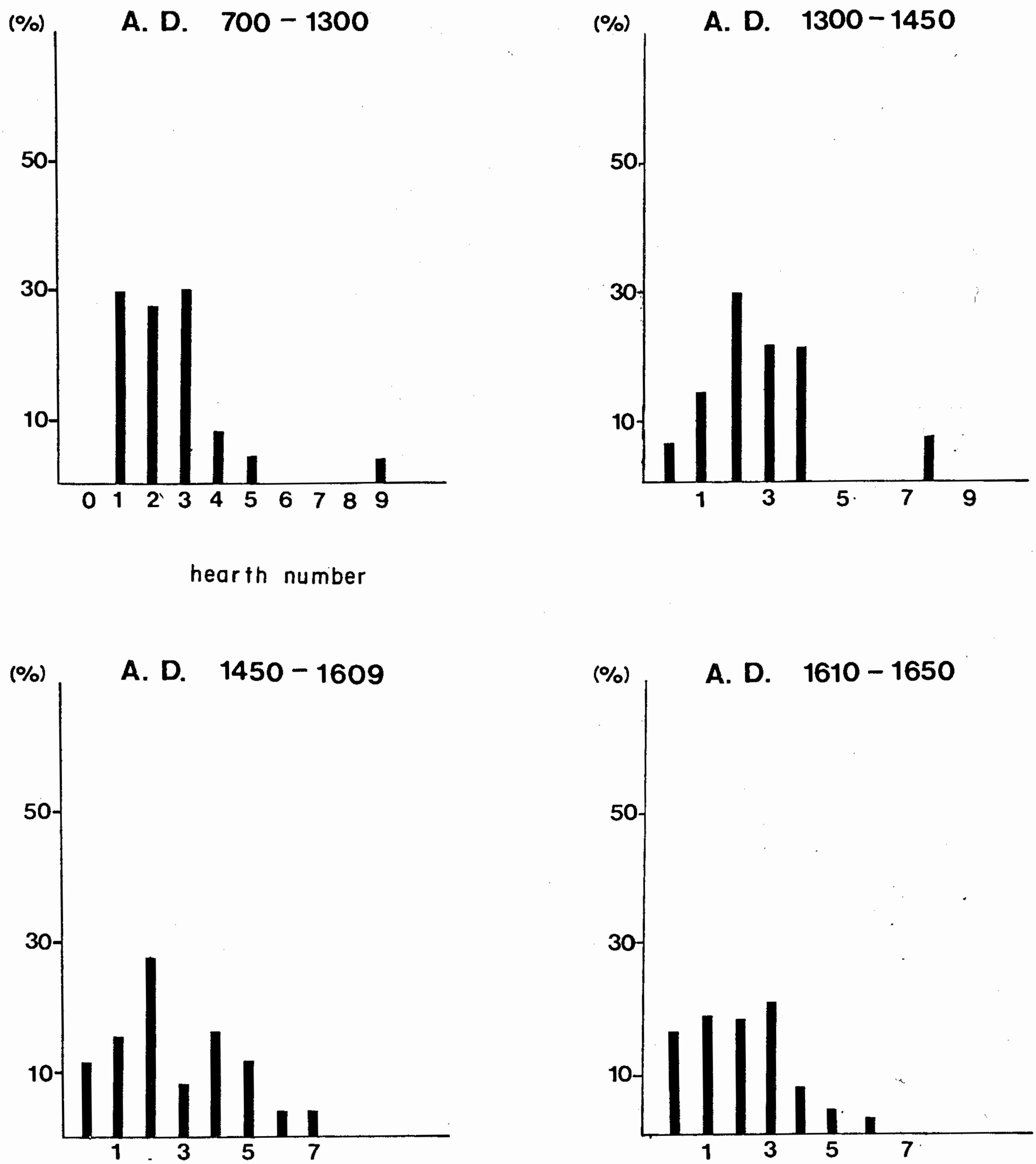
Time	n	range	mean	s
A.D. 700-1300				
Original length, no ext.	12	6.0-39.0	23.7	12.2
Original length, ext.	3	10.6-39.0	24.0	14.3
A.D. 1300-1450				
Original length, no ext.	12	5.0-39.0	23.7	12.2
Original length, ext.	4	25.0-76.5	44.7	21.8
A.D. 1450-1609				
Original length, no ext.	59	7.5-71.0	27.6	15.8
Original length, ext.	13	12.3-66.0	30.1	15.7
A.D. 1610-1650				
Original length, no ext.	67	5.5-40.4	18.0	8.2
Origianl length, ext.	6	14.7-26.1	20.1	2.7

Longhouse Development

Table 6 presents the sample means and standard deviations of longhouse attributes by time period. Kruskal-Wallis and Median statistics were used to test for significant differences in population distributions. The results suggest that a significant difference in distribution exists, and indicates that house length and associated variables increase in dimension until the 16th Century and thereafter diminish in size. Through time the Iroquoian longhouse underwent several changes in outline (Appendix C, Table 3a). Of the variables studied, only hearth number shows no statistically significant change through time. Hearth number remains fairly constant, averaging 2 to 3 hearths per longhouse. Therefore, although the number of hearths did increase through time, the increase was not significant at the 0.05 level (Fig. 16). This suggests that either (1) the results are biased due to a poor sample, and/or (2) the amount of space per family varied through time, and/or (3) there were more than two families per hearth.

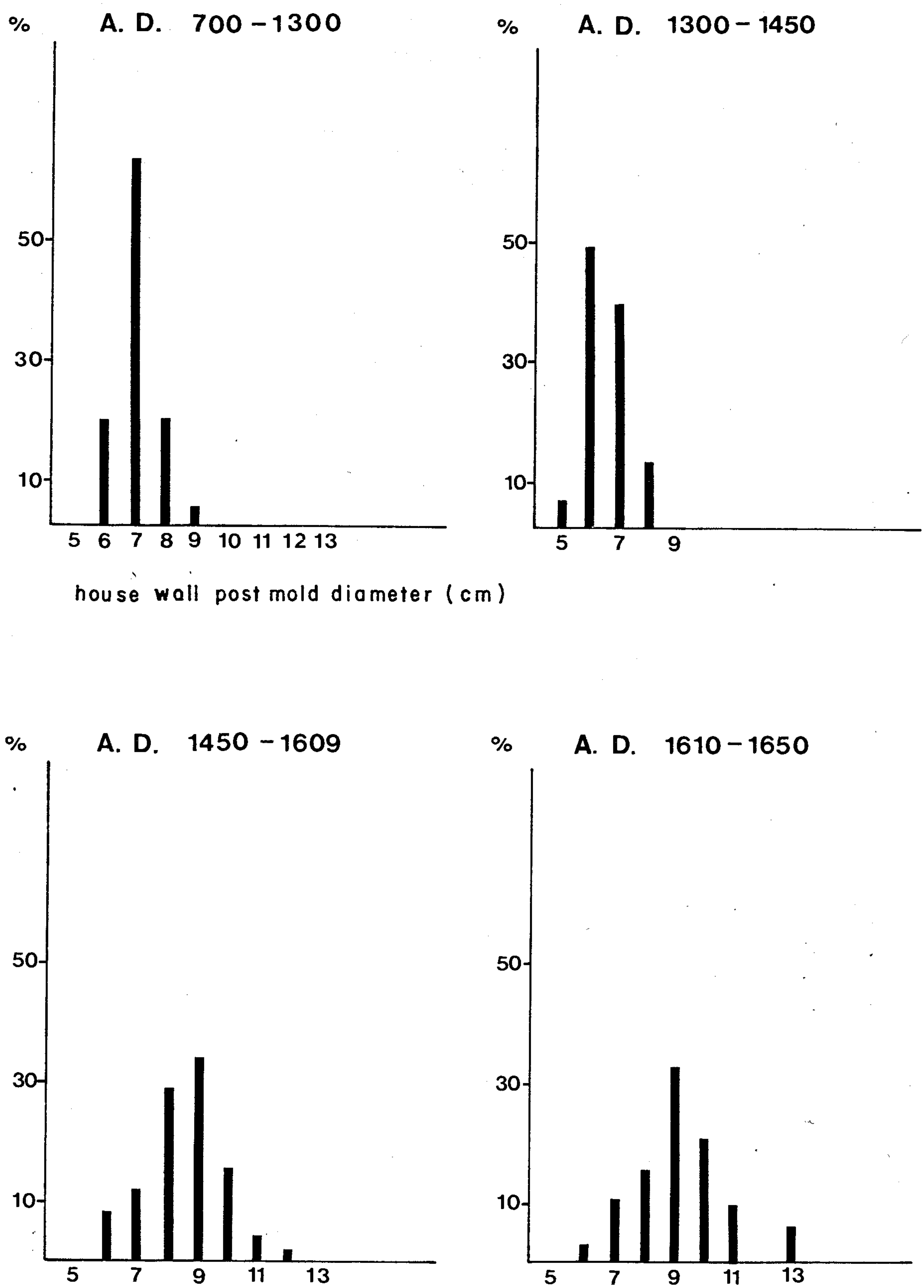
In general, of all longhouse attributes only house wall post diameter did not follow the basic pattern of maximum extent in the Middle Ontario Iroquois stage. Rather, house wall post diameters increased in circumference from an average of 6.8 cm in the earliest house to 9.1 cm in the Historic period sites (Fig. 17). This would suggest that houses became more structurally massive through time.

Fig. 16: Relative Frequency Distribution of Hearth Number by Time Period *



*(see Table 6 for n, $\bar{x}$, and s)

Fig.17: Relative Frequency of Wall Post Diameter by Time Period



House length (Fig. 18), extensions, width at midline, linear taper length, storage cubicle length, hearth spacing to the end walls, hearth spacing, and feature and interior house post mold densities (Fig. 19) all show a concurrent increase in dimensions from A.D. 700, culminating in maximum extent in the first half of the 15th Century. Therefore, house length did not reach maximum size during the Late Ontario Iroquois stage (A.D. 1450-1650) but rather during the Middle Ontario Iroquois stage (A.D. 1300-1450). Equally important to note is that the amount of deviation around the mean of many of these variables is greatest during the Middle Ontario Iroquois stage (Table 6). House length, in particular, shows the greatest amount of variation, not only during the Middle Ontario Iroquois stage but throughout the Ontario Iroquois Tradition. House and corridor width and feature densities display the least amount of variation through time. Although the apparent large variation in house length could be due to the small sample size, it may also indicate that there was a great range in house size during this period. Indeed, the statistical results of Kruskal-Wallis tests on minimum, maximim and mean length per village listed in Appendix C, Table 3b suggests that the smallest houses did not increase in size through time.

Although house extensions were largest during the Middle Ontario Iroquois stage, they were most frequent during the Late Prehistoric - Protohistoric period. This suggests that the greatest amount of flux in longhouse population occured during the Late Prehistoric - Protohistoric period.

Fig. 18: Relative Frequency of House Length by Time Period

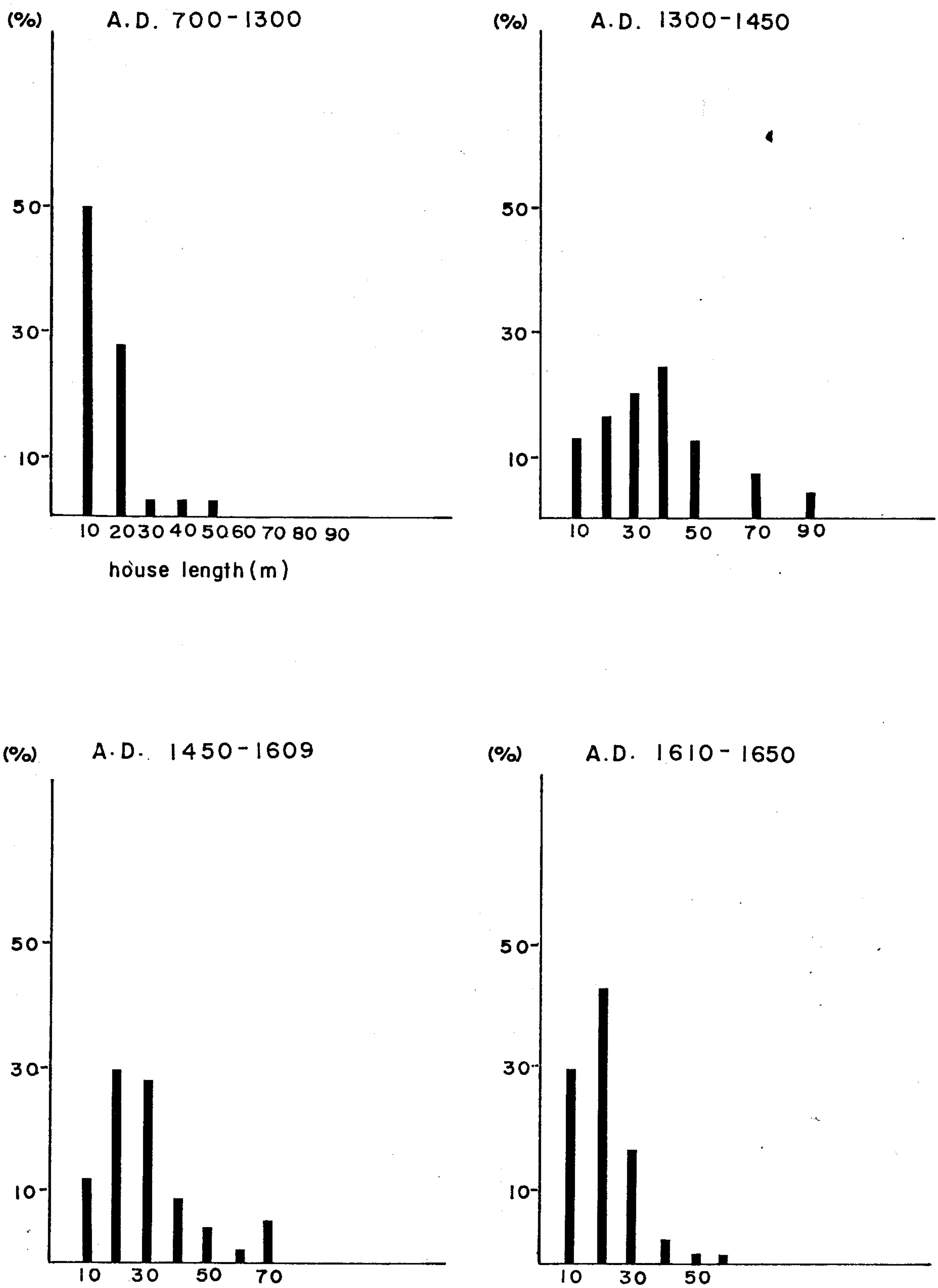


Fig. 19: Relative Frequency of Interior House Post Mold Density by Time Period

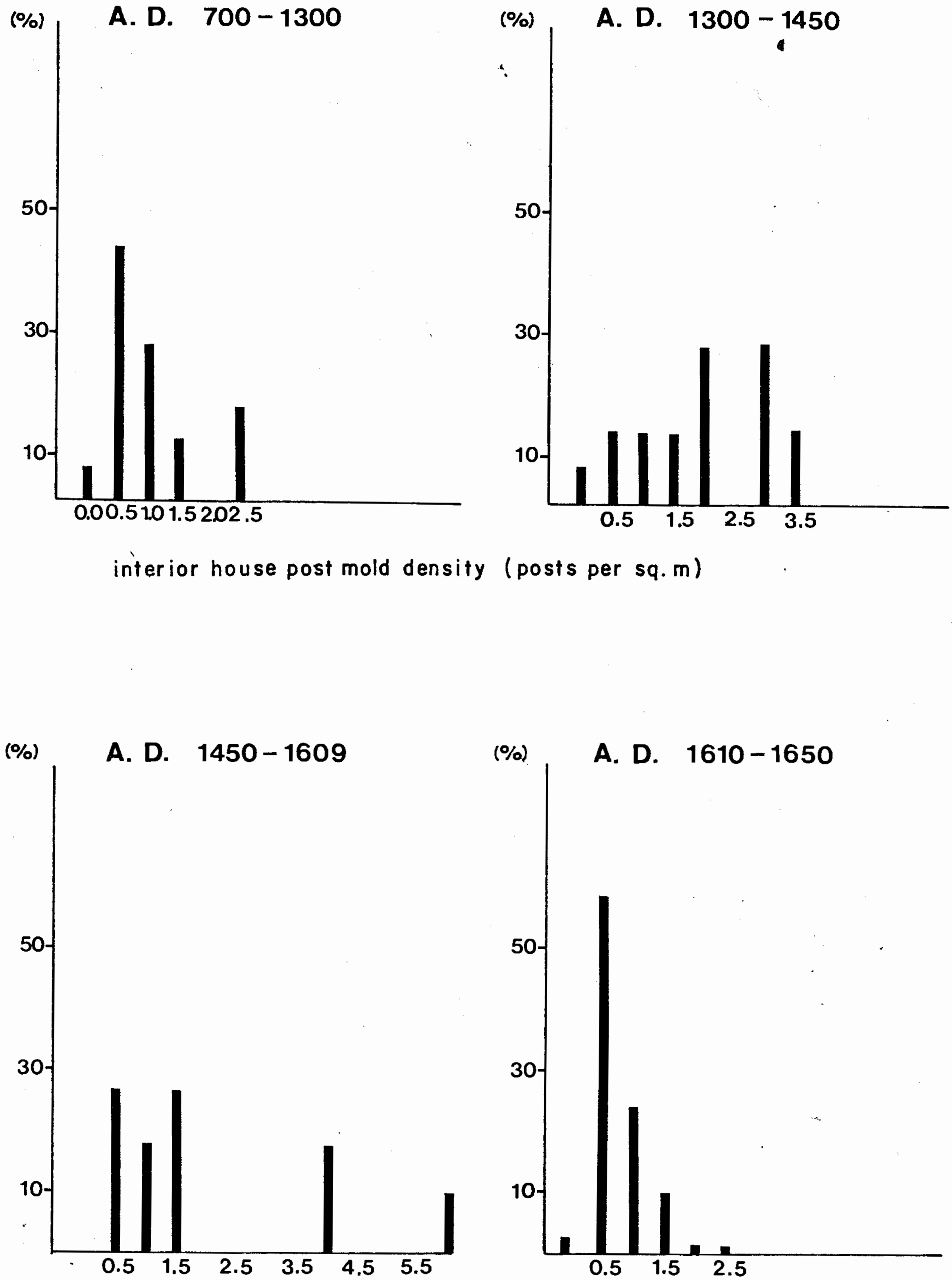


Table 6: Descriptive Statistics on Longhouse Attributes by Time Period

<u>Length</u> (m)	n	range	mean	s
A.D. 700-1300	38	5.1-56.4	16.3	10.7
A.D. 1300-1450	30	5.0-97.9	35.5	20.0
A.D. 1450-1609	124	7.5-71.0	28.6	14.7
A.D. 1610-1650	88	5.3-51.0	19.8	9.0
<u>Extension Length</u> (m)				
A.D. 700-1300	3	1.2-5.1	3.4	2.0
A.D. 1300-1450	4	10.3-33.3	18.5	10.2
A.D. 1450-1609	16	2.0-14.0	7.5	3.7
A.D. 1610-1650	9	1.2-10.4	4.9	2.8
<u>Midline Width</u> (m)				
A.D. 700-1300	51	4.2-9.5	6.7	1.0
A.D. 1300-1450	36	4.5-8.4	7.2	1.0
A.D. 1450-1609	163	4.5-8.5	7.0	0.7
A.D. 1610-1650	111	4.4-9.5	7.0	0.8
<u>End Width</u> (mean,m)				
A.D. 700-1300	8	3.8-5.2	4.6	0.5
A.D. 1300-1450	11	2.6-4.5	3.8	0.5
A.D. 1450-1609	33	2.0-8.0	5.8	1.2
A.D. 1610-1650	56	2.6-6.9	5.3	0.7

Table 6 (cont'd)

Width Difference	n	range	mean	s
A.D. 700-1300	8	28-45	36	5.8
A.D. 1300-1450	11	39-57	47	5.4
A.D. 1450-1609	34	0-45	16	11.7
A.D. 1610-1650	57	0-43	24	7.8
Taper Length (m)				
A.D. 700-1300	11	1.2-5.3	2.3	1.2
A.D. 1300-1450	11	2.4-6.8	4.5	1.4
A.D. 1450-1609	22	0.0-3.8	1.7	0.9
A.D. 1610-1650	52	0.5-4.8	2.7	1.0
N Side Post Density (per m)				
A.D. 700-1300	20	1.0-7.2	3.4	1.6
A.D. 1300-1450	17	3.0-6.8	4.8	1.1
A.D. 1450-1609	57	2.5-7.0	4.3	1.3
A.D. 1610-1650	75	0.2-7.1	3.5	1.1
S Side Post Density (per m)				
A.D. 700-1300	18	1.3-5.1	3.7	0.9
A.D. 1300-1450	15	3.5-5.7	4.8	0.8
A.D. 1450-1609	73	2.4-7.8	4,3	1.3
A.D. 1610-1650	77	0.1-6.1	3.5	1.0

Table 6 (cont)

<u>N End Post Density</u> (per m)	n	range	mean	s
A.D. 700-1300	13	2.0-6.0	4.2	1.2
A.D. 1300-1450	12	0.4-9.9	6.3	2.4
A.D. 1450-1609	51	2.2-9.9	4.5	1.3
A.D. 1610-1650	67	0.1-5.4	2.7	1.2
<u>S End Post Density</u> (per m)				
A.D. 700-1300	11	1.3-9.9	3.8	2.4
A.D. 1300-1450	12	0.6-6.9	4.4	1.7
A.D. 1450-1609	39	1.0-7.4	4.2	1.6
A.D. 1610-1650	61	0.1-5.9	2.9	1.1
<u>Post Diameter</u> (cm)				
A.D. 700-1300	33	5.6-9.4	7.2	0.8
A.D. 1300-1450	19	5.1-8.9	7.1	1.0
A.D. 1450-1609	97	5.8-12.3	8.6	1.3
A.D. 1610-1650	63	6.1-12.4	9.1	1.4
<u>Corridor Length</u> (m)				
A.D. 700-1300	14	4.4-48.5	14.0	12.3
A.D. 1300-1450	11	9.2-85.7	26.7	21.4
A.D. 1450-1609	19	7.6-61.1	22.9	16.9
A.D. 1610-1650	60	3.0-32.5	13.7	6.4

Table 6 (cont'd)

Corridor Width (m)	n	range	mean	s
A.D. 700-1300	18	3.0-5.4	3.9	0.6
A.D. 1300-1450	14	3.1-5.0	4.0	0.5
A.D. 1450-1609	35	2.7-5.5	4.0	0.6
A.D. 1610-1650	80	3.3-5.6	4.2	0.4
Storage Cubicle Total Length (m)				
A.D. 700-1300	18	0-7.2	2.6	2.5
A.D. 1300-1450	15	0-10.7	5.7	3.0
A.D. 1450-1609	19	0-10.3	4.7	2.4
A.D. 1610-1650	63	0-8.9	4.2	2.3
North Bench Width (m)				
A.D. 700-1300	5	0.9-1.5	1.2	0.2
A.D. 1300-1450	9	0.9-2.8	1.6	0.6
A.D. 1450-1609	15	0.7-1.9	1.3	0.3
A.D. 1610-1650	20	0.8-1.6	1.1	0.2
South Bench Width (m)				
A.D. 700-1300	5	1.3-1.9	1.5	0.2
A.D. 1300-1450	9	1.3-2.8	1.8	0.6
A.D. 1450-1609	13	0.8-1.5	1.2	0.2
A.D. 1610-1650	19	0.8-1.6	1.1	0.2

Table 6 (cont'd)

N Hearth-N End Length (m)	n	range	mean	s
A.D. 700-1300	25	0.6-9.9	4.6	3.3
A.D. 1300-1450	15	2.0-7.9	5.5	1.9
A.D. 1450-1609	26	1.4-8.9	4.9	1.9
A.D. 1610-1650	42	1.2-9.9	4.2	2.1
S Hearth-S End Length (m)				
A.D. 700-1300	24	0.3-6.7	3.1	1.5
A.D. 1300-1450	12	2.5-8.5	5.8	2.2
A.D. 1450-1609	28	0.4-7.3	4.9	1.9
A.D. 1610-1650	38	1.2-9.6	4.7	2.2
Hearth Number				
A.D. 700-1300	27	1-9	3	1.7
A.D. 1300-1450	14	0-8	3	1.9
A.D. 1450-1609	25	0-7	3	1.9
A.D. 1610-1650	45	0-7	3	1.8
Hearth Spacing (m)				
A.D. 700-1300	24	0.5-5.5	1.9	1.5
A.D. 1300-1450	14	1.2-9.9	5.3	2.6
A.D. 1450-1609	21	1.2-8.5	3.6	2.2
A.D. 1610-1650	35	1.1-8.8	2.9	1.9

Table 6 (cont'd)

Feature Density (f/sq. m)	n	range	mean	s
A.D. 700-1300	23	0.10-0.83	0.38	0.2
A.D. 1300-1450	15	0.17-1.00	0.57	0.3
A.D. 1450-1609	31	0.04-1.00	0.36	0.2
A.D. 1610-1650	81	0.07-1.10	0.33	0.2
Post Density (p/sq. m)				
A.D. 700-1300	19	0.10-2.40	1.00	0.7
A.D. 1300-1450	15	0.18-3.64	1.90	1.1
A.D. 1450-1609	22	0.48-6.52	2.07	1.9
A.D. 1610-1650	68	0.06-2.55	0.74	0.4
Int. Post Diameter (cm)				
A.D. 700-1300	13	6.3-15.4	9.4	2.4
A.D. 1300-1450	6	7.9-13.2	10.3	1.7
A.D. 1450-1609	70	4.7-13.8	7.5	1.5
A.D. 1610-1650	39	6.3-12.8	8.9	1.3

House end width is broadest in the Late Ontario Iroquois stage. Specifically houses are widest at the ends, and display the least amount of linear taper in the Late PreHistoric - Protohistoric period. As denoted by the mean difference between widths at the midline and ends, houses are most rectangular in the Late Ontario Iroquois stage (especially the Late Prehistoric - Protohistoric period); whereas houses of the Middle Ontario Iroquois stage are the most tapered.

Village Development

Orientation

In order to test Norcliffe and Heidenreich's hypothesis that Ontario Iroquois Tradition houses are predominately oriented to the NW-SE, Chi-Square statistics were run. The results listed in Appendix C, Table 4a indicate that the majority of houses in the sample were oriented to the west of north. However, the data are heavily weighted towards the Late Ontario stage, and masks trends that may be important. For example, Early Ontario Iroquois houses appear to be more randomly oriented, and Middle Ontario Iroquois houses appear to be oriented to the ENE. To correct for this error the modal village orientation was calculated (Appendix C, Table 4b).

Unfortunately the sample size is too small for statistical significance tests. The modal house orientation per village displayed in Fig. 20 suggests that general orientation per village is to the west of north, with minor fluctuations in exact degree of orientation. These deviations may be due to variations in local topographic or climatic conditions.

Village Plan

Through time, the arrangement of longhouses within villages undergoes several changes. Table 7 presents the descriptive statistics on village plan, and Appendix C, Table 4ç the results of statistical tests concerning development of village plan. Villages increase in size through time, although unlike longhouses, the increase in size continues into the Historic period. Palisaded village expansions, like house extensions, are most frequent in the Late Prehistoric - Protohistoric period. In fact, the only villages excavated to date with multiple palisaded expansions are Late Prehistoric - Protohistoric Southern Huron sites. Villages of the Historic period were apparently planned on a larger scale (Fig. 21). The large amount of variation in Historic village size indicates that the larger trade/mission centres were in addition to the average sized villages of ca. 1 ha. As expected low post and feature density suggest that Historic period villages were not occupied as long as were prehistoric villages. Assuming feature and post density are related to length of occupation.

Fig. 20: Preferred Orientation of Houses in Sample

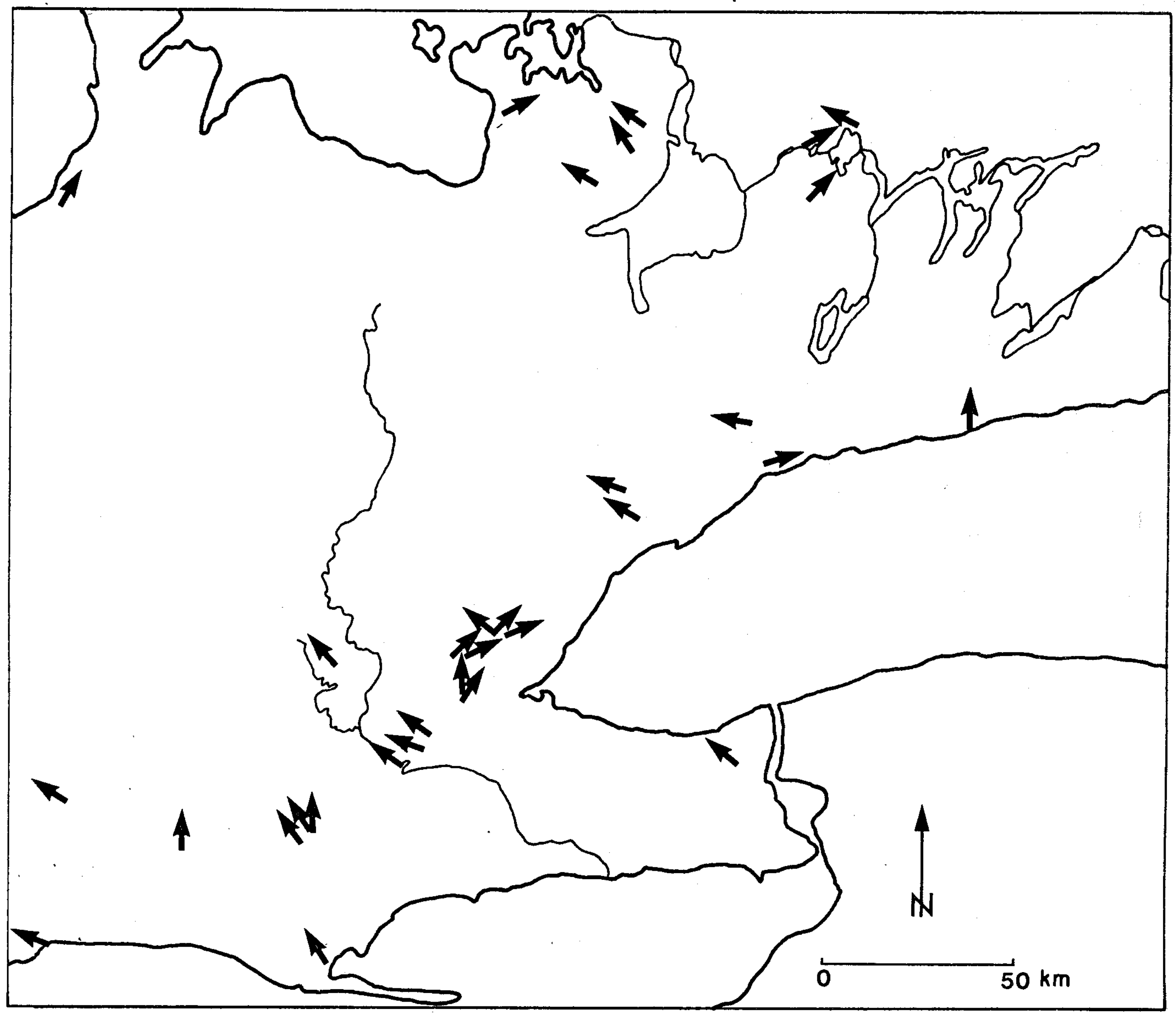
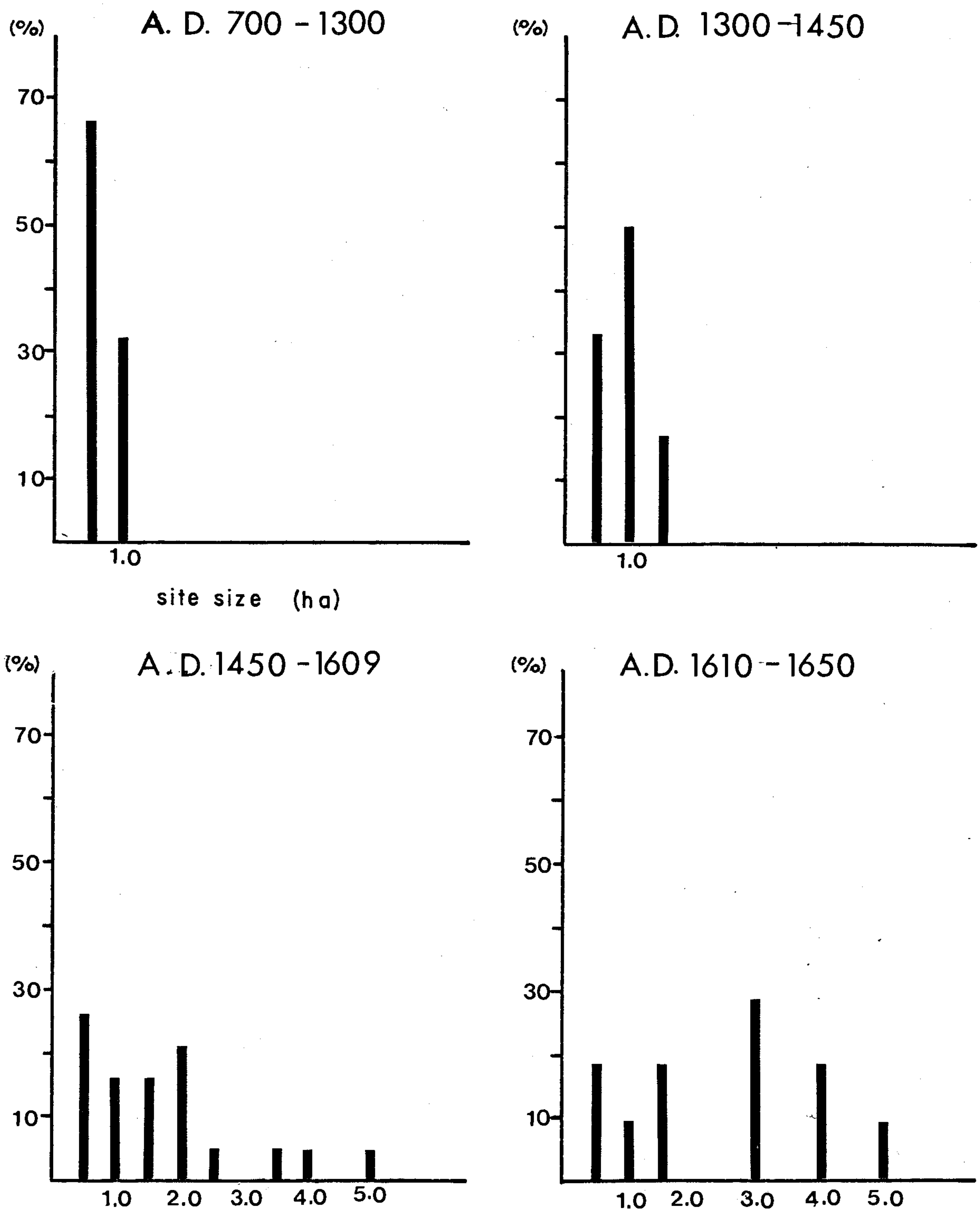


Fig. 21: Relative Frequency of Site Size by Time Period*



*(see Table 7 for n, $\bar{x}$ and s)

Table 7: Descriptive Statistics on Village Plan Attributes by Time Period

	n	range	mean	s
Maximum Village Size (ha)				
A.D. 700-1300	12	0.2-1.2	0.6	0.4
A.D. 1300-1450	6	0.4-1.6	0.9	0.4
A.D. 1450-1609	19	0.2-5.0	1.7	1.3
A.D. 1610-1650	11	0.4-4.8	2.5	1.5
Average Distance between Juxtaposed Houses (m)				
A.D. 700-1300	5	1.8-4.0	2.5	0.9
A.D. 1300-1450	4	1.4-5.0	3.5	1.7
A.D. 1450-1609	8	1.8-4.2	3.0	0.8
A.D. 1610-1650	5	0.8-2.9	2.0	0.8
Avearge Distance between Opposed Houses (m)				
A.D. 700-1300	2	3.2-3.9	3.6	0.5
A.D. 1300-1450	2		6.5	
A.D. 1450-1609	6	3.3-6.9	5.2	1.5
A.D. 1610-1650	2	6.4-9.9	8.2	2.5

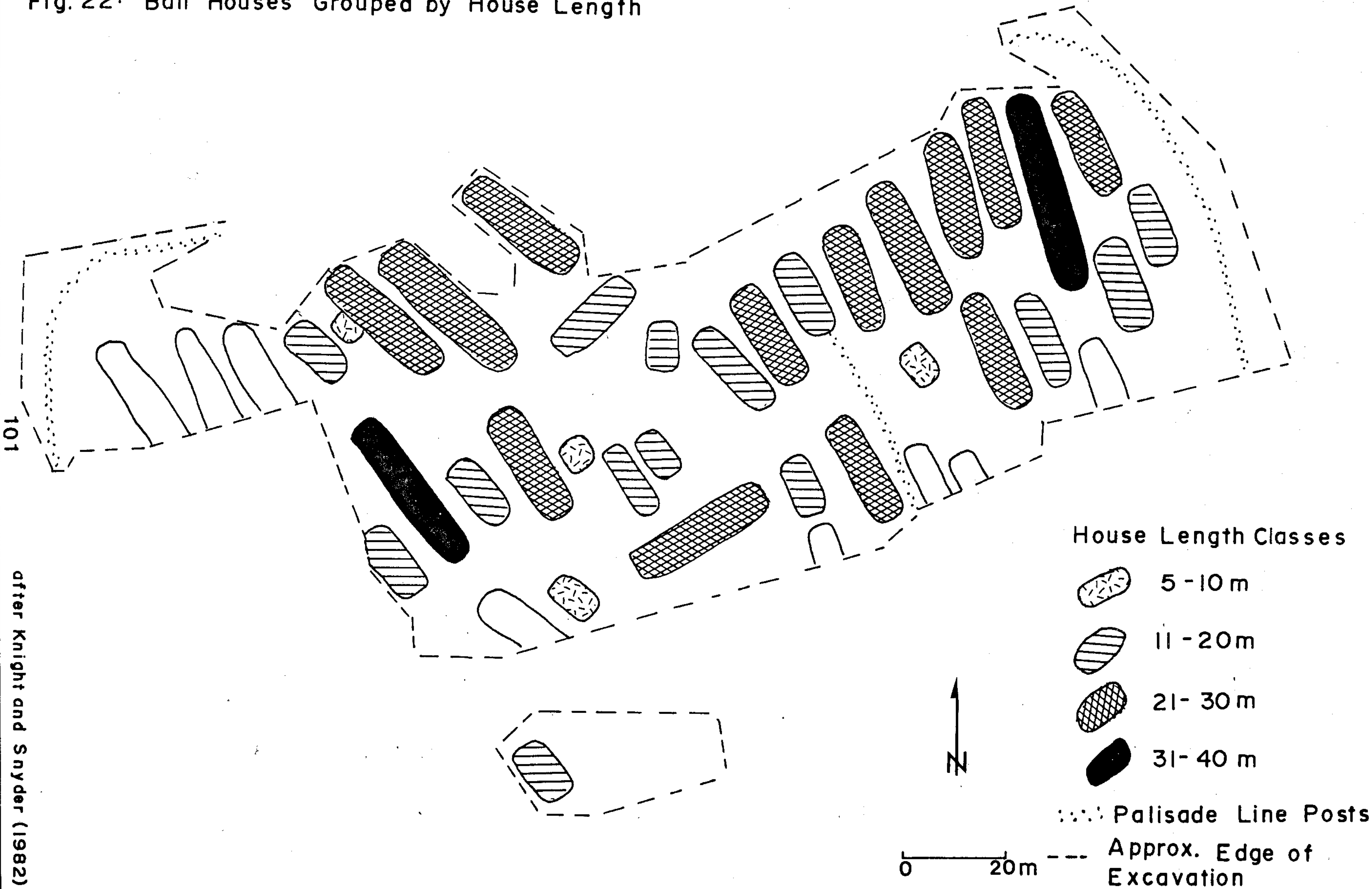
Another indication that Historic villages were not being occupied as long they had been prehistorically is the lack of overlapping houses. Houses overlapping others are most frequent during the Early Ontario Iroquois stage. The most house - palisade overlaps and the most frequent occurrence of houses outside the palisade line occur during the Late Prehistoric - Protohistoric period (Appendix C, Table 4d).

Intravillage Longhouse Variations

Few Iroquoian villages have been thoroughly excavated. In this sample only the Nodwell, Draper, and Ball sites have been almost completely excavated. Of these sites, the most information was obtained from Ball record sheets and floor plan drawings, therefore the Ball village will be used to investigate intravillage variations in longhouse attributes based on length, orientation, and other floor plan characteristics. The significance of the results are difficult to interpret due to the sample size. Therefore, the following results can only be viewed as preliminary.

Knight and Synder (1981) mentioned that the smaller houses at Ball were apparently located in the open, not surrounded by other houses (Fig. 22). The Mann-Whitney U test results bear out this suggestion (Appendix C, Table 5a). Not only are the smaller houses generally not tightly enclosed by surrounding houses, they also contain fewer hearths and interior house posts.

Fig. 22: Ball Houses Grouped by House Length



after Knight and Snyder (1982)

The comparison of Ball houses by length classes indicates that the same pattern emerges as was seen in the general length correlations (Appendix C, Table 5b). Storage partition total length, and hearth number are greater in the larger houses. Feature and post mold density, and mean linear taper length remain constant throughout the different length classes.

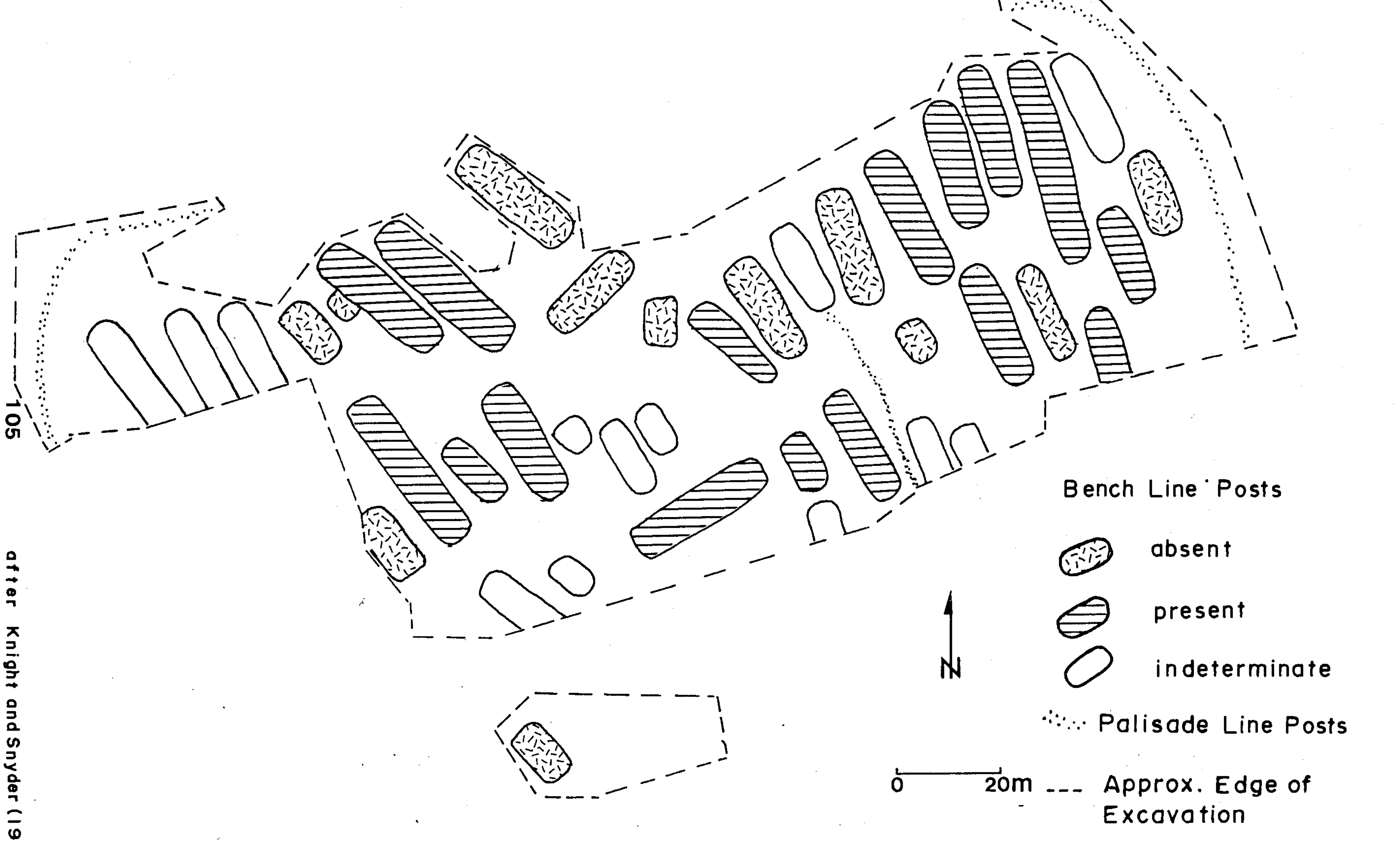
The results listed in Appendix C, Table 5c, suggest that houses bunkline posts contain more end storage space and larger posts. The presence or absence of bunkline posts does not appear to affect corridor width, midline width, taper length, hearth number and spacing, or feature and post density. Fig. 23 suggests that tHe smaller houses do not contain bunkline posts of any description, although the sample is too small for reliable statistical analysis. In similar manner, houses containing end storage cubicles partitioned by posts are longer, are made with larger wall posts, and contain more space for storage (Appendix C, Table 5d). Figure 24 shows that only the largest houses contain two storage partitions, one at each end, and the smallest none at all. On the other hand, houses containing features in the storage cubicle ends are small buildings, with little taper and less storage space than houses without features in the end sections (Appendix C, Table 5e)

While the distribution of large "storage" features does not indicate any apparent differences (Appendix C, Table 5f), interior house post mold distributions suggest, as indicated above, that the houses with few posts are small, do not taper greatly, have little end storage space and few hearths (Appendix C, Table 5g).

Based on the theory that clusters of houses all oriented in the same general direction may indicate other differences that may be referable to clan segments, non-parametric statistical tests were run on Ball village houses, grouped by orientational clusters and comparison of feature and post density, and interior house layout. Group 1 was oriented 120-130 degrees E, Group 2 130-140 degrees E, Group 3 140-150 degrees E, and Group 4 >150 degrees E. The Kruskal-Wallis test results indicate that it was not possible to discern clustering of houses that may indicate clan groupings, based on external wall shape or internal organization of house orientation clusters (Appendix C, Table 5h).

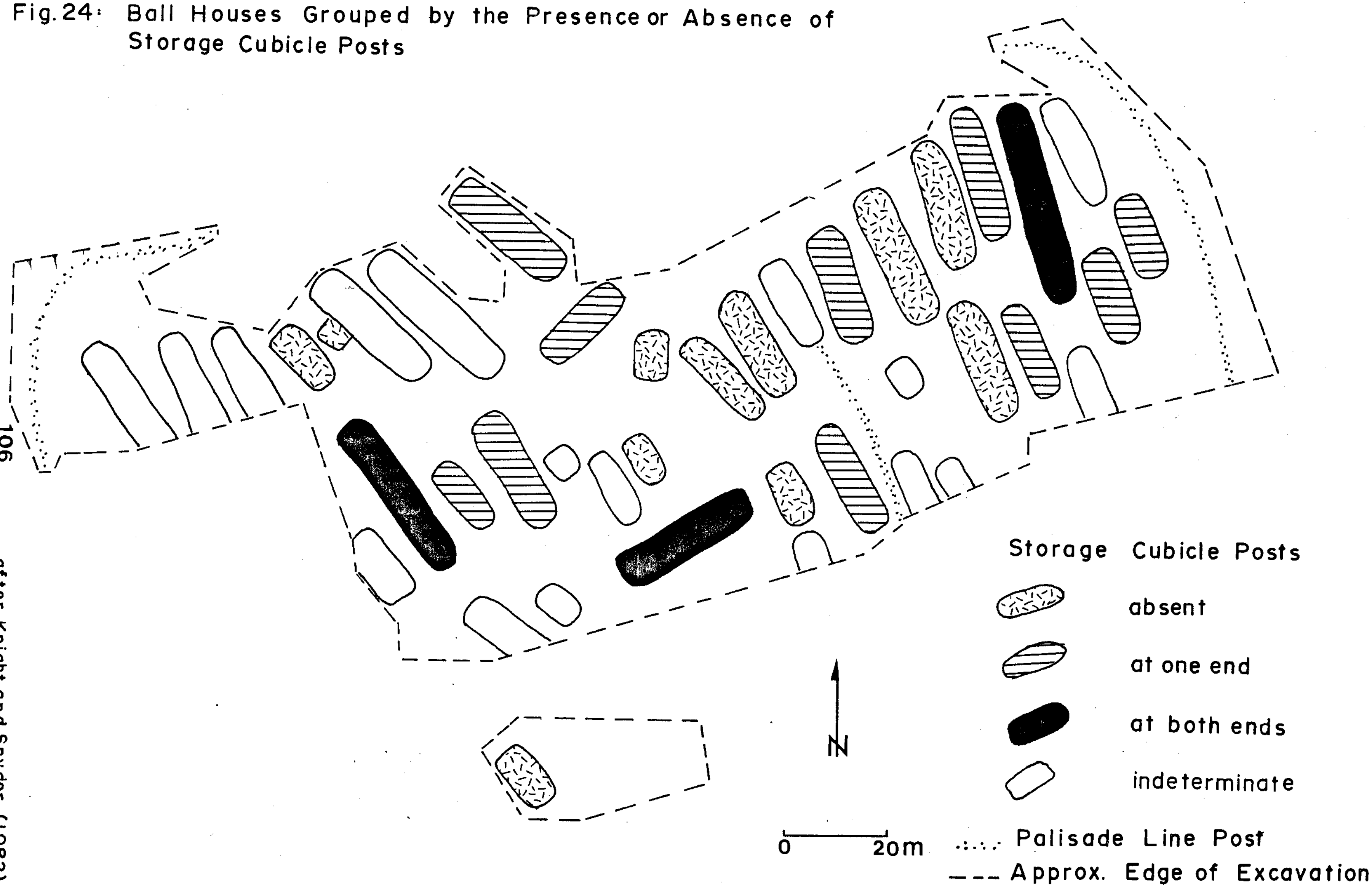
To test for significant differences between the houses of the "core" as compared to the "expansion", Mann-Whitney U and Median tests were run. Again the sample size is very small and the results can, at best, be viewed as tentative. According to Knight and Snyder (1981) there is a general difference in frequency of pottery attribute styles between the area on the west side of the palisade as compared to the east side. However, these authors were unable to discover any evidence that might suggest that the areas were not occupied for the same length of time. Statistical results presented in Appendix C, Table 5i suggest that the main house differences between these areas are in taper length, hearth spacing, interior house post diameters and orientation (Fig 25). There were no differences in post or feature densities. This would tend to suggest that the two areas were occupied at the same time or for the same length of time.

Fig. 23: Ball Houses Grouped by Presence or Absence of Bunk Line Posts



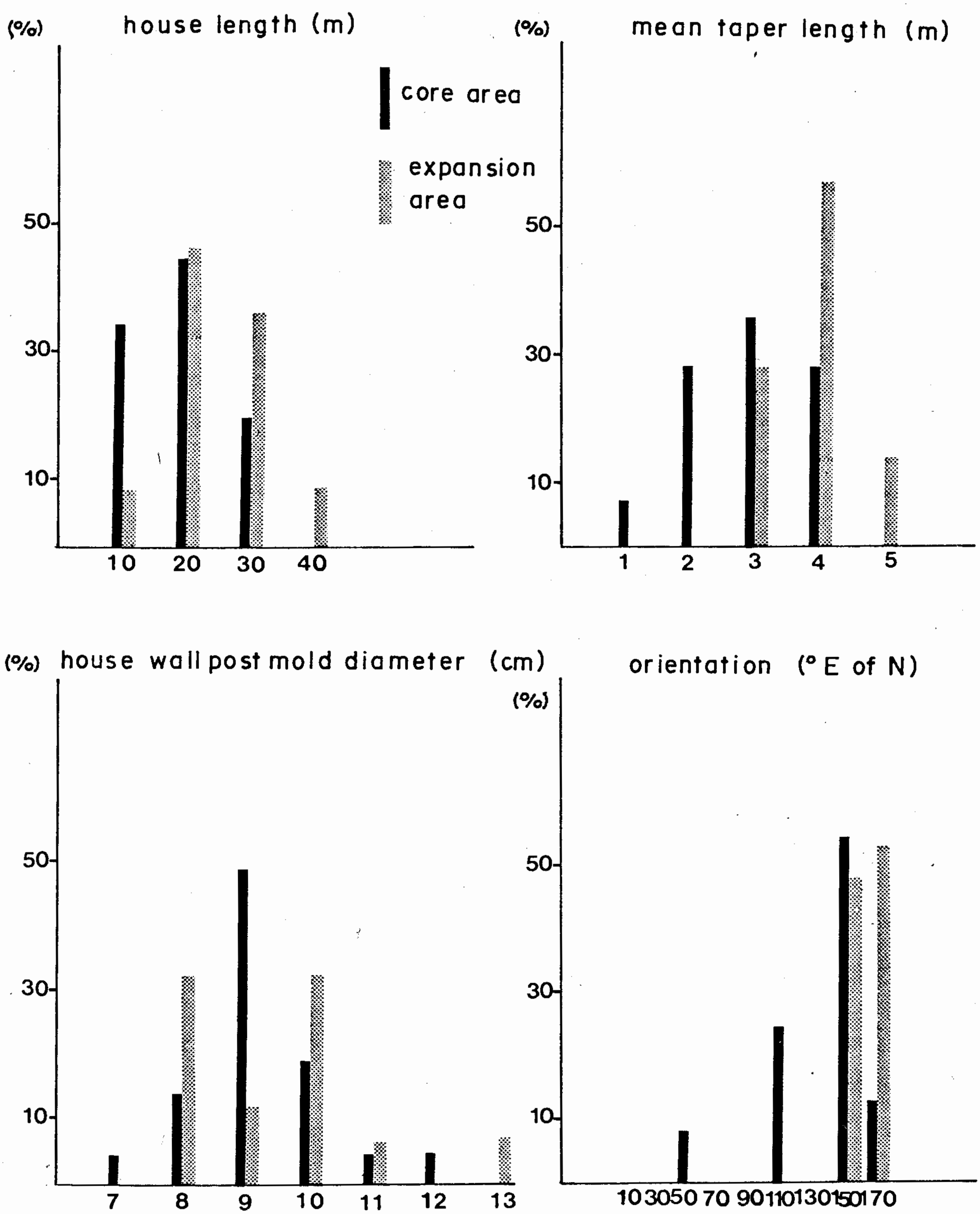
after Knight and Snyder (1982)

Fig. 24: Ball Houses Grouped by the Presence or Absence of Storage Cubicle Posts



after Knight and Snyder (1982)

Fig. 25: Comparison of the Relative Frequency of Longhouse Attributes between Ball Houses in the Core and Expansion



Regional Differentiation

Glen Meyer and Pickering Longhouses

According to Student's t tests, there are few differences in house layout between Pickering and Glen Meyer sites (Appendix C, Table 6a). There are no statistically significant differences in house length, widths at midline or ends, hearth spacing, densities, diameters or orientation (Fig. 26). The only incongruities include differences in numbers of hearths and corridor width; Glen Meyer houses having, on the average, one more hearth and a smaller corridor. There is no significant difference in village size, although a Glen Meyer village was expanded twice, and there are several houses outside the palisade perimeter or overlapping palisade lines on Glen Meyer sites. Glen Meyer houses are also more freqently overlapped by other houses. Finally, only Pickering villages have in-house burials.

Bearing in mind the small sample size, it would appear that there are few significant differences in house form between the Glen Meyer and Pickering cultures. This lack of differentiation may once again be an error of sampling; or it may indicate that both cultures were experiencing the same growth in culture initiated by their increasing reliance on corn horticulture.

Houses of both complexes show a concurrent increase in dimensions through time. Both cultures lived in palisaded villages which, through time, became more organized.

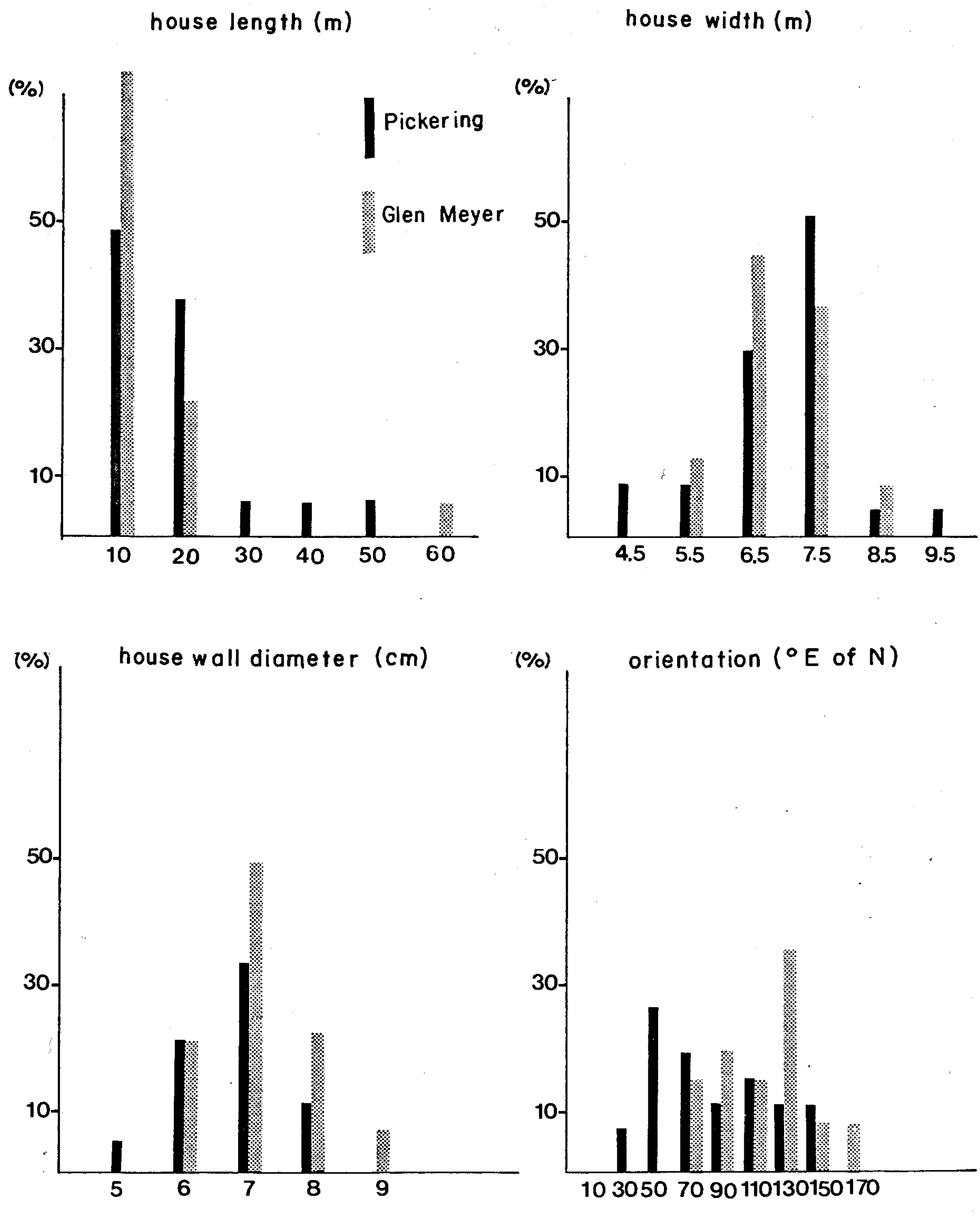
Longhouses of the Late Prehistoric - Protohistoric Huron and Neutral

A number of dissimilarities occur between the Prehistoric - Protohistoric Huron and Neutral (Appendix C, Table 6b). These dissimilarities include house length, house width at midline, corridor width, feature and interior house post mold densities and diameters (Fig. 27). House end width, house wall post densities, hearth spacing and numbers are among variables that remain constant. The differences in length and feature and post density may reflect differences due to the fact that only the Huron were involved in European trade. The differences in post diameter and house width may be related to differences in material and method of construction. There was no significant difference in village sizes, although on average Huron villages were larger, often attained through expansions.

Longhouses of the Historic Huron and Neutral

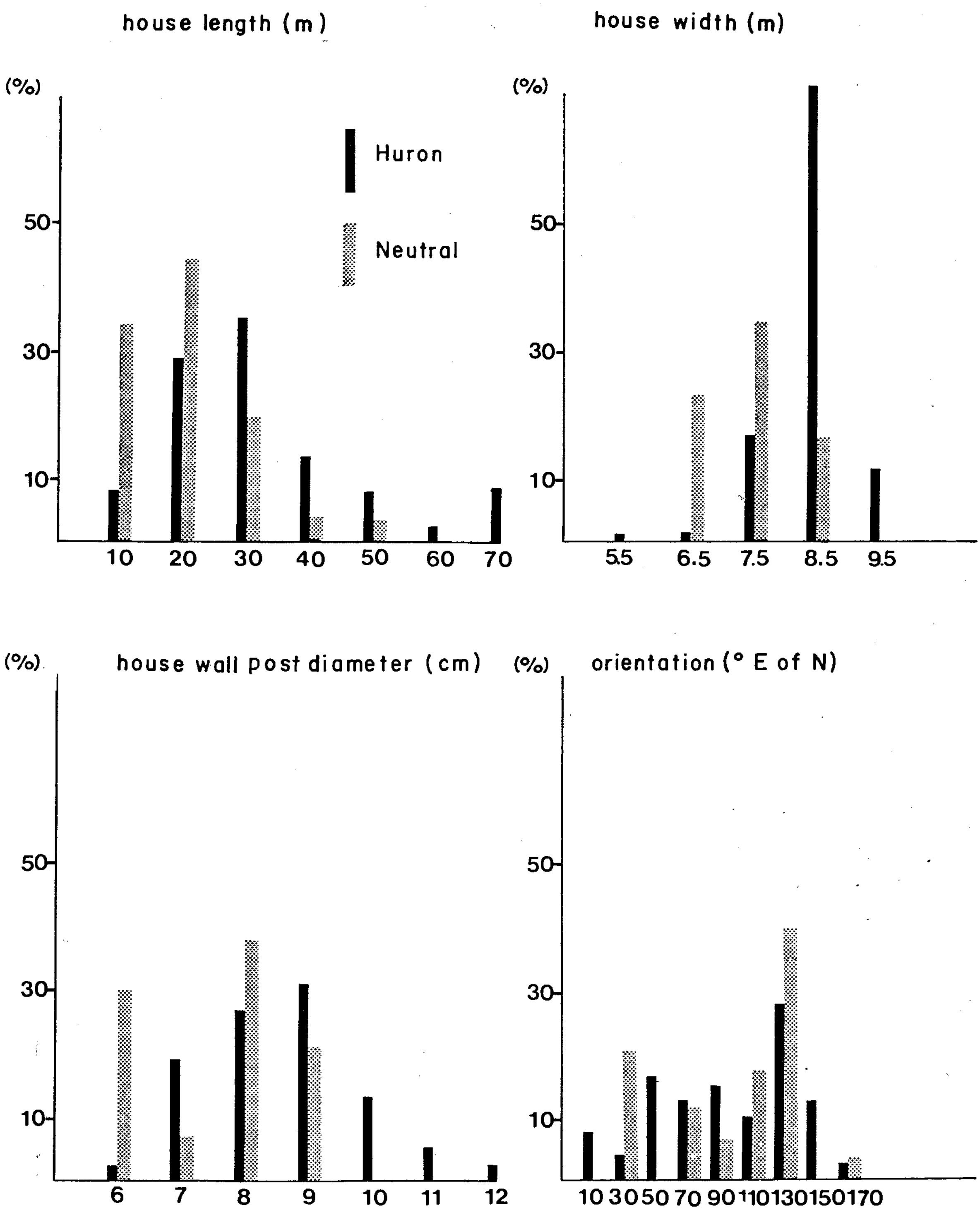
Dissimilarities between Huron and Neutral longhouses include house width, storage space, taper length, corridor length, feature densities, wall post diameters and orientation. Variables that did nct indicate any significant differences are house width at the ends, corridor width, interior house post diameter and density (Fig 28). On the average, Neutral houses were smaller, and their house walls were composed of less posts. The feature density difference is probably explained by the presence of slash pits on Neutral sites and not on Huron sites (Appendix C, Table 6c).

Fig. 26: Relative Frequency of Pickering and Glen Meyer Longhouse Attributes*



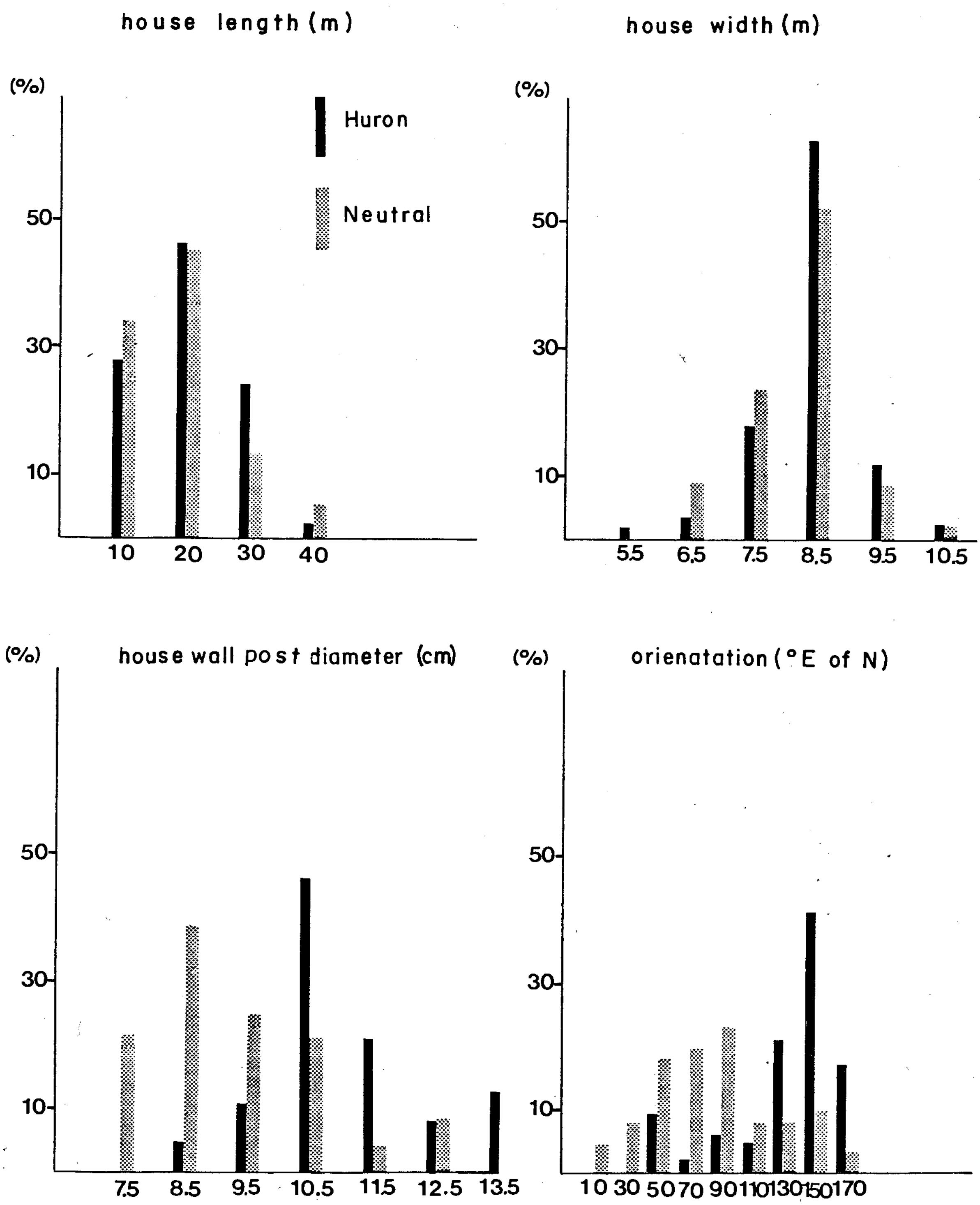
*(see Appendix C, Table 6a for n, $\bar{x}$, and s)

Fig. 27: Relative Frequency of Prehistoric - Protohistoric Huron and Neutral Longhouse Attributes *



*(see Appendix C, Table 6b for n, $\overline{x}$, and s)

Fig. 28: Relative Frequency of Historic Huron and Neutral Longhouse Attributes*



*(see Appendix C, Table 6c for n, $\bar{x}$, and s)

V. Conclusions

In this concluding chapter the results will be discussed in the following sequence: (1) general longhouse characteristics and attribute associations, (2) development of longhouses and villages, (3) comparison of longhouses within a village, and (4) comparison of longhouses between regions. A general summary and discussion of considerations for future studies is provide at the close of this chapter.

Longhouse Characteristics

Two distinctive traits of longhouse floor plans are bilateral symmetry and uniformity of plan. In general, longhouses display remarkably little variation in symmetry of layout. Side to side or end to end, the number of features and posts and the spacing of storage cubicles and benches is similar. Longhouse construction also does not display any apparent concern for the destructive effects of wind. The number of posts in each side wall is similar, and the number of posts in each end wall is similar; nor did one end of the longhouse taper more than the other. The only significant dissimilarity in matched pairs is in the density of features and posts along the central corridor.

It would appear that, in general, the middle section of longhouses was occupied longest or most intensively as shown by feature density. This may be due to one or more of the following causes : First, assuming the space for each two hearth families overlapped, greater feature density in the central area could be explained as overflow from adjoining families. Second, the centre of the longhouse may have offered most protection from the wind and/or surprise attack, and therefore many of the activities were preformed in this portion, (or this section was the first occupied). Finally, disproportionate feature distribution within the longhouse may indicate the residence of the pre-eminent family, assuming that feature and post mold clusters are associated with status or wealth, as suggested by Hayden (1976). Although this last theory is difficult to verify, perhaps an in depth analysis of intra-longhouse artifacts and their distribution may provide more conclusive evidence.

Longhouse Attribute Correlations

An increase in house length is generally associated with an increase in living space (hearth number and spacing, house width) and storage space (storage cublicle length, bench width) variables. Therefore, an increase in house length is not only associated with an increase in the number of occupants, but is an indicator of the wealth/status of the inhabitants. The correlation between house size and wealth/status has been documented in several ethnographic studies (Burling 1963; Hayden 1982; Prussin 1969). Apparently the more people a prominent person can have associated with his longhouse the greater his potential labour force, and amount of extra food-stuffs, increasing his ability to maintain his status through control of access to trade items, and the redistribution of goods.

Longhouse Development

Through time, the longhouse underwent several changes in house plan. During each period the greatest deviation around the mean occurs in house length, storage length, and hearth spacing variables. The least deviation around the mean is found in house width attributes. This would suggest that these latter attributes were dependent on method of construction, whereas length and associated variables were dependent on the number and wealth of the occupants. Width variation through time and space may be indicative of environmental or construction differences. Variations in length and associated variables may signify changes in the longhouse population and in distribution of wealth.

From the onset of the Early Ontario Iroquois stage house length, storage length, house width, taper length, house wall post mold density, hearth spacing, and feature density all increase in dimension, culminating in maximum extent during the

Middle Ontario Iroquois stage.

Through time, the Early Ontario Iroquois stage houses gradually increase in dimension. The trend toward increasing house dimensions is pan-Iroquoian: houses of the New York Iroquois, the Pickering, and Glen Meyer all display the same expansion in size. These results are contrary to the conclusions reached by Noble (1975b), who suggests that house length reached maximum extent during the Late Ontario Iroquois stage. However these findings do concur with results obtained by Tuck (1971) for the New York Iroquois. Apparently, longer houses in a village increased in size, while smaller houses remained unchanged. This increasing disparity between house lengths within a village suggests an increase in the differential control of economic (e.g., trade networks, land resources) and/or socio-political (warfare, ceremonial) activities.

Due to the poor representation of Middleport and early Protohistoric houses in the sample, it is difficult to state precisely when the longhouse began to diminish in size. However, two points should be made: (1) Decline in length is not attributable to direct contact with the Europeans; and (2) This decline in Ontario houses is mirrored by a similar decrease in the size of New York Iroquois longhouses (Tuck 1971).

Decline in house length among the New York Iroquois is attributed to the formation of the League of Five Nations, ca. A.D. 1400, which resulted in the decentralization of the village power base, a weakening of matrilocal residence patterns, thus a decline in house length (Tuck 1971). Trigger (1969) estimated the formation of the Huron confederacy ca. A.D. 1380-1400. This is one possible explanation for the decline of the longhouse in the late stage.

The decline in house length noted in the Late Prehistoric - Protohistoric period continued into the Historic period. This was probably associated with effects of direct contact with Europeans. European contact, as documented ethnograhpically, tended to undermine traditional trade and social systems (Burling 1963). Also, decimation of native population through epidemics and continuing intensification of warfare would have contributed to degradation of tribal socio-political systems, and a concomittant decline in house length.

Village Development

Orientation

The majority of houses in this sample follow Norcliffe and Heidenreich's (1974) basic WNW-ESE oreintation. However, the large sample of Late Ontario Huron houses mask what may be important deviations. For example, the prefered orientation among Neutral houses is apparently to the NE. This suggests that either the wind patterns were different in Neutralia or the Neutral were not concerned with prevailing winds. It is more difficult to interpret what the orientation preferences were during the Early and Middle Ontario Iroquois stages. The sample size is limited, there are few houses per village and houses often overlap.

Village Size

Assuming feature and post density variables are associated with length of occupation, Middle Ontario Iroquois villages were occupied the longest. Also, evident during this period is a decrease in the frequency of overlapping houses which may suggest that villages were becoming more permanent, sedentary communities and therefore houses were being built to last longer.

During the Historic period villages reach maximum size. The peak in village size during this period may be explained by a need for extra defense, or a desire to establish closer contact with Europeans in mission and/or trade centres. Whatever the reason for larger villages the result was a decrease in length of village occupation, as denoted by a decrease in feature density variables. This decrease in length of village occupation is also evidenced in the ethnohistoric documents; the earliest accounts mention village occupations of up to 40 years, but by A.D. 1640 this figure had decreased to eight to nine years. Reasons for increasingly frequent village relocations include an increase in numbers of feuds due to an inadequate policing organization incapable of controlling the ever burgeoning population (Hayden 1978); the losing war against the New York Iroquois (Hunt 1940); or soil and wood depletion.

Intravillage Longhouses

The only village in this sample sufficiently well documented to allow intra-village comparisons was the Ball site. The Ball houses were compared on the basis of general proximity to neighbouring houses, length, presence of bunk lines, storage cubicles, distribution of storage features, presence of posts, orientation clusters, and location of houses in the core as opposed to the expansion.

The main differences between Ball houses seems to relate to length of the houses. Small houses (those less than 19 m long) were more frequently placed in the open than were larger houses. This may mean that houses added to the village after initial settlement may have been restricted in location to the original plazas, and therefore house length was constricted. The larger houses also contained a greater number of hearths, larger storage partitions, storage partition lines, and bench lines, and contained few interior house post molds.

As detailed in Appendix A, ethnohistoric documents do not provide an accurate representation of the Huron longhouse in general (and certainly do not fit the Neutral longhouse). It is suggested that the ethnohistoric descriptions of houses containing 4 or 5 central hearths, a central corridor bordered by storage partitions at each end and benches along each side wall probably only pertained to the longer houses of each village. Considering that the Jesuits mention staying with the high ranking members of villages, it is not surprising that their accounts would appear to more accurately reflect the wealthier houses.

As yet, there is insufficient evidence to delineate clan or lineage groups in the village. The analysis of the Ball site suggests clan segments were: not localized in the village; did not construct different houses; or length of occupation masked interior clan house differences.

Regional Longhouse Variations

Glen Meyer and Pickering Houses

There is little variation in house attributes between the Pickering and the Glen Meyer cultures. Each had villages of ca 0.6 ha, often located on sandy hills, usually surrounded by a palisade and composed of houses averaging 16.3 m in length. The only statistically significant differences between Glen Meyer and Pickering houses were in central hearth number, corridor width, village expansions, and house overlaps. Apparently, Glen Meyer houses were more frequently overlapped by other houses and the palisade, and their houses more often located beyond the palisade. Although the sample size is small, these differences suggest an influx of people into Glen Meyer villages but not into Pickering villages. There are no statistically significant differences in house orientations, However, in general, Pickering longhouses were oriented to the northeast whereas the Glen Meyer village longhouses, were oriented to the northwest. The difference in overall village house orientation may indicate local variation in wind patterns originating from the Great Lakes.

Late Prehistoric - Protohistoric Neutral and Huron Longhouses

Differences between Neutral and Huron houses of the Protohistoric period may relate to the fact that the Huron were in earlier contact with European goods, funnelled through the St. Lawrence Iroquois and Algonquians. According to available information, Prehistoric - Protohistoric Neutral houses were smaller and less frequently enlarged than Huron houses. In addition, to date, only Southern Huron villages are known to have grown in multi-palisaded expansions. This suggests that the Huron were undergoing changes in socio-political or economic organization not apparent among Neutral of the same period. The most likely cause of this upheaval was desire for European trade goods. European trade goods, as the primary (fastest) means of acquiring status and wealth in Huron society, would naturally draw people to the major centres of trade. In this manner, villages such as Draper may have grown to exceptional size because of their significance as trade centres. On the other hand, war for the middleman trading positions may have caused entire villages and tribes to be misplaced and seek refuge in larger villages, as documented historically. The greatest number of extended houses, in this sample, date to the Late Prehistoric - Protohistoric Huron. This suggests longhouse membership was not rigidly controlled. Since the larger houses were preferrentially being extended, it would appear that wealthier longhouse groups either attracted the newcomers hoping for a share in trade (Hayden 1976), or could more readily absorb war refugees.

Historic Huron and Neutral Longhouses

Probably the most readily apparent difference in house styles between the Neutral and Huron is in the presence of slash pits in place of bunkline posts, and linear end stains in place of storage line posts. Other differences between Huron and Neutral houses of the Historic period include width, taper length, house wall post density and post diameter, storage length, corridor length and feature density. The difference in densities is probably explained by the presence of slash pit and linear end stain features in Neutral houses.

The external walls of Neutral houses contained fewer and smaller posts. This suggests that Neutral houses were not constructed as structurally massive as Huron houses, perhaps because of variation in wood types available. This may also explain the smaller widths of Neutral houses.

The Neutral houses also contained less storage cubicle space. This may relate to differences in subsistence exploitation, method of food storage, or food sharing. The variance in house orientation, if actually related to differences in climate, would mean that wind directions were different in Huronia than in Neutralia.

Summary and considerations for Future Studies

Feature and post mold density was greatest in the middle of central corridors. For future studies, an analysis of longhouse features and their distribution and artifact distribution and density may help determine whether this greater centre density was due to intensity/length of occupation or the presence of high status members.

In general, houses of the Ontario Iroquois Tradition were oriented to the west of north. However, numerous variations exist. Deviations in house orientation may be due to local topographic conditions, space restrictions, or local wind patterns. An in-depth analysis of site wind patterns would be germane. Through time, the earliest villages of ca. A.D. 700-1100 were apparently not oriented to a particular direction. A larger sample size, and climatological data may help determine if indeed house orientation was random, perhaps due to milder weather conditions.

House length is related to the number of occupants and their wealth. House length increases with an increase in number of hearths/families and distance between them. In general longhouses displayed the greatest dimensions and variability during the Middle Ontario Iroquois stage (A.D. 1300-1450). Among the New York Iroquois house length also reached maximum extent during this time. It is suggested that disparity between house lengths was due to disproportional wealth. Preferrential access to trade routes, land resources, or powerful war chiefs may have been the cause for this unbalance. Unfortunately there are few houses excavated that date to A.D. 1350-1500 and the few that have been discovered were only partially excavated. Therefore, the nature of house length increase (either through expansions or by original design) and decrease is not well known.

Clans could not be distinguished at the Ball site based on variations in house shape or layout between orientation clusters. Careful excavation of longhouse orientation clusters and an analysis of artifact distributions may prove more productive.

A comparison of the ethnohistoric records against archaeologically excavated houses suggests that early observers were more accurately describing longer houses, such as those belonging to chiefs. Caution is advised in implementing ethnohistoric documents, especially when determining what is a typical longhouse.

Differences between the longhouses in the Neutral territory and Huron teritorry were discovered. Theses differences involve variations in width and diameter and may relate to variations in method of construction, as well as possibly due to subsistence economy.

VI. Appendix A: Ethnohistoric Longhouse Documentation

Ethnohistoric descriptions of longhouses have frequently been employed to describe the Iroquoian dwelling (e.g., Rapoport 1969; Guidoni 1975; Duly 1979; Fraser 1968). Indeed, archaeologists until the late 1950's relied heavily on ethnohistoric documents to describe longhouses, since excavated longhouses were scarce. However, during the last two decades a sizable number of historic longhouses have been excavated, thus the reliability of ethnohistoric accounts can be judged by comparison to archaeologically excavated structures.

Initial Contact

Sporadic trans-Atlantic contact between the Old and New World has probably been going on since the time of Eric the Red in A.D. 1001. By A.D. 1510, 13 years after Cabot's discovery of Cape Breton, the Portuguese and French were annually exploiting the rich marine resources off the coasts of Newfoundland and Nova Scotia. Fur trading was always closely associated with fishing, and may have begun as early as A.D. 1503-1504; by A.D. 1519 it was well established (Hoffman 1961: 201).

Cartier charted the St. Lawrence River as far as Montreal, in the fall of A.D. 1535, providing the only description of St.

Lawrence Iroquois dwellings, in the palisaded village of Hochelaga. An 80 year hiatus exists between his accounts and those of the next explorer, Samuel de Champlain. During the fall of A.D. 1615, Champlain visited several Attigouauntan (Huron) villages, including Otouacha, Camaron, Touaguainchain, Tequenonquiaye, and Carhagouha, where Recollet Father LeCaron was stationed. He wintered at the "capital" village of Cahiague, a town containing some 200 "large lodges" (Biggar 1929:3:46-91). The Jesuits (Thwaites 1959:20:14) later called the village of Cahiague the major centre of the Arendaronons or Rock Nation of the Huron.

The next recorded visit by Europeans to the Huron was made in A.D. 1623-1624. Sagard's two volumes, Long Journey (Wrong 1939) and Histoire (Sagard 1636) are the only substantial records of his, and Recollet fathers' LeCaron and Viel's, travels among the Huron, principally the Attigyahointan, (Bear Nation), the largest and most powerful of the Huron "provinces or countries". The other two provinces mentioned are the Henarhonon and the Atigagnonqueha (Sagard 1636:1:234; Wrong 1939:91). Sagard was originally stationed in the village of Quieuindahian; Tequeunonkiaye of Champlain's time and Ossosane or LaConception to the Jesuits (Heidenreich 1971:36), he later joined LeCaron at Quieunonascaran.

Jean de Brebeuf, Anne de Noue, and Recollet Father de la Roche Daillon arrived in Huronia in A.D. 1626. Brebeuf remained among the Huron until the capture of Quebec by the English

Captain Kirke in A.D. 1629. New France was returned to France with the signing of the Treaty of St. Germain-en-Laye in A.D. 1632, and the Jesuits resumed their missions in Huronia until the demise of the Huron as a nation in A.D.1649-1650 (Thwaites 1959:34,35).

The Jesuits established their mission sites first among the powerful Attignawantan, (Bear Nation), and later expanded their operations to include the other Huron nations (the Attigneenongnahac, Arendahronons and Tohontaenrat) as well as the Petun (Thwaites 1959:16:227).

Longhouse Descriptions

Jacques Cartier

Below is Cartier's description of the dwellings in the palisaded village of Hochelaga in the fall of 1535:

> There are some fifty houses in this village, each about fifty paces in length, and twelve or fifteen in width, built completely of wood and covered in and bordered up with large pieces of the bark and rind of trees, as broad as a table, which are well and cunningly lashed after their manner. And inside these houses are many rooms and chambers; and in the middle is a large space without a floor, where they light their fire and live together in common. Afterwards the men retire to the above-mentioned quarters with their wives and children. And furthermore there are lofts in the upper part of their houses, where they store the corn ...They have in their houses also large vessels like puncheions, in which they place their fish,...,that are smoked in the summer, and on these they live during the winter (Biggar 1924:156-158).

Samuel de Champlain

Champlain's description of the Huron longhouse is as follows:

> The lodges are fashioned like bowers or arbours, covered with tree-bark, twenty-five to thirty fathoms long more or less, and six wide, leaving in the middle a passage from ten to twelve feet wide which runs from one end to the other. On both sides is a sort of platform, four feet in height, on which they sleep in summer to escape the annoyance of fleas of which they have many, and in winter they lie beneath on mats near the fire in order to be warmer than on top of the platform. They gather a supply of dry wood and fill their cabins with it, to burn in winter, and at the end of these cabins is a space where they keep their Indian corn, which they put in great casks, made of tree bark, in the middle of their lodge. Pieces of wood are suspended on which they put their clothes, provisions and and other things for fear of mice which are in great numbers. In one such cabin there will be twelve fires, which make twenty-four households, and there is smoke in good earnest, causing many to have great eye troubles, to which they are subject, even towards the end of their lives losing their sight; for there is no window nor opening except in the roof of their cabins by which the smoke can escape (Biggar 1929:122-124).

Gabriel Theodat Sagard

Sagard's description of the longhouse closely resembles Champlain's and reads as follows:

> Their lodges which they call Ganonchia are constructed...like arcades or garden arbors covered with tree-bark, twenty-five to thirty fathoms long, more or less (for they are not all of equal length), and six in breadth, with a passage down the middle ten to twelve feet wide running from one end to the other. At the two sides there is a kind of bench four to five feet high, extending from one end of the lodge to the other, on which they sleep in summer to escape the importunity of the fleas;...and in winter they sleep below on mats near the fire for greater warmth, and lie close to one

another, the children in the warmest, and highest place as a rule and the parents next... The whole space underneath the benches, they fill with dry wood to burn in winter, but as to the great trunks or logs... which are used for keeping the fire in by being lifted a little at one end, they pile these in front of their lodges or store them in the porches...All the women help in collecting this store of wood ; it is done in the month of March or April, and by means of this arrangement every household is supplied with what it needed in a few days...In one lodge there are many fires, and at each fire are two families, one on one side, the other on the other side; some lodges will have as many as twenty-four families, others fewer, according to as they are long or short....at each end there is a porch, and the principal use of these porches is to hold the large vats or casks of tree-bark in which they store their Indian corn after it has been well dried and shelled. In the midst of the lodge are suspended two big poles,...on them they hang their pots, and put their clothing, provisions, and other things...But the fish...they store in casks of tree tree-bark...except <u>Leinchataon</u>, which is a fish they do not clean and which they hang with cords in the roof of the lodge...For fear of fire, to which they are very liable, they put away in casks their most precious possessions and bury them in deep holes dug inside the lodges, then cover them with the same earth, and this preserves them not only from fire but also form the hands of theives, because they have no chest or cupboard in their whole establishment except these little casks. It is true that they rarely wrong one another but still there are sometimes rascals who commit offences when they think they will not be found out. This happens chiefly in the matter of eatables (Wrong 1939:93-95).

Additional points gleaned from Sagard's narrative include:

1. The entire village of Quieunonascaran constructed an arbor shaped cabin 6 by 3.0-3.7 m (20 by 10 or 12 feet) for the Recollet Fathers (Sagard 1936:1:234; Wrong 1939:80), but only after petitioning the "captain and chief of police" to to call a meeting of the council of notables to discuss and agree upon the plan (Wrong 1939:77). Sagard maintained that because this cabin was constructed out of season (sometime during the fall) the cracked bark sheeting did little to

keep the rain out (1939:81).

2. Towns often split in two when they relocated every ten, fifteen, thirty (1939:92) or forty (1636:1:197) years, more or less.
3. The Huron were fond of painting and decorated the "front of of their lodge" with "men, animals, birds and other things in cariacature" (1939:98).
4. Corn was "hung in rows, the whole length of the lodge from top to bottom, on poles which they put up as a sort of rack, coming down as low as to the edge of the roof in front of the bench". Once the corn was dried it was then shelled and stored in those casks in the porch or in some corner of the lodge (Wrong 1939:104). Sagard also mentions that bears were occasionally kept in circular enclosures to be fattened for feasts (Wrong 1939:220).
5. All large feasts, dances, torture scenes, and council meetings were held in a large cabin (Wrong 1939:115,152,161) usually that of a high ranking captain (1936:391; 1939:149,178,). Seating was apparently important at these events: for torture scenes the onlookers were "ranged along the two sides" (1939:161); at feasts the men were seated on mats at the "upper end, and the women and children next them lower down" (111); at council meetings the highest ranking captain sits where he can see all his counsellors and assistants (1939:149); dance spectators such as old men, women and children sat on mats "laid against the benches,

and the others on top of the benches, the whole length of the lodge" (1939:123); and at marriage ceremonies the assembled were seated according to rank (1939:123)

6. If attack by the enemy was imminent the frontier towns would ready themselves by storing food in holes, cleaning the houses of soot and debris, and building shelters for the extra fighting men recruited from nearby villages (Wrong 1939:156).
7. Sweatbaths constructed of poles planted in the ground in a circle, bent and tied together at waist-height or higher could be found in the middle of the lodge or elsewhere (Wrong 1939:197).

The Society of Jesus

The Jesuits began their mission to the Huron in 1625, however no detailed description of the longhouse is made until 1635:

> The cabins of this country are neither Louvres nor Palaces, nor anything like the buildings of our French, not even like the smallest cottages. They are, nevertheless, somewhat better and more commodious than the hovels of the Montagnais. I cannot better espress the fashion of the Huron dwelling than to compare them to bowers or garden arbors, - some of which, in place of vegetation, are covered with cedar bark, some others with large pieces of ash, elm, fir, or spruce bark; and although the cedar bark is best, according to common opinion and usuage, there is, nevertheless, this inconvenience, that they are almost as susceptible to fire as matches...There are cabins or arbors of various sizes, some two brasses in length, others ten, others of twenty, of thirty, of forty; the usual width is about four brasses, their height is about the same. There are no different stories; there is no cellar, no chamber, no

garret. It has neither window nor chimney, only a miserable hole in the top of the cabin, left to permit the smoke to escape. This is the way they built ours for us. (Brebeuf at Oenrio, 1635) (Thwaites 1959:8: 105-107).

In each cabin there are five fireplaces, and two families at each. Their cabins are made of large sheets of bark in the shape of an arbor, long, wide and high in proportion; some of them seventy feet long. (du Peron, Ossossane 1639) (Thwaites 1959:15:153)

For houses, both the Algonquins and the Hurons have nothing else than cabins, but the former make them of bark light as parchment, which they stretch now here, now there, according to need, over certain pöles which form, as it were, the skeleton of the cabin. The latter build enclosed towns, or fortified strongholds, with crossed stakes, traversed with trunks of trees, to protect themselves from attacks of enemies; and make their cabins ten, fifteen, twenty, thirty, or forty cannes in length, of great pieces of bark supported by beams, which served to hold up their corn, to dry it in winter. But neither of them has any other bed then either some branches of trees, used by the former, or some bark or matting, used by the latter - without tables, benches, or anything of the kind, the earth or some bark serving them for every purpose. (Bressani 1653) (Thwaites 1959:38:247)

Other points of longhouse information extracted from the <u>Relations</u> include the following:

1. Villages contained 50, 60 to 100 cabins composed of 300 to 400 households (Thwaites 1959:10:211). Roughly calculated this means there were from 8 households (4 fires) to 3 households (1 or 2 fires). There is also a reference to a small single fire or family house (Thwaites 1959:21 :285).
2. People from other nations were assigned a special cabin where they had to remain unless given permission to leave (Thwaites 1959:10:291).
3. During the Feast of the Dead members of the other villages would unite in the main village of the nation where "each

has his rendezous in one of the Cabins, all know where they are to lodge their souls, so it is done without confusion" (Thwaites 1959:10:291).

4. Villages changed locale every eight or nine years (Thwaites 1959:19:133).

5. Villages were occupied mainly in the winter, during the summer months the Huron resided in "rural cabins" tending their crops or went off fishing, trading, or warring (Thwaites 1959:8:143, 10:53).

6. The general assemblies of the whole country were held in the lodge of the principal captain of that country, his council chamber properly adorned with mats and fir branches (Thwaites 1959:10:251. Likewise torturing of prisoners was preformed in the "house of cut-off-heads", the abode of the great war captain, where war councils were also held. Below is an account of one such torture event:

> Towards eight o'clock in the evening eleven fires were lighted along the cabin, about one brass distant from each other. The people gathered immediately, the old men taking places above, upon a sort of platform, which extends, on both sides, the entire length of the cabins. The young men were below, but were so crowded that they were almost piled upon one another, so that there was hardly a passage along the fires (Thwaites 1959:13:59).

Seating was also important at council meetings (Thwaites 1959:55) where "his in his own quarter of the cabin, those of the same Village or the same Nation near one another, in order to consult together".

7. Sweatbaths were often erected in the cabin (Thwaites

1959:13:203, 38:253).

8. Cabins were painted with red figures (Thwaites 1959:10:47).
9. The longhouse was considered to be at times "warm and cosy" (Thwaites 1959:10:93) or conversely, miserable, smoke filled, flea infested hovels (Thwaites 1959:8:131, 10:97, 17:13,61, 18:17).
10. There were two doors, one at either end of the house (Thwaites 1959:19:193, 21:285).
11. The roof and the wall were the same, (there was no separate roof structure ?) (Thwaites 1959:17:17).

Interpretations of Ethnohistoric Longhouse Descriptions

Obsurely worded historical descriptions have resulted in disparate ethnographic interpretations. For example, Tooker (1970) maintains that the Jesuits used the term "nation" to refer to clan and tribe interchangeably. Tooker (1970) suggests that this apparent failure to differentiate between clan and tribal systems has led archaeologists to misinterpret "nation" as refering to clans in several instances where Tooker maintains the Jesuits were in fact refering to tribe. Noble (1968) asserts that the missionaries were indeed refering to clans and not tribes. Ramsden (1977a) feels that "nation" refers to a geographical group rather than a lineal descent organization.

The matrilocal vs. virilocal dispute also arises from lack of clarity in the ethnohistoric documents. Trigger (1968) cites instances in the *Jesuit Relations* where inference is made to matrilocality, Richards (1967) quotes sections of the *Relations* to indicate that actually the Huron probably were virilocal, and Smith (1970) uses the confusion of the Jesuits to hypothesize a breakdown in the matrilocal system as a result of European influence on tribal society.

Another area of contrasting interpretations is in the reconstruction of longhouses. For example, a longhouse reconstructed at Ste. Marie among the Hurons has one bench on both sides of the house, while the Lawson longhouse has two levels of benches on each side. Actually the platforms are not as common as is implied in the documents (Noble 1968) It is doubtful the the primary function of the benches was ever as a bed. During the winter months longhouse inhabitants slept huddled close to the hearth (Thwaites 1959:17:17) and during the summer months the village was virtually deserted (Thwaites 1959:8:143). Since the missionaries, upon first arrival in Huronia, stayed in the houses of the captains (Biggar 1929:3:81; Thwaites 1959:8:93, 10:181,233,251, 13:59,193,239,259, 15:173, 18:19, 39:65, 42:87,95,115, 47:77; Wrong 1939: 115,149,152,161) perhaps they were describing the unusual and not the commonplace.

Futhermore, although "maniere d'establie", the phrase used in all accounts describing these platforms, has been translated as bench, the dictionaries of the 16th (Desainliens 1970), 17th (Cotgrave 1971), and 18th (Boyer 1971) centuries translate "establie" as stall or stable. This interpretation would change the picture of longhouse interiors: first, individual apartment units can be more readily envisioned; and second, it is easier to imagine discontinuous stalls or stables than it is discontinuous benches.

Another inherent problem in these accounts is the use of non-standarized linear units when assessing house dimensions. A pace is equal to 2 1/2 feet (0.8 m) or 3 1/2 feet (1.1 m) (Cotgrave 1971), a brass equals 5 old French feet (Cotgrave 1971) or 6 feet (1.8 m) (Boyer 1971), and a "toise" is similar to a fathom at 6 feet (1.8 m) (Cotgrave 1971) or 6.4 feet (2.0 m) (Morison 1972: xiii), as is a canne.

Comparison between Ethnohistoric and Archaeological Longhouses

Historic Huron sites in the province of the Arendaronons include Ball (A.D. 1600-1610) (Knight 1979), Alonzo (A.D. 1600) (O'Brian n.d.), and Warminister, considered to be Champlain's Cahiague of A.D. 1615-1616 (Emerson 1961).

In comparing longhouse dimensions Heidenreich (1971:116) states that archaeclogical data validated ethnohistoric figures. However four of Heidenreich's sample of six sites are prehistoric. Using historic data exclusively it is shown that Champlain apparently overestimated house lengths and widths (Table 1). This is not such a terrible flaw considering Champlain had no tape measure; what is more disturbing is that he neglected to mention any smaller houses. Heidenreich (1971) also maintains that ethnohistoric depictions of house interiors are consistent with the excavated data. Yet according to my calculations house interiors were somewhat less cramped than Champlain estimated: the corridors were wider, hearths fewer, and platforms were not such a common occurrence. Naturally ploughing might eradicate some hearths and platform indicators. Nevertheless most of the Historic houses are just too small to accomodate eight let alone twelve fireplaces, and ploughing would not destroy any but the shallowest of bench posts.

During that same winter of 1615-1616 Champlain and LeCaron also visited the neighboring Petun tribe. Although the Petun were in the midst of building two villages, no mention is made of the construction process. In fact, Champlain says litte of the Petun, other than to state that their customs are the same as as those of the Attignouaatitans (Biggar 1932:3:96).

Table 1: Comparison of Ethnohistoric and Archaeological Longhouses

	n	range	mean	s
<u>House Length</u> (m)				
Champlain		45.7-54.9		
Sagard		45.7-54.9		
Brebeuf		5.5-73.2		
du Peron		-21.3		
Bressani		18.7-73.2		
"Rock Nation" Houses	45	5.3-40.4	20.1	8.0
"Bear Nation" Houses	5	17.0-29.0	23.6	4.5
Historic Huron Houses	50	5.3-40.4	20.4	7.8
<u>House Width</u> (m)				
Champlain			11.0	
Sagard			11.0	
Brebeuf			7.3	
"Rock Nation" Houses	59	4.4-9.5	7.1	0.8
"Bear Nation" Houses	6	6.7-8.2	7.4	0.5
Historic Huron Houses	65	4.4-9.5	7.1	0.5

Table 1 (cont'd)

	n	range	mean	s
<u>Corridor</u> <u>Width</u> (m)				
Champlain		3.1-3.7		
Sagard		3.1-3.7		
"Rock Nation" Houses	38	3.3-5.6	4.2	0.4
"Bear Nation" Houses	6	4.1-4.9	4.4	0.3
Historic Huron Houses	44	3.3-5.6	4.2	0.4
<u>Hearth</u> <u>Number</u>				
Champlain		-12		
Sagard		8-12		
du Peron			5	
Lalement		4-5		
LeMercier			5	
"Rock Nation" Houses	14	0-5	2	1.8
"Bear Nation" Houses	4	3-6	4	1.5
Historic Huron Houses	18	0-6	3	1.8

Table 1 (cont'd)

	n	range	mean	s
<u>Hearth Spacing</u> (m)				
Lalemant		2.1-3.2		
"Rock Nation"	13	1.5-6.1	3.2	1.7
"Bear Nation"	5	2.1-8.8	4.1	2.7
Historic Huron Houses	18	1.5-8.8	3.5	2.0
<u>Average Distance Between Juxtaposed Houses</u> (m)				
Champlain		2.7-3.7		
"Rock Nation" Houses	2	2.1-2.9	2.5	0.6
"Bear Nation" Houses	1		0.8	
Historic Huron Houses	3	0.8-2.9	.19	

Sagard penned his versions of life in Huronia eight and twelve years after returning to France, not to enlighten public awareness of Huron behavior but rather to applaud the contribution of the Recollets in establishing the Huron missions. Hence it is not surprising that Sagard's version of the longhouse is mostly an embellishment of Champlain's.

Two historic villages located in the Huron province of the Attigyahointan are the contact period Robitaille site (Tyyska 1969), and LeCaron (Johnston and Jackson 1980) site, dated ca. A.D. 1640. Based on these sites, Sagard overestimated house measurements, yet he did emphasize variablity in longhouse dimensions. Sagard also extended the number of hearths per house, to "8 to 12" which is more reasonable, but still an exaggeration. Sagard also was first to mention the use of sweatbaths and the presence of porches, two features Champlain neglected to describe, even though they are found at the Warminister site (houses D, and houses D, E, P) as well as LeCaron (house 4). Post molds indicating bench lines are as difficult to discern archaeologically in the province of the Bear Nation as they were in the province of the Rock Nation. The Jesuits calculations appear to be the most realistic, although the upper range of longhouse length quoted is too long.

The missionaries mention only two visits that they paid to the Neutral. The first was made by Recollet Father Daillon in 1627 (LeClerq 1973:2:263-272) and the next was in 1640 when Jesuits Brebeuf and Chaumonot travelled through some 40 Neutral villages. Of this the only significant difference mentioned is that the Neutral dead remained in the longhouse longer than Huron dead, often over the entire winter (Thwaites 1959:21:199). Although the missionaries fail to percieve any differences between Neutral and Huron longhouses, dissimilarities are apparent from reviewing historic Neutral sites such as the early contact period Christianson site (Fitzgerald 1981) and the late Historic period (ca. A.D. 1635-1640) Hood (Lennox 1981), Hamilton (Lennox 1978), and Walker (Wright 1981) sites. Notable among the differences is the presence of a regular line of slash pits in place of bench line post molds, and two sets of linear end stains at each end separating the living area from the storage cubicle(s). These two types of pits are thought to have been the recepticals for wood planks. Perhaps similar to the "bords standing a long the house" seen by Smith (1624) inside a Virginia house. Other Neutral house characteristics not commonly encountered in Huron houses include a tendency to orient their houses east of north, smaller house midline and central corridor widths, less storage space, and smaller house wall posts.

In conclusion, the results of the comparison between ethnohistoric and archaeological houses indicate that: (1) house characteristics were often exaggerated; and, (2) tribal differences apparent in the archaeological record were not mentioned by the early chroniclers.

The motive for the presence of Europeans in the New World was never to unravel the mysteries of native culture (a task difficult even for the trained ethnologist). Therefore it is natural that the Jesuit Relations, for instance, contain seemingly endless accounts of the number of Huron children baptized, and the progress of the novitiates instead of precise descriptions of their material culture. It must also be kept in mind that the Europeans were viewing ways of life in many cases totally foreign to their experience and culture, yet could only describe these mysteries in their own terms of reference. For example, below is a rather peculiar description of a beaver:

> The form of the beaver resembles the shape of a cucumber which has a short stem, or a duck that has the neck and head cut off, or like a ball of yarn wound in long form and flattened a little, being often thicker than long, or like a swine which is flat on its back, with its belly hanging down (van der Donck in O'Donnell 1968: 115).

One can only hope that a European garden arbor more closely resembles a longhouse.

Padden (1974:329) feels that the early chroniclers invariably failed to percieve subtle cultural variations or changes, they recorded everything as if it had been that way for time infinitum. Neitzel (1965) compared his excavation of the Fatherland/Grand village site with the French accounts of the Natchez town and found that the narrators were delinquent in estimating house dimensions, house orientation, and house shape. Quimby (1957) complained that ethnohistoric descriptions of Natchez material culture were either absent or not sufficiently detailed to permit comparison with archaeolgical data. These problems suggest the documents be used only in a general manner with caution (Neitzel 1965:91 Quimby 1957: 160).

VII. Appendix B: The Sites

Pickering sites

The Auda site (AlGo-29) is the earliest Pickering village in this sample dated at ca. A.D. 700. Excavated in 1979 by Kapches (1981), it represents an open, short-term occupation by a small population of horticulturalists. The village contains approximately ten houses arranged with little apparent regard for a parallel alignment pattern, covering approximately 0.24 ha of a sandy plateau near two streams. Auda houses resemble Middle Woodland Donaldson houses (Wright & Anderson 1963) in that they are small oval structures, rather amorphous in appearance, and internally barren. Unlike their Donaldson predecessors the hearths are aligned, although slightly off centre.

The Richardson site (BbGl-4), located in the Rice Lake region, covers approximately 0.2 ha, and is the easternmost Pickering village excavated to date (Pearce 1978). A total of 227 one meter squares were opened in 1976 to uncover two possible house outlines in a palisaded village that may have been expanded. Unfortunately, preservation is poor and all that remains of one of the houses is aligned hearths, some features, one containing a burial, and a few miscellaneous post molds. The site is considered a year round occupation of ca. A.D. 900.

The Boys (AlGs-10) site was excavated in 1972-1973 (Reid 1975a, 1975b). The site is located on 0.45 ha of land between two ravines of a creek adjoining a branch of Duffin Creek. It is a horticultural village radio carbon dated to A.D. 975 ±120, with two houses discovered, one of which was completely excavated. The house plans differ in internal organization. One house has centrally aligned hearths with encircling posts, the other has a line of posts that partition the house in half at the midline.

Miller is the type site for the Pickering branch of the Early Ontario Iroquois stage. In 1958, Kenyon (1968) excavated a substantial portion of the 0.43 ha village, exposing some six houses enclosed within a single row palisade. The site is located on a small glacial outwash estuary. Houses are widely spaced, although several are parallel aligned and lines of posts connecting several of the houses have been interpreted as a defensive measure. The site has been radiocarbon dated to A.D. 1125 ±70 (Kenyon 1968:50); however, Noble (1975:40) is of the opinion that Kenyon's (1968:5) original estimate of A.D. 800 is closer to the date of occupation.

The Bennett site (AiGx-1) was excavated in 1962 (Wright and Anderson 1969) and is situated on a sandy kncll some distance from Bronte Creek. A portion of the 1.2 ha excavated area uncovered some seven houses, and a double palisade. Perservation is poor and therefore many of the houses are not completely outlined. Of the three houses readily distinguished, all have centrally aligned hearths and encircling posts and pits.

Radiocarbon dates are A.D. 1280 +100 and A.D. 1260 ±100.

The Gunby site (AiGx 5) is the youngest Pickering village, and is the first site with the full corn-bean-squash complex in southern Ontario (Rozel 1979). The site is thought to have been occupied ca. A.D. 1300-1320, this date represents the averaging of two radiocarbon dates of A.D. 1385 +80 and 1255 ±135. The 1.1 ha village suggests an amalgamation of Pickering pottery and settlement patterns with Glen Meyer pottery (Rozel 1979:161). Of the ten houses located through trenching, three were completely excavated.

Glen Meyer sites

Of the 6 Glen Meyer sites in the sample, Porteous (AgHb-1), excavated in 1970-1971, is the oldest at ca. A.D. 700. This date represents the averaging of two radiocarbon dates: A.D. 820 ±100 and 580 ±90 (Noble 1975:38; Noble and Kenyon 1972:30). Porteous was originally affliated with the Princess Point culture (Stothers 1976, 1977; Stothers and Kenyon 1970:158); however, it has also been ascribed to early Glen Meyer (Noble 1975; Noble and Kenyon 1972). The village occupies 0.61 ha of a sandy ridge overlooking the Grand River mudflats, and is the earliest village to be double palisaded (Stothers 1977). Like most Early Ontario Iroquois houses, Porteous houses are small, squarish structures with rounded ends. There is one exception - a small circular house.

Van Besian, Dewaele and Uren are all sites located along the upper reaches of the Big Otter drainage. In 1972, 707 sq. m of Van Besian (AfHd-2) were excavated (Noble 1975:3). Radiocarbon dates of A.D. 945 ±90 and 940 ±90 make it the first Glen Meyer village to have palisaded expansions, extending the village from 0.49 ha to 1.22 ha. The site is situated on a sandy knoll. The primary subsistence activity was corn cultivation supplemented by deer hunting. Preservation of features at the site is poor but at least three houses can be delineated. One of these houses overlaps the original single row palisade and another the double row palisaded extension. The largest house was further extended and contains several large storage pits, a possible "storage" partition, and bench line posts.

The Dewaele site (AfHd-1) may represent a multi-component site (Fox 1976). The site was excavated in 1971, and has been radiocarbon dated to A.D. 1050 ±90 and 1095 ±90. It is difficult to discern house patterns in the congestion of overlapping posts and features, that depict interconnecting houses, houses overlapping houses, and houses overlapping palisade. The 0.32 ha site is composed of two different forms of houses: small, squarish; and, more typically, long with rounded ends. Fox (1976) is of the opinion that the longer houses may represent a later occupation. Subsistence was based on corn cultivation complemented by fishing.

Like Dewaele, Calvert is characterized by a myriad of post lines indicating overlaps. The approximately 0.3 ha site was almost completely excavated in 1981 by Fox (pers. comm.) and reavels some ten houses within a double row palisade and another house outside. The houses are aligned in two major orientations and juxtaposed approximately 20 degrees from parallel. The the houses are oblong with rounded ends and contain large "storage" features and central hearths.

The Force (AgHd-1) excavations, like the aforementioned sites, encountered a mass of pits and posts, making it difficult to interpret individual houses. The 0.8 ha site dates to A.D. 1240 (Fox pers. comm.).

Two seasonally occupied, palisaded Glen Meyer villages in the sample are Kelly (AfHi-20) and Reid (AdHc-5). Kelly is a small one longhouse village, while Reid is a 0.8 ha village containing at least six longhouses. In 1976, 2,659 sq. m of the Reid site were excavated. The site is located on an elevated knoll 2 miles from Long Point, Lake Erie. The site was occupied ca. A.D. 1300 and is suggested to have been a spring-summer fishing village (Wright 1976:25). Like Dewaele, Reid houses are of two basic sizes: small houses; and, long houses that overlap the double palisade. Fox (1976:169) feels that Reid may be a multi-componet site, while M. Wright (1978) is of the opinion that Reid represents a long term occupation.

Uren sites

The Uren substage is considered by Wright (1966) to represent the co-alesence of Pickering and Glen Meyer peoples. Uren (AfHd-3), the type site, is the only site in this sample that is assigned to the substage. The Uren site is a multiple palisaded 1.1 ha village that is bounded on two sides by ravines. The 1977 excavation uncovered eleven houses, eight of which were completey excavated (Wright 1979, 1982). The houses formed two rows of six and four houses perpendicular to each other. Radiocarbon dates for the site span several centuries, the average places Uren around A.D. 1250 (M. Wright pers. comm.); however, Ramsden (1977a) prefers a date of ca. 1400.

Middleport sites

Of the sites ascribed to the Middleport horizon, Nodwell (BcHi-3) is the most completely excavated. The site, located on a sand escarpment on the edge of Port Elgin, Lake Huron, was excavated in 1971 (Wright 1974). The 1.0 ha village is composed of 12 houses, one of which is located beyond the double row palisade. The houses are elongate, with tapered ends and contain clusters of posts and features as well as large "storage" features and "storage" cubicles. The radio carbon date places the site at 1340 ±75.

Excavation of the Chypchar site (AiGx-73), has produced very little in the way of settlement data. Only a few fragmentary house wall post lines have been uncovered to date. The site dates to ca. A.D. 1375 and spans approximately 0.61 to 1.0 ha (Smith pers. comm.).

The Moyer (AiHc-2) village houses are the largest in the sample. The palisaded village covers approximately 0.61 ha of a sandy ridge (Wagner, Toombs, & Riegert 1973). The site was excavated in 1970-1972 mainly through trenching and wall chasing, only one of ten houses discovered was completely excavated. Three of the houses have one or more extensions. The site dates to ca. A.D. 1400.

Slack-Caswell (AfHa-1) is a late Middleport site of ca. 1420 (Jamieson 1979). One longhouse of greater than 60 meters was partially exposed. Associated with the Crawford Lake site, although somewhat earlier at ca. 1400-1435, is the Unick site (Smith pers. comm.). It covers 0.81 ha and excavations uncovered portions of 5 houses, placed at random. No palisade was located.

The Crawford Lake site (AiGx-6) is located some three miles from Bennett. The site was excavated in 1973-1974 to reveal a village containing at least 6 houses surrounded by a single row palisade. According to lake varves, the site dates to ca. 1435-1459 (Smith pers. comm.).

Prehistoric - Protohistoric Huron Sites

During the Late Prehistoric - Protohistoric period there are hypothesized to have been southern and northern divisions

divisions of Huron. Southern Huron sites include Draper and Mcleod; Seed and McKenzie, in the Humber River drainage; and, Kirche, Coulter, and Benson in the upper Trent River drainage.

The Draper (AlGt-2) site is located on glacial till deposits on the left bank of Duffin Creek. The site has been explored by several archaeologists including Latta in 1972, 1973 (Ramsden 1978), Emerson in 1973, Hayden in 1973 (Hayden 1979), and Finlayson in 1975-1978. The majority of the site was uncovered during the Finlayson excavations. The original Draper village occupied only 2.8 ha (Finlayson and Pihl 1980), but with five palisaded expansions the village grew to 4.9-6.1 ha in size. A total of 45 houses were uncovered, the majority completly, at least in terms of exposure. There is some dispute over the age of Draper. Wright (1966) places the site at A.D. 1450 - 1500. Ramsden (1978) maintains that the presence of European goods indicates the site can not be earlier than 1500 and the pottery attributes indicate that the site could not be much later. Most of the archaeologists working on Draper would concur that the site dates to sometime near the onset of the 16th century (Finlayson and Poulton 1979; Finlayson and Phil 1980; Hayden 1979). Unfortunately, much of the brass trade goods originally thought to be European have been identified as native copper. Draper radiocarbon dates are not of much help: 1360 ±75, 1380 ±95, 1455 ±65, 1520 ±85, 1545 ±65.

The McLeod site (AlGr-1) was occupied around the same time as Draper (Latta pers. comm.) The site, excavated in 1971-1972, covers approximately 1.62 ha and is enclosed within a single row palisade. Two houses were uncovered.

Situated on a high bluff overlooking the Humber River, the McKenzie (AkGv-2) site, also known as Woodbridge, was first explored by Emerson in 1947 and 1949 (Emerson 1954). In addition to the one longhouse Emerson uncovered, subsequent excavations in 1974 by Johnson (1980) exposed a further eight houses. The site covers 3.6 ha, is surrounded by a multiple palisade, and dates to ca. A.D. 1520.

Seed (AkGv-1) is located on the right bank of the east Humber river, and dates to the mid 16th century (Snow n.d.). The village covers 2.0 ha, of which three houses and a section of the multiple palisade lines were uncovered.

Sites located in the Trent River valley system include: Kirche (BcGr-1), Coulter (BdGr-6), Benson (BdGr-1) and Hardrock. Of these sites only Hardrock is considered indigenous, the others represent a new group in the region thought to be closely associated with Draper and other sites in the Toronto area.

Coulter and Kirche are closely related in terms of artifact assemblages (Nasmith 1981). Coulter dates to ca. 1540 (Damkjar pers. comm.) and Kirche was radiocarbon dated at A.D. 1550 (Nasmith 1981). Coulter was originally a 0.7 ha palisaded village that underwent four palisaded expansions to reach a final size of approximately 3.0 ha. The site is located on a drumlin and contains 26 houses, many of which were rebuilt or overlap mainly through trenching and wall chasing.

Kirche occupies sandy land sloping to the west and south. The site was excavated in 1978, again most of the houses were exposed through wall trenching. The village was expanded once, enlarging it from 0.9 ha to 1.5 ha.

Coulter and Kirche are apparently related tc Benson. Benson is considered by Wright (1966) to be a fusion site; however, Ramsden feel that this is an oversimplification. The Benson village is palisaded and covers 1.8 ha. Three of the 25 houses uncovered at the Benson site, were totally excavated, and an additional four were almost completely excavated.

One Hardrock longhouse was excavated in 1950 by Emerson (1954). Emerson considered the site to be a special purpose portage site, because of its strategic location on a beach of Balsam Lake. The site is 0.41 ha in size and dates to the late prehistoric.

Northern Huron division sites in this sample are Maurice, Copeland and Sopher. The Copeland site was excavated in 1962 by Channen and Clarke (1965), and dates to ca. A.D. 1500. Excavations uncovered portions of 4 houses, two of which are complete, and a palisade line. The site is approximately 1.42 ha in size.

One longhouse was excavated at the Protohistoric Maurice site (BeHa-2) (Tyyska 1969). The village is located in the Penetang Peninsula and covers approximately 0.6 ha.

The Sopher village (BdGu-1) is located on a flat, sandy tract of land with a steep ravine on the north border. The site was excavated in 1965 by Noble (1968), and covers 1.5 ha of land. A portion of one, extended longhouse was unearthed. No palisade was found.

Historic Huron

The contact sites of Ball, Alonzo, and Warminister are all in the same region as Sopher. Warminister is generally assumed to be Champlain's Cahaigue of A.D.1615 (Emerson 1961), the capital village of the Rock Nation. Warminister actually is composed of two juxtaposed palisaded villages. The western village will be examined in this thesis since the east village was only surficially trenched.

The Protohistoric - Historic Ball (BdGv-3) site excavations have been ongoing since 1975, as part of the Sir Wilfrid Laurier field school, under the direction of Dr. Knight (1979, 1981, 1982). To date a substantial portion of the village has been excavated to reveal 26 houses in a core section and 15 houses in a fenced in area. The houses are arranged in rows that form streets opening into a small plaza.

The Alonzo site (BeGw-15) is a small seasonal open hamlet of approximately 1.1 ha (O'Brian pers. comm.). The site dates to the time of Warminister and Ball at ca 1600-1620. Three houses were exposed, one completely.

The Robitaille site (BeHa-3) site is located is the Penetang peninsula near to the Protohistoric Maurice site. Robitaille is thought to be palisaded and cover an estsimated 2.4 ha. One longhouse from the site was completely excavated (Tyyska 1969).

Approximately 20% of the 1.6 ha LeCaron site was excavated by Trent University field schools in the years 1970-1977 (Johnston and Jackson 1980. The village is situated on sandy land protected to the west and south by ravines of the Copeland Creek. Five houses have been uncovered adjacent to that portion of the multiple palisade lines.

Prehistoric-Protohistoric Neutral

The Lawson site (AgHh-1) originally covered 1.6 ha, and was surrounded by earthworks, a six row palisade, and a ditch. The village was subsequently expanded to 2.0 ha and surrounded by earthworks, an eight row palisade, and a ditch. Excavations at Lawson have been ongoing since 1976 (Pearce 1980). The site was orignially investigated by Emerson in 1939, and aside from his longhouse, there are an additional 7 houses, all but one from the expanded area. The houses are placed in a row of parallel houses. The site dates to ca. 1500-1550 (Pearce 1980).

Thought to be associated with Lawson are the small hamlets of Ronto, Smallman and Windemere. Each of these horticultural hamlets comprise one house with associated midden and are all less than 0.2 ha in size. (Pearce pers. comm.).

Southwald (AeHi-1) covers some 1.2 ha and is surrounded by earthworks and palisade (Smith 1977). Of the 18 or so houses discovered through trenching only one was almost completely excavated. Several of the houses overlap. The site pottery resembles Lawson ceramics and is thought to be associated. The site dates to A.D. 1500.

A small portion of the Cleveland site (AhHb-7) was opened to expose one house. No palisade line was found, although one was expected (Noble 1972a). The site dates to ca. 1580 and covers approximately 1.62 ha.

Also on the upper reaches of the Fairchild Creek, Fonger (AhHb-8) is in close proximity to Cleveland and Walker. The site dates to 1610-1620 (Warrick 1982). Fonger is a palisaded village expanded once to reach a final size of 0.8 ha. The site contains many overlapping houses.

The Historic Neutral

Christianson (AiHa-2) is a contact period site that was occupied around A.D. 1615 (Fitzgerald 1981). In 1965 Noble excavated a small house at Christianson, subsequent excavations in 1979 revealed portions of 7 additional houses, one located beyond a multiple palisade line. The site covers 1.6 ha of a drumlin overlooking Spencer Creek.

The Thorold site is located on the Niagara Escarpment near Ste. Catherines. The site was excavated in 1979-1980. The village dates to ca. 1615-1630 and covers approximately 4.1 ha.

Hood (AiHa-7), Hamilton (AiHa-5), and the two small hamlets Boggle I and Boggle II, are in close proximity to Christianson. The Hood village covers 2.7 ha and contains 15 houses, of which all but two were completely excavated, and a palisade, up to five rows deep (Lennox 1978). The site is thought to have been occupied ca. 1630-1641.

Excavations at Hamilton in 1972 and 1976 exposed approximately 1,337 sq. m of the site. Four houses and part of a fifth were completely excavated (Lennox 1981). The site is located on a low rise of sandy loam and is surrounded by a double palisade. The site dates to ca. 1638-1651.

Associated with the large villages of Hood and Hamilton are the Boggle hamlets (Lennox pers. comm.). These villages are thought to have been occupied about the same time as the larger villages. Boggle I is the more completely excavated, with 5 houses exposed. Although no midden or palisade was located on Boggle I these features were uncovered at Boggle II.

The Walker site (AgHa-9) excavated by M. Wright (1981) is considered to be late Historic (ca. 1630) Neutral town. It occupies of a sandy knoll that is well protected on three sides by steep ravines, although, no palisade was found. Portions of the site were not greatly disturbed, and excavation uncovered several wall trenches.

Appendix C: Results of Statistical Analysis

Table 1: Pairwise t-tests

variable	mean	mean diff	std dev	t-stat	signif
House End Width (in m)					
North end	5.1	-.1	.9	-1.2690	.2072
South end	5.3	n= 107			
Linear Taper Length (in m)					
North end	2.6	-.1	1.4	-.99130	.3241
South end	2.7	n= 96			
House Wall Post Mold Number, Side wall					
North side	70.5	-.1	21.4	-.46747-1	.9628
South side	70.6	n= 121			
House Wall Post Mold Number, End wall					
North end	30.2	-.4	12.4	-.39617	.6926
South end	29.8	n= 129			
Storage Cubicle Length (in m)					
North end	2.1	-.1	1.3	-.65687	.5126
South end	2.2	n= 115			
Hearth Spacing to Ends (in m)					
North end	4.6	.2	3.1	.61680	.5392
South end	4.4	n= 79			
Bench Width (in m)					
North side	1.3	.04	.6	.42635	.6719
South side	1.3	n= 45			

Table 1 (cont'd)

variable	mean	mean diff	std dev	t-stat	signif
Spacing between Bench Posts (in m)					
North side	1.3	.1	.5	.95603	.3448
South side	1.2	n= 41			
Feature Number, Benches					
North bench	5.9	-.2	3.7	-.68797	.4929
South bench	6.1	n= 112			
Feature Number, Storage cubicles					
North end	2.6	.2	2.9	.64726	.5188
South end	2.4	n= 116			
Central Corridor Feature Density (per sq. 4m)					
Middle	13.3	4.7	9.5	4.2268	.0001
North	8.7	n= 74			
Middle	12.8	3.6	10.3	2.9462	.0044
South	9.2	n= 70			
North	8.6	.9	7.8	.93826	.3517
South	9.5	n= 63			
Feature Density (per sq. m)					
North half	.61	-.04	.3	-1.5450	.1264
South half	.66	n= 79			

Table 1 (cont'd)

variable	mean	mean diff	std dev	t-stat	signif
Interior House Post Mold Number, Benches					
North bench	13.2	.1	11.9	.95385-1	.9242
South bench	13.1	n= 94			
Interior House Post Mold Number, Ends					
North end	12.0	-.2	12.2	-.20001	.8419
South end	12.2	n= 97			
Central Corridor Post Mold Density (per 4m sq)					
Middle	36.4	9.1	22.6	3.2107	.0021
North	27.3	n= 64			
Middle	35.6	9.4	23.1	3.1908	.0023
South	26.2	n= 61			
North	27.6	.2	21.8	.68727-1	.9455
South	27.8	n= 54			
Post Diameters (in cm)					
House wall	8.7	.4	2.1	2.2347	.0272
	8.3	n=127			

Table 2: Pearson's Rank Order and Kendall's Tau Correlation Coeffiecents

Variable	n	rho	tau	signif
Exterior House Wall				
House Length (m):				
Midline Width (m)	270	.5163	.3715	.0000
Mean House End Width (m)	107	.1093	.0848	.4895
Width Difference (%)	107	.1009	.0717	.1571
Mean Taper Length (m)	96	.5347	.4074	.0000
Corridor Length (m)	104	.9751	.8814	.0000
Corridor Width (m)	121	.2708	.2024	.0014
North Bench Width (m)	42	.3269	.2504	.0245
South Bench Width (m)	39	.3442	.2411	.0393
Storage Length (m)	115	.7966	.6183	.0000
N Hearth-N End Length (m)	89	.4818	.3356	.0000
S Hearth-S End Length (m)	94	.4929	.3434	.0000
Hearth Number	104	.5905	.4443	.0000
Hearth Spacing (m)	75	.5624	.4097	.0000
Feature Density (m sq.)	127	.0980	.0683	.2616
Post Density (m sq.)	105	.1876	.2630	.0047
Original Length (m)				
Extension Length	27	.4164	.2738	.0488

Table 2 (cont'd)

Variable	n	rho	tau	signif
House Midline Width:				
End Width	88	.3341	.2378	.0016
Width Difference	88	.1382	.1021	.0303
Mean Taper Length	88	.2918	.2041	.0070
North End Wall Width:				
South End Wall Width	107	.7387	.5734	.0000
North End Taper Length	107	-.4171	-.3039	.0000
North End Storage Length	105	.0261	.0221	.7498
N Hearth-N End Length	66	.0175	.0202	.8205
South End Wall Width:				
South End Taper Length	100	-.3429	-.2493	.0004
South End Storage Length	97	.0859	.0575	.4210
S Hearth-S End Length	62	-.0821	-.0448	.6192
Mean House End Width:				
Width Difference	88	-.8383	-.6779	.0000
Mean Taper Length	88	-.4154	-.2990	.0001
North End Taper Length:				
South End Taper Length	79	.4596	.3453	.0000
North End Storage Length	93	.4998	.3500	.0000
South End Storage Length	86	.2952	.2105	.0059
N Hearth-N End Length	56	.2700	.1908	.0446
S Hearth-S End Length	52	.1360	.1190	.2342

Table 2 (cont'd)

Variable	n	rho	tau	signif
South End Taper Length:				
North End Storage Length	87	.4417	.3144	.0000
South End Storage Length	93	.3721	.2649	.0003
N Hearth-N End Length	55	.0878	.0471	.6270
S Hearth-S End Length	58	.3851	.2676	.0038
Mean Taper Length:				
Storage Length	80	.6197	.4630	.0000
House Wall Density,S side:				
Wall Density,N side	157	.6030	.4501	.0000
Wall Post Diameter	108	-.1773	-.1268	.0581
Hearth Number	66	.2636	.1966	.0326
Hearth Spacing	62	.2096	.2217	.0124
Feature Density	118	.1333	.0907	.1568
Int. Post Density	98	.3958	.2854	.0000
Int. Post Diameter	129	-.1504	-.1801	.0766
House Wall Diameter				
Feature Density	92	-.2541	-.1785	.0129
Int. Post Mold Density	92	-.2160	-.1530	.0326

Table 2 (cont'd)

Variable	n	rho	tau	signif
Central Corridor Dimensions				
Corridor Length:				
Corridor Width	100	.3101	.2397	.0009
North Bench Width	33	.3220	.2267	.0751
South Bench Width	31	.4905	.3515	.0073
North End Storage Length	97	.6697	.5134	.0000
South End Storage Length	98	.6167	.4483	.0000
N Hearth-N End Length	65	.3737	.2546	.0027
S Hearth-S End Length	64	.4839	.3433	.0001
Hearth Number	75	.6030	.4552	.0000
Hearth Spacing	56	.5549	.4016	.0000
Total Storage Length:				
North Bench Width	33	.4170	.3411	.0071
South Bench Width	31	.6312	.4759	.0002
Hearth Number	85	.4487	.3289	.0000
Hearth Spacing	59	.4983	.3590	.0001
North End Storage Length:				
South End Storage Length	115	.6043	.4649	.0000
N Hearth-N End Length	84	.3970	.2815	.0002
S Hearth-S End Length	73	.3694	.2661	.0011
South End Storage Length:				
N Hearth-N End Length	75	.5781	.4312	.0074
S Hearth-S End Length	87	.3629	.2514	.0018

Table 2 (cont'd)

Variable	n	rho	tau	signif
North Bench Width:				
South Bench Width	45	.5695	.4670	.0000
Hearths				
N Hearth to N End Length:				
S Hearth-S End Length	79	.1491	.0935	.2298
Hearth Number:				
N Hearth-N End Length	43	.0044	.0049	.9745
S Hearth-S End Length	43	-.0033	-.2941-1	.9765
Hearth Spacing	70	-.1315	-.0970	.2872
Feature Density	86	.2913	.1732	.0285
Int. Post Density	80	.3216	.2356	.0037
Hearth Spacing:				
N Hearth-N End Length	36	.1674	.1252	.2959
S Hearth-S End Length	36	.3653	.2538	.0315
Feature Density	71	-.0220	-.0127	.8819
Int. Post Density	64	.1176	.0816	.3491
Feature Density:				
Int. Post Density	77	.6166	.4604	.0000
Int. Post Diameter	50	-.0362	-.0364	.7201
Interior Post Density:				
Int. Post Diameter	50	-.2664	-.1800	.0717

Table 3: Development of Longhouses

Table 3a: Longhouse Attributes through Time

House Length (in m)

	Statistic	df	signif
Kruskal-Wallis	52.154	3	.0000
Median	43.238	3	.0000

Time periods	n	avg. rank	median=21.8 n<	n>	n=
A.D. 700-1300	38	80.184	32	6	0
A.D. 1300-1450	30	190.967	6	24	0
A.D. 1400-1609	124	164.581	46	78	0
A.D. 1610-1650	88	115.409	56	32	0
Total260					

House Extension Length (in m)

	Statistic	df	signif
Kruskal-Wallis	13.259	3	.0041
Median	14.235	3	.0026

Time periods	n	avg. rank	median= 6.2 n<	n>	n=
A.D. 700-1300	3	7.167	3	0	0
A.D. 1300-1450	4	29.250	0	4	0
A.D. 1450-1609	16	17.875	5	11	0
A.D. 1610-1650	9	11.500	8	1	0
Total	32				

House Midline Width (in m)

	Statistic	df	signif
Kruskal-Wallis	10.741	3	.0132
Median	10.469	3	.0150

Time periods	n	avg. rank	median= 7.0 n<	n>	n=
A.D. 700-1300	51	143.186	28	18	5
A.D. 1300-1450	36	214.847	10	22	4
A.D. 1450-1609	163	185.138	52	80	31
A.D. 1610-1650	111	181.320	37	52	22
Total	361				

Table 3a (cont'd)

Mean House End Width (in m)

	Statistic	df	signif
Kruskal-Wallis	36.283	3	.0000
Median	23.589	3	.0000

Time periods	n	avg. rank	median= 5.4 n<	n>	n=
A.D. 700-1300	8	29.688	8	0	0
A.D. 1300-1450	11	10.909	11	0	0
A.D. 1450-1609	33	71.485	11	22	0
A.D. 1610-1650	56	56.598	24	32	0
Total	108				

Midline - End Width Difference (%)

	Statistic	df	signif
Kruskal-Wallis	49.779	3	.0000
Median	26.198	3	.0000

Time periods	n	avg. rank	median=24.0 n<	n>	n=
A.D. 700-1300	8	88.188	0	8	0
A.D. 1300-1450	11	103.773	0	11	0
A.D. 1450-1609	34	33.515	25	8	1
A.D. 1610-1650	57	54.711	27	26	4
Total	110				

Mean Linear Taper Length (in m)

	Statistic	df	signif
Kruskal-Wallis	29.444	3	.0000
Median	15.217	3	.0016

Time periods	n	avg. rank	median= 2.5 n<	n>	n=
A.D. 700-1300	11	38.818	8	3	0
A.D. 1300-1450	11	81.136	1	10	0
A.D. 1450-1609	22	27.909	16	4	2
A.D. 1610-1650	52	52.356	22	26	4
Total	96				

Table 3a (cont'd)

South Side Wall Post Mold Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	28.361	3	.0000
Median	13.630	3	.0035

Time periods	n	avg. rank	median= 3.7 n<	n>	n=
A.D. 700-1300	18	84.889	8	9	1
A.D. 1300-1450	15	135.767	3	12	0
A.D. 1450-1609	73	106.863	24	43	6
A.D. 1610-1650	77	71.045	45	24	8
Total	183				

South End Wall Post Mold Density (post per m)

	Statistic	df	signif
Kruskal-Wallis	23.318	3	.0000
Median	18.432	3	.0004

Time periods	n	avg. rank	median= 3.3 n<	n>	n=
A.D. 700-1300	11	62.455	5	6	0
A.D. 1300-1450	12	84.417	2	10	0
A.D. 1450-1609	39	78.167	10	27	2
A.D. 1610-1650	61	47.172	39	18	4
Total	123				

House Wall Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	60.192	3	.0000
Median	46.960	3	.0000

Time periods	n	avg. rank	median= 8.3 n<	n>	n=
A.D. 700-1300	33	51.258	30	3	0
A.D. 1300-1450	19	52.184	16	3	0
A.D. 1450-1609	97	115.608	40	57	0
A.D. 1610-1650	63	137.794	17	46	0
Total	212				

Table 3a (cont'd)

Corridor Length (in m)

	Statistic	df	signif
Kruskal-Wallis	12.507	3	.0058
Median	8.1475	3	.0431

Time periods	n	avg. rank	median=13.7 n<	n>	n=
A.D. 700-1300	14	38.750	11	3	0
A.D. 1300-1450	11	73.227	3	8	0
A.D. 1450-1609	19	64.684	7	12	0
A.D. 1610-1650	60	48.050	31	29	0
Total	104				

Corridor Width (in m)

	Statistic	df	signif
Kruskal-Wallis	7.6486	3	.0539
Median	6.9704	3	.0728

Time periods	n	avg. rank	median= 4.1 n<	n>	n=
A.D. 700-1300	18	55.083	12	5	1
A.D. 1300-1450	14	67.393	8	6	0
A.D. 1450-1609	35	67.614	19	13	3
A.D. 1610-1650	80	82.206	30	37	13
Total	147				

North Bench Width (in m)

	Statistic	df	signif
Kruskal-Wallis	13.598	3	.0035
Median	12.973	3	.0047

Time Periods	n	avg. rank	median=1.2 n<	n>	n=
A.D. 700-1300	5	24.700	3	2	0
A.D. 1300-1450	9	35.333	2	6	1
A.D. 1450-1609	15	30.133	3	9	3
A.D. 1610-1650	20	16.575	15	2	3
Total	49				

Table 3a (cont'd)

South Bench Width (in m)

	Statistic	df	signif
Kruskal-Wallis	19.075	3	.0003
Median	17.473	3	.0006

Time Periods	n	avg. rank	median=1.2 n<	n>	n=
A.D. 700-1300	5	35.000	0	5	0
A.D. 1300-1450	9	36.611	0	9	0
A.D. 1450-1609	13	21.500	6	4	3
A.D. 1610-1650	46	15.632	14	4	1
Total	46				

Storage Cubicle Total Length (in m)

	Statistic	df	signif
Kruskal-Wallis	12.532	3	.0058
Median	9.1831	3	.0270

Time periods	n	avg. rank	median= 4.4 n<	n>	n=
A.D. 700-1300	18	37.306	14	4	0
A.D. 1300-1450	15	78.000	4	11	0
A.D. 1450-1609	19	61.421	10	8	1
A.D. 1610-1650	63	58.119	29	34	0
Total	115				

Distance from Southernmost Hearth to South End (m)

	Statistic	df	signif
Kruskal-Wallis	16.350	3	.0010
Median	12.713	3	.0053

Time periods	n	avg. rank	median= 4.3 n<	n>	n=
A.D. 700-1300	24	31.917	19	4	1
A.D. 1300-1450	12	69.917	3	9	0
A.D. 1450-1609	28	56.714	11	16	1
A.D. 1610-1650	38	54.211	17	20	1
Total	102				

Table 3a (cont'd)

Hearth Number

	Statistic	df	signif
Kruskal-Wallis	.35577	3	.9492
Median	.77044	3	.8565

Time periods	n	avg. rank	median= 2.0 n<	n>	n=
A.D. 700-1300	27	54.093	8	12	7
A.D. 1300-1450	14	59.071	3	7	4
A.D. 1450-1609	25	58.000	7	11	7
A.D. 1610-1650	45	55.078	15	22	8
Total	111				

Hearth Spacing (in m)

	Statistic	df	signif
Kruskal-Wallis	23.258	3	.0000
Median	9.5729	3	.0226

Time periods	n	avg. rank	median= 2.6 n<	n>	n=
A.D. 700-1300	24	28.333	16	7	1
A.D. 1300-1450	14	70.250	3	11	0
A.D. 1450-1609	21	55.167	7	14	0
A.D. 1610-1650	35	46.943	19	14	2
Total	94				

Feature Density (features per m sq.)

	Statistic	df	signif
Kruskal-Wallis	10.187	3	.0170
Median	6.0147	3	.1109

Time periods	n	avg. rank	median=0.33 n<	n>	n=
A.D. 700-1300	23	77.457	11	12	0
A.D. 1300-1450	15	108.567	3	12	0
A.D. 1450-1609	31	72.387	16	14	1
A.D. 1610-1650	81	70.012	44	34	3
Total	150				

Table 3a (cont'd)

Interior House Post Mold Density (posts per m sq.)

		Statistic	df	signif	
Kruskal-Wallis		26.898	3	.0000	
Median		13.021	3	.0046	
Time periods	n	avg. rank	median=0.78		
			n<	n>	n=
A.D. 700-1300	19	60.974	9	10	0
A.D. 1300-1450	15	89.467	3	12	0
A.D. 1450-1609	22	85.955	7	15	0
A.D. 1610-1650	68	49.390	43	25	0
Total	124				

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Interior House Post Mold Diameter (in cm)

		Statistic	df	signif	
Kruskal-Wallis		32.497	3	.0000	
Median		25.256	3	.0000	
Time periods	n	avg. rank	median= 8.0		
			n<	n>	n=
A.D. 700-1300	13	82.538	4	8	1
A.D. 1300-1450	6	104.333	1	5	0
A.D. 1450-1609	70	48.000	48	21	1
A.D. 1610-1650	39	81.974	9	28	2
Total	128				

Table 3b: Average Length per Village

Minimum House Length per Village (in m)

	Statistic	df	signif
Kruskal-Wallis	2.7598	3	.4302
Median	1.6648	3	.6448

Time Periods	n	avg. rank	median=11.6 n<	n>	n=
A.D. 700-1300	8	13.125	5	3	0
A.D. 1300-1450	4	19.625	1	3	0
A.D. 1450-1609	9	18.000	4	5	0
A.D. 1610-1650	9	13.278	5	4	0
Total	30				

Maximum House Length per Village (in m)

	Statistic	df	signif
Kruskal-Wallis	9.3676	3	.0248
Median	7.7333	3	.0519

Time Periods	n	avg. rank	median=38.0 n<	n>	n=
A.D. 700-1300	8	9.375	6	2	0
A.D. 1300-1450	4	22.750	0	4	0
A.D. 1450-1609	9	19.889	3	6	0
A.D. 1610-1650	9	13.333	6	3	0
Total	30				

Mean House Length per Village (in m)

	Statistic	df	signif
Kruskal-Wallis	11.977	3	.0075
Median	7.7333	3	.0519

Time Periods	n	avg. rank	median=22.3 n<	n>	n=
A.D. 700-1300	8	9.188	6	2	0
A.D. 1300-1450	4	25.500	0	4	0
A.D. 1450-1609	9	19.444	3	6	0
A.D. 1610-1650	9	12.722	6	3	0
Total	30				

Table 3c: House Extensions

Twoway Cross-Tabulation

Time Periods		The Number of House Extensions: None	One	> One
n=	234			
Total=		197	29	8
Row%		84.2	12.9	3.4
Col%				
A.D. 700-1300	38	35	3	0
Expected		32	5	1
Row%		92.1	7.9	
Col%	16.2	17.8	10.3	
A.D. 1300-1450	20	14	4	2
Expected		17	2	1
Row%		70.0	20.0	10.0
Col%	8.5	7.1	13.8	25.0
A.D. 1450-1609	83	63	14	6
Expected		70	10	3
Row%		75.9	16.9	7.2
Col%	35.5	32.0	48.3	75.0
A.D. 1610-1650	93	85	8	0
Expected		78	12	3
Row%		91.4	8.6	
Col%	39.7	43.1	27.6	

Tests of Independence

	Statistic	signif	df= 6	n= 234
Max. Likelihood	19.231	.0038	Cramer's phi=	.1879
Chi-Square	16.522	.0112		

Table 4: Village Characteristics

Table 4a: House Orientation

Twoway Cross-Tabulation

		House Orientation			
		ENE	WNW	NE	NW
n=	415				
Total=		107	131	65	112
Row%		25.8	31.6	15.7	27.0
Col%					
A.D. 700-1300	63	18	20	9	16
Expected		16	20	10	17
Row%		28.6	31.7	14.3	25.4
Col%	15.2	16.8	15.3	13.8	14.3
A.D. 1300-1450	41	15	5	8	13
Expected		11	13	6	11
Row%		36.6	12.2	19.5	31.7
Col%	9.9	14.0	3.8	12.3	11.6
A.D. 1450-1609	197	49	82	35	31
Expected		51	62	31	53
Row%		24.9	41.6	17.8	15.7
Col%	47.5	45.8	62.6	53.8	27.7
A.D. 1610-1650	114	25	24	13	52
Expected		29	36	18	31
Row%		21.9	21.1	11.4	45.6
Col%	27.5	23.4	18.3	20.0	46.4

Tests of Independence

	Statistic	signif	df= 9	n= 415
Max. Likelihood	45.028	.0000	Cramer's phi=	.1892
Chi-Square	44.580			

Table 4b: Preferred Orientation

Twoway Cross-Tabulation

Time Periods		Major Village House Orientation				
		NE	ENE	WNW	NW	none preferred
Total=	35	3	8	11	6	7
Row%		8.6	22.9	31.4	17.1	20.0
Col%						
A.D. 700-1300	10	0	1	4	0	5
Expected		1	2	3	2	2
Row%			10.0	40.0		50.0
Col%	28.6		12.5	36.4		71.4
A.D. 1300-1450	5	1	1	0	2	1
Expected		0	1	2	1	1
Row%		20.0	20.0		40.0	20.0
Col%	14.3	33.3	12.5		33.3	14.3
A.D. 1450-1609	10	1	2	5	2	0
Expected		1	2	3	2	2
Row%		10.0	20.0	50.0	20.0	
Col%	28.6	33.3	25.0	45.5	33.3	
A.D. 1610-1650	10	1	4	2	2	1
Expected		2	3	2	2	
Row%		10.0	40.0	20.0	20.0	10.0
Col%	28.6	33.3	50.0	18.2	33.3	14.3

Tests of independence can not be computed.

Table 4c: Development of the Village

Village Maximum Size (in ha)

	Statistic	df	signif
Kruskal-Wallis	12.655	3	.0054
Median	12.584	3	.0056

Time Periods	n	avg. rank	n<	n>	n=
				median= 1.2	
A.D. 700-1300	12	14.042	10	2	0
A.D. 1300-1450	6	20.167	5	1	0
A.D. 1450-1609	19	27.184	6	13	0
A.D. 1610-1650	11	33.636	3	8	0
Total	48				

Average Spacing Between Houses, Side by Side (in m)

	Statistic	df	signif
Kruskal-Wallis	3.4349	3	.3293
Median	6.3000	3	.0979

Time	n	avg. rank	n<	n>	n=
				median= 2.6	
A.D. 700-1300	5	9.200	4	1	0
A.D. 1300-1450	4	14.625	1	3	0
A.D. 1450-1609	8	13.375	2	6	0
A.D. 1610-1650	5	8.300	4	1	0
Total	22				

Average Spacing Between Houses, End on End (in m)

	Statistic	df	signif
Kruskal-Wallis	4.9231	3	.1775
Median	6.111	3	.1063

Time Periods	n	avg. rank	n<	n>	n=
				median= 6.1	
A.D. 700-1300	2	2.500	2	0	0
A.D. 1300-1450	2	9.000	0	2	0
A.D. 1450-1609	6	6.000	4	2	0
A.D. 1610-1650	2	9.500	0	2	0
Total	12				

Table 4d: Overlaps

Twoway Cross-Tabulation

Time Periods		None	House-House	house-midden	house-palisade
			Overlaps		
n=	288				
Total=		163	82	13	30
Row%		56.6	28.5	4.5	10.4
Col%					
A.D. 700-1300	51	13	32	0	6
Expected		29	15	2	5
Row%		25.5	62.7		11.8
Col%	17.7	8.0	39.0		20.0
A.D. 1300-1450	12	5	3	4	0
Expected		7	3	1	1
Row%		41.7	25.0	33.3	
Col%	4.2	3.1	3.7	30.8	
A.D. 1450-1609	131	61	41	6	23
Expected		74	37	6	14
Row%		46.6	31.3	4.6	17.6
Col%	45.5	37.4	50.0	46.2	76.7
A.D. 1610-1650	94	84	6	3	1
Expected		53	27	4	10
Row%		89.4	6.4	3.2	1.1
Col%	32.6	51.5	7.3	23.1	3.3

Tests of Independence

	Statistic	signif		
			df= 9	n= 288
Max. Likelihood	103.73	0.	Cramer's phi=	.3524
Chi-Square	107.31	0.		

Table 5: Comparison of Longhouses within the Ball Village

Table 5a: Comparison of Houses by the General Distance between Houses

House Length (in m)

		signif
Mann-Whitney U=	47.000	.0564
Median Test		.0891

House Position	n	avg. rank	median= 18.5 n<	n>	n=
Surrounded	17	16.235	6	10	1
In The Open	10	10.200	7	2	0
Total	27				

House Midline Width (in m)

		signif
Mann-Whitney U=	99.000	.5111
Median Test		.5904

House Position	n	avg. rank	median= 7.0 n<	n>	n=
Surrounded	21	17.286	9	9	3
In The Open	11	15.000	5	4	2
Total	32				

Mean House End Width (in m)

		signif
Mann-Whitney U=	21.500	
Median Test		.1192

House Position	n	avg. rank	median= 5.4 n<	n>	n=
Surrounded	14	9.036	8	5	1
In The Open	6	13.917	1	3	2
Total	20				

Table 5a (cont'd)

Mean Linear Taper Length (in m)

		signif
Mann-Whitney U=	16.000	
Median Test		.1656

House Position	n	avg. rank	median= 3.3 n<	n>	n=
Surrounded	13	11.769	4	8	1
In The Open	6	6.167	4	1	1
Total	19				

South House Wall Post Mold Density (post per m)

		signif
Mann-Whitney U=	50.000	
Median Test		.4101

House Position	n	avg. rank	median= 3.4 n<	n>	n=
Surrounded	18	12.278	9	8	1
In The Open	6	13.167	2	3	1
Total	24				

South End Wall Post Mold Density (posts per m)

		signif
Mann-Whitney U=	28.000	
Median Test		.2214

House Position	n	avg. rank	median= 2.8 n<	n>	n=
Surrounded	15	9.867	7	6	2
In The Open	6	13.833	1	4	1
Total	21				

Table 5a (cont'd)

House Wall Diameter (in cm)

		signif
Mann-Whitney U=	65.000	.2298
Median Test		.2491

House Position	n	avg. rank	median= 9.3 n<	n>	n=
Surrounded	18	15.889	7	11	0
In The Open	10	12.000	6	4	0
Total	28				

Storage Cubicle Total Length (in m)

		signif
Mann-Whitney U=	52.000	.2009
Median Test		.1831

House Position	n	avg. rank	median= 5.0 n<	n>	n=
Surrounded	15	14.533	5	8	2
In The Open	10	10.700	6	4	0
Total	25				

Hearth Number

		signif
Mann-Whitney U=	2.5000	
Median Test		.0152

House Position	n	avg. rank	median= 2.0 n<	n>	n=
Surrounded	7	7.643	1	3	3
In The Open	4	3.125	4	0	0
Total	11				

Table 5a (cont'd)

Feature Density (features per m sq.)

		signif
Mann-Whitney U=	65.500	.1753
Median Test		.2999

House Position	n	avg. rank	median= .25 n<	n>	n=
Surrounded	19	16.553	8	9	2
In The Open	10	12.050	6	4	0
Total	29				

Interior House Post Mold Density (posts per m)

		signif
Mann-Whitney U=	50.000	.0389
Median Test		.0173

House Position	n	avg. rank	median= .59 n<	n>	n=
Surrounded	19	17.368	6	12	1
In The Open	10	10.500	8	2	0
Total	29				

Interior House Post Mold Diameter (in cm)

		signif
Mann-Whitney U=	50.500	
Median Test		.4445

House Location	n	avg. rank	median= 8.7 n<	n>	n=
Surrounded	16	11.656	7	8	1
In The Open	7	12.786	4	3	0
Total	23				

Table 5b: Comparison of Ball Houses By Length Classes

House Midline Width (in m)

	Statistic	df	signif
Kruskal-Wallis	6.6032	3	.0857
Median	4.2903	3	.2318

Length Classes	n	avg. rank	median= 7.0 n<	n>	n=
0-10 m	4	8.125	3	1	0
11-20 m	12	14.125	5	3	4
21-30 m	11	20.818	2	7	2
31-40 m	4	16.250	2	1	1
Total	31				

Mean House End Width (in m)

	Statistic	df	signif
Kruskal-Wallis	.89603	2	.6389
Median	.47138	2	.7900

Length Classes	n	avg. rank	median= 5.4 n<	n>	n=
11-20 m	11	11.955	5	5	1
21-30 m	9	13.111	4	4	1
31-40 m	3	8.833	2	0	1
Total	23				

Difference Between Midline and End Width (%)

	Statistic	df	signif
Kruskal-Wallis	.93808	2	.6256
Median	2.7350	2	.2547

Length Classes	n	avg. rank	median= 26.0 n<	n>	n=
11-20 m	11	10.727	6	4	1
21-30 m	9	13.667	2	5	2
31-40 m	3	11.667	2	1	0
Total	23				

Table 5b (cont'd)

Comparison of Ball Houses by Length Classes

Mean Linear Taper Length (in m)

	Statistic	df	signif
Kruskal-Wallis	2.6270	2	.2689
Median	5.5103	2	.0636

Length Classes	n	avg. rank	median= 3.2 n<	n>	n=
11-20 m	11	9.545	8	3	0
21-30 m	8	12.500	3	5	0
31-40 m	3	16.000	0	3	0
Total	22				

South Side Wall Post Mold Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	1.7303	2	.4210
Median	1.8357	2	.3994

Length Classes	n	avg. rank	median= 3.5 n<	n>	n=
11-20 m	11	12.091	6	5	0
21-30 m	11	15.773	4	7	0
31-40 m	4	11.125	3	1	0
Total	26				

South End Wall Post Mold Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	1.0155	2	.6018
Median	.40657	2	.8160

Length Classes	n	avg. rank	median= 2.9 n<	n>	n=
11-20 m	11	13.000	6	5	0
21-30 m	10	11.050	5	5	0
31-40 m	3	15.500	1	2	0
Total	24				

Table 5b (cont'd)

Comparison of Ball Houses By Length Classes

House Wall Post Mold Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	5.6616	3	.1293
Median	2.8166	3	.4208

Length Classes	n	avg. rank	median= 9.3 n<	n>	n=
0-10 m	2	1.500	2	0	0
11-20 m	11	14.909	4	7	0
21-30 m	9	14.889	5	4	0
31-40 m	4	12.500	2	2	0
Total	26				

Storage Cubicle Total Length (in m)

	Statistic	df	signif
Kruskal-Wallis	14.175	3	.0027
Median	7.7662	3	.0511

Length Classes	n	avg. rank	median= 5.1 n<	n>	n=
0-10 m	4	3.875	4	0	0
11-20 m	11	12.545	6	4	1
21-30 m	9	16.389	3	6	0
31-40 m	3	25.667	0	3	0
Total	27				

Hearth Number

	Statistic	df	signif
Kruskal-Wallis	8.5682	3	.0356
Median	10.000	3	.0186

Length Classes	n	avg. rank	median= 2.0 n<	n>	n=
0-10 m	4	2.500	4	0	0
11-20 m	4	6.750	0	1	3
21-30 m	2	9.000	0	2	0
31-40 m	1	11.000	0	1	0
Total	11				

Table 5b (cont'd)

Hearth Spacing (in m)

	Statistic	df	signif
Kruskal-Wallis	3.4773	2	.1758
Mediam	3.5833	2	.1667

Length Classes	n	avg. rank	median= 2.4 n<	n>	n=
11-20 m	4	4.500	3	1	0
21-30 m	4	5.250	2	1	1
31-40 m	3	9.000	0	3	0
Total	11				

Feature Density (features per m sq.)

	Statistic	df	signif
Kruskal-Wallis	2.1588	3	.5401
Median	1.8455	3	.6051

Length Classes	n	avg. rank	median= .25 n<	n>	n=
0-10 m	4	9.875	3	1	0
11-20 m	11	15.318	6	5	0
21-30 m	11	17.227	4	7	0
31-40 m	4	16.875	2	2	0
Total	30				

Interior House Post Mold Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	6.0880	3	.1074
Median	2.1091	3	.5501

Length Classes	n	avg. rank	median= .60 n<	n>	n=
0-10 m	4	6.500	3	1	0
11-20 m	11	14.682	5	6	0
21-30 m	11	18.136	6	5	0
31-40 m	4	19.500	1	3	0
Total	30				

Table 5b (cont'd)

Interior House Post Mold Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	3.3000	3	.3476
Median	3.9000	3	.2725

Length Classes	n	avg. rank	median= 8.6 n<	n>	n=
0-10 m	1	11.500	0	1	0
11-20 m	11	11.182	6	5	0
21-30 m	7	9.429	4	3	0
31-40 m	3	17.500	0	3	0
Total	22				

Table 5c: Comparison between Bali Houses with and without Side Wall Bench Post Lines

House Length (in m)

		signif
Mann-Whitney U=	69.000	.1726
Median Test		.1225

Benches	n	avg. rank	median= 19.3 n<	n>	n=
Absent	20	13.950	12	8	0
Present	10	18.600	3	7	0
Total	30				

House Midline Width (in m)

		signif
Mann-Whitney U=	107.00	.3716
Median Test		.1654

Benches	n	avg. rank	median= 7.0 n<	n>	n=
Absent	24	16.958	10	10	4
Present	11	20.273	2	6	3
Total	35				

Mean House End Width (in m)

		signif
Mann-Whitney U=	50.000	
Median Test		.2468

Benches	n	avg. rank	median= 5.4 n<	n>	n=
Absent	14	11.071	8	5	1
Present	9	13.444	3	4	2
Total	23				

Table 5c (cont'd)

Differnce between Midline and End Widths (in m)

		signif
Mann-Whitney U=	58.000	
Median Test		.6369

Benches	n	avg. rank	median= 26.0 n<	n>	n=
Absent	14	12.357	6	7	1
Present	9	11.444	4	3	2
Total	23				

Mean Linear Taper Length (in m)

		signif
Mann-Whitney U=	46.500	
Median Test		.5000

Benches	n	avg. rank	median= 3.2 n<	n>	n=
Absent	13	10.577	7	6	0
Present	9	12.833	4	5	0
Total	22				

South Side Wall Post Mold Density (posts per m)

		signif
Mann-Whitney U=	61.000	.0854
Median Test		.0131

Benches	n	avg. rank	median= 3.5 n<	n>	n=
Absent	20	17.450	6	12	2
Present	10	11.600	8	2	0
Total	30				

Table 5c (cont'd)

Storage Cubicle Total Length (in m)

		signif
Mann-Whitney U=	42.500	
Median Test		.0484

Benches	n	avg. rank	median= 5.4 n<	n>	n=
Absent	17	11.500	11	6	0
Present	9	17.278	2	7	0
Total	26				

Corridor Width (in m)

		signif
Mann-Whitney U=	70.000	.7785
Median Test		.5959

Benches	n	avg. rank	median= 4.1 n<	n>	n=
Absent	15	13.333	7	5	3
Present	10	12.500	5	4	1
Total	25				

Hearth Number

		signif
Mann-Whitney U=	4.0000	
Median Test		.4667

Benches	n	avg. rank	median= 2.0 n<	n>	n=
Absent	8	5.000	3	3	2
Present	2	7.500	0	1	1
Total	10				

Table 5c (cont'd)

Hearth Spacing (in m)

		signif
Mann-Whitney U=	13.500	
Median Test		.5000

Benches	n	avg. rank	median= 2.6 n<	n>	n=
Absent	9	6.500	5	4	0
Present	3	6.500	1	2	0
Total	12				

Feature Density (features per m sq.)

		signif
Mann-Whitney U=	112.00	.9063
Median Test		.2144

Benches	n	avg. rank	median= .25 n<	n>	n=
Absent	23	16.870	12	10	1
Present	10	17.300	3	6	1
Total	33				

Interior House Post Mold Density (posts per m)

		signif
Mann-Whitney U=	105.50	.7097
Median Test		.3969

Benches	n	avg. rank	median= .59 n<	n>	n=
Absent	23	16.587	12	11	0
Present	10	17.950	4	5	1
Total	33				

Table 5c (cont'd)

Interior House Post Mold Diameter (in cm)

		signif
Mann-Whitney U=	45.000	.0516
Median Test		.0554

Benches	n	avg. rank	median= 8.7 n<	n>	n=
Absent	15	11.000	10	5	0
Present	11	16.909	3	8	0
Total	26				

Table 5d: Comapison between Ball houses with and without Storage Partition Post Lines

House Length (in m)

		signif
Mann-Whitney U=	39.000	.0307
Median Test		.3441

Storage Cubicle Partitions	n	avg. rank	median= 18.4 n<	n>	n=
Absent	16	10.938	9	7	0
Present	10	17.600	4	6	0
Total	26				

House Midline Width (in m)

		signif
Mann-Whitney U=	95.500	.7078
Median Test		.2213

Storage Cubicle Partitions	n	avg. rank	median= 7.0 n<	n>	n=
Absent	16	14.469	7	8	1
Present	13	15.654	3	5	5
Total	29				

Mean House End Width (in m)

		signif
Mann-Whitney U=	44.000	.2902
Median Test		.2064

Storage Cubicle Partitions	n	avg. rank	median= 5.4 n<	n>	n=
Absent	12	12.833	4	6	2
Present	10	9.900	6	3	1
Total	22				

Table 5d (cont'd)

Mean Linear Taper Length (in m)

		signif
Mann-Whitney U=	38.000	
Median Test		.2449

Storage Cubicle Partitions	n	avg. rank	median= 3.3 n<	n>	n=
Absent	12	9.667	7	3	2
Present	9	12.778	3	6	0
Total	21				

House Wall Post Mold Diameter (in cm)

		signif
Mann-Whitney U=	35.000	.0114
Median Test		.0529

Storage Cubicle Partitions	n	avg. rank	median= 9.3 n<	n>	n=
Absent	14	10.000	9	5	0
Present	12	17.583	3	9	0
Total	26				

Storage Cubicle Total Length (in m)

		signif
Mann-Whitney U=	31.500	.0104
Median Test		.0207

Storage Cubicle Partitions	n	avg. rank	median= 5.4 n<	n>	n=
Absent	16	10.469	11	5	0
Present	10	18.350	2	8	0
Total	26				

Table 5d (cont'd)

Hearth Number

		signif
Mann-Whitney U=	.50000	
Median Test		.3333

Storage Cubicle Partitions	n	avg. rank	median= 2.0 n<	n>	n=
Absent	8	4.563	4	1	3
Present	2	9.250	0	2	0
Total	10				

Hearth Spacing (in m)

		signif
Mann-Whitney U=	2.0000	
Median Test		.0714

Storage Cubicle Partitions	n	avg. rank	median= 3.4 n<	n>	n=
Absent	5	3.400	4	1	0
Present	3	6.333	0	3	0
Total	8				

Interior House Post Mold Density (posts per m sq.)

		signif
Mann-Whitney U=	65.000	.0871
Median Test		.2817

Storage Cubicle Partitions	n	avg. rank	median= .55 n<	n>	n=
Absent	16	12.563	9	6	1
Present	13	18.000	5	8	0
Total	29				

Table 5e: Comparison between Ball Houses with and without Features in Storage Ends

House Length (in m)

		signif
Mann-Whitney U=	16.000	
Median Test		.0029

Storage Cubicle Features	n	avg. rank	median= 18.4 n<	n>	n=
Absent	21	17.238	7	14	0
Present	7	6.286	7	0	0
Total	28				

House Midline Width (in m)

		signif
Mann-Whitney U=	90.500	
Median Test		.5712

Storage Cubicle Features	n	avg. rank	median= 7.0 n<	n>	n=
Absent	21	15.310	8	8	5
Present	9	15.944	3	4	2
Total	30				

Mean House End Width (in m)

		signif
Mann-Whitney U=	31.000	
Median Test		.1854

Storage Cubicle Features	n	avg. rank	median= 5.4 n<	n>	n=
Absent	18	11.222	10	6	2
Present	5	14.800	1	3	1
Total	23				

Table 5e (cont'd)

Mean Linear Taper Length (in m)

		signif
Mann-Whitney U=	10.000	
Median Test		.0175

Storage Cubicle Features	n	avg. rank	median= 3.2 n<	n>	n=
Absent	17	13.412	6	11	0
Present	5	5.000	5	0	0
Total	22				

South House Wall Post Mold Density (posts per m)

		signif
Mann-Whitney U=	54.500	
Median Test		.6485

Storage Cubicle Features	n	avg. rank	median= 3.4000 n<	n>	n=
Absent	18	12.528	8	8	2
Present	7	14.214	3	4	0
Total	25				

Storage Cubicle Total Length (in m)

		signif
Mann-Whitney U=	18.500	
Median Test		.0290

Storage Cubicle Features	n	avg. rank	median= 5.1 n<	n>	n=
Absent	20	16.575	7	13	0
Present	7	6.643	6	0	1
Total	27				

Table 5e (cont'd)

Feature Density (features per m sq.)

		signif
Mann-Whitney U=	84.500	
Median Test		.1771

Storage Cubicle Features	n	avg. rank	median= .24 n<	n>	n=
Absent	20	15.275	8	11	1
Present	9	14.389	6	3	0
Total	29				

Interior House Post Mold Density (posts per m sq.)

		signif
Mann-Whitney U=	48.500	
Median Test		.1771

Storage Cubicle Features	n	avg. rank	Median= .56 n<	n>	n=
Absent	20	17.075	8	11	1
Present	9	10.389	6	3	0
Total	29				

Table 5f: Comparison of Ball Houses by Storage Feature Location

House Length (in m)

	Statistic	df	signif
Kruskal-Wallis	6.9641	3	.0730
Median	3.0613	3	.3823

Distribution of Storage Features	n	avg. rank	median= 19.0 n<	n>	n=
Absent	2	11.750	1	1	0
Bench Area	8	9.375	6	2	0
Central Corridor	13	19.423	5	8	0
Bench & Corridor	8	18.125	3	4	1
Total	31				

House Midline Width (in m)

	Statistic	df	signif
Kruskal-Wallis	6.6894	3	.0825
Median	6.0033	3	.1114

Distribution of Storage Features	n	avg. rank	median= 7.0 n<	n>	n=
Absent	2	6.000	2	0	0
Bench Area	8	13.938	4	2	2
Central Corridor	14	18.893	5	5	4
Bench & Corridor	12	23.167	2	9	1
Total	36				

Mean House End Width (in m)

	Statistic	df	signif
Kruskal-Wallis	1.0631	2	.5877
Median	1.4693	2	.4797

Distribution of Storage Features	n	avg. rank	median= 5.4 n<	n>	n=
Bench Area	5	9.900	3	2	0
Central Corridor	11	11.727	6	4	1
Bench & Corridor	7	13.929	2	3	2
Total	23				

Table 5f (cont'd)

South House Wall Post Mold Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	.43730	2	.8036
Median	2.6902	2	.2605

Distribution of Storage Features	n	avg. rank	median= 3.5 n<	n>	n=
Bench Area	5	17.400	1	3	1
Central Corridor	14	14.500	6	7	1
Bench & Corridor	11	15.909	7	4	0
Total	30				

Storage Cubicle Total Length (in m)

	Statistic	df	signif
Kruskal-Wallis	6.2239	3	.1012
Median	4.8859	3	.1803

Distribution of Storage Features	n	avg. rank	median= 5.1 n<	n>	n=
Absent	1	2.500	1	0	0
Bench Area	8	9.813	6	2	0
Central Corridor	11	16.000	4	6	1
Bench & Corridor	7	17.286	2	5	0
Total	27				

Hearth Number

	Statistic	df	signif
Kruskal-Wallis	7.0939	3	.0690
Median	10.000	3	.0186

Distribution of Storage Features	n	avg. rank	median= 2.0 n<	n>	n=
Absent	1	2.000	1	0	0
Bench Area	3	2.667	3	0	0
Central Corridor	5	7.800	0	3	2
Bench & Corridor	2	8.500	0	1	1
Total	11				

Table 5f (cont'd)

Hearth Spacing (in m)

	Statistic	df	signif
Kruskal-Wallis	.29087	3	.9617
Median	1.8333	3	.6077

Distribution of Storage Features	n	avg. rank	median= 2.6 n<	n>	n=
Absent	1	7.500	0	1	0
Bench Area	1	5.000	1	0	0
Central Corridor	8	6.438	4	4	0
Bench & Corridor	2	7.000	1	1	0
Total	12				

Feature Density (features per m sq.)

	Statistic	df	signif
Kruskal-Wallis	3.7430	3	.2906
Median	2.0610	3	.5598

Distribution of Storage Features	n	avg. rank	n<	median= .25 n>	n=
Absent	1	2.000	1	0	0
Bench Area	8	18.313	4	4	0
Central Corridor	14	19.821	5	7	2
Bench & Corridor	11	15.364	6	5	0
Total	34				

Interior House Post Mold Density (post per m sq.)

	Statistic	df	signif
Kruskal-Wallis	6.3521	3	.0957
Median	4.7458	3	.1914

Distribution of Storage Features	n	avg. rank	n<	median= .60 n>	n=
Absent	1	2.000	1	0	0
Bench Area	8	13.375	5	3	0
Central Corridor	14	21.679	4	10	0
Bench & Corridor	11	16.591	7	4	0
Total	34				

Table 5g: Comparison of Ball Houses with Few or Many Interior House Post Molds

House Length (m)

		signif
Mann-Whitney U=	22.000	.0006
Median Test		.0026

Interior House Post Molds	n	avg. rank	median= 18.8 n<	n>	n=
Few	10	7.700	9	1	0
Many	20	19.400	6	14	0
Total	30				

House Midline Width (m)

		signif
Mann-Whitney U=	126.00	.5595
Median Test		.2427

Interior House Post Molds	n	avg. rank	median= 7.0 n<	n>	n=
Few	13	19.308	3	7	3
Many	22	17.227	9	9	4
Total	35				

Mean House End Width (m)

		signif
Mann-Whitney U=	37.500	
Median Test		.3652

Interior House Post Molds	n	avg. rank	median= 5.4 n<	n>	n=
Few	6	14.250	2	4	0
Many	17	11.206	9	5	3
Total	23				

Table 5g (cont'd)

Difference between Midline and End Wdiths (%)

		signif
Mann-Whitney U=	50.500	
Median Test		.5368

Interior House	n	avg. rank	median= 26.0		
			n<	n>	n=
Few	6	12.083	3	3	0
Many	17	11.971	7	7	3
Total	23				

Mean Linear Taper Length (m)

		signif
Mann-Whitney U=	7.5000	
Median Test		.0062

Interior House Post Molds	n	avg. rank	median= 3.2		
			n<	n>	n=
Few	6	4.750	6	0	0
Many	16	14.031	5	11	0
Total	22				

South Side Wall Post Mold Density (posts per m)

		signif
Mann-Whitney U=	66.000	
Median Test		.4045

Interior House Post Molds	n	avg. rank	median= 3.50		
			n<	n>	n=
Few	9	12.333	5	2	2
Many	21	16.857	9	12	0
Total	30				

Table 5g (cont'd)

House Wall Diameter (cm)

		signif
Mann-Whitney U=	96.500	.8774
Median Test		.5539

Interior House Post Molds	n	avg. rank	median= 9.3 n<	n>	n=
Few	10	15.150	4	6	0
Many	20	15.675	9	11	0
Total	30				

Storage Cubicle Total Length (m)

		signif
Mann-Whitney U=	26.500	.0032
Median Test		.0151

Interior House Post Molds	n	avg. rank	median= 5.1 n<	n>	n=
Few	10	8.150	8	1	1
Many	17	17.441	5	12	0
Total	27				

Hearth Number

		signif
Mann-Whitney U=	4.0000	
Median Test		.0455

Interior House Post Molds	n	avg. rank	median= 2.0 n<	n>	n=
Few	6	4.167	4	1	1
Many	5	8.200	0	3	2
Total	11				

Table 5g (cont'd)

Hearth Spacing (m)

		signif
Mann-Whitney U=	3.0000	
Median Test		.1818

Interior House Post Molds	n	avg. rank	median= 2.4 n<	n>	n=
Few	2	3.000	2	0	0
Many	9	6.667	3	5	1
Total	11				

Feature Density (features per m sq.)

		signif
Mann-Whitney U=	131.00	.8452
Median Test		.3932

Interior House Post Molds	n	avg. rank	median= .25 n<	n>	n=
Few	13	17.077	7	6	0
Many	21	17.762	9	10	2
Total	34				

Interior House Post Mold Density (posts per m sq.)

		signif
Mann-Whitney U=	40.500	.7932
Median Test		.6846

Interior House	n	avg. rank	median= 8.6 n<	n>	n=
Few	13	10.115	10	3	0
Many	21	22.071	7	14	0
Total	34				

Table 5 h: Comparison of Ball Houses by Orientation Clusters.

House Length (in m)

	Statistic	df	signif
Kruskal-Wallis	.14868	3	.9854
Median	1.0385	3	.7919

Orientation Groups	n	avg. rank	median= 19.3 n<	n>	n=
Group 1	6	14.667	2	4	0
Group 2	3	14.333	2	1	0
Group 3	6	13.417	3	3	0
Group 4	13	14.962	7	6	0
Total	28				

House Width (in m)

	Statistic	df	signif
Kruskal-Wallis	1.7499	3	.6259
Median	4.5333	3	.2093

Orientation Groups	n	avg. rank	median= 7.0 n<	n>	n=
Group 1	7	19.643	3	4	0
Group 2	5	22.700	0	2	3
Group 3	7	16.143	4	2	1
Group 4	16	16.625	8	6	2
Total	35				

Mean House End Width (in m)

	Statistic	df	signif
Kruskal-Wallis	.13939	3	.9867
Median	.42593	3	.9348

Orientation Groups	n	avg. rank	median= 5.3 n<	n>	n=
Group 1	3	11.167	1	1	1
Group 2	3	12.167	1	1	1
Group 3	5	10.600	2	3	0
Group 4	10	10.800	5	5	0
Total	21				

Table 5h (cont'd)

Difference between the Midline and End Widths

	Statistic	df	signif
Kruskal-Wallis	1.2087	3	.7509
Median	1.9815	3	.5763

Orientation Groups	n	avg. rank	median=26.0 n<	n>	n=
Group 1	3	12.667	1	1	1
Group 2	3	9.000	2	1	0
Group 3	5	9.200	3	2	0
Group 4	10	12.000	3	5	2
Total	21				

Mean Linear Taper Distance (in m)

	Statistic	df	signif
Kruskal-Wallis	9.9898	3	.0187
Median	5.9956	3	.1118

Orientation Groups	n	avg. rank	median= 3.1500 n<	n>	n=
Group 1	3	2.833	3	0	0
Group 2	3	7.000	2	1	0
Group 3	5	10.200	3	2	0
Group 4	9	14.389	2	7	0
Total	20				

South Side Wall Post Mold Density (in m)

	Statistic	df	signif
Kruskal-Wallis	1.8884	3	.5959
Median	.54286	3	.9094

Orientation Groups	n	avg. rank	median= 3.6 n<	n>	n=
Group 1	5	11.900	3	1	1
Group 2	5	17.800	2	2	1
Group 3	5	11.800	2	1	2
Group 4	12	14.208	6	6	0
Total	27				

Table 5h (cont'd)

House Wall Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	6.3560	3	.0955
Median	4.7740	3	.1891

Orientation Groups	n	avg. rank	n<	median= 9.3 n>	n=
Group 1	3	5.000	3	0	0
Group 2	5	20.700	1	4	0
Group 3	6	14.000	3	3	0
Group 4	16	16.406	7	9	0
Total	30				

Storage Total Length (in m)

	Statistic	df	signif
Kruskal-Wallis	2.2431	3	.5235
Median	1.7889	3	.6174

Orientation Groups	n	avg. rank	n<	median= 5.1 n>	n=
Group 1	4	7.750	3	1	0
Group 2	3	14.333	1	2	0
Group 3	5	12.900	3	2	0
Group 4	12	13.458	5	7	0
Total	24				

Hearth Number

	Statistic	df	signif
Kruskal-Wallis	4.5477	3	.2081
Median	2.5714	3	.4625

Orientation	n	avg. rank	n<	median= 2.0 n>	n=
Group 1	2	3.250	1	0	1
Group 2	2	9.000	0	2	0
Group 3	2	6.500	0	1	1
Group 4	4	4.375	2	1	1
Total	10				

Table 5h (cont'd)

Hearth Spacing (in m)

	Statistic	df	signif
Kruskal-Wallis	5.5497	3	.1357
Median	6.7222	3	.0813

Orientation Groups	n	avg. rank	median= 2.6 n<	n>	n=
Group 1	3	4.500	2	1	0
Group 2	2	6.000	1	1	0
Group 3	3	4.333	3	0	0
Group 4	4	9.875	0	4	0
Total	12				

Feature Desnity (posts per sq. m)

	Statistic	df	signif
Kruskal-Wallis	6.2047	3	.1021
Median	5.2292	3	.1558

oreintation Group	n	avg. rank	median= .25 n<	n>	n=
Group 1	6	15.333	4	2	0
Group 2	5	19.500	1	4	0
Group 3	5	22.000	1	4	0
Group 4	14	11.821	9	5	0
Total	30				

Interior House Post Mold Density (posts per sq. m)

	Statistic	df	signif
Kruskal-Wallis	.44316 -1	3	.9976
Median	.66286	3	.8819

Orientation Group	n	avg. rank	median= .64 n<	n>	n=
Group 1	6	16.083	3	3	0
Group 2	5	15.400	2	3	0
Group 3	5	15.700	2	3	0
Group 4	14	15.214	8	6	0
Total	30				

Table 5h (cont'd)

Interior House Post Mold Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	1.5502	3	.6707
Median	2.1905	3	.5338

Orientation Group	n	avg. rank	median= 8.6 n<	n>	n=
Group 1	2	10.500	2	0	0
Group 2	4	16.375	2	2	0
Group 3	4	12.500	2	2	0
Group 4	14	11.679	6	8	0
Total	24 out of 36				

Table 5i: Comparison of Ball Core and Expansion Area Houses

House Length (in m)

	Statistic	df	signif
Kruskal-Wallis	2.1482	1	.1427
Median	.95511	1	.3284

House Location	n	ave. rank	median= 19.0 n<	n>	n=
Core	20	14.225	11	9	0
Expansion	11	19.227	4	6	1
Total	31				

House Width (in m)

	Statistic	df	signif
Kruskal-Wallis	.15621	1	.6927
Median	.29503 -1	1	.8636

House Location	n	avg. rank	median= 7.0 n<	n>	n=
Core	25	20.540	10	11	4
Expansion	14	19.036	6	6	2
Total	39				

House End Width (in m)

	Statistic	df	signif
Kruskal-Wallis	.57065 -1	1	.8112
Median	0.	1	1.0000

House Location	n	avg. rank	median= 5.4 n<	n>	n=
Core	14	11.250	7	7	0
Expansion	8	11.938	4	4	0
Total	22				

Table 5i (cont'd)

Difference Between Midline and End Width (%)

	Statistic	df	signif
Kruskal-Wallis	.22826	1	.6328
Median	.57692 -1	1	.8102

House Location	n	avg. rank	median= 26.0 n<	n>	n=
Core	14	12.000	6	7	1
Expansion	8	10.625	3	3	2
Total	22				

Mean Linear Taper Length (in m)

	Statistic	df	signif
Kruskal-Wallis	4.8437	1	.0277
Median	4.4545	1	.0348

House Location	n	avg. rank	median= 3.3 n<	n>	n=
Core	14	8.893	9	4	1
Expanison	7	15.214	1	5	1
Total	21				

South Side Wall Post Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	1.5921	1	.2070
Median	.40421	1	.5249

House Location	n	avg. rank	median= 3.5 n<	n>	n=
Core	19	13.553	10	7	2
Expansion	10	17.750	4	6	0
Total	29				

Table 5i (cont'd)

South End Wall Post Mold Density (posts per m)

	Statistic	df	signif
Kruskal-Wallis	.39683 -2	1	.9498
Median	.64815 -1	1	.7990

House Location	n	avg. rank	median= 2.9 n<	n>	n=
Core	14	12.071	7	7	0
Expansion	9	11.889	4	4	1
Total	23				

House Wall Post Mold Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	.27489 -1	1	.8683
Mediam	.39811	1	.5281

House Location	n	avg. rank	median= 9.3 n<	n>	n=
Core	20	16.775	7	9	4
Expansion	13	17.346	6	7	0
Total	33				

Storage Cubicle Total Length (in m)

	Statistic	df	signif
Kruskal-Wallis	1.0060	1	.3159
Median	1.1429	1	.2850

House Location	n	avg. rank	median= 5.1 n<	n>	n=
Core	18	12.917	10	7	1
Expansion	9	16.167	3	6	0
Total	27				

Table 5i (cont'd)

Hearth Number

	Statistic	df	signif
Kruskal-Wallis	.21368	1	.6439
Median	.10476	1	.7462

House Location	n	avg. rank	median= 2.0 n<	n>	n=
Core	9	6.222	4	3	2
Expansion	3	7.333	1	1	1
Total	12				

Hearth Spacing (in m)

	Statistic	df	signif
Kruskal-Wallis	5.2572	1	.0219
Median	5.5000	1	.0190

House Location	n	avg. rank	median= 2.6 n<	n>	n=
Core	8	4.813	6	2	0
Expansion	4	9.875	0	4	0
Total	12				

Feature Density (features per m sq.)

	Statistic	df	signif
Kruskal-Wallis	.30491	1	.5808
Medain	.13043	1	.7180

House Location	n	avg. rank	median= .25 n<	n>	n=
Core	23	18.152	11	12	0
Expansion	11	16.136	6	5	0
Total	34				

Table 5i (cont'd)

Interior House Post Mold Density (posts per m sq.)

	Statistic	df	signif
Kruskal-Wallis	.28492	1	.5935
Median	.13043	1	.7180

House Location	n	avg. rank	median= .62 n<	n>	n=
Core	23	16.870	11	12	0
Expansion	11	18.818	6	5	0
Total	34				

Interior House Post Mold Diameter (in cm)

	Statistic	df	signif
Kruskal-Wallis	4.8653	1	.0274
Median	1.3636	1	.2429

House Location	n	avg. rank	median= 8.7 n<	n>	n=
Core	15	16.333	6	9	0
Expansion	11	9.636	7	4	0
Total	26				

Table 6: Inter-regional Comparisons

Table 6a: Comparison between the Pickering and Glen Meyer Houses

Variable	Tribes: Pickering	Tribes: Glen Meyer	Test Statistic	df	signif
House Length (in m)					
mean	17.0	15.6	t= .42160	36	.6758
var	110.2	122.0	F= 1.1067	18, 18	.4160
n	19	19			
House Midline Width (in m)					
mean	6.8	6.6	t= .78195	49	.4380
var	1.5	.4	F= 3.3522	25, 24	.0021
n	26	25			
Mean House End Width (in m)					
mean	4.5	4.6	t=-.36242	6	.7295
var	.1	.3	F= 2.7566	3, 3	.2136
n	4	4			
Difference Between Midline and End Width (%)					
mean	38.0	34.3	t= .90784	6	.3990
var	52.7	15.9	F= 3.3797	3, 3	.1720
n	4	4			
Mean Linear Taper Length (in m)					
mean	2.8	1.9	t= 1.3565	9	.2080
var	2.1	.6	F= 3.3764	4, 5	.1072
n	5	6			
South Side Wall Post Mold Density (posts per m)					
mean	3.7	3.6	t= .18277	16	.8573
var	.3	1.6	F= 4.7896	6, 10	.0149
n	11	7			

Table 6a (cont'd)

Variable	Tribes: Pickering	Tribes: Glen Meyer	Test Statistic	df	signif
South End Wall Post Mold Density (posts per m)					
mean	3.7	4.0	t=-.24610	9	.8111
var	10.6	.9	F= 11.374	5, 4	.0177
n	6	5			
House Wall Post Mold Diameter (in cm)					
mean	7.0	7.3	t=-1.0173	31	.3169
var	.5	.8	F= 1.3985	13, 18	.2504
n	19	14			
Storage Cubicle Total Length (in m)					
mean	1.8	3.2	t=-1.2269	16	.2376
var	4.9	6.7	F= 1.3524	9, 7	.3531
n	8	10			
Corridor Width (in m)					
mean	4.4	3.6	t= 3.7904	16	.0016
var	.4	.1	F= 2.7004	6, 10	.0796
n	7	11			
Corridor Length (in m)					
mean	16.5	13.0	t= .46668	12	.6491
var	134.9	169.3	F= 1.2556	9, 3	.4738
n	4	10			
Distance from Southernmost Hearth to South End (in m)					
mean	2.8	3.3	t=-.79944	22	.4326
var	3.6	1.1	F= 3.1359	10, 12	.0323
n	11	13			

Table 6a (cont'd)

Variable	Tribes Pickering	Glen Meyer	Test Statistic	df	signif
Distance from Northernmost Hearth to North End (in m)					
mean	3.7	5.3	t=-1.2576	23	.2212
var	9.2	11.4	F= 1.2294	13, 10	.3776
n	11	14			
Hearth Number					
mean	3.3	1.9	t= 2.4363	25	.0223
var	4.2	1.0	F= 4.3248	11, 14	.0061
n	12	15			
Hearth Spacing (in m)					
mean	1.6	2.2	t=-.93451	22	.3602
var	1.5	3.0	F= 1.9296	9, 13	.1364
n	14	10			
Feature Density (features per m sq.)					
mean	.35	.41	t=-.62929	21	.5359
var	.07	.04	F= 1.7274	9, 12	.1863
n	10	13			
Interior House Post Mold Density (posts per m sq.)					
mean	1.09	.91	t= .49526	17	.6268
var	.57	.44	F= 1.3511	9, 8	.3411
n	10	9			
Interior House Post Mold Diameter (in cm)					
mean	8.1	10.4	t=-1.9127	11	.0822
var	2.8	6.5	F= 2.3291	6, 5	.1859
n	6	7			

Table 6a (cont'd)

Maximum Village Size (in ha)

		signif
Mann-Whitney U=	16.000	
Median Test		.6894

Tribe	n	avg. rank	median= .5		
			n<	n>	n=
Pickering	5	6.800	2	2	1
Glen Meyer	7	6.286	3	3	1
Total	12				

Minimum House Length per Village (in m)

		signif
Mann-Whitney U=	6.0000	
Median Test		.5000

Tribe	n	avg. rank	median= 11.3		
			n<	n>	n=
Pickering	3	4.000	2	1	0
Glen Meyer	5	4.800	2	3	0
Total	8				

Maximum House Length per Village (in m)

		signif
Mann-Whitney U=	7.0000	
Median Test		.5000

Tribe	n	avg. rank	median= 20.2		
			n<	n>	n=
Pickering	3	4.667	2	1	0
Glen Meyer	5	4.400	2	3	0
Total	8				

Table 6a (cont'd)

Mean House Length per Village (in m)

	signif
Mann-Whitney U= 6.0000	
Median Test	.5000

Tribe	n	avg. rank	median= 16.0 n<	n>	n=
Pickering	3	5.000	1	2	0
Glen Meyer	5	4.200	3	2	0
Total	8				

Median House Length per Village

	signif
Mann-Whitney U= 3.0000	
Median Test	.5000

Tribe	n	avg. rank	median= 13.5 n<	n>	n=
Pickering	3	6.000	1	2	0
Glen Meyer	5	3.600	3	2	0
Total	8				

Table 6a (cont'd)

Twoway Corss-Tabulation

House Location		Tribe Pickering	Glen Meyer
n=	62		
Total=		31	31
Row%		50.0	50.0
Col%			
No Palisade	8	8	0
Expected		4	4
Row%		100.0	
Col%	12.9	25.8	
Core	47	23	24
Expected		24	24
Row%		48.9	51.1
Col%	75.8	74.2	77.4
1st Expansion	4	0	4
Expected		2	2
Row%			100.0
Col%	6.5		12.9
Later Expansions	2	0	2
Expected		1	1
Row%			100.0
Col%	3.2		6.5
Outside Palisade	1	0	1
Expected		1	1
Row%			100.0
Col%	1.6		3.2

Tests of Independence

	Statsitic	signif	df= 4	n= 62
Max. Likelihood	20.816	.0003	Cramer's phi=	.4922
Chi-Square	15.021	.0047		

Table 6a (cont'd)

Twoway Cross-Tabulation

Overlaps		Tribe: Pickering	Glen Meyer
n=	51		
total=		22	29
Row%		43.1	56.9
Col%			
No Overlaps	13	10	3
Expected		6	7
Row%		76.9	23.1
Col%	25.5	45.5	10.3
House-House	32	10	22
Expected		14	18
Row%		31.3	68.8
Col%	62.7	45.5	75.9
House-Palisade	6	2	4
Expected		3	3
Row%		33.3	66.7
Col%	11.8	9.1	13.8

Tests of Independence

	Statistic	signif	df= 2	n= 51
Max. Likelihood	8.3042	.0157	Cramer's phi=	.3992
Chi-Square	8.1282	.0172		

Table 6a (cont'd)

Twoway Cross-Tabulation

Orientation		Tribe: Pickering	Tribe: Glen Meyer
n=	63		
Total=		32	31
Row%		50.8	49.2
Col%			
ENE	18	11	7
Expected		9	9
Row%		61.1	38.9
Col%	28.6	34.4	22.6
WNW	20	8	12
Expected		10	10
Row%		40.0	60.0
Col%	31.7	25.0	38.7
NE	9	6	3
Expected		5	4
Row%		66.7	33.3
Col%	14.3	18.8	9.7
NW	16	7	9
Expected		8	8
Row%		43.8	56.3
Col%	25.4	21.9	29.0

Tests of Independence

	Statistic	signif	df= 3	n= 63
Max. Likelihood	2.9559	.3985	Cramer's phi=	.2154
Chi-Square	2.9238	.4035		

Table 6b: Comparison of Prehistoric - Protohistoric Huron and Neutral Houses

Variable	Tribe: Huron	Tribe: Neutral	Test Statistic	df	signif
House Length (in m)					
mean	31.7	19.9	t= 4.1319	122	.0001
var	232.7	72.2	F= 3.2244	91, 31	.0002
n	92	32			
House Midline Width (in m)					
mean	7.2	6.5	t= 5.7430	161	.0000
var	.3	.6	F= 1.7788	37, 124	.0102
n	125	38			
Mean House End Width (in m)					
mean	5.9	5.3	t= 2.7192	29	.2260
var	1.7	.6	F= 6.7192	20, 9	.0737
n	24	9			
Difference between Midline and End Width (in m)					
mean	15.5	16.9	t= -.3067	27	.7647
var	149.4	112.6	F= 1.3269	24, 3	.3547
n	25	4			
South Side Wall Post Mold Density (posts per m)					
mean	4.5	4.0	t= 1.3329	71	.1868
var	1.7	1.3	F= 1.3521	51, 20	.2329
n	52	21			
South End Wall Post Mold Density (posts per m)					
mean	4.1	4.5	t=-.62658	37	.5348
var	2.4	3.0	F= 1.2617	8, 29	.3010
n	30	9			

Table 6b (cont'd)

Variable	Tribe Huron	Neutral	Test Statistic	df	signif
House Wall Post Mold Diameter (in cm)					
mean	8.9	6.4	t= 6.4806	77	.0000
var	1.6	.1	F= 11.874	67, 10	.0001
n	68	11			
Storage Cubicle Total Length (in m)					
mean	5.0	4.2	t= .65005	14	.5243
var	8.1	3.3	F= 2.4796	10, 4	.1204
n	11	8			
Corridor Width (in m)					
mean	4.1	3.7	t= 2.6744	33	.0116
var	.2	.4	F= 1.9257	11, 22	.0919
n	23	12			
Corridor Length (in m)					
mean	27.6	12.5	t= 1.9473	17	.0682
var	347.6	5.7	F= 60.562	12, 5	.0001
n	13	6			
Distance between Southernmost Hearth and South End (in m)					
mean	4.8	4.2	t= .87982	26	.3870
var	3.0	4.5	F= 1.5053	8, 18	.2235
n	19	9			
Distance between Northernmost Hearth and North End (in m)					
mean	5.4	3.8	t= 2.0870	24	.0477
var	3.6	2.5	F= 1.4522	17, 7	.3194
n	18	5			

Table 6b (cont'd)

Variable	Tribe: Huron	Neutral	Test Statistic	df	signif
Hearth Number					
mean	3.4	2.1	t= 1.8192	23	.0819
var	4.8	2.1	F= 2.3162	11, 12	.0823
n	12	13			
Hearth Spacing (in m)					
mean	3.6	3.7	t=-.10603	19	.9167
var	4.0	7.5	F= 1.8923	5, 14	.1596
n	15	3			
Feature Density (features per m sq.)					
mean	.43	.21	t= 2.7336	29	.0106
var	.06	.90	F= 6.7192	20, 9	.0030
n	21	6			
Interior House Post Mold Density (posts per m sq.)					
mean	2.8	1.0	t= 2.4432	20	.0240
var	4.5	.25	F= 17.985	12, 8	.0002
n	13	5			

Table 6b (cont'd)

Maximum Village Size (in ha)

	signif
Mann-Whitney U= 16.000	
Median Test	.1674

Tribe	n	avg. rank	median= 1.5 n<	n>	n=
Prehistoric Huron	11	11.545	4	7	0
Prehistoric Neutral	7	6.286	5	2	0
Total	18				

Original Village Size (in ha)

	signif
Mann-Whitney U= 23.000	
Median Test	.3522

Tribe	n	avg. rank	median= 1.2 n<	n>	n=
Prehistoric Huron	11	10.909	4	5	2
Prehistoric Neutral	7	7.286	4	2	1
Total	18				

Average Spacing Between Houses in a Row (in m)

	signif
Mann-Whitney U= 7.0000	
Median Test	.5000

Tribe	n	avg. rank	median= 2.9 n<	n>	n=
Prehistoric Huron	5	4.600	2	3	0
Prehistoric Neutral	3	4.333	2	1	0
Total	8				

Table 6b (cont'd)

Mean House Length per Village

		signif
Mann-Whitney U=	4.0000	
Median Test		.4048

Tribe	n	avg. rank	median= 25.9 n<	n>	n=
Prehistoric Huron	6	5.833	2	4	0
Prehistoric Neutral	3	3.333	2	0	1
Total	9				

Median House Length per Village (in m)

		signif
Mann-Whitney U=	5.0000	
Median Test		.4048

Tribe	n	avg. rank	median= 23.3 n<	n>	n=
Prehistoric Huron	6	5.667	2	4	0
Prehistoric Neutral	3	3.667	2	0	1
Total	9				

Table 6c: Comparison of Historic Huron and Neutral Houses

Variable	Tribe: Huron	Tribe: Neutral	Test Statistic	df	signif
House Length (in m)					
mean	20.4	18.9	t= .79691	86	.4277
var	60.5	109.9	F= 1.8150	37, 49	.0255
n	50	38			
House Midline Width (in m)					
mean	7.1	6.8	t= 2.1061	109	.0375
var	.7	.6	F= 1.1073	64, 45	.3625
n	65	46			
Mean House End Width (in m)					
mean	5.4	5.1	t= 1.3786	54	.1737
var	.6	.3	F= 1.9597	35, 19	.0608
n	36	20			
Difference Between Midline and End Width (in m)					
mean	24.4	22.9	t= .73507	55	.4654
var	32.4	113.43	F= 3.5043	20, 35	.0006
n	36	21			
Mean Linear Taper Length (in m)					
mean	3.0	2.0	t= 3.9731	50	.0002
var	.9	.4	F= 1.9521	35, 15	.0833
n	36	16			
South Side Wall Post Mold Density (posts per m)					
mean	3.7	3.1	t= 2.9356	75	.0230
var	.8	1.2	F= 1.5071	29, 46	.0704

Table 6c (cont'd)

Variable	Tribe: Huron	Tribe: Neutral	Test Statistic	df	signif
South End Wall Post Mold Density (posts per m)					
mean	3.3	2.2	t= 4.0995	59	.0001
var	.7	1.5	F= 2.1178	22, 37	.0213
n	38	23			
House Wall Post Mold Diameter (in cm)					
mean	9.7	8.4	t= 5.3030	79	.0000
var	1.5	1.0	F= 1.5124	38, 41	.0979
n	39	42			
Storage Cubicle Total Length (in m)					
mean	5.0	2.8	t= 4.1387	61	.0001
var	4.7	2.9	F= 1.6209	40, 21	.1188
n	41	22			
Corridor Width (in m)					
mean	4.2	4.1	t= 1.7412	83	.0854
var	.2	.1	F= 1.1937	43, 40	.2871
n	44	41			
Corridor Length (in m)					
mean	15.4	10.7	t= 2.8401	58	.0062
var	42.6	27.4	F= 1.5562	37, 21	.1418
n	38	22			
Distance between Southernmost Hearth and South End (in m)					
mean	5.6	4.1	t= 2.0171	36	.0512
var	1.5	6.0	F= 4.0489	23, 13	.0059
n	14	24			

Table 6b (cont'd)

Average Spacing Between Rows of Houses

		signif
Mann-Whitney U=	3.0000	
Median Test		.8000

Tribe	n	avg. rank	median= 5.5 n<	n>	n=
Prehistoric Huron	4	3.750	2	2	0
Prehistoric Neutral	2	3.000	1	1	0
Total	6				

Minimum House Length per Village (in m)

		signif
Mann-Whitney U=	3.0000	
Median Test		.0476

Tribe	n	avg. rank	mèdian= 12.8 n<	n>	n=
Prehistoric Huron	6	6.000	1	4	1
Prehistoric Neutral	3	3.000	3	0	0
Total	9				

Maximum House Length per Village (in m)

		signif
Mann-Whitney U=	3.0000	
Median Test		.4048

Tribe	n	avg. rank	median= 46.5 n<	n>	n=
Prehistoric Huron	6	6.000	2	4	0
Prehistoric Neutral	3	3.000	2	0	1
Total	9				

Table 6c (cont'd)

Variable	Tribe: Huron	Tribe: Neutral	Test Statistic	df	signif
Distance between Northernmost Hearth and North End (in m)					
mean	4.4	4.0	t= .54563	40	.9865
var	1.8	5.8	F= 3.1632	26, 14	.5884
n	15	27			
Hearth Number					
mean	2.5	2.5	t=-.33114	43	.9737
var	3.3	3.4	F= 1.0271	26, 17	.4886
n	18	27			
Hearth Spacing (in m)					
mean	3.5	2.4	t= 1.7042	33	.0977
var	3.9	2.8	F= 1.4220	17, 16	.2432
n	18	17			
Feature Density (features per m sq.)					
mean	.28	.42	t=-4.1609	79	.0001
var	.01	.41	F= 2.9801	28, 51	.0003
n	52	29			
Interior House Post Mold Density (posts per m sq.)					
mean	.74	.75	t=-.18235	66	.8559
var	.23	.15	F= 1.5667	42, 24	.1212
n	43	25			
Interior House Post Mold Diameter (in cm)					
mean	8.9	8.9	t=-.12864	37	.8983
var	1.9	1.2	F= 1.6590	26, 11	.1907
n	27	12			

Table 6c (cont'd)

Maximum Village Size (in ha)

		signif
Mann-Whitney U=	16.000	
Median Test		.5000

Tribe	n	avg. rank	median= 2.6 n<	n>	n=
Huron	5	6.800	3	2	0
Neutral	7	6.286	3	4	0
Total	12				

Minimum House Length per Village (in m)

		signif
Mann-Whitney U=	8.0000	
Median Test		.5952

Tribe	n	avg. rank	median= 6.9 n<	n>	n=
Huron	3	4.667	1	2	0
Neutral	6	5.167	3	2	1
Total	9				

Maximum House Length per Village (in m)

		signif
Mann-Whitney U=	8.0000	
Median Test		.5952

Tribe	n	avg. rank	median= 32.0 n<	n>	n=
Huron	3	5.333	1	1	1
Neutral	6	4.833	3	3	0
Total	9				

Table 6c (cont'd)

Mean House Length per Village

		signif
Mann-Whitney U=	7.0000	
Median Test		.5952

Tribe	n	avg. rank	median= 19.900 n<	n>	n=
Huron	3	5.667	1	1	1
Neutral	6	4.667	3	3	0
Total	9				

Median House Length per Village

		signif
Mann-Whitney U=	6.0000	
Median Test		.5952

Tribe	n	avg. rank	median= 19.5 n<	n>	n=
Huron	3	6.000	1	2	0
Neutral	6	4.500	3	2	1
Total	9				

Table 6c (cont'd)

Twoway Cross-Tabulation

House Location		Tribe: Huron	Neutral
n=	133		
Total=		66	67
Row%		49.6	50.4
Col%			
No Palisade	21	3	18
Expected		10	11
Row%		14.3	85.7
Col%	15.8	4.5	26.9
Core	90	47	43
Expected		45	45
Row%		52.2	47.8
Col%	67.7	71.2	64.2
1st Expansion	20	15	5
Expected		10	10
Row%		75.0	25.0
Col%	15.0	22.7	7.5
Outside Palisade	2	1	1
Expected		1	1
Row%		50.0	50.0
Col%	1.5	1.5	1.5

Tests of Independence

	Statistic	signif	df= 3	n= 133
Max. Likelihood	17.290	.0006	Cramer's phi=	.3456
Chi-Square	15.885	.0012		

Table 6c (cont'd)

Twoway Cross-Tabulation

Overlaps		Tribe: Huron	Neutral
n=	113		
Total=		48	65
Row%		42.5	57.5
Col%			
No Overlaps	91	45	46
Expected		39	52
Row%		49.5	50.5
Col%	80.5	93.8	70.8
House-House	16	0	16
Expected		7	9
Row%			100.0
Col%	14.2		24.6
House-Midden	4	2	2
Expected		2	2
Row%		50.0	50.0
Col%	3.5	4.2	3.1
House-Palisade	2	1	1
Expected		1	1
Row%		50.0	50.0
Col%	1.8	2.1	1.5

Tests of Indepencence

	Statistic	signif	df= 3	n= 113
Max. Likelihood	19.624	.0002	Cramer's phi=	.3490
Chi-Square	13.765	.0032		

Table 6c (cont'd)

Twoway Cross-Tabulation

House Extensions		Tribe Huron	Neutral
n=	96		
Total=		49	47
Row%		51.0	49.0
Col%			
None	86	43	43
Expected		44	42
Row%		50.0	50.0
Col%	89.6	87.8	91.5
One	10	6	4
Expected		5	5
Row%		60.0	40.0
Col%	10.4	12.2	8.5

Tests of Indepencence

	Statistic	signif	df= 1	n= 96
Max. Likelihood	.36104	.5479	Cramer's phi=	.0611
Chi-Square	.35849	.5493		
Binomial Test of Symmetry		.0000	Fisher Exact Prob=	.3971

Table 6c (con'd)

Twoway Cross-Tabulation

In House Burials		Tribe Huron	Neutral
n=	79		
Total=		38	41
Row%		48.1	51.9
Col%			
Absent	69	33	36
Expected		33	36
Row%		47.8	52.2
Col%	87.3	86.8	87.8
Present	10	5	5
Expected		5	5
Row%		50.0	50.0
Col%	12.7	13.2	12.2

Tests of Independence

	Statistic	signif	df= 1	n= 79
Max. Likelihood	.16524 -1	.8977	Cramer'S phi=	.0145
Chi-Square	.16535 -1	.8977		
Bimomial Test of Symmetry		.0000	FisHer Exact Prob=	.5813

Table 6c (cont'd)

Twoway Cross-Tabulation

Orientation		Tribe: Huron	Tribe: Neutral
n=	133		
Total=		67	66
Row%		50.4	49.6
Col%			
ENE	29	6	23
Expected		15	14
Row%		20.7	79.3
Col%	21.8	9.0	34.8
WNW	30	17	13
Expected		15	15
Row%		56.7	43.3
Col%	22.6	25.4	19.7
NE	19	2	17
Expected		10	9
Row%		10.5	89.5
Col%	14.3	3.0	25.8
NW	55	42	13
Expected		28	27
Row%		76.4	23.6
Col%	41.4	62.7	19.7

Tests of Indpedence

	Statistic	signif	df= 3	n= 133
Max. Likelihood	40.806	.0000	Cramer's phi=	.5319
Chi-Square	37.626	.0000		

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