Kitwanga Fort Report

George MacDonald

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by George F. MacDonald

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Abstract

During the mid-eighteenth century, early influences from coastal trade in iron from Russian sources had repercussions on Indian villages up the Nass and Skeena rivers. Eulachon grease trails that had been established between villages for millennia took on new strategic importance in intertribal warfare once iron began to move along them. Kitwanga Fort was probably one of many settlements established by ambitious warriors like Nekt to control this new trade. During the summer of 1979, a joint project of the Archaeological Survey of Canada, Canadian Museum of Civilization, and the National Historic Sites and Parks Services, Parks Canada excavated five houses sites on top of a hill near the confluence of the Kitiwankul and Skeena Rivers and mapped several hundred salmon storage pits around the back of the hill.

Rich oral tradition concerning the hilltop fort and its occupants were collected during the project at the village of Kitwanga, two miles from the archaeological site.

The archaeological and ethnohistoric research at the Kitwanga Fort Site, now a National Historic Site, throws new light on an episode of endemic warfare in Northern British Columbia at the time of initial contact with the outside world.

Résumé

Vers le milieu du XVIIIe siècle, l'influence du commerce de fer d'origine russe sur le littoral commence à se faire sentir dans les villages amérindiens situés le long des rivières Nass et Skeena. Le contrôle des pistes millénaires utilisées pour le commerce de la graisse d'eulakane entre les villages prend alors une importance stratégique nouvelle dans les conflits entre tribus. Le fort Kitwanga est probablement un des nombreux établissements érigés par des guerriers qui, comme Nekt, veulent dominer ce commerce. Au cours de l'été 1979, dans le cadre d'un projet commun de la commission archéologique du Canada (Musée canadien des civilisations) et des Services des parcs et lieux historiques nationaux, cinq emplacements de maisons ont été mis à jour, au sommet d'une colline se trouvant au confluent des rivières Kitiwankul et Skeena, et plusieurs centaines de fosses servant au stockage du saumon ont été repérées derrière la colline.

À quelques kilomètres du site archéologique, les chercheurs ont pu recueillir de nombreux récits sur le fort et ses occupants, récits qui leur ont été transmis oralement.

La recherche archéologique et ethnohistorique menée à l'emplacement du fort Kitwanga, classé depuis lieu historique, nous aide à comprendre cette période de conflit endémique qui sévissait dans le nord de la Colombie-Britannique au moment des premiers contacts avec le monde extérieur.

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Acknowledgements

Historical events associated with the native peoples of Canada are largely unknown to the general public. As an archaeologist, I am increasingly aware that the native history of our country is both rich and varied. It is important to make this rich heritage known to the Canadian public and to see that it is commemorated adequately. The story of the warrior Nekt is one such fascinating episode of Indian history involving hilltop forts, warriors in elaborate suits of armour, and all of the ceremonialism and ritual, which has made Northwest Coast Indian culture so fascinating to us today. Like many such stories, we began with semi-legendary accounts and attempted to fit them into an historic context by investigating both the locale in which the events took place and the memories of people whose ancestors had been associated with those events.

The investigation reported here would not have been possible without the support and assistance of the people of Kitwanga. In particular, I would like to thank the former Chief Councillor, Larry Moore, and the former Band Secretary, Glen Williams, for the arrangements they made for students from the reserve to work on the project. I also wish to thank Neil Sterritt, Director of the Gitksan-Carrier Tribal Council in Hazelton for advice and encouragement as well as Polly Sargent and the 'Ksan Dancing Society for allowing me to photograph the suits of armour they have recreated, particularly that of the warrior Nekt. The picture of Nekt's armour, worn by Victor Mowat of Hazelton (fig. 2), is reproduced here with kind permission of the 'Ksan Dancing Society.

I would like to express my appreciation to the two agencies that sponsored this research, first to the National Museum of Man (now the Canadian Museum of Civilization), National Museums of Canada, particularly the Director at that time, Dr. W.E. Taylor, Jr., for making my time available to the project and to Mr. Wally Kozar, then Assistant Director for providing valuable administration support, and second to the National Historic Parks and Sites Service, Parks Canada, particularly the Research Section, including Mr. John Rick, Head of the Research Division in Ottawa who first invited me to undertake this project, and Mr. Gerard Finn, Head of the Western Canada Research Section in Calgary, who was responsible for the planning and administration of the project. I would also like to thank DiAnn Herst, Chief of the Archaeological Research Section, Ottawa, for providing space for analysis of the collections and the production of this report, and Al Wilson for arranging drafting services. Similarly, I would like to thank Dr. Roger Marois, then of the Chief Archaeological Survey of Canada, National Museum of Man, for services he made available from that agency.

For his extensive assistance both in the field project at Kitwanga and in the laboratory in Ottawa, I wish to thank my colleague Dr. James B. Shaeffer. From the initial planning of the project to the preparation of the report, Dr. Shaeffer was involved throughout. He gave his time and effort far beyond the requirements of his research contract with Parks Canada. I would also like to thank Rosalind Whalley, who has been very helpful in researching questions of much importance to the archaeological interpretation of the site and its former occupants, both through ethnographic research in archives in Ottawa and Victoria, and directly, with the descendants of the people of the Ta'awdzep, now living in and around Kitwanga, British Columbia.

I further want to thank my wife, Joanne MacDonald, for her continued support throughout this project and for her research on material culture associated with the families at the fort.

Thanks also go to Joanne Monahan, the regional advisor for Kitimat district to the Archaeological Sites Advisory Board of British Columbia. She served most ably as finds recorder, photographer and field laboratory supervisor.

To the crew, who excavated the site for six weeks in the summer of 1979, I extend thanks for their interest and help. The student assistants include: Jane Sproule Thompson, Wayne Nelles, Helen Lemmon and Richard Mackie. Two volunteers were Dianna Farrow and Joanne MacDonald. Local assistance from Kitwanga included: Charlie Morgan, Clyde Williams, Valerie Williams, Leona Bright, Leona Williams, Phyllis Morgan and Patsy Bright.

While excavating the fort hill, most of the crew lived in the teacherages in Kitwankul village, arranged by E. Bergman of the Department of Indian Affairs in Hazelton. Chief Peter Williams and Chief Solomon Marsden made us welcome in the traditional way, with a special performance of their Lak-an-zok dance group. May Derek, a local historian, and resident anthropologists Vickey Jensen and Jay Powell helped with many arrangements.

Expression of my appreciation is due to the team of scientists from the Forestry Research Station of the Government of British Columbia in Smithers, who contributed their special expertise for the region to settling some major questions about the natural history of the site. They include Dr. David Wilfred, who provided a thorough interpretation of the geology of the site area; Dr. Richard Throwbridge, who interpreted the soils; and Dr. James Pozar, who provided a definitive list of the plant and tree species observed in the Parks Canada property.

The preparation of this report in Ottawa involved many people in addition to those already mentioned. For the appendix on faunal remains from the site, I am indebted to Anne Meachem Rick, Director, Zooarchaeological Identification Centre, National Museum of Natural Sciences. Thanks also go to Gerard Van Velthuizen, Contract Geologist and L. Moyd, Associated Curator, Mineralogy Department, National Museum of Natural Sciences for the identification and interpretation of mineral specimens; and from the staff of Historic Parks and Sites Branch, Material Culture Research, Karlis Karklins who examined and commented on the bead collection from the site; Douglas Bryce, of the Underwater Archaeology Section, and Bruce Morton, arms specialist, who examined and commented on weapon parts and Catherine Sullivan, glass specialist, who examined and commented on the glass fragments from the Conservation Division; H. Unglik and John Dawson, for chemical analysis and identification of metal objects.

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George F. MacDonald, Ottawa,
January 15, 1980

Introduction

In 1965 I visited Dr. Marius Barbeau at his home in Ottawa to talk of my plans for archaeological field work in northern British Columbia. Dr. Barbeau was almost eighty years old at that time and had been retired from the National Museum for many years. After a brief conversation about my interest in the Skeena River peoples, Dr. Barbeau began a long story about a warrior named Nekt and about the hill near Kitwanga where this warrior had his fort. Before I left that afternoon Dr. Barbeau stressed how important he thought this site was to the history of the coast and that he thought I should undertake an investigation of Nekt's fort.

Figure 2
A reconstruction by the Ksan Dancing Society of the armour and weapons of the warrior Nekt. (Reproduced with the Ksan Dancing Society's permission).

It was not until 1968 that I heard of the site once again, and on this occasion it was from Mrs. Polly Sargeant of Hazelton, who with the Skeena River Totem Pole Restoration Society, had decided to erect a historical marker at the site (Fig. 3). Mrs. Sargeant recounted to me the stories of how the hill was 'man made' as its name apparently indicated and she suggested once again that I investigate the hill. I did make a visit to the site that summer and observed that there were ridges and numerous depressions on top of the hill that indicated the remains of old structures. Shortly, thereafter, I talked to Mr. Philip Ward, Conservator at the British Columbia Provincial Museum, who was helping the local society to conserve poles at Kitwanga and Kitwankul. He said he had excavated a small test pit on top of the hill but that nothing of significance had been found, and that there did not appear to be any sizeable cultural deposit on top of the hill.

In 1975 the Kitwanga Battle Hill came to my attention once again when it was brought before the National Historic Sites and Monuments Board of Canada. I represented the National Museums of Canada on that Board and was pleased to support the Board's declaration that the site was of National Historical importance. I did point out to the board, at that time, that there was another much larger fort at the Kitselas Canyon, which appeared to have much more extensive archaeological remains and had been occupied for a much longer period than the one near Kitwanga. I had cleared the Kitselas site of vegetation and carefully mapped the site in 1968 and published reports on it in 1969 (MacDonald & Allaire 1969) and later in 1979 (Allaire, MacDonald and Inglis 1979). The relationship between these two forts was not well understood but there seemed to be as many differences between these sites as there were similarities.

The National Historic Sites and Parks Service of Parks Canada felt more information about the Kitwanga fort site was required for their planning purposes and invited me to pay a brief visit to the site in November of 1978 and provide them with

recommendations for further work. My visit coincided with a disastrous storm and flood on the Skeena River in which the road and railroads were washed out in literally hundreds of places and the link between Hazelton and Prince Rupert was severed for weeks. This somewhat inhibited my investigation, but with the aid of Mr. Ron Sebastian of Hazelton and his four wheel drive vehicle, I was able to make several trips to the site and make detailed on-site observations that resulted in a report and a number of recommendations. The main recommendation was that the site should be subjected to a limited test with specific objectives as follows: (MacDonald 1978)

- to determine the number and extent of structures on the hill.
- to determine the nature of any features that might survive below the hill, such as trails, storage pits, etc.
- to recover dateable materials to determine when and for how long the site was occupied.

Figure 3
Historic plaque in the form of a ceremonial copper erected by the Skeena River Totem Pole Restoration Committee circa 1967 to commemorate the Kitwanga Ta'awdzep.

In the early spring of 1979 I was asked by Mr. John Rick of the National Historic Sites and Parks Branch if I would undertake a limited test of the kind recommended in a joint project between his agency and the National Museum of Man with whom I am employed. The museum approved of this arrangement and plans were co-ordinated through Gerrard Finn, Head of Historical Research in the Calgary Office of Parks Canada for an excavation to begin in early July, and to last for a period of six weeks with a crew of eight to ten members.

Archival research was begun by Parks Canada who assigned Rosalind Whalley to research the records of Marius Barbeau in The Canadian Centre for Folk Culture Studies of the National Museum of Man, where hundreds of manuscript pages were located that relate to the Kitwanga Fort hill and the activities of the warrior Nekt.

A series of 14 tapes had been purchased by Parks Canada, which recorded Jack Morgan, now deceased, recounting the wars of the Kitwanga people with the Haida, Kitimat and Nass River peoples. Consequently, there was a substantial corpus of historical traditions relating to the site that were available to the project before excavation actually began at the site.

The Kitwanga Fort Project as it became known, presented a unique research opportunity in that it was possible to co-ordinate the archaeology of a specific historical site with a rich oral tradition of the wars and skirmishes that took place there over a number of centuries. Canada has few sites where full accounts of intergroup relationships can be extended back for centuries beyond the period of first contact between Indians and Whites.

As part of the Kitwanga Fort Project, Rosalind Whalley, was re-assigned in May 1979 to the Kitwanga area to record oral traditions associated with the site. There she arranged for native research assistants to accompany her to the site and offer their knowledge for the interpretation of a particular site problems. The information received was of great use in planning the excavation strategy, and in determining the function of artifacts and features encountered in the dig.

Part I
The Cultural Setting

Ethnohistory

The oral history of Skeena River tribes has engaged the interest a number of anthropologists beginning with Franz Boas who collected many legends from the Gitksan and Tsimshian at Port Essington on the lower Skeena late in the last century (Boas 1970). Lieutenant George Thornton Emmons who first served as an American Naval Officer on the coast of Alaska, retired to a long commitment to the study of Indian cultures of the northern coast. He made numerous trips to the Skeena River between 1908 and 1914 and took a particular interest in Kitwanga and the stories of Nekt. Marius Barbeau, and his field researcher William Beynon, collected a large quantity of text materials from Gitksan sources from 1915 until the mid 1950s.

The richness of the Boas, and Barbeau/Beynon narratives attracted the attention of Claude Levi-Strauss who chose the myth of Azdiwal from the Skeena-Nass River as the vehicle for several essays on structural analysis, with many rejoinder articles by colleagues, which continue to appear in the anthropological journals.

"A party of Haidas, from Queen Charlotte Islands, raided a fishing camp at the mouth of the Nass, massacred many of the occupants, and captured a beautiful young woman of high rank, whose name was Lutraisuh. She became the wife of Qawaek, a Haida chief, and gave birth to two sons, whom the father smothered to death after their birth, for fear that some day they might avenge the death of their uncles. Lutraisuh deceived her husband as to the sex of her third child, making him believe in the birth of a daughter, whose life he spared for that reason. With the help of some relatives of the Raven crest, Lutraisuh murdered her Haida husband, cut off his head, and escaped by night in a dug-out. The tale of her flight across the sea to the mainland is illustrated in a few poles of this clan, which may be called the Naeqt (Tongue-licked) clan. Her child in the bow of the canoe is supposed to have sucked the protruding tongue of his father's head. Lutraisuh was rescued at the mouth of the Nass and was adopted there by a family of relatives. Her son, named Naeqt (Tongue-licked) from the episode of his mother's flight in a canoe, grew into a strong, reckless boy, inheriting many of his father's characteristics. The uncles finally dismissed both mother and son, who then began a life of wanderings and solitude in the forest. Naeqt grew up with but one ambition, that of punishing the wrongs which he and his mother had to suffer. He became a bold and powerful warrior and made friends with some families on the Skeena which later were to become the Kitwanga tribe. He fashioned for his use an armour out of a grizzly-bear skin reinforced inside with a coat of pitch and flakes of slate, and began his career as a mysterious raider of coast and Nass River settlements. He was mistaken for a mythic grizzly-bear, whose attacks could not be resisted, on account of a magical war club in his front paw, the Strike-but-once-club. But his identity was ultimately discovered, after he had killed many people. Several tribes, from Kitamat and the Nass, organized together to defeat him and his confederates and curb his ascent to power. He then established his tribal quarters on Ta'awdzep (Fortress), a pyramid-like hill 2 miles north of the present village of Kitwanga, on Gitwinlkul river. To protect his stronghold against a surprise attack, which was anticipated, he made a fence of logs around the five houses of his tribe, and a trap door covered with deer hoofs, which would rattle at the least contact. When the enemies one night tried to climb the steep slope of Ta'awdzep, they were crushed to death by the logs that rattled down as soon as they were released by the besieged warriors above. Naeqt was later wounded, some say by a gunshot (from the first gun used in the country), while he donned his grizzly-bear armour on an expedition, and then clubbed to death."

Although this rich resource of textual materials runs to the thousands of pages, there is a much smaller, but not insignificant amount that relates to the Kitwanga fort hill. The most extensive notes are those of Barbeau/Beynon in the files of the Canadian Centre for Folk Culture Studies of the National Museum of Man in Ottawa.

A collection of materials of special interest to the project are the tapes recorded by Willis Morgan of his elderly uncle Jack Morgan, who died almost a decade ago. These recordings are being transcribed by Rosalind Whalley and together with the archival materials will form the basis of a later study on the oral traditions surrounding the Ta'awdzep of Nekt.

Although there are many variants of the Nekt (Naeqt) story (see Appendix I). Barbeau has conveniently synthesized a standard account, which is reproduced here to set the stage for the reconstruction that follows (Barbeau 1929: 52, 53).

Formal analysis of the many variants of the Nekt story would undoubtedly produce many conclusions of historical and anthropological significance. A structural analysis should reveal a set of relationships between Gitksan families and villages as well as wider set of relationships to other groups as far separated as the Haida, the Haisla, the Niska, Coast Tsimshian and Tsetsaut. In many respects the Nekt story is constructed of archetypal elements that occur in many other warrior stories from the North Coast. Undoubtedly there was a historical person called Nekt who did have a fort on the Kitwanga hill, but his existence was sufficiently far back in the past for the exact localities of his adventures to have been readapted to regional needs. In some accounts his mother comes from Kispiox. In others she is from Kisgigas or from a Nass River village. Stories also vary as to where Nekt resettles after he leaves the Ta'awdzep at Kitwanga and even to the place where, and the method whereby he is finally killed.

Similar to the difficulties of reconstructing the biography of the warrior Nekt are those of trying to sort out the various episodes of warfare that took place at the Ta'awdzep and of matching them with the archaeological remains at the site. In preparation for this task it is necessary to review some of the background of warfare and weaponry among the northern tribes of the northwest coast.

Figure 4
The Tsimshian Artist Fred Alexcee produced many paintings based on memories of Port Sinpson. This Tsimshian warriour is one of a number showing the use of armour, bows and arrows in somewhat crude but very dramatic illustrations. (Courtesy Vancouver Centennial Museum).

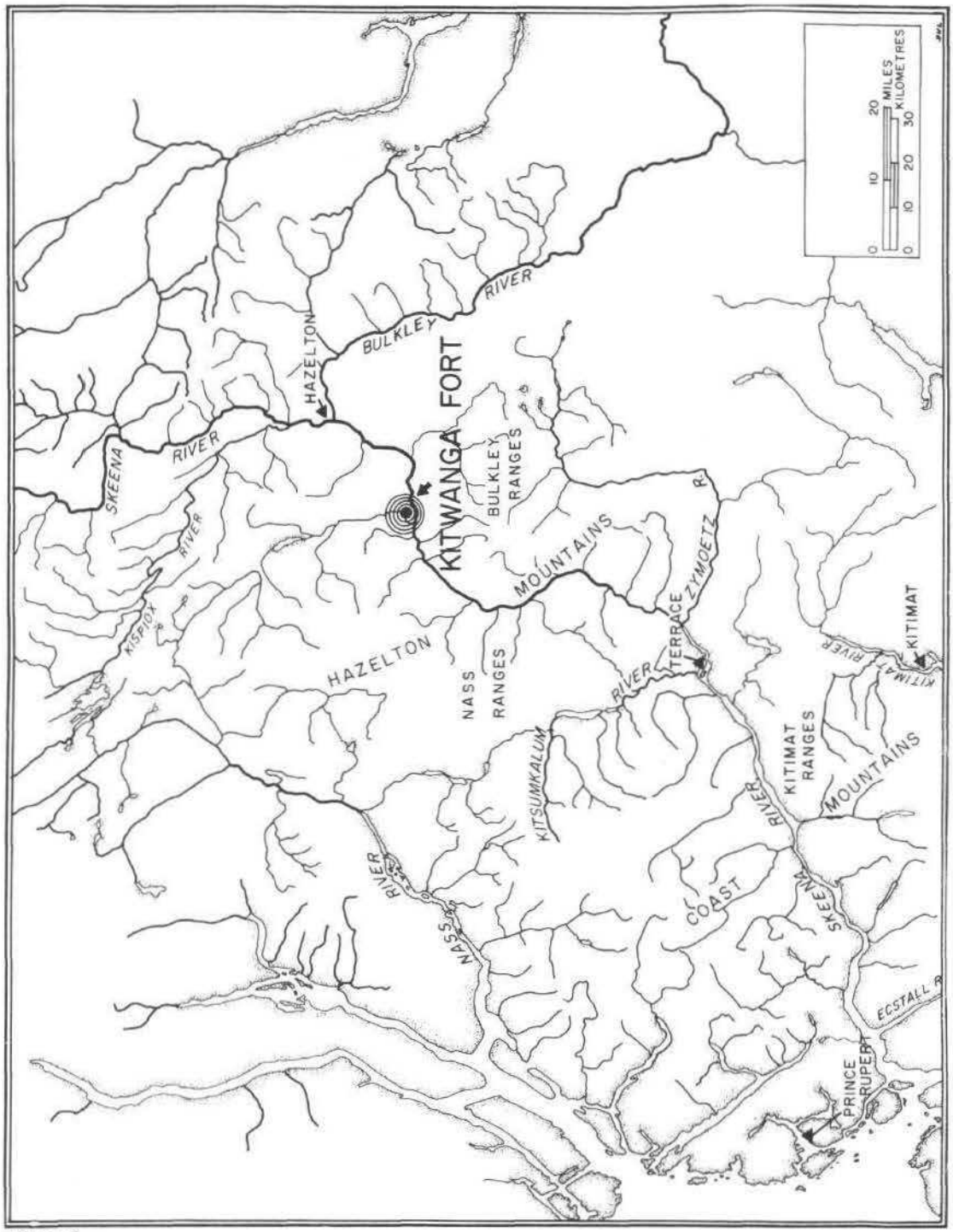


Figure 5
Locations of Kitwanga Fort, North Coast District, British Columbia.

Warfare

Among the Tsimshian speaking peoples of British Columbia warfare is recorded in epic oral histories that, by conservative estimates, span three or four centuries prior to European contact (Robinson and Wright 1962). The wars of the coast Tsimshian were on a much larger scale than were those of their relatives on the upper Skeena River. The coast Tsimshian went to war in large, sea-going canoes that could carry fifty warriors and that were deployed on raids hundreds of miles north and south of their home territory. In a recent study of northwest coast warfare, Ferguson (1979B:4) states:

> "The river mouths also were centers of trade both before and after contact. Furs and other items from the interior were traded down the valleys and western buyers clustered around the estuaries. Control of this trade was a continual source of conflict."

In particular reference to the Skeena Estuary, he states (Ferguson 1979B:6):

> "Boas' (1970:335-378) informants recalled a long series of exterminative raids fought between the Tlingit and Tsimshian over control of the Nass and Skeena Estuaries. These occupied most of the eighteenth century, with the Tlingit finally being defeated and pushed north."

The Haida were pushing out from their Queen Charlotte Islands home in several directions. To the north they displaced Tlingit people from much of the Prince of Wales Archipelago and made frequent attacks on Coast Tsimshian villages. According to legend they were leading war parties up the Skeena River even before the maritime fur trade had been established.

Archaeology in the Prince Rupert Harbour area near the Skeena estuary (MacDonald 1968) demonstrates clearly that warfare has been an organized and relatively extensive activity since approximately 1000 B.C. A study of fractures in human skulls and limbs from skeletons recovered from shell midden sites near Prince Rupert shows major conflicts with heavy weapons such as stone clubs throughout the first millenium B.C. (Cybulski1978). Finds of massive monolithic clubs as well as stone club heads, slate dagger blades and whalebone clubs verify this conclusion. Repercussions of such widespread hostilities near the Skeena estuary undoubtedly were felt at least as far as the Kitselas Canyon (Allaire 1978). Even from this early period the coincidence can be seen in the increase in evidence for interregional trade, and in intergroup conflict. Warfare and trade go hand in hand over the past three thousand years in the Skeena estuary and adjacent coast.

The pattern of warfare was consistent along the entire Northwest coast as far as the Bering Sea (Burch 1974). Night or dawn attacks were favoured and the aim was generally to trap as many people in the house as possible, and to take the women and children alive to be slaves. Most such activities could best be characterized as raids rather than wars. Motivation for war was for revenge or to take slaves, food stores or crest privileges. Territorial expansion was rarely the motivation or result of such hostilities.

Large specially built war canoes gave amazingly effective strike and retreat capability. Campaign supplies could be stored easily in the big watercraft so that the warrior crew was not slowed down by the necessity of foraging for food. There are several accounts that describe Tsimshian war canoes armed with large rocks that were used at close range to sink enemy craft. Small cannon were mounted on war canoes early in the maritime fur trade period. The mobility provided to the coast Indians by the war canoe can be favourably compared to that of the horse nomads of Eurasia. Traditional narratives talk of Haida war parties on the Skeena River with as many as 600 men in 12 canoes.

The only organization of war parties was into lineage or household groups each of which recognized the authority of their own chief. A chief wishing to lead a war party was required to solicit the assistance of other house chiefs within his village. War parties drawn from a number of villages were rare. The close relationships between a household group and a canoe party is noteworthy. A house chief became a canoe chief and every member of the party had an assigned seat in the canoe that corresponded to his seating rank within the house. Canoes, like houses, were named beings

Figure 6
The most complete suit of Northwest coast Indian armour is the one preserved in the Museum of Anthropology and Ethnology in Lenningrad. It was collected from Russian America early in the last century. Suits of armour such as this added at least a foot to the height of the warrior, rendering him a most imposing figure on the battle field, according to Russian accounts.

Figure 6a
In this view the long leather war coat is worn under the fitted slat armour, that protects the chest and abdomen. The helmet is carved of heavy wood with inlays of percula shells for the teeth; abalone shells for the eyes; human hair for the beard and sea lion whiskers dyed black for the crown of hair.

Figure 6b
Detail of the slat armour protector for the upper left arm, which is strung together with twisted nettle fibre. In this example an extra heavy leather collar of sea lion hide has been inserted between the visor and the war coat. The warrior could only glimpse the action through the slit between the helmet and the visor.

thought to have an existence and history of their own.

It has often been noted for the Northwest Coast that warfare is conducted like a ceremony, and ceremonies, particularly the potlatch, are conducted like warfare. There is good evidence to support the view that potlatching and warfare were part of a continuum whereby disputes between groups who were physically or culturally close would be dealt with through the potlatch, whereas disputes between those who were more distant were dealt with through warfare.

The use of armour appears to have been almost as much for ceremonial display as it was for protection. Ritual combats between elaborately armoured warriors were often used to decide the outcome of a particular battle. Elaborately carved helmets, or painted leather jerkins over the armour, were important forms of display.

Preparation for war involved fasting and abstinence from sexual intercourse by the man prior to the campaign, and rigidly observed abstinence by wives back in the villages. Ritual purification of a warrior was achieved by taking emetics or sweat baths.

Shamans were taken on war parties as they could often foretell the future or see through the mist or fog on canoe journeys. Some Shamans had mirrors of stone in which they could foresee the outcome of proposed battles or campaigns. Shamans often wore armour for their combat with other Shamans over the souls of patients. Naekt's armour of a grizzly bear hide is virtually identical to the bear skin cape used by Shamans among the Gitksan. It is this bear skin armour of Nekt that Awkawt wears as a Shaman on The Raven-Sailing-through-the-air pole at Kitwanga.

Armour

Several types of armour were used by the Tsimshian- speaking tribes. The most elaborate was wooden slats or rods woven into an articulated cuirass. Decorative panels on front and back often bore painted clan crest designs. The breast plate was in four parts, two parts cover the thorax front and back and the other two, which are smaller, cover the front and back of the lower neck (Fig. 6b). Assistance is needed to get into this type of armour. It is often worn over a leather shirt, possibly to keep the wood from chaffing the skin, but sometimes the wooden armour is concealed under a leather shirt or jerkin. Wooden armour was particularly common among the Sitka Tlingit, but early accounts speak of wooden armour among the Niska and Coast Tsimshian.

Figure 7
Heavy leather armour was folded double and fastened with toggles up one side. Crest figures often embellished the front and back. (Smithsonian Institute).

The second type of armour was made from heavy leather. This was often the skin of a large animal such as a sea lion, elk or moose folded double and then wrapped around the body and fastened at the left side by toggles or leather thongs. This kind of armour could be reinforced in several ways.

Wooden or metal slats could be sewn inside, and gravel or small stones could be glued on the outside with strong fish glues. This treatment was often applied three or four times until the leather coat was like cement.

Nekt's armour was a variant from both of these types since some accounts claim that he had plaques of shale sewn on the inside of his armour, which was made from a grizzly bear hide with the hair outside. The weight of this armour must have been considerable. Chief Hlengwah of Kitwanga (Jim Laknitz) described Nekt's armour to Barbeau in detail in 1920 (Barbeau ms: 277).

> "Maskibu (the name Nekt had as a youth) made up his mind to skin it (a grizzly bear he & a companion had just killed), but he did not want to cut the skin open, just a little cut across the belly. They skinned it. After that, they decided to kill mountain goats. They got some and took out the sinew and some hoofs. They lit a fire and heated some stones in (it) and put the sinew on the Stones, and they tanned the grizzly's skin there. When the skin was dry, one of Maskibu's nephews tried to put the skin on himself. Putting on the skin, they made a noise 'haw, haw, haw.' The man inside it tried to gallop like a bear. When the skin was quite dry, they opened the hole in the ground where the hot stones were with the sinew. The sinew was cooked and ready. Maskibu and some of his nephews went to get some slate and told the woman to sew the skin of the grizzly together with groundhog skins. They put the cooked sinew (it was cooked soft like cornstarch) on the skin, inside and into the fur, spreading it all over. It was like glue. Then they laid on some broken slate and made it adhere. It was difficult to lay it just right in the joints of the arms and at the knees. After they had finished doing this, they took more sinew (like glue) and spread it all over with more slate. When this was done, they put groundhog skins over it all and made a lining. The name of this [armour] was Gwisendzedzalt, 'Glue-all-over.' Maskibu then tried to put it on himself, and told to some of his nephews, 'When I run, try to shoot me with your arrows. Try to spear me too.' He was testing the grizzly's skin. So they began to chase him with arrows. But the arrows did not penetrate the skin. That is why they had worked on it. It was now complete. (The informant has a skin like it in his house showing the ends of the arrows sticking into it.)."

Limb Armour

Wooden slats were also used in greaves to protect the lower leg and on the lower arms (as in Fig. 6b).

Visors

Wooden collars could be used with either type of armour (as in Fig. 5). They were made by kerfing a piece of wood and bending it into a complete circle, fixed by leather lashing at the back. Visors were widest in front to cover the throat and had a mouth-piece to be held in the teeth for security. Visors had both breathing holes as part of the mouthpiece and eye holes for visibility. They were usually decorated with shallow relief carvings and painted.

Figure 8
A variety of daggers and sheaths (Smithsonian Institute).

Helmets

Massive wooden helmets fitted flush over the visors and added considerably to the height of the warrior. Europeans found that although they had no trouble shooting through the wooden breast plates of the natives they could not shoot through their wooden helmets, which were often at least four inches thick.

The decoration of helmets usually consisted of human faces, often grotesquely contorted, or animal crests such as bear or beaver. A chief at the Kitselas fort surprised and defeated his enemy by wearing a helmet carved like a vagina.

Weapons

Daggers

The most common weapon for close hand to hand fighting was the dagger. In prehistoric times daggers were made of chipped and ground slate (MacDonald & Inglis 1975). Slate daggers have been used by Tsimshian in the area of Metlakatla for the past three thousand years. Old ethnographic examples of such weapons have been collected, which are made of native copper or of whalebone and have the distinctive fluted blade. Some of these examples of native materials may be prehistoric, inspired in their form by the Siberian type of fluted dagger, known

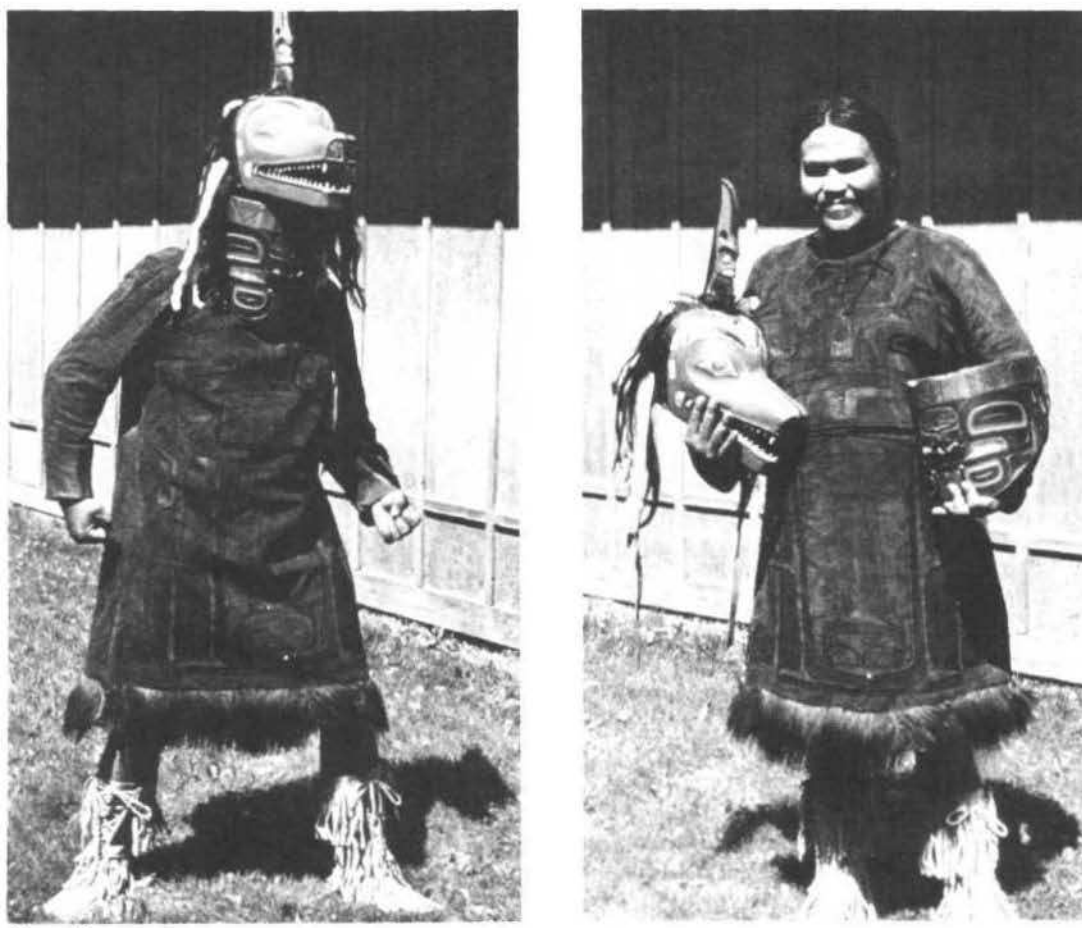


Figure 9
Gitksan armour included the visor and helmet but often hid the armour plating under the decorative war coat. (Jack Hudson photo, Courtesy of the Ksan Dancing Society).

since the Bronze Age of that region. In specific reference to the Gitksan, Emmons notes (1910ms):

> "The primitive knife was of stone and bone, but of these none remain. The oldest type of metal knife was like that of the coast tribes and unquestionably procured from them in trade - a double bladed weapon fashioned from an old file or piece of steel and later steel knife having a broad single blade was procured from white traders."

War Spear

De Laguna (1972:589) describes the war spear of the North Coast as "a knife tied on the end of a stick, and seems to have been the same as that used in hunting bears." The Tsimshian claim to have used spears from the palisades of their forts that were eighteen feet long. Presumably these would be knives or spear points lashed to long poles to ward off attackers. Most spears that were used in hand to hand combat were no more than six or seven feet long and were used for thrusting and never thrown.

War Clubs

Stone

A recognizable "club complex" on the Skeena River (Duff 1963) dates back several millennia. The most dramatic examples are made entirely of stone (Duff 1975: 101-111) and represent a wide variety of animals, birds, fish, humans and mythological, composite creatures. Thirty-five clubs of this style were found in a cache pit in the Hagwilget Canyon by Johnny Muldoe in 1898. Others now in the CMC, Ottawa, were collected at Metlakatla on the coast demonstrating that this style was known throughout Tsimshian-speaking territory. Fragments of similar clubs have been found in the Prince Rupert Harbour

Figure 10
Variety of war clubs from the Skeena River, from left: a prehistoric stone club in the Skeena River style, an ethnographic period stone club, a war pick with a nephrite blade, an antler war club that was broken and repaired with a wooden handle splice.

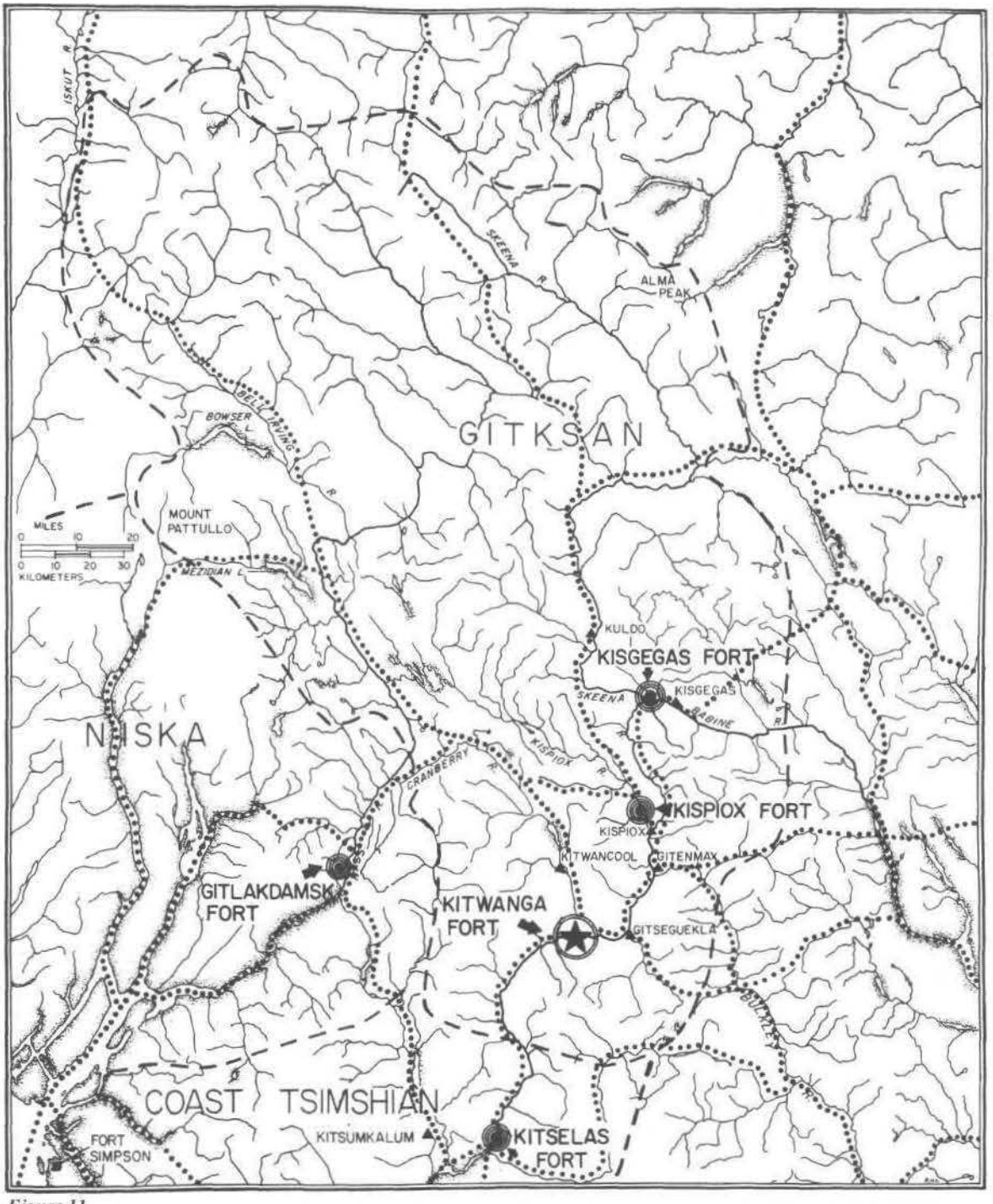


Figure 11
Fort Locations around Kitwanga.

and in the Kitselas Canyon in association with materials radio carbon dated at more than 2000 years old (MacDonald 1977 ms).

Antler

Another type of war club much used by the Tsimshian-speaking peoples was made from the beam of a caribou antler on which one tyne has been left projecting to form a sharp point of the weapon. Miniature examples of this type, carved in bone and antler, have been found in the Prince Rupert sites as early as two millennia ago. G.T. Emmons describe them for us (1910ms):

> "The caribou horn club A halah was common to all of the interior people who had the caribou and reached the coast tribes in trade. I have found the type among the Tlingits which had been brought from the valley of the Yukon, and on a totem pole at kitwangar is represented one in the hand of a human figure. The club is generally ornamental in lines and cuts and a record of those killed was kept in cuts on the under part of the handle. Many small ones were carried concealed under the arm pit or blanket and in the projecting arm was often inserted a sharp point of stone or bone and later steel, such were used to strike a vital blow back of the ear or the temple."

War Picks

These consisted of a slate or nephrite blade attached with lashing to a wooden or bone handle. They were very effective in poking a hole in an enemies skull, a feature noted in some of the skulls from the Prince Rupert Harbour excavations.

The Strike-only-once club of the warrior Nekt was probably this kind of club, as the model which appears on the Ta'awdzep pole of Hlengwah is a variety of this type. Emmons comments on several types of picks, which he noted in the area (1910 ms):

> "Stone clubs dug up on living sites along the river from Kispiox to Kitwangar are of the club and pick type. The form Ahhalah or Hanne yat sar 'to raise up and hit on the head', was pointed at both ends with a deep groove in the middle and is said to have been attached to the end of a short straight handle by means of a lashing of raw hide passing around the handle and over the groove. This character of club is similar to that used by many of the Plains tribes except that the stone head was flattened on the sides instead of being

Figure 12
Combat between armed warriors was a ceremonial as well as a militaristic exercise. A warrior would be chosen to represent each side. The visual effect of the elaborate crest decorations on helmets, clubs and war shirts was considered very important and wars were occasionally terminated when a particularly spectacular piece of weaponry was brought into the duel. Just such a piece was the "Strike-only-once" club belonging to the warrior Nekt from the Kitwanga Ta'awdzep. Fighting usually began with long spears and progressed to clubs and daggers until one warrior was defeated. If the duel was decisive the whole campaign was considered to be determined.

rounded. The other Dar Coess was a stone pick slightly curved at the smaller pointed end, from eight to twelve inches long and mounted through the end of a short stout wooden handle. This type is found among the Tlingit and was somewhat of a ceremonial weapon used to kill slaves at feasts and was the property of a chief. I am inclined to believe that this was of the coast and was borrowed by the Kitckshean (Gitksan)."

Braining Stone

Pecked and ground from a cobble and often bipointed, such hand held clubs were like a concealed weapon. Gitksan stories recount how warriors often carried these stones along with them should they be suddenly attacked. Some examples observed in private collections in the area are grooved for the fingers, while others had knobs or points on either end.

Bows and Arrows

The bow and arrow was widely used in warfare. Some were compound bows reinforced with sinew and pitch while others were simple wooden bows. Some had fluting on the inside of the bow in imitation of the fluting on dagger blades. Many had painted decorations and may have been used only on ceremonial occasions. War arrows were made from the wood of the Saskatoon berry bush that grew almost everywhere in the Skeena Valley but which was rare on the coast. Consequently, there was a brisk trade in arrow shafts from the Gitksan to the coast tribes. The Gitksan maintain that the cedar arrows used by coast tribes could be easily broken off by the wounded man, but that Saskatoon arrows were too hard and consequently caused more bleeding before they were removed.

Firearms

One version of the Nekt story maintains that he was shot with the first rifle that came into the area. It was purchased by a consortium of chiefs from the Nass River, possibly from Tlingits who had guns by 1794 (de Laguna 1972:589). Guns were probably common on the Skeena River after the beginning of the nineteenth century, although it was probably not until about 1835 that good rifles became readily available through the Hudson's Bay Company at Port Simpson, or slightly earlier from Fort St. James.

A pistol barrel was found at Ta'awdzep along with many pieces of lead shot. Although the demise of Nekt by a rifle may be apocryphal, there can be little doubt that the last days of the Th'azdzep resulted from the introduction of accurate rifles. Once attackers could shoot with any accuracy from the

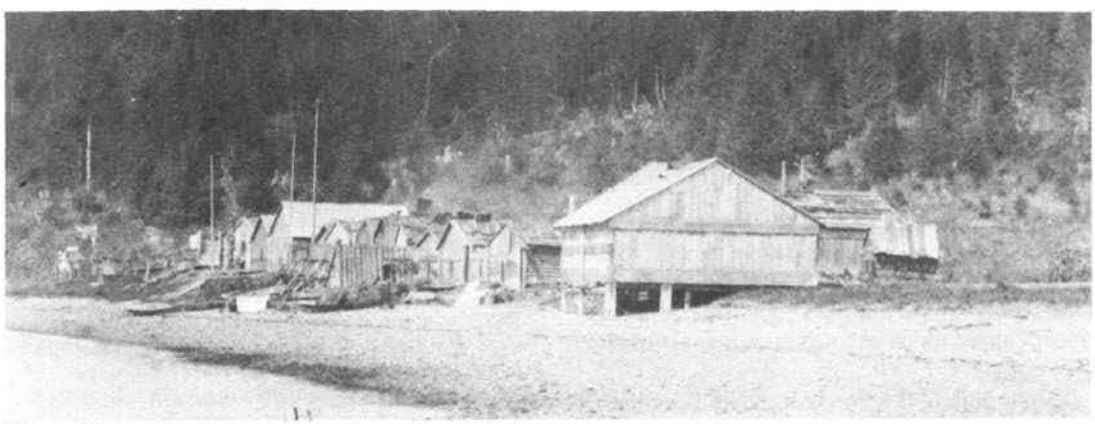


Figure 13
The partially fortified Tlingit village of Hoonah in Southeast Alaska. Only five of fourteen houses have been included within the palisade. The props are only found on the front of the fort and may have been to roll logs down on invaders like at the Kitwanga Ta'awdzep. The house in the foreground is built out beyond the winter high tide line on props like two of the Ta'awdzep houses. On the extreme right behind the village is a brush structure that is probably a sweat lodge. Northwest Trading Company Photo circa 1805. Courtesy Berlin Museum für Völkerkunde. (NMC neg. 78-6040).

high ridge that surrounds the fort hill on three sides, picking off the inhabitants would be like shooting fish in a barrel.

Forts on the Northern Northwest Coast

Of the North Coast language groups, Tsimshian, Haida and Tlingit, all had elaborate forts at the period of contact with Europeans. Captain Cook recorded the first example when he described a hilltop fortified retreat on a small island off the West Coast of Graham Island, Queen Charlotte Islands, in 1778. He called it Hippah Island, after the Maori term for similar forts he had recently encountered in New Zealand.

Newcombe recorded two dozen fort locations on the Queen Charlotte Islands and the myths of the Haida speak of many others. In fact each village appears to have had its retreat or defensive place. Depending on local topography these varied from simple palisades on rocky outcrops to sizeable forts with elaborate defensive systems. One of the largest forts was supposed to have been the one built by the people of Hiellan village at Tow Hill, a prominent landmark on the North Coast of Graham Island, Q.C.I. This fort had rolling log defenses like those of the Kitwanga fort and is the particular fort involved in the Kitwanga-Haida wars.

The Haida term for fort as recorded by Dr. C.F. Newcombe is Taodji. The term is not Haida in origin, but is likely derived from the Tsimshian term Ta'awdzep, which can be analysed to mean 'built up above' a basic description of a hill top fort. This raises an interesting question whether the concept of a hill fort, as well as the term, was borrowed by the Haida from the Tsimshian.

Figure 14
Detail of the Hoonah Fort. Note the large raven head crest on the top of the palisades. The two gateways have two different kinds of stairs. Those in the foreground are of European type while the notched log ladders at the further door are aboriginal and could be quickly drawn back into the fort like a drawbridge. (NMC neg. 78-6041).

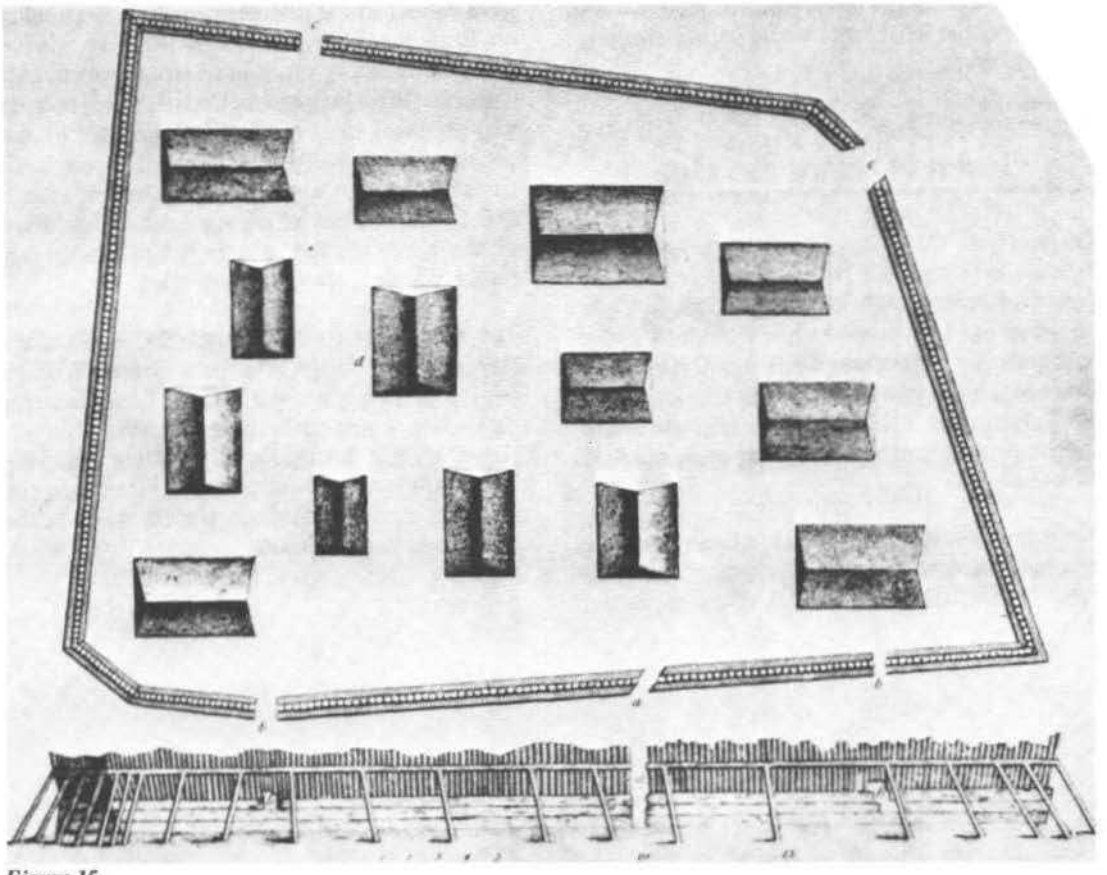


Figure 15
Tlingit Fort at Sitka. Destroyed by the Russians in 1804. The site has been excavated and is now part of the SITKA National Historic Park.

Tlingit Forts

The Russian explorers and early traders recorded many Indian forts, which they called redoubts (the Russian term for fortified retreat).

After the Tlingit tribe attacked and took the Russian fort at Sitka in 1803 they immediately set to work to build a fort for the retributive strike from the Russians, which they knew would come. It came a year later, and various episodes of the conflict are the best documented illustrations of northern Northwest Coast use of forts that we have.

The Tlingit decided to move the fort from the island in Sitka Harbour where it had traditionally been because they knew the Russian gunboats could shell the fort without obstruction. Therefore they moved their fort to the mouth of the Indian River where the shallow tidal flats prevented the ships from drawing within effective cannon range, but which did not inhibit their own canoe navigation. On a foray to attack the fort in longboats, the Russians were taken totally by surprise by a lone Tlingit warrior who had floated down the Indian River to a place below where they landed on the beach. Dressed in a suit of leather and wooden armour, and flailing a Russian made sledge hammer, he attacked the Russian party from behind and drove them off single-handed. Before the Russians could plan a second attack the Tlingit mysteriously abandoned the fort. It took 300 Russian seamen several days to demolish and burn it. Before its destruction Lisianski recorded a plan and elevation. The details of the palisades, entry ways, etc. for this fort are consistent with the oral descriptions of the Kitwanga Ta'awdzep. The Indian River fort has become a U.S. National Historic Monument and has a large interpretive centre, totem pole park and ground interpretation of the fort itself. The whole operation is very

instructive as to what can be done with this type of site.

Only one Tlingit fort, the one at Hoonah, was ever photographed. In Fig. 3. the vertical log palisade protects only five houses in a village of a dozen or more community houses. However, the large bird's head (probably Raven) is evidently a clan-marker and is consistent with the practice of wars being waged primarily by one particular clan against another. The startling feature of these photographs, confirmed by period drawings, is that the palisades always have external supports for the vertical posts. It appears that it would be relatively easy to pull away these supports with ropes and hooks, even under fire, reducing the strength of the palisade wall very considerably.

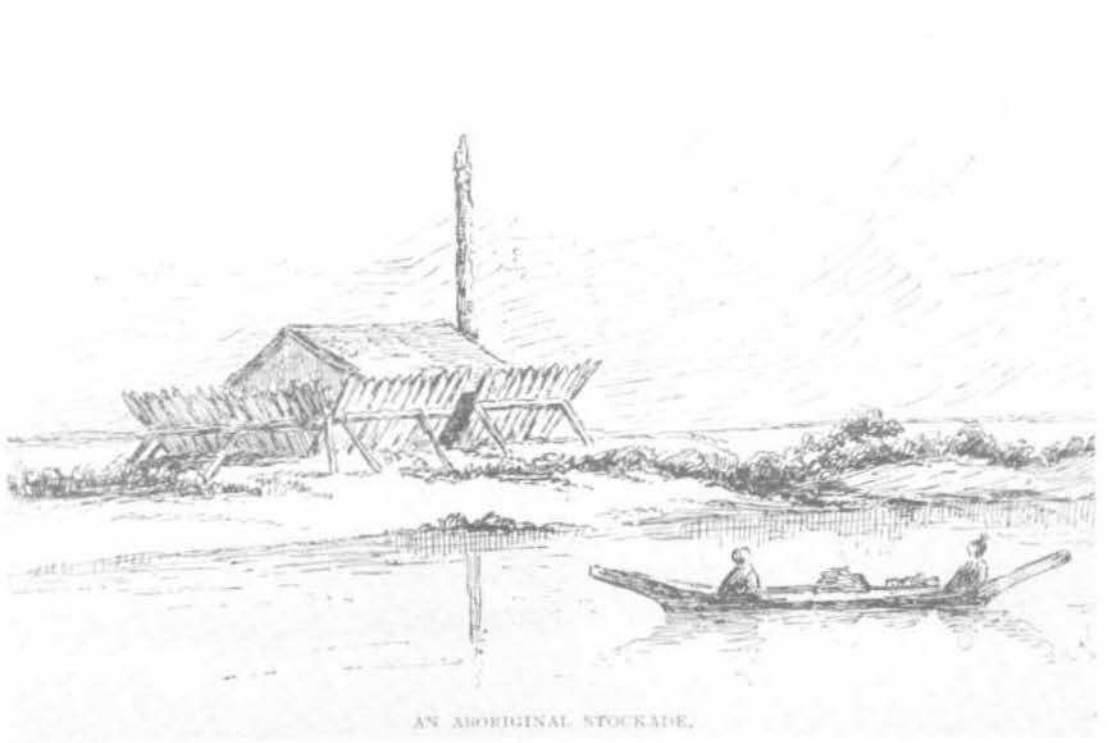


Figure 16
A fortified house in southeast Alaska. The steeply pitched palsade is also described as occurring among the Haida of the Queen Charlotte Islands. The doorways swing up and may have been the origin of the idea of a trapdoor. (Reproduced from Ridley 1903).

Trails and Trade

Kitwankul Trail

Of the dozens of trails that linked native villages in northern British Columbia, the most famous of all was the Kitwankul Trail between the Skeena and Nass Rivers. It was one of the widest trails in the region and reported to be as much as one metre deep where it cut over hills and ridges. It was about 60 km long. The trail was used by many explorers of the late nineteenth century, including George Mercer Dawson and Charles Horetzsky, who have left detailed descriptions of the trail and the traffic they encountered on it.

The Kitwankul Trail is mainly a cross-country trail from Aiyansh on the Nass River to Kitwankul Lake. From there it follows the edge of the lake and the Kitwanga River all the way to its confluence with

Figure 17a
Transport on the old grease trails consisted of carrying heavy loads on the backs of men, women, children and dogs.

Figure 17b
Transport on the rivers relied on small dug-out canoes made from local cottonwood trees or larger red cedar canoes traded from coastal Indians, as in this illustration. (NMC 47035).

the Skeena. There are some minor deviations from the river to cut overland as it does a few kilometres before it reaches the Skeena. This eliminates a large meander of the Kitwanga River and also reaches the Skeena farther upstream from the Village of Kitwanga. Trails rarely have their junctions with other trails or rivers right at villages (Donahue 1974). At the Skeena River, the Kitwankul Trail joined with the Skeena River Trail, a major segment of which ran from Usk to Hazelton via Kitwanga. It was the latter trail that was used by the authorities to suppress the Skeena River Rebellion and hunt down Kitwankul Jim (Barbeau 1928).

Commodities carried over the Grease Trail spanned a wide variety of both native and European trade goods. Olachan grease, from which the trail took its name, was undoubtedly the single most important commodity, since this trail was the main line from the Nass fisheries into the interior. According to Horetzky, men on the trail carried an average of three hundred pounds of goods in tied wooden boxes, with a tump-line to their forehead. Women carried half that amount, but even children and dogs were pressed into service to carry as much as possible.

The Kitwankul Trail was first made in prehistoric times, but it is impossible to say when. As a hunting trail, it is undoubtedly many thousands of years old, but as a major trade route, it probably came into importance between two and three thousand years ago. The technology of fishing Eulachon, and of preserving the fish oil by fermentation and separation, may not be older than that. There is clear evidence of prehistoric trade in the finds of fourteen pieces of obsidian at the site, which came from Mt. Edziza on the Stikine River. The Nass to Skeena Grease Trail and the Nass to Stikine Trail form a direct route from Kitwanga to the Edziza Source. (Appendix VI).

The Kitiwanga Fort Hill is located only a few hundred metres from the Grease Trail. The major question is, however, if the function of the fort was to secure the Grease Trail. Informants say there was no attempt to block anyone going to the Nass fisheries from the trail, nor to charge them a users' fee. It would appear that this situation is parallel to ones described by Amsden in Alaska, where local groups who controlled resources so rich they could not hope to deplete them, would exploit the resources further by inviting the neighbours in to

Figure 18b
Gitksan Indian dog with carrying pack on Skeena River Trail. (Harlan I. Smith, 1925. NMC 65510).

Figure 18a
Indian boy on Skeena River Trail with a woven cedar back pack and woven Tump-line. ((Harlan I. Smith photo, 1925 NMC 49308).

fish, and thereby put the visitors in their debt. This applied to the provision of camp sites and fishing stations to visitors by the Nishka, and the trails were simply another necessity to which sharing was extended. It is unlikely a fort was required on the Grease Trail as long as the main use was in connection with the Nass fishery. When European trade had commenced in the region, however, the situation probably changed rapidly.

European trade items were an extremely desirable and very rare resource in the eighteenth century. Metal weapons, including war daggers, metal arrow points etc., gave a military advantage as well as an economic one. In return for European trade objects, the Indians were required to barter skins, which were also in limited supply. It is clear that in the eighteenth and nineteenth centuries, chiefs vied with each other to control trade routes. This has been documented on the coast for Maquina among the Nootka, Cunneha among the Haida and Legaic among the Coast Tsimshian (Robinson, M; 1978). Legaic formed solid alliances with the Hudson's Bay Company when they established Fort Simpson in 1834, by providing the land on which to build the post, and by marrying his daughter to the chief factor. Within a short period, his new wealth and weaponry gave him undisputed authority over all trade on both the Nass and Skeena Rivers, and presumably the Grease Trail, which linked the two rivers. Since the Kitwanga Ta'awdzep was abandoned at just the time Legaic rose to power, it is conceivable that he may have had a hand in the burning of the fort buildings. Mrs. Sutton (the present Chief Akhawt) said a "crazy man" burned the fort, but there may be a more rational explanation for the event.

The Kitwankul Trail is part of a network of trails that distributed goods between the coast and the interior. Of all of the northern coast rivers, from Telegraph Creek in the north to Kemano in the south, only a handful are navigable (such as the Nass and the Skeena), because of the steep gradient of their channels. Even the Skeena and the Nass present problems of spring flooding, other seasonal flash flooding and winter freeze-up, which put limits on their usefulness for canoe travel. Overland trails or trails along the river banks provided a much more reliable system for the transport of trade items. Is that connected the Kitwankul Trail to the major villages throughout the North Coast and adjacent interior is provided here. The numbers correspond to those on the trail map in Fig. 19. The Kitwankul trail is unnumbered on the map.

- The Skeena Trail runs along the north bank of that river from possibly as far downstream as the Khyex River to the Kitsumkalum River near Terrace, where it linked with a trail past Lake Kitsumkalum to the Nass River. From Kitsumkalum, the Skeena Trail continued through the Kitselas Canyon, past Usk to Kitwanga where it met the Kitwankul Trail. From Kitwanga, the Skeena Trail went to Gitenmax (Hazelton) where it joined with five other trails (Donahue 1973:4). One branch continued up the Skeena River, cutting across the big bend of the river above Kispix to rejoin it at the now abandoned village of Kuldo. From there it continued to Dease Lake and links with other trails. It appears that this one trail alone, which was made up of a number of segments, followed the Skeena River for about one thousand kilometres.
- The Cranberry Trail begins at Kispiox Village on the upper Skeena River and follows the course of the Kispiox River to a point near its source, where it jumps over to the headwaters of the Cranberry River, a tributary of the Nass River. At Cranberry Junction, the Kispiox, Kitwankul and Stikine trails meet together and then descend the Nass River to Gitlaxdamsk. There, it passes the Kitsumkalum Trail and links up with the

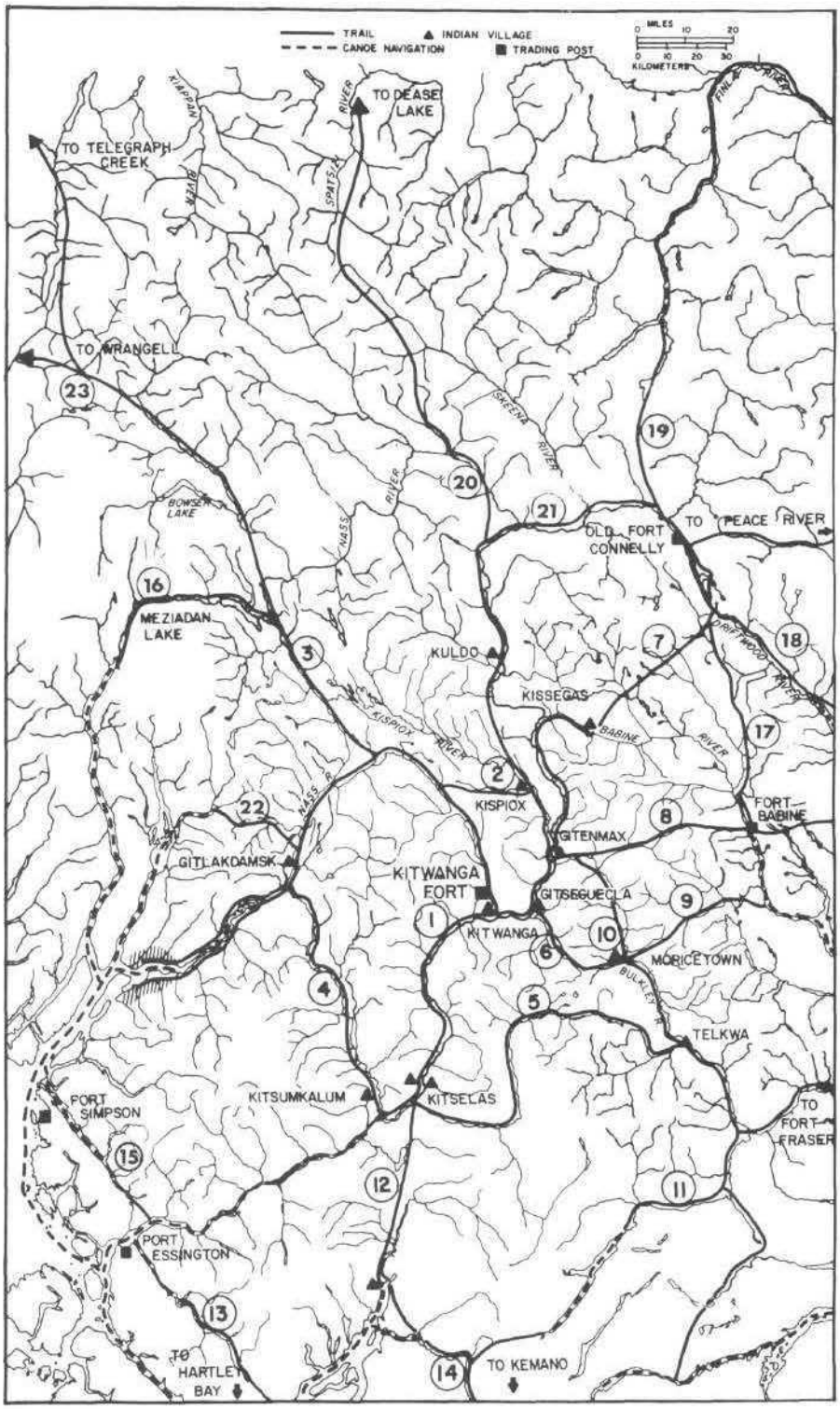


Figure 19
Trading trails in the northern interior of British Columbia. A good number of them have now been developed as roadways.

Figure 20a
The Kispiox fort was the scene of pitched battles with the Coast Tsimshian. Its fortified houses once covered the small island in the middle of the photo.

Figure 20b
The fort of Gitlaxdzok at the Kitselas Canyon stood on the tree covered bluff at the right. It also had rolling log defences and was the largest fort on the Skeena

Eulachon fishery grounds at Mill Bay, Red Bank and Nass Harbour.

- The Stikine Trail begins at Cranberry Junction, where it meets the Kispiox Trail from the Upper Skeena and runs north to Telegraph Creek on the Stikine River, at which point a number of trails intersect. Obsidian from the Stikine source, found in sites along the Skeena River, indicates that this trail has been in use for several thousand years. Although more research is required, it appears that this was a major trail for bringing Russian trade goods into the Upper Skeena and Nass River areas.
- The Kitsumkalum Trail is a close parallel to the Kitwankul Trail. It begins on the Skeena River at Kitsumkalum, below Terrace, and passes the old village site of Kitsumkalum (now deserted). It follows the eastern shore of Kitsumkalum Lake to emerge on the Nass River a short distance from the village of Gitlaxdamsk. The recently constructed highway from Terrace to Ayansh follows this trail.
- The Copper River Trail leaves the south bank of the Skeena River at the bottom of the Kitselas Canyon and follows the course of the Copper River, which is unnavigable, to the Bulkley River near Taye Lake, above Moricetown. It is clearly indicated on Father Morice's map of 1907. It was followed by J. Fountain and H.C. Hawkins in 1904 (Morice 1907). About midway on this trail, a branch north led through a pass to join the Gitseguecla-Moricetown Trail.
- The Gitseguecla-Moricetown Trail follows a mountain pass between the Skeena and Bulkley River valleys. It leaves the Skeena at a point near where the Kitwankul Trail reached the Skeena from the north, just above Kitwanga and just below Gitseguecla, on the opposite side. It was, in a real sense, a southern continuation of the Kitwankul Trail past the Skeena River.
- The Kisgegas Trail began at Gitenmax (Hazelton) and followed the east bank of the Skeena River north to Kisgegas Village (now abandoned). Today, it has been turned into an emergency road for the Fisheries Service of British Columbia. From Kisgegas Village on the Babine River, the trail heads northeast to Bear Lake, where old Fort Connelly once stood, and from there east to Fort Graham on the Finlay River. The use of this trail to bring iron goods to the Finlay River Indians was commented upon by Simon Fraser (Morice 1971).
- The Babine Lake Trail began at Gitenmax (Hazelton) and followed the Bulkley River Trail to just past Hagwilget, where it headed east, following the Bear River Valley to a pass south of Mt. French, down to Fort Babine. The fort was on the site of an ancient village of the Babine Indians at a narrows in the lake. Archaeological work there in 1966 showed evidence for a long occupation of this site (Turnbull 1966 ms). Across the narrows, the trail continued as far as the Peace River.

  The Moricetown-Babine Lake Trail paralleled the Hazelton-Fort Babine Trail but ran from further south on the Bulkley to a more southerly point on Babine Lake.

- The Bulkley River Trail started at Gitenmax (Hazelton) and followed the course of the Bulkley River past Moricetown, and past the Morice River near where Houston stands today, to trails that connect it with Oosta Lake and others in the Tweedsmuir Parks region.
- The Kemano-Telkwa Trail began on Gardner Inlet and ran up the Kemano River, then took a southern branch through a high pass to Emerald Lake, and a chain of neighbouring lakes to Lamprey Creek, a tributary of the upper Bulkley River. From there to Telkwa, the trail was along the banks of the Bulkley River. This was not a major trail and was undoubtedly closed during midwinter.
- The Kitimat Trail was one of major importance that linked the Skeena River with the head of Douglas Channel. The trail left the Skeena just below the Kitselas Canyon, cutting overland to the eastern slope of Lakelse Lake. From there, the trail ran parallel to the Kitimat River, though some miles to the east of it, until it reached salt water, where present day Kitimat stands. This trail is important in the traditions surrounding the Kitwanga Fort, as it was the trail taken by Nekt during his raid on the Kitimat, where he acquired the rights to secret ceremonies. It was also the trail that brought the Kitimat warriors to Kitwanga in another episode.
- The Port Essington - The Hartley Bay Trail left the Skeena at what is now Port Essington, and followed the Ecstall River to a low divide back of Hartley Bay. The Hudson's Bay Co. established a post at Port Essington, only a few years after Port Simpson was established. The people from Kitimat, Kemano and Hartley Bay found this a convenient route to trade for European goods throughout most of the nineteenth century.

  The Kitimat-Kemano Trail linked these two communities through the interior, although good water links also existed between them.
- The trail to Work Channel linked the Lower Skeena, from the mouth of the Khyex River to a small Indian village at the head of Work Channel. It provided a well-protected route from the Skeena to Portland Inlet and the mouth of the Nass River.
- The Stikine Trail ran up the Stikine River, from its mouth to Telegraph Creek, where it met the trail south to the Nass River (trail no. 3). It continued up Telegraph Creek to Dease Lake, and eventually to Lower Post on the Yukon border. The Stikine River is not navigable very far up by canoe. The importance of this trail lies in the fact that this route linked with the Russian Fort Dionysius. Before 1825, this was a major avenue for Russian trade materials, but after this date, the area was leased to the Hudson's Bay Company. The post near the mouth was renamed Fort Dionysius.
- The trail from Babine Lake to Bear Lake is undoubtedly an aboriginal one but became very significant in the early nineteenth century as a link between two fur trading posts - Fort Babine at the north end of Babine Lake, and Old Fort Connelly

Figure 21
The Nass River at Gitlaxdamsk. Looming in the background is another Ta'awdzep at the opposite end of the Kitwankul Grease Trail from the one at Kitwanga. (NMC 69678).

at the north end of Bear Lake. From the latter post, a series of trails led eastwards to the Peace River.

- This is another trail that links Bear Lake to Takla Lake, and a chain of other lakes and rivers to the major trading post at Fort St. James in the Upper Fraser River drainage.

  Leading north from Old Fort Connelly is an important trail to the Finlay River with connections to the Peace River and the high plains.

- At the big bend of the Skeena River, north of Kuldo, the trail branches with the northern trail heading between the headwaters of the Nass and Skeena Rivers to link with the Spatsizi River to Dease Lake near the headwaters of the Stikine River.

- At the same branch where trail No. 19 heads north, the second branch follows the Skeena River to a tributary that leads to Bear Lake and Old Fort Connelly, where several other trails in Carrier territory converge.

- From Gitlakdamsk on the Nass River, a short but important trail leads across to the head of Observatory Inlet, where the town of Alice Arm stands today.

- A branch of the trail from the Nass River to Telegraph Creek heads due west around the north shore of Bowser Lake to the Lower Iskut River, which it follows to the mouth of the Stikine River, near where Fort Dionysius (later Wrangell) was situated. This was indeed the shortest route from the Skeena River to a Russian fur trading post and became most important as trade for European goods opened up in the eighteenth century.

The twenty-three trails discussed above are all major ones that were in use in prehistoric times. There were, of course, scores of secondary trails that linked every village and every major economic or resource area together. For most trails, there were alternate routes that were used in summer and winter. In winter, many of the higher passes were blocked with snow, in which case, longer alternate trails along river banks were used. In spring, however, these routes often disappeared under flood waters. Once the rivers froze over, they became natural highways. There were considerable periods each year on the Skeena when ice was unstable, or the river was in flood, that trails along the bank were required. By late spring, these usually became congested with the prolific new growth, which characterized the area, diverting traffic.

The Tsimshian-speaking peoples of the Skeena and Nass Rivers were unique on the West Coast of Canada for using snowshoes extensively in their trading ventures. They employ their own style with pointed, lashed toe struts that suggest a long period of development and use.

Historically, dog teams have been widely used on the Skeena River in winter. The sleighs were of local manufacture, but were not aboriginally known in this area. Dogs were used to pack supplies in prehistoric times, but dog sleds probably first came into use in the early 1800s, after trading posts at Bear Lake, Fort St. James and Fort Babine introduced the concept.

Charles Horetzky was the first person to leave an eyewitness account of the Kitwankul Grease Trail from Kitwanga to the Nass, when he was surveying the route for the Canadian Pacific Railway in 1872. He decided that the Skeena route was not too promising and that he would cut over to the Nass valley to see what it offered. Unfortunately, he took a short cut overland from the Skeena and met the Kitwanga River Valley just above the fort hill which he never saw. He describes his route as follows (1874:117):

> "For three miles and a half we still kept the ice of the Skeena. When reaching the head of a rapid, we stuck to the right, and ascended a steep hill, keeping a Nor'west course for the Kitwanga River, which we came to at one p.m., having cut off a good-sized triangular piece of the rough country between it and the Skeena."

Horetzky's description of the trail and the traffic that passed along it is particularly useful (1874:117):

> "Since we left the river, we met many of the Kitsgiguehlé (Kitseguecla) Indians returning from the great feast at Kitwancole. More than one hundred must have passed us, and they were, without a single exception, not only the men, but also the women and children, laden with large cedar boxes, of the size and shape of tea-chests, which were filled with the

rendered grease of the candle fish caught in the Nass waters."

He goes on to state, (1874:118):

"They passed us in twos and threes; sometimes a whole family, father, mother and olive branches, all loaded to their utmost capacity; little children even, of tender years, carried burdens of thirty or forty pounds weight, and tottered along in silence. One savage had, in addition to the usual load of grease, perched on its summit, an old and decrepid woman, perhaps his mother. This man could not have had less than two hundred and fifty pounds weight on his back; but they are a tough, hardy set and great carriers."

As to the condition of the trail, he states (ibid:118):

". . . on the morning of the 7th, when we were again on the road, still benefiting by a fine trail, where we could dispense with our snowshoes, we were now following the eastern slope of the Kitwanga Valley, which was very rough and intersected by numerous gullies. The trail kept from a mile to a mile and a half from the river, and soon entered a dense forest of heavy spruce and pine, through which we plodded until ten, when the trail turned suddenly riverwards, and we descended to a beautiful level, in the middle of which the Kitwanga flowed southwards to the Skeena, then distant probably twelve miles. Just before leaving the high ground above, we passed through the centre of an immense encampment of Indians, numbering at least two hundred."

On arriving at Kitwankul, midway on the trail, he observes (ibid:120):

"For the last ten days, this village has been the place of barter between the Naas Indians and those of the interior. The former had carried up grease to the extent of many hundred boxes, which they had exchanged with the Skeena Indians for blankets and other articles."

He passed Kitwankul Lake and, to the north, encountered low swampy ground in which cedars predominated. He continues (ibid: 122):

"Resuming our march after dinner, the trail being yet well beaten . . . we passed, three miles and a half further on, the Indian village of Welpamtoots . . ."

Approaching the Nass River he observes (ibid: 123):

"We pushed on, however, the trail becoming very much worse . . . after making poor progress we camped near a large assemblage of Naas Indians, who were returning homewards. Here, the trail, or what was left of it, disappeared entirely, and we had now to beat the road through three feet of snow, very soft, and extremely difficult to plow through."

Heading down the valley toward Gitlaxdamsk he notes, (ibid: 126):

"On the 13th, at six a.m., we moved on; a mile and a half over the hills, taking us to the edge of the valley again, down the side of which we slid for about two hundred and fifty feet, and as the dawn was breaking, reached the bed of the Chean-Nowan, close to an Indian suspension bridge."

Following a trail that sometimes rose to three hundred and fifty feet above the river, and at other times took them along narrow ledges of river ice, they arrived at Gitlaxdamsk at 5:30 on the 14th. It took them from 6 a.m. on the 6th until 5:30 p.m. on the 14th - or eight and a half days - to cover the Kitwankul Trail from Kitwanga to Gitlaxdamsk, under winter conditions.

George Mercer Dawson, who conducted a geological survey of the Skeena Valley in 1879 for the federal government, states that it could be covered much faster in the summer months:

"A trail leads from this place (Kitwanga) across to the Nass River, the journey occupying, according to the natives, three long days. (Dawson 1889: 15B).

The Historical Period

Early Historical Contacts

It is an open question as to when the first trade objects of European manufacture appeared among the native people of Northwest British Columbia.

Maritime exploration began with the Spanish under Juan Perez, who probably reached the Queen Charlotte Islands by 1775. Cook made landfalls on the outer coast in 1778, followed by Captain Dixon in 1787 (La Perouse). By the 1790s, Vancouver and a host of other explorers and traders had also arrived. Invariably, the early maritime explorers expressed considerable surprise at finding quantities of trade goods, particularly iron axes and knives, in the hands of the native people they contacted.

Dixon remarks, "...A fondness for carving and sculpture was found among the people by Captain Cook; iron implements were in common use." He adds: "It must, doubtless, be a considerable time ago that iron was introduced from that coast" (1968: 243-44).

At roughly the same time, in the late eighteenth century, explorers and traders came to Northern British Columbia over the Rockies, beginning with Alexander MacKenzie in 1792. Father Morice describes what he believes to be the first iron axe owned by the Déné, as coming from a village called "Tsechak," near Hazelton on the Skeena River, in about 1730. Morice also notes that Simon Fraser found iron wares near the 49th parallel ". . . Some of them which seemed of Russian manufactures." (1962: 9) Morice justifies this by pointing out, "When in 1741, Behring first reached the mainland of America, he found, among the inhabitants of the Fox or Eastern Aleutian islands 'long iron knives, apparently their own manufacture'." (quoted in Morice 1962: 346)

Such items were undoubtedly traded across Bering Strait from the Gulf of Anadyr, opposite the mouth of the Yukon River. Behring notes (9-10) that as early as 1648, trading expeditions had brought quantities of trade objects to this area, some of which would have been traded into the New World. Stellar comments of the Siberian Eskimos: (Jochelson 1933: 22):

> "The Chuckchee carry on trade with America through the medium of the islanders (Diomede). They sell to the Americans iron knives, axes, lances, (and) iron points in exchange for sea-otters, martens and foxes. The Chuckchees obtain ironwares at Anadyr at excessive prices from the Russians, and sometimes sell to the Americans for furs."

Gregor Shelikov established the first permanent trading settlement at Three Saints, on Kodiak Island, in 1784 (Clark n.d.). In the 1790s, as the Russians depleted the sea-otter, first on the Aleutians and later around Kodiak Island, they began to extend down the coast of Southeast Alaska. In 1799 Baranov founded Redoubt St. Gabriel at Sitka, in Southeast Alaska, only to be driven out by the Tlingit in 1802.

In reference to the founding of Sitka by Baranov, Bennett and Schermacher state (1967:3):"A settlement here, he saw, would bring the Northwest coast under Russian rule and thus make it more difficult for other nations to continue their trade rivalry."

After driving the Tlingit rebels from their fort at Sitka in 1804, the Russians expanded their settlements and activities rapidly down the coast, until 1824, when they were held by a treaty with the United States to a southern boundary at 54°40'. Zagoskin visited the Russian posts at Fort St. Michael on Norton Sound and Ft. Alexander on Bristol Bay on the Bering Sea coast of Alaska in the 1840s. At that time, he wrote, "Both carried a stock of native goods. In addition to 'Yakut' (knives), 'Kolosh' (capes) and 'Yenesei' (axes), these forts were stocking walrus and whale fat, walrus and deer hides, and decorated Chuckchee parkas." Stoddard (1972:55)

The Yenesei and Chuckchee items were direct imports from Siberian tribes. Recently, I found a suit of Tlingit armour in a small museum in Finland, which had a broad border of Chuckchee fur mosaic

attached to the hem, bearing witness to the trade in native goods between Siberia and the Northwest Coast.

Archaeologically, trade goods which corroborate these dates have been found in the central interior of B.C. Borden (1959) found a Chinese coin at the Carrier village of Chilac, which Morice claims was destroyed during a Chilcotin raid of 1745. Excavating in the Chilcotin area south of Carrier territory, Wilmeth (1979:150) has trade copper objects appearing at A.D. 1705, plus or minus 35 years. It is now apparent that trade objects of European origin began to appear in the Skeena River district in the early decades of the eighteenth century, although the first European did not travel this river until a century later.

Indian consultants confirm that Russian trade goods were the first European-made items they saw. When an iron pot was discovered in house 3 at the Kitwanga Fort this summer, Leonard Bright from Kitwanga said it was a Russian pot and gave a Gitksan term that incorporated a form of the name "Russian." The term is used for all such iron vessels even today, although most were traded later from the Hudson's Bay Company.

The pistol barrel found at the site could have come from any source, as could the adze blades and other metal objects, with the exception of the dagger. The fluted blade of the dagger is based on the Siberian style of knife and unlike any Euroamerican knives, which are usually asymmetrical in outline but symmetrical in cross-section, a design that is the converse of Siberian knives. Siberian forms can be traced back to Bronze Age prototypes approximately 4000 years old. This type of dagger became very popular as a war dagger in the late eighteenth and early nineteenth century. However, there are examples with either copper or bone blades, which could be much older.

Excavations indicate iron was worked at the Archangel Gabriel Redoubt at Old Sitka, which only existed from 1799 to 1802 (Barnett and Schumacher 1967: 29) and at the Archangel Michael Redoubt, which replaced the former in 1804, at the present site of Sitka.

Figure 22
Early view from the foot of Ta'awdzep before bulldozing the farm road looking south to the Seven Sisters Mountains. (Photograph by G.T. Emmons 1910. Viola Garfield Collection, Suzalo Library, University of Washington).

Exploration of the Skeena River

The first European to enter the Skeena River was Mr. Whidby, Captain Vancouver's first officer, on July 9th and 10th in 1793. Whidby surveyed "a very rapid stream against which the boats could scarcely make any way," (Vancouver) and progressed up as far as the Ecstall River, which was named Port Essington. None of the rivers entering the delta of the Skeena at this point were recognized as being of particular size or note.

At the upper reaches of the Skeena in the interior, Sir Alexander McKenzie heard only rumours of the river in his journey of 1793. It was not until 1805 that Simon Fraser, coming via the Parsnip River, established Fort McLeod and, the next year, built Fort St. James on Stuart Lake. In January 1812, D.W. Harmon, the factor at Fort St. James, and McDougal from Fort McLeod paid a New Year's visit to the Indians on Babine Lake. They were the first Europeans to enter the headwaters of the Skeena River. A fort was built on Babine Lake in 1833, the year after the Northwest Fur Company and the Hudson's Bay Company were amalgamated. One of the major reasons for the post was to develop a good source of fish to supply posts located farther in the interior, where fish and game were scarce.

In 1830, Peter Skene Ogden's began a reconnaissance of the north coast for the Hudson's Bay Company to find a suitable post location. As part of that venture, Donald Manson was sent up the Skeena in October, 1832, and ascended the river for about fifty miles by canoe (Large 1957:174).

John Wark probably covered much the same territory of the lower Skeena in 1835. Large (1957: 23) comments,

> "It is doubtful, however, if the Indians would have permitted him to ascend past the canyon, as they were exceedingly jealous of their trading privileges on the river and would look on John Wark as their opposition."

The first record of a European on the Skeena River in Gitksan territory (that is, above the Kitselas Canyon) is the journey of Major Downie, who did pass through the Kitselas Canyon and ascended the Skeena in 1859 as far as Gitenmax (Hazelton). He then took the inland trail to Kisqegas on the Upper Skeena. From there, he went to Babine Lake and Fort St. James, and down the Fraser to Vancouver.

The first steamer was tried on the Skeena in 1864 by Captain Tom Coffin, to supply the proposed Collins overland telegraph line from New York to Europe via the interior of British Columbia and Siberia. He was able to ascend the Skeena for only ninety miles in the steamer "Union," to a point below the present city of Terrace. The scheme to build the overland telegraph trail was abandoned before work crews had progressed very far beyond Fifth Cabin, north of Kispiox. Outside settlement of the area was slow until the railway down the Skeena was built between 1907 and 1914. It was the railways that drew the attention of the National Museum of Man (now CMC) to the fact that the Indian cultures would now face rapid change. Harlan I. Smith and Marius Barbeau were dispatched in 1915: Smith to Kitwanga, Hazelton and Kispiox and Barbeau to Port Simpson on the coast. They both returned periodically to the Skeena villages, until the Great Depression in 1929, when field work halted for some years. Many specimens from Kitwanga were collected during this trip, particularly by Barbeau.

It was the railroad, with its interest in tourism, that provided Smith with most of the funds to restore the totem poles at Kitwanga and Kitselas Canyon. The relocation and conservation treatment the Kitwanga poles received between 1924 and 1926 is largely responsible for their existence today. Many of these poles relate, graphically, the histories of the Ta'awdzep families.

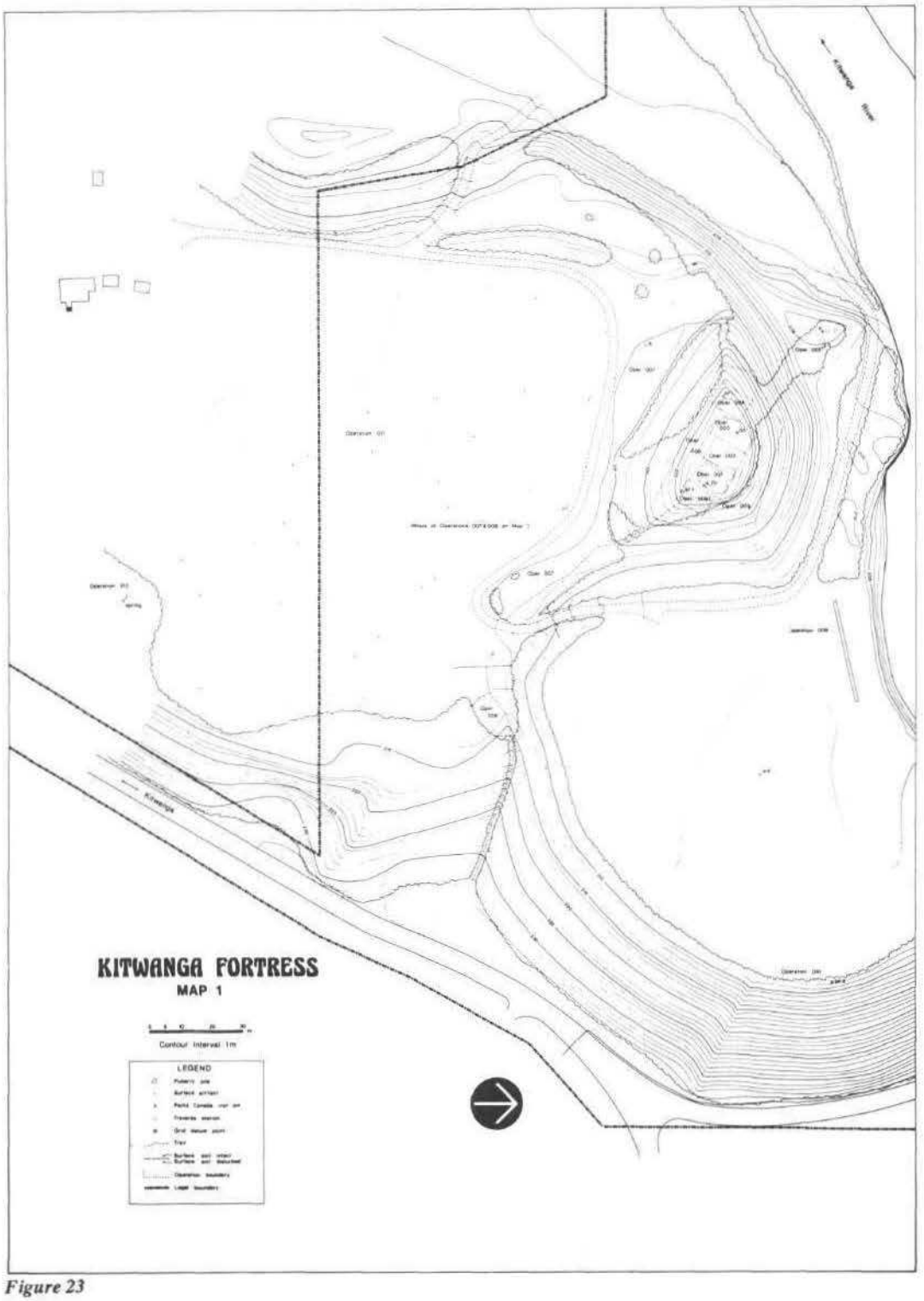


Figure 23

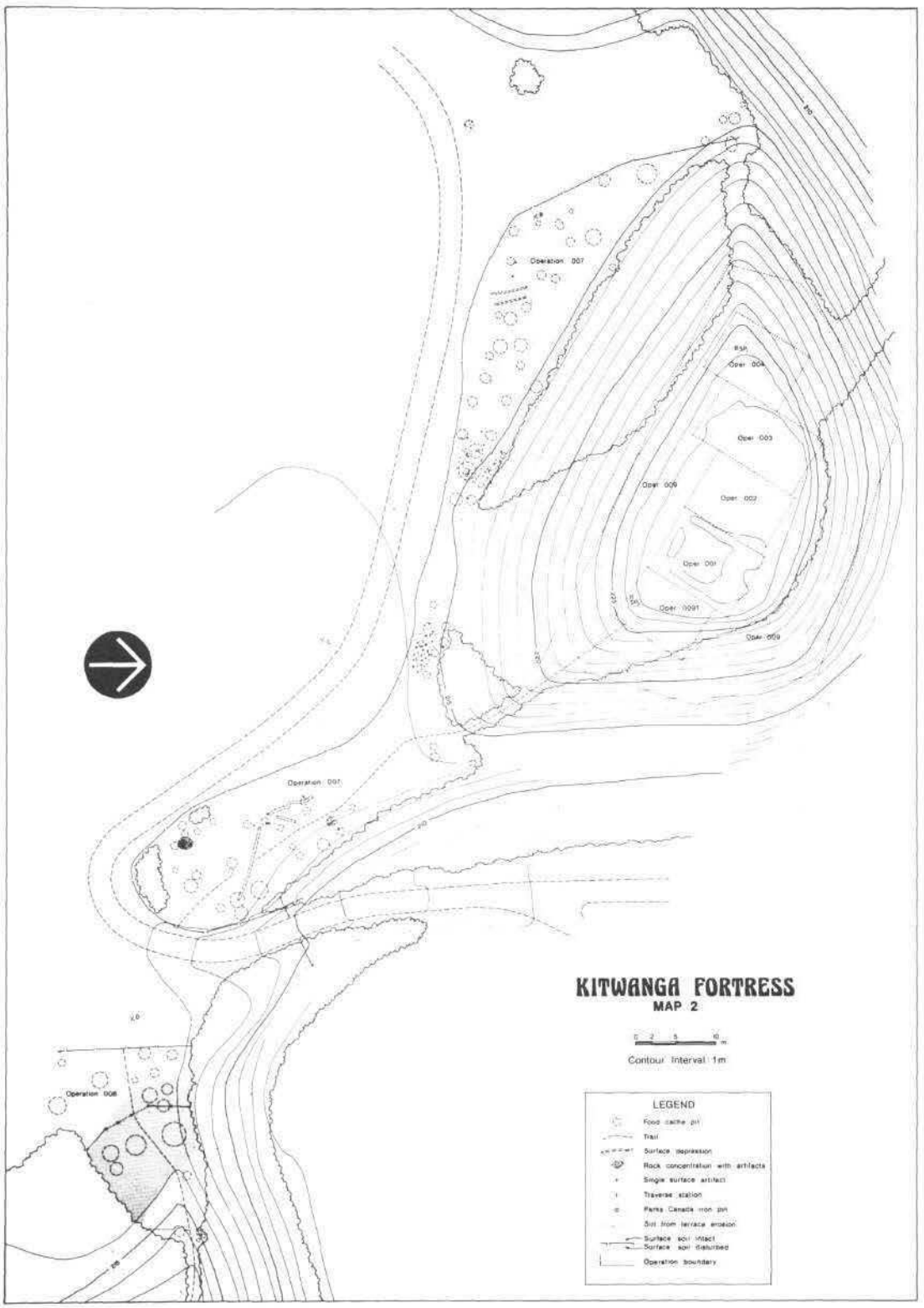

Operation 007
Oper 004
Oper 003
Oper 009
Oper 002
Oper 001
Oper 0091
Oper 009
Operation 007
Operation 008
KITWANGA FORTRESS
MAP 2
0 2 5 10 m
Contour Interval 1m
LEGEND
Food cache pit
Trail
Surface depression
Rock concentration with artifacts
Single surface artifact
Traverse station
Parks Canada iron pin
Soil from terrace erosion
Surface soil intact
Surface soil disturbed
Operation boundary

Figure 24

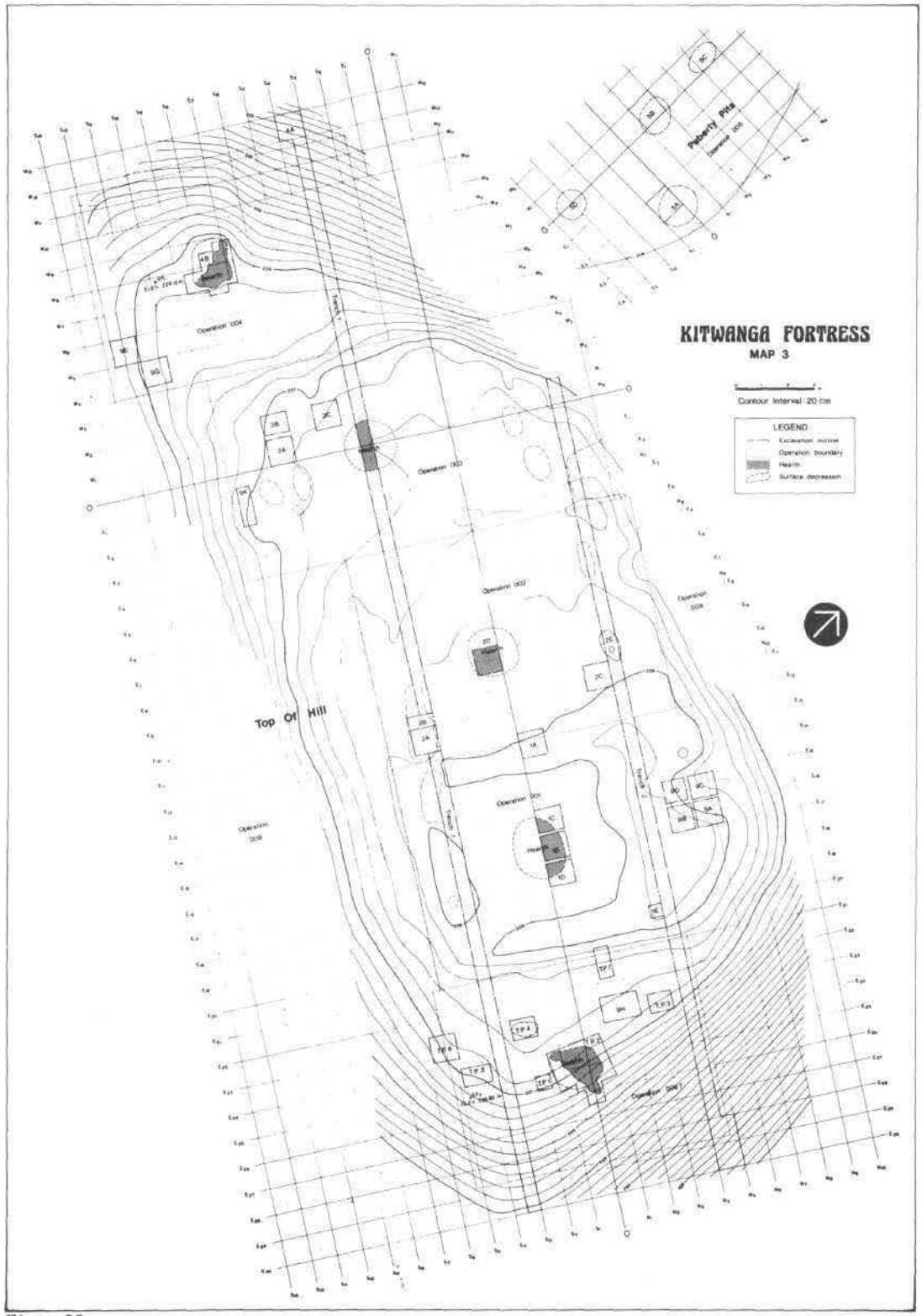

KITWANGA FORTRESS
MAP 3
Contour Interval 20 cm
LEGEND
Excavation outline
Operation boundary
Hearth
Surface depression
Pottery Pits
Operation 005
Top Of Hill
Operation 004
Operation 003
Operation 002
Operation 001
Operation 006
Operation 009
Trench 1
Trench 2

Figure 25

Part 2
Physical Setting at the Ta'awdzep Site

Geology

Dr. David Wilfred, of the Research Branch of the B.C. Forest Service in Smithers, visited the site in mid-July. An inspection was made of the fort hill, as well as a broader survey of the whole of the Parks Canada site to the east of the Kitwanga River, and additional areas near the highway where there were convenient road cuts and a gravel pit. A type section was chosen on the northeast side of the road, which cuts through the lip of the upper terrace, between the Kitwanga road and the Faulkner farm.

The bedrock throughout the area is calcareous limestone. In certain areas, there is an overlying bedrock unit of shale that is very friable and weathered when exposed. This unit has been eroded by the river upstream from the site and accounts for the numerous water-worn shale pebbles encountered in the excavation.

Capping the bedrock units in most areas, is a medium-to-coarse unsorted gravel, which represents outwash from the last glaciation and is found on the highest terraces well above the present river level.

Figure 26
The north face of Ta'awdzep taken in 1945 before the trees had grown extensively over it. The bank in the foreground appears to have eroded little in the past thirty-five years.

The uppermost unit in the section examined on the high terrace was identified as a loess unit that is part of a system due to aeolian deposition of sediment at the end of the Wisconsin glacial period, from about Hazelton, down the Skeena Valley as far as Terrace.

On the lower terrace to the north of the fort hill, the sediments are all fluvial, as exposed in the eroding bank of the Kitwanga River. The variation of sediment size, sorted into various layers, indicated strong seasonal fluctuation of the volume of water in the river and constantly shifting channels. The controlling factor on stream downcutting, at this point, is the level of the bedrock slightly downstream at the hill.

Geology of the Fort Hill

The core of the fort hill is the highlyfractured calcareous limestone unit. The slope of the hill on the north side is 34° steepening to 40° in some areas. A test pit was dug only 40 cm to bedrock, to confirm Dr. Wilfred's observation that the steep slope on that side indicated that bedrock was just under the surface of the ground, although no bedrock is exposed anywhere on the hill itself. To test the depth of the mantle of sediments on top of the hill, one of the excavation units (1A) was taken down a depth of 1.75 m before encountering the top of the rock.

Figure 27
A test excavation on the north side of the Ta' awdzep reveals the bedrock core of the hill close to the surface.

The opposite side of the hill, facing south, has a much gentler slope, protected as it was on the downstream side in early Holocene times. Although no shale bedrock was found in the test pits, heavy gravels were encountered just below the crest of the hill and only 10 cm below the surface. Some of the storage pit features in house 3 had been excavated into these heavy gravels.

The unit capping the fort hill was the yellowish fine loess. The only structure that could be detected in undisturbed sections of this material appeared to be mineralization bands, due perhaps to spring drainage conditions. Dr. Wilfred thought it highly unlikely that there were ever springs on the hill, except at the period of maximum spring runoff. However, springs were found along the bank, beneath the uppermost terrace and near the Kitwanga Road.

Dr. Richard Throwbridge, a pedologist with the B.C. Forest Service, observed that the carbonate and shale bedrock would have encouraged the natural growth of juniper on the south slope of the hill. However, it is clear from accounts of other sites that the slopes of fortified hills were kept clear of vegetation as much as possible.

Climate

The Skeena River system has an interior continental climate above the Kitselas Canyon, and a coast climate below that point. The interior system is characterized by abrupt seasonal temperature change (summer 10°C to 16°C, winter -10°C to -7°C). At Terrace, the mean precipitation is 117 cm per annum, with average temperatures of 17°C in July and -4.5°C in January. At New Hazelton, the precipitation is 46 cm per annum, and the average temperature fluctuates from 15°C in July to -9°C in January. Kitwanga is located midway between Terrace and New Hazelton but, in climate, is closer to the latter.

Figure 28
Photo by Marius Barbeau taken in 1923 entitled "The Mythic Tahawdzep fortress 2 miles behind Kitwanga."

Figure 29
Kitwanga Ta' awdzep from the south. This was the lowest & gentlest slope and probably the most heavily fortified.

Botanical Survey of the Site

A thorough survey of plants to be found on the Parks Canada property was prepared by Dr. James Pozar, a botanist with the Research Branch of the B.C. Forest Service. The complete list of trees, shrubs, herbs and weeds is included as Appendix V.

It is interesting to note that the archaeological finds of wood and bark closely parallel the list of trees on the site at present. Hemlock does not occur in the archaeological remains on the site today but is found in the Kitwanga River valley. Western red cedar occurred in the site remains but is no longer found on the property. It would have been imported for the construction of houses, boxes, etc. Lodgepole pine was the most common wood species found on the site, where it still grows, and was probably the main source of firewood for the site inhabitants. Paper birch is relatively rare on the property today but was extensively used in the past to line storage pits and probably for containers, as well. Cottonwood was likely the commonest material for dug-out canoes in this area.

An attempt was made to investigate the ethnobotany of the site. Almost all of the shrubs that bear edible fruits or nuts were used by the native people, including Saskatoon-berries, hazelnuts, chokecherries, rosehips, gooseberries, squashberries, raspberries, thimbleberries and soopalalies (or soapberries). Willow bark was used as a lashing material, and red willow branches were used for the forms of sweat lodges and puberty huts.

The Excavations

Excavation Control

Since the site on the top of the hill was relatively small, and the deposit quite shallow, metre squares provided convenient excavation units. A metre grid was extended over the site in a quadrant system, having its centre in House Three. The east-west baseline ran through the centres of Houses One to Three. The grid number of the southeast stake was chosen to represent the square. Squares were referenced in the records by the operation number followed by a sub-operation letter (e.g. 9a, b, c, etc.).

Excavation was conducted in lots, or 5 cm levels, starting from the surface at the southeast stake. Isolated squares were trowelled, while the trenches were both trowelled and shovelled, with all dirt screened through a 1/4" or finer mesh screen. Levels for recording purposes were taken from a point at the surface at the southeast stake, which both designated the square and established the datum point for the square. All datum points were calculated from the permanent bench mark datum set on the hilltop in 1976 by Parks Canada surveyors.

Strategy

The excavations were designed to accomplish limited testing objectives and were not intended to be a full-scale investigation of the site. Of the six weeks scheduled for the digging period of the crew, approval delays reduced the operation by one full week. Six full-time student excavators were employed for the entire period, augmented by local labour from the Kitwanga Reserve, which totalled an additional two person months. Thus, it was possible to do only the minimum amount of excavation required to answer key questions about the site. The operations divided neatly into two sections:

- The top of the hill with its houses and palisade.
- The area below the hill with its trails, puberty and storage pits, possible fish smoking houses and sundry other structures.

The investigation and numbering of operations began with the clearest features and were extended virtually to the property limits, and in a few cases, beyond them. The questions posed and the approach taken to testing each of them is outlined below:

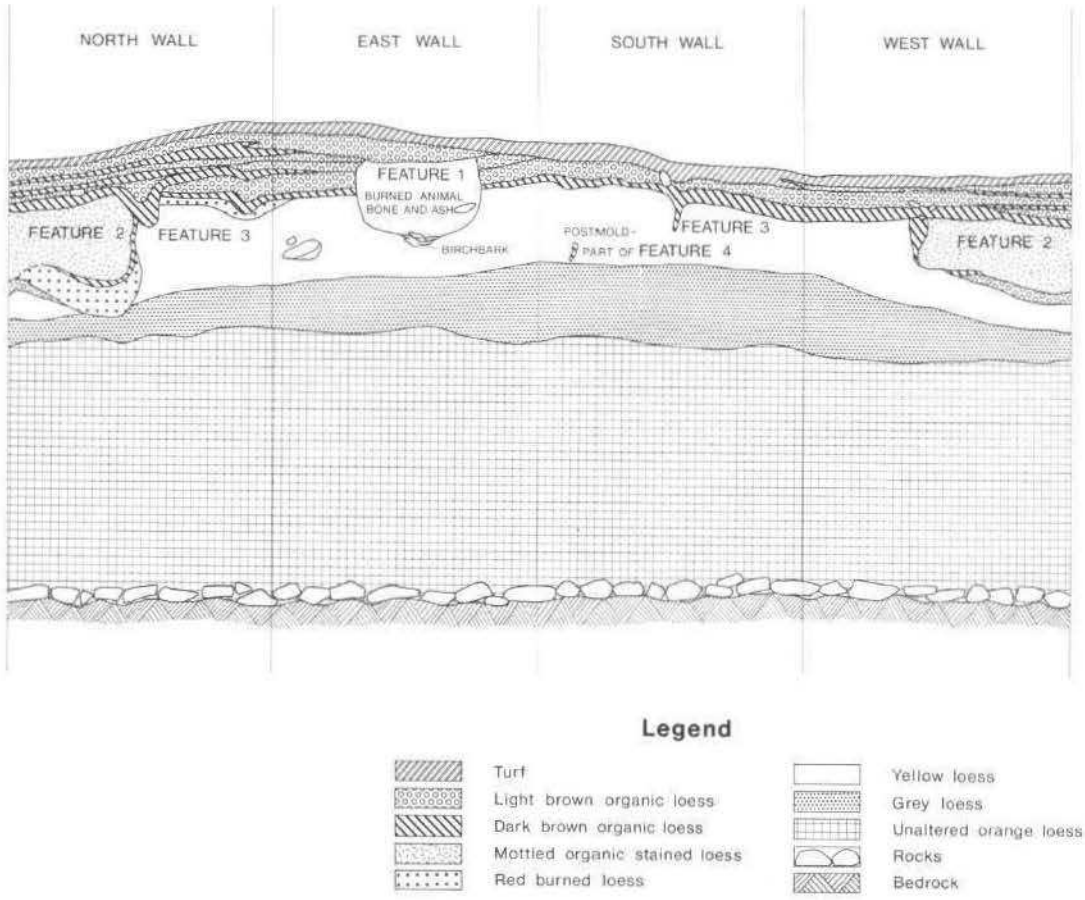


Figure 30

Operations and Sub-operations

Operation	Sub-operations
1	1A, 1B, 1C, 1D, 1E 9A, 9B , 9C, 9D
2	2A, 2B, 2C, 2D
3	3A, 3B, 3C, 9K
4	4A, 4B, 9G, 9E
5	5A, 5B, 5C, 5D
6	trench A
7	7A, 7B, 7C, 7D, 7E 65 food storage pits
8	19 food storage pits
9	9E, 9F, 9G
9T	Test Pits, 1, 2, 3, 4, 5, 6, 7, 9H
10	nil
11	test pit at spring
1-4, 9T	trench 1
1-3, 9T	trench 2

Figure 31
Wooden fragments of a stuctural support post in house 1 discovered in trench 2.

Operation 001

This was meant to coincide as nearly as possible, with surface indications of a house feature on the top of the hill at the eastern end. In most areas, the walls of the house were clearly outlined by a ridge of earth around the periphery and a rectangular central depression inside the wall ridges. Among the Indians of the coast, houses with central depressions invariably indicate those of the higher-ranking families in the village. It is assumed the same principles apply in this area as well. My initial assumption that this was Nekt's house was later confirmed by the majority of the native commentators.

The first test was in what was presumed to be the side wall of house 1. Designated 1A, this one-metre square test encountered the sill of the house as well as some additional features of interest. The second unit 1B, to be opened, was in the presumed area of the central hearth of house 1. It immediately produced grey wood ash of unusual compactness, that extended out beyond the one-metre square in all directions. To delimit the hearth, additional units were placed on either side of the original one along the E-W grid line. They were labelled units 1C & D. The hearth was shown to be roughly circular, and about two metres in diameter. Its shape suggests it was built on a dirt floor rather than within a square hearth opening in a wooden floor.

The hearth was clearly distinguished as a highly cemented layer up to 20 cm in depth that was very consolidated when first uncovered, to the extent that it was assumed to be decomposed limestone. However, it dried out and fractured on exposure to air. Examination of fragments disclosed immediately that the material consisted of highly compacted wood ash with a high admixture of calcined bone and small quantities of earth. The effect of hearth temperatures on this material was to fuse it almost into low-grade bone china. This peculiar hearth lining appeared in all other hearth areas of the site and became a major indicator in test pits of the central hearths of houses. The soil immediately beyond this compact ash crust was invariably reddened by the intense heat of the central hearth.

A half-metre trench cut through the front and back wall areas of house 1 revealed features of house support posts, numerous smaller posts (some still contained preserved wood as in Fig. 32) and food storage pits. At the back of the house was a large pit feature that was presumed from the outset to be a trap door in the palisade. As more information was discovered concerning house 1, it was concluded that this feature was on the back wall of the house, and that the palisade was built against the house wall in such a way that the trap door led under both the back wall and the palisade at the same time. Inside the confines of this large feature was a large storage pit that still retained much of its birch-bark lining. The numbering applied first to this feature was part of operation 9, that assigned to the palisade area, and it was not changed once it was decided that the feature was also part of operation 001 (house 1), since that would have added confusion to the notes and photo records. Consequently, the four units in the trap door feature were designated 9a, b, c & d and are described and illustrated in Operation 009.

Features in Operation 001

Sub-Operation 1A (Fig. 33). This was a single metre square located on the ridge that marked the west wall of house 1. It was the first unit excavated,

since it was on the highest area of the site, which was clearly a cultural feature. It promised to yield the deepest stratigraphic section, as well as details of wall construction of the house. The unit fulfilled all of these expectations, and it was decided to continue its excavation as a geological pit, to test the depth of soft sediment on the top of the hill. Excavation ceased upon encountering a pavement of rocks at 175 cm below the surface. Probing with the steel rod confirmed that bedrock was continuous across the unit. The upper rocks were exfoliated blocks from the surface of the bedrock.

Four significant cultural features were found in this unit:

Feature 1 (Fig. 34) was an ash pit 50 cm in diameter, filled with partly consolidated wood ash and a high proportion of calcined bone fragments. At the bottom of the pit was a dark lens of organic material in which were preserved several large pieces of birch bark. This appeared to be the original lining of the pit. The animal bone has been identified (Appendix II) and consists mostly of small animals like hare, marmot and beaver. The clear demonstration of the pit edges and the remains of birch-bark lining suggest the ashes were buried in the pit, rather than the feature representing a hearth of any kind. The mixture of ash and burned bone is the same as that in the central hearths. It may represent a symbolic transfer of ashes to the walls of the house. This practice is known to have taken place at the rebuilding of houses by a chief's successor, when a small quantity of the old hearth ash is transferred to the walls of the new house.

Feature 2 is a large pit, which is illustrated in the north and west wall profiles. It is a layered pit with burned soil at the bottom, in the deepest area, with a thin layer of dark organic soil separating it from the mottled, organic stained loess.

Feature 3 (Fig. 34) is a trench which, through the middle of the unit, can be clearly seen in the centre of the north and south wall profiles. It appears to be the sill of the west wall of house 1.

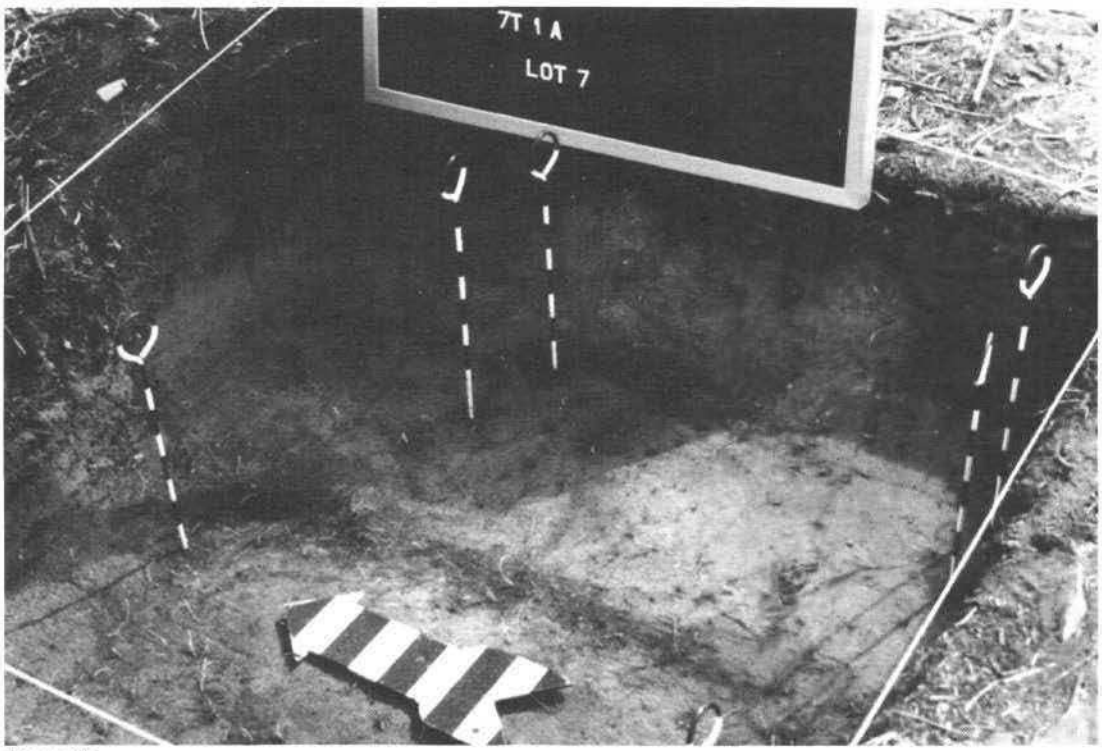


Figure 32
House 1 (op. 001) Organic stain of west house wall across centre unit parallel to arrow. Pins mark post moulds.

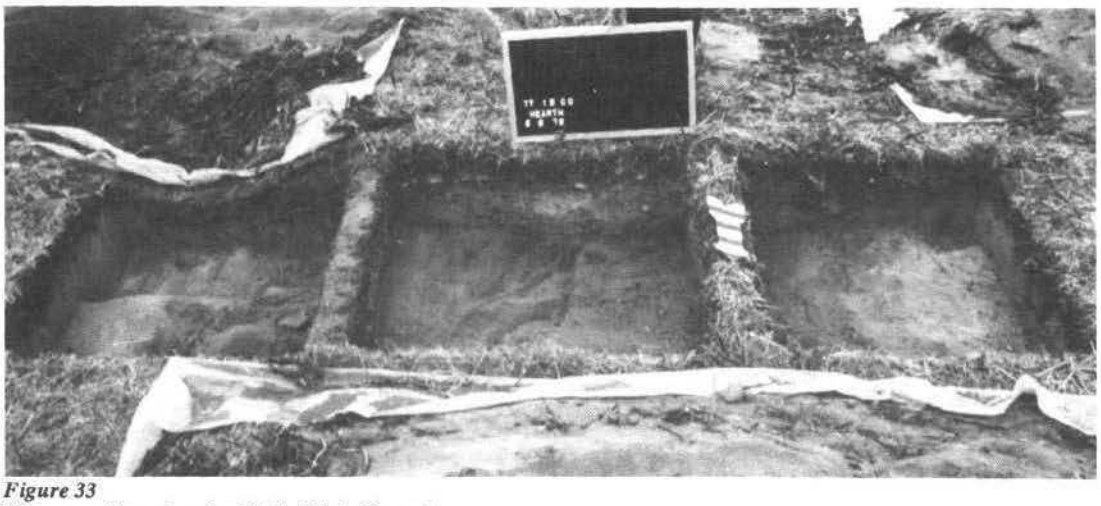


Figure 33
The central hearth, units 1B, C & D in House 1.

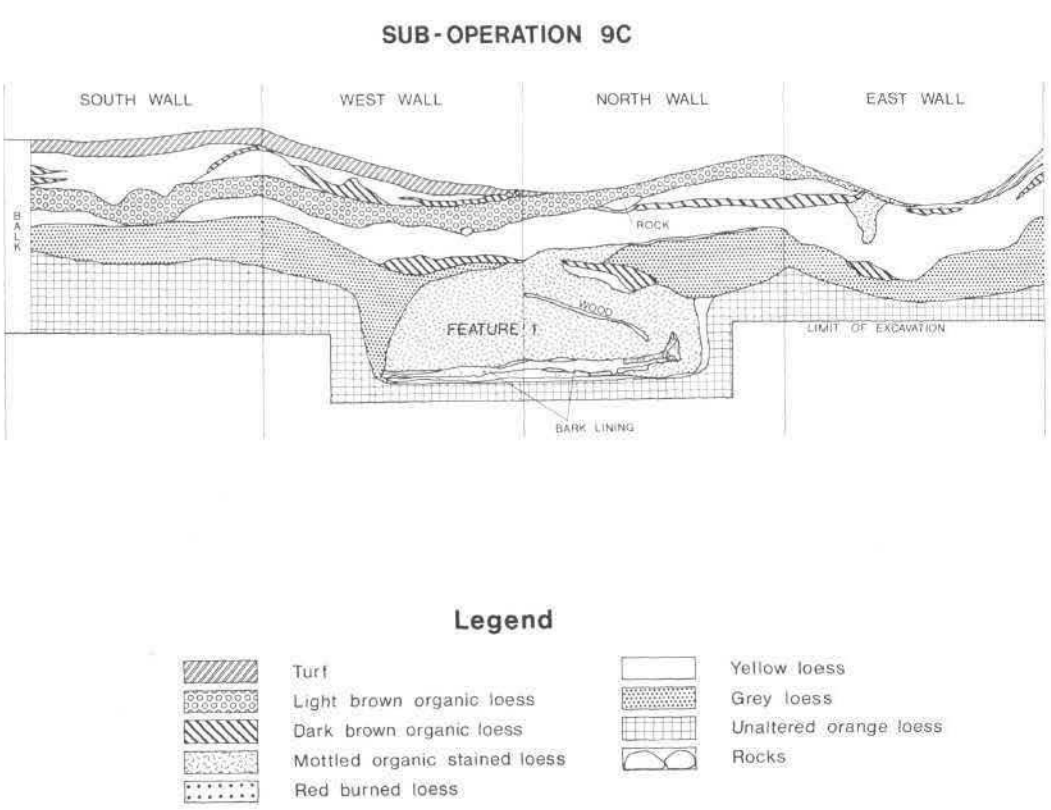


Figure 34

Feature 4 are 10 scattered post moulds, which do not form any particular pattern but may represent stakes set in the ridge to create wall partitions, drying racks, etc.

Sub-Operation 1B, C and D. These three units were excavated to reveal a single large hearth feature in the centre of house 1. It was the most fully excavated of all five central hearths that were tested, and it was also the largest. It is slightly more than two metres in diameter and roughly circular in outline. The hearth was in the exact centre of the house depression, although not the centre of the house itself, since there was a wide back platform to this house.

The hearth is characterized by three layers. The largest portion is the highly consolidated grey wood ash and calcined bone. There are some fire-cracked rocks mixed in the ash and a few artifacts, mostly glass beads.

Underlying the ash is a thin layer of charcoal and incompletely combusted wood. Under the hearth feature, the loess appears to be undisturbed but has been burned red by the heat of the hearth.

Sub-Operation 1E. The purpose of this unit was to determine the nature of a burnt semi-circular lens that appeared in the south profile of trench 2, at 19.5 - 20. OE. When encountered in the trench profile, it appeared this feature might be the remains of a burnt sill of the house but, upon excavation, it appeared to be a localized pit feature.

Sub-Operation 9A, B, C and D. These four one-metre units quartered a large depression on the north edge of the hill behind house 1. I had known of this large depression since my first visit to the site

Figure 35
Excavation of feature 9A, B, C, D, the hiding place and escape hatch at the rear of house 1.

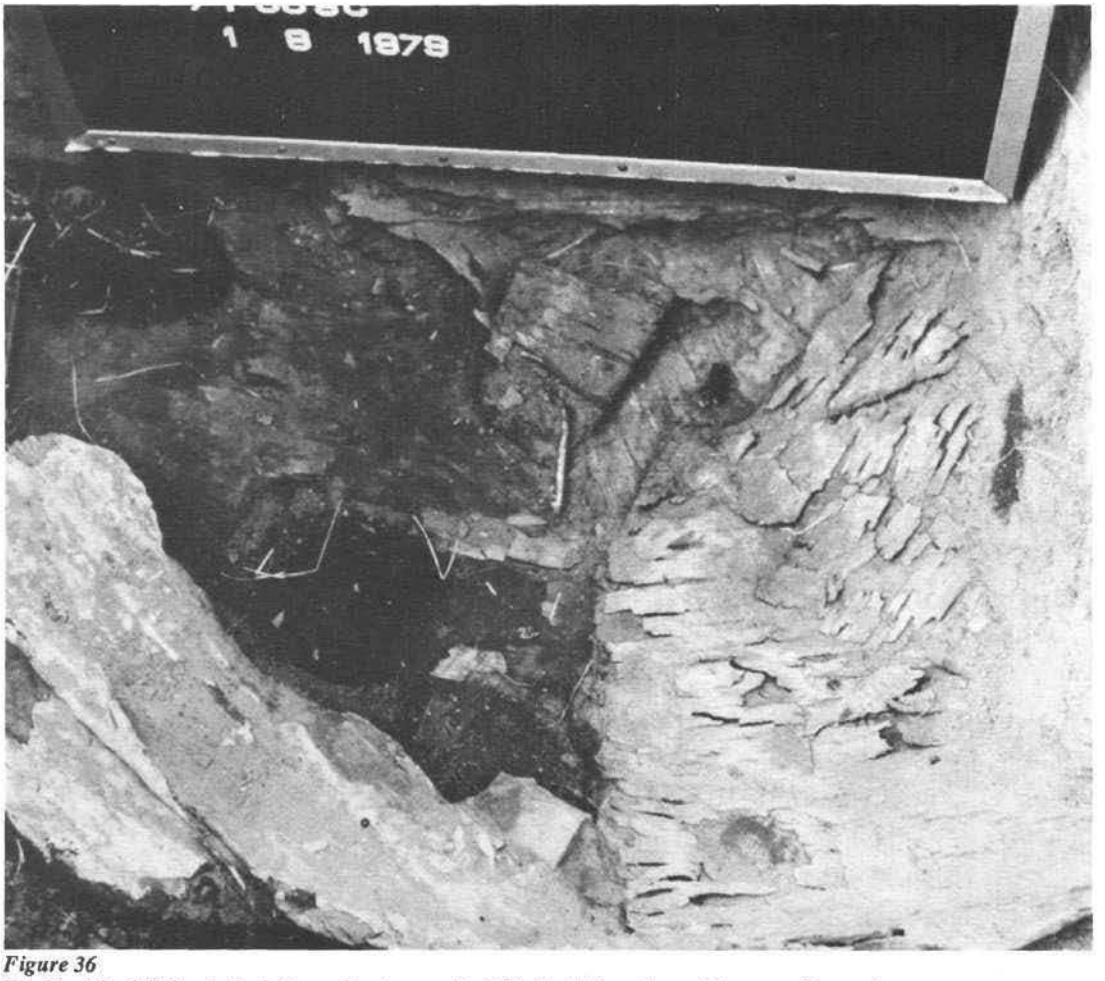


Figure 36
The birch-bark lining in the bottom of a storage pit within the hiding place at the rear of house 1.

and had always considered it to be the best candidate for the trap door entrance to the Ta'awdzep, as described in oral traditions. For this reason, it was included within the operation 009, intended to encompass the palisade.

As clearing of the site continued, and as excavation of the houses advanced, it became more obvious that the entire feature lay within the platform of House 1. Excavation of the large pit itself indicated that there was a large depression filling most of the four units. In the fill of this pit, several complete artifacts were found, including a delicate antler barbed harpoon and a chipped stone projectile point. Since neither artifact was damaged in the slightest, it appeared that these objects had been cached in the pit, probably with their hafts attached. The space in the pit was large enough for several people to hide themselves if the house were under attack.

In the northwest unit, 9C there was a large second pit (Fig. 36, feature 1), which extended an additional 40 cm further down. It was lined with sheets of birch bark, which were still relatively intact, preserved by the depth at which they had lain. After records had been made, hot wax was put on the sheets of bark to preserve them for possible later conservation. Both feature 1 and the larger pit were filled with soil containing numerous fragments of decayed wood and charcoal.

Subsequent interpretation of the palisade at the north side of the hill suggests that it stood directly beside the rear walls of houses 1, 2, 3 and probably

5. The hiding place in 9A, B, C and D was probably built so that one could enter from the back of the house and exit under the palisades by pushing aside some planks disguised on the outside with dirt.

An episode of the Skawah legend of the Gitksan seems to describe this feature dramatically (Barbeau 1928:174-176).

> "Abalone-pearl-labret spread her skin robe over her fair daughter Skawah and led her to the inner partition of the house, wherein are secreted a family's sacred possessions. With her hands she scooped up the earth from the floor and raised a copper shield, which hid a passage extending to the forest tangle in the rear. Both mother and daughter crawled down the narrow opening, resetting the shield behind them. Thus, they passed off from the light of day into the gloom of a refuge underground, while the Kunradal warriors in fearful numbers swarmed over the ice on the river. As the fugitives crouched in hiding, they heard the war-whoops of the invaders, the howling of dogs, the uproar of challenge and defiance in turn; faintly at first, from afar; then distinctly, as the battle spread wide over their heads. They shuddered at the thump of stone mauls on the split-cedar planks of their houses, the peals of invectives, and on every side, the din of blows, incessant and deadly. There travelled through the air at sunset a clamour of victory, the war-chant of Kumradal exultant. Succeeded with fatal progress, the crackling of fire overhead, the acrid smell of burning cedar, the rumbling of corner posts and roof-beams sinking to the floor, then stillness, that of death and extinction. Only ruins remained on the defaced terraces of Keemelay, and terror below, in the bosoms of mother and daughter abandoned to their fate in a wasted homeland."

Operation 002

This operation number was applied to a level rectangular area immediately west of the boundaries of operation 001. It appeared to be a prepared house floor, and although there were numerous surface depressions along the edges of the unit, these were not elevated ridges. On the north side of the operation was a lower terrace, about one metre wide,

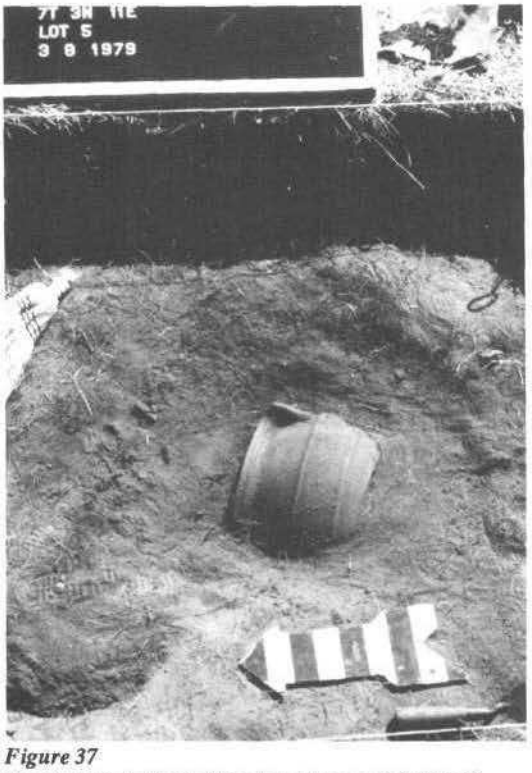


Figure 37
Cast iron trade kettle lying in a storage pit inside of house 2. Carbonized food remains and cedar bark matting were found adhering to the underside of the kettle.

that appeared to be a pathway in front of the house. It connects with a similar path in front of the houses on either side of house 2. The central area of operation 002, a zone about two metres by five metres, was covered in Saskatoon bushes almost ten feet high. They appeared to be growing over the old central hearth. Ash often encourages prolific plant growth of this kind. A metre square (2d) was excavated to confirm the hearth position. The hearth appeared to be of similar dimensions to the central hearth of operation 001, but it was not economical to excavate the feature further. Several fragments of iron-rich rock, possibly from the same parent block, gave extremely high response from the metal detector that was passed over the hearth before excavation, but no other metal objects were found in the unit. Informants had indicated that during times of seige, people hid in pits under the floors of the houses. The shape and location of the two pits at the front of house 2 warranted further investigation. Consequently, a metre square (2b) was excavated into a linear depression about 1.5 metres long, one

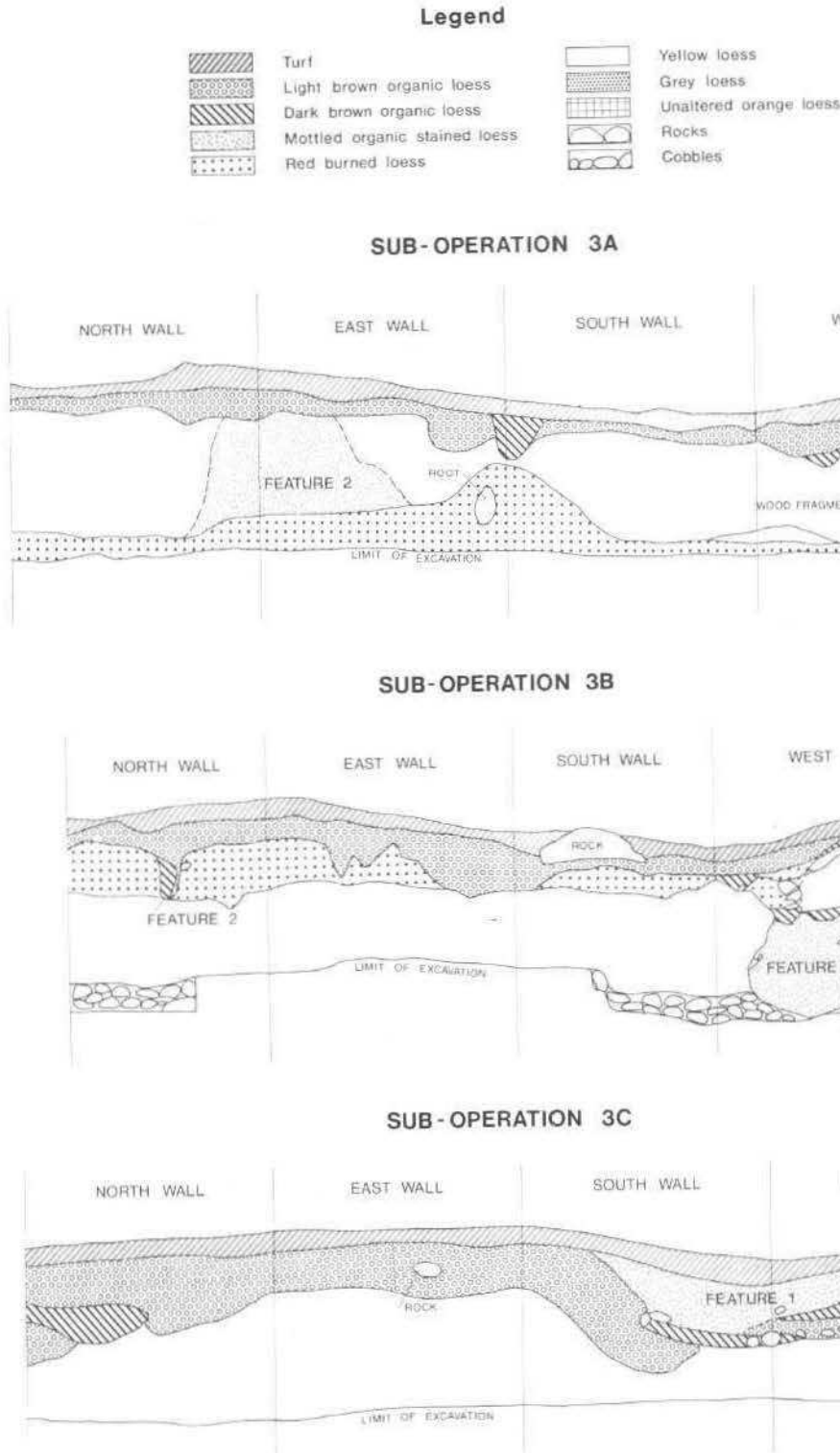


Fig. 40

Figure 38

of a pair of depressions that flanked the front entrance to the house. Large fragments of burned wood were encountered just under the turf and appear to have resulted from the collapse of a burning structure. When a 50-cm trench was laid out across the site, it took in part of this square, so that half was finished as part of the trench, while the other half was abandoned at the 20-cm level.

The metal detector yielded its highest reading on the hilltop at a spot in the northeast portion of house 2 (N3-4, E10-11). To determine the reason for this reading, a metre square (2c) was excavated and found to contain a large side portion of a cast iron cooking pot (Fig. 39) in a pit that had not been detected on the surface.

Trench 2 cut along the back wall of house 2 and through the depression that seems to be the trap door escape hatch of that house. Numerous pit features and fragments of posts were encountered in this trench. They are shown in Fig. 33 and described in features 1-5 of trench 2.

Operation 003

The levelled surface of house 3 consisted of a large rectangular area lying at a slightly lower elevation, immediately to the west of house 2. Three metre squares and two half-metre trenches were excavated in this house. Square 3A and 3B were excavated in a double depression that appeared to represent two overlapping pits or large post moulds. It was hoped that there might be temporal separations between the two pits, so they were both excavated. Square 3C was established to test another large depression, thought to represent a large food storage pit along the western side wall of house 3.

Two more units, 9A and 9B, were excavated into surface depressions in part of zone 9 that were thought to be in the palisade area in front of house 3. It now appears that they are still within the front wall of house 3, and this house projected

Figure 39
Hearth of house 3 encountered in trench 1.

considerably further south of houses 1 and 2, as did its neighbour, house 4, to the west. Although not renumbered as operation 003, these depressions proved to be large storage pits with birch-bark linings rather than palisade post depressions, as first thought.

Trench 2 at the back of this house intersected a very large feature, possibly the trap door/hiding place for house 3.

Features in Operation 003

Sub-Operation 3A: This unit was thought to be in the approximate location of the southwest corner post of house 3. A surface depression was noted in about the centre of the unit before excavation began. It was later evident that this unit was well within the house.

Feature 1 was a large post mould containing decayed wood fragments of red cedar. It must have been a structural member of the house, but to judge from its size, it may have been from an interior partition rather than the main outside wall.

Feature 2 is a continuation of feature 1 into the northeast corner of the unit. The whole feature shows soil disturbance from an old excavation at the time of occupation of the site. It is possible that this wall feature is from a phase of occupation when there were perhaps two house structures on the platform in operation 003.

Sub-Operation 3B: To determine if the large feature (1 and 2) of sub-operation 3A was continuous, as would be expected for a house wall trench, the unit immediately west was opened up. There was no evidence of any such extension in the east wall of 3B, as would have been expected if the feature from 3A had continued.

Feature 1 is a large storage pit in the west wall of 3B. The bottom of the pit was lined with sheets of birch bark and rolls of birch bark were found within the pit fill, along with numerous pieces of charcoal and fire-cracked rock. This probably simply indicates that the pit was filled after use with debris from the hearth.

Feature 2 is a clearly marked post mould that may have been associated with the west wall of the house.

Sub-Operation 3C: In hopes of locating clear evidence for the west wall of house 3, a unit was excavated at the western edge of platform. The dark brown organic soil, which can be noted underlying feature 1 in the south wall and in the north wall, was continuous on the west wall. It probably represents the decayed remains of the sill for the west wall. There were two post moulds, both ten centimetres in diameter, in the floor of the unit. These do not appear in the profiles but were probably used as wall or partition supports.

Feature 1 was a very large pit in the southwest wall of the unit, which contained typical pit fill of small pieces of charcoal and fire-cracked rock. It may have been a hiding place for goods or people under the sleeping platforms, near the wall of the house.

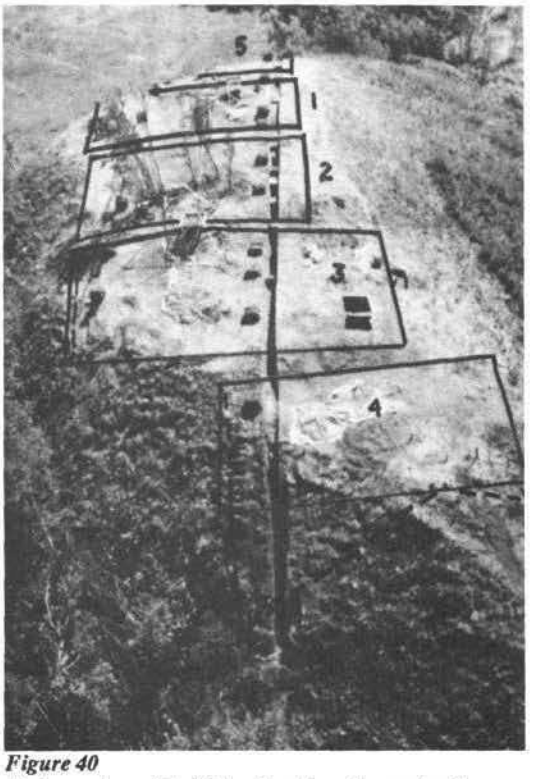


Figure 40
Birdseye view of the Ta'awdzep from the west end showing the estimated outlines of the house platforms in relation to the trenches. The horizontal dimension of the platforms are shown in black. The area covered by the houses as adjusted to the slopes of the hill are in dashed lines.

Figure 41
The hearth of house 5 (operation 009) on the edge of the platform at the east end of Ta'awdzep. Half of the house was built on pilings.

Operation 004

This small triangular terrace at the western tip of the site appeared to be too small to have supported any house structure. Informants claim that there was at least one house built on stilts and overhanging the edge of the hill. Unfortunately, opinion differed as to which end of the site the "hanging house" was on. Mrs. Sutton (Chief Akawt) maintained that it was just east of Nekt's house, on an even smaller triangle of land, while all the other informants maintained that it was in the operation 004 area.

It was assumed that the central hearth of house 4 could not easily have been built out over the edge without danger of fire spreading into the timber supports but was probably located along the edge of the hill. From the likely position of the east wall, it was calculated approximately where the west wall would be and, more particularly, where the corner post on the extreme overhang would be. A metre test square placed downslope at the estimated position, failed to locate the post, but subsequently became a convenient starting point for a trench (No.1) along the south 3 line. It soon became obvious from the downslope profile of this trench, that dirt had been loaded over the side of the hill and had buried an old humus line (Fig. 62). The loaded material came from quarrying the triangular level terrace on which half of house 4 stood. In depth, the material loaded over the side of the hill reached a maximum of 10 cm, and covered an area of the downhill slope slightly larger than the level triangle itself. It is quite likely that the cutting and dumping encountered on this lot constituted a major part of the basket and box transport of soil mentioned in the legends about the construction of the hill. Considerable earthmoving was reflected in this feature, and the story was possibly enhanced through time, to give rise eventually to the story that the hill itself was artificial.

The central hearth for house 4 (Fig. 28) was located on the last day of the project, in a test excavation on

a small bulge along the edge of the hill. The hearth covered the entire surface of the bulge and, although the test unit was not taken down to the sterile zone for lack of time, it appears probable that the bulge was an earth pile built out from the edge to support the central hearth. All the features of this house indicate that every effort was made to establish space for a house where there had originally been only a small sloping triangle, offset to the south of the hill. This offset, part of the downstream hook of the hill crescent, required house 4 to shift south of the other houses in order to encompass enough land on which to build it.

Operation 009T

The fifth and last house was discovered on an even smaller triangle of land than house 4, on the eastern end of the hill. In fact, the level space was so small that I initially thought it may have been an entrance through the palisade; that is, some kind of fortified gateway. There was ample evidence of small pits and trenches on the surface which could have been part of a stockade and gateway. Consequently, the

Figure 42
Burned soil and charcoal just beneath the turf represent the collapsed remains of the burnt house. The slope is steep at this point as shown by the stake, which is being held level.

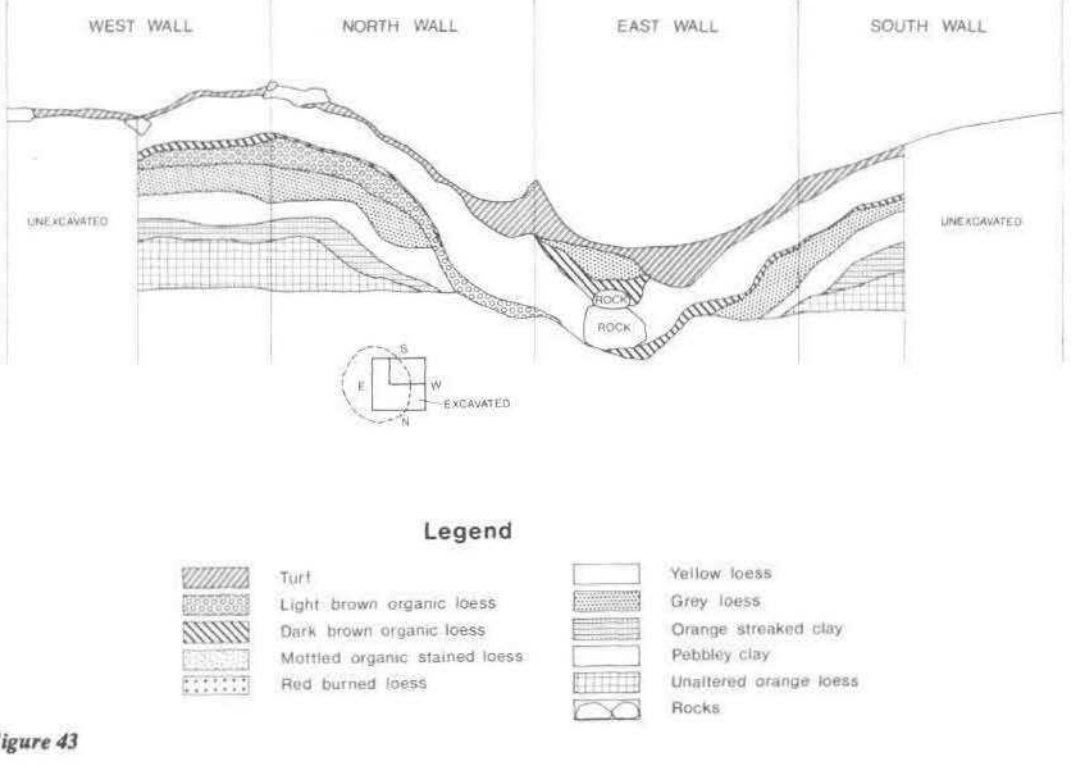


Figure 43

operation was initially considered to be that of the palisades, operation 009, and sub-operation 9H was labelled accordingly.

The first conclusive evidence that this was a house platform was found in one of six test pits dug into various depressions in this operation area. Compact grey ash with calcined bone fragments, underlain by heat-reddened soil, established the location of the central hearth features, confirming evidence in the form of large pieces of burned wood that were found on the downhill slope, under what would have been the house overhang. The length and orientation of the carbonized wood indicated that it resulted from burned planks, which had fallen down the slope (Fig. 44). The location of the charcoal just beneath the sod suggests that the burning episode was the terminal event for use of the fort, since no occupation refuse was found to overlie it. If this slope should be carefully excavated at some future date, it is likely that structural details of the house could be determined from the burned plank remains.

Operation 005

A small terrace located between the hill and the river was found by the surveying crew in 1966 to contain three large depressions, roughly equidistant from each other. The terrace is much lower than the hill but still well above the flood reach of the river. It is a bedrock-controlled feature, with only a thin mantle of soil.

When the area was cleared of dense brush (mostly red willow), another smaller depression was also found near the southern edge of the terrace. It was initially assumed that the depressions were all food storage pits, although they were considerably larger than usual.

Units 1 metre square were excavated into the two largest pits (5A and 5B) to provide cross-sections and soil samples, to be collected for content analysis. During a visit by Mrs. Sutton, she was taken to this area and asked her opinion. At first, she agreed they were food storage pits, but then looked puzzled for a few moments. She kept looking at the pits and then up the hill and down to the river. Finally, her expression changed to a smile of recognition, and she exclaimed, "This is the girls' school!" She then explained to an incredulous audience of students, Rosalind Whalley and myself, that these were the pits over which small conical

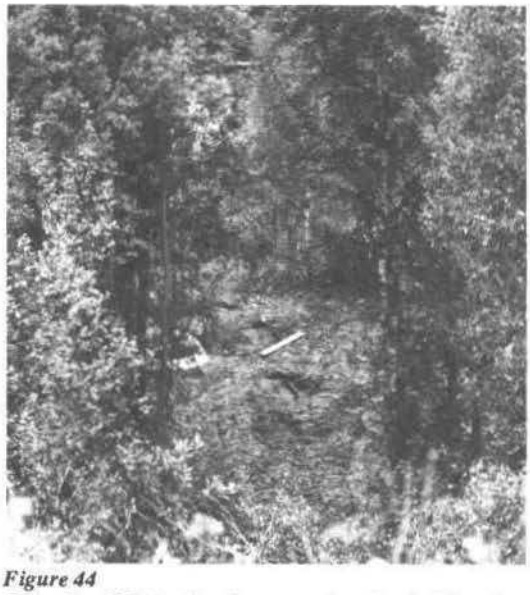


Figure 44

Operation 005 showing the excavation of units 5A and 5B from the top of Ta'awdzep. The girls puberty lodges were usually located at the greater distance from the village, but during times of warfare, the lodges were kept closer to the fort. Cedar bark stings were said to provide a communication link between the lodges and the houses of the girls parents. The girls were not allowed to speak diring their month long seclusion.

huts were built for the seclusion of girls when they reached puberty. At first menstruation, the girls were brought to these huts by an aunt and taught how to behave as a woman. I checked as many details as possible about the size of the huts; how they were heated, how oriented and if they were re-used. My conclusion was that all of the observed features of the pits fitted with Mrs. Sutton's interpretation. The remainder of the units 5A and B were excavated, with a view to testing this suggestion. Unit 5B (Fig. 48) produced a central hearth feature, with abundant charcoal lenses suggestive of re-use at intervals. Samples of the pit's soil content were collected for later analysis. Since food storage pits do not require hearths, it is most likely that 5B is the pit for a puberty hut, with a small fireplace to provide warmth in cold weather. William Beynon describes the use of the puberty hut among the Tsimshian as follows (1948-49 ms):

> "The next stage for the girl was when she had her first menstrual period. When this came on, she would be again in the charge of the oldest paternal aunt or paternal grandmother, and she would be taken to the hut specially-built for

this purpose. There she should be kept in seclusion, attended only by her paternal aunt. She would be made to drink water with a tube, usually a small hollow leg bone of some bird. When she was thoroughly cleaned of her menses, then four children were brought in. These were about six years old, two male and two female and these would chew food for the adolescent. The reason for this was so that she would have children of both sexes."

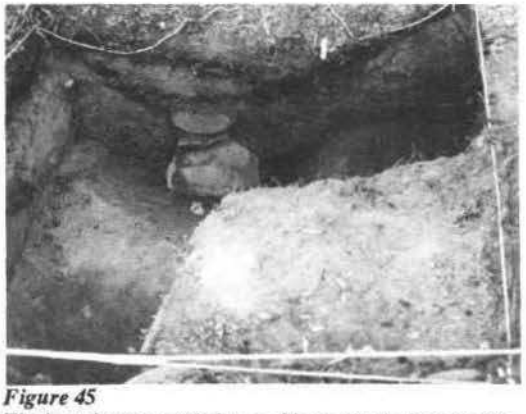


Figure 45
The hearthstones and charcoal lenses in the bottom of a girls' puberty pit 5B.

There was a small swale between operation 005 and the side of the fortress hill that was very wet, when first cleared of the red willow cover. A small shovel test was made in the clearing, to determine if there was a spring at this location. No evidence for a spring was found, and in a few days the exposed soil dried out.

Operation 006

The large terrace, extending several acres to the north of the fort hill, appeared to have all the requirements for a village location. It was close to the hill and protected by it, since most invasion threats by trail or river would come from the south. It was well above the flood plain. Of the two terraces south of the hill, one was below the flood plain and the other quite a climb from the river, rendering both of them undesirable for houses.

The area of operation 006 had itself been a flood plain in early post-glacial times and consisted of fluvial sediments of different grain sizes. A shallow channel, characteristic of the quarrying action of streams along the outer edge of an erosion loop, was traced along the inner edge of the terrace, against the steep face of the next higher terrace.

Figure 46
Excavating a girls' puberty pit in operation 005.

Figure 47
Operation 006 consisted of a trench across what was suspected to be the site of houses or smoke houses. No cultural features were noted in the trench floor.

Figure 48
The trench in operation 006 was excavated by shovel and mechanized shaker screen.

Figure 49
Probing one of 50 food storage pits at the base of Ta'awdzep.

In one area near the hill, there was a depression with relatively heavy vegetation, covering what appeared to be a house site, although not one of long duration. The stream bank was carefully checked, and showed no trace of eroding house deposits. Consequently, a long trench was excavated some 10 metres from the bank, which seemed to be the optional area to encounter house remains if any had stood there. The trench was 60 metres long, ending in a swale that cut diagonally across the terrace, and which marked an old channel of the river. The field on this terrace had been plowed numerous times in the past although, for the last few decades, it had served only as pasture. Cultivation would have filled in any food storage pits. However, the marked contrast between the light yellow subsoil and the dark humus layer would have made any storage pits or post holes stand out very clearly in an excavation. Because of the uncertain return involved, the entire trench was excavated by shovel, with the soil passed through a motor-driven shaker screen of 1/4" mesh. The extremely efficient shovel work of two crew members completed the trench in three days. It is somewhat surprising to note that not a single sub-surface feature or artifact was found in the entire length of the trench, although pieces of modern glass were recovered from the sod zone.

The reaction of a visiting geologist to this situation, was to indicate that very active erosion was occurring along the river edge in this area and that erosion of up to one hundred metres could have occurred within the past two centuries.

Operations 007 and 008

Due to the influence of the bedrock core of the fort hill, a series of depositional and erosional cycles formed a boundary between all the terraces on the property and, at the same time, linked them together. Taking advantage of this topography, the Indians established a trail down the slope from the high terrace where the Kitwankul Trail passed (and where the "Hand of History" sign of the highway is today) to the eastern horn of the hill. From there, the trail ran along the southern flank of the hill to the western horn, where another path zigzagged down the steep northern slope of the hill, toward the area of Operation 005 and the river. The main trail up the hill was in front of Nekt's house (No. 1) and is still clearly marked to this day.

From a point midway down the first slope to the western horn of the fort hill, the trail was spotted on either side with large food storage pits (Fig. 29). I had noted half a dozen of these pits on my visit to the site in November, but the brush was too dense to see many of them. It took two men a full two weeks to clear all the brush from these trails, so they could be accurately mapped and tested. Each pit was marked with an orange tag stake and assigned a number.

Where the modern service road cut over the terrace edge, the trails and pits were obliterated in a swath nearly 10 metres wide (Fig. 29). The area to the east of the road was designated operation 008, while the area to the west of the road, flanking the hill, was operation 007. Once the areas were cleared, it became obvious that they should have been a single operation and should henceforth be considered together, as parts of a trail network between the trail and the river, with the fort hill standing in the middle.

In total, 84 food storage pits were mapped in these two operations. All the pits were tested with a long steel probe (Fig. 49) to determine their depth and

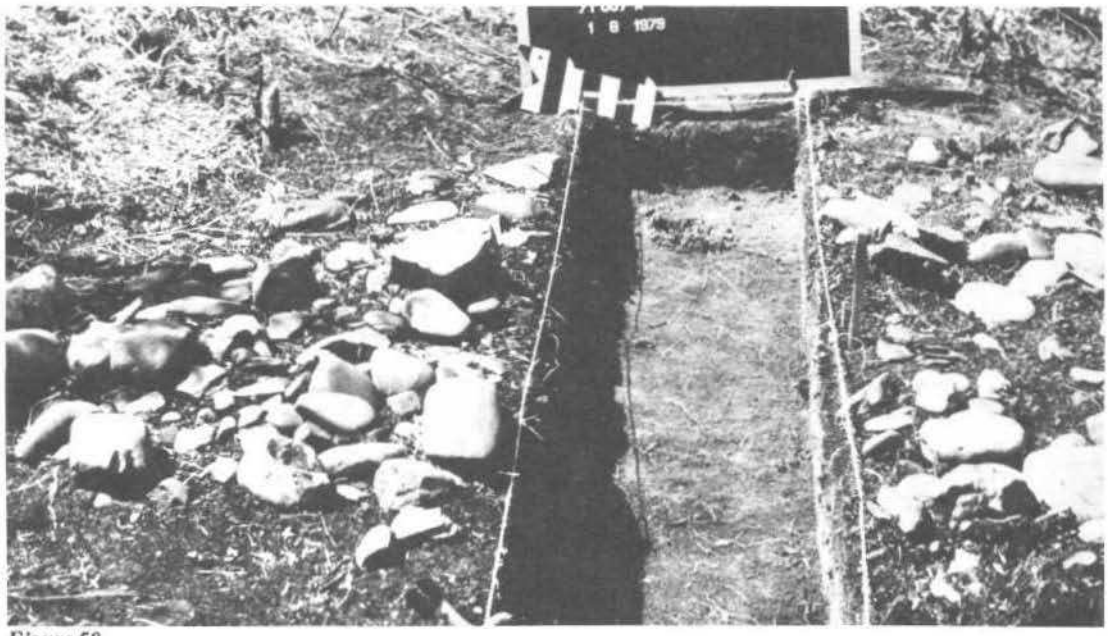
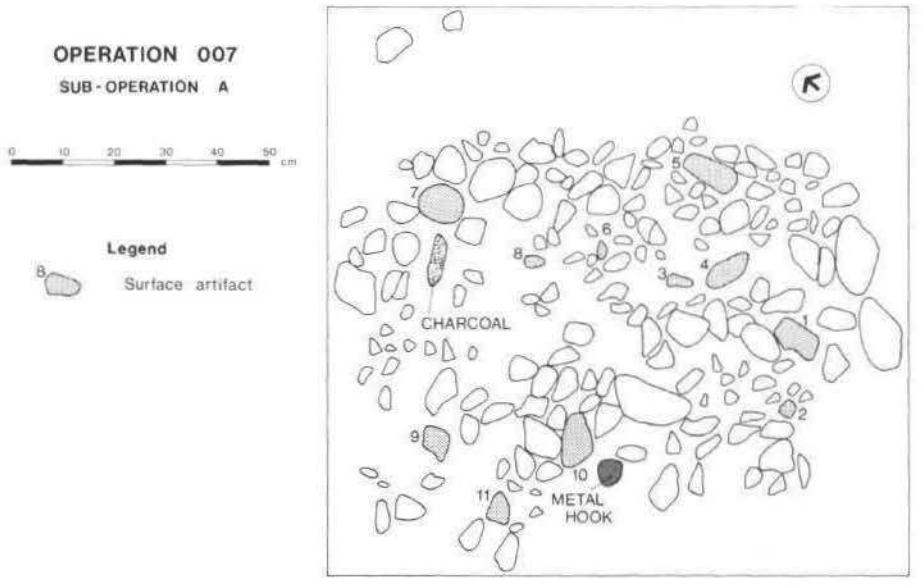


Figure 50
Excavated sweat bath rock pile in feature 7A, which contained scattered charcoal but was only a superficial feature.

Figure 51
Excavated sweat bath feature 7E that had been partly destroyed by agricultural levelling.


OPERATION 007
SUB - OPERATION A
0 10 20 30 40 50 cm
Legend
8
Surface artifact
CHARCOAL
METAL HOOK
1
2
3
4
5
6
7
8
9
10
11

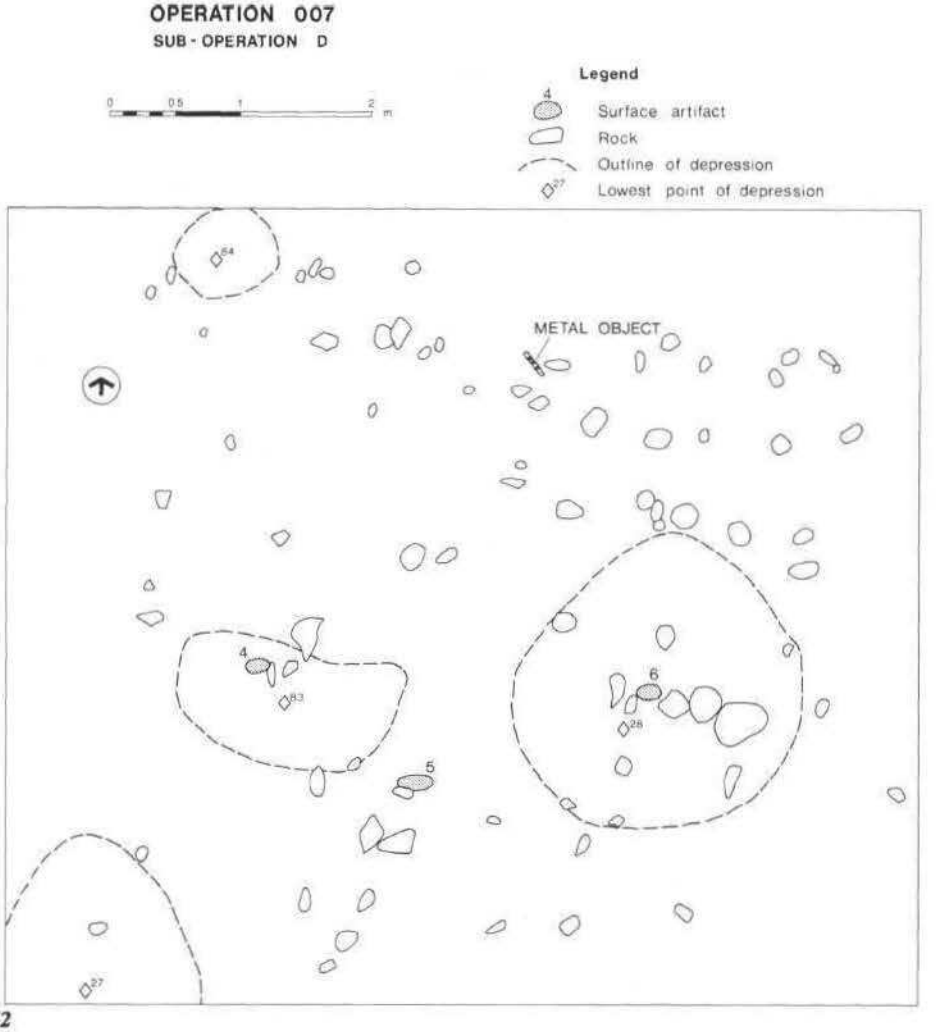

OPERATION 007
SUB - OPERATION D
0 0.5 1 2 m
Legend
4
Surface artifact
Rock
Outline of depression
Lowest point of depression
METAL OBJECT
64
83
28
27
4
5
6

Figure 52

Figure 53
A sweat bath structure among the Tlingit of southeast Alaska ca. 1895. (NMC photo).

whether or not they contained any cultural remains, such as stone or metal tools or weapons. They were also tested with the metal detector, but no artifacts were found in these tests.

Several types of other features were encountered that required explanation. The first type consisted of piles of cobbles, some of which were buried beneath the sod, indicating considerable time depth. Three large cobble concentrations were tested, but there were many smaller concentrations that were simply mapped as a cluster.

The largest of the three tested (designated 7A - Fig. 54) contained over a hundred cobbles, some of which had been worked into chopping tools. A trench was cut across the concentration, after each cobble had been mapped and marked for restoration purposes. After excavation, the trench was lined with a sheet of plastic, to mark the limit of excavation. The trench was then filled and the cobbles restored to their original position. A number of worked cobbles were collected as artifacts from the feature.

A related feature (designated 7C) was encountered just below the hill, adjacent to the trail. It consisted of a small mound with considerably fewer cobbles than in 7A. When cross-sectioned with a half-metre wide trench, the cobbles were found to be mostly resting on the surface. The small mound consisted of loose topsoil, with no indications of burning or evidence for an underlying pit.

The final feature of this type (7D - Fig. 54) was beyond the undisturbed zone of area 7, just in front of the office trailer, and appeared to be a stone pile that had been mostly destroyed by the bulldozer, which cleared a road through the site several decades ago. About twenty larger cobbles and numerous worked cobble spalls were uncovered in the excavation of the feature, but there was no pit associated with the feature.

The interpretation of these stone piles presented a problem that was taken to the native consultants. It was clear that at least one pile was prehistoric, and not the product of field clearance, since most cobbles were partially or completely buried;

furthermore, there were artifacts in all three features, and charcoal in one (7A).

Mary Johnson, of Kispiox, was asked her opinion first. She studied the feature and the immediate surroundings, and then pronounced unequivocally that it had been a steam bath, or "medicine" bath. Other consultants, including Olive Mulwain of Gitseguecla, agreed with the first interpretation. Since no steam bath had been described in detail for the Skeena River, I asked Olive Mulwain to advise on the details of reconstructing one (Fig. 54). Although the results of this experimental reconstruction are not conclusive, they suggest that the "steam bath" (or sweat lodge) is the best explanation for the use of these rock piles. It was deemed that there was no cooking activity associated with preservation of food for the storage pits nearby, that could provide an alternative explanation for these rock features.

Much smaller accumulations of rock, such as 7B, could also have been sweat lodges on a smaller, probably individual scale. They also included both fire-cracked and whole cobbles and varied from a few to a dozen cobbles. No doubt, other examples could have been designated, but in small features of this sort, the effect of "borrowing" stones from one feature to another blunts the usefulness of trying to record all examples of this phenomenon.

Native consultants claimed that both medicine baths (designed to improve the health of a patient) and purification baths (meant to divest a hunter or fisherman of his human smell, which is repulsive to animals and fish) were usually taken "individually." The three larger concentrations may refer to group steam baths, which were an occasional practice, or even communal rock piles at favoured localities, for the use of individuals.

Operation 009

The original intention of this operation was to include the zone around the house lots, which was thought to include the palisade of the fort. As the evidence accumulated for the house structures, it became obvious that some houses were larger than initially assumed. In fact, the back of house 1, and the fronts of houses 3 and 4 extended into operation 009. The fifth house, at the east end of the hilltop, was entirely within operation 009 and was designated 009T. Since, in fact, no evidence was found of a palisade, the raison d'être for the operation designation disappeared, but for the sake of continuity in recording, the original numbering was maintained. The operation 009 features were presented earlier with the house operations to which they belonged, but a résumé of all of the sub-operations is presented below:

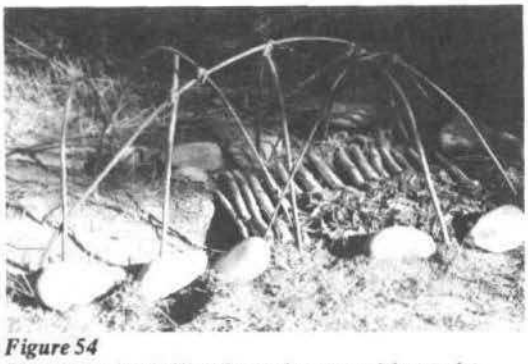


Figure 54
Reconstruction built under native supervision at the Ta'awdzep 1979.

9A, B, C and D were each quadrants of the trap door feature at the back of house 1 (operation 001).

9E, F, and g were storage pits in the south end of House 3 (operation 003). They were marked by surface depressions that were thought to represent posts (possibly of the palisade), but which, on excavation, proved to be storage pits with birch-bark linings.

9K was a small hearth, under a huge flat slab at the southern end of house 3.

Operation 010

Oral history for the site abounds with references to a spring along the hillside, where girls were sent daily to draw water for the fort. In one important episode, the girls see the reflection of an enemy warrior, in the pool at the spring. They quickly return to notify Nekt of an impending attack. The most likely location of the spring seemed, at first, to be in the zone at the base of the hill, but a thorough search of that area revealed no sign of a permanent spring. A note on the local maps showed a spring along the steep slope from the uppermost terrace, where the Grease Trail passes the fort. This slope was cleared from the point at which the road cuts down between the two main fields, to the northeast corner of the property, in an attempt to locate the spring. Since no likely features were found, nothing was designated in operation 010.

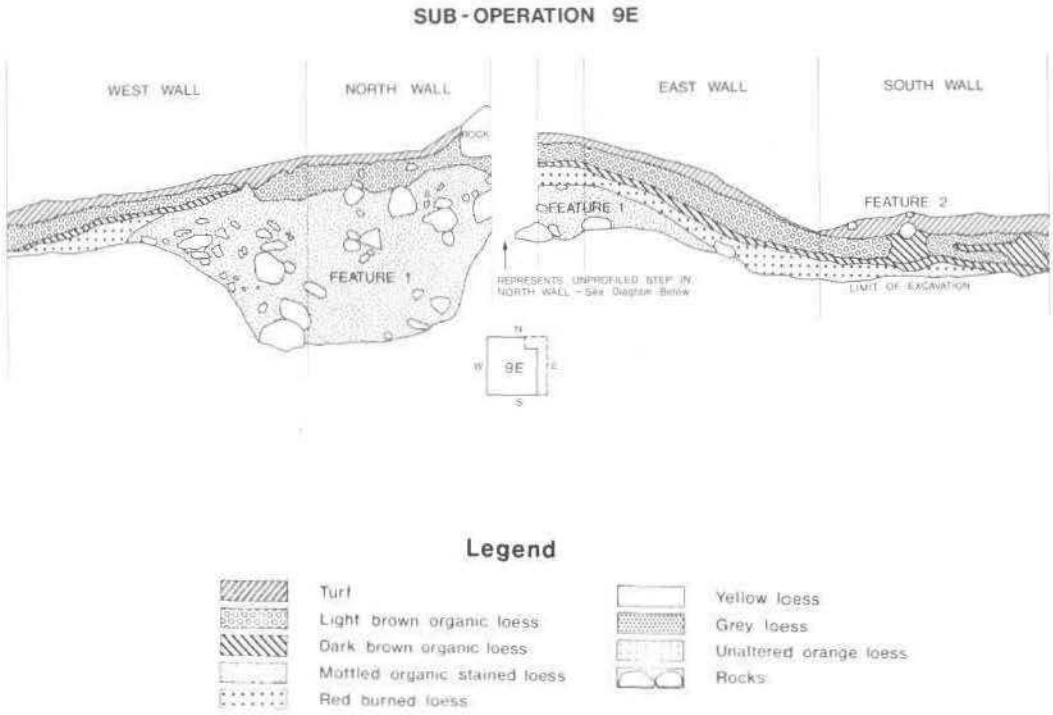


Figure 55

Operation 011

The large field, to the south of the fort hill on the far side of the road, would have been kept clear of trees for defensive purposes while the fort was in use. It would have provided a large activity area for drying fish and processing other food. A thorough search of the area yielded several dozen massive stone tools, mainly cobble choppers and hammerstones.

One intriguing tool type, which turned up in surprising numbers, was a cobble with deeply pitted depressions on one or both faces. Similar artifacts, considered to be anvils for stone chipping, had been found before on Indian sites in Canada, but not previously in this region. Some careful observations and deductions by Mr. Jack Hepplewhite, of Terrace, demonstrated that they were indeed hammerstones, but ones used by local farmers to pound metal horse tethering stakes into the ground. A single example was retained for future reference.

The possibility of the existence of food storage pits in operation 011 cannot be ignored. Bulldozing and cultivation in this area would have obliterated all trace of such pits on the surface, but sub-soil indications should be preserved. Unfortunately, it would require a lot of earth-moving to test this hypothesis and it does not appear to be justified, since a sizeable sample of such features is preserved on the northern side of the road in operation 007.

Operation 012

After a thorough, but unsuccessful, search of operation 005 and 010 for the spring used by the inhabitants of the fort, the quest was extended to the steep bank to the east of operation 011, just below the location of the present highway and the old Grease Trail. Mr. Faulkner, the custodian of the property, had indicated that this is where they tapped the water for their horses and for the family use as well. This spring is just over the boundary of Parks Canada land. With assurance to the owner that we would be careful not to dig up his water supply line, a small test pit was put into a very wet spot just below the spring. In this test, preserved wood was recovered, some fragments of which appear to have been worked. Soil conditions for preservation in this area are optimal, but there is evidence of recent disturbance mixing old and new wood throughout the area.

Figure 56
Feature 9E in house 3 was a large food storage pit with fragments of a bark lining. The large rocks in the bottom may have been added to support later posts. The post mould on the right still contains brittle fragments of red cedar.

Test Trenches

Prior to excavation, the sod from each trench was removed in 25 x 50-cm blocks, to the top of the cultural deposit. The underlying deposit was then removed with shovels in 5-cm layers, in sections of the trench a metre at a time. If soil colours changed, rock concentrations, artifacts or other clues appeared, the area thought to encompass the find was marked off and the shoveller proceeded down the trench. All soil removed from the trench was screened through 1/4" mesh shaker screens that were lined with a finer mesh screen when smaller items, like beads, were suspected.

Follow-up crews excavated the special find areas with trowels and took soil and other samples from the features. The density of features in both trenches was higher than anticipated. A drafting and a photographic team recorded the profiles and features encountered in the trench, using dry and wet spray techniques to enhance the subtle soil and stratigraphic changes.

Trench 1 (Fig. 57)

The first test trench was a half-metre wide and ran east and west along the south three-metre line, from West 13 to East 30. It was situated so as to cut across the front walls of as many houses as possible, with particular attention to houses 1 and 2. General observations on the discoveries, in the trench for each particular house, have already been provided in the operation summaries above. The average depth of trench 1 was one metre, which was sufficient to catch the bottoms of the deepest pits or post features encountered.

The most notable finds in trench 1 were:

- the buried soil horizon (W6 to Wll profile) indicative of site terracing prior to the last period of construction.
- the large central hearth of house 3.
- house post features for houses 1 and 2.

The features in this trench were numbered from 1 to 80 and indicated on the floorplan and profile in Fig.

Features in the North Wall of Trench 1:

Feature 1 (5.3W-13W) here is long lens of fill that has been dumped down the western slope of the hill during the preparation of the lot for house 4. The feature begins at 6.3 metres west and continues to the end of the trench at 13 metres west. The outline of the feature could be detected from the top of the hill when vegetation had been cut down, and the sun was at a low angle in late afternoon. The feature covered about fifty square metres. The average depth of the fill, which comprised the feature, was thirty centimetres. The total volume of fill was about seventeen cubic metres.

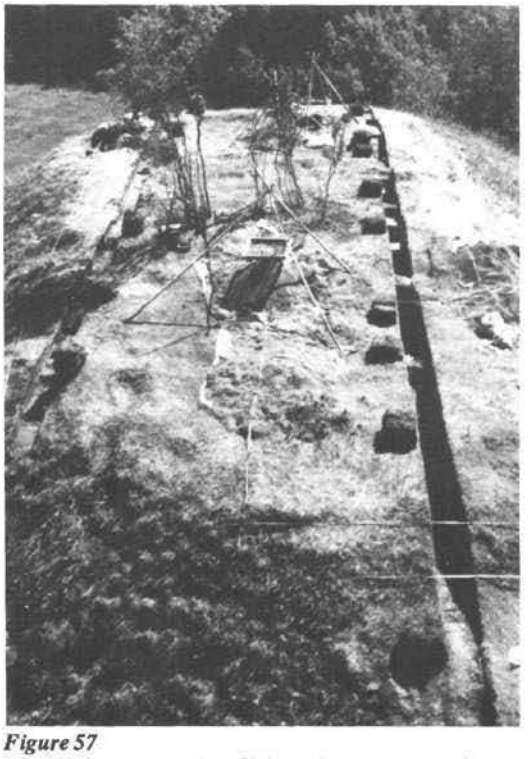
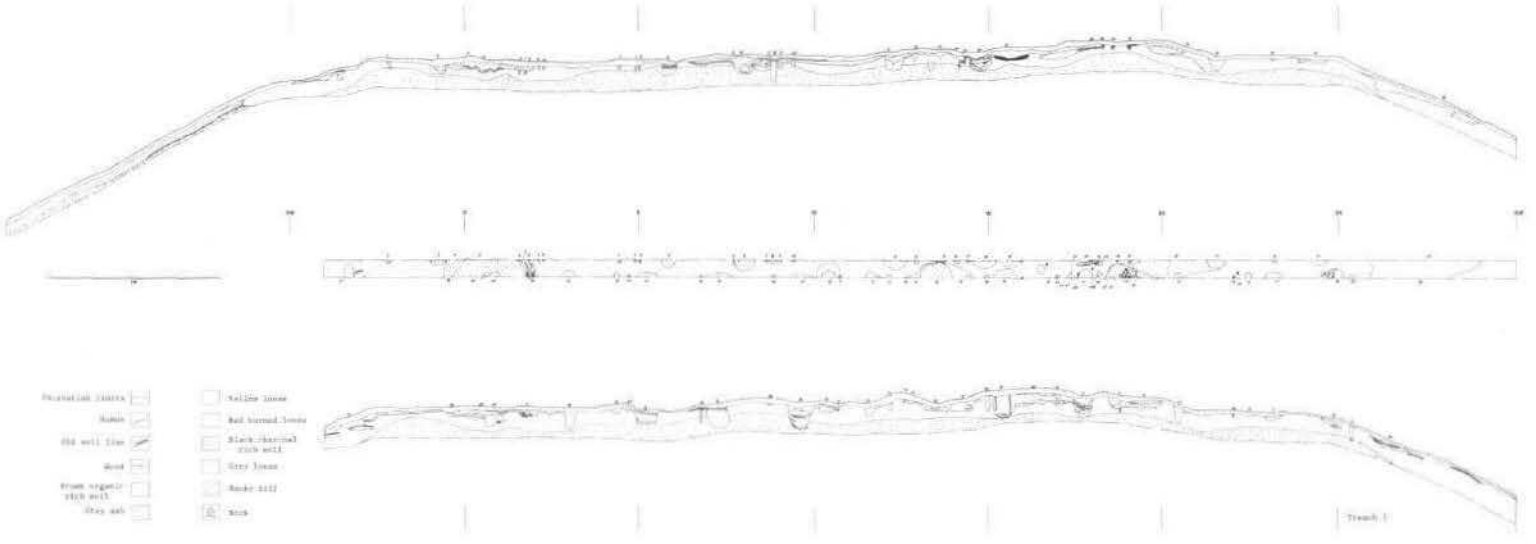


Figure 57
Trench 1 (right) and 2 (left) from the west across the top of the Ta'awdzep. The blocks along the side of the trenches are pites of sod that were carefully replaced after excavations the prevent later erosion of the hill.


Trench 1

The feature overlays the old sod line, and could be clearly traced along the wall of trench 1. The eastern end appears to end in a dark organic stained vertical line, which may represent the remains of a retaining wall, at the west end of house 3 platform.

Feature 2 (2.2W) is a post mould, filled with dark brown organic material. It was approx. 50 cm long and was slightly angled to the west.

Feature 3 (0.5-1W) is a relatively straight-sided pit, about 50 cm in diameter which extends thirty centimetres below the humus zone. The west end of the pit is stained from decomposed organic remains, while charcoal stains are found at the east end and near the top of the pit. It is presumed to be a food storage pit near hearth 3.

Feature 4 (0.11E) is a basin-shaped pit on the very edge of hearth 3. It is filled with charcoal-stained earth. Its shallowness, position and contents suggest it may have been an earth oven for baking at the side of the main fireplace of house 3.

Feature 5(0.2-1.11E) is a trilobate depression, filled with a highly consolidated mixture of wood, bone ash and soil. Beneath the bottom of the feature, the earth is burned red, indicating this was a major hearth feature. Its size and location at the centre of the platform for house 3, indicates it is the central hearth for this house.

Feature 6(1.6 E) this post mould is about 8 cm in diameter and 20 cm in depth below the dark organic and charcoal zone in which it originates. Its total depth from the surface is 35 cm.

Feature 7(1.7 E) is another post mould, similar to feature six in size and contents.

Feature 8(1.9 E) is a concentration of 24 rocks. They range up to 14 cm long, and all show evidence of fire-cracking. It probably represents the remains of a baking oven, although no trace of a pit could be distinguished.

Feature 9 (2.2 E) is a small, post mould about 5 cm in diameter, which extends 25 cm from the surface. It is faint in colour and probably represents the position where a stake, perhaps as a fish roasting fork, was pushed into the ground and later removed.

Feature 10 (2.4E) is virtually identical to feature 9.

Feature 11 (4.5E) is a depression filled with organic matter, which could be traced in a line across the trench. It appears to be part of the sill of a wall of house 2. On the south wall of trench 1, this feature was recorded as number 43.

Feature 12 (5E) is a small depression, perhaps a sill about 5 cm. wide and extending 30 cm from the surface. It may connect with feature 44 in the south wall of the trench.

Feature 13 (5.1E) is another post mould of similar dimensions to feature 12.

Feature 14 (5.6-6.1E) is a large pit, 40 cm in diameter and 35 cm deep, that is marked on the surface by a depression about 15 cm in depth. The pit fill consists of a thin charcoal lining, followed by organic rich, unburned soil, and a core (50 cm in diameter) of burned wood fragments. It may be a door post depression for house 2.

Feature 15 (7.7E) was a small post mould 8 cm in diameter, in the baulk (no 3) which does not show on the profile of the trench. It extended 55 cm below the surface. It lies directly in front of the large post in feature 16.

Feature 16 (7.8E) is a large pit filled with mottled soil. It is 40 cm deep from the surface, and about 50 cm in diameter. It may be another support door post of house 2.

Feature 17 (8.7E) is a small, irregular-shaped, organic-stained area that might be either a post mould of unusual shape, or a large root channel. It is about 7 cm in diameter and extends 30 cm from the surface.

Feature 18 (8.8E) is a relatively large and clearly marked post feature. It is 15 cm in diameter and extends 75 cm from the surface. It may represent a structural member of the wall of house 2.

Feature 19 (9.0E) is a small post mould 8 cm in diameter, extending 38 cm below the surface.

Feature 20 (9.4E) is a small post mould 5 cm in diameter and extends about 35 cm from the surface.

Feature 21 (12-12.6E) at 12 east, is a large pit, about 50 cm in diameter and about 50 cm deep. It is lined with a dark, organic layer on the bottom but mostly

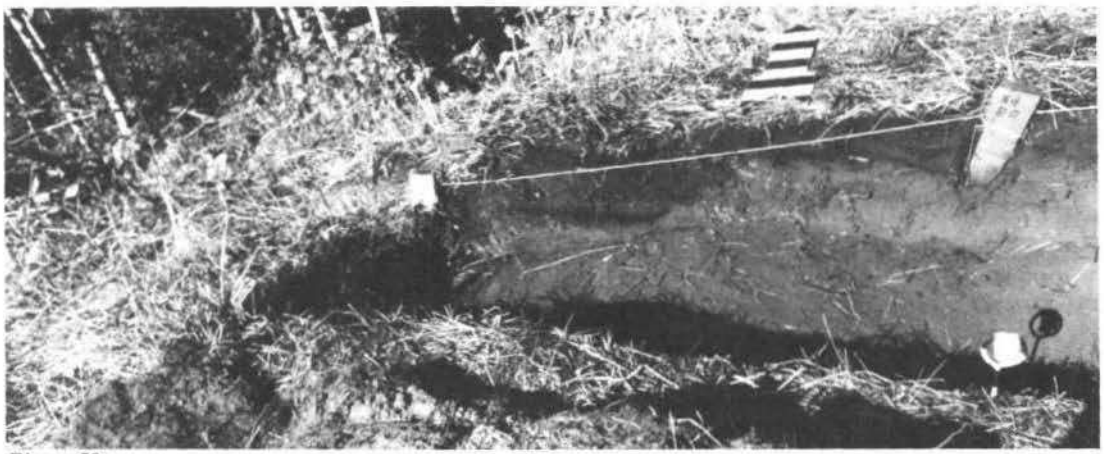


Figure 59
Trench 2 at N4EO showing burned lenses outlining the terraced platforms of houses 3 and 4.

filled with only slightly darkened yellow loess material. The uppermost one-third of the pit contains numerous lenses of charcoal, organic-stained soil and yellow loess.

Feature 22 (12.8E) is a ridge across the trench, filled with organic material that may represent a sill of house 1.

Feature 23 (13.7E) is a small post mould with a tapered base, which extends only 30 cm below the surface.

Feature 24 (14.1E) is a small post mould, 5 cm in diameter and 25 cm deep, which contains decomposed wood in the lower 12 cm of the feature.

Feature 254.4E) is similar to feature 24, but is only 16 cm from the surface to the base.

Feature 26 (14.5-15.1E) is a large pit, 58 cm in diameter by 53 cm in depth. It is filled with layers of charcoal, burned and unburned sand. It may have been used for cooking.

Feature 27 (15.2-16.1E) is a metre-long lens of black stained soil. There is no charcoal in the lens, only a greasy uniform stain in the loess subsoil. It is possible that this feature, and the previous one, relate to the preparation of bone or fish grease.

Feature 28(16.8E) is a small post mould in baulk 7 that does not appear on the north profile.

Feature 29(17.6-18.4E) is a piece of very rotten wood, about 6 cm in thickness and about one metre long, that is lying 10 cm below the surface. The east end of the wood is vertical at 18.6 m east.

Feature 30(18.6E) is another vertical piece of decomposed wood, 10 cm in thickness and extending 20 cm below the surface.

Feature 31 (19.1-19.4E) is another fragment of rotten wood. It is probable that all three pieces of wood in features 29 to 31 were once part of the same structure.

Feature 32(20.4-21E) is an ash lens between 20.5E and 21E, adjacent to reddish burned soil at 20E. Its position, under the eastern sill of house 1, is reminiscent of the ash pit in the west wall of the house in unit 1A, although feature 32 is not as concentrated or as well demarcated as the one in 1A.

Feature 33 (21.3-21.8) is a channel, running along the base of the east ridge of house 1. It appears to be either the remains of a log retaining wall of house 1, or of a log sill of the house in operation 9T (house 5). Since the lot for house 5 is so narrow, the latter seems most likely.

Feature 34(23.1E) is a small post mould 8 cm in diameter, and extending to only 20 cm below the surface.

Figure 60
North wall of trench 1 midway down slope between W9 and W10 showing the old soil horizon that was buried by loess removed in the original construction of house 4.

Feature 35 (24.2-24.7E) appears to be the remains of a burned log, which may have been part of the structure of house 5.

Feature 36 (28.4-29E) is a shallow depression, lined with charcoal fragments. It may relate either to the structure of house 5, or to part of the palisade around the fort.

Features in South Wall of Trench 1

Feature 37 (2.6-3.4W) is in alignment with the eastern end of feature 1, on the north wall of the trench, and marks even more clearly the collapse of a retaining wall along the edge of the platform for house 3. The horizontal lines of rotten wood in the profile probably represent one of the retaining planks with mixed zones of yellow loess and organic and charcoal stained soil over it, representing the collapsed fill that was once retained behind the wall.

Feature 38 (0.4W) is a small basin-shaped depression about 30 cm in diameter and 10 cm deep, filled with charcoal stained soil. Its function is not clear.

Feature 39 (0.0-1.5E) is a part of the same central hearth of house 3, as noted in feature 5 in the north wall. The compact ash is continuous across the trench, as is the underlying burned soil.

Feature 40 (0.6-1.2E) is a food storage pit, with traces of a birch-bark lining in the bottom. Its position under the central hearth of house 3 suggests it was used prior to the positioning of the hearth.

Feature 41 (1.6-2.1E) is a shallow pit on the edge of the hearth of house 3, which has been filled with fire-cracked rocks. It appears to be part of feature 8, noted in the opposite profile.

Feature 42 (2.9-3.2E) is a medium-sized pit, 30 cm in diameter and 62 cm in depth. The pit fill was only slightly darker than the surrounding soil, suggesting that the pit was deliberately filled in after use, with more or less the soil that was excavated from it.

Feature 43 (4.2-4.5E) is a house sill on the 4.4E line. It corresponds with feature 11 in the opposite wall and represents a sill of a house.

Feature 44 (4.7E) may be a continuation of the disturbance associated with the wall of house 2, perhaps another sill that appears in the north wall as feature 12.

Feature 45 (4.9-5.5E) is a large circular pit with remarkably straight sides and flat bottom. It is 60 cm in diameter and extends 45 cm from the surface. The bottom is covered with 5 cm of dark organic

Figure 61
Kitwanga Ta' awdzep from the north taken at the end of the excavation. Trench 1 is in the background and trench 2 is in the foreground.

material, overlain by yellowish-brown loess and topped by another dark organic layer. It is possible that this is a hole for a roof support post.

Feature 46 (6.8E) is a long thin post mould 6 cm in diameter, extending 50 cm below the surface.

Feature 47 (6.9-7.6E) is a large storage pit 60 cm in diameter and 60 cm deep. There was no evidence of a liner in this pit.

Feature 48 (8.7E) shows a slight depression about 10 cm in diameter and about the same depth below the humus (25 cm from the surface).

Feature 49 (9.3-10E) appears to be a double pit, marked by a surface depression. The upper half of the pit is 75 cm in diameter and 45 cm from the surface, to a heavy organic layer in the bottom. Beneath that, a narrower pit, 60 cm in diameter, extends down a further 35 cm.

Feature 50 (10.1-10.6E) is a large slab of rock 50 cm long and 15 cm thick. It is sitting between lenses of charcoal and dark humus material and probably represents a roof weight slab used to hold down sheets of cedar bark roofing.

Feature 51 (10.7E) is a small post mould, 6 cm in diameter and about the same depth below the humus layer.

Feature 52 (11.4-11.7E) is a small semi-circular pit, 30 cm in diameter and extending to 40 cm from the surface. It was filled with lenses of dark organic material and of loess.

Feature 53 (12.2E) is a large post mould, 15 cm in diameter and 45 cm below the surface.

Feature 54 (12.6E) is a small post mould, 4 cm in diameter and 30 cm below the surface.

Feature 55 (12.7-13E) is a shallow depression, filled with dark organic material that may be part of a sill.

Feature 56 (13.1-14.6E) is a large depression, 150 cm long, marked by a surface depression about 50 cm wide by 150 cm long. The fill consists of some fire-cracked rock and dark organic material. It is located just inside the sill of house 1 and may be a hiding place for women or children under the floor of the house.

Feature 57 (14.7E) is a small post mould, 10 cm in diameter and extending 25 cm below the surface.

Feature 58 (14.9E) is a large post mould, 10 cm in diameter extending 55 cm below the surface.

Feature 59 (15.1-15.8E) at 15.4 metres E is a large post hole, 65 cm in diameter and 80 cm deep, which still retains traces of the wooden post on the sides and at the bottom of the pit. The post would appear to be 40 cm in diameter, which is thought to be a reasonable size for houses on the hill at this time.

Feature 60 (15.8-17.5E) is a thick dark lens from the humus zone to 40-50 cm below the surface. It is 170 cm in length. The function of this feature is not obvious, but it possibly is connected with another hiding place just behind the front wall of the house - one that was filled in before the house was abandoned.

Feature 61 (16.7E) is a small post mould in the floor of the trench.

Feature 62 (17.1E) is a medium post mould with dark organic fill that cuts through feature 60.

Features 63-70B (17.3-19.2E) are all small post moulds, 6-8 cm in diameter with the following depths.

63-40 cm	below surface
64-55 cm	below surface
65-33 cm	below surface
66 A,B-59 cm	below surface (slanted)
67	not assigned
68-26 cm	below surface
69A-26 cm	below surface
69B-26 cm	below surface
70A-44 cm	below surface
70B-70 cm	below surface
71 (A,B,C) -	depth not recorded.

This concentration of 14 small post moulds is the most extensive noted at the site. It occurs adjacent to a large concentration of fire-cracked rock, and may represent a sweat bath within the house. Such features are noted in the oral traditions.

Feature 72 (18.6-19E) is an area about 50 cm in diameter that is filled with fire-cracked rock and charcoal. It lacks a layer of solid ash, characteristic of a major hearth, and which may have served only to heat or store rocks for a steam bath.

Feature 73 (20.3-20.6E) is a large post mould, 20 cm in diameter and 55 cm from the surface to the base. It is on the slope of the ridge between house 1 and house 5 (operation 9T). It could belong to either house.

Feature 74 (22.OE) is a small linear depression, filled with dark organic material. It may be part of a sill of house 5.

Feature 75(22.4E) is a small post mould in the floor of the trench.

Feature 76 (22.3-22.5E) is a small depression 20 cm wide and of undetermined length.

Feature 77 (22.9-23.5E) is a large shallow depression 55 cm in diameter.

Feature 78 (24.6-25.1E) is a large pit 50 cm wide on the brink of the hill, with dark organic staining. It may be part of the sill of house 5.

Feature 79 (25.4E) is a large post mould, 10 cm in diameter and 50 cm in depth. It may be one of the palisade pickets.

Feature 80 (25.8-27-OE) is a shallow basin-like depression 1 m wide, with dark lenses. It may also relate to defensive works near the crest of the hill.

Trench 2 (Fig. 63)

Trench 2, also 50 cm wide, was located on the North 4 line from EO to E30, to cut across the back ridges of houses 1, 2 and 3 and the area at the east end of the site that later proved to be the location of another house, number 5 (operation 9T). In houses 2 and 3, the trench revealed the structure of the trap door hiding places. At the west end of the trench in house 3, a buried soil indicated that burning had occurred before the last construction phase. The trap door for house 3 also turned out to be a very large feature, and in the trench through house 1 the stumps of wooden posts were found in place, preserved in the sub-soil.

The trench was opened for its full length by removing the extremely densely rooted sod in rectangles of 30 cm by 50 cm, and stacking them along the south side of the trench. This was done for two reasons: first, because it was almost impossible to trowel through the woody roots in the sod, and second, because a long trench across the top of the hill would have started seasonal erosion, if there were no sod to hold the light loess soil in place, particularly in the spring.

The trench was excavated in 10-cm levels, progressing along the entire length of the trench, then returning to the starting point at the west end to begin the next 10-cm level. All of the soil was sifted through a 1/4" mesh screen. Where finds were dense or the stratigraphy showed complications, an area thought to encompass the find was sectioned off and trowel excavation commenced. Artifacts and features were recorded in reference to one metre grid stakes, which were positioned along the south wall of the trench. Levels were taken from the southeast stake for each grid unit.

Photographs in both colour and black-and-white were taken to record the floor and profiles of the trench at each level. Record photographs were done with the floor and walls in a dry condition. Then, they were sprayed with water from a back-pack

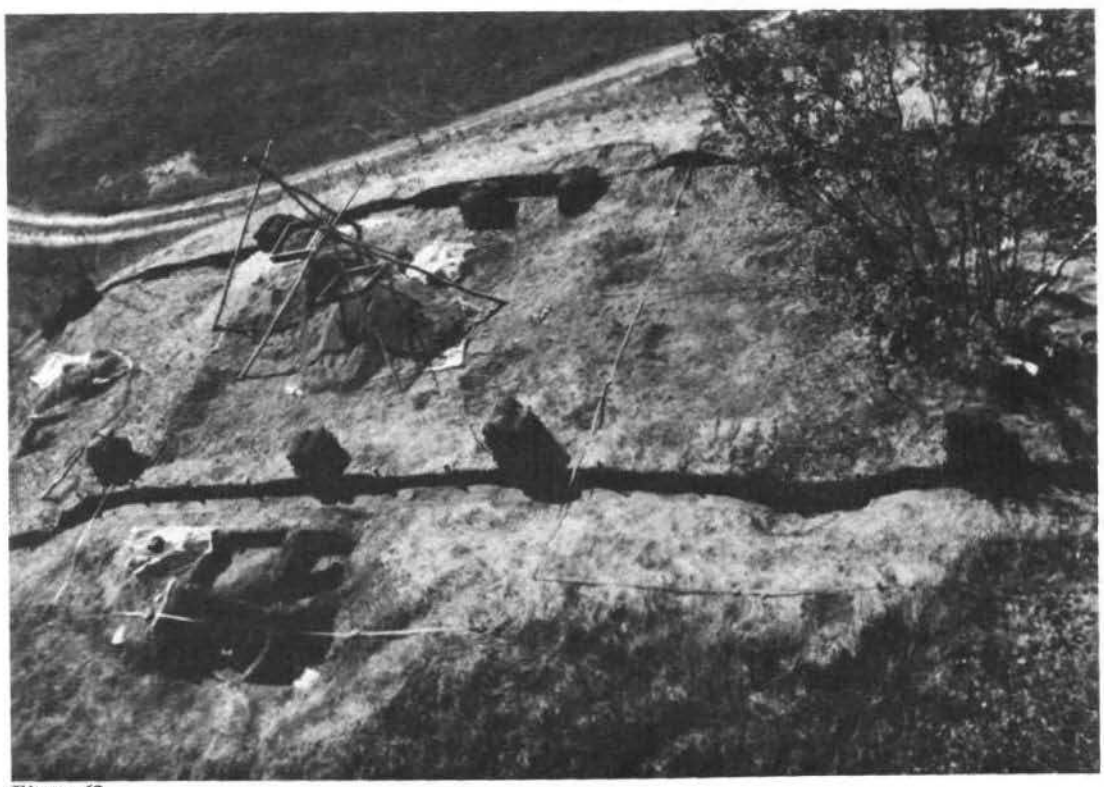


Figure 62
Houses 1 (left) and 2 (right) outlined with surveyor's tape.

sprayer and allowed to dry partially, to bring out the difference in the organic context of the soil. Finally, they were photographed again.

Feature 1 (6.0-8.3E) is a very large, bark-lined pit, 56 cm deep at its deepest point (E7). It is probably part of a much larger feature, joining with feature 11 (E4.5-E5.6), which would make this one super feature almost 4 metres in length and 80 cm in depth. There is complex lensing in the upper parts of the feature, which may represent different periods of use, and abandonment with wall collapse. It appears most likely from the size and position of this feature, that it is part of a trap door hiding place for house 3.

Feature 2 (9.2E) is a post mold 10 cm in diameter and 50 cm in depth from the surface. It is large enough to have been a structural member of the house, perhaps to support an interior partition at the back of the house.

Feature 3 (10.5-11E) is a moderate-sized pit, filled with ash. The sand under the ash is burned orange. It may have been a small cooking hearth.

Feature 4 (10.65-10.70E) is a post mould, 52 cm in depth below the surface.

Feature 5 (11.76-11.81E) is a shallow post mould in the north wall of the trench, which extended 35 cm below the surface.

Feature 6 (12.5E) is a tapered post mould 5 cm in diameter, extending 38 cm from the surface on the south wall of the trench.

Feature 7 (12-12.6E) is a storage pit 39 cm in depth.

Feature 8 (13E) a post mould 9 cm in diameter and 35 cm deep, with an unusually flat bottom.

Feature 9 (13.4-13.8E) is a pit, 50 cm in diameter and 65 cm deep. It is narrower at the top than in the middle, which is an unusual feature in pits at this site. There was no evidence of a bark lining in this pit.

Feature 10 (13.7-14E) is a moderate-sized wooden post in the floor of the trench. The wood had deteriorated in the outer layers but could be removed in tact for later study. It proved to be western red cedar. The post itself was approximately 18 cm in diameter, while the pit it rested in, was 30 cm in diameter. The post was preserved between 26 cm and 63 cm below the surface.

Feature 11 (4.5-5.7E) was numbered out of sequence, and was located adjacent to feature 1. It consisted of a bark-lined pit and, as noted in the comments on feature 1 (which was also a bark lined pit), the two may be opposite ends of a very large trap door structure or sub-floor hiding place, at the back of house 3. If that is the case, then the structure was not completely excavated.

Feature 12 (12.5E) is a post mould in the north wall of the trench. It is 10 cm in diameter and extends 35 cm from the surface.

Feature 13 (12.8E) is a post mould that enters the north wall of the trench at an angle, so that only the lower part is exposed. It is tapered and only 5 cm in diameter at its widest part and could be a root cast.

Feature 14 (13.9-15.5E) is a very large pit, one and a half metres long, which penetrates to 1 m below the surface. It is much larger in the southern profile than in the northern one, but both indicate that it is part of a large storage pit with complex internal stratigraphy and evidence of two intrusive pits within it.

Feature 15 (15.5E) is a small post mould, 5 cm in diameter extending 30 cm from the surface. It occurred in the floor of the trench on the edge of feature 18.

Feature 16 (15.6E) is a small post mould, 6 cm in diameter extending to 24 cm below the surface, in the floor of the trench.

Feature 17 (15.7-16.1E) is a rotten log lying on the floor of the trench, between 20 and 25 cm below the surface. It is probably part of a post that had fallen over and been buried by later fill.

Feature 18 (15.30-16E) is a basin-shaped pit, extending to 45 cm below the surface. There is a lense of rotten organic material on the bottom of the pit.

Feature 19 (16-16.3E) is a large post mould, 30 cm in diameter, extending 90 cm from the surface in the north wall of the trench. The feature is large enough to have supported a structural member of the house.

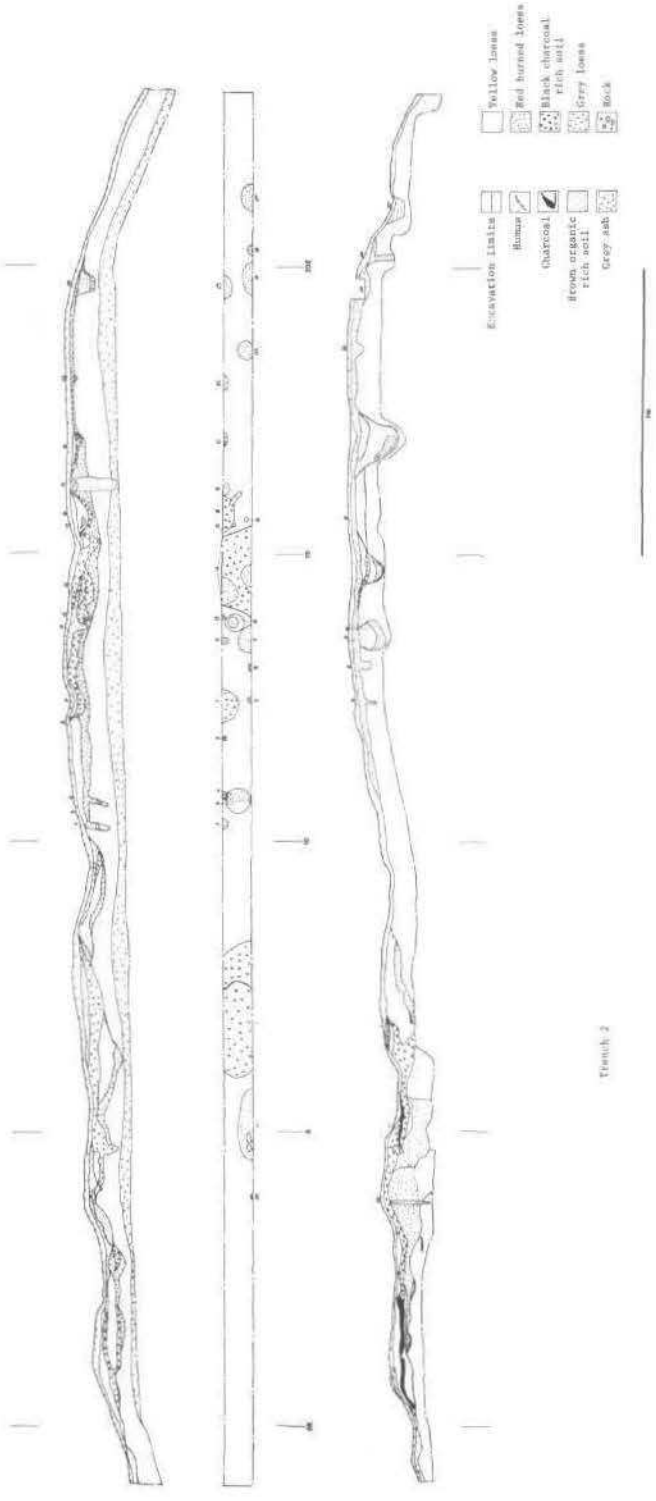

Yellow loess
Red burned loess
Black charcoal rich soil
Grey loess
Rock
Excavation limits
Humus
Charcoal
Brown organic rich soil
Grey ash
Trench 2

Figure 63

A worked shell adze fragment and a flake were found in association.

Feature 20 (16.4-17.63E) is a large pit, over 1 m in diameter and 90 cm deep, in the south wall of the trench. There are alternate lenses ot dark organic and yellow loess filling. This was probably a food storage pit, judging by its size.

Feature 21 (16.88-17.1E) is a small pit extending to 30 cm below the surface on the north wall of the trench.

Feature 22 (17.88-18.17E) is a small pit, 30 cm in diameter and extending only 30 cm below the surface on the north wall of the trench.

Feature 23 (18.46-18.7E) is a small pit, 40 cm at the top and extending down 29 cm from the surface in the south wall of the trench.

Feature 24 (19.47-20.05E) is a small hearth, filled with grey ash, that extends down 30 cm in the south wall of the trench.

Feature 25 (19.37-19.85E) is a pit, 50 cm in diameter and 40 cm deep from the surface, in the north wall of the square, which may have held a wall post of house 1.

Feature 26 (20.24-20.35) is a post mould, 20 cm in diameter and 65 cm deep below the surface in the south wall of the trench.

Feature 27 (21-21.40) is a depression, which could also be traced on the surface, at right angles to the trench and parallel to the ridge of house 1. It was 50 cm wide and 25-40 cm deep. It appears to be the sill of house 5.

Feature 28 (23.08-23.18) is a post mould in the south wall of the trench extending to 22 cms. below surface.

Feature 29 (27.29-28.24E) is a concentration of ash and charcoal, which cuts across the trench and attains a maximum width of 2 m. The whole concentration is only 15 cm below the surface and probably represents the remains of the last burned house on this lot.

Feature 30 (3.9E) is a large post mould, 6 cm in diameter and 95 cm deep below the surface.

Cultural Stratigraphy

The excavations on the hilltop area at the Kitwanga Fort present some unique features, in terms of the stratigraphic interpretation. Since the area available for the houses was slightly crested in its original form and was too small to accommodate the number of structures placed on it, considerable cutting and filling had to be done to terrace the hilltop into house platforms.

For the last occupation of the fort, there is considerable evidence for levelling of the platforms for houses 1, 2 and 3. Platform 4 presented special problems to accommodate a house structure. The west end of trench 1 clearly illustrates the dumping of fill to build up the hillside in this area with fill taken from the eastern side of the platform. The result was that the elevation of house 4 platform was considerably lower overall than that of houses 1 to 3 (but only slightly lower than house 5, which had a similar problem).

The changes made to house 1 were equally drastic in character. The central portion had been excavated, as had the trap door feature, and the fill was used to bank up the walls of the houses and form the rear bench. It appears that some earth was also brought up the bank from house 5, since there is no evidence for a buried soil in the profile of trench 2, on the eastern slope of the hill beneath house 5. In other words, where house 4 added to its own lot by dumping quarried material over the hill, house 5 added to the foundations of house 1.

The effect of all of this cutting, filling and levelling was to remove most of the earlier deposit. The most extreme case was again in house 1 housepit, where there was no evidence of cultural deposits under either the floor or the hearth. On the other hand, most levelling activities were of the order of 25 cm or less, so that the bottom of post holes and pits would not be disturbed. Similarly, some old surfaces would be protected by fill dumped over them. Evidence for all these possibilities were found in the excavations.

There is no evidence, however, that occupations of Kitwanga Fort were very intensive. There is some side-hill midden on the north side of the hill. At no place was it more than 15 cm thick. Since the gradient is so steep (over 40°), it is likely that most garbage tumbled down the hill, rather than building

up in any one spot. This would tend to diminish the accumulation of usual occupation indicators.

The number of pits and post holes dug into the top of the hill is most impressive. Using the pits and posts encountered in the excavation units and trenches, it can be estimated that there were nearly 1000 pits and post moulds of various sizes and functions, dug into the top of the hill. Stratigraphy has been obliterated in certain areas of the hill by this activity. In view of the small population and short occupation of this site, relative to coastal sites, it is staggering to contemplate the effect of the digging of pits and post holes on the stratigraphic picture of coast sites.

Stratigraphic markers in the light brown loess occur in the form of organic staining and of charcoal lenses. The first is due to the decomposition of organic material. Since there is not a great amount of human activity (in terms of population or time) at the fort, the organic staining of deposits can be described as slight.

Burning, however, has been a much more significant marker in the stratigraphy. Oral traditions indicate that the fort was purposefully burned down. This is confirmed by large pieces of charcoal, indicating collapsed structures in house 2 and house 5. This would mark the termination of the fort occupation. Another buried charcoal lens is less extensive but shows up in the profile of N4/EO-4 and possibly in trench 1 in operation 001. It consists of a stain, rather than lumps of charcoal, as in the previous example. Burning of forts may, in fact, have been a frequent occurrence. From the legends, it appears that if a fort was captured, it was always burned down before the enemy retreated.

It is tempting to assume that the zone between the upper and lower charcoal line coincides with the historic occupation of the fort by Nekt, whereas what lies below the charcoal line represents

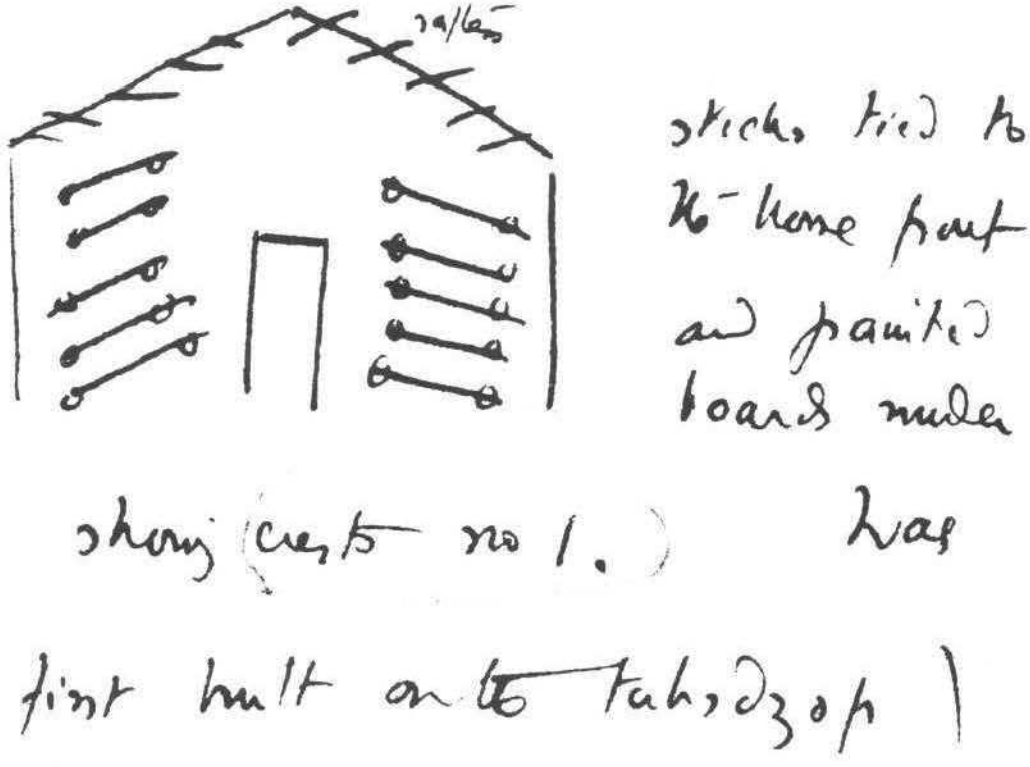


Figure 64
Ta'awdzep house front decoration.

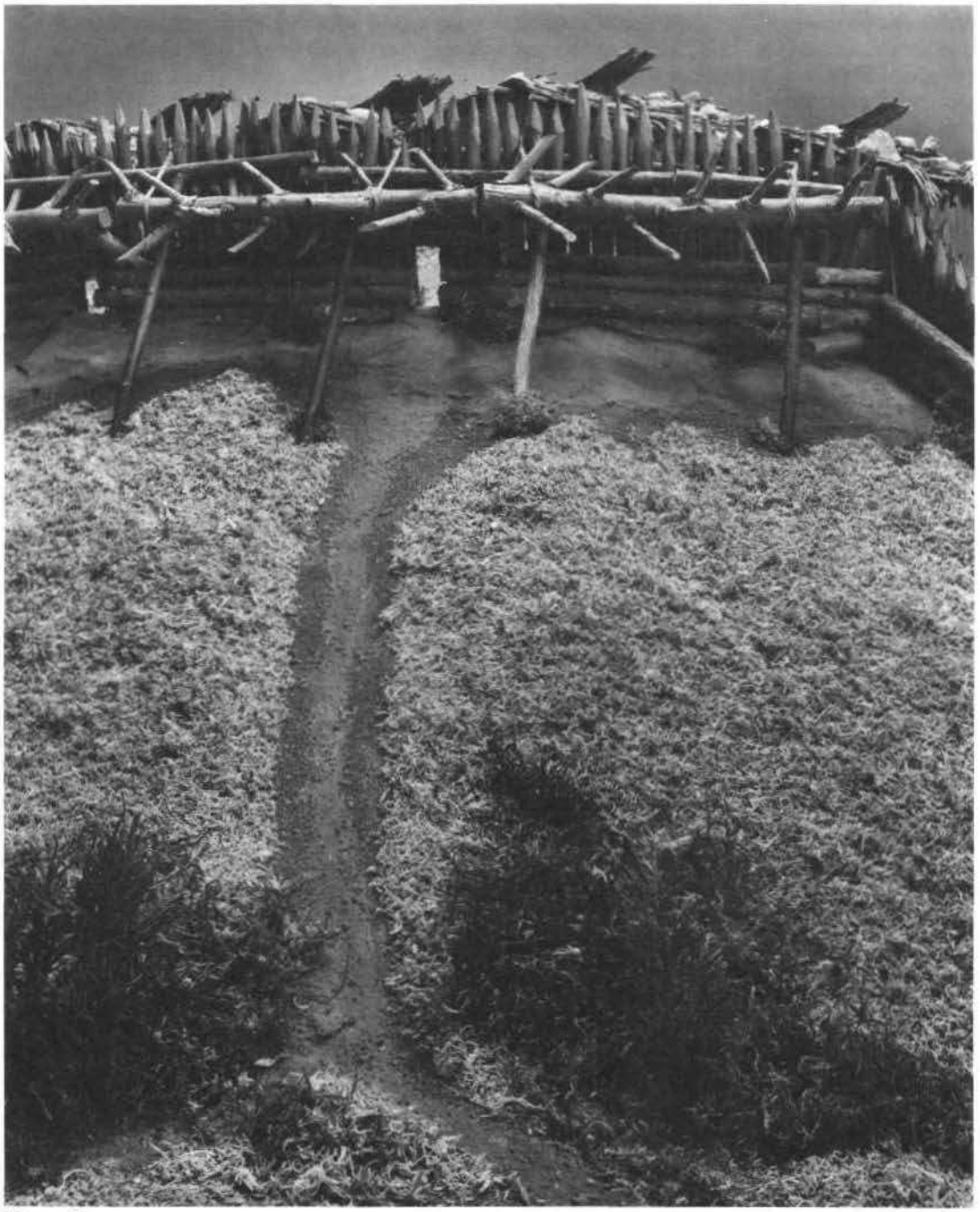


Figure 65
Model reconstruction of the Kitwanga Ta' awdzep. The four spiked log rollers are based on oral traditions, which specify this number.

prehistoric occupation. The distribution of artifacts that are considered prehistoric (including chipped stone, ground shell, adze blades, etc.) coincides with this scheme. This will be elaborated further in of this report. It should be stressed, however, that stratigraphic boundaries are highly discontinuous across the house platforms, and that the picture is further complicated by the large number of intrusions through the stratigraphic horizons.

The Reconstruction of the Model of Kitwanga Fort

In mid-November, 1979, after working with the notes and profiles and looking at the ethnohistoric data for several months, I decided that a model of the site, with reconstructed buildings, would be the best method of bringing various bits of data together from a variety of sources into a coherent whole. Art Price, a freelance artist and an experienced model-maker from Ottawa, undertook to construct the model after my plans and sketches. It was completed before the end of December.

The most appropriate size for the model, in order to show the house structures and palisades in reasonable detail, was on a scale of 1 to 50. Setting the boundaries of the model at the minimum needed to show the special structures investigated in the periphery of the hill, required that the model be two metres square (almost 50 square feet). Since the model was destined to go back to Calgary, and eventually to Kitwanga, it was necessary to build it of light, but strong, materials. The topography was constructed of fibreglass, on a strong plywood frame, so that the finished model weighed only 60 lbs.

Details for the structures came primarily from the floor plans of the excavation. The large central hearths indicated the number of houses and their relative widths. Their length was determined by the house platforms themselves and information from

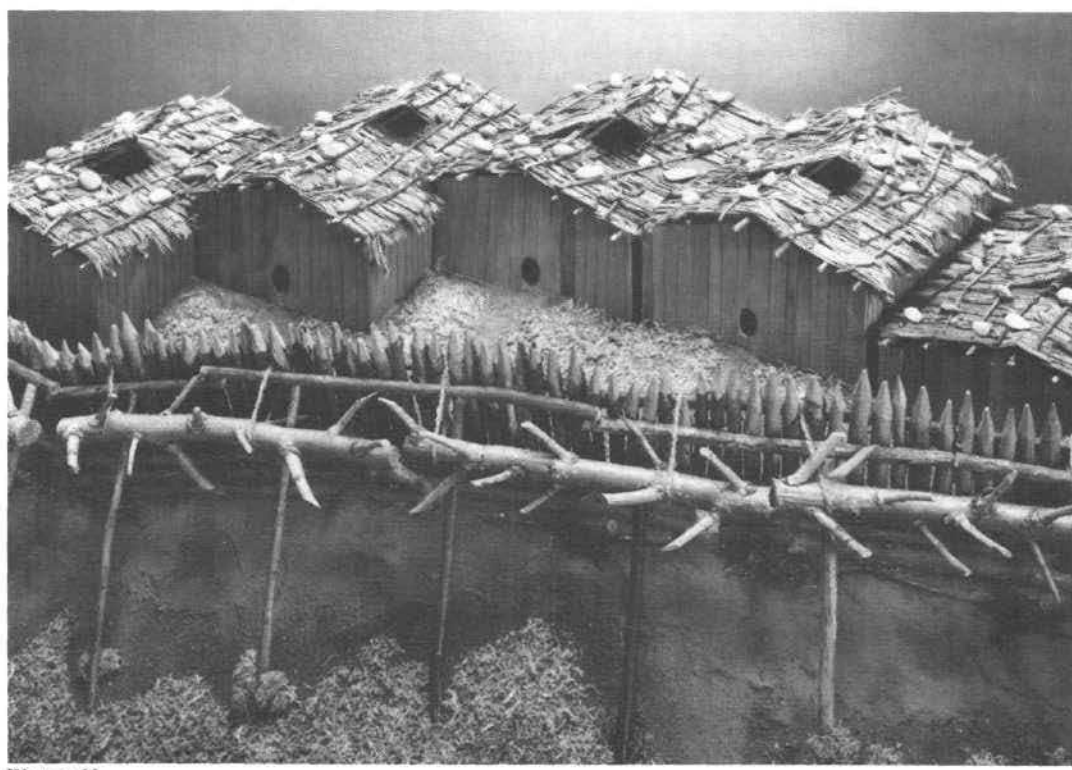


Figure 66
The houses as originally constructed in the model of the Ta'awdzep. Native consultants claim that the houses had hidden doorways and did not have rocks on the roofs of the houses. The log rollers have branches trimmed to the dimensions discussed in the traditions for this fort.

the two trenches. Evidence for the superstructural details came from the photographs, taken along the Skeena River early in the century, by Marius Barbeau and Harlan I. Smith of the National Museum of Man. Cedar bark roofing, held down with light poles, is confirmed in many photographs of Gitksan traditional houses, as is the low pitch of the gable roof. Although there was no direct evidence of oval doorways in any of the photographs, they were originally included in the model houses. This was thought to be appropriate, since there are several very old entry poles still standing in Kitwanga, which have oval doors through them, and which show signs of wear from actual use as doorways. I was soon informed by knowledgeable people on the Skeena, who saw photos of the model, that the Ta'awdzep houses had no doors. Entry to the houses was gained by moving certain loose wall boards, known only to house members and friends.

There were no totem poles on the hill, according to most informants, but one house had a decorated gable according to one of Barbeau's informants (C.C.F.C.S. archives). It consisted of paintings of three women holding children, with an added device of five poles, lashed diagonally on either side of the doorway (Fig. 17). (Barbeau, C.C.F.C.S. A-vii, 48a i).

The decorated house was said to be "Hanging House," which is thought to be either house 4 or 5. This feature was not included in the model because of the uncertainty as to the exact house.

Trap doors were included in the back of houses 1, 2 and 3, as indicated from the excavations. It became obvious, when constructing the model, that the palisade must have virtually touched the back walls of the houses, in order for the trap door hiding places to have allowed passage from the house, under the palisade, within the dimensions of the features found on site.

There was no direct evidence at the site for the palisade, other than scattered post features, which do not form a recognizable pattern. There are several good sources in existing drawings and photographs of nineteenth century forts in Southeast Alaska. The earliest document is the Lisianski drawing of the floorplan and elevation of a Tlingit Fort at Sitka. This fort, (Fig. 15) pictured in 1804, was a contemporary of the late occupation of the Kitwanga Fort. Details from this drawing were followed closely in the model.

For the length and thickness of the pickets, they appear in the photograph in Fig. 14) to be 25 to 30 cm in diameter and 3 to 4 m in length. The pickets are supported in the Sitka Fort, by rows of sleeper logs stacked three high, on both the inside and outside of the palisade. This would allow the pickets to be supported, without being set in deep holes. This would have been impossible on the side of Kitwanga Ta'awdzep, since tests proved the bedrock was only 40 cm or so beneath the surface.

There are three doorways in the model of the Kitwanga Fort. Informants' impressions varied between a single door and four doors. Most forts had multiple doors, to allow escape if the fort fell to attackers. The doorways are modelled on those at Sitka, which are short and raised a metre or so off the ground, so that one must stoop over and climb through them sideways, creating a marked disadvantage for the person going through the doorway.

All three documented forts (Figs. 13-16) show the walls supported by external prop poles, fastened at wide intervals to stringers which, in turn, are fastened near the top of the palisade. This arrangement appears impractical, since it would help enemies to scale the palisade, or would allow them to pull away the props with ropes, and possibly the palisade as well (as in the Haida fort with pickets at a 70° angle). The uniformity of this feature in all the documents shows that they were a regular feature of the palisade.

Jack Morgan said there were poles sloping out from the palisade at the Kitwanga Fort, to start the spiked logs rolling. A spike log dropped vertically from the palisade would merely stick in the ground. They are shown this way in the model, as skids for the rolling logs, as well as props for the palisade. In reference to the log rollings, Luke Fowler, (Laxsail of the house of Haku) told Barbeau (Ms.P: 252): "In all there were four of the large logs covered with sharp spikes."

There were several features surrounding the fort hill that were investigated archaeologically and have been included in the model. Of major significance

were the four puberty pits on the small rock outcrop, between the fort and the river (operation 005). The sweat bath in operation 011 was based on an excavated rock feature, thought to be a sweat bath, and the description of two informants from Gitsequecla on the construction of the framework for the bath.

All features on the model were constructed in such a fashion that they could be altered easily, as new information came in from further excavations or from ethnographic sources. Since this process has already begun with the doorway modifications, the use of interpretive models in ethnohistory and archaeology becomes apparent. It is surprising that so few models are used on an experimental basis in Canadian archaeology.

The Structures at the Kitwanga Fort National Historic Site

Summary and Conclusions

The main structural complex investigated by the National Museum of Man (now CMC) and Parks Canada project team was the fortified dwellings on top of the hill. However, evidence was also sought on Parks Canada land around the hill, for additional structures which native consultants claimed had stood below the hill. In some cases, such as the food storage pits and trails, matching evidence was found in the site. In other cases, where native consultants provided clear descriptions of dwellings and fish smoking houses below the hill, no evidence was found in testing.

Some features, on the other hand, had not been predicted. When they were encountered, native consultants were brought in and, in certain cases, were able to offer probable explanations that could be further tested archaeologically. One such example was the girls' puberty pits. The consultants' explanation for these pits would never have occurred to me, as I assumed that such features would be well secluded from the village. The native explanation that they were kept close to the fort because of the condition of hostilities that prevailed when the fort was occupied, made good sense. On this basis, I was able to postulate differences between food storage pits and puberty pit structures and modify the excavation strategy to look for superstructure details like post moulds for the puberty huts, that would not be found in food cache pits, which were not supposed to be detectable from the surface of the ground.

There were some structures that were claimed to have existed on the site, but which had been destroyed subsequently. One example would be the evidence for fish weirs in the river, all traces of which have been washed away by subsequent floods. Nevertheless, clear oral statements were collected that weirs existed within the Parks Canada property and at another locality one kilometre up the river.

The structures of these weirs would have been very similar to the one that Louis Shotridge photographed fifteen miles further up the Kitwankul River from the Ta'awdsep, while on an expedition for the University of Pennsylvania Museum in 1918 (Fig. 69). He also recorded the basketry traps that went with this weir. Another basketry trap, possibly from a weir near the Ta'awdzep itself, was collected from one of the families related to the fort. This trap is said to be for deep water. It is hard to know whether this might be for a deep pool along the Kitwankul River, or on the Skeena near Kitwanga.

In understanding some of the native interpretations of archaeological structures, it was necessary to attempt actual reconstructions and to put the structures to use. This was particularly valuable for the sweat baths. In this case, a list of all of the materials used could be made, and each sub-activity area recorded, such as the fireplace to heat the rocks, which was discrete from the sweat lodge itself.

It was my intention to reconstruct a food storage pit, but in a projection of the cost, in both time and money, it was decided to postpone that for another time. Digging the pit would have been the easiest part; collecting the bark from four or five birch trees would have been somewhat more difficult, requiring permission of whoever owned the land on which the trees were growing on, to strip and therefore kill that number of trees. The most difficult part would have been accumulating enough dried food stuffs to simulate a woman's food store for a year, and leaving them in the pit long enough to test the results. Native consultants were able to describe

Figure 67
A fish weir on the Kitwankul River, fifteen miles upstream from the Kitwanga Fort. October 1, 1918. Louis Shotridge. Photo NMC 71-8442.

Figure 68
Gitksan youth with salmon trap for use with fish weir above. October 1, 1918. Louis Shotridge. Photo NMC 71-8566.

the delicious aromas that emanated from a freshly opened salmon cache pit.

A detailed description of the construction of the food storage pits was collected on tape. Even though these accounts are quite specific as to the actual construction of the pit, the idea of re-making one should not be abandoned. There are many details of the way the packages for the various types of food were wrapped and tied, and how the pit was disguised, once finished. Such details would only come out in a full-fledged reconstruction. Since food storage pits constitute the single most common structural feature at the Ta'awdzep, and at other prehistoric village sites in the region, and since they figure prominently among the causes of raiding and warfare, they should be understood and interpreted as fully as possible.

There are, of course, other kinds of storage pits, which could be anticipated at a site of this nature. One example is the kind of pit that is used for preparing "stink eggs." These are generally much smaller pits than those used for food storage. They are also carefully lined with birch bark and filled with fresh salmon roe. The pit is then re-sealed and left to ferment for several months. The technique is part of an approach to fish preservation by means of fermentation that is widespread in Asia, particularly Siberia, as well as on the Northwest Coast. It is related to the fermentation of Eulachon oil to make fish "grease" that was so essential in the development of the grease trails. This theme of food

preservation, involving the fermentation of fish oil and eggs, as well as the preservation of fish by drying and smoking, deserves major emphasis in the interpretation of this site.

Although they are not structures in the usual sense, trails across the park property were another type of feature on which a surprising amount of information was recovered. That section of the trail from the observation point on the highway to the western end of the hill, traversing operations 008 and 009, has been remarkably well preserved and should be safeguarded from future degradation. Once cleared of dense brush, it became all the more obvious how close the trail came to obliteration due to agricultural activities in the adjacent fields. The identity of the trail as the original one used by Ta'awdzep inhabitants would not have been nearly as conclusive, had it not been for the more than eighty food storage pits that flanked the trail on either side for virtually its full length. The trail has been seriously damaged at only one point, where the service road cuts through it, but this section could easily be restored.

The linking trail to the top of the hill and the fort itself was so obvious it almost escaped my attention. It runs directly between the main trail and the door of Nekt's house. I had initially concluded that trails to the top of the hill went up the gentle slopes on either end of the hill. Consequently, test excavations were laid out on the east end of the hill, at the position where a gate or entry way might be expected. No such evidence was found, and it became evident from the information in these tests (operation 009T) that the area had been a house structure (house 5). It is quite possible that this house had a trap door escape hatch, as did the houses that were built on platforms 1 to 3 on the hill.

Since house 5 was built mostly on stilts over the end of the hill, it is possible that it could also have had a trap door that functioned as a concealed entrance to the house. This was described in the oral traditions, where a trap door with dried deer hooves was suspended from it on cords.

The evidence for the palisade was the most elusive. The picture is fairly clear on the north slope of the hill, where the palisade had to be adjacent to the back wall of the house, in order to allow the trap door for houses 1 to 3 to function at all. On the south side of the hill excavations were concentrated on top of the hill. From the ridges of house platforms that emerged once the site was cleared of vegetation it initially appeared that the houses were smaller and fewer in number than was evident later. It was not, in fact, until the model was constructed from the house floor plans, that the size and density of structures on the hilltop became obvious. The palisade on the south side of the hill is almost certainly farther down the slope than was tested in the excavations reported here.

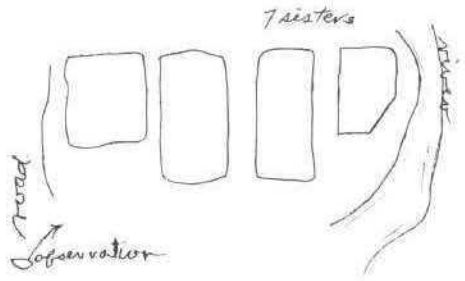
The arguments entertained, while planning the reconstruction of the fort in model form, are reported in the next section.

The main structures on the Ta'awdzep were, of course, the plank houses and it was these structures which received the most attention. Informants claimed variously, that there were three, four, five or six houses on the hilltop in Nekt's time. The people most familiar with the histories of the hill, particularly Chief Hlengwah, claimed there were five houses. Barbeau himself adopts this number as the most likely, when referring to the houses in the fort. I also favour this number, since there were five large, intact hearths, relatively equi-distant along the medial axis of the hill. These houses were entirely contained on their individual platforms, which had been terraced on the hilltop, while the ones at either end of the hill were built out over the edge, supported by posts.

The hearths of both of the "hanging houses" were nestled on the brink of the small triangular platforms, which anchored the two houses to the hilltop. It is probable that the hearths had been cribbed for support, particularly on the downhill slope. The floors of these houses would necessarily have been decked with cedar planks, to provide a level platform.

It is probable that houses 1 to 3 also had planks covering their floors, except for the hearth area, since there were large storage pits and hiding places that would only have been effective if the floors were covered by wide planks.

The floor of house 1 was probably the most elaborate in its construction, since the earth ramps and the corresponding sunken area around the hearth indicate that there were benches around the



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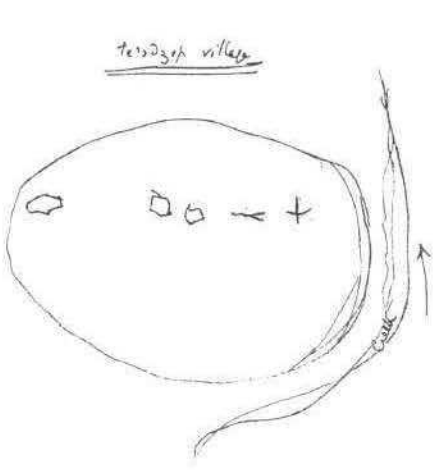

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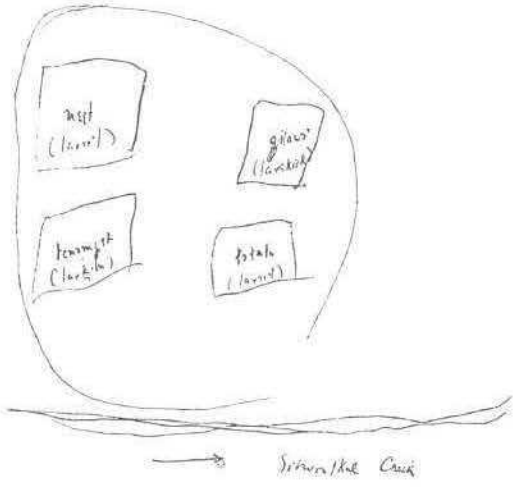

c.

Figure 69

Drawings of the houses on the Ta'awdzep by Chief Hlengwah 1925.
a. The orientation of this sketch is clearly marked. The irregular house lot on the eastern end is shown but no trace is given of the similar house on the opposite end.
b. This drawing with Barbeau's handwriting shows five marked areas, the number of houses he ascribed to the fort in Nekt's day.
c. Barbeau has indicated four chief's houses on this sketch map, that of Nekt and another Laxsel chief, Tenemget (Laxhibu) and Gilawo (Laxskek).

central pit. A wide platform at the rear of the house was likely partitioned off from the rest of the dwelling, as the compartment of the chief.

Informants identified house 1 as Nekt's house, but this poses something of a problem. On the one hand, it appears that Nekt would occupy the most elaborate structure in the fort, since he was the head warrior. However, he was out-ranked, in terms of status, by Chief Hlengwah (at least once the latter had moved to the fort). Nekt was also out-ranked by several other chiefs at the fort. Nevertheless, there appears to be a recognized principle in operation, that the war chief takes over exceptional privileges during times of conflict, and this was probably particularly true in the case of Nekt, whose reputation as a warrior has survived above any other.

There are fragmentary references to the identity of various houses on the hill, the order in which they were built and who inherited them. The social

aspects of the households is discussed in Appendix I.

Marius Barbeau questioned Jim Laknitz (Chief Hlengwah) on this topic in the mid-twenties and has left in his archives a number of sketches of the houses on Ta'awdzep, which are germane to this discussion and are therefore reproduced in (Fig. 69).

The structural members of the houses, from direct site evidence, were of red cedar. None of the support posts appeared to be very large, compared to later historic houses, but were in proportion to the relatively small size of the houses on the hill and the light cedar bark roofs that covered them.

According to the taped information of Jack and Willis Morgan, the first episode of building activity on the hill was a single structure. This was built as a defensive retreat during the Haida wars. In fact, the war never came to the fort, and it was eventually abandoned without ever being used. This structure was described as having two stories; the first story consisted of a cribwork of horizontal logs. Soil was piled up around this barricade to disguise the first story of the building. The informant who provided these details was Jack Morgan, who unfortunately is now deceased. No other native consultant has comparable information to that which he received directly from his grandfather, about the year 1900. Mr. Morgan's grandfather was probably born within the first quarter of the nineteenth century and may have actually lived in the fort, since he passed on a lot of detailed information about the episodes and structures of the Ta'awdzep at Kitwanga to his grandson.

References are made, in accounts from other groups on the North Coast, to double-storied houses used in warfare. These are usually regular plank houses that have had a floor added, to form an attic, where warriors can hide and surprise the enemy. In one such account, the invaders got their daggers stuck in the wooden dummies they took for sleeping people, and were slaughtered by the defenders.

There is some resemblance between the description of the house with the basement where the women and children could hide, and the remains of house 1, which cannot be dismissed without further

Figure 70
Two Kitwanga people standing in the central pit of Nekt's house, which is the most likely place for the double-floored structure mentioned in the legends. It was the first building on top of Ta'awdzep and was designed to protect the Kitwanga people from Haida invaders. (Photo by Marius Barbeau 1924. NMC 59723).

excavation. If the first storey of the Haida war house was, in fact, only a hiding place with room enough to crawl around (perhaps 50 cm), then the central pit of house 1 could have been floored over. This conforms to both the traditions and the physical evidence. The immediate objection to this concept is that the central hearth on the floor of the pit was in situ and had not collapsed from a floor, even a short distance above. This objection can be countered by postulating that the foundation is original, but that the final owner of house 1, possibly Nekt himself, removed the intermediate floor and converted it to a house pit becoming of a warrior-chief. The hearth excavated by the archaeological project could then be in its last position, on the ground, in the pit.

It was hoped that trench 2 would clarify this problem by revealing stratigraphic evidence for several building phases, on the back platform of the house. No such evidence materialized, although the post fragments found near the bottom of the trench, could be interpreted as belonging to an early construction phase of the house.

Two recommendations for further archaeological testing can be made at this point:

1) That the position of the palisade on the south side of the hill be determined by further testing (up to 10 m), downslope from the 1979 excavation.

2) That the wall ridges and interior pit of house 1 be carefully excavated for stratigraphic evidence that could determine the question of whether or not this was once the site of the single, fortified house built for the first Haida war as mentioned in the myth.

There was simply not the time available last summer, within the limited testing operation that had been planned, to solve these two significant problems. Finally, it should be noted here that there is no natural agency threatening this site that would suggest an urgency to the above recommendations beyond that which was set by requirements for this information by Parks Canada.

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APPENDIX I

Preliminary Statement on the Gitksan Villages and Chiefs Associated with the Kitwanga Fort National Historic Site

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This appendix is a preliminary statement on the various Gitksan villages and chiefs of the Kitwanga area associated with Kitwanga Ta'awdzep during the span of its occupation as a fortress.

It is preliminary because, in addition to possible errors by this writer, the research involved is based on information that is oral (in the form of tape recordings or transcriptions of narrations), or derived from oral traditions, which were transcribed by earlier researchers, such as W. Robinson (*Men of Medeek*), W. Beynon and M. Barbeau (unpublished field notes). As such, they are subject to the greater or lesser variations typical of unwritten accounts.

By means of introduction, affiliations of "phratry," (to use M. Barbeau's terminology in *Totem Poles of the Gitksan*) are very significant to the Gitksan Indians. The word refers to a kind of *federation of clans*, and there are four of them among the Gitksan:

1) Frog-Raven
2) Eagle
3) Wolf
4) Fireweed

Although the present-day villages of the Gitksan combine members of several of these four phratries, this was not always the case. There are indications that often a village comprised only one or two phratral groups, which developed out of family groupings. For example, field notes of W. Beynon, 1924, (informant Maggie Wells, Eagle, Kitwanga) when discussing the origins of her ancestor Ska'yeen mentions that there was "only one chief," Ligi'nihla, at Git'angat (near present-day Doreen on the Skeena River). As each phratry was headed by a chief, this indicates that there was only one phratry - in this instance, the Eagle phratry. Again from archival sources, this time field notes of M. Barbeau, (interviewing Jim Lagaxnits), Frog-Raven with interpretation by Alfred Sinclair, we read that "the ancient village" of Gitlusek (formerly just below Cedarvale) had "just one crest/phratry/in that village," namely Frog-Raven. The head-chief there was Wii Hlengwax. As for the Wolf "tribe," Skwilikstat, a former village several miles upstream on the Skeena River/Cedarvale is cited as being theirs (Stephen and Mrs. Morgan, Mrs. Morgan being of the Wolf tribe, 1924 field notes of M. Barbeau). Although similar information was not directly found regarding the Fireweed tribe of the Kitwanga area (there are only a few members there who have come relatively recently), the book *Men of Medeek*, by W. Robinson and W. Wright, describing the history of this tribe at Kitselas, gives similar information. Interestingly, it also corroborates the information given above for the other tribes.

Discussion about motivations for the various groups amalgamating will not be dealt with here, beyond a few brief comments. Despite the abundance of natural resources, they were not limitless, and conflict arose over competition for them. The reasons for co-operating, therefore, must have been equally strong. Increased needs for friendly social interactions were probably minor ones; regulations prohibiting marriage between people of the same phratry and requirements for defence may have been the major ones. It is in regard to the point about defence, that the Kitwanga Fort (Ta'awdzep) is of such interest.

After a 'deadly' revenge attack on his village by the Fireweeds of Kitselas, *Gok*, the leader at that time of the Eagles of the Kitwanga area, escaped to the bank of the Skeena River and

> "with a scattering of warriors he crossed to the other side. Up the valley of the Kitwancool River, they followed the trails, until three miles to the north they rallied on a small round hill to make their final stand against the foe....lights were seen in the four houses that sat on the summit. Here lived four families of the Totem of the Crow /Frog-Raven/."

In the end, despite the opportunity of fending off the attackers by means of the 'great logs' which were to be pushed down over the crest of the hill, *Gok* decided to pay ransom instead. And to this end, he 'borrowed buckskins' from the Frog-Raven people. Thus, collaboration could take the form either of combining forces for defence, or of sharing commodities which were valued for 'ransom' purposes. (*Men of Medeek* pp. 73-75)

From the Barbeau notes mentioned earlier, concerning the Frog-Raven tribe in the ancient village of Gitlusek, we are given a listing of the relative importance of the main chiefs, in order of

rank from the head chief down. They are as follows:

Wii Hlengwax

Nekt

Halus

Axgoot

Perhaps each of these chiefs originally had their own house on the Ta'awdzep. However, as other groups came to join them, they probably doubled up in some way, as varying accounts give the maximum number of houses on the hill as six; on the other hand, some say five, others four.

Subdivisions within individual groups (headed by a chief), and a different attitude to recording the time frame of events by the Gitksan, have presented difficulties in sorting out just who may have been living on the Kitwanga Fort Hill. For example, one person gives the names of the four chiefs as being: Nekt, and Hlohlatxw (Frog-Raven), Gilawo' (Eagle) and Tenemget (Wolf) (Barbeau field notes, Jim Lagaxnits Frog-Raven chief).

Regarding Nekt, there is general agreement that a chief of this name lived on the hill. In fact, most accounts claim that it was he who fortified it for its presumed second occupation (there may have been other prehistoric ones). The difficulty surrounding him is that there are sufficient variations in the accounts of his place of origin and exploits, plus wide variation as to possible dates of occurrence, that Barbeau has used the term 'semi-historical' to describe him. It is outside the scope of this appendix to sort out the controversies between villages and phratries, or to enter into speculations concerning Nekt. Nevertheless, it may be noted that one informant, Mrs. A. Sutton, of Cedarvale, calls Kitwanga Fort hill 'ta'awdzeps Nekt', i.e. Nekt's fortress.

As for the other names mentioned, Hlohlatxw, the other Frog-Raven, it is not familiar to either Agnes Sutton, nor Fred Johnson, both of the Frog-Raven phratry, though of different branches. Yet Barbeau cites it as being a name of the house of Lalt (Frog-Raven), of which Fred Johnson is now the present holder! Perhaps over time, some of the names in 'houses' fall out of use. A further complication arises out of the fact that some families lived together in one house on the hill, only to separate after leaving it. For some, this involved going back to their original state; for others, it meant adaptation to an increase in numbers.

For example, Barbeau noted that for the Wolf group, "There was only one house there. But after living on tahodzep, there were two subdivisions: Hlots and Tenemget." (Axti'ix, another main Wolf chief, is not mentioned directly.) Similarly for the Frog-Ravens, at least at one point, Axgoot had separated from Hlengwax and Halus. "These three were only one house on te'odzep."

An interesting feature of the fortifications is that of a trap door. Some accounts mention that one of the houses was thus protected. It is not clear as to the exact name of the chief at that time, (Frog-Raven family), nor to the name of the family group. The chief's name may be Yaxyak or Txahaphapxw. If the former, the family name is also Yaxyak (which had at one time moved to Kitwancool); if the latter, to the family of Lalt. Further, another name is connected with that of Yaxyak (which means 'hanging down'). It is Doxansxw, mentioned both by Willis Morgan (Tape 1, Side 1) and Leonard Bright. The latter translated the name as 'braced something, to hold something in the ground.' Both of these names may refer to the fact that at least one of the houses on the hill was built partially on stilt-like structures, due to limited space.

As for the Eagle tribe, Gok, Skayeen, Tewalasxw and Ligi'nihla are all names more commonly mentioned in connection with the Ta'awdzep than the name mentioned above, 'Gilawo.' There is only one reference to any of the Fireweed phratry being on the hill (Willis Morgan, Tape 3, Side 1). I do not consider this to be sufficient evidence to make an argument to that effect, and I therefore consider that (unless in very recent time after contact with "Euro-Canadians") they were not represented on the Kitwanga Ta'awdzep.

As there is no agreement as to the number of houses on the Ta'awdzep, or the composition of any one family changed from year to year (especially as to which chief took the headship) it seems to me fruitless to attempt to comment further along this line. It is more appropriate, perhaps, to again point out that the three tribes, which had, over the years, migrated into the area of Kitwanga from their respective ancestral villages, were all, at one time or another, living in houses on the Ta'awdzep. The

fourth tribe, the Fireweed, which was less evident in the local history, was not.

Another aspect of interest, however, is the nature of the habitations. Some people indicated that only the chiefs (and presumably their warriors) lived there, and that the rest of the people lived in safer areas. Others claim that, although the hill looks small, 'everyone' lived there. Perhaps there is confusion over the fact that the surrounding flat areas may have been used at least for fishing and berrying camps in the summer. Interestingly, while Barbeau, in his book on the totem poles of the Gitksan, mentions Txa skabaxs, a Frog-Raven chief who joined Hlengwax's house on the Ta'awdzep, (and subsequently moved to Kitsegyukla), Fred Johnson (on a tape of June 79), mentions him as living on the 'flat part.' It would seem that only much more extensive archaeological studies than were possible in this year's project, would help sort out such questions.

A more detailed look at the relationship of chiefs with the Kitwanga Fort historic site, including further references and an attempt at linking the chiefs' names with the English names of the chiefs, both past and present, will be contained in a report by the same writer for Western Region, Historic Parks and Sites, Parks Canada, to be completed by the end of March, 1980.

APPENDIX II

Preliminary Report on
Animal Remains from the
Kitwanga Fort National Historic Site

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December 20, 1979

Introduction

Kitwanga Fort National Historic Site, British Columbia, is situated in the valley of the Kitwanga River, a tributary of the Skeena. This mountainous region is the territory of the Gitksan Indians of northern British Columbia. The site itself is something of a mystery, but seems to consist of an early historic period occupation from about 1795 to 1835 as well as a smaller late prehistoric occupation. The fort was originally a refuge from attack by the Skidegate Haida from the Queen Charlotte Islands. It was finally abandoned about 1835 with the establishment of a Hudson's Bay Company post at Port Simpson and the introduction of rifles to the area, which made the fort indefensible.

The site was excavated in 1979 by Dr. G.F. MacDonald, Senior Archaeologist, National Museum of Man, for Parks Canada. Animal remains were transferred to the Zooarchaeological Identification Centre (ZIC) for analysis, after the 1979 field season.

Most bone found at Kitwanga was recovered from hearths in three of the five house areas. Bone material was almost all calcined and, in some places, had fused into cement-like blocks, which were collected intact. The sample sent to ZIC for analysis consists of material obtained by general excavation and screening but does not include the blocks.

This preliminary analysis includes description and identification of the bones submitted, as well as minimum numbers of individuals (MNI) calculated for hearth material in houses 1, 2 and 3. A few comments have also been made, but this report is in no way intended to be a full faunal analysis. Future data manipulation and research may follow submission of this report, if the initial results seem promising.

Methods

All bone are listed on ZIC data sheets, where they are described as fully as possible. Because a slightly 'shorthand' method of recording was used, the reader may have to refer to the list of abbreviations to clarify certain points.

Table 1 provides a summary of all identified Kitwanga bone. A detailed list of site bone in each bag of vial appears in Table 6*. For convenience, bags and vials containing only unidentifiable fragments were removed from Table 6 and appear separately as Table 4*.

A fragments summary and MNI for hearths of houses 1 through 3 are presented in Table 2. Table 3* is a detailed list of all proveniences used in preparing Table 2. Table 5* gives a list, by bag or vial, of all fragments used in preparation of Tables 2 and 3. MNI was calculated using all available information rather than a simple element count. However, the fragmentary and calcined nature of the faunal remains meant that little subsidiary data could be obtained. The unit of MNI calculation is the house hearth; referring to Table 3, all bones in proveniences listed under operation 1, were combined to produce the house 1 MNI, operation 2 proveniences were grouped for the house 2 MNI and operation 3 proveniences for the house 3 MNI.

Faunal remains were identified using the skeletal reference collection of the ZIC.

Discussion of such ecological matters as species ranges and availability, habitat preferences, etc. have deliberately been avoided in this preliminary report because of time limitations.

*** NOTE:** Tables 3, 4, 5 and 6 are not included in this appendix.

Abbreviations used in bone data recording - Kitwanga, British Columbia:

f	fragment
H	hare
C	calcined
Bv	beaver
B	burned (some original bone colour remaining) not burned or calcined
Pc	porcupine
MM	medium mammal
MLM	medium to large mammal
P	proximal
UM	unidentified mammal (no size estimate)
D	distal
UF	unidentified fish of ulna
epi	epiphysis
MB	medium bird
a. pr.	anconeal process
caud.	caudal
CU	class uncertain
abd.	abdominal

C. pr.	coronoid process of ulna
phal.	phalanx
pmx	premaxilla
T. c.	central tarsal
mx-	maxilla
T	tarsal
mand	mandible
tmt	tarsometatarsus
cmc	carpometacarpus
tt	tibiotarsus
mc	metacarpal
mt	metatarsal

The Kitwanga Fauna

At Kitwanga, the faunal list is small because of the fragmentary and calcined nature of the bone material. Nonetheless, at least 13 vertebrate species are present. Whereas some identifications have been made to the species level, others are more general and bones could only be assigned to a group of species, subfamily or family. A brief discussion of the rationale behind the identifications is appropriate here.

Mammals comprise the largest group of identified fragments. Six species are definitely present: hare (*Lepus americanus*), hoary marmot (*Marmota caligata*), beaver (*Castor canadensis*), porcupine (*Erethizon dorsatum*), marten (*Martes americanus*) and cow (*Bos taurus*). The marmot was identified on the basis of a single relatively complete unburned bone from an animal of large size, thus excluding the smaller woodchuck (*Marmota monax*). Unfortunately, all other *Marmota* fragments are calcined so that their original size cannot be determined, and they have been lumped in a composite Woodchuck/Marmot category.

Bear bones are represented by foot elements. Since both the black bear (*Ursus americanus*) and grizzly (*Ursus arctos*) occur in the region, identification can proceed no further than genus (*Ursus*). One piece of bone from a large rodent was consigned to a composite Beaver/Porcupine category.

An unburned loon cervical vertebra is within the size range of the Artic loon (*Gavia arctica*) and a dabbling duck carpometacarpus fragment (also unburned) may be from either a small mallard (*Anas platyrhynchos*) or a large pintail (*Anas acuta*). One eagle bone represents either a bald (*Haliaeetus leucophalus*) or golden (*Aquila chrysaetos*) eagle, since both general range through the area, and the element is not diagnostic.

As many as seven members of the grouse/ptarmigan family, Tetraonidae, may occur in the Kitwanga vicinity. Due to the broken and calcined nature of most tetraonid fragments from the site as well as to problems of identification between species, all were assigned to a single general category.

Tetraonids in the area probably include the blue grouse (*Dendragapus obscurus*), spruce grouse (*Canachites canadensis*), ruffed grouse (*Bonasa umbellus*), sharp-tailed grouse (*Pediocetes phasianellus*) and as many as three ptarmigan: willow ptarmigan (*Lagopus, lagopus*), rock ptarmigan (*Lagopus mutus*) and white-tailed ptarmigan (*Lagopus leucurus*). Measurements of two unburned grouse/ptarmigan elements in the faunal collection indicate that one or more of the smaller species is present, not the larger blue or sharp-tailed grouse. However, remains of these species could be present in the calcined, unmeasurable material.

Fish remains at Kitwanga consist primarily of vertebrae, whole or fragmentary. Nearly all these can be assigned to the subfamily Salmoninae, represented in the site area by various salmons (*Oncorhychus*) and trout (*Salmo and Salvelinus*). A single vertebra seems to be from a whitefish, subfamily Coregoninae (probably *Coregonus clupeaformis* or *Prosopium williamsoni*). The faunal remains contain no identifiable cranial elements, but five pectoral and pelvic girdle bones are present and recognizable as salmon (*Oncorhynchus*).

Unidentifiable bone from a site is always worth examining, for it can often yield information concerning animal size or at least vertebrate class. In this instance, remains are usually so fragmentary that much size information has been lost. Also, a site that contains both hare and bird bone in fair quantities, makes separation by class difficult, for unidentifiable hare fragments can be mistaken for bird bone and vice versa. About all that can be said of the unidentifiable component at Kitwanga is that it seems to reflect the composition of the identifiable bone component.

Remarks

A few items of interest are noted here to stimulate further discussion and thought.

Medullary bone, a granular bony material found in long bones of female birds during the breeding season, was noted in three specimens: an ulna and a tibiotarsus fragment from #32, identified as grouse/ptarmigan, and an unidentified bird radius fragment from #213. This indicates that at least some birds were captured in spring.

All 45 bear bones are foot elements. This probably reflects the fact that only these small elements of the bear skeleton survived cultural treatment relatively intact and identifiable. However, one cannot disprove the alternate theory that only bear feet (as amulets or in pelts?) were brought to the site.

Butchering marks or other types of cuts are difficult to see on calcined bone, as are signs of artifact production. Only three fragments are modified. A calcined fragment less than 20 mm long (#533) has a slight polish, which may be artificial. An unburned hare innominate (#536) contains two fine cuts medially on the pubis, but function of such cuts is unclear. A cow phalanx (#1B) shows two crosswise cuts dorsally and a single cut ventrally at the proximal end, all perhaps resulting from skinning activity.

Some bone at the site has been chewed by carnivores, but it is difficult to estimate just how much might have been chewed, since diagnostic chew marks are not usually visible on calcined bone.

Table 1.
Summary of all identified bone from the Kitwanga site

Taxon		Pieces
Hare		456
Woodchuck/Marmot		5
Marmot		1
Beaver		45
Porcupine		16
Beaver/Porcupine		1
Bear		45
Marten		1
Cow		2
	TOTAL	**572**
Artic loon		1
Mallard/Pintail		1
Eagle		1
Grouse/Ptarmigan		37
	TOTAL	**40**
Oncorhynchus (Salmon)		5
Salmoninae (Salmon and Trout subfamily)		354
Coregoninae (Whitefish subfamily)		1
	TOTAL	**362***
	GRAND TOTAL	**974***

* These totals include two Salmonidae vertebrae not otherwise listed. The vertebrae could belong to either salmon, trout or whitefish.

Table 2.
Summary of Identified Bones and Minimum Number of Individuals (MNI) from Hearths at Kitwanga, British Columbia

	House 1		House 2		House 3	
Taxon	**Pieces**	**MNI**	**Pieces**	**MNI**	**Pieces**	**MNI**
Hare	191	12	30	2	5	1
Woodchuck/Marmot	1	1	–	–	1	1
Beaver	8	2	2	1	6	2
Porcupine	4	1	–	–	–	–
Bear	6	1	3	2	4	1
Total	**210**	**17**	**35**	**5**	**16**	**5**
Eagle	1	1	1	–	–	–
Grouse/Ptarmigan	14	2	–	–	–	–
Total	**15**	**3**	–	–	–	–
Oncorhynchus (Salmon)	–	–	1	1	–	–
Salmoninae (Salmon and Trout subfamily)	110	4	39	1	11	3
Coregoninae (Whitefish subfamily)	1	1	–	–	–	–
Salmonidae (Salmon, Trout and Whitefish family)	1	–	–	–	1	–
Total	**112**	**5**	**40**	**2**	**12**	**3**

Appendix III

Wood and Charcoal
Sample Analysis for the
Kitwanga Fort National Historic Site

Dendrochronological analysis by L.A. Jozsa,
M.L. Parker and P.A. Bramhall
Species identification by
R.M. Kellogg and S.Rowe.

Western Forest Products Laboratory
Vancouver

Foreword

The objective of Contract WR 156-79 (Wood Sample Analysis), between Forintek Canada Corp. and Parks Canada, Western Region, is to identify wood species and conduct dendrochronological analyses on wood and charcoal samples from the Kitwanga National Historic Site, Battle Hill.

To fulfil this obligation, tentative master tree-ring chronologies were built for western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) and western red cedar (*Thuja plicata* Donn) living-trees from the Kitwanga area. These chronologies were used for crossdating with archaeological specimens.

Wood and Charcoal Sample Analysis for the Kitwanga Fort National Historic Site

Dendrochronological analysis by
L.A. Jozsa, M.L, Parker, P.A. Bramhall.
Species identification by R.M. Kellogg
and S. Rowe.

Conclusions

1. Identification of archaeological samples of charcoal revealed a predominance of lodgepole pine (56.5%) followed by western red cedar (18.0%) and poplar species (16.8%). The remaining samples (8.6%) were represented by species of spruce, alder, willow, birch and maple.

2. A noteworthy observation is that no western hemlock was found in the charcoal specimens even though this tree species is a very dominant component of the living forest in the Kitwanga area.

3. Visual cross-dating between living trees and archaeological charcoal samples was not possible.

4. The archaeological specimens show more sensitive tree-ring patterns (much year-to-year variation) than do the very complacent living trees (little year-to-year variation).

5. One western red cedar archaeological sample was dated in the period of 1680-1749 by a special computerized dating technique.

6. Dating was hindered by two facts. First, the tree samples available from the logging site were not really old enough; i.e., that the charcoal samples may have come from trees that predated the ones from which the reference specimens were collected. Second, the archaeological samples were of too poor quality; i.e., had an insufficient number of rings or had uneven grain orientation.

Recommendations

1. Living trees, 400-500 years of age, should be sampled in order to ensure that the archaeological samples do not predate the living tree chronology.

2. It also would be desirable to find old lodgepole pine trees, not only because this species was the most common in the archaeological collection, but also because of high sensitivity of the charcoal annual ring patterns.

Introduction

Dendrochronological studies were conducted in the Kitwanga area for several purposes:

1. To identify and determine the composition of genera and tree species of the woody archaeological material.

2. To attempt to date the archaeological tree-ring samples excavated from the Kitwanga Fort National Historic Site (Battle Hill).

3. To build living-tree chronologies that will be useful for dating, dendroclimatic and other environmental studies.

4. To evaluate the dendrochronological quality of several species of trees in the area.

Experimental

A. Living trees

Samples used in this pilot study were taken from 12 western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) and 12 western red cedar (*Thuja plicata* Donn) disks. Cross-sectional disks were cut from freshly felled logs in the Kitwanga area in mid-October, after the 1979 growing season.

Because of the limited time and funds available for this study, four disks were selected for each of

western hemlock and western red cedar, using age (number of annual rings) and lack of decay as the main selection criteria. Two radii were cut from each disk, 16 in all for the two species, to be used for X-ray analysis. These radial strips were glued between two mounting sticks and sawn to transverse sections of a uniform 1.96mm thickness. An in-motion X-ray scanning machine was used to make radiographs of the uniformly surfaced radial strips. Each of the eight western red cedar radii was scanned on a computerized densitometer from the first ring from the pith to the last complete ring on the sample, 1979. For western hemlock, one tree had to be eliminated after being X-rayed, because of the difficulty in cross-dating the two radii from the same disk. During the densitometer scanning, one hemlock radius was aborted because of parity error on the magnetic tape, resulting in five satisfactory radial strips (three trees) being incorporated into the western hemlock summary chronology. All the eight radial scans (four trees) were compiled for the western red cedar summary chronology.

The general techniques in X-ray densitometry used to derive the ring-width and ring-density data have been described by Parker et al. (1977).

B. Archaeological material

Identification of 161 samples of wood charcoal from the Battle Hill site was carried out. In many cases a given sample contained multiple fragments of charcoal. Several fragments might have been examined in making the identification, but no effort was made to systematically examine them all.

Each one of the archaeological samples was carefully examined (in a non-destructive manner) and assessed for dendrochronological potential. Most of the samples in the collection were charcoal and charred wood. Only samples of softwood origin were considered because of the inherent problems with hardwoods. The most serious drawback was found to be the limited number of annual rings (fewer than 10) and the very poor demarcation between those rings on the hardwood samples.

Softwood charcoal samples with 15 or more annual rings were set aside, even though the generally accepted standard for a lower limit is about 50 rings. The reason for this criterion is that short annual ring series (especially the complacent ones) tend to produce inconclusive chance-related multiple cross-dates.

The hand-picked candidate specimens were cut on a band saw to a uniform 2.5-mm thickness. This dimension was found to be a good compromise for a thickness that would reduce the effect of parallax, and at the same time, provide sufficient strength to reduce fragmentation. Adhesive tape was used to minimize crumbling and fragmentation. Radiographs were made by the in-motion technique described by Parker and Jozsa (1973). Grain angle deviations were measured for each sample and compensated for by tilting the X-ray generator head to ensure optimum image sharpness.

C. Cross-dating living trees

A low-power, binocular microscope and a light table were used to examine radiographs for clarity and for annual-ring patterns. Each sample was examined in this manner, and it was ensured that each annual ring in a sample corresponded to the true annual increment. The matching of ring-width and ring-density patterns, or cross-dating, is usually started with the last completely formed annual ring. In the Kitwanga living tree material, 1979 was the last complete ring.

D. Chronology building

In building a master chronology, the ring widths and densities of all the sample trees are combined on a year-to-year basis into a single average for each parameter in order to minimize variations found in individual trees.

Before this summarizing can be done, however, each series must be standardized to remove growth trends due to age and tree vigor.

This was accomplished by using the Digital Filter Index program (Parker 1970) that fits a trend line to approximate the expected growth rate. Then the actual ring-width (or density) for each year was divided by the weighted running mean value for ring width (or density) to obtain an index value reference. The filtered index values derived by this technique accentuate year-to-year variations and permit analysis of the extremely complacent tree-ring material such as that found in the Kitwanga area. Statistics such as mean sensitivity, standard deviations and a number of other values, are

calculated by this program for the purpose of evaluating the quality of the tree-ring series.

E. Cross-dating archaeological specimens

Cross-dating is the method employed to date specimens of wood or charcoal of unknown age. The patterns of narrow and wide rings or low and high density late wood bands in such a specimen are compared with patterns of ring series of other trees in the region (master chronology).

If the specimen came from a site near the trees used in building the master chronology is of sufficient quality and was contemporaneous with the known and dated ring sequences, the patterns will match at some point and the specimen can be dated. Usually a minimum of 50 years is necessary for cross-dating to be reliable. The problem with shorter series, especially when dealing with complacent tree-ring records, is the possibility of accidental or "chance" fits.

With one exception, the Battle Hill charcoal material has to be classified as poor quality for definitive cross-dating.

F. Shifting Unit Dating Program

The Shifting Unit Dating Program (SUDP) was designed to detect cross-dating between chronologies that is not apparent by visual comparison of samples or plots. The SUDP uses computer techniques to cross-date tree-ring series by cross correlation analysis.

A portion (unit length) of an undated tree-ring series is correlated with a dated master tree-ring series in all possible positions. The positions and the correlations of the three best matches between the unit and the master series are recorded.

The correlation coefficient values derived by this procedure indicate not only the number of cases of agreement and disagreement between variables, but also the relative degree of correspondence.

Results obtained by these statistics were cross-checked by broken-line plot comparisons of master and undated tree ring series.

Results and Discussion

The study area, shown in Figure 1, is classified as Coastal Western Hemlock by Krajina, with approximately 30 inches of annual precipitation.

Both western red cedar and western hemlock living trees showed very little annual variation in ring width or density from year to year, resulting in a highly complacent chronology from 1670 to 1979, and 1703 to 1979 respectively, making cross-dating difficult. This lack of sensitivity means that the trees were growing in an environment where conditions of sufficient moisture and proper temperature were present during the growing season. This also results in a 'weak climatic signal' for this particular site. Figure 2 illustrates the quality of living-tree annual ring patterns for Kitwanga.

The inner-most rings (pith years) for the oldest collected western hemlock and western red cedar trees are 1698 and 1660 respectively. Tree numbers, ages and intervals scanned are shown in Table I.

The results of the archaeological sample identification are presented in Table II. Species abbreviations are those based on botanical nomenclature as proposed by R.J. Day of the University of Toronto. A key to the abbreviations follows Table II.

For those samples other than lodgepole pine and western red cedar, identification only to the genus level was possible. There is more than one species of each of these genera indigenous to the Kitwanga area and these are not separable on the basis of their wood anatomy.

For the most part, the fragments within a sample appeared to be from the same species. A few cases will be noted where two species were found within one sample. It is highly probable that a more thorough examination would reveal other samples containing multiple species. The identified samples were distributed as follows:

Sample Identification	Number of samples	% of total identified
Lodgepole pine	91	56.5
Western red cedar	29	18.0
Poplar or cottonwood	27	16.8
Spruce	7	4.3
Alder	3	1.9
Willow	2	1.2
Birch	1	0.6
Maple	1	0.6
Total	**161**	**100**

be a fairly major undertaking. The soil-like samples were, in general, not identified due to the time restraint. An initial inspection of a few of these samples revealed that any wood present was in the form of highly deteriorated, very small fragments. It might be possible to sift these samples and, with careful work, make an identification, if it were important to the analysis of the site. In addition, there were approximately 33 samples in which no attempt at identification was made because of the time restraint.

It is noteworthy that no western hemlock was found in the archaeological collection since this tree species is a dominant component of the living forest in the Kitwanga area.

Charcoal samples with 15 or more annual rings were earmarked for dendrochronological analysis, even though the generally accepted standard for a lower limit for ring width analysis is about 50 rings. Thirty-two samples were found by this selection process, 15 western red cedar and 17 lodgepole pine (Fig. 3). Of these, only 16 specimens produced acceptable radiographs for densitometer scanning.

Archaeological charcoal samples, on the whole, appear to be more sensitive (much year-to-year variation) in both ring-width and maximum-ring-density pattern, than do the living trees. This indicates there is variation in site quality in the Kitwanga area. For this reason, the old, living trees should be sampled from sites that show marked annual variation in these parameters. Such a site will have well-draining, porous soil with rock outcrops and a south-facing slope of about 45 degree angle. Such a microsite will benefit from maximum solar radiation input the year round, and the hydrological activity (runoff, evaporation, snow, flee periods, local wind etc.) will result also in a more stressful growing season.

It is also evident in Figure 3 that the western red cedar charcoal fragments originate from mature, large trees that have ring boundaries with very slight curvature, whereas the lodgepole pine samples have ring boundaries with pronounced curvature, indicating the close proximity of the pith (small stems or blanches).

The four individual western red cedar, living-tree, filtered index chronologies, for ring-width and maximum ring-density, are shown in Figure 4 and Figure 5 respectively. Growth pattern variations for individual trees can be seen clearly for both tree-ring variables. For ring width, in Figure 4, a large portion of the inconsistencies (which are related to non-climatic factors) falls between 1670 and 1757, the juvenile wood part of the radii. Growth pattern, which is associated with climatic variation, shows up in this type of broken-line plot as a reinforcing signal (i.e., when averages are made, these signals are retained and result in marker years). The following dates show this quality in the ring-width pattern: 1727, 1750, 1758, 1771, 1790-1805, 1824, 1840-41, 1870-83 (in both narrow and wide ring patterns), 1886, 1892, 1916-21, 1941-47 and 1967 to 1969.

For maximum ring-density, the first good marker year is 1768, approximately 70 ring-years from the pith. Other good marker years are: 1795, 1801-2, 1810, 1849, 1893-96, 1917-19 and 1943. By comparing the two variables in Figures 4 and 5, it is evident that the maximum density signal is more definitive than the ring width signal. There is less variation, not only generally, but especially in the marker years.

Western hemlock master chronologies were also built for studying the response function of this species. Unfortunately, the trees were too young for cross-dating with the archaeological material.

A number of specimens must be examined and cross-dated from any given site to ensure that no inconsistency appears. In addition, the average of replicated measurements from a large number of trees, provides the best chronology, because the growth variation that is associated with climatic variation, which is common to all trees in a given area, is retained when such averages are made. A large portion of the effects of non-climatic factors, which differ among individuals and from site to site, is minimized by the averaging process. Such a chronology was available for the Kitimat area, approximately 125 km south of Kitwanga.

Kitwanga living-tree master chronologies were cross-dated with Kitimat in order to evaluate the potential of using an existing long chronology from the general area. Although matches were made between both western hemlock and western red cedar for the two sites, the Kitimat master chronology was not adequate to date short series of Kitwanga archaeological material. The Shifting Unit Dating Program was used with unit length of 150 years, for cross-dating the two sites.

Western red cedar charcoal sample No. 111-1 (with 70 annual rings) and No.110-1 (with 40 annual rings) cross-dated with one another visually and by the SUDP. The quality of agreement is shown graphically in Figure 6. Positive radiographic images of the two samples are also included in the illustration, to show annual ring detail. The maximum density pattern of No. 110-1 is of poor quality because of the blurred image, hence the poor agreement on the broken-line plot for this variable.

Sample No. 111-1 also cross-dated with the living, western red cedar, maximum density chronology by the SDUP in the period of 1680-1749. The results of the cross-dating procedure by SUDP is given in Table III and the broken-line plot is shown (Fig.7).

Of the 70 annual rings (undated series), 50 years were designated for the unit length. Successive 50-year units were correlated with the master chronology at all possible locations until the entire undated series (21 separate runs) had been matched with the entire dated interval from 1670 to 1969. The validity of cross-dating was evaluated then by the sequential placement of the 50-year units in Column B and A-B and the values of the correlation coefficients.

Because of little year-to-year variation in the annual ring width pattern and the juvenile nature of this part of the living trees, the ring width variable produced inconclusive results for sample No. 111-1.

In addition to the above match by the SUDP, many other unsuccessful runs were made by cross correlating both ring width and maximum density components of undated archaeological samples with the Kitwanga and Kitimat western hemlock and western red cedar master series. Two possible reasons why no conclusive cross-dating was produced through the use of SUDP are that either archaeological samples predate living-tree chronologies, or the samples had an insufficient number of annual rings or poor resolution.

Work with this complacent tree-ring material from the Kitwanga area indicates that maximum density is superior to ring-width pattern for cross-dating purposes. It also can be concluded that dating of archaeological tree-ring samples is possible, but study samples of higher quality, both archaeological and living tree should be sought in the future in the Kitwanga area.

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List of Illustrations and Tables

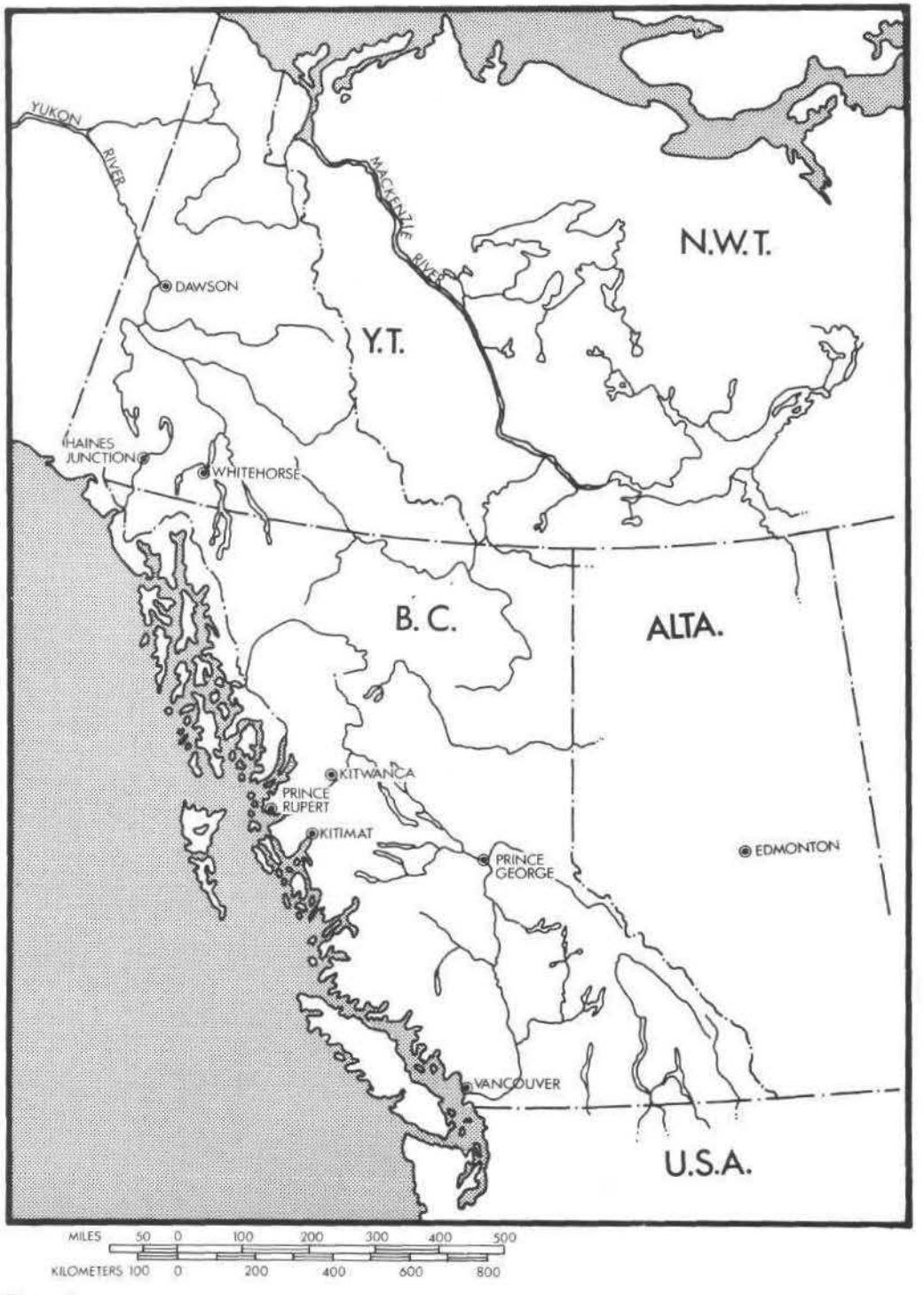

Figure 1
Location of study area, Kitwanga, B.C.

TABLE I
List of living trees used in master chronology building

Tree number and radius	Pith-year	Last complete ring-year	Age yrs.	Interval scanned
Species: Western Hemlock				
1a	1701	1979	279	1703-1979
1b	1701	1979		1706-1979
3a	1720	1979	260	1721-1979
3b	1720	1979		1722-1979**
8a*	1698	1979	282	1800-1979
8b	1698	1979		1720-1979
Species: Western Red Cedar				
14a	1685	1979	2945	1686-1979
14b	1685	1979		1686-1979
16a	1685	1979	295	1701-1979
16b	1685	1979		1800-1979
20a*	1660	1979	320	1680-1979
20b	1660	1979		1670-1979
21a*	1713	1979	267	1760-1979
21b	1713	1979		1726-1979

*Oldest trees in collection.
**Data lost because of parity error on magnetic tape.

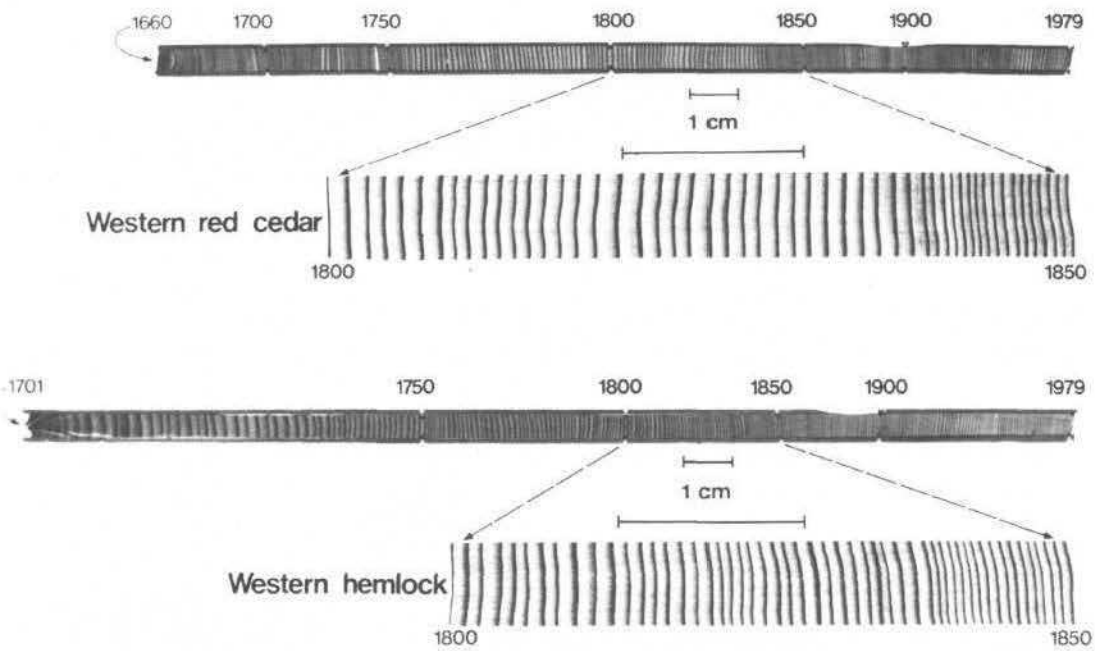

Figure 2
Living-tree annual ring patterns in the Kitwanga area.

TABLE II - Archaeological sample identification

Artifact No.	Identification	Artifact No.	Identification
1	PNc-	46	PO
1A	THp	47	PI
2	PO	48	PO
3	PNc-	49	PI
4	PO	50	PNc-
5		51	No ID
8a	PNc-	52	PI
9	PO	55	PNc-
10	PNc- + THp	56	PNc-
11	PNc-	57	PNc-
13	PO	58	PO
14	PO	59	PO
16	PO	60	PNc-
17	PNc-	61	No sample in bag
18	PO		
19	PNc-	62	PNc-
20	AL	63	PNc-
21	No ID	64	PNc-
22	B	65	THp
23	SA + THp	66A	PNc-
25A	PO	66B	PNc-
26	PNc-	67	PNc-
27	PNc-	68	PNc-
28	PNc-	69	PO
29	AL	70	PO
30	PO	71	PNc-
31	PNc-	72	PNc-
32	PNc-	73	THp
33	PNc-	74	THp
34	THp	75	PO
35	PNc-	76	PO
36	PNc-	77	PNc-
37	THp	78	PNc-
38	PNc-	79	PNc-
39	PNc-	80	PNc-
40	AC	81	PO + THp
41	PNc-	82	PNc-
42	PNc-	83	THp
43	PNc-	84	PO
44	PI	85	No ID
45	PNc-	86	PNc-

Artifact No.	Identification
87	PO
88	PNc-
89	PNc-
90	PNc- + PO
91	PNc-
92	THp
93	PNc-
94	PNc-
95	PNc-
96	PNc-
97	PNc-
98	PI
99	THp
100	PNc-
101	PNc-
102	PNc-
103	PNc-
104	No ID
105	No ID
106	PNc-
107	PNc-
108	No ID
109	THp
110	PNc- + THp
111	THp
112	PO
113	PNc-
114	PNc-
115	THp
116	PNc-
117	PNc-
118	PNc-
119	PO
120	PNc-
121	No ID
122	No ID
123	PO
124	No ID
127	No ID
129	No ID
130	No ID
131	No ID
132	No ID
133	No ID
134	No ID
135	AL
136	PNc-
137	PO
138	PO
120	No ID
356	No ID
456	No ID

Sample Identification Key

THp = *Thuja plicata* - western red cedar

PNc- = *Pinus contorta* var. *latifolia* - lodgepole pine

PO = *Populus* sp. - could be black cottonwood or trembling aspen

AL = *Alnus* sp. - could be any of four alder species

B = *Betula* sp. - could be any of two birch species

SA = *Salix* sp. - could be any of four or more willow species

AC = *Acer* sp. - probably *Acer glabrum* var. *douglasii*, Douglas maple, because of the geographic location.

PI = Picea sp. - could be any of two spruce species

No ID = No identification possible

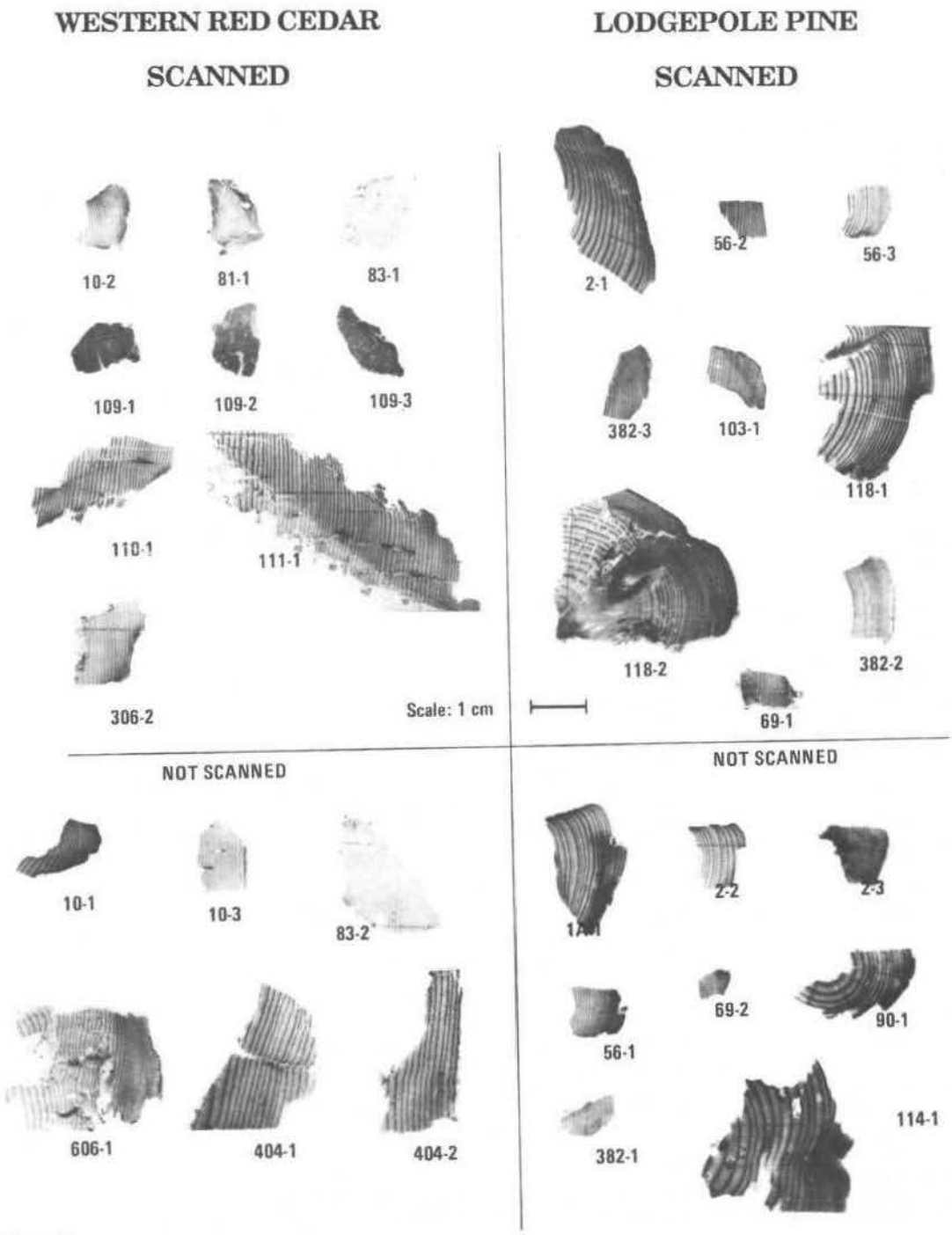

Figure 3
Archaeological charcoal samples.

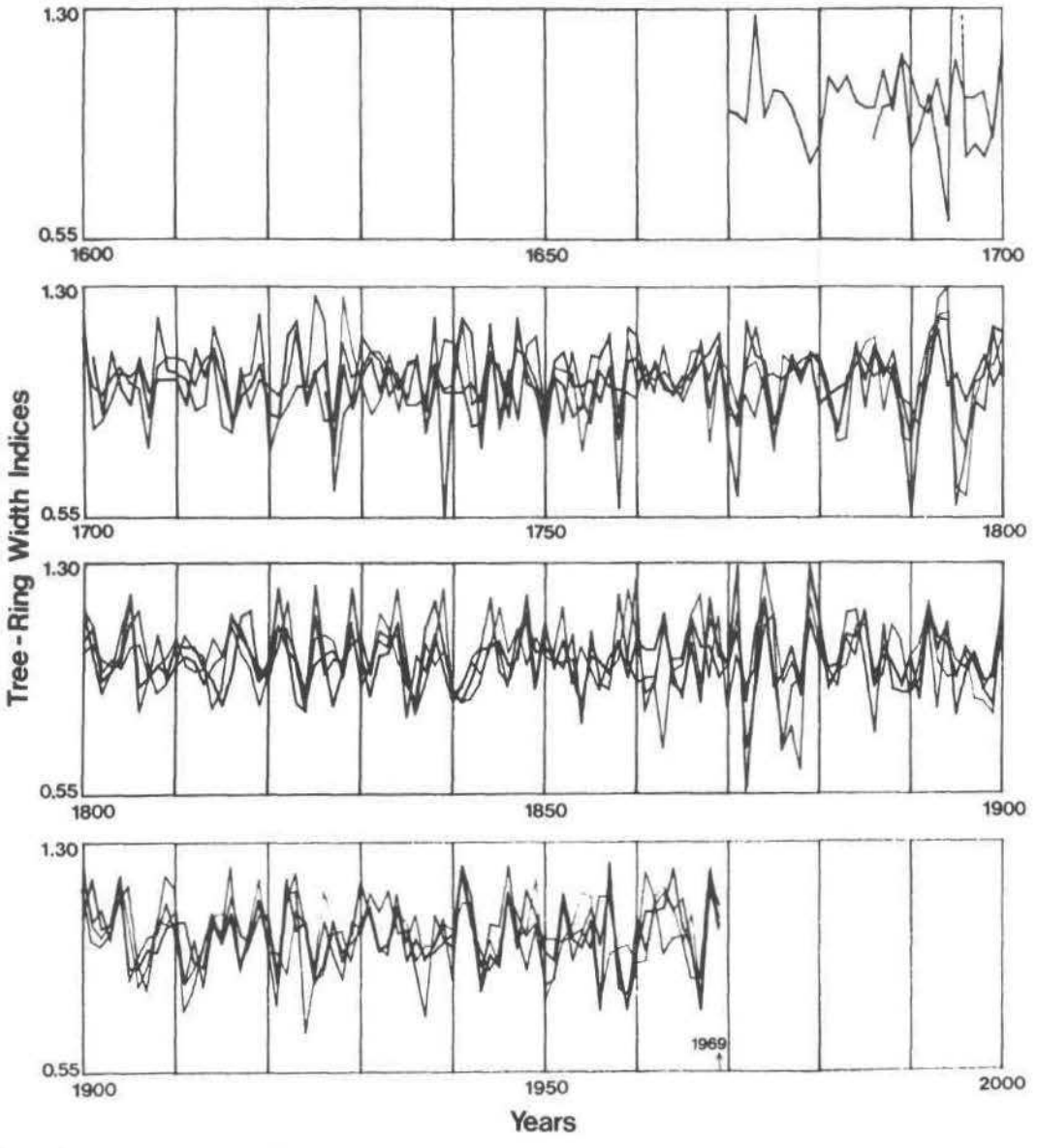

Figure 4
Western red cedar ring-width chronologies for four trees.

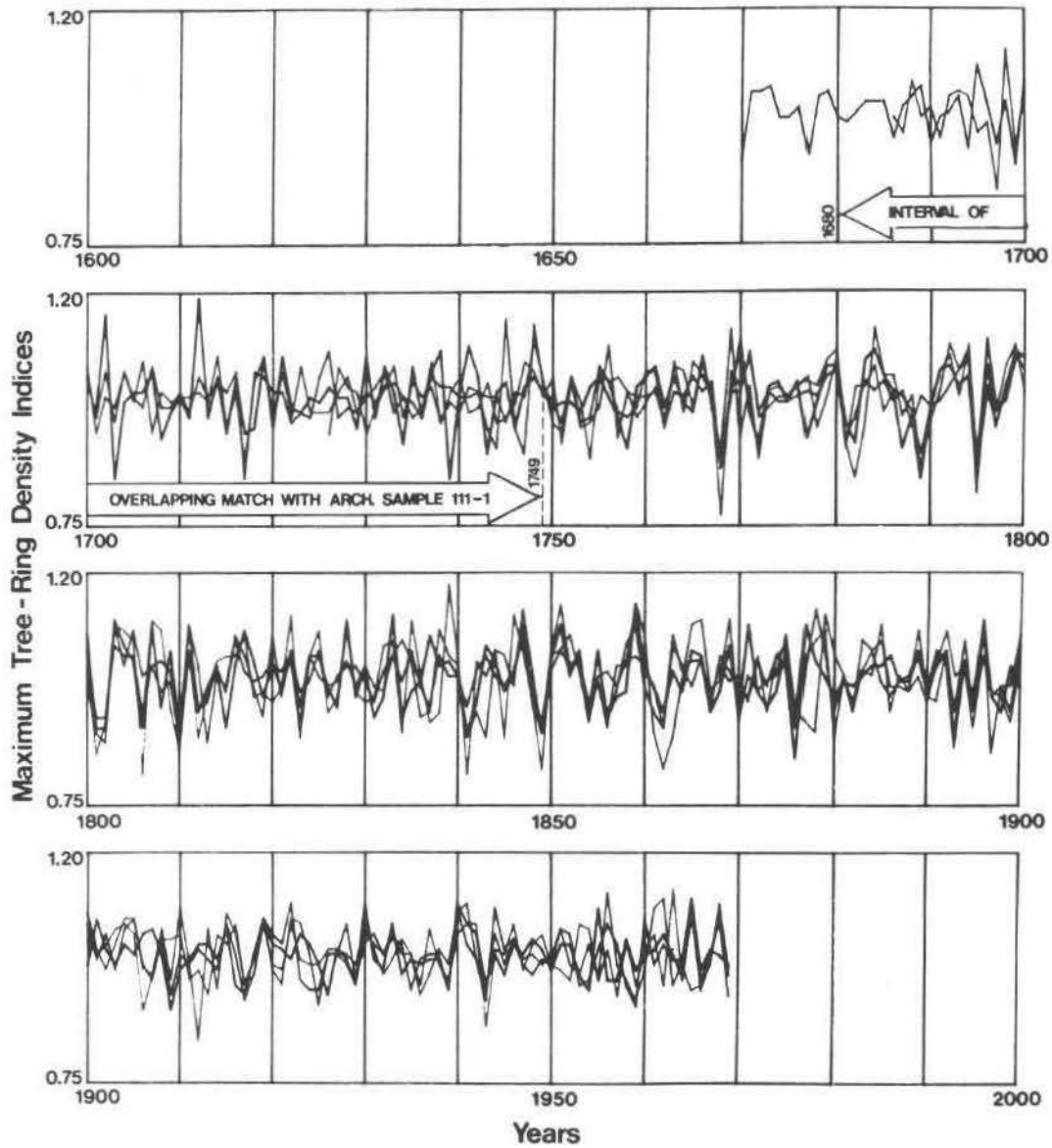

Figure 5
Western red cedar maximum ring-density chronologies for four trees.

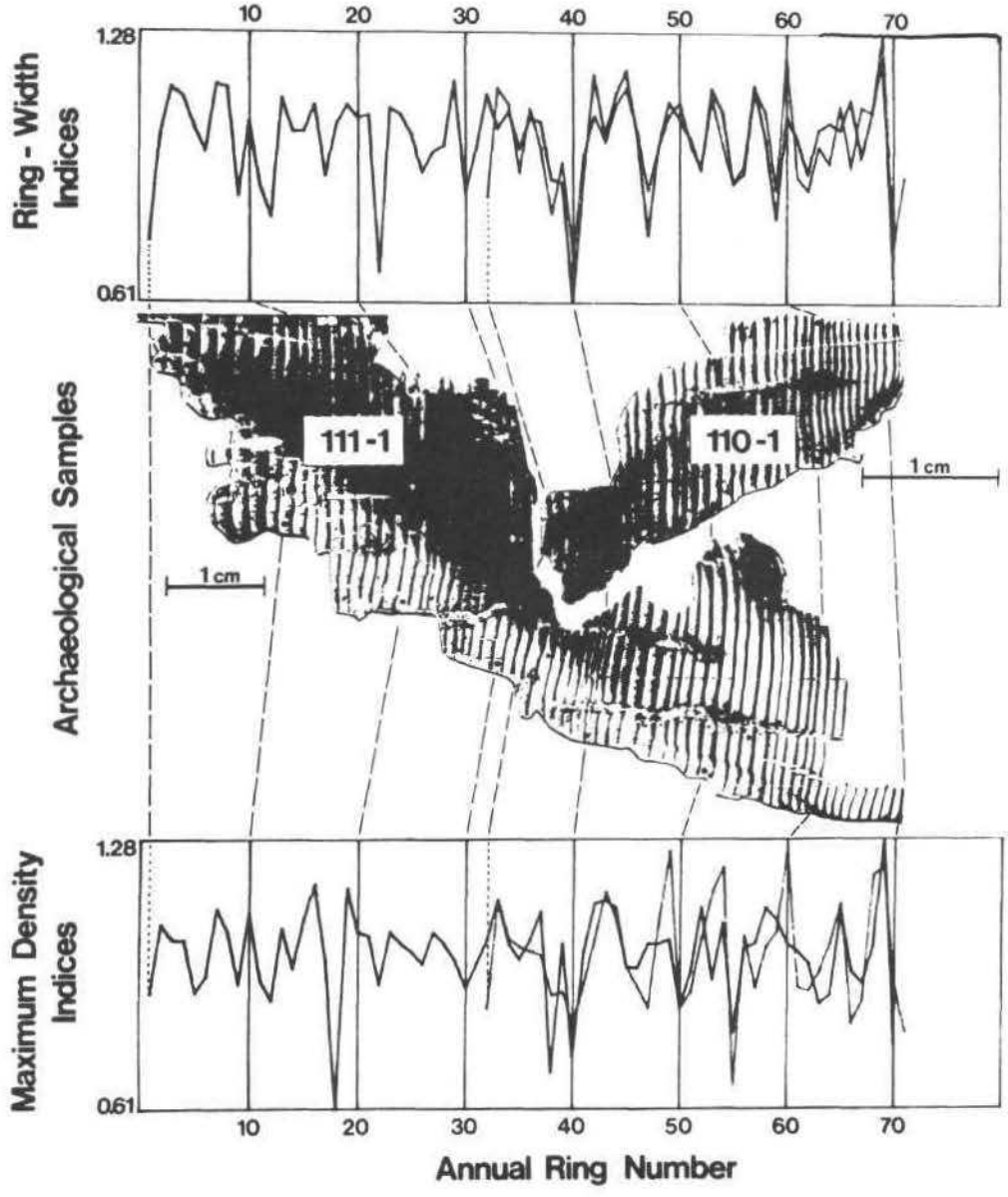

Figure 6
Matching tree-ring pattern of archaeological charcoal samples 110-1 and 111-1.

TABLE III – Computerized Shifting Unit Dating Program Output

Undated Series (BH1BRCT11101-DF)
Number of Values = 70
Interval (ARBITRARY) = 1-70
Unit Length = 50

Master Series (KITWANGA FIELD)
Number of Ring-Years = 300
Date Interval = 1670 - 1969
Increment = 1

Undated series unit	Last ring on undated series unit	Last ring-year of best-fit unit on master			Correlation of undated series unit with best-fit master unit					
		First	Second	Third	First	Second	Third			
	A	B	C	D				A-B	A-C	A-D
1	50	1729	1800	1886	0.459	0.426	0.356	-1679	-1750	-1836
2	51	1730	1801	1887	0.458	0.412	0.351	-1679	-1750	-1836
3	52	1731	1802	1888	0.458	0.358	0.338	-1679	-1750	-1836
4	53	1732	1876	1803	0.443	0.338	0.338	-1679	-1823	-1750
5	54	1733	1804	1877	0.444	0.354	0.344	-1679	-1750	-1823
6	55	1734	1878	1754	0.465	0.366	0.320	-1679	-1823	-1699
7	56	1735	1857	1879	0.472	0.333	0.333	-1679	-1801	-1823
8	57	1736	1770	1858	0.488	0.344	0.332	-1679	-1713	-1801
9	58	1737	1859	1771	0.504	0.354	0.353	-1679	-1801	-1713
10	59	1738	1860	1809	0.526	0.350	0.333	-1679	-1801	-1750
11	60	1739	1891	1861	0.519	0.331	0.326	-1679	-1831	-1801
12	61	1740	1892	1811	0.517	0.326	0.311	-1679	-1831	-1750
13	62	1741	1893	1885	0.507	0.327	0.319	-1679	-1831	-1823
14	63	1742	1886	1813	0.493	0.329	0.310	-1679	-1823	-1750
15	64	1743	1887	1895	0.506	0.328	0.314	-1679	-1823	-1831
16	65	1744	1896	1888	0.492	0.326	0.315	-1678	-1831	-1823
17	66	1745	1770	1823	0.474	0.309	0.307	-1679	-1704	-1757
18	67	1746	1898	1824	0.478	0.302	0.299	-1679	-1831	-1757
19	68	1825	1747	1745	0.366	0.357	0.313	-1757	-1679	-1677
20	69	1748	1826	1940	0.400	0.315	0.311	-1679	-1757	-1871
21	70	1749	1912	1747	0.395	0.376	0.317	-1679	-1842	-1677
				Average correlation	**0.470**	**0.344**	**0.326**	$\frac{0.470}{0.344} = 1.365$		

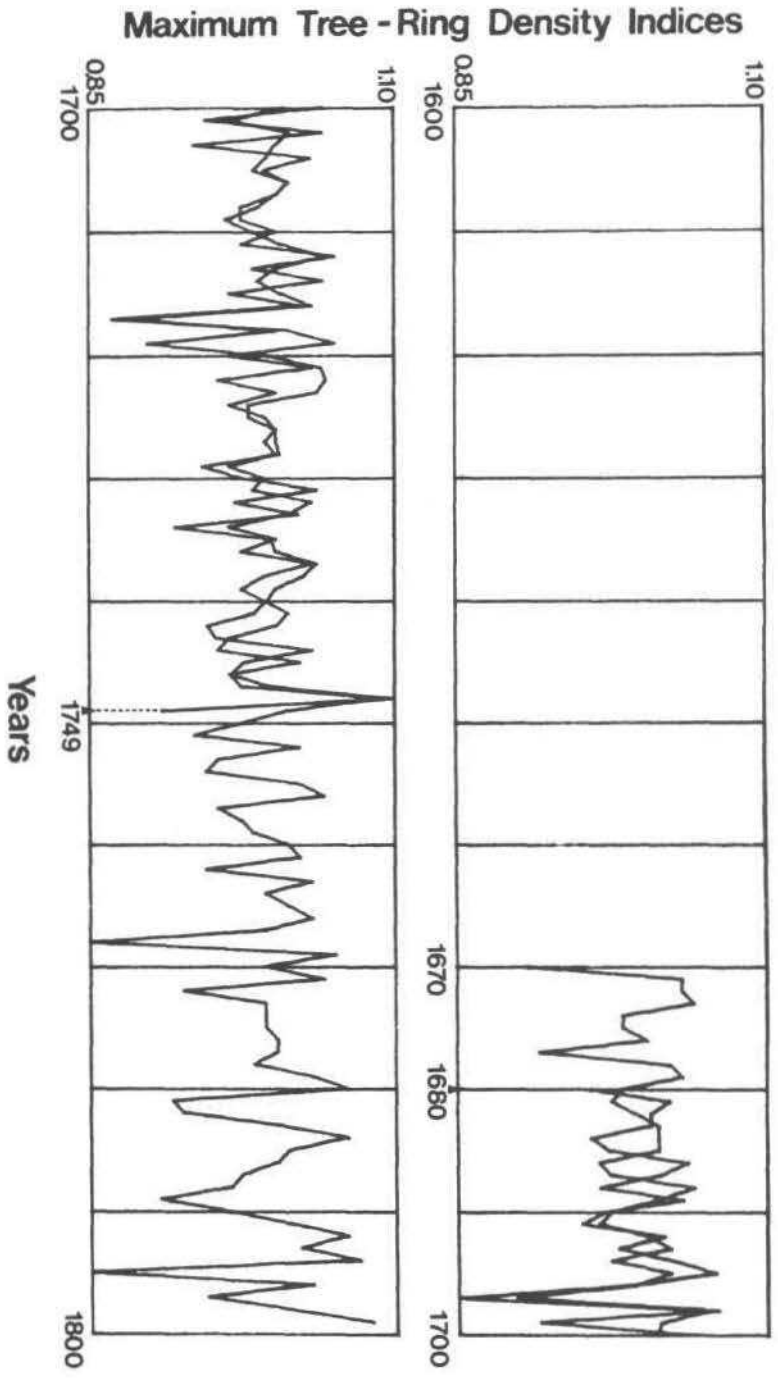

Figure 7
Western red cedar living-tree (1670 to 1799) and archaeological charcoal sample no. 111-1 (1680 to 1749) maximum density chronologies.

APPENDIX IV

Archaeobotany of the
Kitwanga Fort Project
Skeena River, British Columbia

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Royal Ontario Museum,
Toronto

Introduction

Thirty-one samples were submitted for botanical analysis by George F. MacDonald, Senior Archaeologist, National Museum of Man, National Museums Canada, Ottawa. Thirteen soil samples were received on November 5, 1979, eleven seed samples were received on November 13, 1979 and six soil samples were received on November 27, 1979.

Objectives

Analysis of palaeobotanical remains from archaeological soils was undertaken to obtain data concerning: 1) the nature and importance of plant subsistence to the occupants; 2) the season of occupation; 3) the effect of natural fire episodes and hearth fires on plants; 4) the separation of historic from prehistoric component and 5) the nature and function of house structures.

Pollen Analysis

Pollen analysis and a thermal analysis for organic carbon and calcium carbonate was done on seven samples. Six were archaeological soil: C15 and C19 were ash samples; 108, 115 and 116 were hearth samples, 85 was soil lining a pit. A spring detritus sample from a depth of 25 cm was also analysed to serve as a comparison with the archaeological soil.

Method

Two subsamples were weighed: one was used for pollen analysis and the other was dried to determine moisture content and ashed at 550°C for organic carbon content and at 1000°C to determine $CaCO^3$ content. The pollen concentration and organic C and $CaCO^3$ percentages are based on dry weight.

The soil samples concentrated for fossil pollen weighed 20 to 30 g. Before fossil pollen concentration was begun, 23 700 *Lycopodium* spores were added to the subsample. Fossil pollen concentration was by the method of Cwynar et al. (1979) except that both 150 um and 15 um sieves were used before acetolysis. The introduced *Lycopodium* spores were counted together with the fossil pollen and spores. Counting proceeded until 100 fossil pollen were identified. The ratio of introduced *Lycopodium* spores to fossil pollen was used to calculate the fossil pollen concentration per g dry weight of soil.

Results

The organic C, $CaCO^3$ and fossil pollen are given in Table 1. The C content was high in the spring detritus relative to the soils. $CaCO^3$ was relatively low in the pit soil and spring detritus. All samples had abundant charcoal and indigestible plant fragments. Fungal fragments were common, indicating an oxidizing environment.

The pollen was rather well preserved. Sample 119 did not produce an adequate abundance of pollen for an efficient percentage analysis. Fossil pollen varied by a factor of 10, from 200 to 2 300 pollen per g in the soil samples. The highest concentration (31 900) occurred in the spring detritus.

Discussion

The spring sample serves as a control for the analyses. Its high content of organic C and low CaCO3 are consistent with a non-calcareous organic detritus. As expected, the mineral-rich soil had lower organic C but unusually high carbonate (except sample 85 that lined a pit). The carbonate was probably derived from the burning of fishbone. Another possibility is the burning of faeces, but this is unlikely because of the paucity of seeds in the samples.

In general, the tree pollen reflects forest dominance by conifers. The local pine and spruce is well represented, whereas the pollen of fir and western hemlock must be derived from trees growing outside the site locality. The pollen of poplar is absent because it does not preserve. The spring sample confirms the growth of a local stand of alder and suggests a local stand of birch. In contrast, the archaeological soil contains abundant pollen of weedy herbs, particularly grass, composite and chenopod pollen, indicating weedy vegetation. Despite local growth of hazel and presence of hazel nuts, only one pollen grain was found. Most pollen is derived from wind-pollinated species and, except for the composites, there are surprisingly few pollen of insect-pollinated taxa such as heaths, soapberry

and the families exemplified by carrot, pink and evening primrose.

The pollen assemblage does not compare closely with the seed assemblage except that soil samples C15, 108 and 85 (but not 115) have both abundant chenopod pollen and goosefoot seeds. Thus the pollen and seed data are complementary, and therefore they cannot be used to predict one another.

Macrofossil Analysis

Nineteen soil samples and 11 seed samples were submitted for plant macrofossil identification.

The following is the archaeological context of the soil samples;

64, 108, 115, 116, 109, 110 and 111 were hearth samples; 65, 119 and 120 were pit samples; C15 was an ash sample; 66 and 67 were dump samples; 85 was from a pit lining; 78 and 118 were from post moulds; 16, 76 and 79 are 'level' samples.

Method

All soil samples were floated and concentrated in a sieve with a mesh size of 0.5 mm.

A total of 1750 mL of float residue was recovered from flotation of 18 375 mL of soil; this is a reduction to 10% of original volume.

A total of 2461 seeds were present; 2209 were uncarbonized and 252 were carbonized (Tables 2 and 3). Charred seeds were picked from float residue under lOx magnification with a stereo-microscope. Uncharred seeds were identified but not picked, except for unknowns. Seeds were identified using seed identification manuals (Montgomery 1977, Martin and Barkley 1973) and by comparison with reference specimens.

Charcoal was prepared for examination by breaking the specimen to obtain a fresh transverse (cross) section (McAndrews, et al. manuscript). Charred wood from nine samples was classified into three categories, 1) pine, 2) conifer (gymnosperm) wood and 3) diffuse porous (angiosperm) wood.

Results

The concentrate was mostly uncharred plant debris such as roots, wood and leaf fragments. Charred seeds were present (Table 2) but uncharred seeds were more common (Table 3). Bone was often present.

There was a total of 14 taxa of charred seeds (N=252) and 22 taxa of uncharred seeds (N=2209) (Table 4).

Two species, bearberry and hawthorne, occur only as charred specimens. Charred seeds were present in 13 of 19 soil samples and 2 of 12 seed samples. Uncharred seeds were present in all but 2 soil samples and 7 of 12 seed samples.

Results - Soil samples

Sample C15, ash (007T, OOlA, E13 NO, Lot 5, 15P) Charred seeds include blueberry, sedge and goosefoot. Charred sedge seeds are rare with the other occurrence in sample 66. The unusual dearth of uncharred seeds is shared with sample 118. Uncharred spruce needle fragments are present.

Sample 64, central hearth (7TlC, house 1, level 3) The charred seed assemblage is small. Seeds of two small fleshy fruits are present, elderberry and blueberry. One goosefoot seed and one grass seed (unique in the charred seed assemblage) were also identified. Eight seeds were assigned to the goosefoot family. Goosefoot seeds were the only uncharred seeds in the sample. Like the previous sample, uncharred spruce needle fragments were also present.

Sample 108, central hearth 2 (7T2D, DBD 18 cm) The concentrate contained insect parts and some small bone fragments. Charred seeds were absent. The uncharred assemblage contained seeds of the small fleshy fruits of saskatoonberry, raspberry and blueberry and of two weeds, goosefoot and sedge.

Sample 115, central hearth, house 4 (7T4, 13P west side, Battle Hill, 5-15 cm DBC) This sample contained insect parts and was essentially barren of seeds. It contained one unidentified, poorly-preserved, charred seed and one uncharred cherry (*Prunus*) seed.

Sample 67, side hill dump under house 4 (7T4A, level 2, 5-10 cm) This sample contained pebbles, snails, insect parts and small bone fragments. Charred seeds occurred in small numbers, including seeds of the small fleshy fruits, raspberry and elderberry and seeds of two weeds, plantain and knotweed. These weed seeds are rare, each appear in only one other sample, i.e. plantain (a single seed) in dump sample 66 and knotweed (40 seeds) in pit sample 65.

Sample 67 contains the third largest number of uncharred seeds with ten taxa; most numerous are elderberry and raspberry. Seeds of two weedy plants, goosefoot and sedge are abundant, especially goosefoot. Cherry, dandelion, plantain, vetch, birch and 11 seeds that compare closely with violet were also present.

Sample 66, side hill dump under house 4, level 1, 0-5 cm (7T4A, 20P W12 S4) Insect parts and snails are present. Charred seeds were limited to small fleshy fruits and weeds. Raspberry (most abundant), elderberry, cherry and dogwood are present. Cherry and dogwood are represented by single seeds. Weeds are represented by single seeds of sedge and plantain.

This sample contains the second largest concentration of uncharred seeds. Two weeds dominate the assemblage, sedge and goosefoot. Knotweed, campion, dandelion, violet and birch are present. Grass was identified by the presence of glumes. Soapberry is confined to this sample. A moss (cf. *Isothecium*) is present.

Sample 16 (7T5A, level 2, 5-10 cm DBS S 0-50 cm E 0-40 cm) Insect parts, snails and spore balls were in the concentrate. This sample is essentially barren of charred seeds, with one unidentified specimen. The few uncharred seeds are represented by raspberry and elderberry, goosefoot and sedge. A hazel nut shell fragment was also identified.

Sample 78, 'post' feature (7T9C 13P, near bottoming out, level 9, DBS 45 cm, DBD 48-52 cm) Charred seeds are absent.

Uncharred seeds are mostly goosefoot. A few seeds of saskatoonberry and elderberry were also present.

Sample 85, folded bank pit lining, level 13 (7T9E extension) The concentrate included small uncharred bark fragments, insect parts, spore balls and clumps of dirt.

One charred elderberry seed was identified.

The uncharred seed assemblage was limited to three elderberry, three goosefoot and two sedge seeds.

Sample 116, central hearth, house 5 (7T10 24.5 ME/.5 m S oper. 10, 5-15 cm DBS)The concentrate was composed of ash and many small mammal bones; a fish vertebra was also present. This sample was virtually barren of seeds. Charred seeds were absent. One uncharred dandelion seed and one snowberry seed were present.

Sample 109, central hearth, house 3, level 1 (7T3T1) The concentrate contained insect parts and clumps of dirt. Nine charred goosefoot seeds were present.

The uncharred seed assemblage is dominated by sedge and dandelion. Goosefoot, strawberry and saskatoonberry also occur in small numbers.

Sample 110, hearth (7T3T1 17P, from W. section of rock feature - DBS 17-25 cm) Insect parts were present in the concentrate. The sample contained two charred goosefoot seeds and one uncharred strawberry seed. Strawberry seeds are limited to this sample and sample 109.

Sample 119, ash pit (7T1T1 06P, in wall - see p. 57 and floor plan T1 S3 E14 DBD, 37-40 cm S lO-100 cm E 40-80 cm) Leaf fragments, small bone fragments and insect parts were present in the concentrate. This sample contains charred seeds of three small fleshy fruits; saskatoonberry, bearberry and hawthorne. This sample has the largest quantity of bearberry seeds and the only occurrence of hawthorne. One charred goosefoot seed was also present.

Uncharred seeds of sedge and dandelion also occur.

Spruce needle fragments were also present.

Sample 76 (7T3B 07 28/7/79 - house 3, level 4, 15-20 cm N 0-100 cm W 20-100 cm) The concentrate contained insect parts and larvae. The sample was barren of charred seeds. Twenty uncharred seeds were identified, i.e., 18 goosefoot seeds, one elderberry seed and one sedge seed.

Sample 118, house post feature (7TITI 06p 10/8/79, 15-17E 30-35 DBS from house post feature) The sample was essentially barren except for one unidentified uncharred seed.

Sample 65 (7T9G 20p 27/7/79, SE corner of pit, level 3, 10-15 cm, palisade) The sample contained small bone fragments, probably mammal, and insect parts.

This sample contained the greatest number of seeds, both charred and uncharred. Four taxa of charred and eight taxa of uncharred seeds are present. The charred seed assemblage is dominated by knotweed. Charred knotweed occurs elsewhere only in dump sample 67. The greatest concentration of elderberry occurs here together with a few saskatoonberry seeds. One bearberry seed was also identified. The uncharred seed assemblage in this sample accounts for 40% of the seeds of all samples. It has 811 goosefoot, followed in descending order of abundance by: elderberry, sedge, saskatoonberry, raspberry, dragon head (*Dracocephalum parviflorum*) and cherry. Two seeds, one in the grass family and one in the rose family, could not be further identified. Ninety-four identifiable seeds have yet to be identified. Analysis of these seeds is being continued.

Sample 111, ash from hearth (7T9K 06P 9/8/78, 5-15 cm DBS, lot 2) This sample was essentially barren of seeds. No charred seeds were present. Four uncharred goosefoot seeds and two elderberry seeds were present; one seed was unidentified.

Sample 120, puberty pit (7T5B, 10/8/79 07P, bottom of pit - humus layer DBU 70-75 cm, S 0-20 cm E 80-100 cm)
The concentrate of miscellaneous plant fragments, charred and uncharred, also contained insect parts. This sample was one of three samples containing charred bearberry, the others were samples 65 and 119. One bearberry was identified. Two charred raspberry seeds were also present.

The uncharred seed assemblage is dominated by raspberry. One whole hazel nut and hazel nut fragments were present. dandelion, vetch, birch seeds also occurred, and one seed assigned to the composite family was identified.

Sample 79 (7T1A, lot 8, 15P 72 cm) This sample was barren of seeds except for one uncharred goosefoot seed.

Results - Seed samples

Sample S 10 This sample contained uncharred hazel nuts, 7 whole, 48 halves and 10 fragments.

Sample S 12 Like sample S 10, only uncharred hazel nuts were present.

Sample S 13 The three uncharred seeds are red osier dogwood. Two charred seeds could not be identified.

Sample 133 This sample contained one uncharred pin cherry seed.

Sample 152 B This sample contained an uncharred nutshell fragment of hazel.

Sample 152 C The uncharred seed is chokecherry.

Sample 183 Five charred chokecherry seeds were present. Charred cherry seed fragments were also present.

Sample 215 This sample contains three uncharred chokecherry seeds. All seeds have a hole at the proximal end, suggesting insect-boring.

Sample 431 This sample contained dirt clumps; no seeds were present.

Results - charred wood

Charred wood from most samples was small (4 mm), thus making a positive identification difficult. However, some fragments were large enough to make a partial identification.

Pine charcoal was identified in six of nine samples (Table 5).

The pieces of indeterminable conifer were too small to be sure that the resin canals of pine were absent. The diffuse porous angiosperm wood could be poplar. There is no apparent correlation between species and features.

Discussion

The interpretation of the seeds found in the archaeological soil is difficult. Their relative sparseness (except sample 65) indicates that they are more or less randomly distributed and do not represent caches. Except for birch, the seeds are from shrub and herb species that mostly occupy weedy habitats. Most species occur on the site today, and the seeds could be modern and intrusive or could have persisted in the soil since occupation. The charred seeds are likely to be in situ because they are less likely to decay than uncharred seeds.

With regard to their seeds, plant species have varying strategies of reproduction (Grime 1979). Most Canadian tree species have seeds that germinate within a few months of dispersal to produce a more or less annual crop of seedlings. These seedlings usually die unless an opening in the canopy occurs. Such species, with limited dormancy, usually have thin-coated seeds that decay rapidly and do not persist in the soil. On the other hand, many weed species such as cherry and goosefoot (*Chenopodium*), have seeds capable of prolonged dormancy. These seeds have relatively thick seed coats and persist in the soil as a seed bank, until they are stimulated to germinate by change in light and temperature that is associated with soil disturbance and the renewal of a weed habitat.

Soil disturbance during human occupation produces a weedy habitat and weed vegetation. Local burning would produce charred weed seeds and these, together with unburned weed seeds, would result in the archaeological soil becoming a seed bank. Thus, the charred seeds are in situ and the uncharred seeds are probably contemporaneous. The presence of pollen of weedy plants supports the conclusion that the seeds are in situ.

Conclusions

1. Hazel nut and the berries of blueberry, hawthorn, saskatoon, raspberry, elderberry, chokecherry and strawberry were available and perhaps eaten, but there is no evidence that they were quantitatively important.

Goosefoot seeds are abundant and could have been collected for food.

There is no indication of crop plants.

2. The seed assemblage hints at a summer-autumn occupation, because the edible fruits ripen then. However, because the seeds belong to 'weedy' species that probably grew spontaneously on the site, their seeds could be naturally introduced into the soil.

3. There is no evidence as to the season of burning. The seeds, needles and wood are all available on the soil surface and could be burned at any season.

4. Assuming that uncharred seeds eventually decay and only charred seeds persist, then samples with mostly charred seeds would be relatively older. Applying this criteria, samples C15 and 119 are older than samples 65, 66, 67 and 78. However, samples 65, 66 and 67 are near the surface and the uncharred seeds could be modern intrusives.

5. The botanical analyses provide no insight as to feature function.

6. The surprisingly high calcium carbonate content of samples C15, 108, 115, 116 and 119 indicate much burned bone in contrast to the spring sample and sample 85.

7. The pollen analysis indicates the regional forest was dominated by conifers. Birch and alder were locally abundant around the spring. Analyses of the archaeological soils indicate local weedy herbs.

Acknowledgements

We thank G. Christine Manville for moss identification and preparation of samples for pollen analysis, Darakshan Siddiqqi for checking seed identifications and Jo-Ann Huskinson, who typed the report.

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Table 1

Pollen and spore counts in six samples. Identified pollen totals 100. Organic carbon and calcium carbonate determined by method of Dean (1974).

Catalogue number	C15	108	115	85	116	spring 119
% Organic carbon } of dry weight	4.7	1.8	2.1	6.7	1.6	21.3
% $CaCO_3$ } of dry weight	37.5	19.5	17.5	2.7	10.7	2.7
Picea spruce	7	6	9	10	8	2
Abies fir	4	3	6	2	-	2
Pinus pine	50	44	30	41	39	39
Tsuga heterophylla western hemlock	6	19	13	12	22	7
Tsuga mertensiana mountain hemlock	1	-	-	-	-	-
Cupressaceae cedar family	-	-	-	2	-	1
Betula birch	-	3	1	3	-	10
Alnus alder	3	3	1	2	4	33
Corylus hazel	1	1	1	1	1	1
Shepherdia canadensis soap berry	1	1	1	1	1	2
Ericaceae heath family	1	1	1	1	1	1
Gramineae grass family	3	4	5	-	9	2
Tubuliflorae aster group } composite family	1	-	7	-	3	1
Liguliflorae chickory group } composite family	-	1	1	-	11	1
Chenopodiineae chenopods	23	18	27	26	3	-
Umbelliferae carrot family	1	1	1	1	1	1
Caryophyllaceae pink family	1	1	1	1	1	1
Onagruceae evening primrose family	1	1	1	1	1	1
Identified pollen per g dry soil	1,000	200	1,200	2,300	1,400	31,900
Dryopteris type fern	1	1	1	2	1	5
Lycopodium club moss	1	1	1	1	1	2
Sphagnum spnagnum moss	2	2	1	1	1	1
Indeterminable	4	7	3	4	1	7
	2	2	1	2	1	1

trees: *Picea* spruce; *Abies* fir; *Pinus* pine; *Tsuga heterophylla* western hemlock; *Tsuga mertensiana* mountain hemlock; Cupressaceae cedar family; *Betula* birch; *Alnus* alder

shrubs: *Corylus* hazel; *Shepherdia canadensis* soap berry; Ericaceae heath family

herbs: Gramineae grass family; Tubuliflorae aster group; Liguliflorae chickory group; Chenopodiineae chenopods; Umbelliferae carrot family; Caryophyllaceae pink family; Onagruceae evening primrose family

Table 2

Charred seeds from the Kitwanga Fort Project, Skeena River, B.C.

		SOIL														SEED		
	SAMPLE NUMBER	C15	64	115	66	67	16	85	109	110	119	118	65	120	S13	183	Total	%
Nut	Corylus sp. hazel	-	-	-	-	-	-	-	-	-	-	-	-	f	-	-		
Berry	Amelanchier sp. saskatoon berry	-	-	-	-	-	-	-	-	-	2	-	5	-	-	-	7	2.7
	Arctostaphylos uva-ursi bearberry	-	-	-	-	-	-	-	-	-	8	-	1	1	-	-	10	3.9
	Cornus sp. dogwood	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	.4
	Crataegus sp. hawthorne	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	.4
	Prunus sp. cherry	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	.4
	Prunus virginiana choke cherry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5	1.9
	Rubus sp. raspberry	-	-	-	5	3	-	-	-	-	-	-	-	2	-	-	10	3.9
	Sambucus sp. elderberry	-	5	-	4	2	-	1	-	-	-	-	14	-	-	-	26	10.3
	Vaccinium sp. blueberry	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	8	3.2
Weed	Carex sp. sedge	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	.4
	Chenopodium sp. goosefoot	11	1	-	-	-	-	-	9	2	1	-	-	-	-	-	24	9.5
	Plantago sp. plantain	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	3	1.2
	Polygonum sp. knotweed	-	-	-	-	1	-	-	-	-	-	-	40	-	-	-	41	16.3
	CHENOPODIACEAE chenopods	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	8	3.2
	CYPERACEAE sedge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	GRAMINEAE grass family	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	.4
	Unknown	-	2	1	5	-	1	-	-	-	-	1	94	-	f	-	104	41.3
	Picea sp. (needles)	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	
	TOTAL	15	22	1	18	8	1	1	9	2	12	1	154	3	-	5	252	

f = fragment
+ = present

Table 3

Uncharred seeds from the Kitwanga Fort Project, Skeena River, B.C.

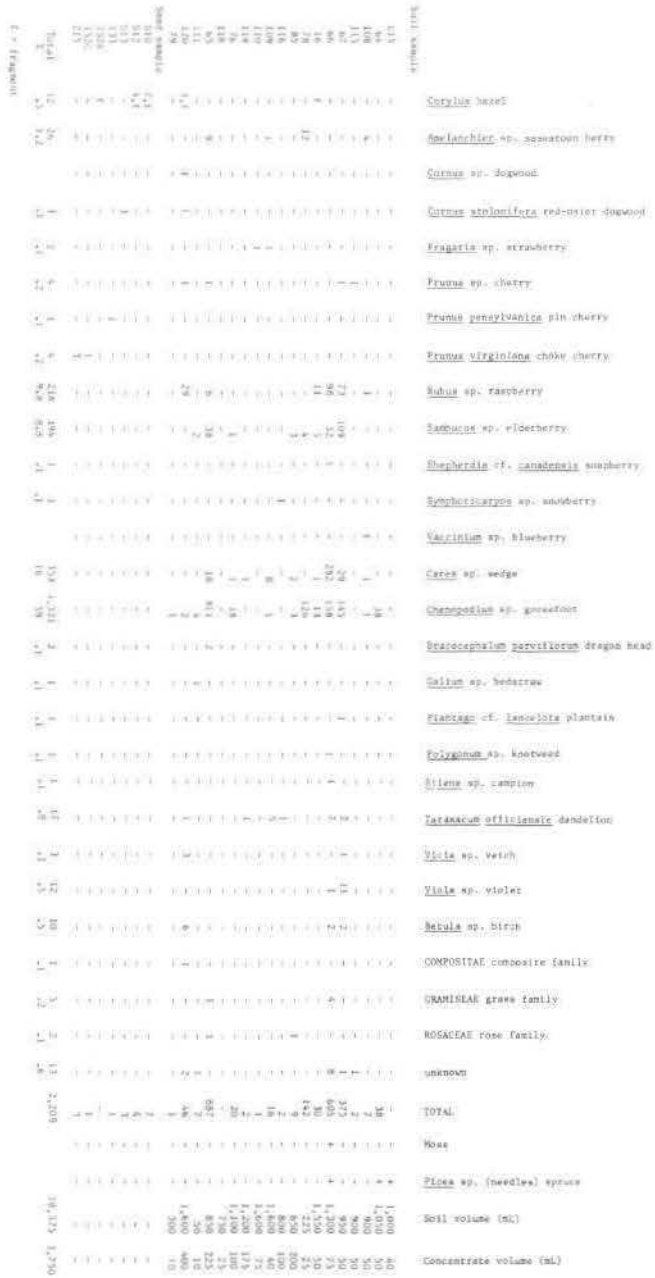

Table 4

List of macrofossils from the Kitwanga Fort Project, Skeena River, B.C. Asterisk indicates plants used by natives (Turner 1975).

	Uncharred	Charred
*	Corylys cornuta beaked hazel BETULACEAE	* Corylus sp. hazel BETULACEAE
*	Amelanchier sp. saskatoon berry ROSACEAE	* Amelanchier sp. saskatoon berry ROSACEAE
*	Cornus sp. dogwood CORNACEAE	* Arctostaphylos uva-ursi bearberry ERICACEAE
	Cornus stolonifera red-osier dogwood CORNACEAE	* Cornus sp. dogwood CORNACEAE
*	Fragaria sp. strawberry ROSACEAE	* Crataegus sp. hawthorne ROSACEAE
*	Prunus sp. cherry ROSACEAE	* Prunus sp. cherry ROSACEAE
*	Prunus pensylvania pin cherry ROSACEAE	* Prunus virginiana choke cherry ROSACEAE
*	Prunus virginiana choke cherry ROSACEAE	* Rubus sp. raspberry ROSACEAE
*	Rubus sp. raspberry ROSACEAE	* Sambucus sp. elderberry CAPRIOFOLIACEAE
*	Sambucus sp. elderberry CAPRIOFOLIACEAE	* Vaccinium sp. blueberry ERICACEAE
*	Shepherdia canadensis soapberry ELAEAGNACEAE	Carex sp. sedge CYPERACEAE
	Symphoricarpos sp. snowberry CAPRIOFOLIACEAE	* Chenopodium sp. goosefoot CHENOPODIACEAE
*	Vaccinium sp. blueberry ERICACEAE	Plantago sp. ribgrass Plantain PLANTAGINACEAE
	Carex sp. sedge CYPERACEAE	Polygonum sp. knotweed POLYGONACEAE
*	Chenopodium sp. goosefoot CHENOPODIACEAE	CHENOPODIACEAE
	Dracocepholum parviflorum dragon head LIBIATAE	CYPERACEAE
	Galium sp. bedstraw RUBIACEAE	GRAMINEAE
	Plantago cf. lancelota ribgrass plantain PLANTAGINACEAE	Picea sp. spruce (neddle) PINACEAE
	Polygonum sp. knotweed POLYGONACEAE	
	Silene sp. campion CARYOPHYLLACEAE	
	Taraxacum officinale dandelion COMPOSITAE	
?	Vicia sp. vetch LEGUMINOSAE	
	Viola sp. violet VIOLECEAE	
*	Betula sp. birch BETULACEAE	
	COMPOSITAE	
	GRAMINEAE	
	ROSACEAE	
	Picea sp. (needle) PINACEAE	
Nbr. FAMILIES	19	12
Nbr. TAXA	22	14

Table 5

Charred wood from the Kitwanga Fort Project, Skeena River, B.C.

Catalogue number	ANGIOSPERM Indeterminable diffuse porous	GYMNOSPERM Pinus pine	Indeterminable Conifer
16	+	–	–
65	–	+	–
67	–	+	+
108	–	–	+
110	+	+	–
111	–	+	–
118	–	+	–
119	+	+	+
120	+	–	–

APPENDIX V

Botanical Species Identification for the Kitwanga Fort National Historic Site Area

James Pozar
B.C. Forest Service, Smithers,

Trees

POPULUS TREMULOIDES	Aspen
P. TRICHOCARPA	Black Cottonwood
BETULA PAPYRIFERA	Paper Birch
PINUS CONTORTA	Lodgepole Pine
PICEA GLAUCA X SITCHENSIS	Spruce

Shrubs

ALNUS INCANA (A. TENUIFOLIA)	Speckled Alder
CORYLUS CORNUTA	Beaked Hazel
AMELANCHIER ALNIFOLIA	Saskatoon
PRUNUS VIRGINIANA	Chokecherry
SYMPHORICARPOS ALBUS	Snowberry
POSA ACICULARIS	Prickly Rose
LONICERA INVOLUCRATA	Black Twinberry
CORNUS STOLONIFERA	Red Osier Dogwood
PARISTIMA MYRSINITES	False Box
VIBURNUM EDULE	Squashberry, Highbush Cranberry
SORBUS SCOPULINA	Mountain Ash
RIBES LACUSTRE	Swamp Gooseberry
R. OXYACANTHOIDES	Yellow Gooseberry
SPIRAEA DOUGLASII	Hardhack
SHEPHERDIA CANADENSIS	Soopalalie, Soapberry
RUBUS IDAEUS	Wild Raspberry
R. PARVIFLORUS	Thimbleberry
SALIX BEBBIANA, S. SCOULENAVA, S. LASIANDRA	Willows

Herbs & Dwarf Shrubs:

FRAGARIA VIRGINIANA	Strawberry
EPILOBUIM AUGUSTIFOLIUM	Fireweed
ASTER CILIOLATUS, A. CONSPICUIS	Asters
SOLIDAGO CANADENSIS	Goldenrod
THALICTRUM OCCIDENTALE	Meadow Rue
ACHILLEA MILLEFOUIM	Yarrow
ARALIA NUDICAULIS	False Sarsapaidla
SMILACINA RACEMOSA	False Solomon's Seal
GALIUM BOREALE	Northern Bedstraw
G. TRIFLORUM	Sweet Bedstraw
GERANIUM REICHARDSONI	White Geranium
GEUM MACROPHYLLUM	Avens
HERACLEUM LANALUM	Cow Parsnip
CAREX MACOVIANA	Sedge
CASTILLEJA MINIATA	Paintbrush
CAMPANULA ROTUNDIFOLIA	Harebell
VIOLA CANADENSIS	White Violet
V. GLABELLA	Yellow Stream Violet
PYROLA ASARIFOLIA	Large-flowered Wintergreen
POTENTILLA ARGUTA	Cinquefoil
ACTAEA RUBRA	Bane Berry
EQUISETUM ARVENSE, E. PRATENSE	Horsetails
DISPORIUM TRACHYCARPUM	Fairy Bells
VICIA AMERICANA	American Vetch
LATHYRUS NEVADENSIS	Purple Peavine
CLINTONIS UNIFLORA	Queen's Cup
AINICA VACCINIUM CAESPITOSUM	Dwarf Blueberry
GYMNOCARPIUM DRYOPTARIS	Oak Fern
CIRCAEA ALPINA	Enchanter's Nightshade
ANEMONE LYALLII	Wood Anemone
SANICULA MARILANDICA	Snakeroot
DELPHINIUM GLAUCUM	Larkspur
ELYMUS GLAUCUS	Blue Wildrye

AGROPYRON TRACHYCAULUM ssp.PINITATERALE Wheatgrass

STIPA RICHARDSONII S. OCCIDENTALIS Needle-and-Thread grasses

KOELERIA MACRANTHA Junegrass

ORYZOPSIS ASPERIFOLIA Indian Ricegrass

HEUCHERA CHLORANTHA Alumroot

Weedy Aliens

TARAZACUM OFFICINDE Dandelion

PHLEUM PRATENSE Timothy

PLANTAGO MAJOR Plantain

PHINANTHUS MINOR Yellow Rattle

Fields

BROMUS INERMIS Smooth Brome

TRIFOLIUM PRATENSE Red Clover

CHRYSANTHEMUM LEAUCANTHEMUM Ex-eye Daisy

MEDICAGO SATERIA Alfalfa

RUMEX ACETOSELLA Sheep Sorrel

Weedy Natives

POA PRATENSIS Kentucky Bluegrass

AGROSTIS SCABRA Tickle Grass

ACHILLEA MILLEFOLIUM Yarrow

EQUISETUM ARVENSE

S. Slope

Earlier probably open grassland 7 natural vegetation influenced by fire, slope, aspect and aboriginal people.

AMELANCHIER ALNIFOLIA

PRuNUS VIRGINIANA

ROSA ACICULARIS

CORYLUS CORNATA

POPULUS TREMULOIDES

SYMPHIRICARPOS ALBUS

AGROPYRON TRACHYCANLUM ssp UNILATERALE

POA PRANTENSIS ?

PHLEUM PRATENSE

CREPIS CAPILLARIS Hawkweed

STIPA COLUMBIANA (S.OCCIDENTALIS)

CAREX ? PRATICOLA or PACKYSTACHIYA

ASTER CONSPICUS

SMILANCINA STELLATA

KOELERIA MACRANTHA

GALIUM BOREALE

ALLIUM CERNUM

LATHRUS NEVADENSIS

Spring Shrubs

ALNUS INCANA (A. TENUIFOLIA)

CORNUS STOLONIFERA

RUBUS PARVIFLORUS

CORYLUS CORNUTA

SAMBUCUS RACEMOSA

RIBES LACUSTRE

RUBUS IDAEUS

Herbs

ACTAEA RUBSA

OSMORHIZACHILENSIS Sweet Cicely

ARALIA NIDICAULIS

EQUISETUM ARVENSE, E. PRATENSE

CINNA LATIFOLIA Nodding Woodreed

DISPOSIUM TRACHYCARPUM

VIOLA BLABELLA

MITELLA NUDA Mitrewort

THALICTRUM OCCIDENTALE

SMILACINA RACEMOSA, S.STELLALA

ATHYRIUM FILEX-FEMINA Ladyfern

GALIUM TRIFLORUM

CIRCAEA ALPINA

HABENARIA SACCATA Green Rein Orchid

APPENDIX VI

**Report on the Analysis of
Obsidian Artifacts from
Kitwanga Fort National Historic Site**

**D.E. Nelson
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Submitted to G. MacDonald,
National Museum of Man,
Ottawa
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The obsidian samples submitted to the SFU Archaeology Department for identification were analysed using the X-ray fluorescence technique described by Nelson et al. (1975). The relative concentrations of the elements K, Ca, Ti, Fe, Zn, Pb, Rb, Sr, Y, Zr and Nb in these samples were compared to those obtained in an identical manner on samples from the majority of the known obsidian sources on the Northwest Coast. They were also compared with the relative concentrations of obsidian sources that are not known to the SFU laboratory; however, these sources must exist, as obsidian artifacts of unique and unknown relative elemental concentrations appear in Northwest Coast sites.

The flakes examined in this study all were found to be made from obsidian originally obtained from the Mt. Edziza volcanic complex located in N.W. British Columbia. (A list of the source identification for each flake is given in Table 1). In this volcanic complex, several separate eruptions have yielded obsidian flows separated by distances of a few kilometres. (This complex has been described by Souther (1972).) An XRF analysis of obsidian samples obtained from Dr. Souther showed that the separate flows he identified had very similar, but distinguishable, relative trace element concentrations (Nelson et al. 1975).

These separate sub-groupings have been labelled Edziza-1 through Edziza-5. However, the numbers of samples analysed for each sub-group are, in some cases, not large enough to allow us to be absolutely certain of the differences between these sub-groups. Some of the sub-groups described must then remain tentative, until a very thorough study can be done on the obsidian flows in the Mt. Edziza complex.

The flakes identified as Edziza-3 were very likely obtained from obsidian cobbles that are found within or close to a small valley that is just south of Raspberry Pass in the Mt. Edziza area. Obsidian from this sub-group is known to have been widely traded prehistorically (R. Carlson and E. Nelson, unpublished data) and the valley itself contains considerable evidence of obsidian-working activity (Fladmark and Nelson 1977). The samples labelled Edziza-2 likely were obtained from an area a few kilometres to the north of Raspberry Pass. This sub-group is also known to have been used prehistorically. However, we have less information on the Edziza - 2 source area.

In summary, we can be quite certain that the artifacts were made from Mt. Edziza obsidian. For each flake, we can also suggest specific quarry locales within the Mt. Edziza complex, but this last must remain tentative until a very detailed study of the complex can be done.

References

Nelson, D.E., D'Auria, J.M. and Bennett, R.B., 1975
Archaeometry 17(1), 85-97.

Souther, J.G., 1972
Bull. Volcanol. Soc. Jap. 117, 107.

Fladmark, K.R. and Nelson, D.E., 1977
Report on a preliminary reconnaissance of a portion of Mt. Edziza Provincial Park, submitted to the B.C. Heritage Advisory Board.

Appendix IX

Analytical Investigation of samples from Kitwanga Fort National Historic Site

1. Identification of Bark Samples
John E. Dawson
2. Surface Analysis of Copper Objects
Henry Unglik
3. Radiography of Ferrous Artifacts
Louis Laflèche & Charles Costain
4. Consolidated Hearth Ash
John Stewart
& Charles Costain
5. Food Material Analysis
Monteiro Helleur

Table 1

MacDonald artifact number	SFU analysis number	Source identification
259	EN92-2	Edziza - 3
285	" -3	"
310	" -4	"
311 (small flake)	" -5	"
311 (large flake)	" -6	"
337	" -7	"
355 (small flake)	" -8	"
355 (medium flake)	" -9	Edziza - 2
355 (large flake)	" -10	"
411	" -11	"
446	" -12	"
447	" -13	"
453	" -14	Edziza - 3
473	" -15	"

1. Identification of Bark Samples
   John E. Dawson, National Museums of Canada

Bark samples number 250, 307, 328, 395 and 440 were identified as paper birch (*Betula papyrifera* March).

2. Surface composition of the examined artifacts obtained with the EDX semi-quantitive analysis
   Henry Unglik, Conservation Division

Artifacts material (approx. percentage)

9 copper

38 'impure' copper 1-3% Pb - 1 - 3% Bi

20D copper

136 "

149G "

208 "

209 "

330 'impure' copper with 2-4% Pb

362 high leaded brass 55-65% Cu, 19-33% Zn 16-22% Pb

373 copper

430 "

464 "

483 "

In all cases some iron (Fe) was also detected, all of which probably comes from iron corrosian products.

3. Radiography of ferrous artifacts
   Charles Costain, Conservation Scientist
   Louis Laflèche, Technician Conservation Division

Five objects were submitted for radiography.

They include an adze (#342), a gun barrel (#415), a knife blade (#308), a dagger (#527) and a blade (#255). No significant features were visible on the radiographs.

4. Preliminary Report on Consolidated Hearth Ash

John Stewart, Acting Senior Conservation Scientist

Charles Costain, Conservation Scientist,
Conservation Division Ottawa.

Summary:

The consolidated hearth ash is composed of a highly porous brown matrix of calcite with white inclusions of hydroxyapatite. The hydroxyapatite is

the normal mineral constituent of bone and has not been altered by the action of the fire. The calcite matrix, on the other hand, most probably results from the formation of calcium oxide from the action of the fire on the hydroxyapatite. This calcium oxide would have rapidly been slaked by water to give calcium hydroxide which, in turn, would pick up carbon dioxide from the atmosphere to form the calcite.

Results:

A) Gross Examination

The samples were cross-sectioned to reveal a brown matrix with numerous white inclusions (maximum size 5 mm by 1 mm (Fig. 1). The matrix had a munsel colour 7.5YR over 7.5/2 and the inclusions a bone white colour.

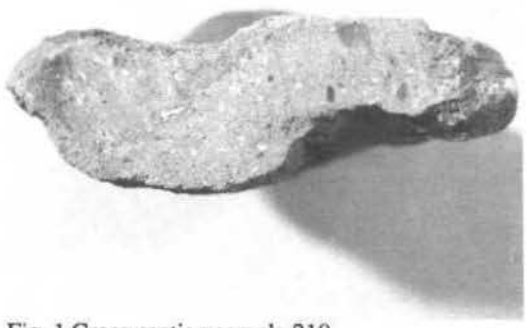

Fig. 1 Cross-section sample 210.

B) Density

A sub-sample was given a thin coating of parafin wax to render it watertight. Its apparent density was then determined by weighing in air and submerged in water. The apparent density was 1.25 g/cm^3; this is the density of the whole object, including pore space and solid material.

A further sub-sample was ground to pass a 200 mesh sieve (ASTM) and its density determined by weighing 5 g into a 10-ml volumetric flask and making to volume with water and weighing. This gives the true density, density of solid material, as 2.5 g/cm^3. The sample then has a porosity or void space of 50%.

C) Mineral Identification

Mineral identification was done using X-ray diffraction and the International Centre for Diffraction Data standard patterns.

The white inclusions were identified as hydroxyapatite ($Ca^5 (P0^4)^3 (OH)$) and the matrix is calcite ($CaCO^3$) with lesser amounts of α - quartz ($Si0^2$).

Conclusion:

The samples from the consolidated hearth ash are formed of a porous brown matrix with white inclusions. They were most probably made by burning bone, some of which remained as hydroxyapatite, giving the white inclusions, and some of which were decomposed to form calcium oxide which, with weathering, produced calcite. The α - quartz in the matrix, as well as the brown colour, are a result of ash contamination. The extent of this contamination, plus a final characterization of the material, waits on a full analysis currently being completed.

5. Food Materials Analysis

L. Monteiro Helleur, Conservation Technician, Analytical Section

Kitwanga Pot Segment (#347) : Preliminary Findings

If the residue in the pot segment was food material, substances such as fatty acids and/or proteins would be expected. Preliminary tests showed nitrogen present. However, there is no evidence of protein or amino acids in either the sample or extracts of the sample. Infra-red spectroscopy of the material in the pot showed the presence of organic matter but no specific compound was identifiable. However, various extracts of the pot material showed presence of unsaturation and the possibility of fatty acids.

Further work is required involving gas-liquid chromatographic analysis, in order to determine if indeed there are any fatty acids present and, if so, their relative proportions. From these data it is hoped that any food types of residues thereof may be identified.

Kitwanga Fort Report

An incisive report on test excavations conducted by an archaeological team at the Kitwanga Fort Site in British Columbia. Evidence from the excavations, analysis of artifacts and archaeological testing of the legendary accounts of the warrior chief, Nekt, constitute an enlightening account about a historical site, rich in oral traditions.

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