BEOTHUK BARK CANOES: AN ANALYSIS AND COMPARATIVE STUDY

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by

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ABSTRACT

The aim of this thesis was to investigate and test hypotheses concerning design and construction of Beothuk birch bark canoes and their relationship to craft of other North American native groups. The study was based on data from artifacts in various museum collections and from documents. New materials resulting from a systematic archival search were used to supplement known sources.

Examination of the data showed that the Beothuk made at least two different bark canoe designs. The more versatile of the two had a straight keel-line, no rocker, and the beam placed abaft midlength; it combined attributes useful for travel on inland waters with those that were advantageous for open water navigation. The second canoe form was a strongly rockered deep draft type especially adapted for travel conditions on the ocean. Both designs shared a V-shaped hull form as well as stylistic attributes which differentiated them from bark canoes of other groups. This interpretation removes an area of difficulty experienced by others who tried to distill one design out of apparently conflicting data.

Beothuk canoes were also compared with sixty-two other native North American craft which revealed that Beothuk bark canoe construction conformed with the traditional methods used by other groups. Although Beothuk

canoes have been described as unique, most of their attributes were found on other North American canoes or kayaks. The uniqueness derived from specific combinations of attributes and from the development of some of them to an unusual degree.

Analysis of canoes outside of Newfoundland demonstrated that several attributes were predominantly found in the North American north west including Alaska, the Yukon and the District of MacKensie but were absent or rare on the eastern seaboard and vice versa. A comparison of Beothuk canoe characteristics with those identified as preferred in north western or eastern regions showed a close association between the straight keel-line canoe and north western Athabascan canoes; the curved bottom form clearly incorporated functional attributes of eastern canoes and both designs had attributes in common with skin kayaks.

The evidence favours the suggestion that a prototype canoe close to the designs of Athabascan bark canoes diffused prehistorically to the Newfoundland Indians and that major elements of the ancient design persisted in both regions. The V-shaped hull form was a modification that evolved in Newfoundland, possibly in emulation of Eskimo kayak features, and the strongly rockered design, which developed at a later stage represents an influence of eastern Indian canoe forms.

The investigation suggests that the two Beothuk canoe designs reflect periods of contact with and absorption of ideas from different native groups, ingenuity at developing canoe forms that met local requirements and were unique among North American bark canoes, and persistence with ancient design features as well as stylistic elements.

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Particular thanks go to my supervisors, Dr. James A. Tuck and Dr. Stuart C. Brown, who have given advice and extensive criticism. I also gratefully acknowledge the assistance of Capt. N.E. Upham, Curator of Models, National Maritime Museum, Greenwich, U.K.; Dale Idiens, Curator of Ethnography, Royal Scottish Museum, Edinburgh, U.K.; Jane Sproull-Thomson, Curator of Archaeology and Ethnography, Newfoundland Museum, St. John's, Newfoundland; Dr. J. Garth Taylor, National Museums of Canada, National Museum of Man, Ottawa; J.C.H. King, Assistant Keeper, Museum of Mankind, London, U.K.; Robert Elder, Smithsonian Institution, Washington, D.C.; Daniel W. Jones Jr., Peabody Museum of Archaeology and Ethnology, Cambridge, Mass., who have allowed access to the canoe replicas in their care, provided me with photographs, measurements or outlines of them, or have unfailingly responded to my requests for information. Jane Sproull-Thomson also arranged for the radiocarbon dating which was paid for by the Newfoundland Museum, St. John's. Special thanks are due to Mr. David Howley, who allowed me access to his family papers. Edward Tompkins found for me the long sought after memorandum by E.T. Adney in the New Brunswick Museum, and Selma Barkham shared with me references from early historic documents. Lydia Snellen and Dr. J. Hare kindly translated Dutch and French texts. Acknowledgements and thanks are also extended to Mr. and

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Photographs are included with permission of:

David Carritt Limited, St. James's, London, Fig. 19;

A.C. Hunter Library, St. John's, Nfld., Fig. 4;

Scott James, Grand Falls, Nfld., Fig. 22a;

Lambeth Palace Library, London, U.K., Fig. 1b;

National Gallery of Canada, Ottawa, Ont., Fig. 20;

National Maritime Museum, Greenwich, U.K., Figs. 10-14;

Newfoundland Museum, St. John's, Nfld., Figs. 2, 6a & b;

Public Archives of Canada, Ottawa, Ont., Fig. 3;

Royal Scottish Museum, Edinburgh, U.K., Figs. 7 & 8;

Smithsonian Institution, Washington, D.C., U.S.A., Figs. 17a & b, and 18.

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CHAPTER ONE

INTRODUCTION

European explorers who arrived on the shores of Newfoundland at the turn of the 15th century found the island inhabited by an Indian population, later identified as the Algonquian speaking Beothuk. During the following two hundred years the migration and expansion of fishing and settler populations and the territorial claims made by Micmac Indians from Cape Breton Island caused a gradual but dramatic decrease of Beothuk territory. Eventually the Beothuk lost access to their traditional food resources and, in combination with increasing hostilities from the settlers and transmitted disease, these conditions brought about their demise in the 1820's.

Throughout the historic period the Beothuk remained in relative isolation and largely persisted with their own cultural traditions. Though intermittent encounters between the Beothuk and settlers occurred, trade contacts were rare and no formalized exchange of goods or ideas took place. Some contemporary records include observations on the life style and social situation of the Beothuk, on their physical features, material culture, and reactions in encounters with the white population, but much of the information was given piece meal and was biased by European

attitudes and Christian ethics. Another factor which has restricted our understanding of these people is the paucity of Beothuk artifactual remains and the small number of undisturbed archaeological sites which have been found and excavated up to date.

By amalgamating the small body of reliable artifactual and documentary evidence, scholars have advanced a tentative reconstruction of Beothuk culture and history but many details of their prehistoric sites of habitation, population size and distribution, affiliations with other native groups, use of resources, settlement patterns, social organization, belief system and material culture have not yet been identified. This lack of information has also obscured cultural changes that would have occurred since early contact. Much room is left for further research on this native group and the discovery of new sources of information is considered a high priority.

As a preliminary measure for an investigation of some of the cultural aspects of the Beothuk a systematic and extensive search for new information was conducted. Most likely repositories of relevant materials were contacted and, over a five-year period, the artifact and document collections of a large number of museums, archives and some private collections were examined. The resulting new information was not as extensive as had been anticipated but one of the more significant items found was a model of a Beothuk birch bark canoe made by Shanawdithit, the last

known Beothuk. In addition, three drawings and a substantial number of references to the use of Beothuk canoes, spanning a period of more than two hundred years, were added to the known records of Beothuk canoes. This material was considered sufficient as a basis for a thorough investigation of Beothuk birch bark canoes. An analysis of design and construction details of this artifact, which represents an important component of Beothuk material culture and persisted from prehistoric to late historic times was thought to be a potential source of new information on social as well as cultural matters.

As an island population, whose subsistence was largely based on marine resources, the Beothuk and their forebears would have been proficient in sea travel and the manufacture of water craft. Whatever type of vessel may have been used as their first means of transportation, in conformity with other North American groups, prehistoric Newfoundland Indians eventually built birch bark canoes.

Possible evidence for the antiquity of such craft in Newfoundland is a 60 x 400 cm sheet of birch bark, thought to have been intended for the construction of a canoe, that was found in 1980 in close proximity to Indian campsites in Bonavista Bay (Austin, 1980:130). Radio carbon dates obtained for two bark samples were 1815 ± 55 B.P. (Austin, 1980:169) and 1700 ± 60 B.P. (Beta 2825).[1]

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[1] $t_{\frac{1}{2}}$ = 5,568 years.

If the bark was intended for a bark canoe, then these dates would add a new dimension to the history of birch bark canoe building in North America, because no evidence for the existence of bark canoes at such an early date has been reported.

Although the building of bark canoes in Newfoundland by ca. A.D. 150 is not proven by the presence of a bark sheet, one of the first groups of Indians from the area of Terra Nova, thought to have been Beothuk, was captured with such a vessel in 1509 (Howley, 1915:7-8). Evidently by this time bark canoes were an established means of transportation by the east coast Indians.

To the Beothuk, canoes were vital for exploitation of marine resources as well as for travel in interior regions; yet little is known about the type and uses of Beothuk canoes and their styles and changes over time. Since bark canoes are complex structures with room for variations in design it may be possible to draw inferences from data on canoes about intragroup integration or to demonstrate influences from or relationships with canoes from other groups. For this reason a thorough investigation of Beothuk canoes was considered potentially promising.

CHAPTER TWO

HYPOTHESES AND METHODS

A. Aims and Hypotheses

The objectives of this thesis are to investigate Beothuk canoes and to compare them with craft of other North American native groups. A detailed analysis of data on Beothuk canoes should establish the canoe design or designs which were built and utilized and, at the same time, represent an extensive repository of information on this artifact. A comparison of Beothuk canoes with craft of other native groups should elucidate similarities and differences between canoes of different groups and facilitate an interpretation of their significance.

Within the framework of these objectives a series of hypotheses are formulated and tested within the context of the investigations:

i) that Beothuk canoe construction conforms to traditional North American bark canoe building methods;

ii) that the Beothuk constructed canoes of different design for different purposes;

iii) that elements of style in different designs are likely to be retained unless they interfere with construction or function;

iv) that the uniqueness of Beothuk canoes is based on particular hull shape and construction attributes which can be identified in a detailed comparison with canoes of other North American groups;

v) that it is possible to postulate communication between native groups and diffusion of technical knowledge if craft of different groups show extensive similarities in structure and design.

B. Methods

1) Sources of Information on Beothuk Canoes

Relatively few Beothuk artifacts have been found and preserved and the volume of written sources documenting aspects of Beothuk culture is very limited. To expand the available information base a systematic search for additional data was made in a large number of museums and archives and in private collections. North American and European institutions which were thought to be the most likely depositories of relevant materials were visited or otherwise contacted between 1975 and 1980.

Major targets in Canada were the Newfoundland Museum, the Provincial Archives of Newfoundland and Labrador, the A.C. Hunter Library and the Centre for Newfoundland Studies, Memorial University of Newfoundland, all in St. John's; the National Museums of Canada, National Museum of Man and the Public Archives in Ottawa; the McCord Museum in Montreal. A further fifteen institutions in Canada, the

United States and Germany were contacted to elicit information on Beothuk artifacts or on relevant documents.

During a sixteen-month sojourn in the United Kingdom, printed, manuscript and artifact collections were searched in the Public Records Office, the British Museum, the National Maritime Museum, the Museum of Mankind, the United Society for the Propagation of the Gospel, Lambeth Palace Library and the House of Lords Record Office, all in London. Visits were also made to the Hydrographic Office, Taunton; the Dorset Record Office, Dorchester; the University of Nottingham, Nottingham; the Royal Scottish Museum and the National Library of Scotland in Edinburgh. Forty-two other institutions were either visited or contacted by letter or telephone.

In addition, access was gained to four private artifact collections as well as to the papers of J.P. Howley, author of the classic source book The Beothuks or Red Indians (1915) and to the Cartwright Papers in Johannesburg, South Africa.[1]

A considerable volume of new material relevant to Beothuk culture and presence in Newfoundland was collected. It included a nucleus of documentation on Beothuk birch bark

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[1]Some of this research was funded by grants from: Institute for Social and Economic Research, Memorial University of Newfoundland (1976); Dean of Graduate Studies, Memorial University of Newfoundland (1976/77); Urgent Ethnology Contract, National Museums of Canada, National Museum of Man, Ottawa, Contract No. 1630-7-440 (1977); Vice President's Fund, Memorial University of Newfoundland (1980).

canoes in the form of illustrations, reports on construction details, an as yet unknown complete replica and contemporary references to circumstances of their use. It was decided to make a thorough investigation of this artifact because canoes were not only important within the Beothuk culture but their design was also unique among North American birch bark canoes and considered to be diagnostic for the Newfoundland Indians.

Old and new source material was integrated and the evidence was divided into three subgroups.

The first group comprises documents with careful observations on specific features and attributes of canoe shapes and construction details. These include a report by John Guy from 1612, accompanied by a small drawing that came to my attention in 1977 and has since been published by Sturtevant (1981); a reference to construction details of Beothuk canoes, published by Richard Whitbourne in 1620; and an extensive set of reports written by John Cartwright between 1768 and 1773, including three drawings of canoes (some of this material was analyzed previously: Marshall, 1977).

A second group consisted of contemporary reports containing fragmentary, sometimes secondhand information on general features of Beothuk canoes, on circumstances of their use, on areas and frequencies of sightings and the number of occupants.

The third group includes four partially or fully finished miniature birch bark canoe replicas. Of these, two unfinished replicas from a burial in Pilley's Tickle, Notre Dame Bay, are in the collection of the Newfoundland Museum; one well preserved and relatively large replica from a burial at Red Indian Lake is in the collection of the Royal Scottish Museum, Edinburgh, U.K.; and one completed replica made by Shanawdithit, a Beothuk female, in the 1820's, is in the collection of the National Maritime Museum, Greenwich, U.K.

The replicas in the Newfoundland Museum were examined and measured for this thesis.

The replica in the Royal Scottish Museum was examined in 1977. Some of the measurements were later made by the curator of Ethnography at the Royal Scottish Museum, Miss Dale Idiens. Miss Idiens also filled out a work-sheet questionnaire, checked a prepared list of attributes for accuracy and provided an outline drawing of one canoe side.

The replica in the National Maritime Museum was investigated and photographed in 1976. An outline drawing of one side and additional details were provided by Captain N.E. Upham, Curator of Models. Further measurements and photographs were made by W.H. Marshall, who also filled out a prepared set of work-sheet questionnaires. A photograph of the replica has since been published by Reynolds (1978: 104).

2) Data on Canoes from Other Groups

Information on other canoes was extracted from written descriptions, line drawings, photographs and specially designed questionnaires. The main source was Adney and Chapelle's The Bark Canoes and Skin Boats of North America (1964). This publication is based on Adney's collected information on canoes, models and literature from various ethnic groups or regions of North America which he had accumulated since the 1880's. Adney described canoe forms prevalent among certain people and in given areas of similar environmental adaptation, and did not rigidly assign canoe "types" to specified ethnic groups. This flexibility allowed for variations within ethnic groups and took into account cultural exchange in border areas. Adney's designations of canoe forms for named ethnic, or as he called it "tribal", groups are considered valid and accepted for this study.

In the course of working with Adney's material a drawback of this source became apparent. Adney was particularly familiar with canoe forms of Indian groups of the eastern seaboard and the central region of northern North America. His data on birch bark canoes of the north western areas were based on substantially fewer samples and are not as representative. When a preliminary analysis indicated that the north western canoes and related kayak forms were of interest in this study, further information on these canoe forms was collected so as to create a broader

comparative base and to take in as many variations as could be found.

Enquiries with the British Museum, London, U.K.; the Smithsonian Institution, Washington, D.C.; the Museum of the American Indian, Heye Foundation, New York; the Peabody Museum of Archaeology and Ethnology, Cambridge, Mass.; and the National Museums of Canada, National Museum of Man, Ottawa, yielded a considerable list of canoes and canoe models available in these collections. Unfortunately, it was not possible to obtain more than a minimum amount of information on even a fraction of them. Specially designed work-sheet questionnaires were dispatched to be filled out by museum staff but due to staff shortages, absence of specialists, or difficulties of access to stored items, the information actually made available was quite limited and could not be double-checked for errors. Consequently, this method of collecting data placed constraints on the extent and possibly also on the accuracy of the tabulations.

No attempt was made to examine an equal number of samples from each area because the objective was to compare different attributes with those of Beothuk canoes and not to compare canoes of other groups to each other. It was considered more important to locate the areas of occurrence of particular attributes than to count their frequencies. When additional information was sought, those canoes were selected which promised either to reveal new attributes or to clarify uncertainties about specific structural aspects.

Consequently, the information from Adney's book was supplemented selectively.

Eskimo kayaks, which were originally deemed to be beyond the concern of this comparative study, became more relevant as the work progressed; eventually some attributes of skin kayaks were included in the tabulation. A major source of information was Eugene Arima's research on different Asian and Eskimo kayaks (Arima, 1975). Arima categorized kayaks according to major designs which coincide with specified areas. This division into regional groups was adopted after consulting most of his original sources. Arima's material was supplemented with samples from Chapelle's "Arctic Skin Boats" (Adney & Chapelle, 1964:174-211).

Other literature on bark canoes and skin craft was consulted as a control. However, the originally used sources contained as much if not considerably more detail than the additional articles, and no significant differences or inconsistencies were found.

3) Methods of Tabulation

In order to make comparisons between canoes, the major features of each were examined systematically. They were listed in the sequence in which they are usually incorporated into a canoe during construction. Each feature was broken down to its smallest identifiable characteristics, termed attributes, which were then tabulated. In this

manner features are identified by their attributes. The following summarizing list shows the type and sequence of features and the number of attributes that was eventually listed for each:

HULL FEATURES:	NUMBER OF ATTRIBUTES Other canoes	Beothuk canoes
a) measurements	3	31
b) lines in side profile (bottom sheer, end section)	28	20
c) beam and depth	7	4
d) lines in end profile	12	3
e) lines in cross section	11	3
STRUCTURAL FEATURES:		
f) materials	17	9
g) building frame	1	
h) keelson	14	5
i) inner gunwales	22	9
j) thwarts	17	9
k) bark cover	19	5
l) lashings	16	6
m) outer gunwales	7	2
n) stempieces and construction of end sections	26	2
o) sheathing	28	7
p) ribs	22	6
q) headboards	9	1
r) gunwale guards	7	11

STRUCTURAL FEATURES: (cont'd.)	NUMBER OF ATTRIBUTES Other canoes	Beothuk canoes
s) fenders	3	5
t) gumming of seams	1	1
u) decorations	17	1
OTHER INFORMATION:		
v) ballast	1	1
w) paddles/oars	4 types	2 types
x) sails	1	1

The tabulation of Beothuk canoe attributes is based on four reports accompanied by four illustrations and on a detailed examination of four birch bark replicas (Tables V and VIII).

For comparative purposes sixty-two bark canoes and kayak desighs of other North American groups, listed and referenced in Table IX, were analyzed and their attributes tabulated. Canoes numbered 1-12, 15, 17, 23, 25, 26, 29-32, 35-40, 47, 49-51, and kayaks 52-62 are considered representative of the designated ethnic groups. Other craft represent only smaller groups or techniques of individual builders and were included as controls; 13, 14, 16, 22, 24, 27, or because they contained additional information: 18-21, 28, 33, 34, 41-48. Consequently, canoes of some areas or design are more extensively represented than others.

The source accounts and drawings do not provide data on every feature and attribute for each canoe, so the tables contain considerable gaps, particularly those recording construction attributes. Hull shapes tend to be described in more detail or could be identified from illustrations so the data here are relatively complete.

Tabulating all noted details causes attribute lists of features, for which many minor variations are recorded, to be excessively long. However, the procedure ensures that in principle all observations are initially taken into account and judgement on their relevance is deferred until the tabulations are completed.

Attributes defining construction details are usually either absent or present. In contrast, hull shape attributes are not as clearly defined and of the sixty-eight listed ones, only forty-six are discrete. The remaining twenty-two are continuous and some require subjective judgement either of canoe forms or of the degree to which they are present. Attributes of the former type are those defining the shapes of the bottom in cross section (flat, rounded, rounded V, V-shaped), the sheer line in end profile (sloping sheer up to centre, sharp lifting sheer to peak), and in side profile (slope or curve upwards, sharp upward turn). More problematic is the tabulation of degrees of presence which may be somewhat subjective. The difficulty here is that such attributes are often judged in relation to the overall size and other measurements of a canoe.

Attributes of this type are rocker (slight, moderate, full length of bottom), width of bottom (narrow, wide), height of canoe sides (low, high), hogging of sides (moderate, strong), height of bow and stern in side profile and cross section (moderately high, very high) and rake (short, moderate, strong).

Beothuk canoe descriptions and replicas can be dated with reasonable accuracy between 1620 and 1824/27. Information on canoes from other groups is not available for equivalent time periods. Data on bark canoes and kayaks were generally not collected until the second half of the 19th century and most of the craft investigated here were built either around 1850 or later. In order to compare canoes that are as contemporary as possible, attribute tabulations of canoes from groups outside Newfoundland are made from "older type" canoes if these were recorded and described.

A fold-out for constant reference with schematic drawings of Beothuk canoes in side profile, end profile, cross section, and inside view with explanatory terms of hull features and attributes is appended to this thesis (Appendix A).

CHAPTER THREE

INFORMATION ON BEOTHUK CANOES

A. Eye Witness Accounts

1) John Guy

The earliest source of relatively detailed information on the Beothuk canoe is John Guy's "The Journall of the voiadge of discoverie made in a barke built in Newfoundland called the Indeavour begunne the 7th. of October 1612 and ended the 25th. November following" (Guy, 1612). Guy, an alderman of Bristol, founded a settlement in Cupids, Newfoundland, in 1610 and acted as its governor. Together with Henry Croute and several other men he set out on an exploration of Trinity Bay in October 1612. Having met with a group of Beothuk Indians and their canoes and having found and expropriated one of their birch bark vessels, Guy was in the position to give fairly accurate data on these craft. Included in his Journall is a drawing with the caption "The picture of the Savages canoa" (Fig. 1b) which clearly illustrates attributes that are considered diagnostic of Beothuk canoes. Guy did not mention the presence of different canoe types and it is therefore assumed that both his description as well as his drawing are valid for those canoes which he observed in or close to Trinity Bay.

Fig. 1. a) Outline of Beothuk canoe in side profile drawn by fisherman George Wells from Exploits Burnt Island in 1886 (Howley, 1915:271); straight bottom, curvature at ends but no rocker, rounded, hogged sheer.

b) "The picture of the Savages canoa" Beothuk canoe illustrated by John Guy in 1612 in "The Journall of our voiadge in . . . the Indeavour begunne the 7 th. of October. . . ." (Lambeth Palace Library, London, U.K., Vol. 250, fol. 412); curved bottom and strong rocker, possibly seam along centreline, pointed, hogged sheer, ends have separate staffs tied on.

the picture of the savages canoa:

Hull shape attributes:

a) Measurements (estimated): Length 20' (610 cm), beam 4 1/2' (137 cm). The canoes were capable of carrying four adults.

b) Side profile: The canoe hull is strongly rockered fore and aft and was likened by Guy to the "form of a new moone." In the illustration the canoe bottom is drawn entirely rounded with no discernible straight, central section. Guy thought that the shape of bow and stern were alike. The sheer is hogged and pointed in the centre, and "in the middle the canoa is higher a great deal than in the bow and quarter" (Guy, 1612). While this wording suggests that the hogged section is higher than the bow and stern, the illustration does not bear out such an interpretation, even if the effect of foreshortening is taken into account. In comparison with a different manuscript, in which this description is differently worded (Howley, 1915:17), it is thought that Guy meant to say: in the middle of the canoa . . . (the sheer) . . . is higher a great deale than in the bow and quarter.

c) Beam: The beam of the canoe is located half way between bow and stern.

d) Cross section: The sides of the canoe flare out from the keel(son) to the gunwales in a straight line, resulting in a V-shaped bottom.

Construction attributes:

f) Materials: Canoes were constructed from thin pieces of dry fir, birch bark and roots. The building materials rendered the canoes remarkably light and Guy estimated that a canoe would weigh a hundred weight (112 lb. or 50.4 kg).

h) Keelson: The "keel" (probably keelson) of the canoes was made of light pieces of dry fir.

i) Inner gunwales: Short lines along the canoe sheer on the drawing indicate the presence of a gunwale.

j) Thwarts: On the illustration the canoe is drawn with four thwarts, one of which is placed in the centre where the hogged sheer comes to a point.

k) Bark cover: Canoes were covered with the outer bark of birch trees, which Guy described as being thinner than boards and having many folds. The illustration suggests a seam along the centre line where the two side panels of the bark hull may have been stitched together under the keelson.

l) Lashings: Lashings were made with quartered roots.

o,p) Sheathing and ribs: All timbers were made from dry fir and they were "applied in the manner of lathes" (Guy, 1612). This remark refers to ribs and sheathing.

v) Ballast: According to Guy's report the Indians would not journey out into the sea unless the weather was

fair and the sea reasonably calm. He said they would always take their canoes ashore with them, a practice which necessitated a fair amount of lifting in and out of the water. No mention of ballast was made. Stem and stern each had a light thin staff about a yard long (91 cm) attached with small roots. Guy said that they served as handles by which the Indians would tow and carry a canoe to shore or into a harbour.

w) Paddles: Guy observed that to propel their canoes the Beothuk used two kinds of oar, which differed in their use as well as in their size and details of manufacture. The shorter one was 4' (122 cm) long, made of one piece of fir and was employed as a paddle. The larger one was approximately 10' (305 cm) long and was assembled from two pieces of beech wood. The handle part was as long and thick as a "halfe pike" with the blade let into one of its end sections; the joint was strongly lashed. Guy suggested that the Indians had made it from a Basque oar. Oars were not mentioned in any of the other reports and, considering that beech is not available in Newfoundland, Guy was perhaps correct.

2) Richard Whitbourne

Captain Richard Whitbourne's long time association with Newfoundland began in 1579 when he first visited this island. In 1620 he published A Discourse and Discovery of the Newe-founde-lande which includes a description of

Beothuk canoes. Whitbourne had been given a bark canoe by sailors from the "Tapson" (probably Topsham), a Devonshire fishing vessel (Cell 1982:193), who had surprised an Indian encampment near Heart's Ease in Trinity Bay and appropriated their three canoes. His description is therefore likely to be reliable and can be summarized as follows:

Hull shape attributes:

Whitbourne likened the canoes of the Beothuk to the River Thames wherries. In 1603 Pring had made a comparison between a New England birch bark canoe and a Thames River wherry stating that the canoe was "open like a Wherrie and sharpe at both ends" (quoted from Kuppermann, 1980:103). Whitbourne may have drawn on this simile.

Construction attributes:

f) Materials: Birch bark, small timbers, turpentine mixture, red ochre.

k) Bark cover: The canoes were covered with birch bark.

l) Lashings: The bark was sewn "very artificially and close together."

t) Gumming: To render the seams watertight, the Indians treated them with turpentine in the same manner in which pitch was used on European ships.

u) Decorations: The canoes were painted with red ochre.

3) John Cartwright

In 1768 Sir Hugh Palliser, Governor of Newfoundland, commissioned Lieutenant John Cartwright R.N. to travel into the interior of the island to find the settlements of the Indians and establish a friendly relationship with them. Cartwright was an intelligent and educated man, sympathetic to the plight of the Indians, a person with insight, and, as an artist, a good observer. To his disappointment Cartwright was unsuccessful in meeting with any Indians. In 1769 he returned to Newfoundland for one more season and again searched for the Beothuk. He once observed a manned canoe through his telescope but failed to catch up with it (Cartwright, 1773 PS. 1770, Ms. V).

Cartwright wrote several reports with appended drawings and maps and recorded detailed observations on Beothuk habitations and artifacts, including canoes. Documents which are drawn upon in this study are Cartwright's letter to Governor Palliser, 1768 (Ms. I); an unfinished map of the River Exploits, 1768 (Ms. II, Fig. 2); a report on the situation of the Indians, 1769 (Ms. III); a sketch of a Beothuk canoe, 1769 (Ms. IV, Fig. 4); an extended report on the situation of the Indians, submitted in 1773 (Ms. V), and a map of the River Exploits, submitted 1773 (Ms. VI, Fig. 3).[1]

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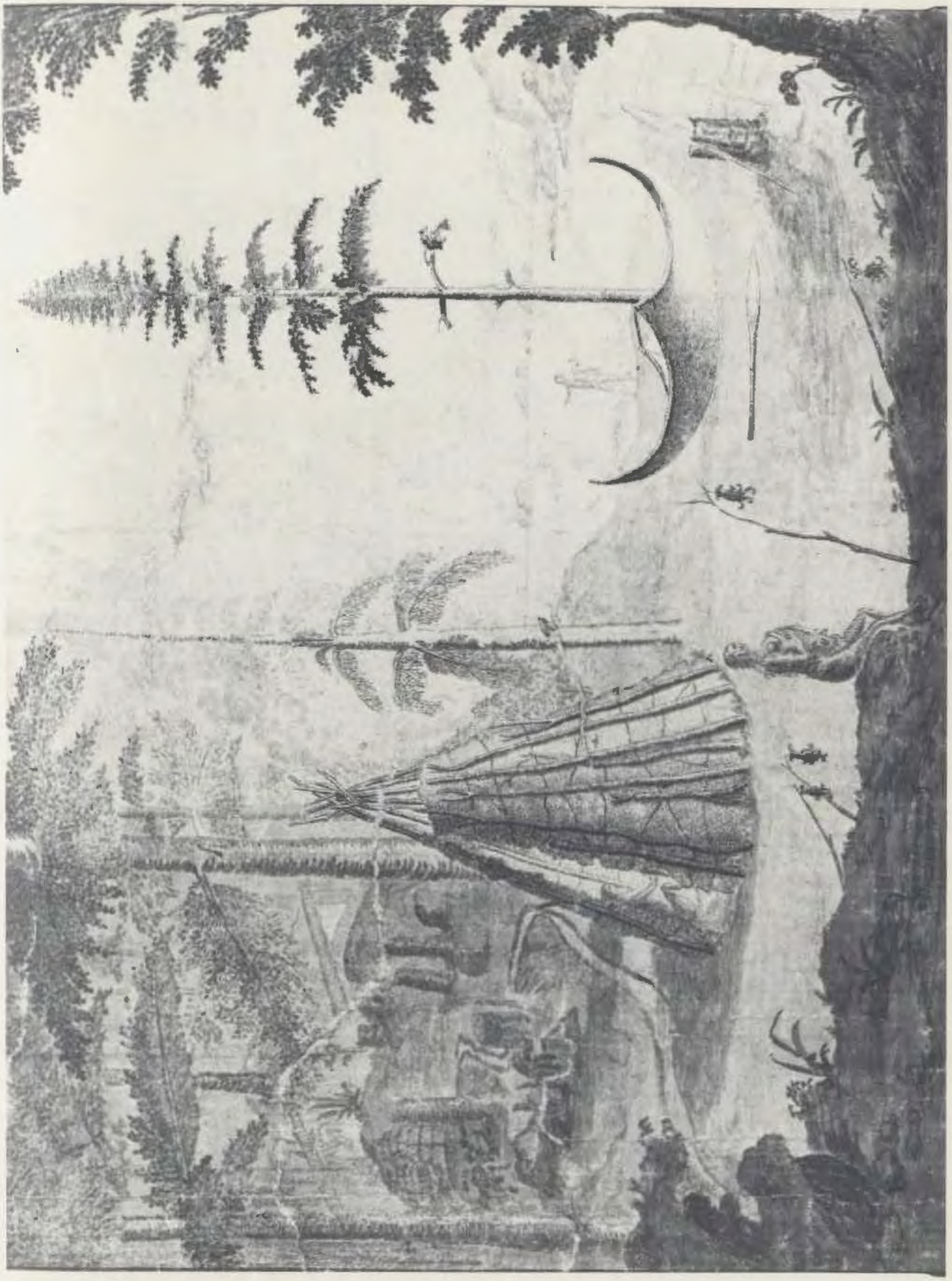
[1] Ms. I: Extract of letter to his Excellency, Sir Hugh Palliser, Governor of Newfoundland, by Lieutenant John Cartwright, dated Toulinguet (Twillingate), 19th. September

Fig. 2. Beothuk camp. Illustration by John Cartwright on his map of the Exploits River, drawn in 1768/69 (Ms. II) (Newfoundland Museum, St. John's, Nfld.). This canoe form corresponds with his description: curved bottom and strong rocker, seam along centreline (not visible here), pointed, hogged sheer, high end sections. It is an ocean going canoe which Cartwright would have observed on the coast. Initially he probably assumed it to be the only Beothuk canoe form and therefore included it in his drawing of an interior campsite.



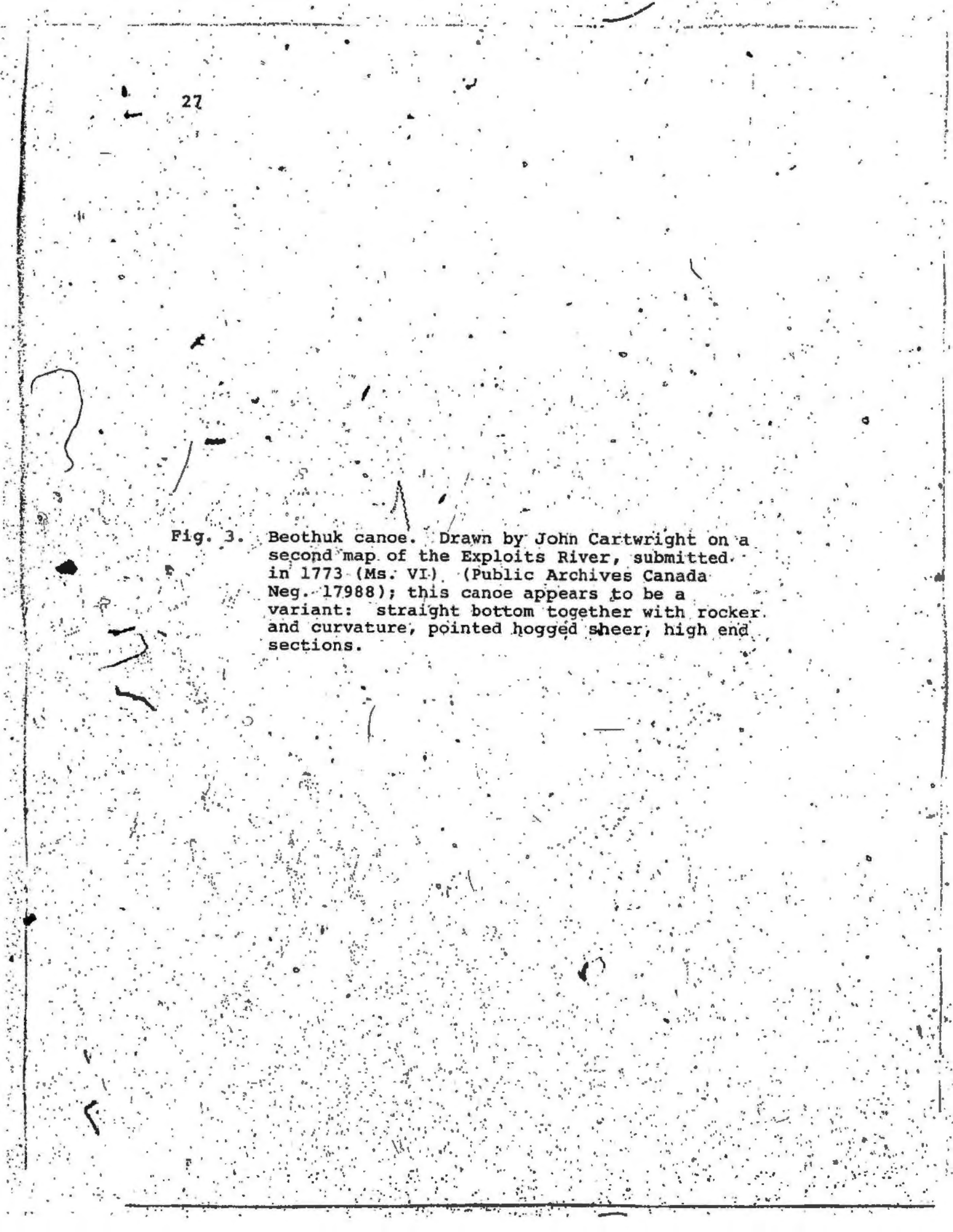


Fig. 3. Beothuk canoe. Drawn by John Cartwright on a second map of the Exploits River, submitted in 1773 (Ms. VI) (Public Archives Canada Neg. 17988); this canoe appears to be a variant: straight bottom together with rocker and curvature, pointed hogged sheer, high end sections.

Fig. 4. Sketch of Beothuk canoe and its midship section drawn by John Cartwright. Frontispiece on a manuscript of his report "Remarks on the situation of the Red Indians . . . ." written in 1769 (Ms. IV); (A.C. Hunter Library, St. John's); midship section demonstrates V-shaped hull form as described by Cartwright.

Midships
Section

A Red Indian canoe of
Newfoundland and a Midship
Section of the same.

It is quite unlikely that Cartwright, without access to a canoe, could have given as detailed a description as he did. He probably saw or even examined a specimen, perhaps one which had been appropriated by the settlers, an occurrence that was referred to in eight different reports (Table I:1, 4, 8, 18, 19, 20, 22, 31). These

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1768 (Howley, 1915:41).

Ms. II: Map, unfinished "A Sketch Of The River Exploits And The Eastend Of Lieutenants Lake And Parts Adjacent In Newfoundland Taken On The Spot By Lieutenant John Cartwright Of Her Majesty's Ship Guernsey - 1768." This map was originally attached to the letter to Governor Palliser, Ms. I. On the lower left hand corner Cartwright has illustrated a small Beothuk camp which includes a canoe and two paddles (Fig. 2) (Marshall, 1977:230).

Ms. III: Report: "Remarks on the situation of the Red Indians, natives of Newfoundland, with some account of their manner of living, together with such descriptions as are necessary to the explanation of the Sketch of the Country they inhabit, taken on the spot in the year 1768." This was written in February 1769 and has a Post Script November 8th. 1769 attached (Howley, 1915:29).

Ms. IV: Drawing of a Beothuk canoe with notation in Cartwright's hand "A Red Indian Canoe of Newfoundland and a Midship Section of the same" (Fig. 4). This drawing is made on a piece of paper 7 x 10 cm and glued onto the front page of an original manuscript of the report Ms. III. (Manuscript in the A.C. Hunter, Library, St. John's).

Ms. V: Report: "Remarks on the situation of the Red Indians, natives of Newfoundland; with some account of their manner of living together with such descriptions as are necessary to the explanation of the Sketch of the Country they inhabit, taken on the spot in the year 1768." The wording of this report is similar to that listed under Ms. III but extended with sections on Indian cultures in general. It is part of a submission to the Earl of Dartmouth, dated 13. Jan. 1773 and includes a Post Script 1770 (Manuscript in Dartmouth Papers, PAC, Ottawa).

Ms. VI: Map. "A Sketch of the River Exploits and the East End of Lieutenants Lake in Newfoundland." This map is part of Cartwright's submission to the Earl of Dartmouth, made in 1773 and includes a drawing of a Beothuk canoe (Fig. 3) (Marshall, 1977:225).

canoes would have given interested parties ample opportunity to study details of design and construction.

Cartwright drew a canoe on both maps of the Exploits River (1768 and 1773). One of these probably accompanied his letter to Governor Palliser in 1768 and shows a canoe with a fully curved hull bottom in side profile (Fig. 2), similar to that drawn by John Guy in 1612 (Fig. 1b). On the second map which Cartwright submitted with an extensive report in 1773, the illustrated canoe has fore and aft rocker but a straight central portion of the keel-line (Fig. 3). In both his reports (Ms. III/1769 and Ms. V/1773) Cartwright gave the same information on hull shapes and construction features of Beothuk canoes which was suitable for the fully curved hull but probably not used for the straight keelson canoe. His inconsistency in depicting the canoe hull has resulted in some confusion although most likely different techniques were used by the Beothuk to construct the hull bottom. Most canoe features as described by Cartwright are probably applicable to either of the two illustrated forms.

Hull shape attributes:

a) Measurements: John Cartwright recorded that a 14' (427 cm) Beothuk canoe had a beam of about 4' (122 cm) and it is assumed that his detailed description concerns the particulars of a 14' (427 cm) canoe (see also Table II).

b) Side profile: The hull bottom of one canoe design is marked by a very strong rocker which renders the

canoe bottom fully curved. On the variant illustrated a few years later, the rockered bottom is modified by including a straight central portion. The sheer is strongly hogged and pointed at the beam; at the bow and stern it rises sharply to high peaks. The highest point of the sides is about two-thirds the height of the end sections. The fore and aft sections are of "similar" shape and the drawings bear out Cartwright's description according to which the canoes are symmetrical lengthwise.

c) Beam: The beam is located amidships and fore and aft quarters are of equal depth and draft.

d) Cross section: The canoe is V-shaped and has

> in a manner no bottom at all, the sides beginning at the very keel(son), and from thence running up in straight lines to the edge or gunwale. (Howley, 1915:31)

e) End profile: The sheer drops from the hogged gunwales and turns up sharply to a very high peak. The V-shape extends from midships into the ends of the hull.

Construction attributes:

f) Materials: The construction of a Beothuk canoe requires large sheets of birch "rind", split spruce roots, gum made of turpentine, oil and ochre, sticks, a keel-rod, thongs, ochre, stones, sods, moss and probably a building frame.

g) Building frame: Cartwright said that introducing the centre thwart into the structure decreased the length of the canoe and resulted in a perceptible convexity

of it, causing a drawing in of the curling ends. He also referred to the sewing of the gunwales to the bark hull before the sides were forced apart by the insertion of the thwarts. Both these techniques suggest that the Beothuk did not construct their canoes around a gunwale-and-thwart structure but used a removable building frame instead.

h) Keelson: The canoe has a keelson made of a rod-shaped piece of wood approximately 1 x 1 1/2" (25 - 38 mm) in diameter. It is thickest in the middle, tapered at both ends and extends into the bow and stern sections, where it curves upwards and acts as inside stem and stern pieces. The keelson terminates together with the port and starboard gunwales at the top of the slender curved extremities of the canoe and is therefore bent in accordance with the outline of the canoe from the highest point of the bow to the highest point of the stern.

i) Inner gunwale: Each of the main or inner gunwales is made of two sticks (saplings?) fitted against each other amidships where the hogged sheer comes to a point. The ends of the gunwales are tapered.

j) Thwarts: The canoe has a main thwart amidships whose ends are "moulded in" with the rising points of the sheer at beam. An end thwart about two fingers wide is fitted in either end section and helps to secure the shape of the canoe.

k) Bark cover: According to Cartwright's report the bark cover of Beothuk canoes consisted of two side

panels sewn together along the centre line below the keelson, resulting in a continuous seam along the centre line of the bottom,

> its form being nothing more than two sides joined together where the keel is to be introduced. (Howley, 1915:32).

This is a completely unconventional method and specifically designed for the canoe form with a fully curved hull bottom. The usual practice among North American Indians is to fold one large bark sheet up at the sides to avoid a seam below the waterline. The rocker is effected by cutting gores in the bark, that is taking out wedge-shaped pieces along the sheer, to allow for the rounded shape of the hull (see also Adney & Chapelle, 1964:45, Fig. 35).

l) Lashings: Sewing and lashing are done with root material, made from spruce roots. The thickness of the split strands varies according to the type of seam for which they are intended. Cartwright did not specify whether the lashings of the gunwale are continuous or in groups.

m) Outer gunwales: On the outside, corresponding to the main gunwales, the canoe has "false" gunwales acting as fenders. They are attached to the inner gunwale with a few thongs. The position of the false gunwales as specified by Cartwright make it likely that they are outer gunwales.

o) Sheathing: The inside of the canoe is entirely lined with sheathing "sticks" that are cut flat and thin

and are 2 to 3" wide (5 - 7.6 cm). The sheathing splints are placed lengthwise in the canoe and are held down by ribs.

p) Ribs: The ribs extend from one gunwale to the other across the bottom where they are sharply bent so as to accommodate the V-shape of the canoe, and they are "secured" at the gunwales.

t) Gumming: The seams are coated with a gum mixure of turpentine, oil and ochre, which renders the canoe completely watertight.

u) Decorations: The Beothuk cover their canoes as well as their garments, utensils and weapons with red ochre.

v) Ballast: Cartwright reported that the Beothuk used stone ballast to float the canoes upright and settle them at a proper depth in the water. Moss or sods served as cover for the rocks on which the Indians would kneel when they paddled. He proposed that the V-shape of the hull and the canoes' light weight would cause them to lie sideways on the water if they were launched without ballast.

w) Paddles: The paddles illustrated on both of Cartwright's maps (Figs. 2 and 3) are slender and pointed. They have a relatively long narrow blade that gradually blends into a plain straight handle. The paddles have no swelling at the end.

x) Sail: In fine weather the Indians set a sail on a very light mast which was fastened to the middle thwart. In Cartwright's opinion the delicate and unsteady bark canoes were not made for sailing.

Table I

Information on Beothuk Canoes from Reports and Documents

Entry Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Source	Aubert	Cartier	Guy Croute	Guy Croute	Guy Croute	Guy	Croute	Whitbourne	de Laet	Capt. Wheeler	H.C. Watts	Jos. Banks	2 furriers
Reference	Hoffman, 1961:31	Biggar, 1925:22	Guy, 1612 Mix 1/66	Guy, 1612 Mix 1/59	Guy, 1612 Mix 1/66	Guy, 1612	Mix 1/24	Howley, 1915:19	de Laet, 1625/40	Cal. of State Papers	Howley, 1915:265	Lysagt, 1971:133	Howley, 1915:43
Year sighted or reported	1507/09	1534	1612	1612	1612	1612	1613	1622	167?	1684	1722/1723	1766	1767/68
Season or month of year			Oct.	Nov.	Nov.					Sum.			Win.
Area													
Ocean	x	x		x	x	x	x	x		x	x		
Lake			x										
River													x

Table I (cont'd.)

Entry Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of canoes	1		1	1		2	1	3			1		1
Number of people in each canoe	7		2			4			4/5		sev.		
Canoes seen in action	x	x	x			x				x	x		
Canoes pulled or stored ashore				x			x	x					
Canoes portaged			x		x								
Canoes b) built r) repaired								b					b
Canoes covered with red ochre								x					
Canoes fold up sideways												x	
Canoes taken away by whites	x			x				3					
Canoes go to Funk Islands												x	
Canoes propelled with single headed paddles						x							

Table I (cont'd.)

Entry Number	14	15	16	17	18	19	20	21	22	23	24	25	26
Source	John Cartwright	John Cartwright	George Cartwright	George Cartwright	William Pitman	Thomas Gilham	William Cull	Richard Richmond	Hicks and Verge	Richard Richmond	John McDonald	settlers at Fogo	settlers at Fogo
Reference	Howley, 1915:32-42	Cartwright, 1768/73	Howley, 1915:47	Howley, 1915:49	Pull.Ms., 1792:40	Pull.Ms., 1792:7	Pull.Ms., 1792:36	Pull.Ms., 1792:14	Pull.Ms., 1792:22	Pull.Ms., 1792:22	Pull.Ms., 1792:1	Pull.Ms., 1792:17	Pull.Ms., 1792:17
Year sighted or reported	1768	1769	1770	1770	1779	1788	1790	1790	1791	1791	1792	1792	1792
Season or month of year	a)win. b)spr.	sum.	Jul.	Jun/ Jul	sum.		sum.	Feb.	sum.	sum.	sum.	sum.	spr.
Area	a)Expl.R. b)N.D.B.	Ladle Cove N.D.B.	Bay o.Expl. N.D.B.	Charles Br. N.D.B.	Shoe Cove N.D.B.	Gander Bay	Indian Cove N.D.B.	Exploits River	Cape Farew. N.D.B.	Charles Br. N.D.B.	Seacoast		Exploits River
Ocean	x	x	x	x	x	x	x		x	x	x	x	
Lake													
River	x							x					x

Table 1 (cont'd.)

Entry Number	14	15	16	17	18	19	20	21	22	23	24	25	26
Number of canoes		1	2	sev.	1	1	3	3	1	1	2		2-4
Number of people in each canoe		5			4+	4			sev.		5	8-10	
Canoes seen in action		x		x	x	x	x		x		x		x
Canoes pulled or stored ashore			x		x	x	2	x	x	x			
Canoes portaged	x												
Canoes b) built r) repaired	r		r							b			
Canoes covered with red ochre	x												
Canoes fold up sideways													
Canoes taken away by whites					x	x	2		x				
Canoes go to Funk Islds.	x		x								x	x	
Canoes propelled with single headed paddles			x										

Table I (cont'd.)

Entry Number	27	28	29	30	31	32	33	34	35	36	37	38	39
Source	Jos. Harnet	William Elliot	Capt. Crofton		Mr. Wiltshier	Capt. David Buchan	Capt. David Buchan	Capt. Gtascock	Triviack R.N.	W.E. Cormack	W.E. Cormack	George Wells	Thomas Peyton
Reference	Pull.Ms., 1792:23	Pull.Ms., 1792:6	CO 194/40	CO 194/43	Tocque, 1878:504	Howley, 1915:75-6	Howley, 1915:77	Howley, 1915:114	Howley, 1915:126	Howley, 1915:190	Howley, 1915:192	Howley, 1915:271	Howley, 1915:282
Year sighted or reported	1792	1792	1797	1803	1810	1810/ 11	1810/ 11	1819	1820	1827	1827	19th cent.	18?
Season or month of year	sum.	Aug.	sum.	Sep.		win.	win.	sum.	sum.				
Area	Ind.Arm N.D.B.	Ragged Harbour	Fogo Isld. N.D.B.	Gander Bay	Green Bay	Exploits River	Red Ind. Lake	Seal Bay	Badger Bay	Badger Bay Gt. Lake	Red Indian Lake	Notre Dame Bay	Expl.River Bushy Pd.
Ocean	x	x	x	x	x			x	x	x		x	
Lake							x				x		
River						x							x

Table I (cont'd.)

Entry Number	27	28	29	30	31	32	33	34	35	36	37	38	39
Number of canoes	1	4		1	1		6	1	1	1	1		1
Number of people in each canoe		3-4		1	5				3				
Canoes seen in action	x	x	x	x	x			x	x				
Canoes pulled or stored ashore					x		x	x	x	x	x		x
Canoes portaged						x							
Canoes b)built r)re-paired													
Canoes covered with red ochre										x			
Canoes fold up sideways								x					x
Canoes taken away by whites					x								
Canoes go to Funk Islds.													
Canoes propelled with single headed paddles													

Map 1. Map of Newfoundland with places and dates of canoe sightings, recorded by contemporary observers (listed on Table I).


LABRADOR
Blanc Saulon
1534
STRAIT OF BELLE ISLE
Quirpon
NORTHERN PENINSULA
WHITE BAY
GREEN BAY
1810
Cape St. Johns
1684, 1792
NOTRE DAME BAY
1797
FOGO
1779
FUNK ISLDS.
1820
1769
Badger Bay
Badger Bay
Gt. Lake
1827
HALL'S BAY
1790
1792
Big Isld.
1819
Charles Brook
1770
Exploits Isld.
1770
1772
1792
1803
1788
Cape Freels
Grand Lake
Exploits River
Grand Falls
1627
1810/11
1768/9, 1790,
1810/11 1792
Red Indian Lake
Gander Lake
BONAVISTA BAY
1507
ST. GEORGE'S BAY
TRINITY BAY
1622
CONCEPTION BAY
1612
1612
St. John's
AVALON PENINSULA
PLACENTIA BAY
0 25 50 75 100 Km

4) Additional Information from Reports and Documents

References to Beothuk birch bark canoes accumulated from the literature and original documents largely concern earliest records, seasons and areas of sightings, sizes of crews, numbers of canoes, storage practices and other references to their use. This information is listed on Table I and the reports are referred to by their entry number.

The first mention of a Beothuk canoe is probably a 1507 record of the "Pensee" from Dieppe, describing the capture of a canoe with its crew of seven on the east coast of Newfoundland. The craft was made of "wicker" and covered with tree bark (Hoffman, 1961:31).

In 1534 Cartier met with seal hunting Indians on the south coast of Labrador near Blanc Sablon. References to their birch bark boats and body painting and the statement that the natives' permanent home was located further to the south indicate that these people may have been Beothuk Indians visiting the Labrador coast on a hunting trip. Both 16th century reports are good evidence that bark canoes were used by east coast Indians at the time of early contacts.

At the beginning of the 17th century Joanne de Laet of Antwerp published a history of the New World (1625). For his description of the Newfoundland Indians he relied largely on Whitbourne's report. De Laet said that,

> they have boats made from the inner bark of trees or of the rind as those in Canada, they are twenty feet long and five and a half wide, weigh not more than one hundred pounds and are made like a new moon, in which they can transport four men; and they carry these with them everywhere. . . .
> (de Laet, 1625:40; trans. Lydia Snellen)[2]

A later extensively revised edition of de Laet's history was published in Latin in 1633 and in French in 1640. In both these texts the Beothuk canoes are described as being 5' (152 cm) wide and capable of carrying five men. As they were very lightweight, the canoes "cut through the water - with their load - at high speed" (de Laet, 1640:16), and were carried by the Indians on their shoulders. No mention is made concerning which additional sources of information were responsible for the change of beam measurement and carrying capacity. Adney stated that de Laet referred to the canoes' sharp keel and the need for ballast to keep them upright (Adney & Chapelle, 1964:94) but neither of de Laet's publications contains this information.

Many references to Beothuk canoes include mention of birch bark as cover material (Table I:1, 2, 6, 8, 9, 12, 14, 16, 37, 39) and the use of split roots (Table I:6, 8, 14, 39) or sinew (Table I:12) for sewing and lashing. They tend to be of an early date, presumably because after 1800 this information was considered common knowledge.

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[2] "haer booten ghemaeckt van basten van boomen ofte schorsen ghelyck in Canada twintich voeten lanck ende vyfdehalf breedt niet over eenhondert pondt swear. ende ghemaeckt alseen nieuwe mane; daer sy vier man in konnen voeren ende draghen die met haer in alle plaetsen . . ." (de Laet, 1625:40).

Areas in which Beothuk canoes were seen correlate with their population distribution according to available historic and archaeological reports. In the 17th century Beothuk canoes were found in Trinity Bay (Table I:3, 4, 5-8, 11), Notre Dame Bay (Table I:10) and were inferred to frequent Placentia Bay (Table I:4). Sightings of canoes in the 18th century were reported from the areas of Notre Dame Bay (Table I:14-18, 20, 22, 23, 27-29) and the Exploits River (Table I:13, 14, 21, 26). After 1800 Beothuk canoes were seen at Red Indian Lake (Table I:33, 37), Badger Bay Great Lake (now South Twin Lake) (Table I:36), and along the Exploits River (Table I:32, 39) as well as in the more sheltered and sparsely inhabited coastal areas of Green Bay (Table I:31), Badger Bay (Table I:35), Gander Bay (Table I: 30), and Notre Dame Bay (Table I:38).

Until the end of the 18th century the Beothuk travelled to the Funk Islands to collect the eggs of the Great Auk, a flightless bird that has since become extinct (Table I:12, 14, 16, 24, 25). The Funk Islands lie out in the open Atlantic 40 to 60 miles from the nearest island or headland where Beothuk groups camped during the summer season. These journeys required considerable navigational skill and were probably made in relatively large canoes.

While the Indians in Trinity Bay in the 17th century were met on the coast in October and November (Table I:3, 4, 6), 19th century reports of settlers, who by then had taken up permanent residence on the coast, refer to

sightings on the ocean only between May and September, suggesting a change in the seasonal movements of the Beothuk (Table I:10, 15-18, 20, 22-25, 27-29, 30).

The number of canoes in different encampments varied. In three cases a single mamateek, the Beothuk term for wigwam, seen by a lake or on the coast had one canoe either stored or in use (Table I:3, 15, 23). The summer camp located on an island, which George Cartwright observed with a telescope, consisted of two mamateeks with two canoes laid up (Table I:16), and the occupants of a camp with three mamateeks at Heart's Ease had three canoes at their disposal (Table I:8). On one occasion a party of four canoes was seen to set off from a single mamateek (Table I:28). Of the two winter settlements which were discovered by search parties one camp was located on the bank of the Exploits River. It had four large mamateeks, reputedly housing approximately one hundred people and three canoes stored nearby in the landwash (Table I:21).[3] A second winter camp at Red Indian Lake had three large mamateeks and six canoes stored in close proximity. These figures suggest that in the summer camps each group which occupied a mamateek had its own canoe. In winter encampments which housed larger groups canoes were more likely shared. Among the Naskapi, for instance, larger canoes were owned by two or more individuals (Turner, 1979:14).

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[3]The sea-shore between high and low tide marks or the shore of a pond or river (Story et al., 1982:297).

On the ocean, canoes were frequently seen travelling alone (Table I:1, 11, 15, 18, 19, 22, 27, 30, 31, 34, 35) indicating that summer fishing or hunting expeditions were often undertaken by a few individuals rather than in larger groups. Only occasionally did several canoes set out together and two, three or four craft were seen on four different occasions. Similarly, the seasonal migration down the River Exploits to the coast was made in groups and convoys, said to consist of two to four canoes (Table I:26).

Few sources report canoe measurements. George Cartwright, who accompanied his brother John on his expedition in 1768 and later travelled in the Bay of Exploits to enquire about the native Indians, said that the canoes differed in size according to the number of persons they were to carry (Howley, 1915:47). By tabulating the number of crew in canoes their approximate size can be extrapolated. Of the eighteen canoes that were sighted on the ocean or in one case on a lake, one canoe each carried one, two or seven occupants; "several" Indians were reported twice, and crews of three to five were seen on eleven occasions. Settlers of Fogo and Twillingate Islands said that canoes usually carried eight to ten people (Pulling, 1792:17). One of them claimed to have seen two very large Beothuk canoes on their way to the Funk Islands with upwards of one hundred Indians in them (Pulling, 1792:1), a figure that was generally believed not to be correct. According to these reports the average carrying capacity was three to five people, though some canoes were apparently large enough to carry seven to ten.

The Beothuk, as did other Indians, carried their bark canoes overland when the need arose. In 1612 a short path leading from Trinity Bay to an inland lake was found and a long portage was followed across the Avalon Peninsula to Placentia Bay (Table I:3, 5). Portage paths were also reported from the Exploits River circumventing several rapids as well as the falls near Grand Falls (Table I:14, 32).

A canoe building site, which was recorded by two different people, was located at "Sewell Point" on the Exploits River (near Bishop Falls) where furriers saw a half-built canoe in 1767/68 and where Cartwright, in the following summer, noted traces of canoe repair or building activities (Table I:13, 14). An unfinished canoe, intended to replace one that had been taken away by settlers, was seen at Charles Brook in the Bay of Exploits (Table I:23); repair activities were also recorded in a small camp on an island in Notre Dame Bay (Table I:16).

Additional observations on canoe features support the description given by Guy, Whitbourne and Cartwright. References to Beothuk canoes collected from documents reflect conditions of use, storage and repairs and add a further dimension to the accumulated information.

B. Canoe Replicas

Four miniature birch bark canoe replicas, all made by Beothuk Indians, are further evidence of their canoe

forms and construction procedures. Three of the replicas come from burials and their function was most likely belief oriented and not concerned with the practical aspects of water transportation. Probably for this reason the replicas are largely unfinished with only a minimum of structural features present. The fourth replica was made by the last known Beothuk woman during her years in captivity and is a relatively complete specimen.

It is recognized that these replicas may not truly represent the building techniques or proportions of full-sized Beothuk canoes, because makers of miniatures may have used techniques or finishes that are not applied on canoes designated for long-term use. Adney found that Indian-built "models" often show simplified construction details not used in actual canoe building (Adney & Chapelle, 1964: 219). Miniature replicas may also not completely conform to the usual canoe proportions or may in some other way include distortions and inaccuracies.

In spite of these potential shortcomings the replicas provide some valid evidence. They come from three different areas and were made at different dates and by different people. It is argued that if attributes and proportions of these replicas are similar, then the replicas were made according to similar mental templates and are therefore--at least to a degree--representative of similar canoes.

1) Two Replicas From a Burial on Big Island

In 1886 a burial of a Beothuk youth was found on Big Island (formerly Burnt Island) in Pilley's Tickle, Notre Dame Bay. It was located in a cave and the grave goods arranged around the body included, among other items, miniature bows, arrows and a "tomahawk" as well as three small birch bark canoe replicas. Information on the number of replicas is not consistent and it is also not clear whether the "tomahawk" was made of iron, stone or wood (Howley, 1915:331, 341, Plates XXXIII, XXXIV). Close by on the same rock shelf were the remains of an adult together with lithic projectiles and iron tools (Howley, 1915:332) which would date this burial to some time in the contact period. The excellent preservation of the perishable items in the undisturbed grave of the youth and its proximity to the burial with iron tools is thought to indicate that both individuals may have been buried within the same century. In the absence of specific evidence a more accurate dating of the replicas is not possible.

The amounts and types of grave goods may reflect the status or the rank of the deceased or of the mourners (Tuck, 1976:86). Of the twenty odd Beothuk burials found altogether only one other grave, namely that of a "chief" and his family at Red Indian Lake contained canoe replicas among a similar variety of grave goods (Howley, 1915:195). It is considered unlikely that the miniature canoe replicas were toys as suggested by Adney (Adney & Chapelle,

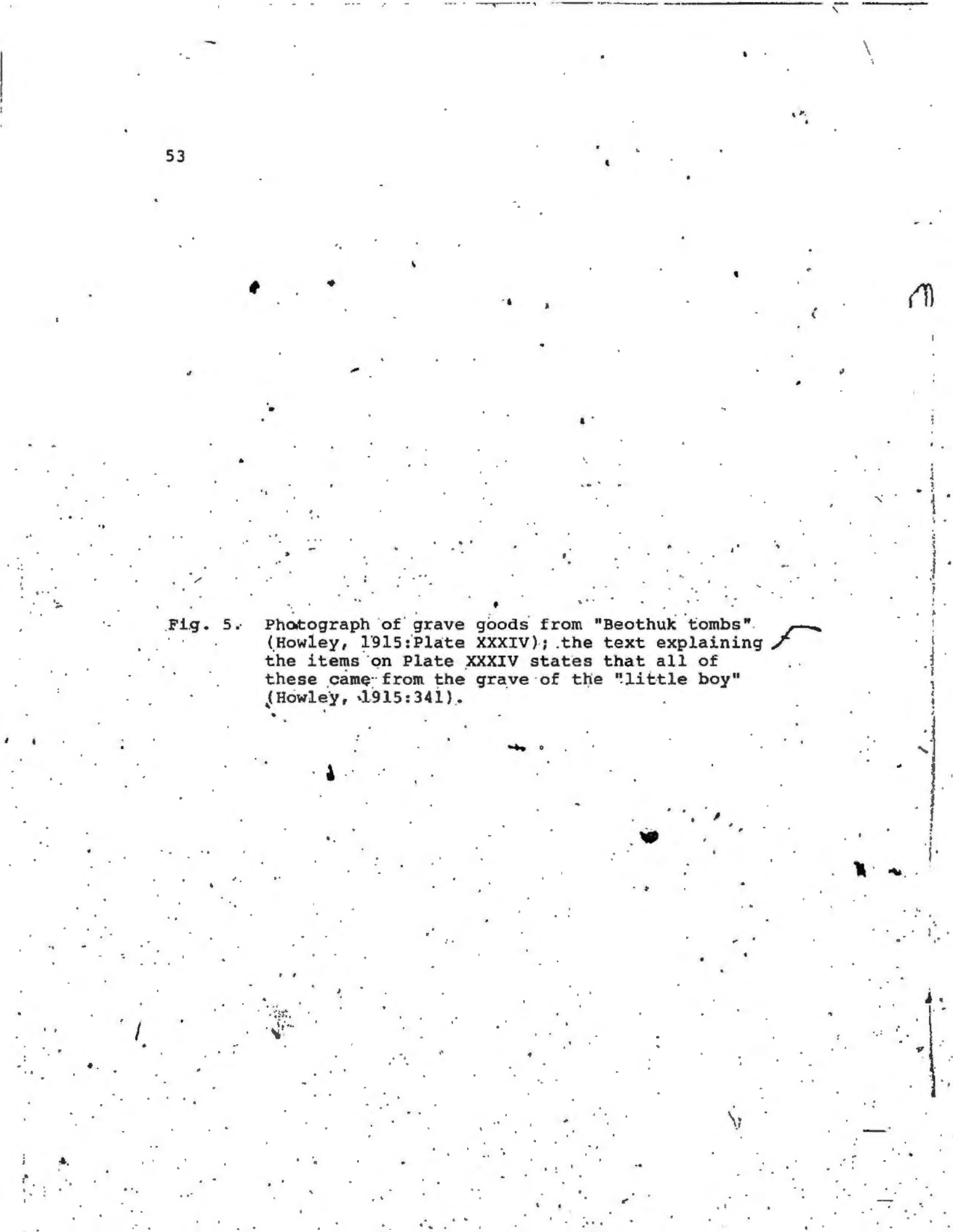
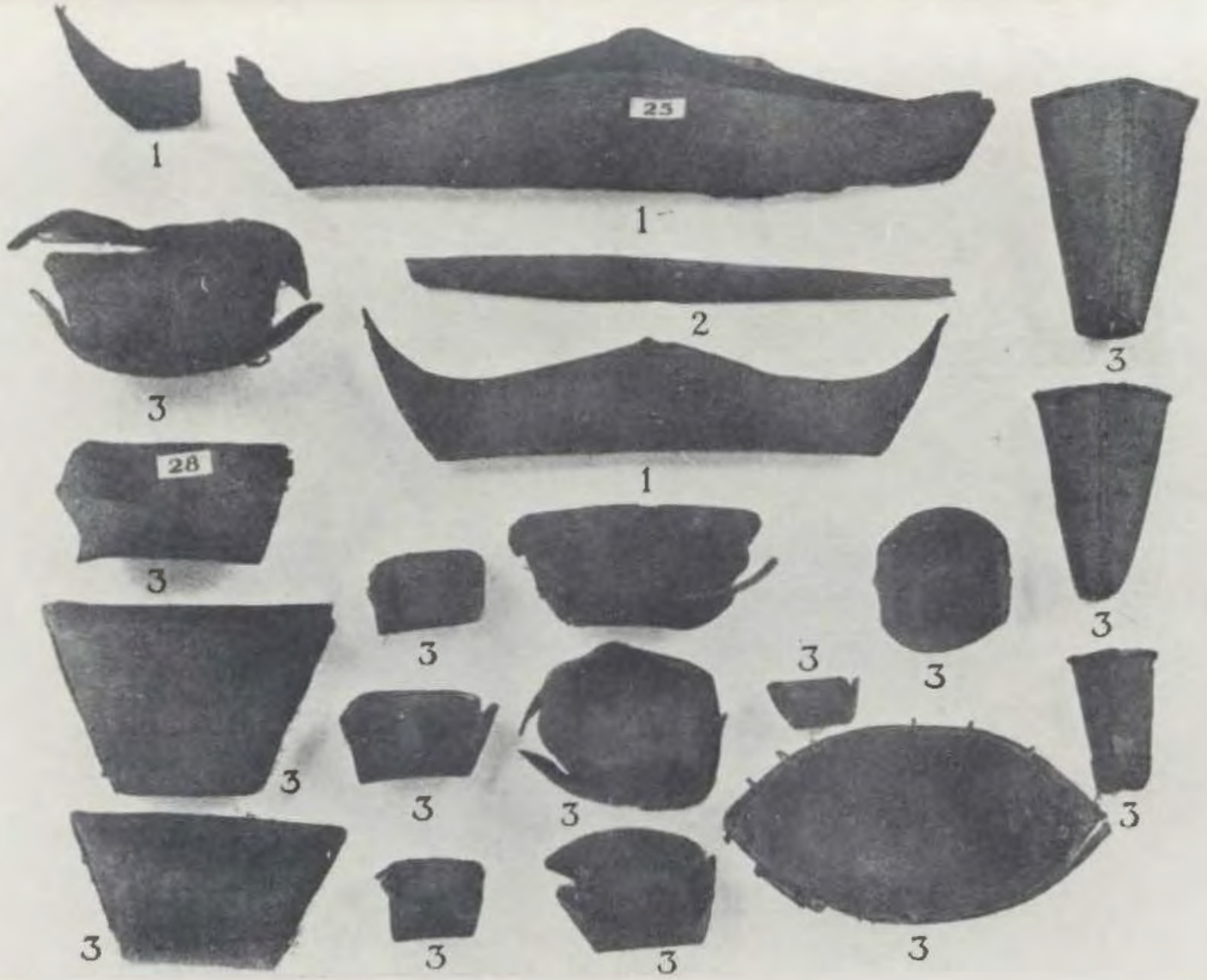


Fig. 5. Photograph of grave goods from "Beothuk tombs" (Howley, 1915:Plate XXXIV); the text explaining the items on Plate XXXIV states that all of these came from the grave of the "little boy" (Howley, 1915:341).



1. Models of canoes made of birch bark.
2. Part of miniature paddle.
3. Drinking cups made of birch bark (Shewan-yeesh).

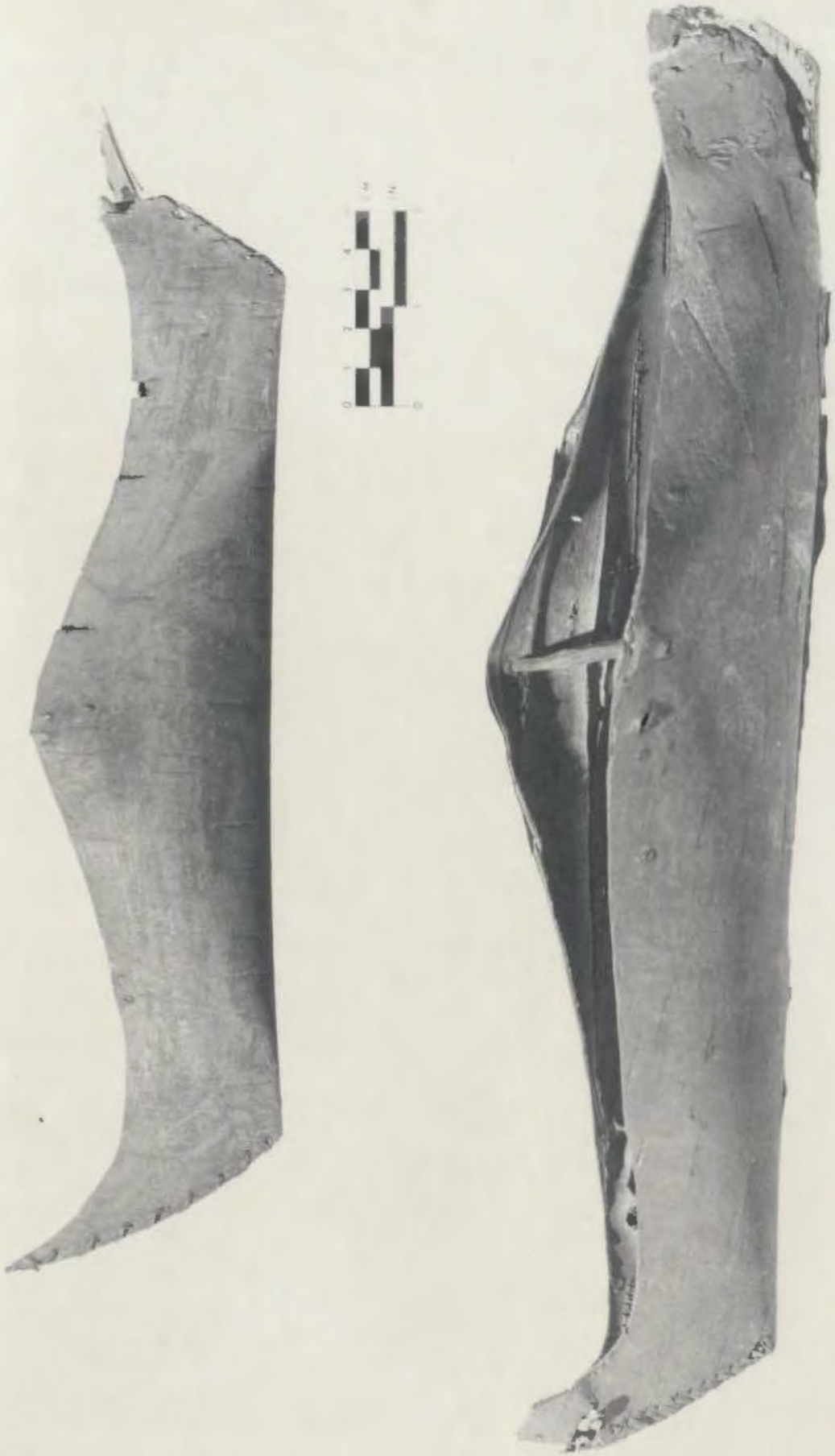
All the above articles are smeared with red ochre, and were all found in Beothuck tombs.

Fig. 6. a) Beothuk birch bark canoe replica II from burial on Big Island, Pilley's Tickle, Notre Dame Bay;

b) Beothuk birch bark canoe replica I from burial on Big Island, Pilley's Tickle, Notre Dame Bay;

(courtesy of the Newfoundland Museum, St. John's, Nfld.)

Straight bottom, no rocker or curvature but angular beam from keel-line into end sections, rounded, hogged sheer, high bow and stern.



1964:95).[4] The canoe replicas in the boy's burial are of different sizes; only two are now preserved in the collection of the Newfoundland Museum (Fig. 6a and b). The presence of a third and smaller one is testified by a photograph (Howley, 1915:Plate XXXIV; see above Fig. 5) which includes the end section of a third canoe replica.

(i) Canoe Replica I

Condition: This canoe replica (Fig. 6b) is in a poor and fragile state of preservation. The drying out process has caused the bark to buckle and warp and on one end it is split and broken along the bottom. The elevations at bow and stern and part of the hogged sheer are missing. One end seam has completely disintegrated. The canoe replica has few structural features.

Hull shape attributes:

a) Measurements: The overall length of the replica is 355 mm but would originally have been greater. Measurements of details are given in Table III.

b) Side profile: The canoe has no rocker fore and aft and the bottom is slightly hogged in the centre. Both end sections rise from the keel-line with a sharp angle. The sheer is strongly hogged amidships but not pointed. At

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[4] Rasmussen (1929:198) reported from the Iglulik Eskimos that the dead were buried with their belongings as well as various articles in miniature such as kayak, sled, harpoon, cups, bow and arrows and no explanation was offered as to the specific significance of the miniature artifacts.

the ends it lifts sharply into slender bow and stern sections. The height and overhang of both ends could not be measured. Though there is no clear indication as to which of the two ends is the bow and which the stern, the width of the broken elevations differ (see Fig. 6b) as does the depth of the two quarters. It is suggested that the greater depth is abaft midlength as noted on the two more complete replicas III and IV in which case the more damaged section of replica I is the bow.

c) Beam: Due to the damaged condition of the replica it is not possible to establish the exact position of the beam. The highest elevation of the sheer is 9 mm off centre towards the stern; the aft quarter has the greater depth.

d) Cross section: The bottom is V-shaped amidships as well as at the ends.

e) End profile: The canoe lines in end profile cannot be analyzed because the replica is too warped.

Construction attributes:

f) Materials: One sheet of birch bark ca. 2 mm thick, a wooden splint, split roots, ochre.

j) Thwarts: One thwart made of a small splint of wood is loosly inserted approximately amidships. It is placed well below the sheer and looks temporary.

k) Bark cover: The replica is made from one sheet of birch bark, the outer side forming the inside of the

craft. Contrary to the usual method the grain is running horizontally.

1) Lashings: The intact end seam is sewn with split root material in a spiral over-and-over fashion, and includes neither a seam batten nor any other support. At the lower end of the seam the sewing starts with a knot and all stitch holes are used only once.

u) Decorations: The replica is covered inside and out with a red ochre substance, so are the seams, the cut edges and the thwart.

(ii) Canoe Replica II

Condition: Canoe replica II (Fig. 6a) is in fairly poor condition. The bark has dried out and curled, causing one side to be strongly warped; it is split in places and small pieces are broken off here and there. Lacking the support of a thwart the sides are collapsed. The replica nevertheless gives a good indication of its original hull shape.

Hull shape attributes:

a) Measurements: The replica is 283 mm long. Detailed measurements are given in Table III.

b) Side profile: The replica has no rocker fore and aft. The warping of the bark obscures the original lines of the bottom but it appears to be slightly hogged. The end sections rise at an angle from the keel-line. The sheer is strongly hogged amidships and rounded and is about

five-sixths the height of the end sections. At either end the sheer rises sharply to high and pointed bow and stern. The end seams curve gently downward but not outward, so that the highest points of the end sections define the overall length of the canoe. The end sections differ with respect to their height and overhang and in accordance with the more finished replicas III and IV the higher of the two is considered to be the stern. The overhang at the bow appears to be 2 mm shorter than that at the stern. This is the reverse of what is found on the other replicas which have the larger overhang at the bow.

c) Beam. The elevation of the canoe sides is highest abaft midlength and this is presumed to be the location of beam. The aft quarter has greater depth than the fore quarter, but the canoe is altogether relatively high sided.

d) Cross section: The canoe is V-shaped.

e) End profile: The replica shows a continuation of the V-shape into the end sections.

Construction attributes:

f) Materials: One sheet of birch bark ca. 1 mm thick, sinew, a wooden splint, red ochre.

j) Thwarts: One loose thwart, made from a wooden splint, could be the centre thwart, but it is considerably shorter than the beam measurement and would have been placed well below the sheer, as is the case on replica I.

k) Bark cover: The hull of the replica is made of one piece of birch bark; its outer side is used for the inside of the canoe and the grain runs across the craft.

l) Lashings: Both end seams are sewn with sinew with over-and-over and occasional cross stitches, rather widely spaced. Each stitch is pulled through a separate hole and the ends of the threads are held in place by knots. A split in the bark is mended in the same manner. No battens are included in any of the seams.

u) Decorations: The canoe is covered with a red ochre substance inside and out, as is the existing thwart.

(iii) Canoe End Portion

The end portion of a third canoe replica from the grave on Big Island (Howley, 1915:Plate XXXIV, lower portion; and see above Fig. 5) is smaller than those of replicas I and II. The angle at the forefoot is ca. 45°, the end seam curves down gently and the highest point is also the most outward point in side profile. Overall the observable attributes are similar to those of replica I and II from the same burial.

2) Replica from Demasduwit's Burial

The collection of the Royal Scottish Museum in Edinburgh includes a Beothuk "model" canoe which, according to the original museum catalogue, was presented together with other Beothuk artifacts by W.E. Cormack to Professor Jameson and by him to the "College Museum" in Edinburgh.

In the report of his journey in search of the "Red Indians" of Newfoundland, undertaken in 1827, Cormack said he had discovered the burial of Demasduwit (also called Wounathoake) on the north west shore of Red Indian Lake. Demasduwit, named Mary March by the settlers, had been taken prisoner by an exploring party in March 1819. In the ensuing confrontation her husband was killed. After Demasduwit's death in captivity in 1820, her body was brought back to a deserted Indian camp. Cormack found her remains in a burial hut which also housed the remains of her husband, believed to be the "chief" of the Indian group, their child and other individuals. The burial hut was evidently a superior type of sepulchre and revisited for the purpose of adding further human remains. The grave goods displayed alongside the bodies included several birch bark canoes and two boat "models" as well as other artifacts (Howley, 1915:241). Cormack took several canoe "models" away with him but only one specimen has been preserved. It does not have all structural features of a full sized canoe though the features that are present display excellent workmanship. In this study it is referred to as replica III (Figs. 7 and 8).[6] While it is likely that the burial hut was mainly the repository of the "chief" and his family,

[6]The two photographs of the replica are the only ones available from the Royal Scottish Museum. Due to staff shortage it was not possible to have the replica rephotographed with a scale or from other angles.

the presence of other remains does not allow a precise dating of the burial and leaves the date of manufacture of the replica undetermined. Its excellent state of preservation suggests that the replica was not older than 20 to 25 years when Cormack found and collected it. A drawing of the outlines of this canoe was published by Howley (1915: Plate III; see below Fig. 9), but in the index mistakenly labelled as "Section of Beothuk Canoe, Cartwright" (Howley, 1915:p. XIII). Several attributes are drawn inaccurately and the measurements are approximations only.[7] This sketch was Adney's major source of information on Beothuk canoes.

(i) Canoe Replica III

Condition: When examined in 1977 the bark cover, gunwales, thwarts and fenders were well preserved. Some of the root stitching, particularly on the end sections of the replica, had disintegrated. The gunwale guards were split in places and had come adrift in parts and on the starboard side at the bow the guard was split off.

Hull shape attributes:

a) Measurements: The replica is 806 mm long and therefore relatively large. Measurements of details are given in Table III.

[7] According to a note in the collection of Howley's private papers, the drawing for Plate III was originally sketched by A. Murray of the Geological Survey of Newfoundland on his visit to the Royal Scottish Museum in 1880/81.

Fig. 7. Beothuk birch bark canoe replica III from Demasduwit's burial hut, Red Indian Lake; straight bottom, no rocker, angular from keel-line into end sections, pointed, hogged sheer, high bow and stern (Royal Scottish Museum, Edinburgh, U.K. Neg. 0418; a photograph with scale was not available).

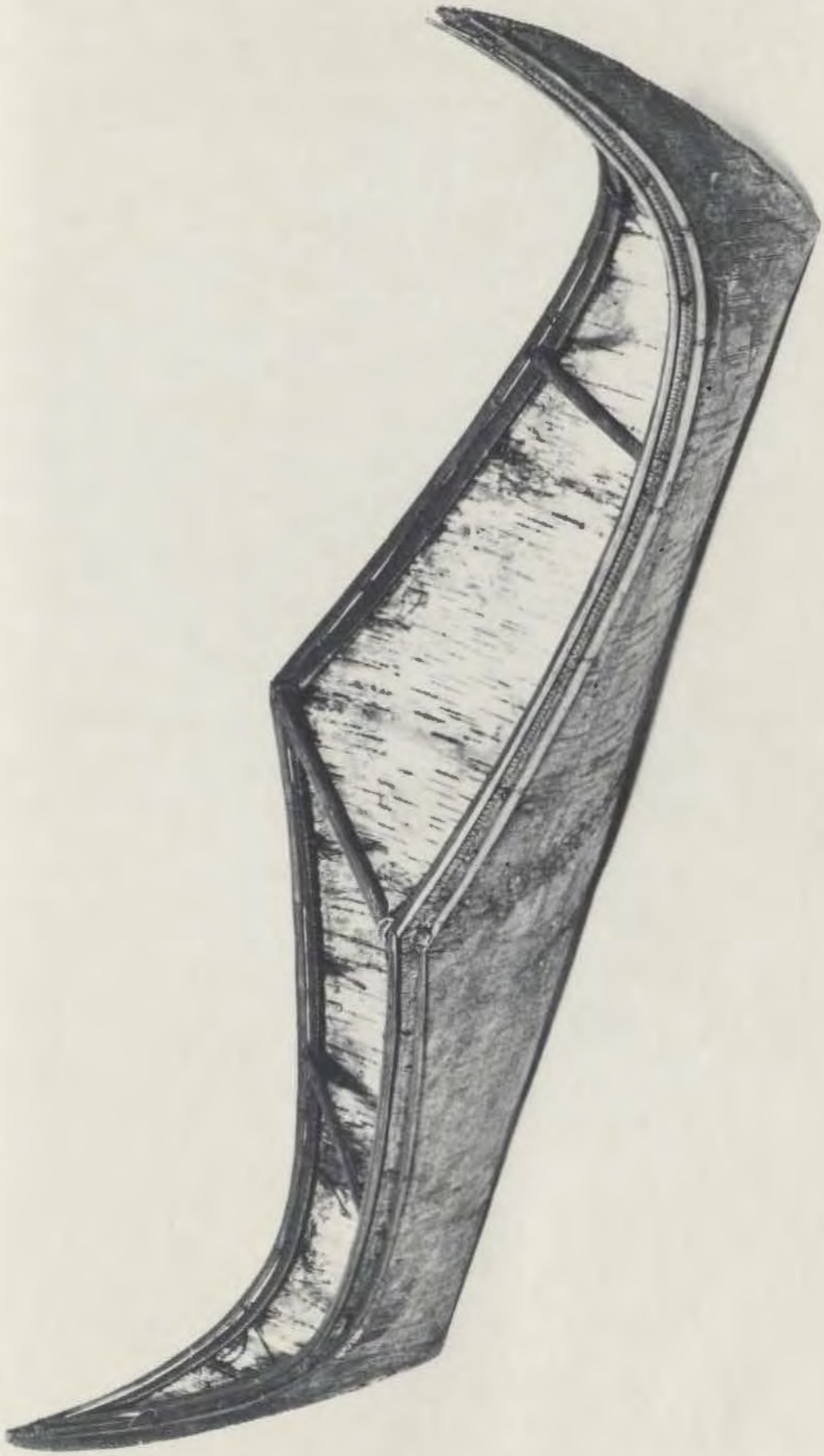
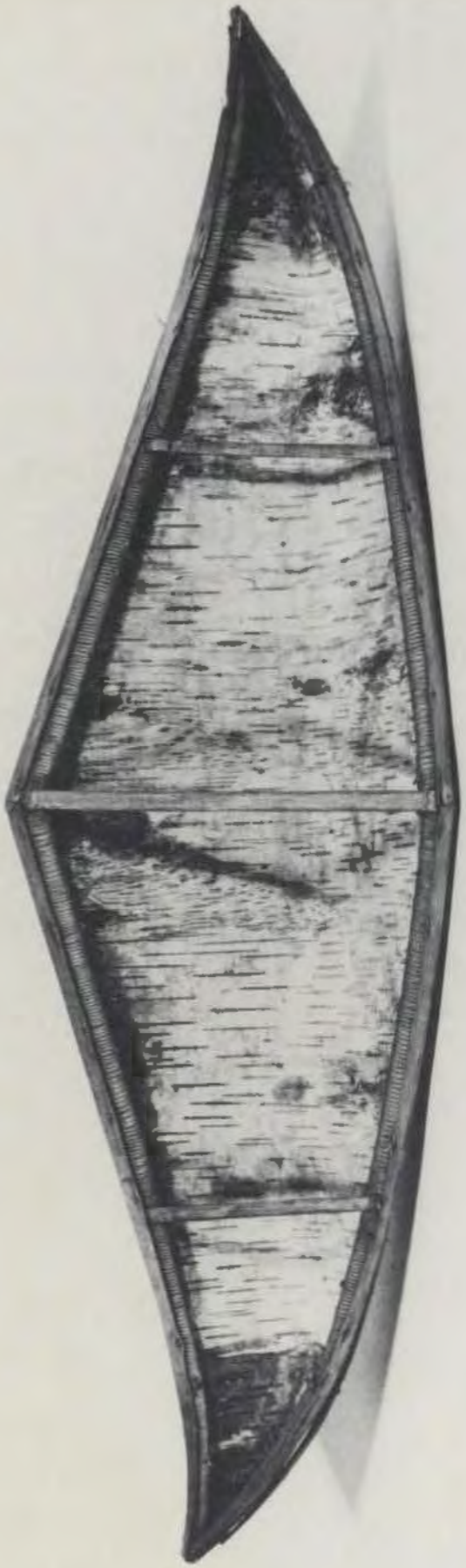


Fig. 8. Beothuk birch bark canoe replica III from Demasduwit's burial hut, Red Indian Lake; overhead view of interior; the canoe is lying on one side (Royal Scottish Museum, Edinburgh, U.K. Neg. 1165).



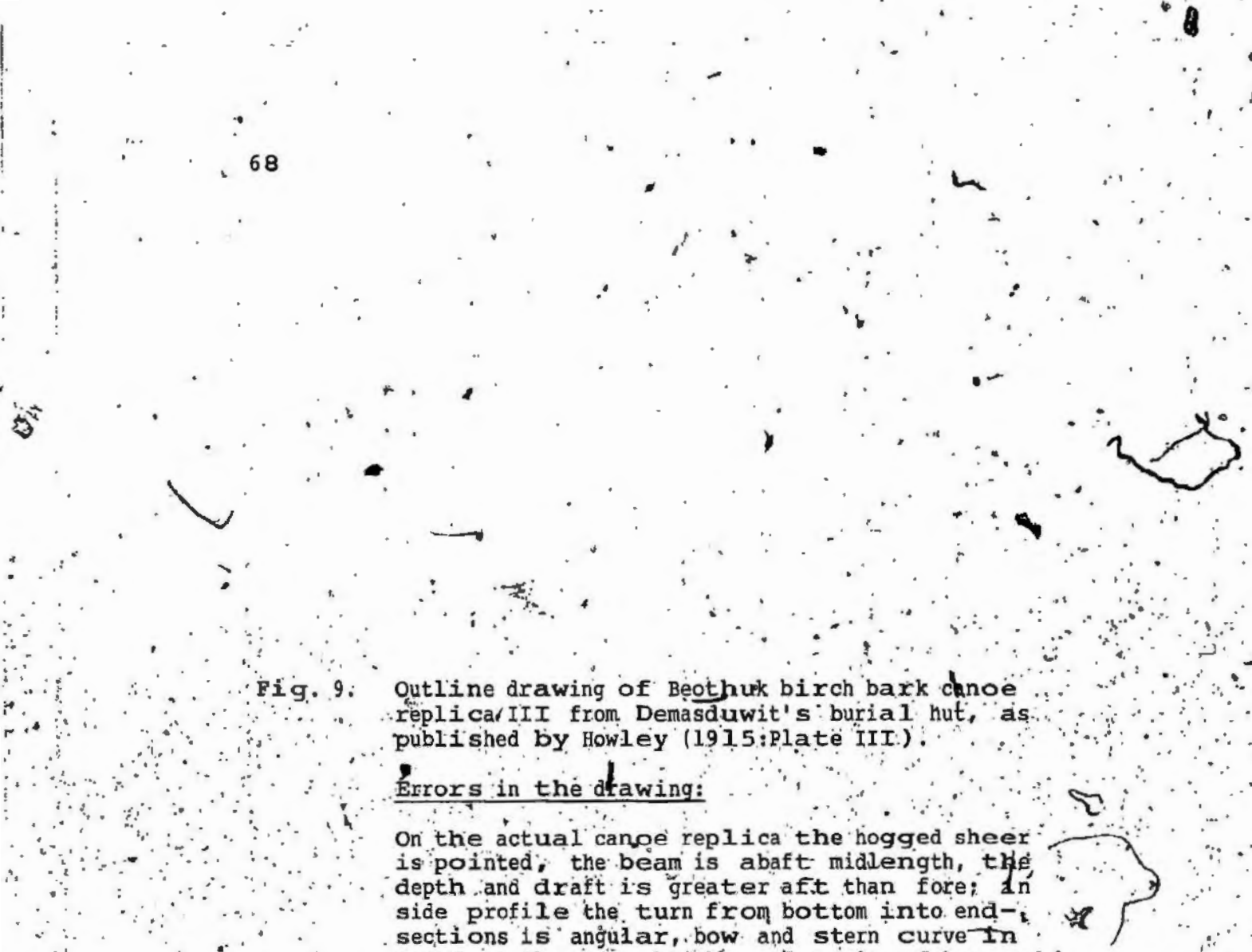
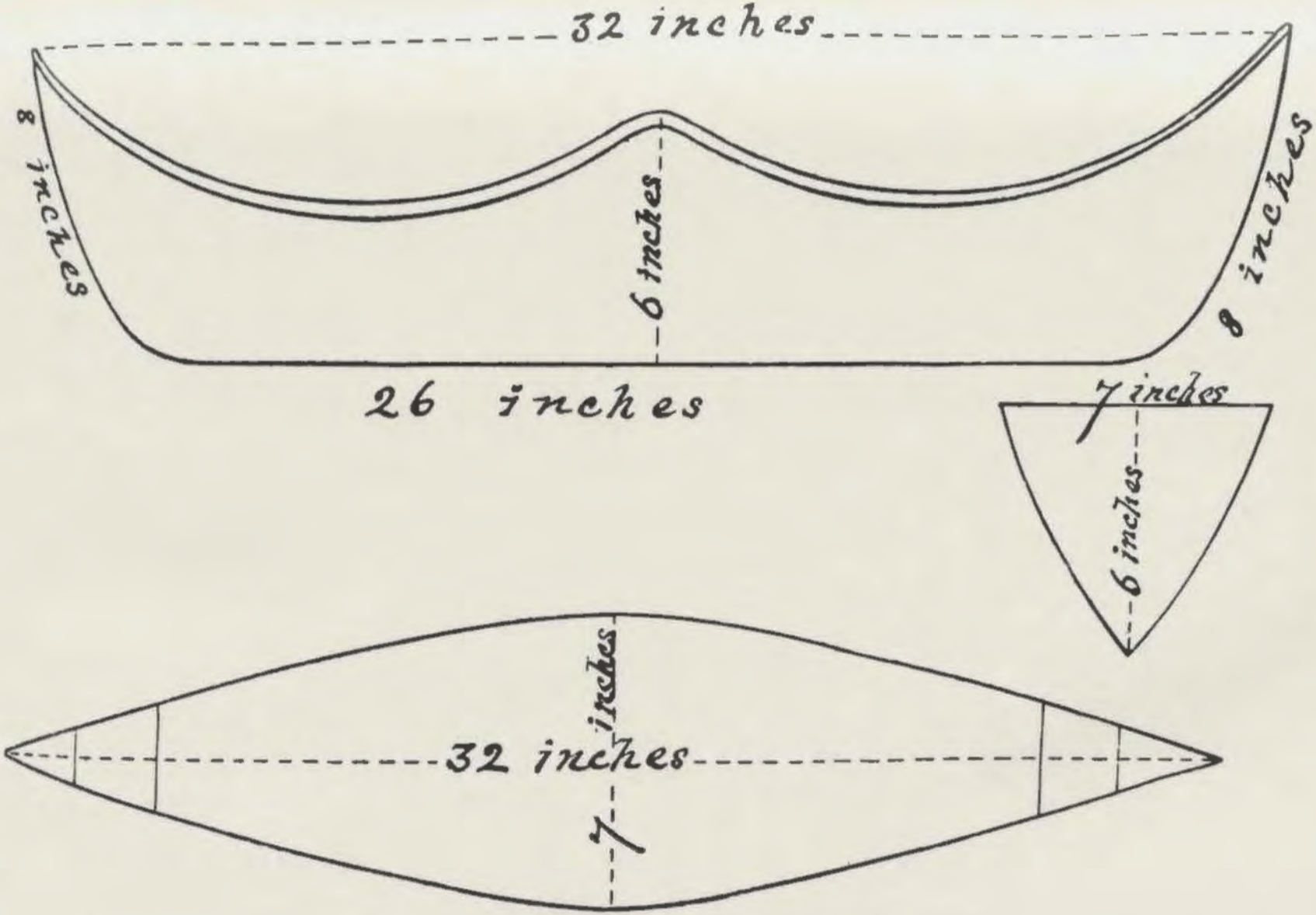


Fig. 9. Outline drawing of Beothuk birch bark canoe replica/III from Demasduwit's burial hut, as published by Howley (1915:Plate III).

Errors in the drawing:

On the actual canoe replica the hogged sheer is pointed, the beam is abaft midlength, the depth and draft is greater aft than fore; in side profile the turn from bottom into end-sections is angular, bow and stern curve inboard at the top, height and angle of bow and stern differ--the stern being higher and steeper than the bow.



Dimensions of Canoe, from model in Museum.

b) Side profile: The canoe has no rocker fore and aft and the centre of the bottom is slightly hogged. Both end sections rise from the keel-line at an angle; at the bow the angle is smaller than at the stern. The overhang of the steeper elevation of the stern section is shorter than that of the bow. The sheer is strongly hogged and pointed at the beam. At either end it turns up sharply to the high peaks of slender bow and stern sections. From the highest point the stem and stern sections curve slightly outward.

c) Beam: The beam is located where the hogged sides come to a point and where the centre thwart has originally been fitted. It is placed abaft midlength and the aft quarter has greater depth and draft than the bow sections.

d) Cross section: The sides flare out nearly straight and render the replica V-shaped.

e) End profile: The sheer drops sharply from the hogged sides and lifts upwards to a high peak. The V-shape of the bottom extends into the end sections.

Construction attributes:

f) Materials: Materials used for this replica are a sheet of birch bark from the paper birch (Betula papyrifera Marsh.), wood (species not identified), split roots, sinew, wooden pegs, and a red ochre substance.

i) Inner gunwales: The inner and only gunwales are lashed along the sheer and follow the pointed hogged sheerline; they rise to high peaks at the bow and stern.

As far as could be ascertained each gunwale consists of one piece of wood which is sharply bent over the point of the hogged section. It tapers in width and height to a point at either end. The port and starboard gunwales are allowed to bear on one another at each end and are pegged and lashed together.

j) Thwarts: The replica has five thwarts, three of which are made of wood and two consist of twisted thongs. The centre thwart is placed at the beam where the hogged sheer comes to a point. Two thwarts each are located in the fore and aft quarter. Their spacing and length differs. The end thwarts, made of thongs, are located where the sheer starts to curve sharply upwards. The wooden thwarts are bevelled in elevation at the ends and lashed on the gunwales but are not perforated for the root lashings. The centre thwart has grooves at either of its ends for the lashings to lie in and is notched underneath so as to fit snugly on top of the pointed gunwale at beam. All three wooden thwarts are parallel-sided and plain and rest on the root lashings of the gunwales.

k) Bark cover: The replica is made from one large sheet of birch bark with the grain of the bark running across the hull. The outer side of the bark sheet is used for the inside of the canoe; it is lightly folded at the bottom to form a straight crease running the length of the canoe bottom, but there is no keelson and no rib structure. At the sheer, the bark has been cut flush along the outside

of the gunwale.

1) Lashings: The gunwales are lashed with split root strands to the bark cover in a continuous, over-and-over fashion. The split side of the roots is turned inside, the lashings are effected edge-to-edge and look neat and uniform. Towards the ends the root strands are thinner than those used for the midsection. Generally the holes in the bark cover are only used for one root strand, except where a new thread is begun. The ends are not tucked under but held in position with knots. The end sections of the canoe are sewn together with a spiral stitch; no root batten is used in the seams and the stitching is relatively fine and spaced.

r) Gunwale guards: Gunwale guards or caps are fitted over the gunwales. They are made of two tapered battens overlapping at the centre thwart: those coming from the bow section are positioned at an angle over those in the aft quarter. This placement is considered an indicator as to which of the two ends of the canoe is the bow, because the gunwale guards would be fitted in accordance with the airflow. Adney, for instance, has observed that if bark was joined with an overlap in the topsides, the exposed edge was always turned towards the stern (Adney & Chapelle, 1964: 42). The gunwale guards are vertically pegged down on the gunwales with wooden pegs and are lashed at irregular intervals. On the curved end sections only pegs are used. The guards are longer and narrower than the gunwales and placed

along their outer edge, thereby avoiding the junction of the thwarts with the gunwales.

s) Fenders: Directly below the gunwales and parallel to the gunwale guards fenders are fitted along the outside of the hull. Each fender is made up of two pieces which overlap slightly below the centre thwart. The fenders are rounded and tapered at the bow and stern. They are fixed with lashings that come through the bark cover from the inside, are wrapped around the fender strakes and are then pulled back inside. The lashings are tied at intervals to the gunwales on the inside.

u) The replica is completely covered with a red ochre substance.

3) Replica Made by Shanawdithit

The collection of National Maritime Museum, Greenwish, U.K., includes a Beothuk canoe replica (Figs. 11 - 16). It was presented to the Royal Naval College by Captain W.H. Jones R.N. of the sloop Orestes and claimed to have been made by Shanawdithit, a Beothuk Indian female.[8] Research into the origin of the replica established that Captain Jones visited Exploits Burnt Island in 1826 and 1827 (ADM.51/3332 Capt. Log, 53/940 Capt. Log), the second

[8] The entry in the 1869 museum catalogue reads: "Canoe made from the bark of a birch tree by Shanawdithit an Indian woman, the last of the Beothic or Red tribe of Newfoundland, and presented by her to Captain Jones HMS. Orestes."

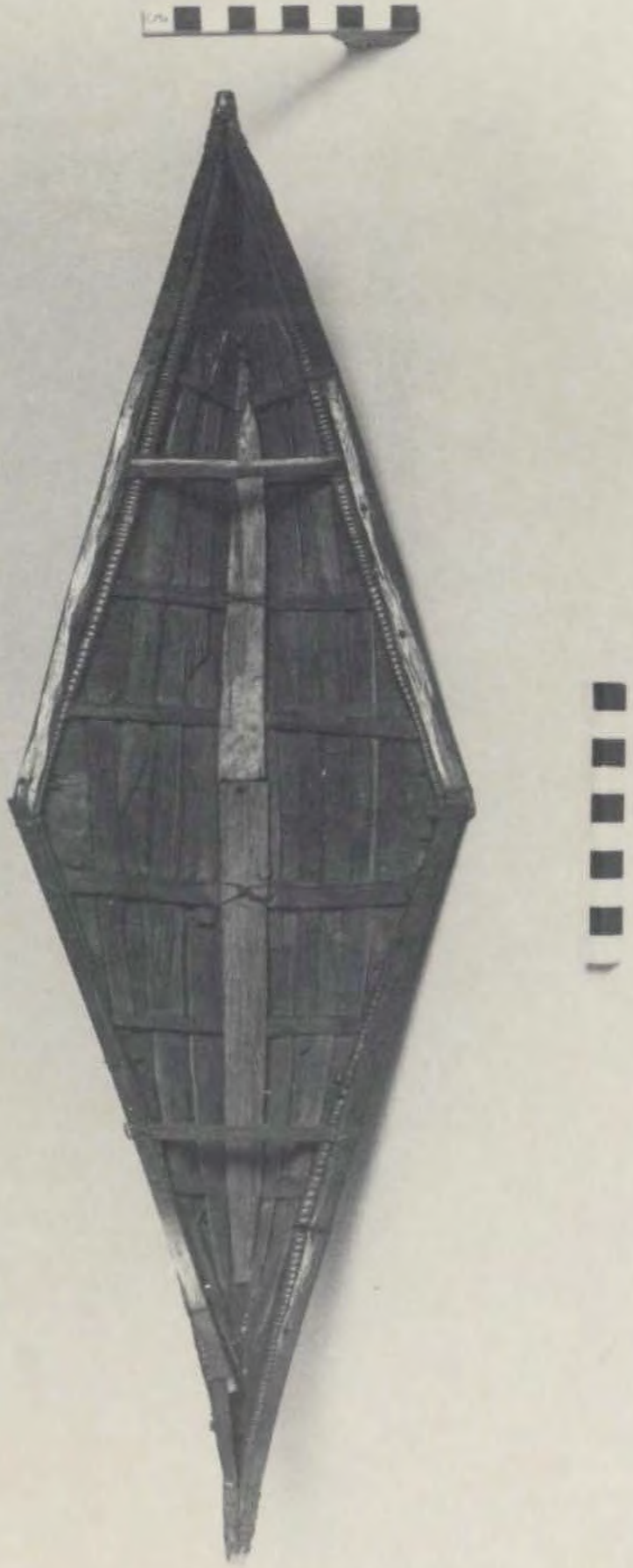
time with Dr. John Englis, Bishop of Nova Scotia, on board. At that time the principal inhabitant of this island was John Peyton, Justice of the Peace, in whose household Shanawdithit, the last known Beothuk, assumed the position of a servant. Under the circumstances it seems reasonable to infer that the Beothuk canoe replica was indeed made by Shanawdithit and was presented to Captain Jones on one of his visits to Exploits Burnt Island. Shanawdithit, who was captured in 1823, would have made the replica before or during Captain Jones' series of visits. In this study it is referred to as replica IV.

The skilful execution of the replica indicates that Shanawdithit was familiar with the making of miniature canoes. Her familiarity with the structural details of a canoe could have been acquired through observation of canoes in use; she may also have played a role in the manufacture or repair of some of them. Wallis and Wallis (1955: 42) who met the Micmac canoe builder Peter Ginnish, in Burnt Church in 1911, reported that Peter's wife was equally competent in building canoes.

During Shanawdithit's lifetime the Beothuk group which she associated herself with lived largely in the extensive watershed area of the Exploits River inland from Notre Dame Bay. Shanawdithit would therefore have been most familiar with the canoe design used in this region. It is suggested that her replica may represent a standard 14' (427 cm) river-hunting canoe; the replica measures exactly

Fig. 10. Beothuk birch bark canoe replica IV made by Shanawdithit ca. 1824/27, side profile; straight bottom, no rocker, angular turn from keel-line into end sections, pointed, hogged sheer, high bow and sheer (National Maritime Museum, Greenwich, U.K. Neg. C 5514 (C)).

Fig. 11. Beothuk birch bark canoe replica IV made by Shanawdithit ca. 1824/27, overhead view, showing keelson under central plank, sheathing splints on either side, held down by sharply bent ribs inserted from port to starboard gunwales across keelson but under central plank, no stem piece in end sections, thwarts resting on gunwales; this model also has finer lines in the fore quarter (National Maritime Museum, Greenwich, U.K. Neg. C 5514 (A)).



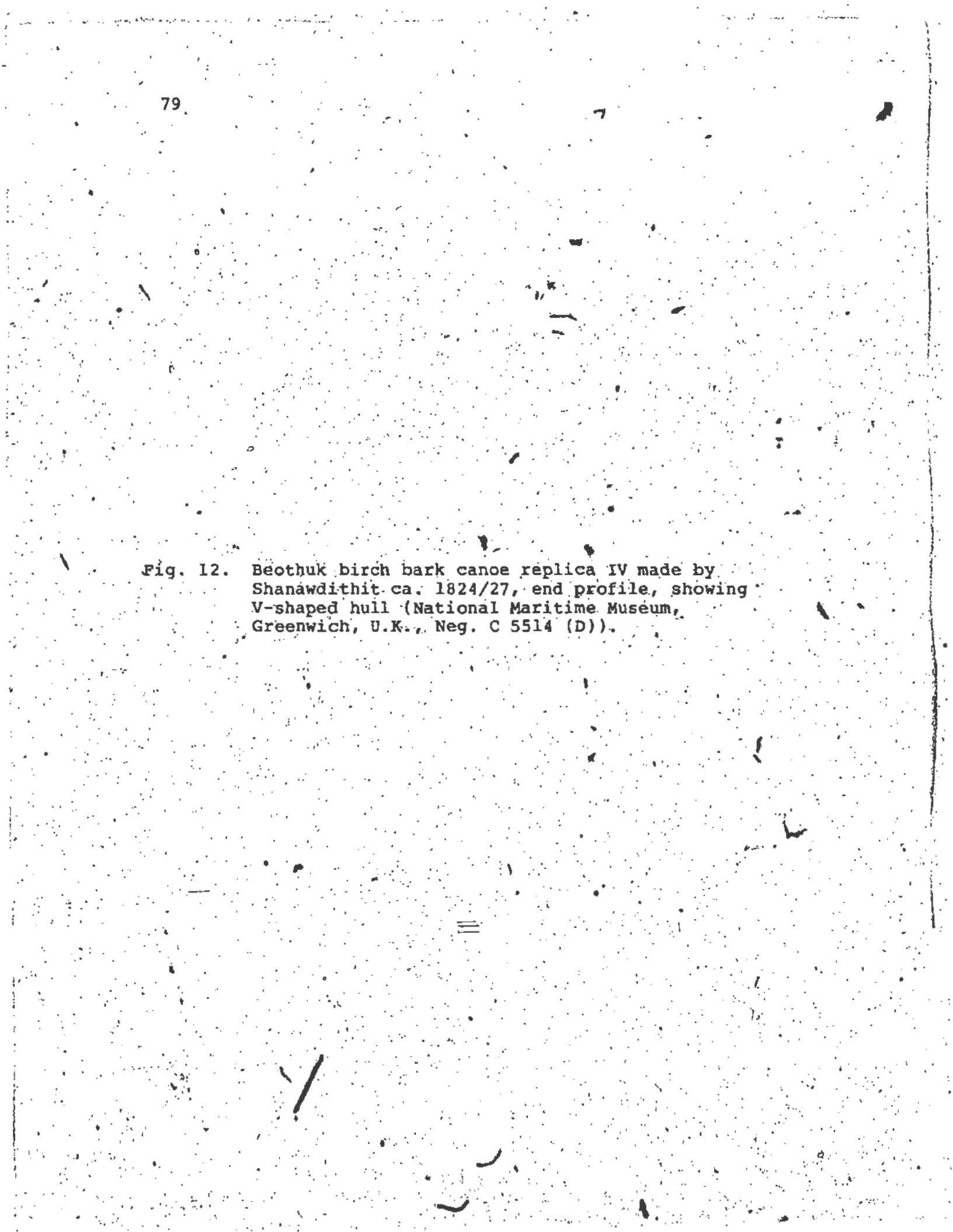


Fig. 12. Beothuk birch bark canoe replica IV made by Shanawdithit ca. 1824/27, end profile, showing V-shaped hull (National Maritime Museum, Greenwich, U.K., Neg. C 5514 (D)).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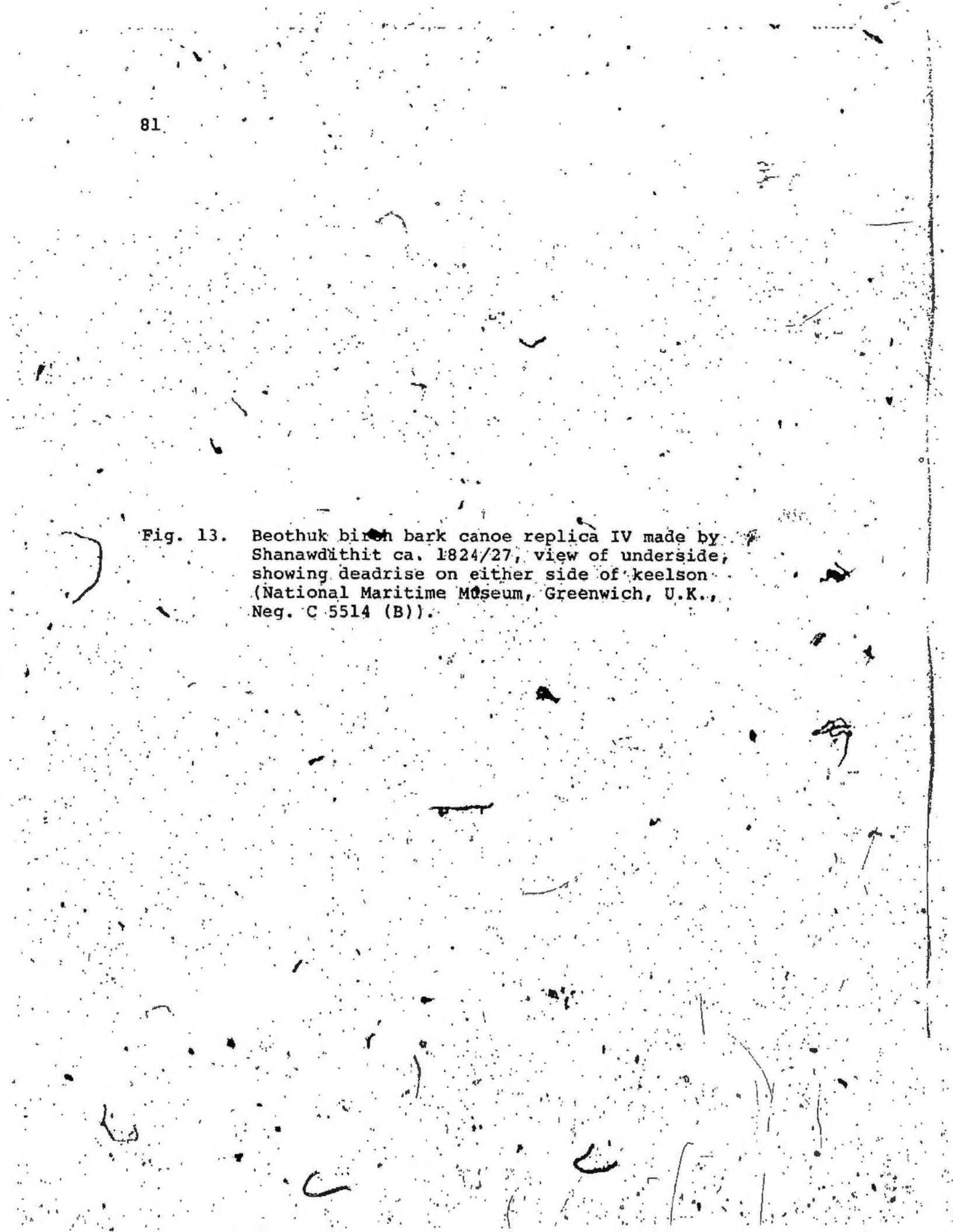


Fig. 13. Beothuk birch bark canoe replica IV made by Shanawdithit ca. 1824/27, view of underside, showing deadrise on either side of keelson (National Maritime Museum, Greenwich, U.K., Neg. C 5514 (B)).

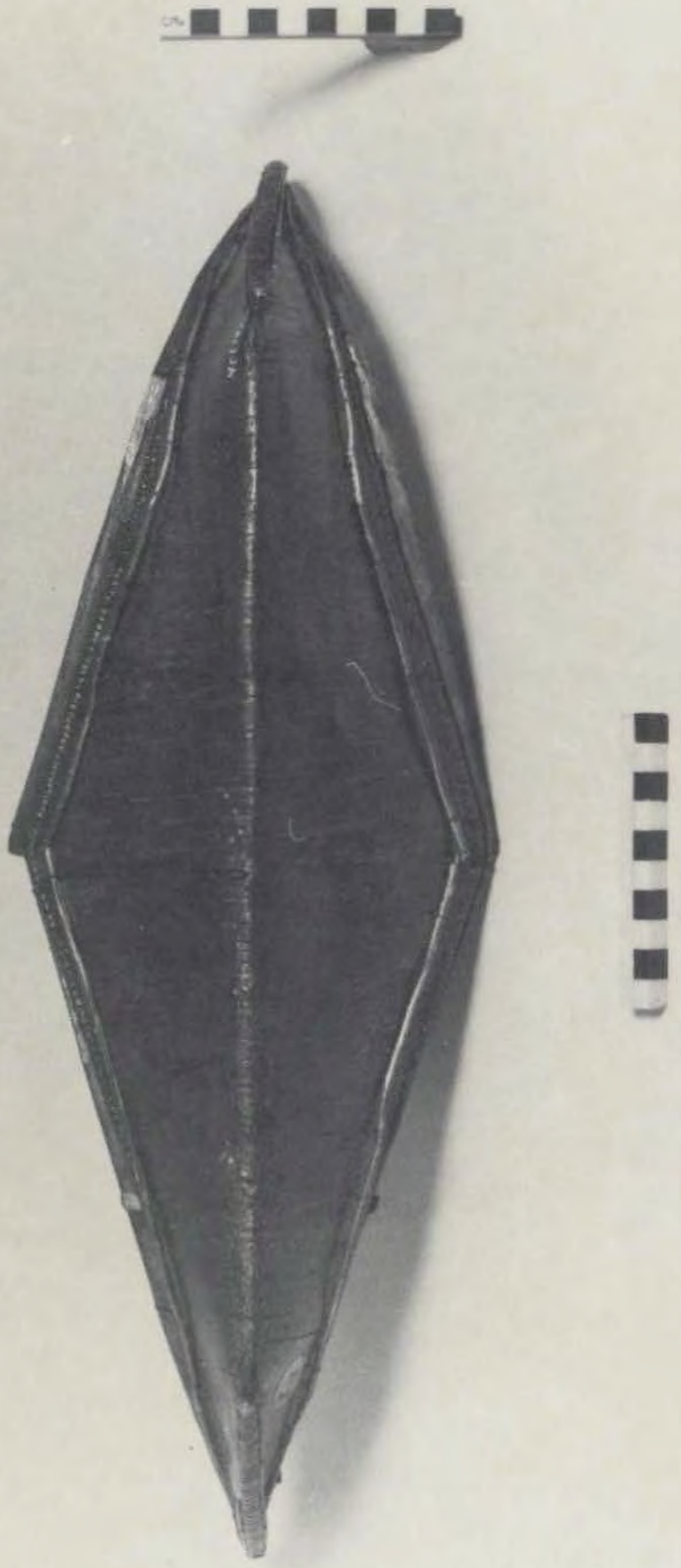


Fig. 14. Beothuk birch bark canoe replica IV.

a) lower portion of end seam, batten broken off at keel-line;

b) stern gunwales joining at the top and forming seam batten over end seam.

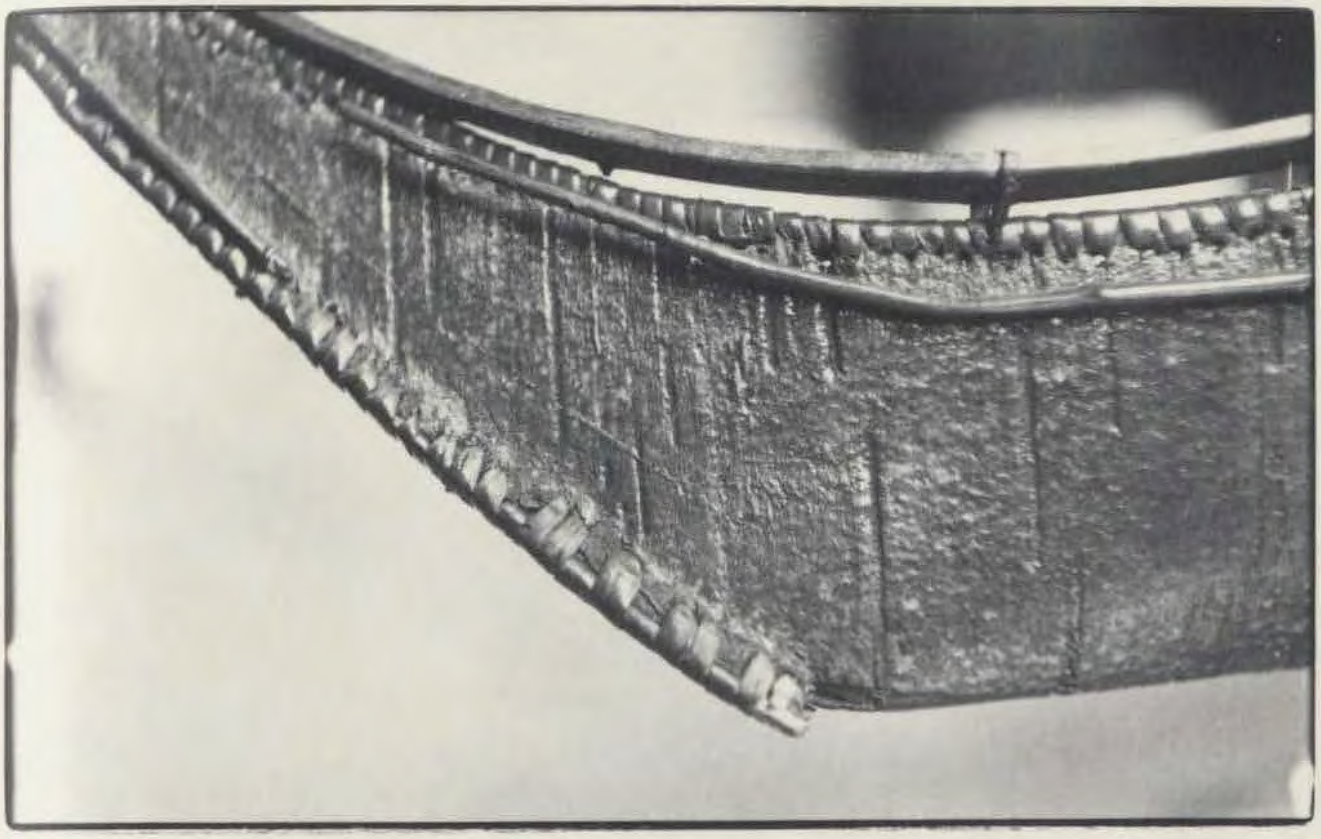
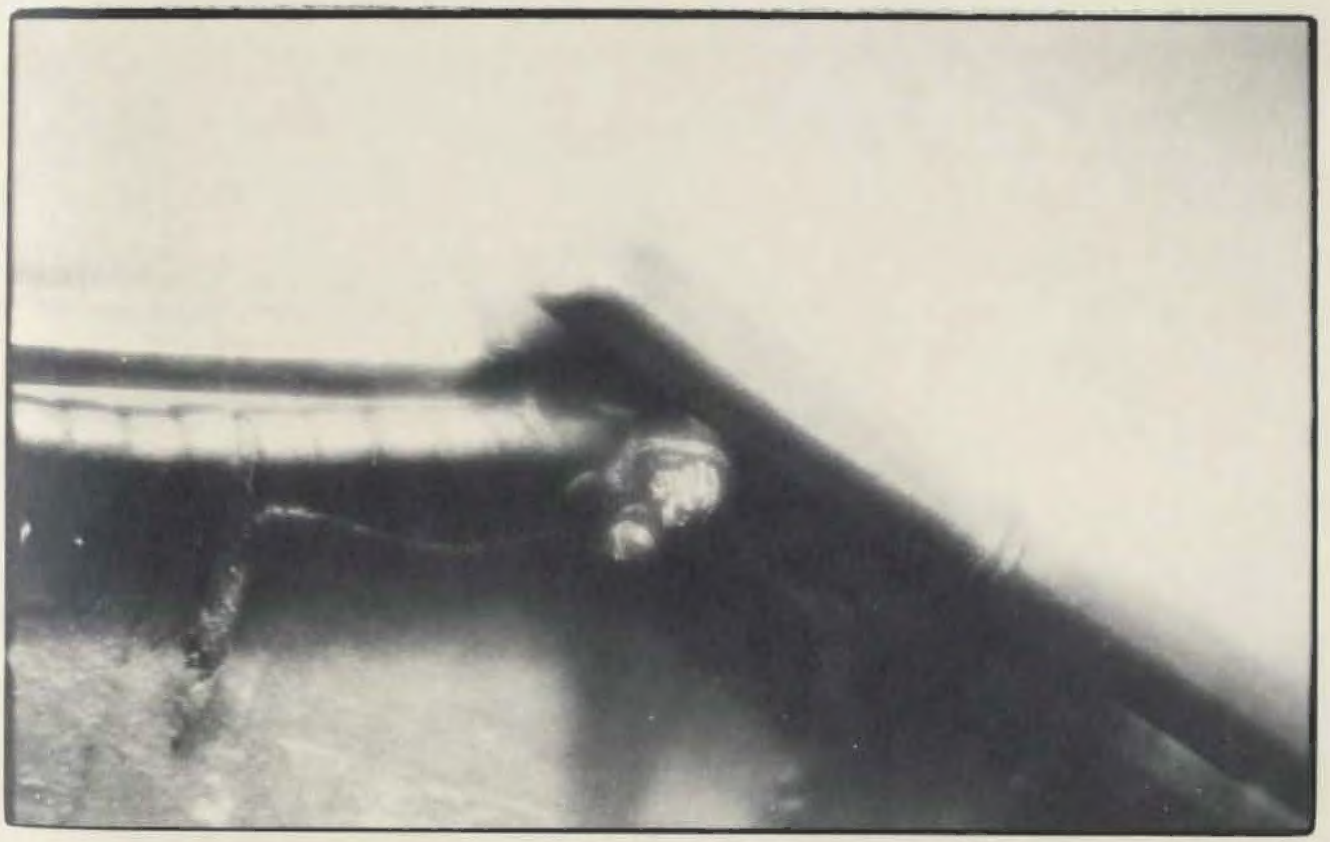


Fig. 15. Beothuk birch bark canoe replica IV.

a) inside view of hogged sheer, starboard;

b) close-up of remnants of centre thwart inside, resting on gunwale, starboard.



one-eighth the size of a 14' (427 cm) canoe.

i) Canoe Replica IV

Condition: When examined in 1976 the canoe replica was in relatively good condition. The bark cover and gunwales were fully intact. Occasional pieces of root lashing were missing and the centre thwart and a short section of the gunwale guard at the bow were broken off and lost. A scarfed joint on the gunwale guard had come apart and in places the gunwale guards were fixed with twisted thread or pieces of pins which may have been the original fittings or may have constituted the replacement of wooden pegs, four of which were still in place. End pieces of the thin fender sections were missing and parts of the chafing strakes along both end seams were broken off.

A rather crude glue job on the ribs was thought to be the result of later repair. In the process of drying out the ribs could have slipped out from under the gunwales, which would explain the disarranged position of the sheathing boards. The entire replica was covered with a heavy layer of varnish or similar preservative.

Hull shape attributes:

a) Measurements: The overall length of the canoe replica is 535 mm. Detailed measurements are given in Table III.

b) Side profile: The bottom of the canoe is straight and has no rocker fore or aft. The end sections turn up

from the keel-line at an angle, which is smaller at the bow than at the stern. Both ends have a moderate overhang, the one at the bow being longer than that at the stern.

The sheer is strongly hogged and pointed at the base. At bow and stern it rises up sharply to a very high peak. The highest points are slightly angular and turn in a gentle curve outward and down toward the keel-line.

c) Beam: The beam is located abaft midlength where the hogged sides come to a point. This is also the position of the centre thwart. The depth and draft of the aft quarter are greater than those of the fore quarter.

d) Cross section: The bottom of the canoe is V-shaped athwartships.

e) End profile: The replica has a sharply lifting sheer, high peaked bow and stern, flaring sides and V-shaped hull ends.

Construction attributes:

f) Materials: Materials used for the manufacture of the replica are birch bark from the paper birch (Betula papyrifera Marsh.)[9] spruce wood and roots, both probably from black spruce (Picea mariana [Mill.] B.S.P.) wooden pegs, twisted thread, pins or nails, red ochre and glue.

h) Keelson: The keelson is inserted along the centre line. It is narrow and fairly thin, flattened on

[9]The species was identified from photographs of the replica by Dr. P.J. Scott, Professor of Biology, Memorial University of Newfoundland.

the uppermost side and rounded underneath where it is in contact with the bark cover. The ends of the keelson are tapered to a rounded point and extend beyond the central planks straight into the lower portion of the end seams. The pressure of the ribs holds the keelson in position and there is no indication of any other securing device.

i) Gunwales: The most integrated part of the support structure are the gunwales. At the beam they are bent at an angle of 150° and thereby follow the pointed hog of the sheerline (Fig. 15a). As far as can be ascertained the gunwales consist of one batten each and have a shelf-like appearance. At either end of the canoe the gunwales unite at the uppermost point of bow and stern inboard into a single batten (Fig. 14a) as port and starboard gunwales are made from one piece of wood split and separated for the length of the sheer at either end. The batten ends are sharply bent at the top of bow and stern and turned downward to the keel-line where they form outside stem/stern "posts" over the end seams in the manner of seam battens. At the level of the keel-line the battens are snapped off (Fig. 14b).

j) Thwarts: Originally the canoe replica had three thwarts. The centre thwart is now missing but remnants are still incorporated between the gunwales and gunwale guards inboard where the hogged sheer comes to a point (Fig. 15a and b). The two end thwarts are placed at an equal distance from either side of the centre thwart.

Both thwarts are plain, parallel sided and fitted on top of the lashed gunwales with metal pins or a twisted thread, lashed crosswise.

k) Bark cover: The hull of the replica is made from a large piece of birch bark, folded halfway lengthwise (Fig. 13). The grain of the bark runs across the craft. A small panel is added on the stern extremity (port side). It is stitched on edge-to-edge with a fine root stand with an over-and-over stitch. The folded bark at the bottom forms a straight keel line and its springy consistency as well as the inserted keelson prevent a sharp crease. The bark is cut flush with the upper edge of the gunwales, outside.

l) Lashings: The lashing of the gunwales and stem/stern battens is accomplished with split root strands in an over-and-over fashion. The flat or split side of the root is consistently turned toward the wood and bark cover, while the rounded outer section of the strands is exposed; the root threads are uniform and stitched closely. With considerable elegance the root material becomes thinner towards the bow and stern and the stitches visually match the tapering of the canoe shape and gunwales. The lashing of the end seams outside over the stem/stern battens is accomplished with a continuous and over-and-over stitch. The split root is pushed through the holes of both bark panels (starboard and port sides) that are placed opposite each other and then lashed over the seam batten before being threaded through

the next set of holes.

n) Construction of end sections: The replica has no inside stem/stern posts. The end sections are held solely by the gunwale extensions which also function as outside seam battens. Thin chafing sticks are attached on either side of the end seams. Close to the top and the keel-line they are incorporated in the root lashing of the end seam or held in position by separate stitches (Fig. 14a).

o) Sheathing: The inside of the hull is covered with thin sheathing boards and tapered at the bow and stern so as to accommodate the diminishing width of the hull. The sheathing boards are fitted in a somewhat disorderly fashion and do not cover the bark interior completely. It is possible that in the process of drying out, sheathing strakes may have slipped out of position or fallen out altogether. A central plank made of two boards abutted at the beam is placed lengthwise over the keelson above the ribs. Both boards are tied with a thread to one of the underlying ribs and the bow and stern ends are tapered to a point. These raised planks cover the entire floor area which, owing to the V-shape of the canoe, is very narrow.

p) Ribs: The replica has seven ribs which hold the sheathing in place and there are no ribs in the raked end sections. Ribs are made of flat pieces of wood sharply bent and placed across the keelson from gunwale to gunwale. They are relatively widely and irregularly spaced at

distances from 30 to 64 mm. The rib ends are not tapered or bevelled and no obvious gaps for their placement are left in the gunwale lashings. Instead, they are pushed under the gunwale members between the lashings.

q) Headboards: The replica has no headboards.

r) Gunwale guards: The gunwales are protected by gunwale guards, each one made up of at least two strips of wood and tapered at the ends. The aft guard is bevelled and terminates at the point of the hogged sheer, the gunwale guard of the fore quarter is placed over the aft guard at an angle with an overlap of 6 mm (Figs. 10, 15a and b). The guard on the starboard section has a scarfed joint at the bow. The gunwale guards are fixed intermittently with lashings of thread and with wooden pegs, metal pins or nails which are driven vertically through them and the gunwales. They are narrower than the gunwales and in the stern quarter are fitted along their outer edge in such a way that they avoid the thwarts whose ends are nailed on top of the gunwales.

s) Fenders: Twigs tapered at bow and stern function as fenders and are fitted below the gunwale on the outside of the canoe. They overlap slightly below the centre thwart, the aft being placed over the fore section. These fenders extend upwards close to the top of the highest points of the end sections and are sewn on at intervals of ca. 80 mm with twisted thread. The thread is pulled through the bark cover from the inside, wrapped round the

fender strakes, pulled back through the bark cover and then tied to the gunwales on the inside.

t) Gumming: The replica shows no evidence of gumming on any of the seams or cracks.

u) Decorations: A strong reddish tint, particularly noticeable on the gunwale guards and thwarts suggests that the replica has been rubbed with a red ochre mixture, at least along the outer edges, but possibly also on the bark cover.

The information on Beothuk canoes and canoe replicas described and analyzed in this chapter is listed on Tables II - V and VIII. In the following chapter the data are compared and discussed.

Table II

Measurements of Full-Sized Beothuk Canoes

Measurements in cm	Overall Length	Beam	Depth at Beam	Height of End
John Guy, 1612	610	137		
Joanne de Laet, 1625	610	168		
Joanne de Laet, 1640	610	152		
John Cartwright, 1768/69	427	122	2/3 of height at ends	
dto. illustration Fig. 2	6,6		1,6	2,5
W.E. Cormack, 1827/40	488-671			

Table III

Measurements of Beothuk Canoe Replicas

	Measurements in mm	I	II	III	IV
1	Overall length	(355)[a]	283	806	535
2	Length of keel	318	214	638	385
3	Beam	(85)		235	167
4	Depth at beam	68	54	149	65
5	Height of bow		60	181	136
6	Height of stern		63	191	148
7	$\bar{x}$ height of ends		62.5	186	139
8	Overhang at bow		31	95	88
9	Overhang at stern		33	80	75
10	Distance between bow and centre thwart		146	413	272
11	Distance between bow end of keel and centre thwart	162			
12	Distance between stern and centre thwart		137	393	263
13	Distance between stern end of keel and centre thwart	153			
14	Height of sides at lowest point: Starbd. bow:	(32)	34	66	49
15	stern:	(33)	36.5	71	55
16	Port bow:	(32)	(31)	73	57
17	stern:	(33)	(33)	81	54
18	$\bar{x}$ height of sides at lowest point: bow:	(32)	32.5	69.5	53
19	stern:	(33)	35	76	54.5
20	$\bar{x}$ height of sides fore and aft	32.5	33.5	73	52
21	Angle at forefoot: bow:	ca. 53°		62°	ca.48°
22	stern:			67°	ca.51°

Table III (cont'd.)

Measurements in mm	I	II	III	IV
23. Number of thwarts	(1)	(1)	3(+2)	3
24. Length of centre thwart	(68)	(43)	216	
25. Length of end thwart: bow:			134	77
26. stern:			127	86
27. Distance between bow and end thwart at bow				143
28. Distance between bow end thwart and centre thwart			191	129
29. Distance between centre thwart and end thwart at stern			216	134
30. Distance between end thwart at stern to stern				129
31. Number of ribs				7
32. $\bar{x}$ distance between ribs				45

[a]Measurements placed in brackets are approximations due to the damaged condition of the specimen.

Table IV

Beothuk Canoe Proportions

Number of Replica or Name of Informant		I	II	III	IV	Guy	Cartw. (fig. 2)[b]
	Size in cm	35.5	28.3	80.6	53.3	610	427
1	Length to beam	-	-	3.4	3.2	4.4	3.5
2	Length to depth at beam	-	5.2	5.4	8.2	-	(4.4)
3	Length to length of keel-line	-	1.3	1.3	1.4	-	-
4	Length of keel-line to depth at beam	4.7	4	4.3	5.9	-	-
5	Beam to depth	-	-	1.6	2.6	-	-
6	Length to $\bar{x}$ of sides at lowest point	9.8	6.4	8.7	7.4	-	-
7	Length to number of thwarts	-	-	161	178	-	-
8	Height of bow to length of bow overhang	-	1.9	1.9	1.6	-	-
9	Height of stern to length of stern overhang	-	1.9	2.4	1.9	-	-
10	Overall length to $\bar{x}$ height of ends	-	4.6	4.3	3.9	-	(2.8)
11	Beam to $\bar{x}$ height of ends	-	-	1.3	1.2	-	-
12	Depth to $\bar{x}$ height of ends	-	0.9	0.8	0.5	-	(0.6)
13	$\bar{x}$ height of ends to $\bar{x}$ lowest height of sides	-	1.8	2.6	2.7	-	-

Table IV (cont'd.)

Number of Replica or Name of Informant	I	I	III	IV	Guy	Cartw. (fig.2)
14 $\bar{x}$ lowest height of front part to height of bow	-	0.5	0.4	0.4	-	-
15 Lowest height of sides abaft midlength to height of stern	-	0.6	0.4	0.4	-	-
16 $\bar{x}$ height of ends to depth at beam	-	1.2	1.3	2.1	-	(1.6)
17 Depth to $\bar{x}$ height of sides at lowest point	2.1	1.6	2	1.2	-	-

[b]Figures in brackets are measured on illustration.

CHAPTER FOUR

INTRAGROUP COMPARISON OF BEOTHUK CANOES

The main purpose in making comparisons among the various Beothuk canoes, either as described by contemporary observers or as seen in replicas made by Beothuk themselves, is to see if they represent different designs or if there is perhaps just one typical Beothuk canoe. Three main areas are compared: proportions, attributes of hull shape, and attributes of construction.

A. Proportions

In order to compare full sized canoes with miniature replicas, the measurements given on Tables II and III have been converted into proportions (Table IV).

For the canoes recorded by Guy in 1612 and Cartwright in 1768/69 few proportional values are available. If the figures for proportions of "length" over "beam" (Table IV:1) are representative then the beam of Beothuk canoes widened over time. The greatest increase of beam may have occurred between 1612 and 1768/69. A comparison with canoes of other groups indicates that an increase of beam was a widespread phenomenon in the north east. For instance Denys (1908:420) had seen 16' to 24' (488 - 691 cm) Micmac canoes with a beam of 2' (61 cm) in 1535/40 while an 18' (548 cm) canoe collected in 1749 had a beam of 28 1/2" (72 cm)

(Adney & Chapelle, 1964:68). Twentieth-century Micmac canoes have considerably wider beam (see Table IX), a factor which was also mentioned by Adney (Adney & Chapelle, 1964:59). The tendency to increase beam was also noted on Malecite and Eastern Cree canoes (Adney & Chapelle, 1964:74, 100) and on kayaks from Labrador, Baffin Island and Greenland. It was explained by the Eskimo as a modification made to achieve greater stability (Arima, 1975:90). Beam changes on bark canoes are more likely to have occurred as a result of increasing trade contacts or a greater need to transport goods.

For "length" over "average height of ends" (Table IV:10) and for "length" over "depth at beam" (Table IV:2) the curved bottom canoe described by Cartwright (Fig. 2) has smaller proportional values than replicas II, III and IV. These proportions are influenced by the strong curvature of the keelson and define the two attributes which differentiate this canoe most prominently from the replicas, namely its exceptional depth at beam and the unparalleled height of both end sections.

Equivalent proportional values for Guy's canoe are not available, but the illustration indicates a markedly shallower curvature of the hull bottom and lower end sections. On the drawing long staves attached to either end give the impression of height at the ends but this effect may be more accentuated on the illustration than on the actual canoes.

The proportional values for the replicas are the same or show only small divergences. The proportions of replica II are similar to those of replica III with the exception of those involving "height of sides" and "depth" measurements, this difference being caused by the relatively high sides of replica II. Replica I on which only few measurements could be made resembles most closely replica III (Table IV:4, 6, 17).

For replica IV proportions based on measurements of "depth" and "height of end sections" differ consistently from those of the other specimens. The divergence relates to its low depth and high end sections.

The proportional figures suggest that the hull shapes of replicas I, II and III largely conform and are most likely representative of canoes designed for similar conditions and purposes. Their draft and relatively high sides would render them useful for rough water travel. While replica IV clearly represents a similar form its proportionally lower sides suggest that it was probably used on more sheltered waters.

The comparisons of proportions indicate that there were two canoe designs, one most clearly described by Cartwright with the greatest depth and the highest bow and stern sections, the other represented by the replicas, particularly numbers I, II and III. Replica IV fits better into the latter group but has modified proportions for height of sides and end sections.

Table V

Beothuk Canoe Hull Shape Attributes[a]

Reports/Replicas:	A	B	C	D	I	II	III	IV
Reference	John Buy, 1612	Rich.Whitbourne, 1620	John Cartwright, 1768/69	John Cartwright, 1773	burial replica II./post contact	burial replica II./post contact	burial replica III./1800/27	Shanawdithit's repl.IV/1824/27
Area	Trinity Bay	Trinity Bay	Notre Dame B.	Notre Dame B.	Hall's Bay	Hall's Bay	Red Ind. Lake	Expl. River
b) Side profile								
1 bottom partly or compl.straight	-		-	x	x	x	x	x
2 fore and aft rocker	x		x	x	-	-	-	-
3 rocker full length of bottom	x		x	-	-	-	-	-
4 angle from keel-line into end sections	-		-	-	x	x	x	x
5 overhang same bow and stern	x		x	x		-	-	-
6 overhang at bow longer than at stern	-		-	-		-	x	x
7 overhang at stern longer than at bow	-		-			x	-	-
8 strong overhang	x		x	x	-	-	-	-
9 moderate overhang	-		-	-	x	x	x	x
10 bottom slightly hogged					x	x	x	
11 sheer strongly hogged, rounded					x	x		
12 hogged sheer pointed	x		x	x	-	-	x	x

Table V (cont'd.)

Reports/Replicas	A	B	C	D	I	II	III	IV
13 sharp lifting sheer at end sections	x		x	x	x	x	x	x
14 high bow & stern	x		x	x	xp	x	x	x
15 bow & stern section same	x		x	x	–	–	–	–
16 stern higher than bow	–		–	–		x	x	x
17 angle betw. sheer and end seam	x		x	x		x	x	x
18 curvature outward from stemhead down	–		–	–		–	x	x
19 top of bow/stern sections pointed	x		x	x		x	x	–
20 top of bow/stern sections angular	–		–	–		–	–	x
c) Beam and Depth								
21 greatest beam at midlength	x		x	x	–		–	–
22 greatest beam abaft					xp	xp	x	x
23 depth of bow/stern sections equal	x		x	x	–	–	–	–
24 greatest depth and draft abaft	–		–	–	xp	x	x	x
d) Cross Section								
25 V-shaped athwartships	x		x		x	x	x	x
26 narrow bottom	x		x		x	x	x	x
27 flaring out sides	x		x		x	x	x	x
e) End Profile								
28 high peaked bow/stern	x		x	x	x	x	x	x
29 sharp lifting sheer to peaked end	x		x	x	x	x	x	x
30 hull end V-shaped	x		x		x	x	x	x

[a] Symbols used: x = present (recorded or by implication), – = absent (recorded or by implication), empty space = not recorded, xp = probably present (assumed, based on some evidence).

B. Attributes of Hull Shape

The performance of a canoe is largely determined by the lines of its hull, the width and shape of its bottom, the height and angle of its sides, sheer and end sections and the placement of the beam. The attributes of Beothuk canoes which define these details are shown on Table V. The discussion concentrates on four aspects of Beothuk canoe hulls: Attributes shared by all Beothuk canoe designs in which they differ from canoes of other groups; attributes which point to a divergence of designs among Beothuk canoes; differences associated with geographic distribution and time; stylistic considerations.

1) Shared Attributes

Although Beothuk canoes were not built to a uniform design they have several hull shape attributes in common which differentiate them functionally and visually from those of other North American bark canoes, and concern three areas of the canoe hull.

V-shape in cross section (Table V:25, 26, 30);

Strongly hogged and often pointed sheer line (Table V:11, 12);

High end sections (Table V:13, 14, 17, 19, 20, 28, 29).

The narrow V-shaped hull bottom, associated with considerable draft dominates the performance of Beothuk canoes. When ballasted it renders the canoes more stable, increases their capacity to keep on course in strong winds

and thereby makes them safer in rough seas. The V-shaped hull ends allow the canoe to cut through waves.[1]

The visually characteristic and distinct strongly hogged sheer, which is most often pointed, probably results from the narrow bottomed hull shape in combination with the use of a building frame (see Section B). It would strengthen the sides, give better protection from spray and allow greater and safer heeling (leaning sideways) when heavy objects are taken aboard.[2]

The third notable set of attributes concerns the high and peaked shape of the end sections. High ends give protection from spray and avoid shipping water at the bow when running rapids, though they make paddling in high winds more strenuous. On land high ends afford ample space for shelter under the upturned canoe but cause portaging to be more cumbersome.

2) Divergent Attributes

In addition to shared attributes Beothuk canoes also show significant divergences from each other. For example,

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[1]Wells, an old resident of Exploits Burnt Island, claimed in discussions with Howley in 1886 that Beothuk canoes had flat bottoms as did those of the Micmac. Howley strongly doubted the accuracy of Wells' contention as it is contrary to all other evidence (Howley, 1915:271); if it were correct it would suggest the existence of an otherwise undocumented variant.

[2]Because the sides of the canoe are rounded heeling causes the greatest increase of contact between side and water surface at the centre rather than at the end sections where the freeboard is lowest.

the keel-line in profile has either a strong curvature along the entire length of the bottom with extensive fore and aft rocker, or is completely straight, has no rocker and turns into the end sections at an angle. The strongly curved shape is documented by Guy and Cartwright, the straight bottom version is represented by four canoe replicas. Each keel-line profile is associated with specific construction techniques.

A less well documented design incorporates a straight central keel-line with a curvature into the end sections and some rocker fore and aft. It is illustrated by Cartwright (Fig. 3) and also reported by George Wells from Exploits Burnt Island (Table I:38, Fig. 1a); Cartwright's canoe has a pointed hogged sheer; Wells' outline shows a rounded sheer and high bow and stern portions, one of which is noticeably higher than the other, which may have had a significance or may have been fortuitous on the drawing. No further information on canoes with these combinations of attributes is available; they are therefore considered to be variants of one of the major designs and as such not separately discussed.

A major differentiating factor is the position of the beam. On the canoes described by Guy and Cartwright it is said to be amidships. On the replicas the beam is located abaft midlength and is associated with greater depth and draft of the aft quarter. This divergence has not been identified before. Early canoe descriptions imply lengthwise

symmetry of Beothuk canoes and 20th-century investigators have assumed this to hold true for all canoes (Howley, 1915: Plate III; Adney & Chapelle, 1964:94-97; Reynolds, 1978: 104). Adney's theoretical reconstruction of "the" Beothuk canoe design which has generally been accepted as valid, is an undocumented symmetrical "composite" that fails to do justice to actual measurements.

If Adney and other investigators did not notice the differences in length and depth of the fore and aft quarters, could Guy and Cartwright have made the same error and dismissed slight "irregularities" of an assumed symmetry as inaccuracies? Although this question cannot be answered with certainty the available evidence suggests that the Beothuk curved keelson canoes were indeed symmetrical. Rockered ocean canoes used by other north eastern Indian groups generally have the beam placed at midlength which is the favoured design. To assist steering in rough seas and to ride waves the occupants position themselves towards the rear so that the canoe lifts up in front.

It is of interest that the data on these two divergent factors, namely location of beam and shape of keel-line, correlate. Thus Beothuk canoes can be divided into two categories:

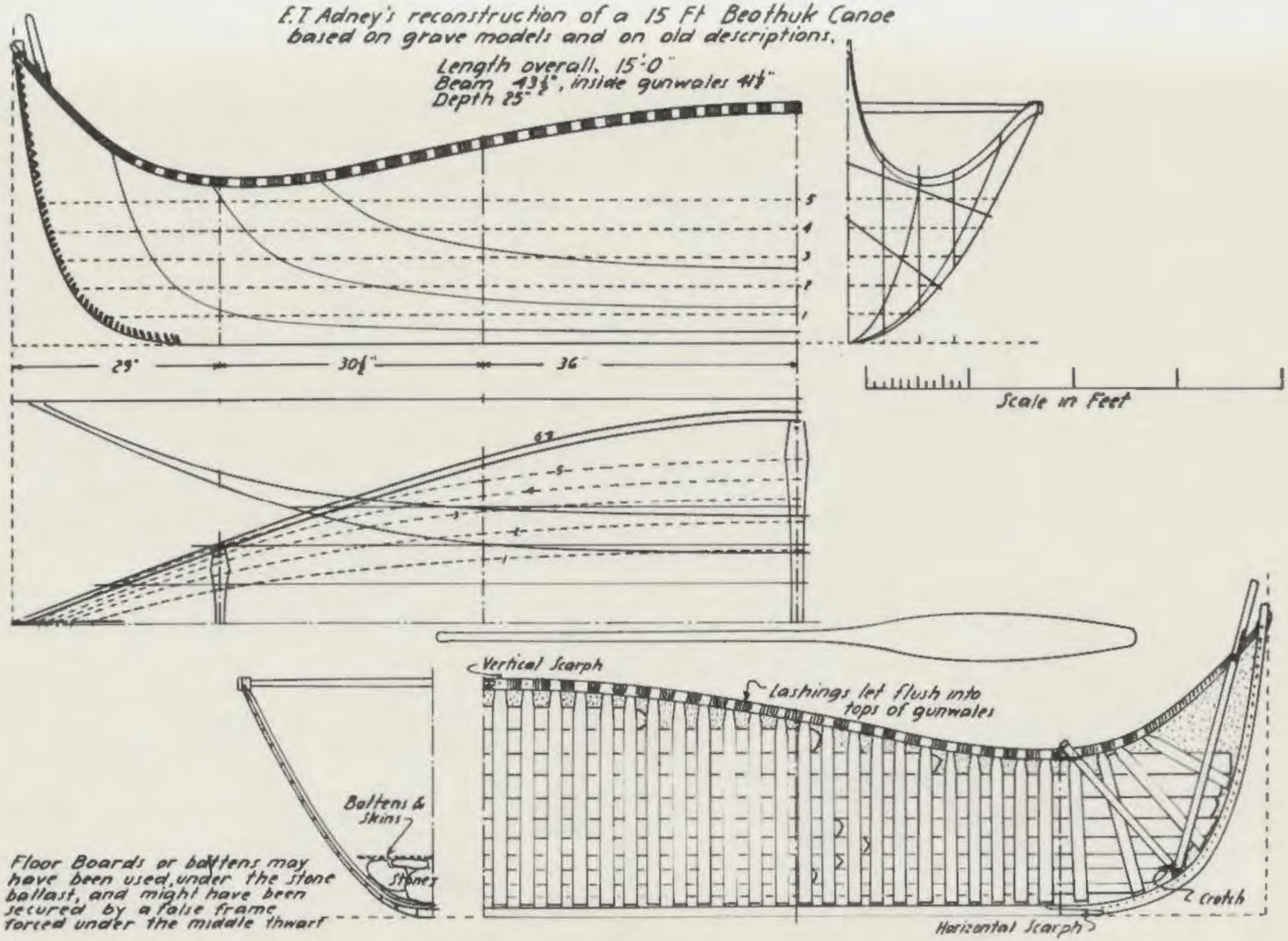
a) canoes with fully curved bottom and beam at midlength;
b) canoes with straight keel-line, angular turn into the end sections and beam abaft midlength.

Fig. 16. "Composite" Beothuk canoe design, as reconstructed by E.T. Adney (Adney & Chapelle, 1964:97).

In comparison with the straight bottom replicas, which it resembles more closely than the curved keelson design, the following attributes are not correct:

Hull shape: End sections low, curvature from keel-line into bow and stern, hogged sheer rounded (majority of canoes had pointed hogged sheer), beam at midlength, fore and aft quarter equal depth and draft, bow and stern sections alike, highest point of end sections define overall length;

Construction: Keelson rectangular, scarfed, laminated at ends, bent to top of end sections, bracing staves at bow and stern, closely spaced, bevelled ribs, ribs in raked end sections, outwales, bark over folded over gunwales, group lashings on gunwales (?), no seam battens, no gunwale guards, no fenders.



BEOTHUK CANOE, APPROXIMATE FORM AND CONSTRUCTION

Seventeen hull shape and nine construction attributes correlate with one or the other of these two canoe forms (Table VI) and provide support for the conclusion that the Beothuk built two designs with different performance characteristics. This is not an unusual situation. Adney found that

> canoes of various models, sizes, methods of construction or decoration might be found within the limits of a single tribal classification. (Adney & Chapelle, 1964:27)

The curved keelson version exhibits greater stability than the straight keel-line design, a characteristic that was confirmed by experiment (Appendix B). On the other hand its greater draft renders it most vulnerable in shallow waters where it can easily sustain damage from striking a rock or the bottom. This is where the reduced draft of the straight keelson canoe has the edge over the curved design, yet its V-shaped hull together with high ends and hogged sides make it suitable for travel on the open sea. The beam abaft midships and the greater depth in the aft quarter, which counteract the tendency of the front to lift when the rear is weighed down by crew are, according to Adney, attributes normally found on canoes for use on lakes and rivers. This combination of attributes increases maneuverability in smooth waters (Adney & Chapelle, 1964: 159) and is also found on north western canoes employed in the interior.

Table VI

Correlating Attributes of Beothuk Canoes

Attrib. No.		(a) Curved Bottom Canoe	(b) Straight Keel-line Canoe
Attributes correlating with hull bottom in side profile.			
Hull (Table V)			
2	Fore and aft rocker	x	
3	Fully curved bottom	x	
8	Long overhang	x	
1	Straight keel-line in profile		x
4	Angle from bottom into stem/stern		x
9	Moderate overhang		x
10	Bottom slightly hogged		x
Construction (Table VIII)			
12	Keelson bent up at ends to top of bow/stern	x	
32	Bark cover lashed together at centre line below keelson	x	
45	Keelson ends serving as stem posts	x	
9	Keelson extends the length of straight bottom		x
32	Bark cover folded along centre line		x
20	Gunwale extensions used as seam battens over endseams (only on one replica)		(x)

Table VI (cont'd.)

Attrib. No.		(a) Curved Bottom Canoe	(b) Straight Keel-line Canoe
Attributes correlating with location of beam			
Hull (Table V)			
5	Overhang same at bow and stern	x	
15	Bow and stern sections same	x	
21	Beam at midlength	x	
23	Depth of bow/stern sections equal	x	
6	Overhang at bow longer than at stern, or		x
7	Overhang at stern longer than at bow		x
16	Stern higher than bow		x
18	Bow and stern curving outward from stemhead down		x
22	Beam abaft midlength		x
24	Greatest depth and draft abaft midlength		x
Construction (Table VIII)			
14	Each gunwale made of 2 lengths abutting at midlength/beam	x	
15	Each gunwale made of 1 length sharply bent over hogged point		x
19	Starbd. and port gunwales one piece split for length of sheer (only on one replica)		(x)

Of the two designs the straight keel-line one is most versatile: it is well adapted for ocean navigation but also suitable for the requirements of interior transportation.

In the years following Guy's meeting with a group of Beothuk in 1612, their territory decreased and eventually comprised the coast between Bonavista Bay and Cape St. John's and the interior as far inland as Red Indian Lake (Howley, 1915:33). This habitat called for extensive travel inland but also entailed navigation of coastal waters for marine exploitation. The use of different canoe designs during the 17th and 18th centuries was therefore consistent with their activities and resource base.

The conclusion that the Beothuk built at least two functionally different hull forms is a new concept. Apart from its good fit with the evidence, it also reconciles inconsistencies in the literature that have previously posed problems. The conclusion substantiates the hypothesis that the Beothuk met requirements for varied travel conditions by constructing different canoe designs.

3) Geographic Distribution Over Time

The distribution of the two major canoe designs is indicated by recorded dates and areas of sightings (Table VII). Beothuk Indians, using curved keelson canoes, were met with on the coast of Trinity Bay from whence they visited the Bay of Placentia, and later a similar canoe form was recorded in Notre Dame Bay. During the intermittent

period the Beothuk had been pressured out of most eastern and southern coastal habitation sites and had become confined to Notre Dame Bay between Cape John and Cape Freels (Bonavista Bay) and the interior region around the Exploits River (Howley, 1915:33). Even within this territory they gradually lost access to most of the salmon runs to newly established salmon "posts" (Howley, 1915:49; Cartwright, 1773:19) and were persecuted on sight. These circumstances would have decreased their ocean travel and may have contributed to the fact that the curved keelson design which was specialized for ocean navigation was not recorded after 1768/69. The more versatile straight keel-line canoes, suited for ocean travel as well as transportation on shallower lakes and rivers would consequently have been employed more frequently. Replicas with a straight keel-line come from Notre Dame Bay, Red Indian Lake and the Exploits River area, suggesting that this type canoe was used in all of these regions.

The presence of straight keel-line replicas in both burials that included miniature canoes among the grave goods may indicate a preference for this design though it is also possible that it expressed a significance that is not evident to us.

The fact that curved keelson canoes were sighted and described before the straight keel-line design became known is consistent with the pattern of exploration in Newfoundland. Early contacts with the Indian population

Table VII

Dates and Distribution of Beothuk Canoes

Date	Coast	Interior	Canoes a) curved	Canoes b) straight
1612	John Guy Trinity Bay (Placentia B.)		x (Fig.1b)	
1768/69	J. Cartwright Notre Dame Bay		x (Fig.2)	
1773	J. Cartwright Notre Dame Bay			x (Fig.3) variant
ca.1800	G. Wells Notre Dame Bay (Hall's Bay)			x (Fig.1a) variant
Post contact	Replicas I & II Notre Dame Bay (Hall's Bay)			x (Fig.6a+b)
1800/27		Replica III Red Indian Lake		x (Fig.7)
1824/27		Replica IV Exploits River		x (Fig.10)

occurred exclusively on the coast where ocean canoes would have been employed. Investigations of the interior, the discovery of canoe replicas in burials (Howley, 1915:193, 331) and the manufacture of a model by Shanawdithit took place at a later date.

It is likely that at one stage both canoe designs were used simultaneously, the strongly rockered form predominantly on the coast and the straight keel-line canoe in sheltered bays and the interior. As will become evident later, the most plausible hypothesis is that the straight keel-line canoe represents an early prototype canoe which the Beothuk later modified by adding strong rocker.

4) Stylistic Attributes

Most birch bark canoes like other artifacts can be identified as to their geographical or ethnic origin by their forms and style and Beothuk canoes are no exception to this rule. Some of the hull shape and construction attributes individually and in combination distinguish Beothuk canoes visually and functionally from other bark canoes, suggesting a strong development of differentiating attributes which contain or constitute elements of style. To identify and define the distinctiveness of Beothuk canoes these stylistic elements are analyzed by comparing Beothuk canoes from different areas and exploring the significance of the stylistic attributes.

A bark canoe is a very complex artifact and nearly every one of its attributes--with the exception of

decorative additions--has one or more operational functions. Style is therefore often, but not exclusively, a preference for one technical solution over another. In canoe construction and design the guiding principle is to achieve a craft that will serve the required functions such as speed, stability, carrying capacity, etc. in a given order of priority and the builder/designer has to select and combine attributes which will ensure the desired characteristics. The resulting canoe constitutes a compromise solution because attributes for different requirements are often contradictory in terms of their technical specifics. Consequently, different canoe makers arrive at a variety of "solutions" for the same combination of requirements. In addition, local traditions and forms vary. Even if only one specific performance characteristic was required, such as speed, the perception of canoe builders from different areas varies as to which design would best meet this requirement. For instance, eastern canoe builders constructed canoes for speed with a narrow beam, rounded bottom and vertical or tumble home sides, while canoe builders in the western regions built fast canoes with a wide beam, a very narrow bottom and flared sides.

Sackett has succinctly expressed this position when he said that style is

> based upon the notion that there are usually alternative means of achieving the same end; that the specific expression any given artifact assumes, results in a sense from a choice made among several equally valid and feasible options, and that the

> choice made in any given cultural situation is determined by its historio-genetic setting. (Sackett, 1973:321)

With respect to bark canoes this setting includes the stage of technical developments, materials that are available and whose qualities are known, and visual components that are familiar and accepted within the cultural context and the personal perception of the builders. The complexity of the canoe as an artifact suggests that a considerable period of time was needed to develop particular canoe styles which eventually became traditional for different groups and regions. While single components may have been modified in the continuing process of adjustment to different functional needs, style as a complete integrated form and as the result of a conceptual process became a relatively stable marker of differentiation that was not easily changed or transferred. Steward and Setzler (1938: 10) explain this phenomenon of stability by theorizing that style as a culture trait is functionally relatively independent and therefore more immune to changes of other traits in the system, while traits with more integrated functional roles are more easily affected by changes of culture traits with which they articulate.

Conkey (1978:63-67) considers stylistic behaviour a significant aspect in the evolution of symbolic behaviour, self-awareness and modes of communication. To her the role of style is potentially one of an integrating mechanism which aids in the conceptualization of group identity and

the perception of distinctiveness from other cultural entities.

Similarly, Wobst (1977:320, 327) conceives stylistic behaviour of a visual nature as a transmission of messages in the artifact mode whose longevity facilitates standardization and predictability. Within a particular group, style aids in the process of social integration and differentiation and efficiently links those members of a community who are not in constant verbal contact. Towards outside groups stylistic signaling serves as a boundary marker broadcasting group affiliation. Only a small number of artifacts in a material culture can be used for this purpose as they have to be distinctly visible and encountered by those groups for whom the message is relevant (Wobst, 1977:329).

Evaluating stylistic attributes on Beothuk canoes two types of "style" are discerned:

a) "dependent" stylistic attributes resulting from functional aspects but nevertheless operating as differentiating factors;
b) "independent" stylistic attributes which visibly differentiate Beothuk canoes but do not add particular operational advantages and are therefore considered to be of a predominantly stylistic nature.

The V-shaped hull form differentiates Beothuk canoes from all other North American bark canoes and constitutes part of their "style." Yet, the attributes

contributing to this style, namely a keelson and straight flaring sides with a deadrise, are predominantly functional. It is self-evident that "dependent" stylistic attributes such as these will not persist, if their functional denominator requires modifications. On Beothuk canoes, V-shaped form and keelson structure whose function largely concern safety and steering qualities in open waters were retained, even though the Beothuk were eventually pressured out of much of their coastal habitat, travelling more extensively on rivers and lakes (Le Blanc, 1973:159; Howley, 1915:243). It could therefore be questioned whether the attributes resulting in the V-shape remained because their function was still desirable, or whether their persistence was due to the traditional aspect of this form.

The highly visible stylistic hull shape attributes which differentiate Beothuk canoes from craft of other groups but appear not to add functional advantages, are

a) very high end sections, and

b) the pointed shape of the hogged sheer.

According to Adney

> the distinctive feature that usually identified the tribal classification of a bark canoe is the profile of the ends, although sometimes the profile of the gunwale, or sheer, and even of the bottom is also involved. (Adney & Chapelle, 1964:27)

The presence of conspicuously high bow and stern configurations on all known Beothuk canoes of the 18th and 19th centuries indicate that they became the accepted traditional design. The upward extension of the end sections could

have been dictated by the functional requirements of travel in rough waters or on streams with rapids. However, in comparison with ocean canoes of other native groups the height of the Beothuk canoe ends appears to be exaggerated and prone to aggravate their drawbacks, namely resistence to high winds and awkwardness when portaging. The nearly flat end sections of Guy's canoe demonstrate that ocean travel does not necessitate such accentuated ends, and if operational considerations alone had prevailed, their conspicuous height may have been avoided.

As the high pointed canoe ends would have been readily seen from a distance, they were most suitable as a signalling device, setting Beothuk canoes clearly apart from other craft in Newfoundland waters, such as Eskimo kayaks or Micmac bark canoes. These considerations advocate the interpretation that the function of the high pointed ends was primarily one of indicating ethnic affilation and was predominantly stylistic. Though the height fluctuates, it is consistently greater than that of canoes of other groups and constitutes a visually differentiating attribute on all canoes recorded after 1612.

The persistence of attributes which differentiate Beothuk canoes from those of other groups substantiates the posited third hypothesis that stylistic attributes which do not substantially interfere with changing operational needs are retained.

The data on the shape of sheer line do not appear to agree with this hypothesis. Technically a rounded hogged sheer amidships can be caused by the use of a building frame on canoes with a narrow hull bottom. However, the final shape of the sheerline depends on the method of gunwale construction. If the gunwales are bent in accordance with the rounded hog then this form is preserved. Gunwales made of saplings or battens that meet or overlap at the centre of the hogged section, as was sometimes the practice on temporary canoes and is described on Beothuk canoes by Cartwright (Howley, 1915:32), could cause a pointed appearance and may be the origin of this shape (Adney & Chapelle, 1964:215). Both Guy and Cartwright reported a pointed hogged sheer on the curved bottom canoes. As this form persists on replicas III and IV even though the gunwales are made from one batten, it is suggested that the visual effect of the sharp turn at beam became a traditional element of style. An exception here is the rounded sheerline on replicas I and II both of which come from a burial on Big Island. A rounded sheer was also described by fisherman Wells on canoes that had been taken away from Indians in the same area (Howley, 1915:270, see also above. Fig. 1a), and may constitute a local variation in this area.

Details of a hogged sheerline would have been less visible from a distance than the bow and stern configurations and would therefore not have been as obvious a marker of ethnic affiliation to other groups. Wobst (1977:324-326)

considers the differential usefulness of a variety of stylistic messages to be proportional to the size and distance of the social groupings involved. He suggests that less prominent stylistic behaviour would be more suitable within intermediate sized groups which live at a distance too far away to maintain constant verbal communication, yet integrated enough to be able to decode the inherent messages. If this theory was applied to bands of the Beothuk, then the significance of a pointed sheer may concern intragroup communication.

The presence of a rounded rather than pointed hogged sheerline on the canoe replicas from Big Island could, in this context, be seen as an expression of separateness of this particular group. Archaeological investigations and historic reports indicate that Beothuk bands migrated to the coast during spring and summer and returned to caribou crossings in the interior for their fall hunt (Howley, 1915: 32; Pulling, 1792:17; Marshall, 1980:730). This subsistence pattern favours a social organization in which the different units are loosely connected with each other and leave some autonomy to individual bands (Beardsley, 1956: 138-139). Originally each Beothuk band may have exploited coasts and interior areas separated by distances that were too great to keep in continuous contact, which would have favoured the development of distinctive styles by different bands. When the resource base of the Beothuk became more confined and the area small enough for formerly more

isolated groups to keep in contact with each other, the social organization of the Beothuk group as a whole may have changed, but a total loss of independence need not have followed. It is suggested that the rounded sheerline of the hogged section is the expression of such an independence and that the socio-cultural system of the Beothuk did not enforce compliance on all levels of activities.

This postulated independence may have extended to other cultural aspects. Three cave burials of thirty odd bone carvings were excavated in the immediate vicinity of Big Island (Marshall, 1974:42), though up to now bone carvings have only been found in the context of human interments (Marshall, 1978:141). However, the grave goods in the burials on Big Island were of a similar kind as those in the Demasduwit burial at Red Indian Lake (Howley, 1915:193, 331) and the canoe replicas from both graves manifest close resemblances, a factor which projects a significant degree of cultural integration of the two groups who were responsible for these burials.

In conclusion, the tabulated Beothuk canoe proportions indicate a general conformity as well as some changes in canoe forms between 1612 and 1824/27. The comparison of hull shapes shows that several prominent attributes or combinations thereof are present on all Beothuk canoes. Others, which correlate with construction attributes and which have previously not been noted, suggest that the Beothuk built two functionally different designs, one of

which was specialized for ocean navigation while the second design was more versatile and suitable for ocean travel as well as transportation on rivers and lakes. Stylistic attributes which differentiate Beothuk canoes from those of other groups and are incorporated in both canoe designs, were retained. These investigations show the second and third hypotheses to be correct.

In the following section the construction attributes of Beothuk canoes are analyzed and discussed.

C. Attributes of Construction

Relatively little information on Beothuk canoe construction is available. Only one contemporary observer gave a fairly full account of the canoe structure. Of the replicas, that made by Shanawdithit is the only completed specimen and constitutes the most extensive source of structural information.

The construction details are listed on Table VIII and are compared to establish whether they are relatively uniform on all examined canoes or whether signigicant differences can be observed. In the ensuing discussion Beothuk canoe construction attributes are compared with those present on canoes of other groups so as to test the hypothesis that they generally conform.

f) Materials: Materials used in Beothuk canoe construction are apparently the same through time. The hull is made of birch bark from the species Betula

Table VIII

Beothuk Canoe Construction Attributes[b]

Reports/Replicas:	A	B	C	D	I	II	III	IV
Reference	John Guy, 1612	Rich.Whitbourne, 1620	John Cartwright, 1768/69	John Cartwright, 1773	burial replica I./post contact	burial replica II./post contact	burial replica III./1800/1827	Shanawdithit's repl.IV/1824/27
Area	Trinity Bay	Trinity Bay	Notre Dame B.	Notre Dame B.	Hall's Bay	Hall's Bay	Red Ind. Lake	Expl. River
f) Materials								
1 birch bark cover	x	x	x	x	x	x	x	x
2 split roots for lashings	x		x	xp	x		x	x
3 sinew f.lashing					-	x	x	-
4 thread f.lashing					-	-	-	x
5 iron nails or pins					-	-	-	x
6 red ochre		x	x	xp	x	x	x	x
7 turpentine/gum mix.		x	x	xp	-	-	-	-
g)*								
h) Keelson								
8 keelson present	x		x	xp				x
9 full length of straight can.bott.								x
10 rounded at bottom and sides								x
11 tapered on either end			x					x
12 ends bent to top of bow and stern			x					-

*g) building frame omitted here as not included in the data; see discussion, p.132.

Table VIII (cont'd.)

Reports/Replicas:	A	B	C	D	I	II	III	IV
i) Inner Gunwales								
13 present			x	xp			x	x
14 2 sticks abutting amidships			x				-	-
15 sharply bent over hogged point							x	x
16 rectangular in cross-section							x	x
17 ends tapered to bear on one another			x				x	-
18 extended to top of raised bow & stern			x				x	x
19 gunwales split f.length of sheer			-				-	x
20 used as seam batten on end-seams			-				-	x
21 bark cover trimmed flush with gunwale			xp				x	x
j) Thwarts								
22 present	x		x	x	x	x	x	x
23 original number	4 (5p)		3				5	3
24 one centre thwart	x		x	x	x	x	x	x
25 thwarts equally spaced	-						-	-
26 thwarts plain			x		x	x	x	x
27 parallel sided			xp		xp	xp	x	x
28 fixed with wooden pegs							-	x
29 with lashings							x	x
30 resting on gunwale lashings							x	x
k) Bark Cover								
31 birch bark used	x	x	x	x	x	x	x	x
32 bark cover joined below keelson	xp		x		-	-	-	-
33 folded along centre line	-		-	xp	x	x	x	x

Table VIII (cont'd)

Reports/Replicas:	A	B	C	D	I	II	III	IV
34 extensions or repair sewn edge-to-edge					-	x	-	x
35 seam battens used					-	-	-	x
1) lashings								
36 split roots used	x		x		x	-	x	x
37 sinew used f. endseams					-	x	-	-
38 spiral over-and-over stitch			x		x	x	x	x
39 gunwale lashings continuous							x	x
40 lashing holes used only once					x	x	x	x
41 occasional use of knot					x	x	x	x
m) Outer Gunwale								
42 present			x		-	-	-	-
43 tied to inner gunwales with few thongs			x		-	-	-	-
n) Stempieces								
44 present					-	-	-	-
45 keelson supports end sections inside			x					
o) Sheathing Splints								
46 present			x	xp	-	-	-	x
47 of irregular size					-	-	-	x
48 placed parallel lengthwise			x	xp	-	-	-	x
49 tapered at bow and stern					-	-	-	x
50 closely spaced			x	xp	-	-	-	x
51 abutting boards forming centre board					-	-	-	x
52 fitted above ribs and tied to them					-	-	-	x

Table VIII (cont'd.)

	Reports/Replicas:	A	B	C	D	I	II	III	IV
	p) Ribs								
53	present			x	xp	-	-	-	x
54	holding down sheathing			x	xp	-	-	-	x
55	rib heads betw. gunwales and bark cover					-	-	-	x
56	ribs bent V-shaped at centre			x	xp	-	-	-	x
57	spaced at relatively wide intervals					-	-	-	x
58	no ribs in raked end sections					-	-	-	x
	g) Headboard								
59	present			-		-	-	-	-
	r) Gunwale Guards								
60	present			-		-	-	x	x
61	joints scarfed					-	-	-	x
62	longer than gunwales at bow & stern					-	-	x	-
63	overlapping at beam					-	-	x	x
64	fixed with wooden pegs					-	-	x	x
65	with few lashings along sheer					-	-	x	x
66	narrower than gunwales					-	-	x	x
67	next to & not over thwarts on gunwale: centre					-	-	x	
68	bow					-	-	x	x
69	stern					-	-	x	-
70	separate staves serving as handgrip	x				-	-	-	-

Table VIII (cont'd.)

Reports/Replicas:	A	B	C	D	I	II	III	IV
s) Fenders								
71 present below gunwales					-	-	x	x
72 made of 2 "saplings" overlapping at beam					-	-	x	x
73 held by few lashings					-	-	x	x
74 chafing sticks next to endseams					-	-	-	x
75 held with few lashings					-	-	-	x
t) Gumming								
76 present		x	x	xp				
u) Red Ochre								
77 on parts or entire canoe		x	x	xp	x	x	x	x
v) Ballast								
78 used			x					
w) Paddles								
79 single headed	x		x	x	x	x		
80 oars	x							
x) Sails								
81 present			x					

[b] Symbols used: x = present (recorded or by implication);
- = absent (recorded or by implication);
= (empty space) not recorded;
xp = probably present (assumed, based on some evidence).

papyrifera Marsh. (Table VIII:1) which is plentiful in Newfoundland and of excellent quality, particularly in the interior of the island (Hosie, 1979:160). For the structural parts black spruce (Picea mariana [Mill.] B.S.P.) was probably utilized as it is most suitable and abundant in Newfoundland (Adney & Chapelle, 1964:17; Hosie, 1979:72), though one observer reports that canoes had ribs and gunwales made of birch (Howley, 1915:86).

Split roots, probably from black spruce (Picea mariana) are used for sewing and lashing (Table VIII:2, 36) and sinew as an alternate thread for fine sewing or tying (Table VIII:3, 37). Replica IV, made by Shanawdithit, is partly made with string of European origin (Table VIII:4) which may have been a substitute for sinew. On the same replica the caps are fastened in places with metal pins or nails (Table VIII:5). Adney comments that many old North American canoes or models show various combinations of root lashings and nails (Adney & Chapelle, 1964:56). He estimates that the introduction of nails into canoe building occurred in eastern areas some time before 1850.

The Beothuk procured iron nails by stealing and burning boats as early as 1720 (Morandière, 1962:I:21) and Cartwright mentions in 1768/69 that their arrows were fitted with iron points. There is also good archaeological evidence for the use of iron by the Beothuk (Le Blanc, 1975:144; Devereux, 1965, Ms. 261, Ms. 743) though not until 1827, when Cormack found the wreck of a birch bark canoe on the

shores of Red Indian Lake with its iron nails still in place (Howley, 1915:192), was the use of nails specifically associated with canoe building.

Construction

g) Building frame: Cartwright observes that the lashing of the gunwales to the bark cover is undertaken before the sides are forced apart for the insertion of the thwarts, and that the latter give the canoe its width and final shape. This information indicates that the Beothuk did not construct their canoes around a gunwale-and-thwart structure which establishes the length and width of a canoe early in the building process and does not result in an "opening up" of the sides. Instead they appear to have used a building frame which is placed on the flattened cut bark sheet on the ground and determines the width and shape of the hull bottom. It is removed after separate gunwales are lashed to the bark sheet. Only then are the thwarts or cross pieces inserted which set the canoe's beam. The different building techniques are associated with specific hull shapes: relatively wide bottom canoes with tumble home or vertical sides, manufactured by east coast Indians, are usually built around a gunwale-and-thwart structure; a building frame is used on narrow bottomed canoes with flaring sides (Adney & Chapelle, 1964:29). This latter procedure may have been the earlier of the two building methods. According to Denys (1908:420) in 1534/40 the Micmac inserted the cross pieces or thwarts on their canoes

after the gunwales were lashed to the bark and Adney thought that formerly Micmac canoes also usually had a hogged sheer (Adney & Chapelle, 1964:59). The combination of these two techniques would suggest that Micmac canoes originally had a narrow bottomed hull and were also built with a removable building frame.

h) Keelson: A unique feature of Beothuk canoes is the keelson (Table VIII:8). The length and placement varies according to the canoe shape in profile. On curved bottom canoes the keelson is curved all along the centre line and its ends are bent up to the top of bow and stern (Table VIII:12). In canoes with a straight keel-line in side profile the keelson does not extend beyond the straight length of the bottom (Table VIII:9). Both types of keelson are tapered at either end (Table VIII:11).

i) Inner gunwales: The inner gunwales extend from the top of the bow to the top of the stern sections (Table VIII:13, 18). On the curved bottom canoes described by Cartwright, they are made of two tapered "sticks" and joined at the beam (Table VIII:14), which is a method also used by Western Cree canoe builders and on temporary bark canoes (Adney & Chapelle, 1964:132, 215).

On replicas III and IV the gunwales are made of rectangular pieces of wood (Table VIII:16) which are sharply bent at the pointed centre of the hogged sheer (Table VIII: 15). They are tapered and bear on one another at the ends (Table VIII:17).

j) Thwarts: All canoes have a main thwart at the beam and one or two thwarts--depending on their size--in each of the end sections (Table VIII:23, 24). John Guy's illustration shows only four thwarts (Table VIII:23); however, it is suggested that a fifth thwart is merely omitted. As a rule if a centre thwart is present, as is the case on Guy's drawing, an equal number of thwarts is placed in the fore and aft sections. In canoes with an even number of thwarts they are located fore and aft of the beam, and there is no thwart in the centre.

The thwarts are plain and parallel-sided and are spaced at different intervals (Table VIII:25, 26, 27). The use of twisted thongs in the place of end thwarts as demonstrated on replica III is otherwise known from temporary bark canoes (Adney & Chapelle, 1964:216). On replica III and IV the thwarts are fixed on top of the gunwale lashings which may be a simplification of the technique used on full-sized canoes. The thwarts largely serve to maintain the width of a canoe hull, a function which is not properly accomplished if they are attached on the gunwales rather than between them. If the positioning of the thwarts is representative then they could not take weight or be used as seats, as they would quickly rub through the gunwale lashings. Cartwright says that the Beothuk used to kneel in their canoes on a layer of sods and moss that covered the rock ballast (Howley, 1915:32-33). Speck (1940:64) found that the Penobscot knelt on fawn skins but later

developed the habit of sitting on the thwarts though, when alone in a canoe, they preferred to stand up. Most 18th century illustrations depict Indians either kneeling or sitting on the canoe floor, or standing up (Adney & Chapelle, 1964:9, 11; Hoffman, 1963:48-50; Whitehead, 1980:cover, 7, 13, 32; Sturtevant, 1981).

k) Bark cover: The canoe hulls are made from large sheets of birch bark (Betula papyrifera Marsh.) with the rougher, outer side turned inside (Table VIII:31). Extensions are sewn on edge-to-edge with no overlap of the adjoining bark and without the use of seam battens (Table VIII:34, 35). The bark of the hull is cut flush with the gunwales (Table VIII:21). The canoes are entirely open and have no decked areas.

The two major canoe designs identified in the previous section require markedly different techniques for the manufacture of the bark hull. According to Cartwright, the bark cover on the curved bottom canoes consists of two complete side sections, sewn together under the keelson (Table VIII:32). The seam along the centre line is vulnerable to abrasion but this drawback is evidently offset by the greater safety factor achieved through additional draft of the canoe. Performance tests with canoes built by Scott James (Appendix B) have shown the curved bottom hull form to be more stable than the straight one. Adney dismisses Cartwright's description of a seam along the centre line, presumably because this method violates accepted principles

of making the bark hull, according to which seams below the waterline are kept at a minimum and they are also not used to achieve rocker of a canoe bottom (Adney & Chapelle, 1964:29).

On the canoes with a straight keel-line the bark is folded over the keelson along the centre line (Table VII:33) which is the usual procedure in bark canoe building.

If the basic canoe form includes a wider bottom, as is the case on Eastern Cree "crooked" canoes, then the extreme rocker can be accommodated without changing the method of producing the bark hull. The greater curvature on the Cree canoe is achieved by a large number of gores, which are wedge-shaped cuts, in the bark along the sheer.

The technical implications of the curved keelson canoe suggest that when a strongly rockered form became desirable, the central keelson of the Beothuk canoe made it difficult to give the bark sheet the required curvature. Consequently, the builders adopted a compromise solution of cutting two side panels and sewing them together. This innovation allows a complete curvature of the bottom and accommodates the keelson with deadrise, but it necessitates a seam below the waterline, which is usually avoided.

This technical development as well as the limited occurrence of the curved keelson design indicate its derivation from the straight keelson canoe and identifies the straight design as the original and earlier form. Guy's

description of the strongly rockered canoe places the adoption of this design into the time period prior to 1612.

The use of skins as cover material for Beothuk canoes is poorly documented. A statement to this effect was made by W.E. Cormack, who collected information on Beothuk lifestyle and culture in the 1820's. Cormack examined deserted Beothuk sites and questioned Shanawdithit during her residence in St. John's and his notes are generally thought to be reliable. They were published by Howley in 1915 and include a description of Beothuk canoes whose hull cover, so Cormack says, was made of deer skins (Howley, 1915:213). This claim, however, does not agree with Cormack's own observations in 1827 (Howley, 1915:190, 192) and with all other reports on the subject. As the description of canoes was written down after 1840[3] Cormack may have had a lapse of memory when he belatedly attempted to recall canoe details.

Indians occasionally resorted to skin as cover material, particularly for temporary craft, and both Adney and Speck (Adney & Chapelle, 1964:219; Speck, 1940:66; 1922:33) describe moosehide canoes in use by the Malecite, Micmac, Montagnais and Penobscot Indians. There is no reason why the Beothuk should not have done likewise. Generally, however, the evidence suggests that they employed birch bark rather than skins.

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[3] Cormack's note paper is watermarked 1840.

1) Lashings: Root lashings on gunwales, bark hull and end seams of Beothuk canoes are applied in a spiral or over-and-over fashion (Table VIII:36, 38).

The method of lashing gunwales to the bark hull largely depends on the presence or absence of outer gunwales. On canoes which have only inner gunwales the latter are usually lashed to the bark hull with continuous wrappings (Adney & Chapelle, 1964:55). If both inner and outer gunwales are present the bark cover is clamped between them and the lashings are done in groups, though there are exceptions to this rule.

As the outer gunwales on the curved keelson canoes are only intermittently fastened with thongs, they are probably attached after the inner gunwales have been lashed to the bark cover with continuous wrappings. This combination of techniques is also known from other Northern American canoes (Adney & Chapelle, 1964:31). Canoe replicas III and IV have only inner gunwales which are fastened with continuous lashings.

Adney argues that the gunwales on Beothuk canoes are attached with group lashings. He considers the evidence of replica III as insufficient, claiming that continuous wrappings on Indian canoe models are a common simplification of the actual type of lashings used on full-sized canoes and that they represent either type indiscriminately (Adney & Chapelle, 1964:96). However, several other canoe models have the gunwales secured by group

lashings (Fenton, 1949; Adney & Chapelle, 1964:93) showing that some model makers accurately reproduced the type of lashing normally in use.

Adney also cites the information from the Micmac, Noel Mathews, who was one of Howley's canoe men during his land survey in the 1880's. In comparison with the continuous lashings used by his own people Mathew explained that the Beothuk canoes had been

> served at intervals and there were spaces cut in the gunwales to receive the binding so as to make it flush with the rest of the gunwale. (Howley, 1915:279)

The information originally came from Mathew's mother and an old Micmac chief; it is not clear whether it described canoes with inner gunwales only or with inner and outer gunwales together. The statement suggests that the Beothuk may have used a variety of lashing techniques.

Adney's arguments for group lashings on Beothuk canoes were probably also motivated by his theory of a prehistoric relationship between Beothuk and Malecite and their common ancestry (Adney Ms. 1945). Group lashings and outer gunwales were used by the Malecites and Adney apparently deduced that the Beothuk would have employed the same methods.

As the replicas have no outer gunwales, it is likely that the Beothuk largely attached the inner gunwales with continuous wrappings as was usual in canoe construction. Whether this also applies to the curved keel-line canoes cannot be determined.

n) Stem/stern pieces: Three types of stem and stern support can be observed: First, on the curved bottom canoes the keelson ends are bent upward to the top of the end sections and serve as stem/stern support inside (Table VIII:12, 45). Second, on straight keel-line canoes (replica IV) the keelson is confined to the straight length of the bottom and the bow and stern sections have no inside stem piece (Table VIII:9, 44). It is proposed that this method was generally used on Beothuk canoes of this design. The end sections would have been supported by the gunwale structure and the stiffness of the bark together with outside seam battens. Neither a stem post nor a headboard (Table VIII:59) connected the keelson and gunwale ends (Table VIII: 44), a method which was also employed on birch bark canoes of the Micmac and Eastern Cree (Adney & Chapelle, 1964:60, 61, 101).[4] Third, on replica IV the inner gunwales are made of one batten that is split for the length of the sheerline and extends as one piece over the top of the bow and stern sections and the end seams, where it functions as outside seam battens (Table VIII:19, 20). In addition, chafing sticks are attached on either side of the end seams (Table VIII:74, 75).

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[4]Adney's description of the Micmac canoes is not consistent; he first claims that they have no stem/stern pieces but later mentions their inclusion in the end sections. The two Micmac canoes in the collection of the National Museums of Canada, National Museum of Man, Ottawa, that were available for examination have no stem pieces; of the five model canoes in the Museum of Mankind, Ethnography Department of the British Museum, London, four models have no stem-pieces while one does.

A split sapling used for the gunwales in a similar manner is recorded on an elm bark canoe model from the Seneca (Fenton, 1949:187). The occurrence of this technique in two distant areas suggests that it was widely known; it may usually have been employed on temporary or smaller canoes only (Adney & Chapelle, 1964:215) or may have been a convention in model making.

o) Sheathing splints: Cartwright reports that the canoes are lined with thin sheathing splints which cover the inside of the bark, are laid parallel lengthwise from the centre upwards and are tapered at bow and stern. The irregular size and placement of sheathing splints in replica IV (Table VIII:46-49) may be the result of shrinkage of ribs and loss of sheathing boards. Various Indian groups used differentiating sheathing patterns on their canoe floors which are claimed to be diagnostic of regional affinity (Adney & Chapelle, 1964:34). Beothuk canoe floors have only room for one plank above the keelson and can therefore not be compared.

On replica IV this central plank consists of two abutting boards, tapered at the ends, that are tied to and placed above the ribs (Table VIII:51, 52). This central plank sets the width of the hull bottom and protects the canoe floor which, on north western narrow bottom canoes is the function of a permanently installed bottom frame. In developmental terms, the plank structure is probably a remnant of a bottom frame. Though the latter is usually held

down by the ribs, lashing of structural components being generally only used on kayaks, an old canoe model from British Columbia with lashed battens shows that exceptions exist (Table IX:33).

p) Ribs: The ribs are sharply bent over the keelson and the rib heads are secured under the inner gunwales (Table VIII:53, 54, 55, 56). On replica IV the ribs are relatively widely spaced and there are none in the raked end sections (Table VIII:57, 58). These last two attributes are otherwise known from canoes made of spruce bark, which is stiffer than birch bark and requires less support (Adney & Chapelle, 1964:158).

r) Gunwale guards: While the curved keel-line canoe has no gunwale guards, replicas III and IV have guards which overlap at the beam where the hogged sides come to a point (Table VIII:60, 63). The guards of the fore quarter are placed over those in the aft. They are narrower than the gunwales and positioned along their outer edge next to rather than over the end thwarts (Table VIII:66-69).

s) Fenders: Canoe replicas III and IV have fenders attached well below the gunwales, a feature that is not reported from 17th and 18th century curved bottom canoes. The fenders are made of two twigs that overlap slightly abaft midlength at the beam, and the aft fender extends a little over the front one (Table I:71-73).

t) Gumming of seams: The technique of coating the seams on canoe hulls with a spruce resin mixture (Picea

mariana or Picea glauca [Moench] Voss) (Table VIII:7) to render them watertight is reported by Cartwright, Whitbourne and Buchan (Howley, 1915:19, 32, 85). It is a standard procedure in bark canoe building and the ingredients of the mixture vary for different groups and builders. None of the replicas is treated with a gum substance.

u) Decorations: Beothuk canoes are not decorated but they are covered with red ochre which is apparent on all replicas (Table VIII:6, 77). Several contemporary observers of the Newfoundland Indians remarked on the liberal use of ochre on their bodies, garments and implements (Whitbourne, 1620:(2); Howley, 1915:47, 86, 259, 190; Pülling, 1792:14). Red ochre has since been noted in Beothuk burials (Howley, 1915:289, 331, 332, 333, 334, 335; Carignan, 1973: 12; Marshall, 1973) and has become a diagnostic feature in archaeological investigations of their sites. The significance of the ochre substance has not been fully defined though its importance was probably of a symbolic nature (Tuck, 1976:57).

v) Ballast: Cartwright is the only person to describe type, placement and cover of ballast. This information may be only valid for the curved bottom canoes (Table VIII:78). The ballast is intended to settle the craft upright in the water and counteract its tendency to tip sideways. This instability is caused by the V-shape of the hull and is increased by strong rocker. Taylor reports that the wife and daughter of a Cree canoe builder found his "crooked"

canoe--so called for its strong rocker--too "tippy" to use, even though it had a rounded bottom (1980:13).

Experiments with Beothuk canoe forms (see Appendix B), one with a curved bottom and the other with a straight keel-line, reveal that rock ballast is required to settle either of the canoes in the water in an upright position, though the curved bottom craft requires considerably more ballast. Trial runs with a reduced amount of rock in the straight keel-line canoe suggest that with the development of skill and dexterity no ballast in addition to the weight of occupants may be needed.

Eighteenth and 19th century records (Table I:18, 19, 22, 31, 34, 35) disclose that of the six canoes which were observed to land four were quickly pulled ashore and would have had little or no rock ballast because a heavy rock load would have prevented them from being dragged out of the water. In one case the swiftness with which the Indians disappeared with their canoe precluded the unloading of ballast rocks; on another occasion they left their craft on shore between the high and low tidemark and hastily placed a rock into the bow. In spite of this precaution, it was shortly afterwards washed away by the sea (Pulling, 1792:22). These reports indicate that rock ballast, if used at all, would not have been extensive.

It is concluded that the curved bottom canoes required some additional ballast but that the straight keelson design may have been used without.

Staves: John Guy records approximately one yard (91 cm) long staves which are tied to bow and stern (Table VIII:70) and used for handling the canoes (Fig. 16). They are not observed on any other Beothuk canoes. Adney, who was not aware of Guy's illustration thought that the staves served as braces inside the end sections, a technique that is occasionally applied on other Indian canoes (Fig. 16).

Folding of the Canoe: A controversial issue is the claim that some Beothuk canoes could be folded together sideways (Table I:12, 34, 39). The first person to mention this feature is Joseph Banks who visited Newfoundland in 1766. Banks was told that the Beothuk canoes

> Differ from the Canadians Essentially in that they are made to shut up by the sides Closing together for the Convenient Carriage of them through the woods which they are obliged to do on account of the many lakes that abound all over the Island. (Lysagt, 1971:133)

The information came from a "gentleman" who was told these details by "his own people" (probably his servants) and "those of neighbouring planters and fisherman" and Banks was not sure whether it could be trusted (Lysagt, 1971:133).

The folding for the purpose of portaging was also mentioned by Captain Glascock R.N. who in 1819 unsuccessfully tried to catch up with a Beothuk canoe in Seal Bay. By the time he reached the beach the Indians had landed and vanished. Glascock who apparently had hoped to find at least their canoe was disappointed in this expectation and in this context credited the Indians with specific modes of concealing their canoes, either by sinking them or by

folding the canoes to make them easily portable in the woods (Howley, 1915:115). The fact that the Indians managed to disappear without trace cannot be considered good evidence for their practice of folding their canoes and Glascock's suggestion was probably based on the opinion of some of the settlers of the area.

References to folding canoes were also made by T.G.B. Lloyd, a geologist, who conducted surveys in Newfoundland in the 1840's. He conversed with John Peyton who had previously lived on Exploits Island and had intermittently been involved with the Beothuk. Peyton said that the Beothuk removed the spreader or thwart when circumstances required it so as to fold up the canoe "like a cocked hat" (Lloyd, 1875:27).

> The joint in question was made of . . . a strip of deerskin . . . forming a flexible hinge by which means the canoe would be folded up without injury . . . [Peyton's son] . . . once found the remains of a canoe [and] described the side of it as consisting of two sheets of bark the edges of which formed a joint half-way between the keel and the gunwale. (Lloyd, 1876:224-225)

This description is accompanied by a drawing (Lloyd, 1876: Plate VII) and presumably refers to the straight keel-line design. It is, however, questionable whether this procedure is actually feasible and useful.

Bark sheets are rarely wide enough for the hull cover and additional panels are often added for the upper part of the sides, avoiding seams below the waterline (Adney & Chapelle, 1964:31). They are covered with gum or pitch or other materials to make them watertight, and their presence

is accounted for by usual building methods.

To fold the upper parts of the canoe's sides inward, all thwarts have to be removed and all rib heads have to be disengaged. The ribs are forced under the gunwales on either side of the canoe and their pressure retains the shape of the bark hull. They also hold the sheathing splints in place. The laborious task of removing and later resetting the ribs hardly justifies the limited benefit derived from folding the upper portions of the canoe sides.

Not one of the three references to canoe folding is based on an eye witness account of this practice. The notion of collapsible Beothuk canoes may well have been based on the sight of a half-built canoe (Howley, 1915:42) which, in its unfinished state, would have looked "folded." This observation could have been misinterpreted by the settlers and induced Peyton to think that the strip of skin over the seam of a canoe remnant was a hinge rather than a means of waterproofing.

Though under certain circumstances it may have been possible and desirable to dismantle and fold the sides of a canoe the evidence is too unreliable to be confident that such operations were actually carried out.

w) Paddles/oars: To propel the canoes the Beothuk employed single headed paddles, ca. 4' long (122 cm). They are made of fir and their long and narrow blade merges into the handle section (Figs. 2 and 3). The blades are ridged

and pointed and there is no evidence of a swelling as reconstructed by Howley (Howley, 1915:Plate XXXI).

John Guy reports the use of a 10' long oar (305 cm), made of beech wood, consisting of a handle part and a blade. The latter was let into the end of the handle, and the joint was strongly lashed. Guy was of the opinion that it was made from a Basque oar. Oars are not recorded elsewhere nor is beech available in Newfoundland and Guy's observations are probably correct.

x) Sail: Though sails were occasionally resorted to they were not used as a rule. Cartwright saw a number of Beothuk canoes with canvas sails hoisted, the canvas having been stolen from the settlers, but he assumed that Beothuk canoes (Table I:19) were not designed for sailing.

In conclusion, divergences in canoe construction attributes support the concept of two functionally distinguishable Beothuk canoe designs. The difference involved the manufacture of the bark hull and keelson, the support of the end sections and the presence or absence of rock ballast and possibly other construction attributes. They also support the idea that the straight keel-line canoe is the original form and that the technical solutions of manufaoturing the bark hull for the curved design are the invention of a Beothuk group.

The examination and discussion of Beothuk hull shape and construction attributes served to test and prove the hypotheses that the Beothuk constructed more than one

canoe design to accommodate different requirements and that elements of style were retained. In the following section Beothuk canoes and their attributes are compared to those of other North American groups.

Table IX

List of Canoes and Kayaks Included in the Study

	Area Designation and Reference	Length	Beam	Depth
1	Micmac 2 fathom woods canoe (Ad.& Ch., 1964:61, fig. 51)	14'7" 445 cm	33" 84 cm	13 1/2" 34 cm
2	Micmac 2 1/2 fathom big river canoe (Ad.& Ch., 1964:62, fig. 52)	17'4" 528 cm	33 1/2" 85 cm	12 1/2" 32 cm
3	Micmac 3 fathom rough water ocean canoe (Ad.& Ch., 1964: 63, fig. 53)	21'8" 660 cm	42" 107 cm	20" 51 cm
4	Malecite, St. John River canoe (Ad.& Ch., 1964:38-57, 70, fig. 31)	16'8" 508 cm	34 3/4" 88 cm	10 5/8" 27 cm
5	Malecite old form, 2 1/2 fathom river canoe (Ad.& Ch., 1964:71, fig. 62)	18'6" 564 cm	35 1/2" 90 cm	10 3/4" 27 cm
6	Penobscot, 1826 2 1/2 fathom ocean canoe (Ad.& Ch., 1964:72, fig. 63) (Speck, 1940:57-65) (Hadlock & Dodge, 1948)	18'7" 566 cm	37 1/4" 95 cm	15 1/4" 39 cm
7	Passaquamoddy, 1873 3 fathom ocean canoe (Ad.& Ch., 1964:73, fig. 64)	20'1/2" 625 cm	44 1/2" 113 cm	20" 51 cm
8	Abnaki/St. Francis 2 fathom hunting canoe (Ad.& Ch., 1964:89, fig. 80)	14'8" 447 cm	32" 81 cm	13 1/2" 34 cm
9	Abnaki/St. Francis open water canoe pre 1890 (Ad.& Ch., 1964:92, fig. 83)	15'1/2" 472 cm	34" 86 cm	12 1/4" 31 cm
10	Ungava Cree 2 1/2 fathom crooked canoe (Ad. & Ch., 1964:103, fig. 92)	18' 549 cm	41" 104 cm	23" 58 cm
11	Montagnais canoe 2 fathom (Ad.& Ch., 1964:102, fig. 91)	14'11" 455 cm	34" 86 cm	14" 36 cm

Table IX (cont'd.)

	Area Designation and Reference	Length	Beam	Depth
12	Nascapi-Cree hybrid 2 fathom canoe (Ad.& Ch., 1964:103, fig. 93)	12'11" 394 cm	32" 81 cm	15 I/2" 39 cm
13	Cree Nascapi Great Whale River model (British Museum cat. 1921 10-4.213)	101 cm	24 cm	12.2 cm
14	Cree Nascapi Great Whale River canoe (Taylor, 1980:86)	14'3" 434 cm	2'8" 81 cm	1'4" 41 cm
15	Téte de Boule 1 1/2 fathom hunting canoe (Ad. & Ch., 1964:111, fig. 102)	9'8" 295 cm	26 1/2" 67 cm	12" 31 cm
16	Weymontaching (Téte de Boule) canoe (Guy, 1974)	12'6" 381 cm	2'6" 76 cm	
17	Algonkian, old form 2 fathom hunting canoe (Ad. & Ch., 1964:116, fig. 108)	13'4" 406 cm	31 3/4" 81 cm	11 3/4" 30 cm
18	Algonkin canoe (Codex Canadiensis, 1974:17, folio 22)			
19	Magoanchiwinouek canoe (Codex Canadiensis, 1974:17, folio 22)			
20	Passinassiouek canoe (Codex Canadiensis, 1974:15, folio 19)			
21	Outaoua canoe (Codex Canadiensis, 1974:18, folio 23)			
22	Cree (Manowan Reserve) canoe (National Film Board Film No. 0371 074)			
23	Western Cree (Northern James Bay) 2 1/2 fathom canoe (Ad.& Ch., 1964:133, fig. 124)	14'10" 452 cm	34" 86 cm	15" 38 cm

Table IX (cont'd)

	Area Designation and Reference	Length	Beam	Depth
24	Cree canoe (British Museum No. 6, 1910)	14'8 1/2" 448 cm	81 cm	35 cm
25	Ojibwa, old style, east 2 1/2 fathom canoe (Ad. & Ch., 1964:125, fig. 117)	16'2" 493 cm	37" 94 cm	14" 36 cm
26	Ojibwa long nose, west 2 1/2 fathom canoe (Ad. & Ch., 1964:125, fig. 117)	16' 488 cm	34" 86 cm	15 1/2" 39 cm
27	Chipewyan canoe (Ritzenthaler, 1950)	14'3" 171		
28	Chipewyan canoe (Hearne, 1971:134)			
29	Chipewyan, narrow bottom canoe 2 1/2 fathom, Dogrib and Slave (Ad.& Ch., 1964:156, fig. 145)	16'2" 493 cm	37 1/2" 95 cm	14" 36 cm
30	Chipewyan kayak form canoe (Ad.& Ch., 1964: 166, fig. 148)	12-14' 366-427 cm	20-24" 51-61 cm	bow: 8 1/2"-9 1/2" 22-24 cm stern: 10-11" 25-28 cm
31	Slavey, 3 fathom narrow bottom canoe (Ad.& Ch., 1964:157, fig. 146)	18'9" 572 cm	44" 112 cm	14 1/2" 37 cm
32	General Athabascan kayak form canoe (Ad.& Ch., 1964:159-164)	12-18' 366-549 cm	24-27" 61-69 cm	9-12" 23-30 cm
33	B.C. Beaver, Nahane, Sekani, old extinct bateaux form canoe (Ad.& Ch., 1964:159, fig. 149)	14'5 1/2" 441 cm	30 1/2" 77 cm	11 1/4" 29 cm

Table IX (cont'd.)

	Area Designation and Reference	Length	Beam	Depth
34	Athabascan extinct kayak bateau form canoe, Alaska (Ad. & Ch., 1964: 161, fig. 149)	16'10" 513 cm	31" 79 cm	11" 28 cm
35	Lower Yukon kayak form canoe (Ad.& Ch., 1964: 159-165)	14'-15' 427/457 cm	2'-2 1/4' 61/69 cm	10'-12' 25/30 cm
36	Eskimo canoe, Lower Yukon (Ad.& Ch., 1964: 164, fig. 150)	14'4 1/2" 438 cm	26" 66 cm	12" 30 cm
37	Athabascan kayak form canoe, Mackenzie Basin (Ad.& Ch., 1964:159, 167)	13'3" 404 cm	27" 69 cm	8 1/2" 22 cm
38	British Col. & Upper Yukon Valley kayak form canoe (Ad.& Ch., 1964: 165, fig. 151)	18'4 1/2" 560 cm	25" 64 cm	9 1/4" 23 cm
39	Loucheux Athabascan kayak form canoe (Ad.& Ch., 1964:166, fig. 149)	12'7" 384 cm	27" 69 cm	12 1/8" 31 cm
40	Athabascan canoe Alaska (Ad.& Ch., 1964:163, fig. 150)	13'2 1/2" 403 cm	26 1/2" 67 cm	8" 20 cm
41	Athabascan canoe model BC (Ad.& Ch., 1964:168, fig. 153 and information from Peabody Mus.)	111 cm	21 cm	8.8 cm
42	Norton Sound (Alaskan) canoe model, scale 1:8 (Smithsonian cat. 32 992)	28 cm	15 cm	8 cm
43	Tinneh, Norvikakat, Alaskan Athabascan canoe (Smithsonian cat. 166 934) (here fig. 17a)			

Table IX (cont'd.)

	Area Designation and Reference)	Length	Beam	Depth
44	Athabascan canoe model (Smithsonian cat. 858:859) (here fig. 18)			
45	Athabascan canoe model (Smithsonian cat 38 880) (here fig. 17b)			
46	Athabascan, Upper Yukon canoe model (Smithsonian cat. 260 375)			
47	Kutenai canoe (Ad.& Ch., 1964:168, fig. 154)	15'4" 467 cm	25 1/2" 65 cm	12" 30 cm
48	Seneca elm bark canoe model made prior to 1826 (Fenton,1949)	4' 121 cm	9 1/2" 24 cm	5" 13 cm
49	Iroquois elm bark canoe (Ad.& Ch.,1964:215-218; Fenton,1949)	20'3" 617 cm	46 1/2" 118 cm	17" 41 cm
50	Temporary bark canoes (Malecite & others) (Ad.& Ch.,1964:214-19)			
51	Temporary moose hide canoe (Malecite) (Ad.& Ch.,1964:219, fig. 209; Speck,1940: 66)	12'6" 381 cm	40" 102 cm	14-19" 36-48 cm
52	Eastern Siberian koryak (Arima,1975:67; Ad. & Ch.,1964:195, fig. 176)	-10' 305 cm	24-26" 61-66 cm	8-9 1/2" 10-24 cm
53	Reindeer Chukchi kayak (Arima,1975:69)			
54	Asiatic Eskimo, Maritime Chukchi kayak (Arima,1975:71)	15' 457 cm	mod.wide	mod.deep

Table IX (cont'd.)

Area Designation and Reference	Length	Beam	Depth
55 Bering Sea Eskimo kayak (Arima, 1975:73; Ad. & Ch., 1964:199, fig. 181)	14-17' 427-518 cm	23-30" 58-76 cm	14-16" 36-41 cm
56 Aleut Eskimo kayak (Arima, 1975:75)	18-21' 549-640 cm	18-20" 46-51 cm	10-12" 25-30 cm
57 North.Alaska, Central Canada kayak (Arima, 1975:76; Ad.& Ch., 1964:202, fig. 187)	17-28' 518-853 cm	15-24" 38-61 cm	7 1/2-12" 19-30 cm
58 Mackenzie Eskimo kayak (Arima, 1975:80; Ad.& Ch., 1964:200-2, fig. 188)	12 1/2-16' 381-488 cm	18-20" 46-51 cm	6 1/2-10" 17-25 cm
59 Eastern Canadian Eskimo kayak (Arima, 1975:82; Ad. & Ch., 1964:205, fig. 198)	16-27' 488-823 cm	23-28" 58-71 cm	8-11" 20-28 cm
60 Greenland Eskimo (Polar) kayak (Arima, 1975:10; Ad.& Ch., 1964:206, figs. 199, 200)	16-20' 488-610 cm	16-26" 41-66 cm	6-8" 15-20 cm
61 Caribou Eskimo kayak (Arima, 1975:99)	27-28' 823-853 cm	15-24" 38-61 cm	8-13" 20-33 cm
62 South-west Greenland Eskimo kayak (Ad.& Ch., 1964:209/11, figs. 206/1)	16'6"-17'1" 503-521 cm	19 1/4-20" 49-51 cm	6 7/8" 17.5 cm

CHAPTER FIVE

COMPARISON OF BEOTHUK CANOES WITH CRAFT OF OTHER NORTH AMERICAN NATIVE GROUPS

To create a comparative data base sixty-two canoe and kayak designs of native groups other than the Beothuk, listed on Table IX, are examined in detail. Altogether sixty-eight hull shape attributes and 232 construction attributes are identified and tabulated. This information is compared with equivalent data for Beothuk canoes to investigate whether Beothuk canoes were built according to traditional methods of canoe construction, whether any of their features or attributes are unique and whether significant resemblances indicate pathways of communication or relationships.

A. Conformity of Beothuk Canoes

The data on bark canoe construction of different Indian groups from across the North American continent is marked by a considerable conformity of building methods. This correspondence in principles and methods suggests that North American Indian bark canoe construction is a diffused cultural trait and was not independently invented by different groups or in different regions.

To accommodate local circumstances and individual requirements separate ethnic groups eventually developed specific designs. Significantly, the resulting variations rarely diverge from basic construction methods and more often than not represent improvements or further developments of techniques rather than changes in principles. In contrast, concepts concerning hull shapes that would best fulfil particular requirements vary significantly and have led to a considerable variety of hull forms that have come to distinguish canoes of different ethnic groups and regions.

To test the hypothesis that Beothuk canoe construction conforms to traditional building methods their features and attributes are matched with equivalent ones of other canoes. If each Beothuk canoe feature and construction attribute has a counterpart on canoes from other regions, it is assumed that the same principles and building methods were applied.

The comparison shows that with few exceptions Beothuk canoe attributes to a greater or lesser degree match equivalent ones on canoes from other groups and that the Beothuk used the same principal methods as did other North American groups. The birch bark hull is held firm by an internal framework and lashed together with split root material or sinew. The inner frame consists of a keelson and gunwales for longitudinal stability while ribs and thwarts give lateral support. Sheathing protects the bark

hull and seam battens support the higher end sections. In short, Beothuk canoes have the same construction features that are present on other canoes. Equally the open, long and relatively narrow hull form with sharp and raised ends conforms to the general shape of North American bark canoes, and clearly places them within the North American Indian bark canoe tradition. This implies that Beothuk canoe building owes its existence to a communicated tradition.

B. Unique Attributes of Beothuk Canoes

Some characteristics of Beothuk canoes make these craft appear to be unique among North American bark canoes (Adney & Chapelle, 1964:94). To examine this supposed uniqueness the components of differentiating features are scrutinized. The analysis extends beyond a consideration of hull forms into details of construction and usage, so as to isolate any attributes that are only present on Beothuk canoes and not on any other.

Contrary to expectations, all Beothuk canoe attributes--with two exceptions--are also found on other bark canoes or kayaks. The exceptions are the method of placing the bark covering on the curved keelson canoes, where two side panels are sewn together beneath the keelson, and the use of ballast rocks. No other bark hull has been reported to be constructed in this manner nor was rock ballast used by other Indians.

It is evident that the apparent uniqueness of Beothuk canoes does not rest on these two details. Rather,

it is the result of either particular combinations of attributes, or of extensive development of attributes to a degree not seen elsewhere, or to the persistence of attributes on Beothuk canoes into the 19th century which were discontinued by other canoe builders at an earlier date. Contributing to the notion of uniqueness are the following attributes or combinations thereof.

i) Bark cover of the curved keelson canoe

The sewing together of the two side panels of bark beneath the keelson is truly unique. This suggests that it is a Beothuk invention and, as described elsewhere in the thesis, may have been their technical solution to the problem posed by introducing a strong rocker into their traditional V-shaped straight keelson design.

ii) The V-shaped hull with a keelson

The striking V-shape of the Beothuk canoe hulls in combination with a keelson is unique among bark canoes, but can be found on kayaks. The closest approximation to the Beothuk V-shaped hull is represented by an old kayak form from King Island in Alaska (Table IX:55; and Adney & Chapelle, 1964:Fig. 181). Modified versions of this form are present on kayaks from Kodiak Island, Alaska, Southampton Island and south western Greenland (Adney & Chapelle, 1964:197, 205, 210), though on these the flare to the sides arising from the keelson is nearer to the horizontal.

Of all bark canoes compared here only an old Athabascan bateau form canoe, which was made in Alaska, is relatively similar to the Beothuk design (Table IX:34). Its sides flare at a 45° angle but, instead of a keelson, it has an exceptionally narrow inside bottom frame and the canoe therefore lacks the sharp central deadrise (Adney & Chapelle, 1964: Fig. 149). The performance characteristics of this canoe form would have been quite similar to those of the Beothuk canoe.

A keelson by itself is present on several narrow bottom canoes from the north western region but its function here is to provide additional longitudinal strength to the bottom (Table IX:28, 42, 47). Approximations to a keelson for the purpose of achieving greater draft as on Beothuk canoes were made by several canoe builders with the aid of different types of central sheathing strakes and keelson pieces in the end sections (Adney & Chapelle, 1964:75, 76, 89, 91; see Table IX:14). A keelson is also incorporated in all kayaks.

These examples demonstrate that the V-shaped hull with a keelson is unique among bark canoes, but that the design is known from skin kayaks. Isolated elements of keelson, deadrise and straight flaring sides are present on a variety of craft.

iii) Keelson extensions to top of bow and stern

On the curved keelson Beothuk canoes the inside support for the end sections is provided by keelson extensions that lead to the top of bow and stern. This is

unusual on bark canoes though it is recorded from one bark canoe model from Norton Sound, Alaska (Table IX:42) and is also frequently found on skin kayaks (Table IX:52, 58, 60, 61).

iv) A central floor plank

Replica IV, which is the only complete specimen, has a central floor plank tied down above the sharply bent ribs and the keelson. It establishes the width of the bottom and protects the "broken" section of the ribs.[1] In narrow bottom canoes of north western groups the width of the bottom is determined by an inside bottom frame, consisting of several battens that are fixed together. Although, this bottom frame is placed under the ribs, it has similar functions a does the Beothuk floor plank and the latter could therefore be a modified bottom frame structure.

A central plank is also reported from some Micmac canoes. However, the wide and rounded bottom of the Micmac canoe hull confines the function of the plank here to one of general convenience for walking and sitting and additional protection of the floor, that is already covered with sheathing splints.

v) Very high bow and stern sections

Guy in 1612 describes relatively low and slender bow and stern sections resembling those of various

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[1] Sharply bent ribs are also referred to as "broken" ribs.

Athabascan bark canoes (Fig. 17a and b; Table IX:43, 45). Beothuk canoes of a later date have a very high peaked bow and stern. Fluctuations in the height of canoe ends were also noted by investigators of other canoes (Adney & Chapelle, 1964:75; Turner, 1979:142; Hadlock & Dodge, 1948: 299), and were thought to be due to diffusion through contact and made in emulation of canoes believed to be superior (Turner, 1979:142). It is not possible to say what motivated the change in height of Beothuk canoe ends. The evidence of Guy's illustration suggests that it may have occurred after 1612. The shape of the end sections and the degree of their height certainly contribute to the canoes' unique appearance.

vi) 'Hogged' sheer

The most conspicuous attribute on Beothuk canoes is their strongly hogged sheer. It is rounded on some replicas but comes to a point on most canoes. Curved hogging is known from canoes of the Chipewyan described by Hearne (1971:34; Table IX:28), from the great Slave Lake area (Fig. 18; Table IX:44), Lake Huron (Fig. 19), and from some ocean canoes of the Micmac (Table IX:3).[2] The pointed finish to the hogged section most likely occurs when the gunwales are made from saplings that abutt or overlap at the beam and was

[2]Sturtevant (1981:304) found a number of early representations of canoes with a hogged sheer and suggests that this attribute was once more widely spread in the eastern and central area and not only present on Beothuk and Micmac canoes.

Fig. 17. a) Full sized birch bark canoe, Tinneh, Athabascan from Norvikakat, Alaska (Table IX:43) (Smithsonian Institution, Neg. 77-12571, Cat. 166934), slender curved-up ends, straight bottom, angle between keel-line and end sections, no rocker, continuous gunwale wrappings, widely spaced ribs.

b) Birch bark canoe model, Fort Reliance, Alaska, Athabascan (Smithsonian Institution, Neg. MNH-2452, Cat. 38880), slender curved-up ends, straight bottom, angle between keel-line and end sections, no rocker, widely spaced ribs, plain parallel sided thwarts, seam battens and chafing sticks at end seams.

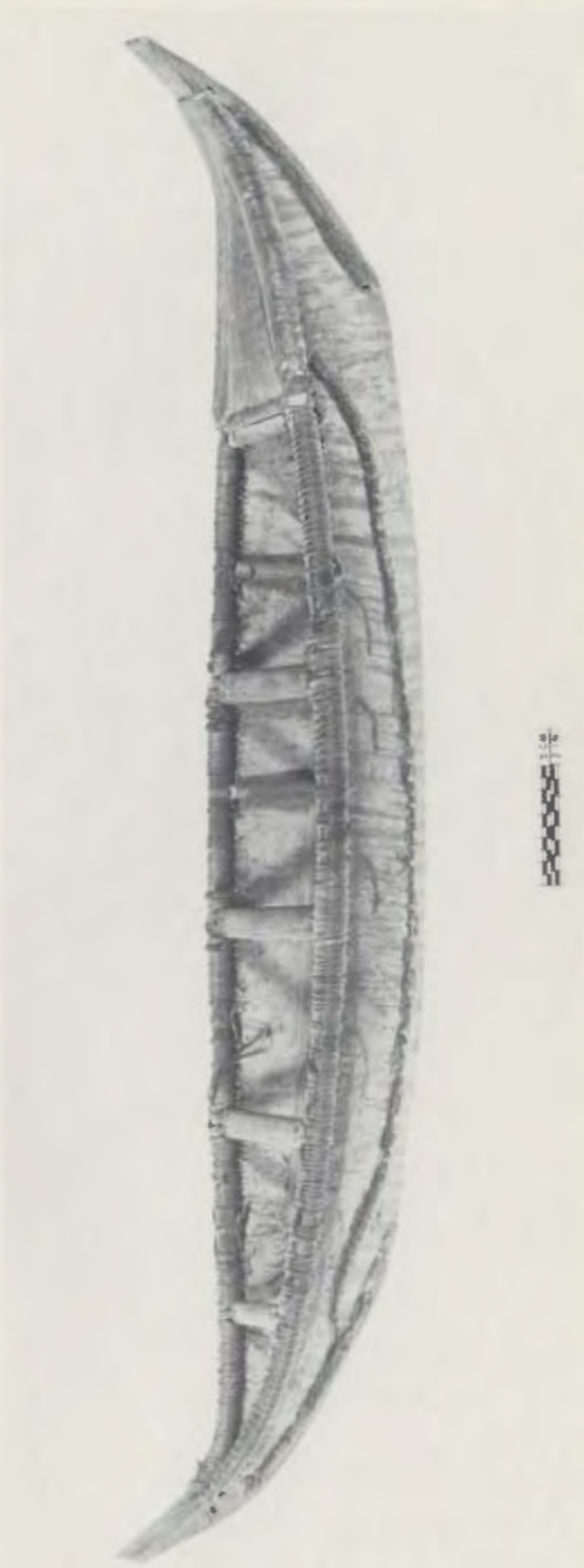

Fig. 18. Birch bark canoe model from Great Slave Lake, N.W. Territories (Table IX:44) (Smithsonian Institution, Neg. 31932-D, Cat. 858), straight bottom, no rocker, beam abaft mid-length, greater draft in the aft section, bow lower than stern, hogged sheer, widely spaced ribs, plain parallel sided thwarts.

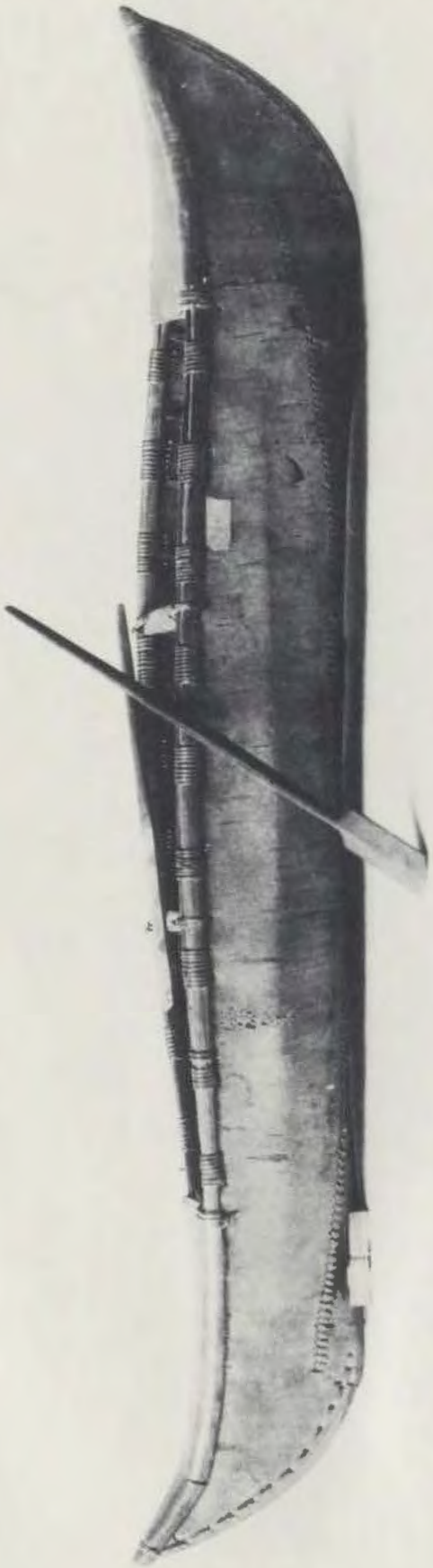

Fig. 19. Michilimackinac on Lake Huron, attributed to William Dashwood, painted in oil ca. 1880.

The painting is based on several sources, mainly on a print by Richard Dillon "Mackinac Island in 1813", depicting a scene in the war of 1812 and the taking of Michilimackinac described in "Richardsons War of 1812" (Casselman, 1902). According to Casselman, the British were aided by "113 Scioux, Fallsovines and Winnebagos" and "130 Ottawas and Chippawas" (Casselman, 1902:25).

Canoes in foreground have open, turned-up ends, one has hogged sheer.

not confined to Beothuk canoes. Between 1650 and 1700 Father Louis Nicolas (Gagnon, 1979) illustrated two canoes with a pointed hogged sheer in what is now known as the Codex Canadiensis. They are designated as those of the "outaoua" (Ottawa) and "Passinassiouek", the latter group residing in the area north of Lake Huron, surrounded by bands known to be Chipewyan.[3] As far as could be ascertained in the 19th century the pointed form no longer existed outside Newfoundland. In comparison with drawings and models of other canoes the width and height of the hogged portion on Beothuk canoes is singular by virtue of its prominence and the pointed hogged form by its persistence into the 19th century.

vii) The use of red ochre

The Beothuk applied an extensive amount of red ochre on the surface of their canoes inside and out. However, the use of ochre or other red colouring agents was widely spread, particularly in eastern North America. For instance, a canoe from Acadie described in 1605 was said to have gummed seams and

> le tout peint de rouge; les rames aussy á demy peincte. (It was all painted red, and the oars [were] also half painted). (De Monts, 1967:104)

In 1718 Dutch whalers saw Eastern Cree canoes painted with red crosses (Kupp & Hart, 1976:19) and canoes from the Great Whale River were decorated with red

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[3]This information comes from a map in the Codex.

geometrical configurations (Taylor, 1980:84). The Beothuk tradition of applying red ochre, noted among a number of eastern Indian groups (Denys, 1908:418; LeClercq, 1968:97; Grant, 1967:61; Kupp & Hart, 1976:19) may have derived from the same cultural horizon. While the Beothuk seem to have used ochre more extensively and persisted with this practice longer, it can hardly be said that this tradition was unique to them.

viii) The use of rock ballast

Evidently Beothuk canoes are the only craft that were stabilized with rock ballast. Difficulties of balancing would have been experienced by other groups with narrow bottom canoes and are reported by Arima from Eskimo kayakers, who nevertheless learn to adapt to this condition (Arima, 1975:140). However, they have the advantage that, as single occupants, they are in control of all movements in their craft. In contrast, Beothuk sea going canoes were manned by crews of up to seven or possibly ten people and therefore proper balance was difficult to achieve. In addition, Beothuk canoes required ballast to settle upright in the water, a circumstance that did not apply to any of the other native craft.

The use of ballast rocks was a standard procedure on European sailing ships. As a solution to the problem of instability of bark canoes, it may be unique though it is conceivable that it was just not recorded elsewhere.

In conclusion, this analysis substantiates the hypothesis that the unique appearance of Beothuk canoes rests upon attributes of hull shape and construction that can be identified. However, the uniqueness is often based on specific combinations or degrees of attributes most of which are not unique by themselves.

C. Relationships Between Beothuk Canoes and Other Craft

Beothuk canoes show a significant similarity with the bark canoes of Athabascan groups in the North American north west. Their V-shaped hull form, which is essentially a kayak feature, may have been borrowed from neighbouring Eskimos. These conclusions are drawn from a comparison of Beothuk canoe attributes with those of bark canoes and skin kayaks of other groups.

In preliminary examinations of the data on native North American craft two factors became apparent:

a) A considerable number of attributes are not useful for identifying associations between canoes from different groups;

b) some attributes cluster according to their geographical distribution and therefore represent regional preferences.

Attributes which are present on most canoes or do not vary significantly and have become part of a general bark canoe building tradition are not suitable for detection of specific resemblances or relationships. The same is true for attributes which vary extensively because they reflect

many local adaptations. Attributes which are rarely mentioned and are therefore incompletely documented are equally unsuited to signify special relationships.

In contrast, the regional clustering of attributes is considered a useful indicator of associations. Examination of the data shows that a number of attributes are fairly consistently included in canoes of the eastern region, but are rarely found or absent altogether on canoes from the north west and vice versa, thereby defining attribute preferences at either end of the geographical spectrum. They are listed on Table X and are placed into the following five categories, each of which represents a region or type of craft.

i) Designated as "eastern" (E) are attributes which are predominantly present on canoes built by groups with access to the Atlantic Ocean, the Gulf of St. Lawrence, Hudson Bay and Hudson Strait (Table IX:1-14).

ii) "North western" (NW) attributes are those that largely occur on canoes from Alaska, British Columbia, Washington, the Yukon Territory, the District of Mackenzie and the western part of the North West Territories (Table IX:27-47).

iii) Canoes from groups in the "central" zone are those that do not qualify as "eastern" or "north western." They also do not show clear preferences for the attributes tabulated in Table X, but incorporate combinations from either region (Table IX:15-26).

iv) Temporary canoes (T) represent simplified and perhaps some early construction techniques and hull shapes (Table IX:48-51).

v) Construction attributes of kayaks (K) are largely different from those of bark canoes, due to different principles involved in the production of craft with a frame and skin cover. However, some of the techniques used by Eskimos and the resulting forms and functional characteristics can nevertheless be compared to those of bark canoes. Kayaks are placed into a separate category (Table IX:52-62).

Of the sixty-eight hull shape attributes identified for craft outside Newfoundland thirty-two are found to be regionally distributed. Nine attributes are specifically found on north western canoes, five on kayaks and five are often incorporated in both these groups. Eleven attributes predominate on eastern canoes, one is mostly present on eastern canoes as well as on kayaks and one attribute is likely to have originated with temporary bark canoes.

Of the 232 construction attributes tabulated for the same craft, thirty-one are associated with specific regions or type of craft. Ten construction attributes occur predominantly on north western canoes, three on kayaks and three on either types of craft. Twelve construction attributes are considered to be typically eastern and three attributes reflect techniques used on temporary canoes.

North western versus eastern regional preferences of hull shape attributes and their different visual effects

Table X

Canoe and Kayak Attributes Indicating Regional Preferences[a]

No.	A) Hull Schape Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
1	No rocker			28,33-36,38-41, 43-47 (32)		53,54 (60)	NW
2	Angle betw. bottom and stem/stern			28,29,31-34, 38,41,43,45, 47	48-50	53,54,59 (60)	NW
3	Bottom hogged		21	28,36,38,41, 45,47			NW
4	Hogged sheer	(2),3	20,21	28,44			NW
5	Beam abaft midships		19,24	28,30,32,33, 35,37,38,40, 41,44	48	55-57,60, 62,	NW
6	Greater depth & draft abaft midships		19,20p	28,30,32,33, 35,37,38,40, 44		52	NW
7	Stern higher than bow		24	28,30,32,40, 44 (37,38)	48	61 (57)	NW
8)	Sharp upturn of sheer at ends		15,17, 18,21-23,25	27,29,32,34, 36,39,41,45, 46,		55,58,61 (57,62)	NW
9)	Bottom flat athwartships	1,4,5	15,16	28,32-34,36, 38-41,44	48-50	59,60 (57)	NW

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No.	A) Hull Schape Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
10	Sharp turn of bilge			30,36,37,38, 41		52-54,58, 59,60,62	NW K
11	Rake at bow longer than at stern	6	19,20	28,38,40		52,60,62	NW K
12	Hull bott. narrow	11-14 (1-3 old form,8-10)	15,17, 25,26	28-34,36,37, 41,47	49	52-62	NW K
13	Sides low	4		32,38,40,41, 47	49,50	52-62	NW K
14	Sides flaring	10,11,13, 14	15-17, 22-26	27,29-34,36- 41,43-45,47	49-51	52-62	NW K
15	Angle of flare ca. 45°			34		52,55, 56,62	K
16	Bottom rounded V	3			(51)	54,56,61 (55,58, 59,60)	K
17	Bottom V-shaped					52,62 (55,60)	K
18	Sheer nearly horizontal	1-3,12	19	47	49-51	52-54,61 (57)	K
19	Bow higher than stern	6		33 (35,36, 41)		55,56,59, 60,62 (58)	K

Table X (cont'd.)

No.	A) Hull Schape Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
20	Fore & aft rocker	1-14	15-18, 20-26	27,29,30,40 (31,32)	48-51	52,57,61, 62 (56, 59,60)	E K
21	Curve from bottom into stem/stern	1-14	15-22, 24-26 (23)	27,30,35,36, 39,40,42,44, 46	51	52,57, 58,61	E
22	Rocker full length of bottom	10,13, 14	18,20(?)				E
23	Beam at midlength	1-14	15-18, 20-23, 25,26	27,29,31,34, 36,39 (37,38)	49-51	52	E
24	Depth bow/st.equal	1-5, 7-14	15-18,21-23,25,26	27,29,31,34, 36,39,47 (37)			E
25	Bow/stern shape same	1-5, 7-14	15-18,21-23,25,26	27,29,31,39, (37,38)	48	61 (57)	E
26	bow/stem high	7,10				stern 61	E
27	Sheer curving or slop.at ends	1-14	16,20,26	28,30,31,33, 37,38,40,43 44	48 (51)	58,60,62 (59)	E
28	Bottom rounded athwartships	2,6-14	17,22,23, 25,26	29-31,37,47		57,58 (59)	E

Table X (cont'd.)

No.	A) Hull Schape Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
29	Hull bottom wide	4-7 (8-10)	16-22	40			E
30	Sides tumble home	1-7,9					E
31	Sides vertical	8,12					E
32	Hogged sheer pointed at beam		20,21				T?

Table X (cont'd).

No.	B) Construction Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
1	Removable building frame used	8-12,14	15,17, 22,23	25-46			NW
2	Use of bott.frame			29,30,32-42			NW
3	Bark cover trimmed flush w.gunwales	(6,10-12)		27,30,32,33, 42,47	50		NW
4	Even no. of thwarts, none at centre		19 (23)	29-32,35-38, 40,41,44,46		52,61	NW
5	Thwarts plain and parallel sided	8,9		27,29,31,32, 37,41,44-46	48-51	56	NW
6	Spruce bark cover	10-12	23	29-35,37,47	50		NW
7	Plank-on-edge stempiece	(4-5)	(17),24	29-37,39-41		62	NW
8	Stempiece plank as cutwater			29-32,36,41 (47)			NW
9	Ribs spaced 10-36 cm			27,28,32,37, 42-47	48,51	52, 55-62	NW
10	No ribs in raked end sections		16	28,32-37, 39,45			NW
11	Decking of one or both ends	(6)	17,26	28-31,35-40		52-62	NW K

Table X (cont'd.)

No.	B) Construction Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
12	Few inside longitudinal battens			28-37,40, 47	48-51	52-62	NW K
13	Keelson without deadrise			28,42,47		53,57, 59-61	NW K
14	Keelson with deadrise					52,54,55, 56,58,62	K
15	Keelson bent up as st/st.piece			42	(51)	52,58 (60), 61	K
16	Sheathing battens tied to ribs			33,47	(49)	52-62	K
17	Gunwale-and-thwart struc.as building frame	1-7			49;51		E
18	Gunwale ends arrow-head shaped	1-3 (4/5) 6;8/9	15,16 22	(29)			E
19	Bark cover pulled over inner gunwale	1-6, 10-14	15		(51)		E
20	Odd number of thwarts one in centre	1-14	15,16, 18,22-24	27,33,39,47	48,49,51		E
21	Special shaping of thwarts	1-6, 10/12				52,55	E

Table X (cont'd.)

No.	B) Construction Attributes	Eastern	Central	North-West	Tempor.	Kayaks	Reg. Pref.
22	Complete lining with sheathing	1-14	15,17, 22,26	27,29,31			E
23	Ribs spaced closely (2.5-5 cm)	1-13	15,16, 23,24	29,31			E
24	Headboards used	(1-3), 4-6,(8-9), 10-12,14	15,17, 22-24, 26	27,39,31			E
25	Gunwale guards used	1-14	15-22, 24,26	27,29,47			E
26	Fenders present	(3)					E
27	Application of decoration	1-7 (8-12), 13,14	22 (17,26)	(29,31,32,40) 37	48	(55), 61	E
28	Use of red ochre	(1-7)-(10-12),13,14	23	(32,40)	48	61	E
29	Gunwales made of a sapl.or spliced		23		49-51		T
30	Two gunwale pieces jog amidships				(49)		T
31	Endthwarts made of twisted things			(47)			T

[a] Figures in brackets indicate that these craft only sometimes have this attribute; NW = North-Western; K = Kayak; E = Eastern. Absence of number means either absence of attribute or lack of information.

are shown in diagram form in Fig. 20.

When attributes of Beothuk canoes are compared with predominantly "north western" and "eastern" ones it is both obvious and surprising to find that greater similarity is with north western canoes. This north western orientation, particularly of the Beothuk straight keelson canoe hull, is based on the very narrow bottom and flaring sides, hogged sheer, location of beam abaft midlength and greater depth and draft in the aft quarter, absence of rocker, angular turn from bottom into end sections, different angle, height and length of rake on bow and stern; in fact, only one "eastern" hull shape attribute, namely that of high end sections, is incorporated in this canoe form (Table XI).

The curved bottom canoe combines an essentially north western hull shape with a narrow bottom and flaring sides, hogged sheer and sharp upturn of the ends with the eastern attributes of strong rocker, centrally located beam and identical end sections.

A major feature of Beothuk canoes, namely their V-shaped hull form in cross section with a central keelson occurs elsewhere only on kayaks.

If we turn from attributes of hull shape to attributes of construction and compare these with attributes documented for Beothuk canoes, it is again possible to discern similarities with both north western and eastern types. For example, the assumed use of a removable building frame, central plank (modified bottom frame) inclusion of a keelson

Fig. 20

NORTH WESTERN AND EASTERN CANOE ATTRIBUTES

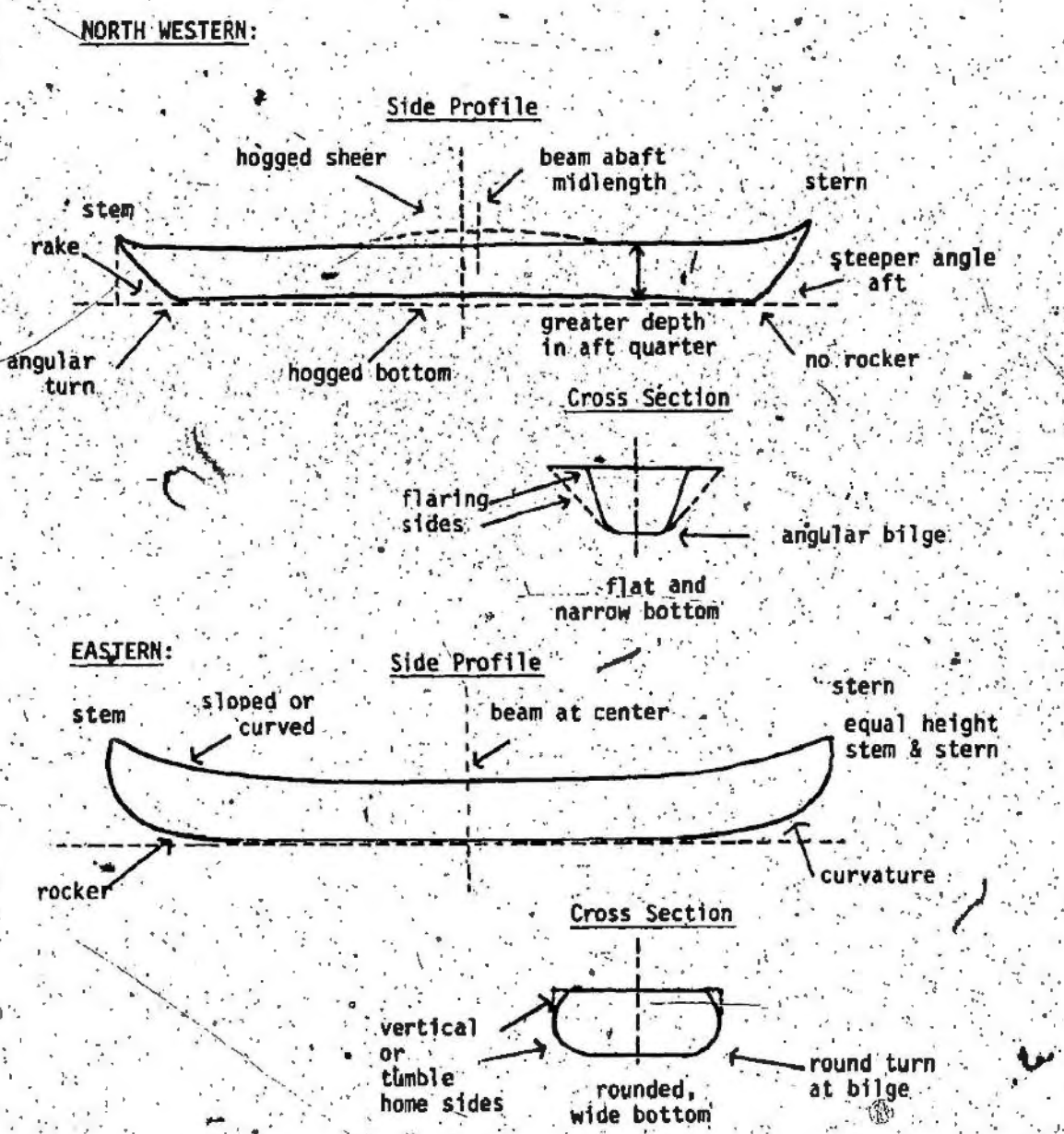

Table XI

Beothuk Canoe Attributes Conforming to Regional Preferences[b]

A. Hull Shape Attributes

	Beothuk Canoes Curved	Straight
North Western Attributes		
1) No fore and aft rocker		x
2) Angular turn from bottom into end sections		x
3) Slightly hogged bottom		x
4) Hogged sheer (associated with building frame and narrow hull bottom)	x	x
5) Location of beam abaft midships		x
6) Greater depth and draft abaft midships		x
7) Stern higher than bow or vice versa		x
8) Sharp upturn of sheer into end sections	x	x
9) Rake at bow longer than at stern		x
10) Narrow hull bottom	x	x
11) Sides flaring	x	x
Eastern Attributes		
1) Fore and aft rocker	x	
2) Curve from bottom into end sections	x	
3) Rocker full length of bottom	x	

Table XI (cont'd.)

	Beothuk Canoes	
	Curved	Straight
4) Beam amidships	x	
5) Depth of bow and stern sections equal	x	
6) Bow and stern shape same	x	
7) End sections high	x	x
Kayak Attributes		
1) V-shaped hull in cross section	x	x
2) Rake, height and shape of bow and stern differ		x
Temporary Canoe Attributes		
1) Pointed shape of hogged sheer (associated with the use of overlapping gunwale saplings)	x	x
B. Construction Attributes		
North Western Attributes		
1) Use of removable building frame	xp	xp
2) Use of bottom plank (remnant of bottom frame?)	?	x
3) Bark trimmed flush with gunwales	?	x
4) Gunwales not mortised	?	x
5) Thwarts plain, parallel sided	?	x
6) Use of outer gunwales	x	
7) Ribs widely spaced	?	x
8) No ribs in raked end sections	?	x
9) Full length keelson	x	x

Table XI (cont'd.)

	Beothuk Canoes	
	Curved	Straight
Eastern Attributes		
1) Odd number of thwarts with a central thwart at beam	x	x
2) Sheathing splints lining entire inside of bark hull	x	x
3) Presence of gunwale guards		x
4) Use of red ochre (general culture trait)	x	x
Kayak Attributes		
1) Full length keelson with deadrise	x	x
2) Keelson extensions bent up to sheer and used as stem/stern support	x	
3) Inside battens/plank here tied on		x
Temporary Canoe Attributes		
1) Gunwales made of spliced or abutting saplings	x	
2) Gunwale pieces abutted or jogged amidships	x	
3) Outer end thwarts made of twisted thongs		x

[b] x = present; xp = assumed to be present, based on some evidence.

and widely spaced ribs are considered to be "north western" techniques; "eastern" attributes are represented by the odd number of thwarts, closely laid sheathing splints and the presence of gunwale guards, all of which reflect improved techniques rather than functional changes.

Some of the Beothuk canoe attributes noted on the replicas are elsewhere only recorded on temporary canoes. This may mean either that these attributes on the replicas represent simplified techniques, usually resorted to on temporary craft only, or with regard to the central jog of the gunwale, that this attribute originated with temporary canoes and in a modified form was later retained by the Newfoundland Indians.

D. Significance of Similarities

Of the two Beothuk canoe forms the straight keel-line design associates more closely with north western than with eastern canoes. It has previously been argued that it reflects most likely an older and original hull shape while the curved keelson form represents a later modification. In a search for ancient associations the straight keel-line form would therefore be the more relevant to investigate.

Before advancing different theories to account for the similarities between north western Athabascan and Beothuk canoes two factors should be emphasized:

a) The number of north western attributes which are incorporated in Beothuk canoes, particularly those concerning their hull shape, is relatively large and dominates the straight keel-line design.

b) There are two specific clusters of attributes which centre (1) around the placement of beam abaft midlength, and (2) around the V-shaped hull in cross section. Each of these attribute combinations consists of several individual attributes and modifies the performance of the canoe in a number of ways.

The two clusters or groups of attributes are not interdependent for technical or for functional reasons, nor does there seem to be particular interdependence of attributes within each cluster. Thus the introduction of a keelson does not automatically require a narrow bottom, nor wide flaring sides with a deadrise. Each of the attributes by itself could be present or absent as is observed on other canoe and kayak forms.

Equally, shifting the beam abaft midlength does not force the canoe builder to give the aft section greater depth, nor a steeper and higher stern nor an angle between keel-line and end section. On ocean kayaks, for instance, regardless of the placement of beam, the greater volume is usually in the fore section to ensure buoyancy of the front and such craft may have rocker, a curvature or an angle between keelson and end sections.

These two factors are important as they suggest extensive, deliberate and nonrandom similarities between north western and Beothuk canoes. The chances of this particular canoe form having been invented independently in the north west and in Newfoundland are extremely small.

Having ruled out coincidence as an explanation for the resemblances, other possible causes are considered.

1) Borrowing from Eskimo kayaks

In discussing the perplexing resemblance of north western canoes with Beothuk craft a modified theory of independent invention was suggested (Donald W. Clark, personal communication). If the Athabascan canoes developed alongside Eskimo kayaks in the north western regions, an argument which will be discussed in more detail in the following section, then perhaps the predecessors of the northern Athabascans absorbed kayak attributes from neighbouring Eskimos. A similar interchange of ideas could have taken place between ancestors of the historic Beothuk and eastern Eskimo groups. In this way the evolving Beothuk canoe form would not have been independently invented but could have been based on a kayak design that also influenced north western canoe builders; Eskimo kayaks could thus have been the common link.[4]

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[4]The likelihood that kayaks were used prehistorically by the eastern Dorset and Thule Eskimo is argued by Arima (1975:231-233, 242) and based on the presence of Dorset kayak hunting tools and Thule kayak models in the archaeological record.

This theory would account satisfactorily for the narrow bottomed hull, the inclusion of a keelson for greater draft, in combination with flaring sides and a deadrise. A central keelson is consistently part of the Eskimo kayak frame and a V-shaped hull form is amply documented from Alaskan and south west Greenland kayaks, though the V-shape here is closer to the horizontal than on the Beothuk craft (Adney & Chapelle, 1964:199, Figs. 181, 206, 207). The only approximate V-shape on a bark canoe other than the Beothuk is recorded from Alaskan Athabascans whose ancestors would have lived in close proximity to Eskimo populations, and may have exchanged attributes with them as is proposed to have happened in Newfoundland (Adney & Chapelle, 1964:161, Fig. 149).

2) Beothuk-Athabascan similarities

The Beothuk hull attributes centring around the beam abaft midships and involving greater depth in the aft quarter, a higher stern than stem, lack of rocker, angle at turn from keelson to end sections and hogged sheer, all of which are also present on some Athabascan canoes, are not explained by borrowing from Eskimo kayaks. It is suggested that the hull form incorporating these attributes may represent an ancient prototype bark canoe which was built by north western as well as Newfoundland Indians.

It may be useful to review the investigations concerning the area of early bark canoe development and a possible time frame.

The ultimate source of early native watercraft has not been determined, and there is no agreement among investigators whether bark canoes or skin craft were the earlier form of craft.

Birket-Smith, for instance, believed that bark canoes and kayaks derived from a common ancestral primitive skin boat (1929:II:172); Hatt and Durham thought that the partly decked northern Athabascan bark canoes were the original craft which stimulated the development of kayaks (Hatt, quoted from Birket-Smith, 1929:II:172; Durham, 1960; 27), while Hornell assigned this role to the sturgeon nosed bark canoes of the Kutenai Indians and Amur River groups in Eastern Siberia (Hornell, 1946:179-180). While there is no consensus in this matter, the different theories are all based on the premise that bark canoes and skin kayaks originally evolved in the areas east and west of the Bering Strait.

The considerable antiquity of early native craft is evidenced by kayak models from the Okvik-Old Bering cultural continuum which represent "a few centuries, if not a millennium or two of development preceding the Christian era" (Arima, 1975:87). Models of newer kayak forms with a narrow and rounded (multi-chined) cross section, similar to bark canoes, were found with remains of the Birnik culture and are dated between A.D. 500 to 900 (Arima, 1975:87). Arima suggests that this kayak type represents a well developed basic form which was then

modified regionally; for example, in the eastern areas changes largely concerned adaptations for open sea travel.

Bark canoe models of a similar age have not been found, yet the apparent borrowing and interchange of attributes noted by other investigators (Hatt quoted from Birket-Smith, 1929:II:172; Hornell, 1946:189; Waugh, 1919: 24) make it likely that the approximate time frame for bark canoe development is similar to that suggested for kayaks. It would place early bark canoe making into the pre-Christian era with further improvements before A.D. 1000 and more sophisticated regional diversifications after A.D. 1000.

If the original core area of development was the North American north west, it is possible that the 19th century north western canoe form represents a more recent version of a prototype canoe which other ethnic groups have modified more substantially.

The attributes that Beothuk straight keel-line canoes share with north western Athabascan craft would thus be of ancient origin. Their persistence may indicate a considerable degree of isolation of these people at a time when other groups developed new forms and techniques. In the case of the Newfoundland Indians it would also imply that by the time they adopted this canoe form these Indians had become a cultural entity which forthwith identified the straight keel-line canoe design as their own. This suggested self-awareness was later expressed by a marked

adherence to traditional practices. The historic Beothuk, for instance, not only continued with canoe-attributes that were abandoned elsewhere, including the extensive use of red ochre, but they also showed great reluctance to adopt European practices or goods (with the exception of iron) and generally carried on with their traditional life style and use of aboriginal weapons. However, the early Newfoundland Indians according to this interpretation readily accepted improvements of their traditional artifacts if advantages were to be gained. They modified the early prototype canoe by introducing a central keelson with a deadrise, a change that has already been discussed. A second modification, most likely due to influences from neighbouring Indian groups, resulted in a canoe form that exhibits many attributes classified here as "eastern" preferences.

3) Eastern attributes and influences

In his classic work on kayaks, Arima (1975:88) described local diversifications of design which were introduced to meet specific needs; in the east they concerned largely adaptations for ocean travel. Similarly, Indian populations modified their bark canoes in response to local circumstances and eastern groups mainly developed hull forms that were suited for transportation in coastal waters. Preferred eastern hull attributes are a lengthwise symmetry of the craft, a well-rounded canoe bottom, vertical

or tumble home sides and fore and aft rockers. The latter is incorporated to a varying degree, most prominently on the "crooked" canoes that were initially built by the Eastern Cree and later adopted by the Montagnais/Naskapi. This canoe type is marked by a strong fore and aft rocker to the bottom without a corresponding downward curve of the sheer and gives it an awkward or "crooked" appearance (Adney & Chapelle, 1964:99). The rocker is achieved by cutting a large number of gores, that is wedge-shaped pieces, out of the bark hull along the sheer, which are sewn together and thereby cause the bottom and end sections to curve strongly. A painting of a rockered Micmac canoe from ca. 1820 (Fig. 21) indicates that a considerable amount of rocker may not have been confined to the Cree/Montagnais/Naskapi canoes, but may have been more widely used than was previously assumed.

Construction techniques that are preferred in the eastern area reflect simplifications and improvements of north western building attributes. For instance, in the east the gunwale-and-thwart structure eliminates the need for a removable building frame; similarly, the bottom frame becomes redundant in a canoe with a wider and more rounded bottom. A complete lining, made of pliable sheathing splints, and held in place by closely spaced ribs, protects the inside of the vulnerable bark hull more effectively. Ribs in the raked end sections, often combined with a headboard, give the canoe ends more support (see also Table X).

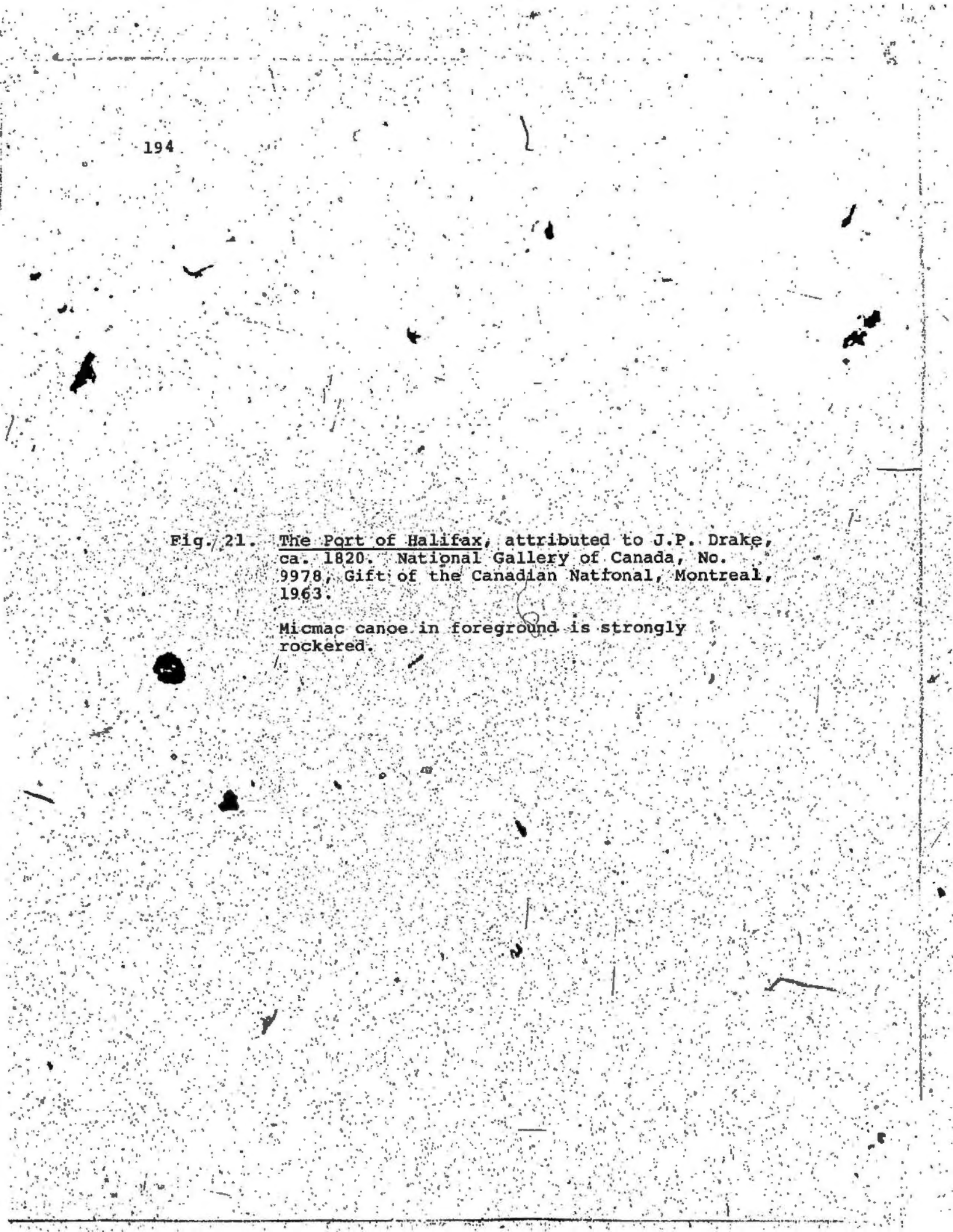

Fig. 21. The Port of Halifax, attributed to J.P. Drake, ca. 1820. National Gallery of Canada, No. 9978, Gift of the Canadian National, Montreal, 1963.

Micmac canoe in foreground is strongly rockered.

Most of these hull changes and improvements were adopted by Indian groups in the eastern area and were selectively incorporated in canoes of the central region. They did not spread to or replace the canoe forms and techniques of some of the Athabascan groups. These people, located on the north western periphery of this new core area of development were apparently too isolated and may also have not been interested in hull forms especially designed for open water travel.

The prehistoric Newfoundland Indians who lived on the eastern periphery retained many attributes of the proposed prototype hull design. Their marine environment would have motivated them to adjust their canoes to requirements of ocean navigation. This was initially achieved by incorporating a central keelson combined with a deadrise into their straight keel-line canoes, which turned out to be an effective improvement. It also seems to have been serviceable for most travel conditions and became a major design feature that persisted with the Beothuk until their demise in the 1820's.

Eventually the Newfoundland Indians would also have perceived the advantages of a strongly rockered hull which allows quick turns in rough seas. This hull form, developed or preferred by neighbouring eastern canoe makers, could not be incorporated into the Beothuk V-shape hull by using the traditional method of cutting gores along the sheer. Instead, separate bark panels for each side were manufactured and sewn together beneath a curved keelson, a

solution that worked but was less than ideal because the central seam was vulnerable to damage and may also have been difficult to keep watertight. This unique method would thus be the invention of the Newfoundland Indians and of relatively recent origin. It resulted in the creation of the curved bottom canoe design, described and illustrated by Guy and Cartwright which strongly reflects "eastern" attributes but also includes the markers of various earlier influences.

In summary, the favoured set of hypotheses to explain the data proposes that the straight keel-line Beothuk canoe was the original design of the prehistoric Newfoundland Indians. It is based on a prototype canoe which remained relatively intact among later Athabascan and Newfoundland Indians but was modified by most other Indian groups.

The Newfoundland Indians adjusted this canoe type to requirements of ocean travel by incorporating Eskimo kayak features. Eventually they also adopted improved construction techniques and hull shape attributes from their eastern Indian neighbours which led to the creation of a second Beothuk canoe design that was more highly specialized for ocean navigation.

CHAPTER SIX

SUMMARY AND CONCLUSION

In this study information on the design, construction and use of Beothuk canoes in Newfoundland was accumulated and examined and functional and stylistic characteristics of different canoe forms were analyzed. Beothuk canoes were also compared with bark canoes and skin kayaks of other North American native groups to establish whether they related to canoe designs of specific groups.

The data on Beothuk canoes are based on three contemporary descriptions, accompanied by illustrations, on three replicas from 18th and 19th century burials and on a "model" made by Shanawdithit, the last known Beothuk. Measurements, proportions and hull shape and construction attributes were tabulated. An analysis and comparison of the data showed that the Beothuk built at least two functionally different canoes. This is a new concept and fits the evidence better than does Adney's reconstruction of a single composite Beothuk canoe form.

Both Beothuk canoe designs have a V-shaped cross section to the hull and a keelson, a strongly hogged sheerline, often pointed at beam and end sections that turn up sharply into high peaked bow and stern. The more

versatile of the two hull forms, exemplified by the replicas, persisted until the demise of the Beothuk. It has a straight bottom in side profile, angular turns into the end sections and the beam located abaft midlength. This design combines features that are preferred for travel on shallow rivers and lakes with others that ensure greater safety on the ocean.

The second hull form, in addition to the shared attributes, has a strong rocker and the beam at midlength, a design which required rock ballast to stabilize the craft. This canoe form which is specifically suited for ocean navigation, was only seen on coastal waters.

Most construction attributes on both canoe designs were found to be alike. The singular and unconventional manner in which the bark hull of the rockered design was manufactured was thought to indicate that this canoe represents a modification of the straight keel-line hull form onto which the rocker was superimposed. Accordingly, the straight keel-line canoe would have been the original and older of the Beothuk canoe designs.

Potential stylistic attributes of both Beothuk canoes are the V-shaped hull form, the very high end sections and the strongly hogged sheer. The former two, in addition to their operational functions within the canoe structure, are thought to have been indicators of ethnic affiliation. The appearance of the hogged sheer portion, which was pointed on some but not on all canoes, may

reflect a degree of cultural independence between different Beothuk bands.

The investigations substantiate the hypotheses, posited at the outset of the study, that the Beothuk had two functionally different canoe designs and retained elements of style.

In order to compare Beothuk canoes with craft of other North American native groups, sixty-two bark canoes and skin kayaks were analyzed and nearly three hundred hull shape and construction attributes identified and tabulated. A detailed comparison showed that Beothuk canoes were largely built according to traditional native North American methods of bark canoe construction. Their apparent uniqueness was found to be mostly the result of specific combinations of attributes which by themselves were also present on other craft. Other factors that contributed to the visual difference of Beothuk canoes were the development of attributes to a degree not encountered elsewhere or to the persistence of practices which had been discontinued by canoe builders of other groups.

Attributes were also investigated to identify similarities with canoes of other groups. Examining the tabulated data it was found that some attributes were present on canoes made by Athabascan Indians of the north west and rarely used by eastern canoe builders, while others were preferred in the east and absent or rare on canoes of the north west. These attributes were classified according

to their regional distribution and utilized for the identification of similarities between different canoes. Designated as "eastern" were canoes from groups with access to the Atlantic, the Gulf of St. Lawrence, Hudson Bay and Hudson Strait; north western canoes largely comprised those of Athabascan groups and bark canoe building Alaskan Eskimos; skin kayaks and temporary canoes were classed separately.

A comparison of regionally preferred attributes with those of Beothuk canoes showed the following associations.

The V-shaped hull form with a keelson, present on both Beothuk canoe designs, differentiates them from canoes of other groups and is otherwise only found on kayaks.

The hull shape of the straight keel-line design incorporates almost exclusively north western canoe attributes, including absence of rocker, angular turn into the end sections and beam abaft midlength. Its construction is based on north western Indian techniques though a few eastern attributes are present.

The curved keelson canoe shows functionally significant eastern hull form attributes. A strong rocker is superimposed on the V-shaped hull, the placement of beam is amidships and stem and stern sections are alike.

The extensive number of attributes shared with north western canoe forms and kayaks and the nature of the attribute combinations virtually rule out the possibility

of independent invention. Because the full length keelson with flaring sides and deadrise is essentially a skin kayak trait, it is suggested that this was borrowed from eastern Eskimo kayaks.

The strong resemblance between the straight keel-line design of the Beothuk and Athabascan hull forms and construction attributes may reflect their persistence with major elements of an original prototype canoe design. Consequently Beothuk and Athabascan canoes relate more closely to each other than to canoes in the regions that separate them.

It is suggested that the prehistoric Newfoundland Indians used traditional North American methods of bark canoe construction and principles of design. In conformity with developments elsewhere, they eventually evolved their own canoe forms. In the process of adjusting the craft to requirements of ocean travel the Beothuk borrowed Eskimo kayak attributes. At a later stage innovations from eastern canoe builders were incorporated which resulted in a specialized rockered variant. After the turn of the 18th century the straight keelson canoe with no rocker, which, according to this theory, would be the more ancient design, appears to have dominated.

The comparison of Beothuk canoes with those of other groups substantiated the hypotheses that Beothuk canoe construction conformed to North American native traditions, that the uniqueness of Beothuk canoes was the result of particular attributes or combinations thereof,

and that extensive similarities with canoes of other groups is suggestive of communication and diffusion of technical knowledge and design features.

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GLOSSARY OF CANOE TERMINOLOGY

Abaft: in the rear of, between midlength and stern.

Amidships: the part midway between stem and stern.

Batten: narrow thin piece of wood 1 - 10 m long.

Beam: the greatest breadth or width of a craft.

Bilge: lowest area of hull.

Blade: a flat thin portion of the paddle that exerts force against the water when paddling.

Bottom frame: flat frame consisting mostly of longitudinals that covers the canoe bottom inside and remains in the canoe.

Bow: the forward part of a vessel.

Building frame: a flat frame made of battens that establishes the outline of the canoe and is disassembled and removed during the building process.

Buoyancy: upward pressure exerted by the water in which a craft is immersed.

Cap: see gunwale guard.

Centre of gravity: that point of a craft from which it could be suspended or on which it could be supported and be in equilibrium.

Centre line: line that divides craft into right and left.

Clearance: area between waterline and gunwale at lowest point.

Cross section: a section made by a plane cutting at right angles to the longest axis.

Deadrise: the angle at which the sides rise on either side of the keelson.

Deck: the top covering of a canoe or kayak.

Depth: a measurement of inside hull roominess; measured at point of maximum beam from the outside hull centre up to the sheer line.

Draft: also draught: the depth a craft sinks into the water.

End profile: profile of canoe when looking at it head-on.

Fender: poles fitted lengthwise on outer sides of canoe serving as bumpers.

Flare: outside spread of sides.

Flat Bottom: a canoe floor that is horizontal or nearly so in cross section.

Freeboard: a measure of that portion of the hull side that is above the waterline.

Gore: wedge shaped cuts in bark cover to effect a curvature, usually along the sheer.

Gunwales; inner: main longitudinal structural member of canoe, lashed along the inner edge of the bark sides (sheer) and lashed together at either end; outer: similar to inner gunwale, but lashed along the outer edge of sides along sheer.

Gunwale guard: batten lashed on top of gunwale(s) to protect lashing; also called cap.

Headboard: rounded relatively narrow board inserted between top of stem and stern and canoe bottom to support end sections.

Heel: a sideways leaning of a craft caused by wind or an occupant.

Hogged sheer: sheer or upper edge of sides curving upwards in the centre.

Hull: the basic structural shell of a craft.

Keel-line: line of bottom in side profile.

Keelson: a longitudinal strength member inside a craft along the bottom centre line from stem to stern post or for the length of the bottom.

Maneuverability: a relative measure of how easily a craft can execute a turn.

Mortize: recess in wooden surface to receive piece of wood which has a tenon.

Multi-chined: hull with a series of hard angles in cross section instead of smoothly rounded sides--usually present on kayaks.

Outwale: same as outer gunwale; see under gunwales.

Paddle: held in the hands of a paddler and used to propel craft; can be single bladed or double bladed, the latter mostly used with kayaks.

Port: left side to a vessel when looking forward.

Rake: projection of stem and stern of vessel beyond the length of the keel-line.

Rib: part of interior structure; flat piece of wood inserted from port gunwale to starboard gunwale and bent over the floor of canoe, holding down sheathing splints.

Rocker: a vertical or upward curve built into the ends of keel or bottom of a craft.

Scarf: joining of wood by sloping off edges and maintaining the same cross section.

Seam batten: protective batten (or root) laid over a seam in the bark and lashed into the seam.

Sheathing: thin wooden splints ca. 5 - 10 cm wide used as inner lining of the bark hull.

Sheer: upper edge of bark sides along gunwale; also: curvature of sheer line; "no sheer" indicating straight gunwale; "reverse sheer" indicating downward longitudinal curve; "sheer" indicating an upward curve of the craft's deck, particularly on kayaks.

Side profile: profile of canoe seen from a side.

Stability: the resistance to capsizing or heeling over.

Starboard: right side of a vessel when looking forward.

Stem: the most forward part of the bow.

Stem or stern piece: wooden post usually inside canoe ends made to shape of the end and used to support the end sections.

Stern: the rear of a boat.

Swelling of paddle end: widening to form grip.

Tenon: end of piece of wood shaped in the form of a rectangular prism which is received into a recess of the same shape and size (= mortize).

Thwart: also cross piece: piece of wood inserted between the gunwales across the vessel at the level of the sheer.

Tumble home: inward inclination of canoe's sides near upper side or gunwale (opposite of flare).

This glossary is based on information from:

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APPENDIX A

SCHEMATIC DRAWINGS OF BEOTHUK CANOES

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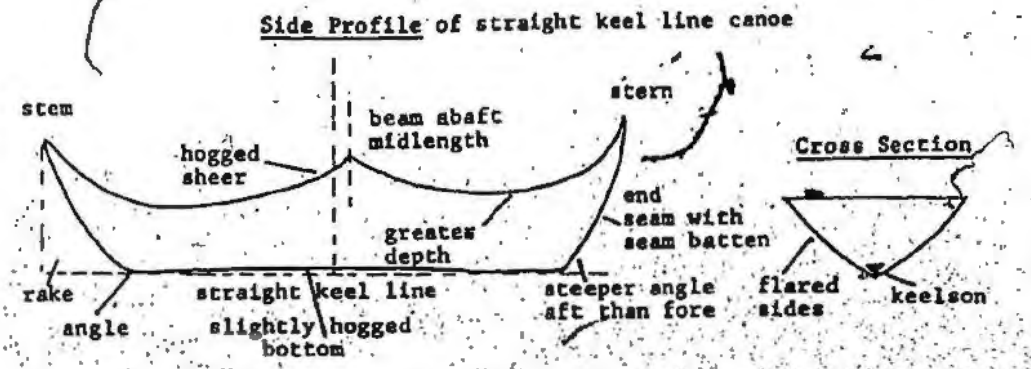

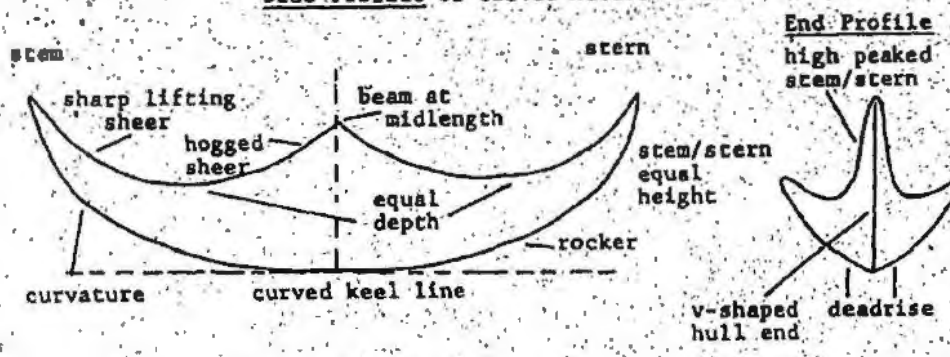

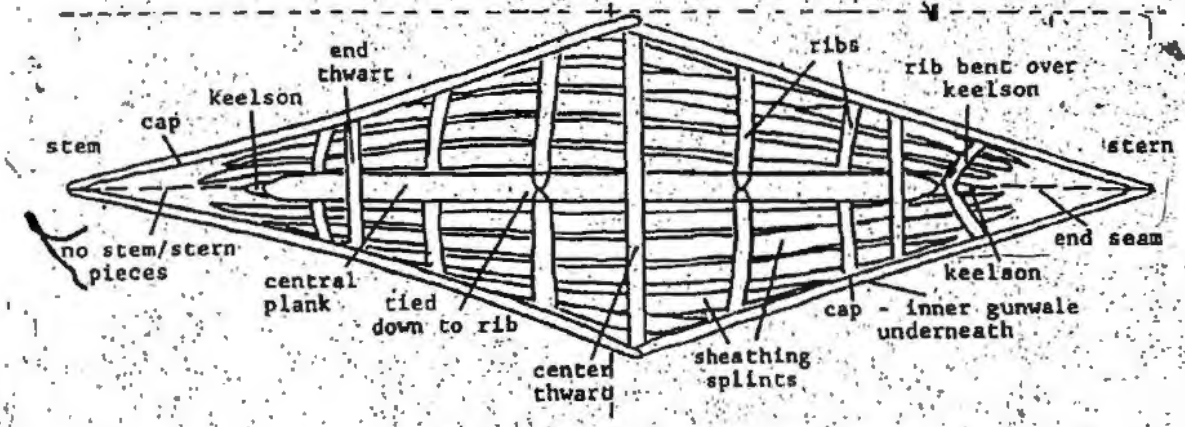

Inside View of straight keelson canoe

APPENDIX B

RECONSTRUCTION OF TWO FULL-SIZED CANOES

RECONSTRUCTION OF TWO FULL-SIZED CANOES

In the 1970's Scott James, an experienced canoeist and engineer with Abitibi-Price Ltd., Grand Falls, became interested in the performance characteristics of the Beothuk canoe. He constructed such a craft from plywood and fiberglas and, for the shape of the hull, followed John Cartwright's drawing and description (Howley, 1915:32-33). The canoe was to be tried out at Point of Bay, Exploits Bay.

James spliced together two 4' x 8' (122 cm x 244 cm) sheets of plywood along the 4' (122 cm) side. To establish the keel-line he drew with the help of a plumber's chain a catenary curve whose axis was 45° to the base; for the two upper curves from stem and stern to the centre he marked a catenary curve whose axis was parallel to the base. He cut out side sections measuring 16' (488 cm) overall length and 4' (122 cm) at the highest point. James fastened them together at the keel-line from the top of the bow to the top of the stern with nylon string, reinforced the seam with glue and nails and sealed it with fiberglas. Gunwales made of 1" x 1.5" (2.5 cm x 3.8 cm) battens, were fitted along the sheer. James also built in airtraps at either end inside to ensure buoyancy in case the vessel capsized. The insertion of the 3'8 1/2" (113 cm) long central thwart which was tied to the gunwale on either side, caused the canoe to become shorter and simultaneously lifted the top portions of the bow and stern sections upwards and inwards. In its

final form the canoe had an overall length of 15'1" (460 cm), the bow and stern sections were 4'6" (137 cm) off the ground; the beam measured 3'8 1/2" (113 cm), and the depth at beam was 2'9" (84 cm) (see Fig. 22a).

When the canoe was launched without ballast, it floated on its side, as predicted by Cartwright (Howley, 1915:32 and Fig. 23a showing second canoe). The canoe was then loaded with beach rocks until it settled in an upright position and was properly balanced. This required much skill and patience. Because the ballasted canoe drew considerable water one had to wade knee-deep in the freezing ocean, which turned out to be a real nuisance and slowed down the operation of landing and launching. Approximately 218 kg of rocks made the canoe comfortably stable and allowed for two passengers but no gear; it resulted in a draft of 22" (56 cm).[1]

Even if one allowed for errors in the measurement and for the difference in construction materials, the rock weight was very considerable and too much for the canoe to support when lifted out of the water.

The sharp, curved, keel-line proved to be very vulnerable to damage from striking rocks or bottom and not suitable for use in shallow or rocky rivers or for running the canoe close to shore.

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[1]To weigh the ballast rocks, their displacement in a bucket with salt water was measured.

Fig. 22. Curved keel-line canoe made by Scott James from plywood according to John Cartwright's description and drawing (Ms. II and III).

a) side profile;

b) afloat with 218 kg rock ballast and two crew.

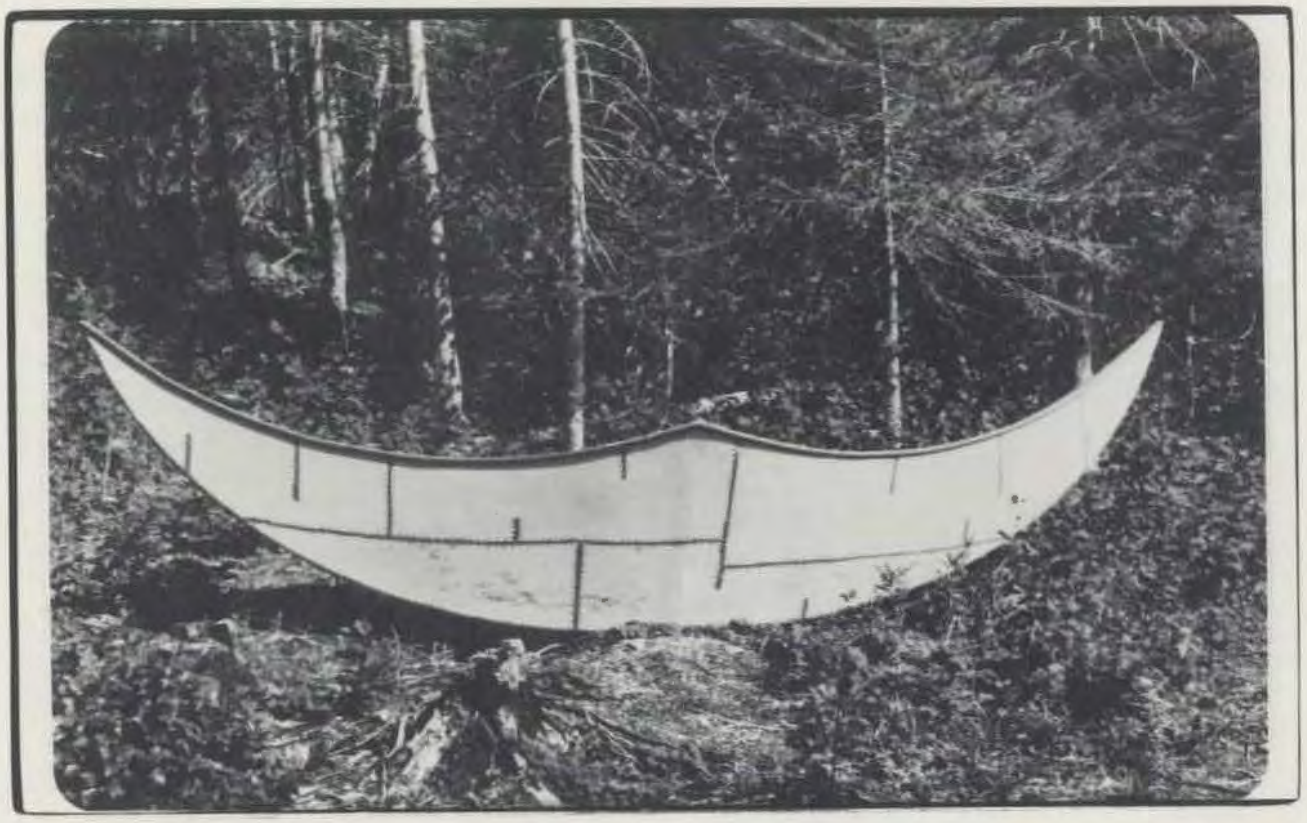
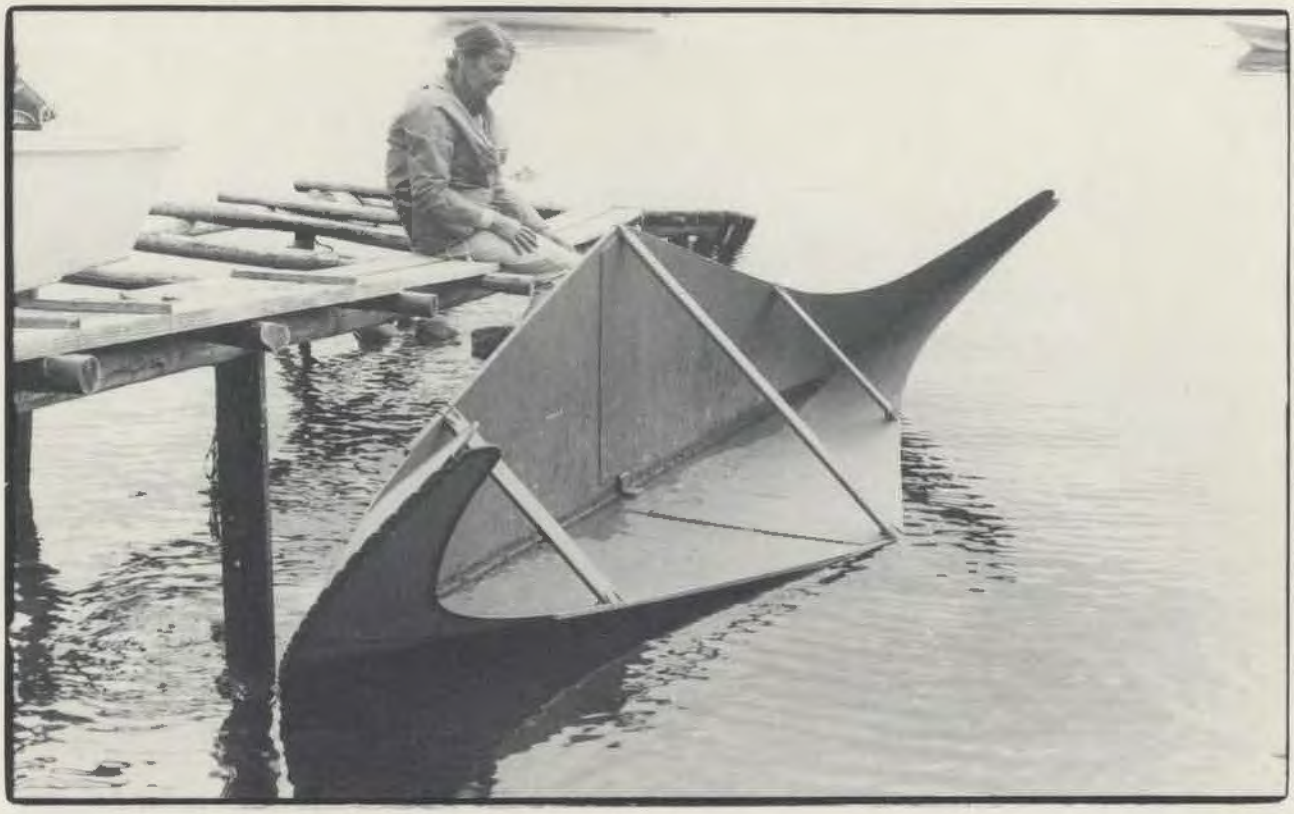


Fig. 23. Straight keel-line canoe made by Scott James from plywood based on replicas II and IV.

a) without ballast, resting sideways on the water surface;

b) afloat with 99 kg rock ballast.



While John Cartwright (Howley, 1915:32) had considered the canoe unstable and easy to upset our trial rides, in calm weather, suggested that this was not so (Fig. 22b). The canoe was much like a dory in that it was tender on an even keel but became stiffer the further it was heeled over, because the centre of gravity was relatively low and when the vessel was made to heel the centre of bupyancy shifted in the same direction, increasing the righting moment. The rising sheer at midlength was necessary since the waterline rose highest at the beam when the canoe was heeled.

In view of the draft and ballast problems Scott James agreed to build a second full-sized Beothuk canoe from plywood with a straight keel-line based on the Demasduwit burial replica and Shanawdithit's model. I supplied James with measurements, coloured slides, photographs and tracings of these two canoes.[2]

James made cardboard models of both these canoes and noted that their shapes were quite different as were the end sections of each model. He enlarged the Shanawdithit model with proportional dividers to the same size of that from the Demasduwit burial, drew a composite shape of the four halves and transposed it to a scale of 1:10 of a 16' (488 cm) canoe. The difference in the stem and stern

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[2]The tracings were made by Miss Idiens, Curator of Ethnography, Royal Scottish Museum, Edinburgh, and Captain N.E. Upham, Curator of Models, National Maritime Museum, Edinburgh.

sections which were thereby eliminated were not recognized as being significant.

For the building of the second canoe James largely used the techniques that were employed for the first one, though he omitted the air traps as there seemed to be no need for such precautions. In its finished form the canoe was 15' (457 cm) long overall, the bottom was 11'9" (358 cm) long, bow and stern were 4' 1/2" (123 cm) high, it had a beam measurement of 4' 9 1/2" (138 cm) and the depth at beam was 2' 3 1/2" (69 cm). The ballast required for this canoe when supplemented by the weight of two adults was 99 kg of beach rocks; with this load it drew 12 1/2" (32 cm) water (Fig. 24a).

The stability of the second canoe in the water was satisfactory, although inferior to the first, because the low gunwales at the quarter points did not allow the canoe to heel quite as far safely (Fig. 24b). Trial runs with different amounts of weight indicated that with the development of sufficient skill at handling the canoe some if not all of the ballast could have been removed, because the straight bottom and lower draft required considerably less weight to float the vessel upright.

In summary, the following points were clarified:

a) The insertion of the thwarts in the curved bottom canoe caused a decrease of length and an inward and upward curl of the ends as predicted by Cartwright (Howley, 1915:32).

b) The seam along the keel-line required much attention to keep it watertight and it was vulnerable to injury from rocks on beaches or in shallow rivers.

c) Launching either of the canoes without ballast caused them to lie sideways on the water surface, as described by Cartwright.

d) The curved bottom canoe required ca. 218 kg ballast as well as patience and skill to float and stabilize it. With this weight the draft was 22" (56 cm).

e) On trial runs this canoe proved to be very stable.

f) The ballast needed to float the straight bottom canoe upright was ca. 99 kg. With this weight the draft was 12 1/2" (32 cm).

g) The stableness of the straight bottom canoe was satisfactory but inferior to that of the curved bottom canoe. It also could not heel as far safely.

h) The requirements for ballast were variable, depending on the number of people to be carried and on the skill of the canoeist.

i) With sufficient skill and experience the straight bottom canoe could probably be used without additional ballast; the curved bottom canoe was likely to require some ballast at all times.

Fig. 24. Straight keel-line canoe made by Scott James from plywood based on replicas III and IV with 99 kg ballast and two crew.

a) view of ballast volume;

b) view of relatively low clearance.