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THE ARCTIC CIRCULAR

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The following meetings have been held:

The Annual General Meeting. The Annual General Meeting was held on 11 January 1966. After the discussion of Club business the following National Film Board films were shown: "Gold", "Nahanni",and "Yukon Old, Yukon New".

One hundred and forty-sixth meeting. 8 February 1966. Dr.E. H. Grainger of the Fisheries Research Board, spoke on "The current studies being carried out in the north by the Arctic Biological Station".

One hundred and forty-seventh meeting. 8 March 1966. Three National Film Board films were shown: "Kenojuak", "Along Uncharted Shores", which describes the work of the British-Canadian Arctic Expedition of 1936-9, and "Northern Voyage", an account of the first trip of the John A. Macdonald to Tanquary Fiord, northern Ellesmere Island.

One hundred and forty-eighth meeting. 12 April 1966. Dr. Walter Kupsch spoke on "The north tomorrow".

One hundred and forty-ninth meeting. 10 May 1966. A panel representing the Indian-Eskimo Association of Canada discussed some of the social problems of the north. The members of the panel were: Mrs. W.H. Clark, Mr. Andrew Cowan, Mr. E.R. McEwen, Dr. Martin O'Connell, and Mr. R.A. Sim.

Kodlunarn Island and Frobisher's "Gold". By R.G. Blackadar

During the summer of 1965 the Geological Survey of Canada carried out a helicopter-supported geological survey of southern Baffin Island south of latitude 66 degrees,and as part of the programme examined Kodlunarn Island whence Frobisher derived the gold ore that so enthused the court of Queen Elizabeth I. Having played its part in northern exploration,this remarkably unprepossessing island disappeared from western knowledge for nearly three hundred years until in 1861 C.F. Hall rediscovered it and

linked unmistakeable evidences of western occupation to Frobisher's voyages.

From time to time since then the island has been visited, the man-made features sketched or photographed and the ruins assiduously culled until now only fragments of brick remain whereas forty years ago plaster, brick, porcelain, lime, coal and flintstones were recovered by members of a Field Museum of Natural History expedition.

What did Frobisher bring back? Did he himself perpetrate a hoax? And because gold was obviously not what was found, what was brought back - pyrite or fools' gold as so often assumed or something even less likely to be mistaken for the precious metal?

The Hakluyt Society in 1867 published an edition of "The Three Voyages of Martin Frobisher" edited by Richard Collinson, which included a reprint of the 1578 account by George Best and selections from manuscript documents in the British Museum and the State Paper Office. This volume provides a readily accessible though secondary source of information and is the main source for much of the story that follows.

The protagonists are Martin Frobisher and Michael Lok. Frobisher, son of a Yorkshire family, went to sea at about 15 years of age and sailed for West Africa aboard a ship commanded by John Lok. The sea became his profession. Michael Lok, son of Sir William Lok, a London merchant, is said to have "travelled through almost all the countries of Christianity". He was probably a nephew of the man under whom Frobisher first went to sea and appears to have followed his father in trade. Frobisher, who had long nurtured the idea of reaching the riches of the east by sailing northwest, served briefly in Ireland where, through the introduction of Sir Humphrey Gilbert, he became acquainted with Sir Henry Sidney, commander of the English army in Ireland and brother-in-law of the Earl of Warwick. The latter was impressed with Frobisher's plan for northwestern exploration and through his efforts the Court became interested. At that time the Muscovy Company held a monopoly for northern trade and although directed by the Privy Council to participate in Frobisher's scheme they refused perhaps due to a fear of encroachment. But they had underestimated Frobisher's influence and the Privy Council directed that a licence to trade be granted by the Muscovy Company to Frobisher. Michael Lok, by now a merchant of standing and a director of the Muscovy Company, formed a new company and sold shares to his fellow merchants, while Frobisher did the same at court.

Two small ships, the barks Gabriel and Michael, and a pinnace sailed for the west in June 1576. The tiny pinnace was lost, the Michael turned back when off Greenland, but Frobisher in the Gabriel made a landfall in the vicinity of Resolution Island

whence they sailed north to Hall Island and then explored part of what is now named Frobisher Bay.

Geographically the returns from the voyage were great, economically they were nil but with Frobisher's return to London in September 1576 begins the incredible tale of the "gold ore", a story that offers an insight into the cupidity and credulity of the Elizabethans.

Early in 1577 the realm was buzzing with the story that vast amounts of gold had been found by Frobisher and Lok felt disposed to write to his queen and explain the background. He writes (the original has been paraphrased and the spelling systematized) on 13 October 1576, "Mr. Frobisher gave me a stone aboard his ship saying that according to his promise he did give me the first thing that he found in the new land". It appears that other pieces went to strangers who were also aboard at the time; "Within the space of one month after, I gave a piece to Mr. Williams, saymaster (assayer) of the Tower not telling him what nor whence". Williams tested it and "found it was but marquesite". Two other tests were made but these too did not disclose the presence of any precious metal.

"Herewithall I stayed, making small account of the stone, and at more leisure musing more thereon." In early January Lok gave a piece to John Baptista Agnello an Italian alchemist not telling him where it came from but asking him "to prove what metal was therein". Agnello reported gold but Lok not satisfied had him make two more tests. From all these Agnello produced a small amount of gold powder. Lok forwarded the gold to the Queen and prepared his narrative.

Lok appears to have been suspicious and questioned Agnello closely during the next few weeks. From the text it appears that Agnello wanted to be included as a partner. Finally on January 24 Lok told Agnello that the "ore" was from a newly discovered land and that the privilege was granted to a company. Agnello then suggested that perhaps the ore could be smuggled back as ballast in one of Frobisher's ships! The next day Frobisher dined with Lok and asked him the results of the assay of the stone Lok had received the preceding October. Lok replied that he had given samples to three or four men and that all but one had found nothing. The one reported tin and a little silver. (It is strange that Lok should not tell Frobisher about Agnello's reported gold.)

On January 28 Lok was questioned by Sir Francis Walsingham, the Queen's Secretary, who surmised that Agnello was another alchemist trying to fleece the Queen. He took three or four pieces of the stone in order to have tests carried out for the Queen.

Three days later Lok reports that Agnello again tried to persuade him to send a ship for the "ore" and to have it return to some remote harbour but Lok said that only Frobisher knew where the ore was. Agnello then appeared to have tried black-mail and the story becomes murky. "Then he thought to reveal it to the captain [Frobisher] I said that I thought he would reveal it to your Majesty, but I devised with him that I would send a ship to the place in the company of the captain under colour of fishing and when the captain was gone through to Cathay, the ship should lade this thing for ballast and return hither. He allowed well of this device and so I departed for that time".

The next day Lok was back to see Walsingham who told him that he had had the samples analysed, that most showed nothing, that one showed a little silver, that he himself had observed the testing and that it was plain to him that Agnello "did but play the alchemist". Lok replied that at his visit to Agnello the day before, he, Agnello, insisted that his results were true. Walsingham would not believe this but Lok replied, "I prayed him to consider better of the matter for what I was well assured that it was true".

Lok now seems to be becoming convinced of the validity of the assays.

On February 3 Lok went to Agnello again in order to avoid any suspicion of double-dealing until he heard from Walsingham. Lok asked Agnello what agreement he would entertain. Agnello said he would arrange to furnish the ship and that if Lok would show him where to find 100 tons he would give Lok £20 for every ton within 3 months after the return of the ship. He also stated that he, Agnello, would supply good artisans and in case he should die he would teach Lok the art of extraction. Lok pretended not to be able to decide whether he or Agnello should supply the ship and on the 6th Lok saw Walsingham again. Walsingham commented that the arrangement was silly because Agnello was poor but he agreed to consider the matter.

On February 13 Lok saw Agnello again and continued to stall for time. He told the alchemist about the laws which reserved precious metals to the Crown. Agnello claimed a friend at court who would help them obtain the proper licence. Lok saw Walsingham on the 16th and was told that further tests still disclosed no gold and Walsingham again discouraged Lok from entering so dubious a venture.

In the meantime Agnello had approached the Queen for a licence but when Lok heard from him on February 27 it seems obvious that his suit had been unsuccessful. He desired Lok to supply the ship and to proceed in secret. Lok however suggested a further approach to the Queen and urged him to tell more of his discovery of gold to her Majesty.

By March 7 no answer had been received from Court and Lok went to see Walsingham who stated that if Agnello would put up securities for the performance of payment, he would guarantee a licence for a ship of 100 tons. Agnello would not say who his security would be and Lok returned to Walsingham and offered himself as surety and guarantee that the ore would be delivered to the Queen on arrival.

Lok now appears to be fairly hooked but is still cagey and goes to Agnello "and more effectively did enter into talk of the manner of the contract to deliver him 100 tons of this ore". The outcome was that Agnello offered to pay £30 a ton cost landed at London. Lok estimated that the charge of the ship and the men to dig the ore would be £10 per ton, that the Queen would get £10 per ton leaving him with £10 which "should be to relieve me and my children".

On March 28 Lok was at the house of Sir William Winter where the projected Second Frobisher Voyage was being discussed. The next day Winter taxed Lok with the story of the gold. Lok hedged and claimed ignorance but finally Winter showed that he knew the entire story from Sir John Barkley, who it appears had suddenly appeared as surety for Agnello in the matter of the royal licence. Winter claimed that they had made further tests and had found the ore to be even richer than Agnello had claimed and that it was "a matter too great for him and me to deal withall and belonged only to the prince". Lok was undoubtedly relieved that through Walsingham he had kept the "prince" informed. Nevertheless it appears that the blame for the public knowledge of the "ore" was laid at Lok's door and on April 22 he wrote Queen Elizabeth outlining the whole matter from the arrival of Frobisher the preceding autumn. He urged her to act promptly to secure the treasure and placated her with a gift "this small carta [map] herewithall presented truly though grossly made according to my skill".

From the foregoing it appears to the writer that in the past blame was too readily laid either at the door of Lok or even Frobisher when the question of the authenticity of the gold was raised. It appears that after much testing and mental questioning Lok finally became convinced that there might be precious metals in the new land discovered by Frobisher but that at no time did he try to use this possibility as a lever to raise capital for a further expedition. Only when the court became aware of the possibilities for an immense coup did the existence of ore become of major interest.

The Queen granted a charter to a group to be known as the Company of Cathay. This charter was modelled after that of the Muscovy Company and considerable trade advantages were granted.

Goods imported were to pay half-rate duty for the first twenty years; thereafter never more than £5 per £100 of the value. Lok was appointed Governor and Frobisher High Admiral. In consideration of Lok's expenses for the first voyage the Queen granted that he should "have, receive, and take of the said company to his own use and behalf forever the rate of one of every hundredth of all the wares, goods, and merchandise that shall be brought into England or other countries ..." Similar privileges were granted to Frobisher.

The estimated cost for the Second Voyage was £4,400; much of this was raised by subscription and the subscription lists contain an impressive array of names, names that are indicative of the urge of the highest of the land to dabble in rank speculation.

Who were these "Venturers"? Queen Elizabeth heads the list and although there are discrepancies in various published lists it appears that her investment exceeded £1,000. The holders of the great offices of state, the Lord High Treasurer, the Lord High Admiral, the Lord High Chamberlain, and other members of the Privy Council each invested £100 or more as did Sir Francis Walsingham, the Queen's Secretary. There were many others - Sir Philip Sidney, poet and Member of Parliament, the merchant prince Sir Thomas Gresham, founder of the Royal Exchange, Sir William Winter, admiral, Surveyor of the Navy, and Master of Ordinance of the Navy, John Dee, mathematician and astrologer, who a few years later prepared a hydrographical and geographical description of the newly discovered lands for the Queen, and a gentleman with the most improbable name of Julius Caesar, a name that lures the writer into one of history's interesting by-ways.

Sir Julius Caesar was the son of an Italian who was physician both to Queen Mary and to Queen Elizabeth a confidence remarkable considering the antipathy that existed between the daughters of King Henry VIII and the political groupings they represented. At the time of Frobisher's voyages the younger Caesar was about 20 years old and probably just beginning the legal career in which he flourished. A Doctor of Roman Law, he was thus aligned with the royal prerogative as opposed to the Common Law and we find that he took notes for and possibly advised King James I at the memorable trial of Lord Chief Justice Coke, a trial that was a milestone in the development of English Common Law. Later, Caesar was Master of the Rolls and a member of King Charles Privy Council. He was a nephew by marriage of Sir Francis Bacon and,in 1621, the great but disgraced Lord Chancellor died at the home of Sir Julius Caesar.

The writer hopes this digression will be forgiven because it is a vignette of the Elizabethan and early Stuart "establishment", the group that encouraged British exploration of North America, a group of men interested primarily in trade but whose knowledge covered a broad spectrum.

With the granting of the charter and the strong support given by the court Frobisher had no difficulty in organizing a second voyage and in May 1577 three ships, the Aid, Gabriel, and Michael set sail having been seen off by the Queen herself. After a stormy passage they raised the North Foreland, the easternmost tip of Christopher Hall Island "and also the small island bearing the name of the said Hall [now called Little Hall Island], whence the ore was taken up which was brought into England this last year 1576, the said Hall being present at the finding and taking up thereof, who was then master in the Gabriel with Captain Frobisher".

Frobisher went on shore to get more ore," but he could not get in all that island a piece so big as a walnut where the first was found." The crew then made a search of the neighbouring islands and "found them all to have good store of the ore". Most of Loks Land is composed of very light grey weathering granite, in places gneissic, but here and there, especially on Christopher Hall Island the writer saw deeply weathered rusty bands of schist. These contain garnet, graphite, and pyrite and undoubtedly Frobisher's party would have been attracted to them.

Leaving Loks Land Frobisher crossed the mouth of Frobisher Bay to the south shore where they examined what appeared to be another place rich in gold but "upon trial made, it proved no better than blacklead and verified the proverb - All is not gold that shineth". Inside Jackman Sound they found a mine of silver on a small island but "not won out of the rocks without great labour". Here the "ore" collected on Loks Land was assayed and it was found that "four sorts thereof hold gold in good quantity". In Jackman Sound they also found a narwhal. The horn was collected and "is to be seen and reserved as a jewel by the Queens majesties commandment in her wardrobe of robes". What one wonders was the fate of this "jewel".

A few days later on July 23 Frobisher made a display on shore. Seventy men took part and trumpets were sounded and a 5-mile parade up and down the rocky slopes ensued. Some of the crew wanted to explore farther but Frobisher "not contented with the matter he sought for [gold] and well considering the short time he had in hand, and the greedy desire our country hath to a present savour and return of gain, bent his whole endeavour only find a mine to freight his ships, and to leave the rest (by Gods' help) hereafter to be well accomplished".

The Aid remained in Jackman Sound but the other two ships crossed to the north side of Frobisher Bay and found a "very rich mine and got almost twenty tons of ore". This was in Beare Sound, a channel about 12 miles long that extends easterly through the cluster of small islands that lie between Loks Land and Blunt Peninsula. No prominent rusty bands were seen from the air

during the geological reconnaissance of this area although a deeply rusted, nearly vertically dipping bed similar to those on Christopher Hall Island outcrops on the north shore of Lupton Channel about 3 miles northeast of the centre of Beare Sound.

The two ships sailed north-northwest along the west coast of Blunt Peninsula until on July 29 "about five leagues from Beare's Sound, we discovered a bay, which being fenced on each side with small islands, lying off the main, which break the force of the tides, and make the place free from any indrafts of ice, did prove a very fit harbour for our ships, where we came to anchor under a small island which now, together with the sound, is called by the name of that right honourable and virtuous lady, Anne, Countess of Warwick". Upon the island was found good store of the ore which ..." held gold plainly to be seen: whereupon it was thought best rather to load here where there was store and indifferent good, than to seek further for better, and spend time with jeopardy".

There is no doubt that the island described by the Eskimo to Hall in 1861 and on which he discovered numerous relics, is that used by Frobisher. This is Kodlunarn Island an island much more exposed than one would surmise from the description quoted above. Possibly the bay immediately west of Napoleon Bay is the Countess of Warwick Sound of Frobisher rather than the rather ill-defined bight shown on present-day maps.

The crew made a small fort on the island by enclosing a corner of a cliff and the mining continued. By August 21 the mining was concluded and "having only with five poor miners and the help of a few gentlemen and soldiers brought aboard almost 200 tons of gold ore in the space of twenty days, every man therewithall [was] well comforted ..."

The ships reached England in the latter part of September, harbouring in different ports and in October the ore was transferred to Bristol Castle. Soon after the return Lok, the principal backer, wrote to the Privy Council asking that the ore, both that stored in Bristol and also London, be looked after carefully and he further requested that the Queen advance £800 to the adventurers to pay off the crew. In reply Lok was advised to assess the venturers on a pro rata basis.

The autumn of 1577 saw the project involved in efforts to extract ore including involved negotiations with the assayers as to where the furnaces should be built. The Privy Council was still dubious - on December 6 they asked Lok why if his assayers were giving results as high as £90 to the ton could the official assayers find nothing.

Ten days later a site was selected for the extracting plant but in mid-January the Council was told that it would take so long to erect the buildings that no proof of gold would be possible before the 1578 arctic navigation season began.

Bickering and subterfuge regarding the assays continued during the spring of 1578 but plans also went ahead for a much larger expedition to the land now called, by the Queen's command, Meta Incognita. It was assumed that with the establishment of mines, defence would be needed and a "strong fort or house of timber, artificially framed and cunningly devised by a notable, learned man ..." was included in the goods to be shipped. Prefabrication of arctic dwellings is nothing new!

It was planned that 100 men should remain over the winter; 40 sailors, 30 miners and 30 soldiers including gentlemen, goldfinders, bakers, carpenters etc. Fifteen ships were assigned to the expedition and on May 31 this impressive fleet set sail for the west. Queens Foreland was reached on July 2 but Frobisher Bay was found to be choked with ice and in the course of working through this the bark carrying part of the prefabricated house was sunk.

While tacking back and forth across the mouth of Frobisher Bay the fleet sailed far to the south and entered Hudson Strait and as Frobisher commented later, he recognized the implication of this relatively ice-free channel and had he not been charged with a commercial venture, he would have pressed on to the west.

It was not until July 31 after many disasters and near disasters, that Frobisher was at last able to reach Kodlunarn Island (Countess of Warwick Island). He found that more than half of the building materials were missing, some lost at sea, others used for various emergency repairs to diverse ships and when he asked his craftsmen for a completion date for a smaller dwelling they replied that it would take eight or nine weeks. Less than a month remained before freeze-up and Frobisher decided that there would be no wintering party.

Although parts of the fleet had reached Kodlunarn Island, other ships were still at sea and the crews of these valiantly prosecuted the search for "ore" wherever they found refuge from the gales. A "great black island" where "they found such plenty of black ore" lay "under" Hattons Headland (Resolution Island). Others found ore farther up Frobisher Bay (Countess of Sussex Mine) and when they rejoined the main group they were informed that this ore promised to be very good.

While ore was being mined a reduced version of the dwelling was erected "to the end that we might prove against the next year whether the snow could overwhelm it, the frosts break up, or the people dismember the same" - a surprisingly practical and scientific approach to building in the north.

On August 31 the fleet being loaded with ore, the return voyage began. Heavy weather dogged them, many boats and several men were washed overboard but, laden as they were, all ships reached England by early October.

Ore derived from various places was carried by the following ships:

Ship	Locality					
	1	2	3	4	5	6
Aid	-	110	20	-	-	-
Thomas Allen	-	60	100	-	-	-
Judith	-	-	80	-	-	-
Anne Frances	-	-	-	130	-	-
Hopewell	-	-	-	-	140	-
Bear	-	-	-	-	100	-
Thomas (Armonell?)	5	-	85	-	-	5
Emmanuel	-	60	30	-	20	-
Frances of Foy	50	-	80	-	-	-
Moon	-	-	-	100	-	-
Emma (Busse)	-	-	-	-	-	-
Salomon	10	60	60	-	-	-
Gabriel	-	20	-	-	-	-
Michael	-	20	-	-	-	-
	65	330	455	230	260	5

total 1,345 tons

1- Countess of Warwick Island (Kodlunarn Island)
2- Beare Sound
3- Countess of Sussex Mine (from extant maps this appears to have been on the east side of the first major inlet west of Countess of Warwick Island)
4- Queens Foreland (Resolution Island)
5- Dyers Passage (Blunt Peninsula)
6- Winters Furnace - near Countess of Sussex Mine

Apparently work at Kodlunarn Island had exhausted the original ore because "foreasmuch as the Countess of Warwick mine failed being so hard stone to break and by judgement yielded not above a hundred tons, we were driven to seek mines as above named [see table] ... and I think much bad ore will be found".

The final act of the first northern mining venture opens with congratulations from the Queen and Council and a request for a speedy trial of the new ore at the furnace erected the preceding spring. A less felicitous note appears when Lok is granted authority to dun those venturers who had not completed their subscriptions. According to one statement this totalled £1173 15s. No money was forthcoming and the crews addressed an "Exclamation" to the Queen through Walsingham her Secretary. By mid-December as Lok reported to Walsingham only £28 15s of the outstanding commitments had been received and the work of testing the ore was at a standstill. After Christmas the claims of the crews and their captains, all of whom were of course private citizens and in no way connected with the state, became more vociferous and personal reputations began to suffer. The storm centred on Lok the originator and principal in the Company of Cathay and in late January he was impelled to send to the commissioners and auditors of the third voyage a résumé of the entire undertaking since 1574, a résumé whose opening paragraph surely reflects the feelings of many similarly placed.

"For as much as words are but wind and are easily forgotten of those whom they touch not, and yet being misplaced by ignorance of the speaker or misheard by negligence of the hearer, or misconstrued by the malicious, they do breed oftentimes contention and displeasure without cause ..."

The trouble of course was that faith in the gold ore was declining rapidly and the venturers were more prepared to part with ephemeral rights in the Company of Cathay than with hard cash. The fabulous ore was relegated to oblivion and according to one story was eventually dumped into the Thames only to be recovered this century. Lok himself claimed that he was slandered by Frobisher whom he claimed had publically stated that he Lok was a false accountant not venturer at all in the voyages and several other more personal thrusts. Considering that for the three voyages about £25,000 had been subscribed and that Lok and the Earl of Oxford, as his partner, had between them put up £4270, the charge seems somewhat foolish.

And so the venture ended - Lok the entrepreneur in debtors' prison, Frobisher the navigator free but in disfavour, and the false ore lying on the bottom of the Thames.

Lok was soon released but never appears to have regained his pre-eminence as a merchant. He was consul for the Levant Company at Aleppo (1592-4), translated Peter Martyr's book about the West Indies (1613) and died about 1615. Frobisher returned to the sea; he fought against the Spanish Armada in 1585, was knighted aboard his own ship soon after that engagement, and died following a wound received off Brest in 1594 still fighting the Spanish.

What was the "gold ore"? On Kodlunarn Island two aligned trenches have been dug through the drift and beach material to bedrock. The northern trench, about 100 feet long and as much as 25 feet deep, has been cut through grey to pinkish grey biotite-quartz-feldspar gneiss that contains lenses and bands of amphibolite. This trench offers access to the beach and has commonly been referred to as a canal in which Frobisher is said to have "dry-docked" his ships.

The second and smaller trench is near the centre of the island and is partly filled with debris but several large blocks of amphibolite can be seen near it.

No pyrite was seen in the bedrock on Kodlunarn Island and the writer agrees with Roy[1] that the ore described by Frobisher as "much like sea coal in colour" was amphibolite, a rock composed mainly of hornblende with minor amounts of pyroxene, biotite, plagioclase and quartz. This is in agreement with unpublished petrographic descriptions of specimens of the supposed ore recovered some years ago from the bed of the Thames. It may be that the bronze-like surface appearance of weathered biotite was mistaken for gold.

Elsewhere in Frobisher Bay area amphibolite is not present at many of the places described as sources for the ore and as noted on a previous page, it is possible that pyrite, present in rusty, graphite-bearing schist bands, was mistakenly collected.

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1 Roy, Sharat K. 1941. 'The Upper Ordovician fauna of Frobisher Bay, Baffin Land'. Geol. Memoirs, Field Mus. Nat. Hist. Vol. 2, p. 48.

Note on ice shelves off the north coast of Ellesmere Island.

By G. Hattersley-Smith [1]

During the course of a flight on 19 April 1966 along the north coast of Ellesmere Island for the purpose of radio depth-sounding of glacier ice (Evans and Robin, 1966)[2], I had an opportunity to observe the ice shelves off this coast and to notice that there has been further break-up since the massive calving from the Ward Hunt Ice Shelf which took place in the winter of 1961-2 (Hattersley-Smith, 1963).

The M'Clintock and Ayles ice shelves are now virtually non-existent, after enjoying a short-lived recognition by the Canadian Permanent Committee on Geographical Names. Air photographs of 13 June 1962 showed that the outer 15 km. of M'Clintock Inlet was covered by unbroken ice shelf; only scattered disoriented fragments of ice shelf (or small ice islands) are now left, except over an area of a few square kilometres around Borup Point, where part of the ice shelf precariously remains. After fragmentation it is evident that most of the ice shelf in this inlet moved out to sea. On the other hand, ice shelf remains intact in the two bays between Bromley Island and Cape Richards. In Ayles Fiord the ice cover presents a very different picture from that shown in the air photographs of 1962, in which ice shelf is seen to cover the outer 15 km. of the fiord; now, as in M'Clintock Inlet, only scattered ice islands and slivers of ice shelf remain.

The Milne Ice Shelf is still intact and, as far as I could tell, the ice front across the mouth of Milne Fiord remains in roughly the same position as shown in air photographs of 1959. Milne Fiord remains the only fiord of this coast where the main outlet glacier is contiguous with the ice shelf. The boundary is visually quite distinct and is marked by a strand crack along which a rampart of large blocks of ice has been forced up, presumably by calving at the glacier front or by slight forward movement of the glacier or by tidal action. The glacier front is certainly not receding or there would be a gap between it and the ice shelf. The sharp transition from ice shelf to glacier ice was very well picked up by the radio echo-sounder, which also demonstrated that the glacier was aground. The relationship of the glacier to the ice shelf in this area would repay close study,

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1 Geophysics Section, Defence Research Board, Ottawa.

2 This was a project of the Scott Polar Research Institute, Cambridge, England for which the Defence Research Board provided logistic support.

both in the air photographs and on the ground. From a cursory examination of the air photographs it is difficult to resist the conclusion that the glacier tongue has been more or less in its present position ever since the ice shelf was formed.

In the flight along the coast from Alert to Cape Columbia two small ice islands were noticed, neither more than 200 m. in length and 100 m. wide; one was situated a short distance off Cape Belknap and the other about 3 km. off Cape Richardson. Other small ice islands may have been missed. The eastern-most development of ice shelf remains in the two bays between Point Moss and Good Point; a small ice rise lies between the two bays. Between Cape Columbia and Ward Hunt Island no changes in the extent of ice shelf since 1962 were noticed, although there may have been minor changes. It is interesting to note that Evans and Robin (1966) by the radio sounding method found ice depths of 125-- 5 m. for the Ward Hunt ice rise and 40-- 5 m. for the ice shelf near Ward Hunt Island.

References

Evans, S. and G. de Q. Robin. 1966. "Glacier depth-sounding from the air". Nature, Vol. 210, No. 5039, pp. 883-5.

Hattersley-Smith, G. 1963. "The Ward Hunt Ice Shelf: recent changes of the ice front". J. Glaciol. Vol. 4, No. 34, pp. 415-24.

Field activities of the Fisheries Research Board of Canada in the Arctic in 1965

During 1965 personnel of the Arctic Biological Station made 10 separate field trips into the Arctic or Atlantic areas to study marine mammals, fish, limnology, and biological oceanography. Approximately one-quarter of this effort was in winter and early spring programmes; the remainder was carried out from June to September. Brief descriptions of these activities are:

1. Biological oceanography

During the period July 24 to September 2 the M.V. Calanus, under the direction of Dr. E.H. Grainger, sailed for Frobisher Bay from Quebec City. En route hydrographic and collecting stations were occupied and five whales were tagged.

2. Marine mammal studies

(a) Grey seals (Halichoerus grypus). From late January to early February B. Beck and I.G. Gidney tagged 450 grey seal pups at breeding colonies off southeast Cape Breton and Sable Island in order to follow the dispersal patterns of the young seals.

(b) Harp seals (Phoca groenlandica). In early January B. Beck collected samples and specimens for measuring changes in age of first sexual maturity resulting from the stress of heavy stock exploitation. In March D.E. Sergeant continued productivity studies on harp seals in the Gulf of St. Lawrence.

(c) White whales (Delphinapterus leucas). In late July D.E. Sergeant made an aerial count of white whales along the west coast of Hudson Bay. The population was estimated at from 5,000 to 10,000 animals.

(d) Fin whales (Balaenoptera physalus). C. Nicol examined 79 fin whales from the commercial fishery catches at New Harbour, N.S., during the period June to August. Data on size, sex, maturity, age, and feeding habits were obtained.

(e) Narwhal (Monodon monoceros). During the summer, A.W. Mansfield and his party completed a three-year life-history, population, and utilization study of the narwhal in the northern Baffin Island area. This region was found to be used largely as a breeding site. Study of the life-history of the narwhal is being continued in Cumberland Sound.

3. Limnology and fisheries studies

(a) Great Bear Lake. L. Johnson, using the 110-foot M.V. Radium Gilbert, completed a three-year limnological and fisheries study of Great Bear Lake. A detailed bathymetric chart of the lake was prepared. Fish and plankton were found to have low population densities at all depths from the surface to the bottom at 1,400 feet. Lake trout and whitefish, the most important food species, were largely confined to the shallow or inshore areas.

(b) Keyhole Lake, Victoria Island. J.G. Hunter and party completed a limnological and fisheries study of this 120-acre lake near Cambridge Bay. A chemocline which persisted until final ice disappearance was found to develop during the winter. Plankton was abundant in the summer and preliminary estimates of arctic char productivity indicate that annual yields of three pounds per acre are possible.

4. Marine fish studies

Exploratory fishing activities were carried out by I.G. Gidney from the 39-foot M.V. Salvelinus in the Bathurst Inlet and Dease Strait area of the central Arctic.

As well as species of fish known to be in the area, specimens of flatfish (Hippoglossoides robustus) were caught for the first time in waters east of the Chukchi Sea; wolf-fish (Anarhichas orientalis), known in the western and central Arctic from only two other specimens, were taken in Bathurst Inlet.

Greenland cod populations (Gadus ogac) were found to be restricted to bays and harbours and to be composed of single or at most two very strong year classes with all intermediate years either completely or very sparsely represented. Tag recoveries indicated a population of 12,000 cod within Cambridge Bay.

Change of Address

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Editorial Note

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Mrs. G.W. Rowley,
245 Sylvan Road, Rockcliffe,
Ottawa 2, Ontario.

T H E A R C T I C C I R C U L A R

VOL. XVII No. 2 Published by The Arctic Circle
Ottawa
(January 1968)

The following meetings have been held:

One hundred and fiftieth meeting. 11 October 1966. Dr. J.C. Reed and Brigadier H.W. Love discussed the work of the Arctic Institute of North America.

One hundred and fifty-first meeting. 8 November 1966. Dr. B.R. Pelletier spoke on "The work of the Marine Geology Unit of the Bedford Institute of Oceanography".

The Annual Dinner. The Annual Dinner was held on 1 December 1966. Dr. R.J.E. Brown, the guest speaker, described his recent visit to the U.S.S.R.

Annual General Meeting. The Annual General Meeting was held on 10 January 1967. After the discussion of Club business the film "Eskimo Bride", made by Knud Rasmussen, was shown.

One hundred and fifty-fourth meeting. 14 February 1967. Dr. R.G. Glover spoke on "Andrew Graham, Reporter of Hudson Bay".

One hundred and fifty-fifth meeting. 14 March 1967. F/L. J.W. Storr, R.C.A.F., spoke on the "Hovercraft trials on the Mackenzie delta".

One hundred and fifty-sixth meeting. 18 April 1967. Three films were shown: "Eskimo Family", "Ikpuk, the Igloo Dweller", and "Little Diomede".

One hundred and fifty-seventh meeting. 9 May 1967. Dr. J.S. Hart spoke on "Studies on cold adaptation in man".

Upper Pleistocene archaeology in Old Crow Flats, Yukon Territory.[1]

By W.N. Irving[2]

As part of a programme of regional archaeological studies, I began working at Athapaskan sites in the Porcupine River basin in 1965. In 1966 C.R. Harington, Curator of Quaternary Zoology in the National Museum of Canada, discovered human artifacts, in association with the bones of mammoth, bison, horse, and other Pleistocene mammals, at several places along the Old Crow River. Later that summer, I visited some of the collecting localities with Harington.

At Locality 14N, some 40 miles up-river from its junction with the Porcupine, Harington had found a toothed flesher made from a caribou tibia. This highly specialized implement, similar in make to tools still used for scraping moose and caribou skins at Old Crow, resembles in its heavy staining and mineralization the bones of Pleistocene mammals found in large quantity nearby. Both the implement and the bones appeared to have been washed out of a buried layer of alluvium which, upon excavation, yielded more bones. The evidence was thus suggestive but suspect.

A closer examination of our collections the following winter showed that some of the mammoth and bison bones had been broken while fresh and that a few had the appearance of implements. There seemed every reason to believe that the concentrations of bones at Harington's collecting localities 14N, 22, and 29 were middens, in the sense that the concentrating had been done, at least in part, by man. Various lines of evidence suggested the bones were more than 20,000 years old. According to our limited observations, when considered with the preliminary findings of Owen Hughes of the Geological Survey of Canada and his associates, the alluvium from which the bones came was thought to be overlain by lake sediments attributable to the Late Wisconsin Maximum of about 18,000 to 20,000 years ago.

The Pleistocene bones so far identified by Harington represent 17 mammalian species, of which 7 are extinct and 4 others are extinct in the Yukon. The extinct forms are Mammuthus primigenius, Megalonyx sp., Bootherium sp., Camelops sp., Mammut americanus, Cervalces sp., and Castoroides sp. Those extinct in the Yukon are Ovibos moschatus, a cervid, Equus sp., and Bison sp.

Samples of wood from the layer that produced bone were subjected to radiocarbon analysis by the Geological Survey of Canada. The first results gave an age of about 41,000 years. Results from two other samples, however, gave 15,000 and $<4,000$ years.

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1 Revised from a paper read at the Alaska Science Conference, College, Alaska, September 1967.

2 National Museum of Canada.

This is the picture as of May 1967. It has not changed greatly since then. Harington and I re-examined the sites in the summer of 1967 and, with the help of T.D. Hamilton, established conclusively, if not entirely to our satisfaction, that the bones, wood, and gravel had all been deposited relatively recently, and are not overlain by lake sediments in the sites they now occupy.

The thick lacustrine and fluvial deposits that partially fill the Old Crow basin are undoubtedly the original source of the bones. These range about 130 feet in depth where they are exposed in recent cuts. We have found bones of bison and mammoth in place throughout most of the lacustrine deposits, but never in quantity and never, so far as we could determine, in association with a weathering horizon. Some appear to have been ice-rafted. Although most of the bones in recently deposited sediments are not badly water-worn, all apparently have been washed out of the older deposits and concentrated according to size and density, along with fossil wood, as alluvium. On this evidence, they could be of any age, or of different ages, as indicated by the C-14 results. Perhaps the mode of deposition accounts for the complete absence of stone tools from our collections. The facts that we have found more artifacts in some deposits than in others sustains the hope that some day actual middens in their primary place of deposition will be found. However, prospecting for these promises to be a long and chancy operation.

The artifacts are no less real for all this, and we have a very sizeable collection of bone to sort for more. The contemporaneity of the first artifact - the flesher - with those made of mammoth bone may yet be established by fluorine or by radiocarbon analyses, and it still seems likely that the artifacts made of mammoth bone are more than 20,000 years old.

We are continuing our studies of the material. If enough organic carbon remains in the bones, we hope to have them dated by C-14 analysis. We hope to encourage work by others in future field seasons on the history of sedimentation and downcutting in the basin, and on the stratigraphy of the extremely rich fossil-bearing sediments. Co-operative studies in the area by geologists, paleontologists, and archaeologists have already been of mutual benefit. Archaeological work will continue in the area, directed both at sites of the last 1,000 years or so, which are fairly numerous, and at the discovery of new sites. Thus far, very few have been found that date from between the extinction of mammoth, bison, and horse and the apparent arrival of Athapaskans.

A search for old kayaks in Holland. By Gert Nooter

Three years ago I started a search for old kayaks preserved in former whaling towns in Holland. The first of these boats was found by chance. But after finding the third one, and after having learned that

nobody knew of all three, I decided to make a trip around the thirty towns, from where the people took part in whaling during the seventeenth and eighteenth centuries.

During the trip around the whaling towns I found nine old kayaks, all frames lashed with baleen, two old-fashioned throwing sticks, five paddles, and part of the skin of - as the people said - a real Eskimo. One of these kayaks, perhaps made for a boy because of its length (3.37 m.), was found behind the organ of an old church on one of our northern islands.

Using the word "found" is not exactly correct, because if you are within a few metres of a kayak, and if you meet the right people they will show you "A wild man's boat, made of skins and whalebones", and sometimes painted with the waves of the sea on each side of the kayak, and in one case with dragons on the bow.

Nearly all the kayaks are now in a very bad condition, because the people failed to put these strange things in a museum at the right time. The kayak from Zierikzee - a small town in the southwestern part of the country - is a fine exception. Most of the inhabitants even know something about this kayak. They can tell you a story about a man named Zierik, who came in from the sea in his kayak, and founded the town Zierikzee in the year 849. Some of them believe it.

Compared with the other countries in Europe where old kayaks are preserved, for instance, western Germany, Scotland, with the famous "Aberdeen Kayak", Norway, Denmark, and perhaps also France, the Netherlands with the nine old kayaks has a rather good "collection".

Of course I tried to find historical dates about these kayaks, but after two years I learned that we had a lot of Eskimos in our country - we showed them for money at our inns, and after the show, we sometimes took them back to Greenland on the next whaling trip, or we buried them in our graveyards - but I have never found any information about the existing kayaks.

As early as 1663 there was a kayak hanging from the ceiling of the navy store in Amsterdam with a man in the boat - made of wood - but this flying Inuk has gone. One of the most interesting findings in my search for historical background of the kayaks are some drawings in a Dutch manuscript, dated 1578, contemporary to Sir Martin Frobisher. On one of the drawings we see the man who "for very choller and disdain... bit his tong in twayne" as everybody cites and George Best has written, but this seems to be the first drawing which portrays the very moment that Frobisher "with maine force" lifted the man with his kayak out of the sea. In the same manuscript we even find a description of the stay of two Eskimo women, shown at an inn at the Hague, for money of course, in the year 1566 - ten years before that great man - Frobisher - sailed for Cathay.

It is quite interesting to do ethnohistoric research about contacts between the people from the low countries and the Inuit, because it seems to be possible, during a rather short time of two or three years, to find quite a lot of new material. The results of this research will be published as a separate volume in Meddelelser om Grønland. Its title "Inuit in the Netherlands" can be seen as a variation on a Danish article by Louis Bobé; "Hollænderne paa Grønland" which means the Dutch in Greenland.

Permafrost Map of Canada

A new permafrost map of Canada in colour has been published jointly by the Division of Building Research of the National Research Council of Canada and the Geological Survey of Canada. Information on the distribution and occurrence of permafrost in Canada collected by Dr. R.J.E. Brown (of DBR/NRC) during fourteen years of research and field work is plotted on the map. The extent of the continuous and discontinuous permafrost zones and the occurrence of permafrost at high elevations in the western mountains are shown. Ground temperatures and thickness of permafrost at 24 stations are included. Isotherms of mean annual air temperature and the physiographic regions show the relation of permafrost distribution to climate and terrain, respectively.

Explanatory notes on the definition of permafrost, distribution and occurrence, physical factors influencing permafrost and a bibliography of source information are printed on the map. The scale is 120 miles : 1 inch or 1 : 7,603,200 and the single sheet measures approximately 40 in. by 30 in. This map will be reissued as new information becomes available. Copies may be obtained at a cost of 50¢, either from the Division of Building Research, National Research Council, Ottawa, Canada (published as NRC 9769) or the Geological Survey of Canada, Department of Energy, Mines and Resources, 601 Booth Street, Ottawa (published as Map 1246A).

Dr. R.J.E. Brown has prepared the following notes on those features on the map which have not appeared on previous permafrost maps of Canada.

(1) On previous permafrost maps of Canada the occurrence of permafrost at high elevations in the western Cordillera has been indicated only in a generalized manner and no attempt has been made to show any detail. In the new map the predicted distribution of permafrost is related to the elevation of the mean annual air isotherm of 30°F. The elevation of this isotherm denotes the lower limit of the permafrost and the elevation of this limit decreases with increase of latitude. The quantitative relationship between elevation and latitude is described in the legend and it is interesting that a band of permafrost occurs at high elevations along the eastern flank of the Cordillera in the Rocky Mountains and also along the Coast Ranges. It appears that there is very little permafrost in the intermontane region between the two flanks of the Cordillera. There is of

course extensive permafrost right across the northern part of British Columbia because of the more severe climatic conditions.

(2) On previous permafrost maps the discontinuous zone had no subdivisions or was divided rather vaguely into a discontinuous zone and a sporadic zone. On my map I have divided the discontinuous zone into two sub-zones: the southern fringe, and a sub-zone of widespread discontinuous permafrost. I have used the 25°F mean annual air isotherm to divide these sub-zones because it appears from field observations and other investigations that permafrost is patchy and occurs in scattered islands in special terrain situations south of this isotherm, and north of this isotherm permafrost occurs widely in many types of terrain.

(3) On previous maps the arctic islands have been placed entirely within the continuous zone of permafrost. On the new map the southeastern part of Baffin Island is shown in the discontinuous zone. This is only speculation on my part but the mean annual air temperature of 17°F which I have used to divide the continuous and discontinuous zones (except along the Hudson Bay coast of Ontario and Manitoba) cuts across the southeastern corner of Baffin Island. With our knowledge of the relationship existing between mean annual air temperature and mean annual ground temperature in permafrost regions it is reasonable to assume that the mean annual ground temperature in the vicinity of the 17°F mean annual air isotherm is about 23°F (-5°C). This is the temperature that the Russians use to divide discontinuous permafrost and continuous permafrost and I have adopted their criterion. More field work will be required in Canada to discover whether in fact the location of the 23°F mean annual ground isotherm actually divides the continuous and discontinuous zones.

(4) There is a rather remarkable shift northward of the boundary between the continuous and discontinuous zones on the Quebec side of Hudson Bay as compared with the west side. It is possible that this abrupt shift can be attributed to the much greater snowfall in Quebec, particularly in the late fall. Although observations are not available, it is probable that regional frost penetration depths are somewhat less in Quebec than across the Bay in northern Ontario and Manitoba. Thus I think it is quite possible that the southern limit of continuous permafrost lies much farther north in Quebec.

(5) The greatest depth of permafrost so far found - 1500 feet on Melville Island - is shown on the map. Thickness of permafrost is not usually mentioned on the maps, and it is very likely that thicker permafrost occurs in the interiors of the large islands in the arctic archipelago where the thermal effect of the ocean is absent.

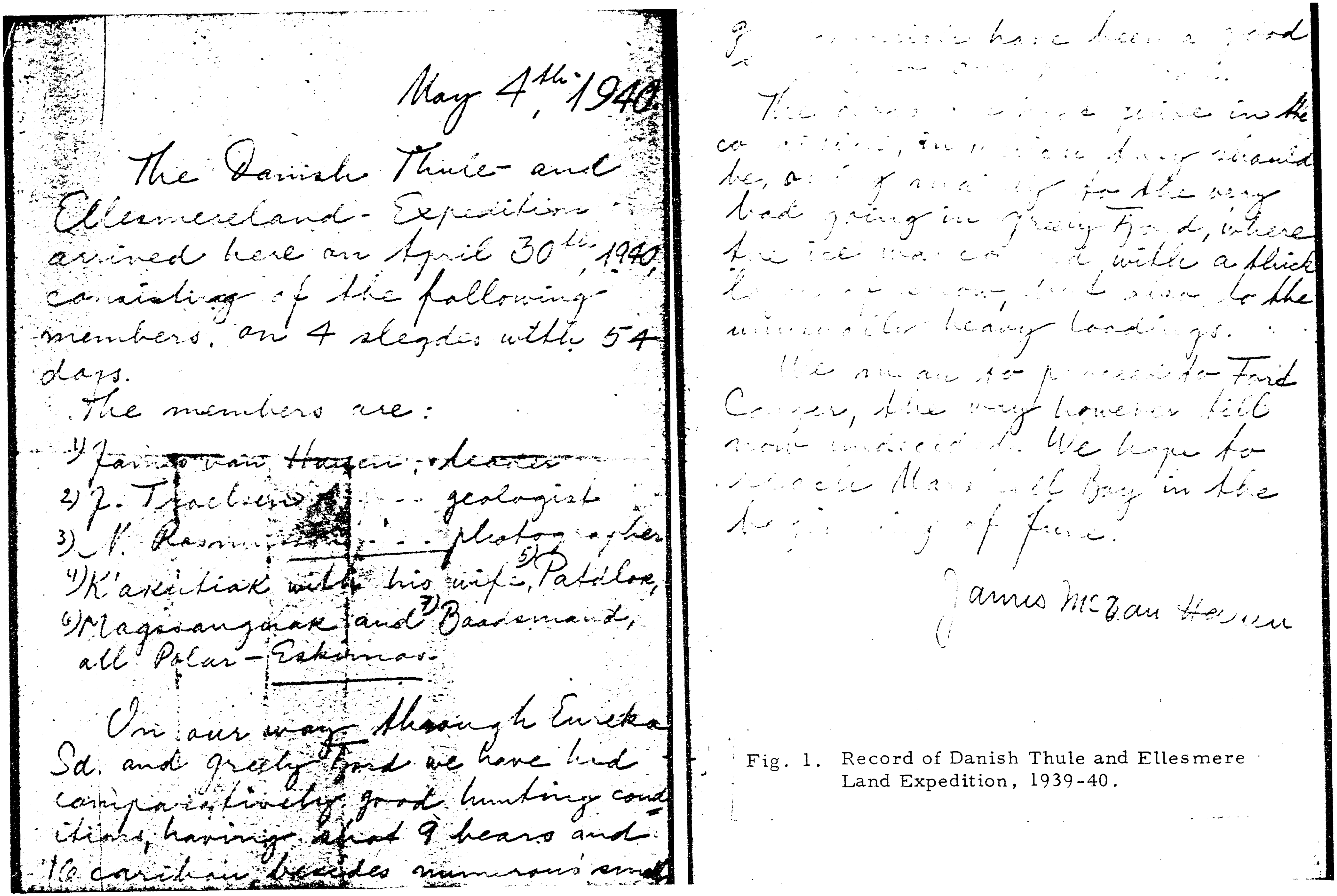
(6) This is the first time that the relationship of permafrost to the physiographic regions has been shown in Canada.

Record of Danish Thule and Ellesmere Land Expedition, 1939-40.

By Geoffrey Hattersley-Smith

The Danish Thule and Ellesmere Land Expedition, led by James van Hauen, wintered on Inglefield Land, 1939-40. They crossed Smith Sound to Bache Peninsula in early March 1940, and then crossed Ellesmere Island from Flagler Fiord to Bay Fiord. From here the northern party under van Hauen continued up Eureka Sound to Greely Fiord, whence a survey was made of Hare and Otto fiords, and the van Hauen Pass, connecting the two fiords, discovered. The party returned via Antoinette Bay, overland to Archer Fiord, around Cape Baird, and thence south through Kennedy Channel back to Inglefield Land (Vibe, C. 1948. "Langthen og nordpaa. Skildringer fra 'Den Danske Thule-og Ellesmereland-ekspedition 1939-40'". Copenhagen, 199 pp.).

The present record was deposited in latitude 81°03N., longitude 74°45W., about halfway up a ravine between the ice-dammed lake at the head of Antoinette Bay and the plateau. From August 12 to 16, Harold Serson and I made a reconnaissance on foot of the area between the head of Tanquary Fiord and the head of Greely Fiord. We descended the ravine from the plateau at an elevation of about 2,000 feet, believing that this was the way up from Greely Fiord taken by W.E. Ekblaw (of the MacMillan Crocker Land Expedition) in 1915, when he crossed Ellesmere Island to Fort Conger. We hoped to find the record and cache left by Ekblaw at a fork of the ravine about 6 miles down from the plateau. After entering the ravine from the plateau near two small lakes, we skirted another lake in the bottom of the ravine, and then descended about 300 feet on rough boulders set at a steep angle. We had walked about 2 miles from the plateau and were now in the narrowest and deepest part of the ravine, shut-in by walls rising 1,000 feet. Here in the stream bed we soon found numerous rusty food cans, including dog pemmican cans, suggestive of a party lightening loads before attempting the steep and difficult ascent to the plateau. A mile or two farther on we found a 40-litre kerosene container and a pair of long underpants in the stream. At the fork in the ravine there was no sign of Ekblaw's cairn, and we started back up the ravine, believing that the cairn had been swept away by the stream, but feeling pleased to have found traces at least of Ekblaw's passing. It was a surprise, therefore, on the way back about half a mile above the fork, to see a large wooden box perched on a natural dam of boulders which had fallen across the stream. The box was in such a position that it had escaped our notice on the way down. The box contained 26 lb. of "Otana" rolled oats, and James van Hauen's record rolled up inside an empty bottle of Horlick's malted milk. Beside the box there was



May 4th, 1940.

The Danish Thule- and Ellesmereland-Expedition arrived here on April 30th, 1940, consisting of the following members, on 4 sledges with 54 dogs.

The members are:

1) ~~James van Hauen, leader~~
2) J. Troelsen — geologist
3) N. Rasmussen — photographer
4) K'aerkiak with his wife 5) Patdloq,
6) Magsanguak and 7) Baadsmand,
all Polar-Eskimos.

On our way through Eureka Sd. and Greely Fiord we have had comparatively good hunting conditions, having shot 9 bears and 10 caribou, besides numerous small [illegible] have been a good [illegible]

The [illegible] in the condition, in which the dogs should be, [illegible] for the very bad going in Greely Fiord, where the ice was covered with a thick [illegible] due to the [illegible] landings.

We mean to proceed to Fort Conger, the way however still not decided. We hope to reach Marshall Bay in the beginning of June.

James McVan Hauen

Fig. 1. Record of Danish Thule and Ellesmere Land Expedition, 1939-40.

another 40-litre can of kerosene, like the one earlier found in the stream, and a broken ice chisel. It was evident that stream action had dislodged one of the kerosene cans.

It is of interest to note that the Polar Eskimo, K'akutiak, who with his wife was in Van Hauen's party, served as a dog-driver on the joint Canadian-United States Ellesmere Ice Shelf operation in 1954. He and his wife are still living in Thule (Kanaq).

As to Ekblaw's record and cache, there are two possibilities: either we were looking in the wrong place, or the record and cache had been swept away by the stream. Van Hauen (personal communication) has confirmed that his expedition did not find them. After a second brief visit to the area in 1966 we are inclined to favour the second hypothesis.

CCGS "Louis S. St-Laurent"

On 23 December 1966, a new triple screw icebreaker, the Canadian Coast Guard Ship Louis S. St-Laurent, was launched in the Montreal yard of Canadian Vickers Limited. Plans call for her to go into service in the spring of 1968 and to work in the Arctic and in eastern Canadian waters.

The Louis S. St-Laurent has a length between perpendiculars of 336 ft. 6 in., an over-all length of 366 ft. 6 in., a beam of 80 ft., and a maximum loaded draft of 31 ft. Normal draft will be 29 ft. 6 in. Her steam turbo-electric propulsion system, made up of three steam turbines driving nine generating units which provide power to three electric propulsion motors, one for each propeller shaft, will develop a maximum continuous shaft horsepower of 24,000 h.p., making her the most powerful conventionally-powered icebreaker in the world and giving her a cruising speed of 13 knots. She will have a displacement of 13,300 tons and a radius of action of 16,000 nautical miles at cruising speed. The steering gear will be electric-hydraulic with emergency power steering, and the control system will allow the ship to be steered from the crow's nest and wheelhouse top as well as from the wheelhouse itself. Heeling tanks will help to free the vessel in heavy ice and a water jet manoeuvring system is installed forward. A patent flume-type passive roll stabilization system will reduce motion in rough seas.

The ship will carry a crew of 122 officers and men and will have accommodation to allow her to be used as a training vessel for cadets from the Coast Guard College. There will also be a hospital for about 15 patients, dry and refrigerated cargo space, and laboratory facilities for oceanographic, hydrographic, and related scientific work. The flight deck for helicopter operations will be served by elevator

from a hangar below decks housing two helicopters. There will be two 5-ton electric deck cranes and two 40-ton heavy-lift booms. Two 50 ft. landing craft will be carried.

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THE ARCTIC CIRCULAR

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The following meetings have been held:

One hundred and fifty-eighth meeting. 17 October 1967. Dr. Olav Gjaerevoll spoke on "Jensen's Nunatak revisited".

One hundred and fifty-ninth meeting. 14 November 1967. Dr. Hans Weber spoke on "The Dominion Observatory North Pole expedition".

The Annual Dinner. The Annual Dinner was held on 30 November 1967. Dr. A.P. Crary, the guest speaker, described his polar experiences.

One hundred and sixty-first meeting. Mr. Ralph Plaisted showed a film of "The Plaisted Polar expedition, 1967" and discussed his plans for the 1968 expedition.

Observations on white whales trapped by ice in the Eskimo Lakes during the winter of 1966-7. By R. M. Hill.[1]

Early in the winter of 1966-7 a number of beluga or white whales (Delphinapterus leucas Pallas, 1776) were trapped by ice in the Eskimo Lakes at a point 30 miles northeast of Inuvik, now known as 'Beluga Point' (68°46N, 133°20W.)[2] Observations were made on the whales by the staff of the Inuvik Research Laboratory from the time they were first sighted in August until their breathing hole closed over at the end of January.

The white whale is a dolphin-like Cetacean measuring 5 feet to 17 feet in length and weighing up to 2,500 pounds. They have rounded heads and a ridge in place of a back fin. Their colour, dark gray when young, gradually changes to a light gray and finally to milky white when adult. These whales have a highly developed social behaviour and are reported to produce a wide range of sounds (Sergeant, 1962, p.2).

Beluga are common in the Beaufort Sea and are often seen in summer from Amundsen Gulf through to Mackenzie Bay. The whales concentrate in the Mackenzie delta area from mid-July to mid-August where they are hunted in the relatively shallow waters with rifles and harpoons from canoes and small boats. Each year 100 to 200 whales are taken by hunters working mainly from Tuktoyaktuk and Kendall Island. Early in August 1966 at least 50 beluga were observed in the fourth Eskimo Lake, which connects to the Arctic Ocean 150 miles away through a chain of lakes of gradually decreasing salinity. Although beluga are often sighted in the Liverpool Bay area and sometimes in the first three Eskimo Lakes, they are seldom seen in the fourth Eskimo Lake. The whales had probably followed a school of herring into the lake and either could not find their way out or were satisfied with the food supply in the area when ice covered over the narrows leading into the lake.

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1. Northern Research Coordination Centre, Department of Indian Affairs and Northern Development.

2. Name not yet officially adopted.

No published records were found of beluga having been trapped by ice before in the Eskimo Lakes or the Mackenzie delta area. However, there are several verbal accounts of whales being trapped some time ago in the first Eskimo Lake and on the west side of the Mackenzie delta. It is fairly common for large numbers of beluga to be trapped by ice in the Eastern Arctic.

As the fate of white whales trapped by ice had not been fully documented before and the location was fairly close to Inuvik, the staff of the Inuvik Research Laboratory planned a programme of observations to document the winter activities and the predicament of the trapped whales. The programme, which was discussed with members of the Arctic Biological Station of the Fisheries Research Board, included measurement of the hole size, number of whales, temperatures, ice thickness, and whale activity. In addition data were collected on total surfacings and duration of dives for specific whales. Underwater noises of the whales were picked up on a tape recorder and an attempt was made to follow the whales with a depth sounder.

Fifteen flights were made by Laboratory staff members to the whale site and extensive use was made of other field parties working in the area and pilots flying between Inuvik and Tuktoyaktuk to provide data. The observation programme was set up to record data without disturbing the whales and without interfering in the hunting of the whales by local natives as permitted by the Department of Fisheries regulations. However, the whales were not disturbed by hunters; presumably, it was not worth while for Tuktoyaktuk residents to come 60 miles overland when their ice cellars were already full from a successful summer of whaling.

Observations

Ice started to form on the fourth Eskimo Lake early in October, covering the bays and the only outlet to the Arctic Ocean. The area of open water decreased rapidly and on November 1 the largest open water area was only 500 feet in diameter. Despite all the winter movement caused by the whales' continuous surfacing, this opening was only 50 feet in diameter on November 10. Two smaller holes, one mile from the main hole, closed completely around November 15 with temperatures as low as -30°F.

Although beluga are reported to make a number of sounds audible above the surface (Slijper, 1962, p. 220), no particular sounds or noises were heard during the observations other than the breathing sound as the whales blew and inhaled air when they surfaced. An attempt was made to record under-water whale sounds with a microphone immersed in a plastic bag, but wave action on the sides of the hole made a considerable noise and only a few squeaks attributable to the whales were picked up by the tape recorder. Later, using a larger plastic bag, the microphone was immersed around 3 feet below the surface, which quietened the noise of the waves, but still only a few high-pitched squeaks were picked up. Other attempts to pick up the whale noises were made by the CBC crew without success.

The plight of the white whales trapped in the Eskimo Lakes attracted international publicity and provided an exciting experience for many Inuvik area residents who visited the whale hole. It would have been more informative to capture one or more of the whales for an examination of its body condition and stomach contents. However, with the difficulty of recovering a whale after shooting or harpooning and the "save-the-whale" atmosphere, no attempts were made to obtain specimens.

The Inuvik Lions Club attempted early in January to move the whales to a new feeding area by cutting a series of breathing holes, but without success as the whales did not use either of the two holes which were cut for them adjacent to their main breathing hole.

During the summer of 1967 several flights were made over the area where the whales had been trapped to look for any sign of carcasses washed up on the shores. However no bodies or remains were observed.

Details of sightings of the trapped whales and all scientific data recorded at the time can be obtained from the Inuvik Research Laboratory.

References

Slijper, E.J. 1962. 'Whales'. London: 475 pp.

Sergeant, D.E. 1962. 'The biology and hunting of beluga or white whales in the Canadian Arctic'. Can. Fish. Res. Bd., Arctic Unit Circular No. 8, 13 pp.

Vladykov, V.D. 1944. 'Chasse, biologie et valeur économique du Marsouin Blanc ou Béluga (Delphinapterus leucas) du fleuve et du golfe Saint-Laurent'. Quebec: Dépt. des Pêcheries, 194 pp.

"Problems of the North"

Problemy Severa ("Problems of the North") is published at irregular intervals by the Soviet Commission on Problems of the North. This important series is being translated in its entirety by the National Research Council. The translations are edited by Mr. G. Belkov under the general direction of an inter-departmental editorial board. Draft translations are referred by the chairman of this board to a Canadian specialist in the subject concerned to ensure technical accuracy. The subject matter covers problems related to environmental conditions and natural resources in the north, the future development of the northern economy, and the industrial utilization of the resources.

The series began in 1958 and twelve issues have appeared. Translations of Nos. 1 to 10 have already been published and No. 11 will follow early this fall. The first three issues contain a wide variety of topics. Most of the articles in subsequent issues have dealt with some particular topic: Nos. 4 and 7 with the transformation of nature in the north, Nos. 5 and 9 with the economic development of northern regions, No. 6 with problems of acclimatization, No. 8 with northern vegetation, No. 10 with northern construction, and No. 11 with the biology and utilization of wildlife in the Arctic.

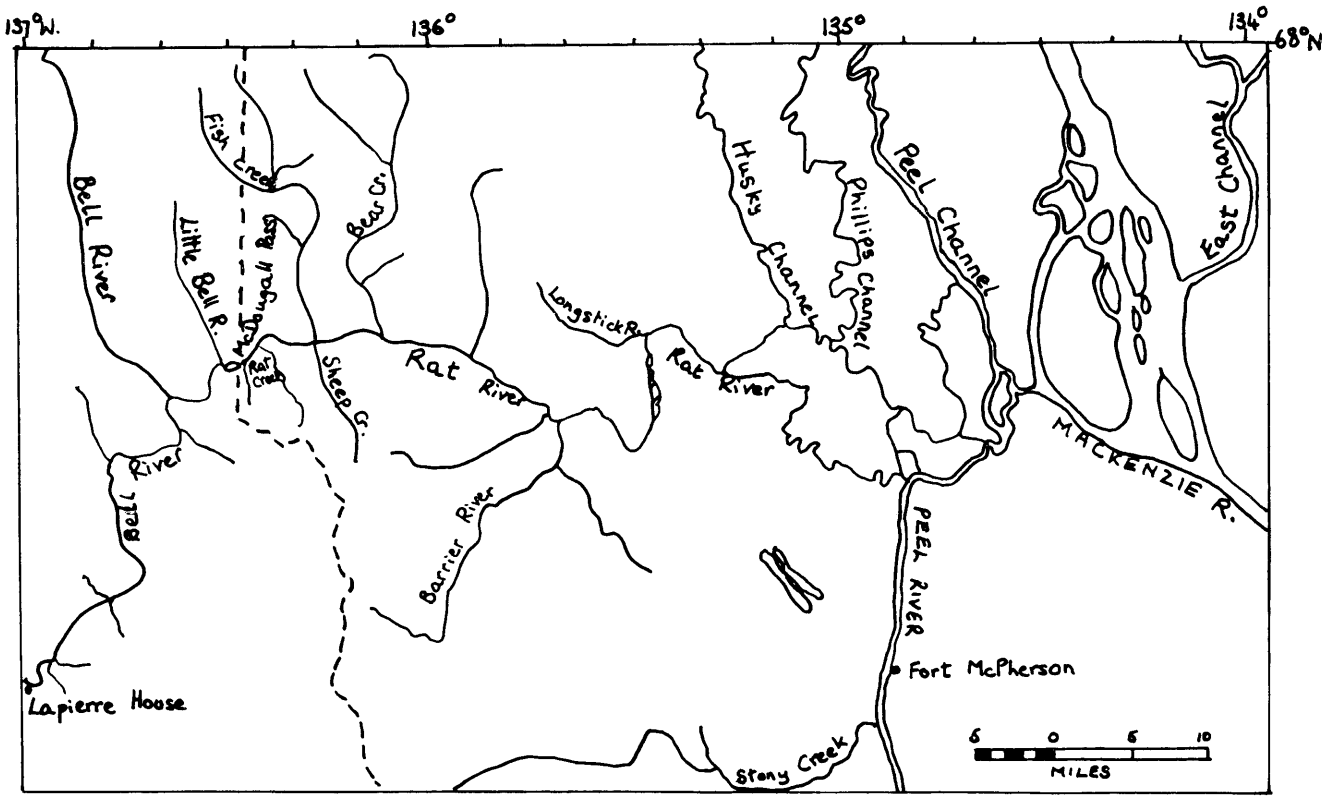
Requests for individual issues ($7.00), single papers ($1.00), or information should be addressed to: Translations Section, The Library, National Research Council, Ottawa 2, Ontario.

The Rat - Bell - McDougall Pass canoe trip. By Eric W. Morse

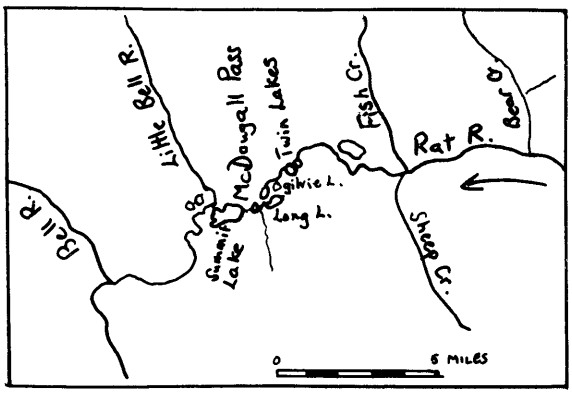
The 600-mile canoe trip from the Mackenzie delta through Yukon Territory to the Yukon River in Alaska was followed by many a Klondiker (while about as many appear to have failed to get through). Robert Service describes using this route on one of his later trips to the Klondike, in his autobiography 'Plowman of the Moon'. Charles Camsell has a chapter on the route in his 'Son of the North', and Stefansson describes it in his writings. The only published book completely devoted to this route is Lady (C.C.) Vyvyan: 'Arctic Adventure'. William R. Bendy made the trip with his wife, Sylva, in 1936. His excellent account with fine pictures, while never published, is in typescript filed with the Canadian Geological Survey Library, with photostat copies in the Library of the Department of Indian Affairs and Northern Development.

This brief account is not intended as a record of a particular expedition, but aims to pass on possibly helpful navigational information about the route. It is based on a canoe trip made in July 1965. The members of the party were: G.H. Bayly, Jack Goering, Eric and Pamela Morse, Bill Sheppard, and David Woods. The party flew to Fort McPherson, and flew out from Fort Yukon.

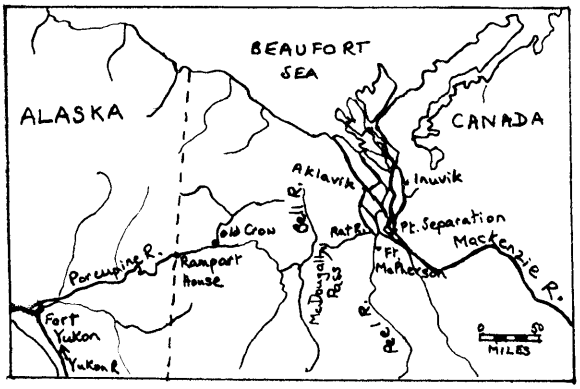
Putting this route in its wider geographical setting, we should follow the Rocky Mountains northward through the Selwyns and Richardsons. This 1,500-mile wall, the continent's spine, runs from the U.S. border through to the Arctic Ocean. In this whole distance McDougall Pass is the only low gap, a nick merely 1,040 feet in altitude. The Rat River and the Bell flow in opposite directions from the summit of the pass, separated by a half-mile portage between two small source lakes which flow respectively into the Arctic Ocean and the Pacific Ocean. Nowhere else in North America is it as short and easy to pass over the main continental divide or to go by water from sea to sea. The bald, craggy, snow-streaked Richardsons rising over 4,000 feet above the pass are dramatic in their beauty.



The Rat River - McDougall Pass - Bell River route



Sketch of McDougall Pass area



General sketch-map

The canoe traveller will be faced, in turn, on this route with five basic problems:

1. How to find the Rat River.
2. How to get up the Rat River.
3. How to get from Summit Lake to the Little Bell River.
4. How much time to allow for the Bell and Porcupine rivers.
5. How to get from the Porcupine River to Fort Yukon.

1. How to find the Rat River

It is hard to imagine a more complicated water jig-saw puzzle than the multi-channelled Mackenzie delta, with its thousands of ponds and lakes, stretching over several thousand square miles. To complicate the route further, the Rat drains into the delta's Husky Channel only a short distance from where it breaks off from the Peel River. The south Rat channel doubles as a normal outlet for the Rat River and an overflow channel for the Peel (flowing in the opposite direction) in the spring flood. Its unstable alluvial banks are thus whip-sawed by strong currents in spring and summer, and its course is constantly apt to change. We found that our topographical maps, strictly accurate for 15 miles, suddenly ceased to conform to the river pattern. Evidently the course had changed substantially in the years since the map was made.

The canoeist has the option of hiring an Indian guide with his motor boat (as both Lady Vyvyan's and Bendy's parties did) or of accepting the adventure of finding his own way. The north-mouth approach to the Rat looks as though it might involve less upstream paddling, but there is no sure way to identify exactly where this drains into the Husky Channel, and one risks being carried on down to the sea on a current uncomfortably fast to paddle against.

Our approach was from Fort McPherson. The Husky Channel breaks off at an easily identifiable point, where the Peel changes course sharply and proceeds northeastward. The south mouth of the Rat enters Husky Channel less than a mile from the start of this channel, and can hardly be missed. The junction is marked to the north by a medium high bank on which is a grassy clearing; in 1965 there was an Indian encampment here.

The Rat winds monotonously between high mud banks and willows for mile after mile, with a sluggish current. A few miles up, an alert map reader will note where there is an option to cut out 2 or 3 miles of paddling by portaging across the base of a big loop. This 'portage' is no more than fifty feet (plus the high banks). Complications in navigation begin when the Rat, nearing the mountains, changes from a simple channel to one draining a large area of lakes and ponds, where the current is often scarcely detectable. A number of probing sallies to search for opposing current may be necessary. Fortunately the mountains are frequently visible to give direction, and the prominent long, low, north-sloping ridge at the foot of the Rat valley is a landmark.

Our party was not prepared for the distance to be covered on flat water on the Rat from its mouth near the Peel River to where rock and riffles first appear - a point known to the Klondikers as 'Destruction City'. Making what was possibly a subjective judgement as he sat in his guide's motor boat, Bendy gives this distance as 15 miles. Another early traveller with whom we spoke raised this figure to perhaps 20-25 miles. Probably our distance was increased by the river having switched to a new channel; the fact is that a strong, fresh party took from noon till 4.30 a.m. to make this distance. With an hour-and-a-half out for snacks and exploring false leads, this was fifteen hours paddling. At the most conservative estimate we were making 2 1/2 m.p.h., so the total distance on course would be over 40 miles upstream on the flat Rat.

At 'Destruction City' the modern voyageur, like his predecessor, the Klondiker, pauses to gird his loins for the ascent. There is nothing on the map to show where this is. But after miles of mud banks (and about an hour after passing the point where the Rat divides into its two outlets), this point is heralded by the sight of bedrock on the south bank. Across the river from the rock is a flat grassy area with evidence of use as an Indian campsite. Two hundred yards on, beside the first riffle and gravel bar, is a low, flat area, which seems to have been the old encampment of Klondike days.

To sum up, what appeared to us to be the simplest way to find the Rat (short of hiring a guide) was:

- approach from Fort McPherson and the Husky Channel;
- go up via the south mouth, from near the start of the Husky Channel;
- do not worry if the river ceases to conform to the map;
- keep watching for opposing current; avoid dead water and down current;
- keep an eye, whenever it shows itself, on the gap in the mountains ahead.

2. How to get up the Rat River

From 'Destruction City' to the summit of McDougall Pass is about 45 miles. In this relatively short distance the climb is nearly 1,000 feet. This may sound easy enough to a mountaineer, but a canoeist picturing a river dropping at 22 feet to the mile knows that he will not have much use for his paddle. The question is for which of three possible means of travel to prepare. None of the previous accounts indicated that the parties did more than alternatively line and wade, nor how much of each.

I should preface any suggestions on this subject by a note on water levels. The Rat, like any river in this latitude, with but few trees in its basin and with permafrost a few inches below the soil, does not sponge up water the way a river flowing through forest farther south does. Rain quickly produces a flood. Within twenty-four hours of the start of rain, we observed a rise of two feet in the river in one night. Moreover, as with any mountain stream (especially in permafrost), its level is sensitive to temperature changes - more of its feeding being due to melting than to rainfall. From our preliminary research and the plight of some of our predecessors, we had been concerned to get through before August, when the water can be too low. We started off on July 6. In retrospect, this may have been too early, for we were held back by high water. Ten days later, around mid-July, might be a better starting date from this standpoint. On the other hand, in the pass near the source of the Rat and Bell, high water was a help.

In reviewing techniques of ascending this fast stream, bear in mind a river with no pools or paddleable sections practically till the very top. Riffles alternate with rapids from 'Destruction City' to the

Forks, and the river is constantly braiding. The outside of each curve is eroding, and trees are tumbling into the water; on the inside of the curve is a 'beach' of pebbles and stones. Always keep to the inside of the curve - where alone there is the tracking beach, the poling bottom, and the slacker current. This means constantly crossing and recrossing the river, in the course of which the canoe should always be angled to the current in a 'cross ferry', to avoid losing ground.

Apart from paddling, a crew can line, pole, or man-haul the canoe. It is hard to escape man-hauling on the Rat for five to ten per cent of the distance - perhaps a distance of 5 miles altogether. This is rough work, especially since boulders often drove us out up to waist depth in the rapid. In half a dozen, worst, short sections, especially after the river had risen two feet in a night, we found it best to put four men on hauling up each canoe, then 'parking' it, and going back for the next canoe.

The easiest way to take a canoe up fast water is to line. Lining requires a reasonably good beach, clear of trees, snags, and bushes. Our party estimated that, at the relatively high water-level we encountered, it was possible to line 50-55 per cent of the total distance from 'Destruction City', or for about 25 miles.

Anyone familiar with lining a canoe alone will know not to attach the bow line to the bow, but to somewhere near the front thwart - otherwise the bow will simply veer into the bank. We found it simplest with two men to a canoe to have both a bow and a stern line, with one man on each. The bow line could then be placed at the bow for maximum pull, and the 'pointing' of the canoe left almost entirely to the stern man. Two skilled operators are able to line a canoe right up the middle of a moderate rapid without even getting their feet wet.

Man-hauling and lining could probably be employed for two-thirds of the total distance. The remaining one-third of this river, however, is either too deep for wading, or its banks are too overgrown for lining. Here we poled or paddled. In a strong current, poling is much faster than paddling, and any crew planning this trip would be well advised to do some homework on this ancient but little-used technique, beforehand. Poling calls for a reasonably shallow and rocky or sandy bottom.

The top section of the Rat offers a chance to revert to paddling for as much as 4 or 5 miles, but part of this distance includes the option of poling. A rough recapitulation, then, of the techniques usable on the Rat would be:

Man-hauling	10%
Lining	55%
Poling	25-30%
Paddling	10- 5%

At lower water than we had, it might be possible to line 75-80 per cent of the distance.

A party should count on taking nine days from 'Destruction City' to Summit Lake. Though we were slowed by having three canoes and flood waters, we were up at five each morning and counted on doing 8-10 hours labour. Wood and Duxbury, who preceded the Bendy party, made this distance in 1936 in seven days. They had one canoe; the water was moderately low; and they were at the end of a summer's paddling, so were in particularly good shape. Bendy took twenty-six days, which allowed time to write up his excellent diary and take his photographs.

No serious problem in navigation is presented by the Rat. One just keeps going up. A party of early travellers is reported to have taken the wrong turn and gone up the Barrier River, but modern maps would make this mistake impossible today. At the Forks of the Rat, Sheep Creek comes in from the south and opposite it Rat Creek and Fish Creek come in, all three joining to form the Rat River. Rat Creek is the middle one. From Twin Lakes westward a number of lakes, or more accurately pockets to the side of the stream, are met. If we entered a lake at all, usually the exit was close by. The only portages in the whole river are two: from Ogilvie Lake a quarter of a mile over to a small unnamed pond, and from this pond, half a mile over the divide to Summit Lake.

Below is Bendy's list of mileages:

'Destruction City' to Summit Lake

'Destruction City' to Longstick River	1½	Bear Creek to little canyon	7
Longstick River to Barrier River	14	Little Canyon to Forks	2½
Barrier River to foot of Canyon	4	Forks to Twin Lakes	5
Canyon	1½	Twin Lakes to Summit Lake	3
Head of Canyon to Bear Creek	4½	Total Miles	43

East end of Summit Lake to Fort Yukon

East end of Summit Lake to Little Bell River	2
Little Bell River to mouth on the Bell River	13
Bell River to mouth on the Porcupine River	105
Mouth of Bell River to Old Crow, on Porcupine	90
Old Crow to New Rampart House	65
New Rampart House to Fort Yukon	233
Total Miles	508

A proper supplement to a discussion of techniques for the Rat is equipment. First is footwear: the life expectancy of a new, good-quality basketball shoe on this river is six or seven days; a pile of our battered boots awaits the next travellers to Summit Lake.

Other recommended items of equipment are:

a) a ten-foot spruce pole cut at 'Destruction City', with a three-inch piece of iron nailed at its foot to reduce its 'brooming';

b) 80 feet of light, strong nylon cord per canoe, cut to 50-and 30-foot lengths for bow and stern ropes;

c) an aluminum or fiberglas 17-or 18-foot canoe.

We had a thermometer with us and kept a record of water and air temperatures. The water slowly chilled as we climbed, from 62°F at 'Destruction City' to 37°F near the summit. Warned by anguished notes in Bendy's diary we had equipped ourselves with waist-high lowers of divers' 'dry suits', beneath which we wore woollen long underwear and two pairs of heavy woollen socks. Stewing all day in our own sweat, we found these so warm that we required periodic immersion to stay at the right temperature. They added immeasurably to our comfort in the cold water.

The incidence of insects on the Rat is probably no greater than on the Barren Grounds, but in a deep valley there is not the strong wind to control them. The mosquitoes on the Rat and Little Bell are worse than I have met anywhere in the north. Fortunately, in early July at least, there were no black flies. Besides headnets (3 per 2-man canoe), we had sewn 'Velcro' strips on our shirts at both front and wrists to prevent blackflies entering between buttons, and also had wristlets and anklets.

3. How to get from Summit Lake to the Little Bell River

Bendy chose to portage, dragging his canoe across the tundra from the southwest extremity of Summit Lake to the Little Bell. We found the small ditch-like streamlet draining Summit Lake blocked by a four-foot beaver dam, with very little water flowing below it. We resorted to an old canoeists' trick, tore out the top third of the dam, and floated down on the wash. The streamlet was so overgrown with willows that we had to lie flat on our packs and claw our way through. The Little Bell has a dozen or so riffles, and three or four rapids requiring wading.

4. How much time to allow for the Bell and Porcupine rivers

These are both fast rivers. Paddling ten hours a day, it is no trouble to do 50 miles a day above Old Crow. With a tail wind and the brisk current of the Porcupine Ramparts we averaged 60 miles a day below Old Crow, once chalking up 65 miles. Below the Ramparts, the Porcupine braids. At low-water always take the channel carrying most water. At medium or high-water the smaller 'snyes' (or 'sloughs', as Americans sometimes call them) are safe to take. Four of these save miles: Six Mile, Nine Mile, Curtis (first half only), and Black River sloughs.

A canoeist who has not before paddled down a large swift river will soon discover that the shortest route on the Porcupine is not the quickest. A river within a river swiftly weaves its way from side to side between the eddies created by the conformations of the banks and bars. To stay in the fast-moving stream, the helmsman studies the subtleties of the river-surface's 'grain'. In general, stream has a rougher surface than eddy, and is characterized by 'boils' of varying force.

The absence of lakes all the way from the source to the mouth of the Porcupine makes it fairly easy to estimate what time to allow. There is only one section where being pinned down is a risk: the Ramparts in a south wind, where the wind meeting this fast water in a canyon creates waves up to four feet high. A river man at Old Crow told us of being pinned down once in his 30-foot motor craft here for three consecutive days. If possible, allow about eleven days from Summit Lake to Fort Yukon. We took nine, but had tail winds most of the way.

5. How to get from the Porcupine River into Fort Yukon

Fort Yukon lies 2 miles above the junction of the Yukon and Porcupine rivers. The current on the Yukon here is too strong to paddle against, and the shore is too steep for lining. It is too deep to pole or wade. If the Porcupine is followed right to its mouth, it is therefore sensible to send a member of the party on foot to get a tow from Fort Yukon.

There is an easier way. Fort Yukon sits on Hospital Lake, a U-shaped slough, once an outlet for the Porcupine and still overflowed by the Porcupine in particularly high floods. An old portage trail 300 yards long leads from the northeast tip of Hospital Lake to the Porcupine River. The trick is to find the start of this portage on the Porcupine side. Near the upper end of Homebrew Island (opposite the radar installations of Fort Yukon) is a long gravel beach. Here also is an excellent campsite. Standing near the upper end of the gravel bar and looking across at the south bank of the river three breaks are seen in the spruce, the lowest and by far the widest of which marks the head of the trail. Willows in this spruce gap and a lowering in the cutbank mark the obvious spot where the Porcupine sometimes spills over. The trail starts in the spruce

just above the willows. Piles of drift along it indicate where the water has overflowed, and lead to the marshy northeast end of Hospital Lake. Canoes and gear can be left at a dock beside the air strip and taken in to town by truck.

Maps and air photography

(a) From Map Distribution, Department of Energy, Mines and Resources, 615 Booth Street, Ottawa, topographical maps at 50 cents per sheet: 106M Fort McPherson; 116P Bell River; 116 O.N. Old Crow (East Half); N.W. 66/144 Porcupine River. (The latter is 8 miles to the inch, the others, 4 miles).

(b) From the Air Photo Library, 615 Booth Street, Ottawa, air photos, at 60 cents each, covering only the top of the pass: A 17622-133; A17622-135; A17622-139; A17622-141; A17622-143; T3-13L (a low oblique).

(c) From the U.S. Geological Survey, Fairbanks, Alaska, at 30 cents each, the following 1-mile-to-the-inch maps covering the Alaska portion: Coleen (A-2), (A-3), (A-4), (B-1), (B-2); Black River (D-4), (D-5), (D-6); Fort Yukon (C-1), (C-2), (C-3), (D-1). In addition, the following 4-miles-to-the-inch maps cover the same area: Coleen (S), Black River (S), and Fort Yukon (S).

A trip down the Rat River in 1967

The following notes are based on an account by Dr. R.W. Shepherd of a trip he made with Dr. Yves Langlois of Montreal down the Rat River, the reverse of the first part of the trip made by Mr. Eric Morse in 1965.

We flew from Inuvik on August 15 with our Grumman canoe on the pontoons of a Beaver Aircraft, and landed in clear water on Summit Lake. Our plan was to canoe down the Rat, then down a section of the Peel, across the Mackenzie at Point Separation, and follow the East Channel to Inuvik. By water the distance was

about 180 miles, two-thirds of it through the Mackenzie delta where we had been assured of good campsites at that time of the year. The advice on this point proved correct.

We made our first camp on the high ground at the eastern end of Summit Lake, and took a day to explore the region, including the Little Bell River, and climbing one of the peaks to the south of the lake. There was snow on the top but the weather was magnificent, once again showing that the best time for canoeing in the north is after the bug season and before the cold sets in. We were virtually free of insect attack during most of the trip, and though we had snow on two mornings, the weather was sunny and pleasant.

The following day we portaged the half mile into the pond near Long and Ogilvie lakes (over rough terrain requiring good boots and a steady eye) and from there floated our canoe in the small creek to Twin Lakes. We had free-flowing water throughout the whole trip.

For the next three days we canoed down the Rat River, a distance of about 50 miles. With the river dropping an average of 22 feet per mile the course was a constant succession of riffles or small falls. Contrary to the opinion given us the trip down the Rat, though obviously less arduous than going up, was not an easy one, and certainly not one to be undertaken by the rank amateur.[1]

We had one bad mishap on the trip, in the lower part of the canyon, about 30 miles below Summit Lake, when we hit a submerged rock and were flipped into the water. We appreciated then in practice the importance of travelling with two canoes. Without assistance from another canoe we had great difficulty in getting our water-logged canoe and gear to shore, in very cold water, before going over the next set of rapids. An American team at the same spot two years' previously had had to let their canoe go to save themselves, and then walked for five days before attracting the attention of a passing

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1. It would be possible to come down the Rat in two days, but for the sake of comfort and interest three days are recommended.

aircraft. We lost one pack with medical kit, food and some clothing, and ruined a good camera and film.

We camped three nights on the Rat, at Summit Lake, Barrier River, and near the delta. Good campsites abounded in the lower parts of the Rat.

Once in the delta we decided to head for Aklavik rather than Inuvik because of our loss of food in the canyon. We took the small channel running northeast out of the Rat into the Husky Channel. We camped three nights in the delta and on our last day paddled 62 miles into Aklavik with the current of about 2 knots but against a strong north wind. It rained most of the day.

There were bear tracks at most of our campsites and we saw two grizzlies, one with two cubs and one with three, an unusual occurrence. Small game was plentiful and there were tracks of caribou and moose.

We reached Aklavik seven days after leaving Inuvik, reducing our planned journey by three days. At Aklavik we returned our Hudson's Bay U-Paddle canoe, and flew south. If we had to do it again we would do it again, with pleasure.

Speech by the Commissioner for Lapps

Mr. Bengt Härdelin, Commissioner for Lapps in Nordland, Sweden, has kindly given us permission to reproduce his speech made at a dinner in Luleå given for the Minister of Northern Affairs and National Resources and his party on 23 May 1965.

Gentlemen,

Yesterday I was asked to address you this evening about Lapps and reindeer. My first thoughts were that it would be an easy task because it is my job to know about these things. Half an hour later I was no longer sure. I asked myself: What would really interest you? How big a reindeer can grow? how reindeer meat tastes? or if there are any Grace Kellys among the Lapp girls? I finally decided to talk for a few minutes about "the underlying factors of

Lappish nomadism", and then go on to a short account of the modern Lapp and his position in the Swedish community.

First, the nomadism of the reindeer-breeding Lapps does not derive solely from the peoples' psyche. There is no similarity between the migrations of the reindeer breeders and the homeless wanderings of the Gipsies and certain other nomads. The Lapp migrates back and forth over a fixed route between the seasonal pasture grounds. He is attached to his hereditary grazing areas and feels at home there, everywhere. These feelings are very strong, although his sentiments towards home are not as narrowly localized as, for instance, those of farmers.

Through innumerable generations the families have wandered between winterland and summerland. It is understandable that this life has got into the people's blood and has evoked a certain nomadic instinct. There are good reasons to long for the summerland, the mountain world, and to take advantage of the winterland's forest protection when the autumnal storms gather over the mountains. But this is not a real nomadic instinct and it is secondary in the question of the origin of Lappish nomadism. The Lapps who no longer subsist on reindeer-breeding, such as the North Cape and other sea-fishing Lapps, are just as fixed to their shoreland homesteads as any other Scandinavians.

In fact, we have two groups of nomads, all the mountain Lapps and half the forest Lapps. But it is not necessary here to give an account of the differences between them. They are really not so far away from each other.

Reindeer-herding nomadism was probably preceded by hunting nomadism. Several thousand pits and other construction for the capture of wild reindeer, have come to light during recent field research and indicate that whole groups of hunters stayed fairly far up in the mountains during late summer and autumn and waited for the wild reindeer herds as they moved down to autumn and winter areas from their summer grazing grounds. After the hunting season, the hunters withdrew to dwellings in the forests. Thus, Lappish nomadism seems to have originated in the reindeer hunting stage before they became herders. As to the time of this occurrence we know only that reindeer domestication had apparently already developed by the ninth century.

According to the opinion of natural scientists it is primarily to escape heat and winged tormentors that the reindeer at the approach of summer, flees from the forest tracts to the cooler and windier sea coast and mountains. You will get precisely the same information when you ask the real experts in this matter - the nomads themselves - as to the reason for the wanderings of their reindeer herds. When autumn comes the reindeer must return to the forest tracts because of poor pasture. The autumnal rain and snow soak the lichens into a particularly suitable forage. During the later winter, when the formation of snow crust makes it difficult to reach the lichens in the forest, the southern slopes of low mountains begin to be free of snow and the reindeer can swallow lichens and the year's first green sprouts. In fact each time of the year has its own particular pasture and that is the primary reason for the migrations of reindeer herds and Lapps.

The Lapps only definitely acknowledged Christianity in the seventeenth century and the beginning of the eighteenth century. Their pagan beliefs can be said to have been a natural form of religion with shamanistic tendencies. The Lapps were animists - all Nature was possessed of a soul and the other world, the spirit world, was as real as this one. There lived many powerful spirits and gods, often natural forces personified, on whom the living were dependent. In order to influence these spirits and gods favourably the Lapp shaman could, with the help of a magic drum, work himself into a condition of ecstacy and fall into a trance in which state his spirit penetrated beyond the material world and came into immediate contact with the gods, the forces.

In 1623 a school was opened in Lapland for the education of Lapps who intended to become teachers and pastors. It is from there we can trace the evolution of the state system down to the schools for nomad Lapps of today. At present we have a sufficient number of boarding-schools and a boarding Folk High-school in Jokkmokk.

The part of Sweden where the Lapps lived came to be divided into certain trading and taxation districts or Lappmarks during the time of the Birkarls, "the beavermen", from the thirteenth century to the beginning of the seventeenth century. The Birkarls were persons appointed by the Swedish Crown to conduct trade with and to collect taxes from the Lapps. In a way they were equivalent to the traders of the Hudson's Bay Company, established 300 years ago.

At the present time the former Lappmarks are divided into about fifty Lapp districts. Each district elects a representative who, by decree of the Governor, shall see that the district regulations are obeyed and that his district's needs are conveyed to governmental authority. This authority is administered by Superintendents of Lapps with the assistance of Lapp district officers. The office of Superintendent of Lapps has existed since the fifteenth century and has always been attached to the Crown.

The right of reindeer herding entitles the Lapp to free use of the land and water resources for himself and his reindeer according to the old customs and manners of livelihood. Should he take up another occupation, the Lapp forfeits his rights not only to the use of reindeer pasturage but also his trapping, shooting, and fishing rights.

Dwelling rights are important and this is related to the Lapp claim for better housing. The nomad Lapps have special difficulties as long migrations make permanent dwellings both expensive and often impracticable. The Lapps have also the right to set up reindeer fences on private land but they have rarely done this, preferring the Crown territories and avoiding disputes with private land owners. Similarly they seldom take firewood and tent poles to which they are entitled on private land.

It is difficult to prevent other people from gaining access to Lapp areas. There are applications from the town for sport and other purposes and inroads are often made. Compensation for damage to pasture from the flooding in forming reservoirs by the various hydroelectric schemes is paid into the state fund for the improvement of the reindeer industry. The reindeer grounds themselves also contain large cultivated areas and sometimes the reindeer owner finds himself liable for damages. However, with rationalizing of agriculture, the cultivation of isolated meadows is being less practised, removing some causes of conflict.

Reindeer-keeping makes great demands on individual owners if they are to avoid conflicts with other herders or settled neighbours and it is only responsible keepers who make a success in this occupation.

This should give you some glimpses from the Lapps and their means of livelihood. I have not given you any statistics, good drinks and statistics - even the word itself - are not very close friends!

Change of Address

Members are earnestly requested to advise the Treasurer, Dr. S.D. MacDonald, Box 68, Postal Station "D", Ottawa, promptly of any change of address.

Editorial Note

The Arctic Circle is very fortunate as Dr. Andrew H. Macpherson has agreed to become Editor of the Circular. All material intended for the Arctic Circular should in future be sent to:

Dr. A.H. Macpherson,
258 Powell Avenue,
Ottawa 1, Ontario.

Before handing over the office of editor to Dr. Macpherson I should like to take this opportunity to thank all contributors and others who have helped me since the first number of the Circular was published in January 1948. If he receives the same cooperation that I have been given, I am sure you will receive a better Circular more promptly.

Diana Rowley

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